ATTACHMENT 6

SURVEY OF RESIDENT RATEPAYERS

A6.1 The waste questionnaire

As part of a major mailout by Council to all resident ratepayers a survey form on waste was included. Of the 5821 forms sent, 1502 were completed and returned. The distribution of surveys was adjusted to take into account dual property holdings and government land owners. The return rate was high, approximately 26%, which demonstrates the importance of these issues to ratepayers. It also provides a statistically strong basis for conclusions.

A6.2 Results

Presently, more people use landfill sites than any other way of disposing of waste, followed by kerbside collection and private contractors. This shows the importance of public services in the community but it also possibly reflects the reality that use of such facilities as landfills is both cost effective and easy because of the mobile population.

Responses to the questions in the survey indicate:

- landfills and Transfer Stations are important for waste and recyclable disposals
- most respondents already recycle
- most do not dispose of their organic wastes outside of their property
- kerbside collections are not favoured
- consistent with the point above, respondents don't feel they need more information about recycling
- approximately 20% of respondents are interested in more information but have a preference for knowing more about what is recyclable.

With respect to recyclables, respondents:

- most respondents already recycle, with less than 20% not recycling
- use their green waste or take to landfill (20%)
- see Transfer Stations and facilities at landfills as important

Respondents did not have a strongly held support for kerbside services for any of waste streams whether these be recyclables, green waste and bulky goods. In fact a closer look at the responses from those who classed themselves as rural compared to urban, saw this view become stronger. In other words, people not living in urban communities felt at best ambiguous towards kerbside or quite strongly did not see the need for it. However, a centralised recycling Transfer Station was more positively supported.

A6.3 Answers to specific questions

Question 1: Type of respondent

	Number	%
Residential	1303	86.7
Non-resident	141	9.3
Other /omitted	38	2.6
Business	20	1.3

The survey was completed mostly by local residents. The 141 non-residents who completed the form presumably have their principal place of residence elsewhere but nevertheless have a residence in the shire and make use of the facilities.

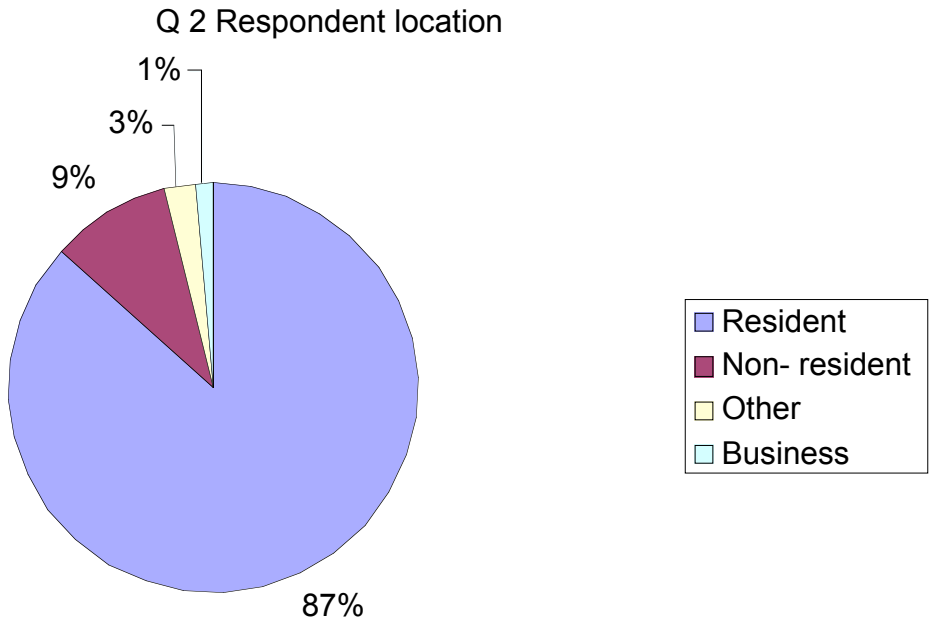
Question 2: Where is your property?
The survey was completed by mostly people from rural parts of the shire –

Rural	1101	73.3%
Urban	342	22.8%
Other	59	3.9%

This response reflects the Palerang Council population of approximately 35% urban: 65% rural. This is based on the population figures from the Council project Brief:

Total population	11,000	Approx Ratio
Town populations	3870	35%
Rural populations	7130	65%

This response rate also reflects what we found in our community consultation process that those with a kerbside collection process appeared to be less concerned about waste matters and thus attendances were lower.



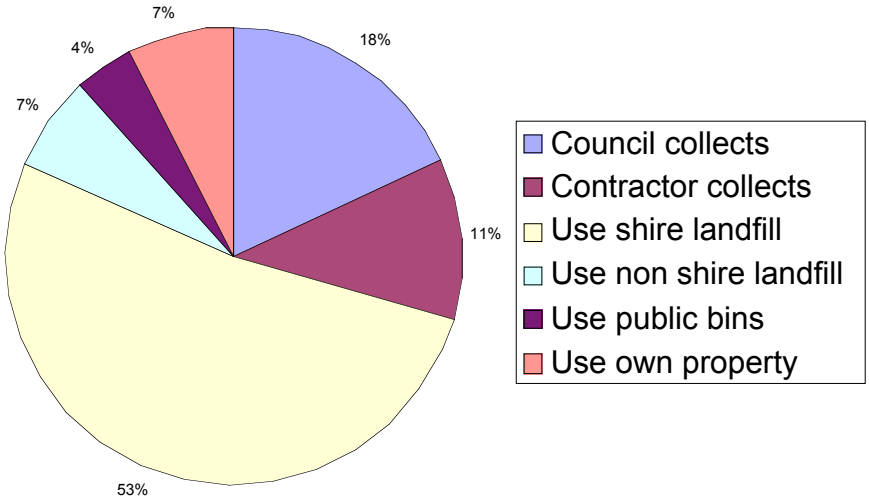
Question 3: How many people live at your property?
This survey represents 3780 people or approximately one third of the total population of Palerang.

Question 4: How did respondents currently dispose of waste?

Sample	**Council collects**	**Contractor collects**	**Use shire landfill**	**Use non shire landfill**	**Use public bins**	**Use own property**	**Other**
1502	303	189	869	109	73	123	131
Percentage of sample	20.4	12.8	57.7	7.4	4.8	8.4	8.8

Note the importance of public services in the form of non-kerbside infrastructure eg landfill and public bins, which are more useful for those in rural communities

Q4. Currently dispose of waste



Question 5: Estimate the amount of ordinary household waste you get rid of on average each week?

	Sample size	Quarter 140	Half 140	Three q 140	Full 140	Quarter 240	Half 240	Three q 240	Full 240	Quarter kitchen	Half kitchen	Three q kitchen	Full kitchen
	1502	115.25	157.5	116.5	355.5	54	82	54.5	192	241.12	143	105.5	1141.5
Total volume		16135	22050	16310	49770	12960	19680	13080	46080	6028	3575	2637.5	28537.5

NB. Proportions refer to estimates by respondents of just how much material they placed in a 140 litre, 240 litre or ordinary household kitchen bin

Total Domestic Waste 104,265 litres per week
Total Waste 145,043 litres per week (or 7,542,236 litres annually)
Total Volume Recyclables 918,000 litres per week

Sample	140 quart	140 half	140 3quart	140 full	240 quart	240 half	240 3quart	240 full	kitchen quart	kitchen half	kitchen 3quart	kitchen full
1427	107	141	99	167	38	79	49	152	108	68	49	351
Percentage of sample	7.5	9.9	6.9	11.7	2.7	5.5	3.4	10.7	7.6	4.8	3.4	24.6
	36%				22.3%				40.4%			
Percentage of bins size	20.8	27.4	19.3	32.5	12.0	24.8	15.4	47.8	18.8	11.8	8.5	60.9

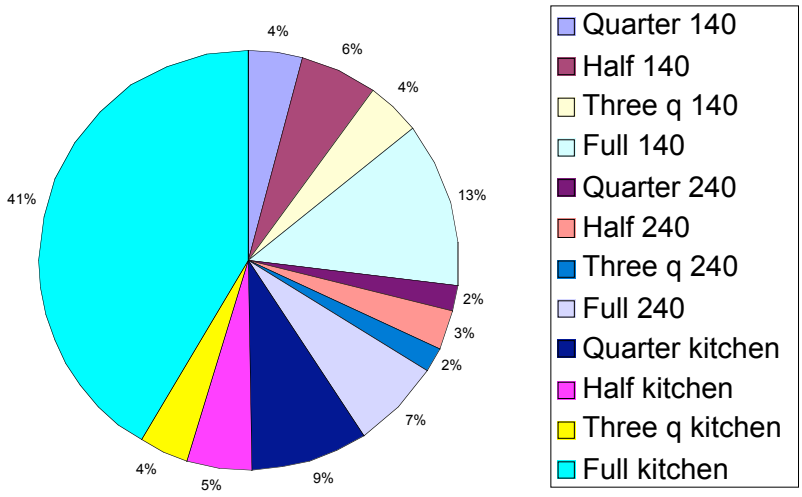
NB. Proportions refer to estimates by respondents of just how much material they placed in a 140 litre, 240 litre or ordinary household kitchen bin

Note the importance of the 40.4% of non-regulation bins, reflecting perhaps self haul and recycling. This reflects the survey response from rural rather than town people.

The total waste disposed of is 7,542,236 litres per year and 4,773,600 litres of recyclables per year. If we divided these figures by the number of respondents (1502), this means that each household on average estimates that it disposes of:
Waste 5018 litres per year
Recyclables 3176 litres per year

It is an interesting figure which reflects the survey response mostly from those living in non-urban environments.

Q 5 Estimate of ordinary waste disposed

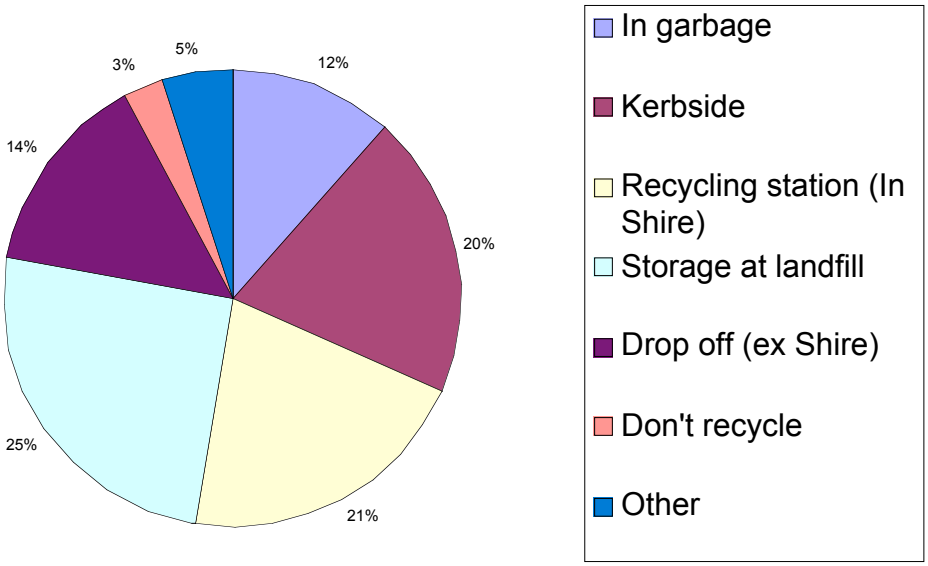


Question 6: How do you currently dispose of your recyclable items?

Sample	In garbage	Kerbside	Recycling station (In Shire)	Storage at landfill	Drop off (ex Shire)	Don't recycle	Other
1502	197	341	350	428	244	49	84
Percentage of sample	13.1	22.7	23.3	28.5	16.3	3.3	5.6

This result suggests that ostensibly there are few people who responded to the survey who don't recycle their waste in one way or another. It also demonstrates that Transfer Stations are important as a vehicle for doing this, while the importance of the existing landfills is also important in facilitating this.

