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PUBLIC

PILBARA REGIONAL COUNCIL

Leading the Way . . .

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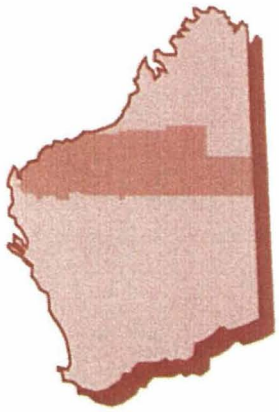

ASHBURTON

EAST PILBARA

PORT HEDLAND

ROEBOURNE

Pilbara Wealth
Sustaining the Nation

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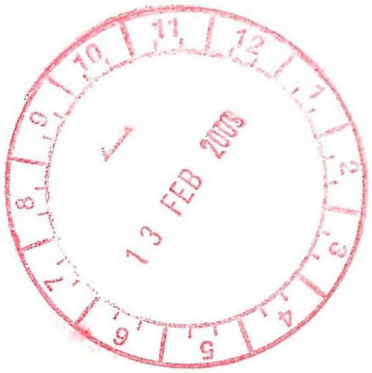

12th February 2009

Hon Sheila Mills, MLC
Chair
Environment and Pubic Affairs Committee
Legislative Council
Parliament House
Perth WA 6000

Dear Hon Mills

RE: INQUIRY INTO MUNICIPAL WASTE MANAGEMENT IN WESTERN AUSTRALIA

The Pilbara Regional Council (PRC) was established in May 2000 by its Member Councils, the Shires of Ashburton, East Pilbara and Roebourne, and the Town of Port Hedland. Attached for your information is a copy of the PRC's Establishment Agreement.

The PRC submits the following for your consideration with respect to municipal waste management in rural and remote Western Australia.

The PRC would like to bring to your attention, that unlike metropolitan regional councils that were initially established and in most cases are still confined to undertake waste management; the PRC has a much broader regional purpose, of which facilitating improvements in waste management is only one aspect of the Council's scope of responsibilities. See '*Regional Purposes*' at the bottom of page 1 of the Establishment Agreement.

The PRC resolved in November 2006 to develop a Regional Waste Management Plan for the Pilbara. The Plan was to identify landfill best practices, opportunities for resource sharing and joint procurements by Member Councils, and whether or not domestic recycling was viable for the Pilbara. Development of the Plan was initially funded by the PRC, Pilbara Development Commission, BHP Billiton, Rio Tinto and Woodside; however, DEC also funded the Plan's development once the scope of the Plan was broaden to meet the requirements of it being a Strategic Waste Management Plan.

The Regional Waste Management Plan was developed during 2007 and endorsed as the State's first Strategic Waste Management Plan in March 2008.

Attached is a copy of our Regional Waste Management Plan for the Pilbara for your information.

The PRC objective is to facilitate best practice across the eight (8) municipal landfills in the Pilbara; however, there are a further twenty-five (25) licensed or registered landfills in the Pilbara. In addition there are an unknown number of landfills servicing indigenous communities and pastoralists.

The Regional Waste Management Plan identifies that there is a need for greater coordination of operation of Pilbara landfill's (Municipal and Private) and recycling to achieve effectiveness and efficiencies through economies of scale. See Strategy 5.4.1 Coordination of Waste Minimisation at page 85. In particular the PRC views this cooperation as an opportunity to implement domestic recycling, which without cooperation, particularly in the form of shared logistics, might otherwise not be doable. Work in this area has already commenced.

The implementation of domestic recycling is the key cornerstone to successfully reducing waste going to landfill in the Pilbara and elsewhere in Western Australia. The PRC has in-principle support from many of the resource companies operating in the Pilbara with respect to implementing domestic recycling but not unilateral support. The PRC would like to see changes to the content of landfill licences to include the requirement for landfill owners to work collaboratively to promote best practice and to minimise waste to landfill.

Of concern to the PRC is the lack of markets for recycled goods, the lack of true recycling companies in Western Australia and the global economic ups and downs for recyclable material means that sustainable recycling in the Pilbara is going to be hard to achieve. The PRC believes that the State Government needs to take more responsibility in stabilizing this industry sector.

The PRC, hopefully with the support of the Waste Authority, is examining the feasibility of using emerging pyrolysis, gasification and plasma technologies in reducing waste going to landfill. These technologies are leading edge technologies and therefore have inherent first user risks associated with each. The PRC believes that where local government shows initiative with respect to the use of emerging technologies that the State Government should partner with local government to share and assist mitigate risks and costs.

The PRC's point of contact with regard to this submission is the Executive Officer, Mr Adrian Ellson, and he can be contacted on 9187 0687, 0447 813 889 or via adrian.ellson@prc.wa.gov.au.

Yours Sincerely

Allan Moles for.

Chief Executive Officer

Attachments:

1. PRC Establishment Agreement
2. Pilbara Regional Waste Management Plan

Cardno BSD

Shaping the Future

PILBARA REGIONAL COUNCIL

March 2008
Job No. V7013

Pilbara Regional Council

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Document Control

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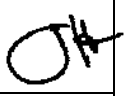
2 *Draft RWMP for PRC and Working Group review*	30/07/07	Giles Perryman		Jason Hick	
3 *Draft RWMP for PRC and Working Group Review*	10/08/07	Megan Haines	MLH	Giles Perryman	
4 *Final RWMP (incorporating workshop and additional feedback)*	12/09/07	Megan Haines	MHL	Giles Perryman	
5 DEC Endorsed RWMP	March 2008	Adrian Ellson	AJE		

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ACKNOWLEDGEMENTS

Cardno BSD gratefully acknowledges the cooperation of numerous stakeholders who provided information used in the development of this Regional Waste Management Plan (RWMP). The Project Team would especially like to thank Adrian Ellson, the Pilbara Regional Council Executive Officer, for his contribution to this report and enthusiasm during the project. In addition, Cardno BSD acknowledges the valuable input from members of the Working Group, including the Member Council CEO's, technical officers and landfill operators during the Waste Management Review and Workshops. Furthermore, Cardno BSD would also like to express gratitude to the mining industry personnel, Department of Environment and Conservation, Municipal Waste Advisory Council and recyclers who provided guidance and advice on a number of issues outlined in this RWMP.

The development of this Regional Waste Management Plan has been funded through grants from the Minister for Environment; Climate Change; Peel out of the Waste Management and Recycling Account; the Pilbara Development Commission; BHP Billiton; Rio Tinto; Woodside; and the Shires of Ashburton, East Pilbara and Roebourne and the Town of Port Hedland.

The development and acceptance of this Regional Waste Management Plan would not have been possible without the input of the Pilbara Community itself. The Pilbara Community was approached for participation in and input into the development of the Plan. An expression of Interest was released, from which community representatives were selected. These representatives reviewed the draft reports developed and participated in workshops identifying and resolving issues, challenges and other impediments to minimising domestic, commercial and light industrial waste production and disposal in the Pilbara.

PILBARA REGIONAL COUNCIL

REGIONAL WASTE MANAGEMENT PLAN

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EXECUTIVE SUMMARY

The Pilbara Region is Western Australia's second most northern region. It covers a total area of 505,378 square kilometres (PRC, 2004) and spans from the Indian Ocean to the west and Northern Territory border to the east. There are four member Councils in the Pilbara region and include the Shire of Roebourne, Shire of Ashburton, Shire of East Pilbara and the Town of Port Hedland.

In February 2006, the Pilbara Regional Council (PRC) resolved to develop a regional waste management strategy for the Pilbara region. The project has been funded with contributions from the PRC 2006/07 Budget, a Pilbara Development Commission Grant and through industry contributions from BHP Billiton, Rio Tinto (Pilbara Iron) and Woodside.

The project was initiated for the following reasons:

- The need to better plan for the management and development of each of the four Council's landfill sites recreation assets
- The need to identify opportunities for the sustainable recycling and/or re-use of materials within the Pilbara Region
- The recognition that local authorities have a growing role to play in reducing the quantum of waste disposed of to landfill
- The desire by the public to have increased recycling services available in the Pilbara Region
- The impact of poor waste management on the Region's tourism industry

Cardno BSD was awarded the contract to review the waste management practices in the Pilbara and to develop a Regional Waste Management Plan (RWMP) that would provide a framework for the management of solid waste in the Pilbara Region over the next 10 years and in accordance with the State's Vision of '***Towards Zero Waste***'.

During the review and assessment of the member Councils current waste management operations a number of observations were made:

Waste Collection

- Each member Council provide different waste collection services
- An issue of residents and small businesses 'abusing' the pre/post cyclone collection service by disposing of general waste via this free service
- Most town sites have dedicated collection truck(s); therefore many of these trucks have a very low utilisation rate
- There is no standardisation of collection trucks or bin sizes within the region.
- Some industry led waste management / recycling programmes are operating in isolation to member Council activities

Waste Management Facilities

- Environmental risk from landfills
- Small unmanned landfills – unquantified environmental risk
- Compliance with DEC licence conditions
- Inconsistent gate-fee charges
- Lack of recording / planning: Where has the waste been buried, or where will the future cells go?
- Poor collection and recording of waste quantity data and type of waste streams
- Lack of compaction at most landfills
- Disposal of potentially recyclable wastes at the landfills
- Tyres, Batteries, Oil Drums are being poorly managed and sometimes landfilled
- Staff recruitment and retention problems

- A lack of collaboration in relation to skills and knowledge between the facilities in the region

Waste Data

- Generally, the quality of the waste data is poor, or reliant on estimates
- Waste stream definitions are inconsistent; therefore site data can not be aggregated to provide regional figures
- The ratio of other waste to MSW received at eh regions landfills is higher than the Perth average. Indeed the average ratio of the Pilbara Region is approximate 9:1 (i.e. nine parts other waste to one part MSW).
- On average, approximately 90% of the waste disposed of at the Region's member Council operated landfills is non-domestic waste; therefore, these facilities are utilised predominately by the region's commercial businesses.
- As approximately 90% of the waste received is non-domestic, this highlights the issue that all costs associated with; establishing, operating and closing each facility must be covered by the gate-fee revenues, to avoid a future financial burden for the member Council rate payers
- The waste received at the member Council landfills only represents a proportion of the wastes generated in the region, there are a further 25 registered landfills operated by private businesses
- The total volume of waste types produced in the region has not been quantified, and it is unlikely that this data is currently available

Viability of Domestic Recycling

- Based on this 'worst case' scenario for recycling quantities, less than 750 tonnes of material could be recycled each year (or less than 0.34% of the total waste currently received at the member Council operated landfill sites)
- Potentially the use of Port Hedland as the central collection point prior to the transporting of the materials to overseas reprocessors and markets is the more cost effective scenario
- The provision of a drop-off collection service appears to be viable at the larger towns in the Pilbara Region including Karratha, Paraburdoo, Tom Price, Newman, Port Hedland and some FIFO mining camps

Based upon the findings of the assessment, together with the objectives of the Pilbara Regional Council's RWMP, a series of waste management strategies have been formulated by Cardno BSD and the PRC Executive. The findings and plan are based on generalisations. In some cases, Member Councils are already undertaking the recommended actions, either in part or in full. However, for consistency it is recommended that each member Council review its waste management practices against each of the recommendations.

The complete Regional Waste Management Strategies are detailed in **Section 5** of the RWMP and are separated into the categories of Best Practice, Technology and Minimisation of Waste Disposal. A number of the key recommendations made are:

Best Practice

Knowledge & Skills

Regional Waste Group to be established with regular meetings and liaison with DEC and industry

Education & Awareness

A horizontal theme that is critical to the success of all the strategies in the RWMP, it will target the wider community (i.e. Industry and residents). The community needs to be on-board for recycling to work and industry must be informed of any changes, the reasons why and benefits.

Licence Compliance

Full compliance with the DEC License Conditions is a regulatory requirement and must be achieved. However, licenses need to be reviewed and 'inappropriate' conditions amended

Data Availability

Accurate waste data is required for DEC surveys, to enable the member Councils to be able to baseline and then monitor progress of any strategies. Planning and recording of cells at each facility is required.

Best Practice

Once full compliance is achieved at each facility, the next step is to target areas of best practice as this will achieve operational efficiencies and minimise environmental risk.

Gate-fees

Gate-fees need to be set to ensure:

- whole of life costs are covered
- recycling (separated wastes) is encouraged
- disposal costs for hazardous, controlled or difficult wastes are recovered
- there is co-ordination throughout the region

If there is likely to be a shortfall in the recover of whole of life costs from the gate fee revenue, the amount must be quantified and alternative funding sources identified.

Green Procurement

A green procurement policy should be established for the member Councils. The purchasing of recycled or recycled content material stimulates the market for recycled materials and this increasing the viability of recycling and the demand for recyclable materials.

Whole of Life costs

Landfill site selection, establishment, operation, closure and monitoring costs must be calculated and used to develop the facilities gate-fee structure. A closure fund should be established for each site and a proportion of the gate-fee revenue must be paid into the fund to avoid a financial liability in the future for the member Councils and rate payers.

Technology

Compactors

The compaction rates achieved at a landfill are directly linked to the operational life of the site. Significant annual savings and increased operational life could be made at the larger sites if a landfill compactor was used.

Transfer Stations

Small unmanned landfills present an unquantifiable risk; therefore transfer stations should be established at Marble Bar, Nullagine and possibly Paraburdoo and the waste collected would be transported to the nearest manned landfill site.

Public access to the tipping face at manned sites should be prevented by establishing transfer stations (Inc. weighbridges) close to the site's gatehouse. This would reduce the public liability issue and encourage recycling.

Recyclables Collection Systems

Implement a drop-off system for domestic recyclables. However a detailed feasibility study is required before committing to implementation

Minimisation of Waste Disposal

Coordinator

Recycling by member Councils and various industry players is currently occurring in isolation. Member Councils, Industry and State Government should fund a coordinator to organise the logistics for the collection and transportation of recyclables in the region.

Greenwaste

Member Councils should purchase a greenwaste shredder to be rotated around the landfills.

Tyres

Member Councils should purchase a mobile tyre baler and store baled tyres in monocells (for future reprocessing). Member Councils to agree a levy to be charge for the disposal of tyres at landfills

(non-domestic) Metals

Currently the most profitable waste stream recycled in the region – future viability uncertain

Member Councils should encourage site staff to separate metals (into types), then transport to central 'hubs'. Recycling co-ordinator to arrange for recyclers to visit 'hubs' with shredders / balers to maximise efficiency and prices received

Oil Drums

Cleaning facilities to be established at all large landfill sites, common pricing to receive drums established, drums containing unknown / toxic material should be re-directed to appropriate disposal facilities and records kept. Strategy to be communicated to industry prior to implementation.

Towards Zero Waste

Guidance for the preparation and approval of the Regional Waste Management Plan has been provided by the Department of Environment and Conservation and the Waste Management Board. This Regional Waste Management Plan for the Pilbara forms part of the State's overall vision of Towards Zero Waste.

Priorities

Notwithstanding that all the recommendations identified within this Regional Waste Management Plan are integral to the successful implementation of improved waste management practices in the Pilbara, the Pilbara's top three priorities are:

- **Priority 1 – Strategy 5.4.1 Coordination of Waste Minimisation**, in particular that the PRC should facilitate the establishment of a Steering Group to oversee waste management coordinator position(s) and the monitoring of the implementation of the Regional Waste Management Plan. This would also include the establishment of the waste management coordinator(s) position(s). Target date is the end of the Financial Year 2007/08 to be productive from the outset of FY 2008/09.

- **Priority 2 – Strategy 5.2.5 Availability of Waste Data**, in particular the Pilbara member Councils need to collect and maintain waste related data, and in a form that can be aggregated and used within subsequent analyses, reports and DEC surveys. The waste definitions and categories used for data collection should be the same as those used for any Toward Zero Waste surveys. The Pilbara member Councils need to monitor its waste management operations and look for aberrations, which should then be subjected to management consideration and action as appropriate. Records need to be kept of landfill cells and for these facilities to be defined as infrastructure assets and managed accordingly. Some of the Toward Zero Waste Phase 2 grant money will be specifically used to assist identify data to be collected and to collect this data with the view to properly base-lining waste management operations and volumetrics in the Pilbara.

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- **Priority 3 – Strategy 5.2.3 Education and Awareness**, in particular the PRC should be tasked with the development of a regional communication and education programme. The programme should be developed in consultation with the DEC. The programme should concentrate on reduce / reuse / recycling strategies to minimise the amount of waste disposed of to landfill. Work has commenced in this area in advance of Department of Environment and Conservation formal endorsement of this Plan, through community action in Onslow, Roebourne, Port Hedland and South Hedland, with sponsorship from Packaging Stewardship Forum, Ashburton Aboriginal Corporation, Ngarluma & Yindjibarndi Foundation Limited and the Care for Hedland Environmental Association.

ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACOR	Australian Council of Recyclers
C&D	Construction and Demolition
C&I	Commercial and Industrial
DEC	Department of Environment and Conservation
EPS	Expanded Polystyrene
FIFO	Fly-in Fly-out
HDPE	High Density Polyethylene
LDPE	Low Density Polyethylene
LG	Local Government
LGA	Local Government Area
LLDPE	Linear Low Density Polyethylene
MSW	Municipal Solid Waste
MWAC	Municipal Waste Advisory Council
PDC	Pilbara Development Commission
PET	Polyethylene Terephthalate
PP	Polypropylene
PRC	Pilbara Regional Council
PS	Polystyrene
RWMP	Regional Waste Management Plan
WALGA	Western Australian Local Government Association
WMB	Waste Management Board
WMP	Waste Management Plan

DEFINITIONS

Biodegradable	Capable of being decomposed by the action of biological process.
Biomedical Waste	Waste comprised of the categories of animal waste, chemical waste, clinical waste, cytotoxic waste, hazardous waste, human tissue waste, laboratory waste, pharmaceutical waste, radioactive waste and sharps.
Biosolids	Stabilised organic solids, produced by wastewater treatment processes, which in most cases can be beneficially used (also known as sewage sludge).
Clean Fill	Material that will have no harmful effects on the environment and which consists of rocks or soil arising from the excavation of undisturbed material.
Compost	Material resulting from the composting process or the controlled microbiological transformation of organic materials under aerobic and thermophilic conditions.
Composting	The controlled biological decomposition and pasteurisation of organic materials under aerobic conditions that can be accomplished in windrows, static piles, or enclosed vessels. Composting involves the action of thermophilic ("heat loving") micro-organisms that thrive under increased temperature conditions and if correctly managed, this can allow for the destruction of disease-causing organisms.
Construction and Demolition (C&D) Waste	Means materials in the waste stream, which arise from construction, refurbishment or demolition activities.
Contaminated Soil	Means soil that contains chemical substances or waste at concentrations above background levels that present, or have the potential to prevent, a risk of harm to human health or the Environment.
Disposal	Means the final stage in the management of the waste stream.
Food Waste	Waste arising from the preparation of food and comprises fruits/vegetables, dairy, meats and breads and other starchy foods. Food waste is generated from domestic (i.e. households) and commercial (restaurants, hotels etc.) sources.
Greenwaste	Comprises the vegetative organic material (yard trimmings, leaves, shrubs, plants, grass, street trees, or tree trunks, park trees or tree trunks etc.) of Municipal Solid Waste (MSW).

Hazardous Waste	Comprise of those materials that pose a threat or risk to public health, safety or to the environment. Hazardous wastes include substances that are toxic, infectious, mutagenic, carcinogenic, teratogenic, explosive, flammable, corrosive, oxidising and radioactive (e.g. batteries, paints, solvents, engine oils and fluids, cleaners etc.).
Inert Waste	Waste, which will not degrade further, either spontaneously or when exposed to microbial attack. This waste primarily includes material arising out of construction and demolition operations such as plaster, cement and metal.
Materials Recovery Facility (MRF)	A centre that receives and separates on the basis of physical properties such as material density and magnetic properties. Mixed waste streams are separated into material fractions (e.g. glass, paper, plastics etc.) that are suitable for reprocessing.
Municipal Solid Waste (MSW)	Classified as household domestic waste that is set aside for kerbside collection or delivered to a waste facility through a drop-off program. MSW also includes other types of waste such as bulky household waste (e.g. appliances, furniture and residential garden waste), household hazardous waste or Local Council generated waste (e.g. waste from street sweeping, litter bins and parks). MSW can include some commercial waste also which comprise waste from food preparation premises, supermarkets etc.
Organic Waste	Consists of materials that contain molecules based on carbon and comprises the component of the waste stream that is readily biodegradable. This includes, for example, green, putrescible and grease trap wastes, but does not include for example, plastic or mineral oil products.
Putrescible Waste	Waste that will decompose readily under microbial attack. It includes green waste and certain wastes arising from residential, commercial and industrial sources.
Recyclables	Part of municipal waste comprised of non-hazardous residential, commercial, or industrial materials or by-products which are set aside for the purpose of being reused or processed and then returned to the economic mainstream in the form of commodities. Recyclables may include paper (newspaper, magazines, corrugated cardboard, craft paper, ledger paper, computer print out, box board, and other paper grades), glass, ferrous and nonferrous metal materials, plastic containers, films, packaging materials and scrap, construction and demolition materials.
Recycling	The recovery conversion of a waste material (through reprocessing). The end result is recycled material that is suitable to replace virgin material (conversion of waste paper into paper and cardboard, cans into aluminium etc.).

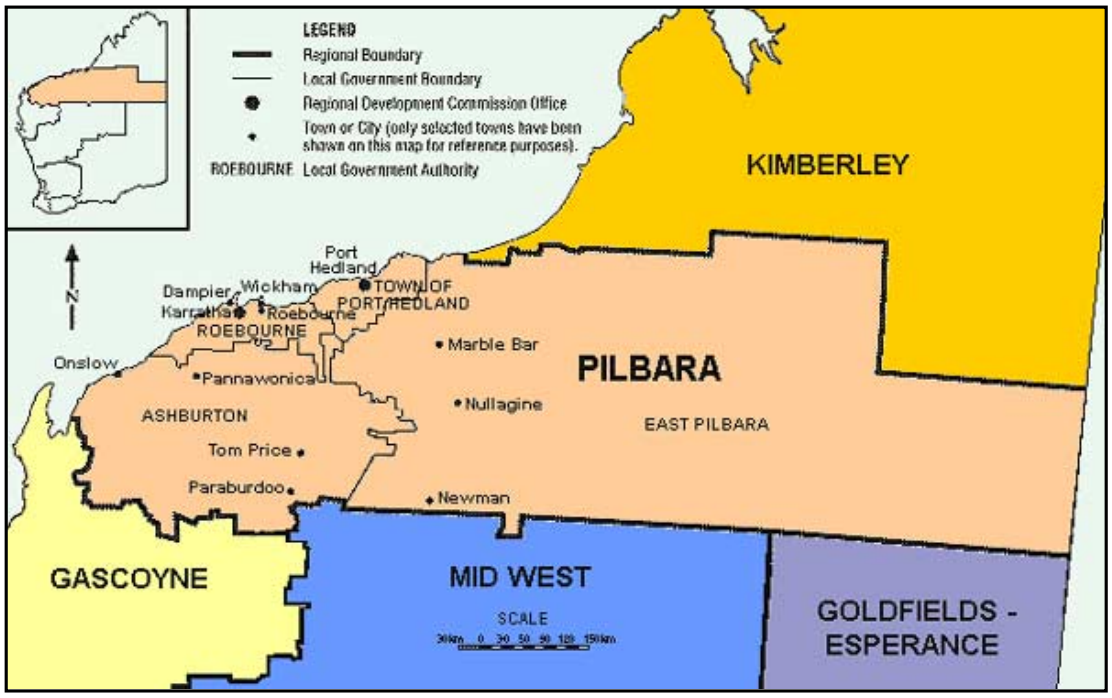
Reprocessing	The conversion of material back to its raw material state (e.g. pulp back to paper or cardboard, or steel cans to steel ingots).
Resource recovery	Occurs when waste materials are converted into resources, generally fuels, soil conditioners or feedstock, and are used as products or for processes such as energy generation.
Resource Recovery Facility	A facility used in the treatment of waste to recover resources like energy, compost, recyclable material and other reusable material.
Reuse	Means the use of a product again for the same or a different purpose without further manufacture/treatment.
Transfer Station	A permanent, fixed, supplemental collection and transportation facility used by persons and route collection vehicles to deposit collected solid waste from off-site into a larger transfer vehicle for transport to a solid waste handling facility. Transfer stations may also include recycling facilities, and compaction/baling systems.
Treated Waste	Means waste, which has been subjected to Treatment.
Treatment	Means the physical (other than compaction), chemical or biological processing of waste for disposal or reuse.
Untreated Waste	Means waste, which has not been subjected to Treatment.
Waste Minimisation	The application of activities such as behaviour modification, waste avoidance, reduction, reuse and recycling to minimise the amount of waste that requires disposal.
Waste Stream	The flow of materials from a point of generation to ultimate disposal. Components from the waste stream may be recovered for other uses (e.g. recycling, composting etc.).

1. INTRODUCTION

1.1 REGIONAL PROFILE: THE PILBARA REGION

The Pilbara Region is Western Australia's second most northern region. It covers a total area of 505,378 square kilometres (PRC, 2004) and spans from the Indian Ocean to the west and Northern Territory border to the east. The Region shares its border with the Kimberly Region to the north and the Gascoyne, Mid West and Goldfield / Esperance Regions to the south. **Figure 1.1** below shows the location of the Pilbara, member Council boundaries and major towns within the region.

Figure 1.1 Map of the Pilbara Region



(Source: DLGRD, 2007)

Iron ore and petroleum industries dominate the Pilbara's economy. The value of minerals and petroleum in the Pilbara region totalled $30.84 billion in 2006, making up 64% of Western Australia's total value of petroleum and minerals (DoIR, 2007). Nearly all of the Pilbara's population is employed in these industries and as such, most people live in the western third of the region close to their work site. The eastern third of the region is largely desert with few inhabitants whilst the central third is made up of small communities that cater largely to the mining industry.

It is not surprising that the population of the Pilbara fluctuates with development of resource projects. Currently the region's resources industry is experiencing a period of significant growth, reflecting the high worldwide demand for resources. However, the 'temporary' nature of the large resource projects has a strong influence on demography in the Pilbara as these projects are tied to world economic fluctuations. Compared to the rest of the state, the Pilbara has a lower proportion of older people and a higher proportion of people in the 25 - 40 age group. Due to introduced working practices including fly in – fly out (FIFO), the population of the Region is transient in nature. The main resources companies operating in the Pilbara include Rio Tinto, BHP Billiton and Woodside.

There are four member Councils in the Pilbara region and include the Shire of Roebourne, Shire of Ashburton, Shire of East Pilbara and the Town of Port Hedland. Each member Council is summarised in the following sections.

1.1.1 Shire of Roebourne

In 1887, the Roebourne Municipal Council, Cossak Road Board and Roebourne Road Board were all gazetted. As the Robourne region's population declined, the three merged into the Roebourne Road Board in 1910. In 1961, it became the Roebourne Shire Council following changes to the Local Government Act (WA Electoral Commission, 2003).

The Shire of Roebourne covers an area of approximately 15,197 square kilometres (PDC, 2007). As shown in **Figure 1.1**, the Shire contains six major townsites, all within a 50 square kilometre radius, including Karratha, Dampier, Wickham, Point Samson, Roebourne and Cossack (PDC, 2007). The Shire offices are located in the township of Karratha, which has direct flights to Perth and is recognised as a major centre within the Pilbara. The Karratha Airport is the second busiest airport in Western Australia, after Perth.

The Shire's population is estimate at 16,423 permanent residents (ABS 2006 Census), which makes up 36% of the Pilbara's permanent population. It has been predicted that an additional 2,298 people are temporary residents, which made up of FIFO personnel[1]. The major industries within the Shire include iron ore export, oil, natural gas, salt, nickel, fishing and tourism[2]. The mining industry within the Shire is the main source of employment. Whim Creek (owned by Straits Resources) is a large mine, extracting Copper, Lead and Zinc. The Dampier Port, one of the three largest ports within the Pilbara, is located within the Shire, and services the petroleum, salt, iron ore and natural gas export industries.

1.1.2 Shire of Ashburton

In 1887, Ashburton Road Board was gazetted, and in 1896, Tableland Road Board followed. Both became Shire Councils in 1961 following changes to the Local Government Act. Then in 1972, the two merged to form West Pilbara Shire, which was renamed Ashburton Shire in December 1987 (WA Electoral Commission, 2003).

The Shire of Ashburton covers an area of approximately 105,647 square kilometres (PDC, 2007). The majority of the area is made up of pastoral leases and cattle stations. Spread among these leases and stations are the four main towns of Pannawonica Onslow, Paraburdoo and Tom Price (see **Figure 1.1**). Tom Price is the largest town and the Shire's administration centre. Pannawonica is a company owned or 'closed' mining town and the town services (including waste management) are operated by the mining company, Rio Tinto.

The Shire contains a number of iron ore mines including:

- Robe River Iron Ore Mine (Deepdale) (owned by Rio Tinto)
- Namuldi, Tom Price, Murundoo and Paraburdoo Iron Ore Mines (owned by Rio Tinto)

In addition, the Shire includes the Karijini National Park, centred in the Hamersley Ranges and is the second largest National Park in the State.

[1] Cardno BSD acknowledges that the Pilbara Local Governments have some concerns that the actual number of people living in and working in their respective Shires and Town may be understated. However, for the purpose of this report and plan, the ABS figures are being used to determine thresholds with regard to landfill use and recycling, and in terms of order of magnitude are acceptable within the context of this report.

[2] Cardno BSD acknowledges that there has been a decline in other industry activity, such as tourism, and that the Pilbara Regional Council is currently addressing these matters through other reviews and discussions.

The Shire's population is estimated at 6,078 permanent residents (ABS 2006 Census), which makes up 13% of the Pilbara's permanent population. It has been predicted that an additional 1,453 people are temporary residents, which include 1,408 FIFO personnel and 45 from the Auski Tourist Park.

1.1.3 Shire of East Pilbara

In 1896, Bamboo Road Board (renamed Marble Bar Road Board in 1904) was gazetted, and in 1898 Nullagine Road Board followed. In 1961 both became the Shire of Marble Bar and the Shire of Nullagine in 1961 (WA Electoral Commission, 2003). The Shire of East Pilbara was formed by an amalgamation of the Shires of Marble Bar and Nullagine in 1972 (PDC, 2007). Upon the amalgamation, the Shire became the largest in the world comprising an area of over 379,571 square kilometres (PDC, 2007).

The main town sites include Newman, Marble Bar and Nullagine. The location of these towns is shown in **Figure 1.1**. The Shire contains numerous Aboriginal communities including Jigalong, Punmu and Parngurr. Aboriginal communities are also located at Nullagine (Irrungadi community) and Marble Bar (Pipunya and Goodabinya communities) (PDC, 2007).

The Shire also contains a number of major mine sites including the following:

- Nifty Copper Mine (owned by Straits Resources)
- Mining Area C, Mt Whaleback, Jimblebar, Yarrie Nimingarra Iron Ore Mines (owned by BHP Billiton)
- West Angelas, Yandicoogina Iron Ore Mines (owned by Rio Tinto)
- Telfer Iron Ore Mine (Newcrest Mining Limited)

The Shire's population is estimated at 6,544 permanent residents (ABS 2006 Census), which makes up 14% of the Pilbara's permanent population. It has been predicted that an additional 3,793 people are temporary residents, which include FIFO personnel.

1.1.4 Town of Port Hedland

In 1894, Pilbara Road Board (renamed Port Hedland Road Board in 1904) was gazetted. In 1961, it became a Shire Council following changes to the Local Government Act, and became a Town in 1989 (WA Electoral Commission, 2003).

The Town of Port Hedland is the smallest of the four member Councils in area, at 11,844 square kilometres. As shown in **Figure 1.1**, the residential centre is Port Hedland, which is divided into Port Hedland and South Hedland. The member Council has a number of pastoral stations located throughout the area which can access the services provided by the town. Located in the Town is the Port of Port Hedland, which provides large bulk export services. The majority of resources extracted in the region are exported from this location with 70 million tonnes of product, worth $3 billion shipped from the port each year (PDC, 2007).

The Shire's population is has 11,959 permanent residents (ABS 2006 Census), which makes up 36% of the Pilbara's permanent population. It has been predicted that an additional 1,145 people are temporary residents, which is made up of FIFO personnel.

1.2 THE PILBARA REGIONAL COUNCIL

The Pilbara Regional Council (PRC) was formally established on the 29th May 2000 under the Western Australian Local Government Act 1995. The four Local Governments located within the Pilbara Region are defined as the PRC's member Councils. The PRC's function is to assist its member Councils in the coordination of resource sharing and to:

- Assess the possibilities and methodology of facilitating, and to identify funding opportunities for, a range of services on a Pilbara regional basis
- Undertake, manage and facilitate services identified from above
- Influence and liaise with local, State and Federal Governments in the development of policies and legislation which are of benefit to the Pilbara region
- Provide administrative services to the member Councils in connection with their membership of the Western Australia Local Government Association (WALGA)

1.3 PROJECT BACKGROUND

The PRC's member Councils plays a key role in the provision of waste services to the Pilbara community. The member Council's plan for and deliver waste management services either directly or through the use of contractors. Councils arrange for the provision of necessary infrastructure and facilities for ratepayers. Historically waste management in the Pilbara region has been provided on an individual Council basis. To date there has been little regional coordination.

In February 2006, the Pilbara Regional Council (PRC) resolved to develop a regional waste management strategy for the Pilbara region. The project has been funded with contributions from the PRC 2006/07 Budget, a Pilbara Development Commission Grant and through industry contributions from BHP Billiton, Rio Tinto (Pilbara Iron) and Woodside.

The project was initiated for the following reasons:

- The need to better plan for the management and development of each of the four Council's landfill sites recreation assets
- The need to identify opportunities for the sustainable recycling and/or re-use of materials within the Pilbara Region
- The recognition that local authorities have a growing role to play in reducing the quantum of waste disposed of to landfill
- The desire by the public to have increased recycling services available in the Pilbara Region
- The impact of poor waste management on the Region's tourism industry[3]

Cardno BSD was awarded the contract to review the waste management practices in the Pilbara and to develop a Regional Waste Management Plan (RWMP) that would provide a framework for the management of solid waste in the Pilbara Region over the next 10 years. Cardno BSD's role is to formulate strategic recommendations for the PRC and its member Councils in the form of an implementation plan. Strategic recommendations have been formulated based on the current waste management operations in the region, the objectives of the RWMP, consultation with stakeholders, industry best practice and professional knowledge. Strategies may include the coordination/monitoring/reporting of recycling and reuse practices in addition to the greater use of technology and best practice to protect the environment while maintaining financial viability.

[3] While the subject of tourism is not a matter for this project, it is apparent that the Pilbara's image may be being negatively impacted because of a lack of recycling and may be contributing to tourist negative perceptions/experience in the Pilbara. It is anticipated that tourists from other parts of Australia and overseas will demand recycling facilities in the future comparable to those within their own residential areas

It is worth noting that private industry plays a key role in waste management within the Pilbara. Petroleum and mining companies located within the Region provide waste collection and disposal services for mining operations and their staff who reside at temporary mining camps. In fact of the 31 registered landfills in the Pilbara Region, only eight facilities are operated by the Pilbara's member Councils. The aim of this RWMP is to review waste management activities of the PRC member Councils. However, the findings and strategies are applicable to member Councils and industry alike.

The key deliverables of the project include:

- A report that compares and contrasts current waste management practices across the Pilbara region
- Clear direction in relation to current (and potential future) recycling and re-use opportunities that exist on both a local, sub-regional and regional basis within the Pilbara
- Recommendations on the most appropriate manner in which to progress recycling and re-use initiatives across the Pilbara region
- Identification of sustainable policy positions and management actions relating to waste management across the Pilbara region

During the development of the RWMP, the following assumptions and facts have been established. The recommendations have been produced in light of these factors:

Assumptions

- The Pilbara community has a desire for increased recycling services in the region
- The Pilbara community are prepared to pay more for waste management services if there are environmental benefits
- Pilbara member Councils are seeking to facilitate recycling and re-use as a service to their respective community not for the purpose of making profit, but equally not at any cost. These functions are to be provided as close to cost neutral as possible and a little profit would be an added benefit
- The primary financial benefit for local governments from this project will come from extending the life and use of existing and new landfill sites, including the application of best practices, and where appropriate technology, to reduce operating costs

Facts

- Recycling requires full community commitment, without which, recycling will not work
- Recycling in the Pilbara is a logistics challenge

1.4 VISION

Notwithstanding the reasons that caused the Regional Waste Project in the first place, the Plan at Section 5 has been developed in accordance with the State's Vision of '***Towards Zero Waste***'.

2. MUNICIPAL SOLID WASTE MANAGEMENT IN WESTERN AUSTRALIA

The principal legislative vehicle for pollution in Western Australia in the *Environmental Protection (EP) Act 1986*. The EP Act regulates the discharge or emissions of waste to water, land or air by a system of works approvals and licenses (DEC, 2006). The acceptable environmental quality standards and conditions for discharging waste and identification of beneficial uses of the environment are specified in relevant Environment Protection Policies (EPP).

The EP Act also defines the powers, duties and functions of the statutory bodies responsible for municipal solid waste management. The role of state and Local Government agencies are provided in **Section 2.1**. Western Australian legislation, programme and policies are provided in **Section 2.2.**

2.1 STATE GOVERNMENT ROLES

Department of Environment and Conservation (Waste Management Branch)
The Waste Management Branch, within the Department of Environment and Conservation has a broad role in facilitating and implementing waste management polices and programmes. The Branch is responsible for developing policy in collaboration with the Waste Management Board, and for undertaking, on behalf of the Board, specific projects aimed at key issues where the greatest strategic impact will be made.

Waste Management Board
The Waste Management Board is an advisory body to provide advice to the Minister for Environment in relation to strategic direction and priorities for waste management in Western Australia. In addition, the board facilitates activities with key stakeholders such as the Local Government and aids the Waste Management Branch in administering the Waste Management and Recycling Fund.

The strategic advice which the Board is responsible for, includes waste management issues such as:

- Setting priorities for waste management policy and programme initiatives
- Reviewing and advising on the available and new technologies within the waste industry
- Assistance for technical advise for the community under the Technical Assistance Grants programme
- Reviewing education and recycling initiatives
- Reviewing the Waste Management and Recycling Fund (WMRF) and the landfill levy
- Recommending changes to regulations and amendments to legislation
- Assistance for community, Local Government and industry under the Strategic Waste Initiatives Scheme and the Community Grants Scheme

(DEC, 2007)

New specific waste management legislation has been drafted and it is expected that the Waste Avoidance and Resource Recovery (WARR) Bill (see **Section 2.2.5**) will be passed during 2007. This legislation will establish a statutory authority for waste management and provide significant new powers for waste management and will result in the establishment of a Waste Authority that will replace the current WMB.

2.1.1 Local Government

Local Government
Local Government plays a key role in the provision of waste services to the local community. Councils plan and deliver waste management services either directly or through the use of contractors. Councils also arrange for the provision of necessary infrastructure and facilities for ratepayers.

Municipal Waste Advisory Council (MWAC)
The Municipal Waste Advisory Council is as a standing committee of the Western Australian Local Government Association (WALGA). MWAC is not a Local Government body, but an independent, membership-based group representing and supporting the working interest of WA Local Governments while also having the delegated authority on municipal waste issues. Membership also includes the major metropolitan Regional Councils. This makes MWAC a unique forum through which all the major Local Government waste management organisations cooperate. The Advisory Council focuses its work in three main areas:

- The proactive development of policy on priority issues
- Comprehensive representation of Local Government views on legislation, regulations, administrative policy and related matters
- The delivery of grant funded programmes consistent with Local Government priorities

Regional Councils
Regional waste management groups are responsible for planning and facilitating management of municipal solid waste (MSW) at a regional level, working in cooperation with member Councils. There are currently six other regional waste management groups in Western Australia and include the following:

- Eastern Metropolitan Regional Council (EMRC)
- Geraldton-Greenough Regional Council Waste Management Authority
- Mindarie Regional Council (MRC)
- South East Metropolitan Regional Council (SEMRC)
- Southern Metropolitan Regional Council (SMRC)
- Western Metropolitan Regional Council (WMRC)

2.2 STATE GOVERNMENT LEGISLATION, STRATEGIES AND PROGRAMMES

The State Government has paid increasing attention to waste management issues in recent years. A number of legislative tools, programmes and policy documents relating to waste management and sustainability aim to reduce the amount of waste going to landfill by maximising waste recycling, reuse and recovery, while minimising the environmental impact of waste disposal. A summary of State Government legislation, policies and programmes are provided in the following sections.

2.2.1 Landfill Licensing and Regulations

Licensed Landfills
All landfill operations must comply with the EP Act, it's regulations and EPPs. The following types of landfills are defined in the Environment Protection Regulations 1997 and are subject to the works approval provisions and license conditions under the EP Act:

- Category 63 (Class I) – Inert landfills
- Category 64 (Class II, III) – Putrescible landfills
- Category 65 (Class IV) – Secure landfills
- Category 66 (Class V) – Intractable landfill

Regulated Landfills
Smaller landfill sites that receive less than 5,000 tonnes per year are covered specifically by the Environmental Protection (Rural Landfill) Regulations 2002. These fall under Category 99 – Putrescible Landfill Site and do not have to comply with license conditions.

2.2.2 WAste 2020

The *WAste 2020* policy document outlines the Western Australian Government's vision of moving towards zero waste to landfill by 2020, with all waste being recycled, reused or recovered. The first of five goals in the *WAste 2020* policy document relates to sustainability and aims: "to achieve waste reduction, re-use and recycling outcomes which are environmentally, socially and economically sustainable". The resource recovery goal seeks "to maximise the recovery and recycling of resources from waste", while the integration goal aims "to establish effective frameworks and structures to coordinate and facilitate waste reduction, re-use and recycling, the recovery of resources and the safe management of remaining wastes".

WAste 2020 therefore provides a framework for the reduction (and ultimate elimination) of waste being sent to landfill and the establishment of operations to recycle, reuse or recover waste materials. The *WAste 2020* policy document has as a key outcome the development of "a thriving industry based on the recovery and re-use of resources from all of the community's waste streams" (DEC, 2001). Overall, *WAste* 2020 recognises the need to establish facilities to recover and re-use household waste.

2.2.3 Strategic Directions for Waste Management in WA

In September 2004, the State Government released the *Statement of Strategic Direction for Waste Management in WA; Vision and Priorities*. This document draws on previous documents (State Recycling Blueprint and *WAste* 2020) and sets out the framework and priorities for waste management in Western Australia. It provides a guide to achieve the Waste Management Board's (WMB) vision that as a community Western Australia moves "Towards Zero Waste".

To realise this ambitious vision for waste management in Western Australia three principles for strategic waste management have been proposed, (listed in order of preference):

- Prevention – avoidance of waste generation
- Recovery – re-use of generated waste through recycling and re-processing
- Disposal – responsible disposal of waste

The vision anticipates that resources available for waste management from 2005 will be predominantly directed towards managing the impacts of the waste by increasing the percentage of resources recovered from the solid waste stream and the disposal of non-recyclable waste in an environmentally acceptable method. Efforts to minimise waste at the generation stage will initially form a secondary priority based on allocation of resources. The focus will shift towards waste management with some avoidance towards 2008. By 2012 approximately half of the waste management effort will be focussed on prevention rather than management.

