Staffordshire County Council and Stoke-on-Trent City Council
Joint Municipal Waste Management Strategy

Technical Appendices in support of Headline Strategy

November 2007
SLR Ref: 402.1395.00001

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DOCUMENT ISSUE REGISTER

Project Title	Joint Municipal Waste Management Strategy	**Job Number**	402.1395.00001
		Phase Number	001
Client	Staffordshire County Council and Stoke-on-Trent City Council	**Client Contact**	Ian Benson

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F	Final
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1 APPENDIX 1: BASELINE REPORT

1.1 Staffordshire and Stoke-on-Trent in Context

This section describes the geographic and socio economic profile of Staffordshire and Stoke-on-Trent, factors which can have a significant impact on quantities and types of waste and the way in which waste should be managed.

1.1.1 Geographical Makeup

The County of Staffordshire and Stoke-on-Trent City Council covers a total land area of 2,716 square kilometres. The County is bounded by a number[1] of local authorities, principally they are, Cheshire, Shropshire, Derbyshire, Worcestershire and the West Midlands conurbation. Staffordshire's main urban areas include Stafford, Lichfield, Tamworth, Cannock, Burton-upon-Trent, Newcastle-under-Lyme, Leek and Codsall. Three-quarters of the total land area is rural and one-quarter of the population live in small rural communities.

To the north east of the county there is also the Peak District National Park whose planning policy together with the its geological features could place restrictions on the siting of waste management facilities, and this will need to be taken into consideration in the development of the waste strategy. Figure 1.1 is a map of Staffordshire, displaying the locations of Stoke-on-Trent City Council and the eight District and Borough Councils.

Located near the geographical centre of the country, Staffordshire has good transport links to the north and south, and improving links to the east and west. Due to its location, large amounts of road and rail traffic pass through the County, namely the M6 and M54 motorways and the West Coast Mainline rail link. The completion of the M6 Toll has improved access to the southern parts of Staffordshire, whilst the A50 provides an important link for the north of the County to the east and west. The movement of waste within (and possibly from) the County, will be an important issue in formulating the preferred future strategy.

[1] Cheshire, Shropshire, Derbyshire, West Midlands, Leicestershire, Warwickshire, Worcestershire and Telford and Wrekin

Figure 1-1: Map of Staffordshire and Stoke-on-Trent

1.1.2 Population and Housing

The combined population of Staffordshire and Stoke-on-Trent is 1,055,000[2] averaging approximately 2.4 inhabitants per household. Within the County the highest populations are found within the Boroughs of Stafford (123,600) and Newcastle-under-Lyme (123,400) with Stoke-on-Trent contributing 238,300 people. The RSS proposes an average increase of 3,500 dwellings per annum across Staffordshire and Stoke-on-Trent, subdivided into 2,700 and 800 respectively. Only a small number of residential demolitions take place in Staffordshire each year with the majority being in Stoke-on-Trent, the RSS (Regional Spatial Strategy) assumes in its housing proposals that demolitions will take place at approximately 50 per annum in Staffordshire and 500 per annum in Stoke-on-Trent until 2010.

A summary of population data, household numbers and land area within each District is given in Table 1-1.

[2] Office National Statistics mid year population estimates (2005)

Table 1-1: Land Area, Population and Household Numbers for Staffordshire and Stoke-on-Trent

Council	Land Area (sq km)	Population[1] (b)	Households (c)	Ratio (b:c)
Staffordshire CC	2,700	816,700	328,234	2.5
Cannock Chase	79	91,487	37,104	2.5
East Staffordshire	389	102,591	42,717	2.4
Lichfield	330	91,635	38,748	2.4
Newcastle-under-Lyme	211	122,030	52,134	2.3
South Staffordshire	408	104,113	42,869	2.4
Stafford	597	118,030	51,602	2.3
Staffordshire Moorlands	576	93,278	40,588	2.3
Tamworth	31	74,199	29,740	2.5
Stoke-on-Trent	93	237,071	108,121	2.2

Notes:
1. Census data 2001

Waste management infrastructure will vary in different parts of the county due to a number of factors, including:

- population distribution;
- geology and geography;
- transport infrastructure; and
- conservation constraints

The different characteristics are likely to influence future waste infrastructure development patterns.

1.2 Waste Management Today

This section details the current waste service provision within Staffordshire and provides current performance in comparison with neighbouring authorities, specifically for waste minimisation and awareness, collection and disposal.

1.2.1 Current Performance

Waste Arisings

In 2005/06 total waste arisings were in the order of 606,000 tonnes of MSW. Of this total, Staffordshire County accounted for almost 466,000 tonnes, whilst Stoke-on-Trent produced a little over 140,000 tonnes. A summary of the data is given in Table 1-2, an explanation of waste related terms can be found in the glossary at the end of this document.

Over 68% of this total is made up of regular household collections, with the total household waste burden accounting for slightly more 92% of all MSW arisings within the County.

Table 1-2: Municipal Waste Arisings 2005/06

			Staffordshire	Stoke-on-Trent	Combined
Household	Kerbside	Kerbside recycling	43,601	9,128	52,729
		Kerbside composting	49,330	0	49,330
		Kerbside residual	237,982	75,072	313,055
	HWRC (ex. Rubble)	HWRC reuse	298	70	368
		HWRC recycling	20,286	6,124	26,409
		HWRC composting	22,826	5,051	27,877
		HWRC residual	35,008	19,613	54,621
		HWRC hazardous	101	17	119
		Bring + 3rd party + other recycling	10,212	2,829	13,042
Commercial		Commercial composting	0	0	0
		Commercial recycling	0	0	0
		Commercial residual	11,028	9,142	20,170
		HWRC commercial	18,434	9,194	27,628
		Litter + street sweepings	14,623	3,074	17,697
		Fly tipping + scrap cars	1,930	1,000	2,930
Total MSW			**465,682**	**140,316**	**605,997**

Recycling Performance

In 2005/06, 92,000 tonnes of MSW waste was recycled whilst just over 77,000 tonnes was composted representing a combined Staffordshire and Stoke-on-Trent household recycling and composting rate of 30.5%. The recycling and composting performance of for each Authority for 2005/06 is displayed in Table 1-3.