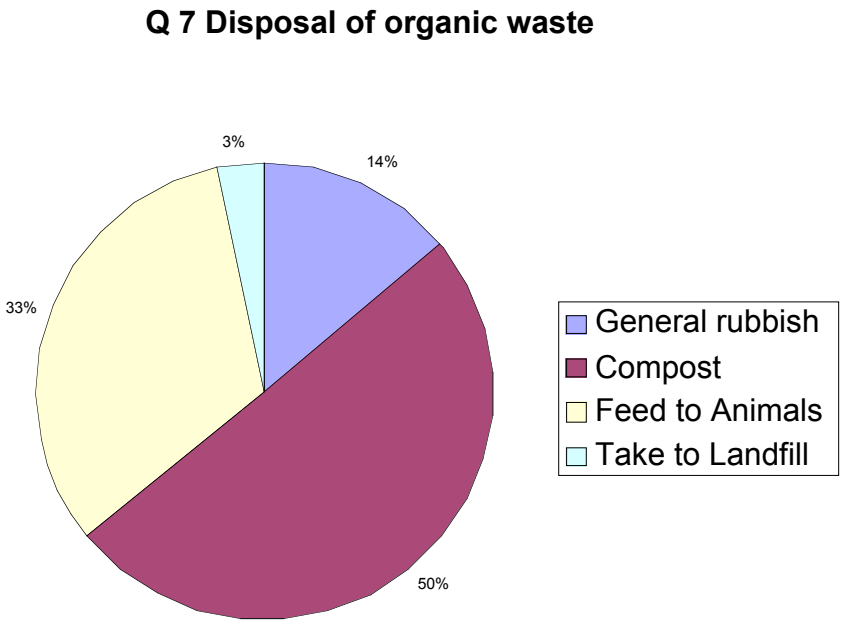
Q 6 Current disposal of recyclables



Question 7a: How do you dispose of your organic waste?

Sample	General rubbish	Compost	Feed to Animals	Take to Landfill
1502 (1875 responses)	260	943	610	62
Percentage of sample	13.9	50.1	32.5	3.3

Multiple responses were provided to this question. The results of answers to his question indicate that less than 20% of respondents actually give away their organic waste. This is perhaps a not unexpected result in a rural shire.

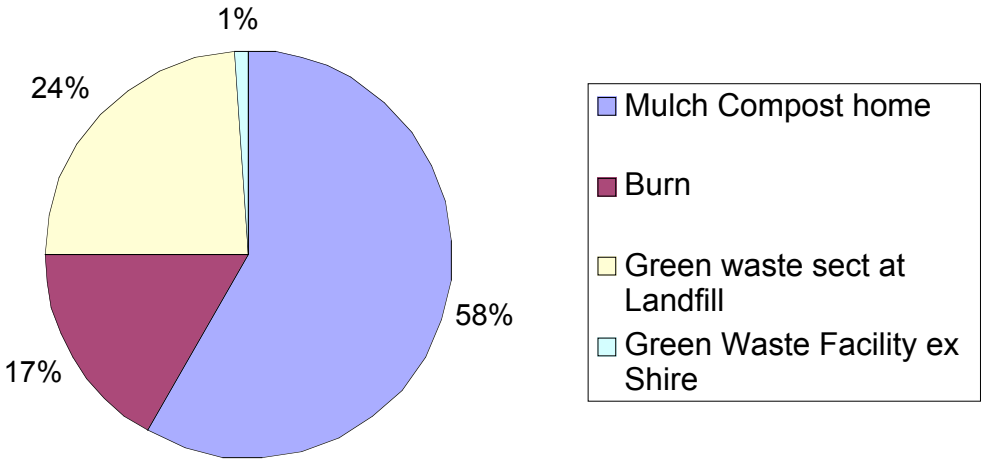


Question 7b: How do you dispose of your kitchen scraps?

Sample	Mulch Compost home	Burn	Green waste sect at Landfill	Green Waste Facility ex Shire
1520 (1760 responses)	1025	297	416	22
Percentage of sample	58.2	16.9	27.7	1.3

Some notable results here in that almost 20% of respondents burn their kitchen scraps, while almost 28% send them to landfill. Again, most use their kitchen scraps for compost as almost 70% of respondents identified this is what they do.

Question 7 b Disposal of Kitchen scraps

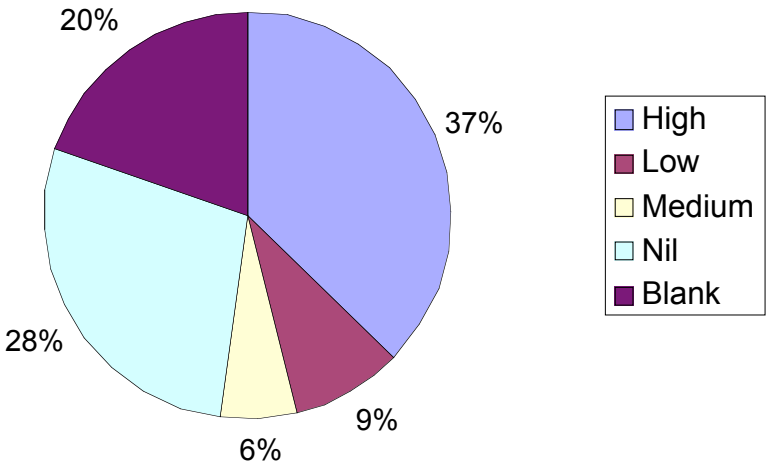


Question 8.1: What are your preferences regarding kerbside waste collection?

	High	Low	Medium	Nil	Blank	Total
Total	545	133	89	412	288	1467
Percentage	37.3%	8.9%	6%	28.1%	19.6%	100%

The results suggest that Kerbside collection is perhaps not seen as quite the priority as has been suggested in the Waste Management strategy adopted by Council.

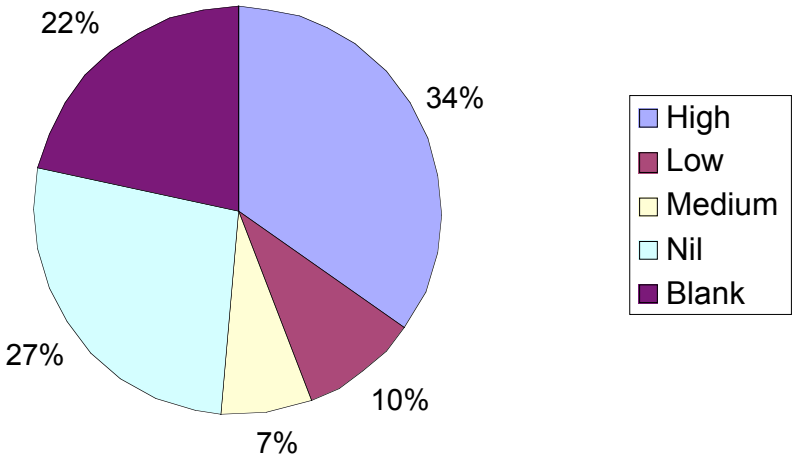
Q 8.1 Preferences for kerbside collection



Question 8.2: What are your preferences for kerbside recyclable services?

	High	Low	Medium	Nil	Blank	Total
Total	522	143	108	405	324	1502
Percentage	34.7%	9.5%	7.2%	27%	21.6%	100%

Q 8.2 Preferences for kerbside recyclables



In a more detailed look at this matter, we dug a little deeper into the returns. Here we looked at the total number of survey returns and made allowances for those whose returns were from people who use kerbside collections and those who do not in the Bywong/Wamboin area. This was chosen as it is proposed that a kerbside collection process be implemented in this area. The results of such an analysis

Locality	High	Low	Medium	Nil	(blank)	Total
Total	532	127	85	403	280	1427
Proportion	37.3%	8.9%	6%	28.2%	19.6%	
Bywong	29	15	8	56	18	126
Wamboin	36	32	18	66	20	172
Subtotal	65	47	26	212	38	298
Proportion	21.8	15.8	8.7	71.1	12.8	

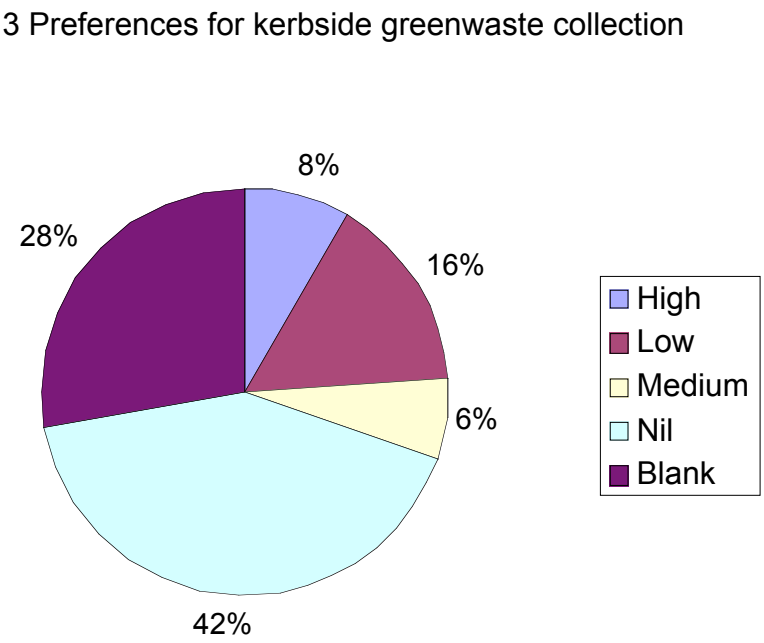
For whole shire		
High – medium support for kerbside collection	High – medium support for kerbside collection if exclude those responding from Bungendore, Braidwood and Captains Flat	Feel weakly or no support for support for kerbside collection
43.3%	13.5%	56.7%
Bywong and Wamboin as part of the overall survey response		
6.4%		14.5%
A detailed look at the Bywong and Wamboin results only		
30.5%		69.5% (56.7% if exclude blanks)

The conclusion here seems to be clear that unless the respondent lives in a town, then the kerbside collection is not strongly supported.

Question 8.3: What are your preferences for kerbside greenwaste services?

	High	Low	Medium	Nil	Blank	Total
Grand Total	125	233	97	629	418	1502
Percentage	8.3%	15.5%	6.5%	41.9%	27.8%	100%

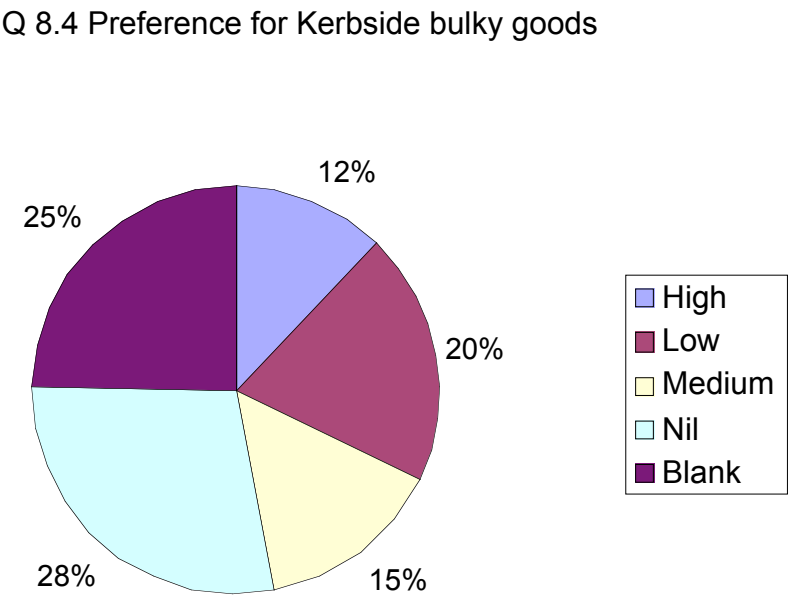
Again, kerbside collection is not strongly supported. This has some implications for the proposal to implement a kerbside town waste bin as proposed in our recommended strategy.



Question 8.4: What are your preferences for Kerbside bulky goods

	High	Low	Medium	Nil	Blank	Total
Grand Total	185	301	221	425	370	1502
Percentage	12.3%	20%	14.7%	28.3%	24.7%	100.00%

As above, kerbside collection is not strongly supported.

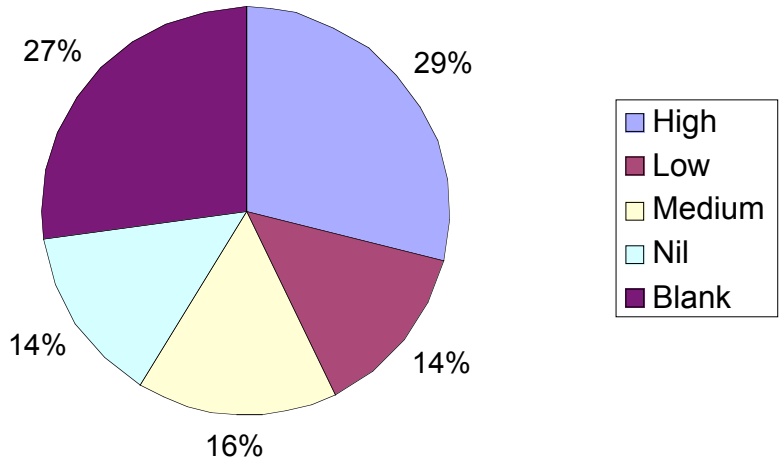


Question 8.5: What are your preferences for a centralised recycling station

	High	Low	Medium	Nil	Blank	Total
Grand Total	434	207	240	211	410	1502
Percentage	28.9%	13.8%	15.9%	14.1%	27.3%	100.00%

Responses to this issue are interesting in that support for a recycling station is about equal to those who are not strongly in favour. This may again reflect the urban-rural differences.

