

## **Chapter 8: Waste**

### **8.1 Summary and indicators**

#### **8.1.1 Summary**

*Waste is a facet of human systems only. Natural systems don't produce waste as the by-products from one species form a resource for another.*

##### **State**

*The capacity of the current landfills and sewerage treatment plants is expected to last the needs of the City until the year 2035. All of the landfills and plants are licensed and comply with State legislation and standards.*

##### **Pressure**

*Growth of the City is expected to take the population to around 700,000 in the next 50 years from its current population of around 370,000.*

*The City generates around 343,000 tonnes of waste that goes to landfill each year, or around 1000kg per resident. This figure is more than 200kg greater than the National average and is likely due to the high numbers of visitors and day-trippers that also enjoy the city. Of the waste generated nearly 70% is compostible and only 7% is recycled.*

*On average the City generates 116ML of wastewater each day. All of this waste is treated to secondary level (removal of solids and some nutrients) prior to discharge. Some wastewater is treated to a tertiary standard. Up to 70% of treated effluent from some plants is reused in the City for irrigation.*

##### **Response**

*The Council provides a range of waste services and levels of service to cope with the diverse needs of the City's residents and visitors. In addition to this, the Council is undertaking accurate and regular surveys of existing landfill sites to improve their management and useful life. The Council is also investigating methods to increase the reuse of effluent in the City and to improve the quality of treatment.*

##### **Conclusion**

*The growing population of the City will place increasing pressure on the existing landfills and treatment plants. There is a need to consider options for increasing the level of organic waste composting and recycling to increase the life of the existing landfills and to convert wastes into resources. The City also needs to consider the level of treatment provided to wastewater as this may be an increasingly important resource in the future.*

### 8.1.2 Indicators

Sub-theme	Indicators
<b>State-</b> ⇒ Waste disposal or treatment facilities	Current capacity and projected longevity of site by type of waste received Condition of sites Compliance with DoE Environmental Authority
<b>Pressure-</b> Solid waste generation ⇒ Domestic ⇒ Commercial/industrial ⇒ Construction/demolition	Composition of solid waste stream by category and annual weight for domestic waste, construction /demolition, commercial waste, industrial waste. Total annual weight of solid waste to landfill. Estimate of green waste/organic wastes for possible composting. Licensing of waste collectors/transporters.
<b>Pressure-</b> Solid waste generation ⇒ Regulated waste	Weight and type of regulated waste generated (specify by type and source). Information from DoE waste tracking system (when introduced) Licensing ERAs
<b>Pressure-</b> Solid waste generation ⇒ Litter (Parks, streets, bins, waterways etc.)	Category and annual weight of litter collected. Cost and frequency of service.
<b>Pressure-</b> Liquid waste generation ⇒ Sewage	Total liquid waste disposed to sites (specify by type of waste and site)
<b>Pressure-</b> Liquid waste generation ⇒ Interceptor traps (including night soil)	No. and type of trade waste permits Licensing of collectors and transporters of liquid waste
<b>Pressure-</b> Liquid waste generation ⇒ stormwater	Refer to SoE theme on Water (aquatic systems)
<b>Pressure-</b> Gaseous waste generation ⇒ Landfill Gases	Amount and type of gases produced
<b>Pressure-</b> Gaseous waste generation ⇒ Industry emissions	Licensing of ERAs
<b>Pressure-</b> Gaseous waste generation ⇒ Open or pit Burning	No. of complaints received No. of authorities-to-burn issued
<b>Pressure-</b> Gaseous waste generation ⇒ other air issues	See SoE theme on Air
<b>Current Responses-</b> ⇒ Waste Minimisation ⇒ Kerbside recycling ⇒ Other recycling ⇒ Strategies for Commercial and Industrial Premises	Cost and freq. of collection. Total quantity of recyclable material collected. Total weight of recyclable material actually recycled, by category and destination. % Of total waste stream recycled. Cleaner production and Waterwise programs
<b>Current Responses-</b> Clean-up programs	Cost, nature and site remediation (contaminated lands) Cost and nature of spill cleanups

### 8.2 Introduction

Waste is defined by the Queensland Department of Environment as any gas, liquid, solid or energy, individually or in combination, that is surplus to, or unwanted from, any industrial, commercial, domestic or other activity, whether or not of value. In other words waste is a by-product of our human, social and economic activity that is unwanted by our society or our economy. Waste is anything that is produced that doesn't have any further use. For example, non-recyclable rubbish removed from

homes, exhaust gases of vehicles, old tyres from vehicles, old oils, and concrete are all examples of waste.

