



Waste Data and Estimated Cash Flows Regional Waste Infrastructure Project

Shires of Carnarvon, Exmouth and Shark Bay



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PREFACE

The draft version of this report was produced and circulated to the group prior to a meeting held on 12th February 2016 to discuss the results and future options for the group. The meeting was attended by representatives from the Shire's of Carnarvon and Exmouth (Shark Bay sent their apologies, due to unforeseen events) and ASK via telecom.

The general comments / observations made during the meeting were as follows:

Bring Centres

The Bring Centres provide a stand-alone recycling service that each Shire could provide for their community, therefore each Shire can decide whether or not to proceed with the introduction of this service without it impacting on the other members of the group.

The costings for the Bring Centres are based on full commercial cost. There may be other ways to provide the service at a lower cost. The two highest cost items are the transport of recyclables to Perth and staffing the facilities.

Transport costs used in the modelling are based on rough quotes from local transport companies; therefore, it is likely that cheaper backloading options could be negotiated. The staffing of the facilities could be completed by community groups, or if the balers were located at the landfills (as planned for Carnarvon and Shark Bay) a portion of the time required to bale and handle the recyclable materials may be able to be completed with existing staff within their rostered hours.

Multi-material shredder

The cost of maintaining and transporting a larger shredder between the Shires is significant and the ownership of the plant would include the risk of unforeseen events such as damage or failure of the machine. Further, while the first shredder would be purchased with the grant, this asset would need to be replaced once it reached its end of life, for the service to continue.

When the cost of asset depreciation is included in the costings, it is more cost effective to process the concrete by engaging a contractor with mobile concrete crushing equipment. This provides the same service (i.e. processing waste concrete to produce recycled concrete aggregate) but without a significant capital cost or on going operational risk.

Therefore, during the discussion at the meeting the group felt that engaging a contractor to process the concrete was a lower risk option when compared to owning and operating a shredder between the group, this does however rise the question about how to process the glass, tyres and greenwaste.

Greenwaste

The group agreed that there was only a small demand for mulched greenwaste in the region as there are no commercial composting businesses. Each Shire already had contractors or equipment available to produce smaller quantities of mulch, while amending the landfill licences to allow the controlled burning of excess greenwaste would result in preserving voidspace and avoiding the generation of methane that occurs when greenwaste is buried. Thus this would provide a lower cost option to the modelling and in some cases the current operations.

Glass

There are several ways to crush any glass that is collected. The simplest option is to crushed the glass using a tracked machine over a concrete pad, alternatively small – medium sized glass crushers are available, such as the Komplet Mill Track 5000 shown below (list price \$89,000 ex GST or \$69,000 ex GST for static model). This model has been provided to at least three WA local governments under a APC funding program.

Example of dedicated glass crusher (Komplet M5000)



Tyres

As each Shire has an excavator already at their landfills or available from the Shire Depot a tyre shear attachment for the excavators would allow the Shire's to cut tyres in half. This makes the landfilling of the tyres easier and utilises less voidspace for their disposal, the cost of tyre shears varies depending upon their size, but are in the range of \$25,000 - \$50,000 ex GST.

Tyres are a controlled waste and thus any commercial transportation of used tyres (from tyre companies to the Shire's landfills) must be completed with registered vehicles and accompanying paperwork. ASK has worked with other Shires in regional WA to liaise with local tyre companies resulting in these companies backloading used tyres to Perth for recycling rather than local disposal, thus the Shires experienced a 70% - 80% reduction in the number of tyres drop-off at the landfills.



Collaboration

The potential options summarised above would allow each Shire to have their own glass crusher and tyre shears permanently at the landfills, rather than transport one large shredder around the region. The Shire's should collaborate in the purchase of the equipment as multiple orders are likely to attract a lower unit cost. This is particularly important for the processing of concrete in the region by a contractor, which should be issued as a regional tender to ensure the lowest rate possible is secured.

Financial summary

The operational cost of providing the recycling service for packaging at the Bring Centre could be reduced through the use of existing staff and lower transport costs as mentioned above, to provide an indication of the potential savings an alternative scenario has been modelled based on a 25% discount of the transport costs quoted, together with half of the time required to bale the materials being completed by existing staff time at the landfills. The model shows that these two changes could result in a 50% reduction in operational cost as shown in the table below.

Bring Centre costs for each Shire based on original modelling and reduced transport and staffing costs (\$ per residential ratepayer) (Average annual operational cost based on 10 years)

Service	Yield	Carnarvon	Exmouth	Shark Bay	Region
Reduced costs	Low	9.00	13.00	15.00	11.00
	High	13.00	19.00	23.00	16.00
Report costings	Low	18.00	25.00	26.00	21.00
	High	30.00	42.00	46.00	35.00

The cost quoted by a contractor based on the South West to process concrete (including mobilisation to the region) was equivalent to the value of the material produced, thus resulting in a breakeven service, but with the benefit of preserving landfill voidspace and recovering recyclable material.

As there are local concrete crushing contractors in the region and the Pilbara, it is likely that a lower process cost could be secured, thus potentially resulting in a slightly profitable recycling service.

Regarding the processing of glass and tyres, each Shire is able to purchase their own glass crusher and tyre shear attachment for the same amount originally allocated for the multiple-material shredder. This will avoid the operational cost to transport the equipment around the region and allow each Shire full flexibility to utilise the equipment as they individually require.

Based on the cost obtained the total cost to provide this equipment to the three Shires would be \$400,000 - \$550,000 ex GST (this total would include transport to site and any commissioning required). There would potential to establish a glass storage bunker and shed for the crushers (see photographs below) as each landfill as part of the project, if there were sufficient grant funding to cover all the costs.

Example of glass bunkers and shed for glass crusher



The ongoing operational cost for the processing of the tyres, glass and greenwaste would be lower than the projected costs in the report.

The cost to have controlled burns of the greenwaste will be to construct at least two dedicated earth banded burning areas and to apply for the licence amendment. The local shredding of greenwaste can be done using local equipment to produce a defined quantity of mulch to be used by the local residents as required.

The glass crusher shown above can process up to 20 tonnes per hour, therefore each Shire would only need to operate the glass crusher for a few hours each month, based on the projected tonnages.

Provided the Shire's 'educate' their local tyre companies and experience a similar reduction of the quantities received, the processing of the tyres with a shear should not incur too much time and can be completed during 'quiet' periods at the landfill. If it found that the shearing of all tyres was taking too long, only larger truck tyres could be sheared prior to disposal. It is likely the shears could also be used to cut up other problematic wastes into smaller sizes prior to disposal.

EXECUTIVE SUMMARY

ASK has reviewed the waste generation and yield estimates for the Gascoyne Region's Waste and Recycling Infrastructure project (the Project) and completed economic modelling to determine the likely operational costs to provide the proposed services. These services include the establishment of Bring Centres for the drop-off of packaging materials for recycling, and the purchase of a multi-purpose shredder to process concrete, greenwaste and tyres. The estimated total waste quantities generated by the Shires annually is estimated to be approximately 31,000 tonnes (8,000t MSW, 15,000t C&D, 8,000t C&I).

The estimated yields of the Project's target material streams for the Shires based on high and low yields are shown in **Table E.2**.

Table E.2 Estimated target stream total generation and yields for the region

Target Waste Streams	Regional Total (tonnes per annum)			Yield low	Yield high
	Generation	Low	High	kg/per/yr	kg/per/yr
Paper and card	2,810	236	438	16.2	30.1
PET	210	18	33	1.2	2.2
HDPE	180	15	28	1.0	1.9
Glass	810	68	126	4.7	8.7
Aluminium cans	170	14	27	1.0	1.8
Steel (Can and containers)	240	20	37	1.4	2.6
Concrete, bricks and tiles	12,470	2,182	4,053	149.9	278.3
Greenwaste	2,620	459	852	31.5	58.5
Tyres	220	15	29	1.1	2.0
Total	19,730	3,027	5,622	208	386

Economic modelling results

The model results are based on operational cost only, as the capital costs will be funded by the grants that have been secured. The tables below list the costs for the Shires, therefore negative values (in red text) for the concrete processing provide positive cashflow.

Table E.3 Cost breakdown of services proposed for each Shire (Annual operation cost 2017/18)

Service	Yield	Carnarvon	Exmouth	Shark Bay	Region
All Services	Low	33,400	22,500	12,400	68,400
	High	52,500	33,900	17,300	103,800
Bring Centres	Low	29,000	17,700	7,100	53,900
	High	48,900	29,700	12,500	91,000
Concrete	Low	-1,200	400	1,800	1,000
	High	-4,500	-1,700	900	-5,300
Greenwaste	Low	5,700	4,400	3,400	13,500
	High	8,200	5,900	4,000	18,100

Table E.4 Breakdown of services proposed for each Shire (\$ per tonne of material) (Average annual operational cost based on 10 years)

Service	Yield	Carnarvon	Exmouth	Shark Bay	Region
All Services	Low	23.00	27.00	35.00	26.00
	High	20.00	22.00	26.00	21.00
Bring Centres	Low	170.00	160.00	170.00	170.00
	High	140.00	130.00	150.00	150.00
Concrete	Low	-1.00	-1.00	7.00	0.50
	High	-2.00	-2.00	2.00	-1.50
Greenwaste	Low	26.00	35.00	68.00	34.00
	High	20.00	25.00	43.00	24.00

Table E.5 Breakdown of services proposed for each Shire (\$ per residential ratepayer) (Average annual operational cost based on 10 years)

Service	Yield	Carnarvon	Exmouth	Shark Bay	Region
All Services	Low	21.00	32.00	45.00	27.00
	High	32.00	48.00	64.00	40.00
Bring Centres	Low	18.00	25.00	26.00	21.00
	High	30.00	42.00	46.00	35.00
Concrete	Low	-0.80	0.50	6.80	0.90
	High	-2.80	-2.30	3.20	-1.50
Greenwaste	Low	3.50	6.20	12.60	5.20
	High	5.10	8.20	14.70	6.90

Given the high cost to provide the services proposed, some of the alternative options the Shires could consider to reduce the operational cost include:

- Exploring the option of loading the bales of material directly into shipping containers at the landfills, organising export and selling the materials directly to an Asian reprocessor, to avoid re-baling and administration costs in Perth.
- Local community groups may consider staffing and operating the Bring Centres, with the Shire's providing the infrastructure.
- Any commercial packaging recyclables should be charged at the full breakeven cost (approximately \$160 per tonne) to avoid an added burden on the Shire's rates.
- The Shires should only process enough greenwaste to provide a stockpile for local use, excess greenwaste could be burnt to preserve voidspace, avoid leachate generation and produce carbon dioxide instead of methane (a 24 times saving in greenhouse gas emissions). If the greenwaste could be periodically burnt and concrete stockpiled, the shredder may need to only travel around the region once a year and thus save \$8000 per year in transport cost.
- Rather than purchasing a multi-purpose shredder, the Shires could consider the purchase of a more efficiently dedicated concrete crusher. The Shires could burn all the greenwaste instead of shredding it, as there does not appear to be a viable market for the mulched greenwaste.
- If the Shires calculated their whole of life landfill costs and charged realistic commercial gate fees that reflected these costs, then the funds (from residential rate payers) currently subsidising commercial waste disposal could be used to fund recycling activities instead. Based on average regional WA landfill costs each of the landfills is being subsidised by \$350,000 - \$550,000 each year (\$1,050,000 – \$1,650,000 per year for all the Shires).

