planning, supply chain management, internal (staff and contractor) and external stakeholder engagement, as well as regional or sector wide sustainability leadership.

4.3 Key result areas

The key result areas and targets identified in *Waste Strategy 2003* have been retained. They remain relevant in the current NSW economic, environmental and social climate. While they are ambitious, the targets are also realistic goals that will continue to provide an impetus for action across all sectors.

The four key result areas are:

- preventing and avoiding waste
- increasing recovery and use of secondary materials
- reducing toxicity in products and materials and
- reducing litter and illegal dumping.

Broad targets for each key result area

Preventing and avoiding waste	To hold level the total waste generated for 5 years from the release of *Waste Strategy 2003*.
Increased recovery and use of secondary resources	By 2014, to: Increase recovery and use of materials from the municipal waste stream, from 26% (in 2000) to 66% Increase recovery and use of materials from the commercial and industrial waste stream, from 28% (in 2000) to 63% and Increase recovery and use of materials from the construction and demolition sector, from 65% (in 2000) to 76%.
Reducing toxic substances in products and materials	By 2014 or earlier: To phase out priority substances in identified products as a first choice or, if not possible, to achieve maximum recovery for re-use.
Reduce litter and illegal dumping	Reduce total amount of litter reported annually. Reduction in total tonnages of illegally dumped material reported by regulatory agencies and RID squads annually.

In addition, the NSW Government has recently adopted the *State Plan, A New Direction for NSW*. One of the five focus areas within the State Plan is Environment for Living. Improved waste minimisation and management contributes to the following priorities listed under Environment for Living:

- Priority E1: A secure and sustainable water supply for all users
- Priority E2: A reliable electricity supply with increased use of renewable energy
- Priority E3: Cleaner air and progress on greenhouse gas reductions
- Priority E4: Better outcomes for native vegetation, biodiversity, land, rivers and coastal waterways.

Conserving our resources and reducing the amount of waste we put in landfill can make a substantial contribution to each of these priorities (see section 2.3).

ARMIDALE DUMARESQ COUNCIL

WASTE STRATEGY 2010

Background

Waste services were originally provided to protect and improve public health and all waste was disposed of to landfill.

In more recent times, environmental concerns have added services to address recycling and minimisation of waste to landfill objectives.

The latter are currently driven by the requirements of the Protection of the Environment Operations Act, the Waste Avoidance and Resource Recovery Act 2001 and Waste Avoidance and Resource Recovery Strategy 2007.

Council's overriding current strategy is to provide waste collection and disposal services to maximise reuse of materials and to minimise waste to landfill in order to:

- Protect public health;
- Conserve scarce natural resources;
- Take better care of the environment.

COUNCIL'S CURRENT WASTE SERVICES AND FACILITIES

These are listed in sequence from disposer through collection and processing to re-use or disposal to landfill:

1. **Waste collection services;**
2. **Waste transfer stations;**
3. **Waste sorting and recovery facilities;**
4. **Landfill for residual waste.**

1. Waste Collection Services.

Services by which waste is collected from premises or locations and taken to the Armidale waste management facility on Long Swamp Road for processing and disposal.

- Domestic waste collection:
  - Garbage.
  - Recyclables; paper, cardboard, plastics and glass.
  - Garden waste.
- Other waste collection:
  - Garbage from public areas.
  - Garbage only on request for commercial sector.
- Recycling muster points around CBD.
  - Fluorescent lighting and sharps.

2. Waste Transfer Stations.

Receival facilities to which the community can take their waste for sorting and disposal.

- Armidale Waste Transfer Station.
- Rural Transfer Stations. Not well spread. Generally at sites of old landfills and limited by the community's ability to fund on a user pays basis.
- No current proposals to expand.

3. Waste Sorting and Recovery Facilities.

These processing activities have grown and continue to grow to meet the objectives of waste minimisation and materials re-use (recycling). Generally, recycling is not profit making and to be worthy, the processes we operate must have a healthy market for disposal and economic processing and transport costs as well as demonstrated environmental benefit before they can be considered practical and economic options for Armidale.

- Sorting at Source is Council's preferred process for waste separation.
  - Council encourages sorting at source at all residential, commercial and industrial premises to minimise contamination of material.
  - Existing domestic sorting and collection operates very well. Crates system minimises contamination. Excellent community participation.
  - Commercial and industrial sector has some good pockets of sorting activity but overall there is significant room for improvement.
- At the Armidale Waste Transfer Station (WTS), a materials recycling facility (MRF) is operated to sort collected recyclables consisting of paper, cardboard, plastics, metal cans and plastic and glass containers.
- Also at the Armidale WTS, facilities are provided for receival and recycling of second hand goods, all metals, garden waste, builders waste, timber, chemicals, waste motor and cooking oil, paint, wet and dry cell batteries, fluorescent tubes and bulbs, tyres, electrical goods, computers and heavy plastics. Additional items are added as markets and costs dictate.

Note that there is currently a commercial MRF operating on Council's Long Swamp Road site that undertakes the sorting of mixed commercial & industrial waste on behalf of clients before the sorted waste is then disposed of through Council's WTS.

4. Landfill for Residual Waste.

- Facility for disposal of residual waste left after recyclable material has been removed from waste.
- Landfill has operated at the current Long Swamp Road site since the 1960s.
- It will be full in next few years and a new landfill is required to take its place.
- Closure works will be required for the Long Swamp Road landfill on cessation of use.

PROPOSED REPLACEMENTS AND AUGMENTATION OF COUNCIL'S WASTE SERVICES AND FACILITIES

The major project that Council must undertake is the construction of the new landfill. During the process for the selection of the site for the new landfill, for environmental protection reasons, Council made the commitment to routinely operate the new landfill as a non-putrescible landfill as much as is practicable. The landfill would be licenced as a putrescible landfill to accommodate the essential intermittent need for disposal of putrescible material for which stabilisation or composting is not a practical option.

Emanating from the above commitment is the need to augment our current processing facilities to deal with putrescible waste by way of composting or stabilisation.

WASTE STRATEGY 2010 (Continued)

The following replacements, changes and augmentations are proposed to deal with putrescible waste and to improve waste recovery from commercial and industrial waste. Further facilities and processes to recover materials for re-use will be added in future as markets and recovery costs dictate

1. **New Landfill.**
2. **Organics (garden and food) waste collection service.**
3. **Processing facilities to deal with putrescible material - compost organic waste and stabilise residual waste containing putrescible material before landfilling. Commonly referred to in the industry as alternative waste treatment (AWT).**
4. **MRF for sorting of mixed commercial and industrial waste. Another AWT process.**

1. New Landfill.

- Site has been selected off Waterfall Way about 12 kms from Armidale and the planning approval process is in progress.
- Environmental Assessment on public exhibition 3 June to 6 August 2010.
- Assuming no delays, commissioning of landfill expected by early 2012.
- All waste is to be routed through the Armidale Waste Transfer Station and its processes for waste recovery and stabilisation of putrescible material with only residual waste taken to the new landfill facility.
- To be funded by the new landfill annual charge introduced to meet costs of new landfill project. Charge will increase as the project progresses and actual costs are determined.

2. Organics (garden and food) Waste Collection Service.

- To enable foodwaste to be collected, it is proposed to change the existing fortnightly garden waste collection service to a weekly organics (garden waste and food waste) collection service.
- A public education program will be run to inform residents of the practicalities and benefits of the organics collection service.
- An organics (mainly food waste) collection service is proposed for the non-residential sectors.

May require to be funded by small increases in annual charges and transfer station charges depending on logistics and contract pricing.

3. Processing Facilities to deal with Putrescible Material:

a) Compost Organic Waste and b) Stabilise Residual Waste that contains putrescible material before landfilling.

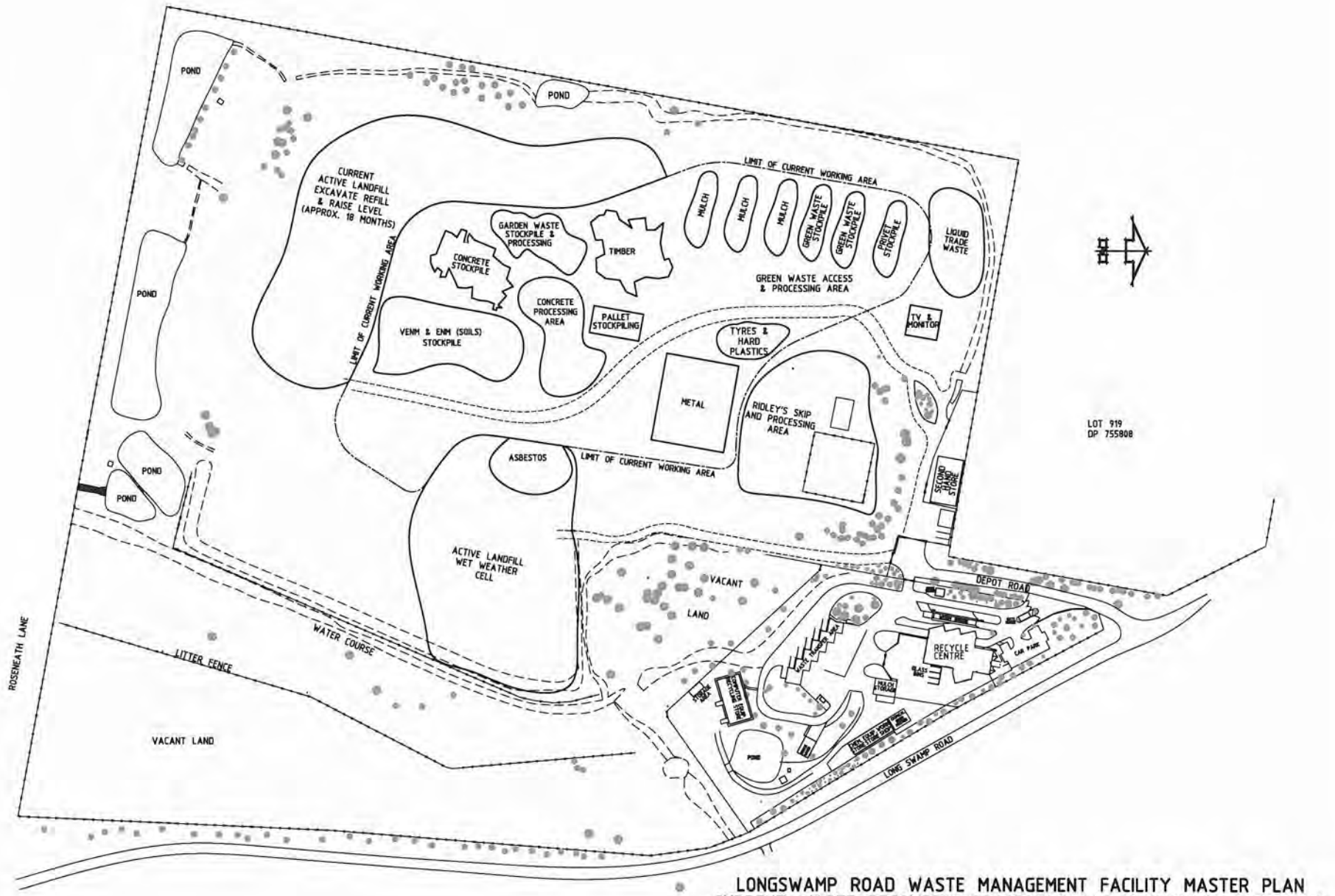
- Two new processes are to be established before the new landfill is operational:
  - Composting of well sorted organic waste – garden waste and food waste.
  - Stabilising of residual waste before it is placed into landfill.
  - These processes are currently being trialled and evaluated at the Long Swamp Road Waste Transfer Facility before full scale adoption and implementation.
- To be funded by increased annual charges and transfer station charges for disposal of this material.

