

Environment Protection Authority

Consultancy report:

Green Organics Contamination

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GREEN ORGANICS CONTAMINATION REPORT

**QUANTIFYING AND MINIMISING CONTAMINATION
IN ADELAIDE'S
KERBSIDE COLLECTED GREEN ORGANICS**



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November 2001

Green Organics Contamination Report

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EXECUTIVE SUMMARY

Since 1995, some suburbs in Adelaide have had green organics collected from the kerbside with mobile garbage bins (MGBs). Since then, twelve out of the nineteen metropolitan councils have instigated a regular collection of kerbside green organics. This material has been an important feedstock for the two major composters in Adelaide and these collections have contributed significantly to the diversion of waste from landfill. Over time, the composters have developed products from recycled organics (RO), which serve the local horticultural markets, particularly the market gardens and the vineyards.

In contrast to other states, South Australia has a problem meeting the demand for RO products. Normally, there is an oversupply of green organics and poor market development. With strong markets, local composters are seeking to increase supply of kerbside collected green organics to process. A major hurdle with current kerbside green organics, has been the level of contamination which has a range of effects, ranging from consumer and worker safety through to increased processing costs and lower product value.

To respond to the problem of contamination in green organics, a study was carried out involving interviews with the stakeholders in the RO sector, an information search and two baseline audits. The final report has sought to:

- identify the range of collection systems operating currently in Adelaide;
- report on the baseline audits;
- identify the major issues relating to contamination in green organics;
- report on response to contamination from other states and overseas;
- recommend contaminant reduction strategies for the RO sector to consider.

A major finding of the report is that contamination of green organics is a widespread problem, however its response needs to be tailored to the local situation. The number and capabilities of the composters, the nature of local government and the collection

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contractors, the local RO markets and current waste management policies all have a bearing on a local response to the problem of contamination. Contamination can be reduced by improving each of the individual steps in the collection and processing of green organics. However, strategies to reduce contamination can be more effective and cost efficient where there is integration and cooperation amongst all the stakeholders in the RO sector.

Currently, the RO sector in South Australia can be described as fragmented with little cohesion between the stakeholders. While there is goodwill amongst the people involved in the sector, there has been little integration on a formal basis. There is a lack of policy to provide an overarching direction to the competing directions and ad-hoc development of the sector. Policy makers will need to address the future of diverting organic waste diversion and how the RO sector, including local government, will play its role in achieving the required environmental outcomes.

Currently in metropolitan Adelaide, only 34% of householders use or have access to a green organics service. To match supply of organic material to the current demand and meet waste diversion goals, more councils need to upgrade their collection services to higher diverting collection systems. While the increase may bring further contamination, matching supply with demand should allow stratification of the green organics material, allowing the capture of higher quality feedstock for high value products and more flexibility in dealing with the more contaminated material.

To determine the effectiveness of future contamination reduction strategies, two baseline audits were carried out in August 2001. Green organics from Marion Council and the Northern Adelaide Waste Management Authority (NAWMA) were sampled over a period of week and sorted by staff and students from Flinders University. Marion Council, which is a full-council collection service, had a contamination level of 2.2% and NAWMA, which has a user-pays collection service, had a contamination level of 0.8%. The audit also showed a similarity in the composition of the contaminants between the two sources.

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The research identified the following issues relating to contamination in kerbside collected green organics:

- inconsistent use of terminology across Adelaide;
- difficulties in defining and measuring contamination;
- lack of resourcing and consistent objectives across councils;
- contracts not written to allow incentives/penalties in regards to contamination;
- lack of processes to measure the effectiveness of public education;
- systemic issues relating to the fragmentation of the RO sector;
- lack of separation technology that can remove contaminants cheaply and efficiently;
- syringes are still a major operational issue in the collection, processing and retailing of RO products.

In response to the issues identified, a list of strategies were developed and are summarised in the following recommendations:

- development of a policy document for the whole RO sector including all organic wastes;
- establishment of a research and resource base for the RO sector;
- further development of strategies for needle reduction in partnership with the main players in the recyclables resource stream;
- the convening of a stakeholder workshop to identify further systemic problems and opportunities for better integration of the RO sector;
- further funding be given to complete the baseline data to allow effective analysis of contamination reduction strategies;
- development of consistent procedures for the collection of contaminated bins on the kerbside;
- development of a Quality Assurance System, establishing an audit trail from the collection through the composting and retailing process allowing the tracking of dangerous contaminants;

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- adoption of the 'International Composting Awareness Week' as a base for a broad media campaign;
- encouragement of councils with low volumes of diverted green organics to consider moving to high diverting collection systems.

By addressing the problems caused by contamination, the RO sector can expand providing a firm basis for the diversion of the remaining green organics in South Australia as well as the next stage of diverting food organics. With the effective diversion of organic wastes from landfill to the beneficial products for horticulture, a number of beneficial environmental outcomes for South Australia can be met.

1. INTRODUCTION

The diversion of kerbside collected green organic material from landfills to composting processors has been operating in metropolitan Adelaide for several years and currently involves most councils. A major problem faced by many councils and the processors is the level of contamination in the collected product which has the following consequences:

- Increased processing costs from removing the major contaminants either through the purchase of screening equipment or the employment of hand pickers;
- Major OHS issues where handpicking is used to remove contaminants;
- Increased wear and tear on machinery that is used to process organic material;
- Disruption to processing schedules when contaminants cause equipment failure;
- Major liability issues when dangerous contaminants remain in final product;
- Retail value and credibility is lowered because of the remaining visual contaminants;
- Environmental impacts resulting from re-diversion of organic material back to landfill that is too contaminated to process or a by-product of sorting processes.

Composted green organic material has a number of economic and environmental benefits such as:

- Water conservation through mulching;
- Improved soil structure and fertility;
- Increased product yields when used in agriculture;
- Natural weed suppression;
- Decreased potential for the groundwater pollution and greenhouse emissions in landfills;
- Increased life span of landfills and reduction in a major source of landfill odour;
- Providing a basis for composting other organic waste streams.

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Contamination in green organics is a complex problem and does not lend itself to simple solutions. This report is the result of a desktop study, stakeholder interviews and an audit of green organics material. The source of the information for the study have been:

- Discussions with the compost processors;
- Discussions with council officers;
- Discussions with local waste management contractors and education officers;
- A discussion with the EPA and the SA Waste Management Committee;
- Discussions with interstate regional waste management boards;
- University libraries and ECORECYCLE Victoria's publication library;
- Discussions with resource recovery equipment suppliers;
- Discussions with the Recycled Organic Unit (University of NSW);
- Information searches on the World Wide Web.

The first section lists the current level and nature of green organics collection in Adelaide. Each council has adopted their own collection model to meet their local needs and available resources. The second section deals with the baseline audit of two systems, the user-pays collection model (NAWMA – Gawler, Playford and Salisbury councils) and the full-council service model (Marion Council). Approximately 3800 kg of green organic material was sorted at two sites to give baseline figures for future comparison.

The third section lists and discusses a number of issues, which were identified during the study relating to contamination in green organics. At one level, contamination can be lowered through better use of procedures and equipment, that is, improving the existing operations. However, at another level, contamination is the result of systemic problems such poor coordination and competing objectives across the recycled organics (RO) sector, which will require more radical changes and initiatives. The last section also lists a number of recommendations for the stakeholders to consider, in reducing the contamination to an acceptable level.

2. CURRENT GREEN ORGANICS COLLECTION

The kerbside collection of green organics in Adelaide has been operating for over ten years in some councils, however, the present format with the 240 L mobile garbage bins (MGBs) has only been operating since 1995. Councils are free to choose the collection system that meets their local objectives, which has resulted in a range of services. In Adelaide, there are five types of systems currently used. They are:

- | | |
|----------------------|--|
| Full-council service | - A fortnightly collection where the 240 L bin is supplied free and the collection cost is paid by the council. |
| Partial user-pays | - A fortnightly or monthly collection where the 240 L bin is purchased by the householder and the collection cost is paid by the council. |
| Full user-pays | - A fortnightly collection where the 240 L bin is purchased and the annual collection cost is paid the householder. |
| Burnside model | - A hybrid model where the 240 L bin is supplied free with no collection charge and collected monthly. The householder can have the service changed to a fortnightly service for an additional annual fee of \$30. |
| Periodic collection | - Some councils offer collection of green organics via their hard waste collection. |

Where there is no kerbside collection, some councils offer reduced charges or no charge for the disposal of green organics at council depots or transfer stations. This material is mulched either for council use or sold to residents or contractors. Information of green organics services and levels of participation in metropolitan Adelaide for August 2001 are summarised in Table One.

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Council	Population	Households	Households Participating	Participation Rate (%)	Drop Off Centre #	Collection Systems
Adelaide	16 115	5 500	-	-	Yes*	No collection
Adelaide Hills	38 512	15 000	-	-	Yes	No collection
Burnside	40 738	18 000	18 000 (1 500)	100 (8)	No	Monthly (Fortnightly)
Campbelltown	46 147	18,341	-	-	Yes *	No collection
Charles Sturt	102 400	49 500	873	2	Yes	Full user-pays
Gawler	18 000	6 995	1 280	18	No	Partial user-pays
Holdfast Bay	32 500	16 000	160	1	No	Full user-pays
Marion	74 317	33 400	33 400	100	No	Fortnightly council service
Mitcham	59 289	24 800	-	-	Yes	Twice yearly - hard waste collection
Nwd., Pyn & St P.	34 000	17 800	1600	9	No	Partial user-pays (Monthly)
Onkaparinga	140 000	55 609	-	-	Yes	No collection
Playford	63 500	26 164	1 681	6	Yes	Full user-pays
P. Ad & Enfield	101 255	45 500	45 500	100	No	Fortnightly council service
Prospect	19 184	9 000	9 000	100	Yes (Boot load only)	Fortnightly council service
Salisbury	114 000	44 172	16 011	36	Yes	Partial user-pays
Tea Tree Gully	97 000	32 434	-	-	Yes*	Bundled collection by appointment
Unley	37 000	17 550	17 500	100	No	Fortnightly council service
Walkerville	6 673	3000	-	-	No	No collection
West Torrens	49 683	19 600	11 700	60	Yes	Partial user-pays
Total	1 090 313	457 479	156 805	34		

Sources : Councils Interviews
www.lga.sa.gov.au/public/councils.htm

Drop-off centre within council area with greens organics facility
* Free drop-off service

Participation Rate: Maximum number of households that can use the green organics service, not actual bins collected on average collection cycle.

Table One – Participation figures for green organics collection in Adelaide (August 2001)

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Table One shows the basic demographic information about each metropolitan council and the types of services for the collection or disposing of green organics. Most councils have a kerbside green organics collection service or provide some drop-off facility at their local depot or transfer station. Currently, only 34% of households in Adelaide use a regular kerbside green organics collection. While some councils have issued green organics bins to every householder in their municipality, not every householder participates on a regular basis. For example, the City of Port Adelaide-Enfield has had presentation rates ranging from 40 – 50%. Currently, two of the larger councils are considering introducing or upgrading their kerbside green organics service.