Q 8.5 Preferences for a centralised recycling station

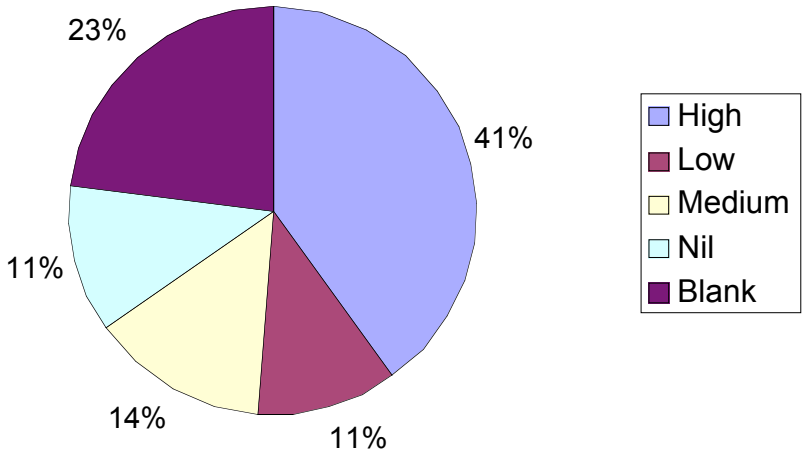


Question 8.6: What are your preferences for direct disposal to landfill

	High	**Low**	**Medium**	**Nil**	**Blank**	**Total**
Grand Total	601	168	213	172	348	1502
Percentage	40%	11.1%	14.2%	11.5%	23.2%	100.00%

The support for direct disposal to landfill is greater than for not having access direct to landfill. This is interesting because respondents do not have as strong a direction in favour of landfill as might be expected in the light of answers to other questions.

Q 8.6 Preferences for Direct disposal to landfill

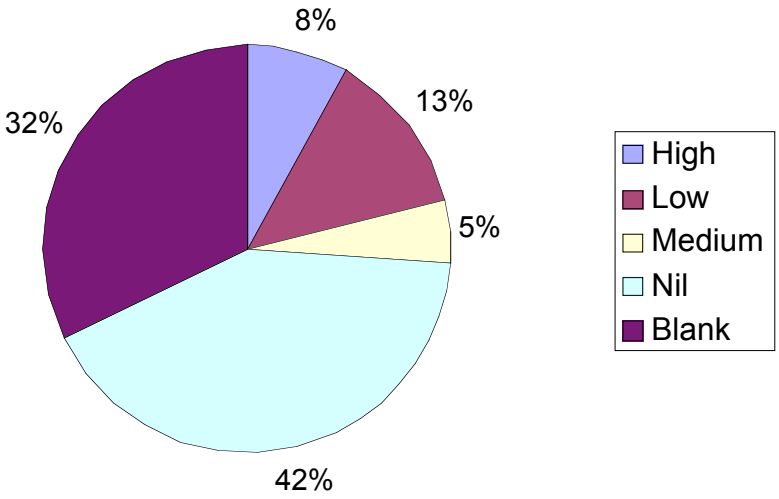


Question 8.7: Use of private waste collector

	High	Low	Medium	Nil	Blank	Total
Grand Total	119	199	74	624	486	1502
Percentage	7.9%	13.3%	4.9%	41.5%	32.4%	100.00%

The small role of private contractors in the overall scheme of things is demonstrated by this Table. Not surprisingly, the respondents in favour here are from such places as Royalla, Burra, Carwoola, Forbes Creek, Ballalaba and Tarago.

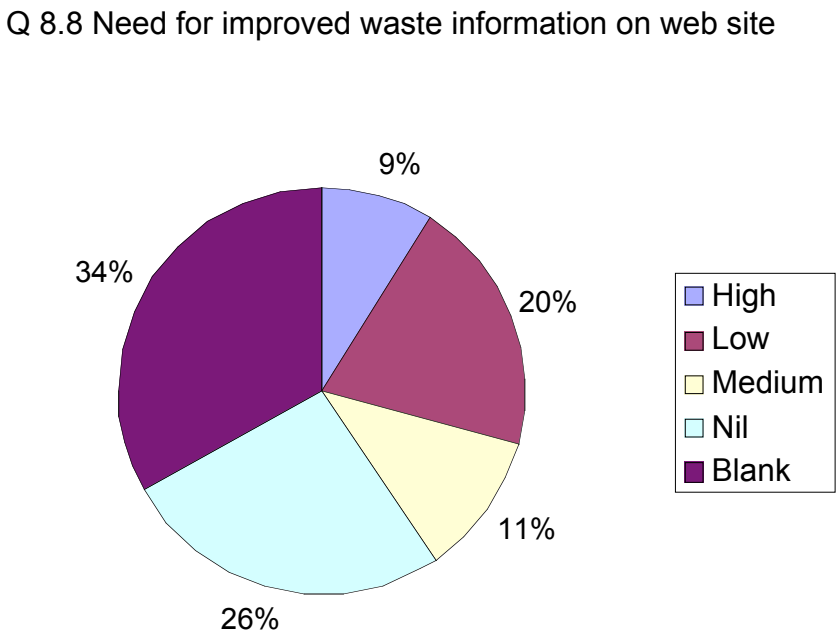
Q 8.7 Preferences for use of private waste collector



Question 8.8: Improved waste information on Council web site

	High	Low	Medium	Nil	Blank	Total
Grand Total	135	302	171	396	498	1502
Percentage	9%	20%	11.4%	26.4%	33.2%	100.00%

Perhaps unsurprisingly, the interest in information to be improved is low. This may reflect that people think they already know a lot or for those who aren't overly interested then they will not use this resource. This response fits also with an apparent lack of interest n accessing material placed on Council web site for this project.

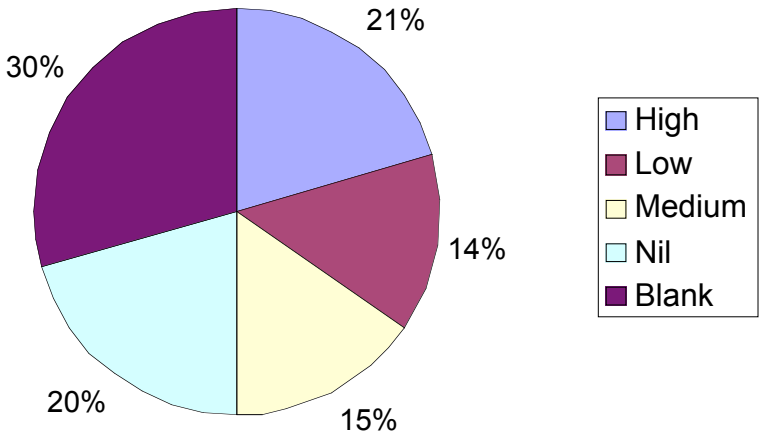


Question 8.9: Information on what is recyclable

	High	Low	Medium	Nil	Blank	Total
Grand Total	310	212	230	306	444	1502
Percentage	20.6%	14.1%	15.3%	20.4%	29.%	100.00%

The greater interest in obtaining more information about what is recyclable than in having improved waste information on the Council web site is interesting, perhaps reflecting more about the methods of communication than the subject matter. The degree of interest in knowing more about what is recyclable is reasonably strong, given one in five suggest they rate it as a matter of high importance.

Q 8.9 Need for more information on what is recyclable

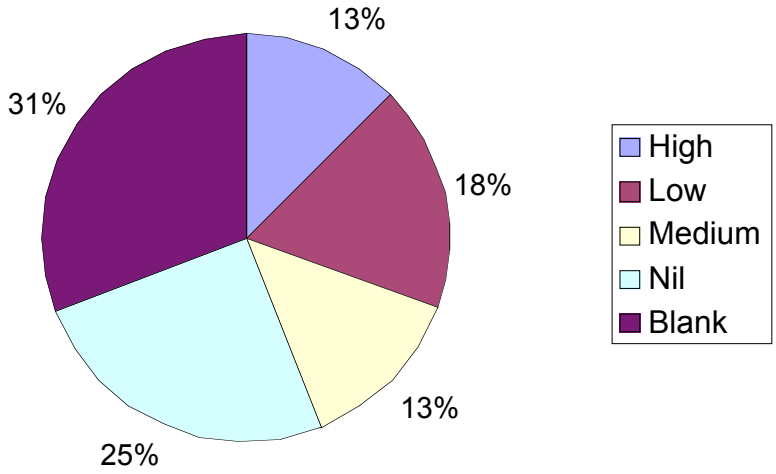


Question 8.10: Advice on worm farming

	High	**Low**	**Medium**	**Nil**	**Blank**	**Total**
Grand Total	188	273	197	381	463	1502
Percentage	12.5%	18.2%	13.1%	25.4%	30.8%	100

If we consider one quarter of respondents relied that they saw more knowledge about worm farming as either high or medium, and so not indifferent, then this is a strong indicator of interest in the context of this project.

Q 8.10 need for more advice on worm farming



Question 9: Do you have enough information to improve your own level of waste separation for recycling?

In summary, a small number of respondents to this question indicated some further information would be useful. This request for information reflected the fact that people at times are just not sure of what is recyclable eg bottle tops, specific materials particularly plastics, corrugated, lined papers and cardboard, or chemical and hazardous wastes.

It also reflected the fact that people need to know more about recycling, such as the level of recycling which occurs in Palerang, whether recycling actually happens and the issue of mixing recyclables together (or co-mingling). There is a need to better explain why carry out recycling and the returns for all in the community from such a practice.

Suggestions regarding communicating such messages included:

- establishing a hands-on demonstration site, including a permaculture site
- hard copy brochure or one-pager
- special letter from Council
- use of rate notices
- fridge magnet
- wall chart
- web site
- schools program
- effective public signs both in towns and at the landfill and drop-off centres, and on bins themselves
- publish success stories
- hold seminars
- have stories in local media including community newsletters

Responses included the comment that reminders were useful, and highlight that it is a daily activity. That is, regular and ongoing information about waste management and recycling

There was a suggestion that rewards or incentives (prizes) might be valuable to assist increase the level of recycling, perhaps through competitions

There was a question of whether there existed a financial case in support of recyclables.

Finally, there was a suggestion that spot checks might be made on recycling bins and reminders about recycling made where issues arose from such inspections including ultimately a defect notice if changes did not happen to improve the situation!

Question 10. What does Council need to do to encourage more people to recycle their waste effectively?

There were many responses to this question with approximately 9% only of responders not answering this question.

The issues covered in this question included

- council to lead in regard to recycling by example (in purchases as well as practices)
- the need for a periodic large recyclables collection
- introduce greenwaste collections, including a kitchen bin, promote composting and produce mulches
- a need to emphasis the environmental outcomes from recycling

- people should know about the reasons for recycling by now, so that Council needn't do anything because is up to the community
- need to make any implemented system cost effective
- many requested that there be a better landfill design, to make these places attractive, and improved management regarding material separation
- however, people are people, ie lazy and unwilling to do something about recycling so it won't be easy to make them change
- in this circumstance, need to make the recycling system as easy as possible, so more drop-off points to be made available
- put into practice a differential charge that will benefit those who recycle, and this may include providing recycling bins – a user pays system is preferred, where the charge is by volume
- ongoing education programs are required
- programs should not involve punishment but rather incentives, except perhaps for those littering and dumping illegally
- establish a sales outlet (ACT Revolve equivalent) for recyclables at landfill sites
- be aware of the specific needs of older people given their capabilities

Question 11: Any further comments about waste management and recycling services in the Shire?

