



**WARRNAMBOOL**  
CITY COUNCIL

## **Kerbside Waste Audit Report**



**A sample of kerbside waste for Warrnambool City Council  
(December 2010)**



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December 2010

## EXECUTIVE SUMMARY

The Warrnambool City Council kerbside waste audit has identified the following key findings:

### Participation

- The average presentation rate of bins for the Warrnambool kerbside waste service was 87%, a slightly higher rate than the 2008 waste audit indicated (81%).
- 43% of the bins in Warrnambool presented for waste collection at the kerbside were full. The percentage of bins presented full at the kerbside was the same as 2008 waste audit data.
- The average bin volume of waste presented at the kerb in Warrnambool was 60L, indicating that a 80L MGB collected on a weekly basis is adequate for residents in the municipality. The fill rates were similar to 2008 recycling audit data (67L).

### Waste

- By weight, approximately 40% of the waste identified is in fact true waste (general waste and nappies and sanitarities).
- 60% of the waste stream in the Warrnambool audit has the potential to be removed from the waste stream by using mechanisms/systems/education to maximise recycling (green & food organics and co-mingled recyclables).
- Food organics is high in terms of weight in the waste stream. More food organics is placed in the waste bin than general waste per household on a weekly basis according to the audit results.
- By weight, paper and cardboard is the largest recyclable material being disposed on in the waste bin. Recyclables make up 17% of the waste stream in the waste bin profile.
- On average Warrnambool residents send 8.68kg of waste to landfill on a weekly basis.
- By improving behaviours in recycling alone, potentially the amount of waste per household could be reduced to under 8kg per week.
- The amount of general waste being placed in kerbside waste bins is significantly lower than 2008 data, but the amount of food organics placed in the waste bin has increased.

It is also recommended that Warrnambool City Council should investigate the viability of a green waste and food organics collection service, potentially increasing the council's current resource recovery rates and reducing waste to landfill.

Other opportunities for reducing waste should include on community education programs, focussing on information concerning what can be recycled, purchasing choices and managing waste in your own backyard (home composting/worm farming).

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## 1. PROJECT SCOPE

### 1.1 INTRODUCTION

The Waste Reduction Group (WRG) was contracted by Warrnambool City Council, to undertake a waste audit on a random kerbside collection of 80 litre general waste bins over five collection areas within the municipality

	Waste
No of bins to be audited per day	100
Container system	80L
Collection frequency	Weekly
Collection contractor	Wheelie Waste

### 1.2 OBJECTIVES

The **waste audit** will identify and quantify in terms of weight and volume, the waste streams and recyclables appearing in the general waste collection.

### 1.3 WARRNAMBOOL CITY COUNCIL DEMOGRAPHIC DATA

WARRNAMBOOL CITY POPULATION	33,500*
RESIDENTIAL TENEMENTS WITH SERVICE	13,700*

\*Information provided by Warrnambool City Council

## 1.4 WASTE AUDIT TEAM

Auditor – WRG (Jill Fraser)

Warrnambool City Council– support staff (Kate McInnes)

Warrnambool City Council- presentation and fill rate data collection (Kate McInnes)

Data Recorder – WRG (Jill Fraser & Yolande Lunn)

Audit Staff – WRG (various casual employed staff)

First Aid Officer – WRG (Jill Fraser)

Executive Officer – WRG (Cydoni Younie)

Education Officer- WRG (Jacqueline Wilson)

## 2. HISTORICAL INFORMATION

The WRG has previously conducted kerbside waste audits for Warrnambool City Council. This data has provided useful information in establishing a household waste profile for the residents of the Warrnambool. In addition to these audits, Warrnambool City Council provides data to contribute to Sustainability Victoria's Annual Local Government Data Collection Survey (LGDS). The LGDS provides estimated household recycling and waste weights based on the data submitted by the waste contractor to Council.

### Kerbside waste (Warrnambool 2008)

WASTE BREAKDOWN	kg	%	kg/hhld/ wk	Litres	%	L/hhld/wk
General Waste	1573.62	37%	3.28	19909	45%	41.48
Co-mingled Recyclables	634.13	15%	1.32	12329	28%	25.69
Green Waste	336.92	8%	0.70	2760	6%	5.75
Food Organics	1365.75	32%	2.85	7551	17%	15.73
Nappies and Sanitaries	317.27	8%	0.66	1908	4%	3.98
<b>Total</b>	<b>4227.69</b>	<b>100%</b>	<b>8.81</b>	<b>44457</b>	<b>100%</b>	<b>92.63</b>

### Warrnambool City Council Local Government Data Collection Survey (LGDC) 2008-2009

WARRNAMBOOL CITY COUNCIL	Waste
TOTAL RESIDENTIAL PROPERTIES SERVICED	13293
ANNUAL SERVICE COST (Waste ONLY)	\$943,585
TONNES COLLECTED	5521
COST PER TONNE	\$170.91
COST PER HOUSEHOLD (HHLD) SERVICED	\$70.98
YIELD (KG/HHLD)	415

(Data provided by Sustainability Victoria)

### 3. PRE-PLANNING

Meetings were conducted with the Warrnambool City Council to discuss collection areas, collection of waste, disposal, work areas and safety issues and systems.

Audit categories were modelled on advice from Sustainability Victoria.

#### 3.1 COLLECTION AREAS

Warrnambool City Council nominated specific areas in the municipal boundaries in which the collection contractor was to collect the d waste samples for the audit. These collection areas were based on the regular collection service provided by the council.

One specific area was to be audited each day. These areas were chosen to provide a spread of demographic types from across the council.

The areas chosen were:

<b>COLLECTION AREA</b>	<b>DATE</b>	<b>Number of bins</b>	<b>Bin size</b>
Day 1 –Waste Dennington	29/11/2010	100	80L
Day 2- Waste Woodford	30/11/2010	105	80L
Day 3- Waste Merri Street East	1/12/2010	100	80L
Day 4- Waste Jamieson Street/Raglan Parade	2/12/2010	100	80L
Day 5- Waste Wanstead Street	3/12/2010	100	80L

#### 3.2 SAMPLE SIZE

A sample size of 500 bins from the identified collection areas was collected for the audit.

A total of 500 tenements audited for a population of 13,700 tenements served, produce a confidence interval of 4.3, in combining the confidence interval with a 95% confidence level, we estimate that the audit results are in the range of +/- 4.3% of true reflection. Further information concerning confidence intervals can be referred to in Appendix H.

#### 3.3 COMMUNITY AWARENESS

The audit is conducted in a manner that minimises disruption to households. Individual residents were not notified that their household was to be audited, as this may have influenced their disposal behaviour. Warrnambool City Council placed a notice in the local newspaper advising that random audits of waste would be conducted over the next few months and that the audit will be an aggregated audit and individual household recyclables will not be identified or supply source recorded.