All the collection systems have their respective advantages and disadvantages. Full council services are expensive to implement but offer strong potential to divert waste from landfill in line with council waste diversion objectives. These systems have high percentage of the householders using the service regularly. The major drawback is the high rate of contamination especially when the public education and community consultation has been inadequate before and after implementation of the service. By offering the service to every household, all the people who are uncommitted to separating their waste properly are given the opportunity to dispose of their waste via the green organics collection.

The user-pays systems are cheaper to implement but have less impact on waste diversion objectives. The full user-pays system involves the initial cost of the bin and \$40 - \$80 annual fee that limits participation significantly. The partial user-pays scheme tends to have higher participation rates with low levels of contamination. These systems can be implemented slowly with the level of public education adjusted to the take-up rate and the resulting level of contamination. Traditionally, this service has been taken up initially by motivated gardeners and has provided a clean source of material.

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The competing aspects are the higher the diversion rate, the greater the contamination rate. Conversely, the lower the diversion rate, the cleaner the material but there is an associated reduction in volumes of material to process. Councils are keen to maximise the diversion rate but this can result in levels of contamination in the material that may be uneconomic to process. Badly contaminated material may need to be redirected to landfill contrary to the council's waste diversion goals.

On the basis of volume diverted, the periodic collection and the full user-pays system are the least preferred collection systems. The other systems give a reasonable level of waste diversion but the final choice would be dependent on the preference of the council, contractors and composters. Further study could be done to clearly define the advantages and disadvantages of the remaining systems. For some councils, the Burnside hybrid model would be worth further consideration as it may be a good compromise between volume diversion and contamination levels. Table Three on the following page lists the advantages and disadvantages of the respective collection systems.

Table Two shows the number of councils involved with each of the current collection systems. To achieve effective diversion of green organics from landfills, councils need to move from the low diversion systems at the bottom of Table Two to the higher diversion collection systems.

Kerbside Green Organics Collection Systems	No. of Councils
Full Council Service	4
Partial User-Pays	4
Burnside Hybrid Model	1
Full User-Pays	3
Periodic Collection (> monthly)	2
No Collection	5
TOTAL	19

Table Two – Numbers of kerbside green organics collection systems used in metropolitan Adelaide (August 2001)

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Collection Systems	Advantages	Disadvantages
Full Council Service	<ul style="list-style-type: none"> ▪ High volume diversion 	<ul style="list-style-type: none"> ▪ Large financial outlay for council ▪ Ongoing public education ▪ High to medium contamination
Partial User Pays	<ul style="list-style-type: none"> ▪ Medium volume diversion ▪ Low contamination ▪ Allows flexibility to grow the client base over time 	<ul style="list-style-type: none"> ▪ Financial outlay shared between council & clients ▪ Low diversion initially
Burnside Hybrid Model	<ul style="list-style-type: none"> ▪ Medium volume diversion ▪ Allows flexibility to tailor the service to the community ▪ Lower contamination 	<ul style="list-style-type: none"> ▪ Ongoing public education ▪ Benefits not yet quantified as an alternative model
Full User Pays	<ul style="list-style-type: none"> ▪ Low contamination ▪ Low financial outlay to council 	<ul style="list-style-type: none"> ▪ Low volume diversion ▪ Large financial outlay for client
Periodic Collection (> monthly)	<ul style="list-style-type: none"> ▪ Low contamination ▪ Low financial outlay to council 	<ul style="list-style-type: none"> ▪ Low volume diversion ▪ Material lacks putrescible green organics for high quality composts

Table Three - Comparison of kerbside green organics collection systems

3. GREEN ORGANICS BASELINE AUDIT

3.1 Methodology

To determine the effectiveness of various strategies of reducing contamination, some contamination baseline data is required so a comparison can be made before and after the strategy is implemented. This study had determined that there was no consistent method of classifying or determining the level of contamination by either the composters or the councils in South Australia. Also, no large scale auditing or analysis had been done on kerbside collected green organics in South Australia resulting in no baseline data available for comparison with current or future contaminant levels. To establish meaningful baseline data in contamination levels, a sampling and a sorting methodology was developed (see Appendix 8.5 and 8.6)

The audited green organic material was sourced from Marion Council and Northern Adelaide Waste Management Authority (NAWMA) where they have both been collecting green organics for several years. Both sources have extensive public education programs and are good examples of green organics collection. Newly introduced schemes will have a higher level of contamination until most of the residents are familiar with the program hence the choice of auditing councils with established green organics collection services.

Marion Council has a full council service and supplies its green organics to Peats Soils & Garden Supplies via the Adelaide Waste and Recycling Centre transfer station at North Plympton. In contrast, NAWMA collects from three councils in the northern suburbs and supplies its green organics directly to Jeffries Garden Soils. Two of the northern councils have a partial user-pays system and the remaining council was at the time of the audit, a full user-pays system.

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3.1.1 Sampling Methodology

Kerbside collected green organics is by its nature, highly variable in its composition and its resident contamination. The nature of the green organics and its contamination can vary with the seasons, the demographic profile of the suburbs within the council region, peak waste periods such as Christmas and Easter and the effectiveness of local hard waste collections. To ensure that the material sampled is a representative sample of the whole council, a sampling methodology was developed (see Appendix 8.5). While the method was valid, the reality was different onsite.

Green organics material was collected over a week instead of a fortnight due to work involved by the staff operating the front-end loaders. Details relating to the loads were not recorded due to time required by the onsite staff. Also, the ‘quartering and coning’ was a lot of work given the level of precision required. The loader operators had established their own method of selecting a random load from the sample pile by taking a bucket load from each of the four faces in turn or as directed by the author. While not every load over the fortnight was sampled, it was considered that samples over a week would be sufficient to establish a representative sample of the council collection to sort.



Figure 1 - Sample pile from NAWMA ready for auditing

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3.1.2 Sorting Methodology

Two environmental science students from Flinders University were employed to sort the green organics. Material was placed on a large table by the front-end loader and the material was sorted manually into several categories. Care was taken to ensure that any hazardous items were removed first. No syringes were found in the material supplied by Marion Council or NAWMA however some fifteen syringes were found nearby in another pile from a different council. The remaining clean green organics from each individual sort was placed into a series of 240L MGBs and weighed on platform scales. The total mass of clean material and the number of full bins were recorded which allowed the density to be calculated.

The material for Marion Council was less dense than NAWMA (198 kg/m^3 vs 253 kg/m^3). This can be explained by the amount of rain the NAWMA material was exposed to and the settling of the green organics due to the delay between the time of collection and auditing. Table Five (see Appendix 8.1) shows the different categories into which the contaminants were sorted. It should be noted that some items belonged to several categories. One example was a small garden trowel, which consisted of a moulded plastic and wooden handle with a metal blade. Such items were placed in the category that represented the worst result. Timber, paper and cardboard were considered as being non-contaminants in terms of the composting process but for interest, were sorted and weighed. In both audits, timber, paper and cardboard were in similar proportions averaging about 0.7% of the total mass of material.

Filled plastic bags were collected separately and weighed. Bags of green organics were included as a separate category where both, the mass of the bag and the organic contents were considered as contaminants. In both audits, bags of green organics averaged 5.5% of the total mass of contaminants. Filled bags of domestic waste were in the order of 2-3 times the mass of green organics. The bags of domestic waste contained a range of items that belonged to other contaminant categories and so their mass was redistributed to the other categories. This was done by using a standard formula in the analysis of the results rather than physically sorting the items due to OHS concerns such as syringes and disposable nappies.



Figure 2 - Environmental science students sorting material from NAWMA

3.2 Results

The first audit sorting Marion Council's green organics, was carried out on August 17, 2001 at the Adelaide Waste and Recycling Centre at North Plympton. The amount of material sorted was 1710 kg, which included 11.6 kg of timber, paper and cardboard and 37.9 kg of contaminants, which gave a contamination level of 2.2%. By mass, nearly half of the contaminants were ferrous metal and stones and one third was the plastics, both hard and film. While most contaminants were similar to NAWMA, there were some differences. The ferrous metal was mostly cutlery as shown in the photographs in Appendix 8.2. The other unusual item was an empty container of a common herbicide. This was placed in the hazardous waste category. The higher percentage value for textiles, leather and rubber was mainly due to a large piece of weed mat.

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The second audit sorting NAWMA's green organics was carried out on August 24, 2001 at the Jeffries Garden Soils at their Wingfield composting site. The amount of material sorted was 2099 kg, which included 15.8 kg of timber, paper and cardboard and 16.9 kg of contaminants, which gave a contamination level of 0.8%. This time, the ferrous metal reduced and the stones were over half the total mass of contaminants. The combined hard and film plastics was again, a third of the mass of total contaminants.

Table Five in Appendix 8.1 list all the results from the two green organics audits. The table lists the masses of the separate categories of contaminants and their percentage of the total mass sorted and their percentage of the total mass of contaminants. As expected, the Marion Council had a higher value of contamination than NAWMA. The full-council service allows all householders to participate resulting in more people who are unaware of what is green organics or not. While Marion Council's contamination value is higher, it would also divert more organic material to meet current waste diversion goals. Both collection systems have their relative advantages and the preferred choice needs to be done on a case-by-case basis. To help view the audit results in a broader context, some data from the month of August from both collection services have been listed in Table Four. The figures for NAWMA have been based on the two councils with the partial user-pays collection model (Salisbury & Gawler Councils) to allow a fairer comparison.

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Data for August 2001	Marion Council	NAWMA*
Population	74 317	132 000
Households	33 400	51 286
Bin Numbers	31 725	17 533
Participation Rate	95 %	34 %
Set Out Rate	65 %	72 %
Green Organics Collected	908 tonnes	633 tonnes
Waste Diversion – Green Organics Only	36 %	17 %
Waste Diversion - Green Organics and Recyclables	49 %	38 %
Contamination	2.2 %	0.8 %

Table Four – Comparison of August collection figures for Marion Council and NAWMA (* Partial user-pay councils only – Salisbury and Gawler)

One intriguing result from the baseline audits was the similar composition of the contaminants between Marion Council and NAWMA. While the overall contamination level for NAWMA was nearly a third of Marion Council, the percentage components were similar. For example, glass was 1% of the total contaminants by mass and the non-ferrous metal was 0.2% in both audits. Values for film and hard plastic, rocks and stones and filled bags of organic material were similar. Figure Three shows the similarity of the contamination with two pie charts. This would suggest the same type of waste is going into both collection services but NAWMA has less of it. Another observation is the low proportion of bags with organic material compared bags of domestic waste and the other contaminants generally. This would suggest that public education on plastic bags and organic material is working but more effort is required with the other contaminants. Also the effort in recovering organic material from filled bags would be better redirected to removing the other contaminants.

