REVIEW OF WASTE MANAGEMENT SERVICES

FINAL - REVISION 1

29 April 2010

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1. EXECUTIVE SUMMARY

The Shire of Roebourne has been subject to considerable growth over the past few years and has struggled to maintain adequate staff levels to sufficiently provide core waste services to its residents. It is anticipated that additional waste will continue to be generated in the area as mining enterprises continue to flourish in the region. Increased expectations from residents on waste management practices and the changing environmental landscape with respect to landfill management and waste recovery have also started to impact on Shire operations.

The Pilbara Regional Council (PRC), which represents the Shires of Roebourne, Ashburton, East Pilbara and the Town of Port Hedland, commissioned a Regional Waste Management Plan (RWMP) two years ago. Recommendations within the RWMP have assisted in providing strategic direction for the development of operational plans for the waste services that the Shire provides.

Bowman and Associates Pty Ltd were contracted to conduct this Review of Waste Management Services in order to provide a gap analysis and improvement plans. This Gap Analysis was based upon licence conditions and current and anticipated best practices, whilst also considering the work being undertaken on a regional basis through the PRC with respect to recycling, resource sharing initiatives and alternative waste treatments. The Gap Analysis and recommendations to address a variety of issues have provided the basis for a comprehensive and detailed framework to enable the necessary changes or improvements to be made to the Shire's waste management services.

Best practice is recommended for waste management activities as it will assist in minimising the risk of environmental damage or pollution, extend the life of waste management facilities such as the 7 Mile Landfill and reduce the operational and maintenance costs associated with the facilities. With heightened environmental awareness, waste management services in the region must be provided in an efficient and effective manner and landfills and waste recovery facilities must be managed in a financially and environmentally sustainable manner.

Shire staff in the preceding years have provided a sound knowledge base for the development of waste management services in the region. Unfortunately this knowledge has either been lost through staff turnover or not adequately recorded and cataloged.

The Review focused on residential and commercial waste collection, operations at the Wickham Transfer Station and 7 Mile Landfill, and Shire's waste management revenue and expenditure. The first section of the Review consists of an overview of current waste management practices within the Shire and waste collection, operating and capital budget information. This is followed by the Gap Analysis, produced in table form and included at the rear of the Report detailing potentially problematic observations for provision of waste services and recommendations to address a range of issues identified during the Review process, in some instances the recommendations pertain to all of the departments within the Shire.

At the time of the completion of this Report many of the initiatives in the Gap Analysis have been completed. The staff at the Shire of Roebourne is to be commended on the spirit of cooperation displayed during the Review process, and in rapidly adopting many recommendations outlined in the Gap Analysis. The draft Gap Analysis relating to this Review was made available to Shire staff in October 2009. A significant number of issues have been reported by the Technical Services Division as being addressed. An additional column has now been included in the Gap Analysis (Section 14), to provide feedback on action taken.

The Gap Analysis tables clearly outline observations made relating to the collection system, Wickham Transfer Station and 7 Mile Landfill that could have a negative affect on the waste services provided by the Shire, with recommendations and possible actions that can be taken to improve the situation as well as feedback on initiatives already undertaken.

Some of the key findings of the gap analysis were:

- Additional human resources are required to address many of the recommendations, particularly within administrative roles, for bin repairs, vehicle servicing and landfill operations,
- Additional vehicle resources and maintenance routines are required to address delayed waste services,
- Data collection and management, including route mapping and knowledge of individual waste services is required,
- Shire carry out a reconciliation of the revenue and costs associated with the kerbside waste collection services to establish the appropriate level for Refuse Collection Fees.
- Staff need to be empowered with more involvement and direct responsibility for waste service operations, particularly at the Transfer Station and Landfill sites that are more isolated, and instilled with a sense of pride in maintaining these premises,
- Litter needs to be addressed within the 7 Mile Landfill site, as does illegal dumping of rubbish at the town limits at the eastern end of the Shire in blatant disregard of the close proximity of the Wickham Transfer Station,
- A new landfill stage will need to be commissioned at the 7 Mile Landfill in the next five year period, and the existing landfill requires a reduction in the number of active disposal areas,
- Waste compaction and landfill design improvements need to be made at the 7 Mile Landfill to fulfill Landfill Licence requirements and ensure the longevity and Environmental Health and Safety at the landfill,
- Staff communications need to be improved, particularly between the Customer Service and Waste Services Departments to facilitate better relations between Shire staff and with residents and commercial clients,
- There is a pressing need to amend the Downer EDI agreement and the depth of related excavations,
- A series of ‘aditorials’ to promote Shire waste management services and educate residents and commercial clients should be considered,
- Opportunities for minimising waste to landfill and improving resource recovery within the region should be implemented,
- Technologies recommended for use within the region include landfill compactors, light vehicle transfer stations and recyclable material drop off facilities, and
- With no kerbside recycling service available in the Shire and with new technologies continually being developed to treat waste the landfilled waste stream may at sometime in the future be used as a fuel source to generate electricity.

It is recommended that a further independent review be undertaken to tick off the improvements made as a result of the preparation of the Gap Analysis. This will allow a report card to be prepared on the Shire’s recent performance and recommendations made for future directions in waste management including the Shire’s preparedness to introduce electronic management systems for waste collection management.

The formalisation of waste management plans would also bring together information to provide clear direction for best practice and environmentally sustainable future waste management services in the Shire.

2. ACRONYMS

Australian Height Datum	AHD
Carbon Dioxide	CO_2
Carbon Pollution Reduction Scheme	CPRS
Chief Executive Officer	CEO
Commercial and Industrial Waste	C&I
Construction and Demolition Waste	C&D
Department of Environment and Conservation	DEC
Environmental Assessment Report	EAR
Frequently Asked Questions	FAQ
Green House Gas	GHG
High Density Polyethylene	HDPE
Household Hazardous Waste	HHW
Hydraulic Retention Time	HRT
Intermediate Bulk Containers	IBC
Independent Market Operator	IMO
Information Technology	IT
Key Performance Indicator	KPI
Kilolitre	kL
Landfill Gas	LFG
Methane	NH_4
Mobile Garbage Bin	MGB
Municipal Solid Waste	MSW
Personal Digital Assistant	PDA
Pilbara Regional Council	PRC
Refuse Derived Fuel	RDF
Radio Frequency Identification	RFID
Regional Waste Management Plan	RWMP
Shire of Roebourne	Shire
Shire of Roebourne	SoR
Strategic Waste Initiative Scheme	SWIS
Western Australian Local Government Association	WALGA
Measure of the hydrogen ion concentration	pH

3. WASTE DEFINITIONS

Municipal Solid Waste (MSW)

Municipal Solid Waste (MSW) includes waste collected by councils or their agents from household kerbside waste services, waste delivered to disposal sites by resident's vehicles, from council activities such as bulk kerbside collections, street litter collections, from parks and from sweeping machines. Typically, about two thirds of MSW is food waste and other green and organic materials, a further 20% consists of non-separated recyclables with the remainder being non recoverable waste.

The MSW in the Shire of Roebourne is vastly different to typical MSW as there is limited opportunity for post consumer recycling, resulting in most recyclable materials going to landfill.

Commercial & Industrial Waste (C&I)

The primary source of commercial and industrial wastes (C&I) are commercial establishments and non-biodegradable wastes from industrial and manufacturing processes, particularly packaging processes and the food and hospitality industry.

In the Shire of Roebourne C&I waste is dominated by wastes from industrial processing and packaging, as industrial activities outweigh hospitality activities.

Construction & Demolition (C&D)

Waste from building demolition, road construction and civil works consists of concrete, sand, gravel, soil, timber, steel, plastic and paper are regarded as construction and demolition (C&D) waste.

4. DISCLAIMER

This Review of Waste Management Services has been carried out using normal industry practices employed by Environmental Consultants for system review and preparation of documents. Bowman & Associates Pty Ltd accepts no liability for loss or damages incurred by the Shire of Roebourne, or any other individual or organisation due to reliance on the included content.

5. BACKGROUND

5.1. INTRODUCTION

The Shire of Roebourne (Shire) has been subject to considerable growth over the past few years and has struggled to maintain adequate staff levels to sufficiently provide core waste services to its residents. Increased expectations from residents on waste management practices and the changing environmental landscape with respect to landfill management and waste recovery have also started to impact on Shire operations.

The Pilbara Regional Council (PRC), which represents the Shires of Roebourne, Ashburton, East Pilbara and the Town of Port Hedland, commissioned a Regional Waste Management Plan (RWMP) two years ago, which has subsequently been endorsed by the Shire. The next step in the strategic development of the Shire's waste services is to undertake certain

recommendations within the RWMP and provide operational plans for the waste services that the Shire provides.

As is the case with many regional and remote Councils the process of waste management has traditionally been simple: “collect the rubbish, dig a hole and bury it”. This is no longer applicable nor acceptable in today’s society with heightened environmental awareness. Services must be provided in an efficient and effective manner and landfills and waste recovery facilities must be managed in a financially and environmentally sustainable manner.

The Shire requires a holistic review of its waste management services as an adjunct to the PRC’s RWMP and in light of current movements towards waste minimisation and other environmental considerations, particularly as they relate to landfills.

The review is to encompass all aspects of Council’s waste management services and provide a gap analysis and improvement plans. This gap analysis is to be based on license conditions and current and anticipated best practices whilst also considering the work being undertaken on a regional basis through the PRC with respect to recycling, resource sharing initiatives and alternative waste treatments. Council ultimately requires a comprehensive and detailed framework to enable the necessary changes or improvements to be made.

The review has been broken down into the following parts:

- Waste collection,
- Transfer Station,
- Landfill, and
- Fees and charges.

The Shire has engaged the services of Bowman & Associates Pty Ltd to conduct a Review of Waste Management Services which investigates the current waste management practices and makes recommendations for improvement.

6. REGIONAL PROFILE

6.1. PILBARA REGIONAL COUNCIL

The Pilbara Regional Council (PRC) was formally established under the Western Australian Local Government Act 1995, in May 2000, to assist Councils in the coordination of resource sharing and common issues 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 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, and
- Provide administrative services to the Participant Councils in connection with their membership of the Western Australia Local Government Association (WALGA).

Each participant Council appoints two Councillors to be members of the PRC. The PRC Councillors elect one of the eight Councillors to be the President and another to be the Deputy President[1].

6.2. SHIRE OF ROEBOURNE

The Shire of Roebourne covers an area of approximately 15,197 square kilometres and contains six major town sites including Karratha, Dampier, Wickham, Point Samson, Roebourne and Cossack. The Shire's population is estimated at 16,423 permanent residents and it has been estimated that an additional 2,298 people are temporary residents in the Shire, which make up the fly in and fly out personnel employed within the resource industries. The major industries include iron ore export, oil, natural gas, salt, nickel, fishing and tourism[2].

The Shire's landfill at 7 Mile currently landfills in the order of 190,000 tonnes per annum of waste including around 70,000 tonnes of earth fill and 50,000 kilolitres of liquid effluent. Solid waste to landfill is in the order of 70,000 tonnes per annum. The Shire's solid waste budget for the 2009-10 period is summarised in Table 1.

Table 1: Solid Waste Budget 2009-10

WASTE SERVICES OPERATING BUDGET SUMMARY	2009-10 BUDGET
Revenue	
Waste Collection	$ 1,714,291
Landfill (Solid Waste Only)	$ 3,008,000
Total Revenue	**$ 4,722,291**
Expenditure	
Waste Collection	$ 1,933,343
Landfill (Solid Waste Only)	$ 2,607,355
Total Expenditure	**$ 4,540,698**
Profit – Waste Services (Solid Waste)	**$ 181,593**
Capital Expenditure (Solid Waste)	**$ 3,474,300**

It is anticipated that the development of the Gorgon project could generate around 10,000 to 20,000 tonnes of solid waste to be disposed of locally per annum. Potentially this waste could find its way into the Shire's 7 Mile Landfill. With other projects proposed for the Burrup Peninsula such as: the Super Gas nitrogen plant, and Burrup Fertiliser's desalination plant and liquefied gas plant, additional waste will be generated in the area.

Woodside is also stating that it intends to continue the expansion of its liquid natural gas plant from the current six trains to 11. The proposed industrial development will be accompanied by growth in the residential population due to a proposed 5,000 fly in personnel for the Gorgon project. Chevron proposes to establish around 60 houses for the Gorgon project and BHP Billiton is planning further housing development in the region also.

[1] www.prc.wa.gov.au
[2] Cardno BSD (Regional Waste Management Plan - 2008)

6.3. REGIONAL MAP

The Shire of Roebourne is located on the northern end on the mid west coast of Western Australia. The main township in the Shire, Karratha, is 1,530 km north of Perth and 2,630 kms south west of Darwin.

Figure 1: Shire of Roebourne Map

7. REGIONAL WASTE MANAGEMENT PLAN

The Regional Waste Management Plan (RWMP) prepared in 2008 by Cardno BSD on behalf of the PRC, reviewed and assessed the waste management operations undertaken by the member Councils of the Pilbara.

A series of recommendations were provided within the RWMP and were separated into the categories of Best Practice, Technology and Minimisation of Waste Disposal.

7.1. BEST PRACTICE

With the RWMP a number of findings showed that waste management operations in the region were not to 'best practice' standards. This included but was not limited to: the lack of knowledge and skill sharing between the different member Councils, lack of staff allocated to complete operations at many of the facilities, lack of knowledge and awareness of waste management and recycling within the community and non-compliance with the Department of Environment and Conservation (DEC) licence conditions on a number of occasions. Best practice was recommended for waste management activities as it 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.

7.2. INVESTMENT IN INFRASTRUCTURE

Technology and infrastructure investment was a key recommendation due to its ability to minimise the risk of environmental damage or pollution, extend the life of the landfill sites and reduce the operational costs associated with the facilities. Technologies recommended for use within the region included landfill compactors, transfer stations and recyclable material collections systems. Attendance to the issue of free trailer tipping was also a recommendation made for waste minimisation and recycling.

7.3. WASTE MINIMISATION

A number of valuable resources were identified as being not recycled or disposed of inappropriately in the region. These materials included household recyclables, greenwaste, pallets, tyres, metals, batteries, oil drums, gas bottles and electronic wastes. Key recommendations made included but were not limited to: coordination of recycling management across the Pilbara under a single entity, introduction of incentive programmes to encourage staff to recycle, separation of recyclable packaging from the domestic waste stream prior to landfilling and provision of appropriate facilities at landfills to prepare materials for recycling. Waste minimisation was recommended as it would 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.

Further to the preparation of the RWMP the PRC has secured additional funding from the Waste Authority under the Regional Funding Program to prepare a Regional Investment Plan (RIP). The bulk of the funding has been assigned to the investigation of the potential to use gasification technologies in the diversion of waste from landfill in the Pilbara region. The investigation titled *Business Case Study into the Use of Gasification Technologies for Waste Management within the Pilbara Region*[3] has now been received by the PRC member Councils.

Carbon pollution is contributing to climate change across the world, resulting in higher temperatures, increasing droughts, rising sea levels and more extreme weather conditions. Without action Australia's economy and environment is likely to be one of the hardest and fastest hit because of its classification as one of the hottest and driest continents in the world. Climate change threatens Australia's food production, agriculture, water supply and icons such as the Kakadu wetlands and Great Barrier Reef which in turn will impact on the big tourist industries they support.

With the introduction of the *National Greenhouse and Energy Reporting Act 2007* and increasing public awareness, businesses throughout Australia are taking initiative to reduce their carbon footprint and environmental impacts. By becoming leaders in the action against climate change, businesses can leverage increased public awareness to gain strategic benefits such as strengthened brand awareness, press and media, employee value proposition, staff retention, and attractiveness to environmentally conscious consumers and businesses.

The *National Greenhouse and Energy Reporting Act 2007 (The Act)* introduces a single national reporting framework for the reporting and dissemination of information relating to carbon pollution, energy consumption and production of corporations. The Act underpins the Carbon Pollution Reduction Scheme (CPRS) which is awaiting introduction and is set up to limit carbon pollution while minimising the impact on businesses and households. The CPRS is a cap and trade system of emissions trading of greenhouse gases. As part of the Scheme the Government

[3] Business Case Study into the Use of Gasification Technologies for Waste Management within the Pilbara Region (Bowman & Associates - October 2009)

sets a cap on the total amount of carbon pollution allowed in the economy by covered sectors. Industries which generate carbon pollution will need to acquire a permit (credit) for every tonne of greenhouse gas they emit and the quantity of carbon pollution produced and the credits they possess must not exceed the cap. Companies that need to increase their emission allowance must buy credits from those who pollute less. The trade of allowances ensures that the buyer is paying a charge for polluting, while the seller is being rewarded for having reduced emissions by more than was needed.

Transport is included in the CPRS because it is a major contributor of carbon pollution which produces around 14 per cent of Australia's greenhouse gas emissions. Emissions from transport have increased by 27 per cent since 1990 and it is the second fastest growing source of emissions. Emission is a business area which could be better managed within companies resulting in both environmental and economic benefits. Reducing transport emissions would also assist companies to abide by the carbon pollution limits set within the CPRS and reduce liability for carbon pollution emissions and energy consumption. [4]

Corporations will need to submit a report for the 2008-2009 financial year if they emit 125 kilotonnes or more of greenhouse gases (measured in CO_2 equivalent) or produce or use 500 terajoules or more of energy each year or control facilities that emit 25 kilotonnes or more of greenhouse gases (measured in CO_2 equivalent) or use or produce 100 terajoules or more of energy per year. Corporations and facilities are defined and ongoing reporting obligations are set out in the National Greenhouse and Energy Reporting Act 2007 available from: www.greenhouse.gov.au/reporting/legislation/act .

Waste disposed of at the 7 Mile Landfill is buried with dirt resulting in the waste decomposing with the absence of air (oxygen). With the assistance of infiltrating moisture, decomposing waste in an anaerobic environment generates methane, which enters the atmosphere. Methane is 21 times more detrimental to our earth's atmosphere than carbon dioxide which is given off as a result of decomposition in the presence of oxygen.

Reduction in transport and landfill emissions will become crucial in the future for the reduction of the Shire's reportable carbon emissions under an emissions trading scheme. If the Shire is required to report its emissions any improvements in transport productivity and reduction of waste to landfill will assist the Shire to reduce its reportable emissions.

8. COMMUNITY SURVEY 2009

During August 2009 the Shire of Roebourne engaged Marketintel to carry out an extensive survey of residents to engage the community and to ascertain the community's perception of the Shire's performance in the provision of community services. The initial community survey will be used as the bench mark for further surveys conducted on an annual basis[5].

The survey had been prepared to enable the community to provide feedback on the Shire's performance. The survey also provided the community with an opportunity to provide comment on public matters.

The survey was completed by 468 respondents providing sample accuracy in accordance with the Auditor General's specifications. Rubbish collection was rated as the most important to residents of the 28 services included in the survey, at 9.1 out of 10. The rubbish tip was ranked

[4] www.climatechange.gov.au/greenpaper/factsheets
[5] Draft Community Survey 2009 (Marketintel – August 2009)

ninth at 8.3 out of 10 on the list. Included in the services, and of lesser importance than rubbish collection and the rubbish tip, were the Leisure Centre and child care facilities.

The Shire's performance in providing the waste related services scored much lower, with the rubbish tip scoring 6.4 out of 10 and rubbish collection at 5.6 out of 10, suggesting that there is a definite need for improvement in the provision of waste collection services. Interrogation of the survey results revealed that 35% of the survey respondents rated the Shire's provision of waste collection services as poor. With an importance rating of 9.1 and a performance rating of 5.6 there is substantial opportunity for improvement by the Shire in the provision of waste services.

The survey also highlighted that the residents of Wickham were the community most dissatisfied with the performance of the Shire's waste collection services, followed by Karratha and Point Sampson.

In contrast the residents of Wickham were the community most impressed with the Shire's rubbish tips, suggesting that the Wickham Transfer Station is a popular and well performing facility.

9. PROJECT METHODOLOGY

9.1. PROJECT OBJECTIVES

The key objective of the Review of Waste Management Services was to carry out a holistic review of the Shire's waste management services including:

- All aspects of the Shire's waste management services,
- Gap analysis and improvement plans,
- Recommendations for best practices in waste management,
- Consideration of regional cooperation through the PRC with respect to recycling, resource sharing initiatives and alternative waste treatments, and
- Framework to enable the necessary changes or improvements to be made.

9.2. PROJECT SCOPE

9.2.1. Waste Collection

Conduct a review of the Shire's domestic and commercial waste collection service methods through an on-site inspection of the Shire's depot, staff interviews, research and a desktop review of available documentation.

Consideration is to be given to waste collection methods, routing and scheduling, labour resources and assessing options for contracting out services. Vehicle tracking technology, communication (both internal and external), and a review of the customer service, administration and vehicle workshop departments is also required.

9.2.2. Transfer Station

Conduct a review of the management of the Shire's transfer station in Wickham through an on-site inspection and staff interviews. The review is to include: compliance, operation hours, plant and equipment requirements, storage, waste transfer methods and labour resources.

Also included is to be a review of the site layout such as signage, buildings and security, and a review of communication systems and support services.

9.2.3. Landfill

Review of the management of the Shire's 7 Mile Landfill in Karratha will be conducted through an on-site inspection, staff interviews, data assessment and researching available documentation.

Included will be a review of licencing conditions, operation hours, plant and equipment requirements and waste treatment storage and methods, and recommendations on compliance. Site layout will be reviewed including roads, parking, access, signs, weighbridge, buildings, security and plant and equipment storage.

Recommendations for site remediation and closure will also be discussed. Other discussion required will relate to a plan for future landfilling and final contours.

9.2.4. Fees and Charges

Conduct a review of the Shire's fees and charges and the Shire's budget:

- A determination to be made with respect to the revenue from solid waste management services and comparison made with operational costs, and
- Proposed capital expenditure will also be explored with recommendations made for capital expenditure in this year's and future years' budgets.

10. CURRENT WASTE SERVICES OVERVIEW

A review of the Shire's waste collection operations was carried out during the week beginning 7 September 2009. The review included staff interviews, driver evaluation, plant inspection and field observations throughout the towns within the Shire.

10.1. WASTE COLLECTION

10.1.1. Waste Collection Fleet

The waste collection fleet consists of three 18m^3 side load waste collection trucks and one small caged tipping vehicle fitted with a manual bin lifter (Table 2).

Table 2: Current Waste Collection Vehicle Types and Number

ITEM NO.	TYPE	PURCHASE DATE AND AGE	ENGINE HOURS	KILOMETRES	COMMENT
901	Isuzu MPR300 4x2 fitted with Side Load Caged Tipping Body	29.06.05 4 years old			Used for bin deliveries/repairs, servicing litter bins, tourist camps, remote locations. Scheduled to be replaced
902	Iveco 3350 4x2 fitted with MDJ 18m^3 Side Load Compaction Body	24.04.06 3 years old	7,482	177,365	Used for MSW collection. Scheduled to be replaced
906	Iveco 3350 4x2 fitted with MDJ 18m^3 Side Load Compaction Body	29.08.07 2 years old	4,702	125,235	Used for C&I collection
907	Iveco 3350 4x2 fitted with MDJ 18m^3 Side Load Compaction Body	08.07.08 1 year old	2,276	51,419	Used for MSW collection

10.1.2. Residential Collection

Collection maps are provided to the drivers for residential collection. The maps, by collection day, are in the form of street layout maps with streets colour coded for individual loads providing around 240 bins per load. Collection routes are decided daily, at the start of shift, by issuing direction to the drivers on which load areas are to be undertaken and in what order.

Route decisions are based on the daily availability of serviceable trucks and skilled drivers. Priority is given to completing residential collections with commercial often only undertaken when a full compliment of serviceable trucks and drivers are available, it was evidenced during the review period that a full compliment may only occur 3 out of 5 days.

The towns of Dampier, Karratha, Wickham and Point Sampson are serviced weekly with Roebourne serviced twice per week on Wednesdays and Saturdays.

10.1.3. Commercial Collection

A commercial collection schedule is provided to the driver, by collection day, in table form showing the client, number of bins to be serviced and a comment if required. The commercial collection driver is also provided with a street layout map for the collection day showing the streets on which the commercial clients reside. The commercial collection relies heavily on the driver's knowledge and experience of the commercial collection routes. In the past the joint collection of residential and commercial services has been trialed. The conclusion reported the combined service being disruptive to the performance of both services.

During the collection review it was noted that residential collection vehicles drive past litter and pavilion bins which require the commercial collection truck to go out of its way to service. This was evident in the areas reviewed, such as Bulgarra West in Karratha and Jiwuna Street, near the Caravan Park in Roebourne. The residential truck deviated 10 minutes out of its way to service a residential bin within 300 metres of a bank of multiple commercial bins for the Caravan Park, which are serviced by a different run on another day of the week.

Most litter bins are serviced by the commercial collection truck. Medical waste services are carried out using bin swap over utilising a light utility.

10.2. MOBILE GARBAGE BINS

The Shire utilises 240 litre mobile garbage bins (MGB); dark green bodies are used for all services except medical waste, which uses a yellow body and yellow lid. Red lids are fitted to additional services, yellow lids are fitted to litter bins, and all other MGBs are fitted with matching dark green lids. In summary:

- Normal residential or commercial service – dark green lid and body,
- Additional residential or commercial service – red lid, dark green body,
- Litter bin – yellow lid and dark green body, and
- Medical waste – yellow lid and body.

MGB stocks are now held by the Stores Department. Approximately 1,150 MGBs were used last year; 850 were used for new services and replacements and 300 MGBs were used for Shire controlled activities such as waste services in public places (short term hire).

The Shire has traditionally used Sulo MGB Australia Pty Ltd for MGB supply but has recently changed to Mastec Australia Pty Ltd at a significant saving in the order of $10.00 per MGB. It is reported that the Mastec MGB is fully compatible, parts wise, with the Sulo MGB.

10.2.1. Bin Repairs

Bin deliveries, repairs, litter and remote area bin collection is carried out on a five day per week basis using a small caged body vehicle. New bin and bin repair requests are sent to the Waste Management Co-ordinator, generally from Customer Service. The request is allocated to an employee from the Waste Management Department and once actioned is recorded in an Excel spreadsheet maintained by the Co-ordinator. The spreadsheet records the date, location and serial number of the delivered bin. Customer Service sends a duplicate of the request to the Rates Department in the case of a new service for a ratable property or to Billing in the case of a replacement bin or an additional service.

Bin replacements are charged to the resident in the case of residential properties and tenant in the case of commercial properties. This encourages bin theft and the removal of bins from premises when property is vacated. The process of charging for bin replacements was introduced to curb damage to bins. The result is that many residents and commercial tenants consider the bin to be their property. The process for bin maintenance and replacement requests is outlined in Figure 2.

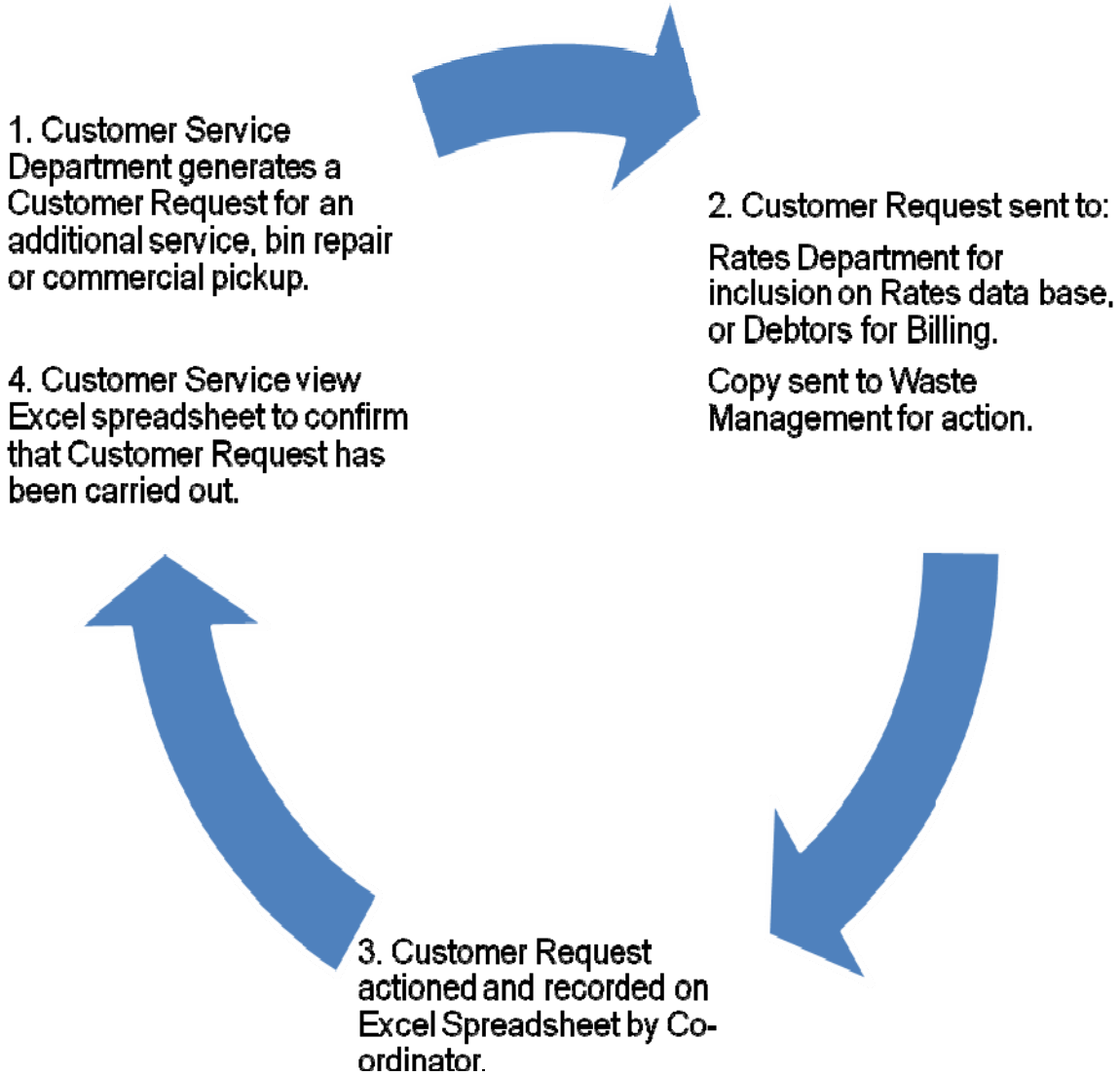

Figure 2: Flow Chart for Bin Maintenance Requests

10.3. DATA MANAGEMENT

10.3.1. Synergy Soft

Synergy Soft is currently being introduced as the Shire's financial and accounting software. Aceam Pty Ltd is providing asset management software called MyData. MyData will allow the user to:

- Track customer requests that are created in Synergy Soft through to work completed,
- Raise work orders and schedule inspections and repairs on plant/fleet etc,
- Store e-documentation records of cells/stockpiles etc within the landfill,
- Store driver training records and agreements with statutory bodies,
- Store multiple activities and checklist forms, and
- Provide a multitude of reporting options.

The new system will allow electronic Action Requests to be generated and sent to an Action Request File. Access to the Action Request File will be limited to the Divisional Administration Officer for Technical Services Division. The Divisional Administrative Officer keys the data from the Action Requests into MyData Assets; action then has to occur within specified time period.

Waste related matters will be all keyed to All Waste Assets in MyData and requests will then be allocated to both a customer and an asset and the Work Order raised. On completion of the request the responsible person, most likely the Waste Co-ordinator or his representative, will generate a Return Advice in MyData.

It is unclear if the Customer Service Centre, who in most cases will generate the original Action Request, will be able to see when the action is completed, as Customer Service may not be given access to MyData.

One advantage of the MyData system will be that performance in taking action on requests will be accessible by monitoring response time, something that does not occur currently.

The system can also be used for plant repairs. The Waste Co-ordinator will be able to raise an Action Request for repairs, and the Action Request is viewed along with other Action Requests by the Divisional Administration Officer who will allocate the request to the Plant Co-ordinator.

The Plant Co-ordinator has the choice of:

- Taking no action,
- Raising a Work Order,
  - Identify work items,
  - Raise a Purchase Order (which may require Executive approval), or
- Pass to an external service provider.

Once the request is completed the Co-ordinator inputs costs (from supplier invoices) and labour resources used in completing the request, and generates a Return Advice in MyData to show the job has been completed.

As performance will be judged on the Co-ordinator's ability to close the request by generating the Return Advice, prompt processing of data will be crucial to assessment of performance.

10.3.2. Arch Software

Arch Software Australia (Arch) was established in 1993 to cater for custom software solutions including the first Waste Data Collection software for the Health Department of WA. In 1997 Redhill Waste Disposal Site was the first WA landfill to use the customized software at its Gatehouse and Weighbridge.

The same setup has since been adapted by almost all Waste Disposal/Transfer Stations in the metropolitan area. Arch supplies Weighbridge Software for other applications (e.g. Ports, Cattle Weighing, etc). It also supplies software to the mining, manufacturing, health and publication industry.

At 7 Mile weighbridge operating procedures have been prepared to facilitate the operation of the weighbridge and the weighbridge data management system, Arch Software. At the time of the site review these documents were not evidenced at the weighbridge but were forwarded to the Consultant late in November 2009.

10.4. RATABLE PREMISES

Currently there are 6,262 residential and several strata properties on the Rates data base. Inquiries suggest that there is no data interrogation in place that will provide a summary of the number of ratable properties per street, which is a prerequisite for best practice management of waste collection services.

To ascertain the quantity of ratable properties within the Shire we have divided the estimated income from the Shire's 2009-10 Budgeted Fees and Charges (Page 24 of the Budget), by the unit fee (without GST). The 2009-10 Budget indicates that 10,854 services are to be provided for the 2009-10 year (Table 3).

Table 3: Number of Waste Services Derived from the 2009-10 Budget

WASTE SERVICE TYPE	NUMBER PER ANNUM
Residential - First Service	6,595
Residential - Additional Service	166
Semi Residential	1,904
Commercial - Normal Service	2,167
Commercial - In yards and not off kerb	22
Total Services per Annum	**10,854**

10.5. TRANSFER STATION

The Waste Transfer Station is located on the eastern side of the road between Roebourne and Wickham. The site is open to the public 7 days per week from 9.00am to 4.00pm with an advertised closure of one hour in the middle of the day.

The facility is of modern design and typical of the transfer station design used around the State.

Vehicles approach up a ramp and are greeted at the office, directions are given and waste is appropriately dropped off at the right locations.

Recyclable and hazardous materials are dropped off to the west of the site. These include used household items and clothing, which are placed on the asphalt in an area used for a tip shop.

There are no resources available to accommodate a tip shop but the service is provided and heavily utilised.

Other items dropped off are gas bottles (that are vented to atmosphere), wet cell batteries, pallets and a quantity of roof tiles. All other waste is placed in the two available bins at the tipping area, one for light metals and white goods and the other for the rest of the waste.

There is a used oil facility available at the exit to the tipping area, to the rear of the site construction rubble is stored and to the front of the site greenwaste, timber and clean fill is stockpiled. All waste collected is transferred to 7 Mile for aggregation with the waste streams at the site. Two bins are made available at any one time: one for light metals and white goods and the other for general waste.

Commercial deliveries are charged via a docket book. There is normally one person on duty throughout the week except Wednesday when a second person is assigned to the site to allow one attendant to act as hook lift driver and transfer waste to 7 Mile Landfill.

Normal operation is for one transfer trip to occur each morning prior to the 9am opening time and two trips carried out on Wednesday whilst the second attendant is on duty.

Labour resources are integrated into the 7 Mile Landfill operation and cumulatively referred to as Site Operations.

10.5.1. Transfer Station Plant and Equipment

Table 4: Current Transfer Station Plant and Equipment

ITEM NO.	TYPE	PURCHASE DATE AND AGE	ENGINE HOURS	KILOMETRES	COMMENT
898	Mitsubishi 345 6x4 Hook Lift Truck	Approximately 5 years		195,923 km	Good condition.
	John Deere 310SG Back hoe	Approximately 5 years	1,365 hrs		Broken hydraulic system for bucket attachments.
	5 hook lift bins				One bin has a hole in side, rest good condition.
	SFM hook lift two axle dog trailer	02/04 5 Years			Licenced but no licence sticker fixed to trailer at time of review.

10.6. 7 MILE LANDFILL

The 7 Mile Landfill is located approximately 5 kilometres from Dampier on the south side of Dampier Road. The landfill site is located on Crown Reserve numbers 32987 and 33135 on Location 256 within the Shire of Roebourne.

Crown land may have considerable importance to native indigenous people in the area and the Commonwealth *Native Title Act* 1993 helps native people to claim rights and protect land important to them. The main objects of the *Native Title Act* 1993 are:

- To provide for the recognition and protection of native title,
- To establish ways in which future dealings affecting native title may proceed and to set standards for those dealings,

- To establish a mechanism for determining claims to native title, and
- To provide for, or permit, the validation of past acts, and intermediate period acts, invalidated because of the existence of native title.

The Commonwealth *Native Title Act* 1993 requires native title claimants to be consulted and compensated if deemed necessary for public lands. It is recommended that the Shire of Roebourne research the area situated in and around the 7 Mile Landfill site prior to undertaking future excavations in virgin ground. In the event that there is potential for native title recognition with the population indigenous to the area, investigate issues surrounding the ongoing operation and development of the landfill.

Native Title negotiations can be complex and an indicative timeframe for this cannot be known. However it has been indicated that negotiations can take up to two years to complete.

The landfill site is surrounded by native scrub and grass land with a railway line immediately adjacent to the west boundary and a watercourse located around 500m to the east of the site. Immediately to the north of the site an industrial subdivision is being planned. The proposed subdivision will require the access road to the landfill to be modified; the modified access is detailed within this report and appendices.

A review of the landfill operations was carried out during the week beginning 21 September 2009. The review included discussions with landfill staff and field observations at the site.

The site totals 100ha and has waste disposal activities that are undertaken throughout the site. It was reported that the site has been used as a landfill since 1974 with large pits being dug across the site using bull dozers and waste being placed and buried. In the early days of the Burrup development and when there was no metal recycling, much of the waste landfill consisted of steel.

The current operation has an entrance road which circles around a large area of virgin land. The entrance road is sealed and the weighbridge is manned at all times whilst the facility is open. As vehicles approach the weighbridge there is a sign to the left displaying disposal charges. Light vehicles approach the weighbridge office to receive instruction on where to tip while commercial trucks veer to the right and mount the weighbridge located on the northern side of the weighbridge office.

A traffic signal (red and green light) is used to signal to the driver when to move off the weighbridge. On mounting the weighbridge the attendant identifies the truck number in the Arch weighbridge software and records the vehicle gross weight. On return to the weighbridge the driver dismounts and enters the weighbridge office to sign the docket and collect a duplicate copy.

Disposal fees are collected and recorded using Arch software linked to the electronic weighbridge. Disposal data is recorded by waste type and all waste disposed at the site is captured in the electronic records, except trailer waste and waste from the Shires works activities. For the purposes of waste tonnage assessment, trailer waste is converted as 0.5 tonnes per vehicle and Works Department waste was estimated at 2,000 tonnes per annum.

Landfill activities are carried out in multiple areas to separate light vehicles from heavy vehicles. On entering the landfill, and with instruction from the weighbridge attendant as appropriate, the delivery vehicles move to the following areas:

- Liquid ponds for deliveries of controlled waste effluent,
- Drop off area for tyres, wet cell batteries, gas bottles, paint, pallets and domestic motor oil (no cooking oil was evident),
- Area 1 and 2 for clean fill. Area 2 fill is used to cover the waste in Area 3,

- Area 3 for light vehicle disposal. Two areas are available as Area 3, also at the start of the second Area 3 waste from compaction trucks is placed,
- Area 5 for timber, commercial skips and dry waste. There is also a second Area 5 dry waste location known as “new Area 5”, for additional disposal,
- Area 4 is for C&D waste, which is predominantly concrete, rubble and sand,
- New light metals area,
- Tyre pit,
- Hazardous waste pit,
- Asbestos pit,
- Dry hazardous waste, such as mineral sands and blasting grit,
- Quarantine pit,
- Drum pit,
- Dead animal pit, and
- Medical pit.

Greenwaste is landfilled in Area 3 along with household dry waste as the landfill is unable to burn greenwaste due to the resultant smoke causing visibility issues for the heavy Hamersley Iron ore trains passing nearby, and the airport and town in close proximity.

Refer Appendix A for a layout of the current landfill operation.

The large size of the site has allowed filling operations to sprawl across the site. This makes it difficult for the Shire to survey and accurately record filling locations and consumes site resources for road maintenance, cell access, landfill cover, cell construction and litter management.

10.6.1. Liquid Waste Ponds

The liquid ponds consist of three receival pits and one main effluent pit. Cleanaway is allocated one pit, Lyons Peirce another and the third is currently closed due to oil contamination.

10.6.2. Drop Off Area

The drop off area allows for the disposal of tyres by placing them in a hook lift bin for transfer to the tyre pit. Wet cell batteries are placed on the ground for staff to stack on pallets for relocation to the battery lay down area. Household paint tins have the lids removed to allow the paint to dry prior to landfilling. Gas bottles are vented to atmosphere and landfilled. Pallets are put aside for use in the storage of batteries. The domestic waste engine oil is collected at the previously federally funded waste oil facility.

10.6.3. Lay Down Area

Behind the drop off area is a concrete pad and shed for storage of greasing equipment. Behind the greasing shed is a storage area for front lift bins collected from the commercial premises following the sale of the bulk commercial service vehicles. The bulk bins were tendered separately with no response. The Shire has gained delegated authority to dispose of the bulk bins and is currently negotiating with interested parties.

10.6.4. Area 1 (Clean Fill)

Area 1 is the most northerly landfill cell and is adjacent to the entrance road and lay down area. It is reported that Area 1 is approaching full height and clean fill material is stockpiled here to be used as cover for the adjacent Area 3. Each cell of the main landfill is lower than the preceding one. Visitors to the landfill are directed to an Area for disposal. The Area numbers coincide with the type of waste delivered and are not cell numbers. The Areas progressively move south over the landfill as the landfilling progresses. The reason for this is that visitors simply go to the Area number that is familiar to them and the landfill staff organise filling locations based on airspace consumption across the site.

There is a new pit currently being dug to the north of Area 1 known as New Area 1.

10.6.5. Area 3 (Household)

Area 3 has two areas for tipping, one lower area and a higher bench moving over the lower one. Area 3 is used for household bulk dry waste (Table 5).

Table 5: Area 3 Household Waste (MSW) Makeup

WASTE TYPE	TOP AREA 3 (% BY VOLUME)	LOWER AREA 3 (% BY VOLUME)
Cardboard	50%	25%
Greenwaste	10%	30%
White Goods	5%	10%
Light Metals	10%	5%
Other	25%	30%

No timber was evident in Area 3.

The waste is dropped on the landfill floor and rapidly spreads out across the floor. It is pushed up regularly using the front end loader. The dozer is not used to push up any waste as it causes damage to the tipping floor. The waste is crushed periodically using the dozer and cover applied.