Waste and pollution were identified as the dominant environmental issues in the Australian community (ABS 1994).

However, waste is a facet of human systems only (Miller 1992). There is no such thing as waste in natural systems where the waste products from one species form the basis of a resource for another. The ecosystem has a diversity of species that process these 'wastes' as a stream of energy and nutrients. This processing forms part of the key natural cycles such as the nitrogen and carbon cycles.

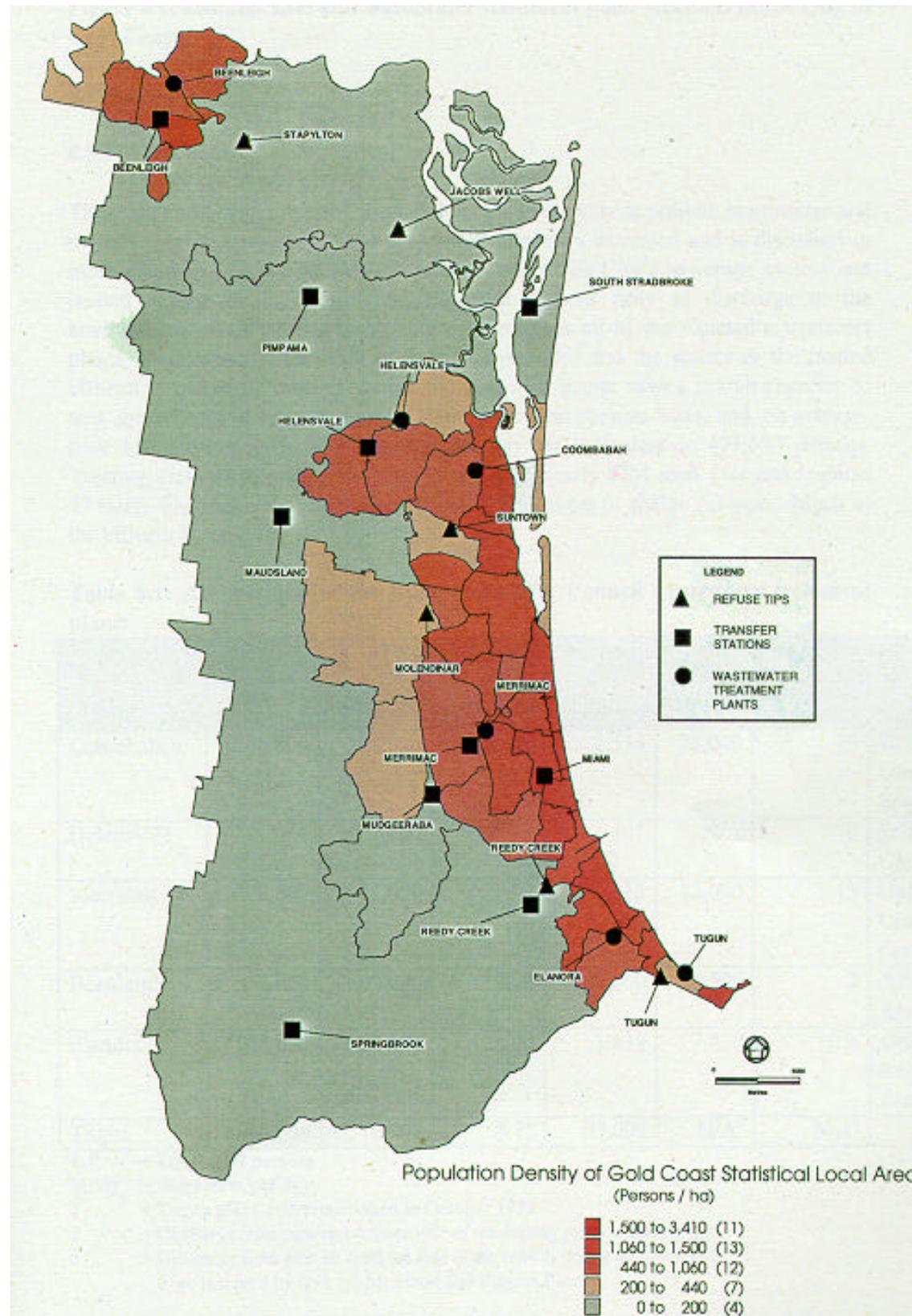
There is tremendous potential for natural systems to absorb and utilise many of our human wastes. However, there is a limit to the capacity of natural systems to process and convert and assimilate our wastes. When this limit is exceeded problems can arise. An excess of waste is often referred to as pollution. Pollution of marine, estuarine and wetland areas has led directly to a loss of fisheries resources.