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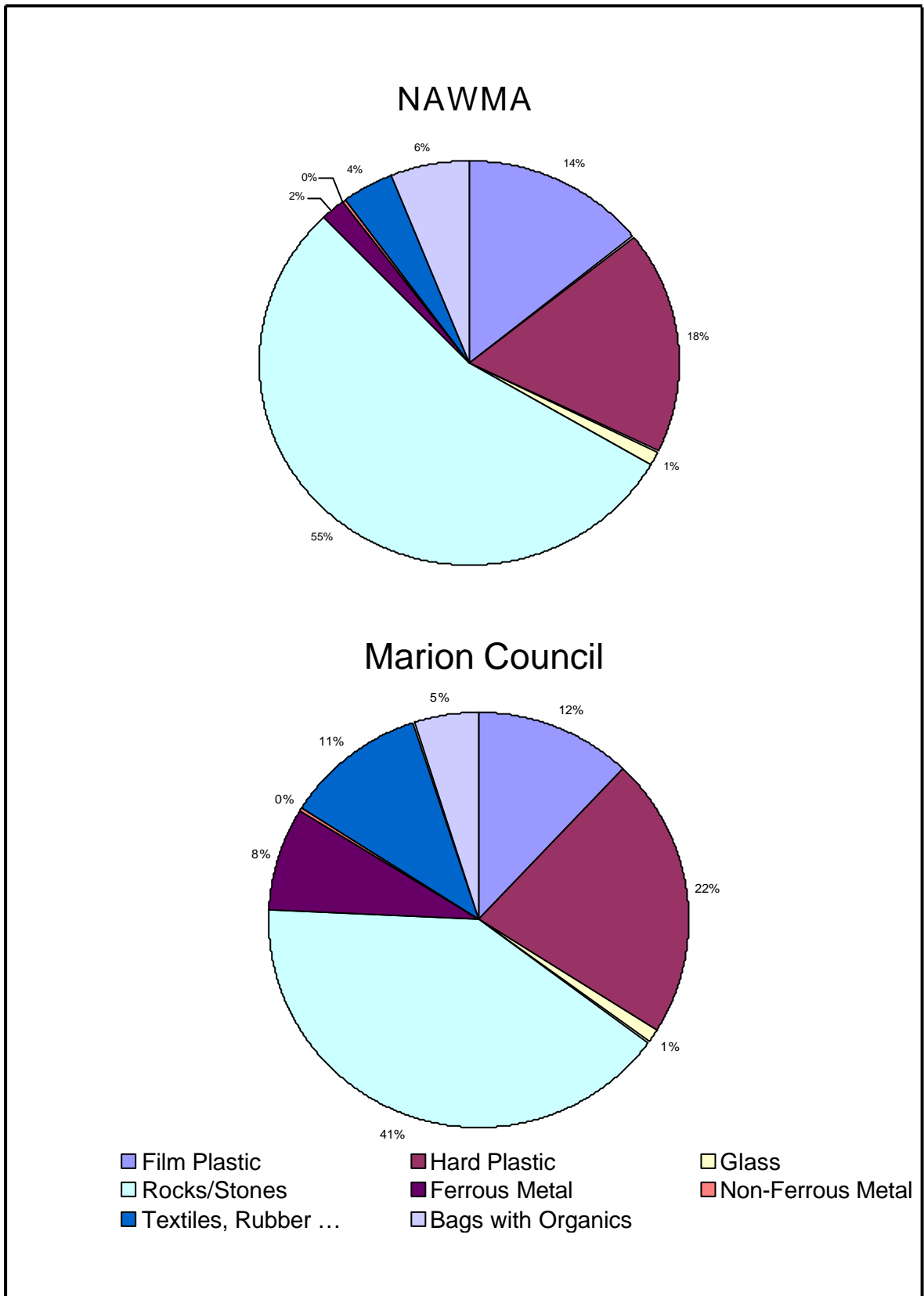


Figure 3 – Comparison of contaminants (as a % of the total contaminants)

4. RESEARCH FINDINGS

To quantify and address the level of contamination in kerbside collected green organics, a series of interviews were carried with most of the stakeholders in the RO sector in metropolitan Adelaide. On the basis of these interviews, a number of issues relating to contamination and the RO sector, were identified. This section lists nine broader issues that need addressing, some responses to contamination from the other Australian states and other countries. The section concludes with a list of strategies that can be considered by the stakeholders to reduce contamination.

Contamination is a complex social problem and will not be solved easily or cheaply. Responses to contamination need to be considered in the light of the local situation. It is important to see beyond the ideal pamphlet and the ideal piece of sorting equipment and develop well-considered responses that address the issue of contamination at all parts of the green organics process. Understanding the local context clearly helps to assess the suitability of other strategies used in other states or overseas.

4.1 Issues Identified

4.1.1 Terminology

The first observation that needs addressing, was the lack of consistent use of terms across Adelaide, to describe the different aspects of the RO sector. There has been an evolution of finding the best description of the green organic material such as branches, pruning, leaves and lawn clippings. The original term was 'garden waste', which has been abandoned by most councils and composters, both in South Australia and interstate. It was found that the term conveyed the wrong image to householders, resulting in rubbish from the garden mixed with the green organics. The next term was 'green waste', which is still used by some councils in Adelaide. There is still some confusion about what the green refers to. There are a number of anecdotes of people ringing the council to see whether green carpet or green crockery are acceptable. Also, the use of the word, 'waste', still gives the wrong image to householders, contributing to some of the contamination.

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The next major shift has been to replace the term, 'waste', with 'organics'. The new term moves from the concept of disposing waste to a resource that can be recovered. Organics implies a substance that was alive such as paper, branches, leaves, lawn clippings, etc. However, the term is not readily understood by those outside the RO sector and needs further public education. New South Wales and Victoria have gone to the next stage introducing another term, 'garden organics' which seeks to give householders the clearest description of the material.

The federal government sees the standardisation of terminology as an important step in integrating the RO sector nationally (Meinhardt, 1999). Nationally, the preferred term is 'garden organics' instead of South Australia's use of 'green organics'. A major benefit from standardising terms is the development of generic public education resources across the state RO sector instead of tailoring everything to specific council collection services. Also, it helps with developing policy where terms are consistent across the sector. In NSW and Victoria, the term 'green organics' would be used as a collective term for all organics including food, timber, manures and so on.

Another example in inconsistent terms is the phrase, user-pays. A collection service where the householder buys the bin and the council pays for the annual collection cost is referred to as a 'user-pays' system by one council and by another as a 'full-council service'. The consistent use of terms across Adelaide would allow more meaningful comparison between collection systems. The next example is the use of the term 'participation rates'. The term is used both to describe the number of potential households that can participate in a collection service and the actual number that do participate on a fortnightly basis. In the case of Port Adelaide-Enfield Council, the potential household would be close to 100% but actual participation on any given fortnight varies from 40% to 50%. The latter is described as the 'presentation rate' or the 'set-out rate'.

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The last example is the lack of consistency in describing syringes. When the term ‘needle’ or ‘syringe’ is used, is it referring to the metal part, the plastic body without the needle or an insulin type where the metal is fused to the plastic body? Sometimes the insulin syringes have been recapped by the user, which presents a lower degree of danger (see Figure 15 in Appendix 8.2). With a consistent method of describing syringes, more meaningful information can be gathered from the field to better manage the problems of syringes.

4.1.2 Contamination

To devise strategies to minimise contamination, the first step is to clearly define it and have consistent ways of measuring it. This report has used the Recycled Organics Unit’s (ROU) definition for contamination, which is, ‘physical inorganic materials (metals, glass etc.), non-biodegradable organic materials (plastics), chemical compounds and /or biological agents that can have a detrimental impact on the quality of any recycled organic products manufactured from source separated green organics’ (ROU Glossary and Thesaurus, 2000). In South Australia, there is no consistent way of measuring it or designating which items are contaminants. Some examples are putrescible waste in the green organics or green organics placed in plastic bags. Is the bag by itself the contamination or the contents as well?

Defining which items are problematic contaminants and hard to remove, will depend on the composting process and equipment used, along with final RO product type. Where there is grinding and mechanised windrow turning, then bricks and large stones can cause equipment damage while a forced aeration system would not be affected by the presence of bricks and stone in the compost material. The nature of the final product will have some bearing on the defining what are problematic contaminants. A nail in a bulk delivery may not be noticed while a large nail sticking out of a bag of RO product on a supermarket shelf, would quickly reduce its retail value.

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There is still uncertainty about the best method to measure contaminants. This report has used a mass-based system to define the contamination level, however, some may argue that a volume-based system or a combination of both, may be a more valid method of measuring contamination. Some people in NSW have advocated for a weighting procedure in the results so the more difficult contaminants are penalised in some way to reflect the contaminant's ability to lower final product value and their resistance or expense to being removed. Syringes would be good example where a small object in mass and volume has a disproportionate effect on consumer confidence and health, while having great resistance to being removed easily.

Without consistent sampling and sorting methodologies to determine contamination levels, meaningful comparison of results between councils and composters cannot be achieved. This report has developed some methodologies to complete the audits and they can be used as a basis for further discussion. The methodologies need to be statistically sound but not expensive or time-consuming to implement. It is preferable that the contamination figures are by-products of a contaminant removal process, providing real-time data for further analysis and immediate feedback to councils. Sampling / sorting methodologies needs to account for:

- Seasonal variations(Autumn and Spring peaks);
- Demographic variation within council regions;
- Peak waste generation periods (Christmas and Easter);
- Recent effects from council hard waste collection.

Other problems encountered with dealing with contamination are standards, lack of audit trails and collection runs. Meeting existing Australian Standards or some land rehabilitation contracts does not mean that the client is satisfied with the quality of the final product. While the level of grinded film plastic may meet the requirements of the standard or government contract for contamination levels, it may still contribute to product failure due to the negative visual impact, out in the field.

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The lack of audit trails and batch numbers make it hard to track clusters or sources of contamination. This is especially so where the organic material is sent to a transfer station, remixed and placed in larger trucks for transport to the composter. As the composters move to new sites further from the city, green organics will be combined for further transport, making it difficult to associate the removed contaminants from their original source or worse, contaminants in the final product from the original source. The final dilemma is the collection runs. Trucks tend to base collection runs on amount of material collected so the size of the collection area will vary on bins put out and the density of the material, making meaningful longitudinal comparison of one run difficult.

4.1.3 Councils

A number of council officers were interviewed as part of this research and some of their observations are noted in the following points. The first observation was the different objectives for collecting green organics. For one council, their main objective was waste diversion and a satisfactory outcome was the diversion of green organics from landfill to the composters, meeting their waste minimisation targets. Another council saw the overall goal was to reduce waste further and eventually seek to reduce the need to have a green organics collection service, relying on home composting and vermiculture options. This latter goal would be not be in the composters' best interest and may affect some of their long-term investments. The large-scale processing of green organics has a number of broader environmental benefits and needs to be seen as a sustainable industry. Another council was hoping to gain carbon credits to meet any future greenhouse gas obligations. With the different objectives, there is a need for a broad RO policy to help integrate the sector and ensure the stakeholders' objectives, including councils, are clear and complementary.

