

Plymouth City Council

**Plymouth Waste Local
Development
Document: Future
Waste Requirements**

Final Report

4 July 2005

Entec UK Limited

Report for

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Plymouth City Council

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1. Introduction

1.1 Background

Entec was commissioned by Plymouth City Council to prepare waste forecasts in support of the preparation of the Waste Local Development Document (WLDD).

Before any waste forecasts could be prepared, however, it was imperative that robust and credible baseline data was established. This report sets out the findings of work undertaken by Entec to establish the necessary baseline information required to assist in the production of waste forecasts for Plymouth (also referred to throughout this report as the “study area”). Specifically, this report is divided into four distinct parts:

- The collation and presentation of data on current waste arisings and disposals/management;
- The collation and presentation of data on existing waste management capacity;
- The presentation of waste forecasts using the existing situation as a baseline and applying a set of agreed/robust assumptions; and
- An analysis of need by comparing existing and future arisings against existing and planned waste management capacity.

This baseline report has been solely concerned with pulling together the most up to date **existing** information that is in the public domain. However, where this data is inadequate, it has, where possible, been supplemented by additional data.

1.2 Baseline Year

2000/01 was the chosen baseline year for this work. This reflects the adopted baseline year in the recently published South West Regional Waste Management Strategy (October 2004). For most waste categories, data for the baseline year has been available. However, for some categories (e.g. municipal waste), more up to date information has been available and is included in the report.

Furthermore, it should be noted that whilst some data is reported on a financial year basis, other data is reported according to calendar year. As such, data in this report has been presented in both ways.

1.3 Categorisation of Waste Data

Traditionally, waste data has been collected and presented according to its origins e.g. household/municipal; industrial/commercial etc. The Environment Agency, as the key body responsible for collecting and collating waste data, has consistently presented data in this

format. For comparative purposes, it has therefore been important to present data in a way that reflects this national approach and the following Agency categories have been adopted:

- Municipal waste (which includes household waste);
- Industrial and commercial waste;
- Inert/construction and demolition waste; and
- Special waste.

Given the urban nature of the study area, this report has made no assessment of agricultural waste.

1.4 Data Sources

As noted in Section 1.1, this report has been concerned with pulling together available data sources - no new survey work has been conducted. Whilst the specific origins of the data referred to in this report are referenced throughout, information has been sourced from the following bodies:

- Plymouth City Council Planning Department;
- Plymouth City Council Waste Management;
- Environment Agency;
- Office of the Deputy Prime Minister (ODPM);
- Department of Trade and Industry (DTI);
- Department for Environment, Food and Rural Affairs (DEFRA);
- South West Regional Waste Technical Advisory Body (SWRTAB);
- South West of England Regional Development Agency (SWEDA); and
- The Office of National Statistics (ONS).

2. Current Levels of Waste Arisings and Disposal/Management in Plymouth

2.1 Introduction

For key waste streams, the following section sets out details of the amount of waste arising and being managed in Plymouth. Much of the available data relates to the quantities of material disposed/managed in the study area, however, some data has been available on an arisings basis. Where this has been the case, it has been highlighted.

2.2 Current Waste Arisings and Disposal/Management

2.2.1 Municipal Waste

Municipal Waste Arisings

Table 2.1 shows that the total amount of municipal waste arising in Plymouth in 2000/01 stood at approximately 160 500 tonnes. Table 2.2 illustrates that this equates to approximately 666 kg per person and almost 1 600 kg per household.

The total quantity of municipal waste arising in the study area increased in 2001/02 to over 170 000 tonnes and decreased in 2002/03 to just under 160 000 tonnes. When averaged out over the period 2000/01 to 2003/04, municipal waste growth in the study area stood at approximately (~) -0.2% (see Table 2.3). This is below the national picture, whereby a national growth rate of 2.4% was reported in the DEFRA Municipal Waste Management Survey 2001/02 (published May 2003).

Table 2.1 Total Municipal Waste Arisings 2000/01 to 2002/03 (tonnes)¹

	2000/01	2001/02	2002/03	2003/04
Total	160 419	172 457	166 184	158 764

(Source: Plymouth City Council Waste Management, 2005).

1 - The data presented in this table is based upon the amount of municipal waste that was collected from kerbside rounds and material deposited at civic amenity sites.

Table 2.2 Municipal Waste Arisings 2000/01: Quantities per Household and per Capita

	(A) Total Municipal Waste Arising in 2000/01 (tonnes)	(B) Total Population (2001 Census)	(C) Total Quantity of Municipal Waste Arising per capita (kg/head/year) (A ÷ B x 1000)	(D) Total Number of Households (2000)	(E) Total Quantity of Municipal Waste Arising per Household (kg/year) (A ÷ D x 1000)
Total	160 419	240 720	666	102 540	1 565

(Source: 2001 Census, Office of National Statistics).

Table 2.3 Percentage Change in Municipal Waste Arisings 2000/01 to 2002/03

	% Change 2000/01 - 2001/02	% Change 2001/02 - 2002/03	% Change 2002/03 - 2004/05
% Change	+7.5	-3.6	-4.5

(Source: Plymouth City Council Waste Management, 2005).

Municipal Waste Deposits

Environment Agency deposits data and Plymouth Council's own data indicate that in 2000/01, Plymouth managed just over 160 000 tonnes of municipal waste (to avoid double counting, this excludes 71 700 tonnes of material handled at transfer stations/CA sites) (Local Waste Interrogator, Environment Agency, 2005) - see Section 3.2 for further details. Arisings data for the same year (see Table 2.1 above), indicates that 160 419 tonnes of municipal waste was generated in Plymouth. It can therefore be concluded that in 2000/01, Plymouth was effectively net self-sufficient in terms of managing its municipal waste.

The management of municipal waste is currently carried out against the backdrop of having to achieve statutory recycling/composting targets. *Waste Strategy 2000* introduced a commitment to setting targets for individual waste collection and disposal authorities and the Government's "*Guidance for Municipal Waste Management Strategies*" (DETR, March 2001) specified individual targets (based on actual recycling rates in 1998/9). The achievement of these targets is an integral part of the Government's Best Value regime and Best Value Performance Indicators (BVPIs) are directly concerned with their achievement.