76% of respondents answered this question

The issues covered included

- community benefits from a better recycling system
- ought to be able to sell recyclables
- collect and process green waste, mulch
- have, and need to retain, friendly staff at landfill, good landfill staff are valuable
- power generation from landfill sites to be considered
- use the widely available land in shire to open up more tips
- there is a negative reaction to waste charges with many suggesting they don't get their value-for-money as not offered services
- need to up-grade local landfill sites
- locations of transfer stations will have an impact through use patterns
- reduce commercial use of landfills, especially if outsiders
- paper recycling is an issue to be better managed
- increased charges at landfill sites will flow through to clients from a business point of view
- private contractors have a role in the overall scheme of waste management
- charge rates to fit circumstances and to be implemented so as to act as an incentive – those who use the landfill infrequently don't understand why they pay
- charging important from those who say they don't get value for money (what are we paying for when no service is required or provided?) to those who see it as a mechanism to improve recycling – an issue of value for money
- charging might mean more illegal dumping
- the net costs of transporting materials out of shire is questionable, as is environmental impact, when they might be used locally
- tip opening hours to be reviewed to cater for locals
- mixture of approval and approbation of existing system
- revolve operation mentioned as a good example of what should be in place in Palerang
- have to provide a service which covers the full range of materials to be recycled – a flexible service

- more information about recycling, composting etc is useful
- there is a little cynicism re recycling as to whether it really is done
- there is a rural versus urban divide as rural users see themselves paying for no services
- another divide is residents versus non-residents
- these are issues about those who don't need/want Council services and reflects the way properties are used
- place more recycling bins in the towns
- paper is a specific issue for recycling
- policing of system might be useful
- there is community value in keeping landfills

ATTACHMENT 7

MODEL TRANSFER STATIONS

We envisage four different types of Transfer Stations:

- Major Transfer Station on landfill with open trench but residuals will be transferred if trench should close
- Minor Transfer Station on landfill sites with open trench but residuals will be transferred if trench should close
- Transfer Station with recycling facilities only and no residual collection
- Recyclables Drop-off centre for co-mingled recyclables to begin with moving to become better source separated after an introductory period of operation

For all of these models, the residuals management could be either via a trench on site or transport to another facility. The scale of the stockpiles would depend on the locality, flows and economics of collection/processing.

Diagrams below are 'idealised' models. For each proposed site there will need to be modifications to these models to suit local circumstances. The model would probably only be applicable to Bungendore when fully operational and with extensive recycling facilities.

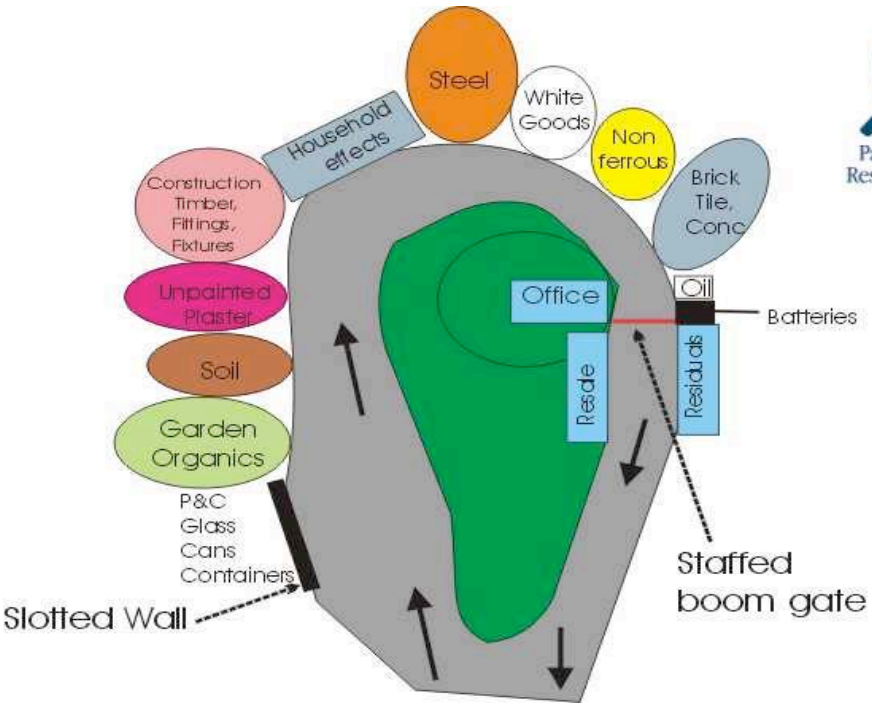
The larger sites of Bungendore and Braidwood would be where this type of operation is put in place and where regular commercial flows are separated from the domestic loads. The smaller sites Araluen, Majors creek and Nerriga are where it is envisaged this type of design would be implemented because a single person can monitor the entire operation.

Table 17: Model Transfer station operations
The following table explains in more detail the operational associated with the model Transfer Stations.

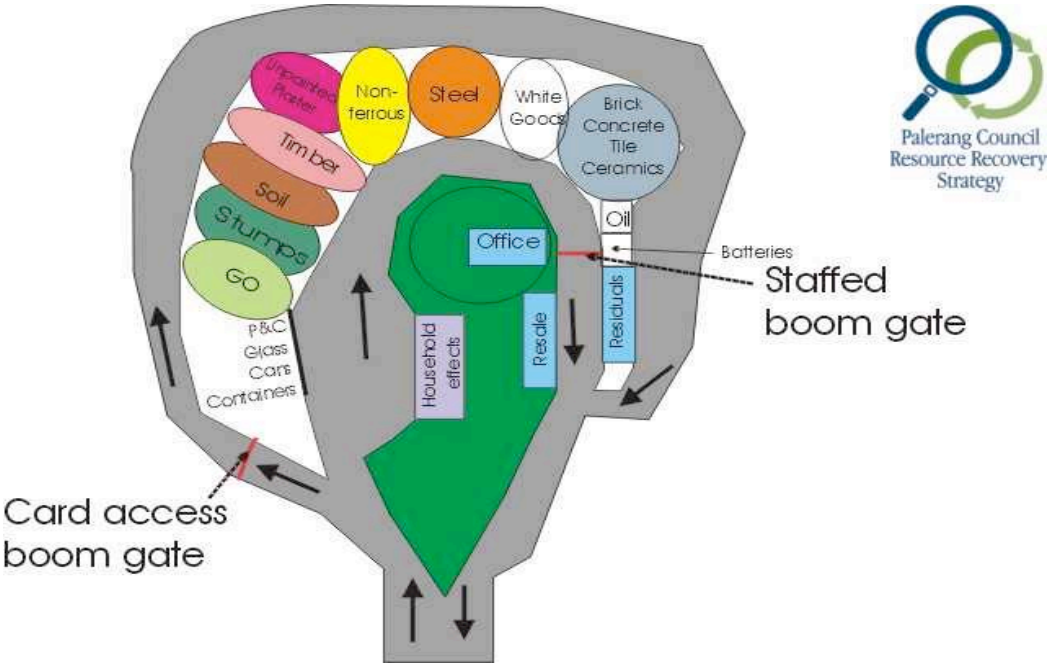
Items to be included in disposal facility options	**Description**
Major site space – all weather tracks, landscaping, earthworks Araluen Braidwood Bungendore Captains Flat Macs Reef Road Majors Creek Bywong Burra/ Royalla Carwoola Wamboin	This is a major site properly designed so as enable large vehicle movements and significant peak hour use. It may include an open t but where this is the case it is quite separate from the other disposa facilities and only accessible by local staff. The issues of the EPA S Wastes Landfill Guidelines are covered. Tracks will be designed to enable residents and companies to drive vehicles to the various drop-off points in all weather conditions. Cı C&D material might be suitable for these tracks, and specifications pavements, earthworks and drainage have been produced to guide councils in this application. Tracks need to be wide enough to enab drivers to pass by other parked vehicles. On a large site, where volumes justify it, a separate small business major skip collection track will allow limited access to the spaces b the recyclables bins and separated materials, and also for storage sp over several months. The entrance and the site will be properly landscaped with appropr native trees, shrubs and grasses. Earthworks may be required to ensure separate spaces are clear and effective for bin separation, for separated sections of the whole site of technology as part of this process

Staff Office facilities inc materials, consumables Training	Staff to manage each site. An office building with basic amenities, including office facilities, to support maximum staff of 2-3 people. office location on the site will be such as to facilitate direct monito disposals taking place, where easy access for visitors, information a point where tip pass checks can be made and finally where charg co-mingled loads can be made, and directions given as required..
Boom-gate and signage	There may be a small number of boom gates on site. One boom ga for ingress or egress, where all visitors are stopped to confirm poin origin and loads confirmed regarding disposal charges. Another ma for specific commercial use either to collect materials as part of SM activity. Signage is mandatory. Signage must be of good quality, contain up date information and effective. Especial attention is to be paid to th entrance and to all deposit bins.
Separate product deposit and collection spaces	Products such as white goods, C&D, metals, timber, tyres, batteries hazardous materials, drum muster, organic waste, specialized prod such as offal, animals etc will need to be allocated a specific area f deposit. Spaces will be required to enable deposit and collection. D features may include clear simple deposit location points, gravity l capacity, access for separation or dismantling, concern for health. sites probably do not need cover but may need a suitable base with OH&S issues are important here.
Product collection recycled materials bins	Materials such as bottles, cans, plastics, furnishings, paper, cardboa clothes, rags etc will require different deposit facilities to reduce contamination and assist subsequent pick-up and transport.
Co-mingled deposit and separation facility	While separated deposit is the purpose as far as possible, deposits v made by people which are co-mingled loads. It is proposed charges made for such loads. Therefore special facilities will be required ar will be located as a last point of deposit. Some of the co-mingled products can be further separated but a considerable proportion ma Thus there will need to be access to the trench where applicable. D with such materials will not be something that can be left for long p of time.
Transport of residuals – round trip	This task may involve taking collected residuals to a central or clos landfill site
Educational facilities and materials	On-site educational facilities may range from extremely simple to a elaborate demonstration site, including a range of visual materials, perhaps electronic.
Small business sites – eg green waste processing Plastics Bottles Steel	There are several opportunities with business and social ends whic be developed utilizing materials deposited. These include organic processing through worm farming, materials repair, ‘mens shed’ ar other opportunities. Space, access and infrastructure facilities of a s nature might include a covered work area and even storage and gar capacity.
Equipment – hired? Loader Medium truck Small plant	Trucks, bob cats, front end loaders and other similar operational su vehicles will be needed especially when the site is a large one. The vehicles may also be shared around the shire’s different sites, or lo contractors used.
Fire fighting capacity	Facilities to ensure any fire which breaks out can be managed

Overarching administration and supervision B'dore – B'wood Additional education support responsibilities – 50%	There is a need for an overarching supervision and coordination of various sites and facilities. This is more than just monitoring staff c contractual operations but may well be closely tied to education, recycling management, monitoring and evaluation.



Category 2 model Transfer station



Category 1 model Transfer station

The following photograph is an example of what is built at Gundaroo and which is similar to the proposed Category 3 Transfer station.

This photograph is of a Yass Transfer station

ATTACHMENT 8

Budget - The following Tables in this Attachment provide the basis to the Resource Recovery Strategy budget. The data used in the calculations below come from Council sources and NSW Department of Environment and Conservation materials.

Table 18: Basic data sets used to calculate the final results

	1 B'dore	1 Bwood	No 2	No 3	No 4	
A. Category of Recycling infrastructure						
Capital expenditure			per unit	per unit	per unit	
Basic site preparation inc roads	250,700	15700	13700	4000		
Staff office facilities	15,000	15000	4000			
Boom gate and signage	16,000	16,000	7000	1000	500	
Product deposit infrastructure eg sheds	60,000	40,000	20,000	5,000		
Product deposit eg bins, skips	40,000	40,000	16,500	4,000	2,000	
OH&S	1,500	1,500	500			
Co-mingled separation equipment	100,000	100,000	25000			
Educational facilities	15,000	15,000	1000	500	500	
Small business facilities	60,000	60,000	15,000			
Site operating equipment	105,000	105,000	20,000			
Compactor	50,000	50,000				
Fire fighting	20,000	1,000				
Design, approval, supervision	100,000	60,000	5000	4000		
Sub total	833,200	519200	127700	18500	3000	
20% contingency	166,640	103,840	25,540	3700	600	
Total capital	999,840	623040	153240	22200	3600	
Totals for categories 1, 2, 3 x 4	999,840	623040	459,720	88,800	36,000	2,207,400
Annual leasing payments	94,378	58,811	65,312	12,644	6,680	237,825
% x yrs	7% x 20	7% x 20	7% x 10	7% x 10	7% x 7	

A1. Other weighbridge, organics
Through SERRROC and Grants

B. Operation costs			per unit	per unit	per unit	
Staffing	132,000	66,000	26,400			
Staff training	5000	5000				
Consumables eg equipment operation	185,000	93,000	8000	4000	1000	
Transport of residuals	38,000	N/A	N/A			
Operating costs per site	360,000	164,000	34,400	4000	1000	
Totals for categories 1,2,3,4	360,000	164,000	103,200	16,000	10,000	653,200

C. Other expenses	
Waste Officer plus following items	51,000
Office expenses, communications, forums, other meetings	
Clean up Australia day	5,300
Public Litter bins	15,000
Road side illegal dumping	65,000
SERRROC	10,000
Haz chemical pick-up	13,000
Bulky goods collection	
Education	21,900
Sub total	181,200

D. Existing Operational expenses	
Total Kerbside Collections	
waste	129,860
recyclables	111,895
	241,755
Total Landfill Operations	573,200

Specific Issues
A number of issues arose during this investigation regarding charges and income. These are further explored below.

a. Special charge for Burra/Royalla section of Palerang Council
The Royalla TS to be constructed in conjunction with Queanbeyan Council