A number of council officers noted the lack of a local information/resource base. Some had seen the original South Australian Waste Management Committee as having this role but little support was offered. To develop public education resources, most of the council officers used their own resources with a few relying on organisations such as the

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Recycled Organics Unit in NSW or EcoRecycle in Victoria. Good public education resources are needed when a green organics collection service is implemented, especially when the domestic waste bin is reduced in size. Poor implementation can result in high contamination and can be hard to address after the service has commenced.

Some council officers that have the responsibility of reducing contamination find it difficult to implement change because of the costs involved, the low priority that upper management gives it or the contract is set for a number of years. In these situations, the council officers are only able to deal with the more obvious symptoms rather than the broader systemic issues. While waste or environmental officers may have a high commitment to the diversion of green organics to composters, there can be range of ownership across the council hierarchy especially when the processing charge exceeds the cost of dumping the material to landfill. Councils are vulnerable to policy change as different councillors are elected. There were some concerns about being too commercially involved in a value-adding sector in contrast to traditional role of service provision.

One council officer had spent some time comparing the benefits of the different hard waste services, however there has not been any serious study to determine whether the choice of the hard waste collection has any impact on the contamination level of green organics. Some of the contamination may be related to an ineffective hard waste collection service. The last concern was the possibility of redirecting organic material too contaminated after processing back to landfill, contrary to the original waste diversion goals.

4.1.4 Contracts/Contractors

Collection contracts are designed to provide long term financial certainty for all stakeholders either minimising costs or maximising profit with little flexibility to address contamination issues. Some council officers have noted there are little financial incentives or goals to reduce contamination especially when processing costs currently exceed landfill

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costs. The collection system provided by contractors, may not be integrated well to ensure low contamination rates in green organics and recyclables waste stream (eg is the current hard waste collection method designed to divert contaminants from green organics stream or act as sweeteners in securing long term contracts).

As the first stakeholder to encounter the householder and their green organics bin, contract drivers play a major role in controlling the overall level of contamination in the collected green organics. Interstate, collection drivers were seen as an integral link reducing contamination but not necessarily seen that way by all the stakeholders in Adelaide. Some drivers have been part of the educative process, approaching householders when bins have been contaminated. This works well in the suburbs where contamination is low but would be inefficient in suburbs with high contamination.

4.1.5 Public Education

The general consensus interstate is that a small percentage of the community is responsible for most of the contamination. These people can be divided as follows:

- 1) Lack of Knowledge
 - New residents moving into the area;
 - Language barriers.
- 2) Lack of Commitment to Source Separation
 - Too busy;
 - Cultural norms (eg age or ethnicity);
 - Just don't care!

The first group has been mostly addressed through existing public education strategies by the councils. This is usually seen in the quick reduction of contamination shortly after implementation, as people understand the service. As kerbside collections become more common, the need to address residents moving from one council to another will diminish. The remaining groups of non-English speaking householders in Adelaide have little

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information in their own language, to help them understand their green organics service. Developing these resources for language groups would be expensive especially when each council has a different collection system with different terminology. An advantage of having standardised terminology and procedures, is this service could be done cheaper with city-wide generic leaflets.

The second group is the more difficult group to work with. Bin inspection officers tend to have the opposite effect, by householders choosing to hide their contamination more effectively rather than disposing of it properly. After little impact on contamination levels, West Torrens Council has discontinued their bin inspection regime. Door visits from drivers viewing contamination on their screens have helped – showing that contaminating can be traced to the householder. Most council staff felt that the most effective strategy was to have good school programs where students re-educate their parents and neighbours, however development of good resources was limited by inconsistent terminology and the range of council services.

There is some debate whether punitive responses such as ‘3 Strikes and You’re Out’ are effective at modifying behaviour. It has strong potential to displace the problem rather than solve the problem. Most contractors and council rather prefer the ‘carrot’ approach, with the emphasis on public education. Even with a regime of bin stickers for contaminated bins, some councils still have high contamination. The system of bin stickers/notes needs to be resourced well to ensure it can deal effectively with the range of ‘offenders’. One council officer in Melbourne found most of the repeat offenders were non-English speaking householders so the program requires careful planning.

One difficulty with public education is measuring its effectiveness. Insufficient investment will lead to poor outcomes while over-investment will lead to wasted resource. At this stage, it is not clear where the optimum level of public education is and how the resources should be spread between the local community and the city as a whole. Also, the lack of consistent contamination data will make it difficult to validate its effectiveness. It will be hard to pick a 2% reduction in the overall contamination rate when the variance can be 2-5% across the council suburbs and across the growing seasons.

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4.1.6 Systemic Issues

While there can be improvement at the different stages of the collection and processing of the green organics to reduce contamination, it has been recognised that the integration of the RO sector can help in the goal. Currently, the RO sector in South Australia can be described as fragmented and needs attention. There is no over-arching policy, which integrates recycled organics sector with the state's organic waste diversion goals, council's objectives, the commercial opportunities of the contractors and processors and the consumers of the final product.

With the integration of the RO sector, strategies for the removal of contaminants can be developed in a more effective manner. The collection and processing of green organics needs to be seen as a broader system where all the stakeholders have an understanding of where they belong. The effectiveness of the RO sector depends on the interrelationships between the stakeholders as much as the stakeholders themselves. Also, as a system, the RO sector is influenced by several externalities, which has an indirect effect on the collection and processing of green organics and the available resources for removing contaminants.. Those externalities are the possible development of Waste-to-Energy plants and the flooding of the RO market of processed biosolids.

While there is good working relationships between most of the stakeholders, there is no formal structure or network to address the contamination issues on a sector wide basis. Organisations such as COMMPOST SA and the new Waste Management and Resource Committee have a role to play to help facilitate the integration. It was interesting to note that during the interviews, the common view amongst the stakeholders was that the other stakeholders were the problem, which shows the need for better networking and integration. There is still some ambiguity amongst the stakeholders about the role of the EPA and the Waste Management and Resource Committee in regards to the RO sector. It is not clear to others what the regulatory and waste management authorities' role is. Is it to provide the leadership by forming cohesive policies for the broader organic waste and the RO sector or play a more passive role, providing support as required.

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When the collection and composting of the green organics is considered as a process with a number of stakeholders then thought can be given to applying the available resources at the most strategic window of opportunity. When the sector is fragmented, it is hard to move resource upstream or downstream to best tackle the contamination problem. Is some of the public education money from local government better spent on pilot studies for contaminant removal technology or subsidising the labour costs of handpickers? Pathways are required to allow the movement of resource and expertise across the RO sector to best deal with the contamination problem.

4.1.7 Contaminant Removal Methods

There are two main ways of removing contaminants, handpicking by workers or using separation technology. Handpicking is the most discerning method. Pickers can leave compostable items such as cardboard and newspaper and remove the most troublesome contaminants such as film plastic or domestic waste according to the composter's needs. However, handpickers:

- Are vulnerable to OHS aspects – such as broken glass, needle stick injuries and back strain;
- Are vulnerable to environmental conditions such as direct sun, heat, cold, rain, dust, odour and flies;
- Are likely to have low job satisfaction, resulting in high turnover of staff;
- Have low rates of contaminant removal;
- Only able to pick on the surface of the pile.

Sorting by equipment can remove contaminants from green organics. Separation technologies are based on exploiting differences in physical characteristics of the feedstock, such as size, density or magnetic behaviour. A trommel screen is used for size separation while air knives are used for density separation. They can handle high volumes of material but has some major drawbacks:

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- Not very discerning where the process is poorly designed;
- Tends to remove a significant amount of organic material along with the contaminants;
- Expensive to buy.

Some equipment may not perform well at all stages of the growing cycles. The physical characteristics of green organics change over the year, with the material having high moisture content during Spring. Some new designs may prove unsatisfactory resulting in high loss of capital.

Since no dedicated equipment exists, composters are left with a difficult decision on choosing the most cost-effective method to remove contaminants. There is financial risk in buying technology that may be inefficient or prone to being damaged by the contaminants. There is also financial risk associated with hiring handpickers with needle-stick injuries or other OHS issues. Handpicking is seen as an unpleasant and some effort is required to manage the high turnover of staff.

Poor choice of separating technology or processes leads to significant loss of organic material as the contaminants are removed. Disposing of this highly contaminated material results in unnecessary organic material finding its way back into the landfill, contrary to the original intention. In terms of Life Cycle Analysis (LCA), it may be better environmentally, to dispose of the more contaminated organic material early in the process before time, money and energy has been invested into the material.

4.1.8 Syringes

In Adelaide, syringes have been entering the kerbside collected green organics for some time and pose a major problem with OHS for workers, retail staff and consumers.

Syringes have been a major concern to composters for various reasons:

- They are hard to detect with standard metal detector (Most surgical stainless steel occurs in its non-magnetic form);

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- Magnetic rollers or eddy current separators cannot remove them;
- They pose significant hazards to hand pickers. Stress from potential and actual needle stick injuries does affect staff who need to sort material. It also contributes to the higher turnover of staff;
- They pose hazards to other staff at downstream processing such as the packing and bagging stages;
- They pose hazards to consumers and final users such as vineyards;
- They have a strong impact on customer confidence in the RO product and can lead to product liability claims;
- Insulin syringes are generally used by both the diabetic and IV drug users, making it hard to identify the source and nature of the initial user;
- The source may be recreation drug-users, which is hard to target in terms of public education;
- It is difficult to establish whether the street sweepings are the source of syringes.

While syringes have been entering the green organics stream, they also enter the recyclables stream. One MRF centre in Adelaide would fill a 240 L MGB with canisters and syringes over an eight-week period. Clearly, the issue of syringes is broader than the RO sector and strategies need to be developed for both resource streams. MRF centres track their loads so when syringes occur in the sorting process, a standard letter can be sent to the 400 houses of that particular run, outlining appropriate methods of syringe disposal. This audit trail is used for other contaminants such as disposable nappies, enabling focussed public education responses.

On the green organics side, there is no formal audit trail system so a needle could come from a potential of 60,000 or 95,000 households depending on which composter is involved, instead of the 200 households in one collection run. While there is an additional expense to set up an effective audit trail, it may be the best defence against the elusive syringes. Since insulin syringes are used for both diabetic patients and I/V drug users, it is hard to target the response. It may be of some benefit to lobby for colour coding or identifying the syringe or

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caps in some manner so that the type of user can be clearly identified, enabling better use of resources to deal with the syringes in the resource streams.

As part of the baseline audits, the sorting sites were visited beforehand. On one visit, the author was shown a plastic shopping bag removed recently from the pile of green organics. The bag consisted of a dozen syringes, some litter and an empty bottle of methadone. The bottle had the name of the methadone patient and the supplying pharmacy. While this case may be the exception, research should be done to ensure that this user group is adequately resourced and informed in terms of appropriate needle disposal.

4.1.9 *Composters*

Composters in South Australia are currently experiencing a strong demand for their RO products, resulting in demand out-stripping the supply of green organics. Their major limitation is the current level of contamination coming through the kerbside collected green organics. One manager has described the removing of contaminants, as their major operational problem in processing kerbside collected organic material. With the demand greater than supply, composters have had to use organic material which is less than suitable for their processing. With an increase in supply, composters should be able to redirect poor quality feedstock to an appropriate low-value use and maximise their return on better quality feedstock.