Table 2.4 sets out these statutory targets and illustrates individual waste collection and disposal authorities' recycling/composting performance for 1998/99-2002/03. The recycling rates achieved in 2002/03 generally fall some way short of the statutory target that must be achieved in 2003/04. This would indicate that further steps must be taken to promote recycling in the study area or the overall level of waste generation must be reduced (whilst maintaining the quantity of waste sent for recycling).

Table 2.4 Municipal Waste Recycling/Composting 1998/99 - 2002/03 (Actual Rates) and 2003/04 - 2005/06 (Statutory Targets)

	2000/01 (actual %)	2001/02 (actual %)	2002/03 (actual %)	2003/04 (statutory target %)	2005/06 (statutory target %)
Plymouth	15.3	12	15.35	16.0	24.0

(Source: Plymouth Council Waste Management, 2005, The Regional Waste Strategy for the South West Consultation Document 2004; and Guidance on Municipal Waste Management Strategies, DETR 2001).

Composition of Household Waste

Understanding the composition of household waste is crucial to understanding how it can be managed most effectively. In 2002, the University of Plymouth undertook an assessment of waste composition in Plymouth. This assessment covered both household collected (dustbin) waste and waste taken to civic amenity (CA) sites for recycling or disposal. Table 2.5 below illustrates the findings of this study. As is shown, paper and putrescible waste such as garden refuse and food waste form the greater part of the waste produced by Plymouth residents that is collected at the kerb-side. For waste taken by residents to CA sites, the vast majority of this is simply “residual waste”, although a significant quantity (45%) is made up of garden refuse and soil/rubble.

Table 2.5 Composition of Household Waste in Plymouth

Material	% of Total
Composition of Household Collected Waste:	
Paper	31
Plastic	14
Textiles	3
Nappies	2
Glass	5
Kitchen / Garden Organics	22
Metal	6
Other Material	17
Composition if Civic Amenity Site Waste:	
Garden Waste	13
Dry Recyclables	8
Soil and Rubble	32
Residual Waste	47

(Source: An Assessment of Some Future Scenarios for the Management of MSW, Land Use Consultants and AEA Technology, February 2003).

2.2.2 Industrial and Commercial Waste

Arisings

The Environment Agency conducted a survey of around 20 000 businesses in 1998-99 to collect data needed to support national and regional industrial and commercial waste production estimates. These estimates are contained in the Strategic Waste Management Assessment (SWMA) for the South West, which was published by the Agency in 2000. An update of this survey is being carried out, and whilst the results were expected to be published in 2004, at the time of writing, they were unavailable.

The information presented in Table 2.6 below is derived from the 1998/99 survey. It shows that 55% of the arisings in Devon were industrial and 45% commercial. Some 49% of these two streams is classified as "general waste". Information for Plymouth was unavailable. However, a calculation can be made using deposits data.

The next section, which looks at industrial and commercial deposits in Plymouth illustrates that in 1998/99, ~124 000 of industrial and commercial waste was handled in Plymouth (86 000 tonnes excluding the material handled at waste transfer stations). As a percentage of the South West total, (which was 5 351 000 tonnes), it can be deduced that Plymouth accounts for ~2.3% of the region's industrial and commercial waste arisings. The amount of industrial and commercial waste arising in the South West according to the Environment Agency's 1998/99 survey was 5 236 000. 2.3% of 5 236 000 equates to 120 428.

With this in mind, it can be assumed that disposals of industrial and commercial waste in Plymouth broadly equate to arisings. In other words, Plymouth does not appear to be a net importer or exporter of industrial and commercial waste.

Table 2.6 Industrial and Commercial Waste Produced in Devon 1998/99 ('000 tonnes)

	Industrial Wastes	% of Total Industrial Wastes	Commercial Wastes	% of Total Commercial Wastes	Total
Inert/Construction & Demolition	30	5	5	1	35
Paper and Card	47	8	44	9	91
Food	31	5	9	2	40
General Industrial and Commercial	172	29	369	74	541
Other General and Biodegradable	172	29	37	7	209
Metals and Scrap Equipment	39	6	9	2	48
Contaminated General	36	6	17	3	53
Mineral Wastes and Residues ¹	9	1	0	0	9
Chemical and Other	65	11	8	2	73
Total	601	100	498	100	1 099

(Source: Strategic Waste Management Assessment for the South East, Environment Agency, 2000)

1 - waste arising from mining and quarrying premises e.g. scrap etc, rather than mining waste per se.

Deposits

The amount of industrial and commercial waste deposited/handled by facilities in Plymouth in 1998/99 and 2000/01 is set out in Table 2.7.

Table 2.7 Industrial and Commercial Waste Deposited in Plymouth 1998/99 and 2000/01 (tonnes)

	South West (98/99)	Plymouth (98/99)	South West (00/01)	Plymouth (00/01)
Disposed to open gate landfill	2 316 000	39 000	2 117 260	47 710
Disposed to restricted user landfill	111 000	0	95 460	0
Disposed of to lagoons	25 000	0	55 000	0
Disposed of to boreholes	34 000	0	0	0
Handled at transfer stations	1 875 000	38 000	862 900	45 200
Treatment - open gate	578 000	46 000	2 126 500	87 000
Treatment - restricted user	412 000	1 000	226 000	0
TOTAL	5 351 000	124 000	5 483 120	179 910

2.2.3 Construction and Demolition Waste

Construction and demolition (C&D) waste in the study area is a further significant waste stream. During 2000, a study, jointly funded by the Environment Agency and the Department of the Environment, Transport and the Regions (DETR) (now the Office of the Deputy Prime Minister - ODPM), was carried out to provide regional and national estimates of the amounts of C&D waste produced, recycled, re-used and disposed of in England and Wales. Unfortunately, no estimates were produced for individual Waste Disposal Authorities. The results of this study, which cover the calendar year 1999, are presented in the South West SWMA and are summarised in Table 2.8. As can be seen from the table, the total arisings of C&D waste in the South West was estimated to be in excess of 6 800 000 tonnes, which accounted for around 5% of the total C&D waste produced in England and Wales.