10.6.6. Area 4 (C&D)

To the west of the site is an area set aside for the placement of construction waste mainly consisting of concrete, rubble and sand. The stock has approximately 20% contamination consisting of timber, plastic and steel.

10.6.7. Rubbish Trucks (C&I and MSW)

On the approach to the upper Area 5 is an area for the placement of waste from front lift and side load garbage trucks. The nature of this waste is putrescible, collected from commercial and industrial (C&I) and residential (MSW) premises, and the decomposing waste attracts flies and vermin. Seagulls were constantly observed feeding on the uncovered waste.

Waste is pushed up using the front end loader and regularly sprayed with insecticide to control flies. The area is also quite odourous.

10.6.8. Area 5 (C&I)

Timber, timber packaging, pallets etc are placed along the embankment between the two Area 5 tipping locations and crushed into the batter (landfill embankment) using the dozer.

Both tipping locations in Area 5 are utilised by skip, hook lift and tipping trucks. Waste in Area 5 consists of dry bulk waste normally referred to as C&I.

Table 6: Area 5 Waste (C&I) Makeup

WASTE TYPE	AREA 5 (% BY VOLUME)
Timber	20%
Cardboard	20%
Plastic Sheeting	1%
Plastic Bags	20%
Light Metals	10%
Other	29%

10.6.9. Light Metals

There are at least three stock piles of light metals located across the site, the most active light metals stock pile is immediately south of Area 4.

Contamination is evident but with improving scrap metal prices this should not be a problem to the recycling companies currently active in the landfill scrap steel market.

10.6.10. Hazardous Pits

Towards the rear of the site are located the quarantine and hazardous waste pits. These pits are numerous and all serve the same basic purpose, which is to isolate hazardous waste from the normal waste stream and cover upon delivery with 1.0m of soil.

Separate pits are provided for hazardous waste, asbestos, dry chemical waste (mineral sands), quarantine waste, dead animals, empty drums and medical waste. These are spread out all over the southern portion of the site and require operational resources to dig new holes, cover waste and monitor disposal.

10.6.11. Landfill Plant and Equipment

Mobile plant at the facility is restricted to a dozer, loader and a tip truck (Table 7). No landfill compactor is on site at present however a Bomag landfill compactor is being purchased and should arrive in Karratha by the end of April 2010.

Table 7: Current Landfill Plant and Equipment

ITEM NO.	TYPE	PURCHASE DATE AND AGE	ENGINE HOURS	KILOMETRES	COMMENT
883	Iveco 4 x 2 Hiab	09/98 11 years	8,862	225,006	Good condition
904	Isuzu 6x 4 Tipper	01.06 3 years			Good condition
	Cat D9 Dozer				On dry hire from Emeco
	Cat D7 Dozer				No longer used on the landfill.
888	Mitsubishi 4 Tonne Tipper			151,033	Poor condition. Normally used at the

ITEM NO.	TYPE	PURCHASE DATE AND AGE	ENGINE HOURS	KILOMETRES	COMMENT
					landfill, occasionally used to back up waste collection
	Cat 928G Loader				Good condition
	2,000L trailer mounted water tank				
	Vermeer Chipper				Not Observed
	Litter critter				Not Observed
	4.5 KVA gen set				Not Observed

10.7. UN-AUTHORISED DUMP SITES

In close proximity to both Wickham and Roebourne there exists un-authorised and illegal dumping of waste.

Roebourne

In the case of Roebourne the dumping location begins in eyesight of houses at the end of Andover Way to the south west of town and stretches a considerable distance along the track running adjacent to the water pipeline. Most of the waste was cleaned up by the Shire Engineering Department over the weeks of the review.

The waste was predominantly bulk household items but residential and putrescible waste was also recorded in the area. There is evidence of other dumping locations further to the south of town and accessed from the Harding Dam Road area. These areas are no longer utilised due to the efficient blocking of access tracks using bulk fill (earth) barriers.

The abundance of un-licenced cars around Roebourne adds to the problem as these vehicles are used by locals who have no means of travelling on main roads to reach the Transfer Station.

Wickham

The situation in Wickham is far worse. Not more than 1 km from the town limits heading north towards the pristine beach location of Cape Walcott there is waste; mainly household putrescible waste dumped along a dirt track. The waste lays spread out, possibly distributed by scavenging animals and is rotting in the sun. The waste consists of kitchen waste, clothing, furniture, white goods, car bodies and other household items.

When you consider that within a five minute drive a modern purpose built transfer station exists where tipping of waste is free of charge and the facility is open to the public 7 days per week between 9.00am and 4.00pm illegal dumping of waste on the outskirts of Wickham is inexcusable.

Wickham is a town under the control of Rio Tinto within the Shire of Roebourne. There is an expectation that Rio Tinto could provide more support to the community of Wickham and assist the Shire in providing community education on waste disposal in the area, assistance with deterring illegal dumping through surveillance and policing, erection of physical barriers and signage to deter dumping and in the cleanup of the area. If there is no change to the way illegal dumping is perceived by the authorities the illegal dumping will continue. Rio Tinto was not contacted for comment as part of this review.

Inspection of the Wickham town sign at the entry to Wickham shows the landfill site located on the Walcott Road, which is where the illegal dumping is occurring. It would be prudent to update the information on this sign.

Located at the rear of the town is a state of the art drop off facility for post consumer recycling and cardboard. Despite all the rhetoric included on the sign displaying joint sponsorship from Rio Tinto and Cleanaway, the facility remained locked, un-serviced and un-maintained during the three weeks of the review.

11. 2009-10 BUDGET

11.1. OPERATING BUDGET

The Shire's 2009-10 Adopted Budget available from the Shire's website was reviewed and the solid waste activities in the budget are summarised in Table 8 with further detail included in Tables 9, 10 and 11.

Table 8: 2009-10 Waste Division Solid Waste Budget Summary

WASTE SERVICES OPERATING BUDGET SUMMARY	2009-10 BUDGET
Revenue	
Waste Collection	$ 1,714,291
Landfill	$ 3,008,000
Total Revenue	**$ 4,722,291**
Expenditure	
Waste Collection	$ 1,933,343
Landfill	$ 2,507,355
Total Expenditure	**$ 4,440,698**
Profit - Waste Services – Waste Collection and Solid Waste Only	**$ 281,593**

Table 9: 2009-10 Waste Collection Budget

WASTE COLLECTION	COA	2009-10 BUDGET
Revenue - Collection		
Domestic Refuse Collection Fee (GST Taxable)	402710	$ 28,366
Domestic Refuse Collection Fee	402711	$ 1,074,324
Industrial/Commercial Refuse Collection Fees	402712	$ 377,650
Industrial/Commercial Refuse (GST Exempt)	402713	$ 8,951
Income From Recycling	402714	$ 10,000
Replacement Sulo Bins	402715	$ 18,000
Proceeds of Sale - Waste Collection	402905	$ 197,000
Total Revenue - Collection		**$ 1,714,291**
Expenditure - Collection		

WASTE COLLECTION	COA	2009-10 BUDGET
Administration	402060	$ 186,225
Domestic Refuse Collection	402200	$ 952,721
Recycling	402201	$ 17,212
Bin Repairs/Replacement	402203	$ 176,677
Litter Control	402204	$ 373,790
Rubbish Collection Community	402205	$ 5,346
Trade/Commercial Refuse	402206	$ 190,678
Wash Pad Maintenance Depot	402207	$ 5,694
Contribution - PRC Waste Management Co-Ordinator	402210	$ 25,000
Loss On Sale - Plant	402610	$ -
Operating Expenditure Total - Collection		**$ 1,933,343**
Loss – Collection		**($ 219,052)**

Table 10: 2009-10 Site Operations Budget – Solid Waste

LANDFILL AND TRANSFER STATION	COA	2009-10 BUDGET
Revenue - Landfill and Transfer Station		
Wickham Transfer Station - Waste Disposal Fees	404710	$ 5,000
Industrial/Commercial Refuse Disposal Fees	404713	$ 2,000,000
Wickham Transfer Station - Recycling Income	404715	$ 3,000
Hazardous Waste Disposal Fees	404716	$ 1,000,000
Total Revenue - Landfill and Transfer Station		**$ 3,008,000**
Expenditure - Landfill and Transfer Station		
Equipment Repair and Replacement (7 Mile Landfill)	404040	$ 9,900
Interest On Loan Repayments	404050	$ 38,737
Administration	404060	$ 248,300
Refuse Site - 7 Mile Landfill (Part of COA 4040200)	4040200	$ 1,851,160
Refuse Site Maintenance	404201	$ 8,794
Refuse Site - Other	404205	$ 7,845
Wickham Transfer Station	404210	$ 342,619
Operating Expenditure Total - Landfill and Transfer Station		**$ 2,507,355**
Profit - Landfill and Transfer Station – Solid Waste		**$ 500,645**

Note:

Site Operations includes the 7 Mile Landfill and the Wickham Transfer Station.

Table 11: 2009-10 Liquid Waste Disposal Operations Budget

LIQUID WASTE PONDS AT 7 MILE LANDFILL	COA	2009-10 BUDGET
Revenue – Liquid Waste		
Liquid Waste Disposal Fees	404718	$ 1,000,000
Total Revenue – Liquid Waste		**$ 1,000,000**
Expenditure – Liquid Waste		
Refuse Site - 7 Mile Landfill (Part of COA 4040200)	4040200	$ 100,000
Operating Expenditure Total – Liquid Waste		**$ 100,000**
Profit – Liquid Waste		**$ 900,000**

Note:

Review of the Shire's adopted 2009 -10 Budget shows a revenue from liquid waste disposal of $1,000,000 at a gate price of $65 per kL giving an expected throughput of 15,384 kL per 2009 -10 year or 295 kL per week. The 2008 -09 estimates in the adopted Budget are $2,675,119 at $60 per kL giving a throughput in the 2008 -09 period of 44,585 kL or 857 kL per week. It is understood from discussions with Shire staff that the safe operating capacity of the current facility is in the order of 800 Kilolitres (kL) per week confirming the 2008 -09 throughput. Based on these numbers the revenue shown in the Table 12 above from the liquid waste facility for the 2009 -10 period is understated.

Table 12 below shows the Consultants estimated 2009 -10 budget based on discussions with Shire staff involved in the operation of the liquid waste facility.

Table 12: 2009-10 Liquid Waste Disposal Operations Budget – Consultant's Estimate

LIQUID WASTE PONDS AT 7 MILE LANDFILL	COA	2009-10 BUDGET
Revenue – Liquid Waste		
Liquid Waste Disposal Fees (42,000 kL per annum at $65 per kL)	404718	$ 2,704,000
Total Revenue – Liquid Waste		**$ 2,704,000**
Expenditure – Liquid Waste		
Refuse Site - 7 Mile Landfill (Part of COA 4040200)	4040200	$ 200,000
Operating Expenditure Total – Liquid Waste		**$ 200,000**
Profit – Liquid Waste		**$ 2,504,000**

11.2. CAPITAL BUDGET

The Gap Analysis following in Section 14 includes discussion and recommendations for capital expenditure. The key plant items from Table 13 below and future capital expenditure areas discussed in this Report are taken from Section 8 Asset Purchases on page 51 of the Shire's adopted Budget for 2009 - 10. Where applicable the items are referenced to the Gap Analysis using the Gap Analysis identification numbers.

Table 13: 2009-10 Waste Collection & Solid Waste Capital Budget

WASTE DIVISION - CAPITAL BUDGET	BUDGET	INTENDED PURPOSE	SUGGESTED EXPENDITURE	COMMENTS
4x4 Single Cab Utility	$ 38,000	Medical waste pickups	$ 38,000	Already purchased
Cat 826 Front End Loader	$ 300,000	Landfill	$ 300,000	Proceed with replacement of current loader
Material Handler (20T Excavator)	$ 300,000	Landfill	$ 300,000	Proceed as additional plant to introduce resource recovery (Ref # L9)
Bomag Compactor	$ 900,000	Landfill	$ 900,000	Proceed to allow compaction of waste (ref # L11)
Mitsubishi 4T Tipper	$ 74,000	Landfill	$ 74,000	Replace current 4 tonne tipper/fuel carrier
4x2 Rear Load Waste Collection Truck	$ 250,000	Waste Collection	$ 250,000	Proceed, to be used for servicing litter and remote bins (ref # C49)
6x4 Side Load Waste Collection Truck	$ 333,000	Waste Collection	$ 333,000	Proceed as replacement for Truck 902
4x2 Side Load Waste Collection Truck	$ 310,000	Waste Collection	$ 310,000	Proceed to provide addition fleet capacity (ref # C48)
8x5 Caged Tipping Trailer	$ 15,000	Waste Collection	Nil	Do not proceed as this item is included at two entries down
Major Spill Kit Trailer	$ 15,000	Landfill	$ 15,000	Proceed to provide Shire with early response capacity
Dual Axle Caged Trailer Ramp	$ 7,500	Waste Collection	$ 7,500	Purchase trailer as per budget for use as general site trailer, bin delivery and repairs
Stationary Waste Compactors (3 only)	$ 270,000	Waste Collection	Nil	Include in the 2010-11 budget the purchase of two stationary waste compactors, one for the Airport and one for the Transfer Station and three 30m^3 bins, refer Quotation Appendix L
NSI High Temperature Burn Incinerator	$ 13,800	Landfill	Nil	Do not proceed due to potential environmental compliance issues relating to emissions
Minor Equipment - 7 Mile Landfill	$ 5,000	Landfill	$ 5,000	Proceed
New Furniture - 7 Mile Landfill	$ 3,000	Landfill	$ 3,000	Proceed
Backup Generator System	$ 20,000	Landfill	$ 20,000	Proceed to provide assurance of power supply (ref # L24)
Temporary Landfill Office and Lunchroom	$ 247,000	Landfill	$ 90,000	Proceed as part of landfill site development
Waste Oil Collection Facility	$ 18,000	Landfill	$ 18,000	Investigate construction of impervious environmental barrier to existing unit. Refer Appendix M for example.
Wash Down Bay	$ 45,000	Landfill	Nil	Carry over to 2010-11budget
Portable Toilet Block	$ 80,000	Landfill	$ 80,000	Proceed as part of landfill site development
Monitoring Bores	$ 30,000	Landfill	Nil	Refer to Health Department as additional monitoring bore were installed last year
Litter Fencing	$ 100,000	Landfill	$ 100,000	Suggest the purchase of 2.4m panels at approximately $100 each for use

WASTE DIVISION - CAPITAL BUDGET	BUDGET	INTENDED PURPOSE	SUGGESTED EXPENDITURE	COMMENTS
				around tipping face area. Provide permanent security (litter) fencing around perimeter of cells. Refer Plates 28, 29 and 30 for photos of typical litter fences and Appendix U and V for typical litter fence layout.
Road Works	$ 100,000	Landfill	$ 100,000	Site Plan to be developed preceding any further road re - development. Some road realignment and development work may be required in vicinity of weighbridge and recycle area
Total - Capital Expenditure	**$ 3,474,300**		**$ 2,943,500**	
Budget Surplus			**$ 530,800**	

Table 14: 2009-10 Liquid Waste Capital Budget

WASTE DIVISION - CAPITAL BUDGET	BUDGET	INTENDED PURPOSE	SUGGESTED EXPENDITURE	COMMENTS
Effluent Pond concrete Safety Barrier & Handrails	$ 24,000	Liquid Ponds	$ 24,000	Fence facility, provide safety ladders at each corner of each pond. (ref # L5)
7 Mile Liquid Waste Pond Redevelopment	$ 100,00	Liquid Ponds	$ 100,00	Install effluent receival pits to eliminate the spraying of effluent over the concrete apron and into the pond. (ref # L6)
Installation of new effluent ponds and modification to dump area	$ 75,000	Liquid Ponds	$ 75,000	Provide discharge pits at the receival ponds that allow trucks to discharge safely into a pit rather than onto a concrete pad. (ref # L5)
Total - Capital Expenditure	**$ 199,000**		**$ 199,000**	
Budget Surplus			**Nil**	

Table 15: 2010-11 Recommended Capital Budget Items

WASTE DIVISION - CAPITAL BUDGET	INTENDED PURPOSE	SUGGESTED EXPENDITURE	COMMENTS
Stationary Waste Compactor – Wickham (1) and Airport (1)	Airport and Transfer Station	$ 355,000	Install two stationary waste compactors, one for the Airport and one for the Transfer Station and purchase three $30m^3$ bins, refer Quotation Appendix L (ref # T21)
Enclose tipping floor and build a Tip Shop - Wickham	Transfer Station	$ 250,000	To house recoverable and recyclable items, (ref # T4 and T1))
Auto Tarp system for hook lift truck	Transfer Station	$ 25,000	To facilitate E,H&S issues with tarping loads, (ref # T7)
Additional hook bins	Transfer station	$ 75,000	5 hook lift bins

WASTE DIVISION - CAPITAL BUDGET	INTENDED PURPOSE	SUGGESTED EXPENDITURE	COMMENTS
	and Landfill		
Auto Tarp system for hook lift trailer	Transfer Station	$ 25,000	To facilitate E,H&S issues with tarping loads, (ref # T10)
New heavy duty wash down bay at the landfill	Landfill	$ 250,000	Establish a heavy machinery wash down bay as part of the landfill infrastructure
Light Vehicle Drop Off Facility and Tip Shop – 7 Mile	Landfill	$ 1,000,000	Lockable 500m^2 shed, shelving, internal fencing, asphalt pavement, electrified perimeter fence, earthworks, signage, light vehicle drop off facility at the landfill entry and car parking, (ref # L13)
Traxcavator for use at the 7 Mile waste tipping face	Landfill	$ 500,000	Track mounted loader will be more suitable for use at the tipping face (no tyres to puncture). The existing rubber tyred front end loader can be utilised for loading cover material and loading waste and materials at the light vehicle drop off facility.
Skid Steer Loader for resource recovery	Landfill	$ 100,000	To be used for moving and loading recycled and recovered materials at the light vehicle drop off facility.
Total – Proposed Capital Expenditure (2010-11)		**$ 2,580,000**	

12. LICENCE AND REGULATORY REQUIREMENTS

12.1. 7 MILE LANDFILL

The Shire must operate its 7 Mile Landfill in accordance with guidelines and policy documents issued by the DEC in association with the Landfill Licence and advise the Director of the DEC where compliance is not possible.

Acts and Regulations include:

- *Environmental Protection Act 1986,*
- *Environmental Protection Regulations 1987,*
- *Environmental Protection (Noise) Regulations 1997,*
- *Environmental Protection (Controlled Waste) Regulations 2004,*
- *Environmental Protection (Unauthorised Discharges) Regulations 2004,* and
- *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*

Guidelines include but are not limited to:

- *Landfill Waste Classification and Waste Definitions 1996 (As Amended),*
- *Guidelines for Acceptance of Solid Waste to Landfills 2001,*
- *Code of Practice, Rural Landfill Management,,*
- *Code of Practice, Management of Clinical and Related Wastes,* and

- *Guideline, Groundwater Monitoring at Municipal Landfill Sites* issued by the Department of Minerals and Energy (Geological Survey of WA).

The Landfill operating licence number L7021/1997/13 issued by the DEC is summarised in Table 16.

Table 16: Landfill Licence Key Parameters

PARAMETER	DETAILS
Premises	Seven Mile Waste Disposal Facility
Name of Occupier	Shire of Roebourne
Classification of Premises	Category 64 – Class II Putrescible Landfill Site Category 61 – Liquid Waste Facility
Term of Licence	Three years
Tyres	A licence is required to store more than 100 tyres, otherwise tyres must be landfilled
Asbestos and Clinical Waste	Buried as soon as possible following arrival and covered with 1m of cover material Maintain a site plan showing the location of the burials Within 2 hours of placement of clinical and asbestos wastes the date, transporter, position and the covering process be recorded in a register at the landfill
Greenwaste	Greenwaste should be diverted from landfill where possible and strategies should be implemented to meet this objective
Buffer distance	35m internal buffer between waste and site boundary
Acceptable Waste Types	Clean fill Type 1 inert waste Type 2 inert waste Putrescible waste Type 1 special waste Type 2 special waste Other wastes that comply with Class II acceptance criteria in the Landfill Waste Acceptance and Waste Definitions 1996 (As Amended)
Reporting Date to the DEC	Submit to the Director of the DEC an annual audit compliance report by February 1 each year Template for the audit report is provided by the DEC as Attachment 6 of the Licence
Hazardous Waste	Comply with Landfill Waste Classification and Waste Definitions 1996
Waste Placement	No closer than 35m to the premises boundary In a defined trench or bunded area Non greenwaste tipping area to be less than 60m in length Cover material placed to a minimum depth of 230mm Waste covered daily MSW covered within 24 hours of delivery Ensure that no waste is left exposed when cover applied Waste placed in 500mm layers and compacted using minimum of 5 passes with a dedicated machine Waste face no more than 2m in vertical height

PARAMETER	DETAILS
	Final landfill cover to a minimum depth of 1m
Fencing	Lockable gates fitted to a 1.8m security mesh fence around the perimeter of the site Fence inspected fortnightly and damage repaired in one working day
Litter	Litter contained within the site boundary Removed from internal roads and all site fencing Collected from outside the landfill site on a weekly basis
Signage	To be maintained at the entrance to the premises
Groundwater	Separation distance of at least 3m to the highest water table level Groundwater elevation is nominated as 10.20m AHD (Attachment 2 of the Licence) Minimum distance of 100m from landfill to any surface water body
Groundwater monitoring	Eight bores in Table 2 of the Licence are to be tested quarterly Bore results to be included in the annual report to the Director of the DEC are MW01, MWO2, MWO3, MW04, MW05, MW06, MW07 and MW08. The location of these are shown on Attachment 2 of the Licence and are located towards the western side of the landfill site Note: There are currently 12 bore casings installed on the site
Effluent Ponds	Wave action or high levels from extreme rainfall events does not cause overtopping No erosion of pond embankments from stormwater Discharge into ponds does not cause erosion of the embankments No noticeable leakage from the ponds No vegetation in the ponds or on the inner embankments

Note:

The Shire advises that an application has been made to the DEC for the inclusion to the Licence of Category 57 – Used tyre storage (general): premises (other than premises within category 56) on which used tyres are stored (100 tyres or more).

12.2. WICKHAM TRANSFER STATION

The Shire must also operate its Wickham/Roebourne Transfer Station in accordance with guidelines and policy documents issued by the DEC in association with the Landfill Licence and advise the Director of the DEC where compliance is not possible.

The Transfer Station operating licence number 7921/2 issued by the DEC is summarised in Table 17.

Table 17: Transfer Station Licence Key Parameters

PARAMETER	DETAILS
Premises	Wickham Transfer Station
Name of Occupier	Shire of Roebourne
Classification of Premises	Category 62 – Solid Waste Depot
Term of Licence	5 years
Emergency or Malfunction	Inform the DEC within two working days of any discharge
Alterations to Premises	DEC approval required if risk created for emissions to land, air or water.
Waste Removal	Daily
Greenwaste storage	No more than 1,000m^3 stored at any one time with a 5m fire break maintained around the storage area
Reporting Date to the DEC	Submit to the Director of the DEC an annual monitoring report by 1 May each year.
Fences	1.8m high, inspected daily and repaired daily
Wind Blown Waste	Collected daily, putrescible waste to be covered at the end of each day.
Burning of Waste	No burning of waste at the premises
Dust	Use water sprays to suppress dust
Drainage	Water emanating from the waste to be treated in a Humeseptor prior to discharge off site.

13. OBSERVATIONS AND DISCUSSION

13.1. COLLECTION

A snap shot of the Waste Management Section's delivery performance was observed during the week of the collection review; truck availability impaired the performance of the waste services. The newest collection vehicle, truck 907, was taken out of service on three occasions affecting the Waste Management Section's ability to complete the required services. With no backup collection vehicle available, waste services, both residential and commercial, were left incomplete at the end of multiple days. At the end of Thursday's collection 50% of Thursday's residential and 90% of the previous day's commercial services were still outstanding.

Table 18 details the scheduled collection runs and includes comment on the Section's performance in completing the runs.

Table 18: Snap Shot of the Collection Route and Performance (September 7 to 11 - 2009)

DAY	RUN	TRUCK	TOWN	APPROX SERVICES	COMMENTS
Monday	1	902	Bulgarra	3.5 loads 875 bins	Completed
	2	907	Nickol	240 bins	Completed with driver under supervised training
	Commercial	906	Karratha, Dampier, Airport	3 loads 750 bins	Completed
	Litter, Bin Repairs	901			Not done
Comment: Litter bin collection and bin repairs not done					
Tuesday	1	902	Bulgarra	1.5 loads 350 bins	Completed
	2	907	Pegs Creek	3.5 loads 875 bins	Truck 907 taken out of service for 10,000km service. Driver and trainee deployed on other duties
	Commercial	906	Karratha, Roebourne, Point Sampson	1 load 250 bins	Completed
	Litter, Bin Repairs	901			Not done
Comment: Pegs Creek on serviced, litter bins and repairs not completed					
Wednesday	1	906	Roebourne, Point Sampson	1.5 loads 375 bins	Completed Roebourne, Point Sampson not done, truck deployed to Pegs Creek Tuesday run
	2	902	Wickham	2.5 loads 626 bins	Completed
	Commercial	907	2 villages, Karratha Industrial Estate	3 loads 750 bins	Completed one load before truck break down (suspected electrical fault)
	Litter, Bin Repairs	901			Partly completed
Comment: Point Sampson and Karratha Industrial Estate not done, litter bins and bin repairs partly completed					
Thursday	1	907	Nickol	3 loads 750 bins	Completed
	2	902	Millars Well	2.5 loads 625 bins	907 out of service (seized paddle bearing). 500 bins left out
	Commercial	906	Karratha Central, Dampier	2.5 loads 625 bins	Completed Karratha Central, Dampier and Point Sampson and Karratha Industrial Estate from Wednesday
	Litter, Bin Repairs	901			Partly completed using driver and leading hand
Comment: 500 bins in Millars Well not done					
Friday	1	907	Dampier	1.75 loads 437 bins	Completed
	2	902	Baynton	4 loads 1000 bins	Millars Well from Thursday done, and Baynton partly completed
	Commercial	906	Central, Point Sampson, Wickham	1.5 loads 375 bins	Completed
	Litter, Bin	901			

DAY	RUN	TRUCK	TOWN	APPROX SERVICES	COMMENTS
	Repairs				
Comment: Part of Baynton not done					
Saturday	1	906	Roebourne Baynton, Tambrey, Nickol West, and Hill Crest Estate,	3 loads 750 bins	Remaining part of Baynton done plus Saturday work
	Commercial	906	Central restaurants, Airport, Dampier	0.5 loads 125 bins	Completed
Comment: All work completed for the week using additional three hours of overtime on Saturday					

The service numbers shown above are estimation only at 6,900 (9,778 including commercial). It is understood from waste services and rates staff that the number of ratable residential services is around 6,500. Table 3 indicates that residential ratable premises may be higher as it will include vacant lots and vacant dwellings.

During the week of the review, from Tuesday on, once one truck was taken off the road for servicing, collections remained outstanding at the end of each day. The collections were all completed by the end of the Saturday shift using approximately three hours double time labour in addition to the regular Saturday work.

It was reported that the week following the review faired even worse as the township of Roebourne's Saturday collection was not carried out at all and was collected on the Monday of the next week.

13.2. HUMAN RESOURCES

13.2.1. Current Staff Structure for the Waste Management Section

Appendix ZB shows the organisational structure for the entire Technical Services Division for 2009-10 period, it includes the transfer station and landfill staff, and other Divisions that contribute to the waste management services. Customer service duties are provided by the front desk staff at the Shire Office. The Depot Co-ordinator provides procurement and stores support for both the ordering of truck spare parts, new bins and bin parts for bin repairs. The Plant Co-ordinator provides or co-ordinates vehicle repairs and servicing.

At the time of the Review the entire waste services division including landfill, collection and transfer station has fifteen budgeted full time positions with twelve currently filled. There are two vacancies, one in the collection area and one vacancy in the landfill. The collection system has six full time positions allocated plus the Leading Hand. Currently the collection system has four drivers. Two are allocated to residential collection to operate trucks 902 and 907, one to operate truck 906 for commercial collection and the remaining driver to operate truck 901 to service litter bins, pavilions and remote area bins. The remaining two positions are to provide labour resources for annual leave, sick days and training.

In addition to the dedicated drivers the Leading Hand allocates a portion of his time to the collection system attending to bin repairs and deliveries and general duties relating to bin collection.

The staff's normal pay period incorporates 10 hours per day over a 9 day fortnight and includes 0.5 hours at the start and finish of each day for vehicle pre checks, greasing, washing and re-fueling. Several staff work a rotating roster to cover the required seven (7) day operations. Current staff numbers and rosters are not adequate to cover full operations.

The following table summarises the current staff positions that are associated with the provision of waste services.

Table 19: Current Waste Management Section Positions

AREA	NUMBER	FUNCTION
Management	1	Waste Services Co-ordinator
Collection	1 6	Leading Hand Collection Truck Operators
Landfill & Transfer Station	1 6	Weighbridge Attendants Plant Operator/Attendant
Total	15	

For labour purposes the landfill and transfer station are classed as one business unit allowing the sharing of labour resources across both facilities. There are seven positions allocated to the landfill and transfer station, five relate to landfill duties, one at the transfer station and a dedicated position of weighbridge operator (Table 20). For the seven positions there are currently six employees and therefore one vacancy. One of the seven also covers the seventh day of operation at the transfer station.

The six current employees work a roster with the intention of having four persons on site Monday to Friday and three on site on Saturday and Sunday. At any one time there are two or three persons not working.

Table 20: Landfill and Transfer Station Positions

AREA	NUMBER	FUNCTION
Weighbridge	1	Weighbridge
Tip Truck & Cat 928G	1	Landfill cover
Dozer	1	Digging holes, compacting and covering waste.
Transfer Station	1	Transfer Station and transfer of waste to 7 Mile Landfill.
Site Attendant	1	Roustabout, litter and general duties, Transfer Station relief, weighbridge relief.
On leave	2	Off on rotation
Total	7	

During the week of the review one of the Site Attendants was working at the Transfer Station effectively allocating two persons to the Transfer Station. With one staff vacancy in site operations and one at the Transfer Station the Site Attendant duties at the landfill are not carried out.

During the week of the review the waste services Leading Hand came to the landfill in the middle of the day to relieve the Weighbridge Attendant. Waste collection drivers, when finished early, were assisting with site operations at the landfill. On these occasions the waste collection trucks were parked at the landfill and returned to the Depot at the end of the day.

13.2.2. Induction and Training

Recruitment is carried out jointly by the Manager Operations, Waste Co-ordinator and Human Resources. An interview matrix is used to screen applicants; reference checks are carried out by the Waste Co-ordinator. Approximately four interviews are conducted per month with around 25% success rate. Many potential applicants refuse offers of employment due to reasons such as low salary, not comfortable in working with waste and in the case of many interstate applicants, the unavailability of suitably priced housing in the region.

Employment retention is also quite low with staff leaving to take up other employment at a higher salary, a job with accommodation supplied, family and personal reasons and at times from job dissatisfaction. Another reason often given is the heat in the Pilbara is found to be too uncomfortable.

At the landfill the reasons relate to heat, flies, dust and smell and at the Transfer Station it is the isolation.

13.2.3. Empowering Staff

Lack of empowerment was reported to be the principal reason for discontentment and high staff turnover when working in the Waste Division. In order to address empowerment and engage employees with regard to operating waste collection vehicles job and run rotation should be considered. Consideration should be given to career advancement through skills development. To overcome the landfill staff shortage issues improved landfill management techniques will assist to address the staff concerns and at the Transfer Station engagement of staff in the performance of the facility may offset the effects of isolation.

Clear designation of duties helps staff to understand their individual responsibilities. Each position should have a job description detailing the key responsibilities for each position. Additionally both sites have previously not had direct supervision out in the field. Coordinator and leading hand positions are time constrained not allowing for the direct supervision and follow up of directions given. The key position prerequisites are:

Manager (Manager Operations)

Understand the principles of managing a business unit.

Supervisor (Waste Management Co-ordinator)

Understand the techniques of management, and able to convert business objectives into process requirements, full knowledge of the product being produced or the service being provided.

Leading Hand(s) (Leading Hand Waste Management)

Able to follow instructions relating to process requirements, proficient in all aspects of producing the product or providing the service.

Specific items for Waste Management Leading Hand would include pinning of commercial runs on maps, conducting driver training and carrying out driver performance evaluation.

13.2.4. Proposed Future Staff Structure

For functionality and operating requirements the Shire proposes to re-structure and re-name the waste management area as “Waste Services” and increase staff positions from the current fifteen to twenty nine. The new staff structure for Waste Services will accommodate the full staffing of the collection, transfer station, landfill operation including the weighbridge and the light vehicle drop off and resource recovery area.

The current waste management area is developing rapidly with the ever expanding industrial growth in the Shire of Roebourne and surrounding areas and is working towards meeting

statutory and operational requirements for the provision of waste services. In order to meet ongoing demands an increase in staff numbers and a dedicated management structure is required.

Waste stream tonnage at the 7 Mile Landfill from 2005-06 to 2008-09 has increased 154%[6]. The waste stream referred to does not include clean fill disposed of at the landfill. Clean fill in the 2008-09 financial year was 71,000 tonnes being an increase of 37% from the previous year. With the ongoing progression of Karratha from a mining industry support town to a city in the north and with the major industrial, mining and gas projects currently in place and proposed the current staffing levels required for the waste management section must be increased.

The Waste Management Area is now providing double the kerbside waste services than ten years ago with the same number of staff and plant. It is integral to running a workable collection service, transfer station and landfill that staff numbers are increased in order to meet the current and future operational requirements.

Establishing a Waste Services management position with administration assistance and additional supervisory (leading hands) positions will allow the Shire to provide the required waste management services. The future staffing numbers proposed by the Shire for the development of Waste Services are as follows:

Table 21: Future Staff Requirements

AREA	NUMBER	FUNCTION
Management	1	Waste Services Manager
Administration	2	Management support
Litter control	1 5	Leading Hand Litter Attendants
Collection	1 5	Leading Hand Collection Truck Operators
Transfer Station	2 1	Attendant/Operator Bin Truck Operator
Landfill	1 1 9	Leading Hand Weighbridge Attendants Plant Operator/Attendant
Total	29	

13.3. DATA FOR ROUTE ANALYSIS

In order to successfully review and rationalise the Shire's waste collection services details of the current service is required, such as the number and location of the services. It is possible for the Shire's Information Technology (IT) Department to create a Query Request that will be able to extract data from MyData giving the number of bins per street. The advantage of a dedicated Query Request being prepared is that the data can be updated regularly by recreation of the Query Request.

[6] Data from the Arch weighbridge software system at 7 Mile Landfill

Street data can also be obtained manually by accessing MyData via the Mapping File. An example was carried out during the review with an Excel spreadsheet being created showing all the ratable properties in the one file. The data was able to be manipulated to show 580 streets listed in the data base. To manually extract the data required from the file a person would be required to access the data base and count the number of entries by street name; it is expected that this process could easily be accomplished in one day.

The output would be a list of all the street names in the Shire and the corresponding number of bins to be serviced in the street. This data can be used to restructure the route collections maps to improve efficiencies in collection productivity. Until accurate route data is available meaningful re-routing cannot be carried out.

13.4. FLEET MANAGEMENT SYSTEMS

The Shire of Roebourne is keen to introduce new technologies to assist in the delivery of services to its residents. A requirement of the Review is to investigate electronic tracking systems and collection route management software and to make a recommendation to the Shire on the most appropriate supplier.

It became evident during the Review that the Shire of Roebourne has wide ranging opportunities to instigate improvements in the provision of its waste services. Many of these improvements have been carried out prior to the completion of the Report and Shire staff continue to proactively make improvements to waste service delivery.

Without these improvements and the achievement of best practice in waste management the introduction of an electronic management system would not be successful. The successful introduction of electronic management systems is totally reliant on the quality of the input data. The initiatives outlined in this Review will assist the Shire to obtain robust data on such things as the number of services being provided, multiple bins, commercial services, route intelligence and truck routing.

A further review should be carried out once the Gap Analysis initiatives are completed. This will allow a report card to be prepared on the Shire's recent performance and a recommendation made as to the preparedness of the Shire to introduce electronic management systems.

With accurate routing data and a manual procedure in place to update and amend the data an electronic data and route tracking system could be considered. As part of the Review eight of the most popular locally supported and affordable soft wear systems were reviewed. Typical cost indications are that a basic system can be introduced for under $40,000, care should be given when specifying the add-ons as this is a way that suppliers raise the overall cost of providing and supporting the product.

Prior to making any recommendation on the most appropriate supplier a review of the Shire's needs in relation to the introduction of the electronic system should be undertaken. It is feasible that what the Shire considers is a requirement for the electronic system at this time may be different after the initiatives in the Gap Analysis have been completed. Suppliers of fleet management systems include:

- ManageMate[7].
- SmartTrack[8]
- BlackBox GPS Locator[9]

[7] www.managemate.com.au
[8] www.smarttrack.com.au

- The Hume City Council Waste Collection System[10]
- SmartTransport[11] (Creatop)
- Australian Software Professionals, ASP Software[12] (Wastedge)
- Adilam Technologies[13]
- Wastedge[14]

13.5. EMERGING TECHNOLOGIES IN WASTE MANAGEMENT

Without a kerbside recycling service operating in the region the post consumer recyclables which include cardboard, newspaper and plastic are deposited in the waste bin and disposed of at landfill. These recyclables are hydrocarbon based and have significant calorific value for combustion. Paper has a calorific value of 18.5 MJ/Kg and mixed plastic is 39.0 MJ/Kg.

The typical waste stream within the Pilbara region has a combined calorific value of 14.4 MJ/Kg[15] which is suitable for use in the preparation of refuse derived fuels for use as a fuel source in emerging waste treatment technologies such as gasification, incineration and pyrolysis. The purpose of these emerging technologies is to use the embedded energy within the waste by converting the waste into a fuel source to power electricity generation.

13.6. CONTRACTING OF COLLECTION SERVICES

In June 2008 the Shire sold its bulk commercial waste collection trucks by tender to the highest bidder as it was unable to maintain an adequate level of service to its customers.

The current 240 L MGB commercial service includes services to ratable properties; the remainder of the commercial services are direct billed to the occupant of the premises. As the client base is charged through a mix of ratable and fee for service billing it would be more convenient to contract out the service based on a fee for collection service basis and the Shire collect the revenue and pay the contractor.

Contact has been made with TPI who expressed interest in providing a budget estimate for service provision, but requested statistical collection data to allow a budget estimate to be provided. A route data collection template, Appendix H, is included to facilitate the collection of the required data.

ToxFree, who also operate a commercial solid waste service in the region, was contacted and it is understood that ToxFree may be interested in providing waste collection services.

There is potential to contract out the waste collection to a private contractor. Continual plant breakdowns are due to high demand on waste collection vehicles have limiting the ability of the Shire to provide an adequate level of waste service. The Shire have now procured additional waste collection vehicles and contracted out a section of collection until the new vehicles arrive. The potential to contract out the full collection service is one of future staff availability and will need further investigation over the coming years.

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[9] www.blackboxgps.com
[10] Hume City Council
[11] www.creatop.com.au/index.cfm
[12] www.aspsoftware.com.au
[13] www.adilam.com.au
[14] www.wastedge.com
[15] Business Case Study Into The Use Of Gasification Technologies For Waste Management Within The Pilbara Region (Bowman & Associates 2009)

Table 20 offers a guide for reviewing collection fees offered by private contractors. The Revenue per Pick up is derived from the annual rates charge for each type of service expressed as a weekly charge. In the case of the commercial service it assumes that on average a bin is picked up once per week.

It can be seen in Table 9 that the Shire currently experiences a loss of $219,012 per annum from the provision of its solid waste services. Based on the estimated 10,854 services (Table 3), this equates to an average shortfall of $0.39 per service per week.

Table 22: Unit Revenue per Pickup

SERVICE	REVENUE PER PICK UP	CURRENT SHORTFALL PER PICKUP	PREFERRED CONTRACT COLLECTION RATE PER PICKUP
Domestic – 240 Litre	$ 3.13	$ 0.39	$ 2.74
Domestic – Additional Bin	$ 3.29	$ 0.39	$ 2.90
Commercial – 240 Litre	$ 3.29	$ 0.39	$ 2.90
Commercial in Yards – 240 Litre	$ 6.57	$ 0.39	$ 6.18
Semi Residential – 240 Litre	$ 4.70	$ 0.39	$ 4.31

Expectations are that a commercial collection service provided by a private contractor may be in the range of $3.50 to $4.00 per service. If the residential collection is also contracted out it is expected that lower rates would be offered.

Should the Shire wish to contract out its services and the rates offered are in excess of the preferred collection rates shown in Table 20 above the Shire would be advised to increase its waste collection fees, either ratable and/or non ratable, accordingly.

13.7. RATES ANALYSIS

Within the Rates charges levied on rate payers is a component for refuse collection fees. For the 2009-10 period the standard fee for the provision and weekly service of a 240L MGB is $162.90 per residential premise and $170.90 plus GST per commercial premise.

Typical residential waste charges in several other Western Australian Shires in the 2008-09 period are shown in Table 23. The Shire of Pingelly is the only Shire in this table that can demonstrate that the Rates charges allow full cost recovery for the provision of waste services. Within the table are shires that provide a mix of services including landfills and recycling services however there is no pattern to the amount of waste charges levied and the degree of services offered, for example the Shire of Cuballing has the highest waste charges in the table but does not provide any form of kerbside waste collection service, bulk or MGB.

Table 23: Refuse Collection Fees – Other Shires

2008-09	LAKE GRACE	DUMBLEYUNG	WAGIN	WOODANILLING	WEST ARTHUR	WILLIAMS
Number of Services	467	168	753	61	214	295
Rates (Waste) per Household	$158.60	$172.00	$210.00	$200.00	$110.00	$230.00
	NARROGIN (TOWN)	**NARROGIN (SHIRE)**	**WICKEPIN**	**CUBALLING**	**PINGELLY**	**WANDERING**
Number of Services	3,071	167	188	0	572	58
Rates (Waste) per Household	$160.00	$160.00	$110.50	$356.14	$225.00	$180.00

Tables 8, 9, 10 and 11 summarise the Adopted Budget numbers for the 2009-10 period and do not provide an indication of projected revenue and cost for future years. In this section are the outcomes of modeling undertaken to determine the required value for residential waste charges for future years.

Modeling was undertaken to theoretically query the Refuse Collection Fee levied as part of the Shire's residential Rates Charges. To carry out the modeling waste related fees and costs were extrapolated from the 2009-10 Adopted Shire Budget and with depreciation allowances developed within the model estimates of the profit and loss of the waste services was developed.