Table 1-3: WCA Recycling Performance

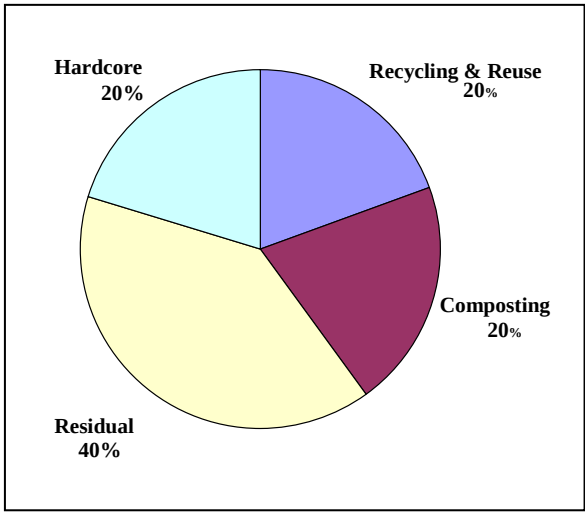
Local Authority	05/06 recycling and composting % (actual)	05/06 recycling and composting % (BVPI target)
Stafford Borough Council	24.2%	18%
Lichfield District Council	45.5%	30%
East Staffordshire District Council	25.2%	18%
South Staffordshire District Council	31.3%	18%
Staffordshire Moorlands District Council	32.2%	18%
Tamworth Borough Council	36.1%	18%
Newcastle-under-Lyme Borough Council	16.6%	18%
Cannock Chase District Council	21.3%	18%
Stoke-on-Trent City Council	19.1%	27%

Recyclable materials are derived from three main sources namely kerbside collections, HWRC sites and bring banks. Similarly, waste for composting is derived from kerbside collections and HWRC sites. We expect that figures for 2006/07 will show about 34% overall.

All of the WCAs in Staffordshire and Stoke-on-Trent collect recyclables from the kerbside. Further details on collection contracts are provided in Table 1-9. All schemes separately collect at least five materials from the kerbside (including green waste).

Figure 1-2 below summarises the household waste diversion performance at HWRC sites across Staffordshire and Stoke-on-Trent, indicating an average re-use, recycling and composting rate of 40%, and rising to 60% with the inclusion of hardcore & soil. Through additional sorting and management the target is to exceed 60% diversion of waste at HWRC's. Targets for household waste diversion at HWRCs can often indirectly result in improvements in overall recycling/composting rates by operators taking relatively simple measures, for example, improved signage and staff visibility and assistance. This is currently being reviewed in Staffordshire and Stoke-on-Trent.

Figure 1-2: HWRC Waste Management Performance (total)



The Staffordshire and Stoke-on-Trent HWRC sites received a total of 137,000 tonnes of MSW in 2005/06 of which, almost 55,000 was either reused, recycled, or composted.

1.2.2 Comparison with Other Authorities

Comprehensive Performance Assessment

Comprehensive Performance Assessment (CPA) was first introduced in 2002, with the aim of measuring how well local authorities deliver services to local people. The CPA framework embraces corporate, community and service delivery assessments of performance which combine to provide one overall judgement for the authority. This judgement, made by the Audit Commission, provides a clear indication about an authority's performance to their local community.

As a key part of the CPA process, the Audit Commission have defined a set of performance indicators which will be used to measure how well services are being delivered and how outcomes can be measured. The Audit Commission have also defined performance levels for good, average and poor performance against each indicator. These levels of performance, known as thresholds, have been determined using national standards and comparisons with authorities throughout England. Waste management indicators measuring user satisfaction, recycling, composting and waste collection levels will be used to assess performance of the Environment block of the CPA.

In addition there are also a series on national Best Value Performance Indicators (BVPI) that all authorities must collect each year. These provide opportunity for measuring performance and improvement against key services while enabling comparisons to be made with other authorities. A summary of the recycling and composting BVPI targets for the Staffordshire Districts is shown in Table 1-3.

The performance standards relevant to waste management are defined as follows:

- BV82a: percentage of household waste recycled
- BV82b: percentage of household waste composted
- BV82c: percentage of household waste recovered
- BV82d: percentage of household waste landfilled
- BV84: kg of household waste collected per head
- BV86: cost of waste collection per head
- BV87: cost of waste disposal per tonne for MSW

The Best Value Performance Indicators provide a rounded view of local authority performance delivery. They are designed to;

- enable central Government to monitor progress over a period of time;
- allow authorities to compare their performance against that of their peers; and
- provide residents with information about the performance of their local authority

A more detailed description of the performance standards is presented in the Section 4 of this report.

Table 1-4 indicates that Staffordshire exhibits relatively high performance when compared with neighbouring authorities. In particular, the percentage of household waste recycled and composted are highest and second highest respectively. In addition the county also has the second lowest household waste per kilogram per household, indicating the councils' success in controlling waste growth and promoting waste minimisation.

Table 1-4: Comparison of Statutory Performance Standards with other Authorities (Staffordshire)

Performance Standard	Cheshire	Derbyshire	Shropshire	Staffordshire	Warwickshire
BV82a	14.0%	17.0%	16.1%	17.1%	14.5%
BV82b	15.5%	9.7%	18.7%	16.6%	15.4%
BV82c	0.0%	0.0%	0.0%	21.9%	4.9%
BV82d	70.5%	73.5%	65.2%	44.4%	65.1%
BV84	620kg	484kg	554kg	534kg	549kg
BV86	N/A	N/A	N/A	N/A	N/A
BV87	£55.8	£45.9	£54.6	£35.2	£36.1

1.2.3 Waste Minimisation and Awareness

Waste minimisation is an important aspect of any waste management strategy, sitting as it does at the peak of the waste hierarchy, and in recent years there has been an increasing emphasis on 'breaking the link between economic growth and the amount of waste produced'[3]

Waste minimisation and re-use has the potential to;

- reduce costs associated with waste collection and management;
- reduce the size and/or number of waste management facilities needed in the future;
- avoid environmental impacts of materials extraction and use;
- improve the authorities' balance of landfill allowances under the LATS; and
- could assist in generating significant social and economic benefits

Much of the success of waste minimisation and re-use initiatives can be achieved through increased awareness of community recycling schemes and sustainable purchasing policies. It is essential that the public is made aware of the problems of waste handling, consequential pollution aspects, and the role that they can play in mitigating these problems. Examples of waste minimisation initiatives are illustrated in Table 1-5.