Table 2.8 South West Estimates of Construction and Demolition Waste and Soil Recycling, Beneficial Re-Use and Disposal in 1999 ('000 tonnes)

Type of Material	Quantity ('000 tonnes)
Recycled Aggregate and Soil Production	2 477
C&D Waste and Soil Beneficially Re-used on Landfill Sites	797
Material Used as Quarry Backfill	No separate data available
C&D Waste and Soil Landfilled as Waste	1 481
Inert Material Received at Registered Exempt Sites	2 052
TOTAL	6 807

(Source: Strategic Waste Management Assessment for the South West, Environment Agency, 2000)

Of the 6 807 000 tonnes of C&D/soil waste thought to be produced in the South West, the work presented in the SWMA further estimated that 50% of this was pure C&D waste; 33% was soil; and 17% was mixed C&D/soil.

During the first half of 2002, the ODPM and the Welsh Assembly commissioned a further survey of arisings and use of C&D waste. This work was essentially an update of the previous work carried out during 2000. The information generated was intended to feed into the revision of Minerals Planning Guidance Note 6 (in England) and the Aggregates Technical Advisory Note (in Wales), and into other policy documents which deal with recycled aggregate. Specifically, the project involved conducting sample surveys of the following:

- Operators of crushers and screens;
- Licensed landfills; and
- Registered exempt sites.

Table 2.9 sets out the results of this survey. As can be seen, the total arisings of C&D waste in the South West was estimated to be almost 12 600 000 tonnes - a significant increase on the 1999 estimates outlined in Table 2.9 above. This accounted for around 14% of the total C&D waste produced in England and Wales - a significantly higher proportion than was calculated two years earlier. This increase is the probable result of:

- The fact that in 2002, ODPM had access to data on backfill (which accounted for an additional 1 375 00 tonnes); and
- More information was available on exempt sites, which probably increased the original 1999 figure by 4 300 000 tonnes.

Table 2.9 South West Estimates of Construction and Demolition Waste and Soil Recycling, Beneficial Re-Use and Disposal in 2001 ('000 tonnes)

Type of Material	Quantity ('000 tonnes)
Recycled Aggregate and Soil Production	3 579
C&D Waste and Soil Beneficially Re-used on Landfill Sites	854
Material Used as Quarry Backfill	1 375
C&D Waste and Soil Landfilled as Waste	479
Inert Material Received at Registered Exempt Sites	6 328
TOTAL	12 615

(Source: Survey of Arisings and Use of Construction and Demolition Waste 2001, ODPM, 2002).

Apportioning subdivisions of regional estimates of arisings is difficult due to the lack of robust data. Nevertheless, an estimate of the C&D waste arisings for Plymouth can be made using the licensed waste deposit data provided by the Environment Agency in the SWMA for 2000/01.

In 2000/01, 3 448 930 tonnes of inert/C&D waste was deposited/treated in the South West (Local Waste Interrogator, Environment Agency, 2005). For the same period, a total of 315 170 tonnes of inert/C&D waste was deposited/treated at **licensed** waste management facilities in Plymouth (9% of the regional total).

These figures, however, do not take account of C&D waste handled at non-licensed/exempt facilities and thus are likely to represent an under-estimate of total arisings. A more accurate calculation therefore would be to apportion the regional figure contained in the ODPM's research (which does make an allowance for material handled at exempt sites). This can be calculated by translating the regional estimates of total C&D waste arisings into the proportion of C&D waste deposited/treated at licensed facilities in the study area i.e. 9% of 12 615 000 = 1 135 350 .

It is considered that a reasonable estimate of C&D waste arisings in the study area is **1 135 350 tonnes (or 565 830 tonnes excluding material handled at exempt sites)**.

2.2.4 Special Waste

Special waste is waste that is potentially hazardous or dangerous, which may require extra precautions during handling, storage, treatment or disposal. Specifically, it is defined by the Environmental Protection (Special Waste) Regulations 1996 (as amended) (Part 1 of Schedule 2) as waste which contains substances at or above a threshold level giving the waste one or more of the hazardous characteristics listed below:

- Explosive;
- Infectious;
- Oxidising;
- Teratogenic (causes birth defects);

-
- Flammable and highly flammable;
 - Mutagenic (causes genetic changes);
 - Irritant;
 - Ecotoxic;
 - Harmful;
 - Substances and preparations that:
 - release toxic or very toxic gases;
 - after disposal can produce a hazardous characteristic.
 - Toxic;
 - Carcinogenic; and
 - Corrosive.

In addition to waste satisfying the tests above, all 'prescription only' medicines are regarded as special waste. The following, however, are **not** included in the Regulation's definition of special waste:

- Household waste (except asbestos and household waste produced by laboratories and hospitals);
- Explosives covered by the Explosives Act 1875;
- Agricultural waste;
- Mine and quarry waste; and
- Radioactive waste on the basis of its radioactivity.

A consignment note system produces data on the type, quantity and origin of special wastes to be recovered or disposed of. A register of special waste moved from a site must be kept for three years. The system is monitored by the Environment Agency, who feed data into a special waste database, which is known as the Special Waste Tracking System (SWAT). This database holds information on every consignment of special waste in England and Wales sent for disposal or recovery. Using this data, (which has been obtained via the Agency's Hazardous Waste Interrogator), information on the types and quantities of special waste generated and disposed of within the study area has been obtained (see Table 2.10). As this data further shows, Plymouth is a net exporter of special waste, although in recent years, the amount of material exported has decreased substantially.

Table 2.10 Special Waste Arisings and Deposits in Plymouth 2000 - 2003

Year	Arisings of Special Waste (tonnes per annum)	Disposal/Management of Special Waste (tonnes per annum)	Net Import (+) / Net Export (-)
2000	24 966	7 312	-17 654
2001	22 784	10 415	-12 369
2002	30 448	8 548	-21 864
2003	25 535	20 078	-5 457

(Source: Environment Agency Hazardous Waste Interrogator, 2005).