#### 3.4 CUSTOMER SERVICE INFORMATION

Customer Service representatives at Warrnambool City Council and at the contractor's office were briefed on the audit timing and the procedure to allow them to provide information to residents if required. This information included the purpose of the audit and the basic audit procedure. It emphasised that residents' privacy was to be protected and all results would only be considered on an aggregated basis and not supply source recorded.

### 3.5 BIN PRESENTATION AND ESTIMATED VOLUME

Warrnambool City Council conducted presentation checks of kerbside bins on the evening prior to collections. In addition to presentation checks, data concerning the volumes of a sample of bins from each of the collection areas was recorded. Estimated volume was based on observations and an estimated % of how full the bin was, by walking the collection area and opening the individual bins.

It should be noted that it would be preferred that bin presentation rate is conducted at the time of collection to ensure complete accuracy. The figures indicated do not take into account that some households may present their bin in the morning or just before the truck approaches for collection. It should also be noted that presentation rates do not take into consideration that some households only present their bins for collection when they are full or more than half full (needs basis).

### 3.6 OCCUPATION HEALTH AND SAFETY

All audit staff had Hepatitis A and B vaccinations and Tetanus vaccinations. The WRG retain documentation of these records.

The auditor conducted an onsite safety assessment of the audit site and inducted all audit staff on the site safety plan and the audit plan (*refer to Appendix A and B*). Audit staff all signed confidentiality agreements in relation to information seen during the audits and the prevention of removal of any items or information from the site. All audit staff were provided with personal protective equipment (PPE) and were instructed on how to use the equipment.

A first aid officer (Level 1) was nominated and a first aid kit was provided.

### 3.7 EQUIPMENT

The WRG arranged all the equipment needed for the audit to be conducted and arranged for the equipment to be transported and established at the audit site.

## 4. AUDIT SITE LOCATION

### Warrnambool

Warrnambool Transfer Station  
Harrington Road, Warrnambool

## 5. AUDIT METHODOLOGY

### 5.1 PRESENTATION RATE

Warrnambool City Council inspected and recorded the presentation rate of bins in the nominated areas. This was conducted on the evening prior to the collection of bins.

### 5.2 ESTIMATED VOLUMES

Warrnambool City Council selected a random sample bins from each of the five collection areas and recorded the approximate % filled volume of each bin. This was undertaken on the evening prior to collection.

### 5.3 COLLECTION

At a stage when the contractor's collection truck was empty, the nominated number of waste bins was collected from Warrnambool City Council over the five days. This sample was taken to Warrnambool Transfer Station where it was deposited on the ground in an allocated area.

## 5.4 AUDIT SITE

The waste audit team secured the safety of the area with temporary barricades and established the auditing table, scales and specific product bins.

## 5.5 AUDIT PROCEDURE

The Audit was conducted in a number of steps including:

1. A safety plan was documented and the Audit Team were provided with information concerning the OH&S issues associated with auditing and the categories of waste streams the sample were to be separated into.
2. All handling of the waste was by the use of tools.
3. Numerous photos were taken documenting different waste streams that were discovered.
4. Sorting of aggregated product on the ground, categorising main recyclables and waste types into clearly market crates identifying the waste stream. Crates were weighed, weights and volumes of the categories were documented and waste streams were then disposed of appropriately either in the recyclable or waste collection point.
5. For recycling audits, bagged waste was put to one side for auditing after loose material had been sorted and completed. Bagged waste was placed on the sorting table and opened for auditing. Recyclables and contaminants were sorted into the appropriate category, weights and volumes of the categories were documented separately under bagged waste contamination. All recyclables and contaminants sorted in the bagged waste category were disposed of appropriately either in the recyclable or waste collection point.
6. The audit site was thoroughly cleaned

## 5.6 WASTE/RECYCLING STREAM COMPONENTS

Waste/Recycling stream types for auditing purposes were used in accordance with Sustainability Victorias Waste Audit Template for kerbside waste. A detailed breakdown for waste and recycling auditing can be referred to in **Appendix C**.

# 6. WASTE ANALYSIS RESULTS

## 6.1 PRESENTATION RATE

	2010 Waste	2008 Waste
Residences sample size	500	480
Total residence traversed to obtain sample size	574	589
Presentation rate %	87%	81%

- The presentation rate observations indicate a slight increase in the percentage of bins presented at the kerbside.
- It should be noted that the presentation rate does not take into consideration that some households may only present their bin when the collection truck approaches their house, or that some households only present their bin when it is completely full (needs basis).



## 6.2 ESTIMATED FILLED VOLUMES

	2010 Waste	2008 Waste
Bin sample size	500	480
Lowest filled volume (Ltrs)	20	8
AVG filled volume (ltrs)	60	67
% Totally filled bins	43%	43%

- The average fill rate of recycling bins in Warrnambool City Council in 2010 is 60L, indicating that an 80L waste bin collected on a weekly basis is sufficient to meet the needs of residents.
- The percentage of totally filled bins presented for collection has not altered between 2008 and 2010 data.

## 6.3 WASTE

A detailed breakdown of the waste streams recorded can be referred to in **Appendix C**.

For the purpose of summarising results, the main waste streams that have been identified in the waste bins are:

### KERBSIDE WASTE AUDIT

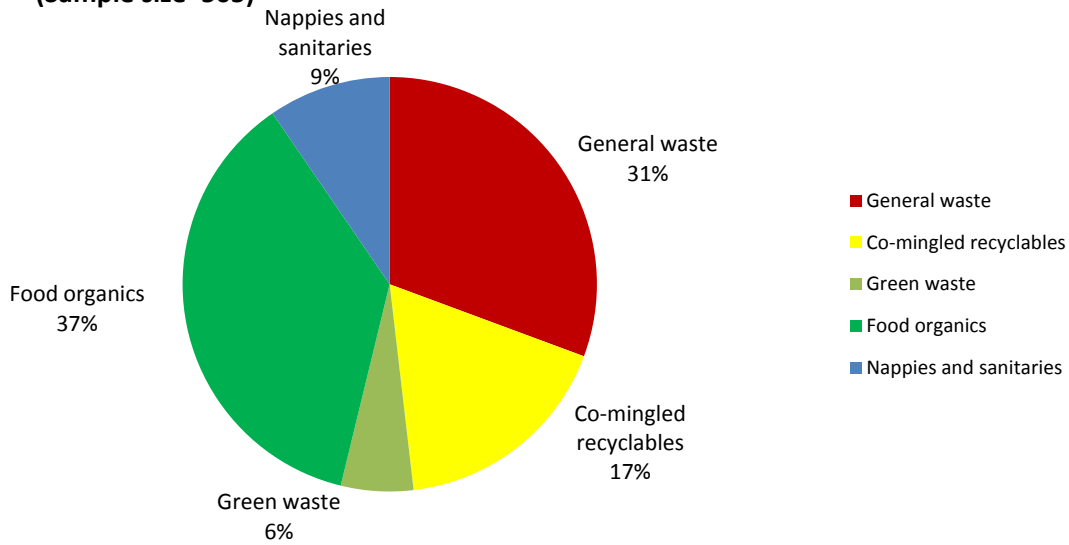
- **Co-mingled Recyclables** (recyclables that should be placed in the recycling bin)
- **Green Waste** (Garden waste)
- **Food organics**
- **Nappies and Sanitaries**
- **General Waste** (All waste types not placed in the above mentioned categories)