The developed world produces more waste each year. For example, the United States produced 150% more waste in 1994 than it did for any year in the 1960's and is estimated to produce 400% more by the year 2000.

It is unlikely that human society can produce no waste, despite the best efforts of all our technologies, but the waste we do produce needs to be safely stored until it has become a resource. This storage is currently handled through the use of landfills in the Gold Coast.

To properly understand and manage waste it is important to measure and record how much is produced. This is not a simple task and requires considerable assumptions in conjunction with some measurement. For example, the United Kingdom produced around 500 million tonnes in 1991. This could be expressed as a volume, but because the density of different types of waste differs it is less meaningful than weight. Such information can be used to construct indicators, which like barometers, tells us about the performance of the system we are part of. In Holland the total mass of solid waste dumped each year is used as their indicator. The Australian Government has set a target to reduce the amount of waste by 50% by the year 2000 from 1990 levels. (ASC 1995 p13.1). Figure 8.1 shows the location of all landfills and wastewater treatment facilities on the Gold Coast.





**Figure 8.1: Landfill sites and wastewater treatment plant locations in the City of Gold Coast****8.3 State****8.3.1 Wastewater**

There are two types of water considered wastes in the City at present, stormwater and sewage. At present, stormwater enters the waterways untreated and is discussed in more detail in Chapter 5. Sewage is collected by the City's sewerage system and treated at one of the 6 different treatment stations prior to discharge to the environment. Table 8.1 presents information about all of the Council's treatment plants, their capacity, the level of treatment provided and the waterway the treated effluent is discharge into. Together the treatment plants have a design capacity to treat the effluent of 600,500 people (on an equivalent persons basis) and, on average, treat 116 million litres of wastewater per day, or equivalent to 471,500 persons. Treating these wastes currently costs the Council nearly \$7M each year and requires 27 staff. The treatment process generates 52,500 tonnes of sludge per year. Much of the effluent is reused.

**Table 8.1: An overview of the Gold Coast City Council wastewater treatment plants**

Plant	Design capacity (E.P.)	Present capacity (E.P.)	Flows (Ml/dy)	Annual budget (\$1,000)	Sludge (t/yr)	Effluent reused (%)	Point of discharge
Coombabah	300,000	220,000	56.00	2,556	28,000	20	Gold Coast Seaway <sup>2</sup>
Helensvale	N/A	1,500	0.35	101	N/A	70	Saltwater Creek
Merrimac	128,500	95,000	21.90	1,813	12,000	15	Gold Coast Seaway <sup>3</sup>
Beenleigh	54,000	62,000	12.00	609,000	5,500	2	Albert River
Elanora	108,000	87,000	22.00	1,639	7,000	N/A	Gold Coast Seaway <sup>3</sup>
Tugun	10,000	16,000	3.75	97,000	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>

**E.P** = Equivalent persons

**Ml/dy** = Megalitres per day

**1** = Tugun plant decommissioned in October 1997

**2** = Discharge from pipe on northern side of the seaway on the outgoing tide

**3** = Discharge from pipe on northern side of the seaway on the outgoing tide  
Pipe is shared by both the Merrimac and Elanora Plants.

### 8.3.2 Current capacity, projected life and types of waste received

One indicator of the urgency of the waste management issue is the number, nature and capacity of each waste disposal facility (landfills). Table 8.2 provides a breakdown of this data for each of the landfills on the Gold Coast.

Many of the City's landfills are closing, or are nearing closure. However, the main landfill at Molendinar is expected to be operating until the year 2035. This will depend on the rate at which waste is taken to the site which will be affected by both population growth and technological improvements.