2.3 Summary of Arisings and Disposals in Plymouth

Table 2.11 below sets out a summary of the data presented in this chapter of the report:

Table 2.11 Summary of Waste Arisings, Disposals and Capacity

Waste Stream	Issues & Options (Arisings - tonnes)	Entec Study		Year of Entec Data	
		Arisings (tonnes)	Deposits (tonnes)	Arisings	Deposits
Municipal Solid Waste	172 000	160 419	160 190 ¹	00/01	00/01
		(166 184)		(02/03)	
Commercial and Industrial Waste	84 500	134 710 ²	179 910 ³	00/01	00/01
Construction and Demolition Waste	277 000	565 830	297 070 ⁵	00/01	00/01
		(1 135 350 ⁴)			
Sewage Waste / Wastewater	84 500	84 500 ⁶	84 500	00/01	00/01
Hazardous / Special Waste	2 900	22 784	10 415	01	01
		(25 535)	(20 078)	(03)	(03)
TOTAL	620 900	968 243	732 085	-	-

1 - Excludes material handled at waste transfer stations (71 700).

2 - Assumes deposits equate to arisings (see report).

3 - Includes material handled at waste transfer stations (45 200).

4 - Includes material sent to sites exempt from waste management licensing for final disposal.

5 - Excludes material sent to sites exempt from waste management licensing for final disposal and material handled at waste transfer stations (18 100).

6 - Assumes deposits equates to arisings.

3. Type of Waste Management and Existing Capacity in Plymouth

3.1 Introduction

Having established the amount of waste arising and/or handled/disposed of in the study area, this section looks at the following:

- The way in which material is presently managed/handled in Plymouth;
- The number and type of existing waste management facilities; and
- The capacity of those facilities to handle waste.

3.2 Type of Waste Management/Disposal

3.2.1 Municipal/Household Waste

Municipal Waste Managed in Plymouth

Table 3.1 illustrates the amount of municipal waste that was managed in the study area in 2000/01 and the method in which the waste was treated/disposed. Unsurprisingly, landfill was the primary disposal route (98%). This table does not take account of material sent out of Plymouth for management - which is reported in the next section - but does include any material that was imported into Plymouth for management.

Table 3.1 Municipal Waste Management in Plymouth 2000/01¹

	2000/01 (tonnes)	2000/01 (%)
Recycled/Recovered	12 200 ²	7.5%
Composted	8 900 ³	5.5%
EfW	0	0
Landfill	139 090	87.0%
Other Chemical/Physical/Biological Treatment	0	0
TOTAL	160 190	100

(Source: SWMA Update 2001, Environment Agency and Plymouth City Council Waste Management, 2005).

1 - This table excludes material handled at Waste Transfer Stations (71 700 tonnes in 2000/01)

2 - This figure relates to the amount inputted into recycling and recovery facilities, thus there may be some double counting in respect of residual material.

3 - The Environment Agency's 2001 SWMA Update data is at odds with Plymouth Council's own information, in that only 3 000 tonnes of municipal waste is recorded as being managed via composting in 2000/01.

3.2.2 Industrial and Commercial Waste

Table 3.2 shows that in 2000/01 over a third of the industrial and commercial waste deposits in the study area were to landfill and a similar amount was dealt with via alternative treatment methods (in this case, biological treatment).

Table 3.2 Industrial and Commercial Waste Management in Plymouth 2000/01¹

	2000/01 (tonnes)	2000/01 (%)
Recycled (including metal recycling)	0	0
Composted	10 000	7
EfW	0	0
Landfill	47 710	36
Materials Recovery	24 000	18
Other Chemical/Physical/Biological Treatment	53 000	39
TOTAL	134 710	100

(Source: SWMA Update 2001 *Local Waste Interrogator*, Environment Agency, 2005).

1 - This table excludes material handled at Waste Transfer Stations (45 200 tonnes in 2000/01).

3.2.3 Inert/Construction and Demolition Waste

In 2000/01 inert/construction and demolition (C&D) waste was primarily disposed of in landfill sites - a significant proportion probably being used for site engineering and capping. However, as later sections of this report demonstrate, this trend is unlikely to continue given the fiscal and policy drivers focussed upon recycling such material and the knock on impact of reduced inert waste landfill capacity in the study area. The remainder of C&D waste in 2000/01 (approximately 5%) was subject to biological treatment. Table 3.3 illustrates disposal routes for inert/C&D waste.

Table 3.3 Inert/Construction and Demolition Waste Disposal Routes 2000/01¹

	2000/01 ('000 tonnes)	2000/01 (%)
Recycled	0	0
Composted	0	0
EfW	0	0
Landfill	282 070	95
Materials Recovery	0	0
Other Chemical/Physical/Biological Treatment	15 000	5
TOTAL	297 070	100

(Source: SWMA Update 2001 *Local Waste Interrogator*, Environment Agency, 2005).

1- This table excludes material handled at Waste Transfer Stations (18 100 tonnes in 2000/01).

3.2.4 Special Waste

As Table 3.4 illustrates, all of the special waste managed in Plymouth was disposed of to landfill.

Table 3.4 Special Waste Disposal Routes 2000/01¹

	2000/01 (tonnes)	2000/01 (%)
Recycled (including metal recycling)	0	0
Composted	0	0
EfW	0	0
Landfill	4 750	100
Materials Recovery	0	0
Other Chemical / Physical / Biological Treatment	0	0
TOTAL	4 750	100

(Source: SWMA Update 2001 *Local Waste Interrogator*, Environment Agency, 2005).

1- This table excludes material handled at Waste Transfer Stations (2 600 tonnes in 2000/01).

3.3 Number and Location of Existing Waste Facilities

Table 3.5 sets out the number and type of waste management facilities in Plymouth.