1 INTRODUCTION

The Shires of Carnarvon, Exmouth and Shark Bay (the Shires) engaged ASK Waste Management (ASK) to project manage the implementation of the Gascoyne Group Country Local Government Fund 2012-2013 Regional Group Project: Waste and Recycling Infrastructure for the Gascoyne Region (the Project).

The purpose of the Project is to enable the Gascoyne to manage the regions waste in a more sustainable and resource efficient way. The Project will allow recycled materials to be sold (e.g. plastic, aluminium, paper) or re-used rather than buying raw materials (e.g. road base, aggregate). The Shire of Gascoyne Junction is no longer a participant in the Project.

1.1 INITIAL REVIEW OF BUSINESS PLAN DATA

There is little accurate waste data available in the region, therefore the majority of the waste data used for the Project's business plan (Cardno, 2012) is based on extrapolated industry averages based on population, combined with information from a waste audit completed in 2009 (APC, 2009).

ASK completed a rough review of the waste data used in the business plan and have questioned some of the assumptions used in the modelling, particularly the estimated yield of packaging recyclables (i.e. paper, cardboard, plastics, aluminium, glass, etc.) likely to be collected at the proposed Bring Centres and the quantities of concrete and greenwaste to be shredded.

Further, during the first Project workshop (Nov, 2015) the Shires were asked how much each had allowed in their 2016-17 budget for the operational costs associated with the Project; none of the Shires had allowed any funds for the on-going operational costs and no value had been estimated.

1.2 REPORT OBJECTIVES

This report has been produced to meet the following objectives:

- Estimate the quantity of waste generated by each Shire based on the Shire's own records, the APC audit and regional averages in WA (broken down to MSW, C&I and C&D)
- Provide a tonnage breakdown for the target waste streams (recyclable packaging, concrete, greenwaste & tyres)
- Define the likely 'yield' of materials based on data from existing regional bring centres and historic data for regional WA
- Confirm the likely price the Shires will get for the recyclable materials
- Identify potential equipment that would match the quantities to be processed
- Calculate the likely capital and operational costs associated with the Bring Centres
- Calculate the likely capital and operational costs associated with the shredder operations

1.3 EXCLUSIONS

This report's focus is to determine the likely volumes and operational costs to provide the proposed services. At this stage of the Project, the exact service, equipment and infrastructure is yet to be defined, therefore the costs provided are only indicative.

To minimise the cost of this report and to ensure the modelling is easily followed, the minor aspects of the Project, such as tyre shredding, fish waste processing and T Tape processing have been excluded from the economic model, as the cost to provide these extra components of the Project are likely to fall within the tolerance of the cost estimates provided.

The cost to reprocess glass has not been included in the modelling as the method of processes is yet to be decided are there would be significant cost differences depending upon the option selected (i.e. crushed by tracked machines, via multi-material shredder or with ALLU bucket shredder. The Australian

suppliers of the ALLU crusher buckets have been contacted regarding capital and operational costs of the buckets, however, at this time a full response has not been received.

Figure 1.1 ALLU shredder bucket (crushing glass in left had photograph)



2 WASTE QUANTITY & COMPOSITION

ASK assessed the available waste data provided by the Shires together with the likely accuracy of the data and decided to use average waste generation per capita data extrapolated from population (Table 2.1) values (both residents and tourist equivalents) as shown in Table 2.2.

The average waste generation per capita values are based on data ASK has calculated from eight Western Australian regional landfill's weighbridge data and their catchment populations. This provides an average value for regional Western Australia based on accurate data.

Table 2.1 Shire populations

Shire	Population		
	Residential (2013 Census)	Visitors Equivalent (2013 TRA)	Total Equivalent
Carnarvon	6,200	1,710	7,910
Exmouth	2,570	2,077	4,647
Shark Bay	928	1,077	2,005
Total	9,698	4,863	14,561

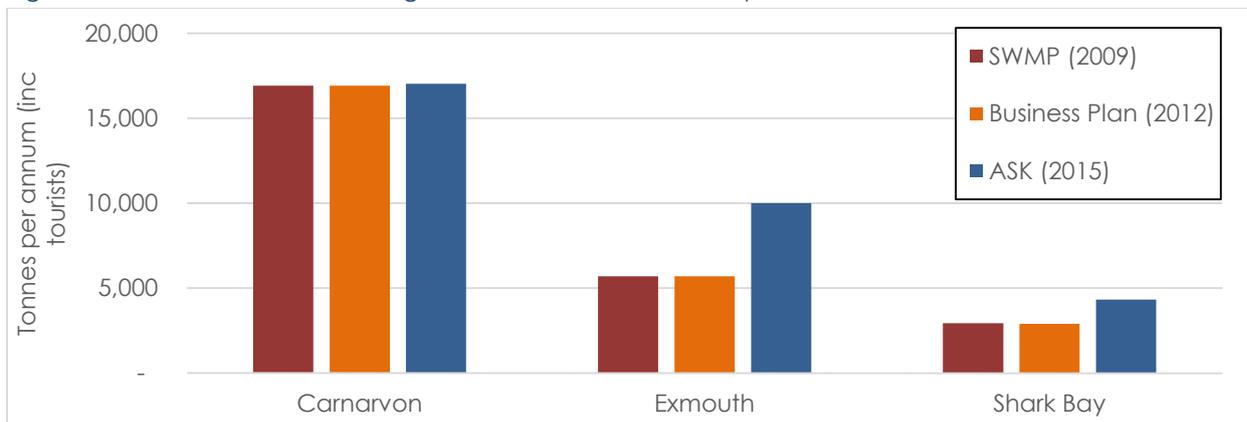
Table 2.2 Estimated waste stream generation per Shire

Shire	Waste Quantities (tonnes)			
	MSW	C&D	C&I	Total
Carnarvon	4,326	8,279	4,443	17,048
Exmouth	2,463	4,864	2,610	9,937
Shark Bay	937	2,098	1,126	4,161
Total	7,726	15,240	8,180	31,146

The waste quantities estimated by ASK are slightly higher than the quantities estimated for the region's Strategic Waste Management Plan (Bowman / APC, 2009) and the Project's business plan (Cardno, 2012), particularly for the Shires of Exmouth and Shark Bay, as shown in Figure 2.1 below.

The main factors for the difference is the source of population data used in the reports. The SWMP and business plan use population data sourced from older ABS data, a 2008/09/10 Tourism WA report and a personal communication with the Shire of Exmouth. The ASK data is based on the 2013 ABS census and Tourism data from 2013 (TRA, 2013), which results in significantly higher population numbers for Exmouth. (see Appendix A)

Figure 2.1 Estimated total waste generation from different reports



The breakdown of the waste generation total into the main three waste types is based on the average breakdown for regional Western Australia, while the further breakdown to material streams is based on the information in the APC audit for MSW breakdown (APC, 2009) and the Productivity Commission Waste Management Report for C&I and C&D waste (Productivity Commission, 2006).

This information was used to estimate the total of each waste stream targeted for recycling in the Project, the results are shown in **Table 2.3**.

Table 2.3 Estimated target material stream generation per Shire (tonnes per year)

Target Waste Streams	Carnarvon				Exmouth				Shark Bay				Regional Total			
	MSW	C&D	C&I	Total	MSW	C&D	C&I	Total	MSW	C&D	C&I	Total	MSW	C&D	C&I	Total
Paper and card	780		810	1,590	420		440	860	170		200	360	1,370		1,450	2,810
PET	60		50	110	30		30	70	10		10	30	100		90	210
HDPE	50		50	100	30		30	60	10		10	20	90		90	180
Glass	240		90	330	330		50	380	80		20	100	650		160	810
Aluminium cans	40		50	90	30		30	60	10		10	20	80		90	170
Steel (Can and containers)	90		50	140	40		30	70	20		10	30	150		90	240
Concrete, bricks and tiles		6,770	0	6,770		3,980		3,980		1,720		1,720		12,470		12,470
Greenwaste	1,020		440	1,450	580		260	840	220		110	330	1,820		810	2,620
Tyres	0		120	120			70	70	0		30	30			220	220
Food waste (not target stream)	980		150	1,130	600		90	680	220		40	260	0		270	270
Other waste (not target streams)	1,060	1,520	2,690	5,270	400	890	1,600	2,890	200	380	690	1,270	3,460	2,790	4,990	11,240
Total	4,320	8,290	4,500	17,100	2,460	4,870	2,630	9,960	940	2,100	1,130	4,170	7,720	15,260	8,260	31,240

3 MATERIAL YIELDS

The likely yield is the proportion of each target waste stream that will be separated prior to drop-off at either the Bring Centres (packaging recyclables) or the landfill (concrete and greenwaste, etc). This value determines the actual quantity that will be collected / processed and thus the required size of the equipment and infrastructure.