4. **MRF for Sorting of Mixed Commercial and Industrial Waste.**
    - Maintain penalty charges for the disposal of unsorted waste at transfer stations.
    - Install a MRF for the sorting of non-putrescible mixed waste similar to the commercial facility currently operating on Council's waste management facility.
    - This facility will be funded from the penalty charges.

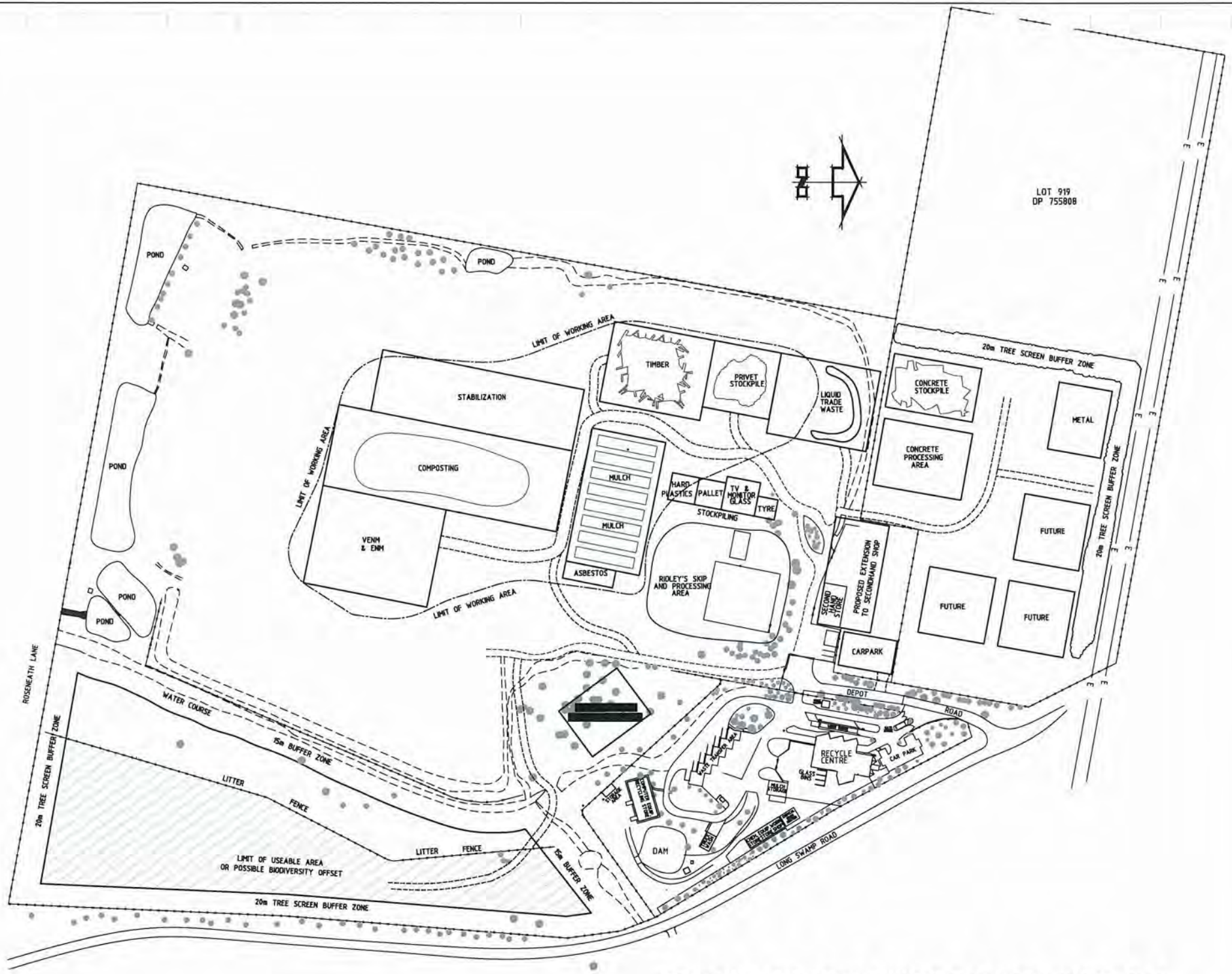
Appendix C

Appendix C

Appendix C- Long Swamp Road Master Plan



LONGSWAMP ROAD WASTE MANAGEMENT FACILITY MASTER PLAN
CURRENT WASTE RECOVERY, PROCESSING AND STOCKPILING ACTIVITIES



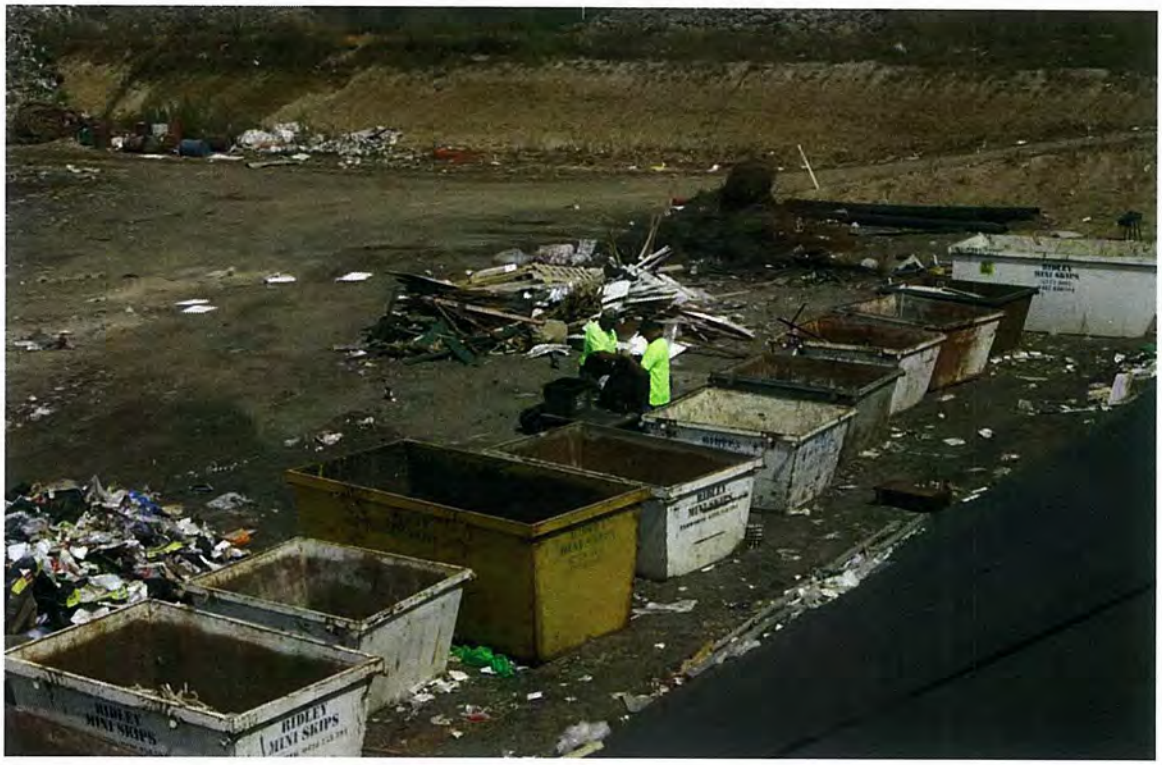
LONGSWAMP ROAD WASTE MANAGEMENT FACILITY MASTER PLAN
FUTURE WASTE RECOVERY, PROCESSING AND STOCKPILING FACILITIES

Appendix D

Appendix D

Appendix D- Waste Characterisation Study

Waste Characterisation Study:
All Landfill Waste, Excluding Kerbside Collected Residential Waste



Armidale, NSW
April 22, 2008.

Executive Summary

A waste characterisation study was conducted at the Armidale-Dumaresq Council Landfill with a specific focus on incoming waste generated from the ICI sector and waste disposed of at the general waste bins located at the waster transfer station. The study was conducted for eight days between March 17, 2008 to March 28, 2008.