The report promotes management of the whole life cycle of a product including wastes generated by the products creation. It advocates the adoption of a strategic approach to

drive the transition from management of waste to a waste free society. To be effective, waste management initiatives should intervene at the point in a product lifecycle where they will have the most impact and have an emphasis on actions that increase recovery or prevent waste generation. In the meantime, initiatives are still likely to involve the responsible disposal of waste.

It was recognised that greater effort is required to encourage and support waste reduction in government, business and industry, especially in small to medium sized enterprises. Efforts directed at government, business and industry includes: waste prevention through product design and production; opportunities for extended producer responsibility; and, encourage and support improvements in recovery of resources in waste and improvements to markets for recyclables.

Local Government has been acknowledged as taking significant steps towards resource recovery through its kerbside recycling services and the development of secondary processing facilities. It is the intention of the WMB to encourage and support development of markets for recyclables, improvements to kerbside recycling and secondary processing and an extension of kerbside recycling into commercial precincts where possible.

The WMB also recognises the efforts being made by the community towards recycling. Part of the community approach endorsed by the statement involves continuous improvement in waste prevention and resource recovery in schools and the wider community.

The statement advocates a new approach to waste management that is essential to achieving Zero Waste, through encouraging behavioural change for significantly greater efforts in waste reduction with a focus on individual responsibility. The cornerstone of this approach is the provision of broad community access to useful information about waste reduction.

In summary, the *WAste 2020* and *Statement of Strategic Direction for Waste Management* documents present a pathway *"towards zero waste".* Both documents place emphasis on the principles of 'reuse', 'recycle' and 'recover', and encourage the establishment of facilities to maximise the recovery and re-use of household waste. (DEC, 2004).

2.2.4 Landfill Levy

In 1998, the Waste Management Board introduced a levy on waste sent to landfill in the Perth Metropolitan Area of $3 per tonne for putrescible wastes and $1 per tonne for inert wastes. As of October 2006, the Landfill Levy increased to $6 per tonne for putrescible waste and $3 per cubic metre for inert waste (MWAC, 2007). The Landfill Levy applies to all metropolitan landfills and any non-metropolitan landfills receiving waste generated in the metropolitan area.

The Landfill Levy has been introduced so that:

- Landfill prices reflect the full environmental cost of landfilling
- Increased prices acts to reduce reliance on landfill and encourage recycling and reuse
- Provide sufficient funds to resource programmes required to achieve the State's zero waste vision

The Board has previously proposed an ongoing annual increase in levy levels with the preferred rate being approximately $35 per tonne by 2020. This would apply to all waste, so that landfill pricing is at, or approaching, the full environmental cost of the operation (MWAC, 2007). In reality, increases in the levy have only been legislated until 2010/11 and are shown in Table 2.1.

Table 2.1 Landfill Levy rate for Western Australia (2006/07 – 2010/11)

Year	Putrescible Landfill Levy $/tonne	Inert Landfill Levy $/m^3
2006/07	6	3
2007/08	6	3
2008/09	7	5
2009/10	8	7
2010/11	9	9

Source: WMB, (2005)

2.2.5 WARR Bill

To improve the legislative framework for waste management in the State, the Western Australia Government has drafted the Waste Avoidance and Resource Recovery (WARR) Bill.

The Bill proposes the following:

- The establishment of an independent statutory waste authority responsible for waste strategic policy and planning, and administers the funds raised through the collection of the landfill levy [*The Waste Authority will replace the current Waste Management Board*].
- To allow the Department of Environment and Conservation to manage regulation, compliance and enforcement issue relating to waste
- To create head powers for the implementation of extended producer responsibility (EPR) and product stewardship schemes
- To consolidate waste provisions currently in other legislation

The intent of the Bill is to consolidate existing provisions relating to waste management under one piece of legislation which would have the necessary powers to drive waste management in Western Australia towards the Zero Waste 2020 vision.
(DEC, 2007b)

2.2.6 Zero Waste Plan Development Scheme

The Zero Waste Plan (ZWP) Development Scheme is intended to assist Local Governments in Western Australia in the preparation of Zero Waste Plans. The Zero Waste Plans will be strategic waste management documents, which are intended to align Local Government practices with the State Government's vision of 'Towards Zero Waste'.

The Development Scheme consists of two key phases. Phase 1 is currently being completed and involves data gathering via an online survey. The aim of the survey is to collect baseline waste data and waste management characteristics of Local Governments and formally constituted Regional Councils across the State. This data must be gathered and entered into the on-line survey by the end of August 2007. The Department of Environment and Conservation (DEC) will analyse the data received and provide recommendations to groups of Local Governments on suggested strategies for improving waste management services in their region. Completion of the Phase 1 survey will mean that each Local Government will have met its legislative annual reporting requirements of the National Environment Protection Council under clause 17 of the National Environment Protection (Used Packaging Materials) Measure (NEPM UPM).

Information obtained during Phase 1 will provide the basis for completion of Phase 2. Phase 2 of the ZWP Development Scheme requires Local Governments to formulate their Zero Waste Plan documents, which focus on strategies and actions to minimise waste disposed to landfill. The Regional Waste Management Plan for the PRC is being

developed in close liaison with the DEC and is intended to comply with the Phase 2 of the ZWP Scheme, however the exact requirements and content of the ZWP's is not currently known, therefore compliance with the ZWP can not be assured.

2.2.7 Auditing Continuity / Data Compilation Scheme

The Auditing Continuity / Data Compilation (AC/DC) Scheme is an interim measure to allow Local Governments to claim a rebate for the recycling services provided (e.g. kerbside, vergeside and drop off recycling services). The Rural Recycling Cost Offset Scheme (RRCOS) complements the AC/DC scheme. Its aim is to deliver funds to rural Local Governments, to assist in offsetting the cost of recycling. To be eligible for funding from the RRCOS, councils must report their recycling activities through the AC/DC Scheme. A minimum payment of $1,000 is available to rural councils that report their recycling activities through the AC/DC Scheme.

It is anticipated that the WARR Bill will ensure that the data reported via the AC/DC scheme will be reported through the Zero Waste Plan Scheme in the future. However, the bill hasn't yet been adopted as legislation.

3. METHODOLOGY

The production of the PRC Waste Management Plan has been completed in two phases:

- **Stage One - Waste Management Review:** this included liaison with the Project Working Group and other stakeholders including government, recycling and mining industry stakeholders. A review of existing waste management operations at ten key facilities and quantification of volumes and waste types received at each facility. The review included an internal workshop that consisted of representation from each of the member Councils, the Department for Environment and Conservation (DEC) and Cardno BSD to discuss the current issues and management strategy options.

- **Stage Two - Development of a Waste Management Plan:** this included meetings with the DEC, MWAC, recyclers located in Perth and the PRC Executive Officer. The Cardno BSD project team produced a draft RWMP that has been provided to members of the Project Working Group and PRC Councillors to review prior to a second workshop, which will be held in August. The second workshop will involve the PRC Working Group, representatives from DEC, mining and waste industries and the Pilbara community to review the Regional Recycling Potential model, findings of the review and the draft RWMP.

The Regional Waste Management Plan development process is outlined in **Figure 3.1** on the next page. The flow chart outlines the two stages and phases undertaken, along with input by key stakeholders. Project phases are outlined in the following section. A list of the stakeholder involved in the development of the RWMP is provided in **Appendix A**.

3.1 STAGE 1 - WASTE MANAGEMENT REVIEW

The aim of the Waste Management Review is to determine the current waste management operations in the Pilbara Region and review the existing landfill sites that are owned and operated by the Local Governments. Stage 1 included the following phases:

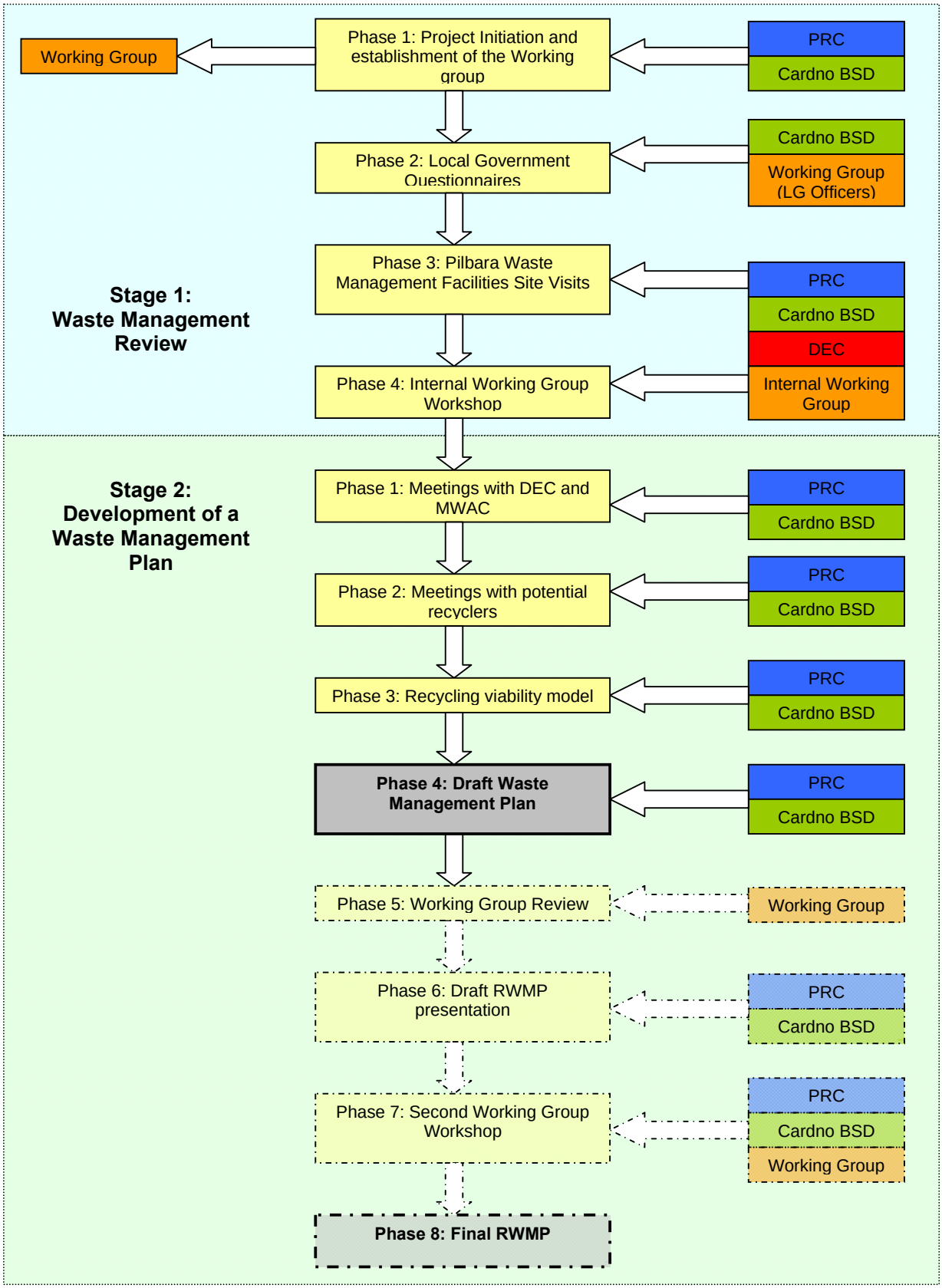
- Phase 1 - Project initiation and establishment of the Working Group
- Phase 2 - Waste collection services and waste management facilities questionnaires
- Phase 3 - Pilbara waste management facilities site visits
- Phase 4 - Internal Working Group workshop

3.1.1 Phase 1 - Project Initiation and Establishment of the Working Group

The project was initiated by Cardno BSD with the support of the PRC Executive Officer. The scope of project was agreed to include a review all municipal landfills, which are owned and operated by Local Government.

The PRC Executive coordinated the establishment of the Working Group which included the Member Council CEO's and Waste Management Technical Officers, together with representatives from the DEC, local industry and the community. The names of Working Group members are listed in **Appendix A**.

Figure 3.1: Regional Waste Management Plan development process showing project phases and the involvement of stakeholders



3.1.2 Phase 2 - Local Government Questionnaires

Two questionnaires were created by the Cardno BSD Project Team and distributed to each of the Local Government Officers responsible for Waste Management collection and disposal services in their area.

A *Collection Services Questionnaire* requested information regarding specific collection services offered by the Local Government and included:

- Frequency of collection
- Bin ownership
- Number of households serviced
- Number of collections per year
- Tonnes of waste collected
- Processing/disposal location
- Cost of collection

A sample of the *Collection Services Questionnaire* is provided in **Appendix B**. A summary of the collection services provided by each of the Local Government is outlined in **Section 4.1**.

A *Disposal Services Questionnaire* requested background information on Waste Management Facilities operated by the Local Government. Information requested included details regarding the design and operation of the landfill sites and transfer station. A sample of the *Disposal Services Questionnaire* is provided in **Appendix C**. A summary of the disposal services provided by each Local Government is outlined in **Section 4.2**.

3.1.3 Phase 3 - Pilbara Waste Management Facilities site visits

The Cardno BSD Project Manager, Giles Perryman, undertook a series of site visits of the waste management facilities operated by Local Governments (and Rio Tinto at Pannawonica) in the region from the 5th May 2007 until the 11th May 2007. A complete list of licensed and registered waste management facilities located in the Pilbara is outlined in **Appendix D**.

The tour was attended by Vinh Nguyen (DEC Environmental Officer) to undertake DEC inspections of each site. A number of photographs taken during the tour are provided in **Section 4.2.** Results of the site visits and an assessment of the facilities compliance with its licence conditions are provided in **Appendix E**.

3.1.4 Phase 4 - Working Group Workshop

On the 11th May 2007, an internal Working Group workshop was held at the Town of Port Hedland council offices. The objectives of the workshop were to summarise the findings of the waste management facilities site visits and to allow for an opportunity for the group to discuss the issues faced in the region, the planned objectives of the RWMP and potential strategies that should be assessed. During the workshop, David Healy from the DEC provided a brief presentation of the DEC's Zero Waste Plans. Attendees and notes from the workshop are provided in **Appendix F**.

3.2 STAGE 2 - DEVELOPMENT OF A WASTE MANAGEMENT PLAN

The aim of Stage 2 was to produce a RWMP for the Pilbara Region. The aim of this document was to outline the findings of the Waste Management Review while providing a clear RWMP strategy for the future. Stage 2 - Development of a Waste Management Plan includes the following phases:

- Phase 1 - Meeting with the DEC (Zero Waste Plans) and WALGA
- Phase 2 - Meeting and site visits with potential recyclers
- Phase 3 - Recycling viability Model
- Phase 4 - Draft RWMP
- Phase 5 - PRC Working Group review
- Phase 6 - Draft RWMP presented to the PRC Council
- Phase 7 - Second Working Group Workshop
- Phase 8 - Final RWMP Produced

Note: the Phases shown in grey have not yet been completed but will be carried out during August and September 2007

3.2.1 Phase 1 – Meeting with DEC and MWAC

On The 26th of June 2007 the PRC Executive and Cardno BS meeting at the DEC Head Office in Perth to discuss the Ze Information on the Scheme is provided in **Section 2.2.6**.

It was discussed that the data collected during Stage 1 of the project will be used to complete the Zero Waste Plan Survey. It was decided that the RWMP would be produced with the aim of complying with Phase 2 of the Zero Waste Plan scheme, however as the exact requirements of the Zero Waste Plans is not yet known this can not be guaranteed.

3.2.2 Phase 2 - Meeting and site visits with potential recyclers

Between the 25th and 27th of June 2007, the PRC Executive and Cardno BSD personnel organised a number of meetings with recyclers located in Perth. **Appendix A** lists recyclers that were met during this time. During these meetings, it was determined that a number of key operators in the recycling industry have an interest in establishing operations in the Pilbara Region. A number of issues were raised by recyclers including the lack of quantitative information to assess the viability of operations in the region. In addition, the cost of transport of recyclables or reprocessed material to Perth is a major barrier in terms of logistics and financial viability.

3.2.3 Phase 3 - Recycling Viability Model

During 2005, the Cardno BSD/Meinhardt Joint venture prepared a report on behalf of the DEC to assess the viability of kerbside recycling and investigate opportunities for cost-effective transport of collected recyclables from regional areas in Western Australia (Cardno BSD/Meinhardt Joint Venture, 2005). During this project, a model was constructed to help assess the critical variables underlying the financial and environmentally viability of recycling in regional Western Australia. This model was updated to reflect current costs and prices of materials. The Regional Recycling Model was used to assess the potential for recycling in each of the towns located in the Pilbara Region. Two scenarios were modelled;

1. A recycling hub located in Perth which processed recyclable material ready for export.
2. A recycling hub located in Port Hedland which processed recyclable material ready for export.

3.2.4 Phase 4 - Draft RWMP

This document represents the Stage 2 - Phase 4 of the development of a PRC Draft Regional Waste Management Plan. This document has been reviewed and authorised by the PRC Executive.

3.2.5 Phase 5 - Working Group Review

The Draft PRC RWMP is currently being reviewed by the members of the Working Group. Some feedback has been incorporated into this draft report. Any further comments or suggestions made by the group will be incorporated into the final Plan.

3.2.6 Phase 6 – Draft RWMP presentation (PRC Council)

The draft RWMP was presented to the PRC Councillors on the 3rd August, during WALGA week. Any comments or suggestions received from the councillors will be incorporated into the final Plan.

3.2.7 Phase 7 – Second Working Group Workshop

A second Working Group workshop will be held to discuss the implementation of proposed strategies outlined in the Draft RWMP. The workshop will provide an opportunity for the Working Group to discuss and provide feedback on these strategies.

3.2.8 Phase 8 - Final RWMP

The final RWMP will incorporate feedback from the Working Group and the Pilbara Regional Council.

4. WASTE MANAGEMENT REVIEW RESULTS

The waste management review results in this section of the report outline the existing Member Council's waste management operations in the region. The information provides a baseline which has been analysed; this analysis together with feedback provided and observations made during the project have been used to identify the key findings that are listed in **Section 4.5**. These key findings have been addressed in the development of the Implementation Strategy in **Section 5**.

4.1 MEMBER COUNCIL COLLECTION SERVICES

Local Governments provide waste collection services for their ratepayers and some commercial properties using day labour or through the use of private contractors. Councils also provide collection services for litterbins located in public areas and for wastes generated from their own operations. Collection services for the Pilbara Region have been divided into the following categories:

- Domestic: Councils provide waste collection services for households including a 240L Mobile Garbage Bin (MGB) kerbside collection, bulk bin service and pre & post cyclone cleanups
- Council Works/ Town Services: Councils generate waste from their own operations such as greenwaste from parks and gardens maintenance, road construction materials and waste collected from public litterbins
- Commercial and Industrial: (C&I) Council provides collection services for some commercial and industrial premises including 240L MGB collection and bulk bin service

Table 4.1 summarises the collection services offered by each Member Council during the 2005/06 Financial Year. The towns located within the Shire of Roebourne share collection vehicles due to the proximity of the towns to one another and the Town of Port Hedland use the same collection vehicles for all of their towns as well. The towns located within the Shire of Ashburton and the Shire of East Pilbara have similar collection services, however each town has separate collection vehicle dues to the large distances between each site.

Pannawonica, located in the Shire of Ashburton, is a closed town in accordance with a State Agreement Act. The town was established due to mining activities in that area and all town services are managed by Rio Tinto. Pilbara Iron, a member of the Rio Tinto group provides waste collection services to the residents of the town. This is the only town within the Pilbara being significantly managed by a resource company.

Additional waste collections are provided by private waste management companies operating from all main towns within the Pilbara. The private companies generally provide waste management services for commercial organisations. For example, mining companies require collection services for waste generated by FIFO residential camps and mining activities and commercial businesses require collection services of the wastes they generate. The details and extent of these waste collection activities have not been quantified during this project. Local Government has little influence over these waste collection activities. However, it is anticipated that commercial industry and the PRC can work together to minimise waste generation and adopt best practices in the Pilbara Region. Cooperation between the two groups may achieve economies of scale and reduce the tyranny of distance, which currently inhibits recycling activities being undertaken.

Table 4.1 Collection Services in the Pilbara Region

Member Council	Towns Supported	*Domestic*					*Council Works / Town Services*			*Commercial & Industrial*			
		Domestic Refuse	**Domestic Recyclable**	**Bulk Bin**	**Pre-Cyclone Cleanup**	**Post-Cyclone Cleanup**	**Green waste from Council Works**	**Inert Waste from Council Works**	**Public Litterbins**	**Commercial Refuse**	**Bulk Bin**	**Used Oil**	**Tyre Collection**
Shire of Roebourne	Karratha, Dampier, Wickham, Point Samson, Roebourne	240L MGB (weekly collection, Roebourne twice weekly)	None	$3m^3$ or $4.5m^3$ bulk bin on request	Verge Collection (annual collection)	Verge Collection (as required)	As required	As required	240L MGB (weekly collection)	240L MGB (twice weekly collection, three times weekly, fortnightly, phone in)	$1m^3$, $1.5m^3$, $3m^3$, $4.5m^3$ Bin Cart (six times weekly collection to periodic phone in)	200L Drum (as required)	Tyre Collection $57m^3$ Hook Lift Bins (as required)
Shire of Ashburton	Tom Price, Paraburdoo, Onslow,	240L MGB (weekly collection)	None		Verge Collection (annual collection)	Verge Collection (as required)	As required	As required	120L, 240L MGB (twice weekly, as required) Onslow – 240L, 1000L (three times weekly	240L MGB (twice weekly collection, Onslow – three times weekly)	Bulk Bin (twice weekly collection, Onslow weekly)		
Rio Tinto (Located in the Shire of Ashburton)	Pannawonica	240L MGB (weekly collection)	None	Bulk Bin (monthly collection		Verge Collection (as required)	As required	As required	As required	240L MGB (weekly collection)			
Shire of East Pilbara	Newman, Nullagine, Marble Bar	240L MGB (Oct to Apr – weekly collection, May to Sept – twice weekly), Newman once weekly	240L MGB (Newman fortnightly collection)		Verge Collection (annual collection)	Verge Collection (as required)	As required	As required	40L, 240L MGB (as required / weekly collection)				
Town of Port Hedland	Port Hedland, South Hedland, Wedgefield	240L MGB (weekly collection)	None		Verge Collection (annual collection)	Verge Collection (as required)	As required	As required	240L MGB (once/twice weekly collection)				

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4.1.1 Domestic Services

Domestic property waste collection services are solely the responsibility of the member Councils within the Pilbara Region (with the exception of Pannawonica which is provided by Pilbara Iron). Waste collection services are provided by council day labour. Domestic waste collection services costs are recovered through householder's council rates.

Domestic Refuse Collection
Residents located in major towns are provided with a minimum of one 240L MGB per household. Bins are collected weekly, with the exception of Nullagine and Marble Bar where bins are collected twice weekly during the summer months due to the extreme heat experienced.

Newman (within the Shire of East Pilbara) is the only town in the region that provides households with a two-bin (recyclables and refuse) system. The two-bin system includes an additional 'yellow-top' bin for the collection of source separated recyclable packaging materials. The recyclables bin is collected on a fortnightly basis.

Bulk Bin Collection
Town residents located in the Shire of Roebourne and Pannawonica are offered an additional service. On request, these residents are able to order $3m^3$ or $4.5m^3$ bulk bins for the disposal of bulky waste. In the remaining towns within the Region, bulk bins can be hired from private waste collection companies for a fee.

Pre/Post Cyclone Cleanup
Pre and Post Cyclone cleanup are offered to residents within major towns as cyclones frequently cross the region and create a significant amount of waste. Bulky / green waste / debris are left on the verge by residents before and after a cyclone and are collected using council vehicles. The Town of Port Hedland only collects greenwaste as part of the per/post cyclone cleanup to prevent residents from 'abusing' the system (i.e. disposing of bulk wastes). In addition, the Shire of Roebourne also offers this service to properties in light industrial areas.

Pre-cyclone cleanups are offered by all member Councils annually, prior the cyclone season. Post-Cyclone cleanups are offered after a cyclone crosses a town. Generally, a low intensity cyclone passes through a populated area of the Pilbara Region every 5 years. High intensity cyclones are less frequent, with one impacting on towns every 10 years.

Self Hauled Trailer Waste
Residents have access to landfills located close to main town. Trailer waste can be self-hauled to landfill sites. This system can be used by any resident, but is particularly common for residents in remote areas, such as pastoral leases and Aboriginal communities, who are not provided with a 240L domestic refuse collection. The waste management practices of these residents have not been investigated as a part of this project. However, it is likely that these residents may use burning, or to a lesser extent, illegal dumping to dispose of some wastes generated. Residents do not have to pay a gate fee for disposing of their trailer waste.

4.1.2 Town and Council Collection Services

Councils generate some waste from their operations. The following services are provided by Councils at their own cost.

Waste from Council Works
All member Councils collect wastes generated from council operations on an ad-hoc basis. This may include greenwaste from street tree pruning, maintenance of parks / gardens and inert waste from road and pavement construction or maintenance.

Public Litterbins
Public litterbins are provided by Councils within town centres. The frequency of the collections varies across towns and councils. This service is provided by Councils and funded by general rates.

4.1.3 Commercial and Industrial Collection Services

Generally, commercial and industrial wastes are collected by private service providers and are not the responsibility of Local Governments. However, the Shire of Roebourne and Shire of Ashburton offer waste collection services to businesses within light industrial areas in competition with local private operators such as Cleanaway, Lothway TBS and Karratha Mini Skips.

Commercial Refuse Collection
The Shire of Roebourne and Shire of Ashburton offer a 240L MGB collection service to a small number of light industrial properties. The frequency of collections varies from town to town and depends on the amount of waste the businesses produce.

Bulk Bin Collection
The Shire of Roebourne and Ashburton both provide a variety of bulk bins to commercial properties. The frequency of collections varies from town to town and depends on the amount of waste the businesses produce.

Other Commercial Collections
The Shire of Roebourne offers 10 commercial kitchens a cooking oil collection in 200L drums. These drums are collected on an 'as required' basis. The Shire offers tyre companies a used tyre collection. $27m^3$ hook lift bins are collected on an 'as required' basis. No other Pilbara Local Government offers these types of services.

4.1.4 Industry Domestic Recycling – Dampier Community Recycling Station

Rio Tinto and Cleanaway have entered into an agreement to jointly manage/fund the Dampier Community Recycling Station (DCRS) and the proposed Wickham recycling station. Cleanaway provide weekly collections of the recyclables from the DCRS and transfer the material to the Cleanaway Dampier depot where recyclables are sorted, packaged, and transported to appropriate recycling facilities.

Rio Tinto have contributed half ($15k) of the running costs of the DCRS. Paper/cardboard, aluminium cans and glass are collected via the DCRD. A major objective of Rio Tinto and Cleanaway has been to increase the profile of the DCRS and the concept of recycling within the local community. This has been achieved through promotional materials such as a large fridge magnet, news paper articles, community newsletter reminders, notice board displays and there are plans to utilise Cleanaway's Educational Officer in local schools and shopping centres. The Wickham Recycling Station will be based on the Dampier model and also operate as a partnership between Cleanaway and Rio Tinto, the establishment of the facility has already started.

The agreement requires Cleanaway to provide:

- Advice and support to Rio Tinto in designing and constructing the recycling facility at Wickham
- Weekly collections of the recyclables from the Wickham Recycling Station and transference to the Dampier depot.
- Sorting and dispatching of recyclables to the appropriate recycling facilities.

- Provide quarterly reports on volumes collected, contamination and issues impacting on the programme
- Assistance to the Community Development Liaison Officer Wickham with the development of promotional materials and activities for the Wickham Community Recycling Station via the involvement of the Cleanaway Education Officer

Under the agreement Rio Tinto provides:

- Project management and financing of the establishment of the Wickham Community Recycling Station
- Responsibility for developing and disseminating promotional materials regarding the Wickham Community Recycling Station to Wickham and surrounding communities residents, in conjunction with the Cleanaway Education Officer

4.1.5 Observations

The information about collection services provided by the member Councils in the Pilbara Region has drawn out a number of observations:

- Each member Council provide different waste collection services for its communities, and although the member Councils are part of the PRC, there is no significant advantage in providing uniform collection services through the Pilbara Region. Indeed, many of the Perth's Regional Council's Local Governments provide different collection services
- There is an issue of residents and small business 'abusing' the pre/post cyclone collection service by disposing of general waste via this free service
- Most town sites have dedicated collection truck(s) due to the distance between towns; therefore many of these trucks have a very low utilisation rate
- There is no standardisation of collection trucks or bin sizes within the region. If collection trucks all used the same bin lift configuration, there would be potential for equipment to be shared during breakdowns or unforeseen events
- Some industry led waste management / recycling programmes operating in isolation to member Council activities

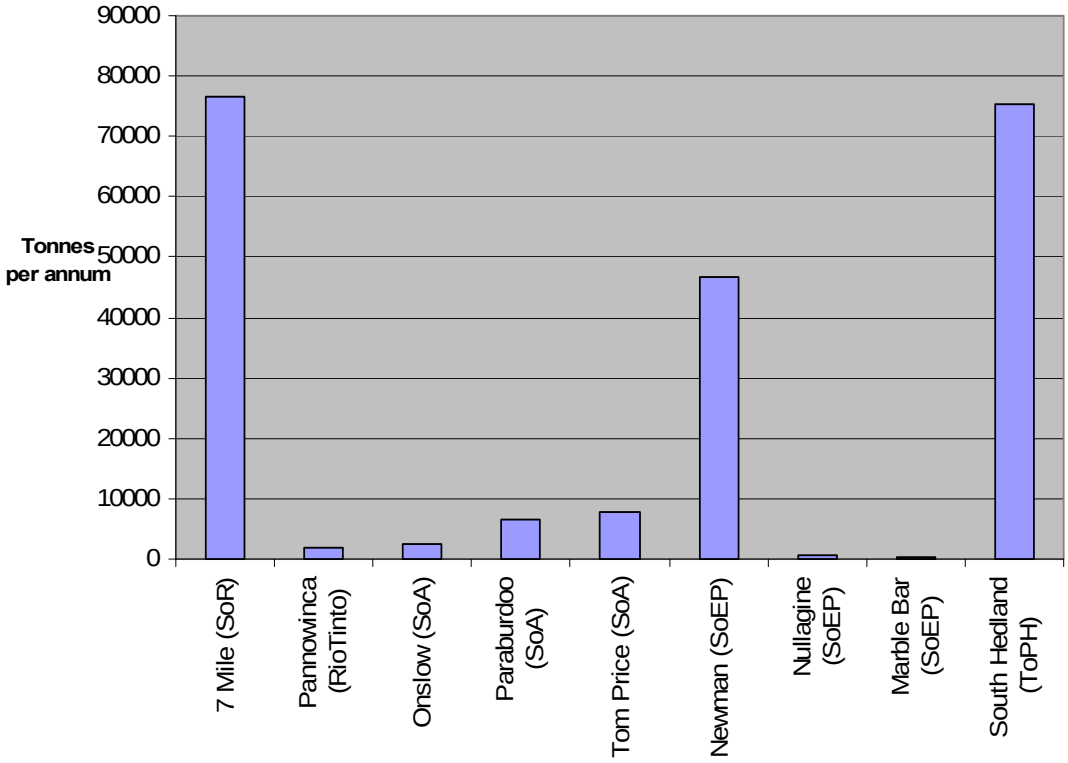
4.2 MEMBER COUNCIL WASTE MANAGEMENT FACILITIES

A total of nine landfills and one transfer station were visited during the waste management review tour. Details of these facilities are provided in **Table 4.2.** The map shown in **Figure 4.2** shows the location of the facilities visited by the Cardno BSD Project Manager. The map also indicates the approximate location of the other landfills, which are owned and operated by mining companies within the region. A list of all the landfills in the region is contained in **Appendix D**. The scope of this report is limited to a review of the Member Council operated facilities, together with the Deepdale Landfill at Pannawonica.

This section of the report summarises the facilities visited during the review and the observations made. During the review each facility was assessed against the DEC licence conditions, the results of each site review are shown in **Appendix E**.

The landfill sites visited during the review process varied considerably in terms of tonnes of waste received. The difference in waste received at each facility is shown in **Figure 4.1**, to highlight the fact that of the Member Council operated landfills, the three facilities of 7 Mile (SoR), Windell (Newman, SoEP) and South Hedland (ToPH) receive in excess of 90% of all the waste received by the Member Council operated landfills.

Figure 4.1 Waste Received at each Landfill Facility (Tonnes per annum)



Source: Council Questionnaire Data (includes estimates for most facilities)

Figure 4.2: Location of Landfills and Transfer Stations within the Pilbara Region

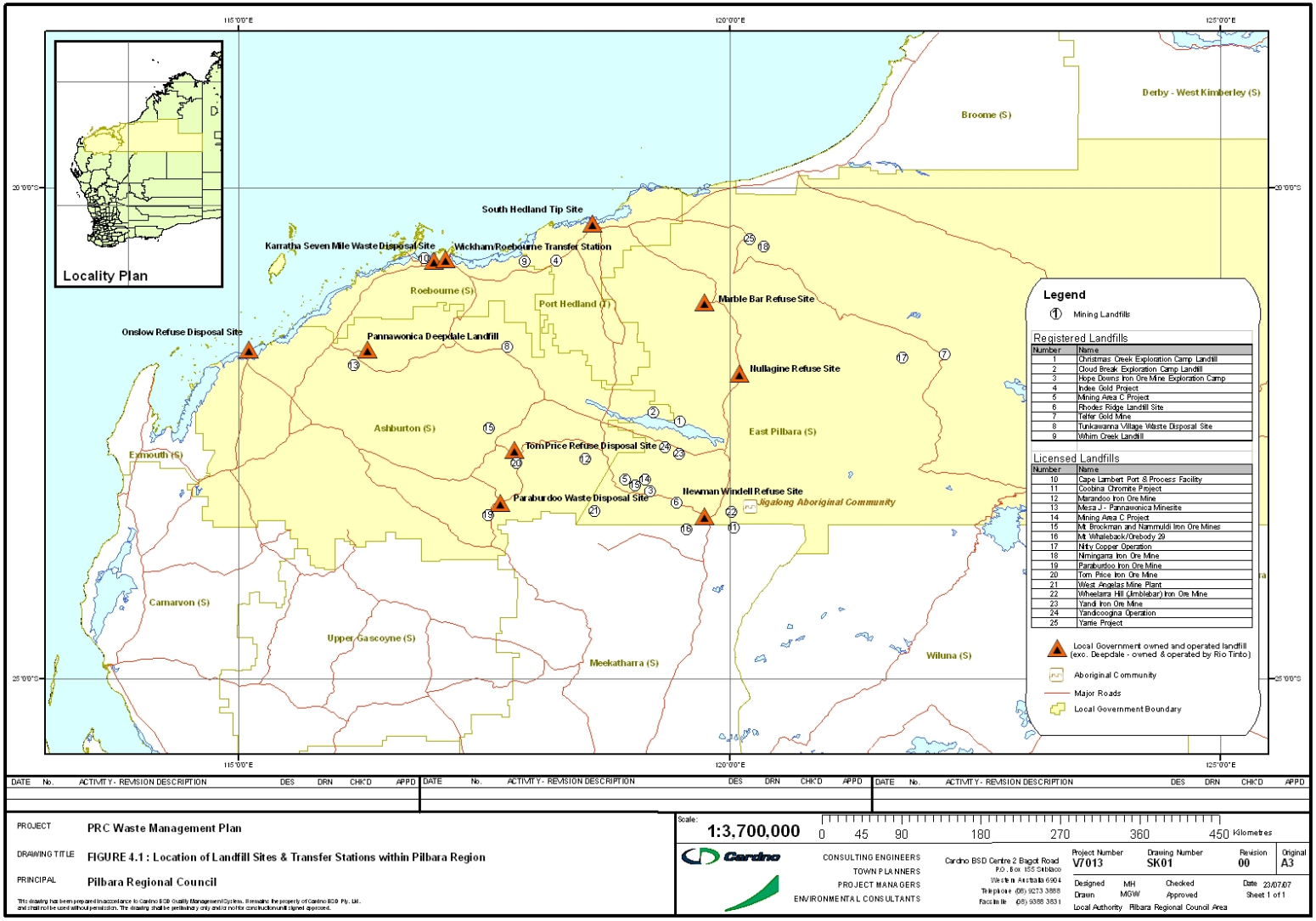


Table 4.2 Council Operated Waste Management Facilities in the Pilbara Region and Deepdale Landfill (Rio Tinto)

Name	Towns Supporting	Owner/ Operator	Category	Landfilling Technique	Life Expectancy	Weighbridge	Compaction	Material Separation for Recycling
Seven Mile Waste Disposal Site	Karratha, Dampier, Roebourne, Wickham, Point Samson	Shire of Roebourne	Category 64 – Class II Putrescible Category 61 – Liquid Waste Facility	Excavation to 6m deep and fill above ground	50 years	✓		Metal, batteries, motor oil, gas cylinders, re-use junk
Wickham / Roebourne Transfer Station	Roebourne, Wickham, Point Samson	Shire of Roebourne	Category 62 – Solid Waste Depot	N/A Transfer Station – temporary storage/consolidation of waste prior to disposal at Seven Mile	No restriction			Metal, batteries, motor oil, gas cylinders, re-use junk
Deepdale Landfill	Pannawonica	Rio Tinto	Category 64 – Class II Putrescible	Excavated pit and fill	7 years			No material separation
Onslow Refuse Disposal Site	Onslow	Shire of Ashburton	Category 64 – Class II Putrescible	Excavated pit and fill Valley fill (natural depression)	6 months			Metal, batteries, motor oil, tyres, green waste
Paraburdoo Waste Disposal Site	Paraburdoo	Shire of Ashburton	Category 64 – Class II Putrescible	Excavated pit and fill	12 months			Metal, motor oil, tyres
Tom Price Refuse Disposal Site	Tom Price	Shire of Ashburton	Category 64 – Class II Putrescible	Excavated pit and fill	15 years			Metal, batteries, motor oil, tyres
Windell Refuse Site	Newman	Shire of East Pilbara	Category 64 – Class II Putrescible Category 61 – Liquid Waste Facility	Excavated pit and fill	20 years			Paper, metal, glass, batteries, greenwaste, reuse junk
Nullagine Refuse site	Nullagine	Shire of East Pilbara	Category 64 – Class II Putrescible	Excavated pit and fill	10 years			Glass, aluminium, cardboard, car bodies, bulk steel, non-ferrous metals
Marble Bar Refuse Site	Marble Bar	Shire of East Pilbara	Category 64 – Class II Putrescible	Excavated pit and fill	10 years			No material separation
South Hedland Tip Site	Port Hedland, South Hedland, Wedgefield	Town of Port Hedland	Category 64 – Class II Putrescible Category 61 – Liquid Waste Facility	Excavated pit and fill	15 years	✓	✓	Metal, motor oil, tyres, greenwaste, timber, reuse junk

4.2.1 Shire of Roebourne

Roebourne Transfer Station

Towns Serviced:	Roebourne, Wickham and Point Samson
Population Serviced:	Approximately 3,000
Tonnage per annum:	1500 tonnes (transported to 7 Mile landfill)
Size:	3.48 ha
Staffed:	Yes
Life Expectancy:	Unlimited
Infrastructure:	1 x Backhoe / Loader, 1 x Hook Lift Bin Truck, 1 x Site office

Comments:

- The site was a tidy and a well-run transfer station.
- Significant volume of material diverted from disposal via reuse shop (trash and treasure) and recycling activity
- Greenwaste collected is disposed of at 7 Mile Landfill. Chipped and mulched greenwaste from 7 Mile is sold for approximate $40 per m^3
- Wind screen for the hooklift bin was not used due to unsuitable design
- Non-compliant with some licence conditions (see **Appendix E** for details)
- Metal separated into type to add value when recycled

7 Mile Landfill

Towns Serviced:	Karratha, Dampier, Roebourne, Wickham, Point Samson
Population Serviced:	15000
Tonnage per annum:	76731
Size:	108.67 ha
Staffed:	Yes
Life Expectancy:	50 years
Infrastructure:	2 x dozer / loader, litter truck, weighbridge, site office, liquid waste lagoons

Comments:

- The 7 Mile landfill is one of the two largest facilities in the region.
- The landfill has basic infrastructure, including a weighbridge, liquid waste lagoons, etc.
- The site was tidy and reasonably well run, the lack of staff availability is impacting on site operations and compliance with licence conditions.
- There is no landfill compactor, this would improve disposal efficiencies, especially considering the large quantity of waste received.
- Contaminated oil drums are filled in unlined mono-cells, this presents a potential environmental risk when the drums degrade (rust) the hydrocarbons will leak and present a risk to groundwater. In addition, as the drums breakdown the mono-cell will experience very significant slumping and will have to be re-profiled and re capped.
- There were large volumes of separated timber packaging waste being disposed of
- Quarantine wastes from metropolitan areas present a potential environmental risk. If a political decision has been made to send the wastes to Karratha, the wastes should be disposed of appropriately, possibly in a fully lined and engineered cell, as it would have been in the metropolitan landfills. The costs of this should be reflected in the gate-fee charged for this waste.
- Non-compliant with some licence conditions (see **Appendix E** for details)

4.2.2 Shire of Ashburton

Deepdale Landfill (Rio Tinto)

Towns Serviced:	Pannawonica
Population Serviced:	686
Tonnage per annum:	<5,000 (estimate)
Size:	64 ha
Staffed:	No
Life Expectancy:	7 years
Infrastructure:	1 x dozer / loader

Comments:

- The site is small, with a basic layout
- The size of the site reported in the survey was 30m x 15m, in fact the site was much larger and is estimated at 5 – 10 hectares.
- Appeared to be a small and tidy site
- Unable to determine many issues as the site visit was unaccompanied
- Greenwaste stockpiled and burnt
- Unable to determine compliance with licence conditions (see **Appendix E** for details) as visit was unaccompanied

Onslow Refuse Disposal Site

Towns Serviced:	Onslow
Population Serviced:	667
Tonnage per annum:	<5,000 (estimate)
Size:	8.2 ha
Staffed:	No
Life Expectancy:	6 months
Infrastructure:	1 x dozer / loader

Comments:

- Areas of stockpiled waste and materials,
- Some wastes were not covered and final contours at the site boundaries were too steep in some areas with exposed waste.
- Licence conditions do not relate to an unmanned site
- Site at capacity and filling continuing. Informed by SoA after visit that an alternative site has been identified and this site will close. It is likely to require some re-profiling prior to capping.
- An untidy site (even for an unmanned site), with little evidence of management or planning
- Potential environmental liability from 'unknown' wastes tipped in unlined site
- On site signage is limited, i.e. for directing people to different tipping areas on site
- Non-compliant with some licence conditions (see **Appendix E** for details)

Paraburdoo Waste Disposal Site

Towns Serviced:	Paraburdoo
Population Serviced:	1,645
Tonnage per annum:	6,000 - 10,000 (estimate)
Size:	14.35 ha
Staffed:	No
Life Expectancy:	12 months
Infrastructure:	1 x dozer / loader

Comments:

- Little or no control over the receival of waste,
- Issues of dumping of wastes in greenwaste stockpiles and other contamination of recyclables stockpiles.