3.1 PACKAGING MATERIAL (BRING CENTRES)

There is very little current data relating to the yield of recyclables from Bring Centres (drop-off facilities) in WA. A model was produced by the Department of Environment (now the Department of Environment Regulation) in 2003 for predicting the potential for recycling of packaging materials in regional WA, this model had yield values of 12.5kg/capita (typical), 20kg/capita (good) and 35kg/capita (excellent).

For this report ASK reviewed NSW data (2012/13) from seven regional local governments with populations between 1,500 – 9,000 that provide drop-off facilities but not a kerbside recycling service. The average yield from these local governments was 31kg/capita or an average of 12% of the total material (waste) generated (**Appendix B**).

The Shires has been providing these services for at least five years, so they have become an established service provided for the local community, however they only include materials from domestic waste (MSW).

The yield previously used for the Project's business plan (Cardno, 2012) was based on 25% of all material generated, this equates to yields of 75kg/capita for packaging recyclables, more than double the NSW average.

Based on the available yield data summarised above, together with the Project's aim of collecting commercial recyclables with the domestic recyclables, a low rate of 8% (25kg/capita) and a high rate of 12% (47kg/capita) has been used. The low rate represents the likely yield when the service is initially introduced, then as awareness of the service increases in the region the yield rate should increase towards the high rate.

Table 3.1 shows the projected low and high yield calculated by ASK for each material stream on a Shire by Shire basis. The total quantity of packaging recyclables projected to be collected is approximately 360t – 700t per year, while the original business case suggested yields of approximately 1,100t – 2,000t per year.

The ASK projection is about a third of the original values, this has a significant impact on the Project's economics and equipment specifications.

Table 3.1 Projected yields of packaging recyclables and 'shredder materials' for each Shire from the MSW and C&I waste streams (low and high yields, tpa)

Target Waste Streams	Yield	Low rate	High rate	Carnarvon			Exmouth			Shark Bay			Regional Total			Yield low	Yield high
		-30%	30%	Gener-ation	Low	High	Gener-ation	Low	High	Gener-ation	Low	High	Gener-ation	Low	High	kg/per/yr	kg/per/yr
Paper and card	12%	8%	16%	1,590	134	248	860	72	134	360	30	56	2,810	236	438	16.2	30.1
PET	12%	8%	16%	110	9	17	70	6	11	30	3	5	210	18	33	1.2	2.2
HDPE	12%	8%	16%	100	8	16	60	5	9	20	2	3	180	15	28	1.0	1.9
Glass	12%	8%	16%	330	28	51	380	32	59	100	8	16	810	68	126	4.7	8.7
Aluminium cans	12%	8%	16%	90	8	14	60	5	9	20	2	3	170	14	27	1.0	1.8
Steel (Can and containers)	12%	8%	16%	140	12	22	70	6	11	30	3	5	240	20	37	1.4	2.6
Concrete, bricks and tiles	25%	18%	33%	6,770	1,185	2,200	3,980	697	1,294	1,720	301	559	12,470	2,182	4,053	149.9	278.3
Greenwaste	25%	18%	33%	1,450	254	471	840	147	273	330	58	107	2,620	459	852	31.5	58.5
Tyres	10%	7%	13%	120	8	16	70	5	9	30	2	4	220	15	29	1.1	2.0
Total of target material streams				10,700	1,645	3,055	6,390	974	1,810	2,640	408	758	19,730	3,027	5,622	208	386
Total of all wastes				17,100			9,960			4,170			31,230				
Percentage recycled					10%	18%		10%	18%		10%	18%		10%	18%		

3.2 CONCRETE, GREENWASTE, ETC. (SHREDDER)

Concrete, greenwaste and any other waste stream to be shredded must be uncontaminated to produce a useable product, therefore these materials must be delivered to the landfills separated from other wastes. Although education and awareness is an important factor to encourage the separation of these materials, economics is considered a more important driver as the materials are predominantly generated by the commercial sector.

Unless the gate fee to drop off separated materials is significantly lower than the gate fee for mixed wastes, the likely yield of these materials will be low. As all the landfills have very low or no gate fees, commercial waste disposal is already being subsidised from other revenue sources which provides little scope to offer lower gate fees for separated materials within the current gate fee structure.

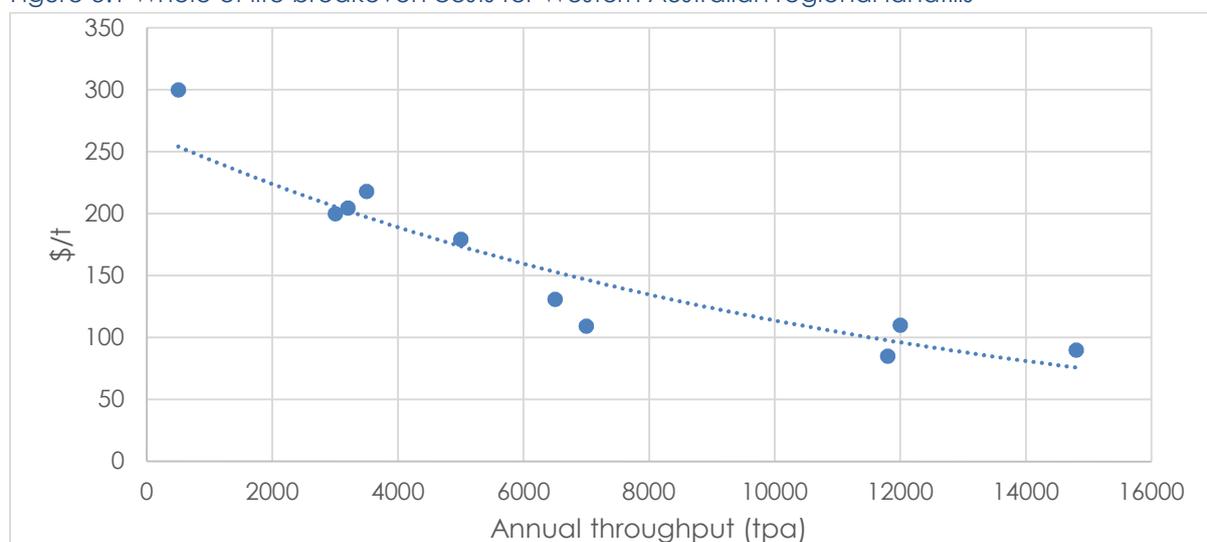
The yield for the materials that would be processed with the shredder has been based on 25% of available material \pm 30% (low yield of 18%, high yield of 33%). This is the same average yield that was used in the business plan, although with a \pm 30%. However, as the ASK estimate for total waste generated for each material was higher, this extrapolates into the projected yield quantities with a range of approximately 2,700t – 5,000t per year of concrete and greenwaste to be processed by a shredder. The breakdown by material stream and by Shire is shown in **Table 3.1** above.

The Project does include a task to identify measures that will encourage the drop off of separated materials and this will be addressed at that stage of the Project. However, to provide some initial information on gate fees; ASK has calculated the whole of life costs for a number of landfills in regional WA. Whole of life costing includes all the stages of a landfills life; operations, landfill rehabilitation & closure, post closure monitoring (30yrs) and asset renewal (new site identification, purchase, approvals and establishment).

Figure 3.1 shows the WoL cost for 10 landfills in regional WA and demonstrates the economies of scales associated with landfilling. Based on these records, a guide to the Shires landfill's WoL costs are approximately \$70/t (\$35/m³) at Carnarvon, \$110/t (\$55/m³) at Exmouth and \$170/t (\$85/m³) at Shark Bay.

During the collation of data for this report ASK were told that C&D waste generated in Onslow is regularly transported to Exmouth landfill for disposal due to the very low cost of disposal (\$6.75 per cubic metre) when compared with the Shire of Ashburton's disposal rates of \$108 per cubic metre (unsorted) or \$54.00 per cubic metre (sorted / separated).

Figure 3.1 Whole of life breakeven costs for Western Australian regional landfills



4 MATERIAL PRICES AND TRANSPORT

The projected yield quantities that will be collected have been used to determine the likely costs and revenues associated with providing the Bring Centres and shredder waste services. The material values used for the revenues are listed below, while the full cost assumptions and calculation tables are shown in **Appendix C**.

4.1 MATERIAL VALUES

The prices for recyclable materials collected are based on the delivery of 'export' bales to Perth. The balers that will be used at each facility are unlikely to produce export bales, which have a defined size and weight specification, therefore the bales from the region will be opened and re-baled in Perth prior to export, a re-baling cost of \$5 per bale¹ has been removed from the value of materials to reflect this additional processing in Perth, the resulting price is shown in the "Shire value" column in **Table 4.1**.

Based on a conversation with a local quarry in Exmouth the approximately value of a 0mm – 75mm crushed rock product is \$20 per tonne, a single shredder with no screen should be able to produce a similar product of Recycled Concrete Aggregate (RCA).

There are no commercial composting companies in the region, therefore there is no or little market demand for the shredded greenwaste. While the mulched greenwaste can be used by the public and possibly in Shire landscaping works a price of \$nil has been assumed as it unlikely the material could be sold.

Note: Providing roughly shredded and mulched greenwaste to be used by the community within a cyclone zone may results in a higher risk of injury during a cyclone event.

Table 4.1 Recyclable packaging values

Material type	Export value (\$/t)	Shire value (\$/t)
Newsprint	130	N.A.
Cardboard	120	N.A.
Mixed paper (all paper and card)	70	42
Aluminium cans	520	500
Steel cans	23	9
Plastic PET (no 1)	200	180
Plastic HDPE (no 2)	470	450
Mixed plastic bottle (PET and HDPE)	150	N.A.
Recycled Concrete Aggregate (0mm – 70mm)	N.A.	20
Mulched greenwaste	N.A.	0
Crushed glass	N.A.	0

4.2 TRANSPORT COSTS

4.2.1 Recyclable materials to Perth

ASK contacted several transport companies operating in the region. A typical cost to freight bales of recyclable material to Perth is \$1,500 per curtain sider truck from Carnarvon, this would contain 48 bales and would equate to approximately \$90 per tonne of material (\$100 per tonne from Exmouth). This value has been used for the modelling, however, it is felt that a lower rate could be achieved via tender given

¹ The re-baling cost had been estimated as none of the wholesale purchasers were prepared to provide the costs associated with re-baling, stating they would provide a price when required. Therefore, the \$5 fee per bale is an estimate by ASK.

the regular and consistent nature of the transport required and it would include 10 - 20 truckloads per year from the region.