Appendix XC shows the summary page of the model that relates to the overall waste management area including collection, transfer station and landfill. Assumptions made throughout the model were:

- Inflation Rate 2.5 %
- Service Growth Rate 5.0 %
- Landfill Annual disposal Rate Increase 5.0 %
- Average Weight of a 240L MGB 21 Kgs
- Term that model was run 5 Years
- Period for Plant Depreciation 6.7 Years

Appendix ZC shows that based on the information able to be identified and extracted from the Budget and with the inclusion of a depreciation cost the waste management area operates close to break even with a shortfall of $213,830 in the current period and a surplus experienced from 2011-12 period.

Appendix ZD drills down another level in the Profit and Loss to the landfill and transfer station which is shown as operating with a surplus 426,713 per annum in the current year to $969,048 in 2013-14.

Appendix ZE is the collection Profit and Loss and shows that the 240L MGB residential and commercial waste and litter collection services provided within the Shire operate at a substantial loss and that the current Refuse Collection Fee charged as part of the Shire's Rates Charges is significantly understated.

Appendix ZE shows the "Rates Revenue" for Rates charges extracted from the Adopted current Budget. Based on an average MGB weight of 21Kgs and a disposal cost for waste of $37.50 per

tonne (Compactor vehicle rate at the landfill) an “Estimated Landfill Disposal Cost” of $444,457 is derived in the model for the current year. This cost relates to the theoretical cost of landfilling the MGB waste at the 7 Mile Landfill; this is a cost to the Shire for disposing of the MGB waste collected and should be recouped within the Refuse Collection Fee levied on rate payers.

Also included in Appendix ZE is the “Collection Costs” extracted from the Adopted Budget. It is understood that these costs within the Adopted Budget include the cost of labour. With an allowance for depreciation of the collection trucks, MGBs and utility over a period of 6.7 years a depreciation component of $253,000 is included as an expense in the Profit and Loss.

The outcome being that the revenue from rates charges appears to be understated by $1,092,999 per annum in the current year and that the more appropriate Refuse Collection Fee within the Rates charges would be $239.58 as apposed to the current Rates charge of $162.90 in the current year. Figure 3 extrapolates the residential Rates charges over the next five years using the model assumptions shown above and shows a comparison between current charges and those estimated in the modeling for “business as usual”.

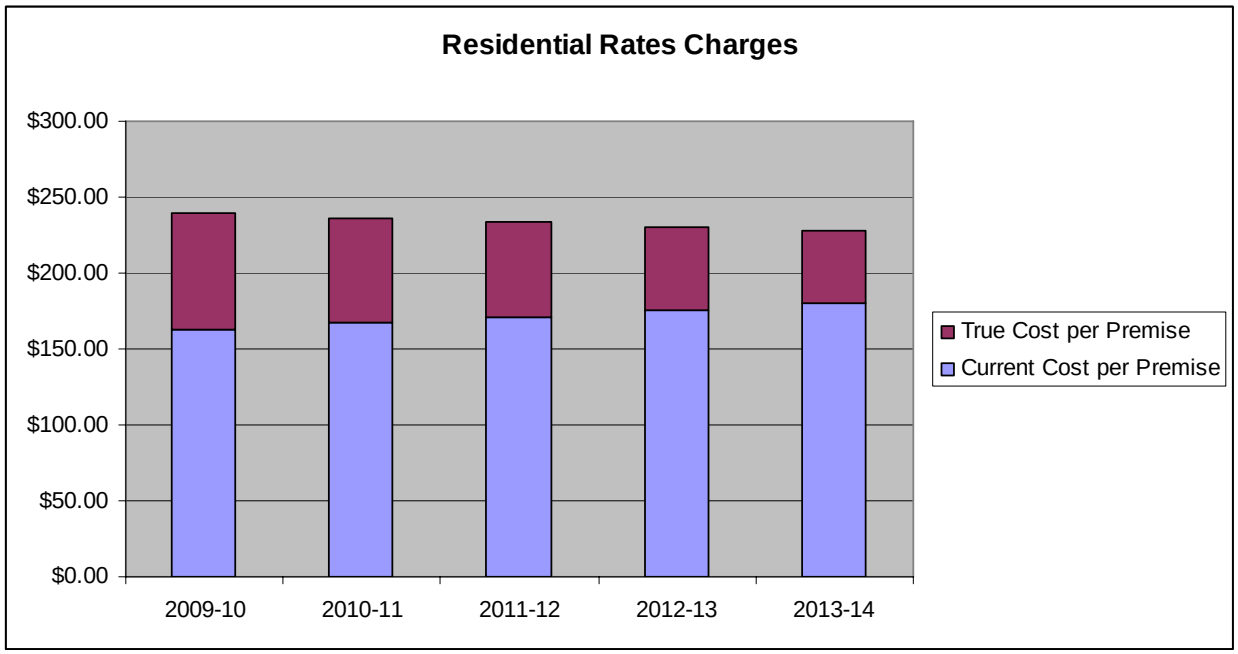

Figure 3: Residential Rates Charges Estimate.

It is recommended that the Shire carry out a reconciliation of the revenue and costs associated with the kerbside waste collection services to establish the appropriate level for Refuse Collection Fees.

13.8. LIQUID WASTE FACILITY

Part of the infrastructure at the 7 Mile Landfill Facility is a liquid waste facility. The facility is one of only two facilities of its type operating the Shire of Roebourne, the other being Water Corporation’s liquid waste facility located in close proximity to the landfill and receives reticulated waste water from within the Shire of Roebourne. Water Corporation does not accept septage and grease trap waste. The closest liquid waste facility able to receive septage and grease trap wastes is located some 200 km to the east in Port Headland.

The Shire of Roebourne’s liquid waste facility operates as a “prescribed premises”, Category 61, under Schedule 1 of the *Environmental Protection Regulations 1987*. Category 61 means liquid

waste facility on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated.

13.8.1. Liquid Treatment Process

The facility's liquid waste treatment process is based upon anaerobic degradation of the organic component of the liquid wastes followed by evaporation of the residual liquid.

Anaerobic digestion is the breakdown of organic material by microbes that live in an oxygen free environment. Anaerobic means 'without air'. When organic matter is decomposed in an anaerobic environment the bacteria produce a mixture of methane (CH_4) and carbon dioxide (CO_2) gases. Anaerobic digestion treats waste by converting putrid organic materials to CO_2 and CH_4 gas.

The anaerobic breakdown is carried out by a group of bacteria, working together to convert organic matter to gas and inorganic constituents. The first step of anaerobic digestion is the breakdown of particulate matter to soluble organic constituents that can be processed through the bacterial cell wall. The main factor that slows the breakdown process is the hydrolysis of insoluble materials. This step is carried out by a variety of bacteria through the release of extra-cellular enzymes that reside in close proximity to the bacteria. The soluble organic materials that are produced through hydrolysis consist of sugars, fatty acids, and amino acids. Those soluble constituents are converted to CO_2 and a variety of short chain organic acids by acid forming bacteria. Other groups of bacteria reduce the hydrogen toxicity by scavenging hydrogen to produce ammonia, hydrogen sulfide, and CH_4. A group of methanogens converts acetic acid to CH_4 gas.

A wide variety of physical, chemical, and biological reactions take place. The bacterial consortia catalyse these reactions. Consequently, the most important factor in converting waste to gas is the bacterial groups. The bacterial groups are essentially the "bio-enzymes" that accomplish the desired treatment. A poorly developed or stressed bacterial group will not provide the desired conversion of waste to gas and other beneficial products.

The rate and efficiency of the anaerobic process is controlled by:

- The type of waste being digested,
- The concentration of the waste,
- The temperature of the waste,
- The presence of toxic materials,
- The pH and alkalinity,
- The hydraulic retention time,
- The solids retention time,
- The ratio of food to microorganisms, and
- The rate at which toxic end products of digestion are removed.

To maximise the performance of the decomposition process and to minimise odorous emissions from the facility operational procedures are to be closely adhered to. Appendix W provides a guideline best practice operational requirements for a liquid waste pond accepting septage and grease trap waste. These include:

- No disruption to the anaerobic crust on the receival pond,
- Maintain the pH above 6.5,

- Maintain trapped overflows between ponds to stop the movement of floating material from one pond to another,
- Maintain a minimum freeboard to prevent overflow,
- Dispose of residual sludge appropriately, and
- No waste other than biological waste to be deposited in the ponds.

13.8.2. Liquid Volumes and Budget Restraints

It is understood from discussions with Shire staff that the operating capacity of the current facility is in the order of 800 Kilolitres (kL) per week and that the Shire has the opportunity to accept a further 600 kL per week from the Gorgon project.

Table 12 suggests that at 800 kL per week the Shire can expect annual revenue for the current period of $2,500,000. With an increase in throughput from the Gorgon project the annual revenue could potentially be more like $4,700,000.

Table 14 shows a capital allocation of $199,000 available to be spent on the liquid waste facility.

In addition Table 10 shows a potential surplus operating profit of $500,645 from the collection and solid waste operations and Table 11 shows a conservative operating profit of $900,000 for the liquid waste facility. An opportunity exists to expense additional monies on liquid waste operations in the 2009 -10 period while remaining in budget.

13.8.3. Increasing Waste Facility Capacity

To increase throughput and meet the proposed future demand the Shire of Roebourne has proposed to construct an additional evaporative pond adjacent to and north of the current liquid waste facility, refer Figure 4.

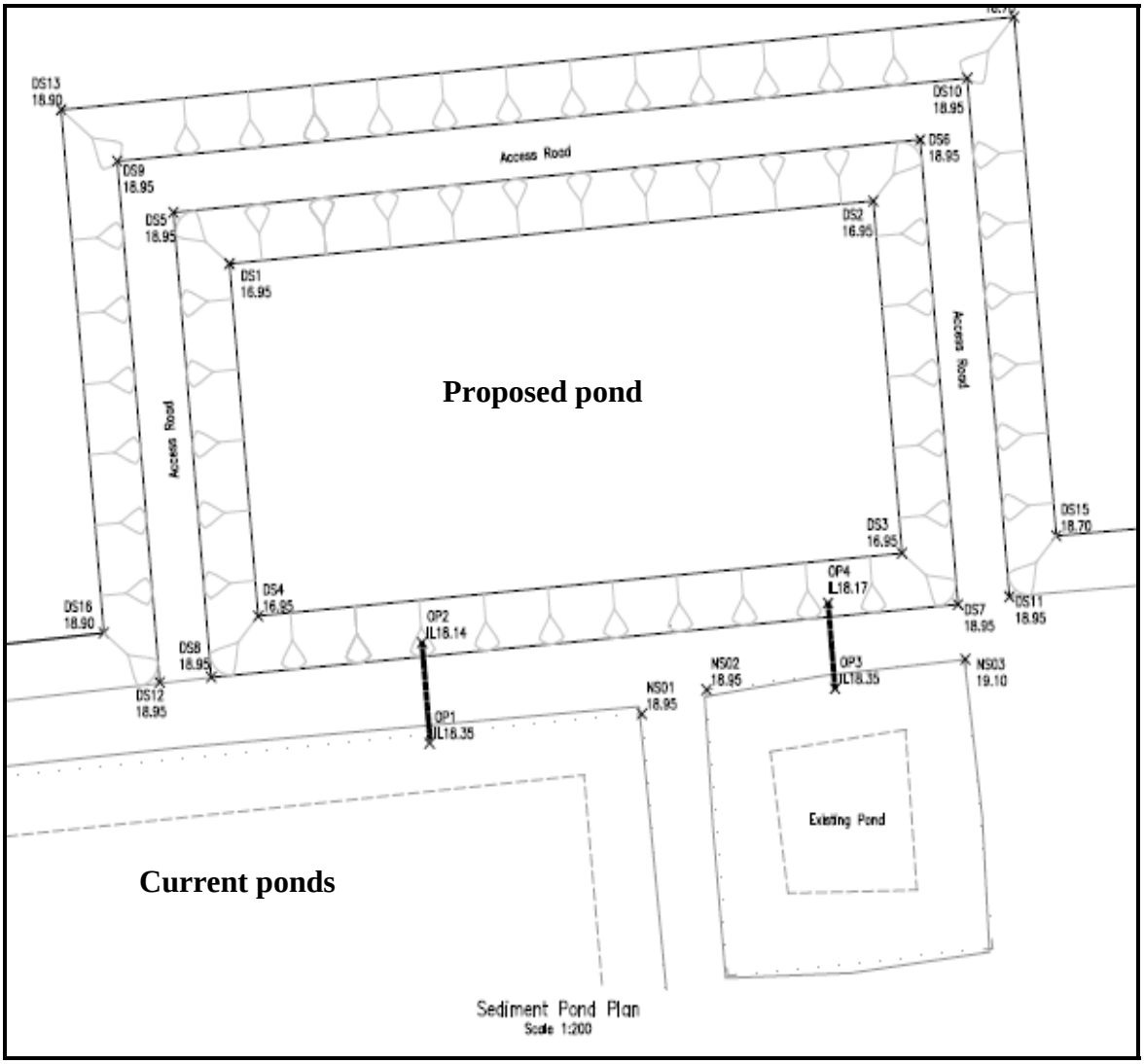

Figure 4: Liquid waste facility showing existing ponds and proposed new pond.

The proposed second evaporation pond will have the ability to either take overflow from the current evaporation pond or be filled directly from the northern most effluent receival pond.

A Works Approval application has been prepared by the Shire of Roebourne for the construction of the additional pond and the DEC has responded by drafting an Environmental Assessment Report (EAR) to provide information on the management and mitigation of emissions and discharges from the new pond.

Prior to progressing the redevelopment of the current facility by constructing an additional evaporation pond the Shire wishes to explore other options that may provide add-on benefits to the Shire.

13.8.4. Discussion Regarding the Expansion of the Ponds

Immediately to the north of the landfill site a new industrial Estate is planned and is to be known as the Karratha Support Industry Estate. This will place future industrial neighbours at 200m from the proposed evaporative pond and 230m from the closest effluent receival pond. The 7 Mile Landfill site already periodically experiences offensive odour emissions from the liquid waste facility which are discussed in Section 14.3 at item L6 of the Gap Analysis.

The landfill site is vast and located several kilometres from sensitive land uses such as residential housing and food preparation and entertainment areas. With the high evaporation rate within the Pilbara region and the relatively low annual rainfall when compared to the evaporation rate the local water balance at the site favours the operation of an evaporative liquid waste treatment process.

The primary intention for the redevelopment of the liquid waste facility is to increase the facility's capacity in order to accommodate the disposal needs of the community and secure the resultant revenue from accepting the liquid waste. For a modest capital expenditure, potentially less than $500,000, the Shire will create the throughput capacity to theoretically generate further revenue $2,000,000 per annum.

The ability of the proposed redeveloped facility to be able to cater for the additional throughput will be the operation of the current and proposed evaporation ponds in parallel. That is, the proposed pond must be filled from the effluent receival pond and not take overflow from the current evaporation pond. Operating the evaporation ponds in parallel will not improve the quality of the final residual liquid. If the evaporation ponds were operated in series then the quality of the liquid in the final evaporation pond would be higher than that contained in the intermediate pond.

Consideration needs to be given pond capacities when designing the redevelopment of the facility to ensure that there is adequate retention time of effluent within the ponds. During the liquid waste treatment process continual discharge of CH_4 and CO_2 to the atmosphere will occur. The volume of discharged gas emissions is reduced by effective treatment by the liquid waste ponds.

The anaerobic effluent receival ponds are to be designed to retain the liquid waste for a fixed number of days. The number of days the materials stay in the effluent receival pond is called the Hydraulic Retention Time (HRT). The HRT is derived using the volume of the pond divided by the daily flow. The HRT is important since it establishes the quantity of time available for bacterial growth and subsequent conversion of the organic material to gas. A direct relationship exists between the HRT and the volatile solids converted to gas.

The Shire does not have control over the quality of effluent deposited in the effluent receival ponds as it does not sample and test deliveries. To test deliveries would be uneconomical and impractical as for any monitoring procedure to be successful a broad suite of analytes would be required to be tested including heavy metals and hydrocarbons.

13.8.5. Establishment of a Green Belt at the Landfill

It is understood that the Shire is considering the establishment of a green belt along the landfill site's northern boundary to provide a visual barrier in readiness for the development of the Karratha Support Industry Estate. To maintain such a green belt subsurface irrigation would be required over an area of approximately 6,000 m^2. At 15 Litres per m^2 per day around 600 kL per week of water would be required. If treated recycled water from the liquid waste facility is used for irrigation then the volume of effluent expected from the establishment of the Gorgon project could be consumed in watering the green belt.

13.8.6. Department of Health Recycled Water Guidelines

The Department of Health has recently released its *Draft Guidelines for the Use of Recycled Water in Western Australia (April 2009)*. The guideline uses a risk management based approach to the assessment of water quality and reuse by encouraging the proponent to understand the systems that it is proposing. The new guideline does not include any classifications for the quality of recycled water.

The former *Department of Health Waste Water Reuse Principles* included as it's Appendix A *Fit for Purpose Guidelines for Recycled Water*. The guideline has recycled water classified into several classes including Class D which can be used for irrigating non-food crops including turf, wood lots and flowers. The requirements for Class D recycled water are:

- E.coli at less than 10,000 organisms per 100 ml,
- pH of between 6 and 9,
- Biological Oxygen Demand less than 20 mg/L, and
- Suspended Solids less than 30 mg/L.

It is unknown if the water in the current evaporation pond would qualify as Class D recycled water. Prior to advancing a decision on the redevelopment of the liquid waste facility it is recommended that the Shire sample the water in the current evaporation pond and establish its status against the above parameters.

13.8.7. Alternative Treatment Technologies

It is understood that the Shire has undertaken preliminary investigations regarding mechanically assisted biological treatment processes. The intention is that the Shire investigates the utilisation of mechanical water treatment processes to produce treated recycled water to Class D quality for use in irrigation at the site.

Two suppliers of treatment systems under consideration by the Shire are Biomax and Moltoni Corporation. The design of the various treatment systems, although differing in patented design, is similar and based on the use of technology to mechanically enhance the biological processes that occurs within the effluent pond system.

The logic is to reduce the storage volume of the facility thus reducing the facility footprint by enhancing the anaerobic and aerobic bacterial action. In order to increase the anaerobic bacterial capacity of a facility one method employed is to increase the available free surface area within the tank by filling the tank with particles designed to have maximum surface area. Where aerobic (with oxygen) decomposition processes are used mechanical aeration is used to accelerate the aerobic bacterial action.

Enhancing the performance of the bacteria within a treatment system increases the risk of system failure from variations in effluent consistency. To reduce the risk of system failure it is advisable for the effluent to be drawn from a storage pond or holding vessel to allow quality compliance checks to be carried out prior to the effluent entering the mechanical treatment process. One contaminated delivery of effluent can kill off the bacteria in the mechanical system rendering the facility inoperable.

It is recommended that should the Shire install a mechanical treatment process that the effluent be drawn from the evaporation ponds and that the quality of the water in the ponds be established on a regular basis.

Mechanical treatment processes require labour to manage the facility operation, power supply to operate pumps and compressors and routine and breakdown maintenance to keep the plant operable. Continual monitoring and testing of the effluent within the tanks is also required to ensure that there is no shock loading on the bacterial processes.

Plant capacity can be scaled up to 500 kL per day and is directly proportional to the cost of the facility. By drawing water from the current evaporation pond the capacity of the plant is not critical and a plant could be scaled to produce the 600 kL per week required for irrigating the green belt.

13.8.8. Recommendations Regarding Redevelopment of Liquid Waste Facility

1. Continue with the construction of the additional evaporation pond to increase the capacity of the current liquid waste facility.
2. Carry out an assessment of the HRT required to treat the expected 600 kL per week of effluent from the Gorgon project.
3. Regularly sample the effluent contained in the current evaporation pond and test for the parameters for Class D recycled water.
4. Investigate the financial feasibility of establishing a mechanical liquid treatment plant capable of producing Class D recycled water as an annex to the liquid waste facility drawing effluent from the evaporation ponds.

13.9. FILLING PLAN

Landfilling occurs in several locations across the landfill. In total it was concluded that there is currently 17 separate tipping locations active at the landfill in addition to the liquid drop off facility and the drop off facility adjacent to the weighbridge.

17 tipping locations is well above an unreasonable number of locations to manage, particularly with limited resources, as is the case at 7 Mile Landfill.

By consolidating the tipping locations less supervision, excavation, waste covering and litter collection would be required. This will assist with site productivity, reduction in demand on plant and man hours and improved environmental compliance.

Tip faces could be consolidated into the following:

Location 1

- Tipping rubbish truck and clean inert fill (to be used for landfill cover) at top and push down, and
- Tipping asbestos, hazardous, dry chemical, medical, empty drums and quarantine waste at bottom and apply landfill cover from top using waste from rubbish truck and topped with clean fill.

Location 2

- Tip industrial trucks at top and push over and down, and
- Tip light vehicles at the bottom, push in and cover with industrial waste topped with clean fill.

Location 3

- C&D waste in one location, either at the bottom and push in or at the top and push over.

Location 4

- Separate pit for dead animals and waste covered as deposited.

Location 5

- Light metal, car bodies, fridges and other white goods placed in one location for collection or further treatment. Refer L36 in Landfill Gap Analysis for discussion on in-house methods for de-gassing refrigerators.

Location 6

- Timber for future recovery or use with greenwaste in composting, and
- Greenwaste for composting.

Location 7

- Tyres buried in lots of 100 in a dedicated pit, potentially for future recovery.

Location 8

- Medical waste with waste covered when deposited.

All waste, except timber, greenwaste and metals, is to be covered with a minimum of 230mm of suitable cover material daily. Hazardous and medical waste etc are to be covered with 1.0m of cover; we are proposing to use waste as cover as an option where possible. The location of asbestos is to be mapped in the landfill.

13.10. WASTE COMPACTION

The objective of waste compaction is to maximise the utilisation of landfill space and land used to dispose of waste. Compaction also improves the stability of landfills, and minimises voids that encourage vermin, fires or excess generation of leachate. A well compacted landfill will also suffer fewer settlement problems. Waste should be placed in a manner that is mechanically stable and that controls litter and birds and maximises the degree of compaction.

Other requirements for achieving good landfill compaction are:

- Ensure there is sufficient volumes of cover material in order to cover the waste daily,
- Maintain as small as possible width for active tipping and no greater than 2m in height,
- Compaction of all waste deposited in the landfill, and
- Assurance that waste is placed so that all unconfined faces are mechanically stable and capable of retaining cover material.

Compaction of waste should be undertaken to ensure that the existing landfill space is optimised. The degree of compaction of the deposited material will play an important role in conserving air space, generating increased revenues and minimising subsequent settlement. The landfill operation will aim for a determined compaction level through the use of appropriate equipment and good operating practices. Equipment to be used can include a compactor, dozer and excavator. Other ancillary equipment on a landfill can include a grader, water cart and tip truck.

Other measures for best practice waste placement and compaction include:

- Keep covering waste to maintain the active tipping area at less than 30m x 30m,
- Place wastes at the base of each lift and compact wastes in layers of approximately 500mm,
- The waste deposited at the tipping face compacted in 500mm layers using a minimum of five passes by the compactor, and
- Ensuring that bulky items are independently crushed prior to landfilling and covered with other waste. It may be necessary to excavate a trench in the landfill to bury large bulky items.

The proposed compacter is a Bomag 732 compactor, with a weight of 38 tonnes and should achieve the optimum compaction level.

Selection of the compactor is dependent on:

- Amount and type of waste to be handled on a daily basis,
- Amount and type of soil cover to be handled,
- Distance cover material to be transported,
- Weather conditions,
- Compaction requirements,
- Landfill method utilised,
- Supplemental tasks,
- Budget, and
- Growth.

The Plant Operator should ensure that every effort is made to achieve the optimum compaction rate (tonnes per cubic metre) continually pushing waste onto the compacting area. The Plant Operator is also responsible for continually spreading and compacting waste pushed onto the compacting area.

If the optimum compaction rate is not achieved, the method for compaction should be reviewed in context with the types of waste being received. If low density waste is being received and the target rate cannot be achieved, then no further action may be necessary. If action is necessary, this may include increasing the number of passes over the waste, upgrading of equipment used at the Landfill, reviewing how much cover is being applied and if it is being removed prior to further landfilling.

A landfill density of 750kgs/m^3 is normally considered an optimum compaction rate and can be used as the initial target compaction rate for the 7 Mile Landfill. The achieved compaction rate can be calculated by recording the weight of all materials, including cover materials, deposited in the landfill over a set time period. Volumetric surveys carried out at the commencement and at the end of the reporting period will allow the actual landfill density to be calculated.

13.10.1. Compactor Operation and Landfilling Procedure

5. PRE START: do a complete walk around check of machine, including condition of wheels/tracks, wheel points, scraper bars, blade, lift cylinders, oil leaks and any other vehicle damage or wear.
6. Check all oils, grease unit, controls and gauges and check the warning panel.
7. Start machine and allow it to warm up.
8. Set out your tipping area with signs or traffic cones.
9. Access area to be filled in a normal workday.

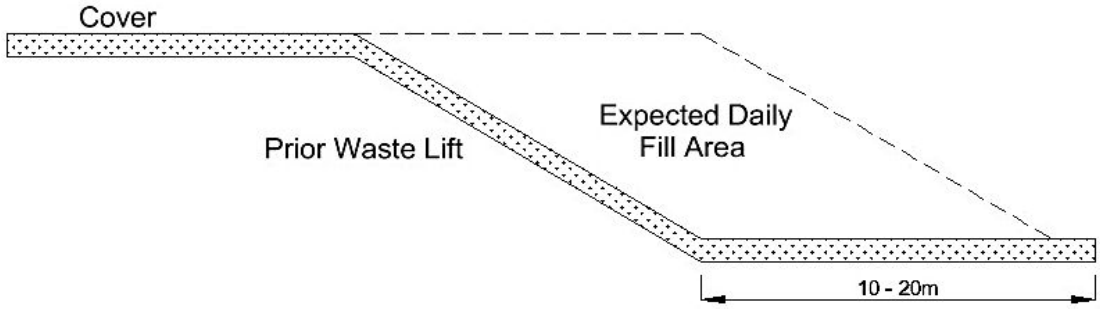

Figure 5: Expected daily fill area.

10. Each level of cover or road material that is not removed must be ripped before the next bench of waste is placed to allow the migration of leachate down to the collection system. If this cover is not ripped then there is potential for the leachate to travel horizontally. This will result in leachate discharging through the side wall of the capping material and down the outside of the cell and is known as leachate 'pop outs'.
11. As waste comes in, shape waste lift as per diagrams.

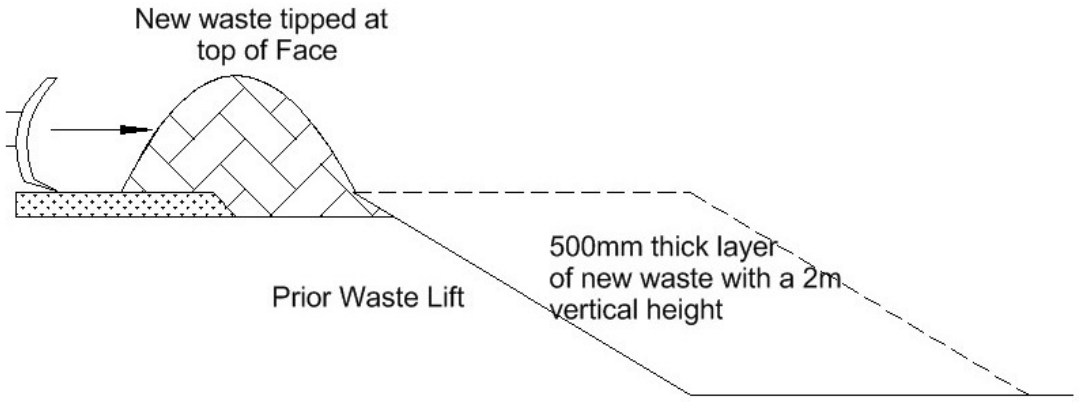

Figure 6: Shaping the waste lift (Pushing Down Method).

12. Continue to add waste to area in levels of 500mm to obtain maximum compaction.

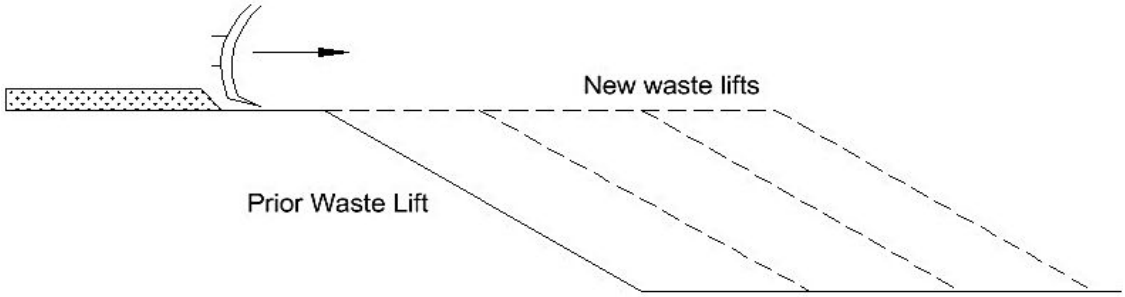

Figure 7: Add waste to gain maximum compaction (Pushing Down Method).

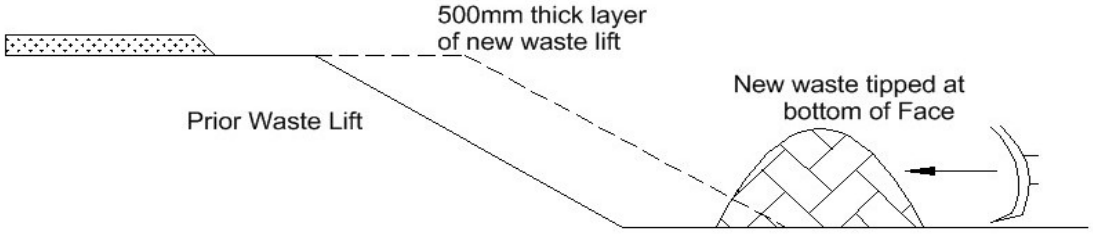

Figure 8: Shaping the waste lift (Pushing Up Method).

13. Compact from top of waste to toe.
14. Maximum compaction is gained by compacting from bottom of waste to top (push up), however, provided waste is put in at depths of 500mm and compacted with five passes of the compaction equipment, compaction from top to bottom is adequate.

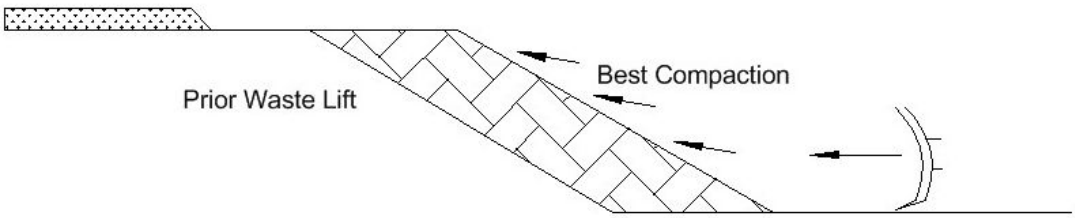

Figure 9: Maximum compaction (Pushing Up Method).

15. At the end of day make sure waste levels are correct, if not, push waste back up from toe to fill holes or raise level.

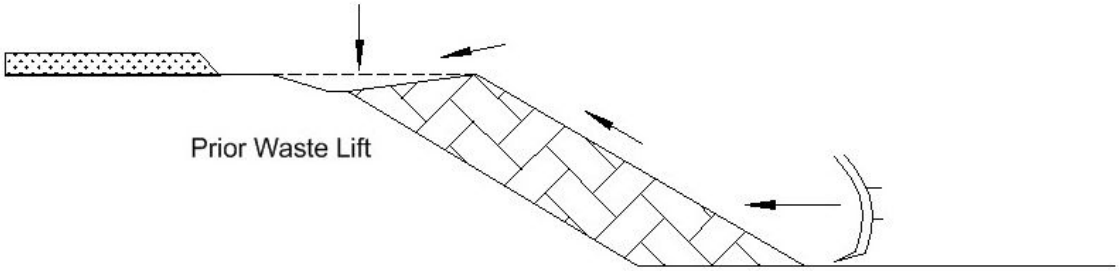

Figure 10: Waste levels are correct.

16. At an agreed time each day close down half the face area to allow for the covering operation to begin.
17. Once the required level is obtained, cover may be applied. Overall landfilling of waste is to be taken to 1m below the design final cap height.

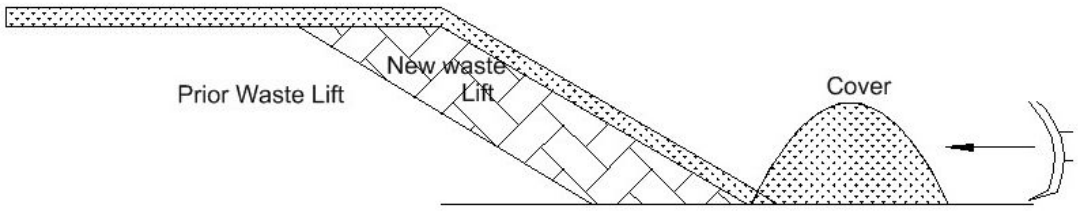

Figure 11: Application of cover.

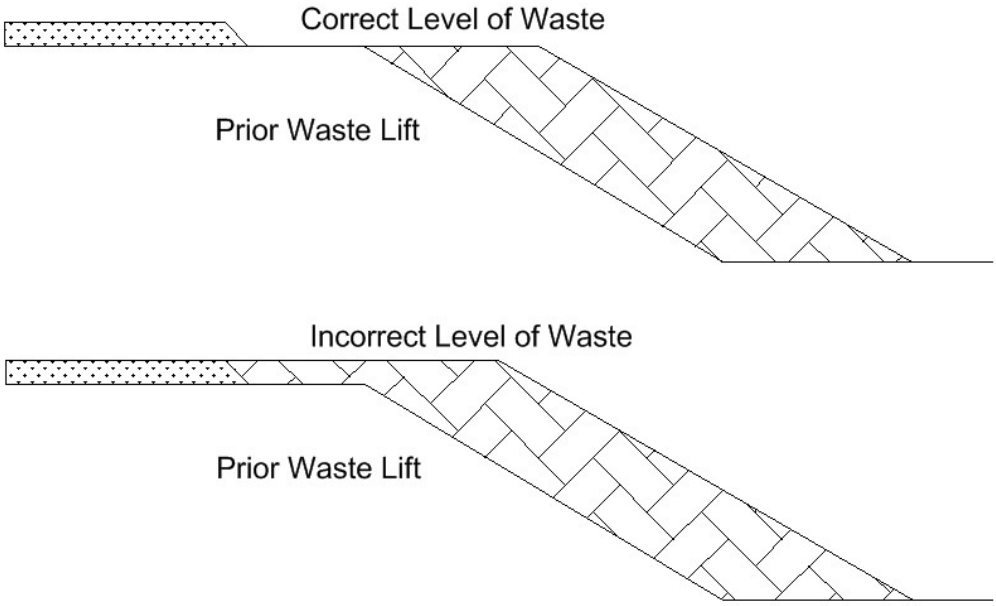

Figure 12: Maintain correct waste floor level.

18. Once all work is completed, idle down the machine, turn off and make sure it is locked up. Never park machine on exposed waste in case of fire.

13.11. FACTORS GOVERNING COMPACTION

- Refuse Layer Thickness – The depth of each compacted layer is the single most important controllable factor influencing density. To obtain maximum density, waste should be spread and compacted in layers not exceeding a depth of 500mm. Thicker layers will reduce the density that a machine can develop in a given number of passes.
- Number of passes – Number of passes made over the refuse also affects density. Regardless of the type of machine used, the unit should make five passes to achieve optimum density. More than five passes tends to result in little additional compactive effort.
- Slope – Maximum compactive effort by a track-type unit is achieved by working the waste on a maximum slope of 5:1. Track-type machines achieve higher densities by grinding and shredding the refuse into smaller pieces as they climb a slope. The opposite is true for landfill compactors, the flatter the slope the better. This is because the weight of the landfill compactor is more efficiently utilised and concentrated when working on a flat surface. Landfill compactors that are used on slight slopes (maximum 8:1) achieve a higher compaction density due to shearing stress that aids shredding and better blending of material.
- Moisture Content – Moisture content has been shown to have a significant effect on compacted density. It is believed that water tends to weaken the bridging characteristics of refuse, particularly paper and large pieces of cardboard, thereby allowing tighter consolidation. The water may also act as a lubricant as it does for soils. A minimum amount of moisture can increase refuse compaction density by 10%. The optimum

moisture content for maximum compaction of household refuse appears to be around 50% by weight. Field tests show actual moisture contents vary from 10-80% during dry and wet seasons. Although higher moisture content can provide higher in-place densities, the chances of leachate formation also increase.

13.12. LANDFILL COVER

An essential part of landfilling operations is the placement of cover over wastes. The purpose of cover is to mitigate against any environmental or health impacts including:

- Minimising landfill odours,
- Controlling litter,
- Preventing the spread of fire,
- Controlling disease vectors such as birds, flies, mosquitoes and rodents,
- Ensuring that the landfill is trafficable,
- Limiting infiltration of water, and
- Minimising emission of landfill gas.

Waste should be covered at the end of every day, however if significant volumes of waste are received waste should be covered to maintain the length of the active tipping area at less than 30m.

Daily cover should be applied to a minimum cover thickness of 225mm. When sandy soils are used the thickness of cover may be as much as 300mm in order to achieve the required coverage of waste. Materials other than soil must not be used without approval from the Director of the DEC.

At least two weeks cover material must be available at the waste facility under all weather conditions. This material can either be obtained on-site, or alternatively delivered to the site and a cover stockpile for at least two days must be maintained adjacent to the tip face at all times.

Daily cover will be used at the end of each working day to cover the deposited waste. The cover material will typically be sand, soil or biodegradable sheeting. The choice of material used as daily cover will be an important management consideration at the landfill as it could potentially limit gas and leachate movement, thereby stratifying the waste. The daily cover may be scraped back before additional waste is placed on top and if this occurs, the daily cover will then be stored for reuse.

An intermediate cap (thickened daily cover material) will be placed over waste that will be left for extended periods of time, e.g. in excess of 90 days. Prior to placement of wastes over these areas the intermediate cap will be removed and the surface ripped to prevent stratification within the waste body.

13.12.1. Daily Cover

A daily cover of minimum 225mm will be applied over the waste prior to ceasing operation at the end of each day. If sand is used, the cover will be at least 300mm.

If odorous loads are received, these are buried amongst existing waste as soon as possible. Daily cover material will be removed prior to the commencement of filling operations.

13.12.2. Intermediate Cover

Intermediate cover material is applied to a depth of 300mm (greater if sand is used) over surfaces that will be exposed for more than 90 days.

To promote water runoff while the intermediate cover is exposed (and also when buried) the cover will be graded at a minimum slope of 2% away from the void face. This will also limit the potential for build up of leachate against the void face.

When active landfilling is to be recommenced over an area previously capped with intermediate cover, the intermediate cover will be stripped off to the degree practicable or ripped in order to minimise the potential for a perched leachate level to subsequently develop over the intermediate cover. Where intermediate cover is not fully stripped back, the edge of the cell along the void face will be ripped to allow free drainage of leachate. Additional windows will be cut in the intermediate cover also to allow through flow of water.

Wherever cover has been shifted due to strong winds, a reapplication of cover is required in order to maintain appropriate waste coverage.

13.12.3. Cover Material Stockpile

Material excavated from the site will be stockpiled next to the landfill area. A minimum two week supply of cover will be maintained on site for the landfill operations.

13.13. RESOURCE RECOVERY

As part of the aim to minimise the volumes that are landfilled, a resource recovery facility is proposed. Designed as a drop off centre, it will ensure that every light vehicle that enters the landfill site passes through the drop off area and disposes of the particular materials in appropriate locations. Each location will have a generic sign indicating the type of waste to be deposited, and segregated within a delineated area using posts, fences, screens or barriers, (refer Appendix N and O).

Light vehicles will be allowed to dispose of recoverable as well as waste materials and leave the site without having to enter the working landfill areas. After the light vehicle, usually residents, has deposited the recoverable materials, typically waste suitable for separation, it will then move to a waste drop off area. At this split level tipping area waste can be dropped into a ‘pit’ where the landfill attendants can give a final check for recoverable material and load the residual waste into bulk skips for removal to the landfill tipping area.

The recoverable materials that accumulate at the drop off facility should be regularly moved to larger stockpiles within the landfill site where either only the landfill staff have access or waste collectors will come in and remove the recovered wastes for recycling and/or transportation. The drop off facility will enable all recoverable items to be recycled in the future providing recycling is a commercially viable option. This will include ferrous and non-ferrous metals, cardboard and paper.

The proposed recoverable areas will be categorised as:

- Used Oil Facility – A used oil facility is to be constructed with a bunded perimeter and HDPE lining or equivalent system for spillage and ground protection (Appendix M),
- Household Hazardous Waste (HHW) - A secure storage locker within a fenced enclosure is to be provided for the containment of HHW (refer Plates 36 and 37),
- Light Metals,
  - White Goods – will be de-gassed, separated and crushed for recycling
  - Sheet Metal,
- Gas Bottles – shall be received empty of contents. Valves are to be removed prior to recycling,

- Non-Ferrous Metals,
  - Hot water services
  - Radiators
  - Alloy metals – will be stacked for removal and recycling,
- Batteries – wet cell batteries will be stacked on wooden pallets for collection,
- Tyres,
- Timber,
  - Pallets,
  - Building Timber,
- Plastic Car Parts – bumpers and similar components will be recovered for plastic recycling.
- Greenwaste,
  - Small deliveries to the drop off area
  - Bulk loads direct to landfill location, and
- Asbestos,
  - Small deliveries to the drop off area
  - Bulk loads direct to landfill location.

All other waste types that are not referred to in this section qualify to be landfilled or stored on site at a separate location to that of the Resource Recovery Area and tipped at the waste drop off area at the same site.

The Landfill Licence does not specify any requirements for resource recovery, other than the prevention of greenwaste and tyres to landfill. The importance of resource recovery lies in the environmental benefits of reducing the amount of waste to landfill. It is best practice to establish an operation to salvage and/or recycle suitable wastes delivered to the landfill.

13.14. LITTER FENCES

The use of litter screens ensures that wind-blown waste (litter) will be contained within the boundaries of the site and any waste that has either washed or blown away from the tipping area will be collected and returned to the tipping area on a weekly basis in accordance with the Landfill Licence.

7 Mile Landfill currently has the minimum requirements for the management of wind-blown waste which is the 1.8m boundary fence. This fence doubles as a security and litter fence.

It is proposed that litter screens be employed at the site for effective litter management closer to the source of the litter, i.e. the tipping face.

Effective litter screen management relies upon good strategic placement of the screens, an understanding of the weather conditions and efficient removal of litter buildup from collection traps.

Appendix U and V demonstrate two different scenarios for litter management using portable litter screens. The two scenarios relate to the two different landfilling techniques employed at a stage where landfilling is above ground, pushing up, or below ground, pushing over.