Objectives of study

The objectives of this study were:

- To estimated a daily average all incoming waste at the landfill excluding kerbside collected residential waste;
- To determine, if possible, any method of reducing the amount of waste entering the landfill;
- To establish baseline data for measuring the effects of future waste reduction and recycling programs;
- To develop strategies to avoid the contamination of ICI wastes that render the material unsuitable for recovery and recycling;

Waste Characteristics

During the audit period, a total of 63 loads were audited totalling 92.29 tonnes of waste.

The following figures and Table summarise the results of the audit.

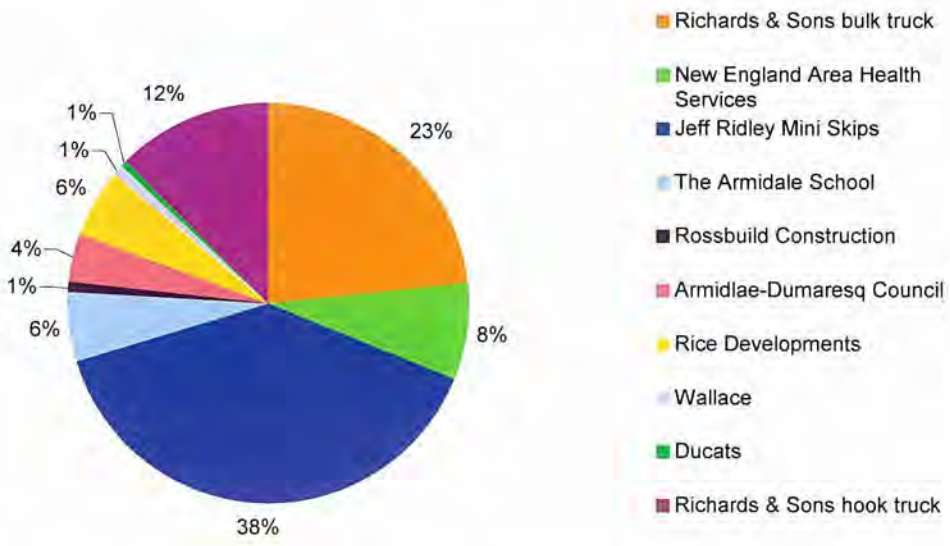


Figure i. Vehicles, by company, disposing waste at landfill during the audit period.

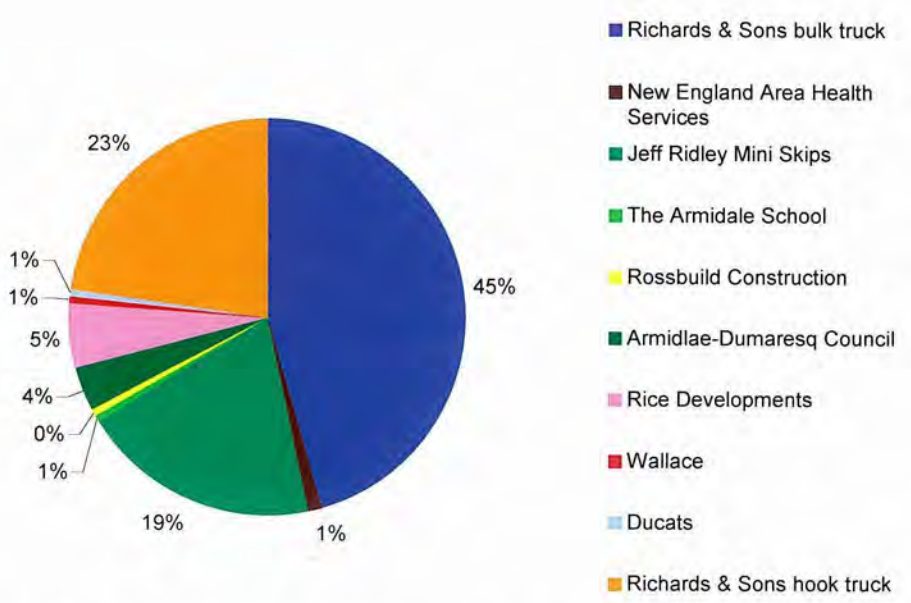


Figure ii. Distribution of waste weight deposited at landfill, by company, during the audit period excluding kerbside collected residential waste

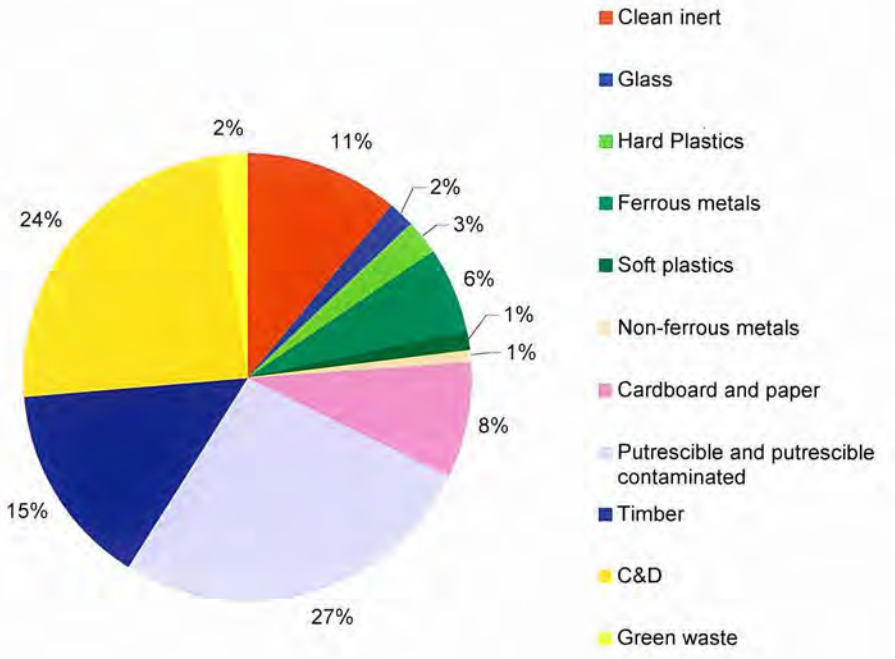


Figure iii. Composition of sorted waste by mass (tonnes)[1].

[1] For a description of what each category constituted refer to Appendix C. For definitions of wastes found in each category in Appendix C refer to Appendix D.

Table i. Observed daily weights and composition of incoming audited waste

Day	Waste weight (tonnes)	Clean inert	Glass	Hard Plastics	Ferrous metals	Soft plastics	Non-ferrous metals	Cardboard and paper	Putrescible**	Timber	C&D	Green waste	Hazardou waste
17-Mar-08	30.58	10%	0%	6%	1%	1%	1%	26%	41%	12%	0%	0%	2%
18-Mar-08	23.59	9%	4%	2%	2%	1%	0%	7%	24%	16%	31%	0%	2%
19-Mar-08	36.10	17%	4%	2%	1%	2%	1%	9%	38%	8%	16%	1%	2%
20-Mar-08	39.06	10%	2%	6%	10%	2%	1%	14%	39%	12%	0%	0%	4%
21-Mar-08	No audit, waste management facilities closed for Good Friday.												
22-Mar-08	15.14	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
23-Mar-08	No audit, Easter Sunday												
24-Mar-08	17.50	54%	1%	1%	1%	1%	1%	8%	31%	0%	0%	1%	0%
25-Mar-08	23.68	18%	3%	4%	10%	4%	2%	9%	10%	15%	17%	6%	2%
26-Mar-08	37.63	4%	0%	2%	15%	1%	0%	7%	25%	24%	20%	0%	3%
27-Mar-08	30.25	8%	2%	2%	10%	1%	0%	3%	21%	19%	26%	7%	2%
28-Mar-08	28.40	5%	1%	0%	2%	1%	0%	2%	12%	13%	60%	1%	2%
Total	281.93												
Mean	28.19	14%	2%	2%	5%	1%	1%	9%	24%	12%	17%	2%	12%
Total*	249.29												
Mean*	31.16	10%	2%	3%	6%	1%	1%	10%	27%	15%	21%	2%	2%

*Does not include Good Friday weekend (21-03-08 to 24-03-08). This data not included due to irregularities of incoming waste caused by the Easter holidays.

**Includes putrescible contaminated waste.

The following conclusions can be drawn about the composition of ICI sector waste and waste deposited at the bins located at the waste transfer station, disposed of at the landfill:

- Three haulers account for 87% of all incoming landfill waste by mass, and included:
  - Richards & Sons bulk truck (45%);
  - Richards & Sons hook truck (23%), and;
  - Jeff Ridley Mini Skips (19%).
- Waste from the ICI sector and the general waste bins located at the waste transfer station account for 64% of the waste entering the landfill;
- Four waste categories accounted for 74% of all waste being disposed, by mass, at the landfill and included:
  - Putrescible and putrescible contaminated waste (27%);
  - C&D waste (24%);
  - Timber (15%), and;
  - Clean Inert waste (11%);

- Large amounts of clean paper products, especially cardboard, are being disposed of to landfill by the Richards & Sons bulk truck;

- The majority of putrescible and putrescible contaminated waste originated from the Richards & Sons bulk truck and Richards & Sons hook truck;

- Large amounts of timber, ferrous metals and C&D waste were being disposed of to landfill by Jeff Ridley Mini Skips;

- The majority of the hospital waste was considered to be hazardous due to contamination of blood products;

- With the exception of hospital waste, only small amounts of materials considered as hazardous waste were observed.

Potential areas for resource recovery

A number of areas for resource diversion from landfill were noted during the characterization study and included:

- Jeff Ridley Mini Skips. Most of the waste brought in by Ridley uncontaminated timber, ferrous metal, and uncontaminated inert waste. If incoming waste was sorted on site, much of the Ridley waste could be diverted from the proposed AWT.