Composters have tried process modifications and other strategies to optimise both the composting process and contaminant removal with some improvement. The dilemma for the composters is the purchase of separation technology is a significant capital investment and may not be efficient at removing contaminants. One manager had expressed his concern that the purchase of expensive separation technology may create the opposite effect by creating complacency at the collection stage, resulting in more contamination to manage.

4.2 Interstate Responses

The collection and diversion of green organics is seen by most states, as an important strategy in reducing the overall amount of waste going to landfill and removing the component, which has a significant environmental impact. Each state has approached the issue of green organics in different ways depending on their local situation. Strategies for kerbside collected green organics will vary according to the number and capability of local composters, development of local markets, integration of waste management sector and state policy directions.

South Australia, in contrast to other states, has a demand-driven situation with strong markets for the collected green organics material. Hence the focus has been, on increasing supply while improving the quality of the feedstock. In the other states, the markets have not developed enough to meet the current supply of green organics so the focus has been on developing markets and using drop-off centres as a clean source of supply. While the situation is different in other states, there are some aspects that can be of some benefit to the RO sector in South Australia. In terms of green organics, Victoria and New South Wales have developed their RO sector further than South Australia.

In Victoria, there has been a strong policy push from EcoRecycle to develop the broader RO sector and address the impediments. Their focus has been on developing markets for the organic material and developing consumer confidence and expectations. Some consumers have been reluctant to pay a premium price for a composted product when they have donated, or payed to give, the initial feedstock to the composter. To meet consumer's expectations, quality feedstock with low contamination has been met by the high reliance on supervised drop-off centres.

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As markets develop and composting capability improves, there will be scope to incorporate more kerbside collections. With the emphasis on drop-off centres as the main supply of green organics, syringes have been less of a processing issue in Victoria than in South Australia. There is one composter in Melbourne that has successfully used people with a disability, as part of a supervised team, to clean local kerbside collected green organics. While the concept may have some merit in South Australia, there are some important OHS issues such as needle-stick injuries that need to be addressed first.

One important aspect of the Victorian RO sector is the support of the state government. In November 2000, the government has released the 'Green Waste Action Plan', which seeks to significantly divert organic material from landfill over the next ten years with \$4.7 million spent in the first three years. In Victoria, the term, 'green waste' is used to describe organic waste from agriculture, food processing, timber from construction and demolition sector and organic material from domestic gardens. It seeks to integrate the broader recycled organics sector and form coordinated strategies for each type of organic waste. As part of the strategy for organics from gardens, it has funded a major marketing campaign for products made from recycled organics and a program to extend agricultural field trials with RO products.

Both Victoria and New South Wales have well-developed information resource and research bases for the support of their RO sectors. EcoRecycle has a large website listing most of their reports and publications on organics and a publication library in their head office.

EcoRecycle also produces a newsletter called 'COM-POST', which helps to disseminate information to the organics recycling industry and compost users in Victoria. In New South Wales, the Recycled Organics Unit based at the University of NSW plays a similar role. They have well-developed website, listing resources relating to the RO sector in New South Wales.

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New South Wales is another state that has a strong policy framework for waste management sector including organics. The waste sector in New South Wales is managed by nine waste boards, with the Central Coast Waste Board (CCWB) nominated as the lead board on organics. The CCWB has recently established an organics contamination project addressing the issue of contamination in collection, transfer and processing of garden organics. The report is the results of interviews with processors and a workshop with most of the stakeholders. The draft report identified a number of action steps to help reduce contamination in their green organics. A number of strategies focussed on integrating the RO sector to remove the conflicting objectives and poor coordination, and developing consistent methodologies. Other strategies included improving each step in the collection and processing chain. For example, identifying and managing the introduction of a green organics service where bin sizes are being reduced. Some councils in Adelaide have not managed this process well, resulting in high contamination.

One interesting development in kerbside collected organics in New South Wales is the introduction of a weekly organics collection in Lismore. The householder places their green organics from the garden with their food scraps, paper and cardboard in a bin, which is collected weekly. The 'non-organic' domestic waste is collected fortnightly. The organic material is used as feedstock for a large vermiculture plant, designed and managed by Tryton Waste Services. This combination has been described, as being the first of its kind in the world. There has been extensive public education program including electronic media and now the contamination rate is around 2%. The main contaminant is the plastic shopping bags which some householders put their food scraps in. Purpose-designed paper bags are being considered as a strategy to displace the plastic bags.

In Queensland, the majority of green organics is collected via drop-off centres with some smaller kerbside programs. In Brisbane, the development of kerbside collections will be delayed as the fire ant eradication program is in progress. There is some concern that the movement of green organics will aid the spread of fire ants. In Western Australia, other technologies are being considered for domestic waste including organics such as anaerobic digestion, waste-to-energy and the Bedminster composting system. In Tasmania, there is little development in kerbside collections in green organics.

4.3 International Responses

Research has shown that the collection and processing of green organic materials overseas is generally treated in two ways. The first method is based on collecting feedstock for composters where the quality of the material is the primary goal and the waste diversion objectives are less important. This would be characterised by collecting source-separated material at local transfer stations, bundled organic material in hard waste collections or clean material from commercial sources. The second method is based on the diversion of organic waste as the primary goal and is characterised by strong waste reduction policy, research and the use of large composting infrastructure such as tunnel composting and expensive separation infrastructure.



Low Organics Diversion

Low Technology

Minimal Policy Framework

High Organics Diversion

Sophisticated Technology

Broad Policy Framework

While not conclusive, it appears that the cost of dumping at local landfills may be an important determinant of how the green organics has processed. Not many countries try to combine large-scale diversion of organics without allocating resources appropriately. This is not necessarily in equipment but creating a stable business and regulatory environment for private entities to develop and invest in large-scale separation technology and composting systems. It is beyond the scope of this report to give a definitive account of each country's green organics program; however, some interesting information from overseas has been included. What is clear, is that contamination is a universal problem but a unique response needs to be developed for each local context, taking into account, markets for RO products, broader waste management policy and the operational capability of the composters.

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Canada - There is a kerbside green organics collection in Toronto but does not use the 240 L MGBs as in Australia. Originally, residents were issued with large transparent plastic bags for green organics. Any contamination in the bag was easily seen by the collector and left behind. The bags were broken open using bag breaking equipment. The bag supplier, as part of the supply contract, needed to refine the technology of breaking the bags and their subsequent removal from downstream processing. The bag breaking technology was unsuccessful and the bags become the major contaminant in the organic material. This method has since been replaced by large kraft bags, which can be composted.

USA - The collection of source-separated green organics varies between the two poles described previously. Waste policy is mainly state-based with a range of responses to the collection and processing of green organics. At one extreme, the city of San Jose in California collects 117,000 tonnes per year (City of San Jose, 2001) with a novel service where the householder places all their green organics on the kerb in a heap, to be collected by a truck and workers. Any bags or containers are discouraged and any contamination is left on the kerb. The resulting material is very clean to process. While the collection costs may be higher, overall costs are less, by having negligible contamination to remove and high quality of the final product. The other extreme is a multi-million dollar facility in Palm Beach, Florida dedicated to cleaning and pre-processing, 155,000 tonnes per year (Solid Waste Authority, 2001) of kerbside collected and commercially sourced green organics and clean timber. After the initial removal of large contaminants, the material is stockpiled for several weeks. Then the material is passed through a large processing system, combining handpicking from a conveyer belt, grinding and final screening. The finished material is sent offsite as either compost feedstock, mulch or boiler fuel.



Fig 4 – Woody Waste Recycling Facility, Palm Beach, Florida

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Austria, Netherlands and Germany- These northern European countries tend to have high diversion of organic (food and garden) material with extensive research and large composting infrastructure such as tunnel composting. Countries such as Germany have been collecting both food and green organics together as source-separated 'biowaste' for over ten years and treat it with anaerobic and aerobic technologies. The high cost of landfill and strong policy direction has stimulated the development of more sophisticated compost technologies. Europe also has a strong policy framework set by the European Union, setting waste diversion targets for all of the member states.

In Germany, contamination in kerbside collected biowaste averages 2% contamination, depending on the level of public education. European countries have experimented with composting co-mingled waste streams and have since fallen out of favour. The low contamination in source-separated organic material would be seen as minor compared to the previous methods of trying to co-compost organic material and domestic waste. Where biowaste is processed first anaerobically, the feedstock is pulped and formed into a slurry. As the slurry is fed into the tank, most of the contaminants either float or sink and can be easily removed.

United Kingdom - In contrast to other countries in Northern Europe, United Kingdom had about 10% of its green organics (40,000 tonnes) in 1999, collected by kerbside systems and the rest is based on drop-off centres (Cranfield University, n.d.). This may be due to low dump charges at landfills. In contrast, kerbside collected green organics in Adelaide in 1999 was 29,600 tonnes (Nolan-ITU, 1999). As the supply of organic material becomes more based on kerbside collections, stakeholders in the UK have started to address the issue of contamination with recent conferences like '*ORGANIC WASTE: From Kerbside to Compost 2001*'. Generally, the UK is seen as poor performer in waste management compared to the other European countries.

4.4 Strategies to Reduce Contamination

Reducing contamination in kerbside collected green organics as mentioned previously, does not lend itself to simple solutions. Contamination reduction will come by the better integration of the RO sector and in the small improvements in the collection and processing green organics. This section lists a number of strategies that addresses most of the issues identified and should enhance the reduction of contaminants in green organics.

4.4.1 *Terminology*

- Adopt consistent terminology for the RO sector with broad endorsement by all stakeholders. Terms need to be chosen to:
 - Reduce confusion of what is being collected and what is not
 - Allow development of statewide public education resources
 - Allow statewide policy development
 - Reserve terms for next generation of organics collection (eg food and agricultural organics)
 - Allow the use of interstate resources
 - Support the national thrust to standardise RO terms across Australia.

4.4.2 *Contamination Reporting Mechanisms*

- Develop a sector-wide endorsement of:
 - Standard categories of contaminants
 - Standard sampling and sorting methodologies
 - Describing which contaminants are problematic and need closer monitoring
 - Consistent forms of reporting to councils and other agencies to allow meaningful comparison of data across the RO sector.
- Develop niche public education strategies to contaminants such as syringes.

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4.4.3 *Stakeholder Workshop/s*

- The Waste Management and Resource Committee could host a major workshop to enable all the stakeholders in the recycled organics sector to:
 - Develop consistent terminology
 - Develop consistent reporting mechanisms
 - Develop a working model of the green organic processing system and the
 - Clarify the steps to further integration especially in regards to matching waste diversion objectives and the commercial objectives
 - Clarify the role of the EPA and the Waste Management and Resource Committee to the RO sector
 - Identify the most effective bin rejection procedure
 - Identify and adopt further strategies in reducing contamination
 - Establish the best window and technology for removing contaminants
 - Identify mechanisms to allow resources to move across the RO sector to support the optimal contaminant removal or reduction process.
 - Develop programs such as 'Close the Loop' or 'Garden to Garden' in NSW. Both programs are designed to help householders develop ownership of the process by supplying clean feedstock and buying the final product.