All of the Districts and Councils provide information on waste issues via leaflets and normal publicity channels and a number have appointed staff dedicated to waste management awareness issues.

The introduction of waste minimisation and re-use initiatives can also be co-ordinated at the County level so as to take advantage of an integrated public awareness campaign which would demonstrate clear and unified messages across the Districts and deliver potential cost savings associated with solitary communication campaigns and marketing materials.

[3] Defra (2005) Guidance on Municipal Waste Management Strategies

Table 1-5: Examples of Waste Minimisation Initiatives

Initiative Type	Examples
Purchasing	Promote durable/reusable items (vs disposable) Reusable shopping bags Encourage 'smart shopping' – buying goods with less packaging Join Mailing Preference Service to reduce junk mail
Diverting material from waste stream	Home Composting Re-usable nappies
Education and awareness	Market campaigns at schools and through community centres
Waste reduction in the work place	Promote energy efficient practices Sustainable purchasing
Financial incentives	Pay as you throw schemes to reduce residual waste
Targets and monitoring	Set per household or per capita arisings and residual targets Monitor progress of targets and effectiveness of initiatives
Re-use	Furniture WEEE Paint Scrap metal Wood Community Recycling Networks

Councils can also introduce internal waste minimisation initiatives;

- awareness raising;
- waste audits of all council operations;
- green procurement;
- internal composting;
- recycling provision within offices; and
- website development

A number of waste minimisation initiatives have been introduced in Staffordshire at the County and District level, examples of some of these initiatives are shown below in Table 1-6.

Table 1-6: Staffordshire and Stoke-on-Trent waste minimisation initiatives

Council	Waste Minimisation Initiatives
Staffordshire CC	Waste Watch national campaign aimed at minimising waste through education and public awareness campaigns. Staffordshire Green Awards
Cannock Chase	Go for Green
East Staffordshire	Real Nappy campaign Subsidised home composters
Lichfield	Beacon Council for waste and recycling Home composting Community repaint 'Freecycle' waste swap scheme
Newcastle-under-Lyme	Reusable Nappy campaign Staffordshire wide home composting campaign
South Staffordshire	'Watch your Waste' campaign Home Composting sales Nappy bins supplied to householders
Stafford	Subsidised home composters Furniture exchange Clear out days
Staffordshire Moorlands	Waste reduction campaign Home composting campaign Real nappies campaign
Tamworth	Nappy incentive (£30 vouchers for re-useable nappies) "Turnaround" furniture re-use campaign
Stoke-on-Trent	"Furniture Mine" furniture exchange programme Plans for composting campaign run by "Recycle Now"

Re-Use Schemes

Reuse is becoming more prominent as a viable waste management option, with product design encouraging repeated utilisation. Incentives presented to manufacturers through the Packaging Regulations encourage the design of refillable packaging and the Waste Electrical and Electronic Equipment (WEEE) Regulation has also encouraged recycling operators to source new markets for re-conditioned IT equipment. This is a key area of waste management that all councils, the voluntary and community sector are attempting to promote and develop.

The collection, refurbishment and redistribution of furniture and white goods are becoming established through a number of community and business ventures, which, in addition to reducing waste, also create employment, training opportunities and some financial benefits. There are a number of national furniture re-use schemes in operation across the region which sell directly to the public and provide furniture for low income families. Many charities receive unwanted items such as clothes, shoes, books and bric-a-brac. The items are collected via bring sites, kerbside collections or by direct delivery by the public. The materials are sorted and sold locally or sent to other countries. A list of schemes within Staffordshire can be found in Table 1-7 below.

Table 1-7: Staffordshire, Districts and Stoke-on-Trent Waste Re-use Initiatives

District	Waste Re-Use Initiative
Stafford	GROW – Great Returns On Waste: North Staffordshire Furniture Mine (bulky household waste collection service for repair and recycling)
East Staffordshire	RISES – Recycling Incentives Scheme in East Staffordshire (cash reward scheme for material recycled)
Tamworth	Turntable Project – community enterprise specifically set up to collect, refurbish and distribute unwanted second hand furniture
Staffordshire Moorlands Newcastle-under-Lyme Stoke-on-Trent	The Furniture Mine – charity organisation collecting quality unwanted furniture for sale at reduced prices
Cannock Chase	Home Comforts Furniture Re-Use Project – project receives donations of furniture, household goods and small electrical items for distribution to individuals/families in crisis
South Staffordshire	The Furniture Reuse Network – national body which supports assists and develops charitable re-use organisations throughout the UK.
Lichfield	Freecycle – initiative which matches people who have items to get rid of with people who can use them. Operates using email based communication.

In order to sustain and expand re-use schemes currently in operation the Government has recently published a document detailing plans to issue re-use credits, similar to the existing recycling credits scheme[4].

1.2.4 Waste Collection

Each of the eight districts plus Stoke-on-Trent offer a kerbside recycling service of varying degrees with separate green waste collection, and four now operate an alternate weekly collection service for residual waste as shown in Table 1-9.

The schemes operating in Staffordshire and Stoke-on-Trent involve sorting of collected materials at the kerbside, as they are collected from the householders. Due to the high quality of the kerbside sorting system, the recyclable materials can be bulked up and sent for recycling with minimum handling costs.

Composting

Green garden waste for composting is derived from two main sources in Staffordshire and Stoke-on-Trent; HWRC sites and kerbside collections.