Burra/Royalla/Urila		
Construction	$53,000	
(Burra/Royalla	$26,000 ea	
Urila	$1000)	
Annual cost at 7% for 10 years		$7546
Bins 70 bins @ $70/bin	$4900	
Annual cost at 7% over 7 years		$910
Capital items annual costs		$8456

For this area there are 560 households with three sites
Each household produces approximately 15kgm per collection per bin = 560 x 15 x 26 = 218,400 kgm of recyclable materials per year
There are maximum 20 full bins per Drop-off Centre located at Burra and Royalla and 10 for Urila, which are emptied per fortnight.
Est 250kms round trip x 50km/hr = 5hrs/trip x $120/hr = $600 per trip x 26 trips = $15,600

Collection cost	$15,600
Charge at Hume MRF	$11,140
Administration offset (560/6960 x $109,000)	$8,770
Total	$43,966
Per household	$78.5 (say $80)

However, if the materials are not taken to the MRF, household cost is $58.6 (say $60). We note however Council has already decided upon a charge of $90

b. Charging regime
Total of visits to landfill from data collected from Council are approximately as follows:

Cars/Station wagons	400/wk x 48 weeks = 19200 visits
Utilities/trailers	700/wk x 48 weeks = 33600 visits
Trucks	50/wk x 48 weeks = 2400 visits
Total	55,200 visits

Ratio of cars/station wagons to Utilities/trailers is approximately 1/3:2/3

From our survey we know that approximately 70% of respondents in one way or another used landfill. There are 6960 rateable properties in Palerang, divided roughly into 65:35 ratio of rural to urban residents, a 4524:2436 break up. These figures provide a base to the income which might be generated from a co-mingled load charge. We assume a rural household will go to a landfill once per month or those living in urban areas might go as frequently as 4 times per year.
4524 vehicles x 12 times per year visit to landfill = 54288 visits
2436 vehicles x 4 times per year visit to landfill = 9744 visits

If we compare this with the 55,000 visits by cars trailers utilities and trucks
80% separated 44,000 visits
20% unseparated 11,000 visits
Options
The table below sets out a number of pricing options for unseparated loads. These pricing options are:

- $20, $16, $15, $12 as an average charge for small and medium vehicles
- $16:$8 ratio for medium and small vehicles with a charge for both separated and non-separate loads
- $15:$5 for average of large and small vehicles plus a charge for separated loads.

Table 19: Possible charging options and income
The following table considers income derived by different visit numbers and different prices charged for such a visit. The final row makes the assumption that with charges, there will be a drop rate in visits, as much as 50%.

Options based on visits	**$20**	**$16**	**$16 – 2/3 unseparated $8 -1/3 separated**	**$15 unseparated $5 separated**	**$15**	**$12**
44,000			352,000	220,000		
11,000	220,000	176,000	176,000	165,000	165,000	132,0
Total	**220,000**	**176,000**	**528,000**	**385,000**	**165,000**	**132,0**
50% drop off in use	110,000	88,000	264,000	197,500	82,500	61,00

These are generalised rates but specific prices by vehicle type and product might mean increased incomes will accrue especially when commercial fees are incorporated. We therefore estimate that a figure of $75,000 per year as income might be more realistic if based on the lowest charge of $12 per vehicle in the above Table.

Table 20: Comparison with the ACT Mugga lane charges
This Table is included for comparison purposes to demonstrate the level of the previously nominated charge rates.

Household waste ACT residential fee – 0.5 tonne or more	$62.00 per tonne
Household waste fee - Small (equal to a sedan boot)	$8.00
Household waste fee – Medium (equal to a sedan with a trailer; a utility; or a wagon)	$16.00
Household waste fee – Large (equal to a utility or wagon with a trailer; or a sedan with a caged trailer)	$24.00

c. Income from Sale of Product
In 2005/6, Palerang council received $60,000 from the sale of recyclable materials picked up at Braidwood, Bungendore and Macs Reef Road landfill sites.

The estimated improvement in collection of materials from an effective Resource Recovery strategy is difficult to accurately forecast. Also, forecasting sales for such products is complex as prices fluctuate for recycled goods. Nevertheless, it is expected that a Resource Recovery Strategy coordinated by the new Resource Recovery Officer will lead to increased returns from the sale of recycled products that have been cleanly separated. The quality of the recycled product will influence the price received and thus low contamination is a prerequisite.

Furthermore, the re-use of organics products, when this happens, is a key factor in reducing materials to trenches as it is such a lage part of the present waste stream.

If the rate of recycling and source separation rose from the existing rate by 25%, 50%, 75% and 100% then, based on current prices and proportions of product, the income received would be:

25% increase	50% increase	75% increase	100% increase
$75,000	$90,000	$105,000	$120,000

The issue about such figures is how likely is this increase to happen? The answer is found through the impact of a range of related factors as listed below. However, effective communication by Council, of the available opportunities for recycling and the benefits to Council, the community and the environment, is critical.

Factors affecting the income from recyclables are:

- 2% pa increase in population
- Increase in wealth per head of population
- Increased access to recycling infrastructure
- Increased prices for recycled materials
- Increase product collection from kerbside collection (by up to a third)
- Improvement in well sorted deposits of recyclables at TS
- Community Co-operation

Our kerbside bin analysis suggests that one third of a waste bin has recyclable materials in them. There is thus an opportunity to increase recycling by 33% from this source. This will require better education and awareness.

From our survey we know that about 70% of respondents claim to recycle by dropping materials at a landfill site, approximate 16% of whom do so outside the Palerang Council area. The extent to which this recycling is carried out and includes good source separation is difficult to judge, but visitors to landfill sites might be considered to be reasonably good at this and will certainly be much better with staff guidance. Staff presence will be an important factor here as will a charging regime.

If 60% of landfill visits are undertaken where those who do so effectively separate their deposited materials, then we have approximately 40% of total Palerang Council households doing a good job. Moving from a rate of 40% of total households to 80% of total households in three years is not impossible.

The proposed Resource Recovery Strategy will bring about changes. These changes include easier and more access to facilities such as drop-off centres plus the existing

landfill sites will be able to better separate and hold significant quantities of source separated materials, and thereby attract contractors to pick up recyclables.
Above, we estimated roughly 44,000 cars, trailers and utilities will come to landfills per year. EPA estimates are that cars bring 60kg of waste per load and utilities bring 300kg per load. If we averaged out our figures of visits above, this means:

19,200 cars and station wagons	1,152,000 kg	1152 tonnes
33,600 Utilities/trailers bring	10,080,000 kg	10,080 tonnes

Our Captains Flat experience suggests the figure for utilities and trailers might be about one third of the EPA figure as most do not bring a full load. That is about 3750 tonnes plus other drop-off area total, might equate to approximately a total figure of 4000T. These figures are split according to product and valued in the following table.

Table 21: Possible total income from recycled materials

Product	**Unit price**	**Volume**	**Total income generated**
Paper	$70/T	1000T	$70,000
Batteries	$1 each	500T	$500
Plastic bottles	$900/T	3T	$2700
Aluminium cans	$1000/T	3T	$3000
Steel	$100/T	500T	$50,000
Glass	$10/T	200T	$2,000
GREEN WASTE	$10/T	1500T	$15,000
Concrete, bricks, tiles	$10/Tonne	500T	$5000
Timber	$50/T	50T	$2500
Fittings and Fixtures	$200T	50T	$10,000
Household	$100/T	100T	$10,000
Other	$50/T	100T	$5,000
Total			**$174,800**

This table suggests that it is not impossible to achieve an income equal to greater than the 100% of present day income listed above.

Data available suggest that the reality might be less than this amount. That is the following items would produce income only of $84,700.

Items	**Income generated**
Plastic Bottles	$300
Aluminium cans	$2,400
Steel (light)	$75,000
Glass	$7,000
Total	$84,700

This comparison gets to the nub of the strategy. It appears from these comparisons that it is difficult to find outlets for such recycled products. This is true only to a certain extent. A different system means that the market opens up. For example, paper is a proven market but will become part of the greenwaste system, batteries are sought after for their lead, fittings, fixtures, household items and timber, all depend upon a Revolve type market which is available. The key issue is quantity to offset transport costs. Likewise concrete, bricks and tiles are well sought after and if the quantity was significant, the market exists.

d. Drop-off recycling stations organised for separate materials

For the proposed strategy to most effectively work requires people to separate their recyclable material at the proposed 10 new Drop-off recycling stations. Most already do this where such facilities are in place. However, Council infrastructure is not readily compatible with this approach and thus the separated material is often is mixed up when collected. There are several disadvantages to this system but to make a recycling system work, a practical operation must be put in place. The argument proposed here is that such a system is warranted and economic.

Recyclable bin collection data analysis indicates each bin has approximately 15kgm per fortnight per household. If we use this figure as an estimate of what might be collected and we assume 3000 rural residences then this amounts to 45,000 kgms per fortnight (1,170,000 kgms/pa).

The calculations are set out in the Table on the following pages. The results are very encouraging.

Table 22: Cost benefits from source separation recycling at Drop-off stations

Item	Total per fortnight
Recyclables collected per fortnight from 3000 rural residence	45 tonnes
ACT MRF charge at $51/tonne	$2295
Travel cost of $95/hour for 2 hours for vehicle	$190
Externality cost of $3/km x 80 km	$240
Sales for an additional 45 tonnes @ $0.5/15kgm	$1500
Total	$4225

This table indicates that Council has approximately $110,000/per annum to use to set up a practical approach to the separated collection at the 10 different sites – 3000 x 4225.

To process these materials may need the following:

All weather unloading and stockpile area	$100,000
Multi-material baler	$60,000
Site amenities	$20,000
Annual financial payments over 7 years	$40,000/pa

Thus it appears that the net value of this activity is approximately $70,000 pa

The mechanism for this is to pick up only one or more products per round so that this might be paper, then plastics, then glass and other. That is products are picked up every two months. Hence larger storage facilities might be needed than the 20 x 240 litre banks of bins if the volumes proposed are collected.

Note that the benefits from this activity are very significant for two reasons. Firstly, income is kept within the shire while, secondly, by not doing this means that there is a lost opportunity cost of $3000. Reductions in volumes collected may mean the net result may be less than the above figures indicated.

Overall Budget
The following Table brings the above data sets together.

Total No. of rate assessments in all of Palerang at April 2006		6960
Those who are paying for the kerbside		1500
Those paying waste levy of $140		5460
Vacant blocks @ $70		290
Sub-total in Urila/Burra/Royalla		560
DWC	$253 - $60 for disposal	1500
GWC	$180 - $80 if also paying DWC	4900
Burra	$90	560

Table 23: Budget summary

Expenses	**2006/7**	**2007/8**	**2008/9**	**2009/10**	**2010/11**	**2011/12**
New Capital items						
10 new Drop-off recycling stations	6680	6680	6680	6680	6680	6680
4 new Transfer stations			12644	12644	12644	12644
Bungendore		94378	94378	94378	94378	94378
Braidwood			58811	58811	58811	58811
4 up-graded Transfer Stations			65312	65312	65312	65312
Capital Totals	6680	101058	237825	237825	237825	237825
Inflation rate of 4%	6680	105,100	247,338	257,231	267,521	278,222
New Operating costs						
10 New Drop-off stations	10,000	10,000	10,000	10,000	10,000	10,000
Bungendore			360,000	360,000	360,000	360,000
Braidwood				164,000	164,000	164,000
4 up-graded Transfer stations				34,000	34,000	34,000
Operational Totals	10,000	10,000	370,000	568,000	568,000	568,000
Inflation rate of 4%	10,000	10,400	399,600	636,160	661,606	688,071
New						
Capital Totals	6680	105,100	247,338	257,231	267,521	278,222
Operational Totals	10,000	10,400	469,800	708,960	737,318	766,811
	16,680	115,500	717,138	966,191	1,004,839	1,045,033

Existing						
Landfill operations	609,800	642,400	370,400			
Kerbside collection - general waste	129,860	133,755	137,770	141,902	146,160	150,545
Kerbside collection - recyclables	111,895	115,252	118710	122,271	125,940	129717
Captains Flat	159,680	194,800				
Macs Reef		5700	56,960			
Sub total	1,011,235	1,091,907	683,840	264,173	272,100	280,262
Management						
Waste Officer	51,000	60,000	70,000	80,000	90,000	100,000
Office expenses, communications, forums, etc						
Expenses						
New Capital costs	6680	105,100	247,338	257,231	267,521	278,222
New operational costs	10,000	10,400	399,600	636,160	661,606	688,071
Existing program costs	1,011,235	1,091,907	683,840	264,173	272,100	280,262
Management costs	51,000	60,000	70,000	80,000	90,000	100,000
Other expenses	130,200	135,408	140,824	146,457	152,316	158,408
Total expenses	1,209,115	1,402,815	1,541,602	1,384,021	1,443,543	1,504,963
***5% reduction per year	1,209,115	1,332,674	1,464,522	1,314,820	1,371,366	1,429,715
Income						
*General waste charge - 6400 x 180	1,152,000	1,170,000	1,188,000	1,206,000	1,224,000	1,242,000
^Burra waste charge - 90 x 560	50,400	50850	54150	51750	52200	52650
Sale of recyclables	80,000	100,000	120,000	140,000	150,000	155,000
TS gate fees	12,000	73,500	75,705	77,800	80315	82725
Other waste fees	2,000	2060	2125	2185	2255	2325
HHW collection	6,500	7000	7500	8000	8500	9000
Total income	1,302,900	1,403,410	1,447,480	1,485,735	1,517,270	1,543,700

ATTACHMENT 9

WASTE PROCESSING TECHNOLOGIES

(From Stewart Smith (2001) Waste Management In NSW: A Review)

Waste Separation

Being able to separate wastes is critical to avoid contamination and increase the value of the recovered materials. This is best achieved at source, before all the various elements are mixed together. The use of separate bins for recyclables, household and garden waste go someway towards this, but new strategies are needed to prevent mixing at source.