Litter fences are commonly 2m high mesh panels. They are generally quite portable as the function accounts for the changing shape and movements of a landfill. Panels are usually supported by star pickets driven into the ground and secured to each other using wire, clamps or cable ties. Props or stays may also be used for added stability. This ensures that strong wind gusts will not blow over the panels when litter buildup occurs, which creates a sail effect on the litter fence. Periodic returns or mesh placed on the stays assist to trap litter allowing it to build up in specific locations making collection of litter easier.

Companies that produce temporary type litter screens include:

Australian -

www.watempfencesupply.com.au

http://www.newwaste.com.au/freedom.aspx?pid=215

http://www.readyfence.com.au/

Overseas -

http://www.boddingtons-ltd.com/forestry/litter-fence-netting.htm

http://www.windpatrol.com/

http://mettatechnologies.com/BULL.html

13.15. ADITORIALS FOR PROMOTING THE SERVICE

Following discussions with the Shire's Waste Management personnel it was agreed that as part of this project a set of 'aditorials' would be prepared with the intention of being used to promote the Shire's waste management services.

Appendix D, E, F, and G are draft layouts of aditorials, being advertisements disguised as newspaper articles, intended to be placed in the local newspaper to communicate current developments within the Shire's waste services.

13.16. FINAL CONTOURS

13.16.1. Current Landfill Area

It has been commented by Waste Management staff that the current landfill area in the vicinity of Area 1 is approaching the target height. Spot heights taken on the Area 1 landfill by the Shire's Survey Department indicate that the highest point in the landfill is 24.2m AHD. The plan of the existing base contours (Appendix X) shows the highest point on Area 1 to the north of the current landfill and the lowest point of 11.7m AHD in the new Area 6 excavation.

13.16.2. Groundwater Table

Item L31 of the Landfill Gap Analysis (Section 14.3) recommends that the Shire research the elevation of the groundwater table and provide guidance to contractors as to the required depth of any future excavation in order to be compliant with the Landfill Licence conditions.

The Shire determined on December 15 2009 the depth of groundwater in the Area 6 location to be at 10 to 12m AHD, refer Appendix K.

The Landfill Licence indicates that the groundwater table is at 10.2m AHD.

13.16.3. Current Landfill Excavation

In order to maintain the required 3.0m clearance to groundwater table the base of the current Area 6 excavation must be backfilled by 3.0m to a typical level of 14.7m AHD (13 to 15m AHD).

The Shire proposes to carry out additional excavations in Area 6 during 2010 to create additional landfill area. The depth of any future excavation should be kept above 14.7m AHD. Material excavated from the future Area 6 excavation can be used to backfill the current Area 6 excavation. The larger area proposed for Area 6 will assist with waste placement and the operation of the new landfill compactor due for arrival around March 2010.

13.16.4.Proposed Final Landfill Contours

The Shire's Survey Department has carried out desk top modeling for final contours for waste placement in the Area 1, 2, 3, 5 and 6 landfill locations. With the inclusion of the proposed excavation of Area 6 the current landfill area will eventually cover an area of approximately 20ha (199,375m^2) and have remaining airspace for landfilling waste of 1,068,412m^3.

The assumptions for these computations were to assume 1 in 4 grades on the external batters of the landfill cap for waste placed above natural ground and around 1 in 100 cross fall on the crown of the future capped landfill. The base of future landfill excavations to be above 13 to 15m AHD. The highest point of the final capped landfill will be 25.5m AHD (Appendix Y).

13.16.5.Life Expectancy of the Current Landfill

It has been estimated by the Waste Management Division that the 7 Mile Landfill will accept during the current 2009/10 year:

- Total hard waste of 92,838 tonnes
- Total liquid effluent of 32,204 tonnes
- Total clean fill of 40,420 tonnes

As the clean fill and the hard waste will most likely be landfilled in the same area, and the clean fill will be used for landfill cover, the estimated solid waste to be landfilled in the current year is 133,000 tonnes.

Assuming an annual growth in solid waste volumes of 10% per annum and an overall landfill density of 750kgs/m^3, the life of the current landfill area including Area 6 is 5 years (Table 24).

Table 24: Estimate of Remaining Airspace in Current Landfill Area

YEAR	AVAILABLE AIRSPACE (M^3)	TONNES LANDFILLED PER ANNUM (TONNES)	AIRSPACE CONSUMED (M^3)	REMAINING CAPACITY (M^3)
1	1,068,412	133,258	177,677	890,735
2	890,735	146,584	195,445	695,290
3	695,290	161,242	214,990	480,300
4	480,300	177,366	236,489	243,811
5	243,811	195,103	260,137	-16,326

Therefore, the recommendation is that the Shire should commence planning for a future landfill area on the current 7 Mile Landfill site incorporating Downer EDI future excavated material needs and resource recovery to further conserve airspace.

13.16.6. Proposed Future Landfill Expansion

To the south of Area 6 is an expanse of land within the 7 Mile Landfill site of approximately 40 Ha. Within this area are the below ground hazardous waste pits and a prior above ground landfill that cannot be disturbed. A hard rock deposit is located at the south west corner of the site. A large portion of this land can however be excavated and the resultant void be used for future landfilling.

Using the same design criteria as above the Shire of Roebourne has estimated that within this southern area of the landfill site a future expansion of the landfill can be undertaken which will generate a further 4,418,000m^3 of landfill airspace (refer Appendix ZA).

Assuming the same annual growth in solid waste volumes of 10% per annum up to a peak of 260,000 tonnes per annum and an overall landfill density of 750kgs/m^3, the future landfill area located to the south of the site will add a further 13 years to the landfill life making the estimated life expectancy of the landfill a total of 18 years (Table 25).

Table 25: Estimate of Airspace in Future Landfill Area

YEAR	AVAILABLE AIRSPACE (M^3)	TONNES LANDFILLED PER ANNUM (TONNES)	AIRSPACE CONSUMED (M^3)	REMAINING CAPACITY (M^3)
1	1,068,412	133,258	177,677	890,735
2	890,735	146,584	195,445	695,290
3	695,290	161,242	214,990	480,300
4	480,300	177,366	236,489	243,811
5	243,811	195,103	260,137	-16,326
6	4,418,000	214,613	286,151	4,131,849
7	4,131,849	236,075	314,766	3,817,083
8	3,817,083	259,682	346,243	3,470,840
9	3,470,840	259,682	346,243	3,124,597
10	3,124,597	259,682	346,243	2,778,354
11	2,778,354	259,682	346,243	2,432,111
12	2,432,111	259,682	346,243	2,085,868
13	2,085,868	259,682	346,243	1,739,625
14	1,739,625	259,682	346,243	1,393,383
15	1,393,383	259,682	346,243	1,047,140
16	1,047,140	259,682	346,243	700,897
17	700,897	259,682	346,243	354,654
18	354,654	259,682	346,243	8,411

13.17. SITE REMEDIATION AND LANDFILL CLOSURE

13.17.1. Dry Tomb Landfills

Landfills are areas of land set aside near communities for the disposal of unwanted materials (waste). Traditionally waste is deposited at a distance from the communities to reduce vermin and disease within the community. Waste was previously left to rot and decay and often regularly burnt to reduce odour, vermin and to create further space for landfilling.

More recently waste includes paper, plastic and other fabricated materials along with household items such as furniture and appliances. As we move ever more towards being a disposable

society the disposal of surplus household items other than kitchen waste is adding an increased management burden on landfills. The increased volumes of wastes produce more toxic smoke if burnt.

The burning of waste in landfills is no longer allowed. Waste in landfills is now buried with dirt resulting in waste decomposing with the absence of air (oxygen). With the assistance of infiltrating moisture, decomposing waste in an anaerobic environment generates methane, which enters the atmosphere, and produces liquid known as leachate, which leaches into the surrounding soil.

Methane is 21 times more detrimental to our earth's atmosphere than carbon dioxide, which is given off as a result of decomposition in the presence of oxygen. To minimise these negative side effects of covering waste in a landfill the 'dry tomb' landfill was encouraged.

A dry tomb landfill has an impervious barrier underneath the waste that can be either a clay based impervious floor or a synthetic lining system made from plastic. The top of the landfill is sealed using clay or other impervious material and the waste is effectively entombed in a dry state without the infiltration of moisture to assist in the decomposition of the waste. The 7 Mile Landfill is effectively a "dry tomb" landfill.

13.17.2. Landfill Site Closure

Site closure occurs when no more waste is to be accepted at the site; it does not refer to the continual completion and capping of cells throughout the life of the landfill. Site closure is an essential final activity in meeting the primary environmental goal of land management and conservation. Proper operation of a landfill should result in efficient remediation, enabling land to be used for other purposes following closure.

Many of the chronic impacts of landfilling occur long after the landfill has closed, and while these can be mitigated against by good design and operation of the landfill, best practice rehabilitation and long-term aftercare of the site will further minimise the potential of any detrimental impacts from the landfill. Best practice for rehabilitation and aftercare is considered very early in the design and operation phase of the landfill.

There are two main aspects to site closure, as follows:

- Site capping and revegetation, and
- Post-closure monitoring and maintenance.

The final step for a landfill operator is to obtain a certificate of completion which states that further environmental management of the premises is not required.

13.17.3. Landscaping of the Finished Landfill

Landscaping and site improvement will be carried out on a continual basis throughout the landfill operation. The landscape works are undertaken to achieve the following objectives:

- To provide surface stability to areas disturbed by construction of perimeter earth mounding,
- To provide additional screening of landfill operations and associated infrastructure from potential view situations, and
- To enhance vegetation diversity and wildlife habitat associated with the site.

The landscape works should be developed in consultation with DEC and the Shire's Parks and Gardens Section.

13.17.4. Progressive Rehabilitation

Due to the Area 1 region of the landfill approaching finished height and future landfilling activities in general heading south into the Area 6 location, progressive rehabilitation of old completed landfill areas is able to occur. While waste placement and compaction occurs in new areas, an old area can be rehabilitated.

A Rehabilitation Plan should be prepared and include:

- Operational requirements, to ensure that the highest value after-use can be achieved,
- The potential after-uses for the site, taking into consideration trends in the surrounding area,
- Surface contours before and after settlement,
- Specifications and materials to be used in the final cap, and
- Preservation/installation of environmental performance control or monitoring features.

13.17.5. Landfill Cap

A key element of the rehabilitation is the capping of the landfill. The design objectives for the final landfill surface or capping should be:

- Minimising infiltration of water into the waste ensuring that the infiltration rate does not exceed the seepage rate through the base of the landfill;
- Providing a long-term stable barrier between waste and the environment in order to protect human health and the environment;
- Preventing the uncontrolled escape of landfill gas; and
- Providing land suitable for its intended after-use.

The landfill cap provides the long-term protection of the groundwater environment. The cap must be designed such that the infiltration through the cap does not exceed the calculated seepage rate through the landfill liner. This avoids the so-called ‘bathtub’ effect, in which leachate levels within the landfill build up and eventually break out through the surface of the landfill.

Rehabilitation plans are based on clear objectives and targets which can be effectively monitored and audited to confirm objectives are achieved. The objective of the landfill cap and rehabilitation plan is to ensure that landfills are rehabilitated to minimise the seepage of water into the landfill.

The primary objective for rehabilitation is to minimise environmental impacts resulting from permanent change to ecosystems. This requires the return of rehabilitated areas to self-sustaining and functional ecosystems comprised of local provenance species. The required performance standards of a Class II cap, and cap design, which is based on preventing infiltration by providing a very low permeability layer (clay or composite barrier) are outlined in Figure 13.

LANDFILL TYPE	CAP PERFORMANCE	INDICATIVE LANDFILL CAP	
Class II	75 per cent of the anticipated seepage rate through the liner	Topsoil / mulch	0.2m
		Soil sub base	0.5m
		Low permeability clay	0.5m
		Daily and Intermediate Cover	0.3m
		Waste	

Figure 13: Indicative landfill cap designs

If the proposed after use of a landfill is to require revegetation of the site, the top-most layer must be able to support vegetation and be of sufficient depth to ensure that roots do not penetrate the cap, providing a conduit for water into the landfill and water out of the landfill.

The surface layer should reflect the type and depth of topsoils normally found in the local area. Where it is not possible to duplicate the local topsoil conditions or the natural soil is too thin to support adequate vegetation for erosion control, then an appropriate mix of soils 200 to 300mm thick should be used, provided it is capable of sustaining vegetation. Any mulch used in the cap should be pasteurised to remove weed seeds, plant pathogens and pests.

Introduced plantings on the landfill should not include any noxious weed variety for that area, nor should the landfill provide a haven for weeds migrating from the surrounding area. Advice should be sought on species selected for planting to prevent them from becoming local weeds. It is advised that planting be restricted to species indigenous to the area and of local provenance to:

- Avoid inappropriate planting,
- Ensure the species are adapted to the local climate, and
- Enhance the local habitat.

The construction and maintenance of a low permeability clay layer for a cap is difficult for a number of reasons, including:

- The spongy foundation of waste on which it is built,
- Differential settlement of the waste causing cracking of the clay, and
- Desiccation of the clay from above due to evapotranspiration and below due to heat released from the landfill.

All of these significantly increase the effective hydraulic conductivity of the clay. The estimate of seepage rates through the cap should make allowance for this.

A drainage layer is sometimes placed between the soil layer and the low permeability capping layer. The purpose of the drainage layer is to remove excessive moisture that has permeated through the soil layer and will not be removed by evapotranspiration. Due to problems with desiccation of the surface or low permeability layer, drainage layers are generally only used in high rainfall areas or where the cap has a very shallow gradient.

14. GAP ANALYSIS

14.1. GAP ANALYSIS - COLLECTION

The tables within the following Gap Analysis identify opportunities for improvement that existed at the time of the Review which was conducted over two weeks during September 2009. As a result of discussions with management and staff of the Shire during the Review and following the release of a draft copy of the Gap Analysis to the Shire for comment the Shire's staff have been proactive in addressing many of the issues raised in the Gap Analysis. The tables are intended to be read by entire line from left to right with the final column detailing the status of the Shire's actions at the nominated date.

Table 26 summarise the observations made relating to the collection system that could have a negative affect on the waste services and includes discussion with recommendations and possible actions that can be taken.

Table 26: Gap Analysis - Collection

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C1	The new SynergySoft and MyData system may not allow the closing of the loop for Action Requests.	Currently the procedure is: • Bin forms emailed to Debtors and Rates Departments. • All Bin requests data updated on spreadsheet Bin repairs recorded as completed on "Bin Repairs" spreadsheet. Customer Service is and will remain the originator of most waste service requests. The current proposal for the new SynergySoft is that Customer Service will not have access to MyData and therefore will not be able to see electronically when requests have been completed.	When introduction of the new SynergySoft occurs consider the 'closing the loop' function of the MyData System for Action Requests raised by Customer Service.	In progress.
	No closure on bin delivery/replacements.	Discussions with staff suggest that the current system for closing out bin requests is not adhered to, partly in part due to it being a manual system with no associated checks or performance measures.	Formalise the communication process for bin deliveries.	Will look to have all inquiries sent to 7 Mile Landfill after Co-ordinator relocates to the landfill location; additional staff will be required to meet this and admin functions.
	No accountable method of closing off service requests for commercial pickups, bin repairs and customer requests.	Introduce a system where the originator and associated stakeholders are informed when service requests have been actioned.		

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C1 Cont.	Manual service request forms generated by customer service, these forms can be lost, action can be delayed.	Conflicting reports from staff, bin delivery forms are reported as sent electronically from Customer Services. A tracking system is required to identify all requests and when requests are closed out. During the introduction of MyData this should be considered.	Formalise electronic processing of customer enquiries with the introduction of the new SynergySoft and MyData.	In progress; SynergySoft and MyData upgrade.
	Limited communication from waste services to customer service to advise of service delays or problems.	The procedure is that an email is to be sent by the Waste Co-ordinator at least daily to Customer Service to inform of service difficulties. This does not always happen with Customer Service not knowing what is going on as it is dependant on Waste Co-ordinator or Leading Hand to initiate and is subject to availability of Co-ordinator or Leading Hand.	Formalise the process of sending email update from Waste Services to Customer Service.	Will look to have all inquiries sent to 7 Mile Landfill after Co-ordinator relocates to the landfill location; additional staff will be required to meet this and admin functions.
	Sometimes collection is delayed up to two days, confusion then as to what is the correct collection day.	Customers and residents are required to leave bins out until serviced. If this is not possible they are asked to place bins out on the next working day. The actual collection day remains the same and bins will be collected as normal. Delays are generally due to truck breakdowns where it is often unknown how long a repair will take. Truck serviceability is being addressed with the purchase of new and additional trucks which will alleviate the delays.	Instruction from Customer Service to Residents should be to leave the bins out until serviced, the regular collections days are those shown on the Shire information and website.	Agreed.
C2	New SynergySoft and MyData software being introduced and no staff training in its operation.	SynergySoft is currently being developed with focus on the Rates area of the Shire's administration system. Once the system has been introduced to the Shire successfully it will be expanded to include the waste service. Shire will conduct training in the use of the new software in coming weeks when appropriate.	Communication from the CEO is required to fully inform staff of the intended changes and timing of the changes to computer systems planned for each Department. This will not only educate staff in the proposed developments but allow input and participation in the process by staff.	

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C3	Co-ordinator's performance will be judged on ability to process data and paper work as well as the physical completion of the requests.	Customer enquiries, file management, purchasing, driver administration is undertaken by the Waste Co-ordinator. Based on my observations of Waste and Plant Co-ordinators computer literacy skills and the daily demands made on their time there is a need for additional administrative support to expedite data processing and allow the Co-ordinators to get on with their primary tasks.	Consider providing additional administrative support to both the Plant and Waste Co-ordinators. In the case of Waste Management customer service support and admin assistance is potentially a full-time position.	Additional staff will be required to meet admin functions when Co-ordinator moves to 7 Mile Landfill, transfer all waste enquiries to this area and assistance for admin functions.
C4	No current method of identifying electronically how many waste services are in the data base. No clear knowledge of actual number of bins collected.	Without fully understanding the number and street location of bin collection routes evaluation cannot be carried out. If the number of services required to be undertaken in every residential street route was known then re-configuration could be undertaken to restructure the routes to allocate workload and improve productivity.	Identify number of services by street name either by: IT preparing a Query Request, or Carrying out manual interrogation of the Mapping database. Extract Rates data from Synergy Soft using the Mapping function and manually compile number of services per street, or Using a spare person positioned in a truck, count the number of services by street for the complete waste system.	

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C5	Illegal dumping occurring at the end of Andover Way in Roebourne. Illegal dumping area to the south west of town for car bodies, white goods, old lounges etc.	The area between Mount Welcome and the water pipeline has become a unauthorised but tolerated dumping area for bulk waste. Although the Transfer Station is no more than three minutes drive from Roebourne the local site remains a popular dumping location. This is in part due to the many unregistered cars in town that are loath to venture out onto the main road leading to the Transfer Station. Many of the residents of Roebourne are on welfare and have limited access to suitable transport to relay bulk waste items to the Transfer Station. The result is that it is far too easy, as well as customary, to dump waste at the back of the town, in some cases using un-licenced vehicles. Engineering mobilises a bulk cleanup of the area on an annual basis but this is time consuming as the waste is dumped over such a wide area. There have been efforts in the past to clean up the town; none have had any lasting success. A bulk skip service has been tried before. It was initiated by Department of Housing & Land Administration at Roebourne and through Shire of Roebourne Aboriginal Liaison Officer. The service was supported by the Waste Management division through the placement and service of Shire bulk waste bins at selected streets within Roebourne, but the bulk waste bin service is no longer available through the Shire. If the service was to be re-introduced private contractors would have to be involved. The Packaging Stewardship Forum has published a booklet called “The ‘clean up’ book for a happier, healthier, cleaner future”. The booklet provides guidance for regional shires and remote community managers on how to prevent and reduce litter.	Install barriers such as half buried truck tyres or similar to limit access to the area and deter the spread of waste. Confining the waste to a smaller area will allow the local practice to continue but in a more orderly and convenient fashion. Consider introducing a bulk skip service using subcontractors on request for the disposal of bulk household waste by approaching Department of Housing & Land Administration. Also approach Department of Housing & Land Administration and request that it provide assistance with an old car body muster to reduce the number of un-licensed and orphan cars in the town. Using the resources of organisations such as Packaging Stewardship Forum and Cleanup Australia investigate ways to clean up the town and adjacent areas. Using means of communication that are appropriate for the Roebourne community provide education on the importance of waste and litter reduction and good hygiene practices associated with waste management. Enforce the severe littering penalties as recently announced by the Minister for Environment; Youth.	Identify to Shire Rangers for follow up action.
C6	Illegal dumping occurring north of Wickham.	Judging by the nature and age of the waste dumped at the illegal dumping site near Wickham there appears to be a very small number of offenders. As the location is open and access is in full view of the town, offenders are most likely dumping rubbish under the cover of darkness.	Enforce the severe littering penalties as recently announced by the Minister for Environment; Youth. Construct large earth bunds or half buried truck tyres at all off road access points to the town to deter the dumping of waste at the town limits.	Identify to Shire Rangers for follow up action.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C7	New drivers are being trained without standard guidelines or record of training being undertaken.	New drivers undergo a disciplined recruitment process but receive *adhoc* training to perform the required tasks. At the time of the review two drivers that were employed for not more than three weeks were required to carry out collection runs that they had not previously seen. Many new drivers are not only new to waste collection but new to the area and have limited knowledge of streets and suburbs. The intended procedure is that the trainee driver is accompanied over a period of two weeks and is progressively introduced to the operation of the collection vehicle. The problem is that this is not always possible due to staff shortages. Training is provided by an experienced operator. Normally this would be a role carried out by the Leading Hand who has both the training and skills to carry out training of new drivers. Training is currently conducted by one or two experienced drivers as the Leading Hand does not have sufficient experience on waste trucks to train staff. Driver training is continued until the new operator and the trainer are content. High turnover of staff adds a burden on the recruitment and training process Introduction of a fleet management system with GPS tracking capability would assist drivers with route familiarisation.	Preparation of a training package including structured training on the maintenance and operation of the trucks and waste collection equipment. Attention to be given to ensure that the trainee driver once operating in solo capacity is kept on familiar runs until competent in the operation of the vehicle. Training should be carried out by an experienced person who is also appropriately skilled in trainer techniques. A trainer or the Leading Hand if appropriately skilled should review the performance of the drivers on a regular (3 monthly) basis by riding in the trucks for one load.	Have discussed the requirement for a Certificate IV trained assessor for all SoR plant operators to be signed off as competent prior to being sent out to perform works.
	Limited knowledge by all drivers of the servicing and greasing requirements of the waste vehicles.	One truck broke down due to poor greasing techniques. The damage resulted from lack of maintenance over a long period. With the high turnover of staff at the depot knowledge is lost due to no structured training regime. MacDonald Johnson should provide training when purchasing new trucks; remoteness means that this does not always occur.	Prepare a DVD or PowerPoint presentation to be used as a training tool for new drivers. The waste body supplier MacDonald Johnson was contacted and is willing to assist in the preparation of the package.	Will arrange for the Plant Co-ordinator (set up for mechanics) to run through all standard checks e.g. grease points and have sign off as acknowledgment from operators for the plant they are to use – run in conjunction with Certificate IV competency sign off.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C8	Roebourne residential MSW collection carried out twice weekly on Wednesday and Saturday.	Some years ago the Shire initiated a "Roebourne Enhancement Scheme" to alleviate litter issues across the town which includes a twice weekly kerbside waste service. It is understood that the Shire would have difficulty in converting back to one service per week. Review of Roebourne during the Wednesday collection run revealed that presentation rate was high and that most bins were either full or over full. Bin weights were slightly lower than other areas possibly due to the twice weekly service or due to the type of waste in the bins. Bulgarra West = 20.46kgs, Roebourne = 16.30kgs, Dampier = 19.42kgs per bin. The strategy of two services per week clearly is not working as litter is abundant and full bins can be seen on properties that are not being presented for service. Town cleanups have been undertaken in the past but waste disposal habits have not changed. Physical litter collection appears to be the most effective method for cleaning the town, a recent initiative "Litter Control Contracts" has provided good results. Approximately 15 tonnes of litter has been removed from specific targeted locations across the Shire including the township of Roebourne. The introduction of a two person Litter Control Crew operating in the Roebourne township to control litter and surrounds will send a good message to the residents. Canvassing support from the Packaging Stewardship Forum will provide funding and promotion of how communities can be kept clean. Reducing the service to weekly will force residents to use two bins (those who have them) rather than leaving one bin continually full, and present fresher waste to the kerb, minimising odour and vermin. A weekly collection will improve productivity by reducing the required number of lifts per week. As a compromise, the Shire could offer residents of Roebourne a second bin free of charge and service the two bins as a once weekly service.	Consider converting the township of Roebourne to a weekly collection in line with the rest of the Shire. As part of the weekly service offer residents a second bin free of charge for collection on a weekly basis. Budget for and adopt a fulltime Litter Collection Crew for the township of Roebourne and its surrounds. Contact the Packaging Stewardship Forum for support with litter control and cleanup initiatives.	Agree and Waste Co-ordinator reviewing runs and pick up areas at present. Review at end of waste report and budget as appropriate.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C9	Pavilion, litter and remote commercial collections carried out in same locations but on different days as residential collections.	Collection trucks do not work across litter, commercial and residential collections. One truck will visit an area on one day and another truck will go to the same street the following day. The reason given for not interacting these litter and commercial services with residential routes is that it is too confusing for the drivers. Joint collection was trialed during 2009 and bins were either missed entirely or left out by drivers after servicing. Comments are that it is not always possible due to restricted access, special customer requirements, continuity of work and service delays caused by truck breakdowns. The 2009/10 Budget allows for the purchase of a dedicated truck to carry out public waste bin collection and will be used for litter control services across the Shire. In order to facilitate the collection of additional/special services by the residential collection driver the services should be clearly shown on the route sheets for the drivers along with special instructions. With clear, detailed written instruction and adequate briefing the drivers should be able to attend to these additional/special services as part of their normal routes.	Integrate where possible commercial, pavilion and litter with residential collections.	Agree and waste Co-ordinator reviewing runs and pick up areas at present.
	Commercial and residential services done in Dampier on differing days.	Drive time in a waste collection truck from the Depot to Dampier is 30 minutes. Return trip to the landfill is 10 minutes. A truck drives out to Dampier on Thursday to service commercial bins and another truck goes out to Dampier to service residential bins on Friday. The collection of remote commercial bins using the residential truck will reduce travel time and improve productivity.	Reschedule remote and isolated litter bins and commercial services to allow collection using a residential collection truck when in the area.	Agree and Waste Co-ordinator reviewing runs and pick up areas at present.
	Karratha Recreation Centre is serviced on Monday and Friday. The nearby residential bins are serviced on Monday using a different truck.	Integration of isolated commercial and litter bins with the residential collection will reduce travel time. This was trialed in January 2009 - failed due to drivers being confused and delays to residential service. Work flow interrupted. Bins missed and forgotten.	Refer recommendation above.	Agree and Waste Co-ordinator reviewing runs and pick up areas at present.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C9 Cont.	Only residents in Jiwuna Street serviced on Wednesday; this is 10 minutes out of the drivers way.	Within 300m of the Jiwuna Street bin is the Roebourne Caravan Park, which is serviced on Tuesday. Comments made are that the Caravan Park is on the market and the service circumstances may change in the future but the Shire should dictate the service in this instance.	Contact the resident in Jiwuna Street and arrange bin collection for Tuesday as part of the commercial run. This strategy should be adopted in all locations where remote residential and commercial bins are in close proximity.	Agree and Waste Co-ordinator reviewing runs and pick up areas at present.
C10	Shortage of new bins and spare parts for bin repairs.	Administer bin stocks from the Store.		Introduced in August 2009 - completed.
C11	Run sheet for commercial collections out of date/not maintained by Shire.	Too much dependence is placed on driver knowledge to ensure services are not missed. All services should be recorded on a run sheet in a format that can be followed by a driver with limited experience on that run. Run sheets should be updated and the drivers run sheets updated each time a service requirement changes. Continual reference is made by Waste Management that the introduction of GPS based software will alleviate many of the service issues. The system procedures for routing and service provision must be efficient prior to the introduction of an electronic tracking and routing system. If services can't be provided using manual means then transferring to electronic systems will not be worthwhile as structure is needed to duplicate electronically. With sound manual systems in place fleet management software could be used to locate bins, provide mapping and assist drivers locate bins and carry out services.	Administration support required for Waste Services to maintain run sheets. Waste services to update and keep the run sheets current.	Agreed – admin support in high need. Agree and Waste Co-ordinator reviewing runs and pick up areas at present.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C12	Commercial run could be more productive.	It is often the case with commercial services that the truck goes into the same area on consecutive days. For example a truck may service a bin three days per week on Tuesday, Thursday and Saturday. The same truck may go back to that area on a Wednesday to collect a weekly bin from a neighbour. The easiest way to identify these cross overs is to "pin a map". This is done by placing a large map on the wall and placing a coloured pin on the map for each service carried out. By using a different colour for each collection day you can build up a coloured pattern on the wall map showing where a truck is required to go on a particular day. If there are isolated coloured pins in a sea of a different colour that odd pin needs to be reviewed and moved to a different collection (colour) day. Pinning a map for commercial services should be done at least every six months and can be done by the Leading Hand or an employee on light duties.	Map the commercial run using a large wall map and pin each service with different colour for each collection day.	Agree and Waste Co-ordinator reviewing runs and pick up areas at present.
	It is reported that there is a big variation in number of commercial services from week to week.	If fortnightly and monthly collections are provided pin additional commercial maps fortnightly and monthly collections. Review the density and number of services and see if some services can be moved to another less busy week.	Conduct data survey over two week period, pin four weeks worth of routes. External assistance (labour hire service) will possibly be required.	

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C13	Commercial run sheets have limited information and include only client name, number of bins, and suburb by collection day. Commercial sheet has limited data, need more information on run sheet.	A commercial run sheet should be issued to the driver daily. This can be done by preparing a daily commercial route sheet for the morning of each collection day. The run sheet should be a print out of the current/updated run sheet and include any new service request provided by Customer Service. The run sheet should be in the form of a table with the services to be carried out listed in route order to ensure that the driver carries out the route in an agreed manner that maximises productivity and provides a regular and dependable service to clients. Additions and deletions to the run sheet as received from Customer Service should be added to the end of the run sheet for the initial service. This allows the driver to see any changes currently being made to the route. The driver can provide feedback during the end of day debrief that may contribute to any special instructions for inclusion in the service request. During the following day's process of reviewing the completed run sheet Waste Services can "schedule" any additional service requests along with special comments into the appropriate spot on the route table. This process will ensure that service has been vetted by a driver prior to being scheduled into the run sheet at the appropriate location to allow continuity of route completion. Information required to be included in a commercial service run sheet include, in the following order: name of client, street number, street name, suburb, quantity of bins to be serviced on that day, whether it is ratable or to be billed, in the case of billed confirm number of bins to be billed on this occasion, any special instructions.	Re format the commercial run sheet to include name of client, street number, street name, suburb, quantity of bins to be serviced on that day, whether it is ratable or to be billed, in the case of billed confirm number of bins to be billed on this occasion, any special instructions. Issue a computer print out of the daily run sheet for the day of each collection. Update the commercial run sheet as changes are received. External assistance (labour hire service) will possibly be required.	

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C13 Cont.	When new services come on line there is no method of getting the new pick ups onto the daily run sheet.	Customer Service requests for changes to the collection run should be keyed into the electronic run sheet by Waste Services. Run sheets can then be printed off daily for attention by the driver. Regardless of the driver the new services will then be carried out as the changes are documented on the daily run sheet.		
C14	Commercial billing system relies on driver identifying the 240 L bin and preparing a manual service docket to give to Debtor Department for billing. Difficulty in identifying which commercial bins to service.	Now that all of the commercial service is 240 L bins consider converting all commercial services to be included in Rates and have all ratable premises receive a 240 L collection service as part of the property rates. A commercial tenant requiring a service to a unit on a strata title or an additional service would then be required to sign up for additional services. This strategy will reduce the quantity of commercial services requiring billing thus reducing the dependence on the generation of commercial service dockets by the drivers and processing by Waste Service and Billing and reduce the load on Debtor Administration. Move to all rateable premises having one service. Use GPS tracking to locate commercial premises for collections.	Allocate one 240L service to every commercial ratable property in the Shire as part of the rates charges. Limit billed commercial services to multiple bins and strata tenants. Consultant to investigate soft ware for commercial service collection.	Look at changing colour of all commercial bins; this will automatically identify commercial bins in area. A bin muster is to be held at the same time.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C15	Bin repairs carried out when labour and resources available.	Currently there is a fulltime operator to carry out repairs, replacements and bin deliveries. This position also carries out public waste bin services. Bin repairs are logged by Customer Services on spreadsheet. This is updated daily and printed for staff to carry out these repairs as part of a day's work. Bin repairs are periodically carried out in conjunction with residential services. Same staff member follows truck repairing bins as they are emptied. This is normally carried out on an annual basis. For example, in 2008/2009 there were 500 – 1000 bins repaired this way. Bin repairs appear to be given the least priority when allocating daily tasks. This is not unusual for waste collection but it causes frustration not only to the resident, but also Customer Service. Delaying bin repairs leads to the damaged bins being taken back behind the property line and used again making bin repair and replacement work more difficult and less productive as a bin may have to be emptied to facilitate the repair. Accountability for carrying out bin repairs in a timely manner would re-focus attention on this non mainstream waste service. The success in providing this service comes back to the availability of trained staff.	Introduce performance standards for bin repairs. Ensure adequate staff levels are maintained.	Look at changing the duties of this position to bin repairs/replacements and minor litter picking. This looks at the moment to be a full time role – additional vehicle/equipment to be budgeted for. Bin muster will provide extra bin spares.
C16	Residential collections carried out using coloured street maps with no instruction are the most productive way of servicing the streets.	Part of the consultancy brief is to investigate route software currently available that may be suitable for introduction to the Shire of Roebourne. Improvements can be made using manual means by revising the current route map system. Collection maps exist that show the streets to be collected per day coloured in a manner to show how many streets are to be serviced as one truck load. This is to ensure that trucks are not overloaded. With the introduction of a 6x4 truck having more capacity, confusion over how many streets can be collected per load will arise. At the moment each truck has a pile of loose route maps on the dash and drivers rummage through the maps to find the appropriate map for that day and that	Consultant to investigate route management computer software that may be suitable for the Shire and include summary in main report. Re construct route maps to include instruction on how to carry out the route and any special instruction required. Issues route map books by route and have them returned to the office at the end of each day. Update route maps when a change to the service occurs. Provide instruction on most productive	Agree and Waste Co-ordinator reviewing runs and pick up areas at present.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C16 Cont		route. Industry practice is to provide by route, not the truck or the driver, a set of route maps in a display folder. One map per day showing the streets to be serviced on that route by using a photocopied black and white street map highlighted with coloured highlighter, a different colour for each day of the week, all routes use the same colour for the same day. Included after the daily route map in the folder should be a list of special instructions for that day's collection routes. Special instructions could include additional services such as pavilion or litter bins on the route, pull outs from behind property lines for the handicapped or the aged, multiple services or difficult to see bins such as at the end of dirt tracks etc; anything that will assist the driver to complete the service. At the completion of each day the driver should return the route map book to a central location and place it in a dedicated location that is clearly labeled by route number. Should updates be required to the route map these can be done by the Waste Services staff by changing the appropriate page in the map book so that when the map book is next used the current information is in the map book. A duplicate set of map books should be kept in the Co-ordinator's office and updated at the same time as the original map book. Part of the driver debrief at the end of the day should include confirmation that the route book has been returned and that there are no amendments required. The following morning the driver is allocated a truck and map book and will have clear instructions on where and what bins to service. Instruction can also be given on the route map as to the order in which to service the streets and direction to travel and when to turn where. By providing instruction on how best to drive the route drivers will operate at maximum productivity and safety. For example adopting the "left hand turn principle", although drivers may travel slightly further, will minimise the need for the more dangerous right hand turns and U-turns, remember side load drivers service bins while sitting in the left hand side of the truck.	order to service streets.	

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C16 Cont.	Residential run maps require more information regarding number of bins to be collected.	Additional data that should be provided is a list of street names, number of bins per street and total number of bins on route. Bin numbers by street provides the driver with handy information for planning collection, particularly when the truck is approaching capacity. It also allows the driver to identify additional bins put out for service. The run sheet is based on the larger electronic data base and sharing this information with drivers helps to identify shortcomings in data records.	Revise run map books to include additional information such as list of the street names in alphabetical order by route accompanied by the number of bins in each street, any extra instructions such as manual pull outs for the aged and handicapped, and hidden locations for bins.	Agree and Waste Co-ordinator reviewing runs and pick up areas at present.
	No documented instructions to drivers for special instruction on residential runs.		Extra pick ups and specials to be written on run sheets.	Position of additional Leading Hand for waste management for all collection seems to be a must.
	Route audits required to identify total number of services.	For ratable properties both residential and commercial total number of services should be shown in the run sheets for commercial services and in the map book for residential services.		
	Public perception is that services are *adhoc* and generally tolerate delayed service.	Another advantage of completing a collection route in the same manner regardless of who is the driver is that residents will have confidence in the collection time and will more readily have the bin presented for service prior to the truck arriving thus reducing the number of missed service requests received by Customer Service and then having them be actioned by Waste Services.		Agreed.
C17	Bin replacements are charged to the resident in the case of residential properties and tenant in the case of commercial. This encourages bin theft and the removal of bins from premises when property vacated.	The process of charging for bin replacements was introduced to kerb the damage to bins. The result is that many residents consider the bin to be their property. When they move they either take the bin with them resulting in the Shire having to sell another bin when a new resident moves in. This has led to many properties now having multiple bins. If a house is left vacant and a bin remains at the property the bin is quickly stolen as it is seen as having value. This perceived ownership of the bins will create issues should the Shire wish to introduce a change in bin configuration in the future to charge the waste collection methodology.	Remove the bin replacement charge for residential bins, i.e. Shire maintains residential bins.	