In 2005/06 almost 28,000 tonnes of green garden waste was delivered to HWRC sites for composting and over 49,000 tonnes of green garden waste was collected from the kerbside. This material is readily compostable in open windrow (OW) composting facilities in or close to the County.

The collection of kitchen waste is more problematic due to the current limited availability of suitable enclosed in-vessel composting facilities (IVC). Under the Animal By-Products

[4] Briefing paper on re-use credits for local authorities (January 2007); FRN, LARAC and WRAP

Regulations 2003 kitchen waste is now categorised as catering waste and can only be composted under controlled conditions. A list of composting facilities in Staffordshire and Stoke-on-Trent is presented in Table 1-8. Only one of the existing facilities is an in-vessel facility capable of accepting kerbside collected kitchen waste. Several councils have expressed a wish to collect kitchen as well as green garden waste since this will make more material available for composting and increase the amount of diversion from landfill. In order for Staffordshire and Stoke-on-Trent to meet their recycling and composting targets post 2010 there is a requirement for additional in-vessel composting capacity. Facility capacity requirements are discussed further in the Implementation Plan Document.

Table 1-8: Composting Sites in Staffordshire and Stoke-on-Trent

District	Site Details
Staffordshire Moorlands	***Green garden waste open windrow*** composting and materials recycling facility (MRF) for inert wastes and soils ***Licence***: licensed ***Status***: operational ***Operator***: Fallows Landfill
Staffordshire Moorlands	***Green garden waste open windrow*** composting (horticultural, landscaping and garden waste) ***Licence***: exempt ***Status***: operational ***Operator***: Moorland Green Waste Recycling
Newcastle-under-Lyme	***Green garden waste open windrow*** ("from agricultural, horticultural, landscaping and gardening works") ***Licence***: exempt ***Status***: operational ***Operator***: Simpro Ltd
Stafford	***Green garden waste open windrow*** (horticultural, landscaping, garden waste, and Local Authority kerbside collected green waste) ***Licence***: licensed ***Status***: temporary permission granted until May 2007 ***Operator***: Mr Robert Ainsworth
South Staffordshire	***Green garden waste open windrow*** (landscaping) ***Licence***: licensed ***Status***: operational under temporary license for 12 month period ***Operator***: HE Humphfries Ltd
South Staffordshire	***Green garden waste open windrow and in-vessel*** facility (including kitchen/catering/food waste) ***Licence***: licensed ***Status***: both operational ***Operator***: Jack Moody Ltd.
South Staffordshire	***Green garden waste open windrow*** ***License***: exempt ***Status***: operational ***Operator***: Mr Pardoe

An important element of working toward waste minimisation involves all Waste Collection Authorities (WCAs) and Waste Disposal Authorities (WDAs) encouraging householders to also use home composters. However, whilst the sale of compost bins can be easily measured, the tonnage of waste diverted and actual participation can not be so easily quantified. At present, home composting does not count towards weight based composting

targets although this is currently subject to review following a recent WRAP[5] study into home composting which could mean that any material diverted from the waste stream will assist in meeting Landfill Directive targets.

[5] Details of WRAPs home composting diversion programme (conducted in 2006) can be found in the 2005/06 Achievements Report

Table 1-9: Waste Collection Authority Contract Status

Waste Collection Authority	Collection scheme	Collection materials	Collection frequency	Contract status	Contract expiry date	Comments
Stafford Borough Council	Residual		weekly	Biffa contract	Feb-08	Contract anticipated to be until 2015
	Dry recyclables	glass bottles, cans, paper, plastic bottles and textiles[1]	fortnightly	Biffa contract	Feb-08	
	Green recyclables	garden waste	fortnightly	Biffa contract	Feb-08	
Lichfield District Council	Residual		fortnightly	In house contract	n/a	Planning to introduce kitchen waste collections April 2007 (to be collected with green waste)
	Dry recyclables	cans, paper, card, textiles, plastic and glass	weekly	In house contract	n/a	
	Green recyclables	green waste	fortnightly	In house contract	n/a	
East Staffordshire Borough Council	Residual		weekly	In house contract	Jun-17	Planning to introduce kitchen waste collections March 2007 (to be collected with green waste). Cardboard to be included in dry recyclables collections
	Dry recyclables	glass bottles, cans, plastic, paper	fortnightly	In house contract	Jun-17	
	Green recyclables	garden waste	fortnightly	In house contract	Jun-17	
South Staffordshire District Council	Residual		fortnightly	Biffa contract	Mar-11	Alternate weekly collection scheme. Recyclables and green collected on the same day.
	Dry recyclables	glass, cans, plastic bottles, paper and card	fortnightly	RU Recycling	Mar-11	
	Green recyclables	garden waste	fortnightly	RU Recycling	Mar-11	
Staffordshire Moorlands District Council	Residual		weekly	In house contract	n/a	Kitchen waste currently on trial, propose to roll out to all District from March 2007. Garden waste currently going to number of on-farm composting units.
	Dry recyclables	glass, cans, paper, textiles and shoes	fortnightly	ACRE[3] contract	Aug-07	
	Green recyclables	garden waste and kitchen waste[2]	fortnightly	Greendoor Recycling	Feb-07	
Tamworth Borough Council	Residual		fortnightly	Serviceteam contract	Apr-09	Residual and green collected on alternate weeks. Plans to introduce kitchen waste collections when IVC facility becomes available
	Dry recyclables	paper, plastic bottles, cans, glass and card	weekly	Serviceteam contract	Apr-09	
	Green recyclables	garden waste	fortnightly	Serviceteam contract	Apr-09	
Newcastle-u-Lyme Borough Council	Residual		weekly	In house contract	Mar-07	Currently re-advertising contract to explore inclusion of plastics and cardboard. No plans as yet to introduce kitchen waste collection.
	Dry recyclables	glass bottles, cans, paper and textiles	fortnightly	ACRE contract	Mar-07	
	Green recyclables	garden waste	fortnightly	ACRE contract	Mar-07	
Cannock Chase District Council	Residual		fortnightly	In house contract	Mar-10	Option to extend contract to 2015. RU Recycling are subcontractor to Cannock Chase.
	Dry recyclables	glass, cans, plastic bottles, paper and card	fortnightly	RU recycling	Mar-10	
	Green recyclables	garden waste	fortnightly	In house contract	Mar-10	
Stoke on Trent	Residual		weekly	In house contract	n/a	Intend to switch to alternate weekly collection for residual if suitable IVC facility is made available.
	Dry recyclables	glass, cans, paper and textiles	fortnightly	ACRE contract	Mar-09	
	Green recyclables	garden waste	fortnightly	In house contract	n/a	