- The Armidale School. The waste coming from TAS contained many recyclable goods and an increase of resource separation at source should be conducted, specifically at the food services end.

- University of New England. A large amount of recyclable goods, including paper, cardboard, plastics and glass are thrown out and end up in landfill. Recycling programs should be implemented at various locations including college cafeterias, college dorms, and the Bistro.

- Richards & Sons bulk truck. Large amounts of cardboard are being disposed by this vehicle and it is recommended that a recycling program be implemented to target the ICI sector. Additionally, a large amount of putrescible contaminated waste is dumped. This waste was contaminated during the compaction process in the container of the truck. If possible, a new pick-up schedule is recommended where putrescible waste is collected in one load and non-putrescible waste be collected in a separate load.

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1.0 Introduction

1.1 Background

Effective solid waste planning and service delivery begins with an understanding of the types and quantities of materials being discarded, the source of these wastes, and the amount that is potentially recoverable. These data inform sound solid waste management policy and program implementation, from designing new waste reduction programs and planning new facilities, to evaluating the effectiveness of current recovery efforts. Currently, Armidale-Dumaresq Council is in the process of planning a new Alternative Waste Treatment (AWT) facility. To construct this facility, data regarding composition of incoming Industrial, Commercial, and Institutional (ICI) waste, as well as any other waste excluding residential kerbside collected waste, disposed of at landfill was needed. A waste composition study was conducted for eight days during the period of March 17, 2008 to March 28, 2008[1].

1.2 Alternative Waste Treatment (AWT) Technology

In an attempt to reduce the amount of material being disposed of at the landfill, Armidale-Dumaresq Council is planning on constructing an AWT. At present, there is no official definition of AWT, however, in general, AWT to mean an alternative to landfilling of residual waste. However, this definition is also not entirely correct as any processing of residual waste produces residues in some form or another that do require landfilling.

In general an AWT processes residual waste, usually after (a proportion) of dry recyclables and organics have been separated at source for recovery. For the purpose of Armidale-Dumaresq Council, the main objectives of an AWT are to:

- Stabilize residual waste going to landfill;
- Reduce the quantity of residual waste going to landfill; and
- Recover further resources from residual waste.

1.3 Defining the Waste Stream

The solid waste that was the focus of this study included all MSW that was generated by the ICI sector, as well as waste generated by the public that was not collected during residential kerbside waste pickup, deposited at the Armidale-Dumaresq landfill.

The incoming waste stream was divided into sub-streams according to the source of the waste. Waste streams identified during the project for auditing included:

- Residential – residential waste from Armidale and surrounding area that was not disposed of by a commercially operated compactor collection vehicle (i.e. Richards and Sons residential kerbside collected waste). Incoming waste falling under this category included "self-hauled" waste disposed of at the large bins located at the Council Transfer Station by residents.

[1] Limited data was collected for incoming waste from March 21 to March 24, 2007. The Easter holidays fell on this weekend and disrupted regular waste disposal activities. Due to this bias, the data collected during the Easter holidays were not used in calculating the results.

- Industrial/commercial/institutional (ICI) – MSW disposed by industrial facilities, and by businesses, institutions, and multi-family dwellings. This waste was collected in a variety of vehicles including loose drop boxes, compactor drop boxes and packer trucks. Some of this waste was self-hauled by the businesses that generated it.

- Construction/demolition (C&D) – MSW disposed during construction or demolition activities. This waste typically is collected in vehicles such as dump trucks, loose roll-off boxes, and end-dump vehicles. This waste was transported either by a commercial hauler, or by the business or resident that generated the waste.

1.4 Objectives of Study

The objectives of this study were:

- To estimated a daily average of the composition of all waste entering the landfill, excluding kerbside collected residential waste;
- To determine, if possible, any method of reducing the amount of waste entering the landfill;
- To establish baseline data for measuring the effects of future waste reduction and recycling programs;
- To develop strategies to avoid the contamination of ICI wastes that render the material unsuitable for recovery and recycling;

1.5 Summary of Methodology

The Study was undertaken in a number of distinct and sequential stages, including:

Step 1 Concept Stage

- Identify information outcomes and target audience;
- Establish data quality objectives;
- Seek to minimise the disruption of operating landfills;
- Build on existing information on waste composition and flows of waste into, and out of the landfill.

Step 2 Research and Design Stage

- Review similar waste composition studies, and;
- Develop a composite sampling and measurement technique to address the challenges of characterizing identified waste streams and to ensure the sampling and measurement techniques are performed safely.

Step 3 Pre-field Audit Stage

- Consult with the Council on the sources or types of waste received at the landfill, and;

- Develop a stratified sampling plan for the 12 sub-streams based primarily on quantity and homogeneity.

Step 4 Field Audit Stage (Appendix A)

- Conduct field audit for incoming identified waste streams, and;
- Check integrity of collected data.

Step 5 Entry and Analysis of Field Audit Data (Appendix B)

- Enter and analyze data collected from the field audit, and;
- Collect any additional data needed for study.

Step 6 Preparation of Report

- Prepare report.

2.0 Results

2.1 Characteristics of waste source vehicles

A total of 177 vehicles accessed the landfill disposing 404.87 tonnes of waste during the audit period. Of the 177 vehicles, 130 (74%) carried waste collected from the ICI sector and self-hauled commercial and residential waste deposited at the transfer station. Figure 1 shows the break-up of vehicles, by company, disposing waste at the landfill during the audit period. This data does not included vehicles disposing kerbside collected residential waste. As can be seen, four companies accounted for 81% of all vehicles disposing waste at the landfill, including:

1. Jeff Ridley Mini Skips (Ridley) (38%)
2. Richards and Sons bulk truck (23%)
3. Richards and Sons hook truck (12%)[2]
4. New England Health Services (8%).

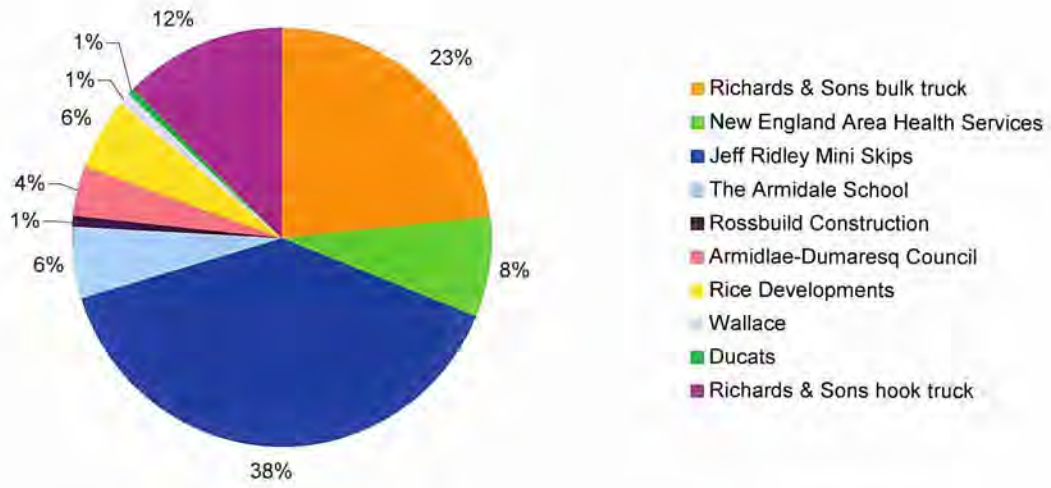

Figure 1. Waste haulers, by company, disposing waste at landfill during the audit period.

2.2 Waste composition of waste by source vehicle

Of the 404.87 tonnes of waste deposited at the landfill during the audit period, 249.29 tonnes or 62% (Figure 2) came from the ICI sector and waste deposited at the bins located at the waste transfer station. Figures 3 displays the distribution of waste mass deposited at landfill by company during the audit period of all waste excluding kerbside collected residential waste. As can be seen, three companies account for 87% of the mass of all ICI sector waste being disposed of at the landfill and include:

[2] The Richards & Sons hook truck disposed general mix and clean inert waste at landfill which was initially deposited by self-haul residential and commercial vehicles, in the bins located at the waste transfer station.

1. Richards & Sons bulk truck (45%);
2. Richards & Sons hook truck (23%), and;
3. Ridley (19%).

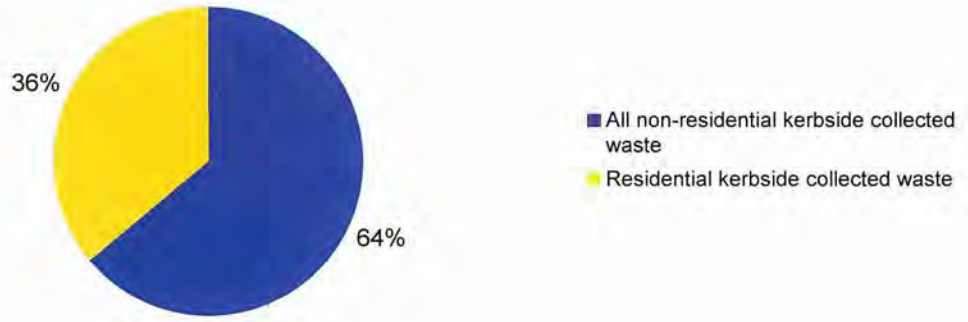

Figure 2. Total amount of kerbside collected residential waste versus ICI sector[3] waste and waste deposited at the waste bins located at the waste transfer station, by weight at landfill during the audit period.