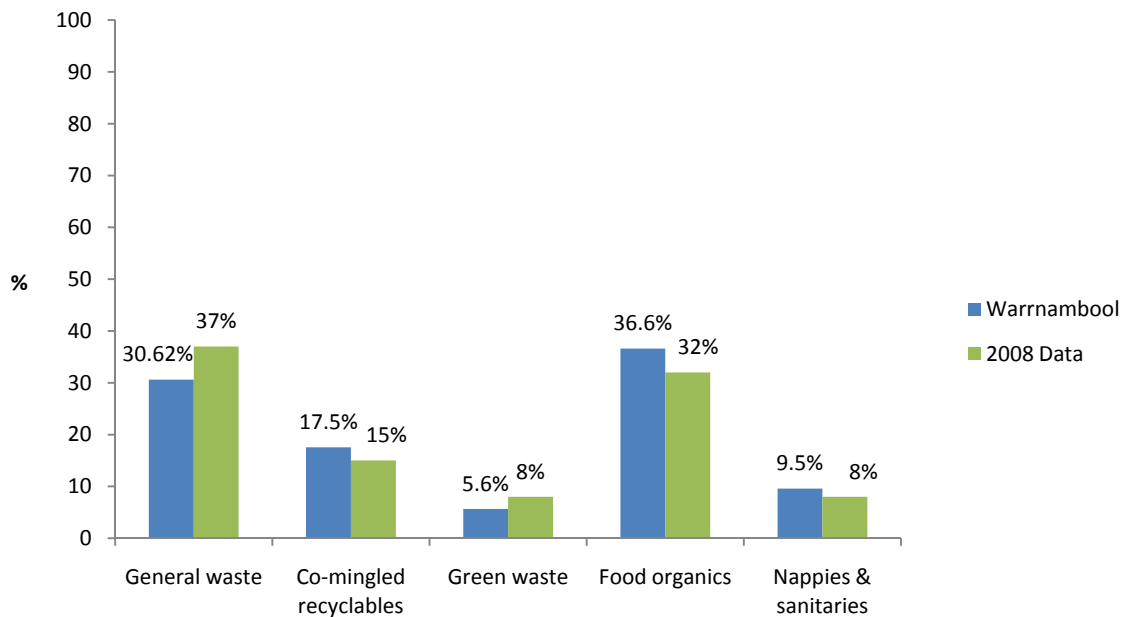
**100 Kerbside waste bins were audited each day over a week period.**

## 6.4 WASTE PROFILE

### WASTE PROFILE 2010- % by kg per household per week Warrnambool City Council Audit (Sample size=505)



### WASTE PROFILE 2008 & 2010- % by kg per household per week Warrnambool City Council Audit (Sample size=505, 2008 Data=480)



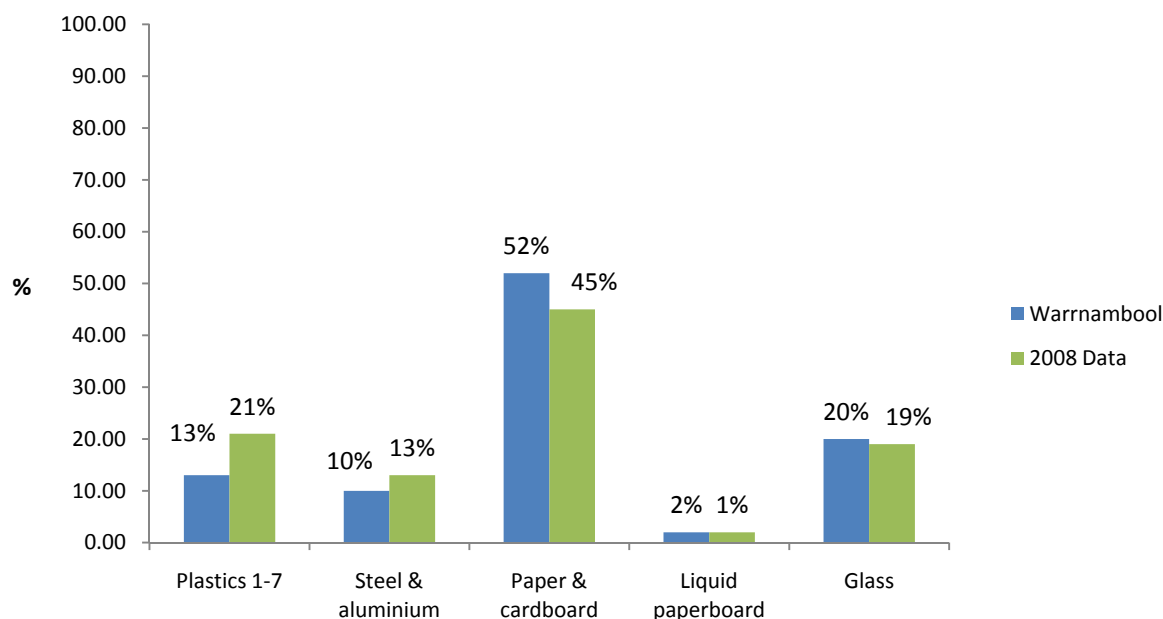
Waste breakdown	Warrnambool				2008
	kg	kg/hh/wk	Ltrs	Ltrs/hh/wk	Kg/hh/ wk
General waste	1,341.99	2.66	14,796.00	29.30	3.28
Co-mingled recyclables	768.72	1.52	11,316.00	22.41	1.32
Green waste	248.27	0.49	1,560.00	3.09	0.70
Food organics	1,604.03	3.18	7,075.00	14.01	2.85
Nappies and sanitararies	420.18	0.83	1,745.00	3.46	0.66
<b>TOTAL</b>	<b>4,383.19</b>	<b>8.68</b>	<b>36,492.00</b>	<b>72.26</b>	<b>8.81</b>

## 6.5 WASTE PROFILE CONTINUED

- By weight per household, approximately 40% of the waste identified is in fact true waste (general waste and nappies and sanitarries), this is similar to waste audit data collected in 2008 (44%).
- 60% of the waste stream in the Warrnambool audit has the potential to be removed from the waste stream by using mechanisms/systems/education to maximise recycling (green & food organics and co-mingled recyclables).
- Food organics is high in terms of weight in the waste stream. According to the audit, more food organics is placed in the waste bin than general waste per household per week.
- By improving behaviours in recycling alone, potentially the amount of waste per household could be reduced to under 8kg per week.
- The amount of general waste being put in the bins is significantly lower than 2008 data, but the amount of food organics placed in the waste bin has increased.
- By weight recyclables make up 17% of the waste stream in the waste bin profile.