- There was a large stockpile of Commercial and Industrial (C&I) waste that the site operator had no intended final use.
- Licence conditions do not relate to an unmanned site
- Appeared to be raising site by filling cells in 'lifts'
- Quite an untidy site, typical for an unmanned site
- Signage and roads around site were not very clear
- Non-compliant with some licence conditions (see **Appendix E** for details)

Tom Price Refuse Disposal Site

Towns Serviced:	Tom Price
Population Serviced:	3,242
Tonnage per annum:	7,500 - 10,000 (estimate)
Size:	20.0 ha
Staffed:	Yes
Life Expectancy:	15 years
Infrastructure:	1 x dozer / loader

Comments:

- Receival of waste was controlled at the gatehouse
- Daily cover was spread over the waste every afternoon
- Minor licence non-compliance issues (see **Appendix E** for details)
- Well run tidy site
- Problems with oil drums containing unknown liquids, tyres, and contamination of separated recyclable from public (i.e. not separating materials properly)

4.2.3 Shire of East Pilbara

Windell Refuse Site

Towns Serviced:	Newman
Population Serviced:	5,448
Tonnage per annum:	23,000 - 25,000
Size:	80.17 ha
Staffed:	Yes
Life Expectancy:	20 years
Infrastructure:	Leachate Collection System Visual Screening 1 x dozer/loader 1 x litter truck 1 x water cart

Comments:

- The site covered a large area and was operated by a local contractor (John Ward)
- The site was rather untidy but reasonably well run
- Site was achieving a high level of separation and recycling of materials, both from kerbside collection of recyclables and from C&I waste received at the site
- Scrap metals, steel drums, aluminium cans, plastic and other materials were being separated and transported to Perth for recycling
- The site had existing liquid waste lagoons, however new lagoon had been designed and was due for construction
- A MRF was being constructed on site to sort the 'recyclables bin' that is provided to some residents in Newman
- Minor licence non-compliance issues (see **Appendix E** for details)

Nullagine Refuse Site

Towns Serviced:	Nullagine
Population Serviced:	242
Tonnage per annum:	<1,000 (estimate)
Size:	6.0 ha
Staffed:	No
Life Expectancy:	10 years
Infrastructure:	Unknown

Comments:

- Some waste (car bodies, greenwaste etc) had been dumped outside the perimeter fence of the site
- A small unmanned site
- Appears to suffer from frequent burning of general waste in the landfill cell
- Unaccompanied site visit, but some licence non-compliance issues (see **Appendix E** for details)

Marble Bar Refuse Site

Towns Serviced:	Marble Bar
Population Serviced:	655
Tonnage per annum:	<1,000 (estimate)
Size:	4.0 ha
Staffed:	No
Life Expectancy:	10 years
Infrastructure:	No equipment on site. Equipment is brought from Shire Depot as required.

Comments:

- A small unmanned site
- Appears to suffer from frequent burning of general waste in the landfill cell
- Based upon cell not collecting any rainfall, the cell bases have a high level of permeability, which could be causing an impact on groundwater quality
- The site had a “used oil pit’ that also had evidence of burning
- Uncompliant with some licence conditions (see **Appendix E** for details)

4.2.4 Town of Port Hedland

South Hedland Tip Site

Towns Serviced:	Port Hedland (inc. Wedgefield, South Hedland, surrounding communities and stations)
Population Serviced:	12,556
Tonnage per annum:	63,000 – 65,000
Size:	37.37ha
Staffed:	Yes
Life Expectancy:	15 years
Infrastructure:	Weighbridge Waste down facility Recycling depot 1 x dozer / loader 1 x excavator 1 x compactor

Comments:

- South Hedland landfill is one of the two largest facilities in the region.
- The site has a weighbridge and landfill compactor, together with other basic infrastructure and equipment.

- Once past the gate house, the public have open access to all parts of the site and this presents a safety and public liability issue. The site was tidy and reasonably well run,
- There were large volumes of timber waste and old railway sleepers on site
- Poor maintenance of liquid waste lagoons
- Uncompliant with some licence conditions (see **Appendix E** for details)

4.2.5 Additional Facilities and Communities

A number of waste management facilities have been visited during this project, including the three largest Member Council operated sites. However, there are a number of other communities with their own waste management facilities that have to be considered as the RWMP has been developed. These need to be included in the implementation of the recommendations, (e.g. Jigalong).

4.2.6 Observations

The review of waste management facilities produced a number of issues about the operational practices in the Pilbara Region by the member Councils, these include:

- Environmental risk from landfills[4]
- Small unmanned landfills – unquantified environmental risk
- Compliance with DEC licence conditions[5]
- Inconsistent gate-fee charges
- Recording / Planning: Where has the waste been buried, or where will the future cells go?
- Poor collection and recording of waste quantity data and type of waste streams
- Lack of compaction
- Disposal of potentially recyclable wastes
- Tyres, Batteries, Oil Drums are being poorly managed and sometimes landfilled
- Staff retention
- A lack of skills collaboration and knowledge between facilities

4.3 WASTE DATA

An objective of the Waste Management Review was to gather waste stream data, compiled into the following categories:

- Municipal Solid Waste (MSW)
- Commercial and Industrial Waste (C&I)
- Construction and Demolitions Waste (C&D)

Waste stream data provided was limited for the majority of sites and not available for unmanned facilities. Some data was reported for the Seven Mile Waste Disposal Site and the South Hedland Landfill facility; however there was inconsistent terminology and definitions for waste stream. The lack of consistency of waste definitions means that the waste quantity data can not be aggregated to a regional level, other than for total wastes received. The data provided by the member Councils in the survey responses was varied

[4] Information provided by the DEC has stated "The environmental risks associated with landfill sites are generally considered to be low provided they comply with the licence conditions. However, there are exceptions such as Onslow and Marble Bar, which will be closed in the near future. Some of these sites will be closely monitored following the recent site inspections. The majority of the sites are generally compliant and are considered to present a low environmental risk".

[5] Once this report is finalised, the DEC will review the landfills in the Pilbara region with the aim of removing restrictive licence conditions and replacing them with the EP Act and Regulations.

and contained a number of estimates and inconsistent data (when compared to typical quantities and ratios). The waste quantity data provided has been included in **Appendix G**, together with notes about the data. Due to these issues, the data (if used at all) should be utilised with caution.

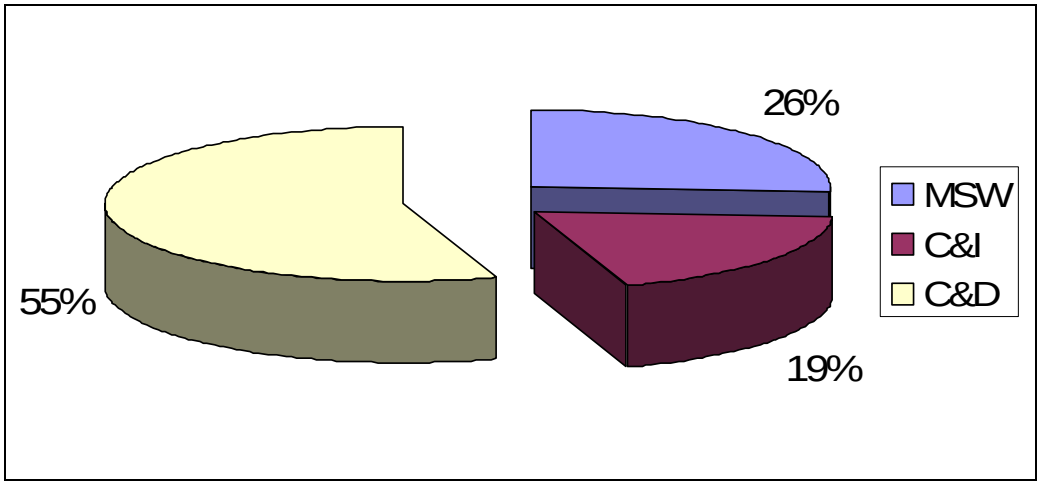
Projections for waste stream volumes (based upon population forecasts) for the Region could not be extrapolated from the data provided by the Council questionnaire results. Predictions on volumes would be inaccurate and including the data would introduce risk as any assumptions could lead to incorrect conclusions being drawn from the data.

The population and economic activity in the Pilbara Region is likely to increase significantly based on resource industry growth. Therefore, based on these assumptions, it can be concluded that the waste volumes generated in the region are likely to increase over the next 5-10 years.

4.3.1 Proportion of Municipal Solid Waste Received

The proportion of tonnages landfilled from the three main waste streams (MSW, C&I and C&D) within the Perth Metropolitan Area are shown in **Figure 4.3**. The ratio of other wastes landfilled in relation to MSW is approximately 3:1. To enable appropriate comparison to the metropolitan waste ratio against the Pilbara Region, the greenwaste and recyclable packaging that is recycled in the Perth area would need to be included as these materials are generally still landfilled in the Pilbara Region. If these materials are added to the total of MSW in the Perth area, the ratio may be as low as 2:1, (i.e. two parts C&I and C&D waste to one part MSW).

Figure 4.3 Waste to Landfill – Percentage Breakdown by Waste Stream for the Perth Metropolitan Area (2004)



The waste quantity data provided by the Local Governments within the PRC does not provide a sufficient breakdown of waste streams received at the landfills to compare the percentage breakdown of waste streams directly against the Perth area data. However, by using typical MSW generation per capita figures for a large Perth Regional Council and the population data for the communities within each landfill's catchment area, the likely tonnage of MSW generated within the catchment of each landfill can be estimated, the data is shown in **Table 4.3** on the next page.

Table 4.3: Estimated Populations Generating MSW, Extrapolated MSW tonnages Generated and Total Waste Received

Landfill Site	Population[1]	MSW (tpa)[2]	C&I and C&D (tpa)	Total (tpa)[3]
Seven Mile	17937	10224	66507	76731
Pannawonica	686	391	1504	1895
Onslow	686	391	1969	2360
Paraburdoo	667	380	6030	6410
Tom Price	1645	938	6736	7674
Newman	5449	3106	43543	46649
Nullagine	242	138	362	500
Marble Bar	655	373	77	450
South Hedland	12556	7157	68235	75392
PRC Total	**40523**	**23098**	**194963**	**218061**

NOTES:
1. The population data used is based upon ABS data, combined with FIFO populations and visitors (using average occupancy rates for hotels and other visitor accommodation).
2. Based on typical MSW generation of 570kg per capita per year
3. Total waste received at each landfill from data provided by PRC Local Governments.

The relative proportions of MSW landfilled in relation to the total waste landfill has been calculated for each site and is shown in **Figure 4.4**, the red line on the graph shows the Perth percentage. The sites with shading are unmanned sites, and the total waste quantities provided are likely to be inaccurate estimates (e.g. Pannawonica, Onslow, etc).

Figure 4.4 Proportion of Municipal Solid Waste (MSW) Received at the Landfill Sites, in Relation to Total Waste Received

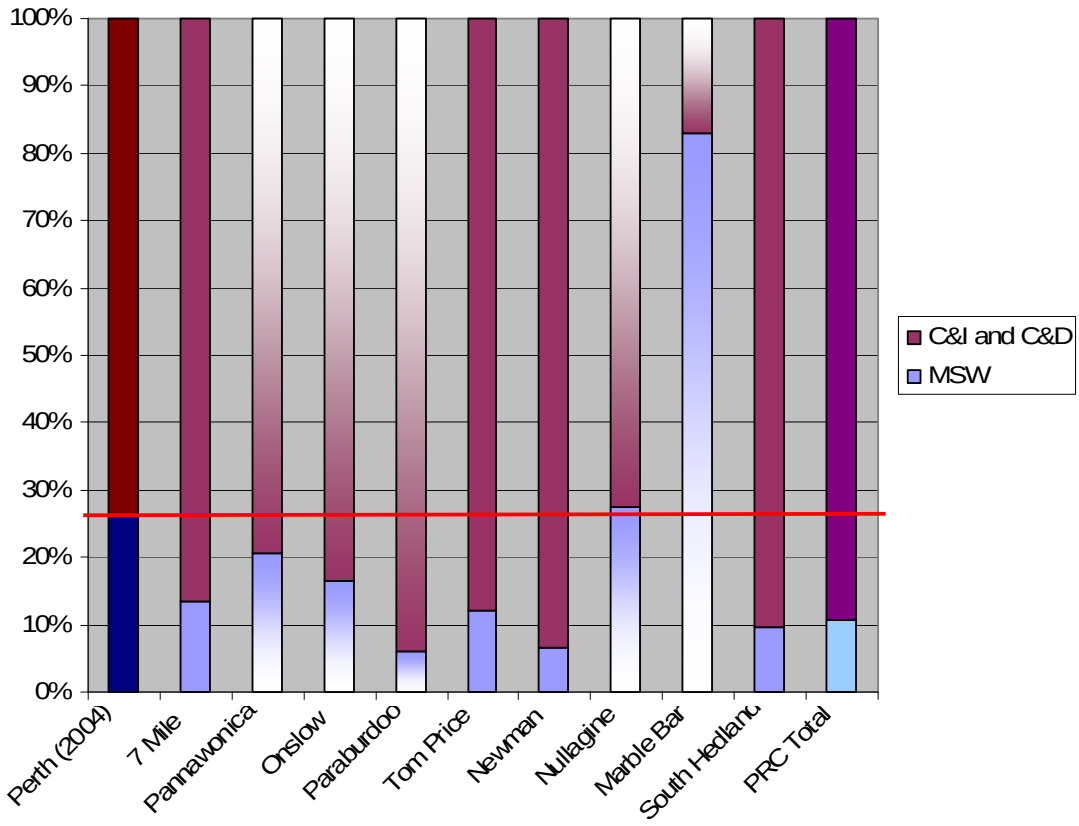


Figure 4.4 shows that for the Pilbara Region, there is a greater proportion of other wastes (C&I and C&D) received at the Member Council landfills than is received at the Perth Metropolitan Area landfills.

4.3.2 Regional Waste Generation Data (inc. private landfills)

The focus of the RWMP has been the waste streams managed by the PRC member Councils. However, this accounts for only a proportion of the total wastes generated in the Region. There are 33 landfills licensed or registered with the DEC in the Pilbara Region, only eight of these facilities are operated by the Pilbara Local Governments and the remainder are operated by resources companies. It is understood that a number of the resource companies are currently recycling materials or assessing the viability of recycling.

The recycling industry, like any other industry, becomes increasingly cost effective as the volume of wastes managed increases. Therefore, to maximise the potential recycling in the region, the collection, transport and reprocessing of wastes generated in the Pilbara needs to be co-ordinated between both the public and private sectors. Unfortunately, the data relating to waste quantities received by the Local Governments is limited, and the scope of this report has not included the collection of waste quantity data from private industry. However to develop and implement effective recycling strategies, this data should be gathered and analysed to present the complete picture of all the waste generated in the region.

4.3.3 Observations

A number of observations can be drawn from the waste data available:

- Generally, the quality of the data is poor, or reliant on estimates
- Waste stream definitions are inconsistent; therefore, site data can not be aggregated to provide regional figures
- Considering the three main landfills, the ratio of other waste to MSW received is higher than the Perth average (see **Figure 4.4**). Indeed the average ratio of the Pilbara Region is approximate 9:1 (i.e. nine parts other waste to one part MSW). Therefore there is a higher proportion of other waste (i.e. C&I and C&D waste) than experienced in the Perth area
- On average, approximately 90% of the waste disposed of at the Region's Member Council operated landfills is non-domestic waste; therefore, these facilities are utilised predominately by the region's commercial businesses.
- As approximately 90% of the waste received is non-domestic, this highlights the issue that all costs associated with; establishing, operating and closing each facility must be covered by the gate-fee revenues, to avoid a future financial burden for the Member Council rate payers
- The waste received at the Member Council landfills only represents a proportion of the wastes generated in the region, there are 25 registered landfills operated by private businesses
- The total volume of waste types produced in the region has not been quantified, and it is unlikely that this data is currently available

4.4 POTENTIAL TO RECYCLE DOMESTIC PACKAGING WASTE

An objective for the RWMP was to identify opportunities to increase the level of recycling in the Pilbara Region. A key assessment area is the viability of recycling packaging waste from domestic waste streams. Generally, these materials are collected by Local Governments via a kerbside bin collection and / or drop-off collection systems before they are transported to Perth for reprocessing or further transport interstate or overseas. Kerbside bin collection systems have been shown to capture a great proportion of

packaging waste (35kg - 60kg per capita per year) while drop-off collection yields are generally lower (15kg – 25kg per capita per year). However, the cost to provide a kerbside collection system is can be 10 – 20 times greater than the cost to provide a drop-off collection. It should be noted that the town of Newman (within the Shire of East Pilbara) already provides a kerbside collection for recyclable packaging waste for its residents.

Due to the poor quality of the data the member Councils are able to provide, the viability for the recycling of packaging materials has been assessed using extrapolated waste data based upon typical generation quantities per capita for regional Western Australia.

The Cardno BSD/Meinhardt Joint Venture produced a Regional Recycling Potential Model to assess the viability of kerbside or drop-off recycling in regional Western Australia (Cardno BSD / Meinhardt JV, 2005). The model has be adapted for the PRC and utilised to model two 'drop-off' collection scenarios:

- Scenario 1 - recyclable packaging material from the Domestic waste stream is transported to Perth for processing and then exported to overseas markets

- Scenario 2 – recyclable packaging material from the Domestic waste stream is transported to Port Hedland for processing and then exported to overseas markets

'Drop-off' collections are often the first stage for recycling domestic packaging recyclables, and should assist in increasing general waste and recycling awareness within the community. Ultimately this could lead to the implementation of a kerbside collection for packaging recyclable in the future.

The Regional Recycling Potential Model is not designed to accurately estimate the costs and benefits for undertaking recycling. The model is designed to provide early indication if recycling might be feasible and if further exploratory work should be undertaken. The model assumes around 15 kg of domestic recyclable material each year will be generated per capita and will be dropped off at nominated drop off points, including transfer stations. The model currently excludes glass from the suite of recyclable materials collected as the nearest reprocessing facility for glass is located in South Australia and together with contamination issues that collecting glass can create, is impacting on the future viability of recycling glass within Western Australia. If local markets for the material, such as use in roadbase, or as a drainage medium can be developed, glass may be separately collected and used within the region.

The Regional Recycling Potential model was populated with ABS 2006 census data, which represents permanent town population. Daily transient population was estimated and added to ABS figures by contacting each of the major local hotels, motels and tourist parks for number of rooms and sites. ABS March 2007 occupancy rates were applied to the number of rooms and sites. The population was also updated to include an estimated FIFO work force population by applying the difference between residential population and ABS census data while also making some allowances for people being accommodated in the major local hotels, motels and tourist parks. However, the member Councils are still concerned about the accuracy of the population data provided by the ABS. The member Councils feel that the population data from the 2006 ABS survey and the population projections for the region are low, a report by the Pilbara Industry's Consultative Committee (2007) suggest the regions population will exceed 50,000 before 2011 and may increase to in excess of 65,000 by 2021.

The model also takes into account, the distances to Perth and Port Hedland, which were taken from Hema maps. With regard to the FIFO population, the furthest distance within each Shire/Town was assumed to be the distance from Perth and Port Hedland respectively (i.e. worse case scenario). The actual population of FIFO workers has been calculated to allow for the part-time nature of their residency so the FIFO population figures used are equivalent to full time residents. The model does not include domestic waste

coming from Local Government organisations, resource companies, commercial activities or light industrial industries sources. The population numbers and distances are understated and some source streams are ignored, hence the model represents close to the worse case scenario for each town within the Pilbara and the volumes of recyclable material that can be generated is significantly under estimated as a result. The results of the model analysis are outlined in **Table 4.4.**

The model calculates both the financial benefit and environmental benefit (red figures indicate a negative benefit, i.e. cost). The financial values are potential estimates only and should not be assumed as actual values. Further work is required before actual fiscal estimates can be determined. The green cells indicate that a 'recycling hub' is potentially a viable option at the stated location, while red cells indicate that a 'recycling hub' is unlikely to be viable at the stated location. An example of the model is shown in **Appendix I**.

Table 4.4 Results from the Regional Recycling Potential Model

	Population	Tonnage	Perth Hub Compact	Port Hedland Hub Compact
Shire of Roebourne				
Karratha (& surrounds)	15,637	234.6	H	H
Miscellaneous				
Cleaverville				
40 Mile Beach				
FIFO Camps	2,298	34.5	L	L
Total	**17,935**	**269.0**		
Shire of Ashburton				
Pannawonica	686	10.3	L	L
Onslow	667	10.0	L	L
Paraburdoo	1,645	24.7	L	L
Tom Price	3,242	48.6	H	L
Miscellaneous				
Auski Tourist Park	45	0.7		
FIFO Camps	1,408	21.1	L	L
Total	**7,694**	**115.4**		
Shire of East Pilbara				
Newman	5,448	81.7	H	H
Marble Bar	654	9.8	L	L
Nullagine	242	3.6	L	L
Jigalong	278	4.2	L	L
Miscellaneous				
Cape Keraudren				
FIFO Camps	3,793	56.9	H	L
Total	**10,416**	**156.2**		
Town of Port Hedland				
Town of Port Hedland	11,411	171.2	H	H
Miscellaneous				
??				
FIFO Camps	1,145	17.2	L	L
Total	**12,556**	**188.3**		

Total Recycling Potential	**48601**	**729.0**	tonnes/year

Notes: 'H' = heavily or tightly compacted and 'L' = loosely compacted.
The Regional Recycling Viability Model can be downloaded from the Zerowaste website at: http://www.zerowastewa.com.au/communication/publications/da/

4.4.1 Environmental Benefits and Costs

The environmental benefit calculations for the model are sourced from the most comprehensive economic valuation of the environmental costs and benefits of recycling that were calculated in the *Independent Assessment of Kerbside Recycling in Australia* for the National Packaging Covenant Council (Nolan-ITU & SKM, 2001). Key relevant findings of the report that have been used to quantify the environmental benefits in the model are shown in this section.

Table 4.5 Environmental Benefits of Recycling

Finding	Net Environmental Benefit ($ / hh / year)
Australia	$ 68
Western Australia	$ 85
Regional Australia	$ 56

The values shown in **Table 4.5** are based on an typical mix of recyclable materials collected from regional areas (Cardno BSD / Meinhardt JV, 2005); benefits were not presented for specific materials. These values provide best available basis for valuing the environmental externalities from recycling from regional Western Australia. Perth values will dominate the Western Australia figure; therefore the regional figure provides the best starting point. However, any differences in environmental costs and benefits between regional Western Australia and the average for regional Australia need to be considered. Western Australia's regional transport distances, (particularly in relation to the Pilbara), will often be higher. To identify differences, the various factors contributing to the valuation are examined below.

Table 4.6 Differences in Factors Contributing to Environmental Benefits of Recycling – Regional Western Australia vs Regional Australia

Contributing factor	Issues	Valuation Adjustments Needed
Kerbside collection	Collection, transfer and sorting has a small environmental cost of $3 per household per year, according to Nolan-ITU et al. (2001). No similar valuation is provided for resident transport to drop-off facilities (as assessed for the PRC scenarios). For the purposes of this report, any difference in environmental cost would be within the margin of error.	None
Forestry values	Benefits arise from reduced demand for pulp logs from paper recycling. The paper market is globally and nationally integrated. Western Australia has only 0.3% of industry capital investment and 1.7% of its employment (APIC 2004).	None
Mineral resource values	Were based on Western Australia data	None
Air and water emission	The base valuations should not change because they are derived from national and international valuations of repair costs. We assume no	None

Contributing factor	Issues	Valuation Adjustments Needed
values	change in emission quantities from processing since some of these occur interstate and there is no reason to assume that industrial processes in Western Australia are different from the national average. Emissions from transport will be higher due to longer distances, but these occur in rural areas and are assumed to have negligible cumulative impact.	
Global warming	Base valuation should not change because it is derived from national valuations of a global problem. Emissions per unit power delivered in Western Australia are very close to the national average (GWA, 2002). There will be additional emissions due to longer transport distances.	Need to account for emissions from additional transport
Noise, traffic and landfill values	Both form a trivial component of the overall valuation, so any differences would have a negligible impact	None

Note: 1. The model follows Nolan-ITU's precedent in not taking into account the externalities from traffic accidents.

Based on the assessment in **Table 4.6**, the only potentially necessary adjustment to the Nolan-ITU et al. (2001) data is in relation to the greenhouse gas emissions from transport. The data in **Table 4.7** provides the basis for valuing these.

Table 4.7 Data for Valuing the Global Warming Impacts of Transport

Datum	Source	Value
Emissions from medium and heavy duty trucks 2002	AGO (2004)	14,345 Gg CO_2-e
Emissions from railways 2002	AGO (2004)	1835 Gg CO_2-e
Total truck freight task 2001/02	BTRE (2004)	135 billion tonne/km
Total rail freight task 2001/02	BTRE (2004)	156 billion tonne/km
Value per tonne CO2-e	Nolan-ITU et al (2001)	\$20.60/t CO_2-e

Based on this data, the global warming externalities per tonne kilometre of freight transport are 0.22¢ for truck transport and 0.024¢ for rail transport. For rail, this amounts to at most about 1% of the financial cost per tonne kilometre; it can therefore be safely ignored in the model. For road transport the global warming externalities are potentially as high as 10% of total costs, and are therefore included in the assessment. This is achieved by adding or subtracting the calculated externality where transport distances are more or less than the 300 km average distance assumed by Nolan-ITU et al. (2001).

4.4.2 Observations

The results of the recycling viability model suggest the following:

- Based on this 'worst case' scenario for recycling quantities, less than 750 tonnes of material could be recycled each year (or less than 0.34% of the total waste currently received at the Local Government operated landfill sites)
- Potentially the cost to use Port Hedland as the central collection point prior to the transporting of the materials to overseas reprocessors and markets is the more cost effective scenario
- The provision of a drop-off collection service appears to be viable at the larger towns in the Pilbara Region including Karratha, Paraburdoo, Tom Price, Newman, Port Hedland and some FIFO mining camps

4.5 KEY FINDINGS RELATING TO WASTE MANAGEMENT WITHIN THE PILBARA REGION

A number of key findings have been identified during the review of the waste management practices within the Pilbara. The key findings aim to address the issues highlighted in the previous sections of the RWMP and from the comments made during the internal Working Group workshop (**Appendix F)**. These findings have been divided into three categories:

- ***Best Practice***: a number of findings showed that current waste management operations in the region were not to 'best practice' standards. The use of best practice for the waste management activities would assist in minimising the risk of environmental damage or pollution, extend the life of waste management facilities and reduce the operational and maintenance costs associated with the facilities.

- ***Technology and Infrastructure Investment:*** the use of technology at waste management facilities will aid in minimising the risk of environmental damage or pollution, extend the life of landfill sites and reduce the operational and maintenance costs associated with the facilities.

- ***Waste Minimisation:*** the minimisation of waste will assist in extending the operational life of the landfill facilities, maximise the recycling and preservation of resources and minimise the risk of environmental damage or pollution.

The key findings listed in this section have been addressed in the RWMP (**Section 5**). The findings are based on regional generalisations. In some cases individual landfill sites or member Councils are already undertaking the recommended actions, either in part or in full. There is a degree of 'overlap' between some of the findings, with common recommendations.

4.5.1 Best Practice

Knowledge and skills sharing
The technical skill and knowledge of the site staff and managers varied throughout the region. There were some examples of good operational practice, while other areas required improvement. The skills and knowledge within the region are found in 'pockets' and there is currently little opportunity for this to valuable experience to be shared between the staff at other landfill sites. The facilities are often operated in isolation with little linkage between the different member Councils at an operational level.

Staff Recruitment and Retention
The majority of the facilities did not have the full allocation of staff required to complete all the sites operations. This is due to the more attractive salaries that are available with employment within the resources sector. Some of the basic operational activities are compromised at the facilities due to lack of staffing and high staff turnover.

Education and Awareness
There is a lack of knowledge and awareness of waste management and recycling issues and activities within the residential and commercial community. There is a need to educate the community (residential and commercial) about the waste management and recycling issues and programmes.

There is no coordination of education programmes within and between the member Councils, the community (incl. schools), industry and State Government.

Gate fee and waste management operations are likely to change with the implementation of the RWMP. Any significant changes in pricing or operations need to be communicated to the waste generators and other stakeholders.

Compliance with DEC Licence Conditions

There were a number of non-compliances with licence conditions at the facilities visited (see **Appendix E** for details of these non-compliances). All DEC licence conditions must be complied with as the very minimum standard of operation.

A number of licence conditions for some of the facilities are not appropriate for the type or operation of the facility[6]. These licence conditions can not be complied with and could establish a culture of accepting non-compliance by operators[7].

Availability of Waste Data

The quantity and quality of data provided by the Pilbara member Councils was incomplete, inconsistent and lacked substance. Therefore, the Project Team was unable to baseline operations and costs, upon which to determine structured change and the performance indicators to be used to measure the impact and value of change. Variations in waste type terminology and definitions between the Pilbara Local Governments mean that data could not be aggregated at a regional level. Although not part of the scope of this report, the waste data from the 25 private landfills in the region should be collected to provide a clear picture of the total wastes disposed of in the Pilbara Region.

The waste received at the eight landfills operated by the Member Council accounts for only a proportion of the waste disposed at the 33 registered landfills, contained in the Pilbara Region. Some resource companies are already collecting a range of materials and transporting them to Perth for reprocessing, however this is being carried out in isolation to Local Government waste management activities.

The lack of data results in the member Councils being unable to baseline operations and costs, upon which to determine structured change and the performance indicators to be used to measure the impact and value of change. Variations in waste type terminology and definitions between the Pilbara member Councils mean that data could not be aggregated at a regional level. The keeping of records relating to previous cell locations and waste types are a regulatory requirement, this is particularly important for hazardous wastes such as asbestos and clinical wastes.

Best Practice Landfilling Techniques

The operational practices at the waste management facilities varied considerably. Some operational activities were well managed while others require improvement (See **Appendix F** for details of site assessments).

Gate Fee Prices and Regional Techniques

The gate fees ($ cost per tonne) at each landfill site were inconsistent and prices did not always reflect the true cost of processing or disposing of the waste streams. The unmanned sites have open access with no gate fees. In extreme cases, this has led to examples such as waste that was produced in Tom Price (a manned site) being transported to Paraburdoo (an unmanned site) to avoid paying the gate fee (Per comm. Mark Gladman (SoA)). The inconsistent, low or lack of gate fees do not always reflect the true cost of processing or disposing of the waste. Therefore, the revenue from gate fees does not cover the cost of operating the landfills. This results in waste generators in the region being subsidised by ratepayers to cover their disposal costs. Inconsistent gate fees can also lead to 'competition' between facilities, although the distances between sites minimises this risk.

[6] The DEC have stated that they will be reviewing the licence conditions after this report to focus on the key environmental issues rather than enforcing all aspects of the licence.

[7] The DEC have advised that, in the short term, that any site that receives less than 5,000 tonnes per annum will fall under the Environmental Protection (Rural Landfill) Regulations 2002. Therefore some of the smaller landfills may change from a licensed landfill to a regulated landfill.

The gate fee prices at some facilities were structured to encourage recycling or the separation of household hazardous wastes, but this was not the case at all facilities. Establishing different (lower) pricing for recyclable and household hazardous wastes produces an economic incentive to encourage these materials to be delivered to the sites already separated. This enables the recyclable materials to be stored for collection prior to reprocessing and avoids household hazardous wastes entering the landfill cells and potentially causing environmental damage.

'Green' Procurement

This issue was not included in the survey or during the workshop; therefore the current situation within the region is unknown. A 'green' procurement policy would assist with the development of markets for recycled content products. Opportunities range from recycled concrete used for road base, to the simple use of recycled content paper in Member Council offices. 'Green' procurement policies assist in stimulating the demand for recycled materials and therefore increase the price for the material, ultimately increase recycling activities.

Household Chemical Waste

Some Household Chemical Waste (HCW) is disposed of to landfill. The staffed landfills allow for the drop off of high volume low toxicity (HVLT) wastes e.g. paint, car batteries and oils. There was limited evidence that there were coordinated collections for low volume high toxicity (LVHT) wastes e.g. household cleaning chemicals. The harmful properties of HCW may provide exposure pathways that may impact on human health and the environment. There is a need for a coordinated approach to managing household chemical waste disposal

Hazardous Wastes

The sites received a number of hazardous wastes. Particular issues relate to the disposal of quarantine waste at Seven Mile (in an unlined cell) and the potential illegal disposal of hazardous wastes at the unmanned facilities. In addition, other industrial wastes may be received at a number of sites in the region as new industrial projects are initiated.

The hazardous wastes, by their very definition, present a greater risk to the environment and human health. If these wastes were disposed of in Perth, they would have to taken to at least a Class III facility, with a lined cell. While the quantity of these wastes is low, the potential risk they present is high, especially when disposed of in unlined landfill cells. These wastes could infiltrate through the cell floor and contaminate the underling groundwater.

'Whole of Life' Landfill Costs

The gate fees charged at the facilities need to reflect the 'whole of life' cost for the site. Based on the information provided during site visits, a number of facilities where not making financial provision for closure. The costs of excavating, (lining) operating, closing and monitoring a landfill site are significant and need to be considered when calculating the gate fees to be charged. If the whole of life costs are not covered by the gate fees, there is a risk that a Member Council will incur a future financial burden.

4.5.2 Technology and Infrastructure Investment

Compaction of waste

A landfill compactor is currently used at the South Hedland landfill. Compactors are not currently used at the other sites; instead waste is spread and compacted with tracked bulldozers or wheeled loaders, resulting in poor compaction of waste and the inefficient use of available void space.

A tracked bulldozer will produce a maximum compaction density of 500 – 600kg/m3 (although densities as low as 350 kg/m3 have been reported from some rural landfills in

WA). A dedicated landfill compactor can achieve maximum densities of 550 – 1100 kg/m3, depending upon the machine model and waste types.

The density of waste is directly related to the operational life of a site (i.e. a 25% increase in compaction density results in a 25% increase in operational life). Low compaction densities may result in increased settling and slumping of landfill cells, which would lead to remediation work to landfill caps and the associated cost to undertake these works.

Use of Transfer Stations (Instead of small landfills and to restrict public access to tipping faces)

There are a number of smaller facilities in the region that are currently unmanned (e.g. Pannawonica, Onslow, Paraburdoo, Nullagine and Marble Bar). The sites are generally untidy as they lack supervision and provide no revenue as gate fees can not be collected. There is no control over the waste disposed on site, monitoring of the quantities or types of waste disposed. Due to the small volumes of waste received there is often little infrastructure and equipment (e.g. weighbridge, compactor, loader, etc) to maintain the facility.

The lack of monitoring and data collection makes reporting (e.g. DEC Zerowaste survey) and planning for the sites problematic. Hazardous wastes could be illegally disposed at sites, creating an environmental risk. Lack of supervision can also lead to poor separation of recyclables and increased contamination within storage areas. Open access to the entire site creates potential public liability issues for the PRC member Councils.

The larger landfills have uncontrolled public access to the tipping face and in some cases, to the entire site. General access to the tipping face can create public liabilities issues; in addition, it allows the public to easily by-pass any recycling areas. Once the public pass the gatehouse, they can dispose of waste anywhere within the landfill area or scavenge from the site.

The introduction of transfer stations would avoid the use of unmanned landfills and open access to the tip face on the larger sites.

Recyclable Material Collection Systems

The Working Group indicated that there is a desire by the public to recycle using the 'twin bin' waste collection system. The member Councils are not sure whether this system is financially viable. Kerbside collection is expensive and yield of recyclable material is often less than expected due to contamination. However, education and awareness programmes limit this problem.

Community drop-off facilities may be an option for the Pilbara Region; however, there have previously been issues with high contamination in Karratha. The Regional Recycling Model indicates that recycling of domestic waste should be possible within the Pilbara Region at larger towns through recycling drop off centres and recycling hubs at community centres and transfer stations.

Trailer Waste

The quantity of trailer waste received at the landfill facilities is significant. Residents have access to landfills located close to the main towns. Trailer waste can be self-hauled to these landfill sites. The system can be used by any resident and there is no disposal fee for the waste material. The free tipping of trailer waste does not promote recycling or waste minimisation. There is a concern that if a charge for the disposal of these wastes was introduced, it may lead to an increase in illegal tipping.

4.5.3 Minimisation of Waste Disposal

Coordination of Recycling

A number of the resource companies operating in the Pilbara Region are undertaking recycling but independent of each other. Local Governments have differing policies and practices regarding recycling but recycling is a low priority for Councils because of its complexity and cost. The coordination of recycling management across the Pilbara under a single entity should provide economies of scale to the betterment of industry and community. Resource companies are using leverage associated with transporting goods to the Pilbara to back load recyclable material to Perth. Local government does not have the same leverage as the resource companies do in minimising back loading costs; therefore, making recycling non-cost effective. The Regional Recycling model indicates that recycling of domestic waste should be possible within the Pilbara Region.

Working Group discussions during the first workshop indicated that networking among Member Council waste management professionals, and industry environmental officers is non-existent. The lack of networking between waste management professionals within member Councils and within industry and between the two is preventing the promotion of best practice and identification of cost saving opportunities to the betterment of all parties.

Incentives to Recycle

The contractor managing the Windell (Newman) Landfill is undertaking some pro-active recycling; where as the municipal managed landfills are generally not actively pursuing recycling. The Windell Landfill is the only landfill being operated by a contractor. The profitability of the contractors operations are directly impacted by costs and the revenue received. There is a strong incentive to recycle however no incentive programmes occur within the member Councils to encourage staff to proactively collect and manage recyclable materials.

Previous attempts to recycle in Karratha have failed because high levels of contamination. Contamination is also a problem in Broome and Newman. High levels of contamination reflect the lack of education and awareness of the community.

Recycling is a latent thought within corporate operational processes, which makes recycling difficult. The requirement for recycling is not properly considered during the design and construction phases of hospitality related businesses, which includes FIFO camps.

Kerbside collection is expensive and the yield of recyclable material is often less than expected due to contamination. This is the preferred method of recycling for most people as it is seen as the easiest method; unfortunately, it is also abused frequently resulting in less than expected yields.

Recyclers have an interest in setting up recycling operations in the Pilbara Region but there is a lack of quantitative information to build an appropriate business case on. The public have a general perception that recycling is feasible and that it should be undertaken in the Pilbara Region. The undertaking of recycling must be cost effective and sustainable over the long term and this involves developing the recycling industry within the Pilbara Region.

The Regional Recycling Model indicates that recycling within the Pilbara should be possible; however, previous experience is that contamination offsets the value of recycling. There was no exact data that identified the actual level of contamination that was occurring and evidence was anecdotal.

The member Councils and the WALGA – Municipal Waste Advisory Council (MWAC) do not hold a comprehensive range of standards relating to waste and recycling. There are standards for waste management and recycling and these should be readily available to all Member Council waste management staff.

There are Material Safety Data Sheets (MSDS) for most products; especially those associated with chemical hazards and other safety related issues.

Household Recyclables

For all member Councils, (with the exception of Newman within the Shire of East Pilbara), recyclable packaging was mixed with the domestic refuse waste stream and landfilled. The disposal of these materials causes the loss of embodied energy, resources and uses landfill air space. Degradation of organic materials (e.g. paper and card) contributes to leachate that can contaminate groundwater and generates methane (which has twenty one times the greenhouse potential of carbon dioxide).

Greenwaste

The management of greenwaste throughout the region includes burial, burning, storage and chipping. Greenwaste is an organic waste stream, therefore when disposed of to landfill produces methane and leachate, while also consuming landfill void space. When burned greenwaste produces carbon dioxide emissions but preserves landfill void space. When mulched the greenwaste is recycled, void space is preserved and the embodied carbon is released into the natural carbon cycle. Significant quantities of greenwaste were observed as being disposed of at the landfills as part of mixed loads, even when the separation of the greenwaste was encouraged.

Pallets

Pallets are being taken to landfill sites where they are being buried, burnt, reused or sold. It is illegal to destroy, reuse or sell CHEP or Loscom hire pallets and this includes returning the pallets to CHEP/Loscom clients as it distorts their accounts to the detriment of the companies. CHEP and Loscom will collect serviceable pallets free of charge. Pallets that are not labelled can be re-used and re-sold. Perth based second-hand dealers will purchase pallets for between $2.00 and $4.00 per pallet depending on type and condition. These dealers will not pay transport costs to Perth. Second-hand dealers then sell pallets for around $5.00 each. Pallets built for transporting goods overseas are treated and should be disposed in accordance with appropriate standards and instructions.

Tyres

TPA Australasia has approached the Pilbara Regional Council to support its process to recycle tyres in the Pilbara Region. There is an end-of-life tyre management problem within the region with no cost effective method for disposing of end-of-life tyres. Currently all tyres are buried, most in individual tyre cells. TPA Australasia is seeking to identify the correct number of passenger, light vehicle, truck, plant and haulpak tyres available for recycling to determine the viability of setting up a tyre recycling facility in the Pilbara. TPA Australasia is also seeking the composition of haulpak tyres in order to identify how to properly decompose the tyre via shredding.

Rio Tinto is exploring the feasibility of recycling tyres, in particular its haulpak tyres, and is in discussion with several companies. There is some sensitivity relating to tyre usage and management within the resource sector. Some member Councils charge a levy for the disposal of tyres in their landfills.

Metals (excluding domestic recyclable metals)

The recycling of metals provided the greatest financial return to those recycling and to recyclers, such as SIMS Metal. Separated metals demand a higher price than mixed metals. SIMS Metal advised that it is facing economic challenges associated with moving its crusher/baler around the Pilbara Region and was looking for ways to reduce transportation costs and increase productivity.

Smorgon Steel expressed views that the current method of recycling of metals out of the Pilbara Region is uneconomical. The recycling of metals can be lucrative for those collecting and recycling metals and for the recyclers. However, the increasing cost of

transportation is making some practices non-profitable. Better coordination of preparation and collection of metals is required to ensure the longevity of metal recycling.

Batteries
The management and recycling of car and truck batteries is being undertaken to mixed standards, making it difficult to handle batteries and for recyclers to accept batteries. In some cases the poor management of batteries at landfills makes the collection areas look untidy and poses additional hazards and causes recyclers to have to re-pack pallets prior to or during transportation.

Oil Drums
Oil drums are problematic and most are being unnecessarily buried. Drums are being collected and prepared at Windell Landfill (Newman) for recycling. Oil drums need to be cleaned and prepared before recycler crushing and baling. Landfill sites do not have the appropriate facilities to clean and prepare drums for recycler crushing and baling.

Gas Bottles
Gas Bottles are problematic and some are being unnecessarily buried. A number of gas bottles are taken to the landfill sites because domestic removal companies will not move the bottles. Preparing gas bottles for recycling can be dangerous if not done correctly. Landfill sites do not have the appropriate equipment to prepare gas bottles for recycling.