4.4.4 *Information Resource Base*

- Develop an information resource base where all the stakeholders can obtain information for further development of the RO sector such as:
 - Relevant reports from local, interstate and international sources
 - Generic statewide resources for public education
 - The collection and contamination figures to fine-tune further strategies
- The provision of resources for the councils wanting upgrade or implement a new green organics collection in regards to the most effective model

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- Employ a RO research officer.
- Develop the concept of 'beacon councils' as good working examples to other councils.
- Pool the best of the council and waste educator's resources.
- Provide support for waste educator networks.

4.4.5 *Councils / Contracts*

- Develop new contracts that provide incentives and flexibility for all stakeholders to reduce contamination.
- Develop strategies to reduce the gap between landfill charges (increase levy or introduce RO levy) and/or reduce processing charge (through productivity gains).
- Use the true cost of landfills to councils, internalising all future costs, as a baseline for comparing the costs of green organics processing rather than the current landfill dumping charges.
- Trial monthly competitions with \$50 vouchers for landscape supplies from the composters for the first four bins randomly selected and absent of contamination. This would provide both incentives for householders and further opportunities for public education and media profiles.
- Design a mobile education display incorporating council, community and health outreach to tour around the area, particularly the 'hot spots' identified through the bin rejection stickers.

4.4.6 *Stratifying the Green Organics Material*

- Recognising that there will be a baseline contamination and a limitation of contaminant removal technologies:

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- Develop a strategy of collecting and assigning material with the least contamination to the highest product value. For example;
 - Grade 1 - Vineyards / Market Gardens / Potting Soil
 - Grade 2 - Landscaping / Site Rehabilitation
 - Grade 3 - Bioremediation / Landfill Cover
 - Grade 4 - Landfill / Waste to Energy.
- Phase out the current practice of diluting good quality feedstock with poor quality feedstock. That is, redirect badly contaminated material from problematic councils / suburbs to low value uses.
- Contractors could be provided with financial incentives to provide higher quality feedstock by redesigning collection runs and storage piles to ensure that the less contaminated material is diluted by material from problematic suburbs.
- Encourage more councils to adopt or increase their green organics collections to better match supply with current strong demand for the material and to facilitate stratification of the material.

4.4.7 Further Monitoring / Audits

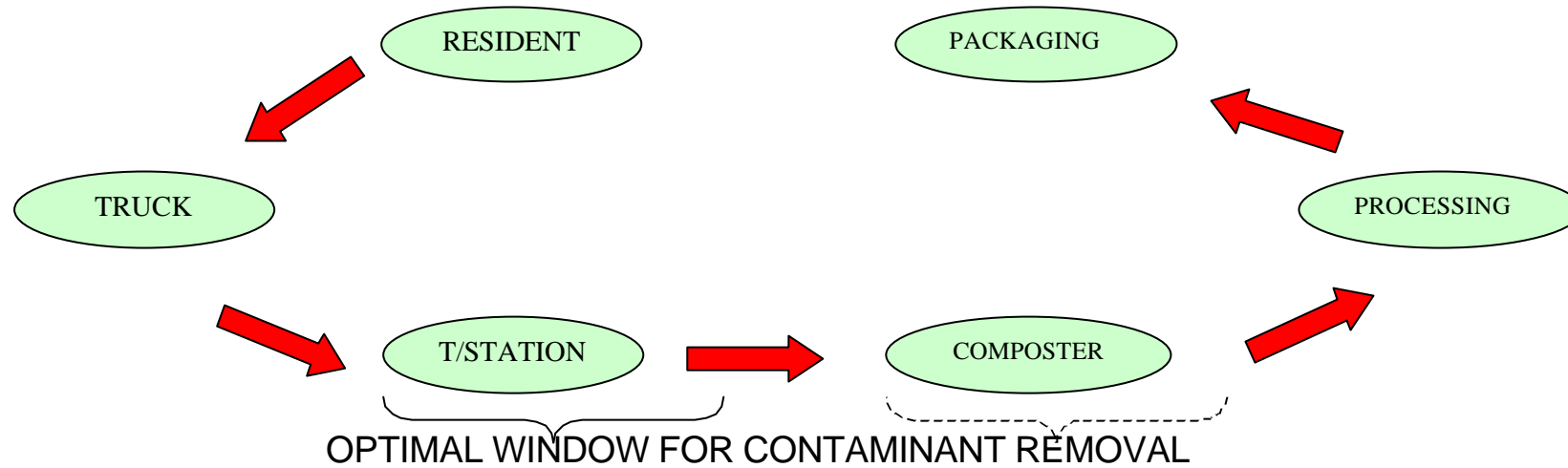
- Enable other councils to establish baseline data.
- Establish the variance of contamination due to vegetation growth periods, peak waste periods and post hard waste collections.
- Establish other relevant data for further equipment design (eg size fractions of organic material and sorting rates). Size fractions would be needed to determine the amount of material likely to pass through an air density separator and the remaining material for handpicking. Another example would be a formal trial of cleaning green organics through an existing MRF.

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4.4.8 *Optimise the Removal of Contaminants*

- Evaluate the viability of a MRF style sorting process by a third party.
 - Introduce another value adder into the green organics processing chain by separating the contamination removal and composting processes.
- Discard organic material from peak waste periods such as post Christmas and Easter.
- Select the best location and time to remove contaminants with regard to OHS issues, ease of removing contaminants, cost of public education resources and cost of separating technologies. The available resources for removing contamination need to be applied in the most strategic way. Figure 5 shows a number of parameters, which can give a method of defining the optimum window. For example, the contamination starts as clumps in the collected material but gets redistributed evenly as the material is mixed and transported. It would be more efficient to remove clumps earlier in the process rather than later. The 20:80 rule may be relevant where 20% effort when the collection truck is emptied, could remove 80% of the contaminants. If handpickers are employed then it is preferable to have the organic material at its freshest stage. The other parameters are self-explanatory.
- Evaluate the in-house hybrid sorting model with coarse screening and air density separator. Figure 6 shows the concept diagram. This model seeks to incorporate the advantages of using separation technology and handpicking by employees. Further research will be required to optimise the screen size on the trommel screen to maximise the efficiency of both sorting processes. Ideally, handpickers should be removing items larger than their fist to improve their removal efficiency while the air density separator should have a small range of particle size to better exploit differences in density
- Encourage the use of magnetic rollers in the processing since they are cheap and effective.

GREEN ORGANICS PROCESS FLOW DIAGRAM



PROCESS PARAMETERS

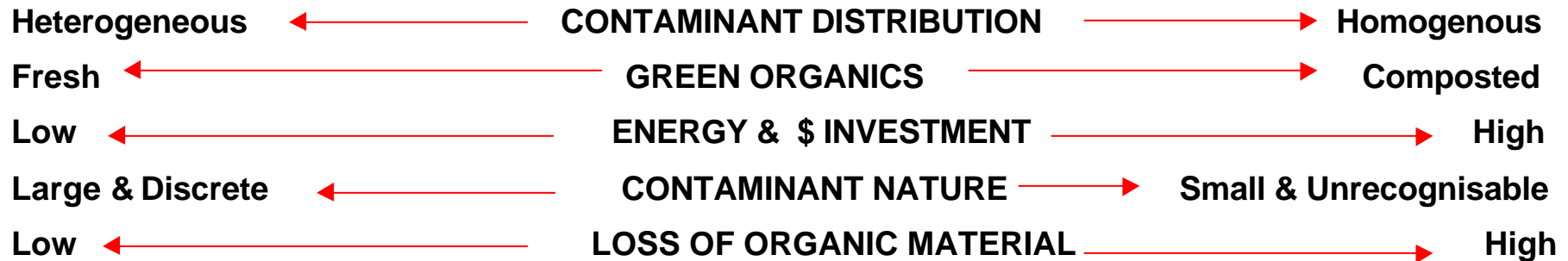


Figure 5 - Process flow diagram showing optimal window for removing contaminants

GREEN ORGANICS SEPARATION FLOW DIAGRAM

MR = Magnetic Roller

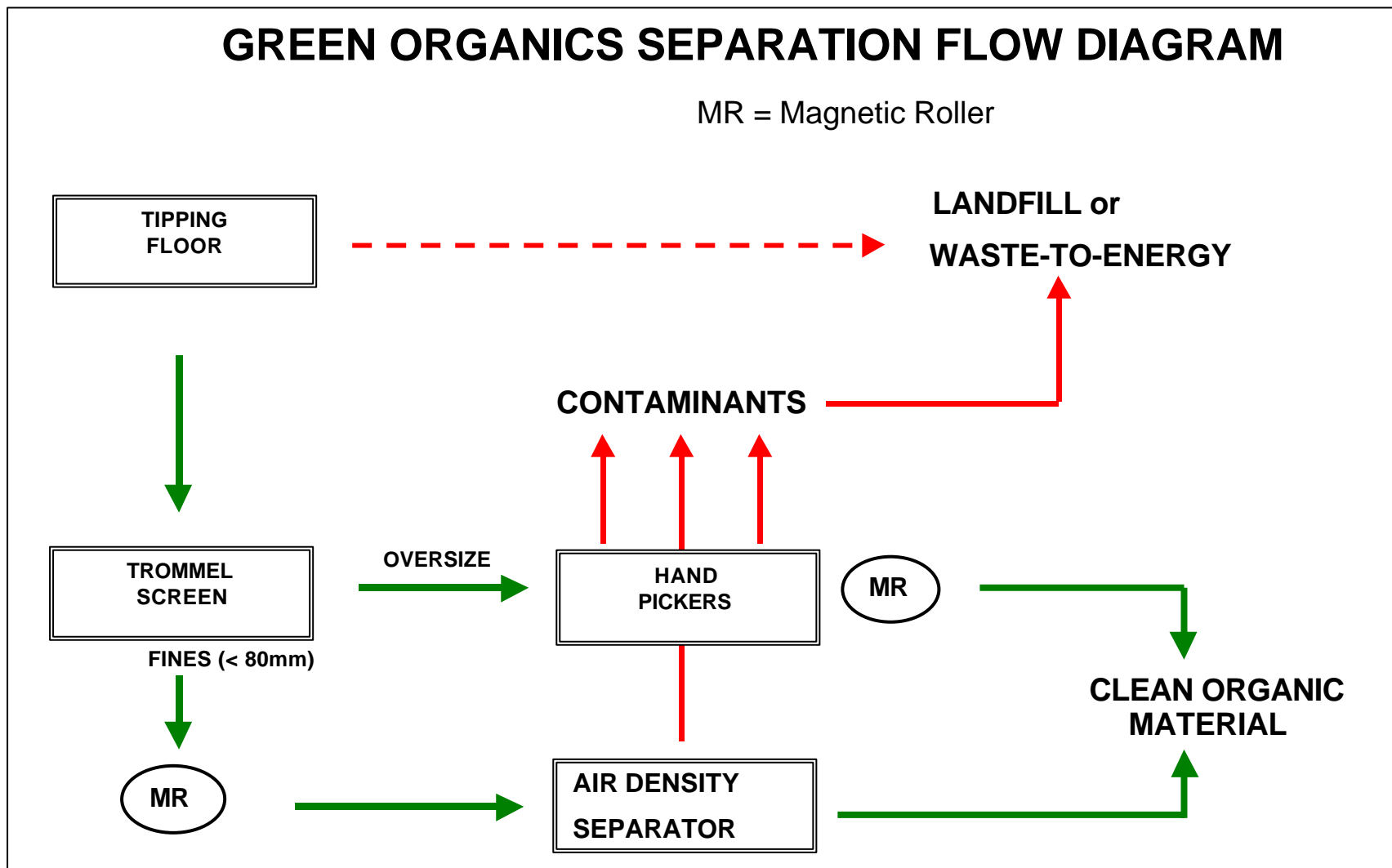


Figure 6 - A concept diagram showing a hybrid model of sorting contaminated green organics

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4.4.9 *Management of Syringes*

- Develop good OHS systems for workers and consumers. (see Appendices 8.4)
- Develop audit trails of organic materials to trace needles and other problem contaminants to sources. (ie street sweeping)
- Develop information packages for home users of needles such as methadone patients.
- Identify common responses to kerbside collected needles with other processors such as MRF facilities
- Lobby for colour coding or marking of needles to identify type of user to allow better targeting of resources. For example, colour A could be diabetic patients, colour B could be methadone patients and colour C for clients of needle exchanges programs.