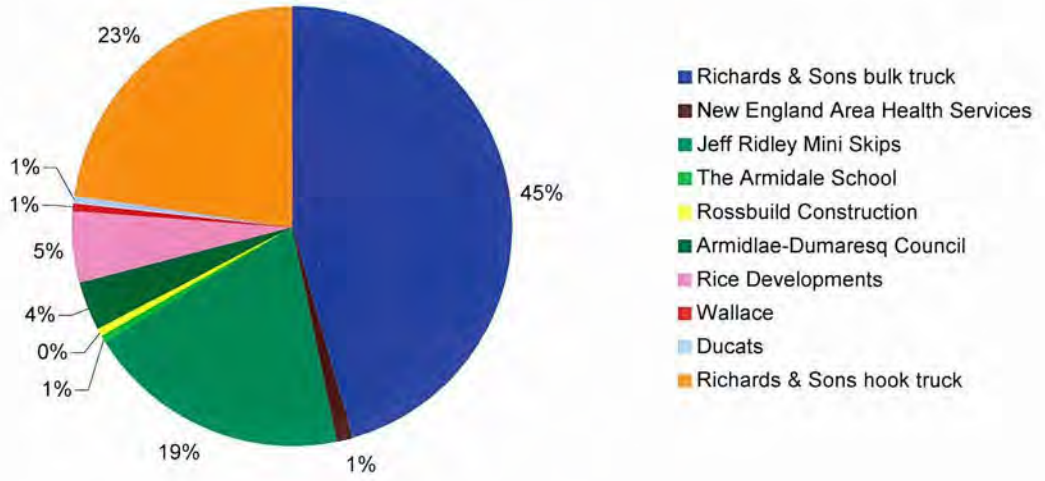

Figure 3. Distribution of waste mass (tonnes) deposited at landfill by company during the audit period excluding kerbside collected residential waste

[3] For the purpose of this audit, ICI waste included C&D waste. During the audit C&D waste was found in the Richards & Sons bulk truck, Richards & Sons hook truck (waste from transfer station) and in the Ridley Mini Skips.

2.3 Composition of audited waste

During the audit period a total of 60 vehicles were audited, representing 46% of all targeted vehicles disposing waste at the landfill. A total of 113.41 tonnes of waste was disposed of at the auditing area by the targeted waste haulers of which 27.70 tonnes or 25% was sorted and weighed. Table 1 displays the amount of incoming waste per day as well as daily compositions of audited waste.

Table 1. Observed daily weights and composition of incoming audited waste.

Day	Waste weight (tonnes)	Clean inert	Glass	Hard Plastics	Ferrous metals	Soft plastics	Non-ferrous metals	Cardboard and paper	Putrescible**	Timber	C&D	Green waste	Hazardous waste
17-Mar-08	30.58	10%	0%	6%	1%	1%	1%	26%	41%	12%	0%	0%	2%
18-Mar-08	23.59	9%	4%	2%	2%	1%	0%	7%	24%	16%	31%	0%	2%
19-Mar-08	36.10	17%	4%	2%	1%	2%	1%	9%	38%	8%	16%	1%	2%
20-Mar-08	39.06	10%	2%	6%	10%	2%	1%	14%	39%	12%	0%	0%	4%
21-Mar-08	No audit, waste management facilities closed for Good Friday.												
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23-Mar-08	No audit, Easter Sunday												
24-Mar-08	17.50	54%	1%	1%	1%	1%	1%	8%	31%	0%	0%	1%	0%
25-Mar-08	23.68	18%	3%	4%	10%	4%	2%	9%	10%	15%	17%	6%	2%
26-Mar-08	37.63	4%	0%	2%	15%	1%	0%	7%	25%	24%	20%	0%	3%
27-Mar-08	30.25	8%	2%	2%	10%	1%	0%	3%	21%	19%	26%	7%	2%
28-Mar-08	28.40	5%	1%	0%	2%	1%	0%	2%	12%	13%	60%	1%	2%
Total	281.93												
Mean	28.19	14%	2%	2%	5%	1%	1%	9%	24%	12%	17%	2%	12%
Total*	249.29												
Mean*	31.16	10%	2%	3%	6%	1%	1%	10%	27%	15%	21%	2%	2%

*Does not include Good Friday weekend (21-03-08 to 24-03-08). This data not included due to irregularities of incoming waste caused by the Easter holidays.

**Includes putrescible contaminated waste.

Figure 4 displays the composition of the sorted wasted, by mass (tonnes), during the audit period. As can be seen in Table 1 and Figure 4, 85% of the audited waste was composed of five waste categories, including:

1. Putrescible and putrescible contaminated waste (27%);
2. C&D waste (24%);
3. Timber waste (15%);
4. Clean inert waste (11%), and;
5. Clean cardboard and paper (8%).

All weighed hazardous weight resulted from disposed hospital waste. In addition to this waste, the following hazardous waste was observed but not weight:

- 4 mobile phones including batteries;
- 12 500ml paint cans containing paint;
- 7 computer monitors;

- 2 desktop computers;
- 3 computer printers;
- 6 tyres;
- 3 10L paint containers containing paint;
- 2 automotive batteries;
- 1 CRT television;
- 3 500mL poison containers containing liquid;
- 9 fluorescent tube light bulbs.

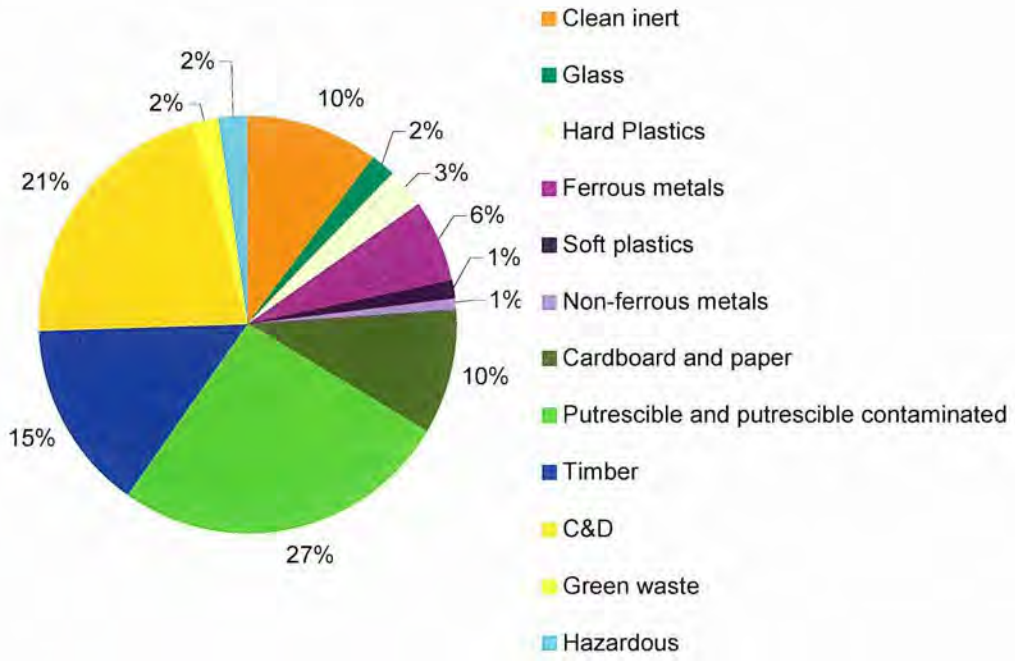

Figure 4. Composition of sorted waste by mass (tonnes)[4].

[4] For a description of what each category constituted refer to Appendix C. For definitions of wastes found in each category in Appendix C refer to Appendix D.

3.0 Discussion

3.1 Incoming traffic accessing landfill

A large proportion (81%) of vehicles accessing the landfill constituted four separate waste haulers including;

5. Ridley (38%)
6. Richards and Sons bulk truck (23%)
7. Richards and Sons hook truck (12%)[5];
8. New England and Area Health Services (8%).

The Richards & Sons bulk truck and New England Health Services waste hauler have a consistent schedule and thus dispose waste at regular and predictable intervals throughout the week. The Richards & Sons bulk truck is a large compactor truck which collects waste from the Industrial, Commercial and Institutional sectors within Armidale and the surrounding area. During the audit it was noted that the type of waste disposed by this truck include:

- Putrescible and putrescible contaminated waste;
- Clean inert;
- Timber;
- Clean paper products including cardboard;
- Ferrous and non-ferrous metals;
- Clean recyclable plastics, and
- Fecal and fecal contaminated wastes from the sewage treatment plant.

The New England and Area Health Services waste is self-hauled by way of trailer and is dumped everyday of the week. Although the incoming waste for this hauler contained recyclable goods, the majority of this waste was considered hazardous due to the existence of blood products and other hospital waste.

The Richards & Sons hook truck and Ridley dispose of waste on an irregular basis, depending on the rate bins/skips are filled.

The Richards and Sons hook truck is the vehicle which removes and dumps the contents of the bins located at the waste transfer station. Due to the irregularity of the waste disposed at these bins, the bins themselves are only empties at landfill when full. In addition, due to the variety of haulers disposing waste at these bins, the composition of this waste was varied. However, during the audit it was noted that the following waste categories were observed:

- Putrescible and putrescible contaminated waste;
- Clean inert;
- Clean paper products including cardboard;
- Ferrous and non-ferrous metal, and;

[5] The Richards & Sons hook truck disposed general mix and clean inert waste at landfill which was initially deposited by self-haul residential and commercial vehicles, in the bins located at the waste transfer station.

- Clean recyclable plastics;
- Green waste, and;
- C&D waste.

Ridley operates a small skip business servicing Armidale and surrounding area. As a result the incoming waste is varied and includes significant amounts of:

- Timber
- Ferrous metals
- C&D waste
- Some putrescibles specifically from the Centro shopping centre and the Guyra glasshouse.

All other waste haulers come at irregular intervals.

3.2 Waste Composition

The composition of incoming waste fluctuated on a daily basis due to various factors including, but not limited to:

- Holidays (Easter);
- One off events including activities at the race course, and;
- Construction activity.

However, by conducting the waste characterisation study, it is believed that the data in Table 1 gives a good indication of the amount of weight that can be expected along with the characteristics of the incoming waste during a given work week.