Electronic Waste
Quantities of electronic waste (E-waste) and household appliances (fridges, washing machines etc.) are being disposed of at the landfills. SIMS metals are currently undertaking metal collections in the Region. In addition to metal recycling, the company also offers E-waste and household appliance recycling.

5. REGIONAL WASTE MANAGEMENT STRATEGIES – RECOMMENDATIONS AND IMPLEMENTATION

5.1 VISION, GOALS AND STRATEGIES

Vision
The Pilbara's Vision for waste management is the same as the State's Vision – '***Towards Zero Waste***'.

Goals
The Pilbara's Goals are:

- **Goal 1**: Develop a Strategic Waste Management Plan that outlines the actions necessary to be taken to minimise the direct and indirect environmental impacts of waste and its management on the Pilbara over the next ten years.

- **Goal 2**: Manage waste in a sustainable manner, through the use of:
  - Best Practice,
  - Technology, and
  - Minimisation of Waste Disposal.

- **Goal 3**: Increase awareness of the impact of waste on the environment by the whole community.

Strategies
The first goal is achieved with the development of the plan below, which will be monitored during implementation for effectiveness and efficiency. The Plan itself will be formally reviewed and updated in 2012.

The follow regional waste management strategies have been formulated by Cardno BSD and the PRC Executive to meet the requirements of Goals 2 and 3. Each strategy is shown in the following tables and comprises of these columns:

- Findings: A brief description of the findings discovered by the Project Team during the Waste Management Review and the development of the RWMP
- Issues: The economic / environmental / financial / social issues that are brought about by the findings
- Recommendations: Recommended actions which are formulated through innovation, imagination and/or improvisation
- Implementation Strategy: Actions required to implement the strategy
- Cost: Estimated cost to implement the strategy
- Priority: The priority of the strategies implementation, the entity responsible and a measurable outcome for the recommendation.

The findings and plan are based on generalisations. In some cases, member Councils are already undertaking the recommended actions, either in part or in full. However, for consistency it is recommended that each member Council review its waste management practices against each of the recommendations below.

5.2 BEST PRACTICE

The use of best practice for the waste management activities in the Pilbara Region will assist in minimising the risk of environmental damage or pollution, extend the life of landfill sites and reduce the operational and maintenance costs associated with the facilities.

5.2.1 Knowledge and Skills Sharing

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The technical skill and knowledge of the site staff and managers varied throughout the region. There were some examples of good operational practice, while other areas required improvement.	The skills and knowledge within the region are found in 'pockets' and there is little opportunity for this valuable experience to be shared between the staff. The facilities are often operated in isolation with little linkage between the different sites at an operational level.	The existing 'pool' of knowledge and skills needs to be increased and expanded throughout the region. The region needs a forum for the waste management staff to compare operational practices at the facilities and discuss new policies, regulations, funding schemes etc. to ensure the skill and knowledge base of the waste management staff is continually improving and shared. This will also help to minimise the knowledge that is lost with staff turnover.	A waste group should be established in the region made up of operational and managerial staff. The location of the regular meetings, (possibly quarterly), should be rotated around the region's facilities. This would include a site tour and then a structured meeting. Each site should be visited every 2-3 years by the group. The group should include invited guests such as representatives from the DEC, MWAC, the resources industry, commercial waste management companies, etc. This will ensure the council employees are up to date with any changes in the industry.	The cost to establish and run the group would be the time 'lost' for staff to travel and attend the meetings. The strategy will also introduce a travel cost for each of the member Councils. However, the knowledge and experience gained from the meetings would provide a far greater benefit in terms of increasing staff knowledge and skills, which will assist in improving operations at the regions facilities which should result in operational cost savings.	Immediate **Whom** PRC with support from all member Councils and DEC **Outcome** First meeting within 3 months of RWMP being adopted

5.2.2 Staff Recruitment and Retention

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The majority of the facilities did not have the full allocation of staff. This is due to the more attractive salaries that are available with employment within the resources sector.	Some of the basic operational activities are compromised at the facilities due to lack of staffing and high staff turnover.	The PRC should explore the option of attracting overseas waste management staff, by providing sponsorship visas for the potential employees. Any employees that are sponsored will be 'linked' to their employment at the facility via their visa, which should ensure they remain employed by the member Councils. However, this will not address the issue of providing accommodation for the staff.	The PRC should investigate the potential use of employee sponsorship visa to attract overseas workers. If viable staff could be sought via specialist overseas recruitment companies.	The costs to be incurred are the initial investigation into the viability of the recommendation, visa application costs (approx $1000) and the recruitment company fee (variable).	Within 12 months **Whom** PRC **Outcome** Feasibility decided within 12 months

5.2.3 Education and Awareness

As outlined in **Section 1.3,** a number of facts and assumptions were stated and included the following:

- *The Pilbara community want to do recycling*
- *The Pilbara community are prepared to pay more for waste management services if there are environmental benefits*
- *Recycling requires full community commitment, without which, recycling will not work*

Education and awareness of waste management and recycling throughout the community (i.e. residents, organisations, business and industry) must be included as a 'horizontal' strategy throughout the entire implementation strategy and is integral to its success or failure. The wider community need to understand the issues and reasons why the waste management and recycling programmes are being introduced, how they will be affected, what is required from them and the benefits that the community and the Pilbara Region will gain.

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
There is a lack of knowledge and awareness of waste management and recycling issues and activities within the residential and commercial community.	There is a need to educate the community (residential and commercial) about the waste management and recycling issues and programmes. The PRC, together with its member Councils, must focus on communicating why it is important to act in more sustainable ways and this must be supported with measures of success. If the community understand the reasons for their actions, and can see genuine and attainable results, this is a great motivator and reinforcer for changes in behaviour. Sometimes, just knowing that they are making a difference is a strong enough incentive for change. Reporting	The PRC should be tasked with the development of a regional communication and education programme. The programme should be developed in consultation with the DEC. The programme should concentrate on reduce / reuse / recycling strategies to minimise the amount of waste disposed of to landfill: **Reduce:** - Buying items with less packaging - Buying in bulk - Use own shopping bags - Buy environmentally friendly products - Buying items that can be reused/refilled/recharge/recycled - Buy loose fruit and veg - Buy items that will last	One of the first tasks would be to determine what communication and education programmes are currently being undertaken in the Region. A regional brand should be created. Member Councils and the PRC should agree on the key messages and communication priorities on a regional basis. Communication materials should be developed and distributed to each household in the region, covering the regional details of how waste is disposed of, and what households can/should do with their waste and planned recycling and waste programmes.	The initial set-up costs would be spread across governments and industry as equitably as possible. Some of the costs associated with DEC run programmes will be absorbed by State Government. Programmes are paid for by the Waste Management and Recycling Fund, raised from the Landfill Levy. Some programmes are also sponsored by corporate businesses within the waste management industry.	Within 12 months **Whom** PRC with support of all member Councils **Outcome** Programme developed and implementation started within 12 months

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
	feedback on performance to the community can assist in improving community awareness.	**Reuse:** - Promote charities or selling/buying items second hand - Promote lasting/refillable/rechargeable product **Recycle:** - Promote proposed recycling hubs and recycling at landfills/transfer stations	A plan for major advertising and editorial in local papers across the region reinforcing the regional messages. A regional tool should be developed for reporting performance to the community, for example – a community score card. These implemented strategies should involve consultation with the involved stakeholders and in consultation with DEC and any programme sponsors.		

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
There is no coordination of education programmes within and between the member Councils, the community (inc. schools), industry and State Government.	Waste management will be most effective in the region when the objectives and activities of all stakeholders are aligned. **Member Councils:** Member Councils operate largely independently from each other. When it comes to waste management it is important that Councils can work together to find an education strategy appropriate for the region. **Industry:** Education strategies have been implemented within the commercial and mining industry. **Community and Schools:** Waste education within the community and schools has not been identified through this project. It is anticipated that there is a limited amount of education within these sectors. An education strategy is needed by the PRC to coincide with the introduction of the RWMP.	Programmes should be unified In addition, different programmes should cater for the community, industry and school. **member Councils:** The PRC was established with this partnership in mind. The PRC and regular meetings will provide a forum for dialogue between member Councils. **Industry:** Current activities should be communicated to all stakeholders. Achievements and gaps should be identified. Suggested strategies - Extended producer responsibility - Industry waste reduction - Discuss the new gate fee structure at landfills and how the price reflects amount of processing required and potential environmental impacts. The future pricing policy will need to be communicated to all those involved, including member Councils, industry and the community. **Community:** - Buy recycled guide - How to shop smart - Fact sheets - At home composting - Location of proposed community run drop off facilities/transfer stations **Schools:** - The recycling coordinator should discuss the 'Wastewise' programme with schools located in the Region, in consultation with the DEC who run the programme	As above	As above	Within 12 months **Whom** PRC with support of all member Councils **Outcome** Programme developed and implementation started within 12 months

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
Gate fee and waste management operations are likely to change with the implementation of the RWMP.	Any significant changes in pricing or operations need to be communicated to the waste generators and other stakeholders.	Regional gate fees should be communicated to all stakeholders involved in waste disposal including member Councils, industry and the community.	The rationale behind any changes should be explained and included in the wider community awareness programme		Within 12 months **Whom** PRC with support of all member Councils **Outcome** Industry communication plan developed and implementation started within 12 months

5.2.4 Compliance with DEC Licence Conditions

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
There were a number of non-compliances with licence conditions at the facilities visited. (See **Appendix F** for details of site assessments).	All DEC licence conditions must be complied with as the very minimum standard of operation.	The Pilbara member Councils need to commit to work to the regulatory processes in place and ensure all licence conditions are complied with[1]. The DEC could provide some input in providing assistance/advice to operators to comply with the relevant legislation. This could be either through training/seminars or through liaising with DEC staff when they pass through the regions.	Each member Council should ensure current and new site operators/managers are aware of the licence conditions and the need to maintain compliance with the conditions. The landfill site review findings are included in **Appendix D**, this provides each member Council with an indication of the issues that need to be addressed for each site.	The training and awareness of staff about the licence conditions can be incorporated into normal training activates. Some capital or operational costs may be incurred to ensure compliance (e.g. cost of completing groundwater monitoring and reporting, production of post closure management plans, etc).	Started within 3 months **Whom** Each member Councils for its own facilities, but linkage for regional cooperation **Outcome** Action plan developed and full compliance within 24 months
A number of licence conditions for some of the facilities are not appropriate for the type or operation of the facility.	These licence conditions can not be complied with and could establish a culture of accepting non-compliance by operators.	The licenses should be reviewed to determine relevance of licence conditions stated for each site.	Each member Council (or the PRC) should liaise with the DEC to review each site's licence and amend any inappropriate conditions that can not be complied with.	The process should include a site visit, together with the licence condition review. This is likely to require 7-10 person days as a one-off activity for the Pilbara Region.	Started within 3 months **Whom** Each member Councils for its own facilities, but linkage for regional cooperation with DEC **Outcome** Licenses amended within 9 months

Note: The DEC have advised that, in the short term, that any site that receives less than 5,000 tonnes per annum will fall under the Environmental Protection (Rural Landfill) Regulations 2002. Therefore, some of the smaller landfills may change from a licensed landfill to a regulated landfill.

5.2.5 Availability of Waste Data

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
Quantity and quality of data provided by the Pilbara member Councils was incomplete, inconsistent and lacked substance. Record keeping and planning at the sites was inconsistent. At the time of the site visits a number of the operators were not aware of any records showing the location of previous cells and waste types buried.	Unable to baseline operations and costs, upon which to determine structured change and the performance indicators to be used to measure the impact and value of change. Variations in waste type terminology and definitions between the Pilbara member Councils mean that data could not be aggregated at a regional level. The keeping of records relating to previous cell locations and waste types are a regulatory requirement, this is particularly important for hazardous wastes such as asbestos and clinical wastes.	The Pilbara member Councils need to collect and maintain waste related data, and in a form that can be aggregated and used within subsequent analyses, reports and DEC ZeroWaste (Phase 1) surveys. As the PRC and member Councils will be required to report their waste data annually via the ZWP survey, the waste definitions and categories used for data collection should be the same as those used for the ZWP survey. The Pilbara member Councils need to monitor its waste management operations and look for aberrations, which should then be subjected to management consideration and action as appropriate. Records need to be kept of landfill cells and for these facilities to be defined as infrastructure assets and managed accordingly.	The PRC should be tasked to undertake a review of all member Council electronic waste management systems to ensure that they are optimally configured in the same way. Each member Council should, as a minimum, randomly count and record waste coming to and from each of their landfill sites. Consideration should be given to the PRC coordinating this activity, with the view to counts being conducted with the same methodology to improve consistency. The sites should be surveyed to define current landfill cells. Knowledge of previous cells should be recorded on the survey. The record must be maintained within an Information Management System (IMS) and updated as new cells are established. An IMS would provide scheduling and prompts for other activities relating to the landfill assets, such as groundwater monitoring, etc.	Between two (2) and four (4) person days per month to be allocated to collecting and recording data at each landfill site. Consideration will need to be given to how waste is counted and recorded at non-manned landfill sites, but a visual survey will at least provide an indication of the volumes and composition of waste received. Mobile axle weigh pads could be purchased ($4,000) and used for these surveys to provide accurate tonnage data, but ultimately weighbridges should be established at each of the larger facilities (see **Section 5.3.2 Transfer Stations**) An IMS would be utilised by all assets in the region, so the relative cost to waste management would be minimal.	Survey process and timetable developed within 6 months **Whom** Each member Councils for its own facilities, but linkage for regional cooperation with survey format and waste categories **Outcome** Every site completed two surveys and data collated for 2008 ZWP survey

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The waste received by the 8 Member Council landfills is only a proportion of the waste disposed of in the 33 registered landfills, within in the Pilbara Region. Some resource companies are already collecting a range of materials and transporting them to Perth for reprocessing.	The viability to recycle wastes in the region is directly related to economies of scale. The lack of co-ordination between private and public sectors is not capitalising on the potential economies of scale that could be achieved. Without the waste data for private landfills and comprehensive strategy can not be developed.	The private landfills are not operated by the member Councils, and therefore Local Government does not have any control over the collation the majority of waste data in the Region. A number of key resource companies are represented on the Working Group. The PRC should approach resource companies to provide any waste data they collate.	Provided the resource companies are prepared to provide the data and collaborate with the member Councils, the available waste data should be aggregated or the data collection systems should be improved to provide some useable data. Once a clearer picture of the total waste received at the regions landfills is developed, the data can be used to produce effective recycling and waste management strategies. The PRC should write to the resources companies to request they collate waste data in relation to disposal and recycling activities and quantities in the same format as the ZWP survey. This would enable the PRC and resource company data to be aggregated and show the full picture for the Pilbara Region.	The cost to member Councils would be staff time for some liaison with the resource companies; however the resource company's main point of contact to provide waste data should be the DEC. The cost to the resource companies is unknown, as the level of waste data they have is also unknown. The cost may only involve collating the data, but may require waste surveys to actually quantify the wastes received at the privately operated landfills.	Started within 3 months **Whom** PRC to write to resource companies **Outcome** All letters sent and replies chased within 6 months

Notes:

1. The objective is for each of the member Councils, individually and collectively, to build a database that contains relevant waste management data that shows waste types and volumes entering and leaving landfill sites, and any cyclic natures in the movement of waste upon which appropriate structured change can be determined, and/or to measure any changes that have been implemented.

5.2.6 Best Practice Landfilling Techniques

The DEC document titled Best Practice Environment Management – Siting, Design, Operation and Rehabilitation of Landfills (DEC, 2006) provides a guide focused on Class III landfills. The DEC proposes to develop another document for Class II landfills, but until this is produced the Class III document provides the only best practice guide for Western Australia. While these are only guidelines, not regulatory requirements, they do provide a target regarding operational practices and it is likely that these guidelines will be adopted as regulations in the future.

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The operational practices at the waste management facilities varied considerably. Some operational activities were well managed while others require improvements (See **Appendix F** for details of site assessments).	The adoption of the best practice operational guideline will assist the PRC in meeting their objectives for waste management in the region, which are: • Minimise environmental impact • Maximise recycling • Cost effective waste management While these guidelines are not regulatory, the future for waste management operations is very likely to follow these guideline, and in the future they may become compulsory.	The landfill facilities in the region should use the guidelines to set operational targets. Regulatory compliance should be the priority target (see **Section 5.2.4 – Compliance with DEC Licence Conditions**), but once these have been achieved at a facility, the operational practices should be further improved in line with the DEC guidelines. The guidelines should also be referred to for the planning of any new facilities or the closure of existing sites. The adoption of the guidelines would bring the operation of landfills in the region up to 'industry best practice' for Western Australia.	The DEC guidelines should be reviewed and appropriate measures adopted as targets at the sites. Once guideline targets have been set, the operations relating to each target area need to be monitored and recorded. The adoption of the guidelines should be staged, with the aim of continual improvement for each site until all the appropriate guidelines are complied with. The timescale for this goal would by 5-10 years, by which time it is likely that the guidelines could become regulation.	The cost to review the guidelines and develop appropriate targets would be 2-4 person days per site (whether the targets were developed internally by the PRC or outsourced to a consultant). The cost to implement the guidelines and meet the targets set would be dependent upon each area of focus, however this may result in increased operational costs in the short term, but this should lead to increased efficiency in the long term and the best practice operations would result in the PRC achieving its waste management objectives.	Started within 3 years **Whom** Each member Councils for its own facilities, but linkage for regional cooperation **Outcome** Focus areas identified and action plan developed by 2010 for each site.

5.2.7 Gate Fee Prices and Regional Co-ordination

The gate fee charged at a facility should cover all operating costs. The fee can be structured to act as a financial incentive to encourage the separation of recyclables and household hazardous wastes by waste producers, therefore avoiding these materials entering the landfill cells. In addition, there needs to be co-ordination of pricing at facilities throughout the region to avoid inconstancies and accidental competition between sites.

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The gate fees ($ cost per tonne) at each landfill site were inconsistent and prices did not always reflect the true cost of processing or disposing of the waste streams. The unmanned sites have open access with no gate fees. In extreme cases this has led to examples such as waste that was produced in Tom Price (a manned site) being transported to Paraburdoo (an unmanned site) to avoid paying the gate fee.	The inconsistent, low or lack of gate fees do not always reflect the true cost of processing or disposing of the waste. Therefore the revenue from gate fees does not cover the costs of operating the landfill facilities. This results in waste generators in the region being subsidised by rate payers to cover their disposal costs. The inconsistent gate fees can also lead to 'competition' between facilities, although the large distances between sites minimises this risk.	The Pilbara member Councils need to ensure their gate fees are consistent and cover the full cost of operation. Unmanned facilities present a particular problem (this issue is dealt with further in **Section 5.3.2 Transfer Stations**). Landfills and transfer stations should be staffed or automated to enable a gate fee to be charged. Gate fees charged at facilities need to reflect the full operational cost and be co-ordinated throughout the region	The gate fee pricing should be based on the whole of life cost for each facility, the capacity of the site (i.e. how many tonnes can it receive) and the proportion of the waste types that are likely to be received (**Section 5.2.11, Whole of Life costs**). With this information a breakeven cost per tonne for each waste type can be calculated. The pricing may require further changes to ensure a co-ordinated pricing structure throughout the region.	The development of gate fee pricing for each facility is a desk exercise and would only require a number of person days to calculate the costs for each waste type. The co-ordination of the waste type definitions and regional pricing would be completed as part of the regional waste group's activities (see **Section 5.2.1 Knowledge and Skill Sharing**) Once the gate fee pricing has been established the PRC member Councils would be certain that the revenue from gate fees would be covering all the costs incurred at the facilities, or at least with the knowledge of any shortfall that would need to be covered via a different funding source. NOTE: These actions require all sites to be manned or automated. The issue of manning sites is covered in **Section 5.3.2 Transfer Stations.**	Started within 6 months **Whom** Each member Council and the PRC **Outcome** Regional pricing policy agreed and new gate fee prices in place at all facilities for 2008-09 financial year.

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The gate fee prices at some facilities were structured to encourage recycling or the separation of household controlled wastes, but this was not the case at all facilities.	Establishing different (lower) pricing for recyclable and household controlled wastes produces an economic incentive to encourage these materials to be delivered to the sites already separated. This enables the recyclable materials to be stored for collection prior to reprocessing and avoids household controlled wastes entering the landfill cells and potentially causing environmental damage.	The gate fee prices need to be structured in order to maximise the financial drivers. This means structuring prices so that mixed wastes are charged a higher fee than separated recyclables and household controlled wastes. The gate fees for some commercial and industrial wastes may be increased if they are problematic to manage and dispose of.	The gate fees for separated recyclables and household controlled wastes should be nil. However, this requires monitoring to ensure any loads do not contain contamination. Although no revenue will be derived from these materials, non-financial benefits will include: for recyclables, landfill void space will be preserved and materials will be recycled; while for household controlled wastes, they will be collected and disposed of appropriately therefore minimising their risk to the environment.	See above	As above

5.2.8 'Green' Procurement

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
This issue was not included in the survey or during the workshop; therefore the current situation within the region is unknown.	A 'green' procurement policy would assist with the development of markets for recycled content products. Opportunities range from recycled concrete used as road base, to the simple use of recycled content paper in Member Council offices. 'Green' procurement policies assist in stimulating the demand for recycled materials and therefore increase the price for the material, ultimately increasing recycling activities.	The member Councils need to develop a 'green' procurement policy to ensure the use of recycled content products by their staff and contractors. Once adopted by the member Councils, commercial organisations in the region should be encouraged to develop or adopt the same policy.	The PRC should be tasked to undertake a review of existing 'green' procurement policies for other Local Governments and develop a suitable policy for the member Councils to adopt. The policy can be phased to include a limited range of products initially, which can expand over a number of years, together with the proportion of recycled content in those products.	As a guide, an external consultant could assist in production of a 'green' procurement policy in liaison with the PRC for around $10k - $15k. The cost of purchasing some recycled content products may be higher than 'virgin' products; however some products may be cheaper and provide a 'cycle' for wastes generated in the region to be reused as different products. The financial impact of adopted the policy would be quantified during the development of the policy and would be considered before the policy was adopted.	Started within 3 months **Whom** The PRC in liaison with the member Councils **Outcome** Develop staged green procurement policy by 2008/09 with increasing targets for next 10 years

5.2.9 Household Chemical Waste

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
Some Household Chemical Wastes (HCW) are disposed of to landfill. The staffed landfills allow for the drop off of high volume low toxicity (HVLT) wastes (e.g. paint, car batteries and oils). There was limited evidence that there were coordinated collections for low volume high toxicity (LVHT) wastes (e.g. household cleaning chemicals).	The harmful properties of HCW may provide exposure pathways that may impact on human health and the environment particularly since the Pilbara landfills are not suitable for accepting such wastes There is a need for a coordinated approach to managing household chemical waste disposal.	Member Councils should establish drop-off centres at their each landfill or transfer station. These facilities would provide interim storage for household chemicals. Training personnel for the aggregation of LVHT waste is not the norm as the cost associated with identification and disposal is substantial. member Councils should concentrate on HVLT wastes Facility operators should undergo special training for the identification and quantification of HCW, safe handling, recording and storage. OH&S and Dangerous Goods regulations and licensing requirements need to be complied with.	Establish drop off facilities and scheduled collections for car batteries, paint and oil. Implement an education and communication strategy to promote the service and increase community and industry awareness about the responsible management of HCW. Continual education is the vital tool to ensure programme success (see **Section 5.2.3 - Education and Awareness**)	The gate fee for HCW needs to be free to encourage the safe disposal of the wastes. Free drop off services would avoid the potential impacts of tipping/ un safely disposing the wastes. The cost to establish a drop off facility should be divided equally among Local Governments.	Started within 1 year **Whom** Each member Councils for its own facilities **Outcome** All site to establish facilities by 2010

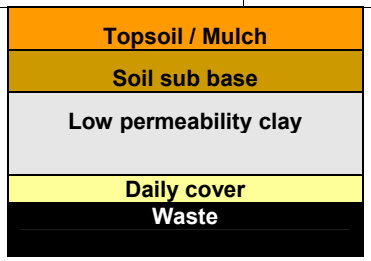
5.2.10 Hazardous Wastes

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The sites received a number of hazardous wastes. Particular issues relate to the disposal of quarantine waste at Seven Mile (in an unlined cell) and the potential illegal disposal of hazardous wastes at the unmanned facilities. In addition, other industrial wastes may be received at a number of sites in the region as new industrial projects are initiated.	The hazardous wastes, by their very definition, present a greater risk to the environment and human health. If these wastes were disposed of in Perth, they would have to be taken to a Class III facility, with a lined cell. While the quantity of these wastes is low, the potential risk they present is high, especially when disposed of in unlined landfill cells. These wastes could infiltrate through the cell floor and contaminate the underlying groundwater.	The potential illegal disposal of these wastes at unmanned sites can only be prevented by either automating or manning all of the sites in the region. The small volume of hazardous waste generated or imported into the region (e.g. quarantine waste) should be disposed of in an appropriately designed and constructed cell. This will increase the cost of disposal of these wastes, but this will also minimise the risk they present to the environment and the community. The cost to construct the hazardous waste cells should be reflected in the gate fee for these wastes. As the quantities generated throughout the region are small it may be cost effective to transport all the hazardous wastes to one facility with a suitably designed landfill cell. Wastes should be assessed for suitability at each landfill site, prior to disposal.	The provision of manned facilities throughout the region is dealt with within recommendation **5.3.2 - Transfer Stations**. Prior to the construction of a hazardous waste cell, the tonnage of hazardous waste managed in the region requires quantification, to determine the size of the cell required. The feasibility to transport all the hazardous wastes to a single facility should be assessed; this is likely to be the most cost effective method of disposal, as the additional transport cost would be incurred by the waste producer. Once the feasibility of the recommendation has been determined, provided the conclusion is positive, a hazardous waste cell should be constructed to a standard appropriate for hazardous wastes received. The member Councils should use the DEC Landfill Waste Classification and Waste Definitions 1996, to assess the suitability of wastes brought to their facilities for disposal. If wastes are not suitable for disposal at the class II facilities they should be redirected to suitable disposal facilities.	The cost to construct an appropriately designed landfill cell for hazardous wastes would incur significant capital expenditure. Although, the size of the cell required may be small (depending upon the quantity managed). The cost of the cells construction would be recovered via the gate fee for these wastes. The alternative, (i.e. continuing with current practice) may lead to the contamination of groundwater or surface water with significant financial and environmental implications. The costs incurred to remediate any contamination or as a result of any public liability would be incurred by the councils.	Started within 12 months **Whom** PRC **Outcome** Quantity and type of hazardous waste received annual, together with cost for lined cell, etc established by 2009

5.2.11 'Whole of Life' Landfill Cost

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The gate fees charged at the facilities need to reflect the whole of life cost for the site. Based on the information provided during site visits, a number of facilities were not making financial provision for closure of the existing site or the establishment of a new facility.	The costs of identifying, excavating, (lining) operating, closing and monitoring a landfill site are significant and need to be considered when calculating the gate fees to be charged. If the whole of life costs are not covered by the gate fees, there is a risk that a Member Council will incur a future financial burden. The capping and on going monitoring of a landfill site is a regulatory requirement and the draft Siting, Design and Operation of Landfills (DEC, 2005) outlines the best practice requirements for landfill capping[1].	Gate fees should be calculated to take into consideration, the whole of life cost, including: • Site construction • Site Operation • Site Closure • Post Closure Site Monitoring The post closure cost should be estimated and a fund established to cover these costs, generally by a proportion of the gate fee being paid into the closure fund.	The whole of life costs need to be calculated and used to calculate the gate fee prices for each facility, this information will be used to develop the regional pricing structure (**see Section 5.2.7 Gate fee Prices**). A closure fund should be established for each landfill and a proportion of the gate-fee revenue must be paid into this to cover the cost of closure and monitoring.	The cost to implement this action is 1-2 person days for each facility (assuming post closure management plans have been produced). However the actual closure costs that need to be covered from the gate fee are large, for example the approximate costs to cap a Class II landfill would require the following material per hectare of site: 2500m^3 Topsoil / mulch 2500m^3 Soil sub base 5000m^3 Low permeability clay With these materials on site, the cost for earthworks, vegetation rehabilitation and other works such as drainage would cost approximately $47,000 - $70,000 per hectare. If the capping material had to be transported from off site the costs could increase to $80,000 - $120,000 per hectare.	Started within 3 months **Whom** PRC in liaison with each member Councils for its own facilities, **Outcome** Whole of life cost to be calculated for each site by 2008-09 and funding provision for closure started

Notes: 1. Structure of a Class II landfill cap



5.3 TECHNOLOGY

The use of technology at waste management facilities will aid in minimising the risk of environmental harm or pollution, extend the life of landfill sites and reduce the operational and maintenance costs associated with the facilities.

5.3.1 Compaction of Wastes

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
A landfill compactor is currently used at the South Hedland landfill. Compactors are not used at the other sites, instead waste is spread and compacted with tracked bulldozers or wheeled loaders, resulting in poor compaction of waste.	A tracked bulldozer will produce a maximum compaction density of 500 – 600kg/m^3 (although densities as low as 350 kg/m^3 have been reported from some rural landfills in WA). A dedicated landfill compactor can achieve maximum densities of 550 – 1100 kg/m^3, depending upon the machine model and waste types. The density of waste is directly related to the operational life of a site (i.e. a 25% increase in compaction density results in a 25% increase in operational life) Low compaction densities may lead to increased settling and slumping of landfill cells which could lead to remediation work to landfill caps and the associated cost.	The landfill sites should have compaction machines that are appropriate for the quantity of waste received at each site. Recommendations made for **Section 5.3.2 – Transfer Stations**, would results in only five key landfill facilities operated by the member Councils. South Hedland already has a compactor; Seven Mile should strongly consider the purchase of a dedicated landfill compactor, while it may be feasible for Tom Price and Windell (Newman) to share a landfill compactor. However, a 'temporary' compactor visiting the site may not achieve the gains in compaction densities required to off-set any cost savings from sharing a compactor. The landfill at Onslow is unlikely to receive the waste quantities required to justify a compactor, however if the quantities received increase beyond 12,000 tonnes per annum a compactor should be considered for the Onslow site.	Seven Mile is the priority site for a dedicated compactor, as of the sites without a compactor this site receives the greatest tonnage. The SoR should strongly consider the option of purchasing a landfill compactor. Tom Price and Windell (Newman) will receive additional waste tonnes if recommendation **5.3.2 – Transfer Stations**, is implemented. The additional tonnage will improve the viability of a landfill compactor to be used at these sites. The use of a landfill compactor will not require additional staff as the driver of the current dozer can be utilised to operate the compactor.	To evaluate the viability of a compactor at the three sites, the approximate cost of voidspace has been calculated (see **Appendix G**) and the impact of the cost saving from using a compactor has been estimated. The likely annual savings (excluding the cost of a compactor) for each site range from: Seven Mile: $473k - $1,490k Tom PrIce (inc Paraburdoo's waste): $87k - $274k Windell: $284k - $297k To provide an indication of landfill compactor prices, a CAT 826G (37t, 354hp) is approximately $950,000, while a second hand machine would range from $250,000 - $700,000.[1] The EMRC currently use a CAT 826 and achieve compaction densities in excess of 1000kg/m3.	Started within 6 months **Whom** SoR to decide about purchase of compactor SoA and SoEP to investigate potential to share compactor and impact on compaction rates achievable **Outcome** Decision made by SoR, SoA and SoEP by 2008-09 financial year start.

Waste baling is not currently practiced as a waste compaction measure across the region	Refuse can be baled prior to landfilling to maximise the void space utilisation rate and to control the environmental aspects of the site including litter management. In addition, baling of separated recyclables can reduce transportation costs and improve materials handling.	Baled Waste Landfilling is a relatively modern practice and consists of the landfilling of baled MSW which is done off site at a bailing station. Baled waste landfill operations require specialist, non tradition landfill, equipment for waste acceptance (unloading the baled waste from the articulated trucks) and waste placement (positioning the unloaded bales onto the work face of the landfill). However there are many disadvantages compared to lose waste landfills that are making such operations unattractive with such facilities in the UK returning to traditional landfilling operations. Baled facilities have greater capital costs with the procurement of an additional facility for a baling station. The baling station will also have significant design and construction costs for provide adequate baling operations. In addition there will be site machinery costs including bobcats to feed the waste material into the baler and specially designed articulated trucks to transport the baled waste off site.	A Waste Baling facility should not be used by the PRC and the member Councils. Ensure that the end products of primary recovery facilities such as the sorting of materials at Materials Recovery Facilities (MRFs) are baled for easy of handling and reduced transportation costs.	No cost Balers are usually included in the original design and construction of Materials Recovery Facilities so no additional cost would be included.	N.A.

		Greater compaction rates are achieved through the application of a modern landfill compactor doing approximately 5 passes over the waste material than well run baled waste landfills. It is recommended that the procurement and application of best practice landfill compaction measures to maximise the lifespan of the facility as apposed to conversion of the landfill site and investment in baling operation. The primary sorting of materials is amongst the first stage of the recycling process. Primary recovery facilities such as the sorting of materials at Materials Recovery Facilities (MRFs) will result in the generation of separated recyclable materials which are shipped on for further processing. These separated materials should be baled prior to shipment to reduce transportation costs and make handling more convenient.			

Waste shredding in not currently undertaken for the pre-treatment of waste prior to disposal	Waste shredding can increase compaction rates and void space utilisation.	It is anticipated that there is no financial benefits or gains to be achieved from shredding of MSW prior to landfilling. There is no void space advantages to be gained form such operations as it is envisage that modern compaction of loose or shredded waste would be in the same region, therefore not resulting in any significant financial void space utilisation gains. The recovery of the metallic materials from the MSW would results in financial gains but not to a level that would make the acquisition, through purchasing or rental, and subsequent operation of a shredder cost positive or even neutral. It would be anticipated that it would be heavily cost negative and substantially add to the current capital and operation costs. In relation to environmental benefits attachments to shredding infrastructure allows for increased recovery of ferrous and non ferrous metal products with the use of Eddie currents and magnetic fields resulting in environmental benefits. One potential negative environmental and operational impact is the wind blown litter. It is recommended that the procurement of a modern landfill compactor and the daily application of best practice compaction measures to be adopted on site to achieve the optimum financial benefit from the landfill site.	See above (Landfill Compactor)	No cost	N.A

NOTES:
1. Cardno BSD does not endorse CAT products. They are only used as an example. There are a number of landfill compactor brands available in Australia.

5.3.2 Transfer Stations

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
There are a number of the facilities in the region that are currently unmanned (e.g. Pannawonica, Onslow[1], Paraburdoo, Nullagine and Marble Bar), These facilities are the smaller landfills. The sites are general untidy as they lack supervision and provide no or little revenue as gate fees can not be collected. There is no control over the waste disposed on site, monitoring of the quantities or types of waste disposed. Due to the small volumes of waste there is often little infrastructure and equipment (e.g. compactors, loader, etc) to maintain the facility.	The lack of monitoring and data collection makes reporting (for Zerowaste survey) and planning for the site problematic. There is no revenue from the wastes received (unless the wastes are collected by the member Councils) Hazardous wastes could be illegally disposed of on site, creating an unquantifiable environmental risk. Lack of supervision on site can lead to poor separation of recyclables and increased contamination within storage areas. Open access to the entire site creates potential public liability issues for the PRC member Councils. Small volumes of material lead to poor economies of scale.	Transfer stations should be established at; Paraburdoo (the waste generated would be transfer to the Tom Price landfill), Nullagine (waste generated transported to Newman) and Marble Bar (waste generated transported to South Hedland). The closure of these landfills and the construction of manned transfer stations will encourage recycling, remove the environmental risk of the current landfills, enable revenue to be collected via gate fees and increase the economies of scale at the 'receival' landfill sites. The opening hours for the transfer stations would be reduced to minimise operational costs. Additional transfer stations could be established at Auski and at Aboriginal Communities (e.g. Jigalong). However the operational responsibility of facilities at Aboriginal Communities is currently being amended by the Commonwealth Government.	The transfer stations should be established at least before the current sites require expansion. Each site would require a survey to quantify the waste tonnage and types received, as this will determine the viability of the transfer station, the required design and its capacity. However the costs estimates provided are based on the currently available tonnage estimates provided by the councils. A number of systems could be considered such as; 'saw toothed loading bays', hook-lift bins, static compactors (see photo below), etc. 	The capital costs to establish transfer stations at each facility would be dependent on a number of factors including; quantity and type of waste received, topography of the site, complexity of the transfer station, increased construction cost for the Pilbara Region, etc. Indicative costs for the capital cost are: $50,000 –150,000 for Nullagine and Marble Bar $150,000 - $400,000 for Paraburdoo (N.B. The construction of the new transfer station at Onslow will provide more accurate capital cost estimates.) A breakdown of estimated operational costs (incl. capital repayment and interest) are shown in **Appendix G**, the total estimates are: Nullagine: $160,000 pa Marble Bar: $150,000 pa Paraburdoo: $500,000 pa These costs do not allow for any income from wastes received, or gate-fee costs at the receival landfill sites.	Started within 18 months **Whom** SoA and SoEP for their own facilities, **Outcome** Capital expenditure approved and construction timetabled as landfills become full, or before.

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The larger landfills have uncontrolled public access to the tipping face and in some cases the entire site.	General access to the tipping face creates public liabilities issues; in addition it allows the public to easily by-pass any recycling areas. Once the public are out of sight of the gate house they can 'dump' waste anywhere within the landfill or scavenge from the site. The current system present serious public health and liability issues from the potential injuries that could be sustained by the public visiting the sites. The opportunity to encourage and increase the recycling of trailer waste is lost, therefore voidspace is used and resources lost unnecessarily. In addition uncontrolled dumping of wastes around the site can lead to stockpiles of recyclables becoming contaminated and requiring disposal in the landfill.	Larger manned sites should construct transfer stations with all waste acceptance and disposal activities centralised to that area. There are a number of benefits including the increased control of waste disposed on site therefore maximising landfill void space and contamination of recyclable collected; increased recycling through prioritising such services as apposed to landfilling; and reduced health and safety risk by confining public interaction with the facility. All the larger sites should have weighbridges to monitor the quantity of waste received and recyclables recovered. Therefore Windell and Tom Price should both have weighbridges included in the design of the transfer stations, together with appropriate software, that should be compatible with the software used at Seven Mile and South Hedland to allow the easy aggregation of data in the region.	The landfill facilities at Seven Mile, Tom Price, Windell and South Hedland should construct transfer stations on site. To minimise cost and improve uniformity throughout the region each transfer station should be based on the same basic design and layout, this will also assist with familiarity if people use different landfills throughout the region. Once established the transfer stations can be screen for the rest of the site with bunding and vegetation. A detailed survey of waste quantities and type received at Tom Price and Windell site should be completed before the transfer stations are designed. Transfer stations at Seven Mile and South Hedland should be the priority sites to establish transfer stations as these receive the largest waste quantities (in excess of 70,000tpa based on data provided)	The capital cost to establish transfer stations at the landfill facilities would be dependent on a number of factors including; quantity and type of waste received, topography of the site, complexity of the transfer station, increased construction cost for the Pilbara Region, etc. However, existing infrastructure such as weighbridges, gate house, loader, collection bins, etc could be utilised at the transfer station. Indicative costs for the capital expenditure are $150,000 - $350,000 for each transfer station, (plus approximately $100,000 for a weighbridge and software). The staffing requirement will vary depending upon the existing systems used. For example the SoR see this model as beneficial as less staff will be required to 'police' the site. Once established the transfer station would require one staff member to provide direction and instruction for community members dropping off waste and recyclables.	Started within 24 months **Whom** Each member Councils for its own facilities. However 7 Mile and South Hedland sites are the priority facilities due to tonnages **Outcome** 7 Mile and South Hedland established by 2010 and Tom Price and Windell by 2013

Notes: 1. It is understood that Onslow will soon have a new landfill facility, (with a control entry gate) established away from town and a transfer station will be constructed at Onslow.

5.3.3 Recyclable Material Collection Systems

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
There is a desire by the public to recycle using the 'two bin' waste collection system. The member Councils are unsure whether this system is financially viable. Kerbside collection is expensive and the yield of recyclable material collected that is suitable for recycling is often less than expected due to contamination. Typically kerbside collection systems for recyclables will yield between 35 – 60 kg per person per year.	This is often the preferred collection system for packaging recycling for most people as it is seen as the easiest method. It is also a very 'visual' system for the community to participate in. The cost to provide a kerbside collection has to be subsidised through the rates system as the income from the sale of the recyclables only covers a proportion of the collection, sorting and transport costs. In order to maximise collection rates, while minimising contamination, any recyclables collection systems must be supported with an on going community education programme.	It is recommended that kerbside collection for domestic recyclables is not implemented at this time. This is due to the cost to provide this collection service (approximately $80 - $120 per household for the larger towns in the Pilbara). Instead 'drop-off' collections should be further assessed as the first domestic recycling system to be introduced (see **recommendation 5.4.3**) Determine community support for kerbside collection of recyclables Invite waste management businesses to present a business case for kerbside recycling in the region. Once 'drop-off' system is established, verge side collection of specific material type could be introduced, (e.g, Greenwaste, white goods, electronic waste, etc as the collection and processing of these materials becomes viable)	Member Council to provide a drop-off system for the collection of recyclable material from the community (see **recommendation 5.4.3**) Complete market research study in each community to see if residents would pay extra rates to receive a kerbside collection of recyclables. Invite waste management companies to present a business case for kerbside recycling in the region, this will assist in determining the likely costs and infrastructure requirements. Vergeside collections to be assessed for specific material types, for example, prior to metal recycling companies visiting the region to bale and transport metals a 'white goods' collection could be completed. This collection would need to be publicized and householders informed about the type of material to be collected and any contamination will result in their waste not being collected, i.e. it is a collection of recyclables NOT waste. To assess this	The cost to complete a market research study by a professional market research company is likely to be between $15k – $25k Negligible cost to the member Councils The feasibility study could be completed 'in-house' or by an external consultant (likely cost $15k - $30k)	Started within 6 months **Whom** PRC with liaison with member Councils **Outcomes** Market Research study started within 12 months Invitations sent to WM companies within 6 months Feasibility for vergeside collection started within 24 months

			collection option a feasibility study would need to be completed to assess the cost of collection and associated public information programmes		
Community drop-off facilities may be an option for the Pilbara Region; however, there has previously been an issue with high contamination. The Regional Recycling Model indicates that recycling of domestic waste should be viable within the Pilbara through recycling drop off centres and recycling hubs at transfer stations. .	Based on the 'worst case' scenario for recycling quantities, less than 750 tonnes of material could be recycled each year using community drop-off facilities each year. However, this only represents 0.34% of the total waste disposed to landfill. The Regional Recycling Potential Model indicates that costs could be saves if Port Hedland is used as a central collection point, prior to the transportation of material to overseas markets. The provision of drop-off facilities appear to be viable at the larger towns including Karratha, Paraburdoo, Tom Price, Newman, Port Hedland and some FIFO mining camps.	To minimise transport costs and to achieve transport efficiencies, the facilities must be designed and operated so that transportation is efficient due to easy loading and high density loads. Compactors and balers should be used to increase the density of materials for transfer. This reduces the volume of materials (less storage space required and less frequent collections) The Pilbara member Councils should work with the DEC and industry to create a position to coordinate the collection and transportation of recyclable material to recyclers.	A drop-off facility is recommended. Type of infrastructure and exact locations should be determined using a feasibility study. The PRC should be tasked to create a position for a centralised recycling coordinator who works with member Council, community groups and industry.	The cost of drop off facilities would be determined in the feasibility study	Started within 9 months **Whom** PRC with liaison with member Councils **Outcome** Study completed (in-house or externally) within 18 months

5.3.4 Trailer Waste

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The quantity of trailer waste received at the landfill facilities is significant. Residents have access to landfills located close to the main towns. Trailer waste can be self-hauled to these landfill sites. The system can be used by any resident and there is no disposal fee for the waste material.	The free tipping of trailer waste does not promote recycling or waste minimisation. There is a concern that if a charge for the disposal of these wastes was introduced, it may lead to an increase in illegal tipping.	The introduction of a limited number of free tip passes to households (e.g. two per household) should be introduced, if households produce more than two trailer loads, there will be a token charge to dispose of the waste. The aim of this recommendation is to show the community that they is a cost associated with waste disposal. Households that do not receive a kerbside collection should continue to have free unlimited tipping at landfills to promote suitable disposal of material. The tip pass system would only be introduced in towns with manned landfills. Separated trailer waste that promotes ease of sorting and recycling would not require the use of a tip pass. Member Councils should look to increase the fines for illegal dumping of material and publicize any convictions via local papers, however it is unlikely that the level of illegal tipping will increase simply to avoid a small disposal fee.	The introduction of tip passes can be communicated to the community through a range of media types. Tip passes can be distributed through the postal service, together with rate requests. A gate-fee price structure should be created depending on the size of trailer waste material deposited and whether it contains separated recyclable material. The aim of introducing a cost for the disposal of trailer waste is to make the community aware that waste disposal is not a free service, rather than a method to generate revenue. Any incidents of illegal tipping should be investigated and if identified the offenders should be prosecuted.	The cost to implement a tip pass system is unlikely to be offset by revenue from trailer waste fees. However, this is an awareness recommendation, rather than a revenue generation recommendation. The cost to provide the tip passes and manage the collection of the passes or fees at the gate-house would be minimal, as there would little change from the current practices of the staff. The investigation and prosecution of illegal tipping is likely to incur significant cost, however this cost would not be directly linked to this recommendation as the rate of illegal tipping is unlikely to increase with the introduction of charging for trailer wastes.	Started within 6 months **Whom** Each member Council and the PRC **Outcome** Regional pricing policy agreed and new gate fee prices in place at all facilities for 2008-09 financial year.