### 6.5.1 RECYCLABLES IN THE WASTE STREAM

**RECYCLABLES IN THE WASTE STREAM PROFILE 2010- % by kg per household per week  
Warrnambool City Council Waste Audit  
(Sample size=505, 2008 Data=480)**



Recyclables in the waste stream	Warrnambool				2008
	kg	kg/hh/wk	Ltrs	Ltrs/hh/wk	Kg/hh/ wk
Plastics (1-7)	105.12	0.21	<b>3,086.00</b>	6.11	0.27
Steel/Aluminium	81.23	0.16	<b>1,455.00</b>	2.88	0.17
Paper & cardboard	404.83	0.80	<b>5,580.00</b>	11.05	0.59
Liquid paperboard	21.05	0.04	<b>615.00</b>	1.22	0.03
Glass	156.49	0.31	<b>580.00</b>	1.15	0.25
<b>TOTAL</b>	<b>768.72</b>	<b>1.52</b>	<b>11,316.00</b>	<b>22.41</b>	<b>1.32</b>

### 6.5.1 RECYCLABLES IN THE WASTE STREAM CONTINUED

- By weight, paper and cardboard is the largest recyclable material being disposed of in the waste bin. This is consistent in both waste audits conducted.
- By weight recyclables make up 17% of the waste stream in the waste bin profile.
- Glass, and plastics are relatively high in terms of weight.
- Warrnambool City Council residents send approximately 1.52kg of recyclables each week to landfill, this is similar to the 2009 audit data results.

### 6.5 WASTE RESULTS BY TOWNSHIPS

A detail breakdown of waste stream results by collection area can be referred to in:

**APPENDIX D1- Dennington**

**APPENDIX D2- Woodford**

**APPENDIX D3- Merri Street East**

**APPENDIX D4- Jamieson Street/Raglan Parade**

**APPENDIX D5- Wanstead Street**

## 7. TOTAL WASTE AUDIT / LOCAL GOVERNMENT DATA COLLECTION SURVEY (LGDC)

It should be noted that when comparing the results from the audit to the data submitted by Council for the LGDC, the calculations indicates a small discrepancy in the quantity of waste collected. The LGDC figures are calculated on the number of residents serviced across the whole shire therefore leading to the small differences in data. Other possible reasoning for these small discrepancies could be an unusual collection week (wet/rain week), larger contamination rates than usual or incorrect number of household bins supplied for the audit.

The purpose of the audit is not to dispute the LGDC survey results but to provide Council with a snap shot of waste and recycling in the municipality at a particular time.

	Audit (kg)	Audit kg/hhld/wk	Audit kg/hhld/yr	LGDC (Tonnes)	LGDC kg/hhld/wk	LGDC kg/hhld/yr
<b>Warrnambool Waste</b>	4,383.19	8.68	451.36	5521	7.9	415

Local Government Data Collection Survey (LGDC) – Glenelg Shire 2008-2009  
(Data provided by Sustainability Victoria)

\*Quantity collected, not quantity recycled



Waste is sorted on a table into the various categories.

## 8. KERBSIDE WASTE SUMMARY

### Participation

- The average presentation rate of bins for the Warrnambool kerbside waste service was 87%, a slightly higher rate than the 2008 data indicated (81%).
- 43% of the bins in Warrnambool presented for waste collection at the kerbside were full. This is significantly lower than the 45% of bins presented for recycling being full in 2009 audit in Portland.
- 52% of the bins audited in Warrnambool for the kerbside waste collection were full presented for waste collection, were full.
- The average bin volume of waste presented at the kerb in Warrnambool was 60L, indicating that a 80L MGB collected on a weekly basis is adequate for residents in the municipality. The fill rates were similar to 2008 recycling audit data (67L).

### Waste

- By weight, approximately 40% of the waste identified is in fact true waste (general waste and nappies and sanitariums). 60% of the waste stream in the Warrnambool audit has the potential to be removed from the waste stream by using mechanisms/systems/education to maximise recycling (green & food organics and co-mingled recyclables).
- Food organics is high in terms of weight in the waste stream. More food organics is placed in the waste bin than general waste per household on a weekly basis according to the audit results.
- By weight, paper and cardboard is the largest recyclable material being disposed on in the waste bin.
- By weight recyclables make up 17% of the waste stream in the waste bin profile.
- On average Warrnambool residents send 8.68kg of waste to landfill on a weekly basis.
- By improving behaviours in recycling, potentially the amount of waste per household could be reduced to under 8kg per week.
- The amount of general waste being placed in kerbside waste bins is significantly lower than 2008 data, but the amount of food organics placed in the waste bin has increased.



## 9. ADDITIONAL OBSERVATIONS/LIMITATIONS

- Day 1 of auditing showed a large amount of toys which may be linked to a clean out before Christmas.
- It was noted on day 4 that there were 3 large bags of dental surgery waste. Syringes (no sharps), rubber gloves and face masks.
- Day 5 of auditing showed a large amount of medical waste, no syringes
- It was also noted that there were large quantities of lawn clippings on day 5 of auditing.



Toys were a common waste item on day 1 auditing



There was significant variation in the amount of green waste audited daily.



Medical waste was evident in 2 days of the audits.



Items that can be recycled through waste facilities/businesses can have significant bearing on the weight of waste sent to landfill.