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C17 Cont.	Several spilt and damaged bins remain in service.	Split bins are removed from service free of charge if bin is old, worn out or damaged by the collection truck. Replacements are not charged. This is at Shire discretion. Spilt bins can be stripped to provide replacement parts. Lids can be reused if disinfected, one wheel with axle attached can be reused and second hand bins are also used for public waste bins. Spilt bins can also be successfully welded using industrial style glue guns and High Density Polyethylene (HDPE) resin.		
	Replacement bins come from new bin stocks.	With fees charged for replacement bins it is reasonable for a resident to receive a new bin when a bin is replaced. But by dropping the fee for replacement bins and by using parts from recovered or damaged bins replacement bins can be provided using second hand bins at a much reduced cost. This will negate the implied ownership issues of bins by residents.	If fees for replacement bins are dropped second hand bins could be used for bin repairs and replacements. Where second hand bins cannot be used for replacements they can be used for public waste bins and short term hire bins.	Bin muster to happen and used as recommended.
C18	Although in most cases only one residential bin placed out for service many properties have multiple bins visible behind property lines.	With the perceived monetary value embedded in the bins many properties have additional bins available for use. The more experienced drivers do not service these bins if presented to the kerb but inexperienced drivers will service all bins presented as they do not want to have to return to carryout missed service requests. In the past the Shire has carried out “bin musters” to rein in illegal and orphan bins and have collected around 300 bins per occasion. These bins could be used for repairs and replacement. Bin musters are normally conducted annually with the next due in November 2009. The coming muster will be subject to available staff and is a two man operation. Bin musters also reduces the amount of illegal bins able to be put out for collection. There is a register kept in Waste Services of the bin replacements complete with serial number for the bin delivered. Using this data base, the Mapping/Rates data base for multiple services and a spare person in a collection truck further bin musters could be undertaken to identify illegal multiple bins in services and remove the bins.	Conduct a bin muster of residential services annually to retrieve illegal bins. Serial numbers of bins should be checked against the names of residents prior to collecting surplus bins.	Agree and Waste Co-ordinator reviewing runs and pick up areas at present.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C18 Cont.	Second hand bins not used for replacements and repairs.	This practice was stopped two years ago on advice from the Health Department. As replacements are charged it is hypocritical to provide a second hand bin. If repairs were provided free of charge then second hand bins and repaired bins could be sanitised and used as replacements.		Will look into this and include duties into dedicated position.
C19	The commercial debtors list can indicate 150 bins on a run where often 250 bins are serviced.	It appears that the quantity of commercial bins serviced may exceed the number of bins shown on the run sheets. This can be due to multiple bins being presented for service without accountability. Commercial bins are separate to ratable bins and not identified on debtors list. By placing a second person in the commercial collection truck for one week the run can be "audited" providing reconciliation of the required services against the actual number undertaken.	Carry out audits on commercial runs to identify illegal bins. Administration assistance will be required.	Change of commercial bin colours and updated run sheets will rectify.
C20	Limited information available to Customer Service Officers with repetitive enquiries forwarded to Waste Services.	Waste Services receive regular calls that have been diverted from Customer Service as it does not have the knowledge to effectively respond to the inquiry. Many of these enquiries are repetitive and could be addressed by Customer Service if it had access to the knowledge. Documenting a list of frequently asked questions (FAQ) along with an agreed response would facilitate the handling of customer enquiries using Shire staff other than the Waste Services Co-ordinator.	Through consultation between Waste Services and Customer Services prepare a list of frequently asked questions for staff to use for customer enquiries. This is in progress but needs to be completed and adopted.	FAQ's in progress.
C21	Wickham Landfill closed in 2004 with waste now being brought back to 7 Mile Landfill leading to increased drive time by the collection trucks.	The Transfer Station near Wickham is only used for residential waste transfer during times of low wind as litter becomes a problem. To use the Transfer Station for transfer of residential waste, litter controls such as screens or enclosing the tipping area, are required.	Refer recommendations for Transfer Station at T1.	Will be budgeting for enclosed operational area and additional modifications to area.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C22	With only three waste trucks to carry out work requiring 2.5 trucks there is not enough opportunity for vehicle servicing.	Workshop mechanics and collection drivers work the same hours resulting in no workshop maintenance being done during truck down time.	Stagger the starting times of the two duty mechanics so that one starts with the drivers and the other starts four hours later in order to be available at the end of the day to render all waste trucks serviceable for the following day, or Engage contract mechanical services that can work in the Shire's workshop with much more flexibility.	Agree and Waste Co-ordinator reviewing runs and pick up areas at present. Leading Hand approved for the Work Shop. Trade Assistant for Work Shop to be re introduced.
C23	Single axle waste trucks have difficulty on the landfill in wet weather from bogging.	6x4 waste collection trucks carry more load and are less susceptible to bogging on muddy landfills. 4x2 trucks are still required to service areas of Dampier where adequate turnaround cul-de-sacs are not available.	Shire is about to order its first 6x4 waste vehicle.	
C24	Waste trucks are not washed often enough.	There is a dedicated wash bay at the rear of the Depot. Inspection revealed that the area is poorly maintained and exposed to the weather. Drivers view washing of trucks as punishment and avoid the activity where possible. Washing of a truck should be a matter of driver pride so that the truck is presentable as it carries out its activities throughout the residential areas. With the wash bay not being user friendly drivers are not likely to go to the area and work. 2009/10 Budget allows for the partial development of a similar facility at 7 Mile. As the wash bay facility will still be required at the Depot it may be more economical to enhance/improve the current wash bay rather than build a new one at 7 Mile. Heavy plant can be washed at the 7 Mile up on the landfill cells.	Use the 2009/10 Budget monies to enhance the depot washbay rather than construct another one at 7 Mile. Drivers to clean the wash bay when used by drivers, clean the bay and surrounding area on a weekly basis using a driver roster. Construct an awning over the wash bay to provide weather protection when in use. A good example is the Searipple City Camp wash bay (Plate 31). Provide a small shed for the storage of detergents and other washing equipment. Construct splash walls around the wash bay to control debris, over spray and protect the wash bay from strong winds and dust.	The reviewed truck routing and upgrade to wash down facility will improve this item.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C25	Drivers do not complete a daily check sheet at the start of the shift.	Although the drivers carry out an *adhoc* walk around vehicle inspection and grease in the morning best practice dictates that the driver should record the pre trip inspection on a sheet noting any issues and signing the sheet to state that the check was carried out. The sheet is to remain in the vehicle whilst in operation and provided to transport inspectors or police on demand. If a driver commences operation of a vehicle part way through a day a second sheet is to be prepared by the relieving driver. Pre-trip/start-up sheets are available but not utilised by all operators. Waste Co-ordinator tried to introduce daily vehicle check sheets two years ago but the operators would not accept the initiative with the reason being that the rest of the Shire operators do not use them.	Introduce pre trip inspection sheets for drivers in the form of a daily driver sheet. Introduce the pre-trip inspection check sheet to all plant and truck operators across the entire Shire.	Being trialed as of December 2009.
C26	At the end of the day drivers hang up keys and do not always report vehicle problems. Review of truck 902 revealed that fuel gauge not working, RHS alarm not working if driver leaves vehicle without applying park brake.	With no paper work to drop off at the workshop, such as a maintenance request, drivers are not obligated to report issues to the workshop. Service requirements not communicated to workshop.	Introduce maintenance request forms for the drivers to complete and hand into the workshop.	Vehicle pre-start checks to have fault section to be provided to Workshop.
C27	Fueling is only done once a day and under supervision of Depot staff.	Introduce a fuel management system with a key or password to allow drivers to fuel up as they return to the yard. This will save operator time as several vehicles can be lined up at the one time under the current system. Advice on 27.11.09 was that waste collection drivers have access to fuel from service stations. At the time of the review drivers did not reveal this option and chose to queue at the Depot's bowser and wait for Depot staff to come out and fuel up the trucks.	Introduce fuel management system for Depot bowser use, or Educate drivers that there are alternative options for refueling trucks.	
C28	No driver assessment by workshop staff.	Workshop staff have a sound understanding of how a vehicle should be operated. Regular review of driver performance and one on one review of maintenance procedures will improve vehicle performance and serviceability.	Workshop to participate in structured driver performance review and maintenance training.	Looking at appointing a Certificate IV trainer for sign off on driver daily maintenance training by Work Shop staff.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C29	Waste drivers drive and operate the waste collection trucks from the left hand side.	Department of Transport has no rules for the operation of dual control vehicles. *Road Traffic Act 1974* Regulation 132 and 133, and the provisions of Part 12, do not apply to a driver who is driving a vehicle collecting household waste for or on behalf of a local government if, in the circumstances — (a) the driver is taking reasonable care; and (b) it is reasonable that the provision should not apply. The vehicle licence papers include condition 128 which states that: Left hand drive mode is permitted only when vehicle is being used for its designed purpose. There is therefore room for debate regarding the meaning of designated purpose and whether a dual control vehicle can be operated from the left hand side in transit. Best industry practice is that the dual controlled waste vehicles are only operated from the left hand side when operated in the immediate bin collection area and below 25kph.	Direct drivers to only use left hand driving position whilst operating in the immediate collection area.	Meeting scheduled with waste drivers in December 2009 to identify and resolve this issue.
C30	More communication required with residents to inform and promote the waste service.	Because of the often *adhoc* nature of the waste service there is confusion as to the correct day for collection; trucks turning up late one week and early the next can result in missed services as bins are not out the night before. Many bins are over full, split, or placed too close together resulting in difficulties in providing service.	Use the website to broadcast updates and newsy stories regarding the waste services. Place notes in with Rates notices to communicate waste related matters to residents. Four aditorials (advertisements that resemble newspaper articles) are included as Appendices D, E, F and G for use by the Shire to promote the waste services.	In progress for December 2009.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C30 Cont.	Multiple bins placed too close together, many bins over full.	Communication of waste collection issues required to inform residents how to present bins for collection. Advertising of the waste service on the website, newspaper advertisements, stickers printed and placed on offending bins. Advertising should also include what not to place in the bins such as car batteries, oil, car parts. Alloy cans, milk containers, cardboard packaging should be crushed prior to placing in the bins to help save space.		
C31	Most residents leave the residential areas prior to the time of waste collection.	Traditionally in other areas waste collection starts as early as appropriate in the mornings to get the bins emptied and the trucks off the road before the heat of the day. In some areas where retirees reside collection starts at 7.00am. In the Shire of Roebourne where the majority of residents work collection should commence at an earlier time, e.g. 6.00am. This will result in the trucks finishing service mid afternoon, missing a part of the hot day and providing more time for the workshop to carry out repairs.	Consider commencing daily collection at 6.00am for residential areas and 5.00am for commercial areas.	
C32	Drivers tell workshop when vehicle is due for service.	A system is required to inform both the workshop and driver of a pending service. Normally the manual method for doing this is to display a large white board in the workshop where service frequencies are displayed and resources are allocated. There is such a board in the Plant Co-ordinator's office located behind the door but is not used. The reason given was that it is in the wrong place. By displaying the board in the workshop area mechanics, drivers and Co-ordinators can see the board, plan and take action and update the board as required.	Redesign the layout and relocate the existing service board to a more suitable location where it can be viewed by mechanics and drivers alike.	
C33	No computer available for use by the mechanics.	Maintenance manuals nowadays are either web based or in DVD format requiring the mechanics to regularly log onto a computer to access service information.	Provide a computer of suitable configuration for use by the mechanics in their workplace.	
C34	UHF base station not working at the time of the review.	New drivers had no knowledge of what was wrong with the UHF radios. Investigations revealed that the local base station had been off line for sometime but this had not been communicated to drivers by the workshop staff.	Inform all affected staff of service difficulties regarding communication, vehicle and parts availability. When repairs are not actioned provide feedback to the driver regarding status.	Being dealt with by Plant Co-ordinator December 2009.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C35	Multiple levels of management on leave at the one time.	Effective management requires robust supervision and access to management by staff and drivers. At the time of the review two levels of management were about to go on leave at the one time. Although management duties had been delegated sideways to other Shire Managers waste operations will be compromised due to lack of management waste experience, knowledge of the current issues and dynamics of the work force.	Within a business unit adjoining levels of management should not go on leave at the same time.	
C36	Litter blows from hopper when driving down the road.	MacDonald Johnson provides a bristle skirt that can be fitted around the hopper to stop litter from blowing out.	Trial the MacDonald Johnson hopper surround on one truck.	Plant Co-ordinator to contact supplier and arrange for skirts.
C37	Many old cars reside in Roebourne.	Old car bodies are a danger to children and provide a habitat for vermin. Homeswest have provided car clean ups in the past.	Contact Homeswest and request it carry out a car body cleanup in Roebourne.	Notify Rangers.
C38	Residential trucks have an even work load per day and finish at the same time.	With both trucks having a similar work load each day there is restricted opportunity for both trucks to be regularly washed and maintained.	Set runs so one truck has a longer run each alternate day to facilitate vehicle washing, maintenance and provide backup capacity should another truck break down.	
C39	When residential trucks finish runs in good time they park up at the landfill and the drivers assist with landfill operations.	This is quite good operationally for the landfill but parking the trucks at the landfill provides no benefit to the workshop. If truck is due for service or has a fault the operator does return to Depot, but by parking at the landfill the workshop staff cannot have access to the vehicle if required.	Return waste vehicles to the Depot when not in service to assist with vehicle maintenance.	Will be arranged in December 2009.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C40	Red lidded second service bins are often relocated to another premises and put out for service without the resident paying for additional service.	Red lidded bins are for use as an additional paid service. It is possible for a resident to move houses and take the red lidded bin with them. The red lidded bin is then serviced on presentation at the new premises. Without adequate system controls this bin now becomes an unauthorised service. Preparation of stickers to be placed on the tops of red lidded bins to authorise the service. The stickers can act as a licence and resemble a generic sticker inscribed using permanent marker by the Rates Department staff. The sticker can either be posted out upon payment of rates or given to Waste Services to fix to the bin. If Waste Services put the sticker on the bin they can take the opportunity to record the serial number of the bin against the address. The sticker would be marked with an address and expiry date. If the sticker doesn't fit the premises or is past its expiry date the bin is to reported to the Depot for further action.	Prepare stickers to be placed on the tops of red lidded bins to authorise the service as a second bin. Audit residential service and check recorded bin number against all ratable properties listed. Contact property owner if bin not registered against property address. Retrieve additional bins and relocate to correct address or remove from service.	Reviewing December 2009.
C41	Commercial collection could be suited to being provided by a contractor.	The Shire's bulk commercial service was sold to Cleanaway in June 2008 as the Shire was unable to provide an adequate level of service to its customers. The fleet was not adequately maintained and the route suffered from poor productivity due to low density. There is a large component of the current commercial service relating to services paid through the Rates. There is an opportunity to transfer billed services across to rates services. As much of the current 240 L MGB commercial service includes services to ratable properties the Shire should consider contracting out rather than selling the current commercial service.	Obtain indicative prices for provision of commercial services.	Investigating viability Nov/Dec 2009.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C41 Cont.	Waste collection vehicle breakdowns are limiting the ability of the department to perform its tasks.	There are several issues that are affecting the availability of waste trucks to complete collections. One option could be to follow the same course of action as was employed with the bulk commercial collection and hand over responsibility to a third party. Contact has been made with Cleanaway who expressed interest in providing a budget estimate for service provision, more statistical data is required to allow a budget estimate to be provided. ToxFree was called on two occasions and it was learned that, as is the case with the Shire, two immediate levels of management at the ToxFree Karratha Depot have gone on leave at the one time being the Branch Manager and the Solid Waste Manager. No one else is currently available to respond to my request.	Consider subcontracting out the waste services to a private contractor. To achieve this the following should be undertaken: Have the drivers complete the route data template (previously provided to Waste Services by Bowman & Associates), included as Appendix H, for a two week period to obtain data relating to collection statistics. Approach Cleanaway for a price for commercial collection and a price for residential collection (contact has been made and Cleanaway are keen to offer prices). Approach Tox Free with the same request (contact has been made but calls have yet to be returned).	

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C42	Paddle on a waste vehicle seized due to lack of grease.	This truck (907) is the newest waste vehicle in the fleet and purchased in July 2008. The seizing of a paddle bearing is an expensive and avoidable repair if appropriate maintenance is performed. Waste Services has a template for a daily vehicle inspection sheet but this is not used. The induction package includes a 15 page MacDonald Johnson service guideline, vehicle check list and pre-start checklist but the two recently inducted drivers had no knowledge of these documents. There are no formal tool box meetings to communicate issues and required actions, or to communicate driver issues back to management in an open forum. There is no formal training by workshop staff to drivers in the appropriate servicing and operation of the waste vehicles. There is no assessment of driver performance by the workshop staff for vehicle operation. There is no assessment of driver performance by Waste Services staff.	Revise the driver induction package. Ensure that the revised driver induction package is fully implemented and documented as being carried out. Provide one on one training on the servicing and operation of the waste vehicles. Provide ongoing assessment on driver performance by both Waste Services and Workshop management. Introduce tool box meetings on a monthly basis.	
C43	Vehicles only go into the workshop if a repair is required or if a 10,000km service is required.	It could take a vehicle up to three months to travel 10,000kms. Best practice waste vehicle maintenance is to have a vehicle undergo servicing by trained mechanics at 50, 250, 500 and 1,000 hour intervals. Each service has differing requirements and as a minimum includes the manufacturer's recommendations. The 50 hr service is generally not much more than a daily check with the addition of a full vehicle grease. 250 hour service is equivalent to the manufacturer's 10,000 km service, complete with oil and filter changes. The 500 and 1,000 hr services would include other activities such as re greasing of hubs and/or the removal of wheel hubs on the cab chassis and invasive assessment of the waste body components.	Instigate more regular vehicle periodic maintenance based on earthmoving plant guidelines designed for aggressive mechanical operation rather than highway driving.	

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C44	Drivers do not know if red lidded bins are legitimate additional services.	Red lidded bin signifying an additional service are few compared to the total number of services undertaken. To ascertain the legitimacy of the red lidded bins in service the drivers could conduct an audit by recording the addresses for red lidded bin of an entire collection week. The data collected can then be reconciled with MyData Rates data to verify that the bin is included as an additional service on Rates notices.	Instigate a red lidded bin audit using the collection drivers and reconcile with Rates data to verify that the bin is being charged.	
C45	No spare truck available to allow for breakdown or maintenance.	The current budget has allowance for both a replacement and an additional truck. Delivery can be in excess of seven months from the placement of an order. Hiring a waste truck on dry hire until the additional truck arrives will alleviate many of the waste service issues faced by Waste Services. Enquiries undertaken did not identify any commercial waste sideload vehicle hire units available. It is understood that the City of Melville or the City of Wanneroo may have units available for hire. Both Councils are known to hire out trucks to other Councils in need.	Investigate the dry hire of a waste collection truck from either the City of Melville (Paul Wilde) or the City of Wanneroo (Chris Hunt) for the short term, or Investigate the purchase of a second hand collection vehicle to provide back up fleet reserve.	Spare vehicle in process of being purchased December 2009.
C46	Bins fall off lifters into truck from time to time.	Due to contamination with oil or water and due to wear occasionally bins can fall off the lifter and into the truck loading hopper. In many instances a diligent driver will stop the truck, climb up to the hopper area and attempt to pull the bin out of the truck. On occasions the bin will become stuck due to being jammed under the packer paddle or due to it still containing waste, drivers are known to experience severe rotor cuff injuries to the soft tissue of the shoulder attempting to pull the bins out and to enter the hopper to improve purchase on the stuck bin. The truck packers are capable of devouring MGBs and at a replacement cost of under $100 per bin it is far more prudent to loose a bin that expose drivers to unnecessary safety risk. Drivers have advised that that this may have happened in years past but not in recent years.	Within the waste driver induction and training kit include instruction on what to do in the event of a bin falling into a truck hopper.	Discussed with collection staff and noted to leave bins in hopper but this is not an issue in recent times with the new grab arm technology.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C47	Shire office in Welcome Road generates a large amount of office paper which goes to landfill.	The Shire should be leading the community by example and reducing its waste volume to landfill. Although not economically viable the Shire should, from a social point of view, adopt strategies for reducing paper waste to landfill through composting or vermiculture. Other initiatives for reuse of paper is using shredded paper for animal bedding for poultry and live stock such as horses. It is understood that there is a stable close to town.	Investigate ways to divert the Shire's paper waste away from landfill to set an example to the community.	Discuss with Managers at bi-monthly meeting.
C48	Dampier township layout is poorly designed with many dead-end streets without adequate cul-de-sacs at the end.	Larger 6x4 waste trucks may have difficulty in turning at the end of some of Dampier's residential streets. The Shire is considering purchasing a 6x4 waste collection truck.	At least one 4x2 waste collection side load truck should be retained in the fleet for servicing Dampier.	Agree and Waste Co-ordinator reviewing runs and pick up areas at present.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/09
C49	Town camps and food outlets generate large amounts of food waste.	Town camps such as Searipple and Bayview and the town's restaurants and food outlets potentially could produce large volumes of food waste. The Shire is considering purchasing a 4x2 rear loading waste collection vehicle. Rear load trucks are especially suited to the collection of wet waste and food waste. With consultation a small food waste route could be established to collect food waste for either vermiculture or composting. Food waste is a valuable source of nutrients as well as seeding bacteria for composting processes. Investigation of the Searipple kitchen bins on a Friday suggested that of the 23 bins presented for collection 50% contained source separated foodwaste and the other 50% contained post consumer packaging and other containing paper cups and dining waste. It appeared that the source separation was due to the location of bins inside the building being adjacent to specific work areas. This suggests that it would take little effort for this facility to separate its waste stream into food waste and dry waste streams providing potential for inclusion in a dedicated source separated food waste collection run three times a week. Tox Free have indicated a willingness to set up a composting facility at its plant in Karratha. Food waste and effluent could be used in composting.	Investigate the opportunity to introduce a foodwaste route for collection of feed stock for composting or vermiculture. Investigate commercial interest in developing a composting facility at 7 Mile.	Looking at emerging technologies in waste management for use in disposal of all waste types.
C50	Camp bins at Cleaverville not in standard Shire colours.	The bush camp bins at Cleaverville are a mix of yellow and green bodies and lids. The nature of the bins detracts from the Shire's professionalism in waste service provision. Litter bins are sourced from second hand stock and subject to availability. The Shire generally lose a number of these bins due to theft and vandalism (burning). The bins are returned to the Depot at end of Tourist Camping Season (September/October) and placed out again at the end of April. The Shire fabrication department manufactures a steel bin using 205 litre steel drums fitted with wheels and a plastic lid (Plate 32).	Replace bins with the colours of the Shire's standard litter bins. Consider using the steel bins in remote tourist locations.	Leading Hand to change over the bins in December 2009.

14.2. GAP ANALYSIS - TRANSFER STATION

Table 27: Gap Analysis – Transfer Station

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
T1	Site susceptible to strong winds.	Current awning at Bay 1 provides no protection from the wind. The Shire had intended to extend wind shelter but it was considered too expensive and not functional. A sheltered shed is considered to be a better option. Light waste such as cardboard and plastic wrapping blow away before it reaches the bin. Extending the existing awning (wind barrier) across all four bays will provide little relief as the wind will blow around the ends of the walls and channel up through the transfer bin area. There needs to be protection along the back wall and the sides. The truck requires access at the southern end to move the bins.	Consider enclosing the entire unloading floor and bin area and installing a roller door for truck access to the bins.	Will be budgeting for enclosed operational area and additional modifications to area. The use of waste compactor bins at Wickham Transfer Station has been budgeted and on hold until finalisation of waste services review.
	Bin area and tipping area exposed to the weather.	There are four bays for Bins at the Transfer Station. Only two are in use at any one time, one for light metals and one for general waste, two bays are normally barricaded off. There is only a requirement to provide protection over two loading areas. Bay 1 can be used for metals and does not require protection, Bay 1 is also fitted with the existing wind wall. Bay 2 and 3 could be enclosed for protection and the unloading of general waste. Bay 4 can be semi-enclosed to house a shute for bagged waste to the stationary compactor in Bay 4.	Provide an enclosure over Bay 2, 3 and part of 4 only. Refer Appendix T.	

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
T2	Visitors stand on the nib wall while unloading trailers.	There is a grade difference of approximately 2.5m between the unloading area and the floor under the skips. Visitors reverse their trailers and cars right up to the nib wall and then have no room to stand and unload. This leads to visitors standing on the nib wall while pulling and lifting waste from the trailer or vehicle. There is provision for a safety chain to be installed but this has been removed to provide access for the backhoe to compact waste in the bins.	Provide replacement safety chains with a quick release catch to allow removal when backhoe is working on the bins. Use safety barriers when chain is down or back hoe is working in the area. Install a bolt down speed hump approximately 1.5m away from the nib wall to stop vehicles reversing right up to the nib wall. This will require the back hoe to drive over the speed hump to get to the bin. Refer Plates 20 to 24 for examples from Henderson Transfer Station. Provide instruction and signage that safety chain must be in place at all times that the bay is open to the public. Provide danger warning signs for when safety chain is removed.	Co-ordinator to scope up works required for funding request to resolve this issue ASAP, December 2009.
T3	Children stand on the nib wall. Most small children visit the Transfer Station in bare feet. Dogs are normally unrestrained causing dog fights and general nuisance.	The children jump out of the car to look at the toys in the tip shop, and from there climb the nib wall to look in the bins. Access between the tip shop and the tipping area needs to be restricted.	Install safety chains on the nib walls. Put up a sign that states that children must be supervised (at the tip shop), remain in cars (at the tipping area), shoes must be worn at all times, no smoking (at the tipping area) and dogs must be on a leash.	Co-ordinator to scope up works required for funding request to resolve this issue ASAP, December 2009.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
T4	Tip shop is in the open with no protection from the elements.	There is a rudimentary tip shop operating. Household items are dropped off and placed on the asphalt pavement. Cars regularly visit the tip shop and collect items of interest. There is a token payment for items when the attendant feels payment is appropriate. Electrical items contribute to about 30% of the items dropped off. Shire Insurers consider that there is a potential risk from selling n unchecked electrical items. Staff are instructed not to hold electrical items due to liability issues. There will be a cost to the Shire to check electrical items, which should be recouped at the point of sale. Most recyclable items are gone the same day and slow moving items are dumped after one week.	Provide a dedicated shed for the tip shop. Refer Appendix R for draft sketch. Within the shed have a secure section for newly arrived electrical items. Arrange for an electrician to inspect and tag electrical items that are reusable. Sell approved electrical items at cost recovery plus.	Noted. Will investigate – have found that the cost of electrical tagging in the Pilbara is not cost effective for resale. May have to arrange to be done in-house with internally trained staff member.
T5	No security safe on site.	In the five years of operation there has been no reported break in to the Transfer Station office. There is a cash tin kept in the office that is not secured.	Provide bolt down security safe/box in a concealed location in the office or kitchen area. Limit cash kept on premises to a minimum ($150) and collect cash from Transfer Station weekly.	Co-ordinator to arrange install of safe or cash transferred to Karratha daily in December 2009.
T6	Gates are open longer than displayed opening times.	During the week of the review there was two staff allocated to the Transfer Station; normally there is one. The new EBA requires employees to work 10 hour days but the opening times are 9am to 4pm. Residents have already developed a habit of coming in before 9am as the gate is now open from 7am. There is a risk of future illegal dumping at the gate when published opening hours are reinstated.	Ensure gates remain closed before 9am and after 4pm.	This has now been actioned (30.10.09.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
T7	Skip bins are filled at three locations in the Transfer Station prior to leaving the site. Tarps are not used as they get caught on debris, bin must be placed on the ground to get tarps off effectively. Windy conditions make it hard to fold up tarps.	Bins are firstly filled to around 50% capacity at the tipping wall and moved to the greenwaste area. Bins are topped up with 40%greenwaste and covered with 10%dirt. This is to compact waste in the skips and stop waste from blowing out during the trip to 7 Mile Landfill. Dirt and potentially greenwaste do not require transport to 7 Mile Landfill.	Include in the 2010/11 budget to install an auto tarp system on the hook lift truck. Cease carting soil to 7 Mile and use clean soil/fill for rehabilitation of the surrounding area. Limit the amount of soil accepted at the transfer station by introducing the requirement that all soil/fill material of more than 2 m^3 to be taken direct to 7 Mile Landfill. Extend this policy should be extended to general waste as well.	Not included in this years budget; will be budgeted for all requirements in next years budget.
T8	Oil drop off facility dirty.	Oil spilt on the top of the tank. 8 x 204 L drums with bungs removed are nearby. Volumes of oil collected are low compared to 7 Mile so with good management there is no need for over flow drums at the Transfer Station. The main tank can be serviced at the same time as the 7 Mile tank, negating the need for back up drums. 2 x 204 L Fataway drums have been placed at the Transfer Station, allegedly by the Ashburton Aboriginal Corporation from Tom Price, to collect cooking oil for the manufacture of Bio diesel.	Clean up the spilt oil. Remove the empty drums. Contact Gaye Paskel, the Administration Manager at the Ashburton Aboriginal Corporation in Tom Price on 91891758; Gaye can organise George to collect and exchange drums when full. Include in the 2010-11 budget to build a concrete pad with sump and nib wall around the used oil facility to prevent soil contamination.	December 2009. December 2009. Contact established with the Ashburton Aboriginal Corporation. They are to provide containers and funnels. To be serviced once a month (30.10.09). Co-ordinator to review and advise Operations Manager of viability of the recycling used cooking oil.
T9	Sweeper and forklift attachment available for backhoe but can't be used.	There is a design issue with the hydraulic lines on the backhoe causing regular damage to the hydraulic system when fitting the equipment.	Repair/modify the hydraulic system on the back hoe. If can't be modified provide assistance to attendant when attachments are being fitted.	Co-ordinator to notify Plant Co-ordinator to investigate or to have modifications made in January 2009.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
T10	The dog trailer is not used for the transfer of bins to 7 Mile.	The Transfer Station attendant does one transfer trip to 7 Mile prior to 9am daily and two during the day on Wednesday. This requires two persons to be allocated to the Transfer Station on Wednesday. The Transfer Station has a two axle dog trailer designed to be towed behind the hook lift truck allowing two bins to be taken on each trip to 7 Mile Landfill. An additional person has been allocated to the Transfer Station; this has been ongoing for 2 – 3 months. The regular Transfer Station attendant does not have a HC licence, which is required to drive a truck and trailer combination. If the trailer was used twice per week the additional attendant would not be required on Wednesday. If the trailer was used daily the transfer of waste could be done in five trips rather than the current nine trips. *Note:* Manual tarps would be required to be used on the dog trailer and manual tarps create EH&S issues from climbing on bins.	Make HC drivers licence the minimum mandatory requirement for prerequisites for the transfer station attendant. Consider training current operators to obtain HC licences. If the trailer is uses on a regular basis, consider installing an automatic tarping system on the trailer.	In-house training where required for staff without these qualifications. Staffing has been a major issue and attracting staff members with the HR license has been difficult at times also.
T11	Transfer Station phone not working.	Landline phone was reported as been down for 18 months and not repaired. Phone contact with a facility such as the Transfer Station should be mandatory. Options are to repair existing phone system or provide mobile phone for use at the facility.	Provide phone availability to site.	Co-ordinator to contact I.T. and arrange. Mobile phone now provided (30.10.09). Desktop phone-link to be updated (30.010.09).
T12	Entry bell not working.	There was a bell system on the approach ramp to alert attendant that visitors where in the Transfer Station but this no longer works. The attendant is required to work down around the bin area and out the back away from the line of site of the Transfer Station tipping floor and tip shop.	Repair the entry bell.	Co-ordinator to contact Building Maintenance and arrange.
T13	Office work station layout not appropriate.	The desk used is too long and can't be placed under the window as it juts out past the door. The office furniture was sourced from the tipping floor and not provided by the Shire and is not appropriate.	Provide fit for service office suite for the Transfer Station office.	Co-ordinator to arrange purchase of furniture to suit office.

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
T14	Grass is too long and Transfer Station surrounds un-kept.	No resources available to attend to grounds due to demarcation issue with industrial relations. Attendants claim they get bored and require additional activities to pass the day. EBA agreements are designed to provide flexibility in the work force, the EBA has recently been negotiated but there is no resultant flexibility to allow the Transfer Station staff to trim the grass, or erect signs. The long grass makes it difficult to collect litter and is unsightly. Long grass creates an unnecessary fire hazard.	Provide the Transfer Station with a whipper snipper and training in how to operate it. At the next EBA negotiation ensure that multi-skilling is included as part of the negotiation process.	No demarcation issue exists in regards to this item; it is a perception held by wages staff only. Co-ordinator to arrange for Transfer Station to have equipment required to perform clearing of these areas.
T15	No fire fighting equipment at the waste bin area.	There has previously been a fire in a bin caused by a carelessly discarded cigarette butt. There is one fire extinguisher located in the kitchen at the back of the office. There was no sign outside the office to indicate where the extinguisher was kept. There are garden hose points around the hardstand (drop off area) for garden maintenance. There is no fire hose reel at the facility.	Have fire equipment requirements evaluated by the CFA and/or FESA and actioned.	Co-ordinator to contact Building maintenance and Emergency Co-ordinator to make site compliant with Standards.
T16	Water not allowed to be used on site.	To limit the cost of water rates charges attendants have been instructed not to unnecessarily wash down, water gardens or suppress dust. Ground water is available in the area but is reported as very brackish.	Allow mains water to be used to maintain the site. Investigate installing a bore with a header tank, pump and hose for wash down water and dust suppression.	This is not the case, no instructions given in regards to this in the last six years of current supervisor's term. (27.11.09).
T17	Hand tools in disrepair.	The only broom available had a broken handle. Attendants have a lot of spare time and become bored.	Maintain an adequate quantity of appropriate hand tools at all times.	

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
T18	Large quantities of greenwaste generated during cyclone season. Large quantities of cardboard are deposited at the Transfer Station.	All waste collected at the Transfer Station is transferred to 7 Mile Landfill. Greenwaste could be shredded on site but would require composting to kill pathogens and seeds prior to being sold. The Shire plans to introduce shredding to its waste management at 7 Mile Landfill; the contractor could travel from Karratha to Wickham to shred greenwaste when passing. Composting of greenwaste would require shredding, stockpiling, mixing with water and other organics such as cardboard. Composting would require large quantities of water. The back hoe is available to turn the compost piles. Composting greenwaste and cardboard onsite will provide further activities for the attendants, a locally produced organic resource, interest for the local community, an additional revenue stream from the sale of compost and reduce the amount of trips to and from the 7 Mile Landfill. A wire fenced compound would be required to house unshredded cardboard. The Vermeer shredder at the Depot could have the potential to shred cardboard for composting on demand. There is a large area of land at the back of the Transfer Station that is within the security fence that could be suitable for establishing a compost plant; currently this area is used to store concrete and road construction waste. There would be minimal additional operations costs as, apart from the greenwaste shredding (that will most likely be done at 7 Mile Landfill for greenwaste anyway), there would be minimal addition cost. Additional cost would mainly relate to the provision of suitable water for composting. Cooking oils could also be composted along with source separated organic waste such as fish offal, restaurant waste, sea weed etc.	Investigate the establishment of a composting facility at the Transfer Station. Consideration needs to be given to: 1. Investigating the ability of the Vermeer shredder to shred cardboard, 2. The quality of bore water and suitability for use in compost, and 3. Changes to current site DEC Licence conditions.	

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
T19	No Licence sticker on dog trailer. Draw bar often falls to the ground when coupling trailer to truck and draw bar is too heavy to lift.	Depot has confirmed that trailer is currently licenced but licence sticker is not fixed to trailer. The heavy pivoted draw bar can become dislodged from its prop when the trailer is being fitted to the truck. The draw bar is very heavy and can't be readily lifted by one person. There are heavy duty drawbar mounted swiveling jockey wheel assemblies available to dog trailers. Contact the trailer manufacturers for options.	Fix licence sticker to trailer in appropriate holder. Supply and fit a heavy duty dog trailer jockey wheel to the trailer drawbar.	
T20	Information signs at and around the Transfer Station are badly faded.	Many of the Shire signs around the site are faded.	Replace faded signs.	
T21	Light waste gets blown from bin.	A large quantity of waste is bagged waste, plastic film and cardboard. This waste is suitable for transport in a compaction body. Bay 4 has a long approach and would be suitable to house a stationary compactor with a removable $27m^3$ bin fitted.	Install a hook lift stationary waste compactor in Bay 4 with safety cages and a bin lifter fitted. Supply two $30m^3$ waste bins for compactor. Refer Appendix S and T for a concept layout.	Budgeted and on hold for area development.
T22	Entries in the hook lift controlled waste form book show the truck capacity as 27,000 kgs.	Controlled waste forms, which are a requirement of the DEC, ask for the capacity of the vehicle and then the amount of waste transported as either litres or tonnes. Bin size is 27,000 L ($27m^3$) Weighbridge dockets issued at 7 Mile Landfill are in tonnes. Capacity of the vehicle should be in the same units to amount of waste transported, therefore capacity should be the pay load capacity shown on the licence papers, being 11.76 tonnes for the truck and 13.66 tonnes for the trailer. The pay load displayed on the side of the truck is 12 tonnes and different to the licencing papers.	Instruct drivers to use 11.76 tonnes for truck capacity when completing controlled waste forms for transporting solid controlled waste using the hook lift truck. When using the truck and trailer use 25.66 tonnes as the combination capacity. Amend the vehicle capacity as displayed on the side of the truck to be in accordance with the licence papers.	Already fixed. Documentation amended (30.10.09).
T23	No Muster Point.	Muster Point sign has been provided but without holes drilled or mounting post or brackets. No instruction given as to where to install the sign.	Identify a Muster Point and install the Muster Point sign.	Muster Point has been nominated as the Main Gate Entry - instruction has been issued to staff to erect sign at main gate (30.10.09).

NO.	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
T24	Paint on nib wall and line markings is faded. Bay identification numbers faded and obscure.	Faded and peeling paint makes the place look shabby and inhibits safe operation of the facility. Paint has been provided to attendants but no brushes or rollers provided. Instruction is also required on how and where to repaint the lines.	Provide brushes and painting equipment to transfer station. Repaint the lines and nib wall. Repaint bay numbers on nib wall after the wall is painted.	Co-ordinator arranging December 2009.
T25	Transfer Station is currently open seven days per week.	Based on the volume of waste received a seven day operation is unnecessary. With communication and advertising the facility could be closed mid week on Wednesday and even Thursday.	Recommend to the Shire to reduce the number of days per week that the site is open to five.	Requires seven day operation, otherwise the dumping of rubbish in surrounding bush land becomes an issue.
T26	Large quantity of wet cell batteries on site.	A Transfer Station should be just that. If a waste stays on site for more than a week (apart from used oil) it is too long. Batteries, paint and gas bottles should be regularly moved to 7 Mile Landfill for incorporation with Karratha materials for treatment/packaging and disposal. If relocated each week quantities would be minimal and could be relocated in the Leading Hand or Waste Co-ordinator's utility.	Transfer batteries and gas bottles to 7 Mile on a weekly basis.	Co-ordinator arranging December 2009.

14.3. GAP ANALYSIS – LANDFILL

Table 28: Gap Analysis - Landfill

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L1	One notice board displaying disposal fees at the weighbridge blocks the vision from the weighbridge office.	There are two notice boards displaying disposal fees upon entering the site. One is a large sign approximately 1.2m high x 2.4m long immediately outside the weighbridge office. It is designed to show tipping fees to vehicles that have approached the office. The majority of vehicles that approach this side of the office are light vehicles that are not charged any disposal fees. The sign is so large that it inhibits the attendant's view of the trailer hitched behind light vehicles entering the landfill. The landfill attendant then provides instruction on where to tip without fully viewing the contents of the trailer.	Remove the gate fee sign from adjacent to the weighbridge and relocate to a more suitable location.	January 2009.
L2	Line of sight from the weighbridge awning and southern door is partially blocked by two shipping containers.	The weighbridge attendant's view is blocked by around 40% to the south towards both the landfill and the lay down area due to shipping containers being stored in the lay down area. A landfill administration facility is planned to be established adjacent to the weighbridge; the oil facility and the shipping containers will then have to be moved.	Relocate the lay down area, shipping containers and oil facility to another location.	January 2009.

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L3	Weighbridge office is susceptible to dust, high temperatures and limited visibility.	Door of the weighbridge office is continually opened by drivers signing dockets and picking up duplicate dockets. Weighbridge building is made from a demountable building with limited insulation and ventilation. Office is located at ground level making it impossible to communicate face to face with drivers sitting in trucks on the weighbridge or to have any idea what is in the delivery vehicles. Although light vehicle traffic volume is not recorded indications are that the peak number on weekends can be as high as 100 and commercial deliveries range from 80 to 230 per day, and often around 180 deliveries per day.	Elevate the weighbridge and move it closer to the weighbridge to allow face to face communication with truck drivers for the signing of dockets passed out the window. When relocating the office fabricate a false roof over the top of the office to provide additional protection from the hot sun. Refer Plates 1 to 7 for an example from the Welshpool Transfer Station and Appendix P and Q for concept sketches for 7 Mile. Introduce the use of camera to view loads.	Included in 09/10 Budget. Traffic audit being carried out (30.10.09).
	Approach aprons to the weighbridge are inclined.	Road trains are split weighed on the weighbridge with one half positioned on the sloping approach aprons during weighing. Weight is transferred from truck to trailer and vice versa through the draw bar when vehicle is on uneven ground. The driver applying the brakes also transfers weight from one to the other. Combination vehicles should be split weighed when on the same grade and with the brakes off. Weights and measures require the approaches to certified weighbridges used for sale of goods to be at the same level as the weighbridge deck when vehicles are split weighed. To conform with Weights and Measures the trailers would need to be uncoupled on the weighbridge creating unreasonable delays.	The legality of split weighing road trains on the 7 Mile weighbridge is compromised and needs further investigation. Incorporate level approach aprons for future weighbridge installations to allow split weighing of combination vehicles at the site.	Included in 09/10 Budget.
L4	Multiple pits are used for deep burial.	There are seven pits across the site serving a similar purpose, being to bury waste with deep earth cover on disposal. There are also new pits under various levels of construction to replace these pits as they are filled. The construction of so many pits underutilises the site, as between each pit is a wasted bank of natural earth that is left in place to maintain the integrity of the deep burial pit.	Review waste being deep buried and reduce the number of locations for deep burial where possible.	Agreed.

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L5	Liquid ponds are not fenced.	The side slopes on the ponds are relatively steep and there are no access points in the receival pits and only one access ramp at the far end of the effluent pond. There are no safety ladders of points of entry of egress from the ponds. It is understood that kangaroos have had to be rescued from the ponds after entering the ponds for a drink.	Fence the entire pond facility with a security fence placed on the top of the banks. Provide safety ladders at each corner of each pond. Provide discharge pits at the receival ponds that allow trucks to discharge safely into a pit rather than onto a concrete pad. Ensure safety and security infrastructure is included when designing and building future ponds. Geraldton sewage ponds have been built with good safety measures incorporated.	By April 2010. Liquid pond design and layout currently under review (30.10.09).
L6	Westerly wind blows flies and odour from the liquid waste pits towards the weighbridge and staff amenities.	Septage and especially grease trap waste are extremely odorous. Spraying (discharging) the effluent over the concrete pad at the receival pit increases the surface area of the effluent allowing more odour to be created. By tipping the effluent into a receival pit there will be less effluent surface area exposed to atmosphere reducing the generation of odour during unloading. Also by using an effluent receival pit allow the effluent to enter the receival pond from below the surface of the pond. This reduces the disruption to the crust overlaying the pond and further reduces the generation of odour. 7 Mile Landfill Licence L7021 includes details for maintenance of septage lagoons but does not detail operation procedures for the septage lagoons. Other Landfill Licences such as L7065 for Brown Range Landfill in Carnarvon includes details for the operation of the septage treatment system.	Install effluent receival pits to eliminate the spraying of effluent over the concrete apron and into the pond. Port Hedland has a good design for these pits (Plate 34). Consider the adoption of the operating procedures from the Landfill Licence L7065 (Brown Range Waste Management Facility – Carnarvon) for the liquid waste facility. Refer Appendix W for and extract of L7065 licence. Consider inviting private enterprise to construct and manage future effluent pits.	This area needs to be relocated or sealed; Biomax style system used if in same position to make usable and allow for predicted volumes.

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L7	Waste oil facility is very messy.	The waste oil facility has oil spilt over the top of the tank. Although a 4.5m^3 bin is provided for the collection of empty containers there are containers scattered about. In addition to the oil tank there are two intermediate bulk containers (IIBC) for additional storage and 24 x 204 L steel drums with the lids removed and containing various amounts of liquid. There is evidence of oil spills on the ground.	Provide a synthetic environmental barrier under the oil facility to enhance environmental compliance of the site. Shire of Carnarvon has recently done this at the Brown Range Landfill. Clean up the existing oil facility and surrounds on a regular basis. Empty the 24 x 204 L drums, rinse, punch and landfill the drums.	In budget to bring to standard, February 2010.
L8	Paint dried out and landfilled.	Paint is offered to residents free of charge but there is very little demand for second hand paint. Paint tins are dropped off near the entry, lids are removed by landfill staff and the paint allowed to dry prior to landfilling. City of Cockburn employs a person to sort paints into like types of paint into drums. The paint is popular and sought as fence paint.	Contact ToxFree or other private enterprise to gauge interest in establishing a paint recovery program as part of a future resource recovery centre.	Looking at staff numbers to have paint sorted for site use and donation to community groups.
L9	All tip locations have large quantities of light metals suitable for recovery	Metals have been stockpiled for sale to metal recyclers. Light gauge metals brought to site by residents are separated and stockpiled. Commercial quantities of ferrous and none ferrous metals will be separated from general waste when excavator becomes available. There is an excavator included in 09/10 budget. Greenwaste to be separated and stockpiled for periodic shredding. Metal prices are back above $130 per tonne, with scrap metal merchants once again becoming active in the scrap market. Timber can be shredded to either reduce volume in the landfill, to be used as a rafting material to allow travel over placed waste in times of wet weather or used in composting processes to aid aeration and provide bulk to the composting medium. Greenwaste should be removed from landfill to reduce the generation of methane due to decomposition within an oxygen starved landfill environment.	Consider deploying a 12 tonne excavator fitted with a grab to remove light metals, timber, cardboard and greenwaste from the landfill.	Included in this years budget.

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L9 Cont	Light vehicle and industrial waste contains large quantities of cardboard, greenwaste, timber and metal.	Cardboard and greenwaste generate methane during decomposition in an anaerobic environment such as a landfill and should be removed from the waste stream. Metals such as white goods, roof sheeting, ducting and other metallic items have a scrap metal value and can be removed for recovery.	Engage a 12 tonne excavator with a grab to recover metals, timber, cardboard and greenwaste from the industrial and light vehicle waste stream at proposed location 2.	
L10	Large volumes of cardboard are landfilled at 7 Mile. Considerable quantities of plastic are also being landfilled.	Due to the large volumes of cardboard at the landfill a compound could be built to contain the cardboard for baling. Ruggies Recycling operates throughout the State to recycle a range of mine site waste materials that were previously going to landfill. The proceeds are donated to the Princess Margaret Hospital for Children. A mobile shredding plant macerates soiled poly pipe removed from mine sites, which is placed in bags and transported to Perth in empty mine trucks at no cost to the mining companies. The shredded plastic makes the journey to South Australia, again at no cost and organised by Ruggies Recycling, where two recycling companies reprocess the material to make recycled plastic products.	Investigate using the resources available in the region to introduce cardboard and plastic recycling at the 7 Mile Landfill.	
L11	Waste receives minimal compaction prior to burying. New waste compactor in budget but no operating procedures yet available.	The putrescible waste from compaction vehicles is pushed up using a front end loader and receives no compaction prior to covering. Putrescible waste dumped in a landfill has a typical density of 450 kg/m^3 inside the compaction truck and reduces to around 250 kg/ m^3 when tipped on the landfill. With waste pushed up to 2.5m in height only the top 0.5m will receive compaction as cover material is placed over it. Net density of the landfilled waste is estimated at 350kg/m^3. The target density for landfilled waste is 750 kg/m^3, suggesting that the Shire could be operating at 50% performance inefficiency in airspace consumption. Landfill compactor operating methodology required for 7 Mile Landfill.	Compact waste in 0.5m layers throughout the landfill. Consider purchasing a dedicated landfill waste compactor for 7 Mile Landfill. A waste compactor is included in the Shire's Budget. Refer to landfill compaction methodology included within this report at Item 14.7 Waste Compaction.	In progress.