4.2.2 Movement of shredder within region

Two haulage companies were contacted and both provided rough costing of \$2,000 per machine (less than 24t) between either Carnarvon to Exmouth or Carnarvon to Denham, therefore assuming the shredder was based at Carnarvon each 'round trip' to the other Shires would incur a transportation cost of approximately \$8,000. The shredder used as an example in the economic model is 17 tonnes. Given the high mobilisation cost, it would be economically prudent to only travel the region twice a year.

5 ECONOMIC ASSESSMENT

A projected 10 year cashflow has been produced for each Shire for both a high yield and low yield of materials for processing/recycling.

5.1 SCENARIO MODELLED

The cash flow modelling is based on a set scenario, but with low and high material yield rates (quantity of materials collected). This is not the definitive set up for the Shires, but it is a similar to the likely set up and provides a reasonably accurate estimate of the capital and operational expenses that would be incurred by each Shire.

The equipment used for the modelling has been selected as it meets the general requirements of the Project, ASK does not recommend these specific products nor manufacturers to the Shires.

5.1.1 Packaging recyclables (Bring Centres)

The cash flow model is based on a Bring Centre at Carnarvon, Exmouth and Denham (not Coral Bay), each Bring Centre has its own shed, baler, forklift (with bale squeeze attachment) and skips/bins for receiving packaging materials. The balers used will be the smaller vertical balers that require manual feeding and do not produce export specification bales, thus bales will need to be re-baled in Perth prior to export.

The six materials streams to be collected at the Bring Centre are assumed to be:

1. Mixed paper and cardboard - baled and recycled;
2. PET plastic (No 1) – baled and recycled;
3. HDPE plastic (No 2) – baled and recycled
4. Aluminium cans – baled and recycled;
5. Steel cans – baled and recycled;
6. Glass – collected, crushed and used locally

The baled materials would be transported to Perth and sold to waste management companies that already operate Material Recovery Facilities (MRF's) and export recycled material for reprocessing.

A Miltek H501 Waste Press has been used as an example in the economic model as they are used widely throughout Australia (**Figure 5.1**). This type of baler requires manual loading.

Figure 5.1 Miltek vertical baler: used as an example in the economic modelling



5.1.2 Concrete, Greenwaste, etc (Shredder)

The cash flow model is based on the shredder travelling around the region and visiting each of the three landfills twice a year (Coral Bay has not been included in the model). The shredder would be supported

by a loader or excavator during operations, the loader/excavator has been included with an hourly rate to cover the plant and driver (hourly rate sourced from the Shire of Exmouth). No mobilisation cost has been included as it is assumed each Shire will have a suitable loader or excavator available at, or close to each site.

A Hammel 750D has been used as an example for the economic model (**Figure 5.2**) together with the optional extras of tracks, magnet separation and breaker bar (for larger material). The manufacturer's information states that this sized shredder can process C&D material, greenwaste, used tyres and general commercial waste, the size of the final product is 150mm – 400mm. There has been no allocation for the 'pre-crushing' of oversized concrete (see **Section 5.1.2.1**).

Figure 5.2 Hammel 750D shredder: used as an example in the economic modelling



5.1.2.1 Processing oversized concrete

Concrete is usually handled by an excavator while it is being processed as it can sort and stockpile oversized material. Typically concrete that is larger than 600mm or contains large metal items (e.g. fence posts) is diverted from the crusher for pre-treatment, generally this makes up about 10% of most stockpiles of concrete. The oversized material is broken up with a concrete hammer attachment on the excavator and then fed through the crusher / shredder.

The existing stockpiles of concrete at the Shires facilities have not undergone any acceptance screening, therefore the oversized proportion is likely to exceed 10%. Indeed, based on the stockpiles observed during the site tours significant sorting is likely to be required when the historic stockpiles are processed.

Any concrete accepted for processing in the future will need to meet the asbestos acceptance regulations, thus any loads containing a high proportion of oversized material can be stored separately and a higher gate fee should be charged to reflect the additional processing costs.

5.1.3 Modelling assumptions

As the Project has secured a grant to fund the capital costs associated with the Project, this has been excluded from the operational costs. However, this approach does mean there is no depreciation allowed for assets purchased with the grant, thus once the equipment has reached the end of its operational life no funds would have been accrued to replace the assets.

Based on the likely operational life of the shredder and the hours required for operation each year by the Shires, a regularly serviced and maintained machine should last the Shires for up to 20 years. Based on an operational life of 20 years the asset renewal cost would be an additional \$6 - \$12 per tonne, depending upon the annual tonnage of greenwaste and concrete processed.

All costs and revenues are linked to an inflation increase of 3% per annum.

6 CASH FLOW RESULTS

6.1 ALL SHIRES, ALL SERVICES

A summary of the estimated total costs, revenues and profit/loss for the low and high yield scenarios are shown below. The full cash flow breakdown for each Shire is shown in **Appendix E – G**. These breakdowns do not allow for capital costs as these will be funded by the grant.

Based on the likely operational life of the shredder and the hours required for operation each year by the Shires, a regularly serviced and maintained machine should last the Shires for up to 20 years. Based on this, the asset renewal cost would be an additional \$6 - \$12 per tonne to allow for the capital cost of \$600,000 for the shredder, depending upon the annual tonnage of greenwaste and concrete processed. This depreciation cost is not included in the model, however, if the Shires wish to replace the shredder asset at the end of its operational life this is the approximate value that should be allocated.

Table 6.1 shows that the annual operational cost for all three shires to provide all the services modelled is approximately \$70,000 - \$100,000 per annum (2016/17).

Table 6.1 Cash flow summary for all proposed recycling services, low and high yields (Operational cost only in Years 1 -10)

		2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	
Low estimate	Year	0	1	2	3	4	5	6	7	8	9	10	Total Opex
All Shires low	Total Costs	1,283,300	144,939	149,313	153,792	158,406	163,158	168,053	173,095	178,287	183,636	189,145	1,661,825
All Shires low	Total Revenue	1,616,547	76,590	78,888	81,255	83,692	86,203	88,789	91,453	94,196	97,022	99,933	878,022
Profit / loss, all Shires Low		333,247	-68,349	-70,425	-72,538	-74,714	-76,955	-79,264	-81,642	-84,091	-86,614	-89,212	-783,804
High estimate	Year	0	1	2	3	4	5	6	7	8	9	10	Total Opex
All Shires high	Total Costs	1,283,300	245,998	253,378	260,979	268,809	276,873	285,179	293,735	302,547	311,623	320,972	2,820,094
All Shires high	Total Revenue	1,616,547	142,239	146,506	150,901	155,428	160,091	164,894	169,841	174,936	180,184	185,590	1,630,611
Profit / loss, all Shires high		333,247	-103,759	-106,872	-110,078	-113,380	-116,782	-120,285	-123,894	-127,611	-131,439	-135,382	-1,189,482

6.2 BRING CENTRE CASH FLOW

A summary of the cash flow for the introduction of Bring Centres at the three Shires is shown below. This only includes operational costs, no capital costs are included. The modelling confirms that the Bring Centres are the most expensive service proposed, with a combined annual cost of approximately \$50,000 – 90,000 in 2017/18 for all the Shires.

Table 6.2 Cash flow summary for Bring Centres, low and high yields (Operational cost only in Years 1 -10)

Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	Total Opex
	0	1	2	3	4	5	6	7	8	9	10	
Bring Centre Opex (low)	-	85,496	88,061	90,703	93,424	96,227	99,114	102,087	105,150	108,304	111,553	980,119
Bring Centre Income (Recyclables) - low	-	31,636	32,585	33,563	34,569	35,607	36,675	37,775	38,908	40,075	41,278	362,670
Bring Centre Annual profit / loss (low estimate)	0	-53,860	-55,476	-57,140	-58,855	-60,620	-62,439	-64,312	-66,241	-68,229	-70,276	-617,448
Bring Centre Opex (high)	-	149,774	154,267	158,896	163,662	168,572	173,629	178,838	184,203	189,730	195,421	1,716,994
Bring Centre Income (Recyclables) - high	-	58,752	60,515	62,330	64,200	66,126	68,110	70,153	72,258	74,426	76,659	673,531
Bring Centre Annual profit / loss (high estimate)	0	-91,022	-93,752	-96,565	-99,462	-102,446	-105,519	-108,685	-111,945	-115,304	-118,763	-1,043,463

6.3 CONCRETE CASH FLOW

A summary of the cash flow for the introduction of concrete shredding at the three Shires is shown below. This only includes operational costs, no capital costs are included. The \$15,000 allocated in Year 0 relates to the cost of adding a Category 13 to the facility licences for the crushing of concrete and production of the associated Asbestos Management Plans. Based on the model results, the processing of the concrete is a breakeven service.

Based on the likely operational life of the shredder and the hours required for operation each year by the Shires, a regularly serviced and maintained machine should last the Shires for up to 20 years. Based on this the asset renewal cost would be an additional \$6 - \$12 per tonne, depending upon the annual tonnage of greenwaste and concrete processed.

Table 6.3 Cash flow summary for concrete shredding, low and high yields (Operational cost only in Years 1 -10)

Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	Total Opex
	0	1	2	3	4	5	6	7	8	9	10	
Concrete Crushing (low)	15,000	45,941	47,319	48,739	50,201	51,707	53,258	54,856	56,502	58,197	59,943	541,663
Concrete income (RCA) - low	-	44,954	46,303	47,692	49,123	50,597	52,114	53,678	55,288	56,947	58,655	515,351
Concrete Crushing Annual profit / loss (low estimate)	-15,000	-987	-1,016	-1,047	-1,078	-1,111	-1,144	-1,178	-1,214	-1,250	-1,288	-26,312
Concrete Crushing (high)	15,000	78,166	80,511	82,927	85,414	87,977	90,616	93,335	96,135	99,019	101,989	911,088
Concrete income (RCA) high	-	83,487	85,991	88,571	91,228	93,965	96,784	99,687	102,678	105,758	108,931	957,081
Concrete Crushing Annual profit / loss (high estimate)	-15,000	5,320	5,480	5,644	5,814	5,988	6,168	6,353	6,543	6,740	6,942	45,993

6.4 GREENWASTE CASH FLOW

A summary of the cash flow for the introduction of greenwaste shredding at the three Shires is shown below. This only includes operational costs, no capital costs are included. The mulch has an estimated value of \$nil / tonne as there are no commercial composters in the region nor recognised market for the material other than use by residents. The modelling results show an annual cost of approximately \$10,000 - \$20,000 per annum (2016/17) to process the greenwaste.