Table 3.5 Number of Waste Management Facilities (2004/05)

Type of Facility	Number
Landfill	
Non-Inert	1
Inert	0
Aggregates Recycling	0
Metal Recycling Sites	7
Waste Water Treatment (Biological Treatment)	4
Waste Water Treatment (Physical)	1
Waste Processing:	
Household Waste Recycling Centres/Civic Amenity	2
Transfer and Recycling (excluding HWRC)	
Clinical/Special Waste Transfer	3
Household and I&C Transfer	1
I&C only Transfer	1
Other Treatment	
Thermal (EfW)	1
Composting	1
Biological	0
Physical	1
Wood Chipping	1
Paper Reprocessing	1
Material Recovery Facility	1
TOTAL	26 facilities (at 21 sites)

(Source: Sitefile Digest 2004/05)

As the table shows, in respect of facilities that represent a means of **final** treatment or disposal (i.e. all facilities with the exception of transfer stations), metal recycling sites are the most numerous. The table also shows that there are a number of transfer stations in the study area. This reflects the relatively high levels of export of waste, specifically household and special waste, sent to other parts of the south-west region and outside the region, for final disposal or disposal.

Although Table 3.5 represents the most up to date position available, other facilities currently exempt from regulation via the waste management licensing regime exist, such as sites where inert waste is used for engineering purposes (golf courses or sites engaged in the storage of small quantities of harmless waste material). The Environment Agency maintains a register of exempt sites. This register is by no means complete as the sites must be drawn to the attention of the Agency prior to them being entered on the register. No information has been available on exempt sites for this report.

3.4 Existing Waste Management Capacity in Plymouth

Having established the number and type of waste management facilities in the study area, the remainder of this section looks at the capacity of those facilities to manage waste. This exercise has been conducted in two parts:

- The first looks at the remaining void space at landfill sites in the study area; and
- The second seeks to establish the throughput capacity of those other facilities that represent a means of final disposal.

In terms of existing capacity, transfer stations and civic amenity sites are not assessed here, as the waste is not normally treated or disposed of at these sites, but simply bulked up for onward transportation. The throughput capacity of the recycling sites is considered in terms of how much waste is diverted from final disposal i.e. the recovery rates are assessed and included as contributing to overall capacity. The residual material from recycling sites is not included, as like material passing through transfer stations, it has to be sent elsewhere for final disposal/further treatment.

3.4.1 Remaining Void Space

Table 3.6 summarises the available consented void space as at the beginning of April 2001.

Table 3.6 Remaining Capacity at Licensed Landfill Sites in Plymouth on 01/04/01 (m³)

Type of Waste ¹	Capacity at Open Gate Landfills	Capacity at Restricted User Landfills	Total Capacity
Inert/Construction and Demolition Waste	0	0	0
Non-Inert/Biodegradable ²	0	0	0
Co-Disposal	980 000	0	980 000
TOTAL	980 000	0	980 000

(Source: SWMA Update 2001 *Local Waste Interrogator*, Environment Agency, 2005).

1 - Article 4 of the Landfill Directive (99/31/EC) requires each landfill site to be reclassified as either hazardous, non-hazardous or inert. Hazardous sites must have been classified by July 2002 and must stop accepting any non-hazardous waste by July 2004. The classification of existing landfills as either non-hazardous or inert should be carried out as soon as possible through the PPC process, but by July 2009 at the latest. Given the transitional nature of these re-classification arrangements, at the time of writing this report a breakdown of capacity according to the new classification system was not possible.

2 - Capacity data derived from the EA in respect of non-inert waste has not allowed for this category to be further sub-divided into remaining capacity for household and commercial/industrial waste.

Taking the total capacity and recent deposits, the life expectancy of the remaining non-inert void space can be calculated. This is achieved by dividing total remaining void space by recent input trends, whilst also making an allowance for the input of inert material for daily cover and final capping. Table 3.7 sets out the results of these calculations.

Table 3.7 Void Space, Deposits and Remaining Capacity at Open Gate Sites Licensed for Inert and Non-Inert/Special Waste on 01/04/01 (000 m³)

	Void Space Capacity at Open Gate Landfills	Type of Capacity		2000/01 Inputs of Waste ¹	Life Expectancy (years)
		Cover (40%)	Waste (60%)		
Co-Disposal	980 000	392 000	588 000	191 550	2.56 ²

(Source: SWMA Update 2001 *Local Waste Interrogator*, Environment Agency, 2005).

1 - For calculation purposes, 1 tonnes = 1.2 m³.

2 - Notwithstanding this Environment Agency data, it is understood that the site is scheduled to close in March 2007.

3.4.2 Throughput Capacity of Non-Landfill Waste Facilities

Table 3.8 sets out the maximum licensed throughput capacity (in tonnes) of all permitted waste facilities in Plymouth that are engaged in the final treatment or disposal of waste.

Table 3.8 Total Throughput Capacity at Other Open Gate Waste Management Facilities 2000/01 (tonnes)¹

	Inert/C&D	Non-Inert/ Biodegradable	Special	TOTAL
Physio-Chemical Treatment²	0	129 750	4 750	134 500
Biological Treatment³	0	194 030	0	194 030
TOTAL	0	323 780	4 750	328 530

(Source: SWMA Update 2001 *Local Waste Interrogator*, Environment Agency, 2005).

1 - Capacity data derived from the Environment Agency in respect of non-inert waste has not allowed for this category to be further sub-divided into remaining capacity for household and commercial/industrial waste. Data also excludes capacity at metal recycling sites.

2 - The treatment of waste by one or a combination of physical (e.g. filtration, settlement etc) and chemical (e.g. neutralisation) methods to recover it and/or produce a less harmful waste for disposal.

3 - Any other biological process (over and above composting) that changes the properties of waste (e.g. anaerobic digestion).

The amount of waste handled at Plymouth's non-landfill facilities at 2000/01 is set out in Table 3.9.