5.4 MINIMISATION OF WASTE DISPOSAL

The minimisation of waste will assist in extending the operational life of the landfill facilities, maximise the recycling and preservation of resources and minimise the risk of environmental damage or pollution.

5.4.1 Coordination of Waste Minimisation

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
Many resource companies are undertaking recycling, however the activities are not co-ordinated and often occur in isolation, and may not consider other options such as re-use. Member Councils have differing policies and practices regarding waste minimisation but recycling, re-use, etc is a low priority because of its complexity and cost.	The coordination and monitoring of waste minimisation management across the Pilbara under a single entity should provide economies of scale to the betterment of industry and community. Resource companies are using leverage associated with transporting goods to the Pilbara to back load recyclable material to Perth. Member Councils do not have the same leverage as the resource companies in minimising back loading costs; therefore, making recycling non-cost effective. The Regional Recycling Model indicates that recycling of domestic waste should be possible within the Pilbara	The PRC member Councils work with the DEC and industry to create an independent position (or positions) to coordinate the collection and transportation of recyclable material to recyclers. This position should be responsible to a non-partisan government, industry and community steering committee. The role of the coordinator is facilitation / liaison / project management. And will complete specific projects such as education programmes, the coordinator would identify existing programmes or funding that could be utilised, but once the project was set-up the delivery would be completed by a third party. Another role could be the project management of any consultancy project that were required. Essentially the role is coordination.	The PRC should facilitate the establishment of a Steering Group to oversee waste management coordinator position(s) and the monitoring of the implementation of the Regional Waste Management Plan. The PRC should be tasked to create a centralised waste minimisation coordination position that works with member Councils, community groups and industry. The position should be non-partisan and be able to access environmental and logistic officers within in all member Councils and private companies to coordinate the collection and transportation of recyclable waste.	The employment and administrative costs of this position should be distributed across member Council, industry and State Government. This recommendation seeks the goodwill of the resource companies in assisting in the minimisation of transportation costs by allowing and facilitating the use of back loading.	Funding and recruitment process started within 1 month **Whom** PRC **Outcome** Funding identified and role filled by end of FY 2007/08.

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
		The Steering Group through the coordinator(s) should be tasked to review and comment on the progress of the implementation of this Plan annually, including making suggestions for improved practices where appropriate. The Steering Group should be tasked with conducting a major review and update of this Plan in 2012.	PRC approach DEC and request that the new Waste Advisor for the North West be tasked to support and assist the proposed coordinator, coordinate the collection and transportation of recyclable materials.		
Networking among member Council waste management professionals, and industry environmental officers is very limited.	The lack of networking between waste management professionals within member Council and within industry and between the two is preventing the promotion of best practice and identification of cost saving opportunities to the betterment of all parties.	That there are regular (possibly quarterly) meetings of member Council waste management professionals to discuss best practices and to identify opportunities for improvement. Likewise that there are regular meetings of all waste management professionals in the Pilbara (see **recommendation 5.2.1 - Knowledge and Skills Sharing**).	The coordination of networking meetings of waste professionals would be one of the roles of the proposed recycling coordinator. Meetings to include professional development in the form of best practice, product training and legislative updates.	Each member Council, DEC and industry to fund the attendance of their respective waste management officer at the proposed networking meetings.	Within 3 months **Whom** Each member Council, DEC and industry **Outcome** First meeting within 3 months

5.4.2 Incentives to Recycle

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The member Councils and MWAC do not hold a comprehensive range of standards relating to waste and recycling.	There are standards for waste management and recycling and these should be readily available to all Member Council landfill site staff. There are Material Safety Data Sheets (MSDS) for most products, especially those associated with chemical hazards and other safety related issues.	MWAC set-up and maintain a comprehensive library of standards and MSDS as they relate to waste, recycling and disposing of products, including processes for updating / informing member Councils of new and updated standards and MSDS. Each member Council should store and maintain up to date copies of relevant standards and MSDS for all products used or being handled by member Council employees. Each employee should know how to access these standards and MSDS. There should also be regular training on these documents. Standards are available for the Australian Council of Recyclers website (www.acor.org.au), and once registered member Councils will receive notification of any updates of the standards.	The PRC should approach WALGA requesting that MWAC set-up and maintain a comprehensive library of standards and MSDS as they relate to waste, recycling and disposing of products. The PRC working with MWAC (and ACOR) ensure that each Pilbara Member Council has a proper library of waste/recycling related standards and MSDS. Alternatively, if there is a readily available data source for the MSDS, MWAC should inform its members of the contact details. Each member Council implements a professional development programme that informs their employees of waste/recycling related standards and MSDS, their purpose and how to obtain copies as required.	It is a cost prohibitive activity for a single member Council to set-up and maintains a standards and MSDS library. However, the standards are available (at no cost) from ACOR and WALGA should be able to develop a library for the MSDS so the cost for doing this being shared by all Local Governments, if this data source if not already available elsewhere.	Started within 3 months **Whom** PRC **Outcome** PRC to contact WALGA in regarding to establishing library within 3 months

5.4.3 Household Recyclables

This recommendation should be read in conjunction with **Recommendation 5.3.3 - Recyclable Material Collection Systems** as there is a significant linkage between the two areas.

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
Paper/Cardboard Household paper and cardboard waste is mixed with the domestic refuse waste stream and landfilled.	Manufacturing paper and cardboard requires the consumption of energy, water and fibre. During manufacturing de-inking, pulping and papermaking poses a risk to the environment. Discarded paper and cardboard uses landfill space. Degradation of the materials contributes to leachate that can contaminate groundwater. In addition the material generates methane which has 21 times the greenhouse gas potential than CO_2.	Where possible, separate recyclable material from the refuse waste stream. Separation may occur at community drop-off facilities or transfer stations. Collected materials must be stored and sorted to meet the specifications required for the receival of the materials by recyclers. It would be beneficial to use compactors and balers to increase the density of materials for transfer. This reduces the volume of materials (less storage space required and less frequent collections) The separation of packaging recyclables from household waste can be encouraged with waste education and awareness programmes in the community, differential	The PRC should initiate a feasibility study to further investigate the economic, environmental, technological and financial benefits of separating paper and cardboard at community drop-off facilities and transfer stations. PRC approach DEC to fund and develop a suitable awareness campaign promoting the virtues of domestic recycling and how to recycle properly. Also linked to **recommendation 5.3.3**	The cost of the feasibility studies would be would be spread across member Councils and industry as equitably as possible. DEC should be able to provide material for an appropriate awareness campaign. Recyclers would be responsible for providing training.	Started within 6 months **Whom** PRC with liaison with member Councils **Outcomes** Feasibility study started within 12 months
Plastic Containers Household plastics are mixed with the domestic refuse waste stream and landfilled.	Recycling plastic containers reduces the need for raw materials, reduces the use of valuable energy resources and reduces the levels of waste disposed of in landfill. Separating plastics into types receives a higher purchase price.				

Aluminium Cans Aluminium cans are mixed with the domestic refuse waste stream and landfilled.	Recycling aluminium beverage cans reduces the need for raw materials, reduces the use of valuable energy resources and reduces the levels of waste disposed of in landfill. The energy required to produce the metal for one aluminium beverage can is equivalent to the energy required to recycle that can 20 times.	pricing for wastes (gate-fees), and clearly marked tipping areas within view of operational staff (if on site)			
Steel Cans Steel cans are mixed with the domestic refuse waste stream and landfilled	Recycling steel beverage cans reduces the need for raw materials, reduces the use of valuable energy resources and reduces the levels of waste disposed of in landfill.				
Glass Containers Glass containers are currently mixed with the domestic refuse waste stream and landfilled.	Manufacturing of glass containers requires the consumption of energy, water and silica based material. Discarded glass containers uses up landfill space. However, glass is an inert material; therefore the potential for environmental harm is limited when landfilled. In Western Australian there are limited markets for recycled glass. Excess glass is currently shipped to the Adelaide for processing however the cost of transport is high, making the glass reprocessing industry economically unviable.	It is recommended that glass is not separated from the general refuse stream and continues to be landfilled unless a local market can be identified.	Continue landfilling glass containers, until a viable market is identified.	No change in cost	N.A.

5.4.4 Greenwaste

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The management of greenwaste varied throughout the region and included burial, burning, storage and chipping.	Greenwaste is an organic waste stream, therefore when disposed of to landfill produces methane(1) and leachate, and the resource is lost while it consumes landfill void space. When burned greenwaste produces carbon dioxide emissions and the resource is lost however this does preserve landfill void space. When mulched the greenwaste is recycled, void space is preserved, the resource is utilised and the embodied carbon is returned into the natural carbon cycle.	Based on the waste hierarchy, the chipping and recycling of greenwaste is the best environmental option as this would utilise the resource, prevent the generation of methane or leachate and preserve landfill void space. However, there are costs associated with the chipping and potentially composting of this material. The markets for mulched or composted greenwaste would need to be established and these may vary throughout the region, as the low value, high bulk nature of the product means it is not viable to transport it large distances. Potential markets include the rehabilitation of industry and mine sites. Woodside will start restoring 30ha of land at their gas plant in the next few years and may require additional mulch or compost.	The PRC should purchase a greenwaste chipper for use at all the key collection sites in the region. This would be recycle approximately 6,200 tones of greenwaste per year (nearly 3% of the total waste received by the member Councils) based on data provided by the council surveys. The actual volume of greenwaste may be larger. Considerable quantities of timber waste (packaging and sleepers) were observed at the sites, which could be chipped. The quantity can not be established from the survey data, but this would improve the financial viability by economies of scale, although a market we need to be found for this material.	Cost estimates (see **Appendix G**) based on a new chipper being transported to each site twice a year, the approximate cost would be $28 per tonne (inc. capital repayment, interest, operation, maintenance, use of a loader and transport costs). Used greenwaste chippers are available and would reduce the cost to approximately $20 per tonne. This does not include the cost to produce compost or mulch from the chipped greenwaste, but this would be an additional cost between $10 – 25 per tonne. If the timber waste received in the region is assumed to be 5000 tonnes per year, the additional throughput would reduce the chipping cost to approximate $20 per tonne (or $14 per tonne if a used chipper was purchased).	Started within 6 months **Whom** PRC with liaison with member Councils **Outcomes** Determine size and specification of shredder required. Shredder purchased during 2008-09 financial year.

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
Significant quantities of greenwaste were observed being disposed of at the landfills (sometime in mixed waste loads), even at sites that burnt or chipped their greenwaste.	Some greenwaste received at the landfill sites is still disposed of; this is general due to the greenwaste making up part of a mixed load of waste or due to unsupervised tipping.	The separation of greenwaste from mixed loads and diversion of the material from the landfill cell can be encouraged with waste education and awareness programmes in the community, differential pricing for wastes (gate-fees), and clearly marked tipping areas within view of operational staff (if on site)	Reduced gate fees for clean greenwaste loads tipped in a designated greenwaste area, higher gate-fees for mixed loads. Greenwaste tipping area to be clearly visible from gatehouse by site staff. Awareness of greenwaste chipping and greater benefits to be communicated to community and industry, together with the need (and gate-fee cost saving) of bring uncontaminated loads for recycling, rather than mixed loads for disposal.	The gate fee pricing for greenwaste should be set to encourage separation of waste streams (see **Recommendation 5.2.7 - Gate Fee Pricing and Regional Co-ordination)** Design of site layout costs will vary by site, (**see Recommendation 5.3.2 – Transfer Stations**) The community will need be made aware of any recycling initiatives, including greenwaste recycling (see **Recommendation 5.2.3 - Community Education and Awareness**)	See rec. **5.2.7, 5.3.2 & 5.2.3**

5.4.5 Pallets

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
Pallets are being taken to landfill sites where they are being buried, burnt, reused or sold.	It is illegal to destroy, reuse or sell CHEP or Loscom hire pallets and this includes returning the pallets to CHEP/Loscom clients as it distorts their accounts to the detriment on CHEP and Loscom. CHEP and Loscom will recover (free of charge) their serviceable pallets. Non-named pallets are fair game and can be re-used and re-sold. Perth based second-hand pallet dealers purchase serviceable (returned) pallets for between $2.00 and $4.00 per pallet depending on type and serviceability. These dealers will not pay transport costs to Perth. The current second-hand dealer sale price is around $5.00 per pallet. Pallets built for transporting goods overseas are treated and should be disposed in accordance with appropriate standards and instructions.	CHEP and Loscom pallets should be returned to CHEP and Loscom. Serviceable non-named pallets built to international standards should be re-used and in particular re-used for the transportation of batteries. Other serviceable non-named pallets should be re-used and sold to the public wherever possible. Non-serviceable pallets should be disposed of in accordance with current standards.	Landfill staff should isolate and stack CHEP (blue) and Loscum (red) pallets, and ring CHEP/Loscom once there are twenty pallets their pallets. CHEP and Loscom will arrange for the collection of the pallet for no charge to the member Councils. Re-use serviceable non-named pallets built to international standards where ever possible. Reuse and sell serviceable non-named pallets. Landfill staff should dispose of non-serviceable pallets in accordance with current standards	There are no discernable additional costs for this recommendation. There is an opportunity cost to disposing pallets and Member Council might wish to consider applying a small levy to accept non-serviceable pallets.	Started within 1 month **Whom** PRC with liaison with member Councils **Outcomes** Branded pallets separated and returned, unbranded pallet stored on site and levy agreed within 6 months

5.4.6 Tyres

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
TPA Australasia has approached the Pilbara Regional Council for support of its system that will recycle tyres and for the establishment of a tyres recycling facility in the Pilbara.	There is an end-of-life tyre management problem within the Pilbara with no cost effective method for disposing end-of-life tyres. Currently all tyres are disposed of, most in individual tyre cells. The State Government has announced a total ban on the dumping of used tyres into landfill in the Perth metropolitan area and the **larger regional centres** by 2011. A two-stage strategy will progressively phase out landfill disposal in selected areas of the State. From January 2008, all loose tyres generated within a defined zone that have not been recycled must be compacted into tight bales and placed in monofills. As of January 2011, the second phase will come into effect and prohibit landfill disposal of all used tyres in the metropolitan area and some regional centres. Only some remote rural areas without access to transport routes or recycling facilities will be permitted to put baled tyres into landfill after this date.	The PRC purchase a tyre baler and continue to dispose of end-of-life tyres in individual landfill cells until a suitable method for recycling tyres is established. The use of a baler will increase the density of the disposed tyres, therefore increasing the life of the sites, also it is economically viable to exhume baled tyres from a monocell from reprocessing, therefore the void space would be made available for additional landfilling. It is currently not economically viable to exhume loose tyres for reprocessing. Tyres should not be stores, under the Environmental Protection Regs, more than 100 tyres 'stored' on a premise is seen as a fire hazard	Continue current practices. Ensure that the PRC are active in the consultation phase of the new used tyre legislation for WA. Member Councils to purchase a mobile baler for used tyres to be compacted and baled throughout the region or selected areas which may need to be used to comply with additional tyre landfilling restrictions of new state legislation.	Indicative costs for a mobile baler for the region were identified to be in range of $50,000 – $80,000. An example of the potential equipment would include the baler (Trethewey 250 / 350 Series Mobile Autobaler) and trailer. These can be supplied by Its Green in Victoria[8]. The costs would be shared between the member Councils.	Started within 12 month **Whom** PRC with liaison with member Councils **Outcomes** Baler requirements identified and funds allocated for 2008-09 budget

[8] Cardno BSD have used this baler and supplier as an example only and do not endorse this product or supplier.

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
	The exact geographical areas that the tyre policy will apply to have not yet been determined. This will be done in consultation with stakeholders, including Local Government. The Minister will be writing to individual Councils on the subject in the near future. TPA Australasia is seeking to identify the correct number of passenger, light vehicle, truck, plant and haulpak tyres available for recycling to determine the viability of setting up a tyre recycling facility in the Pilbara.	The PRC consider undertaking a study to determine the actual numbers of end-of-life tyres being disposed in the Pilbara and surrounding regions and make this information publicly available. Quantities of tyres could be reported in the Annual Environmental report (part of the licence requirement for DEC), which would allow the DEC to quantify the amount of tyre disposal. This would need support of Shires and site operators.	The PRC and DEC should together devise and implement a methodology for identifying the total quantities of tyres reaching end-of-life in the Pilbara each year. This information should be aggregated at the Shire/Town level and individual company usage should be kept confidential.	The PRC should seek State Government and industry funding for this project. A possible funding source would be via the Strategic Waste Initiative Scheme (SWIS Fund), this is managed by the DEC and has bi-annual calls for projects to requesting funding.	Started within 6 month **Whom** PRC in liaison with member Councils **Outcomes** SWIS funding application completed and submitted for June 2008 funding round
	TPA Australasia is seeking the composition of haulpak tyres in order to identify how to properly decompose the tyre via shredding. Rio Tinto is exploring the feasibility of recycling tyres, in particular its haulpak tyres. Rio Tinto is in discussion with several companies. There is some sensitivity relating to tyre usage and management within the resource sector.	The PRC should encourage Rio Tinto and TPA Australasia to communicate on this matter to determine if there is any common ground.	This has been completed and Rio Tinto has agreed to contact TPA Australia.	Nil Cost	N.A.

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
	Some Local Governments charge a levy for the disposal of tyres in their landfills.	All member Councils should apply a levy to all tyres to be disposed in their respective landfills. .	The four member Councils should met and agree on a common levy to be used across the Pilbara. Some of the money raised should be set aside for the reclaiming of tyres when a recycling option becomes available.	Money raised could be used to offset some of the costs associated with upgrading landfill sites to include material recycling facilities.	See **rec. 5.2.7**

5.4.7 Metals (excluding domestic recyclable metals)

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
The recycling of metals provided the greatest financial return to those recycling and to recyclers, such as SIMS Metal. Properly sorted metals provided greater fiscal returns than metals grouped together (i.e. separated into Aluminium, Copper, Steel, etc). SIMS Metal advised that it is facing economic challenges associated with moving its crusher/baler around the Pilbara and was looking for ways to reduce transportation costs and increase productivity. Smorgon Steel expressed view that the current method of recycling of metals out of the Pilbara is uneconomical.	The recycling of metals can be lucrative for those collecting and recycling metals and for the recyclers. However, the increasing cost of transportation is making some practices non-profitable. Better coordination of preparation and collection of metals is required to ensure the longevity of metal recycling.	The proposed recycling coordinator (see **Recommendation 5.4.1 - Coordination of**) be tasked to work with metal recyclers and to assist the facilitation of the collation and preparation of metals for collection and the coordination of the baling and collection of metals from municipal landfill sites and key industry locations.	Member Councils and industry proactively centralise metals to major pick-up sites (landfills and industry sites). This would involve Member Council possibly introducing some localised back loading practices and/or some specific collection days. Landfill staff to separate metals in to appropriate groups. Recycling coordinator coordinating with metal recyclers to come and crush/bale metals and subsequent collections.	There will be an increase in operational cost and some trucks may need to be augmented with hoists to load and unload metals on to Council trucks. If conducted properly maximum prices should be obtained for metals offsetting some of the initial set-up costs. Industry and State Government might be prepared to sponsor the upgrading of vehicles for additional productivity improvements. This should be explored by the PRC.	Started within 3 months of co-ordinator role filled **Whom** Coordinator in liaison with member Councils and recyclers **Outcomes** Logistics arranged for movements within region and coordination with recyclers within 12 months of appointment

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
Car and truck batteries are being managed to mixed standards.	The management and recycling of batteries is being undertaken to mixed standards, making it difficult to handle batteries and recyclers to accept batteries. In some cases the poor management of batteries makes areas look untidy and poses additional hazards and causing recyclers to have to re-pack pallets prior to or during transportation.	The management of batteries should be consistent across all landfill sites and transfer stations. Batteries should be properly palletised before transportation and recycler acceptance to avoid recyclers having to repack for on-forwarding to processing plants.	Pallets to export standard be used at landfills for the collection of batteries. Residents to place batteries placed/stacked on the pallets provided. As each pallet is filled, the pallet is plastic wrapped and strapped in accordance with standards. Member Council staff should transport batteries from the small landfill sites to larger landfill sites in small numbers below hazard thresholds. This should occur as opportunity / back load transportation rather than any specific collection run. Landfill staff liaises with recycling coordinator to arrange collection / transportation.	Major landfill sites will require forklift capabilities to load pallets of batteries on to trucks. Landfill staff to be provided with plastic wrapping and strapping to pack batteries properly.	Correct storage of batteries started within 3 months **Whom** Member Councils **Outcomes** Lifting and collection procedures and equipment established within 12 months

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
Oil Drums are problematic and most are being unnecessarily disposed of. Drums are being collected and prepared at Newman for recycling. Contaminated drums are separated and disposed of in mono-cells at Seven Mile (Karratha) Landfill. This can cause groundwater contamination and landfill slumping issues.	Oil drums need to be cleaned and prepared before recycler crushing and baling. Landfill sites do not have the appropriate facilities to clean and prepare drums for recycler crushing and baling.	Member Councils should implement a proper management regime for the acceptance and preparation of oil drums for recycling. Landfill staff should ensure that drums are properly prepared for recycler crushing and baling. Industry building / business approvals to include drum cleaning facilities as appropriate. Drums containing toxic / hazardous fluids and residues to be redirected to appropriate disposal facilities.	Drum cleaning facilities be established at all major landfill sites.	Member Councils will need to plan this and seek additional State Government funding as required to implement.	Started within 18 month **Whom** PRC with liaison with member Councils **Outcomes** Funding source identified and application made within 24 months
			Member Council to implement a differential pricing policy for the acceptance of drums based on cleanliness. Residents to be given the option to use the drum cleaning facility free of charge	Based on the level of effort to prepare and clean drums for recycling. The levies should be non-punitive and not too high as to encourage dumping and inappropriate cleaning practices.	Started within 3 months **Whom** Member Councils **Outcomes** Acceptance policy communicated and levy implemented within 12 months
			Landfill to clean, as required, and prepare drums for recycling in accordance with standards and MSDS.	Portable equipment and safety gear to prepare drums.	Dependent upon funding for infrastructure

			Redirected drums containing toxic / hazardous fluids and residues to appropriate disposal facilities.	System for recording the details of who has been redirected and for what reasons.	Started within 3 months **Whom** Member Councils **Outcomes** Acceptance policy communicated and reporting procedures established within 12 months
			New acceptance and pricing strategy to be communicated to industry (see **Recommendation 5.2.3 - Education and Awareness**) prior to implementation.	As part of general waste education and awareness programme.	As above

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
Gas Bottles are problematic and some are being unnecessarily buried. A number of gas bottles are taken to the landfill sites because removalists will not move the bottles. Preparing gas bottles for recycling can be dangerous if not done correctly.	Landfill sites do not have the appropriate equipment to prepare gas bottles for recycling.	That all serviceable gas bottles should be re-used where possible. That all gas bottles be prepared for recycling in accordance with the appropriate standards.	Landfill staff to be trained in gas bottle management. Redirect gas bottles to companies with appropriate facilities. Landfill prepare gas bottles for recycling in accordance with standards and MSDS	There may be a cost to training staff, but it is anticipated that the recyclers might pay for this under the right circumstances. Portable equipment and safety gear to prepare gas bottles.	Started within 6 months **Whom** Member Councils **Outcomes** Equipment established and training completed within 18 months

5.4.8 Electronic Waste

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
Quantities of Electronic Waste (E-waste) are being disposed of at the landfills SIMS Metal is currently undertaking metal collections in the Region. In addition to metal recycling, the company offers e-waste recycling.	E-waste poses an environmental risk due to the hazardous metals contained in electronic equipment. Computers and other electronic contain mercury, lead, cadmium, chromium that can pollute soil and groundwater. These waste streams are increasing in volume as technological innovation continues to reduce product life spans as more and more products are becoming obsolete.	The proposed recycling coordinator (see **Recommendation 5.4.1 - Coordination of**) should be tasked to work with metal recyclers to facilitate the collection and preparation of e-waste for collection from municipal landfill sites and key industry locations.	Member Councils and industry proactively centralise e-waste to major pick-up sites (landfills and industry sites). This would involve member Council possibly introducing some localised back loading practices and/or some specific collection days. Landfill staff to separate e-waste into appropriate groups. Recycling coordinator coordinating with recyclers to collect e-waste.	There will be an increase in operational cost and some trucks may need to be augmented with hoists to load large appliances onto member Council trucks. If conducted properly, material prices (especially metals) could offset some of the initial set-up costs. Industry and State Government might be prepared to sponsor the upgrading of vehicles for additional productivity improvements. This should be explored by the PRC	Started within 12 months of co-ordinator role filled **Whom** Coordinator in liaison with member Councils and recyclers **Outcomes** Logistics arranged for movements within region and coordination with recyclers within 24 months of appointment

Findings	Issues	Recommendations	Implementation Strategy	Cost	Priority
		Drop-off recycling stations accept smaller e-waste items such as mobile phone and computers. These stations should be established in major towns and operated by community groups and schools, where profits from recycling are returned to community groups and schools.	Member Councils provide land to community groups for the purpose of undertaking recycling. Member Councils approach the State Government, and resource and recycling industries provide funding for facilities and specialist recycling equipment. Community drop-off recyclable material to recycling stations. Community groups and schools collect and properly sort recyclable material, and prepare for transportation and sale. Community groups and schools to liaise with recyclers, transport companies or the proposed coordination officer to transport recyclable material to recyclers. PRC approach DEC to fund and develop a suitable awareness campaign promoting the virtues of recycle and how to recycle properly.	The initial set-up costs would be spread across member Councils and industry as equitably as possible. Community groups and schools would be responsible for the operating costs of recycling stations, but would receive any profits to pursue community group activities. DEC would be responsible for an appropriate awareness campaign. Recyclers would be responsible for providing training. **Note: This recommendation is based on the claimed support for recycling within the Pilbara communities and will test/validate the actual level of support for recycling within the Pilbara communities**	Started within 12 months of co-ordinator role filled **Whom** Coordinator in liaison with member Councils, DEC and community groups **Outcomes** First programme established within 36 months of appointment

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APPENDIX A

Consultation List

Name	Council/Organisation	Title	Working Group Member
Annette Debenham	Amcor Recycling	Business Development	
Justin Pereira	Amcor Recycling	Recycling Consultant	
Rachael Williams	BHP Billiton		✓
Martin Ladyman	CLAW Environmental	Managing Director	
James Ladyman	CLAW Environmental	Sales/Marketing	
Vinh Nguyen	DEC	Environmental Officer	
Anne Trevena (currently on maternity leave)	DEC	Environmental Protection Program Officer – North West Region	✓
Alistair Bain	DEC	Regional Co-ordinator – North West Waste Management	✓
James Milne	DEC	Project Coordinator, Waste Management Branch	
David Healy	DEC		
John Davis	DEC	Senior Project Co-ordinator	
Jakkie Joubert	JoJo Plastics		
Liza Joubert	JoJo Plastics		
Paul Dunn	JoJo Plastics		
Rebecca Brown	MWAC		
Keith Pearson	Shire of Ashburton	CEO	✓
Jeffery Breen	Shire of Ashburton	Executive Manager Engineering Services	✓
Oliver Schaer	Shire of East Pilbara	Acting Director of Technical Services	✓
Allan Moles	Shire of Roebourne	CEO	✓
Craig Fitzgerald	Shire of Roebourne	Engineering Design Officer	✓
Jon Jones	Shire of Roebourne		✓
Stuart Mayne	SIMS Metal	Operations Manager – Western Australia	
Nigel Drury	SIMS Metal	Trading Representative	
Vic Ristovichis	Smorgon Steel	Account Manager	
David Hopkins	Smorgon Steel	State Manager Recycling	
Chris Adams	Town of Port Hedland Pilbara Regional Council	CEO CEO	✓
Grant Logie	Town of Port Hedland	Director Engineering Services	✓
Russell Dyer	Town of Port Hedland	Works Manager	✓
Vic Andrich	TPA Australasia	Tyre Plant Department	
Bob Phillips	TPA Australasia	Sales Manager	
Ray Mackie	VISY Recycling	Sales/Supply Manager	
Clint Bain	Rio Tinto	Superintendent Towns	✓
Yvonne O'Neill	Rio Tinto		
Jarrod Pittson	Woodside	Senior Environmental Advisor	✓

APPENDIX B

Waste Collection Services
Sample Questionnaire

INTRODUCTION

PURPOSE OF THIS QUESTIONNAIRE

Cardno BSD was appointed by the Pilbara Regional Council (PRC) to produce a Waste Management Plan. The information requested from this questionnaire relates to the **collection services** offered to the _____ residents and will be used to model the financial cost and waste flows for the PRC. This questionnaire does not address the disposal services provided at the local waste disposal facility. Disposal service information will be provided in a separate questionnaire.

Please answer each question by either marking the appropriate box(es) or filling in the blank space provided after each question.

If there is insufficient space provided please attach relevant information to this questionnaire. If your Council does not have access to tonnage data – please attach any calculations or assumptions to the additional sheets provided in **Appendix A.**

Cardno BSD would appreciate if you could complete the questionnaire by **Friday 23rd March,** to enable progress to be made on the modeling. It is requested that questions be answered in relation to the 2005/06 financial year. The accuracy of the information provided will affect the financial assessment of the alternative option for the PRC.

Should you have any queries or require assistance with regards to answering any questions, please contact Megan Haines or Robert Sim at Cardno BSD on (08) 9273 3888.

QUESTIONNAIRE FORMAT

This questionnaire is comprised of the following components, which outline the possible collection services offered at _____ by the Shire of _____. Please tick the waste services currently offered and undertaken by the Council.

Current Collection Services

- ❑ 2.1 Domestic Waste Collection (240L MGB)
- ❑ 2.2 Domestic Waste Collection (Bulk Bins)
- ❑ 2.3 Commercial Waste Collection (240L MGB)
- ❑ 2.4 Commercial Waste Collection (Bulk Bins)
- ❑ 2.5 Recyclables Collection
- ❑ 2.6 Pre Cyclone Clean Up
- ❑ 2.7 Waste from Council Works
- ❑ 2.8 Public Litterbins
- ❑ 2.9 Other Collection (1) (please specify) _____
- ❑ 2.10 Other Collection (2) (please specify) _____

CURRENT COLLECTION SERVICES

DOMESTIC WASTE COLLECTION (240L MGB)

This category covers all general waste produced by household/domestic properties and collected by the Council's domestic waste collection service.

- **What is the frequency of the collection?**
  - ❑ Once weekly
  - ❑ Twice weekly
  - ❑ Fortnightly
  - ❑ As required
  - ❑ Other (please specify) _____

- **Does Council own the 240L bins?**
  - ❑ No (please specify who owns these bins) _____
  - ❑ Yes. What was the purchase price for these bins? _____
    What is the expected life of the bins? _____ years

- **Please specify the number of households that were offered this service in the 2005/06 financial year.**

  ❑ _____

- **Please approximate the total number of collections performed each year.**

  ❑ _____

- **How many tonnes of waste, in total, is collected annually from this waste category?**
  (Note: if tonnage data is not available, please outline any calculations and assumptions in the pages provided in **Appendix A**.)

  ❑ _____ tonnes/year

- **Please specify where this waste is processed / disposed**
  If there is more than one site, please specify percentages entering the other site(s). Also state the transfer station if applicable.

Waste Processing / Disposal Site(s)	Rate $/tonne	Transfer Station (if applicable)
☐ (% entering)	☐ $ /tonne	☐
☐ (% entering)	☐ $ /tonne	☐

- **Cost of Collection**
  If a contractor is used for this service, what is the cost per collection?
  $_____/collection

- **Cost of Collection**
  If the Council uses day labour for this service, please fill in the table below.

Alternatively, if there are any spreadsheets available, which outline the cost of this collection, please send these to Megan Haines or Robert Sim.

Note : In the space for "Annual Cost", insert the amount related to THIS service category only (eg. The operating cost of the trucks should be apportioned to household/domestic waste collection and disposal only. Therefore, if the truck is used for collection of recyclables as well – the recycling portion of the cost should be EXCLUDED).

Exclude tip charges for disposal of waste.

Item Description	Units
❑ Truck type used	
❑ Number of trucks used	
❑ Truck size/capacity	
❑ Number of drivers	
❑ Number of collectors	
❑ Number of supervisory staff	
Item Description	**Annual Cost**
❑ Truck operating cost	$ /year
❑ Truck Driver cost	$ /year
❑ Waste collector cost	$ /year
❑ Supervisor cost	$ /year

- Other overhead costs associated with this service (eg. Supervisor's vehicle). Exclude items such as pensioner rebates, publicity cost and general administration of accounts – insert these in **section 5** later.

❑	$ /year
❑	$ /year
❑	$ /year

- **Complete the following details for the trucks used.**

Vehicle A

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle B (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle C (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

DOMESTIC WASTE COLLECTION (BULK BINS)

Domestic Bulk Bin collection is defined as the collection of waste, which is not included with the weekly domestic waste in the previous section, and is periodically collected by the Council's collection service.

- **What is the frequency of the collection?**
  - ❑ Once weekly
  - ❑ Fortnightly
  - ❑ As required
  - ❑ Other (please specify) _____

- **Please specify the number of households offered with this service.**

  ❑ _____

- **Please approximate the total number of collections performed each year throughout the Council.**

  ❑ _____

- **How many tonnes of waste, in total, is collected annually from this waste category?** This is inclusive of greenwaste and all recyclables whether eventually separated or not (Note: if tonnage data is not available, please outline any calculations and assumptions in the pages provided in **Appendix A**.)
  ❑ _____

- **Please specify where this waste is processed / disposed**
  (If there is more than one site, please specify percentages entering the other site(s). Also state the transfer station if applicable).

Waste Processing / Disposal Site(s)	Rate $/tonne	Transfer Station (if applicable)
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑

- **Is garden waste/greenwaste (eg. Tree prunings) separated during/after collection?**
  - ❑ No
  - ❑ Yes - Where is it processed? _____
    - ❑ Who processes it? _____
    - ❑ How much greenwaste is collected & processed annually? ____tonnes
    - ❑ What is the cost per tonne for shredding? $_____ per tonne
    - ❑ What is the income per tonne for the greenwaste? $_____per tonne

- **Are other bulk items separated for recycling?**
  - ❑ No (go to next question)
  - ❑ Yes - complete the table below (insert income only if Council owns the recyclables)

Tick relevant category	Tonnes collected annually	Net Income per tonne (if applicable)
❑ 'Whitegoods'	❑ tonnes/year	❑ $ /tonne
❑ Aluminium	❑ tonnes/year	❑ $ /tonne
❑ Steel	❑ tonnes/year	❑ $ /tonne
❑	❑ tonnes/year	❑ $ /tonne

- **Cost of Collection**
  If a contractor is used for this service, what is the cost per collection?
  $_____/collection

- **Cost of Collection**
  If the Council uses day labour for this service, please fill in the table below.

Alternatively, if there are any spreadsheets available, which outline the cost of this collection, please send these to Megan Haines or Robert Sim.

Note : In the space for "Annual Cost", insert the amount related to THIS service category only (eg. The operating cost of the trucks should be apportioned to household/domestic waste collection and disposal only. Therefore, if the truck is used for collection of recyclables as well – the recycling portion of the cost should be EXCLUDED).

Exclude tip charges for disposal of waste.

Item Description	Units
❑ Truck type used	
❑ Number of trucks used	
❑ Truck size/capacity	
❑ Number of drivers	
❑ Number of collectors	
❑ Number of supervisory staff	

Item Description	Annual Cost
❑ Truck operating cost	$ /year
❑ Truck Driver cost	$ /year
❑ Waste collector cost	$ /year
❑ Supervisor cost	$ /year

- Other overhead costs associated with this service (eg. Supervisor's vehicle). Exclude items such as pensioner rebates, publicity cost and general administration of accounts – insert these in **section 5** later.

❑	$ /year
❑	$ /year
❑	$ /year

- **Complete the following details for the trucks used.**

Vehicle A

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle B (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle C (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

COMMERCIAL COLLECTION (240L MGB)

This category covers all general waste produced by commercial and collected by the Council's commercial waste collection service.

- **What is the frequency of the collection?**
  - ❑ Once weekly
  - ❑ Twice weekly
  - ❑ Fortnightly
  - ❑ As required
  - ❑ Other (please specify) _____

- **Does Council own the 240L bins?**
  - ❑ No (please specify who owns these bins) _____
  - ❑ Yes. What was the purchase price for these bins? _____
    What is the expected life of the bins? _____ years

- **Please specify the number of commercial properties that were offered this service in the 2005/06 financial year.**

  ❑ _____

- **Please approximate the total number of collections performed each year.**

  ❑ _____

- **How many tonnes of waste, in total, is collected annually from this waste category?** (Note: if tonnage data is not available, please outline any calculations and assumptions in the pages provided in **Appendix A**.)

  ❑ _____ tonnes/year

- **Please specify where this waste is processed / disposed**
  If there is more than one site, please specify percentages entering the other site(s). Also state the transfer station if applicable.

Waste Processing / Disposal Site(s)	Rate $/tonne	Transfer Station (if applicable)
☐ (% entering)	☐ $ /tonne	☐
☐ (% entering)	☐ $ /tonne	☐

- **Cost of Collection**
  If a contractor is used for this service, what is the cost per collection?
  $_____/collection

- **Cost of Collection**
  If the Council uses day labour for this service, please fill in the table below.

Alternatively, if there are any spreadsheets available, which outline the cost of this collection, please send these to Megan Haines or Robert Sim.

Note : In the space for "Annual Cost", insert the amount related to THIS service category only (eg. The operating cost of the trucks should be apportioned to household/domestic waste collection and disposal only. Therefore, if the truck is used for collection of recyclables as well – the recycling portion of the cost should be EXCLUDED).

Exclude tip charges for disposal of waste.

Item Description	Units
❑ Truck type used	
❑ Number of trucks used	
❑ Truck size/capacity	
❑ Number of drivers	
❑ Number of collectors	
❑ Number of supervisory staff	

Item Description	Annual Cost
❑ Truck operating cost	$ /year
❑ Truck Driver cost	$ /year
❑ Waste collector cost	$ /year
❑ Supervisor cost	$ /year

- Other overhead costs associated with this service (eg. Supervisor's vehicle). Exclude items such as pensioner rebates, publicity cost and general administration of accounts – insert these in **section 5** later.

❑	$ /year
❑	$ /year
❑	$ /year

- **Complete the following details for the trucks used.**

Vehicle A

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle B (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle C (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

COMMERCIAL WASTE COLLECTION (BULK BINS)

Commercial Bulk Bin collection is defined as the collection of waste, which is not included with the weekly commercial waste in the previous section, and is periodically collected by the Council's collection service.

- **What is the frequency of the collection?**
  - ❑ Once weekly
  - ❑ Fortnightly
  - ❑ As required
  - ❑ Other (please specify) _____

- **Please specify the number of commercial properties offered with this service.**

  ❑ _____

- **Please approximate the total number of collections performed each year throughout the Council.**

  ❑ _____

- **How many tonnes of waste, in total, is collected annually from this waste category?** This is inclusive of greenwaste and all recyclables whether eventually separated or not (Note: if tonnage data is not available, please outline any calculations and assumptions in the pages provided in **Appendix A**.)

  ❑ _____

- **Please specify where this waste is processed / disposed**
  (If there is more than one site, please specify percentages entering the other site(s). Also state the transfer station if applicable).

Waste Processing / Disposal Site(s)	Rate $/tonne	Transfer Station (if applicable)
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑

- **Is garden waste/greenwaste (eg. Tree prunings) separated during/after collection?**
  - ❑ No (go to next question)
  - ❑ Yes - Where is it processed? _____
    - ❑ Who processes it? _____
    - ❑ How much greenwaste is collected & processed annually? _____tonnes
    - ❑ What is the cost per tonne for shredding? $_____ per tonne
    - ❑ What is the income per tonne for the greenwaste? $_____per tonne

- **Are other bulk items separated for recycling?**
  - ❑ No (go to next question)
  - ❑ Yes - complete the table below (insert income if Council owns the recyclables)

Tick relevant category	Tonnes collected annually	Net Income per tonne (if applicable)
❑ 'Whitegoods'	❑ tonnes/year	❑ $ /tonne
❑ Aluminium	❑ tonnes/year	❑ $ /tonne
❑ Steel	❑ tonnes/year	❑ $ /tonne
❑	❑ tonnes/year	❑ $ /tonne
❑	❑ tonnes/year	❑ $ /tonne

- **Cost of Collection**
  If a contractor is used for this service, what is the cost per collection?
  $_____/collection

- **Cost of Collection**
  If the Council uses day labour for this service, please fill in the table below.