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L12	Empty drums may contain residue.	Landfill waste acceptance practices dictate that empty drums can be accepted if triple rinsed. There remains a risk that the drums may contain residual liquid. Holes can be easily punched into drums using a pick axe.	Amend the empty drum acceptance criteria to include “drums must have holes in the sides and both ends”, or Ban steel drums from the landfill and instruct waste generators to take drums directly to metal recyclers.	
L13	There is no resource recovery or tip shop at the landfill. No drop off centre at the site.	The transient nature of the local population lends itself to the need for a tip shop. The area of land immediately inside the entrance gate, approximately 110m x 140m in size, would make an ideal location for a waste drop off area, resource recovery and tip shop. There is a flood mitigation drain through the centre of the area and a new culvert installed. Drainage is to the east towards a flood mitigation dam. The drain can be readily diverted to the north, and a new culvert placed under the entrance road at the gate. The drain can be diverted to run inside the entrance on the northern side of the entrance road and rejoin the mitigation pond without crossing the central piece of land.	Investigate the establishment of a tip shop and resource recovery area immediately inside the main gate. Refer Plates 9 to 16 for examples from the Henderson Landfill tip shop. Investigate using the area for the establishment of a drop off and resource recovery area. Relocate the drain if drop off area is to be established. Refer Appendix N and O for draft layout sketch.	To be arranged after receipt of waste services review report.
L14	The Waste Co-ordinator in charge of the operation of the waste collection, landfill and Transfer Station has had limited experience working in waste management outside of rural Shires.	The Waste Co-ordinator along with the Manager Operations have had limited experience in waste management and are responsible for the expenditure of a large amount of capital on waste handling equipment and infrastructure in the coming months. As part of this project Bowman & Associates offers to accompany these individuals on a tour of landfills, drop off centres, resource recovery centres and tip shops in the Perth metropolitan area. The tip shop at Armadale Landfill grossed $100k last year and the Henderson Landfill’s new tip shop has an annual revenue expectation of $100k per year.	Bruce Bowman arranges a tour of selected facilities in Perth for the Waste Co-ordinator and Manager Operations .	Agree and to be arranged Jan/Feb 2010. An invitation has been extended by the City of Cockburn’s Henderson Landfill Manager, Lyall Davieson, for Shire of Roebourne staff to tour the facility’s landfill, tip shop and resident waste transfer facility. (27.11.09).

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L15	2,000 L trailer mounted water tank is extent of fire fighting equipment on site.	In the event of a landfill or grass fire on site the current trailer mounted water tank and pump would be unsuitable. Water supply to the site is via the nearby water main and no header tank or reserve storage tank is available on site. There is no means for dust suppression on site. Although the Isuzu tip truck (904) is a late model robust vehicle for carting fill material its productivity as an earthmoving vehicle is hindered by the harsh working environment of the landfill.	Consider the purchase of a slide in 14,000 litre water tank fully equipped for fire fighting to be provided for use with unit 904 the Isuzu 6 x 4 tip truck (Plate 35). Provide an 80,000 litre water tank, loading stand pipe and high volume pump to provide back up water supply and quick loading capability for the water truck. Consider the purchase of an articulated 30 tonne dump truck for carting cover materials around the site.	Being investigated.
L16	There are two holes in the western perimeter fence, one man made and one due to vegetation.	Holes that occur, or are cut, in the perimeter fences should be repaired immediately as a deterrent to would be repeat intruders. It should be the responsibility of the Leading Hand to inspect perimeter fences on a regular basis and action any repairs.	Instigate a documentation system for landfill inspection using weekly, monthly, quarterly and yearly site inspection forms. Refer Appendix B and C for examples of typical forms. Repair damaged perimeter fences immediately.	Co-ordinator to arrange December 2009.
L17	Unknown number of people have been issued gate keys.	The current site key level is reported as Level R5. It is unknown how many R5 keys are in circulation as no key register was produced. It is important to the security and compliance of the landfill that only a limited number of people hold keys to the landfill.	Retrieve and re-issue landfill keys to the Waste Co-ordinator, Leading Hand, landfill staff and the Country Fire Authority only. No one else, including the Chief Executive Officer (CEO,) should require unauthorised/unsupervised access to the site outside normal working hours.	Change of locks January 2010.

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L18	Rubbish truck waste had not been covered for at least a week.	Waste from compaction vehicles such as side loaders and front lifts contains the highest proportion of putrescible waste of all types of waste and can become quite odorous. Putrescible waste when left uncovered attracts vermin such as feral cats, rats, birds, flies and other pests. Vermin are vectors that spread pathogens and disease. The area is sprayed for flies on an almost daily basis; this consumes expensive insecticides and valuable labour resources. Seagulls were present at the rubbish truck tipping area in significant numbers on all occasions the landfill was visited, suggesting that they maybe roosting and nesting on the landfill site. Introduction of a Waste Compactor will reduce the requirement for large amounts of backfill, therefore reducing cover time.	Cover all putrescible waste on a daily basis in accordance with Licence condition G4 (iv).	Waste cover reported as now up to date (19/10/09).
L19	Dry waste landfill area behind Area 4 construction rubble landfill needs covering.	A large amount of unsightly dry waste has been left uncovered at the western end of the site. Waste has been dumped illegally immediately inside the western gate and left without removal to landfill. The landfill site is extremely large by landfill standards and this luxury has engendered complacency in landfill housekeeping. The large size of the site requires greater diligence to ensure the site is kept clean.	Clean up all orphan waste piles from around the site and bury in the active landfill.	

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L20	Litter is only obvious is a few locations around the site but closer inspection reveals that litter is everywhere.	The large size of the site gives a first impression that litter is not a problem as it is not visible in large quantities. As you move around the site and contemplate the size of the task to clear the site of all litter it becomes apparent that the amount of litter is notable. Portable litter screens can be used near tipping areas that generate high amounts of litter. Waste that generates litter should be covered more regularly. The Shire's litter critter can be used to remove litter from site. The litter critter's performance can be enhanced by installing litter traps in litter prone areas; litter traps are only effective if cleared of litter on a regular basis and prior to changes in wind direction. Litter trap fencing is included in the 2009/10 budget. Dedicated Litter Control staff are unavailable. Existing staff are available on an *adhoc* basis to collect litter. Reduction in the amount and size of tipping areas in conjunction with litter traps will assist the spread of litter and minimise control issues.	Set up a program to rid the site of litter by adopting a grid system for management across the site. Use portable litter screens close to the tipping areas. Install litter traps around the perimeter fences and at strategic locations around the site. Internal fence stays, as used at 7 Mile, make ideal frames for litter traps. Restrict the size and number of tipping areas. Clean up litter on a regular basis. Employ dedicated staff or contractors to collect litter. Litter management should not be a spare time task.	Co-ordinator to have completed in January 2010.
L21	Landfill site is large and has limited signage.	There is limited signage on site to direct traffic and explain the various tipping areas. Signs are available but installation has been delayed until new site layout has been developed. With layout designed and adopted signs could be installed.	Install road signs around the site to help direct traffic. Install waste disposal signs that clearly indicate the type of waste to be disposed at each location. Install a site layout sign at a convenient location near the entry to explain the layout of the site. Prepare printed instructions to give to landfill users, including printed maps showing the layout of the site.	Signs are purchased and waiting for final report on site modifications prior to installing. Investigating movable sturdy sign bases for relocated areas.

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L22	A landfill customer was interviewed and suggested that the weighbridge staff lacked appropriate communication skills.	Upon my enquiry one customer alleged that a weighbridge operator was extremely unhelpful in addressing an outstanding issue requiring a complaint to be made to the depot to secure co-operation from the attendant. Although there is minimal requirement for the Weighbridge Officer to attend to customer service issues there is rarely any other Shire employee that experiences as much customer contact as the weighbridge or Transfer Station attendant. The primary duties of the Weighbridge Officer are to enter traffic details onto the data collection system and direct residential traffic to tipping area but best practice requires excellent customer service skills as being mandatory for weighbridge attendants as they are the interface of the Shire with the public.	Adopt excellent customer service skills as a mandatory prerequisite for weighbridge attendants. Have the Weighbridge Officer direct all customer enquiries or complaints to the Customer Service Department. When the administration facility is constructed at 7 Mile the Waste Co-ordinator will be onsite and able to assist with direct customer enquiries.	The Shire considers that only one customer being interviewed is not representative of the 7 Mile customer base.
L23	Some commercial premises deliver waste to the landfill in light vehicles and avoid waste disposal charges.	Some commercial premises use car trailers to deliver quantities of commercial waste to landfill. At times it is difficult to distinguish between commercial waste and residential waste delivered to the landfill in car trailers. There is a set charge of $24.20 displayed on the disposal fees board for commercial waste delivered in trailers. Free tipping should be for residential generated waste only. Debate is required as to how many passes should be issued and how this system may impact on illegal dumping. Where tip passes have been introduced in other Shires, apart from the odd repeat offender, illegal dumping has not been of significant concern. The Minister for Environment; Youth recently announced new penalties for illegal dumping to accompany the new landfill levies for Perth landfills.	Introduce tip passes for all ratable properties at four tip passes per year. Once the tip passes are used up the light vehicles will be required to pay the scheduled and displayed disposal fee regardless of whether it is residential or commercial. Introduce the new fines for illegal dumping as announced by the Minister for Environment; Youth during September 2009.	Being investigated.

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L24	The site experiences power supply failures.	The weigh bridge runs on mains power and the weighbridge is the cash register (source of income generation) for the landfill. There is a small 4.5 Kva generator available but this is not capable of powering all of the appliances to the weighbridge and amenities building. When power failure occurs clients are billed the minimum weight charge as deemed by Fees & Charges structure and ratified by Council. This can lead to revenue loss up to $20,000 per day. The reason given for charging minimum gate rates is that consensus can't be reached regarding the mass of waste in the trucks. Many other landfills faced with this dilemma use an average weight for past deliveries, Arch software can readily produce a report of a truck history on demand to assist in deriving average weights. For skip and tip trucks a visual inspection of the load and, when accompanied by a print out of the trucks history, agreement can be reached quickly.	Conduct an investigation of the frequency of power outages at the landfill. If outages are deemed significant purchase a 15 or 20Kva generator for stand-by power supply at the weighbridge. If outages are not deemed significant develop a written instruction for weighbridge staff on how to charge clients during power supply failure using average weights.	No longer being considered in this year's budget; will be considered again in next year's budget.
L25	Two positions not filled on the landfill roster.	One person was deployed to the Transfer Station all week and one position was not filled. This resulted in the landfill being two persons short during the entire week of the review. Relief for the weighbridge attendant was provided by the Leading Hand taking him away from his normal duties. Outside general duties were not taken care of as there was no other staff available. History shows that the Shire's Waste Services traditionally does not have a full compliment of staff. The department has become used to operating without a full compliment of staff and not being able to fulfill all duties. Consideration should be given to 'lifting the bar' for recruitment. With the high turnover of staff the Shire should allow for an additional 'trainee' position to be created on a permanent basis. This will provide further incentive to engage a higher number of staff in the department.	Rather than aiming to fill vacant positions strive to exceed number of employees by at least one by adding another position to the Technical Services Organisational Chart under the title of Site Operations trainee.	

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L25 Cont.	Shire provides housing to staff in some instances.	Staff view the provision of housing and accommodation allowances as very important considerations when accepting positions in the region. The Shire provides housing to some staff and accommodation allowances to others. Expansion of these initiatives would make employment with the Shire more attractive.	Shire to consider expanding its portfolio of Shire-owned residential real-estate to defend itself against current and future staff housing shortages.	
L26	No fire suppression equipment on Shire D7 Dozer.	Earthmoving plant, particularly heavy landfill compaction equipment, are prone to catching fire when working on landfills. This is due to the build up of trash, dust and oil inside the belly plates and over the engine and transmission. The Cat D9 dozer on hire from Emeco has fire suppression fitted.	Ensure that any future landfill heavy plant such as dozers and compactors are fitted with fire suppression equipment.	New equipment is specified with fire suppression.
L27	Internet link was down on one of days of the review.	It is alleged that the internet access is spasmodic. This is in part due to the quality of the wireless remote access that has been provided to the site. Analogue wireless access typically performs poorly. It is not known what type of wireless access is available at the site. As a minimum internet access is required to log controlled waste receipts into the DEC website. The communication links are to be upgraded in 2010 in conjunction with administration building construction.	Investigate an improved remote internet access system as part of the establishment of the new administration facility.	Four Shire facilities are being upgraded December 2009.
L28	The private access road to 7 Mile has a blind spot.	Waste Services vehicles regularly use the private road to the west of the site as a short cut to the depot. The road has a crest which needs to be approached with caution.	Options are: Request warning signs to be placed each side of the crest' Discuss the dangers of the crest at tool box meetings' and/or Advise drivers not to use the private road.	Co-ordinator contacting Rio Tinto to confirm approval to use road and discuss line of site issue.
L29	Household hazardous waste collection area hidden from view.	The household hazardous waste collections area just past the weighbridge is hidden by several IBC pods.	Relocate/dispose of the IBC pods. Provide better signage for materials drop off areas.	In progress January 2010.

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L30	Quantity of trailers (light vehicles) using the landfill is unknown	Light vehicles with household waste are waved past the weighbridge office and directed to tip in Area 3. It is unknown how many light vehicles actually use the site. In the last Waste Co-ordinator's report the number of light vehicles was estimated and multiplied by 250kg per vehicle to derive an estimate of waste tonnages for light vehicles. Robust data is required if the establishment of a Transfer Station is to be considered.	Introduce a record system that records the number of light vehicles visiting the site with household waste. Record deliveries by suburb name to identify where waste originates.	In progress December 2009.

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L31	Cells possibly being constructed too close to the water table.	The Landfill Licence states that the Licensee must maintain an undisturbed separation distance of at least 3.0m between the base of the waste and the highest level of the groundwater. Downer EDI has an agreement to remove materials from the 7 Mile Landfill site (Appendix Z). The agreement states Downer EDI will excavate material to 4.5m below existing surface and batter the walls as agreed with the Shire. It has been suggested that the water table could be around 7.0m below ground level and that there has been groundwater ingress through the base of the new Area 6 cell at the lowest point during the wet season. The lowest point of Area 6 excavation is 11.7m Australian Height Datum (AHD). With an excavation of 4.5m from existing surface, which in most instances is natural ground, the separation distance to the groundwater is approximately 2.5m placing the groundwater table at approximately 9.2m AHD. The site has 12 groundwater monitoring bores installed; 10 around the perimeter fence and two along the main arterial road through the centre of the site. Attachment 2 of the Landfill Licence makes reference to 8 groundwater monitoring bores for the site. Attachment 2 also suggests that the groundwater elevation is 10.2m AHD which is 1.0m higher than that currently assumed by the Shire. The highest seasonal level of ground water under the site can be confirmed from the standing water height in one monitoring bore with the direction of flow determined from a minimum of three monitoring bores. The bores must be sampled on a quarterly basis by the Shire for licence compliance and standing water heights should be on file within the Shire.	Using a minimum of three ground water bores establish the level of the highest seasonal water table and the direction of flow. Ensure all excavations for future waste cells have a minimum clearance of no less than 3.0m to the highest seasonal water table. Amend the Downer EDI excavation agreement from excavating to a depth of 4.5m below the existing surface to a nominated AHD which will be 3.0m above the highest seasonal groundwater table as determined by the Shire using its monitoring bores. Also take the opportunity when amending the agreement to include direction to Downer EDI on the construction of excavated batters and access ramps as follows: Construct side batters to 1 in 3 grade with a flat floor and install an entry ramp at 1 in 10 grade at two locations within the excavation. The base of Area 6 needs to be backfilled by 3.0m to achieve a clear distance of at least 3.0m to groundwater table. The height of the groundwater table needs to be reviewed regularly to determine the highest level of groundwater. The level of the base of the landfill may have to be revised in order to maintain the required clear distance above the groundwater table.	Under review by the Co-ordinator December 2009. Appendix K shows the groundwater table as determined by the Shire Survey Department on December 15 2009. The current groundwater table beneath the Area 6 excavation is estimated to at 11m AHD. The lowest point of the Area 6 excavation is 11.7m AHD. The current clear distance between the groundwater table is 0.7m whereas it should be 3.0m clear distance to the highest level of groundwater.

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L32	There is a large quantity of bulk front lift bins on site.	The bulk front lift bins have been returned from service due to the sale of the business to Cleanaway. The Shire intends to advertise and dispose of the bins.	Advertise and dispose of the surplus front lift bins. If second tender is unsuccessful consider adding the bins to the metal scrap heap and write off any asset loses.	CEO is taking the matter of the bin disposal to the December 2009 Council meeting. Tender for disposal of bins was not successful and is to be re-tendered (30.10.09).
L33	Tipping techniques need revision. Need to make site smaller.	In total it was concluded that there is currently 17 separate tipping locations active at the landfill in addition to the liquid drop off facility and the drop off facility adjacent to the weighbridge. 17 tipping locations is an unreasonable number of locations to manage, particularly with limited resources. By consolidating the tipping locations less supervision, excavation, waste covering and litter collection would be required. This will assist with site productivity, reduction in demand on plant and man hours and improved environmental compliance.	Reduce the current 17 tipping locations to 8; refer Appendix I for a proposed future layout for tipping locations.	Agreed.

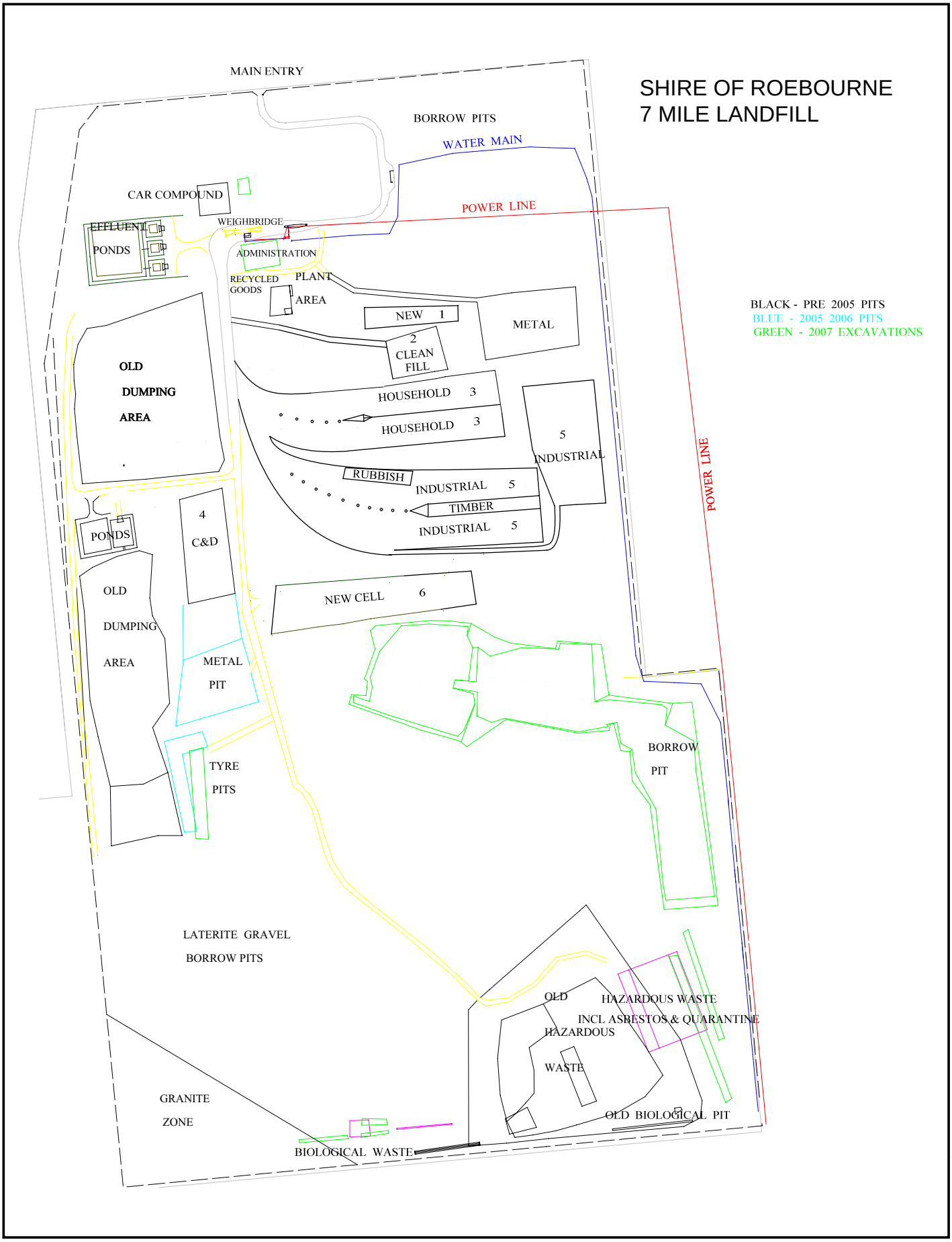
CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L33 Cont.	Too many tip faces are used across the landfill.	Tip faces could be consolidated into the following: Location 1 4. Top and push down - rubbish trucks, clean fill. 5. Bottom and cover from top - asbestos, hazardous wastes, dry chemical, medical, empty drums and quarantine waste. Location 2 6. Top – and push down – industrial. 7. Bottom and push in - light vehicles. Location 3 8. C&D waste. Location 4 9. In a pit – dead animals. Location 5 10. Metal. Location 6 11. Timber. 12. Greenwaste. Location 7 13. Tyres buried in lots of 100 in a dedicated pit, potentially for future recovery. Location 8 14. Medical waste with waste covered when deposited. All is to be covered with a minimum of 230mm of suitable cover material daily. Hazardous and medical waste etc is to be covered with 1.0m of cover; we are proposing to use general waste as cover. The location of asbestos is to be mapped in the landfill.		

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L34	Landfill open to 5.30pm	The landfill is open seven days per week from 7.00am to 5.30pm on weekdays and from 7.00am to 4.00pm on weekends. Normal industry work hours are 7.00am to 5.00pm. Reducing the landfill gate opening hours to 7.00am to 5.00pm weekdays would not be unreasonable.	Consider closing the gates weekdays at 5.00pm.	To be changed February 2010.
L35	Large volumes of greenwaste and cardboard are landfilled.	Greenwaste and cardboard could be composted at the landfill site.	Investigate establishing a compost process at the site for greenwaste, cardboard, timber, liquid pond residues etc.	
L36	Gas bottles are vented to atmosphere and taken to landfill. Fridges are not degassed.	The venting of gas bottles is an unavoidable issue as there are no economic ways of avoiding this. Gas bottles with a hole punched through the base can be recycled by the steel merchants. Refrigeration gas is a significant greenhouse gas. Repair technicians have the resources to remove gas from fridges without venting to atmosphere. Fridges and freezers would require separation and storage away from light metals to allow degassing services to be introduced. It is understood that the City of Cockburn has received Government funding to purchase equipment and train its landfill staff in the correct procedures for de-gassing refrigerators and air conditioning systems.	Either obtain a gas bottle punching machine or facilitate local industry to provide the service to recycle gas bottles as scrap steel. Investigate the availability of local refrigeration services able to remove gas from old fridges. Investigate the funding received by the City of Cockburn to allow its landfill staff to de-gas fridges on site using in-house resources. Separate fridges and freezers from light metals for degassing.	To be considered in the 2010 budget. Shire has recently banned gas bottles being disposed at the site (30.10.09).

CAT	OBSERVATION	DISCUSSION	RECOMMENDATION	STATUS REPORT FROM SHIRE 27/11/2009
L37	Opportunity for private investment to become involved with the 7 Mile Landfill with the development of further resource recovery.	Invite private enterprise to carry out or possibly base themselves at the 7 Mile Landfill site for recycling of all materials. Some potential opportunities are: 1. Concrete – Karratha Earthmoving have indicated an interest in crushing concrete for road works and are interested in material 100,000m^3 at site. 2. Effluent – Cleanaway and Lyons & Pierce could build their own effluent receival facilities. They could build, manage and administrate the sites themselves reducing Shire overheads and costs. 3. Bio Remediation - Interest has been shown from companies to utilise land for bio-remediation. 4. Storage of Bins – Cleanaway requires space to store bins. 5. Invite steel/metals recyclers to sort and recover these products on site. 6. Tip Shop – Invite not for profit organisations to operate the proposed tip shop.	Consider inviting private enterprise to manage strategic facets of the 7 Mile Landfill operation. This could be done by calling expressions of interest from suitably qualified organisations or individuals.	The Shire is currently being approached by various companies and will be looking at Expressions of Interest from interested parties in the near future.

15. APPENDICES

APPENDIX A CURRENT LANDFILL LAYOUT



APPENDIX B DAILY DIARY

Date_____Day_____Completed By_____ **DAILY DIARY**

SHIRE OF ROEBOURNE – 7 MILE LANDFILL

Weather Conditions		**Rain**	mm	
Temperature	^{O}C	**Wind**	KPH	**Direction**

DAILY SUMMARY – Summary of main activities and issues
MEETINGS **COMMENTS**
☐ Introduction/Training/Meetings ☐ Safety ☐ Other _____
_____
VERBAL INSTRUCTIONS – List any instructions received from Environmental Officers, Shire Officers, Authorities and the names of the persons issuing instructions
VISITORS – List any visitors

NAME/COMPANY	REASON

MATERIAL – Summary of plant or materials delivered to site
INDUSTRIAL, SAFETY & ENVIRONMENTAL – List any industrial concerns, accidents, odorous loads, breaches, improvement notices issued on safety or environmental issues. List issues addressed at the tool box meetings or specific verbal instruction given to workers
OTHER COMMENTS

If insufficient space, please attach additional information

Waste Management Co-ordinator…….. Environmental Officer……

Shire of Roebourne

7 Mile Landfill Monthly Site Inspection Check List

INSPECTION DATE:		**INSPECTION BY:**			
Item		**Status**			**Comment/Action Required**
		Yes	**N/A**	**No**	
OFFICE AREA					
Are policies clearly displayed in the office?					
Are the MSDS's for the chemicals stored onsite current and clearly displayed?					
Is current licence stored on site and accessible?					
Are first aid kits fully stocked?					
Is the toilet free of offensive odours and flies?					
Are all fire extinguishers accessible, tagged and valid?					
Other observations?					
GENERAL					
Are rehabilitated areas in need of any maintenance (ie watering, weeding, replanting)?					
Depth of leachate in the Leachate Well?					
Is the site in an orderly and tidy condition?					
Are storm water drains functional and free of litter?					
Is there dust generated on the site?					
Is there evidence of vermin on the site?					
Is site free of hazards?					
Other observations?					

DROP OFF FACILITY				
Are all recycle areas clearly labelled?				
Are all Household Hazardous Wastes stored in the secure locker?				
Are all hydrocarbons and other liquid chemicals stored within a bund?				
Is the area clean and tidy?				
Have recycling and other materials been cleared away from the facility on a regular basis?				
Is there evidence of vermin in the facility?				
Is the area in an orderly and tidy condition?				
Area free of hazards?				
Other observations?				

APPENDIX D ADITORIAL 1 – SHIRE OF ROEBOURNE

The Shire of Roebourne

The Shire of Roebourne is committed to driving positive change for our regional community. The Shire is conscious of the crucial role it plays in the planning, delivery and sustainability of major resource projects and in doing so must effectively deliver infrastructure, facilities and services that meet the needs and aspirations of our community and local economy.

We encourage all residents in the Shire to become a part of this vision to produce a liveable, vibrant community.

Providing Waste Management Services for our local community

One of the many ways in which the Shire and the community can work together is to manage and minimise waste disposal in the region.

The Shire of Roebourne collects household waste from residents in the towns of Dampier, Karratha, Wickham and Point Sampson one day a week, with Roebourne serviced twice per week on Wednesdays and Saturdays. The Shire provides each household with a 240 litre mobile garbage bin, which should be placed on your street verge the evening before your collection day.

Your bin will be collected on one of the following days depending on where you live in each collection area:

DAY	LOCATION WITHIN THE SHIRE OF ROEBOURNE
Monday	Bulgarra (Part 1), Nickol (Part 1)
Tuesday	Bulgarra (Part 2), Pegs Creek
Wednesday	Roebourne, Point Sampson, Wickham
Thursday	Millars Well, Nickol (Part 2)
Friday	Dampier, Baynton (Part 1)
Saturday	Baynton (Part 2), Hill Crest Estate, Tambrey Sub Division, Nickol West, Roebourne

Visit the website located at http://www.roebourne.wa.gov.au/Assets/Documents/Waste/rubish_pickup_days.pdf to see which day of the week your household rubbish is collected or phone the Shire of Roebourne on **9186 8555**.

APPENDIX E ADITORIAL 2 – TRANSFER STATION

Roebourne/Wickham Waste Transfer Station

The Roebourne/Wickham Waste Transfer Station is located on the Roebourne-Point Samson Road (on the old Speedway site, near Roebourne Prison) and provides residents from the Point Samson, Wickham, Cossack and Roebourne communities with the following waste services:

- Limited recycling - metal, aluminium cans
- Trash & treasure - used household items and clothing
- Greenwaste
- Car bodies accepted and stored for recycling (disposal fee applies)
- Waste oil from domestic premises (maximum of 60 litres per resident)
- Fish waste bin (emptied daily)

Larger quantities of waste material exceeding 2 cubic metres or Household Hazardous Wastes must be taken to the Shire of Roebourne 7 Mile Waste Disposal Facility located at Karratha.

The Roebourne/Wickham Waste Transfer Station is **OPEN EVERY DAY** from:
9.00 am - 12.00 pm
1.00 pm - 4.00 pm
(*Closed Christmas Day, New Years Day and Good Friday.*)

Waste disposal is **FREE** to all residents disposing of household rubbish. Fees apply for commercial operators.

For further information

The Shire of Roebourne's website located at www.roebourne.wa.gov.au is a great source of information on waste and recycling matters, including:

- MSW collection days in your area;
- What materials can be recycled;
- How to dispose of Household Hazardous Waste;
- Where to take your bulk rubbish; and
- Tipping fees and charges for commercial and large quantities of waste.

For all queries concerning the Roebourne/Wickham Waste Transfer Station or Karratha Waste Disposal Site (7 Mile) contact the Customer Services Department during office hours on **9186 8555**.

APPENDIX F ADITORIAL 3 – 7 MILE LANDFILL

Karratha Waste Disposal Site (7 Mile)

The Karratha Waste Disposal Site, or 7 Mile as it is more commonly known by local residents, is approximately 7 km from Karratha on the Karratha to Dampier Road. The facility offers more extensive waste disposal options than the Roebourne/Wickham Waste Transfer Station located on the Roebourne-Point Samson Road.

The 7 Mile Disposal Site provides Shire of Roebourne residents and businesses with the following disposal services:

- Limited recycling – metal, aluminium cans
- Trash & treasure
- Greenwaste
- Car bodies, caravans and trailers accepted and stored for recycling (disposal fee applies)
- Waste oil from domestic premises (maximum of 60 litres per resident)
- Effluent disposal
- Hazardous Household Waste disposal (including paints, chemicals, solvents, limited quantities of asbestos double wrapped in heavy duty plastic and medical waste)
- Wet cell batteries
- Timber pallets
- Tyres (up to 10 car tyres or 5 truck tyres), which should be separated from other waste

LPG gas bottles and disused hi-pressure containers are ***not accepted***. These must be returned to the gas supplier or container owner.

7 Mile Landfill Facility

A landfill operation is managed at the 7 Mile Waste Disposal Site. This facility is soon to be upgraded with a new administration building, drop off area for recyclable materials and a new Bomag 732 38-tonne landfill compactor. The machine will crush and compact waste to save valuable landfill space and reduce fire risk, smells and flies.

The Karratha Waste Disposal Site is **OPEN EVERY DAY** from:
7:00 am - 5:30 pm Monday – Friday
7:00 am - 4:00 pm Saturday, Sunday & Public Holidays
(*Closed Christmas Day, New Years Day and Good Friday.*)

For all queries concerning the Roebourne/Wickham Waste Transfer Station or Karratha Waste Disposal Site (7 Mile) contact the Customer Services Department during office hours on **9186 8555**.

APPENDIX G ADITORIAL 4 – LITTER

Help keep the Shire of Roebourne litter free

Whether it's a cigarette butt dropped on the ground or an unwanted vehicle left in our bushland, littering and illegal dumping is unacceptable to our community.

Residents and visitors can dispose of waste through the Shire's weekly general rubbish collection service. Alternatively you can go to either the Roebourne/Wickham Waste Transfer Station or Karratha Tip (7 Mile) where it is **FREE** for residents to dump their own rubbish.

Help us to protect our local environment. If you see a person or vehicle that you believe has committed a litter offence, please contact **Ranger Services on 9186 8528**.

How do I dispose of Hazardous Waste?

Household Hazardous Wastes such as paints, solvents, some chemicals, asbestos (double wrapped in heavy duty plastic) and treated green pine (containing arsenic) can be delivered to 7 Mile for disposal.

In order to dispose of commercial hazardous waste at the Shire of Roebourne's 7 Mile landfill facility, you must hold a Hazardous Waste Disposal Permit, obtained from the Divisional Administration Officers for Development Services at the Shire of Roebourne.

For more information about Hazardous Wastes please contact the Shire of Roebourne's Environmental Health Section on 9186 8555.

APPENDIX H DATA COLLECTION SHEET

Shire of Roebourne

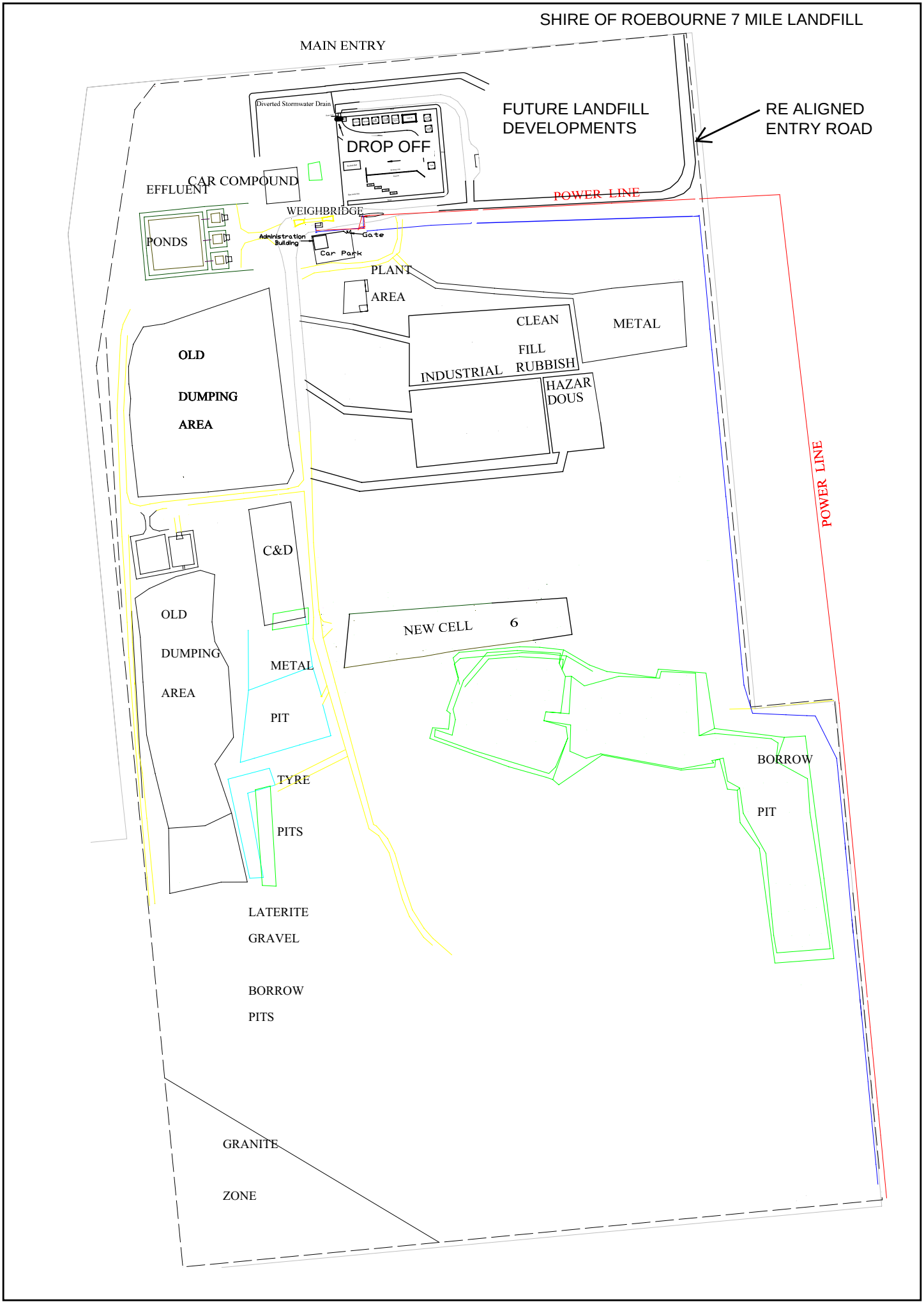
Daily Sheet - Collection Driver

Date:……	Day of Week:……..	Driver Name:……
Truck No:……		
Hour Meter (Start):…….	Hour Meter (Finish):……..	Daily Engine Hours:……..
Odeometer (Start):…….	Odeometer (Finish):……	Daily Kilometres:……..
Collection Type	Residential (Tick):……	Commercial Tick:……
For Bin Repairs, Jobs completed	Number:…….	
Delays and hold ups (give details)	Details:……..	Time Lost:……
	……	……..
	……	……..

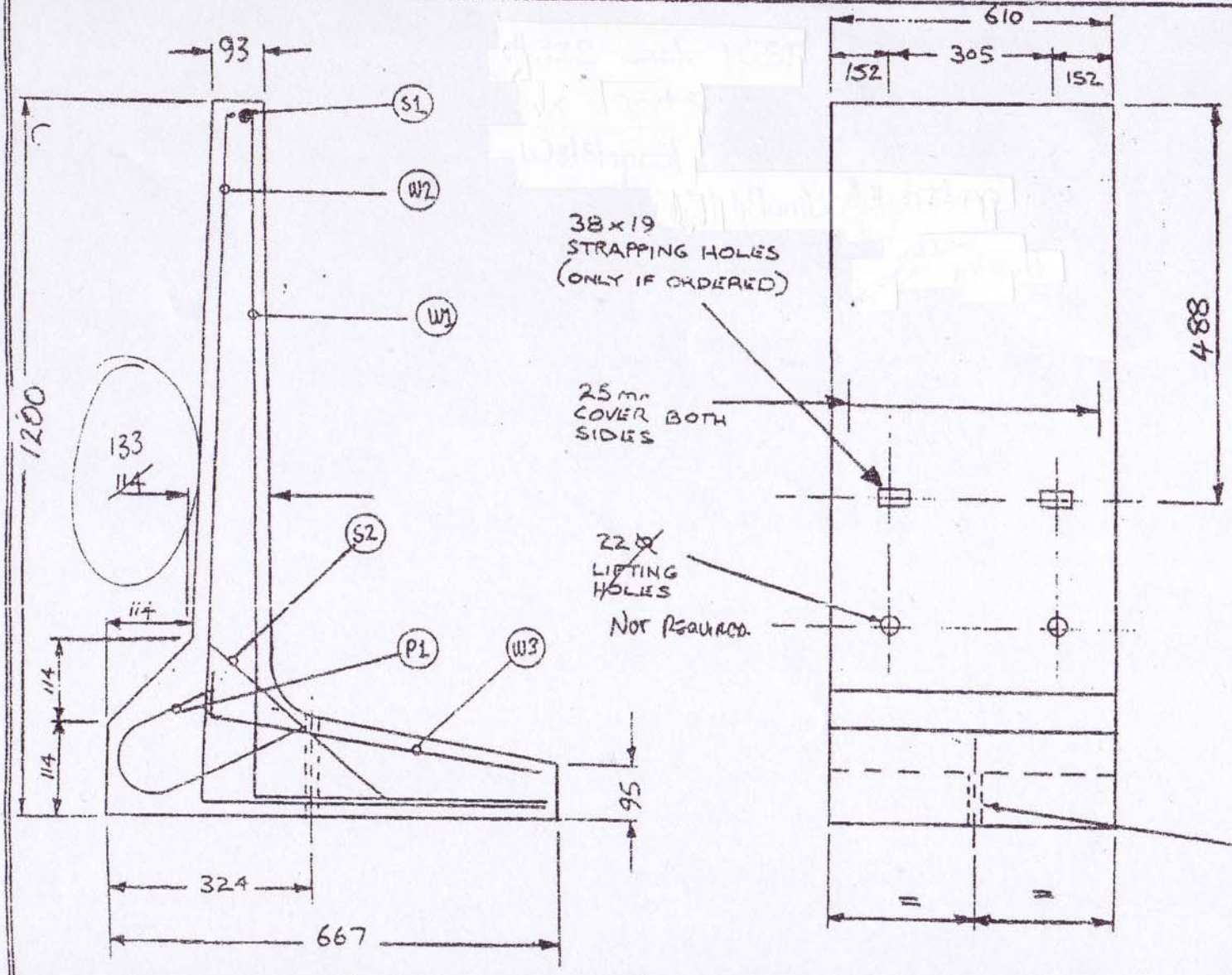
Load 1	Load 2	Load 3
Number of bins:……..	Number of bins:……..	Number of bins:……..
Gross Weight:……..T	Gross Weight:……..T	Gross Weight:……..T
Tare Weight:……T	Tare Weight:……T	Tare Weight:……T
Nett Weight:……T	Nett Weight:……T	Nett Weight:……T
Suburbs/Areas serviced:……	Suburbs/Areas serviced:……	Suburbs/Areas serviced:……
……	……	……
……	……	……
……	……	……
……	……	……

Comments/Notes:

APPENDIX I PROPOSED LANDFILL LAYOUT



CSR HUMES PTY LTD	WESTRAIL DRAWINGS	DATE:. 14-5-02...	PAGE..1..OF..2
1·200. m L/SHAPE DRAWING No LW-1205-RB		DESIGNED:.....	CHECKED:.....