4.4.10 *Adoption of 'International Composting Awareness Week' in partnership with COMPOST AUSTRALIA (Last week in April)*

A media platform which could basis for:

- Promotion of all types of composting
- Development of further public ownership of RO products
- Facilitating the integration across the RO sector
- Introducing new terminology and statewide public education
- Launching major policy initiatives in the RO sector
- Promoting state conferences.

The program originated in Canada several years ago and has been adopted since by the composting councils in the UK and the United States to promote composting, ranging from home composting to large commercial facilities.

5. RECOMMENDATIONS

Based on the information and results listed in this report, the following recommendations have been made. It is recommended that:

- ◆ the Waste Management and Resource Committee develop a policy document for the whole recycled organics sector incorporating all organic waste streams.
- ◆ the Waste Management and Resource Committee establish a research/resource base for the recycled organics sector.
- ◆ the Waste Management and Resource Committee develop further, the needle reduction strategy across both, the green organics and recycling sector encompassing diabetic, methadone treatment and other non-institutional medical situations.
- ◆ the Waste Management and Resource Committee host a stakeholder seminar to identify further systemic problems and opportunities for better integration of all the stakeholders in the recycled organics sector.
- ◆ the stakeholders develop through networking and stakeholder forums:
 - ◆ consistent terminology and contaminant descriptions
 - ◆ agreed methods of sampling and sorting for contamination audits
 - ◆ a review of contracts and charges to maximise stability and incentive with due regard to contaminant reduction
 - ◆ stratification of the collected organic material to allow protection of the cleanest material for the highest financial return

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- ◆ strategies for optimum timing and process of contaminant removal
- ◆ procedures to allow the movement of capital and resources up and down the green organics chain to best resource the optimal contaminant removal process.

- ◆ further funding be given:
 - ◆ to enable other councils to establish their own baseline data
 - ◆ to establish the variance levels of contaminants due to:
 - ◆ seasonal growth
 - ◆ demographics
 - ◆ waste from Christmas and Easter
 - ◆ recent hard waste collections.
 - ◆ to further quantify the advantages and disadvantages of the higher diversion kerbside collected green organics systems to assist councils in choosing the optimum collection system
 - ◆ to collect relevant data to assist in the design of a hybrid sorting system
 - ◆ to undertake a feasibility study into the viability of a green organics MRF sorting venture.

- ◆ contractors develop consistent operating procedures for drivers confronted with contaminated bins.

- ◆ composters and contractors develop systems of tracking organic material through the collection, storage, transport and processing stages to establish audit trails of problematic contaminants.

- ◆ COMMPOST SA with COMPOST AUSTRALIA adopt the 'International Composting Awareness Week' (April 29 -May 5) as a base for a broad media campaign and mechanism for further integration of the recycled organics sector.

- ◆ councils move to higher diversion collection systems where the volume of kerbside green organics collected is low or non-existent.

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7. GLOSSARY

<i>AS 4454 - 1999</i>	AS 4454 is a document outlining the Australian Standard for composts, soil conditioners, and mulches. The objective of the Standard is to provide manufacturers, local government bodies, consumers and growers with the minimum requirements for the physical, chemical and biological properties of composts, soil conditioners, and mulches. It also aims to standardise labelling and marking, in order to facilitate the beneficial recycling and use of organic materials with minimal adverse impact on environmental and public health.
<i>Bioremediation</i>	Process by which microorganisms are stimulated to rapidly degrade hazardous organic contaminants to environmentally safe levels in soils, sub-surface materials, water, sludges, and residues.
<i>Compost</i>	Material resulting from the controlled microbiological transformations of natural organic materials under aerobic and thermophilic conditions.
<i>Compostable Organics</i>	Compostable organics has been adopted by NSW Waste Boards as the generic term for all organic materials that are appropriate for collection and use as feedstocks for composting or in related biological treatment systems (e.g. anaerobic digestion). Compostable organics is defined by its material components: food organics; garden organics; wood and timber; biosolids, and agricultural organics.
<i>Composting</i>	The process of aerobic conversion of organic materials by microorganisms into soil conditioners, compost or humus.
<i>Contamination</i>	Contaminants within the composting context include physical inorganic materials (metals, glass etc.), non-biodegradable organic materials (plastics), chemical compounds and/or biological agents that can have a detrimental impact on the quality of any recycled organic products manufactured from source separated green organics.
<i>Domestic Waste</i>	Represents all household waste placed on the kerbside for collection by council or council contractors.
<i>Feedstock</i>	Organic materials used for composting or related biological treatment systems. Different feedstocks have different nutrient concentrations, moisture, structure and contamination levels (physical, chemical and biological).

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<i>Food Organics</i>	Food Organics includes organics generated by any one of the following activities: the manufacturing, preparation or consumption of food (including beverages); the processing of meat, poultry or fish, and the manufacturing of edible grocery products.
<i>Green Organics</i>	Any garden derived organic (plant) materials generated by domestic and commercial & industrial sources. Green Organics is defined by its component materials including: putrescible garden organics (grass clippings); non-woody garden organics; woody garden organics; trees and limbs, and stumps and rootballs. May include council street sweepings. (Has been described as yard waste, yard trimmings, garden waste, green waste and garden organics)
<i>Garden Organics</i>	The term used in NSW and Victoria as the equivalent to South Australia's 'Green Organics'.
<i>Kerbside Collection</i>	A formalised collection system for recyclables and green organic material from households, where the generator segregates wastes according to material type and places them in containers on the kerbside for separate collection.
<i>Life Cycle Analysis</i>	Analysis of the environmental impacts incurred during the life cycle (the production, consumption and disposal) of a product.
<i>MRF</i>	A facility for separating co-mingled collected recyclables, with emphasis on separating and processing waste materials. (Materials Recovery Facility).
<i>Participation Rate</i>	The maximum number of households that can potentially participate in a kerbside collection scheme.
<i>Presentation Rate</i>	The actual number of households that participate in a kerbside collection scheme over one collection cycle. Also known as set-out rate.
<i>Transfer Station</i>	A waste handling facility used to transfer waste from collection vehicles to a bulk haul vehicle in order to achieve long-distance transportation efficiency. It may also be used to sort and redirect waste with the potential to recycle prior to disposal.
<i>Trommel Screen</i>	A rotating cylindrical screen used to loosen recyclable material and sort into two size fractions, undersize and oversize.

Source: *RECYCLED ORGANICS Dictionary and Thesaurus 2000*

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Appendix 8.1 Green Organics Audit - Raw Data (Table Five)

	Marion Council			NAWMA (Salisbury, Playford & Gawler)		
Collection System	Full-council service			User-pays (partial & full)		
Sorting Location	Adelaide Waste and Recycling Centre (17 August 2001)			Jeffries Garden Soils (24 August 2001)		
Contaminants	Mass (kg)	% of Total Mass	% of Total Contam.	Mass (kg)	% of Total Mass	% of Total Contam.
Film Plastic	4.50	0.26	12	2.40	0.11	14
Hard Plastic	8.50	0.50	22	3.00	0.14	18
Glass	0.44	0.025	1	0.12	0.006	1
Rocks/Stones	15.4	0.90	41	9.2	0.44	54
Ferrous Metal	3.0	0.18	8	0.38	0.018	2
Non-Ferrous Metal	0.087	0.005	0.2	0.03	0.001	0.2
Textiles, Leather and Rubber	4.0	0.23	11	0.7	0.033	4
Hazardous Waste	0.021	0.001	0.06	-	-	-
Filled Bags -Organic	2.0	0.12	5	1.1	0.052	6
Filled Bags - Rubbish	(6.0)	-	-	(2.2)	-	-
Contaminant Sub Total	37.9 kg		2.2 %	16.9 kg		0.8 %
Paper/Cardboard	6.0	0.35		7.6	0.36	
Timber	5.6	0.33		8.2	0.39	
Green Organics	1661	97.1		2066	98.4	
TOTAL	1710 kg		100 %	2099 kg		100 %
Green Organics Density (after sorting)	192 kg/m^3			253 kg/m^3		

Appendix 8.2 Photographs From Green Organics Audits



Figure 7 – Sorting at Adelaide Waste and Recycling Centre
(Green organics from Marion Council)



Figure 8 – Sorting at Jeffries Garden Soils (Green organics from NAWMA)

Note: The rear sample pile is material from NAWMA and the front sample pile is material from a full-council service.