Alternatively, if there are any spreadsheets available, which outline the cost of this collection, please send these to Megan Haines or Robert Sim.

Note : In the space for "Annual Cost", insert the amount related to THIS service category only (eg. The operating cost of the trucks should be apportioned to household/domestic waste collection and disposal only. Therefore, if the truck is used for collection of recyclables as well – the recycling portion of the cost should be EXCLUDED).

Exclude tip charges for disposal of waste.

Item Description	Units
❑ Truck type used	
❑ Number of trucks used	
❑ Truck size/capacity	
❑ Number of drivers	
❑ Number of collectors	
❑ Number of supervisory staff	

Item Description	Annual Cost
❑ Truck operating cost	$ /year
❑ Truck Driver cost	$ /year
❑ Waste collector cost	$ /year
❑ Supervisor cost	$ /year

- Other overhead costs associated with this service (eg. Supervisor's vehicle). Exclude items such as pensioner rebates, publicity cost and general administration of accounts – insert these in **section 5** later.

❑	$ /year
❑	$ /year
❑	$ /year

- **Complete the following details for the trucks used.**

Vehicle A

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle B (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle C (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

RECYCLABLES COLLECTION

This category consists of all waste separately collected for recycling. It does not include waste such as green waste.

- **Who operates the Domestic Recycling collection service?**
  - ❑ Council day labour
  - ❑ Contractor (please specify name & contract expiry date)_____

- **What type of collection unit is provided for each household?**
  - ❑ 240 L Mobile Garbage Bin (MGB)
  - ❑ 50 L crates (please specify number per household) _____
  - ❑ Bags (please describe) _____
  - ❑ Drop off facility (eg. please specify type of bin) _____

- **Does Council own these recycling containers?**
  - ❑ No (please specify who owns these containers)_____
  - ❑ Yes. What was the purchase price for these containers? $_____ What is the expected life of the containers in years

- **Please specify the number of containers of this type currently in service with Council**
  - ❑ _____

- **What is the frequency of the collection?**
  - ❑ Once weekly
  - ❑ Twice weekly
  - ❑ Fortnightly
  - ❑ As required
  - ❑ Other (please specify) _____

- **Please approximate the total number of collections performed each year.**
  - ❑ _____

- **Who owns the recyclables collected?**
  - ❑ Council
  - ❑ Contractor

- **How much money has the Council recouped from the Resource Recovery Rebate Scheme (2005/06)?**
  - ❑ $_____

- **How many tonnes of recyclables are collected annually (2005/06) for each of the categories below, and what is their value? (insert income only if Council owns the recyclables).**

Note : In the column for "Net Income", insert the income received after allowance for the cost of sorting. Ignore this column if Council does not own the recyclables.

Tick relevant category	Tonnes collected annually	Net Income per tonne (if applicable)
❑ Paper and cardboard	tonnes/year	$ /tonne
❑ Glass	tonnes/year	$ /tonne
❑ Plastic	tonnes/year	$ /tonne
❑ Aluminium	tonnes/year	$ /tonne
❑ Steel	tonnes/year	$ /tonne

❑ Other recyclable categories (please specify).

❑	tonnes/year	$ /tonne
❑	tonnes/year	$ /tonne
❑	tonnes/year	$ /tonne

- **Please specify where the recyclables are unloaded for sorting (if there is more than one site, please specify percentages entering each site.**

Tick relevant category	Waste Disposal Site(s)
❑ Paper and cardboard	
❑ Glass	
❑ Plastic	
❑ Aluminium	
❑ Steel	

❑ Other recyclable categories (please specify)

❑	
❑	
❑	

- **Cost of Collection**
  If a contractor is used for this service, what is the cost per collection?
  $_____/collection

- **Cost of Collection**
  If the Council uses day labour for this service, please fill in the table below.

Alternatively, if there are any spreadsheets available, which outline the cost of this collection, please send these to Megan Haines or Robert Sim.

Note : In the space for "Annual Cost", insert the amount related to THIS service category only (eg. The operating cost of the trucks should be apportioned to household/domestic waste collection and disposal only. Therefore, if the truck is used for collection of recyclables as well – the recycling portion of the cost should be EXCLUDED).

✋ Exclude tip charges for disposal of waste.

Item Description	Units
❑ Truck type used	
❑ Number of trucks used	
❑ Truck size/capacity	
❑ Number of drivers	
❑ Number of collectors	
❑ Number of supervisory staff	

Item Description	Annual Cost
❑ Truck operating cost	$ /year
❑ Truck Driver cost	$ /year
❑ Waste collector cost	$ /year
❑ Supervisor cost	$ /year

- Other overhead costs associated with this service (eg. Supervisor's vehicle). Exclude items such as pensioner rebates, publicity cost and general administration of accounts – insert these in **section 5** later.

❑	$ /year
❑	$ /year
❑	$ /year

- **Complete the following details for the trucks used.**

Vehicle A

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle B (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle C (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

PRE-CYCLONE CLEANUP

Pre-Cyclone Cleanup is defined as the collection of waste which is not included with the weekly or fortnightly domestic waste, greenwaste and recycling collection covered in other sections, and is periodically collected by the Council's collection service prior the cyclone season.

- **Please specify the number of households offered with this service.**

  ❑ _____

- **Please approximate the total number of collections performed each year throughout the Council.**

  ❑ _____

- **How many tonnes of waste, in total, are collected annually from this waste category?** This is inclusive of greenwaste and all recyclables whether eventually separated or not (Note: if tonnage data is not available, please outline any calculations and assumptions in the pages provided in **Appendix A**.)
  ❑ _____

- **Please specify where this waste is processed / disposed**
  (If there is more than one site, please specify percentages entering the other site(s). Also state the transfer station if applicable).

Waste Processing / Disposal Site(s)	Rate $/tonne	Transfer Station (if applicable)
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑

- **Is garden waste/greenwaste (eg. Tree prunings) separated during/after collection?**
  ❑ No (go to next question)
  ❑ Yes
  ❑ Where is it processed? _____
  ❑ Who processes it? _____
  ❑ How much greenwaste is collected & processed annually? _____tonnes
  ❑ What is the cost per tonne for shredding? $_____ per tonne
  ❑ What is the income per tonne for the greenwaste? $_____per tonne

- **Are other bulk items separated for recycling?**
  ❑ No (go to next question)
  ❑ Yes - fill on the table below (insert income only if Council owns the recyclables)

Tick relevant category	Tonnes collected annually	Net Income per tonne (if applicable)
❑ 'Whitegoods'	❑ tonnes/year	❑ $ /tonne
❑ Aluminium	❑ tonnes/year	❑ $ /tonne
❑ Steel	❑ tonnes/year	❑ $ /tonne
Other recyclable categories (please specify)		
❑	❑ tonnes/year	❑ ☐ $ /tonne
❑	❑ tonnes/year	❑ ☐ $ /tonne
❑	❑ tonnes/year	❑ ☐ $ /tonne

- **Cost of Collection**

If a contractor is used for this service, what is the cost per collection?
$_____/collection

- **Cost of Collection**
  As the Council uses day labour for this service, please fill in the table below.

Alternatively, if there are any spreadsheets available, which outline the cost of this collection, please send these to Megan Haines or Robert Sim.

Note : In the space for "Annual Cost", insert the amount related to THIS service category only (eg. The operating cost of the trucks should be apportioned to household/domestic waste collection and disposal only. Therefore, if the truck is used for collection of recyclables as well – the recycling portion of the cost should be EXCLUDED).

Exclude tip charges for disposal of waste.

Item Description	Units
❑ Truck type used	
❑ Number of trucks used	
❑ Truck size/capacity	
❑ Number of drivers	
❑ Number of collectors	
❑ Number of supervisory staff	

Item Description	Annual Cost
❑ Truck operating cost	$ /year
❑ Truck Driver cost	$ /year
❑ Waste collector cost	$ /year
❑ Supervisor cost	$ /year

- Other overhead costs associated with this service (eg. Supervisor's vehicle). Exclude items such as pensioner rebates, publicity cost and general administration of accounts – insert these in **section 5** later.

❑	$ /year
❑	$ /year
❑	$ /year

- **Complete the following details for the trucks used.**

Vehicle A

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle B (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle C (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

WASTE FROM COUNCIL WORKS

This section includes greenwaste and inert waste emanating from Council works, such as pruning of street trees and maintenance of parks and reserves.

Greenwaste

- **How many tonnes of waste are disposed annually from this waste category?**

  ❑ Street trees _____

  ❑ Other (please specify) _____

- **Please specify where each of the types of greenwaste are processed / disposed of**
  If there is more than one site, please specify percentages entering the other site(s). Also state the transfer station if applicable. The disposal rate may be substituted for tipping fee if applicable.

Waste Processing / Disposal Site(s)	Rate $/tonne	Transfer Station (if applicable)
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑

Inert Waste

- **How many tonnes of waste are disposed annually from this waste category?**
  ❑ Engineering works _____

  ❑ Parks _____

  ❑ Other (please specify) _____

- **Please specify where each of the types of greenwaste are processed / disposed of**
  If there is more than one site, please specify percentages entering the other site(s). Also state the transfer station if applicable. The disposal rate may be substituted for tipping fee if applicable.

Waste Processing / Disposal Site(s)	Rate $/tonne	Transfer Station (if applicable)
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑

PUBLIC LITTERBINS

Public litterbins refer to bins placed in/along roads, parks and reserves (they do not include bins placed in shopping centres, libraries, and recreation centres/halls - which will have to be included in the "Commercial Waste" section earlier). If the public litterbin waste is collected as part of the domestic / household waste collection rounds and is not separately accounted for do not try to estimate the quantities associated with this service. However, if the same trucks are used for separate public litterbin rounds then estimate the proportion of usage between the two services.

- **Does Council have any public litterbins in its locality?**
  - ❑ No (go to section 3.8)
  - ❑ Yes (answer subsequent questions in this section)

- **How many public litterbins are within Council?**
  - ❑ _____

- **What is the size of each bin? (If more than one size, please state).**
  - ❑ _____ Litres
  - ❑ _____ Litres

- **Who operates the Public waste collection service? (in 2005/06 financial year).**
  - ❑ Council day labour
  - ❑ Contractor (please specify name & contract expiry date)

    _____

- **Does Council own these bins?**
  - ❑ No (please specify who owns these bins) _____
  - ❑ Yes. What was the purchase price for these bins? $_____
    What is the expected life of the bins? _____years

- **What is the frequency of the collection?**
  - ❑ Once weekly
  - ❑ Twice weekly
  - ❑ Fortnightly
  - ❑ As required
  - ❑ Other (please specify) _____

- **Please approximate the total number of collections performed each year.**
  - ❑ _____

- **How many tonnes of waste is collected annually from this waste category?**
  - ❑ _____

- **Please specify where this waste is disposed (if there is more than one site, please specify percentages entering the other site(s). Also state the transfer station if applicable).**

Waste Disposal Site(s)	Disposal Rate $/tonne	Transfer Station (if applicable)
☐	☐ $ /tonne	☐
☐ (% entering)	☐ $ /tonne	☐
☐ (% entering)	☐ $ /tonne	☐

- **Cost of Collection**
  If a contractor is used for this service, what is the cost per collection?
  $_____/collection

- **Cost of Collection**
  If the Council uses day labour for this service, please fill in the table below.

Alternatively, if there are any spreadsheets available, which outline the cost of this collection, please send these to Megan Haines or Robert Sim.

Note : In the space for "Annual Cost", insert the amount related to THIS service category only (eg. The operating cost of the trucks should be apportioned to household/domestic waste collection and disposal only. Therefore, if the truck is used for collection of recyclables as well – the recycling portion of the cost should be EXCLUDED).

Exclude tip charges for disposal of waste.

Item Description	Units
❑ Truck type used	
❑ Number of trucks used	
❑ Truck size/capacity	
❑ Number of drivers	
❑ Number of collectors	
❑ Number of supervisory staff	

Item Description	Annual Cost
❑ Truck operating cost	$ /year
❑ Truck Driver cost	$ /year
❑ Waste collector cost	$ /year
❑ Supervisor cost	$ /year

- Other overhead costs associated with this service (eg. Supervisor's vehicle). Exclude items such as pensioner rebates, publicity cost and general administration of accounts – insert these in **section 5** later.

❑	$ /year
❑	$ /year
❑	$ /year

- **Complete the following details for the trucks used.**

Vehicle A

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle B (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle C (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

OTHER COLLECTION (1)

Please include any other collections offered within the Shire. There may include:

- Tyre collections
- Car body / scrap metal collections
- Oil collections

- **Please describe the service**

_____
_____
_____
_____

- **Please approximate the total number of collections performed each year throughout the Council.**

  ❑ _____

- **How many tonnes of waste, in total, are collected annually from this waste category?** (Note: if tonnage data is not available, please outline any calculations and assumptions in the pages provided in **Appendix A**.)

  ❑ _____

- **Please specify where this waste is processed / disposed**

(If there is more than one site, please specify percentages entering the other site(s). Also state the transfer station if applicable).

Waste Processing / Disposal Site(s)	Rate $/tonne	Transfer Station (if applicable)
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑

- **Are other items separated for recycling?**
  - ❑ No (go to next question)
  - ❑ Yes - fill on the table below (insert income only if Council owns the recyclables)

Tick relevant category	Tonnes collected annually	Net Income per tonne (if applicable)
❑ 'Whitegoods'	❑ tonnes/year	❑ $ /tonne
❑ Aluminium	❑ tonnes/year	❑ $ /tonne
❑ Steel	❑ tonnes/year	❑ $ /tonne
Other recyclable categories (please specify)		
❑	❑ tonnes/year	❑ $ /tonne
❑	❑ tonnes/year	❑ $ /tonne
❑	❑ tonnes/year	❑ $ /tonne

- **Cost of Collection**
  If a contractor is used for this service, what is the cost per collection?
  $_____/collection

- **Cost of Collection**
  As the Council uses day labour for this service, please fill in the table below.

Alternatively, if there are any spreadsheets available, which outline the cost of this collection, please send these to Megan Haines or Robert Sim.

Note : In the space for "Annual Cost", insert the amount related to THIS service category only (eg. The operating cost of the trucks should be apportioned to household/domestic waste collection and disposal only. Therefore, if the truck is used for collection of recyclables as well – the recycling portion of the cost should be EXCLUDED).

✋ Exclude tip charges for disposal of waste.

Item Description	Units
❑ Truck type used	
❑ Number of trucks used	
❑ Truck size/capacity	
❑ Number of drivers	
❑ Number of collectors	
❑ Number of supervisory staff	

Item Description	Annual Cost
❑ Truck operating cost	$ /year
❑ Truck Driver cost	$ /year
❑ Waste collector cost	$ /year
❑ Supervisor cost	$ /year

- Other overhead costs associated with this service (eg. Supervisor's vehicle). Exclude items such as pensioner rebates, publicity cost and general administration of accounts – insert these in **section 5** later.

❑	$ /year
❑	$ /year
❑	$ /year

- **Complete the following details for the trucks used.**

Vehicle A

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle B (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle C (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

OTHER COLLECTION (2)

Please include any other collections offered within the Shire. There may include:

- Tyre collections
- Car body / scrap metal collections
- Oil collections

- **Please describe the service**

_____
_____
_____
_____

- **Please approximate the total number of collections performed each year throughout the Council.**

❑ _____

- **How many tonnes of waste, in total, are collected annually from this waste category?** (Note: if tonnage data is not available, please outline any calculations and assumptions in the pages provided in **Appendix A**.)

❑ _____

- **Please specify where this waste is processed / disposed**

(If there is more than one site, please specify percentages entering the other site(s). Also state the transfer station if applicable).

Waste Processing / Disposal Site(s)	Rate $/tonne	Transfer Station (if applicable)
❑ (% entering)	❑ $ /tonne	❑
❑ (% entering)	❑ $ /tonne	❑

- **Are other items separated for recycling?**
  - ❑ No (go to next question)
  - ❑ Yes - fill on the table below (insert income only if Council owns the recyclables)

Tick relevant category	Tonnes collected annually	Net Income per tonne (if applicable)
❑ 'Whitegoods'	❑ tonnes/year	❑ $ /tonne
❑ Aluminium	❑ tonnes/year	❑ $ /tonne
❑ Steel	❑ tonnes/year	❑ $ /tonne
Other recyclable categories (please specify)		
❑	❑ tonnes/year	❑ $ /tonne
❑	❑ tonnes/year	❑ $ /tonne
❑	❑ tonnes/year	❑ $ /tonne

- **Cost of Collection**
  If a contractor is used for this service, what is the cost per collection?
  $_____/collection
- **Cost of Collection**
  As the Council uses day labour for this service, please fill in the table below.

Alternatively, if there are any spreadsheets available, which outline the cost of this collection, please send these to Megan Haines or Robert Sim.

Note : In the space for "Annual Cost", insert the amount related to THIS service category only (eg. The operating cost of the trucks should be apportioned to household/domestic waste collection and disposal only. Therefore, if the truck is used for collection of recyclables as well – the recycling portion of the cost should be EXCLUDED).

Exclude tip charges for disposal of waste.

Item Description	Units
❑ Truck type used	
❑ Number of trucks used	
❑ Truck size/capacity	
❑ Number of drivers	
❑ Number of collectors	
❑ Number of supervisory staff	

Item Description	Annual Cost
❑ Truck operating cost	$ /year
❑ Truck Driver cost	$ /year
❑ Waste collector cost	$ /year
❑ Supervisor cost	$ /year

- Other overhead costs associated with this service (eg. Supervisor's vehicle). Exclude items such as pensioner rebates, publicity cost and general administration of accounts – insert these in **section 5** later.

❑	$ /year
❑	$ /year
❑	$ /year

- **Complete the following details for the trucks used.**

Vehicle A

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle B (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

Vehicle C (If req.)

❑ Purchase price	$
❑ Expected years of service	
❑ Disposal price	$

COUNCIL ANNUAL DAY LABOUR RATES

This section aims to determine the total workforce involved with the Council's entire waste collection and disposal operation. If Council operates using contractors for some waste services, exclude this portion of labour.

- **Please fill in the table below. In the "Description" column, fill in the labour category (eg. Foreman, Driver, Leading Hand, Collector).**

Description	Number of Units/Persons	Annual unit cost $/year	Annual Unit Overtime Cost $/year

VEHICLE OPERATING COSTS

This section aims to determine the total number of Council vehicles and associated costs involved with the Council's waste collection and disposal operation.

- **Please fill in the table below regarding the waste collection and disposal trucks used by Council to carry out the waste management operation.**

Truck Type (Description)	Truck Size (Tonnes)	Number of Vehicles	Annual Operating Cost ($/year)	Purchase Price ($)	Expected Life (years)	Expected Disposal Price ($)

- **Does council operate any other vehicles in relation to this waste collection operation?**
  (eg. Supervisors Vehicle, Leading-hand's vehicle).
  If so then please fill in the table below.

Vehicles Type (Description)	Number of Vehicles	Annual Operating Cost ($/year)	Purchase Price ($)	Expected Life (years)	Expected Disposal Price ($)

OTHER COSTS

This section has been included to determine any other costs related to the Council's waste collection operation. Listed below are items of cost not identified in the previous categories.

- **Please insert annual cost for each applicable item for the 2005/06 financial year.**

Description	Cost $ per year
❑ Administration	❑
❑ Publicity (Recycling, Bulk Collection, etc)	❑
❑ Maintenance of bins	❑
❑ Replacement of bins	❑
❑ Home compost bins	❑
❑ Transfer Station charge	❑
❑ Pensioner rebates	❑
❑ Research & Development	❑
❑ Miscellaneous	❑

- **Have we missed out any categories? If so then please insert other costs in the space below.**

Other costs	Cost $ per year
❑	❑
❑	❑
❑	❑
❑	❑

APPENDIX C

Waste Management Facility Sample Questionnaire

1. INTRODUCTION

1.1 PURPOSE OF THIS QUESTIONNAIRE

Cardno BSD was appointed by the Pilbara Regional Council (PRC) to produce a Regional Waste Management Plan. The information requested from this questionnaire relates to the **landfill services** offered to the Onslow residents and will be used to determine the disposal services provided at the local waste disposal facility. The questionnaire also relates to the operation of the facility.

Please answer each question by either marking the appropriate box(es) or filling in the blank space provided after each question.

If there is insufficient space provided please attach relevant information to this questionnaire. Additional space is provided in **Appendix A.**

Cardno BSD would appreciate if you could complete the questionnaire by **Monday 2nd April,** to enable progress to be made on the Waste Management review. It is requested that questions be answered in relation to the 2005/06 financial year.

It is important that the questionnaire is filled out correctly and accurately as possible as the information provided will contribute towards the determination of future waste management options in the Pilbara Regional Council.

It is acknowledged that many of the questions will be difficult to answer due to no available data. If necessary, could you please provide an educated estimate. I.e through tonnes, trucks loads or trailer loads that will be sufficient.

Should you have any queries or require assistance with regards to answering any questions, please contact Robert Sim at Cardno BSD on (08) 9273 3888.

2. LANDFILL SURVEY

- **Name of the facility?** _____
- **Facility licence number:** _____
- **Facility Address:** _____
- **Operator:** _____
- **Owner:** _____
- **Class Type:** _____
- **When was the facility established?** _____
- **What geographic area (towns) does the facility support?**

  _____

- **What are the dimensions (m^2) of the facility?** _____
- **What are the dimensions (m^3) of the actual landfill?** _____
- **What is the estimated life expectancy?** _____
- **How much airspace (m^3) is left?** _____
- **Is expansion possible?** Yes / No
- **What are the disposal costs (gate fees $)?**

MSW		**Greenwaste**	
Recyclables		**Other:**	
Hazardous			

- **What type of landfill is it?**

Hard Rock	
Above Ground (Mound method)	
Excavated pit and fill	
Bale Fill	
Valley Fill (natural depression)	
Quarry	
Other	

Other: Please specify or describe if unsure

_____

- **Is the site staffed?** Yes / No

- **If so, how often?**

Full Time	
Periodic	

- **Please state staffing arrangements / details**

_____
_____
_____

- **Is the site fenced? Yes / No**
- **What measures are in place for cyclone / flood activity?**

_____
_____
_____
_____

- **What infrastructure / equipment is present on site**

	Y/N		Qty
Weighbridge		**Dozer or Loader**	
Stormwater Ponds		**Excavator**	
Leachate Collection System		**Road Sweeper**	
Landfill Gas Collection		**Litter Truck**	
Visual Screening		**Water Cart**	
Transfer Station		**Dump Trucks**	
Recycling Depot		**Compactor**	
Other			

Other: Please Specify / Quantity

_____

- **Is the landfill lined? Yes / No**
- **If so, what type of lining system or components are in place?**

Sub-Base Only	
Clay Liner	
GCL Liner	
Geomembrane	
Geotextile	
Other	

Other: Please Specify or Describe if unsure

_____

- **What environmental controls are in place?**

Waste inspection		**Litter Control**	
Waste compaction		**Fire Control**	
Pre-Treatment before disposal		**Vermin Control**	
Daily Cover		**Odour Control**	
Periodic Cover		**Dust Control**	
Leachate treatment		**Noise Control**	
Gas Flaring		**Weed Control**	
Stormwater Control		**Other**	

Other: Please Specify

_____

- **Please describe cover regime if any? (daily / weekly)**

_____

- **Does any monitoring take place on site?**

Waste tonnage		**Noise**	
Type of waste being disposed		**Leachate**	
Groundwater		**Landfill Gas**	
Odour		**Other**	
Dust			

- **What quantity of waste is disposed each year? (estimate if unknown)**

_____

	Tonnage or %
Household Waste	
Commercial Waste	
Trailer Waste	
Inert Waste	
Industrial / Mining	
Other	

- **What recyclables drop off facilities are in place? (estimate if unknown)**

		Qty (T/year)			**Qty (T/year)**			**Qty (T/year)**
Paper			**Motor Oil (L)**			**Greenwaste**		
Metal			**Batteries**			**Timber**		
Glass			**Gas Cylinders**			**C&D**		
Plastic			**Tyres**			**Reuse Junk**		
Clothing			**Paint**			**Other**		

- **How often are these materials collected? _____**
- **If greenwaste is collected, is it shredded on site? _____**

- **Are other wastes besides putrescible / inert accepted? (estimate if unknown)**

Type	Y/N	Qty (tonnes)	If no, where is it disposed?
Asbestos			
Contaminated Soils			
Sewerage Sludge			
Hazardous Waste			
Animal Bodies			
Other			

Please list examples

_____

- **Are disturbed areas rehabilitated? Please describe.**

_____

_____

_____

- **Are exhausted landfilled areas sealed with an impervious cap? Eg. Clay or synthetic**

  Yes / No

3. COST OF MAINTAINING FACILITY

If the Council uses day labour for this service, please fill in the table below.

Alternatively, if there are any spreadsheets available, which outline the cost of operation, please send these to Robert Sim.

Note : Insert the amount related to the landfill operation only (eg. household/domestic waste collection costs should be EXCLUDED).

Item Description	Type (eg. Excavator/Truck)	Units	Operation cost	Capacity
Equipment				
Labour				

Item Description	Total Annual Cost	
Equipment operating cost	$	/year
Labour cost	$	/year

- **Other overhead costs associated with this service.**

	$	/year
	$	/year
	$	/year

- **Complete the following details for the equipment used.**

Vehicle A

Purchase price	$
Expected years of service	
Disposal price	$

Vehicle B (If req.)

Purchase price	$
Expected years of service	
Disposal price	$

Vehicle C (If req.)

Purchase price	$
Expected years of service	
Disposal price	$

APPENDIX D

Waste Management Facilities Site Visit Assessment and Observations

The information in this appendix is based upon data provided by the Council's via the completed questionnaires and site visits. The data has not undergone any form of verification.

SHIRE OF ROEBOURNE

WICKHAM ROEBOURNE WASTE TRANSFER STATION

Questionnaire Response

A questionnaire was sent to the Shire of Roebourne and completed by Craig Fitzgerald (Engineering Design Officer). Details within the questionnaire are outlined in table below.

Background	
Facility Licence Number:	7921/2
Facility Address:	Lot 105, Point Samson – Roebourne Road (Reserve No. 34631, 18.301 Ha)
Operator:	Shire of Roebourne
Owner:	Shire of Roebourne
Class Type:	Category 62 – Solid Waste Depot
Established:	March 2004
Towns Supporting:	Roebourne, Wickham, Point Samson
Dimensions:	3.48 Ha (fenced area)
Life Expectancy:	No restriction
Airspace remaining:	N/A
Expansion possible:	Yes
Landfilling Technique:	N/A
Staffing:	Yes, full time. One site attendant during all opening hours plus one part time Hooklift Bin Truck Driver transporting waste to Karratha 7-Mile Waste Disposal Facility and recyclables to market
Opening Hours:	9am – 12pm, 1pm-4pm 7 days (except Christmas Day, New Years Day and Good Friday)
Infrastructure / Equipment	Transfer station with Recycling depot Recycling hardstand areas 1 x site office 1 x Backhoe / Loader 1 x Hook Lift Bin Truck 1 x 2,250 Litre Used Oil Recycling Unit
Design	
Water Management *Stormwater Management* *Leachate Management*	-
Air Quality *Odour Control* *Dust Emissions*	-
Noise	No Noise control system in place.
Traffic Considerations	-
Site Security and Fencing	1.8m Security Fence (chain wire with 3 strand barbwire)
Operation	
Waste Minimisation *Material Separation*	The following material are separated at the facility for recycling: Metal 300t Batteries 12.5t Motor Oil 6t Gas Cylinders 1t Re-use junk 6t
Waste Acceptance	Commercial Waste (5%) 72 Trailer Waste (95%) 1,361
Waste Pre-Treatment	None
Waste Placement	General waste is placed in a Hook lift bin truck and transported to the 7-mile waste disposal site.
Waste Cover	N.A
Litter Control	Controlled by site operator
Fires	-

Contingency Planning *Cyclone/flood activity measures*	During cyclone or flood activity, the facility remains open during Yellow Alert for as long as possible to allow residents to dispose of waste from residential properties that may pose a hazard. Facility then reopens once the all clear has been given.
Management of Chemicals and Fuels	-
Disease Vector Control	N.A
Noxious Weed Control	-
Performance Monitoring and Reporting	-

Site Visit Assessment

The site was visited on 6 May 2007, during the visit Giles Perryman was accompanied by Jon Jones (Shire of Roebourne). The assessment has been made in relation to the sites licence conditions and any further comments or observations are made at the end of this table.

No	Condition	Compliance	Comments
G1	Monitoring and Reporting		During the visit it was not determined if the annual reporting to the DEC had occurred
G2	Waste Removal	No	Hook bins are filled and taken to 7 Mile disposal facility when full, rather than daily
G3	Greenwaste Storage	Yes	Currently greenwaste is disposed of at 7 Mile
G4	Fencing	Yes	
G5	Waste Oil Storage	Yes	
G6	Wind Blown Waste	No	Although a tidy site with no evidence of significant wind blown waste, the hook bins containing putrescible waste were not covered at the end of each working day
G7	Signage	Yes	
A1	Dust	Yes	
W1	Drainage	Yes	During the visit the Humeceptor was not assessed

General Observations

- The site was a tidy and well run transfer station.
- Significant volume of material diverted from disposal via reuse shop (trash and treasure) and recycling activity

SEVEN-MILE WASTE DISPOSAL SITE

Questionnaire Response

A questionnaire was sent to the Shire of Roebourne and completed by Craig Fitzgerald (Engineering Design Officer). Details within the questionnaire are outlined in table below

Background	
Facility Licence Number	7021/11
Facility Address	Lot 85 (Reserve No. 32987) Seven Mile Road Lot 256 (Reserve No. 33135) Seven Mile Road
Operator	Shire of Roebourne
Owner	Shire of Roebourne
Class Type	Category 64 – Class II Putrescible Landfill Category 61 – Liquid Waste Facility
Established	1992
Towns Supporting	Karratha, Dampier, Roebourne, Wickham, Point Sampson
Landfilling Technique	Excavation to 6m deep and fill above ground
Dimensions of Facility	108.676 Ha
Dimensions of landfill	
Expansion possible	Yes
Life Expectancy	50 years
Airspace remaining	450,000m3
Staffing	1 x weighbridge operator during all hours of operation 2 x site attendants during tip cover, site maintenance and recycling 1 x dozer operation – Monday to Friday for tip cover and waste cell excavation Additional council and contractor plant staff for waste cell excavation and tip cover on an as required basis
Opening Hours	7:00am – 5:30pm Monday to Friday 7:00am – 4:00pm Saturday, Sunday and Public Holidays Closed Christmas Day, New Years Day and Good Friday
Infrastructure / Equipment	1 x weighbridge 2 x dozer 1 x litter truck 1 x site office Recycling hardstand area 1 x 2,250 litre used oil recycling unit Plant shed Liquid waste ponds
Design	
Water Management	
Stormwater Management	Sub Base – Natural Clay base
Leachate Management	No leachate collection system
Groundwater Management	Groundwater monitoring bores
Air Quality	
Landfill Gas Control	None
Odour Control	Daily Cover
Dust Emissions	None
Noise	No Noise control system
Traffic Considerations	-
Site Security and Fencing	1.8m Security Fence (chain wire with 3 strand barbwire)

Operation	
Waste Minimisation Material Separation	The following material and quantities are separated at the facility: Metal 150 Batteries 100 Motor Oil 12 Gas Cylinders 2 Re-use junk 6 The materials are stored on site prior to collection
Waste Acceptance	**Tonnage**
Household Waste – Council Trucks	5,312.32
Commercial Waste – Council + Commercial Compactor Trucks	6,425.72
Trailer Waste – Public tip	5,000.00
Inert Waste – Includes Industrial and Mining	25,899.20
Industrial / Mining	
Other – Clean Fill	15,609.11
Tyres	402.12
Empty 200L Drums	80.68
Clean Green Waste	1,247.63
Waste Pre-Treatment	None
Waste Placement	Waste is placed in a Hook lift bin truck and transported to the 7-mile waste disposal site.
Waste Cover	Daily cover
Litter Control	Litter screens – 4m high Litter crew
Fires	
Contingency Planning Cyclone/flood activity measures	During cyclone or flood activity, the facility remains open during Yellow Alert for as long as possible to allow residents to dispose of waste from residential properties that may pose a hazard. Facility then reopens once the all clear has been given.
Management of Chemicals and Fuels	
Disease Vector Control	Tipping face is covered daily
Noxious Weed Control	
Performance Monitoring and Reporting	

Gate Fees

Item / Load	2005 / 2006	2006 / 2007
Duplicate Tip Docket	$10.00	$10.00
Tip Excavation Contributions		
• Loaded by user – General fill per tonne	$2.20	$2.20
• Loaded by user – Gravel per tonne	$8.80	$8.80
• Loaded by Shire – General fill per tonne	$4.40	$4.40
• Loaded by Shire – Gravel per tonne	$11.00	$11.00
Hazardous Waste Disposal		
• Medical Waste – Per 240 Litre bin	$11.00	$11.00
• Hazardous Waste – Per tonne (min charge $88.00)	$77.00 (min charge $77.00)	$88.00
• Quarantine Waste – Per tonne (min charge $220.00)	$77.00	$88.00
Liquid Waste Disposal		
• Liquid Waste per tonne	$44.00	$60.00
Sale of Recyclable Goods – Karratha (7-Mile Facility)	Various	Various
Sale of Recyclable Goods – Wickham (Transfer Station)	Various	Various
Roebourne / Wickham Transfer Station		
• Domestic Waste (Residential tip user's), cars, utilities and 6x4 trailers	Free	Free
• Commercial cars, utilities, trailers (set charge)	$11.00 Rateable, $22.00 Non Rateable	$22.00
• Car Tyres (Includes 4wd and passenger vehicles) per tyre – maximum 10	$2.20	$2.30
• Light Truck Tyres – Per tyre – maximum 10	$5.50	$5.80
• Truck Tyres – Per tyre – maximum 10	$11.00	$11.50
• Petroleum Oils and Cooking Oil - Per litre (maximum 60 litres) (Oil contained in up to 20 litres containers only)	$0.33	$0.40
• Car Bodies or part thereof	$33.00	$35.00
• Disposal of empty 200 litre drums	$3.30	$3.30
• Green Waste – Suitable for 9'' mulcher and totally free of contaminants	Free	Free
7 – Mile Waste Facility		
• Domestic Waste (Residential tip user's), cars, utilities and 6x4 trailers	Free	Free
• Commercial cars, utilities, trailers (set charge)	$11.00 Rateable, $22.00 Non Rateable	$22.00
• Cubic metre rate applicable when weighbridge is inoperable, all Commercial waste (per cubic metre)	N/A	$22.00
Item / Load	**2005 / 2006**	**2006 / 2007**
• Trucks (from Rateable property) per tonne (minimum charge $15.00)	$11.00 (min charge $8.80)	$38.50
• Trucks (from Non-Rateable property) per tonne (minimum charge $15.00)	$66.00 (min charge $66.00)	$66.00
• Compactor Vehicles per tonne	$35.20	$35.20
• Car Tyres (Includes 4wd and passenger vehicles) per tyre – maximum 10	$2.20	$2.30
• Light Truck Tyres – Per tyre – maximum 10	$5.50	$5.80
• Truck Tyres – Per tyre – maximum 10	$11.00	$11.50
• Tyres all sizes per tonne	$154.00	$162.00
• Petroleum Oils and Cooking Oil - Per litre (maximum 60 litres) (Oil contained in up to 20 litres containers only)	$0.33	$0.40
• Disposal of Confidential Documents per hour	$93.50	$99.00
• Car Bodies or part thereof	$33.00	$35.00
• Disposal of empty 200 litre drums	$3.30	$3.30
• Green Waste – Suitable for 9'' mulcher and totally free of contaminants	Free	Free
• Disposal of Clean Fill – suitable for tip coverage	Free if required	Free if required
Sale of Mulch Karratha		
• Collected and Loaded by User on Site per cubic metre	$44.00	$44.00
• Collected and loaded by Shire on Site per cubic metre	$38.50	$49.50
• Delivered Karratha / Dampier per cubic metre (minimum Load 4 cubic metres)	$49.50	$60.50
• Delivered to Other Locations	POA	POA
Sale of Mulch Wickham		
• Collected and Loaded by User on Site per cubic metre	$44.00	$44.00
• Collected and loaded by Shire on Site per cubic metre	$38.50	$49.50
• Delivered Wickham / Roebourne / Point Samson per cubic metre (minimum Load 4 cubic metres)	$49.50	$60.50
• Delivered to Other Locations	POA	POA

Site Visit Assessment

The site was visited on 6 May 2007, during the visit Giles Perryman was accompanied by Jon Jones (Shire of Roebourne). The assessment has been made in relation to the sites licence conditions and any further comments or observations are made at the end of this table.

No	Condition	Compliance	Comments
G1	Waste Acceptance & Management	No	Generally good, except some oil drums with residual contamination are accepted, rather than refused and incur a risk of illegal tipping.
G2	Clinical and Asbestos Waste	Yes	
G3	Hazardous Waste	Yes	Liquid and solid haz wastes are disposed off in separate cells to avoid chemicals 'reacting'
G4	Management of Landfill Activities	No (iv)	Daily cover was not being applied due to bulldozer being serviced and unavailable to spread daily cover.
		Observation	No compaction machinery on site
G5	Fencing	Yes	
G6	Wash Bourne and Wind Blown Waste	No	Although a generally tidy site, wind blown waste is not collected weekly due to lack of staff.
G7	Signage	Yes	
G8	Monitoring and Reporting	Yes	During the visit it was not determined if the annual reporting to the DEC had occurred
A1	Dust	Yes	
A2	Burning of Waste	Yes	
W1	Stormwater Management	Yes	
W2	Protection of Ground and Surface Waters	No	During the visit it was explained that historically cells had been excavated to a depth of 6m, however following heavy rain some test pits were dug and the groundwater was found to be nearer the surface than previously thought. Current and future cells are not excavated as deep to maintain 3m separation distances.
W3	Groundwater Monitoring	No	Recent groundwater modelling has shown that the ground water is flowing in the opposite direction; therefore the groundwater monitoring bores are not correctly positioned. In addition, a increase in concentration for some parameters has occurred. The concentrations are below the licence limits, but they are occurring in upstream bores. This should be investigated further to determine the source of the contamination.
W4	Maintenance of Septage Lagoons	No (v)	The lagoon embankments had vegetation growing on them, this is due to lack of staff to doing the required vegetation control.
W5	Truck Washdown Facility		During the visit the Washdown facility was not assessed

General Observations

- The site was tidy and reasonably well run, the lack of staff availability is impacting on site operations and compliance with license conditions.
- Contaminated oil drums are filled in mono-cells, this presents a potential environmental risk when the drums degrade (rust) the hydrocarbons will link and present a risk to groundwater. In addition as the drums breakdown the mono-cell will experience very significant slumping.
- There were large volumes of timber packaging waste
- Quarantine wastes from Metro areas present a potential environmental risk. If a political decision has been made to send the wastes to Karratha, the wastes should be disposed of appropriately, possibly in a fully lined and engineered cell, as it would have been in the Metro landfills. The costs of this should be reflected in the gate-fee charged for this waste.

SHIRE OF ASHBURTON

PANNAWONICA – DEEPDALE TIP (RIO TINTO)

Questionnaire Response

A questionnaire was sent to the Rio Tinto and completed by Jeff O'Neill. Details within the questionnaire are outlined in the table below.

Background	
Facility Licence Number:	7278/9
Facility Address:	Deepdale Drive, Pannawonica
Operator:	Spotless
Owner:	Pilbara Iron (Rio Tinto)
Class Type:	Class
Established:	Category 64 – Class II Putrescible Landfill
Towns Supporting:	Pannawonica
Dimensions:	640,000m^2
Life Expectancy:	7 years
Airspace remaining:	'As each one is filled, another one is dug'
Expansion possible:	No
Landfilling Technique:	Excavated pit and fill
Staffing:	No
Opening Hours:	
Infrastructure / Equipment:	1 x dozer / loader
Disposal Costs:	
Design	
Water Management *Stormwater Management* *Leachate Management* *Groundwater Management*	 - No leachate management – landfill is not lined No groundwater management
Air Quality *Odour Control* *Dust Emissions*	 No odour control No dust control
Noise	No noise control
Traffic Considerations	-
Site Security and Fencing	Site is fenced
Operation	
Waste Minimisation *Recyclables drop off*	 Every Monday – recyclables are separate from general waste
Waste Acceptance	Household waste Commercial waste Trailer waste Industrial / Mining Asbestos - some asbestos is received
Waste Pre-Treatment	
Waste Placement	
Waste Cover	Periodic cover
Litter Control	Litter control
Fires	Fire control
Contingency Planning *Cyclone/flood activity measures*	 -
Management of Chemicals and Fuels	-
Disease Vector Control	-
Noxious Weed Control	-
Performance Monitoring and Reporting	-
Rehabilitation and Aftercare	
Rehabilitation *Site after use* *Settlement /Final Surface Profile* *Landfill Cap*	 Disturbed areas are levelled back to original contours and then revegetated

Site Visit Assessment

The site was visited on 6 May 2007; during the visit no one from Pilbara Iron was available to accompany Giles Perryman. The assessment has been made in relation to the sites licence conditions and any further comments or observations are made at the end of this table.

No	Condition	Compliance	Comments
G1	Waste Acceptance & Management	?	This is an unmanned site, therefore there is little control over the type of waste tipped at the site. Domestic waste appeared to be tipped in a cell, however there was a load of industrial waste tipped randomly on the site.
G2	Clinical and Asbestos Waste	?	Despite the license allowing the tipping of asbestos, signs at the site entrance state that asbestos can not be tipped onsite. However once on site, there are signs to a separate cell for asbestos. The cell had been covered. Unable to find out if these wastes are tipped under supervision or a register and plan is kept.
G3	Management of Landfill Activities	?	Appear to be compliant, but unable to determine frequency of cover material being spread
G4	Fencing	Yes	Site has perimeter fence and lockable gates (License does not state that gate must be locked when site is unmanned)
G5	Wind Blown Waste	Yes	Site was tidy with little wind blown waste
G6	Signage	Yes	Required signage at entrance
G7	Monitoring and Reporting	?	Unable to determine if reporting for site has been completed
A1	Dust	?	Unable to determine if dust is every blown off site. NB. The site is very remote and away from any other properties.
A2	Burning of Waste	?	Unable to determine greenwaste burning procedure during visit
W1	Stormwater Management	?	Unable to determine stormwater management during visit
W2	Protection of Ground and Surface Waters	?	Unable to determine depth to groundwater during site visit.

General Observations

- Appeared to be a small and tidy site
- Unable to determine many issues as the site visit was unaccompanied

ONSLOW REFUSE DISPOSAL SITE

Questionnaire Response

A questionnaire was sent to the Shire of Ashburton and completed by Jeff Breen (Executive Manager Engineering Services). Details within the questionnaire are outlined in the table below.