Table 3.9 Handling of Waste at Non-Landfill Sites 2000/01 (tonnes)

	Inert/C&D	Municipal	Industrial/ Commercial	Special	TOTAL
Physio-Chemical Treatment	0	0	53 000	0	53 000
Biological Treatment (including composting)	15 000	3 000	10 000	0	28 000
TOTAL	15 000	3 000	63 000	0	81 000

(Source: SWMA Update 2001 *Local Waste Interrogator*, Environment Agency, 2005).

The disposal/management capacities set out in Table 3.8, when compared against the latest disposal/management rates given in Table 3.9 allow an assessment to be made of the theoretical spare capacity or shortfall in the study area's facilities. This simple calculation is set out in Table 3.10, which illustrates that there is an apparent surplus of capacity in the study area for those types of waste handled during 2000/01 by means other than landfill. What this broad based assessment probably hides though, is a shortage of specific capacity at an individual waste stream level.

It should be noted that the detailed disposal/capacities data set out above relates to the position as at the beginning of April 2001. Since this time, a number of facilities have closed and new sites opened (Table 3.5 illustrates the most up to date position in terms of the number and type of permitted facilities in the study area). However, this report has been unable to express the detailed capacity position for the period since April 2001.

Table 3.10 Comparison of Waste Handled at Non-Landfill Facilities with Licensed/Permitted Capacity (2000/01)¹

	Total Capacity (tonnes)	Total Handled (tonnes)	Spare Capacity / Shortfall
Physio-Chemical Treatment	134 500	53 000	+81 500
Biological Treatment (including composting)	194 030	28 000	+166 030
TOTAL	328 530	81 000	+247 530

(Source: Entec calculations).

1 - Much of the capacity detailed in this table probably represents capacity at wastewater treatment works. However, due to the composite manner in which the data is presented, no differentiation between wastewater/sewage capacity and other capacity has been possible.

3.5 Conclusions

This section of the baseline report has illustrated how waste is managed in Plymouth. Moreover, it sets out information on the number, type and capacity of the existing waste management facilities.

Unsurprisingly, for most waste landfill has been the primary disposal route. However, with the introduction of a range of diversionary policies such as the landfill tax and statutory recycling/recovery targets, the role of landfill is set to diminish and more focus placed on recycling and recovery options.

In terms of capacity to manage waste, a simple analysis of existing permitted capacities against annual input rates has demonstrated that the study area has an apparent surplus of disposal/management capacity in all recorded treatment categories. This will have to be re-assessed once the forecasting element of the study is completed (see next section).

4. Future Waste Management Requirements

4.1 Baseline Assumptions

Prior to any estimate being made of the amount and type of waste requiring management in Plymouth over the life of the WLDD i.e. up to 2016, a set of assumptions were agreed with officers at Plymouth Council. Details of these assumptions are set out in the following sections.

4.1.1 Waste Growth Assumptions

In looking at what waste growth (or otherwise) assumptions would be appropriate to apply over the period, a steer has been taken from:

- LUC and AEA Technology's work on assessing future scenarios for the management of municipal solid waste (MSW) (February 2003);
- The Regional Waste Management Strategy for the South West (October 2004); and
- SLR's work that underpins the Regional Waste Strategy, The Development of a Waste Management Strategy for the South West Region (April 2003);
- Expected development within Plymouth that would affect waste arisings.

It was agreed that the most appropriate methodology to apply would be to reflect the scenarios based approach that has recently been adopted by the South West Regional Assembly in their Regional Waste Strategy i.e. a **high, medium and low** growth scenarios. The forecast rates also reflect the Regional Waste Strategy with some amendments to better reflect the Plymouth situation.

The rates adopted are as follows:

Low Scenario

- Industrial and commercial - 1% per annum reduction to the end of the life of the WLDD (2016);
- Special waste - same as industrial and commercial;
- Construction/demolition waste - 2% per annum reduction up to the end of the life of the WLDD (2016); and
- MSW - 0.6% per annum growth up to the end of the life of the WLDD (2016).

Medium Scenario

- Industrial and commercial - 2% per annum growth up to 2006; then 1% per annum growth up to the end of the life of the WLDD (2016);
- Special waste - same as industrial and commercial;
- Construction/demolition waste - 0% per annum growth up to the end of the life of the WLDD (2016); and
- MSW - 3.5% per annum growth up to 2006; then declining (in a linear fashion) to 0% growth up to the end of the life of the WLDD (2016).

High Scenario

For the high scenario, the effects of planned house building have been accounted for, which equates to an increase of 400 to 1 200 houses per year. Rates exceed those used in the Regional Waste Strategy as follows:

- Industrial and commercial - 2.5% per annum growth up to the end of the life of the WLDD (2016);
- Special waste - same as industrial and commercial;
- Construction/demolition waste - 2% per annum growth up to the end of the life of the WLDD (2016);
- MSW - 3.5% per annum growth up to the end of the life of the WLDD (2016).

4.1.2 Household Growth Assumptions

For municipal waste, consideration was given to incorporating predicted changes in household numbers, as often it is the number of households rather than change in overall population that can have the most dramatic change on municipal waste growth.

The following baseline figures were agreed with Plymouth City Council:

- 2001 - 102 540 households;
- 2011 - 109 000 households; and
- 2016 - 112 200 households.

It is anticipated that there will be an increase of approximately 6 460 households between the period 2001 and 2011; and a further increase of 3 200 households between 2011 and 2016. In total, therefore, households are predicted to increase by 9 660 up to 2016. Based upon the data presented in Table 2.2 of this report, in 2000/01 households in Plymouth generated 1 565 kg of waste. Not taking account of any growth over the life of the WLDD, the additional amount of municipal waste that will require handling in 2016 (as a result of household growth), is expected to equate to $9\,660 \times 1\,565 \text{ kg} = \mathbf{15\,118 \text{ tonnes}}$.

How Household Growth has been Incorporated into the Waste Development Document Growth Scenarios

The growth assumption of 0.6% for the low scenario for municipal waste delivers a growth based on an increase in the numbers of households only. It therefore assumes that the amount of waste generated on a per household basis would remain unchanged throughout the life of the WLDD. As noted above, the high scenarios have made an adjustment to test the implications of high levels of growth.