During the audit it was noted that five distinct categories comprised 85% of all waste being disposed of at the landfill, by mass (tonnes), they included:

1. Putrescible and putrescible contaminated waste (27%);
2. C&D waste (24%);
3. Timber waste (15%);
4. Clean inert (11%), and;
5. Clean paper products (8%).

3.2.1 Putrescible and putrescible contaminated waste

About a quarter of the sorted waste was considered putrescible or putrescible contaminated waste. This waste was brought in by the following:

- Richards & Sons, both bulk and hook truck;
- The Armidale School;
- New England and Area Health Services, and;
- Ridley (specifically from the Centro shopping centre and the Guyra glasshouse).

Of the four companies, Richards & Sons bulk truck disposed of the majority of this waste.

The putrescible contaminated waste was a result of two factors:

1. At source contamination with putrescible wastes, and;
2. Contamination of waste during hauling of wastes. Clean inert and recyclable goods were contaminated in the hauling vehicles during transport.

3.2.2 C&D waste

The majority of the C&D waste was brought in by Ridley, however some was dropped off at the general waste skips located at the waste transfer stations. The majority of this waste weight was comprised of bricks, stone and gypsum board. The bricks and stone can be diverted and crushed as per the current practice at the waste management facilities.

3.2.3 Timber waste

During the audit, it was noted that the majority of the timber that was being disposed of at the landfill was coming from two main sources:

- Ridley
- Richards & Sons bulk truck.

The timber waste brought in by Ridley came from many different sources including private residential and various businesses. Timber waste brought in by Ridley was mixed with other materials however it was easily segregated once dumped.

The timber waste brought in by Richards & Sons varied day-to-day however it was noted that on some days concentrations of timber would be found once the bulk truck was emptied. Upon speaking with the driver of the truck it was noted that the concentrated wood piles were a result of a specific customer, Vickery Kitchens and Joinery, disposing wood cuts from the construction of kitchen units.

3.2.4 Clean inert waste

Clean inert waste consisted of waste that could not be recycled and that was not contaminated by putrescibles. For the purposes of the AWT this waste would not have to be processed prior to disposal at landfill. Sources of clean inert waste included Ridley and the general waste skips located at the waste transfer station.

3.2.5 Cardboard and other paper products

Cardboard and paper waste came from a variety of hauling vehicles from all targeted waste sectors. During the audit it was noted that the Richards & Sons bulk truck and hook truck were disposing significant amount of paper waste. This paper waste was mixed with putrescible waste and as a result a significant amount was considered as contaminated.

3.2.6 Recyclable plastics

Recyclable plastics were most evident in the waste disposed of by the Richards & Sons bulk and hook trucks. In all instances it was mixed with other wastes, usually with putrescible waste.

3.2.7 Other waste

Overall, little hazardous, green, and glass waste was found within the audited waste. All non-ferrous waste consisted of aluminium cans.

3.3 Potential for Diversion

The potential to divert ICI and waste disposed of at the general waste bins at the transfer station from the landfill is considerable, with more than half of this waste having the potential of being diverted. The waste categories with the most potential for increased recovery include:

- Timber waste
- C&D waste
- Cardboard and paper products
- Ferrous metals
- Glass
- Recyclable plastics (those accepted by the Armidale Recycling Services)
- Aluminium.

3.3.1 Timber waste

During the audit, it was noted that the majority of the timber that was being disposed of at the landfill was coming from two main sources:

- Ridley
- Richards & Sons bulk truck.

To reduce timber waste entering the landfill deposited by Ridley, it is suggested that this waste be segregated at source or when brought onsite at the Waste Management Facilities.

To reduce timber waste disposed of by the bulk truck, it is suggested that Vickery Kitchens and Joinery use an alternative waste disposal service which segregates the timber waste from other waste.

3.3.2 C&D waste

During the audit it was noted that Ridley disposed most of the C&D waste. To recover more incoming C&D waste, specifically concrete and bricks, it is recommended that Ridley sort incoming C&D waste.

3.3.3 Cardboard and paper

During the audit, recyclable paper products came from many sources. However, it was noted that a significant amount was disposed of by the Richards & Sons bulk truck. To reduce the amount of paper products being disposed of by the bulk truck it is suggested that the businesses that are serviced by the bulk be consulted on a possible separate recyclable paper product pick-up.

3.3.4 Ferrous metals

The majority of the ferrous metal disposed of at the landfill resulted from Ridley. To reduce the amount of ferrous metal entering the landfill it is suggested that Ridley separate ferrous metal from incoming skips prior to dumping waste at the landfill.

3.3.5 Recyclable materials (specifically glass, plastics and aluminium)

Recovered recyclable materials, including glass plastics and aluminium, were disposed of mainly by the Richardson & Sons bulk truck, Richardson & Sons hook truck[6], The Armidale School (TAS), New England and Area Health Services and Armidale Council (waste from town parks). It is believed that in all instances the amount of recyclables entering the landfill could be diverted, with recovery at source being the most suitable strategy. This can include and is not limited to:

- Introducing recycling bins at local parks;
- Increasing recycling rates within the institutional sector, specifically at the University of New England colleges (at dorms and cafeterias) and TAS (cafeteria);
- Increasing recycling rates within the commercial sector specifically shopping centres/mall, the racetrack and small businesses by setting up separate recycling bins beside garbage bins;
- Council could encourage more source-separation by clients of Richardson & Sons. The introduction of a partially subsidized commercial recycling service could offer customers a cardboard or metal recycling collection as part of an integrated garbage and recycling collection service.

3.3.6 Putrescible and putrescible contaminated waste

During the audit, it was noticed that clean inert waste was contaminated by putrescible waste when the two types of waste were mixed during a collection run. A suggested alternative in reducing the amount of putrescible contaminated waste could be to reschedule waste pickup whereby putrescible waste would be picked up separate from non-putrescible and non-putrescible contaminated waste.

[6] Waste originating from the waste transfer station skip bins.

4.0 Conclusion

A waste characterisation study was conducted at the Armidale-Dumaresq Council Landfill with a specific focus on incoming waste generated from the ICI sector and waste disposed of at the general waste bins located at the waster transfer station.

4.1 Composition of waste

The following was observed about the composition of ICI sector waste and waste deposited at the bins located at the waste transfer station, disposed of at the landfill:

- Waste from the ICI sector and the general waste bins located at the waste transfer station accounted for 62% of the waste entering the landfill;
- Five waste categories accounted for 85% of all waste being deposited, by mass, at the landfill and include, putrescible and putrescible contaminated waste (27%), C&D waste (24%), Timber (15%), clean inert waste (11%) and clean recyclable paper products (8%);
- Large amounts of clean paper products, especially cardboard, were disposed of to landfill by the Richards & Sons bulk truck;
- The majority of putrescible and putrescible contaminated waste originated from the Richards & Sons bulk truck and Richards hook truck;
- Large amounts of timber, ferrous metals and C&D waste were disposed of to landfill by Ridley;
- The majority of the hospital waste was considered to be hazardous due to contamination of blood products;
- With the exception of hospital waste, only small amounts of materials considered as hazardous waste were observed.

4.2 Commercial traffic profiles

Most of the vehicles delivering ICI waste, as well as waste from the bins located at the waste transfer station, were large or midsized. However, large vehicles, particularly compactor trucks, delivered most of the waste, based on mass of waste. The following was observed:

- Four haulers account for 74% of all vehicles disposing waste at the landfill and included, Ridley (38%), Richards & Sons bulk truck (23%), Richards & Sons hook truck (12%), and New England and Area Health Services (8%);
- Three haulers account for 87% of all incoming landfill waste by mass, and included, Richards & Sons bulk truck (45%), Richards & Sons hook truck (23%) and Ridley (19%).

4.3 Potential areas for resource recovery

A number of areas for resource diversion from landfill were noted during the characterization study and included:

- Ridley. Most of the waste brought in by Ridley uncontaminated timber, ferrous metal, and uncontaminated inert waste. If incoming waste was sorted on site, much of the Ridley waste could be diverted from the proposed AWT.

- The Armidale School. The waste coming from TAS contained many recyclable goods and an increase of resource separation at source should be conducted, specifically at the food services end.

- University of New England. A large amount of recyclable goods, including paper, cardboard, plastics and glass are thrown out and end up in landfill. Recycling programs should be implemented at various locations including college cafeterias, college dorms, and the Bistro.

- Richards & Sons bulk truck. Large amounts of cardboard are being disposed by this vehicle and it is recommended that a recycling program be implemented to target the ICI sector. Additionally, a large amount of putrescible contaminated waste is dumped. This waste was contaminated during the compaction process in the container of the truck. If possible, a new pick-up schedule is recommended where putrescible waste is collected in one load and non-putrescible waste be collected in a separate load.

5.0 References

Bailie, R.C., Everett, J.W., Liptak, B.G., Liu, D.H.F., Rugg, F.M., Switzenbaum, M.S. 1999, 'Solid Waste', in *Environmental Engineers Handbook*, eds D.H.F. Liu and B.G. Liptak, CRC Press, Boca Raton, pp. 1141-1243.

Appendix A - Methodology

The methodology for the project was developed specifically for this audit, with the aims of ensuring that:

- Accurate, reliable and statistically valid data was collected;
- Measurements were weight-based avoiding the inherent errors of visual estimation;
- Appropriate sampling techniques provided useful data within the available time and budget.

The methodology consisted a weight-based physical field audit, based upon a series of sampling techniques to enable the mixed waste stream of interest to be accurately and efficiently targeted. The methodology was developed to avoid the inherent inaccuracies associated with using visual-based assessment.

A summary of the methodology is provided below.

Sampling Regime

Waste Sub-Streams

Interviews with members of the engineering department at the Armidale-Dumaresq Council determined the vehicles and waste type that would be audited for the study, and included:

- All incoming Industrial, Commercial, and Institutional waste, and
- All other waste deposited at landfill excluding kerbside collected residential waste.