**Table 8.2: Current capacity, projected life and types of waste received at each waste disposal site**

Landfill	Location	Area of landfill (Ha)	Volume in place (1000m3)	Year opened	Depth of fill (m)	Weight dumped each year 1000 t	Closure year (see note below)	Expected volume at closure (1000m3)	Materials accepted
Tugun	Boyd St.	53.29	4,900	1947	10	25	2000	5,300	NPS
Reedy Creek Site 1	Rudman Pd.	4.28	964	1977	15	40	1994	964	PH&C
Reedy Creek Site 2	West Burleigh	10.97	510	1977	25	included above	2010 See Note 2	1,645	NPS
Suntown Site 1	Captain Cook Dr.	20 of 44	1,100	1977	18	150 +200?	2001 See Note 2	2,400	PH&C
Suntown Site 2	Arundel	8 of 21	510	1977	15	Included above	2010	1,018	NPS
Runaway Bay	Oxley Dr.	16.13	620	1947	4	full	1996	645	PH&C
Molendinar Stage 1	Harper St.	46	500	1984	27	100	1998	1,000	PH&C NPS
Molendinar Stage 2	Harper St.	30	0	Possibly 1998	20	Included above	2035	7,800	PH&C NPS
Jacobs well	Behms Ck. R.	4.8	113	1980	6	2	1997	263	PH&C NPS
South Stradbroke Island						1	1997		PH&C
Staplyton	Rossmans Rd.	70	144	1976	10-12	25	2030	6,200	PH&C NPS

**NPS** - Non Putrescible Solid Waste.

**PH&C** - Putrescible Household and Commercial Waste.

**Note 1:** the projected year of closure is based on the mass of material coming into the fill site and a final compacted average density of 500 kg/m<sup>3</sup>. This density is much lower than is usual for undisturbed land and the fill areas would not be generally suited to building.

**Note 2:** currently all commercial and domestic waste from the southern two thirds of the Gold Coast (200,000 tonne/yr) is being disposed of at Suntown. This landfill is expected to close around the year 2001. After this time all waste will be diverted to Molendinar. Molendinar currently receives 30,000 tonne/yr.

**Note 3:** These land fill sites receive wastes from a number of transfer stations: Beenleigh, Helensvale, Maudsland, Merrimac, Miami, Mudgeeraba, Pimpama, Springbrook and Tallebudgera. Proposed transfers stations are at South Stradbroke Island, Currumbin Valley, Neranwood.

**Note 4:** There are two privately run landfills on the Gold Coast accepting industrial wastes. However, there are no statistics available on the volume/weights of waste that they are receiving. It is hoped that this information will be available in the future.

### **8.3.3 Condition of sites and compliance with licence conditions**

All landfill sites and sewage treatment plants are managed to a satisfactory standard by the Council through a combination of direct involvement and the use of contractors. The standards of management achieved are as required by the Department of Environment (DoE) and is sufficient for the Council to include the land-fill sites in its Integrated Environmental Management System which allows a single licence from DoE for all sites and depots managed by the Council.

Every day 200-300mm of clay is used to cover the waste. This cover allows vehicles to safely move over the landfill site and also reduces availability of putrescible material to scavenging animals, and any issues with respect to odour for neighbouring areas. Dust problems are localised to the landfill area.

An independent audit of the environmental condition of the sites is being done as part of an integrated Environmental Management System to cover all landfill sites on the Gold Coast.

## **8.4 Pressure**

### **8.4.1 Population growth/consumption growth/environmental awareness**

The human population of the Gold Coast is likely to continue to grow, from around 356,000 in 1996 to 700,000 by the year 2050. Such a population increase will place considerable pressure on the land fill sites and the waste management systems of the city. This pressure will become acute if the expectations of the community for improving waste management, and the current trends in consumption and recycling per person, continue.

In addition to handling the growing volumes of waste from a growing City, the City must also cope with the increasing environmental awareness of the residents and visitors of the City. This awareness will place increasing pressure on waste management facilities to reduce the impact of the City's wastes on the surrounding environment.

### **8.4.2 Composition of solid waste stream**

Some 343,000 tonnes of putrescible and non-putrescible waste is dumped each year. That is around 1000kg of solid waste per person per year. This amount is much larger than that produced on average in Australia (785kg/person/year in 1994). It is likely that the extra waste is generated as a result of the large numbers of visitors and day-trippers that visit the Gold Coast through out the year. These data may be useful in the future for estimating the number of visitors to the Gold Coast.