Background	
Facility Licence Number:	6808
Facility Address:	Lot 101, Reserve 38336 Eagle Nest Road
Operator:	Shire of Ashburton
Owner:	Shire of Ashburton
Class Type:	Category 64 – Class II Putrescible Landfill
Established:	1986
Towns Supporting:	Onslow
Dimensions:	82,000m2
Life Expectancy:	6 months
Airspace remaining:	1,000m3
Expansion possible:	No
Landfilling Technique:	Excavated pit and fill Valley fill (natural depression)
Staffing:	None
Opening Hours:	unmanned
Infrastructure / Equipment	1 x dozer or loader
Disposal Costs	MSW $Nil Recyclables $Nil Green waste $Nil Hazardous $33/$m^3$
Design	
Water Management *Stormwater Management* *Leachate Management*	 No stormwater control Site is not lined
Air Quality *Odour Control* *Dust Emissions*	 No odour control No dust control
Noise	No noise control
Traffic Considerations	
Site Security and Fencing	Site is fenced, but gates are left open and unlocked at all times. The site is unmanned
Operation	
Waste Minimisation *Recyclables drop off*	 A drop off facility is provided at the landfill site and accepts the following materials: - Metal - Batteries - Motor Oil - Tyres - Green waste (stored on site) These materials are collected as required
Waste Acceptance	- Household waste 70% - Commercial waste 15% - Trailer Waste 10% - Inert Waste 5% - Asbestos - Animal Bodies
Waste Pre-Treatment	
Waste Placement	
Waste Cover	Daily cover (during weekdays)
Litter Control	-
Fires	-
Contingency Planning *Cyclone/flood activity measures*	 No measures are in place for cyclone / flood activity

Management of Chemicals and Fuels	
Disease Vector Control	Vermin control in place
Noxious Weed Control	No weed control
Performance Monitoring and Reporting	No monitoring in place
Rehabilitation and After Care	
Rehabilitation *Site after use* *Settlement /Final Surface Profile* *Landfill Cap*	Exhausted landfilled areas are not sealed with an impervious cap

Site Visit Assessment

The site was visited on 6 May 2007, during the visit Giles Perryman was accompanied by Ross Blair (Shire of Ashburton). The assessment has been made in relation to the sites licence conditions and any further comments or observations are made at the end of this table.

No	Condition	Compliance	Comments
G1	Waste Acceptance & Management	?	This is an unmanned site; therefore there is little control over the type of waste tipped at the site.
G2	Clinical and Asbestos Waste	No	The waste didn't appear to be tipped in a separate cell, and Ross was unaware of any plan showing the cells location or a register being maintained.
G3	Management of Landfill Activities	No	Waste has been tipped within 35m of the boundary. Generally an untidy site with some random tipping away from face. Areas of uncovered waste.
G4	Fencing	No	Licence states gate should be locked when site is unattended. The sites is unmanned and the gates are not locked
G5	Wind Blown Waste	No	No litter screen around tipping area, site did not appear to have monthly litter collections
G6	Signage	Yes	Entrance signs in place
G7	Monitoring and Reporting	?	Ross was unaware of any reporting that may have been sent to the DEC
A1	Dust	No	Hard to determine during site visit, however based on the elevation of the site in relation to the surrounding area, and the frequency of cyclones, it is very likely that dust is blown from the site. This licence condition seems to be unpractical for this site.
A2	Burning of Waste	Yes	There was no evidence of waste burning on site, and Ross stated that the greenwaste was now being stored rather than burnt, however he did not know why it was being stored.
W1	Stormwater Management	No	There did not appear to be any stormwater management on site, other than the tipping are being the highest point on the site. No collected of water that has been in contact with waste material.
W2	Protection of Ground and Surface Waters	?	No monitoring bores and Ross was unaware of the depth to groundwater.

General Observations

- Licence conditions do not relate to an unmanned site
- Site at capacity and filling continuing. Informed by SoA after visit that that an alternative site has been identified and the old site will be closed
- An untidy site, with little evidence of management or planning
- Potential environmental liability from 'unknown' wastes tipped in unlined site
- On site signage poor, i.e. for directing people to different tipping areas on site

PARABURDOO WASTE DISPOSAL SITE

Questionnaire Response

A questionnaire was sent to the Shire of Roebourne and completed by Jeff Breen (Executive Manager Engineering Services). Details within the questionnaire are outlined in the table below.

Background	
Facility Licence Number:	6806
Facility Address:	Loc 120 Beasley Road
Operator:	Shire of Ashburton
Owner:	Shire of Ashburton
Class Type:	Category 64 – Class II Putrescible Landfill
Established:	1960
Towns Supporting:	Paraburdoo
Dimensions:	143,500m^2
Life Expectancy:	12 months
Airspace remaining:	2000m^3
Expansion possible:	Yes
Landfilling Technique:	Excavated pit and fill
Staffing:	No
Opening Hours:	
Infrastructure / Equipment:	Dozer or Loader
Disposal Costs:	MSW $Nil Recyclables $Nil Green waste $Nil Hazardous $Nil This is an unmanned site
Design	
Water Management *Stormwater Management* *Leachate Management* *Groundwater Management*	 - No leachate management – landfill is not lined No groundwater management
Air Quality *Odour Control* *Dust Emissions*	 No odour control No dust control
Noise	No noise control
Traffic Considerations	-
Site Security and Fencing	Site is fenced, but gates are unlocked and unmanned
Operation	
Waste Minimisation *Materials Separation*	 The following materials are separated at the Facility: Metal Motor Oil Tyres Green waste (burned) These materials are collected (excluding greenwaste) as required
Waste Acceptance	Household waste 60% Commercial waste 15% Trailer waste 15% Industrial / Mining 10% Asbestos - some asbestos is received Animal bodies
Waste Pre-Treatment	
Waste Placement	
Waste Cover	MSW – weekly collection, covered that day
Litter Control	-
Fires	-
Contingency Planning *Cyclone/flood activity measures*	 No management measures in place
Management of Chemicals and Fuels	-
Disease Vector Control	No vermin control

Noxious Weed Control	No weed control
Performance Monitoring and Reporting	No monitoring
Rehabilitation and Aftercare	
Rehabilitation *Site after use* *Settlement /Final Surface Profile* *Landfill Cap*	 Rehabilitated areas are covered and contoured Exhausted landfill areas are not sealed with an imperious cap

Site Visit Assessment

The site was visited on 7 May 2007, during the visit Giles Perryman was accompanied by Regan Erikson (Shire of Ashburton). The assessment has been made in relation to the sites licence conditions and any further comments or observations are made at the end of this table.

No	Condition	Compliance	Comments
G1	Waste Acceptance & Management	?	This is an unmanned site, therefore there is little control over the type of waste tipped a the site.
G2	Clinical and Asbestos Waste	No	The waste is tipped in a separate cell, and Regan is contacted by phone prior to tipping, so he can inspect waste and ensure waste is covered quickly. However, Regan was unaware of any plan showing the cells location or a register being maintained.
G3	Management of Landfill Activities	No	A large heap of uncovered C&I waste that has been on site for approx 2 years
G4	Fencing	No	Licence states gate should be locked when site is unattended. The sites is unmanned and the gates are not locked
G5	Wind Blown Waste	No	No litter screen around tipping area.
G6	Signage	Yes	Site entrance signs in place
G7	Monitoring and Reporting	?	Regan was unaware of any reporting that may have been sent to the DEC
A1	Dust	Yes	
A2	Burning of Waste	Yes	
W1	Stormwater Management	Yes	
W2	Protection of Ground and Surface Waters	?	No monitoring bores and Regan was unaware of the depth to Groundwater. Generally they excavate cells 4m deep and then hit rock.
W3	Groundwater Monitoring	No	Recent groundwater modelling has shown that the ground water is flowing in the opposite direction; therefore the groundwater monitoring bores are not correctly positioned. In addition, a increase in concentration for some parameters has occurred. The concentrations are below the licence limits, but they are occurring in upstream bores. This should be investigated further to determine the source of the contamination.

General Observations

- Licence conditions do not relate to an unmanned site
- Appeared to be raising site by filling cells in 'lifts'
- Quite an untidy site, typical for an unmanned site
- Signage and roads around site were not very clear

TOM PRICE REFUSE DISPOSAL SITE

Questionnaire Response

A questionnaire was sent to the Shire of Ashburton and completed by Jeff Breen (Executive Manager Engineering Services). Details within the questionnaire are outlined in the table below.

Background	
Facility Licence Number:	6807
Facility Address:	Loc 11 R39084 Tom Price – Karratha Road
Operator:	Shire of Ashburton
Owner:	Shire of Ashburton
Class Type:	Category 64 – Class II Putrescible Landfill
Established:	1968 (approx)
Towns Supporting:	Tom Price
Dimensions of facility:	200,000m^2
Dimensions of landfill:	250,000m^3
Life Expectancy:	15 years
Airspace remaining:	2500,000m^3
Expansion possible:	Yes
Landfilling Technique:	Excavated pit and fill
Staffing:	Yes One full time staff member on site when the tip is open
Opening Hours:	-
Infrastructure / Equipment:	Recycling Depot Dozer or Loader
Disposal Costs	MSW $Nil Recyclables $Nil Green waste $Nil Hazardous $33/$m^3$ Other $33/$m^3$
Design	
Water Management *Stormwater Management* *Leachate Management*	 No stormwater control – landfill is not lined No leachate treatment – landfill is not lined
Air Quality *Odour Control* *Dust Emissions*	 No odour control No dust control
Noise	No noise control
Traffic Considerations	-
Site Security and Fencing	Site is fenced and gates locked when unattended
Operation	
Waste Minimisation *Recyclables drop off*	A drop off facility is provided at the landfill site and accepts the following materials: - Metal - Batteries - Motor Oil - Tyres - Green waste (periodically burnt)
Waste Acceptance	Household waste 45% Commercial waste 25% Trailer waste 15% Inert waste 10% Industrial / Mining 5% Asbestos Animal Bodies
Waste Pre-Treatment	None
Waste Placement	-
Waste Cover	Daily
Litter Control	Regular collection of wind blown waste
Fires	-

Contingency Planning *Cyclone/flood activity measures*	No measures in place for cyclone / flood activity other than normal cover requirements
Management of Chemicals and Fuels	
Disease Vector Control	No vermin control
Noxious Weed Control	-
Performance Monitoring and Reporting	No monitoring in place
Rehabilitation and Aftercare	
Rehabilitation *Site after use* *Settlement /Final Surface Profile* *Landfill Cap*	Covered and contoured, natural regeneration Exhausted landfill areas are not sealed with an impervious cap

Site Visit Assessment

The site was visited on 7 May 2007, during the visit Giles Perryman was accompanied by Mark Gladman (Shire of Ashburton). The assessment has been made in relation to the sites licence conditions and any further comments or observations are made at the end of this table.

No	Condition	Compliance	Comments
G1	Waste Acceptance & Management	Yes	The site is manned with a boom control gate and the site acceptance criteria is enforced
G2	Clinical and Asbestos Waste	Yes, but see comments	Asbestos waste is tipped in a separate cell, under supervision and immediately covered. Clinical waste only comprises of non-surgical waste (e.g. bandages) and is tipped in general waste cell and covered with MSW (with is covered with daily cover).
G3	Management of Landfill Activities	Yes	Waste is contained in cells and covered daily
G4	Fencing	Yes	Fence around perimeter (although broken during visit, but already noted and repair scheduled) and gates locked when site is unattended
G5	Wind Blown Waste	No (a)	No litter screen around tipping area. However tidy site and any litter is regularly collected by site operators
G6	Signage	Yes	Entrance signs in place
G7	Monitoring and Reporting	?	Mark was unaware of any reporting that may have been sent to the DEC
A1	Dust	Yes	
A2	Burning of Waste	Yes	Greenwaste burnt as required by license
W1	Stormwater Management	Yes	
W2	Protection of Ground and Surface Waters	?	No monitoring is required but there is a monitoring bore on site. Mark was not aware of the depth to groundwater

General Observations

- Minor licence non-compliance issues
- Well run tidy site
- Problems with oil drums containing unknown liquids, tyres, and contamination of separated recyclable from public, i.e. not separating materials properly

SHIRE OF EAST PILBARA

WINDELL REFUSE SITE (NEWMAN)

Questionnaire Response

A questionnaire was sent to the Shire of East Pilbara and completed by Oliver Schaer (Acting Director Technical Services). Details within the questionnaire are outlined in the table below.

Background	
Facility Licence Number:	7059
Facility Address:	Yates Road, Newman WA 6753
Operator:	Shire of East Pilbara
Owner:	Shire of East Pilbara
Class Type:	Category 64 – Class II Putrescible Landfill Category 61 – Liquid Waste Facility
Established:	1992
Towns Supporting:	Newman
Dimensions of site:	801,710m^2
Dimensions of landfill:	750,000m^3
Life Expectancy:	20 years
Airspace remaining:	
Expansion possible:	Yes
Landfilling Technique:	Excavated pit and fill
Staffing:	4 permanent full time staff
Opening Hours:	
Infrastructure / Equipment:	Leachate collection system Visual screening Recycling depot 1 x dozer / loader 1 x litter truck 1 x water cart
Disposal Costs:	MSW – n/a Recyclables - \$8.80/m^3 Hazardous - \$27.5/m^3 Greenwaste - \$8.80/m^3 Septage - 4.9c/litre Asbestos - \$27.5/m^3
Design	
Water Management *Stormwater Management* *Leachate Management*	 Stormwater control No leachate management
Air Quality *Odour Control* *Dust Emissions*	 No odour control Dust control
Noise	No noise control
Traffic Considerations	
Site Security and Fencing	Site is fenced
Operation	
Environmental Improvement Plan	
Financial Insurance	
Waste Minimisation *Recyclables drop off*	 A drop off facility is provided at the landfill site and accepts the following materials: - Paper - Metal - Glass - Batteries - Green waste - Reuse junk
Waste Acceptance	Household waste – 2,817 tonnes Commercial waste – 9,662 tonne Trailer waste – 2,080 tonnes Inert waste – 7,800 tonnes Industrial and mining – 1,100 tonnes Asbestos – 13 tonnes Contaminated soils – 4 tonnes Sewerage sludge – 156 tonnes

	Hazardous waste – 5 tonnes Animal Bodies – 40 tonnes Other (Septage treated on site) – 10,400 tonnes
Waste Pre-Treatment	
Waste Cover	Daily cover
Litter Control	Litter control – litter truck
Fires	Fire control
Contingency Planning *Cyclone/flood activity measures*	Drainage ditches
Performance Monitoring and Reporting	
Rehabilitation and Aftercare	
Rehabilitation *Site after use* *Settlement /Final Surface Profile* *Landfill Cap*	Disturbed areas are not rehabilitated Exhausted landfilled areas are not sealed with an impervious cap

Site Visit Assessment

The site was visited on 8 May 2007, during the visit Giles Perryman was accompanied by Ken Gilbert (Shire of East Pilbara) and John Ward (Contractor employed to run the facility). The assessment has been made in relation to the sites licence conditions and any further comments or observations are made at the end of this table.

No	Condition	Compliance	Comments
G1	Waste Acceptance & Management	Yes	Manned site and waste received is monitored
G2	Clinical and Asbestos Waste	Yes	Tipping supervised, waste immediately covered, position recorded and registered
G3	Management of Landfill Activities	Yes	
G4	Fencing	Yes	Perimeter fence and locked gates when unattended
G5	Wash Bourne and Wind Blown Waste	No	No litter screens in place around tipping area. License actually states "Wind blown waste is controlled… …by installing and maintaining litter on three sides on the tipping area". This license condition is probably missing the word 'screens' after 'litter'.
G6	Signage	Yes	
G7	Monitoring and Reporting	?	John provides all records of tipping and incidents to the Shire on a monthly basis, John did not know if the Shire complete annual reporting to the DEC.
A1	Dust	Yes	
A2	Burning of Waste	Yes	Note: Greenwaste was previously tipped, but now being stored for mulching
W1	Stormwater Management	Yes	
W2	Protection of Ground and Surface Waters	?	John thought the groundwater was 15m below site level, but not sure.
W3	Maintenance of Septage Lagoons	No	The lagoon embankments had vegetation growing on them. However the Shire had just tendered for the construction of new lined Septage lagoons for the site.

General Observations

- The site was a rather untidy but reasonably well run.
- John was very aware of recycling and separated and sorted any wastes that were of value (e.g. steel, aluminium). In addition, John was about to end his contract with the Shire to run the site (after 15yrs) and he appeared to be sorting out all recyclable material around the site prior to his contract ending
- A MRF was being constructed on site to sort the 'recyclables bin' that is provided to some residents in Newman

NULLAGINE REFUSE SITE

Questionnaire Response

A questionnaire was sent to the Shire of East Pilbara and completed by Oliver Schaer (Acting Director Technical Services). Details within the questionnaire are outlined in the table below.

Background	
Facility Licence Number:	7057
Facility Address:	Nullagine Common Reserve No. 2804 Marble Bar Road, Nullagine WA 6753
Operator:	Shire of East Pilbara
Owner:	Shire of East Pilbara
Class Type:	Category 64 – Class II Putrescible Landfill
Established:	
Towns Supporting:	Nullagine
Dimensions of site:	60,000m^2
Dimensions of landfill:	172,500m^3
Life Expectancy:	10 years
Airspace remaining:	
Expansion possible:	Yes
Landfilling Technique:	Excavated pit and fill
Staffing:	No
Opening Hours:	
Infrastructure / Equipment:	
Disposal Costs:	No charge
Design	
Water Management *Stormwater Management* *Leachate Management*	 No stormwater management No leachate management – landfill is not line
Air Quality *Odour Control* *Dust Emissions*	 No odour control No dust control
Noise	No noise control
Traffic Considerations	-
Site Security and Fencing	Site is fenced and gate locked when unattended
Operation	
Environmental Improvement Plan	
Financial Insurance	
Waste Minimisation *Recyclables drop off*	 Steel Aluminium Paper / Card Plastic Batteries A Material Recycling Facility (MRF) is under construction
Waste Acceptance	Household waste 50% Commercial waste 30% Trailer waste 10% Industrial / Mining 10% Asbestos Minimal
Waste Pre-Treatment	None
Waste Cover	Cells are covered when full
Litter Control	No litter control
Fires	-
Contingency Planning *Cyclone/flood activity measures*	 Tip site is located on high undulating terrain
Performance Monitoring and Reporting	Types of waste being disposed is monitored
Rehabilitation and Aftercare	
Rehabilitation *Site after use* *Settlement /Final Surface Profile* *Landfill Cap*	 Cells are covered with fill and native shrub revegetation resumes Exhausted landfill areas sealed with an impervious cap

Site Visit Assessment

The site was visited on 9 May 2007, the visit Giles Perryman was unaccompanied. The assessment has been made in relation to the sites licence conditions and any further comments or observations are made at the end of this table.

No	Condition	Compliance	Comments
G1	Waste Acceptance & Management	?	This is an unmanned site; therefore there is little control over the type of waste tipped at the site.
G2	Disposal of Asbestos Waste	?	Notice states any disposal of asbestos waste requires approval of Shire, but as the site is unmanned there is no way to enforce this condition.
G3	Management of Landfill Activities	No	Waste has been tipped outside the fenced site (greenwaste and car bodies)
G4	Fencing	No (but see comment)	Licence states '…a stock fence must be maintained around the whole of the perimeter of the site.' This is not in place as there is a gap to enter the site. However, the site could not be used if this condition was met.
G5	Wind Blown Waste	?	Unable to determine during site visit
G6	Signage	Yes	Entrance signs in place
G7	Monitoring and Reporting	?	Unable to determine during site visit
A1	Dust	?	Unable to determine during site visit.
A2	Burning of Waste	No	There was evidence of significant waste burning in the cell.
W1	Stormwater Management	?	There did not appear to be any stormwater management on site.
W2	Protection of Ground and Surface Waters	?	Unable to determine the depth to groundwater.
General Observations • A small unmanned site • Appears to suffer from frequent burning of general waste in the landfill cell			

MARBLE BAR REFUSE SITE

Questionnaire Response

A questionnaire was sent to the Shire of East Pilbara and completed by Oliver Schaer (Acting Director Technical Services). Details within the questionnaire are outlined in the table below.

Background	
Facility Licence Number:	7058
Facility Address:	Marble Bar Common Reserve No. 2906, General Street, Marble Bar WA 6760
Operator:	Shire of East Pilbara
Owner:	Shire of East Pilbara
Class Type:	Category 64 – Class II Putrescible Landfill
Established:	
Towns Supporting:	Marble Bar
Dimensions of site:	40,000m^2
Dimensions of landfill:	112,500m^3 (estimate)
Life Expectancy:	10 years
Airspace remaining:	
Expansion possible:	N/A
Landfilling Technique:	Excavated pit and fill
Staffing:	No
Opening Hours:	Unmanned
Infrastructure / Equipment:	
Disposal Costs:	$nil
Design	
Water Management *Stormwater Management* *Leachate Management*	 No stormwater management No leachate management – site is not lined
Air Quality *Odour Control* *Dust Emissions*	 No odour control Not dust control
Noise	No noise control
Traffic Considerations	-
Site Security and Fencing	Site is fenced but no gates
Operation	
Waste Minimisation *Recyclables drop off*	 No waste minimisation
Waste Acceptance	Household waste 50% Commercial waste 30% Trailer waste 10% Industrial / Mining 10% Asbestos
Waste Pre-Treatment	None
Waste Cover	-
Litter Control	-
Fires	-
Contingency Planning *Cyclone/flood activity measures*	 -
Performance Monitoring and Reporting	-

Site Visit Assessment

The site was visited on 9 May 2007; Giles Perryman was accompanied by Steve Dehne (Shire of East Pilbara). The assessment has been made in relation to the sites licence conditions and any further comments or observations are made at the end of this table.

No	Condition	Compliance	Comments
G1	Waste Acceptance & Management	?	This is an unmanned site; therefore there is little control over the type of waste tipped at the site.
G2	Disposal of Asbestos Waste	?	Steve told us that no clinical or asbestos waste is disposed of in this site, but site is unmanned, so this can not be proved
G3	Management of Landfill Activities	No	Waste has been tipped outside the fenced site (car bodies)
G4	Fencing	No (but see comment)	Licence states '…a stock fence must be maintained around the whole of the perimeter of the site.' This is not in place as there is a gap to enter the site. However, the site could not be used if this condition was met.
G5	Wind Blown Waste	Yes	
G6	Signage	Yes	Entrance signs in place
G7	Monitoring and Reporting	?	Steve was unaware of any annual reporting
A1	Dust	Yes	
A2	Burning of Waste	No	There was evidence of significant waste burning in the cell.
W1	Stormwater Management	No	There is no stormwater management on site.
W2	Protection of Ground and Surface Waters	?	Unable to determine the depth to groundwater. Steve did mention that after heavy rainfall there is never any water collected in the cells.

General Observations

- A small unmanned site
- Appears to suffer from frequent burning of general waste in the landfill cell
- Based upon cell not collecting any rainfall, the cell bases have a high level of permeability, which could be causing an impact on groundwater
- The site had a "used Oil pit' that also had evidence of burning

TOWN OF PORT HEDLAND

SOUTH HEDLAND TIP SITE

Questionnaire Response

A questionnaire was sent to the Town of Port Hedland and completed by Grant Logie (Director Engineering Services) and Russel Dyer (Operations Manager). Details within the questionnaire are outlined in table below.

Background	
Facility Licence Number:	3917/8, file no. L122/97
Facility Address:	Reserve 41342 North Circular Road, South Hedland
Operator:	Town of Port Hedland
Owner:	Town of Port Hedland
Class Type:	Category 64 – Class II Putrescible Landfill Category 61 – Liquid Waste Facility
Established:	1985
Towns Supporting:	Port Hedland, South Hedland, Wedgefield, surrounding communities and stations
Dimensions of site:	37.3662 Ha
Dimensions of landfill:	27.454 Ha
Life Expectancy:	*Previous report has estimated 8 years, however since then we have purchase a dedicated landfill compactor and have implemented measures to increase life expectancy to approx. 15 years*
Airspace remaining:	580,000m^3
Expansion possible:	No
Landfilling Technique:	Excavated pit and fill
Staffing:	Yes, full time 2 weighbridge operators, 2 tip face officers on a rotating roster, 1 officer for recycling station (recently implemented service on a trail basis
Opening Hours:	
Infrastructure / Equipment:	Weighbridge Recycling Depot Washdown Facility Septage Ponds 1 x dozer 1 x excavator 1 x compactor
Disposal Costs:	-
Design	
Water Management *Stormwater Management* *Leachate Management*	 Stormwater control No leachate treatment – site is not lined
Air Quality *Odour Control* *Dust Emissions*	 No odour control Dust control
Noise	No noise control
Traffic Considerations	-
Site Security and Fencing	Site is fenced and gates are locked when site is unattended
Operation	
Waste Minimisation *Recyclables drop off*	 A drop off facility is provided at the landfill site and accepts the following materials: - Metal 265 tonnes - Motor Oil (new service) - Tyres 12,071 (number) - Green waste 4,637 (shredded on site, when avail) - Timber - Re-use Junk These materials are delivered to the landfill by residents/contractors
Waste Acceptance	- Household waste 4,636.735

	- Industrial waste 43,273.38 - Liquid waste 3,623.31 - Asbestos 177.39 - SMF 5.44 - Clinical waste 14.06 - Hazardous waste - Car Bodies 63 (number) - Cars 6,862 - Truck 2,952 - L/Truck 2,201 - E/Mover 56
Waste Pre-Treatment	None
Waste Cover	Daily compaction and cover of waste (min 230mm)
Litter Control	-
Fires	-
Contingency Planning *Cyclone/flood activity measures*	Currently programmed improvements to road access and drainage as landfill is currently closed during extremely wet conditions
Performance Monitoring and Reporting	Waste tonnage monitoring Type of waste being disposed Groundwater monitoring Odour monitoring Dust monitoring
Rehabilitation and Aftercare	
Rehabilitation *Site after use* *Settlement /Final Surface Profile* *Landfill Cap*	No rehabilitation. Post closure management plan must be considered Exhausted landfilled areas are not sealed with an impervious cap

Site Visit Assessment

The site was visited on 10 May 2007, during the visit Giles Perryman was accompanied by John (Town of Port Hedland). The assessment has been made in relation to the sites licence conditions and any further comments or observations are made at the end of this table.

No	Condition	Compliance	Comments
G1	Waste Acceptance & Management	Yes	The site is manned with a weighbridge and gate house and the site acceptance criteria is enforced
G2	Clinical and Asbestos Waste	No	Register in gate house, but tipping is generally unsupervised as the asbestos tipping cell is out of site of gate house
G3	Hazardous Waste	Yes	
G4	Management of Landfill Activities	No (vi)	Occasionally they run out of daily cover on site, and some cells are within 8m of boundary however this was the previous licence condition.
G5	Fencing	No	Ongoing problem with break-ins to site (cutting of fence). There are security checks four times a night. Licence states that fencing with be repaired on the following day, but this is not always possible
G6	Wash Bourne and Wind Blown Waste	No	Although a generally tidy site, wind blown waste is not collected and there is a lot of wind blown litter at site perimeter. A litter catcher (netting) has been installed to try and minimise the problem
G7	Signage	Yes	
G8	Monitoring and Reporting	Yes	Records kept in gate house, but John was not sure if the annual reporting to the DEC had occurred by the Council
A1	Dust	Yes	
A2	Burning of Waste	Yes	Greenwaste now stockpiled to be mulched
W1	Stormwater Management	Yes	
W2	Protection of Ground and Surface Waters	?	John want not aware of the depth to groundwater

W3	Groundwater Monitoring	No	John suggested that no groundwater monitoring has been completed for at least 18 months
W4	Maintenance of Septage Lagoons	No	The lagoon embankments had vegetation growing on them. John stated that new Septage lagoons are planned

General Observations

- The site was tidy and reasonably well run,
- There were large volumes of timber waste and old railway sleepers on site
- Access to site by public once past gate house
- Poor maintenance of liquid waste lagoons

APPENDIX E

Registered and Licensed Waste Management Facilities located in the Pilbara Region

(Source: DEC Licence and Registered Landfills, January 2007)

Registered and Licensed Waste Management Facilities Located in the Pilbara Region (January, 2007)

Legend

1	Landfills associated with mining/export activities
▲	Waste Management Facilities visited during the Pilbara tour (owned and operated by Local Government, excl. Deepdale - owed and operated by Rio Tinto

Registered Landfills

Number (Figure 4.1)	Name	Class
1	Christmas Creek Exploration Camp Landfill	99 - Putrescible landfill site
2	Cloud Break Exploration Camp Landfill	99 - Putrescible landfill site
3	Hope Downs Iron Ore Mine Exploration Camp	99 - Putrescible landfill site
4	Indee Gold Project	99 - Putrescible landfill site
5	Mining Area C Project	99 - Putrescible landfill site
6	Rhodes Ridge Landfill Site	99 - Putrescible landfill site
7	Telfer Gold Mine	73- Bulk storage of chemicals, 75 - Chemical blending or mixing not causing discharge, 79 - Carbon Stripping, 99- Putrescible landfill, 106 - Abrasive Blasting
8	Tunkawanna Village Waste Disposal Site	99 - Putrescible landfill site
9	Whim Creek Landfill	99 - Putrescible landfill site

Licensed Landfills

Number (Figure 4.1)	Name	Class
10	Cape Lambert Port & Process Facility	58 - Bulk material loading or unloading, 52 - Electric power generation, 63 - Class I inert landfill site, 5 - Processing or beneficiation of metallic or non metallic ore, 67 - Fuel burning
11	Coobina Chromite Project	5 - Processing or beneficiation of metallic or non metallic ore, 64 - Class II or III putrescible landfill site
12	Marandoo Iron Ore Mine	5 - Processing or beneficiation of metallic or non metallic ore, 64 - Class II or III putrescible landfill site
▲	Marble Bar Refuse Site	64 - Class II or III putrescible landfill site
13	Mesa J - Pannawonica Minesite	85 - Sewage facility, 6 - Mine dewatering, 5 - Processing or beneficiation of metallic or non metallic ore, 63 - Class I inert landfill site,
14	Mining Area C Project	5 - Processing or beneficiation of metallic or non metallic ore, 64 - Class II or III putrescible landfill site, 54 - Sewage facility,
15	Mt Brockman and Nammuldi Iron Ore Mines	5 - Processing or beneficiation of metallic or non metallic ore, 85 - Sewerage facility, 52 - Electric power generation, 64 - Class II or III putrescible landfill site, 6 - Mine dewatering,
16	Mt Whaleback/Orebody 29	5 - Processing or beneficiation of metallic or non metallic ore, 64 - Class II or III putrescible landfill site, 54 - Sewage facility,
17	Nifty Copper Operation	52 - Electric power generation, 7 - Vat or in situ leaching of metal, 54 - Sewage facility, 64 - Class II or III putrescible landfill site, 73 - Bulk storage of chemicals, 5 - Processing or beneficiation of metallic or non metallic ore
18	Nimingarra Iron Ore Mine	5 - Processing or beneficiation of metallic or non metallic ore, 6 - Mine dewatering, 63 - Class I inert landfill site,
▲	Nullagine Refuse Site	64 - Class II or III putrescible landfill site
▲	Onslow Refuse Disposal Site	65 - Class II or III putrescible landfill site
▲	Pannawonica Deepdale Landfill	64 - Class II or III putrescible landfill site

19	Paraburdoo Iron Ore Mine	5 - Processing or beneficiation of metallic or non metallic ore, 64 - Class II or III putrescible landfill site, 61 - Liquid waste facility, 6 - Mine dewatering, 52 - Electric power generation
▲	Paraburdoo Waste Disposal Site	64 - Class II or III putrescible landfill site
▲	Seven Mile Waste Disposal Facility	65 - Class II or III putrescible landfill site, 61 - Liquid Waste Facility
▲	South Hedland Tip Site	66 - Class II or III putrescible landfill site, 61 - Liquid Waste Facility
20	Tom Price Iron Ore Mine	5 - Processing or beneficiation of metallic or non metallic ore, 64 - Class II or III putrescible landfill site, 54 - Sewage facility,
▲	Tom Price Refuse Disposal Site	64 - Class II or III putrescible landfill site
21	West Angelas Mine Plant	63 - Class I inert landfill site, 64 - Class II or III putrescible landfill site, 5 - Processing or beneficiation of metallic or non metallic ore,
22	Wheelarra Hill (Jimblebar) Iron Ore Mine	5 - Processing or beneficiation of metallic or non metallic ore, 64 - Class II or III putrescible landfill site,
▲	Windell Refuse Site	66 - Class II or III putrescible landfill site, 61 - Liquid Waste Facility
23	Yandi Iron Ore Mine	6 - Mine dewatering, 64 - Class II or III putrescible landfill site, 5 - Processing or beneficiation of metallic or non metallic ore, 85 - Sewage facility
24	Yandicoogina Operation	6 - Mine dewatering, 5 - Processing or beneficiation of metallic or non metallic ore, 54 - Sewage facility, 64 - Class II or III putrescible landfill site
25	Yarrie Project	5 - Processing or beneficiation of metallic or non metallic ore, 6 - Mine dewatering, 64 - Class II or III putrescible landfill site, 85 - Sewage facility,

Licensed Transfer Stations

▲	Wickham Roebourne Transfer Station	62 - Solid Waste Depot

APPENDIX F

First Working Group Workshop Notes

First Workshop Notes

Attendees: **See below**
Date: **Friday 11th May 2007**
Time: **10.00am – 2.00pm**

1 Attendees

	Adrian Ellson PRC	Allan Moles CEO SoR	Keith Pearson CEO SoA	Chris Adams CEO ToPH	
Jeff Breen SoA					Craig Fitzgerald SoR
David Healy DEC					Jon Jones SoR
Vinh Nguyen DEC					Grant Logie ToPH
					Russell Dyer ToPH
	Giles Perryman CBSD		Screen		

Absent: Shire of East Pilbara

2 Notes from 'round the table' and issues raised by attendees

ToPH:

- Public commitment to recycling (lack of)
- Mining waste increasing in volume
- Peaky waste volumes, e.g. originally 5,000t of concrete ended up as 50,000t
- Community desire for 'twin bin' recyclable collection, Council not sure if viable
- Waste Management run as separate business unit, it's profitable with a reserve of $1m
- Only collect Greenwaste with (pre-) cyclone clean up, to avoid abuse of service (see SoR comment below)

SoR:

- Community want twin bin, Council not sure
- Five towns (in shire) all wanting a uniform service
- Possible future path would be for Shire to stop commercial bin collections
- Would like to run WM as a separate business unit
- Currently have different gate-fee for rateable ($34) and non-rateable ($66), but the plan is to end this approach
- (Pre-)Cyclone clean up service provides companies with an opportunity to abuse service and dispose of wastes at no charge
- Lack of knowledge by industry, i.e. lots of wastes disposed, that could be recycled

SoA:

- Plans to close Onslow site and have new tip 16km out of town, with a manned transfer station near town (pot. Use swipe cards for commercial operators to access tip)
- Collection service (esp. commercial) is profitable
- Uncertainty with future planning due to WARR bill, Container Deposit (CDS) and Zerowaste plans
- Issues with low volumes (economies of scale)
- No compaction of waste, so void space is used up quickly
- Problem wastes include, tyres, oil and batteries (batteries can be collected at neutral cost, but OH&S issues for staff handling batteries

Objectives of the WMP:

- Consider and identify 'REGIONAL' opportunities (possibly sub-regional i.e. 2 of the 4 Councils), rather than specific actions for individual councils. [e.g. Regional equipment that could be bought and managed by the PRC]
- ToPH: Reuse and recycling are key objective for the WMP
- Consider 'whole of life costs' for any options (inc landfill), and consider (but not calculate) CO_2 emissions for options, i.e. emissions from transport to take wastes for reprocessing
- Benchmarks in terms of the breakeven for when to recycle or not to recycle
- Identify achieveable short-term quick win objectives as well as long-term objectives

Targets:

A general discussion about the targets that should be set by the PRC within the WMP was held, and although it was agreed that measurable realistic targets are needed, there was insufficient time to define the target areas and values. The workshop attendees were asked to consider target areas and provide feedback to Giles via email or phone.

General Discussion and potential solutions

- A general lack of 'duty of care' by industry, i.e. load up waste onto truck, then it's the truck drivers problem to get the waste accepted at the landfill.
- Noted that the four Councils control all the landfills in area, so they are in a position to implement changes in waste management practices and costs, while being aware of potential increase in 'fly tipping' of wastes.
- Need to educate industry so there is a change in culture regarding waste in the Pilbara, so inform industry about planned changes (lead in period), then enforce new 'rules', industry fall in line and change practices.
- It was felt that the development of markets for recyclable is not the responsibility of LGA's, and manufacturers should be responsible for their product (e.g. tyres). David Healy (DEC) pointed out that this will be possible via the WARR Bill, but it's a long process to encourage / enforce extended producer responsibility (EPR). However a number of products including tyres are being dealt with at a federal level.
- Regarding solutions, rather than the attendees coming up with an answer the consultants should evaluate best practice solutions, while considering some of the unique issues faced by the Councils in the Pilbara.