## 10. RECOMMENDATION

- Provide education programs which focus diverting recyclables from the waste stream. This may include specific programs for specific waste types, for example bagged products.
- Provide education programs which focus on not only reducing waste in the home but also to maximise recycling. For example consider packaging types when shopping.
- Investigate the viability of a green waste and food organics collection service with the municipality.
- Continue to provide education programs which focus on diverting food organics and green waste at home. Eg: Home composting and worm farming.
- Investigate charity collection programs for diverting textiles and toys. Example: Southern Cross Recycling (<http://www.southerncrossrecycling.com.au/school-fundraising-ideas.html>)

## APPENDIX A: RISK ASSESSMENT

**RISK ASSESSMENT:** Warrnambool Transfer Station

**DATE:** NOVEMBER/December 2010

**FOR:** WASTE AUDIT FOR THE WARRNAMBOOL CITY COUNCIL

<b>SEVERITY OF HAZARD</b>		<b>LIKELY OCCURRENCE</b>		
	<b>VERY LIKELY 1</b>	<b>2</b>	<b>3</b>	<b>VERY UNLIKELY 4</b>
<b>MOST SEVERE 1</b>		Sharps Fall into Skip		Traffic accident
<b>2</b>	Noise			
<b>3</b>	Exposure to Dust Back Soreness Heavy Lifting	Exposure to Bacteria		
<b>4</b>	Tripping			
<b>LEAST SEVERE 5</b>				Fatigue Exposure to Odour



## APPENDIX B: SAFETY PLAN

**SAFETY PLAN :** Waste & Recycling audits (WARRNAMBOOL TS)  
**DATE:** NOVEMBER 2010

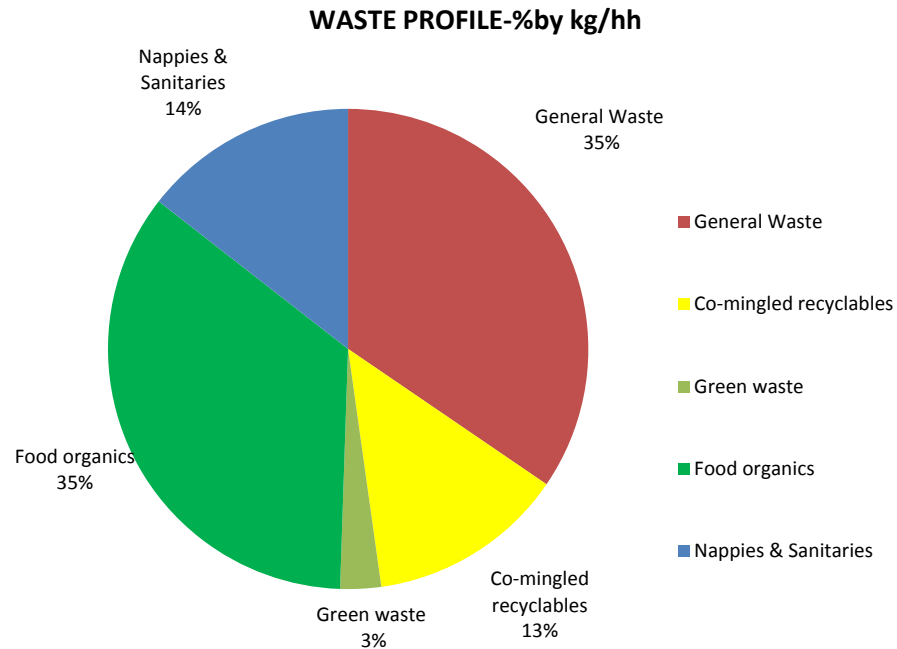
HAZARD	RANKING	RISK	ACTION
Sharps Exposure to chemicals Fall into a Skip Noise	1	2	<ul style="list-style-type: none"> <li>-Personnel to be made aware of potential risks. Sharps to be placed into appropriate container.</li> <li>- Personnel to be briefed on standard yellow sharps containers which may be used for containment of needles. If sharps are located a ""call out"" will occur. Work will not commence until the problem has been contained.</li> <li><b>-All handling of the waste other than by the use of tools is prohibited</b></li> <li>-All waste personnel are to be given a copy of this Audit Plan and will be instructed to read the plan prior to works commencing.</li> <li>-Personnel to wear protective clothing.</li> <li>-Suitable washing facilities to be provided.</li> <li>-Work Site to be well ventilated.</li> <li>-Spill kits to be provided.</li> <li>-Ready access to medical advice be available.</li> <li>-Sites to have safety barriers installed where possible during the audit process. If this is not possible, practical advice on skip access will be delivered by the supervising auditor.</li> <li>-Personnel to be advised of site noise and to take protective measures.</li> </ul>
Back Soreness, Heavy Lifting Exposure to Dust,	2	3	<ul style="list-style-type: none"> <li>-Rotation of staff involved in heavy lifting will occur to help reduce the incidence of heavy lifting and back soreness.</li> <li>-Appropriate lifting techniques are to be used.</li> <li>-If necessary face masks are available to be worn. Work site to be well ventilated.</li> </ul>
Traffic Accident Tripping	3	4	<ul style="list-style-type: none"> <li>-Personnel to wear high visibility jackets onsite. -Personnel to be briefed on traffic movements at the site.</li> </ul>
Exposure to Bacteria	4	6	<ul style="list-style-type: none"> <li>-Personnel to wear the necessary PPE to reduce the exposure to bacteria.</li> </ul>
Fatigue Exposure to Odour	5	20	<ul style="list-style-type: none"> <li>-Monitor staff well-being. Provide timely work breaks.</li> <li>-Ensure drinking water is on hand.</li> <li>-Work site to be well ventilated. PPE to be worn were appropriate.</li> </ul>