Table 6.4 Cash flow summary for all greenwaste shredding, low and high yields (Operational cost only in Years 1 -10)

Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	Total Opex
	0	1	2	3	4	5	6	7	8	9	10	
Greenwaste Shredding (low)	-	13,527	13,932	14,350	14,781	15,224	15,681	16,152	16,636	17,135	17,649	155,068
Greenwaste income (Mulch) - low	-	-	-	-	-	-	-	-	-	-	-	-
Greenwaste Annual profit / loss (low estimate)	0	-13,527	-13,932	-14,350	-14,781	-15,224	-15,681	-16,152	-16,636	-17,135	-17,649	-155,068
Greenwaste Shredding (high)	-	18,058	18,599	19,157	19,732	20,324	20,934	21,562	22,209	22,875	23,561	207,012
Greenwaste income (Mulch) high	-	-	-	-	-	-	-	-	-	-	-	-
Greenwaste Annual profit / loss (high estimate)	0	-18,058	-18,599	-19,157	-19,732	-20,324	-20,934	-21,562	-22,209	-22,875	-23,561	-207,012

7 COST FOR PROPOSED SERVICES

All of the proposed services will result in additional costs for the Shires, even when allowing for the capital purchase grants. The costs will need to be passed on to the rate base of each Shire. Note, the tables below show the operational cost to provide the services, therefore negative values represent services that would provide revenue.

The cost for each of the three main services (bring centres, concrete crushing and greenwaste shredding) have been broken down to; the total cost per service (**Table 7.1**), the cost per tonne of material processed (**Table 7.2**), and the cost per residential ratepayer (**Table 7.3**).

Table 7.1 Cost breakdown of services proposed for each Shire (Annual operation cost 2017/18)

Service	Yield	Carnarvon	Exmouth	Shark Bay	Region
All Services	Low	33,400	22,500	12,400	68,300
	High	52,500	33,900	17,300	103,800
Bring Centres	Low	29,000	17,700	7,100	53,900
	High	48,900	29,700	12,500	91,000
Concrete	Low	-1,200	400	1,800	1,000
	High	-4,500	-1,700	900	-5,300
Greenwaste	Low	5,700	4,400	3,400	13,500
	High	8,200	5,900	4,000	18,100

Table 7.2 Breakdown of services proposed for each Shire (\$ per tonne of material) (Average annual operational cost based on 10 years)

Service	Yield	Carnarvon	Exmouth	Shark Bay	Region
All Services	Low	23.00	27.00	35.00	26.00
	High	20.00	22.00	26.00	21.00
Bring Centres	Low	170.00	160.00	170.00	170.00
	High	150.00	150.00	160.00	150.00
Concrete	Low	-1.00	-1.00	7.00	1.20
	High	-2.00	-2.00	2.00	-1.10
Greenwaste	Low	26.00	35.00	68.00	34.00
	High	20.00	25.00	43.00	24.00

Table 7.3 Breakdown of services proposed for each Shire (\$ per residential ratepayer) (Average annual operational cost based on 10 years)

Service	Yield	Carnarvon	Exmouth	Shark Bay	Region
All Services	Low	21.00	32.00	45.00	27.00
	High	32.00	48.00	64.00	40.00
Bring Centres	Low	18.00	25.00	26.00	21.00
	High	30.00	42.00	46.00	35.00
Concrete	Low	-0.80	0.50	6.80	0.90
	High	-2.80	-2.30	3.20	-1.50
Greenwaste	Low	3.50	6.20	12.60	5.20
	High	5.10	8.20	14.70	6.90

8 ECONOMIC SUMMARY & COMMENTS

The modelling shows that recycling is a costly exercise and only becomes economically viable when waste disposal has a higher cost. In regional Western Australia it is far more cost effective to recycle materials that have large annual quantities and can be used in local markets, as the transport cost to markets in Perth and / or overseas is prohibitively expensive.

8.1 COST FOR ALL SERVICES

The cost to provide the services is most likely to be met by the residential ratepayers of each Shire, especially as the provision of the Bring Centre accounts for approximately 80% of the cost. The Shire may need to consult with their communities to determine if they value the option to recycle packaging material given the likely increases in rates would be approximately \$20 - \$65 per rateable property.

8.2 BRING CENTRES

The Bring Centre service has the highest costs due to the high staffing and transport costs. With a cost to the ratepayer of approximately \$18 - \$46 per rateable property, the Shires should not offer this service to commercial organisations at anything below breakeven cost (approximately \$160 per tonne). The estimated quantities of packaging material used in the modelling do include approximately 35% commercial waste, however if this was paid for by organisations dropping off the materials, the operational cost per rateable property would improve by about the same proportion, hence reduced to \$12 - \$30 per rateable residential property.

8.3 CONCRETE SHREDDING

The processed concrete, known as recycled concrete aggregate (RCA) has a local market (the Shire's engineering / roads departments) and a value of approximately \$20 per tonne. Based on the operational cost estimates, the concrete crushing service would approximately breakeven, together with the additional benefit of preserving voidspace at the landfill and avoiding the quarrying of virgin materials.

To ensure that purchasing a concrete processor by the Shires was the best economic option ASK contacted a contractor near Bunbury that specialise in concrete crushing for local governments. Based on a scenario of the contractor mobilising to the region every five years with a jaw crusher, excavator (with rock hammer) and visiting all three facilities the net cost per tonne of material produced would be \$2.00 - \$2.50 per tonne (allowing for a value of \$20 per tonne of the crushed concrete produced).

ASK have identified at least one contractor within the region with a suitable mobile concrete crusher, therefore with lower mobilisation costs it is likely that this contractor would be able to process the material at a lower unit cost, probably at a breakeven value and possibly at a profit for the Shire (allowing for the value of the RCA produced).

The contractor's costs include capital depreciation, but are comparable with the Shire's operational unit cost (without an allowance for capital depreciation). Using a contractor would mean the grant would not be utilised for the shredder, but would remove the risk of an unforeseen serious breakdown or failure of the shredder and the associated costs.

8.4 GREENWASTE PROCESSING

The mulched greenwaste is unlikely to have an economic value, therefore none of the shredding cost can be recovered, resulting in a processing cost of \$3 - \$15 per rateable property. While shredding the greenwaste preserves voidspace, minimises leachate generation and avoids methane production; the decision to produce a product that has no market could be questioned, especially if the mulched greenwaste has to be landfilled if large unused stockpiles become a fire risk.

9 ALTERNATIVE OPTIONS & CONSIDERATIONS

Given the high cost to provide some of the services proposed, there are some alternative options the Shires could consider.

9.1 BRING CENTRES

The provision of the Bring Centres is expensive, the options the Shires could consider to reduce the cost include;

- To avoid the re-baling and fees associated with 'whole sale' purchasers of the recycled materials in Perth, the Shires could explore the option of loading their bales directly into shipping containers at the facilities, organising export and selling the materials directly to Asian reprocessor (Addressed in Task 6 of the Project)
- Local community groups may consider staffing and operating the Bring Centres, with the Shire's providing the infrastructure. The revenue from the sale of materials could be split between the group and the Shire. If the facilities are community operated, it is more likely that favourable backloading transport costs could be secured (The backloading options are addressed in Task 7 of the Project)
- Given the current value of steel cans (\$20 - \$35 per tonne) rather than incurring the transport cost (\$90 per tonne) sending these to Perth, the steel could be taken to the landfill and added to the scrap metal stockpiles.
- Any commercial packaging recyclable should be charged at the full breakeven cost (approximately \$160 per tonne) to avoid an added burden on the Shire's rates.

9.2 GREENWASTE BURNING

Given the lack of a market for mulched greenwaste, other than residential use (i.e. individuals helping themselves to stockpiles of mulch at the landfills for domestic gardening and possibly in Shire landscaping works). The Shires should only process enough greenwaste to provide a stockpile for local use, excess greenwaste could be burnt to preserve voidspace, avoid leachate generation and produce carbon dioxide instead of methane (a 24 times saving in greenhouse gas emission). The Shire's could apply to DER for a licence amendment to allow the controlled burning of clean greenwaste.

If the greenwaste could be periodically burnt and concrete stockpiled, the shredder may need to only travel around the region once a year and thus save \$8,000 per year in transport costs.

9.3 DEDICATED CONCRETE CRUSHER

Rather than purchasing a multi-purpose shredder, the Shires could consider the purchase of a dedicated concrete crusher. This would be a jaw crusher, rather than a shredder and would process the concrete material more efficiently and produce a better quality product. The Shires could burn all the greenwaste instead of shredding it, as there does not appear to be a viable market for the mulched greenwaste.

9.4 MOVE TOWARDS WOL GATE FEES

Waste flows to the lowest cost option and the Shires landfills have gatefees significantly below breakeven cost, thus the general rates are currently subsidising commercial waste disposal.

If the Shires calculated their whole of life landfill costs and charged realistic commercial gate fees that reflected these costs, then the funds (from residential rate payers) currently subsidising commercial waste disposal, sometimes from wastes generated outside the Shires, could be used to fund recycling activities instead.

The whole of life cost for a landfill must be calculated on a site by site basis, but in very general terms given the typical WoL cost for regional WA landfills (**Figure 3.1**), the current gate fees at each landfill and

the quantity of commercial waste (C&I and C&D waste streams) estimated to be disposed of; each of the landfills is being subsidised by \$350,000 - \$550,000 each year (\$1,050,000 – \$1,650,000 per year for all the Shires).

The strategic decision for each Shire to make is whether to continue subsidising commercial waste disposal, or to charge breakeven gate fees and use this revenue to subsidise recycling activities or other services within the Shire instead.