Notes

1. Textiles separately collected by charity organisation
2. Trial collection to 500 homes
3. Abitibi Consolidated Recycling Europe

Bring Bank Recycling

All WCAs provide "bring banks", which involve free standing containers placed at specific locations where the public can deposit a variety of materials including paper, newspapers, card, books, textiles, glass, cans and plastic bottles. These vary in size from small facilities, i.e. one or two containers in car parks to larger facilities on dedicated sites collecting a wider range of materials. Bring sites are mainly operated by the WCAs but are often run in conjunction with commercial or retail organisations.

At present, over 250 bring sites, plus additional 3rd party collections are operational throughout Staffordshire and Stoke-on-Trent, collecting a variety of materials and accounting for over 13,000 tonnes of material annually. A summary of the range and extent of materials recycled at bring sites within Staffordshire and Stoke-on-Trent is provided in Table 1-10. It is anticipated that with the increase in kerbside collection services offered by the councils bring bank services are unlikely to require expansion and are assumed to remain constant in future options development (see Options Appraisal Document).

Table 1-10: Details of Current Bring Sites (2005/06)

District Council	Bring Site Collections							
	Number of sites	Paper	Glass	Textiles	Cans	Plastics	Cardboard	Other
Stafford Borough Council	38	✓	✓	✓	✓		✓	
Lichfield District Council	1	✓	✓	✓				✓
East Staffordshire Borough Council	53	✓	✓	✓	✓	✓		
South Staffordshire District Council	26	✓	✓		✓			
Staffordshire Moorlands District Council	41	✓	✓	✓	✓	✓		
Tamworth Borough Council	30	✓	✓	✓				
Newcastle-u-Lyme Borough Council	18	✓	✓		✓			
Cannock Chase District Council	16	✓	✓	✓				
Stoke on Trent	31	✓	✓		✓			

Bulky Waste

Where the householder has bulky waste that will not fit in their wheeled bin or bag and they are unable to deliver their waste to a HWRC the WCA can be asked to remove the bulky materials. Councils are allowed to make a charge for this service and the level of charging varies from no charge to more than £10 per item / collection. Each WCA has its own charging and collection policy, a summary of these collection services are shown in Table 1-11. A proportion of the collected bulky items consist of white goods and furniture which may go on to be reused.

Refrigerators and freezers constitute a proportion of bulky waste, with over 1000 tonnes being disposed of by householders during 2005/06 (approximately 25,000 units). These units may contain CFC (chlorofluorocarbons) gases in the refrigerant and the foam insulation, these gases are ozone depleting substances and their emission to the atmosphere is not allowed. The units have to be processed in a special facility where the CFC gases are captured and sent for destruction while the rest of the material, plastics and metals, are recovered for recycling (up to 90%) as required under the WEEE regulations. Newly manufactured units do not contain these gases and can be recycled by normal methods as required by the WEEE regulations.

Table 1-11: Bulky Waste Collection in Staffordshire and Stoke-on-Trent

Council	Bulky Items
Cannock Chase	Special collections for large items. Charge for the collection.
East Staffordshire	Chargeable scheme for bulky waste and fridges/freezers
Lichfield	Chargeable service
Newcastle-under-Lyme	Chargeable service
South Staffordshire	Twice yearly free collection of bulky items
Stafford	Charge £22.70 for up to 3 items – weekly service
Staffordshire Moorlands	Chargeable service
Tamworth	Fortnightly bulky waste collection – requires pre booking
Stoke-on-Trent	Chargeable service

Clinical Waste

Upon request household clinical waste is collected through a separate collection system operated by each individual WCA and is transported to an incinerator for destruction or where permissible to a landfill site. Each of the Staffordshire WCAs will have a specific contract arrangement for the management of clinical waste and these are shown in Table 1-12.

Table 1-12: Clinical Waste Collection Status in Staffordshire and Stoke-on-Trent

District	Clinical Waste
Stafford	A service is operated by the Staffordshire Ambulance Courier Service on behalf of the Mid-Staffs Area Health Authority
East Staffordshire	Separate service provided
Tamworth	Primary Care Trust collection service
Newcastle-under-Lyme	Free service arranged following requests by medical practitioners,
Cannock Chase	Local hospital collection service
South Staffordshire	Weekly clinical waste collection service (free service)
Lichfield	Local hospital collection service
Staffordshire Moorlands	Provides a weekly free collection of clinical waste from domestic properties following a referral from the health authority
Stoke-on-Trent	Provides free clinical waste collection with referral by doctor, nurse or health authority

1.2.5 Waste Management and Disposal

Staffordshire County Council has an existing contract in place with Stoke Incinerator to take approximately 180,000 tonnes of residual waste per annum and is not due to expire until 2022. The existing arrangement with Stoke Incinerator will need to be included in any future residual treatment facility developments.

The remaining residual waste collected in Staffordshire and Stoke-on-Trent not recycled or recovered is sent to landfill[6], however this is seen as a short term solution until a suitable residual treatment facility is made available resulting in zero primary waste to landfill by the year 2020.

There are currently 30[7] 'pre-operational' or 'operational' landfill sites in Staffordshire and Stoke-on-Trent, of which nine are permitted to take household waste and are summarised in Table 1-13 below.