# APPENDIX C:

## WASTE BREAKDOWN

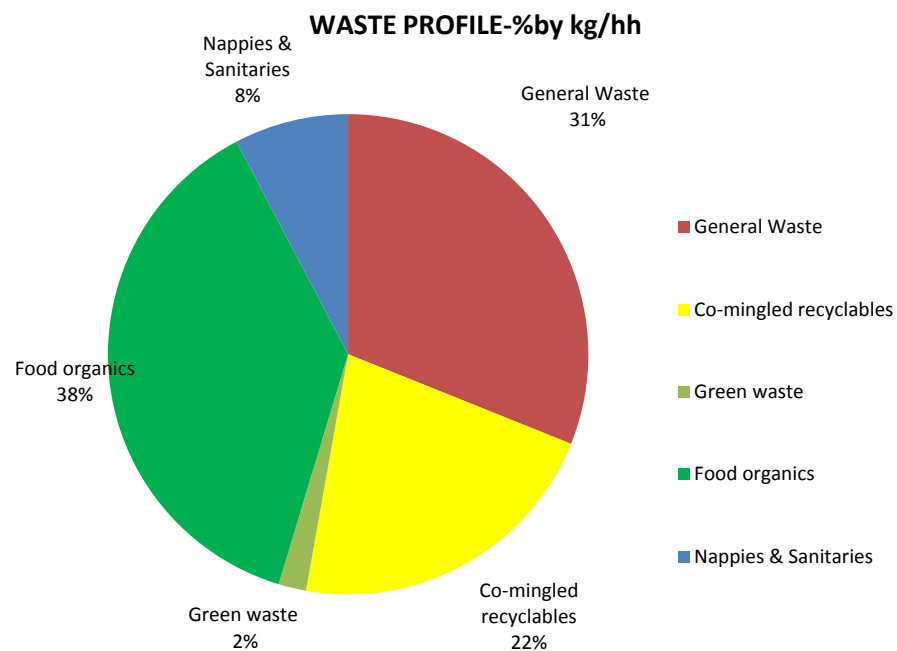
RECYCLABLES	Dennington 29/11/2010		Woodford 30/11/2010		Merri Street (East) 1/12/2010		Jamieson St/Raglan Pde 2/12/2010		Wanstead Street 3/12/2010	
	Weight (kg)	Volume (L)	Weight (kg)	Volume (L)	Weight (kg)	Volume (L)	Weight (kg)	Volume (L)	Weight (kg)	Volume (L)
PET (1) Bottles	4.5	150	9.89	350	1.66	170	5.65	160	5.39	190
HDPE (2) Bottles & Containers	3.94	90	6.97	195	4.5	80	3.98	115	4.4	120
PVC (3) Bottles	0.47	10	0.48	20	0	0	3.17	5	0.28	10
LDPE (4)	0.39	10	1.23	30	0	0	0.91	5	0.46	5
PP (5) Containers	3.16	90	5.57	180	3.45	120	4.14	135	3.79	130
PS (6) Containers	4.14	190	3.72	200	1.71	90	1.53	70	2.23	110
Other Plastic (7) Containers	0.86	1	3.91	15	2.41	15	2.3	10	3.93	15
Glass (Bottles & Jars)	28.68	100	52.21	210	23.27	80	24.16	90	28.17	100
Aluminium Cans / Foil	2.42	80	4.68	150	4.48	140	2.91	90	7	230
Steel Cans	4.96	65	14.66	195	4.79	55	8.56	120	12.86	160
Aerosol Cans	1.89	20	3.14	30	2.46	60	3.4	30	3.02	30
Liquid Paperboard (Milk & Juice)	3.07	80	5.24	160	4.12	135	3.62	90	5	150
Paper / Newspaper / Magazines	36.12	470	79.68	940	57.35	730	52.51	640	69.37	660
Cardboard	15.94	285	28.13	600	16.46	390	23.83	360	25.44	505
Other	0	0	0	0	0	0	0	0	0	0
<b>SUB TOTAL</b>	<b>110.54</b>	<b>1641</b>	<b>219.51</b>	<b>3275</b>	<b>126.66</b>	<b>2065</b>	<b>140.67</b>	<b>1920</b>	<b>171.34</b>	<b>2415</b>
NON RECYCLABLES	Weight (kg)	Volume (L)	Weight (kg)	Volume (L)	Weight (kg)	Volume (L)	Weight (kg)	Volume (L)	Weight (kg)	Volume (L)
Green Waste	23.08	180	19.41	210	96.36	490	42.94	320	66.48	360
Timber (tree logs)	0	0	0	0	0	0	0	0	0	0
Food Waste	292.51	1330	379.99	1735	311.36	1430	317.99	1350	302.18	1230
Nappies & Sanitary Items	120.5	440	77.92	320	70.56	350	51.76	260	99.44	375
Non recyclable packaging (soft)	38.43	1010	46.58	1370	29.96	920	29.07	820	35.25	1120
Non recyclable packaging (rigid)	14.2	200	19.76	340	8.49	200	10.96	260	20.08	380
Polystyrene (expanded foam)	1.1	60	3.28	180	2.65	150	2.76	140	3.33	240
Building Materials (incl timber)	5.7	20	21.34	200	9.98	42	3.68	30	25.98	82
Textiles	17.86	210	33.51	300	17.2	240	23.21	250	28.34	240
Leather, Rubber, Oil & Ceramics	9.18	110	32.41	130	11.72	75	15.74	90	30.73	160
Inert dust, soil, sand etc	21.3	60	33.1	110	13.13	40	46.69	150	51.88	105
Other metal objects	38.84	55	5.61	20	2.02	5	2.53	15	3.8	10
Batteries	0.75	6.5	1.36	1	1.35	1	0.55	1	18.15	12
E-Waste	3.64	20	4.86	20	8.83	61	7.04	30	8.02	65
Hazardous Items	0.26	0.5	1.04	5	1.9	10	2.68	15	1.18	10
Other (Golf Balls)	2.86	0	0	0	0.76	4	0	0	0	0
General Waste	134.54	1030	111.29	1055	66.52	570	82.33	740	110.7	1000
<b>SUB TOTAL</b>	<b>724.75</b>	<b>4732</b>	<b>791.46</b>	<b>5996</b>	<b>652.79</b>	<b>4588</b>	<b>639.93</b>	<b>4471</b>	<b>805.54</b>	<b>5389</b>
<b>TOTAL</b>	<b>835.29</b>	<b>6373</b>	<b>1010.97</b>	<b>9271</b>	<b>779.45</b>	<b>6653</b>	<b>780.6</b>	<b>6391</b>	<b>976.88</b>	<b>7804</b>

## Appendix D1: TOTAL WASTE- 29/11/2010 WARRNAMBOOL- Dennington (n=100)



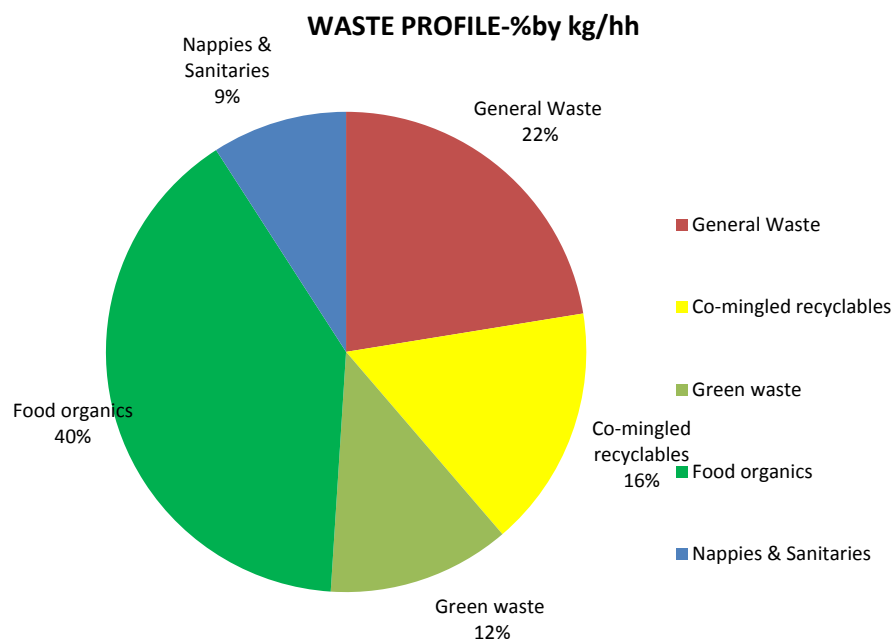
Recycling breakdown	Weight (kg)	Volume (L)	Kg/hh/wk	L/hh/wk
Plastic Code 1-7)	17.46	541	0.17	5.41
Steel & Aluminium (includes cans, clean foil & aerosol cans)	9.27	165	0.09	1.65
Paper & Cardboard	52.06	755	0.52	7.55
Liquid paperboard	3.07	80	0.03	0.80
Glass	28.68	100	0.29	1.00
<b>TOTAL</b>	<b>110.54</b>	<b>1,641</b>	<b>1.11</b>	<b>16.41</b>
Waste breakdown	Weight (kg)	Volume (L)	Kg/hh/wk	L/hh/wk
General Waste	288.66	1,141.00	2.89	11.41
Co-mingled recyclables	110.54	1,641.00	1.11	16.41
Green waste	23.08	180.00	0.23	1.80
Food organics	292.51	1,330.00	2.93	13.30
Nappies & Sanitaries	120.50	440.00	1.21	4.40
<b>TOTAL</b>	<b>835.29</b>	<b>4,732.00</b>	<b>8.35</b>	<b>47.32</b>