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APPENDIX A – POPULATION AND WASTE QUANTITIES

Business Plan Data (Cardno, 2012)

Shire	Population [2008/09/10 (Tourism WA & per com with SoExmouth)]			Waste Quantities (tonnes)			Per capita waste quantities		
	Residential	Visitors Equivalent	Total Equivalent	Residential	Visitors Equivalent	Total Equivalent	Residential	Visitors Equivalent	Total Equivalent
Carnarvon	5,488	2,887	8,375	14,267	2,651	16,918	2.60	0.92	2.02
Exmouth	1,849	969	2,818	4,984	708	5,692	2.70	0.73	2.02
Shark Bay	721	1,342	2,063	1,642	1,246	2,888	2.28	0.93	1.40
Total	8,058	5,198	13,256	20,893	4,605	25,498	2.59	0.89	1.92

ASK Data and extrapolation

CURRENT DATA (non-metro average)									
Shire	Population			Waste Quantities (tonnes) [RLFD Meth2]			Per capita waste quantities		
	Residential (2013 Census)	Visitors Equivalent (2013 TRA)	Total Equivalent	Residential	Visitors Equivalent	Total Equivalent	Residential	Visitors Equivalent	Total Equivalent
Carnarvon	6,200	1,710	7,910	13,346	3,680	17,026	2.15	2.15	2.15
Exmouth	2,570	2,077	4,647	5,532	4,470	10,002	2.15	2.15	2.15
Shark Bay	928	1,077	2,005	1,998	2,318	4,315	2.15	2.15	2.15
Total	9,698	4,863	14,561	20,875	10,468	31,343	2.15	2.15	2.15

CURRENT DATA (sector source breakdown)								
Shire	Waste Quantities (tonnes)				Per capita waste quantities [RLFD Meth3]			
	MSW (Census Data)	C&D	C&I	Total	MSW	C&D	C&I	Total
Carnarvon	4,326	8,279	4,443	17,048	0.55	1.05	0.56	2.16
Exmouth	2,463	4,864	2,610	9,937	0.53	1.05	0.56	2.14
Shark Bay	937	2,098	1,126	4,161	0.47	1.05	0.56	2.08
Total	7,726	15,240	8,180	31,146	0.53	1.05	0.56	2.14

APPENDIX B – NSW LGA YIELDS FROM DROP-OFF FACILITIES

The information provided below lists the yields from NSW local governments that provide drop-off facilities for their community, but do not have a kerbside recycling service.

NSW LGA Report 2012-13 (LGA self reported)						
LGA	Pop (exc tourists)	Total waste generation (MSW only)		Drop-off recycled t/yr	Yield (% of MSW) %	Yield kg/capita
		t/yr	t/capita			
Conargo	1576	1129	0.72	46	4.1%	29.2
Hay	3013	2033	0.67	133	6.5%	44.1
Cobar	4946	1549	0.31	72	4.6%	14.6
Oberon	5209	545	0.10	41	7.5%	7.9
Walget	6858	1402	0.20	300	21.4%	43.7
Deniliquin	7338	4771	0.65	161	3.4%	21.9
Wellington	8919	4197	0.47	421	10.0%	47.2
Total / Average	37859	15626	0.41	1174	7.5%	31.0
W A Recycling Model (BSD, 2002) RRRBS Data					Typical	12.5
					Good	20



APPENDIX C – CASH FLOW MODEL CALCULATION TABLES

Shire	Carnarvon							Exmouth							Shark Bay						
	Paper & Card	PET	HDPE	Al	Steel	Total	Staff hours	Paper & Card	PET	HDPE	Al	Steel	Total	Staff hours	Paper & Card	PET	HDPE	Al	Steel	Total	Staff hours
Annual tonnage collected (low est)	134	9	8	8	12	171		72	6	5	5	6	94		30	3	2	2	3	39	
Annual tonnage collected (high est)	248	17	16	14	22	317		134	11	9	9	11	175		56	5	3	3	5	72	
Bale weight range (kgs/bale) Miltek H501	350-450	350-450	350-450	350-450	350-450	100%		350-450	350-450	350-450	350-450	350-450	55%		350-450	350-450	350-450	350-450	350-450	23%	
Bale weight used for calc	350	350	350	350	350			350	350	350	350	350			350	350	350	350	350		
Bales per year (low estimate)	381.6	26	24	22	34	488	366	206	17	14	14	17	269	202	86.4	7	5	5	7	111	83
Bales per year (high estimate)	708.686	49	45	40	62	905	679	383	31	27	27	31	500	375	160.46	13	9	9	13	206	155
Material values (\$/t) (export bales)	70	200	470	520	23			70	200	470	520	23			70	200	470	520	23		
Material value after rebale (\$5 / bale)	55.7	185.7	455.7	505.7	8.7			55.7	185.7	455.7	505.7	8.7			55.7	185.7	455.7	505.7	8.7		
Material income \$/yr (low est)	7441	1716	3828	3823	102	16,911		4025	1092	2297	2549	51	10,014		1685	468	766	850	22	3,790	
Material income \$/yr (high est)	13819	3187	7109	7100	190	31,406		7475	2028	4265	4733	95	18,597		3129	869	1422	1578	41	7,038	
Truck loads per year (low est)						10	31						6	17						2	7
Truck loads per year (high est)						19	57						10	31						4	13
Staffing	filling and cycle for each bale (hours)					0.75	source: Miltek for manual loading of baler														
	Loading truck					3															



Shire	Carnarvon			Exmouth			Shark Bay		
	C&D	Green waste	Glass	C&D	Green waste	Glass	C&D	Green waste	Glass
Annual tonnage collected (low est)	1,185	254	28	697	147	32	301	58	8
Annual tonnage collected (high est)	2,200	471	51	1,294	273	59	559	107	59
Shredder processing capacity (t/hr)	20	20		20	20	0	20	20	0
Fuel use per hour (diesel) l/hr	25	25							
Fuel cost per litre	1.30	1.30							
Fuel cost per tonne processed	1.63	1.63							
Wear cost per tonne processed	1.15	0.40							
Servicing (oil and filter) per hour	9.00	9.00							
Servicing cost per tonne	0.45	0.45							
Shredder opex cost per tonne	3.23	2.48							
Shredder opex total (low)	3821	628		2246	364		971	143	
Shredder opex total (high)	7096	1166		4172	676		1803	265	
Shredder opex (\$/t) range	\$10 - \$20	\$8 - \$12	?	\$10 - \$20	\$8 - \$12		\$10 - \$20	\$8 - \$12	
Cost per tonne used in calc	3.23	2.48	5	3.225	2.475	5	3.225	2.475	5
Cost per year (low estimate)	3,821	628	139	2,246	364	160	971	143	42
Cost per year (high estimate)	7,096	1,166	257	4,172	676	296	1,803	265	78
% of total use (for opex %) low	4%	1%	0%	2%	0%	0%	1%	0%	0%
% of total use (for opex %) high	7%	1%	0%	4%	1%	0%	2%	0%	0%
Time for processing (loader / excavator hr)	71	13		42	7		18	3	
Time for processing (loader needed) high	132	24		78	14		34	5	
Samples required (asbestos) low	12			7			4		
Samples required (asbestos) high	23			13			6		
Ownership (use) %	54%			32%			14%		



APPENDIX D – CAPITAL AND OPERATIONAL COSTS USED IN CASH FLOW

Item	Unit	Unit		Opex	Hire	Notes, Sources, etc
		Cost	Units			
Grant funding total		1716547	1616547			
Carnarvon		838636				
Exmouth		399570				
Shark Bay		378341				
Value of recycled concrete aggregate		20	per t			from cardno report, and quote from Exmouth civils for <75mm product
Value of mulched greenwaste		0	per t			Cardno report had \$5, but I don't think the produce will be sold
Value of crushed glass		0	per t			
Industrial Shed	m2	900		1500		
Industrial shed with loading dock	m2	1100		1500		
Concrete pad with metal cover/roof	m2	750				
Vertical (small) baler	Unit	30000	Miltek 501H + comp	2000		
Conveyor feed for baler	Unit	20000	tbc			
Horizontal (large) baler	Unit	190000		10000		
4m3 skips	Unit	2500				
Electric stacker	Unit	7000				
Forklift truck	Unit	25000		2000		
Forklift squeeze clamp attachment	Unit	1500				
Shire drop-off staff	\$/hr	47				SoE level 5
Transport of recyclables	\$/load carn to perth				1500	Toll rough quote for 48 bales
Glass crusher	Unit	?		5000		
Multipurpose shredder	Unit	600000		see bale No sheet		Hammel, tracks, magnet, breaker bar
Shredder transport		2000	per movement		16000	Based on two round trips (8 movements) per year shared three ways equally
	\$/load exmouth to perth				1800	Toll rough quote
Shire loader and driver	\$/hr	160				SoE costs
Shire excavator and driver	\$/hr	190				SoE costs
Asbestos postage and lab cost	per sample	120				need to be confirmed
Manager	\$/hr	96.15				Estimate
Administrator	\$/hr	48.08				Estimate
Mobilise crusher (or screening plant) Bunbury to Exmouth		9000	per machine			
Mobilise crusher (or screening plant) Denham to Bunbury		6500	per machine			
Mobilise excavator Bunbury to Exmouth		7000	per machine			
Mobilise excavator Denham to Bunbury		5000	per machine			
Movement of plant between sites		2000	per machine			
Processing concrete to 0 - 75mm		10	per m3 of final prod	1m3 = 2t	5	\$ per tonne of product (Bunbury contractor quote)
Residential ratable properties (Exmouth)		820	properties			
Residential ratable properties (Carnarvon)		1850	properties			
Residential ratable properties (Shark Bay)		310	properties			