[6] Contract with Biffa, expired in 2005 with current disposal by ongoing agreement
[7] http://www.staffordshire.gov.uk/NR/rdonlyres/21578ABE-BD95-40E1-9DDB-BED45ACCD468/44625/Landfillsites_weblistJan07.pdf (January 2007)

Table 1-13: Landfill sites in Staffordshire and Stoke-on-Trent

District	Site Details
Stoke-on-Trent	***Co-disposal – open gate:*** inert, non-hazardous and hazardous – co-disposal ***Status***: pre-operational ***Operator***: Biffa Waste Services ***Site name***: Fenton Manor Quarry
Cannock Chase	***Co-disposal – open gate:*** inert and non-hazardous ***Status***: operational (this site is temporarily closed Jan 07 but hoped to recommence soon) ***Operator***: Cleansing Services Group Ltd. ***Site name:*** Wyrley Grove Landfill
Cannock Chase	***Co-disposal – open gate:*** inert and non-hazardous – multi-disposal (domestic, industrial, C&I) ***Status***: operational (includes MRF and composting) ***Operator***: Biffa Waste Services
Stafford	***Co-disposal – open gate:*** inert and non-hazardous – multi disposal (C&I, domestic) ***Status***: operational (will close 2008, move to Warwickshire for 4 years and then re-open) ***Operator***: Hanson Building Products Ltd ***Site name:***
Stoke-on-Trent	***Household/I&C:*** inert and non-hazardous ***Status***: pre-operational ***Operator***: Lafarge Aggregates ***Site name:*** Clanway
Stoke-on-Trent	***Household/I&C:*** inert and non-hazardous ***Status***: operational (includes MRF) ***Operator***: Biffa Waste Services ***Site name:*** Newstead Disposal Area

In order to effectively implement a municipal waste management strategy within Staffordshire and Stoke-on-Trent, careful consideration of existing contractual arrangements is required. Statutory household recycling targets for the WDA and each WCA will require current contracts to be flexible enough to allow necessary changes in collection, treatment and disposal practices to occur. New contracts are increasingly being required to be performance driven, whilst also being flexible to allow for future legislative changes.

Information provided in Table 1-9 would suggest that most collection and contracts could be realigned by 2010, with the exception of East Staffordshire whose contract is until 2017. This would therefore suggest that flexibility with respect to contracts can be achieved in the short to medium term within Staffordshire and Stoke-on-Trent.

1.3 Cost Implications

The financial costs of waste management have risen significantly over recent years, driven largely by the introduction of new and more stringent environmental controls and regulation (at European and National level). Historically, options that are considered to be higher up the 'waste management hierarchy' (for example, recycling and energy recovery) have been more costly than those that are lower down (for example, landfill). Government has sought to redress this balance through the introduction of fiscal measures such as the Landfill Tax which makes landfill a less attractive option. It is fair to assume, however, that the costs of all waste treatment and disposal technologies are likely to increase over time.

Historically, within Staffordshire, there has been a fairly heavy reliance on landfill as the principal disposal route municipal waste. For reasons discussed elsewhere in this document (See Section 3) this situation has to change, with the introduction of systems which serve to

increase recycling and recovery of waste and therefore over time greatly reduce the proportion of the waste stream sent to landfill. Due to increases in landfill tax, and improved recycling, composting and waste treatment it is inevitable that waste management costs will rise significantly.

Set out below is a brief discussion on the key factors and uncertainties that will influence the costs associated with the future management of municipal waste.

1.3.1 Landfill Tax

The Landfill Tax system was introduced by Government in October 1996. The current (2007/08) standard rate of landfill tax is £24 per tonne for active wastes. The 2007 Government Budget announced annual increases in the standard rate of landfill tax of £8 per tonne from 2008/09 until at least 2010/11, by which time it will have reached £48 per tonne. This is higher than the estimates provided in the 2007 Pre-Budget Report which announced that the standard rate of Landfill Tax would increase by £3 per tonne in April 2007, and at least £8 per tonne in the years thereafter[8]. It is clear that the Government is fully committed to the use of a Landfill Tax, and indeed it is a recognised fiscal measure throughout Europe.

1.3.2 Other Landfill Cost Implications

Historically, the disposal of waste to landfill has been seen as a relatively cheap solution when compared to other options higher up the 'waste management hierarchy'. The application of a landfill tax has, as discussed above, eroded this differential to a degree. However, introduction of the Landfill Directive is also having a noticeable impact on the costs of landfill. The Landfill Directive places much more stringent requirements on the design, operation and environmental controls for landfills, and this will increase the costs of waste disposal to landfill.

1.3.3 Tax on Incineration

Currently, there are no plans by Government to introduce a tax on incineration, although there has been pressure brought to bear from certain organisations for its introduction. Waste Strategy 2007 recognises the role that waste to energy can play alongside recycling and composting in achieving a balanced and sustainable approach to waste management. The Government indicated in its 2004 pre budget report that they were "not convinced that there is a strong case for the introduction of a tax on incinerated waste," and that a tax on incineration would not necessarily encourage a move towards a more sustainable approach.

1.3.4 Renewables Obligation Order

The Renewables Obligation is the Government's main policy measure to encourage the development of electricity generating capacity using renewable sources of energy in the UK, therefore reducing carbon dioxide emissions. Since January 2006, energy from waste combined heat and power (CHP) plants[9] that are fully compliant with the Good Quality benchmark are eligible for Renewables Obligation Certificates (ROCs). A certificate can be issued for each megawatt hour of renewable energy generated.

[8] Lets recycle article 'Treasury: Landfill Tax rises could accelerate from 2008' (December 2006)
[9] Only stations first commissioned or re-equipped on or after 1 January 1990 are eligible (www.dti.gov.uk accessed 02.02.07)

1.3.5 Costs Associated with Local Issues

Variations in cost can occur due to site specific issues, often within fairly localised areas. Staffordshire County and Stoke-on-Trent covers a large area and has varied centres of population spread throughout the county. It is important to recognise therefore, that distances to waste management facilities (whether these are landfill sites, materials recovery facilities or waste reprocessors) can have a marked impact on relative costs. The geographical characteristics of an area can also have an impact, with noticeable differences in costs between relatively urban areas and rural areas. These factors can therefore have a bearing on the types of waste management solution implemented.