Fig. 10 – Glass from Marion Council



Fig. 12 – Metals from Marion Council



Fig. 9 – Rocks from Marion Council



Fig. 11 – Hard Plastic from Marion Council



Fig. 14 – Film plastic from Marion

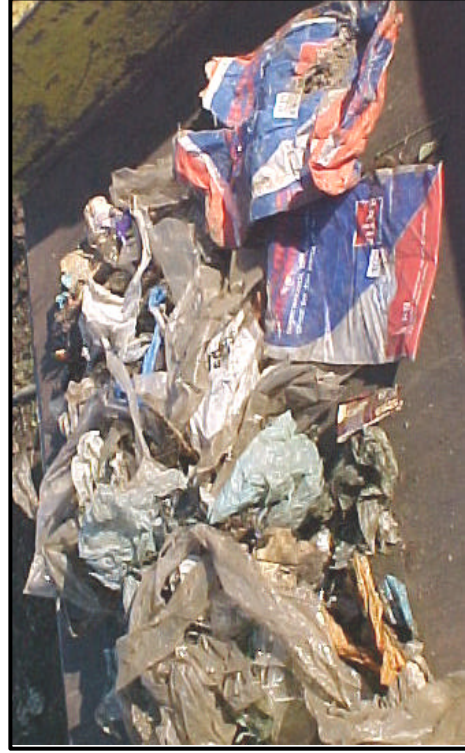


Fig. 16 – Film plastic from NAWMA

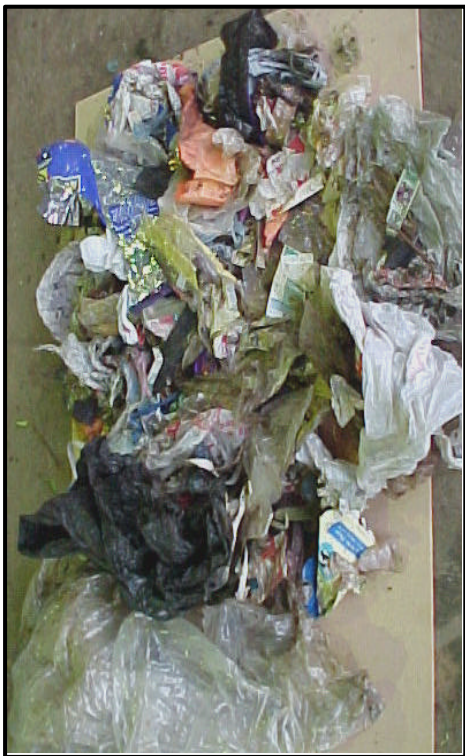


Fig. 13 – Hard plastic from NAWMA



Fig.15 – Syringes from a non-audited

Appendix 8.3 Organisations Visited / Contacted

Organisations Visited

Adelaide Waste and Recycling Centre
Burnside Council
EcoRecycle Victoria
EPA SA
Jeffries Garden Soils
Marion Council
Northern Adelaide Waste Management Authority
Peats Soil & Garden Supplies
Port Adelaide – Enfield Council
West Torrens Council

Organisations Contacted

EPA WA
EPA QLD
Bayside Council (Victoria)
Mulchmasters (Victoria)
Recycled Organics Unit (NSW)
Various Regional Waste Boards in NSW and Victoria
All Metropolitan Councils in Adelaide
Global Magnetics USA
Drug and Alcohol Services Council

Conferences Attended

Recycled Organics 2001: Partnerships, Processes & Products (Gatton, QLD)

Appendix 8.4 Syringe Management Strategy

Needles and Syringes in Green Organics Compost Products

Prepared for COMMPOST SA
by Dr Nick McClure
Senior Lecturer in Biotechnology
Flinders University of South Australia

Introduction

In South Australia there have been a number of incidences where people handling green organics-based compost/mulch projects have sighted or been exposed to used needles and syringes. In a limited number of cases this may have resulted in needle stick injuries which cause significant concern to the person involved. The actual risks of serious injury or contracting a blood-borne disease from such an incidence are negligible, however to allay public concern and minimise exposure to litigation, major compost suppliers that use kerbside-collected green organics as part of their product feedstock need to be aware of the potential liabilities, should instigate procedures to minimise risk and should also be in a position to provide relevant information to users who find used syringes in any products.

The Drug and Alcohol Services Council in South Australia has a number of useful leaflets/information cards which advise members of the public and workers as to what they should do if they find or are injured by a used syringe. These information cards should be available to major producers and users of green organics-based products and are available from the Drug and Alcohol Services Council, 161 Greenhill Rd, Parkside, SA 5063 Tel. (08) 8274 3333 Fax (08) 8274 3399.

What are the Dangers Associated with Used Needles/Syringes in Compost Products?

If a needle/syringe goes through a proper composting cycle the actual dangers of contracting disease from a needle stick injury are even lower than from an injury obtained by eg stepping on a needle/syringe on a public beach. The main organisms of concern which cause blood-borne diseases (HIV and Hepatitis B and C) associated with used needles syringes would be rapidly killed in the composting process.

Needle stick injuries occur mainly in the health care environment eg when health care workers obtain a needle stick injury during patient treatment during the course of their work or when a worker/member of the public is injured by a needle which has been improperly discarded. It is important to note that NO cases have been documented of a member of the general public becoming infected with HIV, Hepatitis B or Hepatitis C as a result of a needle stick injury from discarded injection equipment (cited in "Needle and Syringe Program: A Review of the Evidence" Published by the Australian National Council on AIDS, Hepatitis C and Related Diseases). Major international studies have confirmed this finding.

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Compared to the health care environment, the risk of disease transmission to a member of the general public is much lower for a number of reasons:

- the needle normally has to penetrate shoes, clothing or gloves
- viruses which cause blood borne diseases of concern are rapidly killed outside the body under typical environmental conditions
- the volume of blood in a discarded syringe is much less than that likely in the health care situation
- any syringe which has been through a compost cycle consistent with the requirements of Australian Standard AS 4454-1999 would carry negligible risk of infection as the blood borne viruses would be readily inactivated under these conditions.

Risk Minimisation

As responsible compost producers it is important that measures are instigated to minimise the risk to both company workers handling green organics-based products and end users. Whilst not providing a significant health risk, discarded needles/syringes are a major aesthetic problem and cause alarm and concern to personnel exposed to them. For this reason information which can allay fears must be made available and advice consistent with that provided by the Drug and Alcohol Services Council (eg their information leaflets) is the best mechanism for doing this. Information cards give advice on what to do if someone either finds a discarded needle/syringe or obtains a needle stick injury. There are some simple measures which could be implemented to reduce both concern and the possibility of injury as follows:

- Discourage manual handling of green organics-based products. Advise the use of good quality gloves for any workers or end users who do have to handle green organics-based products.
- Obtain multiple copies of advisory leaflets available from the Drug and Alcohol Services Council and make these available to major end users
- Attempt to identify source materials which are more likely to have discarded syringes/needles and consider not using these in “sensitive” end uses where manual handling of material is likely
- Develop a simple guide for end users specifically aimed at compost products which give advice on all health-related aspects of compost use (similar to the warnings currently on bagged products). A simple one page guide would be useful in terms of covering a range of issues such as respiratory problems, tetanus and concerns over blood borne diseases in use syringes without drawing unnecessary attention to the low risk associated with the latter.

July, 2001.

Appendix 8.5 Sampling Methodology

Introduction

This appendix describes the method to produce a representative sample of green organics for the contamination audit. Contamination in kerbside collected green organics varies in several ways such as demographics and seasonally. For a single contamination audit, the distribution of contamination within a single trip and the range of contamination level across the council region needs to be considered. Contamination occurs mainly from a small number of individuals so the contamination occurs in heterogeneous manner. To ensure meaningful results, the sampling method needs to have sufficient sample number to cover the variability of contamination levels.

To get a representative sample of green organic material across a council region, one collection truck will be monitored for one fortnight. Collection trucks average 2-3 trips a day and cover a council area in two weeks. One loader bucket of material will be removed from each load in a similar manner and placed on a separate storage pile. At the end of the sampling period, there will be approximately 30-40 m³ of green organics stored separately. Depending on the final volume, the storage pile will be divided into equal portions of 10m³. A final portion of green organics will be chosen by a random method and set aside for sorting.

Method

- Step 1 - Select the council region to audit.
- Step 2 - Select the collection vehicle to monitor.
- Step 3 - The collection vehicle normally dumps the green organics material on the ground in the front of main storage pile. At this stage:
 - Record basic details such as date, trip number and collection suburb/s.
- Step 4 - Organise the large loader to remove one bucket-load of the material from the front of the dumped load and place it on a separate storage pile. It is important that the operator removes the material from the same location for all the dumped loads over the fortnight to remove operator bias.



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- Step 6 - At the time of sorting, divide the separate storage pile into multiples of approximately 10m³. Select a random 10m³ portion to sort. Take photographs to record the extent of the heterogenous nature of the contamination.
- Step 7 - The loader will collect 1 – 1.5m³ samples of material from the 10m³ pile and place on the sorting table, ready for the sorting process.

OHS Issues

Sorting staff should take care in moving material in the final division of the storage pile with hazardous contaminants such as syringes, broken glass and disposable nappies. Organic material should be handled minimally until the absence of needles can be established.

Appendix 8.6 Sorting Methodology

Introduction

This appendix describes the process of sorting the organic material that has been placed on the sorting table. If the load meets the initial visual test for safety, the sorters will proceed carefully to redistribute the material with the contaminants moved to one side of the sorting table and the garden material moved to the other end. Larger branches can be removed first and placed in the designated bin or area for later removal to the main green organics pile. As the larger material is removed, contaminants can be placed into piles on the sorting table according to the sorting categories. When the load has been sorted, the contaminants will be weighed and the values recorded with any other relevant details.

Method

- Step 1 - Place organic material on the sorting table.
- Step 2 - Carry out visual inspection by all the sorting staff to identify any dangerous contaminants. If safe to do so, remove any dangerous material such as syringes with hand extenders and place in a dedicated bin. If sample has significant hazards, take photographs and discard the sample.
- Step 3 - Lift off any larger branches or stumps and place in 240 L bins behind the sorting table. Heavy material shall be moved in accordance to OHS Manual Handling Guidelines – eg. bending the knees, not the back. Place clean organic material in the 240 L bins and weigh them when they are full.
- Step 4 - Remove all plastic bags that have material inside them. Sort and weigh the full bags into two groups according to their contents – garden material or general waste. Due to health risk, bags should be opened using hand tools (eg hand extenders) and the contents sorted into the relevant categories.
- Step 5 - With the larger material removed, move the contaminants to the far end of the table and the garden material in the opposite direction. As the garden material is removed, sort the contaminants into the relevant categories and take photographs. Larger contaminants can now be removed and placed in the respective bins. Smaller material can be removed with a trowel or similar device.

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Step 6 - Empty the sorted garden material from the 240 L bins and organise the loader operator to bring the next load to be sorted.

Step 7 - At the end of the total sort, weigh the sorted contaminants, record their values and dispose of the contaminants into the relevant containers.

Sorting Categories

- Glass
- Hard plastic
- Film plastic
- Ferrous metal
- Non-ferrous metal
- Paper & cardboard
- Timber
-
- Bags with green organics
- Bags with general rubbish
- Stones and gravel
- Textiles, leather and rubber
- Hazardous items – needles, herbicide containers

OHS Issues

There are three main concerns relating to OHS at the sorting stage. They include hazardous items, large vehicles and lifting heavy items. Needles and sharps are a real risk and the potential for needle stick injury needs to be managed. Clear procedures and suitable training will be provided by the supervisor for handling hazardous items. Dust and plant allergens are also another risk during the sorting process so suitable dust masks will be provided.

Sorting staff will be required to wear the personal protective equipment (PPE) during the sorting process. PPE will consist of a lab coat or overalls, safety vest, dust masks, eye protection, gloves and sun protection if working outdoors. Sorting staff will be expected to wear appropriate clothing such as long-sleeved shirt, long pants and suitable work boots. All lifting will be done according to OHS Manual Handling Guidelines.

Diagram