Putrescible household & commercial waste (PH&C) is around 50:50 household to Commercial. Non-putrescible solid waste (NPS) is made up of around 10-30% demolition materials; 40-60% dry industrial; 10-40% household. The weight of waste dumped in each landfill each year is given in Table 8.2 above. The data in Table 8.3

include the rubbish and weed growth that is removed from streets, parks and waterways each year.

**Table 8.3: Weights and proportions of waste categories taken to the Suntown landfill site over the month of June 1996**

Waste type	Weight (t)	%
Green waste	39.46	0.40
Demolition	42.42	0.40
Commercial (mixed)	1854.98	17.60
F.O.C. Green waste	18.08	0.20
F.O.C. Demolition	117.86	1.10
F.O.C. Commercial	3846.90	36.5
F.O.C. Clean Fill	2849.14	27.0
Min. Charge Garden	.8	0.01
Min. Charge Commercial	8.24	0.08
Net. mass only	19.44	0.20
Public Weighing	11.34	0.10
Concrete (recyclable)	162.88	1.50
Asphalt	155.44	1.50
Tyres Whole (by number)	55	0.50
Asbestos	46.2	0.40
Radioactive Sand	537.42	5.10
F.O.C. Asbestos	1.06	0.01
F.O.C. Concrete(Recyclable)	211.76	2.01
Recycling contaminant	47.16	0.45
F.O.C. Commercial (mixed)	0.22	2.09
F.O.C. Asphalt	288.38	2.74
Cleanaway household Recycling	233.20	2.21
<b>Total</b>	<b>10,544</b>	<b>100</b>

Some 6800 tonnes of recyclable material (2% of the waste stream) is received at the landfills each year. This is made up of greenwaste, glass, aluminium, steel, paper and cardboard, and concrete. There has not been a detailed waste stream analysis done on the Gold Coast. However, it is likely that the waste stream for the Gold Coast is similar to that of Brisbane. This assumption needs to be checked because of the differences in industry mix and rate of development between the Gold Coast and Brisbane. Table 8.4 provides a split of waste by source and content, whereas Table 8.5 provides a comparison between three Australian cities. These data reinforce the information regarding compostible materials, as food and other organic wastes comprise a large part of the waste stream.

These tables also indicate that there is little difference in the waste streams between the cities but that there are significant differences between the sources of waste, Commercial, Industrial and Domestic.

**Table 8.4: Waste by content and source for Brisbane**

Waste type	Commercial (%)	Industrial (%)	Domestic (%)
Newspaper	4.5	1.2	5.2
Other Paper	29.3	31.3	13.5
Plastic	6.4	5.0	7.7
Rubber	2.1	0.1	1.0
Glass	6.3	3.4	10.5
Steel	5.4	1.3	5.1
Other Metal	0.5	0.1	1.0
Food	11.6	4.7	28.0
Other Organic	12.9	34.6	22.0
Other	21.0	18.3	6.0

**Table 8.5 Comparison of waste streams between different Australian cities**

Waste type	Brisbane (%)	Melbourne (%)	Wollongong (%)
Newspaper	5.2	7.2	}
Other Paper	13.5	16.7	}12.5
Plastic	7.7	7.7	12.8
Rubber	1.0	N/A	N/A
Glass	10.5	6.9	3.5
Aluminium	1.0	0.6	N/A
Steel	3.0	3.3	5.7
Other Metal	2.1	0.1	0.3
Food	28.0	31.2	}
Wood and Garden	21.0	20.7	}52.1
Other Organic	N/A	N/A	10.7
Rags	2.0	2.2	N/A
Inert	N/A	3.4	N/A
Other	5.0	N/A	2.4

### 8.4.3 Greenwaste and other organic wastes

From the Tables above, the proportion of the waste stream that is green waste can be estimated at:

- 24% of Commercial;
- 39% of Industrial; and,
- 50% of Domestic.

If paper and cardboard are included as being compostible then these data figures change to:

- 58% of Commercial;
- 72% of Industrial; and,
- 69% of Domestic.

Therefore, as much as 60-70% of the waste stream is possible to be composted. If all of this waste were composted it would reduce the amount going to landfill by around 70% or 240,000 t. This would bring the amount of waste going to land fill down from 1000kg per capita to 300kg per capita.

Such a result would place the Gold Coast as one of the most waste-efficient cities in the world and would greatly improve the sustainability of the City.