Factors that can influence the cost of waste management include:

- Landfill scarcity
- Size and type of outlets for compost
- Funding availability
- Existing and emerging local markets for materials
- Specific contract characteristics including type, scale and performance requirements

Whilst recognising the range of factors and that such variations can occur, it is very difficult to quantify their potential impact in precise financial terms.

2 APPENDIX 2: LANDFILL ALLOWANCE TRADING SCHEME (LATS) STRATEGY

2.1 Introduction

Guidance on Developing Municipal Waste Management Strategies requires that Councils prepare a Biodegradable Municipal Waste (BMW) Diversion Plan to identify the proposed strategy for diverting biodegradable municipal waste away from landfill in order to achieve the EU Landfill Directive targets.

2.2 Background

The Landfill Directive was brought into force in the UK on the 15th June 2002 as the Landfill (England and Wales) Regulations 2002 and since then has been introduced in stages to give UK industry time to adapt. The Landfill Directive is seen as providing the principal legal framework influencing MSW management and strategy development in the UK. The Directive seeks to prevent or reduce negative environmental effects from the landfilling of waste by introducing uniform standards throughout the European Union. The main regulatory provisions of the Directive stipulate:

- classes of landfill;
- requirements for obtaining a permit for operating a landfill;
- waste acceptance procedures;
- control and monitoring procedures for operating a landfill; and
- closure procedures.

The first requirement of the Regulations was for all landfill operators to submit a conditioning plan by 26th July 2002, which reclassified the site as inert, hazardous or non-hazardous. This is one of the key provisions of the Directive, as previously UK landfills had either been inert or practiced co-disposal of hazardous and non-hazardous material. Now, non-hazardous sites can accept only non-hazardous waste, while hazardous sites could continue co-disposal until 2004, when it was finally banned.

The most significant part of the Directive is Article 5 which proposes a strict timetable for reductions in the landfilling of biodegradable waste. These are onerous requirements and have been the principal influence on the formulation of *'Waste Strategy 2000'* and the superseding document '*Waste Strategy 2007'*. The EC Landfill Directive sets mandatory targets which mean the UK must adhere to the following (these include the 4 year extensions granted to the UK.):

- By 2010 to reduce biodegradable municipal waste landfilled to 75% of that produced in 1995
- By 2013 to reduce biodegradable municipal waste landfilled to 50% of that produced in 1995
- By 2020 to reduce biodegradable municipal waste landfilled to 35% of that produced in 1995

On the 10th November 2003, Parliament approved the Waste and Emissions Trading Bill. This implements Articles 5(1) and 5(2) of the EC Landfill Directive in the UK. The Waste and Emissions Trading Act 2003 introduced a system of tradable allowances to help the UK meet the 99/31 BMW requirements. The Secretary of State has set gradually reducing BMW landfill limits for England, Wales, Scotland and Northern Ireland, and can set specific targets for any year (target years) and any individual country. Regional Governments (the Scottish Minister, the Government for Wales and the Department of the Environment for Northern

Ireland and, in the future, regional assemblies) share out the total BMW landfill allowance for their regions between the local disposal authorities. The total regional allowance cannot be exceeded, however, in England individual authorities can:

- Bank any unused allowance for later use;
- In addition, councils may borrow up to 5% of their own allocations from future years;
- Transfer any unused allowance by trading with another disposal authority who wishes to landfill more than its allowance;
- Buy allowances from another disposal authority if needed;
- Councils will be fined £150 per tonne, almost three times the average cost of landfill, if they do not take reasonable steps to secure sufficient landfill allowances for the amount of waste they need to landfill;
- No banking or borrowing into / in / from target years 2009/10, 2012/13 and 2019/20.

Regulations for the Landfill Allowance Trading Scheme (LATS) were delayed until 2005. On 14th May 2004 the Government announced that the LATS will begin for English county and unitary council authorities on 1st April 2005. LATS is regarded as the Governments key measure in meeting landfill reduction targets.

Staffordshire and Stoke-on-Trent have received their final LATS allocations as shown in Table 2-1 below.

Table 2-1: Summary of Staffordshire and Stoke-on-Trent Landfill Allowances

Year	Staffordshire County Council	Stoke-on-Trent City Council	Total Allocation (Tonnes)
2006/07	189,303	27,732	217,035
2007/08	187,981	34,455	222,436
2008/09	186,328	42,860	229,188
2009/10	184,345	52,945	237,290
2010/11	163,826	47,051	210,877
2011/12	143,306	41,158	184,464
2012/13	122,787	35,265	158,052
2013/14	117,520	33,752	151,272
2014/15	112,253	32,240	144,493
2015/16	106,986	30,727	137,713
2016/17	101,719	29,214	130,933
2017/18	96,452	27,701	124,153
2018/19	91,185	26,189	117,374
2019/20	85,918	24,676	110,594

2.3 What does this mean for Staffordshire and Stoke-on-Trent

The proposed landfill allowances for Staffordshire and Stoke-on-Trent and the resulting additional diversion requirements are displayed in Table 2-2.

Table 2-2: BMW Diversion Requirements for Staffordshire and Stoke-on-Trent

Year	Staffordshire Predicted MSW Arisings [1]	Staffordshire Predicted BMW Arisings [2]	Staffordshire BMW Allowances [3]	Staffordshire BMW Diversion Required
2006/07	470,576	319,992	189,303	130,689
2007/08	477,585	324,758	187,981	136,777
2008/09	484,646	329,559	186,328	143,231
2010	**491,759**	**334,396**	**184,345**	**150,051**
2010/11	497,118	338,041	163,826	174,215
2011/12	502,503	341,702	143,306	198,396
2013	**507,913**	**345,381**	**122,787**	**222,594**
2013/14	513,348	349,077	117,520	231,557
2014/15	518,808	352,790	112,253	240,537
2015/16	522,510	355,307	106,986	248,321
2016/17	526,211	357,824	101,719	256,105
2017/18	529,913	360,341	96,452	263,889
2018/19	533,614	362,858	91,185	271,673
2020	**537,316**	**365,375**	**85,918**	**279,457**