## Appendix D2: TOTAL WASTE- 30/11/2010 - Woodford (n=105)



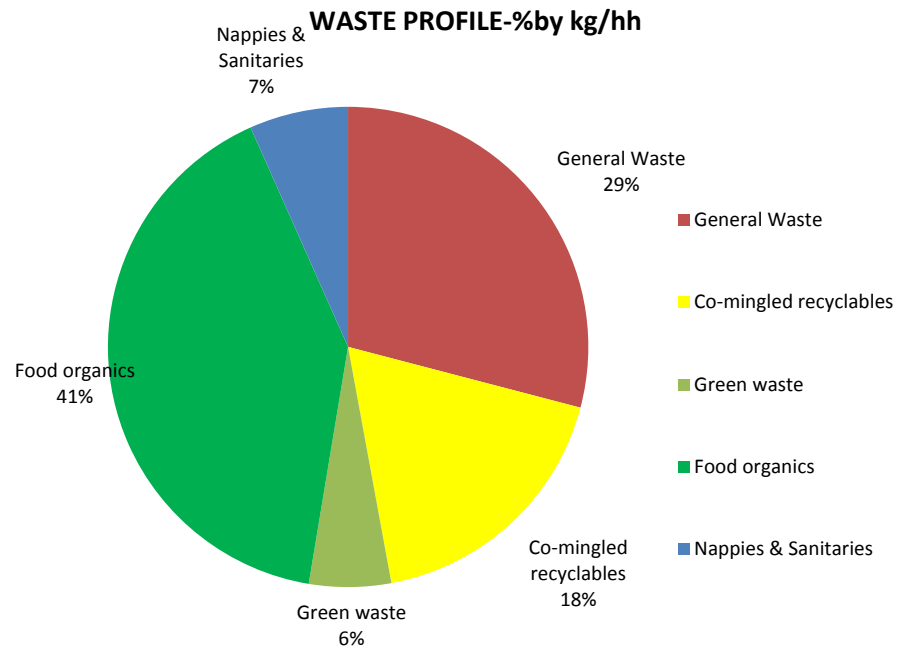
Recycling breakdown	Weight (kg)	Volume (L)	Kg/hh/wk	L/hh/wk
Plastic Code 1-7)	31.77	990	0.30	9.43
Steel & Aluminium (includes cans, clean foil & aerosol cans)	22.48	375	0.21	3.57
Paper & Cardboard	107.81	1,540	1.03	14.67
Liquid paperboard	5.24	160	0.05	1.52
Glass	52.21	210	0.50	2.00
<b>TOTAL</b>	<b>219.51</b>	<b>3,275</b>	<b>2.09</b>	<b>31.19</b>
Waste breakdown	Weight (kg)	Volume (L)	Kg/hh/wk	L/hh/wk
General Waste	314.14	3,731.00	2.99	35.53
Co-mingled recyclables	219.51	3,275.00	2.09	31.19
Green waste	19.41	210.00	0.18	2.00
Food organics	379.99	1,735.00	3.62	16.52
Nappies & Sanitaries	77.92	320.00	0.74	3.05
<b>TOTAL</b>	<b>1,010.97</b>	<b>9,271.00</b>	<b>9.63</b>	<b>88.30</b>

## Appendix D3: TOTAL WASTE- 1/12/2010 - Merri Street East (n=100)



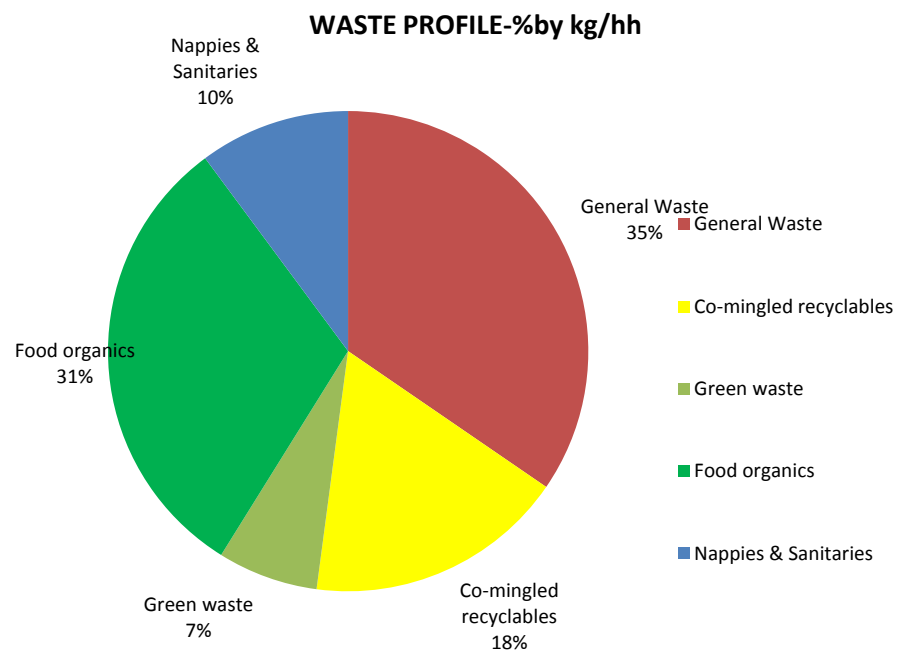
Recycling breakdown	Weight (kg)	Volume (L)	Kg/hh/wk	L/hh/wk
Plastic Code 1-7)	13.73	475	0.14	4.75
Steel & Aluminium (includes cans, clean foil & aerosol cans)	11.73	255	0.12	2.55
Paper & Cardboard	73.81	1,120	0.74	11.20
Liquid paperboard	4.12	135	0.04	1.35
Glass	23.27	80	0.23	0.80
<b>TOTAL</b>	<b>126.66</b>	<b>2,065</b>	<b>1.27</b>	<b>20.65</b>
Waste breakdown	Weight (kg)	Volume (L)	Kg/hh/wk	L/hh/wk
General Waste	174.51	2,318.00	1.75	23.18
Co-mingled recyclables	126.66	2,065.00	1.27	20.65
Green waste	96.36	490.00	0.96	4.90
Food organics	311.36	1,430.00	3.11	14.30
Nappies & Sanitaries	70.56	350.00	0.71	3.50
<b>TOTAL</b>	<b>779.45</b>	<b>6,653.00</b>	<b>7.79</b>	<b>66.53</b>