4.2 Predicted Future Waste Management Requirements

4.2.1 How Much Waste?

Using 2000/01 as the baseline, and using the assumptions agreed (and set out above), calculations have been made as to how much waste is likely to arise up to the end of the life of the WLDD i.e. 2016. These calculations (for key years and for each growth scenario) are set out in Tables 4.1 to 4.3 below.

Table 4.1 Waste Arisings in Plymouth 2000 - 2016: Low Growth Scenario

Waste Stream	2001	2005	2010	2013	2015	2016
Municipal Solid Waste	160 419	164 304	169 293	172 358	174 433	175 479
Industrial & Commercial	179 910	172 821	164 351	159 470	156 296	154 733
Construction & Demolition	565 830	521 904	471 759	444 016	426 433	417 905
Special	22 784	21 886	20 814	20 195	19 794	19 596
Total	928 943	880 915	826 217	796 039	776 956	767 713

Table 4.2 Waste Arisings in Plymouth 2000 - 2016: Medium Growth Scenario

Waste Stream	2001	2005	2010	2013	2015	2016
Municipal Solid Waste	160 419	172 963	190 031	201 069	208 783	212 750
Industrial & Commercial	179 910	194 740	206 701	212 964	217 244	217 244
Construction & Demolition	565 830	565 830	565 830	565 830	565 830	565 830
Special	22 784	24 662	26 177	26 970	27 512	27 512
Total	928 943	958 195	988 739	1 006 833	1 019 369	1 023 336

Table 4.3 Waste Arisings in Plymouth 2000 - 2016: High Growth Scenario

Waste Stream	2001	2005	2010	2013	2015	2016
Municipal Solid Waste	160 419	184 085	218 635	242 404	259 669	268 758
Industrial & Commercial	179 910	198 587	224 683	241 959	254 208	260 563
Construction & Demolition	565 830	612 473	676 219	717 609	746 601	761 533
Special	22 784	25 149	28 454	30 642	32 193	32 998
Total	928 943	1 020 294	1 147 991	1 232 614	1 292 671	1 323 852

4.2.2 Implications of Statutory and National Targets

Tables 4.4-4.6 set out how national, regional and local waste management targets will shape the way in which waste will, in the future, need to be managed in Plymouth.

Table 4.4 Implications of National, Regional and Local Waste Management Targets: Low Growth Scenario

Waste Stream & Target	Amount of Waste that Requires Alternative Treatment					
	2001	2005	2010	2013	2015	2016
Municipal Solid Waste:						
Recycling & Composting (BVPI target and national targets)	-	39 433 (24%)	50 788 (30%)	-	57 563 (33%)	-
Landfill Diversion ¹	-	-	45 140	30 090	-	-
Recovery Targets ²	-	65 722 (40%)	76 182 (45%)	-	116 870 (67%)	-
Industrial & Commercial:						
Recycling & Composting	-	-	-	-	-	68 083 (44%)
Recovery	-	-	-	-	-	60 346 (39%)
Landfill	-	-	-	-	-	26 305 (17%)
Construction & Demolition	No national or regional target (simply a regional commitment to maximise)					
Special Waste	No national or regional target					

1 - Landfill Directive Targets:

- Reduce the amount of biodegradable MSW landfilled to 75% of that produced in 1995 by 2010.
- Reduce the amount of biodegradable MSW landfilled to 50% of that produced in 1995 by 2013.
- Reduce the amount of biodegradable MSW landfilled to 35% of that produced in 1995 by 2020.

Amount of MSW produced in Plymouth in 1995/6 = 114 000t (105 000 tonnes of household and 8 500 CA site, street sweepings etc).

Compositional work indicates that 56% of household waste and 13% of the remainder is biodegradable. This means that the amount of BMW in Plymouth in 1995/6 = 59 080 + 1 105 = **60 185 tonnes**.

2 - National Recovery Targets:

- Recover value from 40% of MSW by 2005.
- Recover value from 45% of MSW by 2013.
- Recover value from 67% of MSW by 2015.

Table 4.5 Implications of National, Regional and Local Waste Management Targets: Medium Growth Scenario

Waste Stream & Target	Amount of Waste that Requires Alternative Treatment					
	2001	2005	2010	2013	2015	2016
Municipal Solid Waste:						
Recycling & Composting (BVPI target and national targets)	-	41 511 (24%)	57 009 (30%)	-	68 898 (33%)	-
Landfill Diversion ¹	-	-	45 140	30 090	-	-
Recovery Targets ²	-	69 185 (40%)	85 514 (45%)	-	139 885 (67%)	-
Industrial & Commercial:						
Recycling & Composting	-	-	-	-	-	95 587 (44%)
Recovery	-	-	-	-	-	84 725 (39%)
Landfill	-	-	-	-	-	36 931 (17%)
Construction & Demolition	No national or regional target (simply a regional commitment to maximise)					
Special Waste	No national or regional target					

1 - Landfill Directive Targets:

- Reduce the amount of biodegradable MSW landfilled to 75% of that produced in 1995 by 2010.
- Reduce the amount of biodegradable MSW landfilled to 50% of that produced in 1995 by 2013.
- Reduce the amount of biodegradable MSW landfilled to 35% of that produced in 1995 by 2020.

Amount of MSW produced in Plymouth in 1995/6 = 114 000t (105 000 tonnes of household and 8 500 CA site, street sweepings etc).

Compositional work indicates that 56% of household waste and 13% of the remainder is biodegradable. This means that the amount of BMW in Plymouth in 1995/6 = 59 080 + 1 105 = **60 185 tonnes**.

2 - National Recovery Targets:

- Recover value from 40% of MSW by 2005.
- Recover value from 45% of MSW by 2013.
- Recover value from 67% of MSW by 2015.