APPENDIX E – CASH FLOW TABLES: SHIRE OF CARNARVON

Carnarvon Bring Centre and Shredder												
Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	Total
	0	1	2	3	4	5	6	7	8	9	10	\$
Low yield	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Direct Costs (linked to inflation)	100%	103.00%	106%	109%	113%	116%	119%	123%	127%	130%	134%	
Baler and conveyor feed (Capex)	50,000											50,000
Bring centre plant capex (e.g. Forklift & clamp)	26,500											26,500
Building & bins / skips (Capex) (10m x 10m)	122,500											122,500
Capex contingency (10%) inc shredder	52,584											
Baler (Opex)		2,060	2,122	2,185	2,251	2,319	2,388	2,460	2,534	2,610	2,688	23,616
Forklift (Opex)		2,060	2,122	2,185	2,251	2,319	2,388	2,460	2,534	2,610	2,688	23,616
Building (Opex / Maintenance)		1,545	1,591	1,639	1,688	1,739	1,791	1,845	1,900	1,957	2,016	17,712
Bring Centre staffing (loading baler, baling and loading truck)		19,195	19,770	20,364	20,974	21,604	22,252	22,919	23,607	24,315	25,045	220,044
Transport of recyclables to Perth		15,708	16,179	16,664	17,164	17,679	18,209	18,756	19,318	19,898	20,495	180,069
Shredder (capex) Shire proportion of tonnage	326,839											326,839
Shredder (opex for concrete)		3,935	4,054	4,175	4,300	4,429	4,562	4,699	4,840	4,985	5,135	45,115
Shredder (opex for greenwaste)		647	666	686	707	728	750	772	796	819	844	7,416
Excavator for concrete (Shire)		13,911	14,329	14,759	15,201	15,657	16,127	16,611	17,109	17,622	18,151	
Loader for greenwaste (Shire)		2,091	2,154	2,218	2,285	2,353	2,424	2,497	2,572	2,649	2,728	
Shredder transport (hire)		5,493	5,658	5,828	6,003	6,183	6,368	6,559	6,756	6,959	7,168	
Cat 13, Asbestos Management and product testing	5,000	1,483	1,528	1,574	1,621	1,669	1,719	1,771	1,824	1,879	1,935	22,003
Admin & Management time (10% of total time of other staff)		7,135	7,349	7,569	7,796	8,030	8,271	8,519	8,775	9,038	9,309	81,793
Total Costs	583,423	75,263	77,521	79,846	82,242	84,709	87,250	89,868	92,564	95,341	98,201	1,147,222
Income (linked to inflation)												
Sale of packaging recyclables		17,418	17,941	18,479	19,033	19,604	20,192	20,798	21,422	22,065	22,727	199,680
Sale of recycled concrete aggregate		24,406	25,138	25,892	26,669	27,469	28,293	29,142	30,016	30,917	31,844	279,786
Sale of mulched greenwaste		-	-	-	-	-	-	-	-	-	-	-
Funding grant (capital cost only)	838,636											-
Revenue	838,636	41,824	43,079	44,371	45,702	47,073	48,486	49,940	51,438	52,981	54,571	479,466
Annual profit/loss	255,213	-33,439	-34,442	-35,475	-36,540	-37,636	-38,765	-39,928	-41,126	-42,359	-43,630	
Cumulative profit/loss		(33,439)	(67,881)	(103,356)	(139,896)	(177,532)	(216,297)	(256,224)	(297,350)	(339,709)	(383,340)	- 2,015,024
Profit/loss per domestic rateable property		(18.00)	(19.00)	(19.00)	(20.00)	(20.00)	(21.00)	(22.00)	(22.00)	(23.00)	(24.00)	



	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	Total
Year	0	1	2	3	4	5	6	7	8	9	10	
High yield	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Direct Costs (linked to inflation)	100%	103.00%	106%	109%	113%	116%	119%	123%	127%	130%	134%	
Baler and conveyor feed (Capex)	50,000											50,000
Bring centre plant capex (e.g. Forklift & clamp)	26,500											26,500
Building & bins / skips (Capex) (10m x 10m)	122,500											122,500
Capex contingency (10%) inc shredder	52,584											
Baler (Opex)		2,060	2,122	2,185	2,251	2,319	2,388	2,460	2,534	2,610	2,688	23,616
Forklift (Opex)		2,060	2,122	2,185	2,251	2,319	2,388	2,460	2,534	2,610	2,688	23,616
Building (Opex / Maintenance)		1,545	1,591	1,639	1,688	1,739	1,791	1,845	1,900	1,957	2,016	17,712
Bring Centre staffing (loading baler, baling and loading truck)		35,596	36,664	37,764	38,897	40,064	41,266	42,504	43,779	45,093	46,445	408,074
Transport of recyclables to Perth		29,130	30,004	30,904	31,831	32,786	33,769	34,782	35,826	36,901	38,008	333,939
Shredder (capex) Shire proportion of tonnage	326,839											326,839
Shredder (opex for concrete)		7,309	7,528	7,754	7,986	8,226	8,473	8,727	8,989	9,258	9,536	83,786
Shredder (opex for greenwaste)		1,201	1,237	1,274	1,313	1,352	1,393	1,434	1,477	1,522	1,567	13,772
Excavator for concrete (Shire)		25,835	26,610	27,409	28,231	29,078	29,950	30,849	31,774	32,727	33,709	
Loader for greenwaste (Shire)		3,883	4,000	4,120	4,243	4,370	4,502	4,637	4,776	4,919	5,067	
Shredder transport (hire)		5,493	5,658	5,828	6,003	6,183	6,368	6,559	6,756	6,959	7,168	
Cat 13, Asbestos Management and product testing	5,000	2,843	2,928	3,016	3,106	3,200	3,296	3,394	3,496	3,601	3,709	37,590
Admin & Management time (10% of total time of other staff)		13,235	13,632	14,041	14,462	14,896	15,343	15,803	16,277	16,766	17,268	151,723
Total Costs	583,423	130,191	134,096	138,119	142,263	146,531	150,927	155,454	160,118	164,922	169,869	1,619,665
Income (linked to inflation)												
Sale of packaging recyclables		32,348	33,319	34,318	35,348	36,408	37,500	38,625	39,784	40,978	42,207	370,835
Sale of recycled concrete aggregate		45,325	46,685	48,085	49,528	51,014	52,544	54,121	55,744	57,417	59,139	519,602
Sale of mulched greenwaste		-	-	-	-	-	-	-	-	-	-	-
Funding grant (capital cost only)	838,636											-
												-
Revenue	838,636	77,673	80,003	82,404	84,876	87,422	90,045	92,746	95,528	98,394	101,346	890,437
Annual profit/loss	255,213	-52,517	-54,093	-55,716	-57,387	-59,109	-60,882	-62,708	-64,590	-66,527	-68,523	
Cumulative profit/loss		(52,517)	(106,610)	(162,326)	(219,713)	(278,822)	(339,704)	(402,412)	(467,002)	(533,529)	(602,053)	-3,164,688
Profit/loss per domestic rateable property		(28.00)	(29.00)	(30.00)	(31.00)	(32.00)	(33.00)	(34.00)	(35.00)	(36.00)	(37.00)	



APPENDIX F – CASH FLOW TABLES: SHIRE OF EXMOUTH

Exmouth Bring Centre and Shredder												
Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	Total
	0	1	2	3	4	5	6	7	8	9	10	\$
Low yield	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Direct Costs (linked to inflation)	100%	103.00%	106%	109%	113%	116%	119%	123%	127%	130%	134%	
Baler and conveyor feed (Capex)	50,000											50,000
Bring centre plant capex (e.g. Forklift & clamp)	26,500											26,500
Building & bins / skips (Capex) (10m x 10m)	122,500	25										122,475
Capex contingency (10%) inc shredder	39,065											
Baler (Opex)		1,137	1,171	1,206	1,242	1,279	1,318	1,357	1,398	1,440	1,483	13,029
Forklift (Opex)		1,137	1,171	1,206	1,242	1,279	1,318	1,357	1,398	1,440	1,483	13,029
Building (Opex / Maintenance)		1,545	1,591	1,639	1,688	1,739	1,791	1,845	1,900	1,957	2,016	17,712
Bring Centre staffing (loading baler, baling and loading truck)		10,581	10,898	11,225	11,562	11,909	12,266	12,634	13,013	13,403	13,805	121,295
Transport of recyclables to Perth		10,390	10,702	11,023	11,354	11,694	12,045	12,406	12,779	13,162	13,557	119,111
Shredder (capex) Shire proportion of tonnage	191,650											191,650
Shredder (opex for concrete)		2,314	2,383	2,454	2,528	2,604	2,682	2,763	2,845	2,931	3,019	26,523
Shredder (opex for greenwaste)		375	386	398	409	422	434	447	461	475	489	4,296
Excavator for concrete (Shire)		8,178	8,424	8,676	8,937	9,205	9,481	9,765	10,058	10,360	10,671	
Loader for greenwaste (Shire)		1,211	1,248	1,285	1,324	1,363	1,404	1,446	1,490	1,534	1,580	
Shredder transport (hire)		5,493	5,658	5,828	6,003	6,183	6,368	6,559	6,756	6,959	7,168	
Cat 13, Asbestos Management and product testing	5,000	865	891	918	945	974	1,003	1,033	1,064	1,096	1,129	14,919
Admin & Management time (10% of total time of other staff)		3,977	4,096	4,219	4,346	4,476	4,610	4,749	4,891	5,038	5,189	45,591
Total Costs	434,715	47,177	48,618	50,077	51,579	53,127	54,720	56,362	58,053	59,794	61,588	766,130
Income (linked to inflation)												
Sale of packaging recyclables		10,314	10,623	10,942	11,270	11,609	11,957	12,316	12,685	13,066	13,457	118,239
Sale of recycled concrete aggregate		14,348	14,778	15,222	15,678	16,149	16,633	17,132	17,646	18,175	18,721	164,483
Sale of mulched greenwaste		-	-	-	-	-	-	-	-	-	-	-
Funding grant (capital cost only)	399,570											-
Revenue	399,570	24,662	25,402	26,164	26,949	27,757	28,590	29,448	30,331	31,241	32,178	282,722
Annual profit/loss	-35,145	-22,516	-23,216	-23,913	-24,630	-25,369	-26,130	-26,914	-27,722	-28,553	-29,410	
Cumulative profit/loss		(22,516)	(45,732)	(69,645)	(94,275)	(119,645)	(145,775)	(172,689)	(200,411)	(228,964)	(258,374)	-1,358,026
Profit/loss per domestic rateable property		(27.00)	(28.00)	(29.00)	(30.00)	(31.00)	(32.00)	(33.00)	(34.00)	(35.00)	(36.00)	