During the meeting with members of Council, 12 distinct waste sub-streams were identified based on the waste diversion practices practiced by Council at the waste management facilities. The sub-streams included[7];

1. Clean inert waste
2. Glass
3. Hard plastics
4. Ferrous metals
5. Non-ferrous metals
6. Soft plastics
7. Cardboard/paper
8. Timber
9. C&D
10. Green waste
11. Putrescible/ putrescible contaminated waste
12. Hazardous.

Data recording sheets

[7] For specific waste types that fell into these sub-streams refer to Appendix C. For definitions of waste listed in Appendix C refer to Appendix D.

For this audit two data-recording sheets were used. A sample of the data recording sheets used for this study are located in Appendix E.

Data recording sheet for incoming vehicles and general waste skips

The first data-recording sheet recorded information from all vehicles that were directed to the waste sorting area, and included:

- Date and time;
- Type of vehicle;
- Load classification, i.e. C&D, institutional, commercial, residential, etc.;
- Entity disposing weight, i.e. specific company, private household, etc.;
- Weight of incoming waste;
- Origin of waste; and
- Percentage breakdown of waste where possible.

Data recording sheet for sorted bins

The second data-recording sheet recorded information pertaining to sorted material bins originating from the audit area and included:

- Date and time;
- Type of material; and
- Weight of all bins with sorted material.

Gatehouse Activities

Attendants at the gatehouse recorded basic information about incoming landfill waste, directed vehicles to the audit area, alerted the physical sorters of incoming vehicles to the sorting area, and recorded skip weights of sorted material.

Basic Information was collected for every vehicle entering the facility that was directed to the landfill during the audit period and stored on the database located on the computer at the gatehouse. The collected data included:

- Date and time;
- Registration number, and;
- Net weight of incoming waste.

In addition to incoming waste haulers, the weight of the contents within the large general rubbish bins located at the waste transfer station were recorded, prior to being emptied at the landfill.

During the waste audit period, the procedures that were followed by the gatehouse attendants were as follows;

1. The first vehicle for the day, disposing any waste, excluding residential kerbside collected waste or waste disposed at the large bins located at the transfer station, was directed to the auditing area. Before directing the vehicle to the audit

area, basic information was collected regarding the hauler and waste and stored on the database located at the gatehouse. Once a vehicle was directed to the audit area, the sorting crew was alerted of the coming vehicle.

2. Once the first vehicle had been sent to the audit area all other vehicles eligible for auditing were sent to the landfill unless otherwise notified by the sorting crew. For these vehicles, only the information stored on the gatehouse database was collected.

3. Throughout the day, when notified by the auditing team, the gatehouse attendant would direct the next eligible waste-carrying vehicle to the audit area. Information for the incoming waste was recorded on computer database and the sorting team was notified of the incoming waste.

4. Throughout the auditing period sorted material bins were sent to the weighing bridge and the weights of the bins recorded by the gatehouse attendant. This information was later collected by the audit supervisor at the end of each audit day.

5. Large skips containing general rubbish from the transfer station were also audited. Once ready for disposal, the waste would either be dropped off at the audit area or the landfill, depending on the request of the sorting team. If the sorting team was sorting waste when the bin was ready for emptying, then the waste would be sent to the landfill. If the sorting team was ready for another load of waste, then the bin would be emptied at the audit area.

Physical sorting

The purpose of the physical sorting was to obtain data specific to the composition of large, highly mixed loads being disposed of at the landfill with the exception of residential kerbside collected waste

Sorting area

The sorting area was located at the north end of the landfill, within the empty area of the cell. This site was chosen on the following criteria:

- Area – sufficient area for 12 skips to be stored and maneuvered, discharging and storing of loads, and maneuvering of waste hauler trucks;
- Access – easy access for diverted trucks; and
- Safety – sufficiently far enough away from the tipping face that the physical sorting team could work safely.

Conducting the sort

Once a load was directed to the sorting area, the audit team leader instructed the driver of the incoming waste where to discharge the load. After the load was discharged, the

waste was quartered and coned manually, with the aid of an excavator, or with a front-end loader, depending on the size of the waste pile. Once this process was completed, the remaining coned pile was completely sorted into one of 12 skips pertaining to the 12 above-mentioned categories. Once a bin containing sorted material had been filled to capacity, it was weighed over the weighbridge, the weight for the containing material recorded at the gatehouse, and the sorted material disposed of at a respective location within the waste management facility. For example, sorted timber was emptied at the timber pile.

Random sampling based on sorters progress was used to determine which of the vehicles disposing waste of interest was sent to the audit area.

The quarter and cone sampling technique in addition to the rate of sampling was derived in consultation with Bailie et al. (1999).

Due to the unpredictable schedule of the contracted skip provider, all skips containing sorted materials at the end of the day were weighed the ensuing morning prior to the opening of the waste management facilities. All weights were recorded on a separate sheet with daily-sorted waste tallies. On the final day of the audit, the weighing of sorted material was conducted at the end of the day and not the ensuing morning.

Clean up

The waste audit team was responsible for ensuring that the sorting area was tidy at the end of each day, and that the area completely cleared at the end of the audit.

Issues during waste sort and data quality

Site Management

Ground Surface Sampling

One of the limitations of the audit process was the contamination of the sample stockpiles from the ground surface on which they were built. There was no access to areas of hardstand on which to construct the sample stockpiles. An attempt was made by the front-end loader operator to lay down areas of crushed rock to increase the stability of the ground surface and further minimise the possibility of contamination. Additionally, the front-end loader operators conducting the quartering and coning sampling were extremely careful not to disturb the ground surface when cutting these samples but it should be noted that the precautions were not full proof and one of two consequences arose:

1. Small pieces of waste were not picked up by the bucket of the front-end loader, or
2. Small amounts of ground surface material was incorporated into the quarter and cone sample.

With this stated, it is believed that the amount of missed waste and levels of ground surface material contamination was minimal.

Additionally, while using the front-end loader and excavator, it was noted that during the sorting process, items fell out of the buckets or claws of the machine in use. Every attempt was made to recover these materials and add them to the quarter and cone sample. There were instances where not all material that fell out of the bucket or claws of the machinery was recovered. It is believed, however, that the items that were not recovered did not influence the end resulting data.

Data Management

A number of minor issues arose with regard to the management of data during the course of the field audit and were resolved during the audit. These issues included the daily reconciliation of data sheets to ensure that all data was captured and that all data sheets were completed correctly and quality checked for errors. This includes a daily check and reconciliation of:

- Data sheet totals;
- Material codes for each skip weighed with sorted material;
- Completion of all data sheet specific information, and;
- Sample totals for weighed skip bins for end of day results.

Appendix B – Waste Audit Results

Refer to Excel sheets

Appendix C – Waste Categories

The twelve categories used for the waste characterisation study included;

1. Cardboard and paper
    - Newsprint
    - Plain OCC/Kraft paper
    - Waxed OCC/Kraft paper
    - High-grade paper
    - Mixed low-grade paper

2. Plastics (plastics accepted by Armidale Recycling Services)
    - PET bottles
    - HDPE natural bottles
    - HDPE coloured bottles
    - # 1 to 7 non-contaminated tubs, cups and lids
    - Other plastic bottles

3. Other plastics (plastics not accepted by Armidale Recycling Services)
    - Non-recyclable rigid plastics

4. Ferrous metals
    - Tin/steel cans
    - Empty paint and aerosol cans
    - Empty propane and other tanks
    - Appliances
    - Other ferrous
    - Composite/other metals.

5. Non-ferrous metals
    - Aluminium cans
    - Aluminium foil/containers
    - Other aluminium
    - Other non-ferrous.

6. C&D waste
    - Clean gypsum board
    - Painted gypsum board
    - Rock/concrete/brick
    - Tar paper
    - Cement board
    - Ceramics

7. Green waste
    - Grass
    - Prunings

8. Timber
    - Clean timber
    - Pressure treated timber
    - Stumps and logs
    - Composite/other wood.

9. Glass
    - Beverage bottles
    - Container glass.

10. Clean Inert (all items in this section were considered not contaminated by putrescibles).
    - Poly-coated paper
    - Composite/other paper
    - Non-food services plastics
    - Non-recyclable food services plastics
    - Non-recyclable rigid plastic packaging
    - Shopping/dry cleaning bags
    - Clean polyethylene film
    - Other film
    - Composite/other plastic
    - Plate glass
    - Rubber
    - Textiles
    - Apparel
    - Carpet/Upholstery
    - Furniture
    - Mattresses
    - Fibreglass insulation
    - Composite/other glass
    - Non-ferrous appliances
    - Composite/other products.

11. Putrescible and putrescible contaminated waste
    - Food
    - Disposable diapers
    - Animal by-products
    - All putrescible contaminated waste
    - Composite/other organic.

12. Hazardous waste
    - Hazardous waste.

Appendix D – Waste Definitions

Paper

1. Newspaper: Printed ground-wood newsprint.

2. Plain OCC/Kraft Paper: Unwaxed/uncoated corrugated container boxes and Kraft paper.

3. Waxed OCC/Kraft Paper: Waxed/coated corrugated container boxes and Kraft paper, and brown paper bags.

4. High-Grade Paper: White and lightly colored bond, rag, or stationery-grade paper. This includes white or lightly colored sulfite/sulfate bond, copy papers, notebook paper, envelopes, continuous feed sulfite/sulfate computer printouts, and forms of all types, excluding carbonless paper.

5. Mixed Low-Grade Paper: Mixed paper accepted by the Armidale Recycling Services. This includes junk mail, magazines, colored papers, bleached Kraft, boxboard, mailing tubes, carbonless copy paper, ground-wood computer printouts, paperback books, and telephone directories. Includes large Kraft carryout bags and white shopping bags without a supermarket name, department stores, hardware stores, etc. with or without handles, paper fast-food packaging bags, paper lunch-size bags, advertising flyers, etc.