There are green waste recycling facilities at most landfills and transfer stations on the Gold Coast. Domestic green waste is mulched and may be collected for free by residents. However, large trees and commercial green waste is composted and sold. In the first five months of the 1996-97 financial year, contractors mulched approximately 4700 t of green waste at Council facilities and removed 1200 tonnes of mulch reuse. Approximately 3500 tonnes was on-site awaiting removal. The Scheme will be evaluated in 1997.

## **8.5 Response**

The current responses dealing with the issue of the City's waste are waste collection, sorting, composting and recycling. The city is also accurately surveying the landfill sites to derive better estimates of the volume being occupied by the waste and the volume remaining for fill. These data have provided improved estimates of the life of the landfills and suggest that some of the data in Table 8.1 are conservative.

### **8.5.1 Household and commercial waste collection**

There are currently 65 licensed waste collectors/transporters operating in the Gold Coast, 43 solid waste, 19 liquid waste and 3 collecting both. This number may vary due to recent, and emerging, legislative changes. This particularly applies to carriers of construction and demolition waste.

These companies collect household and commercial waste and run the recycling facilities for the Council. There are a number of other companies that will recycle many other products such as:

- aluminium,
- batteries,
- bars,
- CFC refrigerants,
- chemicals and residues,
- computer ribbons,
- toners and cartridges,
- concrete and demolition waste,
- cooking oils drums,
- electronic equipment and appliances,
- oil and fuel filters,
- fire extinguishers,
- fuel,
- glass,
- greenwaste/timber,
- grease and industrial liquid waste,
- inks and paints,
- marine services,
- paper and cardboard,
- pallets,
- plastic,
- printers,
- rags,
- scrap metal,
- solvent recovery,
- textile and cloths,
- tyres, and
- waste oil.

Council currently has no accurate data on the types, or sources, of regulated waste generated on the Gold Coast. This has been, and remains, a State Government responsibility. However, it is anticipated that the Department of Environment may provide Council with this information within 12 months. This is due to the likely introduction of a waste tracking system for regulated waste.

### **8.5.2 Litter (parks, streets, bins, etc.)**

The management of the waste services of the City has yet to be adjusted from the former Councils. Consequently, some information regarding waste collection services can only be reported on the basis of the former Council areas.

#### **8.5.2.1 Former Albert Shire**

Park and litter bins are serviced under contract by J.J. Richards. However, no data on the weight or amount collected is available. No waste stream analysis is available. A total of 1,430 litter bin services are provided:

- weekday services to the 1,292 litter bins in the area;
- weekend services to 62 litter bins in the area;
- services outside the designated refuse area to 76 bins.

Park and litter bins are serviced under contract by J.J Richards and differ in frequency from one day per week to 7 days per week, depending on location and need. The cost per service is \$0.7061 for a weekday service, \$1.0345 for a weekend service, and \$2.1777 for bins outside the refuse area (as at 31/7/1996).

#### **8.5.2.2 Former Gold Coast City**

Gold Coast City is much more heavily affected by tourism in two ways. Firstly the higher density of people produce more litter. Secondly the higher density of people demand higher standards. Consequently the City has evolved a zonal system of collecting litter and relies on a complaints driven mechanism to monitor the performance of the system.

Beach cleaning is done by the Council with 3 machines that collect approximately 1,500 tonnes of rubbish each year. This material is light such as cigarette butts, papers, food wrappings (esp. McDonalds), bottles, cans etc.

There is a total of 2800 daily services of public litter bins in the area. There are 2100 litter bins some of which are serviced more than once a day. Others are not serviced every day. Approximately 12,775 tonnes of litter are collected each year. Each service costs \$0.60.

Each Council staff collects around 1,100 t of litter comprised mainly of light items such as paper, aluminium cans, bottles etc. These staff operate in zones which require different levels of service. High traffic and tourist areas require more frequent services. The level of servicing ranges from several times a day in and around Surfers Paradise, to occasionally in areas of the Hinterland.

Street Sweeping is done by 9 Council machines (6 large and 3 small) that are operated 24hrs a day. The 6 large machines do 9 shifts and the 3 small 6 shifts each day. These machines collect around 14,560 t of litter each year. The cost of a machine and operator is \$52.00/hour.