Table 4.6 Implications of National, Regional and Local Waste Management Targets: High Growth Scenario

Waste Stream & Target	Amount of Waste that Requires Alternative Treatment					
	2001	2005	2010	2013	2015	2016
Municipal Solid Waste:						
Recycling & Composting (BVPI target and national targets)	-	44 180 (24%)	65 591 (30%)	-	85 691 (33%)	-
Landfill Diversion ¹	-	-	45 140	30 090	-	-
Recovery Targets ²	-	73 634 (40%)	98 386 (45%)	-	173 978 (67%)	-
Industrial & Commercial:						
Recycling & Composting	-	-	-	-	-	114 648 (44%)
Recovery	-	-	-	-	-	101 620 (39%)
Landfill	-	-	-	-	-	44 296 (17%)
Construction & Demolition	No national or regional target (simply a regional commitment to maximise)					
Special Waste	No national or regional target					

1 - Landfill Directive Targets:

- Reduce the amount of biodegradable MSW landfilled to 75% of that produced in 1995 by 2010.
- Reduce the amount of biodegradable MSW landfilled to 50% of that produced in 1995 by 2013.
- Reduce the amount of biodegradable MSW landfilled to 35% of that produced in 1995 by 2020.

Amount of MSW produced in Plymouth in 1995/6 = 114 000t (105 000 tonnes of household and 8 500 CA site, street sweepings etc).

Compositional work indicates that 56% of household waste and 13% of the remainder is biodegradable. This means that the amount of BMW in Plymouth in 1995/6 = 59 080 + 1 105 = **60 185 tonnes**.

2 - National Recovery Targets:

- Recover value from 40% of MSW by 2005.
- Recover value from 45% of MSW by 2013.
- Recover value from 67% of MSW by 2015.

5. Overall Need Assessment

This chapter attempts to pull together the data presented in earlier sections of this report and set out the capacity that may be required during the period of the WLDD i.e. up to 2016.

5.1 Municipal Waste

5.1.1 Recycling and Composting

- By 2016, between ~60 000 tonnes and 90 000 tonnes of recycling and composting capacity for municipal waste will be required in Plymouth;
- As existing capacity equates to ~10 000 tonnes per annum (this relates to the composting facility at Chelson Meadows), this means that an additional 50 000-80 000 tonnes capacity is required over the life of the WLDD.

5.1.2 Recovery

- By 2016, between ~117 000 tonnes and 174 000 tonnes of recovery capacity for municipal waste will be required in Plymouth.
- Existing non-inert/biodegradable recovery capacity equates to ~ 324 000 tonnes per annum. However, the vast majority of this capacity is for waste water treatment (at waste water treatment works). Indeed, in 2000/01, no municipal waste in Plymouth was sent to a recovery facility for management (excluding composting). As such, it can be concluded that between ~124 000 tonnes and 174 000 tonnes recovery capacity is required in Plymouth over the life of the WLDD.

5.1.3 Final Disposal

- Given the anticipated recycling/composting and recovery rates (which need to be met to comply with the relevant national targets), it is expected that by 2016, final disposal capacity for municipal waste will only be required for residual material.
- The amount of capacity that must be planned for depends upon the recovery technology utilised. Potentially, up to ~30% of municipal waste processed via some form of recovery technology could end up as residual material. Based on this assumption, between ~37 000 tonnes and 52 000 tonnes of residues could require final disposal by 2016.

5.2 Industrial and Commercial Waste

5.2.1 Recycling and Composting

- By 2016, between ~68 000 tonnes and 115 000 tonnes of recycling and composting capacity for industrial and commercial waste will be required in Plymouth;

- As existing capacity equates to ~10 000 tonnes per annum (this relates to the composting facility at Chelson Meadows for which there is no limit on the amount of industrial and commercial green waste. However, for the purposes of this report, a limit similar to that placed on municipal waste has been assumed). This means that an additional 58 000 to 105 000 tonnes of capacity is required over the life of the WLDD.

5.2.2 Recovery

- By 2016, between ~60 000 tonnes and 100 000 tonnes of recovery capacity for industrial and commercial waste will be required in Plymouth;
- Existing non-inert/biodegradable recovery capacity equates to ~ 324 000 tonnes per annum. However, the vast majority of this capacity is for waste water treatment (at waste water treatment works). Indeed, in 2000/01, only 53 000 tonnes of industrial and commercial waste in Plymouth was sent to a recovery facility for management (excluding composting). As such, it can be concluded that up to 50 000 tonnes of industrial and commercial recovery capacity is required in Plymouth over the life of the WLDD.

5.2.3 Final Disposal

- The Regional Waste Strategy permits the provision of landfill for up to 17% of industrial and commercial waste. This equates to ~26 000 and 44 000 tonnes per annum by 2016;
- Moreover, the amount of final disposal capacity also depends upon the recovery technology utilised. Potentially, up to ~30% of industrial and commercial waste processed via some form of recovery technology could end up as residual material. Based on this assumption, between ~18 000 tonnes and 30 000 tonnes of residues could require final disposal by 2016.

5.3 Other Waste Streams

5.3.1 Construction and Demolition Waste

By 2016, there will be between 418 000 and 762 000 tonnes of construction and demolition waste arising in Plymouth. Given the national and regional commitment to maximising the recycling of construction and demolition waste, and against the background of there being no appropriate recycling facilities in Plymouth, provision should be made for a network of such facilities.

5.3.2 Special Waste

This waste stream is predicted to stand between 20 000 and 33 000 tonnes by 2016. Historically, Plymouth has been a net exporter of this waste stream, although in 2000/01, almost 5 000 tonnes of special waste was landfilled in Plymouth. With the closure of Chelson Meadows (the only landfill site in Plymouth), this situation will not be able to continue over the life of the WLDD. However, given the small quantities of special waste generated in Plymouth,

it is unlikely that the provision of a special waste facility in Plymouth would be economically viable.

5.4 Conclusions

The overall assessment of waste management requirements has indicated that a significant amount of new waste management infrastructure is likely to be required if the City is to become more self-sufficient in managing its waste. The extent of requirements is always difficult to predict, but by using different scenarios the implications of different levels of growth can be assessed. Growth levels will need to be monitored during the course of the WLDD as even small variations can have significant implications for management requirements.