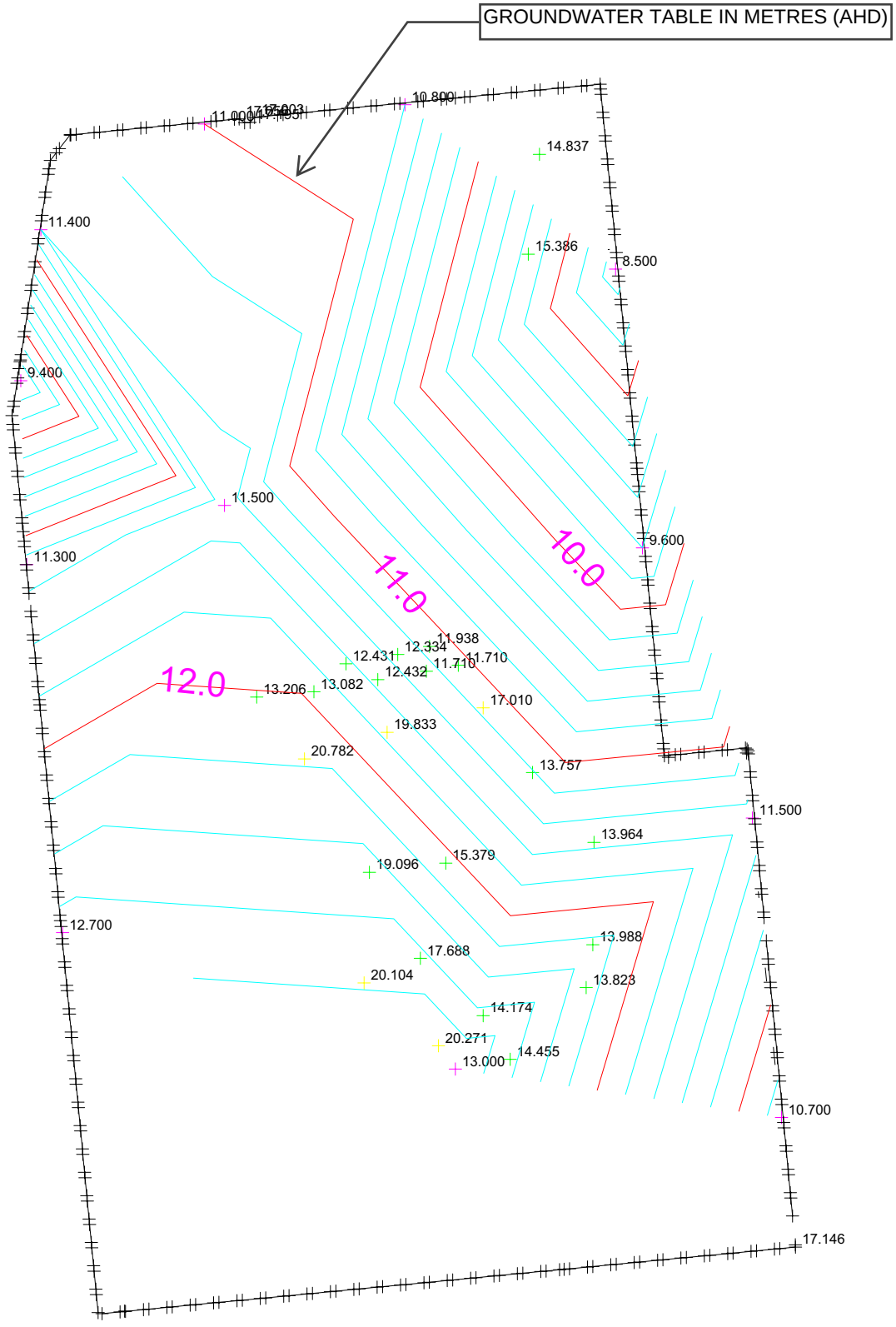


BAR MARK	SIZE	No OF	TYPE
W2	N12	4	
W1	N12	4	
W3	N12	4	
S2	N12	4	
P1	N12	4	
S1	N12	8	

NOTES:

1) COVER = 25mm U.N.O
2) F'c = 50 MPa
3) UNIT MASS = 365 kg
4) SWIFTLIFTS TO BE
   1.3 TONNE FA055
   RED MASS = 24
6) CONCRETE MASS = 341

SHIRE OF ROEBOURNE 7 MILE LANDFILL



Head Office 65–73 Nantilla Road Clayton North, Victoria 3168 T 03 9271 6400 Freecall 1800 023 441
Private Bag 349 Clayton South, Victoria 3169 F 03 9271 6485 jdmacdonald.com.au

30th September 2009

Bruce Bowman
Bowman and Associates Pty Ltd

Dear Bruce,

Roebourne Shire Compactors
Estimate

Further to our recent discussions , we have much pleasure in providing you with our estimate for the supply and installation of standard Macapak equipment.

The pricing includes supply of equipment, delivery and installation to Karratha and Wickham

Macapak 2000
Based on the standard price for the supply of compaction equipment, controls and containers, our price for each unit would be:

- One only Macapak 2000-52-V2-10hp stationary compactor with oil drip tray, machine mounted control panel to hand feed hopper, special requirements with pulse cycle timer, container fill light and sound pack as standard build.
- Hand-feed hopper complete with access door and safety bars
- RCBL Bin Lifter with hydraulic circuit and safety fence.
- Freight, cranage, installation and commissioning of equipment within Karratha and Wickham

Standard Macapak configuration as above with 30m^3 Bin	**$111,918 plus GST**
Standard Macapak configuration as above with 23m^3 Bin	**$111,293plus GST**
Standard Macapak configuration as above with 19m^3 Bin	**$110,668 plus GST**

Head Office 65–73 Nantilla Road Clayton North, Victoria 3168 T 03 9271 6400 Freecall 1800 023 441
Private Bag 349 Clayton South, Victoria 3169 F 03 9271 6485 jdmacdonald.com.au

There are optional bin sizes of 40 cubic meters and 45 cubic meters however we have not included these items in this quote as we have are not sure of the weight capacity you can carry. We would be happy to give you estimates of these costs if you require.

Bins
Prices for the bins include delivery to Roebourne and Wickham

One only 30 cubic metre bin with Hook or Roll Off Roll On devices	**$43,515**	**ex GST**
One only 23 cubic metre bin with Hook or Roll Off Roll On devices	**$42,890**	**ex GST**
One only 19 cubic metre bin with Hook or Roll Off Roll On devices	**$42,265**	**ex GST**

Options
We are able to offer a chequer plate platform for walk out access to feed the hopper however, we can only provide an estimate of $4000 plus GST for this item. Firm pricing can be provided once we have detailed plans of the area.

Terms:
These prices are given as estimates only at this stage, firm prices can be given once we have detailed site plans, and we have confirmed your bin sizes.

The above price allows for commissioning being carried out at the time of installation.

All wall penetrations, concrete foundations and the supply and connection of 3-phase power, 415 volt will be provided by builder to detail supplied by J.D MacDonald. All platforms and external works by others, unless otherwise agreed.

We hope the information supplied will be helpful and look forward to your response.

Yours sincerely,

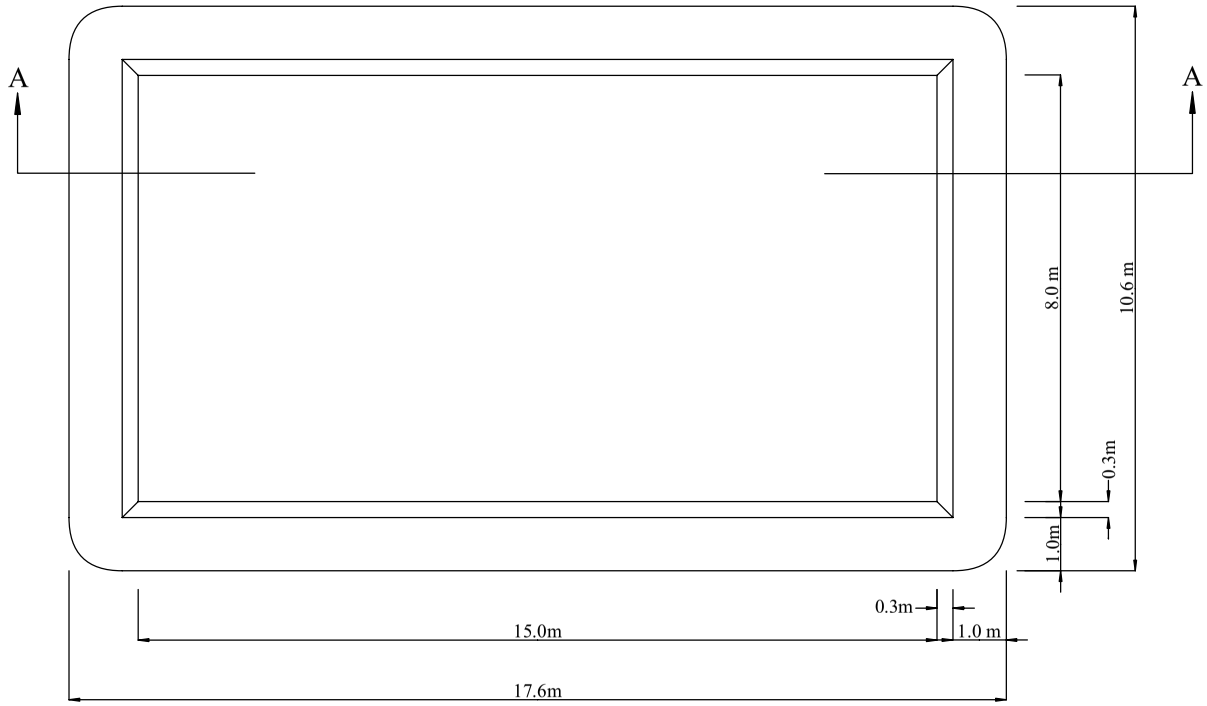
Erin Dolman
Regional Manager

Perth
239 Collier Road
Bayswater WA 6053
T 08 9271 8455
F 08 9272 5815

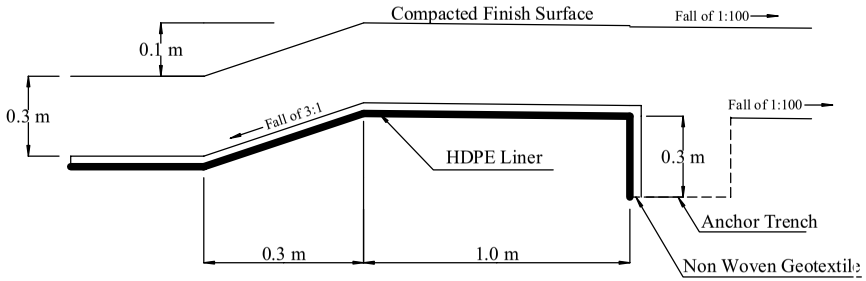
Brisbane
10 Moonbi Street
Brendale QLD 4500
T 07 3205 3166
F 07 3205 4151

Adelaide
4 Newcastle Crescent
Cavan SA 5094
T 08 8168 2222
F 08 8168 2240

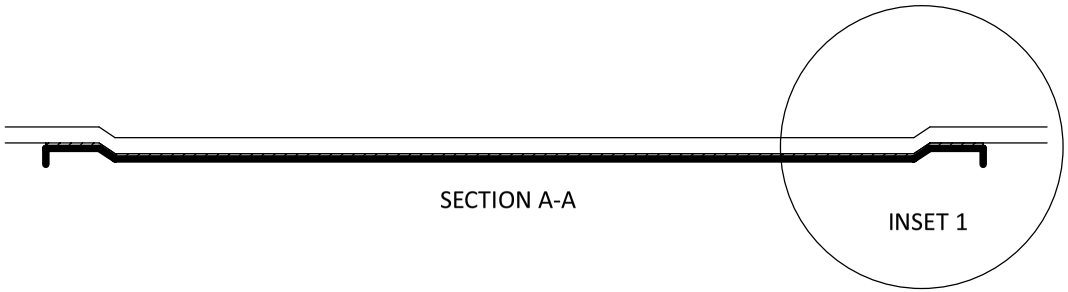
Sydney
Unit 2/9 Enterprise Place
Wetherill Park NSW 2164
T 02 9756 1622
F 02 9756 0666



PLAN



INSET 1

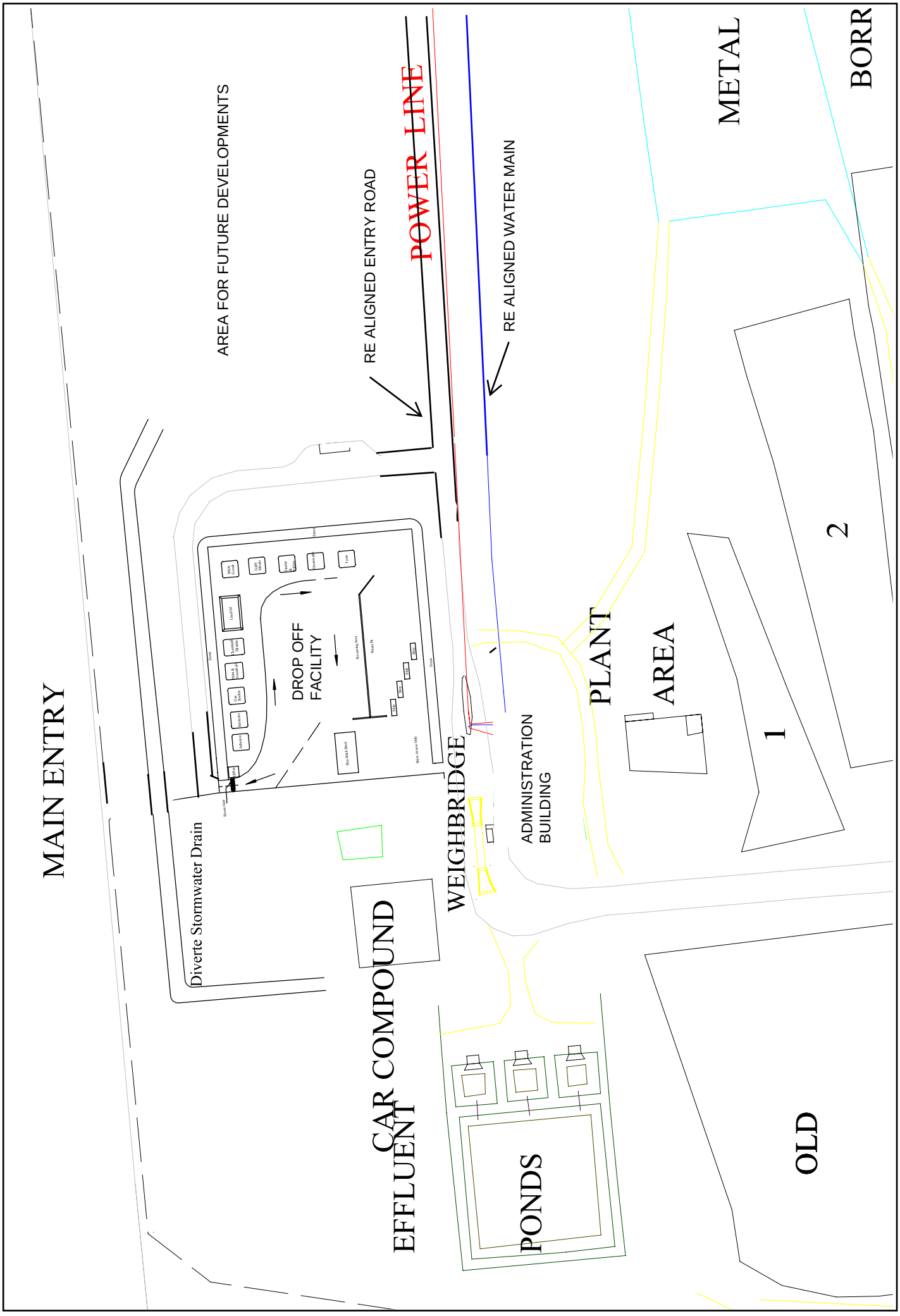


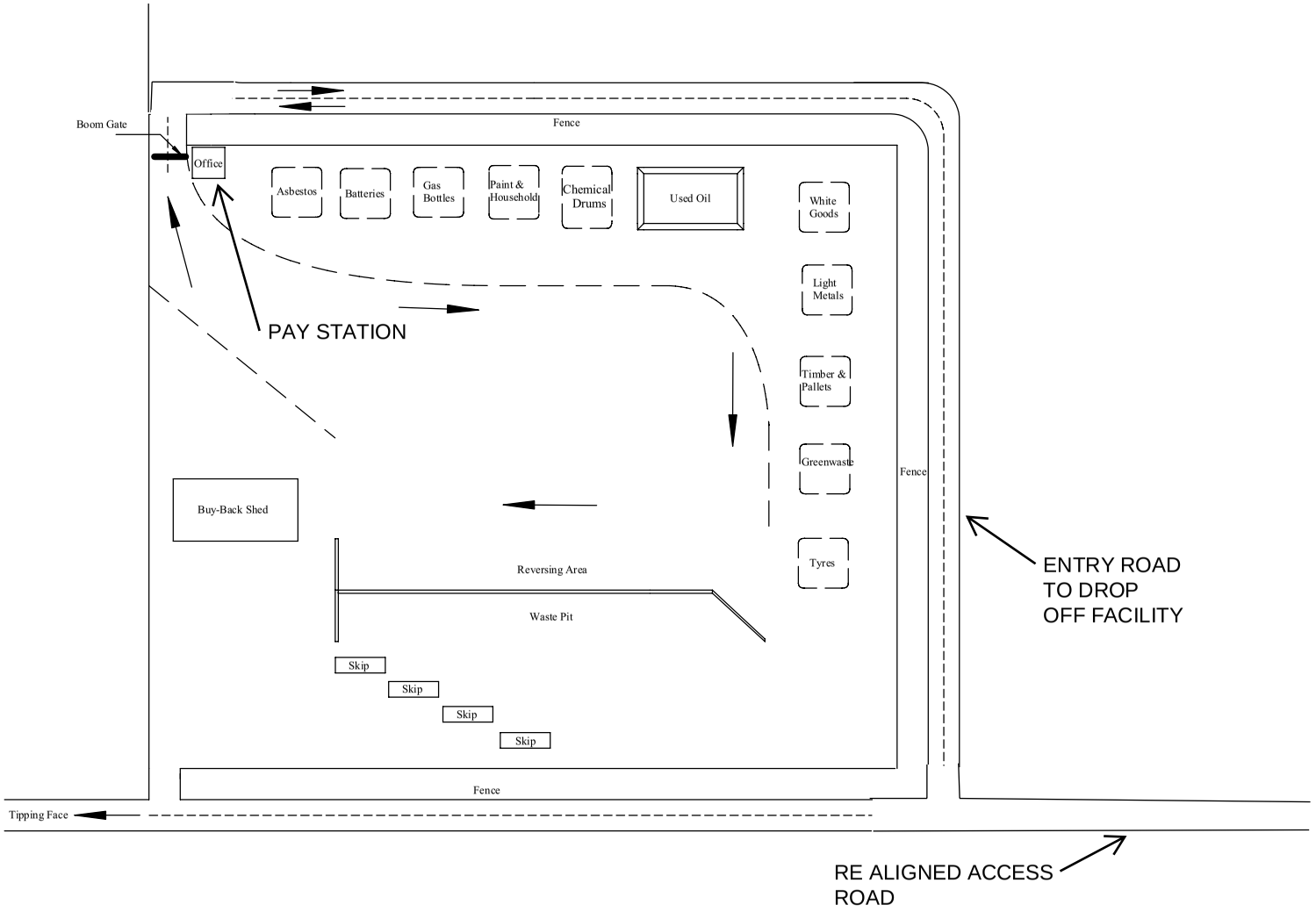
Bowman and Associates Pty Ltd
ABN: 22 112 399 514
Po Box 2059
Rossmoyne WA 6148
Phone: 9457 5899
Fax: 9457 6277

Project	Location	Drawing Title	Original Drawing Size
Used Oil Facility		Plan & Inset: Bund	A4

Date	Scale	Drawn By	Client	Drawing Number	Version
17/04/09	Not to Scale	Alex Upitis			

APPENDIX N 7 MILE PROPOSED DROP OFF LOCATION PLAN



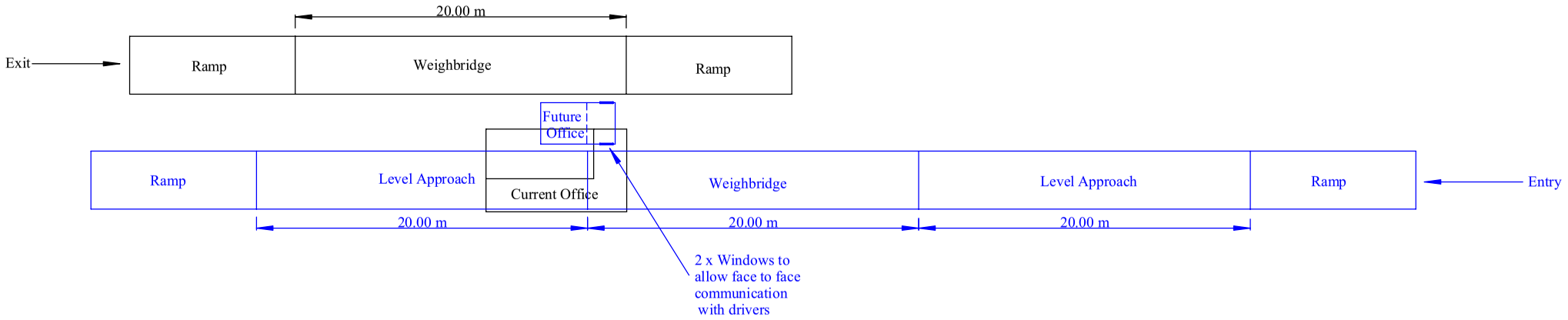


Bowman and Associates Pty Ltd
ABN: 22 112 399 514
PO Box 2059
Rossmoyne WA 6148
Phone: 0402 373 582
Fax: 9457 6277

Project	Location	Drawing Title	Original Drawing Size
Drop Off Facility	7 Mile Landfill - 7 Mile Road, Karratha	DrpOffFac - Plan	A4

Date	Scale	Drawn By	Client	Drawing Number	Version
2/10/09	Not to Scale	Alex Upitis	Shire Of Roebourne	RoBrne-DrpOffFac	1

APPENDIX P 7 MILE PROPOSED FUTURE WEIGHBRIDGE LAYOUT PLAN

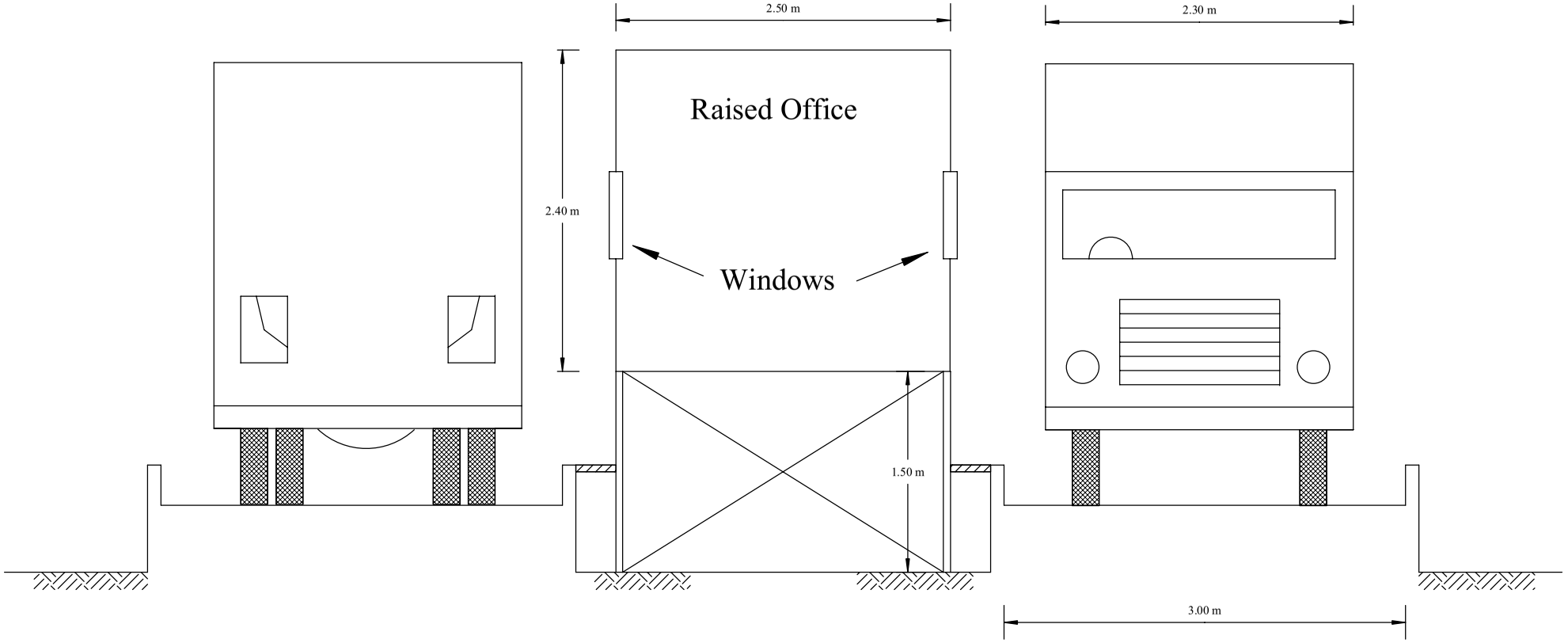


Bowman and Associates Pty Ltd
ABN: 22 112 399 514
PO Box 2059
Rossmoyne WA 6148
Phone: 0402 373 582
Fax: 9457 6277

Project	Location	Drawing Title	Original Drawing Size
Review of Waste Management Services	7 Mile Landfill	Plan: L3	A4

Date	Scale	Drawn By	Client	Drawing Number	Version
21/10/09	Not to Scale	Alex Upitis	Shire Of Roebourne	Rbrne-WghBrdge	1

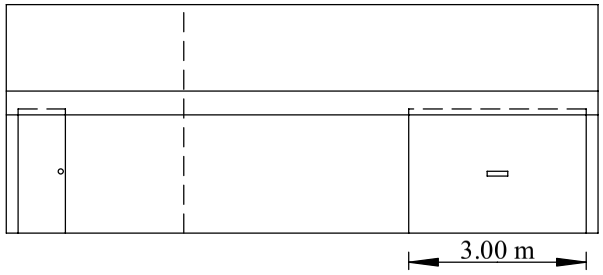
APPENDIX Q TYPICAL DETAIL FOR ELEVATED WEIGHBRIDGE OFFICE



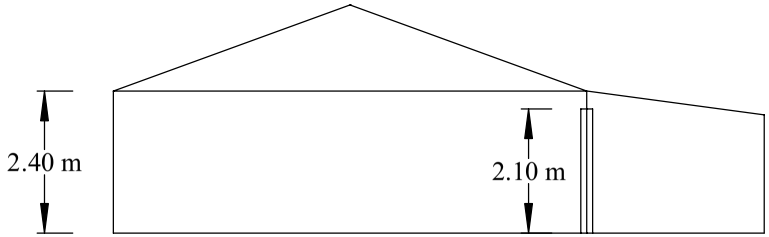
Bowman and Associates Pty Ltd
ABN: 22 112 399 514
PO Box 2059
Rossmoyne WA 6148
Phone: 0402 373 582
Fax: 9457 6277

Project	Location	Drawing Title	Original Drawing Size
Review of Waste Management Services	7 Mile Landfill	Side View: L3	A4

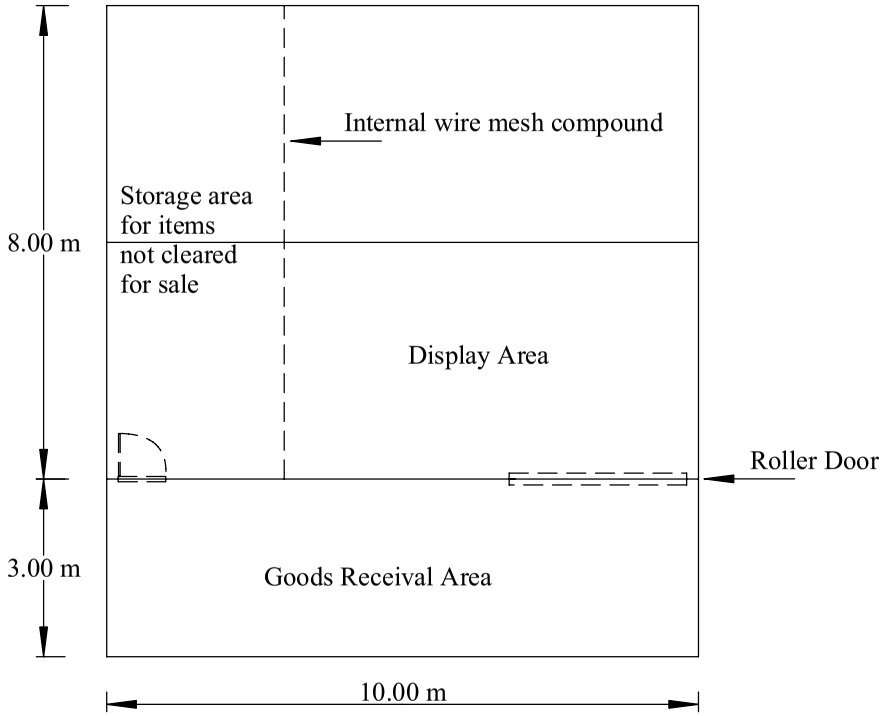
Date	Scale	Drawn By	Client	Drawing Number	Version
23/10/09	Not to Scale	Alex Upitis	Shire Of Roebourne	Rbrne-WghBrdge	1



ELEVATION



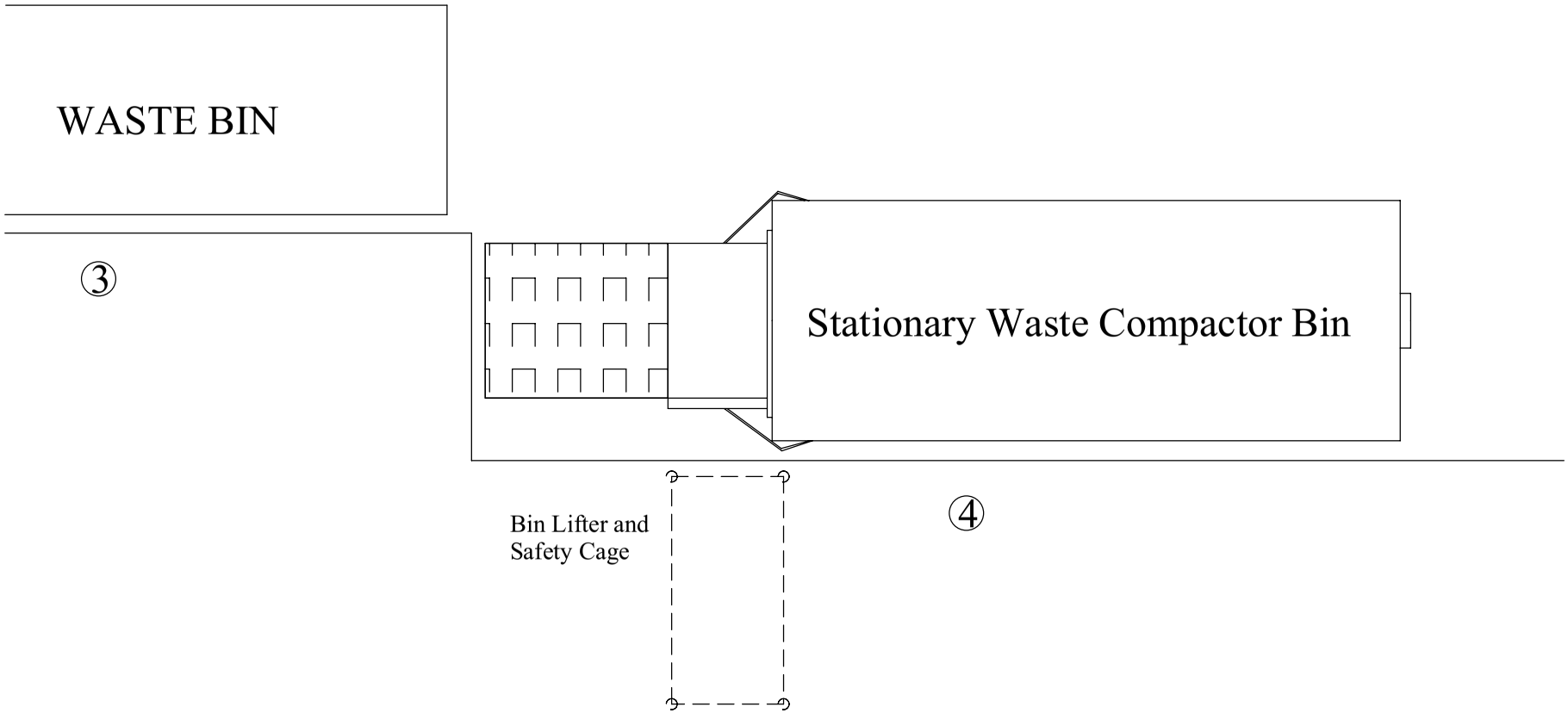
SIDE ELEVATION



PLAN

Bowman and Associates Pty Ltd ABN: 22 112 399 514 PO Box 2059 Phone: 0402 373 582 Rossmoyne WA 6148 Fax: 9457 6277	Project: Review of Waste Management Services		Location: Wickham Transfer Station	Drawing Title: Plan & Elevation: T4	Original Drawing Size: A4
	Date: 30/11/09	Scale: Not to Scale	Drawn By: Alex Upitis	Client: Shire Of Roebourne	Drawing Number: Rbrne-DrpOffShd Version: 1

APPENDIX S WICKHAM STATIONARY COMPACTOR LOCATION

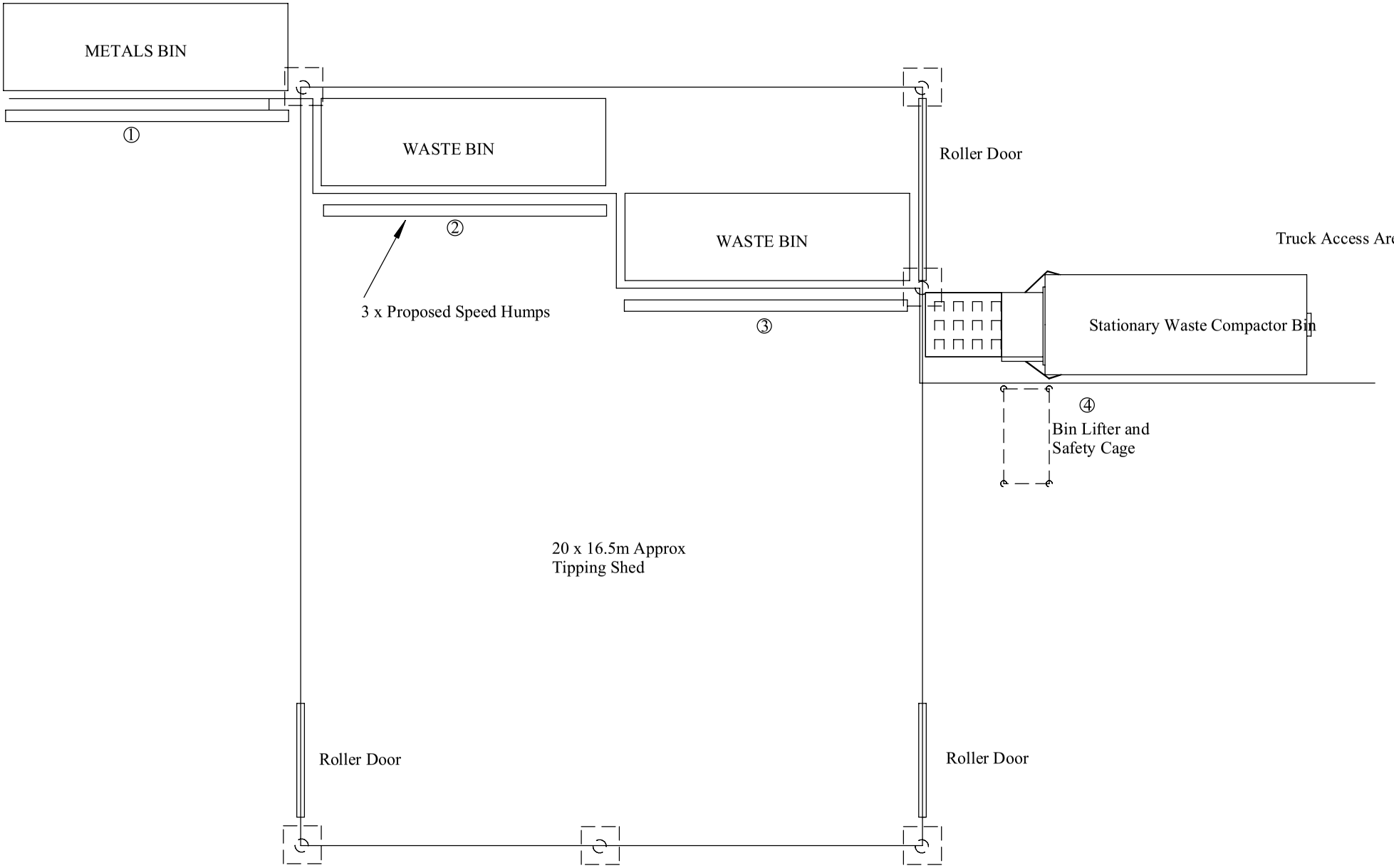


Bowman and Associates Pty Ltd
ABN: 22 112 399 514
PO Box 2059
Rossmoyne WA 6148
Phone: 0402 373 582
Fax: 9457 6277

Project	Location	Drawing Title	Original Drawing Size
Review of Waste Management Services	Wickham Transfer Station	Compactor: T21	A4

Date	Scale	Drawn By	Client	Drawing Number	Version
30/11/09	Not to Scale	Alex Upitis	Shire Of Roebourne	Rbrne-StatCmptr	1

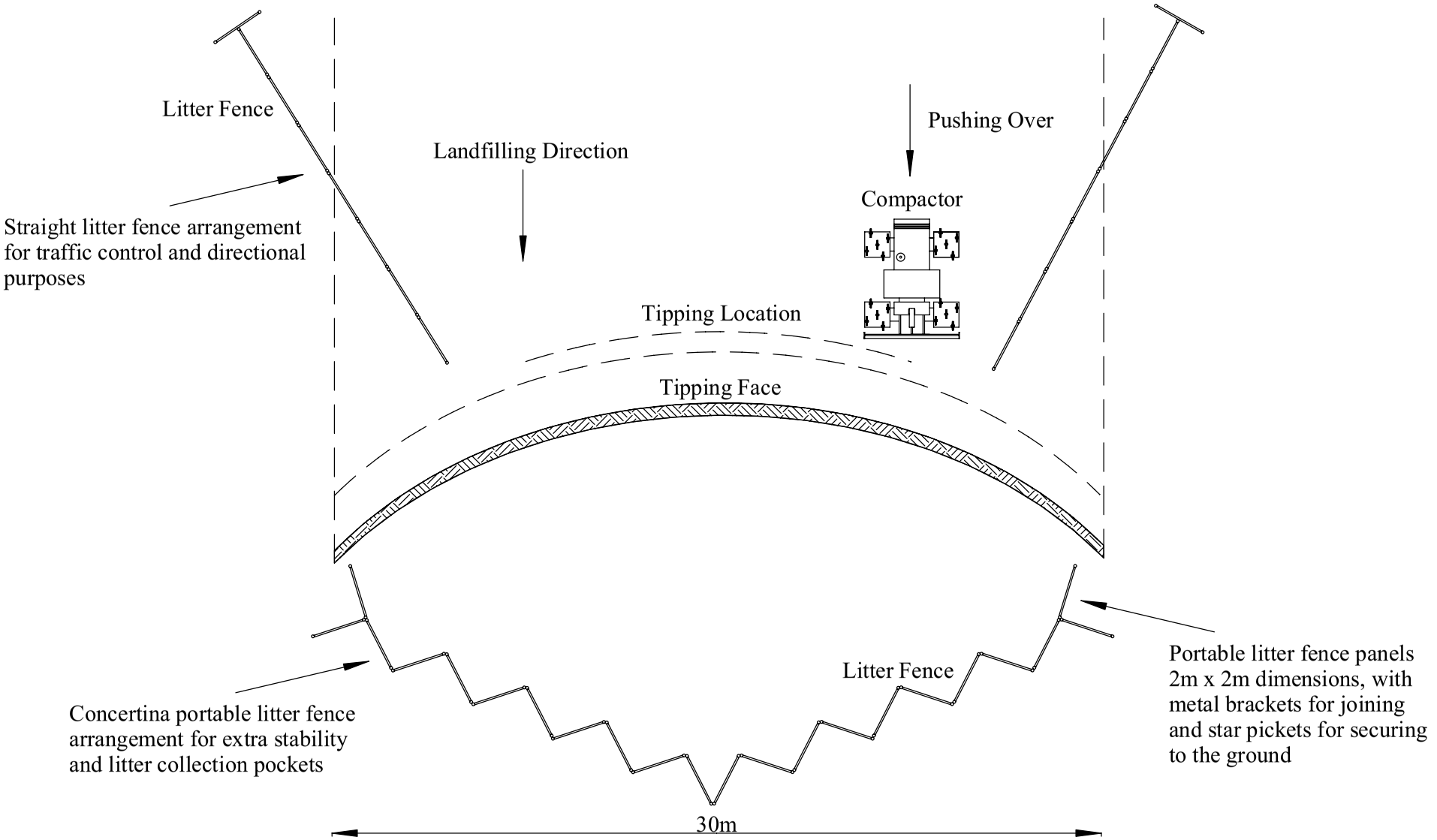
APPENDIX T WICKHAM TRANSFER STATION ENCLOSED TIPPING AREA



Bowman and Associates Pty Ltd
ABN: 22 112 399 514
PO Box 2059
Rossmoyne WA 6148
Phone: 0402 373 582
Fax: 9457 6277

Project	Location	Drawing Title	Original Drawing Size
Review of Waste Management Services	Wickham Transfer Station	Plan: T21 & T22	A4

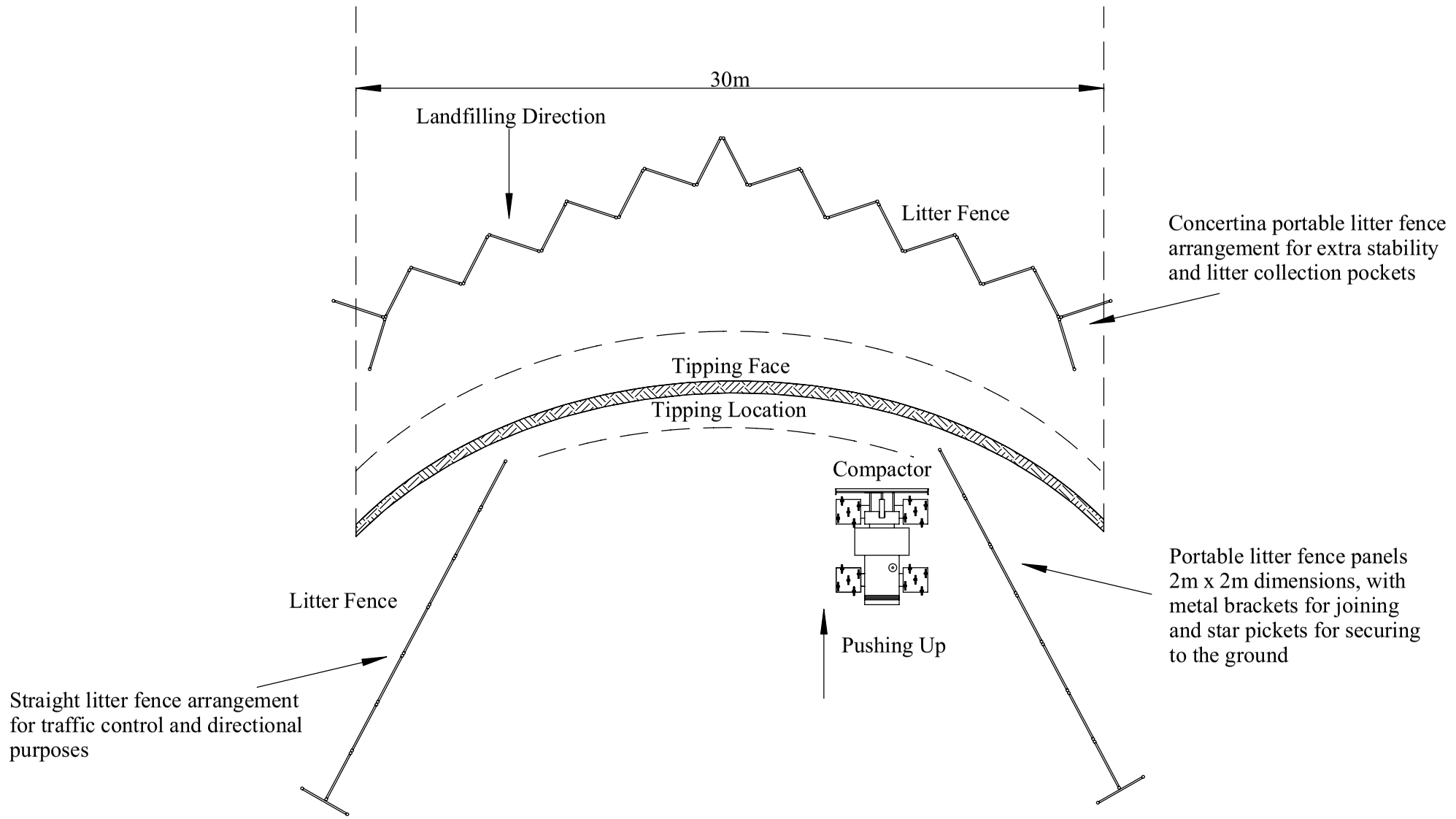
Date	Scale	Drawn By	Client	Drawing Number	Version
30/11/09	Not to Scale	Alex Upitis	Shire Of Roebourne	Rbrne - TipShed	1



Bowman and Associates Pty Ltd
ABN: 22 112 399 514
PO Box 2059
Rossmoyne WA 6148
Phone: 0402 373 582
Fax: 9457 6277

Project	Location	Drawing Title	Original Drawing Size
Review of Waste Management Services	7 Mile Landfill	Litter Fence - Push Over	A4

Date	Scale	Drawn By	Client	Drawing Number	Version
30/11/09	Not to Scale	Alex Upitis	Shire Of Roebourne	Rbrne-LFence	1



Bowman and Associates Pty Ltd
ABN: 22 112 399 514
PO Box 2059
Rossmoyne WA 6148
Phone: 0402 373 582
Fax: 9457 6277

Project	Location	Drawing Title	Original Drawing Size
Review of Waste Management Services	7 Mile Landfill	Litter Fence - Push Up	A4

Date	Scale	Drawn By	Client	Drawing Number	Version
30/11/09	Not to Scale	Alex Upitis	Shire Of Roebourne	Rbrne-LFence	1

(ii) waste from grease traps;
(iii) low strength wastewater; and
(iv) other wastes as approved by the Director.