### **8.5.3 Liquid waste generation**

There are currently 22 operators licensed to transport liquid waste in Gold Coast City. This waste is conveyed to the sewage treatment plants directly or via the sewer where it is treated.

### **8.5.4 Landfill gasses**

The main gas produced is methane. Council is moving to improve its management of landfill gas at currently operating and closed sites. At several sites the capture of gas and conversion into energy is highly likely.

### **8.5.5 Kerbside Recycling**

#### **8.5.5.1 Former Albert Shire**

J.J. Richards provides a weekly service in a divided wheelie bin (72 litres of space) to each residence. There are 64,700 services done each week at a cost of \$0.281 per service.

#### **8.5.5.2 Former Gold Coast City**

Cleanaway provides a fortnightly service in a separate 240 litre wheelie bin. There are 67,600 services done each fortnight at a cost of \$1.5331 per service.

The total quantity of recyclables collected from kerbside collections for the City of Gold Coast is shown in Table 8.6 below.

Approximately 25,000 tonnes of waste material is recycled each year. If 340,000 tonnes of waste is buried at landfills, then a total of 365,000 tonnes of waste is produced on the Gold Coast each year. Recycling currently only captures around 6.8% of the total waste stream.

#### **8.5.5.3 Waste minimisation/commercial and industrial recycling/cleaner production**

While there are currently no existing Council strategies/programs for the waste minimisation/commercial and industrial recycling/or cleaner production but these activities are encouraged through the licensing of environmentally relevant activities and a commercial/industrial recycling guide has been developed. These areas should be a focal point for the Waste Management Section, and other sections of Council, to create new programs and initiatives. However, any initiatives are constrained by lack of stable markets for recycled materials and lack of Federal and State Government regulations.

In addition to the responses associated with solid waste, all sewerage treatment will be progressively taken to tertiary level in line with State Government directions. Further to this, however, the Council undertook a public consultative process to develop the Northern Wastewater Management Strategy. This Strategy is being implemented.

**Table 8.5 Gold Coast City Council recycling statistics 1995/96 and 96/97**

Waste type and source	95/96	96/97
<u>Kerbside collection</u>		
Glass	9065.00 tonnes	7431.50 tonnes
Paper	3762.91 tonnes	3249.80 tonnes
Aluminium	148.30 tonnes	174.50 tonnes
Steel	613.10 tonnes	562.90 tonnes
PET (plastic)	462.20 tonnes	403.40 tonnes
HDPE (plastic)	460.20 tonnes	439.30 tonnes
Liquid paper BD	42.80 tonnes	24.50 tonnes
Polypropylene	23.47 tonnes	19.10 tonnes
<u>Drop-off Facilities</u>		
Paper/cardboard	1245.00 tonnes	1066.10 tonnes
Cooking oil	42.00 litres	N/A
Motor oil	78500.00 litres	80290.00 litres
Glass	1034.20 tonnes	108.00 tonnes
Aluminium cans	55.00 tonnes	N/A
Scrap metal	7183.00 tonnes	50.10 tonnes
Car bodies	1100 car bodies	N/A
Aluminium ingots	53.00 tonnes	N/A
Waste rag	25.00 tonnes	N/A
Halon fire extinguishers	18 extinguishers	N/A

## 8.6 Conclusions and possible future responses

Waste in the City of Gold Coast is a growing problem particularly with the pressures that are likely to be placed on the existing landfill sites. The solutions appear to lie in learning from natural systems, that is, turn wastes into resources that can stimulate new economic growth. For example, complete purification of wastewater to a quality suitable for drinking may be a more cost effective and environmentally sensitive method of supplying water for the City's growth than construction of new dams.

The most significant option will be to remove as much compostible material from the waste stream; this has the potential to treble the lives of the existing landfills. This compost is a likely resource for domestic consumption as well as by neighbouring areas. Similarly, increased emphasis on recycling will further reduce the waste stream and will also be a resource to the city. However, the current lack of stable recycling markets hampers this philosophy

There are already considerable statistics gathered on waste generated by the City. However, its potential for use in estimating the number of visitors to the region should be further investigated.

### 8.7 References

ABS (1994) *Environmental Issues: peoples views and practices*, Australian Bureau of Statistics

ASC (1995) *Planning Studies*, Albert Shire Council

Miller (Jr), G.T., (1992) *Living in the Environment (7th ed.)*, Wadsworth Ca.