Material Sorting Technologies

These use automated and manual sorting to separate mixed recyclable material to groups of specific materials. The outputs are suitable for reuse, recycling or reprocessing. The main technology types, Material Recovery Facilities (MRFs) perform two key functions in waste separation – consolidation of pre-sorted collected materials for transport to reprocessors, and sorting of co-mingled waste streams to aggregate specific commodities. NSW has many sophisticated MRF sorting technologies for mixed recyclables, whereby co-mingled paper and packaging materials may be effectively sorted to type as recycled streams.

Waste Separation

These technologies use a variety of physical processes, such as drums and pulverises, to separate mixed residual wastes. The aim is to recover specific waste streams for further processing or reduced volume disposal.

Biological treatment technologies

A variety of technologies are available for processing organic material from commercial and industrial and municipal waste sources. Decomposition is achieved by microbial activity within biologically degradable wastes.

Land application

This involves direct injection of organic wastes to increase the availability of nutrients in farm soils. Typical waste materials include sewage sludge, agricultural wastes and grease trap wastes.

Open windrow composting

Composting involves the decomposition of organic materials by microbial activity under open, aerobic conditions to produce a stable organic material containing plant nutrients. The material can be used as a good soil conditioner. The simplest large scale composting processes uses open windrows, which can be applied to garden waste, food waste and sewage sludge. Open windrow composting uses relatively low technology, and is most effective in situations where the proportion of organic material in the waste stream is high and markets for the product are readily available.

Vermicomposting
These technologies use worms to consume organic wastes including sewage sludge, food and animal wastes. The product is high quality compost suitable for soil conditioning.

Enclosed Composting
Controlled atmosphere and moisture conditions are used to improve the rate of organic waste decomposition (over open windrow composting) and to control odours. Food, sewage sludge and garden wastes can be used to produce good quality compost.

Anaerobic Digestion
This involves the biological degradation of organic materials by microbial activity in the absence of oxygen. It takes place in digestor tanks or reactors, which enable control of temperature and pH levels for optimising process control. The process produces methane suitable for energy generation, and a nutrient rich organic digestate suitable for soil conditioning.

Fermentation
These technologies involve biological degradation or organic wastes to produce a chemical feedstock or liquid fuel. Primary inputs have been agricultural wastes, but recent developments take municipal organics including food wastes and sewage sludge.

Mechanical Biological Treatment
There are several forms of this technology to allow compost based processing of source separated waste or mixed municipal waste. One of the processes involves waste separation such as shredding, followed by a biological process, either aerobic or anaerobic. The process results in a significant reduction of biologically decomposable substances. The product is low in gas formation potential and has a low carrying potential of pollutants.

Thermal technologies
Thermal waste technologies are well established in Europe and North America, with incineration the most widely used thermal process. Energy recovery is usually in the form of heat and electricity.

Incineration
These technologies recover the calorific energy contained in residual wastes. Heat and steam for electricity generation is produced through combustion of the input waste. Conventional incinerators consume some 200 to 400 tonnes of waste per day. However, air pollution control is critical because particulates and dust, Nitrogen oxide, acid gases and dioxins, furans, polyaromatic hydrocarbons and heavy metals may be generated.

Pyrolysis/Gasification/Melting
Pyrolysis involves indirectly heating carbon rich material. The aim is to achieve thermal degradation of the material at a temperature of some 500 degrees centigrade in the absence of oxygen and under pressure. Useable energy of around 200 to 400 kWh/tonne of waste is generated in the process. Energy production and greenhouse gas production

are lowered due to the starved air conditions. Less volatile heavy metal species are produced in the char, while volatile species need to be caught by gas cleaning systems and treated as hazardous materials. A liquid fraction is also produced which, with further processing, may be used as a synthetic oil. Gasification involves heating carbon rich waste in a slightly reduced oxygen atmosphere. The majority of carbon is converted to a gaseous form, leaving an inert residue. Gasification is widely considered an energy efficient technique for reducing the volume of solid waste and for recovering energy. Waste melting refers to thermal technologies that operate at sufficiently high temperatures to completely oxidise or reduce the waste and produce an inert glassy slag.

Landfill technologies
Landfill is the disposal of waste to land. In 1998, 62 percent of waste was landfilled in NSW. Landfill technology is based on anaerobic decomposition, which depends on hyrdrolysis (breakdown of complex organics to monomers), acidification, and methanogenisis (methane and carbon dioxide formation).

Conventional Wet Landfill
These mature technologies are used to facilitate waste decomposition in a controlled manner. As the process of biodgradation takes place methane and carbon dioxide are released. Landfill gas is usually collected from large scale developments by a piped collection system, and may be combusted to produce electricity. Landfills now use a liner or natural geological barrier beneath the waste, aimed at water protection.

Conventional Dry Landfill
These are feasible in low precipitation climates where the minimisation of water infiltration inhibits the biodegradation of waste. This reduces or eliminates leachate and landfill gas formation because of the dry stable conditions.

Bioreactor Landfill
These landfills rely on enhanced microbial decomposition that result in an accelerated process compared with conventional landfill. The rate of anaerobic decomposition is accelerated by recirculation of leachate and sometimes sewage sludge. The process aims to improve gas production and to reduce the time taken to achieve landfill stabilisation.

ATTACHMENT 10

ORGANIC RESOURCE RECOVERY
for
Compost, Soil Conditioner and Liquid Fertilizer

A10.1 Introduction

Many households in the Palerang shire already use composting to dispose of or recycle organic wastes. This is the only practical alternative for rural households. However, composting fails for some due to a lack of understanding of the function or process of composting. In most cases, failure comes about due to the compost becoming anaerobic and smelly. Compost can only remain aerobic with adequate oxygen and a large and varied population of microbes. In most cases, the microbes have to be added to the compost on a regular basis and the compost mix turned regularly for aeration.
Worm farms (vermiculture) will also be tried by some and often this practice will end in failure due to the lack of care or maintenance of the worm's environment (eg. correct moisture levels, adequate and correct food source, etc.)

People take on composting or worm farms for all the right reasons of trying to return carbon to the soil and improve soil health in their garden. This is not only a household issue but also a local, regional and national issue in sustaining soil health, and particularly the viability of farms. Carbon is exported from agricultural soils at a rapid rate through food export, ploughing and burning. Also, farming practices that over use fertilisers and chemical will kill soil microbes that are critical in incorporating organic matter into the soil, producing humus and recycling nutrients. Humus is the glue that binds soil particles together and provides a pantry for nutrients and minerals that microbes (eg. fungi) transfer to plants.

Palerang is a rural shire with a high economic dependence on agriculture. The viability of the farms in the shire is intrinsically tied to soil health that relies on an adequate % of carbon volume in the soil. In many cases the history of conventional agriculture in the area (that goes back to the 1830's) will have depleted soil carbon from about 3-4% soil volume of carbon to probably less than 1% on most farms. The most inexpensive method to rectify this decline is for the community to support the collection, processing and return of carbon to local farms, as compost or vermicast.

Many local governments throughout Australia have established centralised composting facilities (eg. at Lismore, NSW) that include modern composting technologies, techniques and skills. This approach significantly increases the amount of organic material recovered from landfill and this includes putrescent (food), garden, manure, quarry fines (rock dust) and soil wastes, primarily from urban centres and industrial sites.

A10.2 Local or regional solutions

The results of the community consultation process and the Council wide questionnaire indicate a wide support for organic resource recovery. Ideally, this resource should be

collected and processed as close as possible to the intended sites of use. In Palerang, this would include:

1. Household composting for garden soil conditioning purposes. This level of activity is unlikely to change with the introduction of centralised or decentralised composting facilities in the shire. This activity is worth supporting through Council coordinated education/demonstration programs at a local level, eg, village and town scale sessions perhaps using household sites that have effective compost operations.
2. Local or decentralised resource collection, sorting and processing/treatment at a designated and controlled space within a small village, eg. Mongarlowe, Hoskinstown, etc. A local community group might undertake this activity, eg. Fire brigade, Progress Association, etc. a community goodwill exercise and a source of revenue from the sale of compost or vermicast back to local residents. This scale of operation would require some resource support to establish a site and provide composting or vermiculture facilities. An agreement would be required between the Council and a local community group or contractor to operate the facility in an acceptable manner (eg. health and safety issues) and perhaps acquire the facilities from council as a commercial enterprise. This type of operation would suit sites that fall into the proposed Resource Recovery Categories 2, 3 and 4. The organic products produced from these sites would primarily be used locally and not involve Council transport or recovery, ie. local drop-off and/or collection.
3. Centralised resource collection, sorting and processing/treatment at Braidwood and Bungendore, ie. the proposed Category 1 Resource Recovery/ Major Transfer Station. This composting and vermiculture facility can afford to be a modern and sophisticated facility using advanced technologies and techniques, appropriate to the scale of operation. For example, these sites could process putrescent wastes and source complementary organic wastes (eg. manures and quarry fines) from other regional sources to increase and improve the range of organic products and the viability of the operation. Council would have the option of establishing the facility or inviting commercial operators to establish the facility. Alternatively, it could be a Council facility that is leased or sold to a commercial operator. The organic material entering this site would be from Council collections, and drop-off from industrial and household sources.

A10.3 Organic products

The organic products that would be produced from the composting and vermiculture facilities described above are:

1. Solid composted materials without other soil conditioner additives. The products can be packed in bags or bulk.
2. Solid composted materials that are integrated with other soil conditioner materials, eg. composted manures, microbe biology (as a spray application), rock dusts, boiler ash, grape marc, etc. The products can be packed in bags or bulk.
3. Liquid produced from the worm farms (eg. Vermiliquid or worm juice). The product is packaged in bottles, 10- 1000 litre containers or small tanker loads for direct spray applications or mixing with liquid fertilisers and liquid microbes.

A10.4 Business stimulus

There has been a major shift in farming, gardening and intensive food production enterprises to biological practices during the past 10 years. This driven by:

1. The understanding that conventional agricultural practices are degrading soil health and demanding an increase in fertiliser inputs to sustain plant growth.
2. Inorganic fertiliser prices have escalated with the increase in the petro-chemical products involved in chemical fertiliser production.
3. The ready availability of organic fertilisers and soil conditioners at comparable prices to the inorganic/chemical fertiliser products. This has come about due to the advances in the technology. Techniques and skills in composting and liquid fertiliser production.
4. The collection, sorting and processing of organic wastes at local and regional scales has significantly increased the supply of soil conditioners and liquid fertilisers that has created a latent demand.

A10.5 Limitations in the market place

Some limitations still exist in relation to the development of the organic fertiliser industry;

1. The market is fragmented through the production and services supply chain.
2. There is limited public and private investment into the supporting R&D, innovation and education that is required to increase market demand.
3. There are limited large scale production facilities due in part to limited access to organic, cost of collection/sorting and processing and lack of enterprise investment.
4. The chemical fertiliser products dominate the market.

A10.6 Markets

The markets can be divided as:

1. Home gardener
2. Intensive food production, ie. vegetables, viticulture, horticulture, etc.
3. Commercial turf producers and nurseries
4. Public sports ovals and green space areas for recreation and leisure (eg. racecourses and golf courses).
5. Cropping and grazing farms.
6. Forestry

A10.7 Typical business interest in organic resources

There is a wide range of business interests and employment opportunities associated with organic waste management operations. These include both direct and indirect interests;

1. Stockpiling organic wastes (eg. rock dust/quarry fines, manures, boiler ash, grape marc, etc) for various markets.
2. Transport of organic resources to processing or end-user sites.
3. Processing facilities for organic wastes to create value-added products. This includes composting, vermiculture, liquid fertiliser production, etc.
4. Greenhouse vegetable producers integrated with the compost or soil conditioner operations.