	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	Total
Year	0	1	2	3	4	5	6	7	8	9	10	
High yield	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Direct Costs (linked to inflation)	100%	103.00%	106%	109%	113%	116%	119%	123%	127%	130%	134%	
Baler and conveyor feed (Capex)	50,000											50,000
Bring centre plant capex (e.g. Forklift & clamp)	26,500											26,500
Building & bins / skips (Capex) (10m x 10m)	122,500											122,500
Capex contingency (10%) inc shredder	39,065											
Baler (Opex)		1,137	1,171	1,206	1,242	1,279	1,318	1,357	1,398	1,440	1,483	13,029
Forklift (Opex)		1,137	1,171	1,206	1,242	1,279	1,318	1,357	1,398	1,440	1,483	13,029
Building (Opex / Maintenance)		1,545	1,591	1,639	1,688	1,739	1,791	1,845	1,900	1,957	2,016	17,712
Bring Centre staffing (loading baler, baling and loading truck)		19,667	20,257	20,864	21,490	22,135	22,799	23,483	24,187	24,913	25,660	225,455
Transport of recyclables to Perth		19,313	19,892	20,489	21,103	21,736	22,388	23,060	23,752	24,464	25,198	221,396
Shredder (capex) Shire proportion of tonnage	191,650											191,650
Shredder (opex for concrete)		4,297	4,426	4,558	4,695	4,836	4,981	5,130	5,284	5,443	5,606	49,257
Shredder (opex for greenwaste)		696	717	738	760	783	807	831	856	882	908	7,978
Excavator for concrete (Shire)		15,188	15,644	16,113	16,597	17,095	17,607	18,136	18,680	19,240	19,817	
Loader for greenwaste (Shire)		2,250	2,317	2,387	2,458	2,532	2,608	2,686	2,767	2,850	2,935	
Shredder transport (hire)		5,493	5,658	5,828	6,003	6,183	6,368	6,559	6,756	6,959	7,168	
Cat 13, Asbestos Management and product testing	5,000	1,607	1,655	1,705	1,756	1,808	1,863	1,919	1,976	2,035	2,097	23,420
Admin & Management time (10% of total time of other staff)		7,391	7,613	7,841	8,076	8,319	8,568	8,825	9,090	9,363	9,643	84,728
Total Costs	434,715	79,719	82,110	84,573	87,111	89,724	92,416	95,188	98,044	100,985	104,015	1,046,655
Income (linked to inflation)												
Sale of packaging recyclables		19,155	19,729	20,321	20,931	21,559	22,206	22,872	23,558	24,265	24,992	219,587
Sale of recycled concrete aggregate		26,646	27,445	28,269	29,117	29,990	30,890	31,817	32,771	33,754	34,767	305,468
Sale of mulched greenwaste		-	-	-	-	-	-	-	-	-	-	-
Funding grant (capital cost only)	399,570											-
												-
Revenue	399,570	45,801	47,175	48,590	50,048	51,549	53,096	54,689	56,329	58,019	59,760	525,054
Annual profit/loss	-35,145	-33,918	-34,935	-35,983	-37,063	-38,175	-39,320	-40,500	-41,715	-42,966	-44,255	
Cumulative profit/loss		(33,918)	(68,853)	(104,837)	(141,900)	(180,075)	(219,395)	(259,894)	(301,609)	(344,575)	(388,830)	-2,043,885
Profit/loss per domestic rateable property		(41.00)	(43.00)	(44.00)	(45.00)	(47.00)	(48.00)	(49.00)	(51.00)	(52.00)	(54.00)	



APPENDIX G – CASH FLOW TABLES: SHIRE OF SHARK BAY

Denham (Shark Bay) Bring Centre and Shredder												
Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	Total
	0	1	2	3	4	5	6	7	8	9	10	\$
Low yield	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Direct Costs (linked to inflation)	100%	103.00%	106%	109%	113%	116%	119%	123%	127%	130%	134%	
Baler and conveyor feed (Capex)	50,000											50,000
Bring centre plant capex (e.g. Forklift & clamp)	26,500											26,500
Building & bins / skips (Capex) (10m x 6m)	78,500											78,500
Capex contingency (10%) inc shredder	23,651											
Baler (Opex)		467	481	495	510	525	541	557	574	591	609	5,351
Forklift (Opex)		467	481	495	510	525	541	557	574	591	609	5,351
Building (Opex / Maintenance)		1,545	1,591	1,639	1,688	1,739	1,791	1,845	1,900	1,957	2,016	17,712
Bring Centre staffing (loading baler, baling and loading truck)		4,366	4,497	4,632	4,771	4,914	5,061	5,213	5,370	5,531	5,697	50,051
Transport of recyclables to Perth		2,858	2,944	3,032	3,123	3,217	3,313	3,413	3,515	3,621	3,729	32,767
Shredder (capex) Shire proportion of tonnage	81,511											81,511
Shredder (opex for concrete)		1,000	1,030	1,061	1,093	1,125	1,159	1,194	1,230	1,267	1,305	11,462
Shredder (opex for greenwaste)		147	152	156	161	166	171	176	181	186	192	1,688
Excavator for concrete (Shire)		3,534	3,640	3,750	3,862	3,978	4,097	4,220	4,347	4,477	4,612	
Loader for greenwaste (Shire)		476	490	505	520	536	552	568	585	603	621	
Shredder transport (hire)		5,493	5,658	5,828	6,003	6,183	6,368	6,559	6,756	6,959	7,168	
Cat 13, Asbestos Management and product testing	5,000	494	509	525	540	556	573	590	608	626	645	10,668
Admin & Management time (10% of total time of other staff)		1,651	1,701	1,752	1,804	1,858	1,914	1,971	2,031	2,091	2,154	18,927
Total Costs	265,162	22,499	23,174	23,869	24,585	25,323	26,082	26,865	27,671	28,501	29,356	390,487
Income (linked to inflation)												
Sale of packaging recyclables		3,904	4,021	4,141	4,266	4,394	4,525	4,661	4,801	4,945	5,093	44,751
Sale of recycled concrete aggregate		6,201	6,387	6,578	6,776	6,979	7,188	7,404	7,626	7,855	8,090	71,083
Sale of mulched greenwaste		-	-	-	-	-	-	-	-	-	-	-
Funding grant (capital cost only)	378,341											-
Revenue	378,341	10,104	10,407	10,720	11,041	11,372	11,714	12,065	12,427	12,800	13,184	115,834
Annual profit/loss	113,179	-12,395	-12,766	-13,149	-13,544	-13,950	-14,369	-14,800	-15,244	-15,701	-16,172	
Cumulative profit/loss		(12,395)	(25,161)	(38,310)	(51,854)	(65,804)	(80,173)	(94,973)	(110,217)	(125,918)	(142,090)	- 746,894
Profit/loss per domestic rateable property		(40.00)	(41.00)	(42.00)	(44.00)	(45.00)	(46.00)	(48.00)	(49.00)	(51.00)	(52.00)	



	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	Total
Year	0	1	2	3	4	5	6	7	8	9	10	\$
High yield	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Direct Costs (linked to inflation)	100%	103.00%	106%	109%	113%	116%	119%	123%	127%	130%	134%	
Baler and conveyor feed (Capex)	50,000											50,000
Bring centre plant capex (e.g. Forklift & clamp)	26,500											26,500
Building & bins / skips (Capex) (6m x 10m)	78,500											78,500
Capex contingency (10%) inc shredder	23,651											
Baler (Opex)		467	481	495	510	525	541	557	574	591	609	5,351
Forklift (Opex)		467	481	495	510	525	541	557	574	591	609	5,351
Building (Opex / Maintenance)		1,545	1,591	1,639	1,688	1,739	1,791	1,845	1,900	1,957	2,016	17,712
Bring Centre staffing (loading baler, baling and loading truck)		8,103	8,346	8,596	8,854	9,120	9,393	9,675	9,965	10,264	10,572	92,888
Transport of recyclables to Perth		6,631	6,830	7,034	7,245	7,463	7,687	7,917	8,155	8,399	8,651	76,013
Shredder (capex) Shire proportion of tonnage	81,511											81,511
Shredder (opex for concrete)		1,857	1,913	1,970	2,029	2,090	2,153	2,217	2,284	2,352	2,423	21,287
Shredder (opex for greenwaste)		273	282	290	299	308	317	326	336	346	357	3,134
Excavator for concrete (Shire)		6,564	6,761	6,964	7,172	7,388	7,609	7,837	8,073	8,315	8,564	
Loader for greenwaste (Shire)		884	910	938	966	995	1,024	1,055	1,087	1,119	1,153	
Shredder transport (hire)		5,493	5,658	5,828	6,003	6,183	6,368	6,559	6,756	6,959	7,168	
Cat 13, Asbestos Management and product testing	5,000	742	764	787	810	835	860	886	912	939	968	13,502
Admin & Management time (10% of total time of other staff)		3,064	3,156	3,251	3,349	3,449	3,552	3,659	3,769	3,882	3,998	35,130
Total Costs	265,162	36,089	37,172	38,287	39,435	40,618	41,837	43,092	44,385	45,716	47,088	506,878
Income (linked to inflation)												
Sale of packaging recyclables		7,250	7,467	7,691	7,922	8,160	8,404	8,656	8,916	9,184	9,459	83,109
Sale of recycled concrete aggregate		11,515	11,861	12,217	12,583	12,961	13,350	13,750	14,162	14,587	15,025	132,011
Sale of mulched greenwaste		-	-	-	-	-	-	-	-	-	-	-
Funding grant (capital cost only)	378,341											-
												-
Revenue	378,341	18,765	19,328	19,908	20,505	21,120	21,754	22,406	23,079	23,771	24,484	215,120
Annual profit/loss	113,179	-17,324	-17,844	-18,379	-18,930	-19,498	-20,083	-20,686	-21,306	-21,945	-22,604	
Cumulative profit/loss		(17,324)	(35,168)	(53,547)	(72,477)	(91,975)	(112,058)	(132,744)	(154,050)	(175,996)	(198,599)	-1,043,937
Profit/loss per domestic rateable property		(56.00)	(58.00)	(59.00)	(61.00)	(63.00)	(65.00)	(67.00)	(69.00)	(71.00)	(73.00)	