## Appendix D4: TOTAL WASTE- 2/12/2010 - Jamieson Street/Raglan Parade (n=100)



Recycling breakdown	Weight (kg)	Volume (L)	Kg/hh/wk	L/hh/wk
Plastic Code 1-7)	21.68	500	0.22	5.00
Steel & Aluminium (includes cans, clean foil & aerosol cans)	14.87	240	0.15	2.40
Paper & Cardboard	76.34	1,000	0.76	10.00
Liquid paperboard	3.62	90	0.04	0.90
Glass	24.16	90	0.24	0.90
<b>TOTAL</b>	<b>140.67</b>	<b>1,920</b>	<b>1.41</b>	<b>19.20</b>
Waste breakdown	Weight (kg)	Volume (L)	Kg/hh/wk	L/hh/wk
General Waste	227.24	2,541.00	2.27	25.41
Co-mingled recyclables	140.67	1,920.00	1.41	19.20
Green waste	42.94	320.00	0.43	3.20
Food organics	317.99	1,350.00	3.18	13.50
Nappies & Sanitaries	51.76	260.00	0.52	2.60
<b>TOTAL</b>	<b>780.60</b>	<b>6,391.00</b>	<b>7.81</b>	<b>63.91</b>

## Appendix D5: TOTAL WASTE- 3/12/2010 -Wanstead Street (n=100)



Recycling breakdown	Weight (kg)	Volume (L)	Kg/hh/wk	L/hh/wk
Plastic Code 1-7)	20.48	580	0.20	5.80
Steel & Aluminium (includes cans, clean foil & aerosol cans)	22.88	420	0.23	4.20
Paper & Cardboard	94.81	1,165	0.95	11.65
Liquid paperboard	5.00	150	0.05	1.50
Glass	28.17	100	0.28	1.00
<b>TOTAL</b>	<b>171.34</b>	<b>2,415</b>	<b>1.71</b>	<b>24.15</b>
Waste breakdown	Weight (kg)	Volume (L)	Kg/hh/wk	L/hh/wk
General Waste	337.44	3,424.00	3.37	34.24
Co-mingled recyclables	171.34	2,415.00	1.71	24.15
Green waste	66.48	360.00	0.66	3.60
Food organics	302.18	1,230.00	3.02	12.30
Nappies & Sanitaries	99.44	375.00	0.99	3.75
<b>TOTAL</b>	<b>976.88</b>	<b>7,804.00</b>	<b>9.77</b>	<b>78.04</b>

## APPENDIX E: CONFIDENCE LEVEL

The **confidence interval** is the plus-or-minus figure usually reported in newspaper or television opinion poll results. For example, if you use a confidence interval of 4 and 47% percent of your sample picks an answer you can be "sure" that if you had asked the question of the entire relevant population between 43% (47-4) and 51% (47+4) would have picked that answer.

The **confidence level** tells you how sure you can be. It is expressed as a percentage and represents how often the true percentage of the population who would pick an answer lies within the confidence interval. The 95% confidence level means you can be 95% certain; the 99% confidence level means you can be 99% certain. Most researchers use the 95% confidence level.

When you put the confidence level and the confidence interval together, you can say that you are 95% sure that the true percentage of the population is between 43% and 51%. The wider the confidence interval you are willing to accept, the more certain you can be that the whole population answers would be within that range.

For example, if you asked a sample of 1000 people in a city which brand of cola they preferred, and 60% said Brand A, you can be very certain that between 40 and 80% of all the people in the city actually do prefer that brand, but you cannot be so sure that between 59 and 61% of the people in the city prefer the brand.

### Factors that Affect Confidence Intervals

There are three factors that determine the size of the confidence interval for a given confidence level:

- Sample size
- Percentage
- Population size

#### Sample Size

The larger your sample size, the more sure you can be that their answers truly reflect the population. This indicates that for a given confidence level, the larger your sample size, the smaller your confidence interval. However, the relationship is not linear (i.e., doubling the sample size does not halve the confidence interval).

#### Percentage

Your accuracy also depends on the percentage of your sample that picks a particular answer. If 99% of your sample said "Yes" and 1% said "No," the chances of error are remote, irrespective of sample size. However, if the percentages are 51% and 49% the chances of error are much greater. It is easier to be sure of extreme answers than of middle-of-the-road ones.

When determining the sample size needed for a given level of accuracy you must use the worst case percentage (50%). You should also use this percentage if you want to determine a general level of accuracy for a sample you already have. To determine the confidence interval for a specific answer your sample has given, you can use the percentage picking that answer and get a smaller interval.

#### Population Size

How many people is there in the group your sample represents? This may be the number of people in a city you are studying, the number of people who buy new cars, etc. Often you may not know the exact population size. This is not a problem. The mathematics of probability proves the size of the population is irrelevant unless the size of the sample exceeds a few percent of the total population you are examining. This means that a sample of 500 people is equally useful in examining the opinions of a state of 15,000,000 as it would a city of 100,000. For this reason, The Survey System ignores the population size when it is "large" or unknown. Population size is only likely to be a factor when you work with a relatively small and known group of people (e.g., the members of an association).

The confidence interval calculations assume you have a genuine random sample of the relevant population. If your sample is not truly random, you cannot rely on the intervals. Non-random samples usually result from some flaw in the sampling procedure. An example of such a flaw is to only call people during the day and miss almost everyone who works. For most purposes, the non-working population cannot be assumed to accurately represent the entire (working and non-working) population.

**Information provided by: Nick Chrisant, Project Manager, Sustainability Victoria**

<http://www.surveysystem.com/sscalc.htm#cineeded>