5. Wastewater and sewage waste treatment using liquid microbe products.
6. Production of feed stock pellets from the integration of organic materials other high value organic sources, eg. probiotics (as microbe concentrates), omega 3 oils, minerals, proteins, carbohydrates (sugars such as molasses) and vitamins.

A10.8 Business initiatives: starting the process in Palerang

The key elements to kick start the process in Palerang is as follows:

1. Establish the economic and social base or commercial viability of the various mixes of organic production facilities outlined above.
2. Promote soil health management a priority in local and regional development, including education or demonstration sessions on composting for households.
3. Establish local business facilities at village and town scale that collect, sort and process organic wastes into value-added products.
4. Establish local and regional networks for soil health improvement, education, R&D, and innovation.
5. Collaborate with private industry specialists in business expansions measures, including investment, marketing, innovation and commercialisation.

A10.9 Summary

The collection, sorting and processing of organic wastes in the Palerang shire would provide the impetus for a new and growing business in organic fertilisers or soil conditioners in the region.

Biological and organic agriculture is a growing market that promotes an active management system to identify and overcome factors limiting plant and animal production by applying solid compost and/or spraying liquid cultures extracted from compost (*ie.* compost tea or microbe concentrate) on soil and plants. These cultures can be modified with fungi and bacteria to actual plant needs, and are a source of vitamins, minerals, proteins, enzymes, amino acids, carbohydrates and growth promoters. The aim is to provide a food source for the soil biota and, by increasing their activity, to improve calcium and phosphorus uptake by plants, soil nitrogen fixation, decomposition of crop residues, and the health of plants and grazing animals without reliance on chemicals.

ATTACHMENT 11

DEMOGRAPHIC AND WASTE STREAM ANALYSIS

A11.1 Executive Summary

A twelve day placement was undertaken with Sustainability Science Team (SST). SST is a research/consultancy organisation based in Canberra dealing with sustainability issues from a systems thinking perspective. SST's work draws on the physical, biological and social sciences to provide innovative solutions to sustainability problems. Over the duration of the placement, a series of tasks were completed, which will aid in the development of a waste recovery strategy for Palerang Shire in South Eastern NSW.

The resource recovery strategy is founded on the collection of quality baseline data. While on placement with SST this data was collected and used to analyse shire demographics, waste production and waste composition. Detailed results are presented under the four main tasks undertaken.

The first task was the collection of demographic data and the generation of a number of population projection models for Palerang Shire. Such data and models are a vital part of the waste recovery strategy as they enable the calculation of potential waste generation in each locality in the shire. In addition, road distances between localities were calculated for the future analysis of waste transportation. The second task was to determine and compare average waste production figures across NSW and for Palerang Shire. Following this, the third task undertaken was to determine the composition of this waste produced in Palerang Shire. Using mean waste composition figures from NSW and the waste production figures generated in the second task, typical composition figures of waste to landfill and recyclables in Palerang Shire were calculated. The final task was the production of figures for waste and recyclables production for each locality within the Palerang Shire according to waste type. Calculating how much of each waste type is produced in each location within the Palerang Shire is essential to determine the most efficient design of resource recovery strategy.

Constructing an effective and efficient waste recovery strategy for the Palerang Shire has the potential to have multiple benefits for the waste management across rural and regional Australia. Not only will the strategy provide a sustainable waste management strategy in Palerang Shire, but has the additional potential to be developed as a 'blueprint' for waste management in a number of other rural shires across Australia.

A11.2 Introduction

Sustainability Science Team (SST) is a research organisation that brings together research from universities, research institutions and independent researchers to work on complex problems that defy solutions within single disciplinary frameworks. SST's work is undertaken under the primary principle that a whole systems thinking methodology that integrates all economic, social and environmental issues is essential to understanding complex situations. SST's research draws on the physical, biological and social sciences to provide innovative solutions to sustainability problems. To achieve solutions to complex problems, SST utilises a number of methodological tools, including material stocks and flows analysis (MSFA) and life cycle analyses (LCA). In addition, a systems thinking paradigm is integral to all work undertaken by SST. SST provides research and skills for a range of clients encompassing both urban and rural, public and private organizations and entities.

In 2005, the Palerang Shire council commissioned a study into waste management within the Shire. The contracted consultant, URS, developed a strategy which was centred on the region's current and future landfill capabilities. Council recognised that available landfill capacity was limited, but would be enhanced if a resource recovery strategy was developed.

The Resource Recovery project aims to propose a more environmentally sustainable waste management strategy that will be more economically viable that the current waste strategy for the Shire.

Due to the large scope of the waste recovery project, a smaller subset of research was undertaken during the placement's duration. Integral to the accuracy, legitimacy and therefore success of the project is the collection and presentation of baseline data. The collection and presentation of such data was the primary focus of work during the placement with SST. In addition, a number of GIS modelling exercises were undertaken to gain an understanding of the data in a spatial and temporal context.

Work undertaken during the placement with SST can be divided into two categories. The first task was to gather demographic information for the Palerang Shire and use this data in the generation of a number of future population projection models. Using this demographic information, the second task was to model waste production and its characteristics and composition within the Palerang Shire. Throughout these two tasks a number of models were created using GIS to spatial present the information and illustrate temporal changes.

The work undertaken over the duration of the placement is integral to the overall production of the Waste Recovery Strategy. The success of the Waste Recovery Strategy in the Palerang Shire may potentially see the strategy being used as a blueprint for all rural Shires in Australia.

A11.3 Method

The accumulation of demographic data and the production of population projection scenarios were done through traditional means of research and a literature review process. Where available, data was sourced from peer reviewed material or government published documents. When such data was not available information was sourced from directly involved organisations and agencies by the means of personal communication. To validate the accuracy of this data, review processes were undertaken. Once data was collected, projections were calculated in Microsoft Excel.

Waste production and composition data was also collated through a literature review process, as outlined above, and manipulated in Microsoft Excel. All data modelling was done using ARC GIS software.

A11.4 Results

The following five pages present the key results of the research undertaken during the placement.

Results fall into four main categories:

1. Palerang Shire Population Statistics and Future Population Projection Models
2. Waste Production in NSW – Recyclables and Waste to Landfill
3. Waste Characteristics and Composition – NSW and Palerang Shire
4. Waste Production by Towns and Villages in Palerang Shire by Location - tonnes/location/an

GIS Modelling results are presented in the appendices section of this report. Explanation on their construction can be found in the Discussion section of this report.

NB: Results are presented in landscape format due to the size of data tables and the constraints of Excel formatting.

1. Palerang Shire Population Statistics and Future Population Projection Models

Table 1:

	Population Data		Population Projections																			
	ABS 2001 Census Data [1]	Palerang Council Data 2005 [2]	ABS Proj. A[a] - 2015		ABS Proj. B[a] - 2015		ABS Proj. C[a] - 2015		URS Proj. [b] 2015		Pot. Growth Scen. [c] - 2015		ABS Proj. A[a] - 2025		ABS Proj. B[a] - 2025		ABS Proj. C[a] - 2025		URS Proj. [b] 2025		Pot. Growth Scen. [c] - 2025	
Queanbeyan	31280	34500	34847	38435	33615	37076	32752	36124	38205	42138	38205	42138	38822	42818	36125	39844	34294	37825	46664	51468	46664	51468
Bungendore	1,690	2000	1883	2228	1816	2149	1770	2094	2064	2443	2786	3297	2097	2482	1952	2310	1853	2193	2521	2984	4594	5437
Braidwood	1,006	1200	1121	1337	1081	1290	1053	1256	1229	1466	1501	1790	1249	1489	1162	1386	1103	1316	1501	1790	2239	2671
Captains Flat	421	500	469	557	452	537	441	524	514	611	514	611	523	621	486	577	462	548	628	746	628	746
Majors Creek	n/a	70		78		75		73		85		85		87		81		77		104		104
Araluen	n/a	70		78		75		73		85		85		87		81		77		104		104
Nerriga	n/a	50		56		54		52		61		55		62		58		55		75		61
Hoskinstown	n/a	20		22		21		21		24		33		25		23		22		30		54
Rossi	n/a	20		22		21		21		24		30		25		23		22		30		45
Mongarlowe	n/a	25		28		27		26		31		31		31		29		27		37		37
Reidsdale	n/a	20		22		21		21		24		22		25		23		22		30		24
Macs Reef Rd [3]	n/a	2000		2228		2149		2094		2443		2700		2482		2310		2193		2984		3644
Carwoola	n/a	500		557		537		524		611		675		621		577		548		746		911
Burra	n/a	800		891		860		838		977		1080		993		924		877		1193		1458
Wamboin	n/a	1000		1114		1075		1047		1221		1350		1241		1155		1096		1492		1822
Jerangle	n/a	50		56		54		52		61		55		62		58		55		75		61
Farms	n/a	2000		2228		2149		2094		2443		n/a		2482		2310		2193		2984		n/a
TOTAL		44825		49937		48171		46935		54749		54038		55632		51768		49145		66871		68648

[1] *= ABS 2001 Census Data*

Available Online: http://www.abs.gov.au/websitedbs/D3110124.NSF/24e5997b9bf2ef35ca2567fb00299c59/034b261536480e03ca256c3a0000d6a8!OpenDocument

Date Accessed: 19/01/06 Ref#: 3, 4, 5, 6

[2] *= Palerang Shire Council Data*

Source: Lynch, M. 2005. Personal Communication. Palerang Shire Council, Braidwood, New South Wales. 19/01/06.

Ref#: 7

[3] *= Macs Reef Road Proximity*

Population figures include both Sutton and Bywong communities along Macs Reef Road

Note:

For localities where ABS Census data is available, projections have been implemented using both ABS figures and Palerang Shire Council Figures.

For those localities where ABS Census data is unavailable, projections are calculated solely using Palerang Shire Council data.

(a) = ABS Population Projections

The population projections presented are primarily based around the Australian Bureau of Statistics (ABS) Australian Population Projections (2005).
Three series of projections, A, B and C, are presented each representing a different scenario as presented below:

	Total Fertility Rate (babies per woman)	Life Expectancy at Birth (yrs)		Growth Rate (a) (%)
		Males	Females	
Projection A:	1.9	92.7	95.1	1.08
Projection B:	1.7	84.9	88	0.72
Projection C:	1.5	84.9	88	0.46

(a) = Average Annual Growth Rate. Calculated as per the standard ABS formula: $r = (\ln(N(t)) - \ln(N(0)) / t$

Projected population figures are calculated as per the following formula for exponential population growth: $N(t) = N(0)e^{rt}$

Where: r = Average annual growth rate
t = No. of years over which growth is to be measured
N(t) = Population at period's end
N(0) = Population at period's start

Source : Australian Bureau of Statistics, 2005. 'Population Projections, Australia'. Available Online:
http://www.abs.gov.au/Ausstats/abs@.nsf/Lookup/0CD69EF8568DEC8ECA2568A900139392
Date Accessed: 19/01/06
Ref#: 2

(b) = URS Projection

This population projection is founded around potential growth figures reported in the 'Waste Management Report' compiled by URS and adopted by the Palerang Shire Council.
This projection is based around the reported figure of a 2% average annual growth rate.

Source: URS Australia Pty Ltd. 2005. 'Palerang Council Waste Management Strategy 2005-2025: Draft Report' Available Online:
http://www.palerang.nsw.gov.au/council/2297/2423.html. Date Accessed: 19/01/06
Ref#: 10

(c) = Potential Growth Scenarios

Disaggregated average annual growth rates for individual towns and villages
Average Annual Growth Rate figures based on estimated future population trends and scenarios in the Palerang Shire.

Table Below: Town/Village followed by its estimated Average Annual Growth Rate

Queanbeyan	2	Captains Flat	2	Nerriga	1	Mongarlowe	2	Carwoola	3	Jerangle	1
Bungendore	5	Majors Creek	2	Hoskinstown	5	Reidsdale	1	Burra	3		
Braidwood	4	Araluen	2	Rossi	4	Macs Reef Rd (3)	3	Wamboin	3		

2. Waste Production NSW - Recyclables and Waste to Landfill

Table 2: Domestic Waste Production NSW - Recyclables and Waste to Landfill - kg/c/an and t/HH/an

Location	Domestic Recyclables inc. Green Waste		Domestic Waste to Landfill		Total	
	(kg/c/an)	(t/HH/an) [2]	(kg/c/an)	(t/HH/an) [2]	(kg/c/an)	(t/HH/an) [2]
Bathurst	484.00	1.26	314.00	0.82	798.00	2.07
Orange	188.00	0.49	507.00	1.32	695.00	1.81
Goulburn	189.00	0.49	381.00	0.99	570.00	1.48
Albury	181.00	0.47	385.00	1.00	566.00	1.47
Griffith	90.00	0.23	340.00	0.88	430.00	1.12
Lismore	193.00	0.50	225.00	0.59	418.00	1.09
Wagga Wagga	242.00	0.63	148.00	0.38	390.00	1.01
Queanbeyan	150.00	0.39	218.00	0.57	368.00	0.96
Dubbo	21.00	0.05	341.00	0.89	362.00	0.94
Tallaganda Shire [1]	108.00	0.28	180.00	0.47	288.00	0.75
Wingercarribee	136.00	0.35	136.00	0.35	272.00	0.71
NSW Average	140.00	0.36	289.00	0.75	429.00	1.12
TOTAL	**2122.00**	**5.52**	**3464.00**	**9.01**	**5586.00**	**14.52**

[1] *= Tallaganda Shire*

Due to the lack of waste audit work in the Palerang Shire, waste production data collected from the, now amalgamated, Tallaganda Shire are used as a surrogate.