The workshop was brought to a close at 2.00pm

APPENDIX G

Breakdown of Costing for Capital Expenditure Estimates

Table G.1 Cost Estimate Calculations for a New Greenwaste Chipper

Capital cost	$600,000	
Op Cost (inc fuel, maintenance, etc	$150	per hr
Throughput	120	cubic metres per hr
Density of greenwaste	250	kg/m3
PRC greenwaste total	6200	tonnes
Period of Depreciation	7	years
Interest rate	8.5%	
Cost of loader per hr (inc driver)	$85	per hour
Number of site visits per year	2	
Transport cost per km	$2.50	$/km
Distance for one 'round' trip	1900	km

Total greenwaste	24800	cubic metres
Hours to chip	207	hrs per year
Operational cost	$31,000	per year
Interest and repayment of capital	$117,222	per year
Total opex and capex	$148,222	per year
Total opex and capex per tonne	$23.91	per tonne
Additional cost		
Loader	$17,567	per year
Transport	$9,500	per year
Additional cost per tonne	$4.37	per tonne
Total cost (operation, capital, loader and transport)	**$175,288**	**per year**
Total cost (operation, capital, loader and transport)	**$28.27**	**per tonne**

Table G.2 Cost Estimate Calculations for a Used Greenwaste Chipper

Capital cost	$300,000	
Op Cost (inc fuel, maintenance, etc	$150	per hr
Throughput	120	cubic metres per hr
Density of greenwaste	250	kg/m3
PRC greenwaste total	6200	tonnes
Period of Depreciation	7	years
Interest rate	8.5%	
Cost of loader per hr (inc driver)	$85	per hour
Number of site visits per year	2	
Transport cost per km	$2.50	$/km
Distance for one 'round' trip	1900	km

Total greenwaste	24800	cubic metres
Hours to chip	207	hrs per year
Operational cost	$31,000	per year
Interest and repayment of capital	$58,611	per year
Total opex and capex	$89,611	per year
Total opex and capex per tonne	$14.45	per tonne
Additional cost		
Loader	$17,567	per year
Transport	$9,500	per year
Additional cost per tonne	$4.37	per tonne
Total cost (operation, capital, loader and transport)	**$116,677**	**per year**
Total cost (operation, capital, loader and transport)	**$18.82**	**per tonne**

Table G.3 Cost Saving Estimate Calculations for a Landfill Compactor at 7 Mile Landfill Facility

Variables	Low	High	Unit
Depth of excavation	4	4	metres
Height of fill from base of cell (exc cap)	5	5	metres
Proportion of Daily cover	30%	30%	
Proportion of cell bunds	10%	10%	
Cost of excavation / m3	$4.00	$6.50	$/m3
Cost of disposal/filling per tonne	$6.00	$10.00	$/t
Cost of capping & closure per hectare	$47,000	$120,000	$/ha
Current compaction density	450	350	kg/m3
Compaction density with compactor	900	1000	kg/m3
Tonnes filled per annum	76,500	76,500	tonnes per year

Results

Description	Without landfill compactor		With Landfill Compactor	
	Low	High	Low	High
Void space (cubic metres) created per hectare	50000	50000	50000	50000
Void space lost to daily cover	15000	15000	15000	15000
Void space lost to cell bunds	5000	5000	5000	5000
Void space remaining for waste	30000	30000	30000	30000
Cost of excavation per tonne of waste filled	$8.89	$18.57	$4.44	$6.50
Cost to dispose of waste per tonne	$6.00	$10.00	$6.00	$10.00
Cost of capping / closure per tonne	$3.48	$11.43	$1.74	$4.00
Total cost per tonne	$18.37	$40.00	$12.19	$20.50
Total cost per Year	$1,405,333	$3,060,000	$932,167	$1,568,250
Annual saving from use of Compactor			**$473,167**	**$1,491,750**

Table G.4 Cost Saving Estimate Calculations for a Landfill Compactor at Tom Price Landfill Facility

Variables	Low	High	Unit
Depth of excavation	4	4	metres
Height of fill from base of cell (exc cap)	5	5	metres
Proportion of Daily cover	30%	30%	
Proportion of cell bunds	10%	10%	
Cost of excavation / m3	$4.00	$6.50	$/m3
Cost of disposal/filling per tonne	$6.00	$10.00	$/t
Cost of capping & closure per hectare	$47,000	$120,000	$/ha
Current compaction density	450	350	kg/m3
Compaction density with compactor	900	1000	kg/m3
Tonnes filled per annum	14,084	14,084	tonnes per year

Results

Description	Without landfill compactor		With Landfill Compactor	
	Low	High	Low	High
Void space (cubic metres) created per hectare	50000	50000	50000	50000
Void space lost to daily cover	15000	15000	15000	15000
Void space lost to cell bunds	5000	5000	5000	5000
Void space remaining for waste	30000	30000	30000	30000
Cost of excavation per tonne of waste filled	$8.89	$18.57	$4.44	$6.50
Cost to dispose of waste per tonne	$6.00	$10.00	$6.00	$10.00
Cost of capping / closure per tonne	$3.48	$11.43	$1.74	$4.00
Total cost per tonne	$18.37	$40.00	$12.19	$20.50
Total cost per Year	$258,728	$563,360	$171,616	$288,722
Annual saving from use of Compactor			**$87,112**	**$274,638**

Table G.5 Cost Saving Estimate Calculations for a Landfill Compactor at Windell (Newman) Landfill Facility

Variables	Low	High	Unit
Depth of excavation	4	4	metres
Height of fill from base of cell (exc cap)	5	5	metres
Proportion of Daily cover	30%	30%	
Proportion of cell bunds	10%	10%	
Cost of excavation / m3	$4.00	$6.50	$/m3
Cost of disposal/filling per tonne	$6.00	$10.00	$/t
Cost of capping & closure per hectare	$47,000	$120,000	$/ha
Current compaction density	450	350	kg/m3
Compaction density with compactor	900	1000	kg/m3
Tonnes filled per annum	46,000	46,000	tonnes per year

Results

Description	Without landfill compactor		With Landfill Compactor	
	Low	High	Low	High
Void space (cubic metres) created per hectare	50000	50000	50000	50000
Void space lost to daily cover	15000	15000	15000	15000
Void space lost to cell bunds	5000	5000	5000	5000
Void space remaining for waste	30000	30000	30000	30000
Cost of excavation per tonne of waste filled	$8.89	$18.57	$4.44	$6.50
Cost to dispose of waste per tonne	$6.00	$10.00	$6.00	$10.00
Cost of capping / closure per tonne	$3.48	$11.43	$1.74	$4.00
Total cost per tonne	$18.37	$40.00	$12.19	$20.50
Total cost per Year	$845,037	$1,840,000	$560,519	$943,000
Annual saving from use of Compactor			**$284,519**	**$897,000**

Table G.6 Cost Estimate Calculations for a Transfer Station at Paraburdoo (to Tom Price)

Operational Cost Estimate		Cost per hour	Hours per week	Total per annum	Comments
Loader (cost per hour inc fuel, servicing and driver)		$85	8	$35,360	Loader used for pushing up and loading MSW from kerbside collection
Site Operators (based on Perth rates)		$30	56	$87,360	Site manned 8 hrs per day, 7 days per weeks
Site Maintenance and repairs				$20,000	

Capital Repayment Estimate (ex. Interest payments)	Total cost	Depreciation Period	Interest rate	cost per year	
Capital cost Infrastructure and static equipment	$300,000	15	8.5%	$36,126	Capital repayment and interest on loan for capital

Transport Cost Estimate	$ per tonne per km	Tonnes Generated	Distance to landfill (km)	Total per annum	
Transport of waste (& Recyclables)	$0.60	6500	80	$312,000	Transport from Paraburdoo to Tom Price

Total Operational & Transport cost per annum	**$490,846**

Table G.7 Cost Estimate Calculations for a Transfer Station at Nullagine (to Newman)

Operational Cost Estimate		Cost per hour	hours per week	Total per annum	Comments
Loader (cost per hour inc fuel, servicing and driver)		$85	8	$35,360	Loader used for pushing up and loading MSW from kerbside collection
Site Operators (based on Perth rates)		$30	20	$31,200	Site manned 4 hours per day, 57 days per week
Site Maintenance and repairs				$20,000	

Capital Repayment Estimate (ex. Interest payments)	Total cost	Depreciation Period	Interest rate	cost per year	
Capital cost Infrastructure and static equipment	$100,000	15	8.5%	$12,042	Capital repayment and interest on loan for capital

Transport Cost Estimate	$ per tonne per km	tonnes generated	Distance to landfill (km)	Total per annum	
Transport of waste (& Recyclables)	$0.65	550	175	$62,563	Transport from Nullagine to Newman (increased rate due to unsealed road)

Total Operational & Transport cost per annum	**$161,165**

Table G.8 Cost Estimate Calculations for a Transfer Station at Marble Bar (to South Hedland)

Operational Cost Estimate		Cost per hour	hours per week	Total per annum	Comments
Loader (cost per hour inc fuel, servicing and driver)		$85	8	$35,360	Loader used for pushing up and loading MSW from kerbside collection
Site Operators (based on Perth rates)		$30	20	$31,200	Site manned 4 hours per day, 5 days per week
Site Maintenance and repairs				$20,000	

Capital Repayment Estimate (ex. Interest payments)	Total cost	Depreciation Period	Interest rate	cost per year	
Capital cost Infrastructure and static equipment	$100,000	15	8.5%	$12,042	Capital repayment and interest on loan for capital

Transport Cost Estimate	$ per tonne per km	tonnes generated	Distance to landfill (km)	Total per annum	
Transport of waste (& Recyclables)	$0.60	450	200	$54,000	Transport from Marble Bar to South Hedland

Total Operational & Transport cost per annum	**$152,602**

APPENDIX H

Waste Quantity Data (Council Survey)

Summary of Waste Quantities from All Councils

NOTE Data contains a number of estimates and uncertainties

NO	DESCRIPTION	SHIRE OF ROEBOURNE Combined 2005/06	SHIRE OF ASHBURTON Combined 2005/06	SHIRE OF EAST PILBARA Combined 2005/06	TOWN OF PORT HEDLAND Combined 2005/06	PILBARA REGION All Councils 2005/06
1	*Domestic Collections*					
1.a	Domestic refuse - 240L MGB	5,296	6,000	2,796	11,830	25,922
1.b	Domestic refuse - 3-4.5m^3 Bulk bins	17	12	200	0	229
1.c	Pre-Cyclone Cleanup - verge collection	1,403	560	20	1,200	3,183
1.d	Post-Cyclone Cleanup - verge collection	2,875	4	0	0	2,879
1.e	Trailer Waste	6,361	1,300	2,170	0	9,831
				0		-
2	*Commercial Collections*			0		-
2.a	Commercial refuse - 240L MGB	783	2,553	10	0	3,346
2.b	Commercial refuse - 1, 1.5, 3, 4.5m^3 Bulk bins	2,411	3,760	384	0	6,555
2.c	Cookling Oil - 200L drum	11	0	0	0	11
2.d	Tyre collection - 27m^3 hook lift bin	163	0	0	0	163
		0	0	0	0	-
3	*Council Works / Town Services*	0	0	0	0	-
3.a	Green waste from Council Works	200	1,300	4	0	1,504
3.b	Inert waste from Council Works	900	350	10,993	0	12,243
3.c	Public Litterbins	61	1,500	8	0	1,569
				2		2
4	*Landfilled Wastes*			0		-
4.a	Other commercial	3,232	0	9,937	0	13,169
4.b	Inert Waste	25,899	500	7,800	0	34,199
4.c	Industrial / Mining	0	500	1,190	43,273	44,963
4.d	Clean Fill	15,609	0	0	0	15,609
4.e	Empty 200L Drums	81	0	0	0	81
4.f	Asbestos	120	0	13	177	310
4.g	Contaminated Soils	0	0	4	0	4
4.h	Sewerage Sludge (liquid waste)	8,165	0	10,400	3,623	22,188
4.I	Hazardous Waste	1,258	0	5	0	1,263
4.j	Animal Bodies	0	0	40	0	40
4.k	Medical Waste	30	0	0	14	44
4.l	Quarantine Waste	13	0	0	0	13
				0		-
5	*Recyclables Drop Off*			156		156
5.a	Metal	450	0	0	256	706
5.b	Motor Oil	18	0	1,042	0	1,060
5.c	Batteries	113	0	0	0	113
5.d	Gas Cylinders	3	0	200	0	203
5.e	Greenwaste	1,248	0	104	3,436	4,788
5.f	Reuse Junk	12	0	0	0	12
5.g	Tyres	0	0	0	11,487	11,487
5.g	Car Bodies	0		0	95	95
5.I	Paper			232		15,749
5.j	Glass			72		72

No. of domestic properties serviced:	6,081	1,915	1,760	6,041	15,797
No. of dwellings					
Waste generated per domestic property per yr (tonnes):	***2.62***	***4.11***	***2.95***	***2.16***	***2.66***
No. of commercial properties serviced:	0.00	126.95	0.00	0.00	
Waste generated per commercial property per yr (tonnes):		**49.73**			
TOTAL (tonnes per yr):	**76,731**	**18,339**	**47,782**	**75,392**	218,064.30

Summary of Waste Quantities from the Shire of Roebourne

NOTE Data based on weighbridge records and likely to be accurate

NO	DESCRIPTION	SHIRE OF ROEBOURNE All Townsites 2005/06	*Notes*
1	*Domestic Collections*		
1.a	Domestic refuse - 240L MGB	5,295.52	
1.b	Domestic refuse - 3-4.5m^3 Bulk bins	16.80	
1.c	Pre-Cyclone Cleanup - verge collection	1,403.00	includes light industrial estate properties
1.d	Post-Cyclone Cleanup - verge collection	2,875.00	amount from Cyclone Claire (early 2006)
1.e	Trailer Waste	6,361.35	5000 tonnes to Landfill and 95% of total waste going to Roebourne Transfer Station
2	*Commercial Collections*		
2.a	Commercial refuse - 240L MGB	782.77	
2.b	Commercial refuse - 1, 1.5, 3, 4.5m^3 Bulk bins	2,411.18	includes 5% commercial waste from Roebourne transfer station
2.c	Cookling Oil - 200L drum	11.40	
2.d	Tyre collection - 27m^3 hook lift bin	163.03	
3	*Council Works / Town Services*		
3.a	Green waste from Council Works	200.00	includes oval dethatching and street treens/gardens
3.b	Inert waste from Council Works	900.00	includes engineering works, road maintenance/construction works, road sweeper
3.c	Public Litterbins	60.84	
4	*Landfilled Wastes*		
4.a	Other commercial	3,231.77	Difference between 6,425.72 and commercial collections
4.b	Inert Waste	25,899.20	includes mining and industrial
4.c	Industrial / Mining		
4.d	Clean Fill	15,609.11	
4.e	Empty 200L Drums	80.68	
4.f	Asbestos	120.00	
4.g	Contaminated Soils		included in hazardous waste
4.h	Sewerage Sludge (liquid waste)	8,165.10	
4.I	Hazardous Waste	1,257.78	
4.j	Animal Bodies		included in hazardous waste
4.k	Medical Waste	29.98	
4.l	Quarantine Waste	13.28	
			57,775.28
5	*Recyclables Drop Off*		
5.a	Metal	450.00	includes 300t Roebourne Transfer Station and 150t 7 mile landfill
5.b	Motor Oil	18.00	includes 6t from Roebourne Transfer Station and 12t 7 Mile Landfill
5.c	Batteries	112.50	Includes 12.5t from Roebourne Transfer Station and 100t 7 mile Landfill
5.d	Gas Cylinders	3.00	includes 1 tonne from Roebourne Transfer Station and 2t 7 mile landfill
5.e	Greenwaste	1,247.63	
5.f	Reuse Junk	12.00	includes 6 tonnes from Roebourne Transfer Station
5.g	Tyres		
	No. of domestic properties serviced:	**6,081**	
	No. of dwellings		
	Waste generated per domestic property per yr (tonnes):	**1.92**	
	No. of commercial properties serviced:		
	Waste generated per commercial property per yr (tonnes):		
	TOTAL (tonnes per yr):	**76,731**	

Summary of Waste Quantities from Deepdale Landfill, Pannawonica (Shire of Ashburton)
NOTE Data based on estimates for an unmanned site and likely to be very inaccurate.

NO	DESCRIPTION	SHIRE OF ASHBURTON (Rio Tinto) Pannawonica 2005/06	*Notes*
1	*Domestic Collections*		
1.a	Domestic refuse - 240L MGB	1,800.00	
1.b	Domestic refuse - 3-4.5m^3 Bulk bins	12.00	
1.c	Pre-Cyclone Cleanup - verge collection		
1.d	Post-Cyclone Cleanup - verge collection	4.00	
1.e	Trailer Waste		
2	*Commercial Collections*		
2.a	Commercial refuse - 240L MGB	79.00	
2.b	Commercial refuse - 1, 1.5, 3, 4.5m^3 Bulk bins		
2.c	Cookling Oil - 200L drum		
2.d	Tyre collection - 27m^3 hook lift bin		
3	*Council Works / Town Services*		
3.a	Green waste from Council Works		
3.b	Inert waste from Council Works		
3.c	Public Litterbins		amount not known
4	*Landfilled Wastes*		amount not known
4.a	Other commercial		amount not known
4.b	Inert Waste		amount not known
4.c	Industrial / Mining		amount not known
4.d	Clean Fill		amount not known
4.e	Empty 200L Drums		
4.f	Asbestos		amount not known
4.g	Contaminated Soils		
4.h	Sewerage Sludge (liquid waste)		
4.I	Hazardous Waste		
4.j	Animal Bodies		
4.k	Medical Waste		
4.l	Quarantine Waste		
5	*Recyclables Drop Off*		
5.a	Metal		amount not known
5.b	Motor Oil		amount not known
5.c	Batteries		amount not known
5.d	Gas Cylinders		amount not known
5.e	Greenwaste		amount not known
5.f	Reuse Junk		amount not known
5.g	Tyres		amount not known
	No. of domestic properties serviced:	**500**	
	No. of dwellings		
	Waste generated per domestic property per yr (tonnes):	**3.63**	
	No. of commercial properties serviced:	**19**	
	Waste generated per commercial property per yr (tonnes):		
	TOTAL (tonnes per yr):	**1,895**	

Summary of Waste Quantities from Onslow Landfill (Shire of Ashburton)

NOTE Data based on estimates for an unmanned site and likely to be very inaccurate

NO	DESCRIPTION	SHIRE OF ASHBURTON Onslow 2005/06	*Notes*
1	*Domestic Collections*		
1.a	Domestic refuse - 240L MGB	1,000.00	70% of landfill
1.b	Domestic refuse - 3-4.5m^3 Bulk bins		
1.c	Pre-Cyclone Cleanup - verge collection	10.00	
1.d	Post-Cyclone Cleanup - verge collection		amount not known
1.e	Trailer Waste	200.00	10% of landfill - estimated by MLH
2	*Commercial Collections*		
2.a	Commercial refuse - 240L MGB	300.00	15% of landfill
2.b	Commercial refuse - 1, 1.5, 3, 4.5m^3 Bulk bins	200.00	
2.c	Cookling Oil - 200L drum		
2.d	Tyre collection - 27m^3 hook lift bin		
3	*Council Works / Town Services*		
3.a	Green waste from Council Works	100.00	street trees
3.b	Inert waste from Council Works	50.00	parks
3.c	Public Litterbins	400.00	
4	*Landfilled Wastes*		
4.a	Other commercial		
4.b	Inert Waste	100.00	5% of landfill
4.c	Industrial / Mining		
4.d	Clean Fill		
4.e	Empty 200L Drums		
4.f	Asbestos		amount not known
4.g	Contaminated Soils		
4.h	Sewerage Sludge (liquid waste)		
4.I	Hazardous Waste		
4.j	Animal Bodies		amount not known
4.k	Medical Waste		
4.l	Quarantine Waste		
5	*Recyclables Drop Off*		
5.a	Metal		amount not known
5.b	Motor Oil		amount not known
5.c	Batteries		amount not known
5.d	Gas Cylinders		
5.e	Greenwaste		amount not known
5.f	Reuse Junk		
5.g	Tyres		amount not known
	No. of domestic properties serviced:	**215**	
	No. of dwellings		
	Waste generated per domestic property per yr (tonnes):	**5.58**	
	No. of commercial properties serviced:	**15**	
	Waste generated per commercial property per yr (tonnes):	**33.33**	
	TOTAL (tonnes per yr):	**2,360**	

Summary of Waste Quantities from Paraburdoo Landfill (Shire of Ashburton)

NOTE Data based on estimates for an unmanned site and likely to be very inaccurate

NO	DESCRIPTION	SHIRE OF ASHBURTON Paraburdoo 2005/06	*Notes*
1	*Domestic Collections*		
1.a	Domestic refuse - 240L MGB	1,200.00	60% of landfill
1.b	Domestic refuse - 3-4.5m^3 Bulk bins		
1.c	Pre-Cyclone Cleanup - verge collection	250.00	
1.d	Post-Cyclone Cleanup - verge collection		amount not known
1.e	Trailer Waste	500.00	15% of landfill - est amount by MLH
2	*Commercial Collections*		
2.a	Commercial refuse - 240L MGB	1,500.00	15% of landfill
2.b	Commercial refuse - 1, 1.5, 3, 4.5m^3 Bulk bins	1,560.00	
2.c	Cookling Oil - 200L drum		
2.d	Tyre collection - 27m^3 hook lift bin		
3	*Council Works / Town Services*		
3.a	Green waste from Council Works	600.00	200t from street trees and 400t from contractors
3.b	Inert waste from Council Works	100.00	Parks
3.c	Public Litterbins	400.00	
4	*Landfilled Wastes*		
4.a	Other commercial		
4.b	Inert Waste		
4.c	Industrial / Mining	300.00	10% of landfill - est made by MLH
4.d	Clean Fill		
4.e	Empty 200L Drums		
4.f	Asbestos		
4.g	Contaminated Soils		
4.h	Sewerage Sludge (liquid waste)		
4.I	Hazardous Waste		
4.j	Animal Bodies		
4.k	Medical Waste		
4.l	Quarantine Waste		
5	*Recyclables Drop Off*		
5.a	Metal		
5.b	Motor Oil		
5.c	Batteries		
5.d	Gas Cylinders		
5.e	Greenwaste		
5.f	Reuse Junk		
5.g	Tyres		
	No. of domestic properties serviced:	**1,200**	
	No. of dwellings		
	Waste generated per domestic property per yr (tonnes):	**1.63**	
	No. of commercial properties serviced:	**14**	serviced with 240L MGB
	Waste generated per commercial property per yr (tonnes):	**218.57**	
	TOTAL (tonnes per yr):	**6,410**	

Summary of Waste Quantities from Tom Price Landfill (Shire of Ashburton)

NOTE Data based on estimates for a manned site without a weighbridge and likely to be inaccurate

NO	DESCRIPTION	SHIRE OF ASHBURTON Tom Price 2005/06	*Notes*
1	*Domestic Collections*		
1.a	Domestic refuse - 240L MGB	2,000.00	45% of total landfill
1.b	Domestic refuse - 3-4.5m^3 Bulk bins		
1.c	Pre-Cyclone Cleanup - verge collection	300.00	
1.d	Post-Cyclone Cleanup - verge collection		amount not known
1.e	Trailer Waste	600.00	15% of total landfill - amount est by MLH
2	*Commercial Collections*		
2.a	Commercial refuse - 240L MGB	674.00	25% of total landfill
2.b	Commercial refuse - 1, 1.5, 3, 4.5m^3 Bulk bins	2,000.00	
2.c	Cookling Oil - 200L drum		
2.d	Tyre collection - 27m^3 hook lift bin		
3	*Council Works / Town Services*		
3.a	Green waste from Council Works	600.00	200t from street trees 400t from contractors
3.b	Inert waste from Council Works	200.00	Parks
3.c	Public Litterbins	700.00	
4	*Landfilled Wastes*		
4.a	Other commercial		
4.b	Inert Waste	400.00	10% of total landfill - amount est by MLH
4.c	Industrial / Mining	200.00	5% of total landfill - amount est by MLH
4.d	Clean Fill		
4.e	Empty 200L Drums		
4.f	Asbestos		minimal
4.g	Contaminated Soils		
4.h	Sewerage Sludge		disposed at Karratha
4.I	Hazardous Waste		
4.j	Animal Bodies		minimal
4.k	Other		
5	*Recyclables Drop Off*		
5.a	Metal		amount unknown
5.b	Motor Oil		amount unknown
5.c	Batteries		amount unknown
5.d	Gas Cylinders		
5.e	Greenwaste		amount unknown
5.f	Reuse Junk		
5.g	Tyres		amount unknown
	No. of domestic properties serviced:	**1,500**	
	No. of dwellings		
	Waste generated per domestic property per yr (tonnes):	**1.93**	
	No. of commercial properties serviced:	**19**	
	Waste generated per commercial property per yr (tonnes):	**78.95**	
	TOTAL (tonnes per yr):	**7,674**	

Summary of Waste Quantities from Windell (Newman) Landfill (Shire of East Pilbara)
NOTE Data based on estimates for a manned site without a weighbridge and likely to be inaccurate

NO	DESCRIPTION	SHIRE OF EAST PILBARA Newman 2005/06
1	*Domestic Collections*	
1.a	Domestic refuse - 240L MGB	2,340
1.b	Domestic refuse - 3-4.5m^3 Bulk bins	200
1.c	Pre-Cyclone Cleanup - verge collection	
1.d	Post-Cyclone Cleanup - verge collection	
1.e	Trailer Waste	2,080
2	*Commercial Collections*	
2.a	Commercial refuse - 240L MGB	10
2.b	Commercial refuse - 1, 1.5, 3, 4.5m^3 Bulk bins	384
2.c	Cookling Oil - 200L drum	
2.d	Tyre collection - 27m^3 hook lift bin	
3	*Council Works / Town Services*	
3.a	Green waste from Council Works	
3.b	Inert waste from Council Works	10,980
3.c	Public Litterbins	5
4	*Landfilled Wastes*	
4.a	Other commercial	9,662
4.b	Inert Waste	7,800
4.c	Industrial / Mining	1,100
4.d	Clean Fill	
4.e	Empty 200L Drums	
4.f	Asbestos	13
4.g	Contaminated Soils	4
4.h	Sewerage Sludge (liquid waste)	10,400
4.I	Hazardous Waste	5
4.j	Animal Bodies	40
4.k	Medical Waste	
4.l	Quarantine Waste	
5	*Recyclables Drop Off*	156
5.a	Metal	
5.b	Motor Oil	1,042
5.c	Batteries	
5.d	Gas Cylinders	200
5.e	Greenwaste	104
5.f	Reuse Junk	
5.g	Tyres	
5.h	Car Bodies	
5.I	Paper	52
5.j	Glass	72
	No. of domestic properties serviced:	**1,600**
	No. of dwellings	
	Waste generated per domestic property per yr (tonnes):	**2.89**
	No. of commercial properties serviced:	
	Waste generated per commercial property per yr (tonnes):	
	TOTAL (tonnes per yr):	**46,649**

Summary of Waste Quantities from Nullagine Landfill (Shire of East Pilbara)

NOTE Data based on estimates for an unmanned site and likely to be very inaccurate

NO	DESCRIPTION	SHIRE OF EAST PILBARA Nullagine 2005/06	*Notes*
1	*Domestic Collections*		
1.a	Domestic refuse - 240L MGB	248.88	2074m3 - using a conversion of 100m3 to 12 tonnes. Includes some commercial waste. 50% of landfill
1.b	Domestic refuse - 3-4.5m^3 Bulk bins		
1.c	Pre-Cyclone Cleanup - verge collection		minimal
1.d	Post-Cyclone Cleanup - verge collection		
1.e	Trailer Waste	50.00	10% of landfill. Amount estimated by MLH
2	*Commercial Collections*		
2.a	Commercial refuse - 240L MGB		included in domestic
2.b	Commercial refuse - 1, 1.5, 3, 4.5m^3 Bulk bins		
2.c	Cookling Oil - 200L drum		
2.d	Tyre collection - 27m^3 hook lift bin		
3	*Council Works / Town Services*		
3.a	Green waste from Council Works		minimal
3.b	Inert waste from Council Works	5.00	
3.c	Public Litterbins		
		2.00	
4	*Landfilled Wastes*		
4.a	Other commercial	150.00	30% of landfill. Estimated by MLH
4.b	Inert Waste		
4.c	Industrial / Mining	50.00	10% of landfill. Amount estimated by MLH
4.d	Clean Fill		
4.e	Empty 200L Drums		
4.f	Asbestos		minimal
4.g	Contaminated Soils		
4.h	Sewerage Sludge (liquid waste)		
4.I	Hazardous Waste		
4.j	Animal Bodies		
4.k	Medical Waste		
4.l	Quarantine Waste		
5	*Recyclables Drop Off*		
5.a	Metal		
5.b	Motor Oil		
5.c	Batteries		
5.d	Gas Cylinders		
5.e	Greenwaste		
5.f	Reuse Junk		
5.g	Tyres		
	No. of domestic properties serviced:	**60**	
	No. of dwellings		
	Waste generated per domestic property per yr (tonnes):	**4.98**	
	No. of commercial properties serviced:		
	Waste generated per commercial property per yr (tonnes):		
	TOTAL (tonnes per yr):	**506**	

Summary of Waste Quantities from Marble Bar Landfill (Shire of East Pilbara)

NOTE Data based on estimates for an unmanned site and likely to be very inaccurate

NO	DESCRIPTION	SHIRE OF EAST PILBARA Marble Bar 2005/06	*Notes*
1	*Domestic Collections*		
1.a	Domestic refuse - 240L MGB	207.36	1728m3 - using a conversion of 100m3 to 12 tonnes. Includes some commercial waste. 50% of landfill
1.b	Domestic refuse - 3-4.5m^3 Bulk bins		
1.c	Pre-Cyclone Cleanup - verge collection	20.00	
1.d	Post-Cyclone Cleanup - verge collection		
1.e	Trailer Waste	40.00	10% of landfill - amount estimated by MLH
2	*Commercial Collections*		
2.a	Commercial refuse - 240L MGB		
2.b	Commercial refuse - 1, 1.5, 3, 4.5m^3 Bulk bins		
2.c	Cookling Oil - 200L drum		
2.d	Tyre collection - 27m^3 hook lift bin		
3	*Council Works / Town Services*		
3.a	Green waste from Council Works	4.00	
3.b	Inert waste from Council Works	8.00	
3.c	Public Litterbins	3.00	
4	*Landfilled Wastes*		
4.a	Other commercial	125.00	30% of landfill - amount estimated by MLH
4.b	Inert Waste		
4.c	Industrial / Mining	40.00	10% of landfill - amount estimated by MLH
4.d	Clean Fill		
4.e	Empty 200L Drums		
4.f	Asbestos		minimal
4.g	Contaminated Soils		
4.h	Sewerage Sludge (liquid waste)		
4.I	Hazardous Waste		
4.j	Animal Bodies		
4.k	Medical Waste		
4.l	Quarantine Waste		
5	*Recyclables Drop Off*		
5.a	Metal		
5.b	Motor Oil		
5.c	Batteries		
5.d	Gas Cylinders		
5.e	Greenwaste		
5.f	Reuse Junk		
5.g	Tyres		
	No. of domestic properties serviced:	**100**	
	No. of dwellings		
	Waste generated per domestic property per yr (tonnes):	**2.67**	
	No. of commercial properties serviced:		
	Waste generated per commercial property per yr (tonnes):		
	TOTAL (tonnes per yr):	**447**	

Summary of Waste Quantities from South Hedland Landfill (Town of Port Hedland)

NOTE Data based on weighbridge records and likely to be accurate.

NO	DESCRIPTION	TOWN OF PORT HEDLAND All Towns 2005/06	*Notes*
1	*Domestic Collections*		
1.a	Domestic refuse - 240L MGB	11,830.00	includes domestic, commercial and public litterbins (from council rubbish truck)
1.b	Domestic refuse - 3-4.5m^3 Bulk bins		
1.c	Pre-Cyclone Cleanup - verge collection	1,200.00	only greenwaste is collected
1.d	Post-Cyclone Cleanup - verge collection		
1.e	Trailer Waste		
2	*Commercial Collections*		
2.a	Commercial refuse - 240L MGB		included in domestic
2.b	Commercial refuse - 1, 1.5, 3, 4.5m^3 Bulk bins		
2.c	Cookling Oil - 200L drum		
2.d	Tyre collection - 27m^3 hook lift bin		
3	*Council Works / Town Services*		
3.a	Green waste from Council Works		included in greenwaste at Recyclables drop off
3.b	Inert waste from Council Works		
3.c	Public Litterbins		included in domestic
4	*Landfilled Wastes*		
4.a	Other commercial		
4.b	Inert Waste		
4.c	Industrial / Mining	43,273.38	
4.d	Clean Fill		
4.e	Empty 200L Drums		
4.f	Asbestos	177.39	
4.g	Contaminated Soils		
4.h	Sewerage Sludge (liquid waste)	3,623.31	liquid waste'
4.I	Hazardous Waste		
4.j	Animal Bodies		
4.k	Medical Waste	14.06	
4.l	Quarantine Waste		
5	*Recyclables Drop Off*		
5.a	Metal	256.00	portion of industrial
5.b	Motor Oil		new service
5.c	Batteries		
5.d	Gas Cylinders		
5.e	Greenwaste	3,436.00	
5.f	Reuse Junk		
5.g	Tyres	11,487.50	assumes 8 kg per car tyre, 50kg per truck tyre, 5 tonne for earthmover and large truck
5.h	Car Bodies	94.50	assumes 1.5t per car
	No. of domestic properties serviced:	**6,041**	domestic and commercial properties
	No. of dwellings		
	Waste generated per domestic property per yr (tonnes):	**2.16**	
	No. of commercial properties serviced:		
	Waste generated per commercial property per yr (tonnes):		
	TOTAL (tonnes per yr):	**75,392**	

APPENDIX I

Example of Recycling Viability Model

Shire of Roebourne

WA REGIONAL RECYCLING VIABILITY ASSESSMENT MODEL

Introduction

MODEL SCOPE AND CHARACTERISTICS

This model estimates the financial costs and environmental benefits of recycling in regional WA. It assumes a typical, standardised suite of materials is either collected from kerbsides or dropped off by residents, then prepared for transport, stored and transported to Perth by road when a full trailer load has been accumulated.

The financial costs depend on user selections for catchment population, the distance from Perth, the yield per capita, the type of recycling system (kerbside or drop off), the cost of landfill and whether or not a state rebate is available. The environmental benefits are related largely to yield but also take into account the greenhouse costs of road transport.

INSTRUCTIONS

Go to the 'Input & Results' Worksheet and enter the following information:

Enter Catchment Population
Enter Distance from Perth
Select Kerbside or Drop off Collection
Select Yield Estimate (Typical, Good or Excellent)
Select Landfill Type (Basic Rural or Standard)
Select RRRS Rebate

The model will calculate the most efficient compaction rate under both high and low transport cost scenarios

The model will calculate the financial and net viability of the selected recycling system under:
- A high transport cost scenario
- A low transport cost scenario
- A charity-based scenario (applicable for drop-off systems only)

High and Low transport cost estimates are based on equations derived from actual quotes.

Net viability incorporates environmental benefits
All cost data excludes GST

KEY

Input datum	Red text
Assumed / constant datum (see report for selection justification)	Black text
Derived datum (i.e. will vary with input datum)	Blue text
Comment (hold mouse over the cell to read)	
Low transport cost scenario	
High transport cost scenario	
Low compaction (not applicable to kerbside collected materials)	
Higher compaction	
Viability - net cost	
Viability - net benefit	

FORMULAE

Input & Results Worksheet

Total Yield *(tonnes / year)*	=	yield *(kg / person / year)* * population / 1000
Total Financial benefit or cost *($ / year)*	=	value of materials + offset landfill costs + rrrs rebate - pre-transport costs - transport costs
Per capita financial benefit or cost *($ / person / year)*	=	(Total Financial benefit or cost) / population
Net Cost (including environmental benefits) *($ / person / year)*	=	Financial cost - environmental benefit + environmental cost of transport

Quantities Worksheet

Tonnes recovered per material *(tonnes / year)*	=	total yield *(tonnes / year)* * weight % per material
Volume recovered per material *(m^3 / year)*	=	tonnes recovered per material / material density *(tonnes / m^3)*
Total volume recovered *(m^3 / year)*	=	sum of volume recovered per material
Volume % per material *(vol %)*	=	volume per material / total volume * 100
Average density (standard recyclables mix) *(tonnes / m^3)*	=	total tonnes recovered / total volume recovered
Number of loads per material *(if density < 0.333 tonnes / m^3)*	=	tonnes recovered per material / (effective truck volume * material density)
Number of loads per material *(if density > 0.333 tonnes / m^3)*	=	tonnes recovered per material / maximum allowable transport weight

Costs Worksheet

Low Transport Delivery Cost Equation *($ / truckload)*	=	0.5 * distance *(km)* + 560
High Transport Delivery Cost Equation *($ / truckload)*	=	1.667 * distance *(km)* + 630
Pre-transport costs per material *($ / year)*	=	Total pre-transport costs * volume % per material
Transport costs per material *($ / year)*	=	Number of loads per material * (delivery costs per load + loading cost)
Total transport costs *($ / year)*	=	Total number of loads * (delivery costs per load + loading cost)

Benefits Worksheet

Value per material *($ / year)*	=	unit value per material * tonnes recovered per material
Total value of materials *($ / year)*	=	sum (value per material)
Value of materials *($ / mixed tonne)*	=	total value of materials / total tonnes recovered
Offset landfill cost *($ / year)*	=	unit offset landfill cost * total tonnes recovered
RRRS rebate *($ / year)*	=	unit RRRS rebate * total tonnes recovered
Environmental benefit (total) *($ / year)*	=	unit environmental benefit ($ / kg) * total tonnes recovered * 1000
Environmental cost of transport *($ / year)*	=	(distance from Perth - 300) * 0.0022

WA REGIONAL RECYCLING VIABILITY ASSESSMENT MODEL - Shire of Roebourne

Input & Results

PRIMARY INPUT DATA — Enter information here

		Perth	Port Hedland
Enter Catchment Population (pop)	17,937		
Enter Distance from Perth (km)	237	1566	237
Select Kerbside Collection or Drop-off	Drop-off		
Select Yield	Good	20 kg/person/yr	
Select Landfill Type	Standard	20 $/t	
Select RRRS Rebate	No rebate	0 $/t	

RESULTS

	LOW TRANSPORT COST SCENARIO	HIGH TRANSPORT COST SCENARIO	CHARITY-BASED SCENARIO
Total Yield (tonnes / year)	359	359	359
Efficient Compaction Rate	HIGHER	HIGHER	LOW (assumed)
Number of truckloads per year	14.9	14.9	19.6
Total Financial benefit or cost (-)	$9,701	$4,875	$41,816
Total Environmental benefit	$154,584	$154,584	$154,584
Per Capita Financial benefit or cost (-) ($/person/yr)	$0.54	$0.27	$2.33
Net Per Capita benefit or cost (-) ($/person/yr)	$9.16	$8.89	$10.95
FINANCIAL COSTS ($ / year)			
Pre-Transport Costs	$26,700	$26,700	$1,200
Transport Costs	$13,486	$18,312	$6,871
FINANCIAL BENEFITS ($ / year)			
Value of Materials	$42,712	$42,712	$42,712
Offset Landfill Costs	$7,175	$7,175	$7,175
RRRS Rebate	$0	$0	$0
BENEFIT OR COST (-) CONTRIBUTION OF SPECIFIC MATERIALS ($ / YEAR)			
Newsprint & other paper	$4,689	$1,341	$29,031
Cardboard	-$2,837	-$3,980	$7,388
Liquid Paperboard	-$2	-$19	$126
Glass	$0	$0	$0
Steel cans	-$184	-$301	$666
Aluminium	$7,903	$7,783	$8,983
PET	-$376	-$533	$1,046
HDPE	-$225	-$410	$1,448

WA REGIONAL RECYCLING VIABILITY ASSESSMENT MODEL

Quantities

TRANSPORT CONFIGURATION DATA

Minimum assumed density for transport costing *(t/m³)*	0.333
Maximum allowable transport weight *(t)*	24
Assumed 'dead space' in truck	10%
Truck volume *(m³)*	80
Effective truck volume *(m³, allowing 10% dead weight)*	72

			LOW COMPACTION				HIGHER COMPACTION			
Recyclable material	Weight %	Tonnes recovered t/yr	Density t/m³	Volume recovered m³/yr	Volume %	Loads per year	Density t/m³	Volume recovered m³/yr	Volume %	Loads per year
Newsprint & other paper	69.4%	248.9	0.3	829.5	58.9%	11.5	0.45	553.0	59.2%	10.4
Cardboard	21.3%	76.4	0.2	382.2	27.1%	5.3	0.3	254.8	27.3%	3.5
Liquid Paperboard	0.4%	1.3	0.3	4.3	0.3%	0.1	0.45	2.9	0.3%	0.1
Glass	0.0%	0.0	0.45	0.0	0.0%	0.0	0.45	0.0	0.0%	0.0
Steel cans	2.4%	8.7	0.3	29.0	2.1%	0.4	0.45	19.3	2.1%	0.4
Aluminium	2.1%	7.4	0.15	49.2	3.5%	0.7	0.275	26.8	2.9%	0.4
PET	2.1%	7.4	0.14	52.7	3.7%	0.7	0.21	35.2	3.8%	0.5
HDPE	2.4%	8.7	0.14	62.0	4.4%	0.9	0.21	41.4	4.4%	0.6
TOTAL	**100.0%**	**358.7**		**1409.0**	**100.0%**	**19.6**		**933.4**	**100.0%**	**14.9**
Average Density (ρ_{av}) (standard mix of recyclables)			**0.255**				**0.384**			

WA REGIONAL RECYCLING VIABILITY ASSESSMENT MODEL

Costs

PRE-TRANSPORT COSTS (COLLECTION & SORTING)

KERBSIDE COLLECTION	
Pick up cost *($ per drive by)*	
- if population is between 5,000 and 7,500	$1.85
- if population is between 7,500 and 10,000	$1.50
- if population is greater than 10,000	$1.00
MRF sorting cost ($ / tonne)	$100
DROP-OFF	
Labour costs *($ / year)*	
- if material throughput < 125 tonnes / year	$6,000
- if material throughput is between 125 and 300 tonnes / year	$12,000
- if material throughput is > 300 tonnes / year	$24,000
Infrastructure cost - Low compaction	$1,200
Infrastructure cost - Higher compaction	$2,700

ROAD TRANSPORT DATA & CALCULATIONS

		LOW TRANSPORT COST SCENARIO	HIGH TRANSPORT COST SCENARIO	CHARITY-BASED SCENARIO
Delivery cost equation ($ / truckload, where d = distance from Perth)		Cost = 006 (d) +560	Cost = 1.667 (d) + 630	
Delivery costs per load ($ / truckload)		$702	$1,025	$351
Loading cost ($)		$200	$200	$0
LOW COMPACTION				
Pre-transport costs, standard recyclables mix ($/yr)		**$25,200**	**$25,200**	**$1,200**
Total Number of loads per year		**19.6**	**19.6**	**19.6**
Total Transport Costs		**$17,656**	**$23,975**	**$6,871**
Specific materials (rough estimate)	**Pre-transport**	**Transport**	**Transport**	**Transport**
Newsprint & other paper	$14,836	$10,394	$14,114	N/A
Cardboard	$6,835	$4,789	$6,503	N/A
Liquid Paperboard	$78	$54	$74	N/A
Glass	$0	$0	$0	N/A
Steel cans	$518	$363	$493	N/A
Aluminium	$880	$617	$838	N/A
PET	$943	$661	$897	N/A
HDPE	$1,110	$777	$1,056	N/A
TOTAL PRE-TRANSPORT AND TRANSPORT COSTS		**$42,856**	**$49,175**	**$8,071**
HIGHER COMPACTION				
Pre-transport costs, Drop-off recycling ($/yr)		**$26,700**	**$26,700**	**N/A**
Pre-transport costs, Kerbside recycling ($/yr)		**$394,614**	**$394,614**	**N/A**
Total Transport Costs		**$13,486**	**$18,312**	**N/A**
Specific materials (rough estimate)	**Pre-transport**	**Transport**	**Transport**	**Transport**
Newsprint & other paper	$15,819	$9,355	$12,703	N/A
Cardboard	$7,289	$3,193	$4,335	N/A
Liquid Paperboard	$83	$49	$67	N/A
Glass	$0	$0	$0	N/A
Steel cans	$552	$327	$443	N/A
Aluminium	$768	$336	$457	N/A
PET	$1,006	$441	$598	N/A
HDPE	$1,183	$518	$704	N/A
TOTAL PRE-TRANSPORT AND TRANSPORT COSTS		**$40,186**	**$45,012**	**N/A**

WA REGIONAL RECYCLING VIABILITY ASSESSMENT MODEL

Benefits

VALUE OF MATERIALS

Recyclable material	Unit value of materials ($/tonne)	Value of materials collected ($)
Total (standard mix of recyclables)		$42,712
Specific materials		
Newsprint and other paper	$100	$24,886
Cardboard	$80	$6,115
Liquid paperboard	$80	$104
Glass	$50	$0
Steel cans	$60	$521
Aluminium	$1,200	$8,860
PET	$125	$923
HDPE	$150	$1,303

OFFSET COSTS AND REBATES

Recyclable material	Offset Landfill costs ($)	RRRS Rebate ($)
Unit cost / rebate ($ / t)	**20**	**0**
Total (standard mix of recyclables)	$7,175	$0
Specific materials		
Newsprint and other paper	$4,977	$0
Cardboard	$1,529	$0
Liquid paperboard	$26	$0
Glass	$0	$0
Steel cans	$174	$0
Aluminium	$148	$0
PET	$148	$0
HDPE	$174	$0

ENVIRONMENTAL BENEFITS CALCULATION (standard recyclables mix)

Environmental benefit of recycling from regional Australia	
$ / household / yr (from Nolan-ITU)	$56
Average yield (kg / household / week)	2.50
$/kg	$0.43
Total value	$154,534
Additional env. cost of transport (function of distance) ($/t)	-$0.14
Total value	-$49.72
Net environmental benefit ($/yr)	$154,584
$/person/yr	$8.62

APPENDIX J

Second Working Group Workshop Notes

Second Workshop Notes

Attendees: **See below**
Date: **Wednesday 22nd Aug 2007**
Time: **10.00am – 2.00pm**

1 Attendees

	Chris McKay Sims Metals	Chris Adams CEO ToPH	Kelly Howlett Community Rep	Jarrod Pittson Snr Enviro Advisor Woodside	
Vic Andrich TPA					Adrian Ellson PRC
Alistair Bain DEC					Troy Davis SoR
					Cath ToPH
					Russell Dyer ToPH
	Giles Perryman CBSD		Screen		

Absent:
Shire of East Pilbara
Shire of Ashburton
BHP Billiton
Rio Tinto

2 Presentation

Giles Perryman presented a summary of the report findings and recommendations

3 Review of Baseline Data and Findings

The draft RWMP (version 3) was reviewed by the group and feedback was gathered relating to section 4 and section 5 of the report.

4.2.1 Shire of Roebourne population data for Roebourne Transfer Station to be reviewed.
4.4 Potential to Recycle Domestic Packaging Waste. Remove cost values as they have no point of reference, include example of the model print out as appendix.
4.5.1 Availability of Waste Data. Requires detail about issues arising and the data categories to be used for waste data collection – which will be included in the recommendation relating to this finding

4 Review of Recommendations and Implementation Plan

All recommendations need to consider who will be responsible and a measurable outcome

5.1.3 Compliance with DEC licence conditions; provide an indication of which member Councils are required to do what at each site, by referring to the site reviews in the appendices.
5.1.4 Availability of Waste Data; emphasis on industry providing waste data to DEC rather than PRC, additional action for PRC to write to industry and ask for waste data to be collected and provided to PRC in the same format at ZWP survey.
5.1.9 Hazardous Waste; member Councils should be prepared to refuse unsuitable wastes, prefer the concept on a single lined cell at one facility to take all haz waste from the region.
5.2.1 Compaction of Wastes; include options of baling and shredding of waste prior to disposal. Calculate high and low range for cost savings for compactor.
5.2.2 Transfer Stations; expand issues, implications and benefits. Include staffing requirements.
5.2.3 Recyclable Material Collection Systems; remove rec about kerbside collection in LIA, as they include domestic properties as well, recs and implementation need to link up better, include WM Companies presenting business case fro kerbside recycling and use of vergeside collection for specific recyclable materials, e.g. white goods.
5.3.1 Coordination of Recycling; define the role of coordinator, expand funding to include State Gov.
5.3.2 Incentives to Recycle; mention that outsourcing of operations is on appropriate for some member Councils. Problem with member Councils enforcing building licence approvals to include the provision of recycling infrastructure.
5.3.6 Tyres; investigate the cost for a mobile tyre baler

Additional comments

Include the issue of staff recruitment and retention

The workshop was brought to a close at 2.15pm