6. Polycoated Paper: Bleached and unbleached paperboard coated with HDPE film. This includes polycoated milk, juice (including those with plastic spouts), and ice cream cartons, paper cups, takeout containers, and frozen/refrigerator packaging. Excludes juice concentrate cans.

7. Compostable/Soiled Paper: Paper towels, paper plates, waxed paper, tissues, and other papers that were soiled with food during use (e.g., pizza box inserts).

8. Composite/Other Paper: Predominantly paper with other materials attached (e.g., orange juice cans and spiral notebooks), and other difficult to recycle paper products such as carbon copy paper, hardcover books, photographs, and aseptic drink boxes.

Plastics

9. PET Bottles: Polyethylene terephthalate (No. 1) translucent bottles.

10. HDPE Natural Bottles: High-density translucent polyethylene (No. 2) milk, juice, beverage, oil, vinegar, and distilled water bottles with necks.

11. HDPE Colored Bottles: High-density colored polyethylene (No. 2) bottles. Liquid detergent bottles and some hair care bottles with necks.

12. Other Plastic Bottles: Plastic bottles not classified in the above-defined PET or HDPE categories; includes No. 3 through No. 7, unknown bottles, and other bottles with necks.
13. No. 2, 4, and 5 Tubs, Cups, and Lids: No. 2, 4, and 5 wide mouth cups and tubs, without a neck, and lids, such as for yogurt, cottage cheese, and margarine containers.

14. No. 1, 3, 6, and 7 Tubs, Cups, and Lids: No. 1, 3, 6, and 7 wide-mouth cups and tubs, without a neck, and lids, such as polystyrene (expanded and clear) drink cups, and food, cosmetic, cleaning, auto, and other products and packaging.

15. Nonfood Expanded Polystyrene: Nonfood packaging and finished products made of expanded polystyrene. Includes Styrofoam products made for packaging purposes.

16. Other Food Service Plastics: Includes plastic food-related packaging and finished products not classified elsewhere that are made of polystyrene and other plastics. Includes items such as plates, bowls, clamshells, salad trays, microwave trays, cookie tray inserts, utensils, straws, stirrers, and condiment packaging.

17. Other Rigid Packaging: No. 1 through No. 7 and unmarked rigid plastic packaging and containers(excluding expanded polystyrene and food service plastics). Includes plastic toothpaste tubes and spools.

18. Clean Shopping/Dry Cleaner Bags: Includes grocery and other checkout bags without a supermarket or other type of store name printed on them. This category includes bags intended to contain produce, bread, merchandise, dry-cleaned clothing, and newspapers, but it does not include bags that were not contaminated with food, liquid, or grit during use.

19. Other Clean Polyethylene Film: Polyethylene film, plastic sheeting, and bags, other than those identified above, which were not contaminated with food, liquid, or grit during use.

20. Other Film: Film packaging other than checkout bags, and not defined above, or: was contaminated with food, liquid, or grit during use; is woven together (e.g., grain bags); contains multiple layers of film or other materials that have been fused together (e.g., potato chip bags). This category also includes photographic negatives, shower curtains, and used garbage bags. This category also includes supermarket and shopping bags that were contaminated with food, liquid, or grit during use.

21. Plastic Products: Other finished plastic products made entirely of plastic such as toys, toothbrushes, vinyl hose, and lawn furniture. Includes fiberglass resin products and materials.

22. Composite/Other Plastic: Items that are predominantly plastic with other materials attached such as disposable razors, pens, lighters, toys, and binders.

Glass

23. Beverage Bottles: Bottles of all colors including: soda, liquor, wine, juice, beer, mineral water, and sports drinks.

24. Container Glass: Glass jars and other containers of all colors holding solid and/or liquid materials such as condiments, jam, pickles, nondairy creamer, vinegar, extracts, and facial cream.

25. Plate Glass: Clear or tinted window, door, shelf, tabletop, flat auto, bus shelter, and other flat glass, including tempered.

26. Composite/Other Glass: Mirrors, glassware, crystal, Pyrex, and laminated or curved glass such as windshields.

Non-ferrous metals

27. Aluminum Cans: Aluminum beverage cans (UBC) and bi-metal cans made mostly of aluminum.

28. Aluminum Foil/Containers: Aluminum food containers, trays, pie tins, and foil.

29. Other Aluminum: Aluminum products and scraps such as window frames and cookware.

30. Other Nonferrous: Metals not derived from iron, to which a magnet will not adhere, and which are not significantly contaminated with other metals or materials.

Ferrous metals

31. Tin/Steel Cans: Tinned steel food, pet food, and other containers, including bi-metal cans mostly of steel.

32. Empty Paint and Aerosol Cans: Empty, metal paint and aerosol cans, including metal lids.

33. Empty Propane and Other Tanks: Metal tanks used for storage and distribution of propane and other compressed fuels.

34. Other Ferrous: Ferrous and alloyed ferrous scrap metals, to which a magnet adheres, and which are not significantly contaminated with other metals or materials.

35. Composite/Other Metals: Items that are predominantly metal such as motors, insulated wire, appliances, and other products or parts containing a mixture of metals, or metals and other materials.

Green waste

36. Grass: Grass clippings only, not including sod or weeded plants.

37. Prunings: Leaves, weeds, brush, and cut prunings, 4 feet or less in length, from bushes, shrubs, and trees.

Putrescible and putrescible contaminated waste

38. Food: Food wastes and scraps, including meat, bone, dairy, grains, rinds, tea bags, coffee grounds with filters, food packaging with food scraps, etc.

39. Disposable Diapers: Diapers made from a combination of fibers, synthetic and/or natural, and made for the purpose of single use. This includes disposable baby diapers and adult protective undergarments.

40. Animal By-products: Animal carcasses, animal wastes, animal food scraps and kitty litter.

41. Composite/Other Organic: Combustible materials including wax, bar soap, cigarette butts, feminine hygiene products, vacuum cleaner bag contents, leather, briquettes, and fireplace, burn barrel, and fire-pit ash, and other organic materials not classified elsewhere.

Other Products

42. Tires: Vehicle tires of all types. Inner tubes are put into the rubber category.

43. Rubber: Finished products and scrap materials made of natural and synthetic rubber, such as bath mats, inner tubes, rubber hoses, and foam rubber.

44. Textiles: Rag stock fabric materials and clothing including natural and synthetic textiles such as cotton, wool, silk, woven nylon, rayon, and polyester.

45. Carpet/Upholstery: General category of flooring applications and non-rag stock textiles consisting of various natural or synthetic fibers bonded to some type of backing material.

46. Apparel: Shoes, tennis shoes, purses, and other composite accessories.

47. Furniture: Mixed-material furniture such as upholstered chairs. Furniture that is made purely of one material, such as plastic or metal, would be categorized according to that material (e.g., plastic products or other ferrous metal).

48. Mattresses: Mattresses and box springs.

49. Non-ferrous Appliances: Nonhazardous, electric appliances, not predominantly metal, such as toasters, microwave ovens, power tools, curling irons, and light fixtures.

50. Composite/Other Products: Other multi-material assembled or composite household and other products.

Timber

51. Clean Wood: Including milled lumber commonly used in construction for framing and related uses, including 2 x 4's and 2 x 6's, and sheets of plywood, strandboard, and particleboard.

52. Pallets and Crates: Clean wood pallets (whole and broken), crates, pieces of crates, and other packaging lumber and panel board. Small compostable wooden produce crates are put in the food category.

53. Stumps and Logs: Stumps or logs of various sizes.

54. Composite/Other Wood: Predominantly wood and lumber products that are mixed with other materials in such a way that they cannot easily be separated. This includes wood with metal, gypsum, concrete, or other contaminants.

55. Treated Wood: Painted or chemically treated wood of various size.

C&D Waste

56. Clean Gypsum: Calcium sulfate dehydrate sandwiched between heavy layers of Kraft-type paper. Also known as drywall. This category includes drywall that has not been painted or treated in other ways.

57. Painted Gypsum: Used or demolition gypsum wallboard that has been painted or treated.

58. Fiberglass Insulation: Fiberglass building and mechanical insulation, batt or rigid.

59. Rock/Concrete/Bricks: Rock, Portland cement mixtures (set or unset), and fired-clay bricks.

60. Tar Paper: Tarpaper used for built-up roofing.

61. Ceramics: Finished ceramic or porcelain products such as toilets, sinks, cups, and dishware.

62. Composite/Other Construction Debris: Construction debris (other than predominantly wood) that cannot be classified elsewhere.

Hazardous Waste

63. Hazardous Waste: Latex paints, solvent-based adhesives/glues, water-based adhesives/glues, oil-based paint/solvent, caustic cleaners, pesticides/herbicides, dry-cell batteries, wet-cell batteries, gasoline/kerosene, motor oil/diesel oil, oil filters, asbestos, explosives, medical wastes, other cleaners/chemicals, light bulbs, televisions, computer monitors, other computer equipment, other electronics, certain cosmetics, and other potentially harmful wastes. This category also includes plastic, paper, and glass containers that were used for the sale or distribution of products categorized as hazardous materials and that contained any noticeable amount of the hazardous product.

Appendix E – Data Recording Sheets

Data recording sheet for incoming vehicles and general waste skips

Date page of

	Vehicle Licence or ID	Company	Origin of waste	Vehicle type	Weight of waste	% breakdown of waste	Time
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
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17							
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20							

Notes:

Data recording sheet for sorted bins

week starting .../.../....	Monday	Tuesday	Wed	Thurs	Friday	Sat	Sun
Soft Plastics							
Hard Plastic							
Timber							
Ferrous Metals							
non Ferrous Metals							
Paper/cardboard							
Green waste							
Glass							
Inert non-recyc (clean)							
concrete, brick, other C&D							
putrecible/dirty inert							
Hazardous							

Notes:

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