[2] *= Persons per House Hold (HH)*

Mean number of persons per household = 2.6.

Source: Australian Bureau of Statistics - Australia Year Book, 2005
Ref#: 1

3. Waste Characteristics and Composition - NSW and Palerang Shire

Table 3: Tallaganda Shire Waste Production (from Table 2)

Location	Domestic Recyclables inc. Green Waste		Domestic Waste to Landfill		Total	
	(kg/c/an)	(t/HH/an)	(kg/c/an)	(t/HH/an)	(kg/c/an)	(t/HH/an)
Tallaganda Shire [1]	108.00	0.28	180.00	0.47	288.00	0.75

Table:4: Waste Composition - NSW Mean and Tallaganda Shire

Composition of Rural NSW Waste Stream [1]		Tallaganda Shire [2]
Waste to Landfill (%)		Waste to Landfill (kg/c/an)
Vegetation	32.17	57.91
Food (organic - compostable)	24.52	44.14
Other Plastics	4.62	8.32
Hazardous	2.24	4.03
Other	7.45	13.41
Plastics 1&2 [3] (Recyclable)	1.51	2.72
Paper	14.20	25.56
Nonferrous	0.43	0.77
Glass	5.59	10.06
Ferrous	2.28	4.10
Other Recyclable Material	4.99	8.98
	100.00	180.00
Recyclables (%)		Recyclables (kg/c/an)
Paper/Cardboard	26.98	29.14
Glass	41.95	45.31
Ferrous	2.45	2.65
Plastics 1&2 [3]	4.87	5.26
Nonferrous	1.22	1.32
Contamination	5.22	5.64
Other Recyclable Material	17.31	18.69
	100.00	108.00

[1] = Typical composition of domestic waste to landfill and recyclables in Rural NSW

The typical waste composition of domestic waste going to landfill in regional/rural NSW. Due to the lack of detailed waste audit work in the Palerang Shire, typical regional/rural NSW composition figures sourced from the NSW Department of Environment and Conservation (2003) are used.

Ref#: 8

[2] = Typical composition of domestic waste to landfill in Tallaganda Shire

As previously, due to the lack of available data for Palerang Shire, figures from the now amalgamated Tallaganda Shire are used.

The data presented in Table 4 for 'Waste to Landfill (kg/c/an)' and 'Recyclables (kg/c/an) are calculated using waste production figures as presented in Table 3, initially presented in Table 2.

For example:

Vegetation = 32.17% of Waste to Landfill in Rural NSW (mean value)
Tallaganda Shire total domestic waste to landfill = 180 kg/c/an

Therefore, % Vegetation in Tallaganda's waste stream = 32% of 180
= 57.91 kg/c/an

[3] = Plastics 1&2 - PET, HDPE, All Other Recyclable Plastics

4. Waste Production by Towns and Villages in Palerang Shire by Location - tonnes/location/an

Table 5: Palerang Shire Waste Production - Current Demographic Statistics

Population [1]		Domestic Waste to Landfill (tonnes/location/pa)											Domestic Recyclables (tonnes/location/pa)						
Current Demographics		Vege-tation	Food (org. compost.	Other Plast.	Haza-rdous	Other	Plast. 1&2 (Rec.)	Paper	Non-ferr.	Glass	Ferr.	Other Rec. Mat.	Paper/ Cardb.	Glass	Ferr.	Plast. 1&2	Non-ferr.	Contam-ination	Other Rec. Mat.
Queanbeyan	34500	1997.9	1522.8	287.0	139.0	462.6	93.8	881.8	26.6	347.1	141.5	309.8	1005.3	1563.2	91.4	181.5	45.5	194.6	644.8
Bungendore	2000	115.8	88.3	16.6	8.1	26.8	5.4	51.1	1.5	20.1	8.2	18.0	58.3	90.6	5.3	10.5	2.6	11.3	37.4
Braidwood	1200	69.5	53.0	10.0	4.8	16.1	3.3	30.7	0.9	12.1	4.9	10.8	35.0	54.4	3.2	6.3	1.6	6.8	22.4
Captains Flat	500	29.0	22.1	4.2	2.0	6.7	1.4	12.8	0.4	5.0	2.1	4.5	14.6	22.7	1.3	2.6	0.7	2.8	9.3
Majors Creek	70	4.1	3.1	0.6	0.3	0.9	0.2	1.8	0.1	0.7	0.3	0.6	2.0	3.2	0.2	0.4	0.1	0.4	1.3
Araluen	70	4.1	3.1	0.6	0.3	0.9	0.2	1.8	0.1	0.7	0.3	0.6	2.0	3.2	0.2	0.4	0.1	0.4	1.3
Nerriga	50	2.9	2.2	0.4	0.2	0.7	0.1	1.3	0.0	0.5	0.2	0.4	1.5	2.3	0.1	0.3	0.1	0.3	0.9
Hoskinstown	20	1.2	0.9	0.2	0.1	0.3	0.1	0.5	0.0	0.2	0.1	0.2	0.6	0.9	0.1	0.1	0.0	0.1	0.4
Rossi	20	1.2	0.9	0.2	0.1	0.3	0.1	0.5	0.0	0.2	0.1	0.2	0.6	0.9	0.1	0.1	0.0	0.1	0.4
Mongarlowe	25	1.4	1.1	0.2	0.1	0.3	0.1	0.6	0.0	0.3	0.1	0.2	0.7	1.1	0.1	0.1	0.0	0.1	0.5
Reidsdale	20	1.2	0.9	0.2	0.1	0.3	0.1	0.5	0.0	0.2	0.1	0.2	0.6	0.9	0.1	0.1	0.0	0.1	0.4
Macs Reef Rd	2000	115.8	88.3	16.6	8.1	26.8	5.4	51.1	1.5	20.1	8.2	18.0	58.3	90.6	5.3	10.5	2.6	11.3	37.4
Carwoola	500	29.0	22.1	4.2	2.0	6.7	1.4	12.8	0.4	5.0	2.1	4.5	14.6	22.7	1.3	2.6	0.7	2.8	9.3
Burra	800	46.3	35.3	6.7	3.2	10.7	2.2	20.4	0.6	8.0	3.3	7.2	23.3	36.2	2.1	4.2	1.1	4.5	15.0
Wamboin	1000	57.9	44.1	8.3	4.0	13.4	2.7	25.6	0.8	10.1	4.1	9.0	29.1	45.3	2.7	5.3	1.3	5.6	18.7
Jerangle	50	2.9	2.2	0.4	0.2	0.7	0.1	1.3	0.0	0.5	0.2	0.4	1.5	2.3	0.1	0.3	0.1	0.3	0.9
Farms	2000	115.8	88.3	16.6	8.1	26.8	5.4	51.1	1.5	20.1	8.2	18.0	58.3	90.6	5.3	10.5	2.6	11.3	37.4
TOTAL	**44825**	**2595.8**	**1978.6**	**372.9**	**180.6**	**601.1**	**121.9**	**1145.7**	**34.5**	**450.9**	**183.8**	**402.5**	**1306.2**	**2031.0**	**118.8**	**235.8**	**59.2**	**252.8**	**837.8**
							Total Recyclables to Landfill =					2339.4							
							Total Domestic Waste to Landfill =					**8068.5**						**Total Domestic Recyclables =**	**4841.5**

A11.5 Discussion

As results indicate, there were four main tasks undertaken. In the following section, these four main areas of activity are discussed in turn.

The first task was the collection of demographic data and the generation of a number of population projection models for Palerang Shire. Such data and models are a vital part of the waste recovery strategy as they enable the calculation of potential waste generation in each locality in the shire. Due to the limited data available from the Australian Bureau of Statistics (ABS) 2001 Census, additional population figures were sourced from Palerang Shire Council. Using these population figures, a number of population projections were calculated. The three types of projections that were used were: 1) an ABS projection using a relatively slow growth rate (1.08%); 2) a projection based on the predicted population growth as sated in the URS report (2.00%); and 3) a projection based on growth rates as predicted by SST, adjusted for each locality within the shire. Calculating the population within the shire under a number of different projections is necessary as to gain an understanding of future growth in waste generation within Palerang Shire. In addition to the production of demographic data, the first task included the use of GIS software to produce a series of schematic maps of the Palerang Shire. A separate map was produced for each population projection, each displaying localities drawn to scale according to population size. In addition, road distances between localities were calculated. These distances will become useful when determining the most sustainable locations for waste collection stations and analysing the sustainability of waste transferral. Appendix 1 displays an example schematic map produced for Palerang Shire's current demographic statistics.

The second task was to determine and compare average waste production figures across NSW and for Palerang Shire. Due to the lack of waste audit work in the Palerang Shire, waste production data collected from the, now amalgamated, Tallaganda Shire are used as a surrogate. Figures are divided into 1) waste to landfill and 2) recyclables, and figures given in kilograms per capita per annum and tonnes per household per annum. When comparing mean waste production in NSW with waste production in Tallaganda Shire (Palerang Shire surrogate), it is clear that the level of 'waste education' is greater within Palerang Shire. Waste education strategies and campaigns employed by Palerang Shire Council, may be responsible for these lower levels of waste production compared to the state average.

The third task undertaken was to determine the composition of waste produced in Palerang Shire. This was done using state average composition figures published by the NSW Department of Environment and Conservation (2003). Using these waste composition figures and the waste production figures generated in the second task, typical composition figures of waste to landfill and recyclables in Palerang Shire were calculated. Figures are presented as kilograms per capita per annum so that extrapolation into Palerang Shire demographics can be made.

The fourth task was to produce figures for waste and recyclables production for each locality within the Palerang Shire according to waste type. A number of separate tables

were produced displaying waste and recyclables production figures under each population projection. In similarity to task 1, a number of schematic maps were produced using GIS software. As displayed in appendix 2, the symbol for each locality is scaled to represent the quantity of the waste type produced in that locality. Waste production values for 2006, 2015, and 2025 are presented for each locality for each population projection.

The value of producing such data-sets and maps is high due to the influence they have on the effectiveness of the overall strategy. Therefore, there is an imperative for these data-sets to be reliable, accurate and defensible. Satisfying these criteria was achieved by sourcing information and baseline figures of the highest quality for the most reliable sources. As previously outlined, the majority of data was sourced from peer reviewed material or government published documents. The remaining data was sourced from directly involved organisations and agencies by the means of personal communication. Despite the high quality of the data used, it must be recognised that certain limitations still exist. The most important of these is the limitation of population data collection and its subsequent analyses. Firstly, there is a limited availability of high quality ABS population data within the Palerang Shire. Where available, ABS data is used in the project. The remaining data used in the project is from the most accurate sources possible; however it should be acknowledged that it is not official Commonwealth Government figures. Secondly, it must be recognised that demographic data is not static, and thus the collected and used in the project will change subsequently with time.

Calculating how much of each waste type is produced in each location within the Palerang Shire is essential to determine the most efficient design of resource recovery strategy. For example, by knowing where the most waste is being produced and its quantity, more efficient waste collection stations can be built that are size specific and location in suitable locations. Knowing exactly how much waste is generated, its composition, and where it is generated will enable a waste recovery strategy to be tailored to the exact needs of the Palerang Shire.

A11.6 Conclusion

During the period of placement with SST, a series of tasks were undertaken with the aim of developing a waste recovery strategy for Palerang Shire in NSW. Data was collected and analysed with a number of map projections produced aimed at gaining a greater understanding waste production within the shire. The collection of this essential baseline data has enabled the planning and execution of a targeted, efficient and effective waste recovery strategy. Essentially, work conducted during the placement was research for a problem solving situation, which has ultimately unlocked to door to the construction of the resource recovery strategy. Constructing an effective and efficient waste recovery strategy for the Palerang Shire has the potential to have multiple benefits for the waste management across rural and regional Australia. Not only will the strategy provide a sustainable waste management strategy in Palerang Shire, but has the additional potential to be developed as a ‘blueprint’ for waste management in a number of other rural shires across Australia.

28/02/06

ATTACHMENT 12

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