OPERATION OF THE SEPTAGE TREATMENT SYSTEM

W5 The licensee shall operate the septage treatment system in the following manner:

(i) discharge septage to the anaerobic pond(s) in a manner that does not disrupt the anaerobic crust;
(ii) discharge septage with a pH above 6.5 (by the use of lime where necessary) to the anaerobic pond(s);
(iii) maintain trapped overflows between the treatment pond(s) to reduce the potential for carry-over of floating material;
(iv) maintain a minimum 300mm freeboard in the treatment pond(s) so that overflow does not occur as a result of either wave action alone, wave action coupled with incident or inflowing stormwaters except as a result of 1 in 10 year stormwater event of 24hour duration;
(v) dispose of sludge removed from the septage ponds in a manner approved by the Director.
(vi) waste other than septage shall not be disposed of in the septage pond.

SEVERANCE

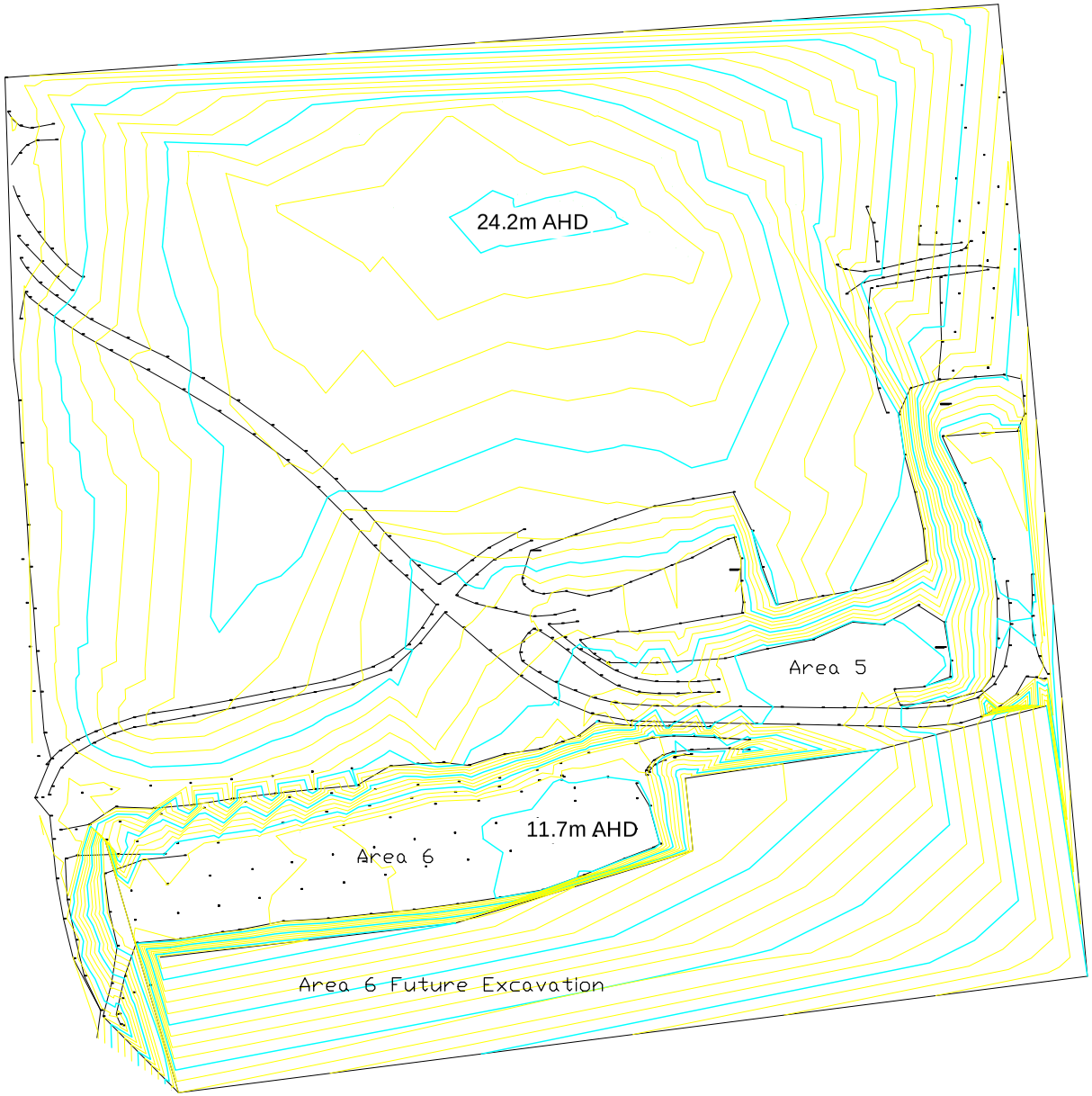
It is the intent of these licence conditions that they shall operate so that, if a condition or a part of a condition is beyond my power to impose, or is otherwise *ultra vires* or invalid, that condition or part of a condition shall be severed and the remainder of these conditions shall nevertheless be valid to the extent that they are within my power to impose and are not otherwise *ultra vires* or invalid.

Dec E.J. Morg
.....

Officer delegated under Section 20
of the *Environmental Protection Act 1986*

Date of Issue: Thursday, 2 November 2006

APPENDIX X EXISTING BASE CONTOURS



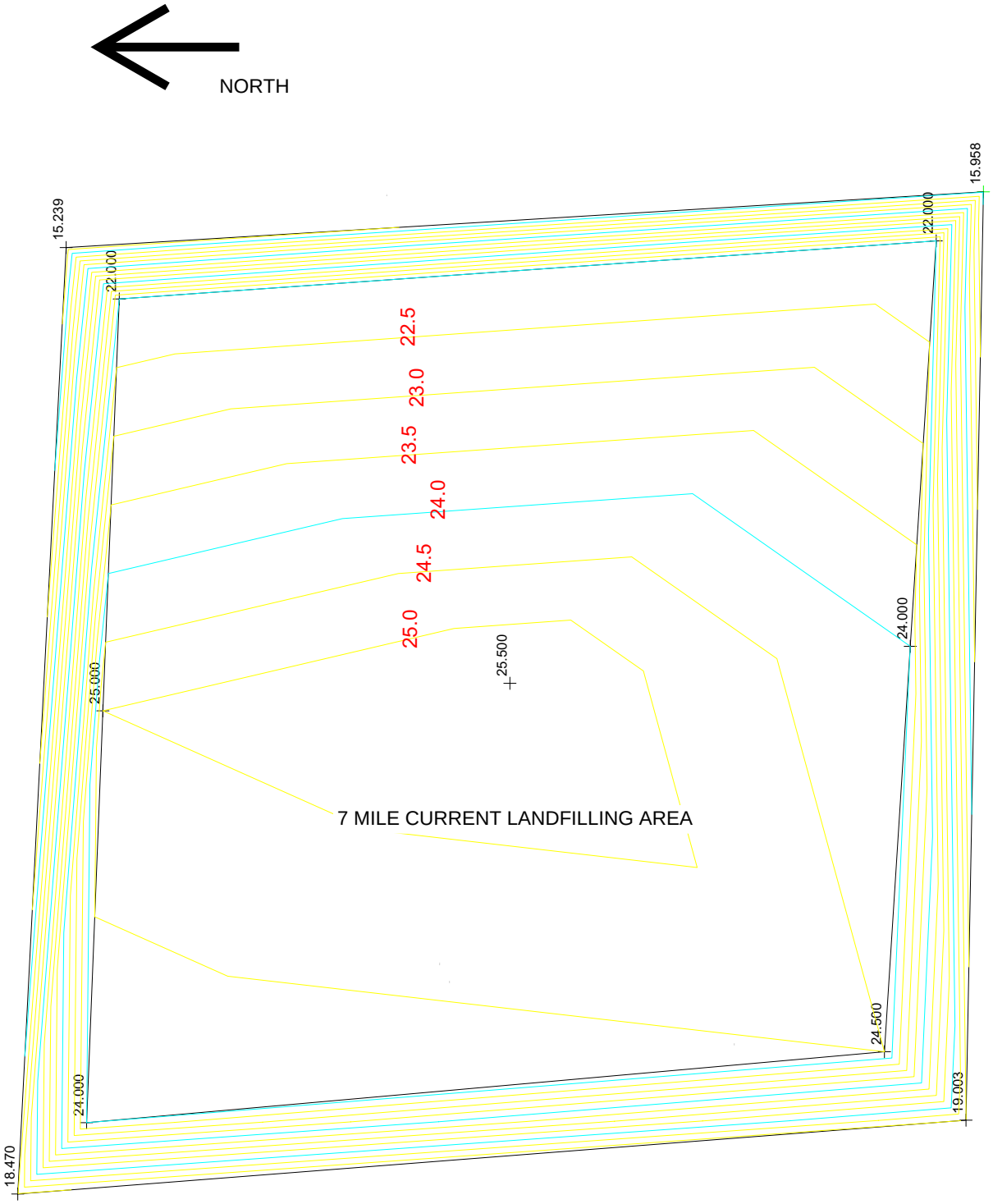
NORTH

Bowman and Associates Pty Ltd
ABN: 22 112 399 514
PO Box 2059
Rossmoyne WA 6148
Phone: 0402 373 582
Fax: 9457 6277

Project	Location	Drawing Title	Original Drawing Size
Review of Waste Management Services	7 Mile Landfill	Base Contours Landfill	A4

Date	Scale	Drawn By	Client	Drawing Number	Version
10/12/09	Not to Scale	Alex Upitis	Shire Of Roebourne	Rbrne-BaseCntrs	1

APPENDIX Y PROPOSED FINISHED CONTOURS



Works INFRASTRUCTURE
A DIVISION OF DOWNER EDI LIMITED

Works Infrastructure Pty Ltd
ABN 66 008 709 608
Level 1
130 Fauntleroy Avenue
Redcliffe WA 6104
Locked Bag 130
Welshpool DC WA 6986
Telephone: 61 8 9475 6000
Fax: 61 8 9475 6001
info@works.com.au

Shire of Roebourne
PO Box 219
KARRATHA WA 6714
Attention: Paul Webb – Manager of Engineering Works

Agreement to remove materials for the 7 Mile Tip site, Karratha

We (Works Infrastructure Pty Ltd) would like to enter an agreement on the following basis and conditions to obtain fill material from the Shire of Roebourne's 7 Mile tip facility.

The intent is for us to remove materials suitable for us to use as structural and general fill. In lieu of direct payment we will excavate the areas we remove fill from to the desired 4.5m floor level for the Shire. Once we remove the fill we require to about 2 to 3m or more below existing ground level, we cut the underlying material to the Shire's desired floor level and stockpile it, either in that area or in adjacent areas at a similar level, within 50m. We can further agree that we lower other locations to the same surface area from a similar reduced level in lieu of the location we are removing fill from where requested.

We will produce plans, in conjunction with our surveyor defining the areas where we will remove the fill from.

The basis of the agreement would be that:

- We clear the overburden and vegetation, and stockpile it adjacent to the pit.
- We remove approximately 105,000 bcm of the fill we require.
- We excavate the unsuitable material to 4.5m +/- 200mm below the existing surface (the Shire's desired floor level), and stockpile it within 50m of where we excavate it.
- We will batter the walls of the excavation as agreed.
- The work will be carried out between the hours of 6.00am and 7.00pm and will be carried out in a manner that will not interfere with the normal running of the tip site and will not endanger the public or any persons working on the site.
- The areas we expect to remove fill from will be surveyed by Handley Surveys prior to commencement of work and again after clear of topsoil and vegetation. Once the fill has been removed, the base of the excavation will be surveyed to provide quantities of fill removed and floor area to be lowered. Additional survey of fill areas for intermediate volumes can be carried out if requested.

The following conditions would apply to excavating to the desired floor level for the Shire:

- Only material that can be removed by the D10 dozer would be moved. No blasting or breaking of rock will be carried out.
- The material will be stockpiled within 50m of where it is removed, in agreed locations, using the D10. No trucks or excavators will be used.
- No dewatering will be provided. It is expected that the water table is about 6m below existing ground level and that we will not excavate below the water table.

- We will not take any responsibility for the performance or stability of the floor or walls of the pit, for seepage, leaching or other possibilities. Where soft or unsuitable floor areas are encountered, these will be brought to the attention of the Shire.
- We have not allowed for any safety bunting, barricading or fencing of excavations
- We have not allowed for dust suppression.
- The work is to be carried out continuously; we have allowed only one mobilisation/demobilisation

Signed as an agreement between:

Works Infrastructure Pty Ltd, ABN 66 008 709 608, of LMB 130 Welshpool DC, Welshpool WA 6986

And

Shire of Roebourne, of PO Box 219 Karratha WA 6714

Executed By
Works Infrastructure Pty Ltd by its
Authorised Representative in the presence of:

.....	.....
Signature of Authorised Representative	Signature of Witness
.....	.....
Name of Authorised Representative	Name of Witness

Executed By
Shire of Roebourne by its
Authorised Representative in the presence of:

.....	.....
Signature of Authorised Representative	Signature of Witness
.....	.....
Name of Authorised Representative	Name of Witness

TRADE OF SERVICES BETWEEN SHIRE OF ROEBOURNE AND DOWNER EDI AT THE 7 MILE WASTE FACILITY

- Memorandum of Understanding -

Agreement in Principle

Downer EDI approved to remove approximately 95,000 BCM of soil from the 7 Mile facility for use in 400 lot development.

The SOR are to receive services on an hourly rate from Downer EDI beginning no later than the end of December 2008 equated from survey pick up (SOR to perform pick up Monthly)and cross reference of trip sheets (Downer EDI to supply trip sheets weekly). The main goal from the service provided is initially for the construction of Cell 6 at the 7 Mile facility (as attached).

The following information is to be prepared and provided prior to works going ahead:

- Traffic Management Plan for entirety of works as described above, updated as required for alteration to site usage.- **DOWNER EDI**
- Emergency contact details - **DOWNER EDI & SOR**
- Details of radio channels – **DOWNER EDI & SOR**
- Site Inductions – **DOWNER EDI & SOR (AS BELOW)**

Downer EDI are to have initial prestart works meeting with all Downer EDI staff and contractors including all SOR waste Management staff. Waste Coordinator (SOR) to prepare additional topics of discussion for meeting in regards to 7 Mile facility and localised issues of site:

- Water meter (sub meter- water charged at rate as per current Water corporation rate plus 12.5%) for stand pipe – **SOR (Rose Clark)**
- Details of hours of operation (outside Shire hours 0700hrs – 1730hrs) – **DOWNER EDI**
- Details of employee responsible for daily lock up of SOR 7 Mile facility if work hours go past SOR standard hours of work. – **DOWNER EDI**

The rate costs for soil removed are to be calculated at the agreed value of $3.00/M, quantified monthly.

Downer EDI to provide SOR with plant rates the SOR would be using for calculation of services provided by Downer EDI in relation to Cell 6 construction.

Downer EDI Plant, equipment and staff are restricted to areas north of cell 6 (proposed on attached pdf. This includes SOR site office, ablutions and site hut) fence to fence line and other areas to be defined at site prestart meeting with Waste Coordinator and added to Traffic Management Plan.

Downer EDI are to supply the SOR with certificate of Currency for insurance cover for all Plant, equipment, temporary structures and employees during all works from start to end of works inclusive of services provided to SOR at hourly rate, excavation/ removal of soils as described and mobilisation / demobilisation.

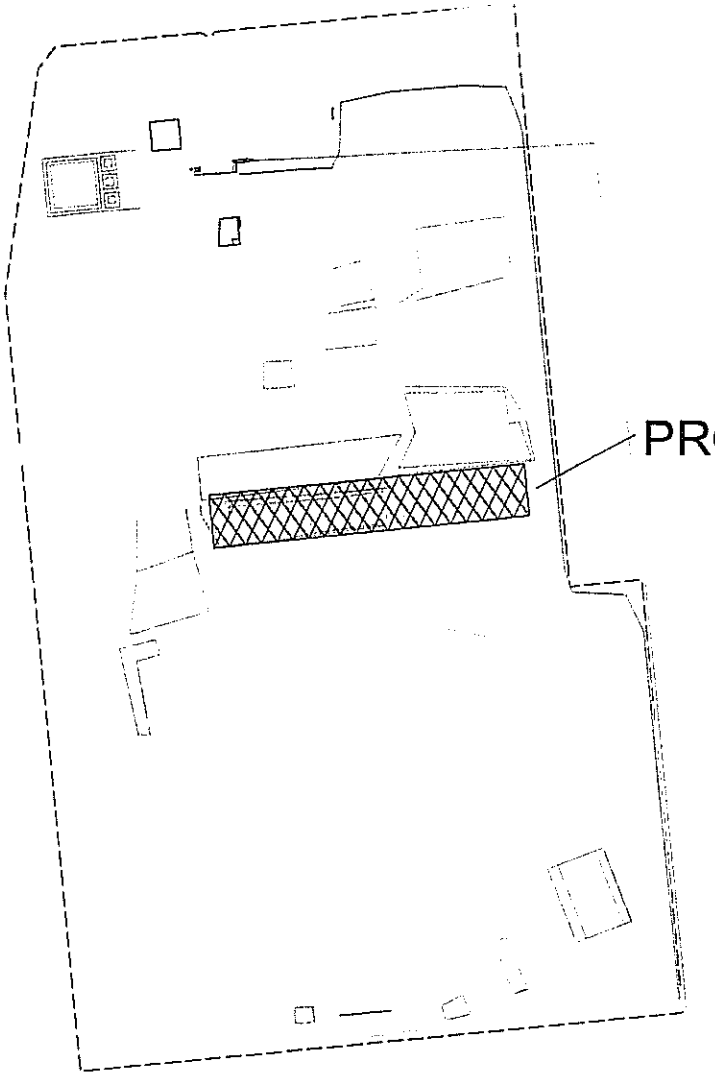
Signed:

8/8/8

Allan Moulton
Manager Operations
Shire of Roebourne

David Ness
Project Manager
Downer EDI

7 MILE TIP



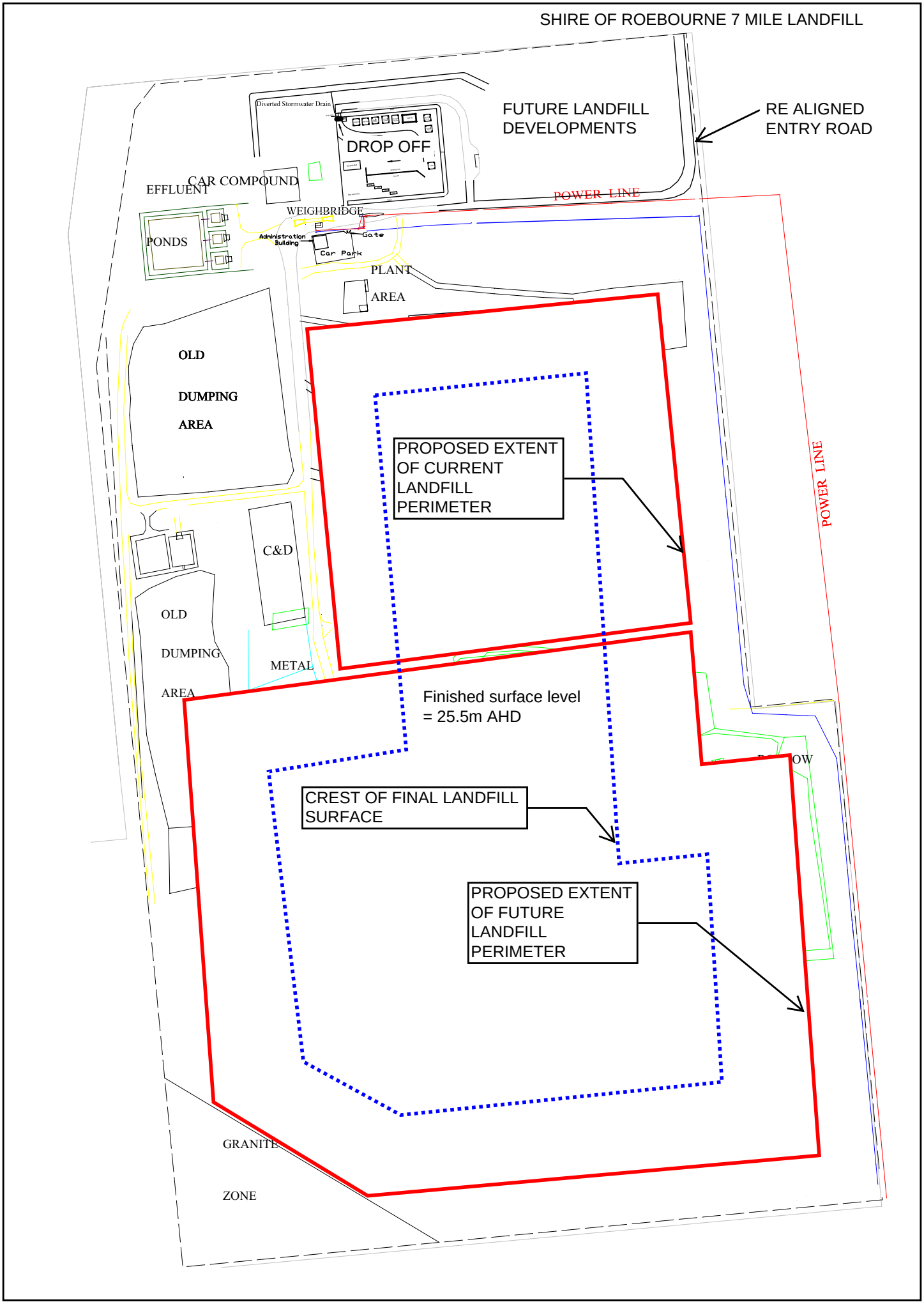
PROPOSED EXCAVATION

PIT DIMENSIONS ARE 440m X 72m
THIS ALLOWS FOR A BASE OF 60m WITH BATTERS AT 1:1

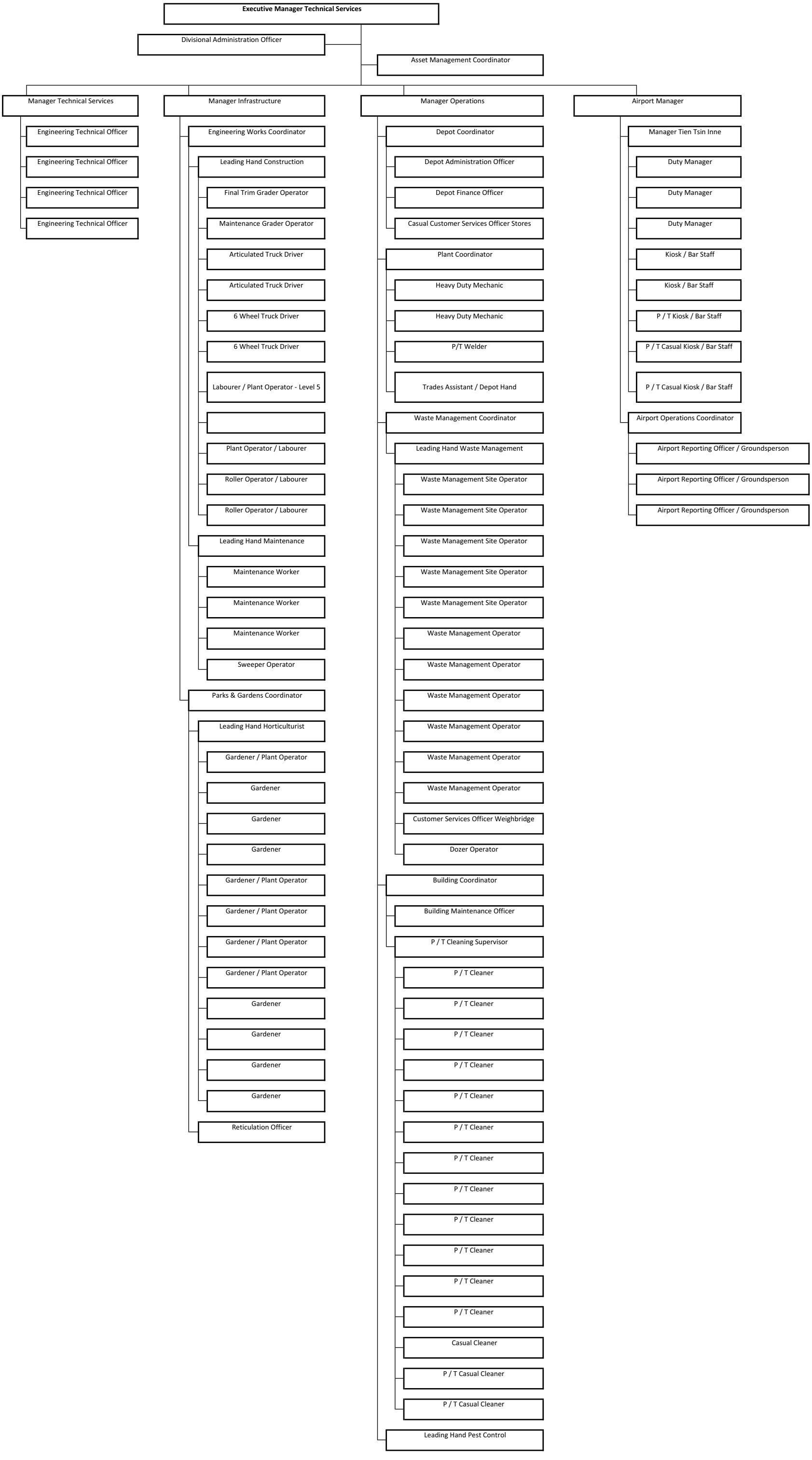
Signed
Allan Moulton
Manager Operations SOR

Signed
David Ness
Project Manager Downer EDI

APPENDIX ZA PROPOSED FUTURE LANDFILL EXPANSION



APPENDIX ZB TECHNICAL SERVICES DIVISION ORGANISATIONAL STRUCTURE



Bowman & Associates Pty Ltd
Domestic Rates Charges Review

Consultant	Bowman & Associates Pty Ltd	Prepared by:	B Bowman
Company:	Shire of Roebourne	Date:	31/03/2010
Project name:	Domestic Rates Charges Review		
Project type:	Domestic Collection		
Project location:	**Shire of Roebourne**		

Total capex:
Initial beginning capex:
Contract / Project Term 2014 Years Inflation Rate 2.50%
No Of Premises - Resi & Comm Service Growth Rate 5.00% Bin weight (kgs 21

PROFIT AND LOSS ESTIMATION

2014 YEAR MODEL

Year	**2008-9**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Year Finishes June	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Revenue								
Rates Collected	0	1,489,291	1,602,849	1,725,067	1,856,603	1,998,169	0	0
Other Charges	0	18,000	18,450	18,911	19,384	19,869	0	0
Landfill Income	0	4,014,224	4,214,935	4,425,682	4,646,966	4,879,314	0	0
Transfer Station Income	0	8,000	8,200	8,405	8,615	8,831	0	0
	0							
	0							
Sub Total	**0**	**5,529,515**	**5,844,435**	**6,178,065**	**6,531,568**	**6,906,183**	**0**	**0**
			0	0	0	0	0	0
			0	0	0	0	0	0
			0	0	0	0	0	0
			0	0	0	0	0	0
			0	0	0	0	0	0
Sub Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Costs								
Collection Costs		1,902,649	1,950,215	1,998,971	2,048,945	2,100,168	0	0
Waste Overheads		540,386	553,896	567,743	581,937	596,485	0	0
Landfill Costs		2,568,618	2,632,833	2,698,654	2,766,121	2,835,274	0	0
Plant Depreciation		731,692	731,692	731,692	731,692	731,692	0	0
Sub Total	**0**	**5,743,345**	**5,868,636**	**5,997,060**	**6,128,694**	**6,263,619**	**0**	**0**
Profit or Loss	**0**	**-213,830**	**-24,201**	**181,005**	**402,874**	**642,564**	**0**	**0**

Bowman & Associates Pty Ltd
Domestic Rates Charges Review

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Company:	Shire of Roebourne	Date:	31/03/2010
Project name:	Domestic Rates Charges Review		
Project type:	Domestic Collection		
Project location:	**Shire of Roebourne**		

Total capex:
Initial beginning capex:

PROFIT AND LOSS ESTIMATION

2014 YEAR MODEL

Contract / Project Term 2014 Years — Inflation Rate 2.50%
No Of Premises - Resi & Comm — Service Growth Rate 5.00% — Bin weight (kgs 21

Year	**2008-9**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Year Finishes June	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Landfill Revenue								
Medical Waste	0	1,000,000	1,050,000	1,102,500	1,157,625	1,215,506	0	0
Recyclables - Karratha	0	10,000	10,500	11,025	11,576	12,155	0	0
Tipping Charges - Solid Wa	0	2,000,000	2,100,000	2,205,000	2,315,250	2,431,013	0	0
Tipping Charges - Liquid	0	1,000,000	1,050,000	1,102,500	1,157,625	1,215,506	0	0
LG Report Fees	0	1,200	1,260	1,323	1,389	1,459	0	0
Septic Tank Inspections	0	3,024	3,175	3,334	3,501	3,676	0	0
Sub Total	**0**	**4,014,224**	**4,214,935**	**4,425,682**	**4,646,966**	**4,879,314**	**0**	**0**
Waste Overheads								
Employment Costs		540,386	553,896	567,743	581,937	596,485	0	0
			0	0	0	0	0	0
			0	0	0	0	0	0
			0	0	0	0	0	0
			0	0	0	0	0	0
Sub Total	**0**	**540,386**	**553,896**	**567,743**	**581,937**	**596,485**	**0**	**0**
Landfill Costs								
Equipment Repair and Replacement (7 I		9,900	10,148	10,401	10,661	10,928	0	0
Interest On Loan Repayments			0	0	0	0	0	0
Administration		248,300	254,508	260,870	267,392	274,077	0	0
Refuse Site - 7 Mile Landfill		1,951,160	1,999,939	2,049,937	2,101,186	2,153,716	0	0
Refuse Site Maintenance		8,794	9,014	9,239	9,470	9,707	0	0
Refuse Site - Other		7,845	8,041	8,242	8,448	8,659	0	0
Wickham Transfer Station		342,619	351,184	359,964	368,963	378,187	0	0
Sub Total	**0**	**2,568,618**	**2,632,833**	**2,698,654**	**2,766,121**	**2,835,274**	**0**	**0**
Depreciation		**478,507**	**478,507**	**478,507**	**478,507**	**478,507**	**0**	**0**
Profit or Loss	**0**	**426,713**	**549,699**	**680,777**	**820,401**	**969,048**	**0**	**0**

Bowman & Associates Pty Ltd
Domestic Rates Charges Review

Consultant	Bowman & Associates Pty Ltd	Prepared by:	B Bowman
Company:	Shire of Roebourne	Date:	31/03/2010
Project name:	Domestic Rates Charges Review		
Project type:	Domestic Collection		
Project location:	**Shire of Roebourne**		

Total capex:
Initial beginning capex:
Contract / Project Term 2014 Years Inflation Rate 2.50%
No Of Premises - Resi & Comm Service Growth Rate 5.00%

PROFIT AND LOSS ESTIMATION

2014 YEAR MODEL

Bin weight (kgs 21

Year	**2008-9**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Year Finishes June	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Rates Revenue								
Domestic	0	1,074,324	1,156,241	1,244,405	1,339,290	1,441,411	0	0
Additional Bin	0	28,366	30,529	32,857	35,362	38,058	0	0
Commercial	0	370,275	398,508	428,895	461,598	496,795	0	0
Commercial in Yards	0	7,375	7,937	8,543	9,194	9,895	0	0
Semi Residential	0	8,951	9,634	10,368	11,159	12,009	0	0
Replacement MGBs	0	18,000	18,450	18,911	19,384	19,869	0	0
Sub Total	**0**	**1,507,291**	**1,621,299**	**1,743,978**	**1,875,987**	**2,018,038**	**0**	**0**
Estimated Landfill Disposal Cost								
Domestic		270,065	311,925	360,273	416,116	480,614	0	0
Additional Bin		6,797	7,850	9,067	10,473	12,096	0	0
Commercial		88,723	102,475	118,359	136,704	157,893	0	0
Commercial in Yards		884	1,022	1,180	1,363	1,574	0	0
Semi Residential		77,988	90,076	104,038	120,164	138,789	0	0
Sub Total	**0**	**444,457**	**513,348**	**592,917**	**684,819**	**790,966**	**0**	**0**
Collection Costs								
Administration		186,225	190,881	195,653	200,544	205,558	0	0
Domestic Refuse Collection		952,721	976,539	1,000,953	1,025,976	1,051,626	0	0
Recycling		17,212	17,642	18,083	18,535	18,999	0	0
Bin Repairs/Replacement		176,677	181,094	185,621	190,262	195,018	0	0
Litter Control		373,790	383,135	392,713	402,531	412,594	0	0
Rubbish Collection Community		5,346	5,480	5,617	5,757	5,901	0	0
Trade/Commercial Refuse		190,678	195,445	200,331	205,339	210,473	0	0
Sub Total	**0**	**1,902,649**	**1,950,215**	**1,998,971**	**2,048,945**	**2,100,168**	**0**	**0**
Depreciation		253,184	253,184	253,184	253,184	253,184	0	0
Profit or Loss	**0**	**-1,092,999**	**-1,095,448**	**-1,101,094**	**-1,110,961**	**-1,126,281**	**0**	**0**
No. of Premises	0	10,854	11,396	11,966	12,564	13,193	0	0
True Cost per Premise		$239.58	$238.39	$237.76	$237.73	$238.34	$0.00	$0.00
Forecast Charge per Premise		**$162.90**	**$166.97**	**$171.15**	**$175.43**	**$179.81**	**$0.00**	**$0.00**
(Business as usual)								

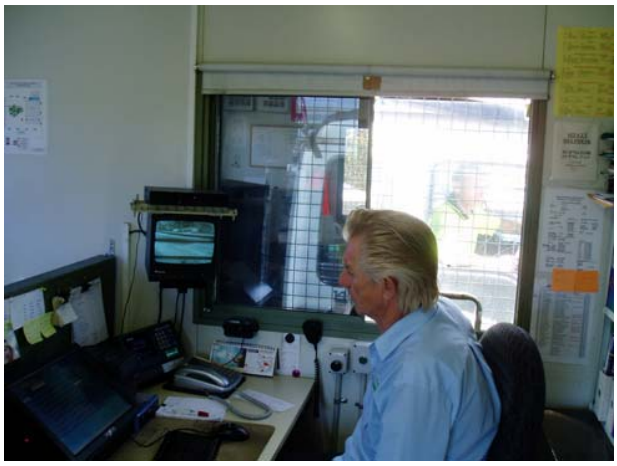

Plate 1: Welshpool Transfer Station

Weighbridge attendant has face to face contact with truck drivers on the weighbridge.

Plate 2: Welshpool Transfer Station

Raised weighbridge office enclosed underneath for added security.

Plate 3: Welshpool Transfer Station

Protected walkway along the side of the elevated weighbridge for driver safety.

Plate 4: Welshpool Transfer Station

Weighbridge attendant and truck driver can communicate without leaving the vehicle or opening the office door.

Plate 5: Welshpool Transfer Station

Perspex sheeting fixed to the security screen helps to maintain the office environment.

Plate 6: Welshpool Transfer Station

In and out weighbridges position offset to allow the truck windows to line up with office window.

Plate 7: Welshpool Transfer Station

Access stairs to office. Short weighbridge ramps such as these are no good for weighing combination vehicles.

Plate 8: Welshpool Transfer Station

Truck driver gets his docket through the window. Note also the auto tarping system fitted to the hook lift truck.

Plate 9: Henderson Tip Shop

A 500m^2 shed enclosed in an electrified security fence. Total cost $150,000.

Plate 10: Henderson Tip Shop

Secure yard for the sorting of recyclable materials prior to placing them on display for sale.

Plate 11: Henderson Tip Shop

A recycling drop off location is at the side entrance to the shed.

Plate 12: Henderson Tip Shop

Secure compound inside for the sorting and storage of recyclable items prior to going on display.

Plate 13: Henderson Tip Shop

Shelving and carpeted walking areas over compacted road base floor.

Plate 14: Henderson Tip Shop

Recyclable items placed on display.

Plate 15: Henderson Tip Shop

Customer service desk at the exit point to the display area.

Plate 16: Henderson Tip Shop

Clear signage throughout the tip shop area.

Plate 17: Henderson Waste Transfer

Skip placed throughout the drop off area for waste separation.

Plate 18: Henderson Waste Transfer

Refrigerators separated for degassing.

Plate 19: Henderson Waste Transfer

Recyclables drop off locations clearly signed and orderly.

Plate 20: Henderson Waste Transfer

General waste drop off area located at the rear of the drop off area for waste to be landfilled.

Plate 21: Henderson Waste Transfer

Bumper stop positioned 1m away from tipping edge to provide working space for residents.

Plate 22: Henderson Waste Transfer

Split level tipping area to comply with working from heights legislation.

Plate 23: Henderson Waste Transfer

Separation between residents and heavy equipment.

Plate 24: Henderson Waste Transfer

Front end loader used to load waste into skips for delivery to landfill tipping face.

Plate 25: Henderson Waste Transfer

Precast retaining wall sections used for the change in level at the waste drop of area.

Plate 26: Henderson Waste Transfer

Bumper made from 300mm steel pipe semi buried in the ground.

Plate 27: Henderson Waste Transfer

Reinforced 15m^3 hook lift skips used to transfer waste. 30m^3 skips unable to handle the high number of lifts required.

Plate 28: Wickepin Landfill Litter Screens

Prefabricated panels used to control litter near the tipping area.

Plate 29: Wickepin Landfill Litter Screens

Panels kept close to ground and secured using star pickets driven into the ground.

Plate 30: Wickepin Landfill Litter Screens

Welded mesh panels are light weight while providing strength.

Plate 31: Searipple Wash Bay

Shelter over the wash bay makes it more user friendly, a wind protection/splash wall would also be helpful.

Plate 32: 205 Litre Steel Mobile Garbage Bin

The Shire of Roebourne manufactures steel mobile garbage bins for use in remote areas or where bin vandalism occurs.

Plate 33: Precast Walls

Precast concrete sections used in the retaining wall at the Henderson Waste Transfer station.

Plate 34: Port Hedland Effluent Unloading Pit

Concrete pit used by truck for the disposal of effluent into the effluent ponds at Port Hedland.

Plate 35: Typical Slide on Water Tank

Slide on truck mounted water truck that could value add the 7 Mile Landfill tip truck functionality.

Plate 36: Typical HHW Compound

Fenced compound at Henderson Landfill for the storage of paints and household hazardous waste.

Plate 37: Typical HHW Storage Locker

Lockable storage locker at Henderson Landfill for the storage of household hazardous waste.