Notes

[1] Based on the adopted Staffordshire growth scenario

[2] Based on 68% BMW arisings. Guidance on the Landifll Allowance Scheme: Municipal Waste. September 2005

[3] Copy of LATS allocations available at http://www.defra.gov.uk/environment/waste/localauth/lats/index.htm

Year	Stoke-on-Trent Predicted MSW Arisings [1]	Stoke-on-Trent Predicted BMW Arisings [2]	Stoke-on-Trent BMW Allowances [3]	Stoke-on-Trent BMW Diversion Required
2006/07	143,862	97,826	27,732	70,094
2007/08	145,351	98,838	34,455	64,383
2008/09	146,846	99,855	42,860	56,995
2010	**148,348**	**100,877**	**52,945**	**47,932**
2010/11	149,340	101,551	47,051	54,500
2011/12	150,335	102,228	41,158	61,070
2013	**151,333**	**102,906**	**35,265**	**67,641**
2013/14	152,335	103,588	33,752	69,836
2014/15	153,339	104,271	32,240	72,031
2015/16	153,822	104,599	30,727	73,872
2016/17	154,305	104,928	29,214	75,714
2017/18	154,788	105,256	27,701	77,555
2018/19	155,271	105,584	26,189	79,395
2020	**155,754**	**105,913**	**24,676**	**81,237**

Notes

[1] Based on the adopted Stoke-on-Trent growth scenario

[2] Based on 68% BMW arisings. Guidance on the Landifll Allowance Scheme: Municipal Waste. September 2005

[3] Copy of LATS allocations available at http://www.defra.gov.uk/environment/waste/localauth/lats/index.htm

Table 2-3 below shows the total diversion achieved if the ‘do nothing’ scenario is implemented in Staffordshire. Figure 2.1 illustrates a graphical representation of the information in Table 2.3. Table 2.4 shows the total diversion achieved in Staffordshire if recycling and composting performance is improved from the current rate to 55%, with no additional treatment capacity procured. Figure 2.2 illustrates a graphical representation of the information in Table 2.4. Tables 2.5 and 2.6 show the total diversion achieved in Staffordshire if recycling and composting performance is improved from the current rate to 55%, and an additional facility is procured to treat the remaining residual waste stream (it is assumed a residual treatment facility could be procured in time for the 2013 target year). Table 2.5 assumes the procured facility is an Energy from Waste plant, whereas Table 2.6 assumes an Autoclave facility is procured. Figures 2.3 and 2.4 present the data from Tables 2.5 and 2.6 respectively.

Table 2.7 shows the total diversion achieved if the ‘do nothing’ scenario is implemented in Stoke-on-Trent and is illustrated in a graphical form in Figure 2.5. Table 2.8 shows the total diversion achieved in Stoke-on-Trent if recycling and composting performance is improved from the current rate to 55% with no additional treatment facility procured within Stoke-on-Trent. Figure 2.6 presents the data from Table 2.8 graphically.

Table 2-3: BMW Diversion for 'Do Nothing' Scenario (Business as Usual Situation) in Staffordshire only

Year	2006/07	2007/08	2008/09	2010	2010/11	2011/12	2013	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2020
MSW arisings	470,576	477,585	484,646	491,759	497,118	502,503	507,913	513,348	518,808	522,510	526,211	529,913	533,614	537316
BMW arisings	319,992	324,758	329,559	334,396	338,041	341,702	345,381	349,077	352,790	355,307	357,824	360,341	362,858	365,375
BMW diversion required	130,689	136,777	143,231	150,051	174,215	198,396	222,594	231,557	240,537	248,321	256,105	263,889	271,673	279,457
Recyclables (biodegradables)	40,645	41,250	41,860	42,475	42,937	43,403	43,870	44,339	44,811	45,131	45,450	45,770	46,090	46,409
Green (biodegradtables)	59,954	60,847	61,746	62,653	63,335	64,022	64,711	65,403	66,099	66,570	67,042	67,514	67,985	68,457
Kitchen (biodegradables)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total BMW Diverted	100,599	102,097	103,607	105,127	106,273	107,424	108,581	109,742	110,910	111,701	112,492	113,284	114,075	114,866
Treatment Diversion														
MSW to Facility (Stoke Incinerator)	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Treatment Total BMW Diverted	68,000	68,000	68,000	68,000	68,000	68,000	68,000	68,000	68,000	68,000	68,000	68,000	68,000	68,000
LATS Surplus / Deficit	**37,910**	**33,320**	**28,375**	**23,076**	**58**	**-22,972**	**-46,013**	**-53,814**	**-61,627**	**-68,620**	**-75,612**	**-82,605**	**-89,598**	**-96,591**
Total BMW to Landfill	151,393	154,661	157,953	161,269	163,768	166,278	168,800	171,334	173,880	175,606	177,331	179,057	180,783	182,509

Table 2-4: BMW Diversion for Option 3 (55% recycling and composting) with no additional residual treatment plant in Staffordshire only

Year	2006/07	2007/08	2008/09	2010	2010/11	2011/12	2013	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2020
MSW arisings	470,576	477,585	484,646	491,759	497,118	502,503	507,913	513,348	518,808	522,510	526,211	529,913	533,614	537316
BMW arisings	319,992	324,758	329,559	334,396	338,041	341,702	345,381	349,077	352,790	355,307	357,824	360,341	362,858	365,375
BMW diversion required	130,689	136,777	143,231	150,051	174,215	198,396	222,594	231,557	240,537	248,321	256,105	263,889	271,673	279,457
Recyclables (biodegradables)	44,493	48,943	53,393	57,842	59,498	61,153	62,809	64,592	66,376	67,581	68,787	69,992	71,197	72,402
Green (biodegradables)	62,485	64,200	65,916	65,929	66,651	67,373	68,095	68,825	69,555	70,052	70,548	71,044	71,540	72,037
Kitchen (biodegradables)	2,987	8,219	13,451	20,927	23,804	26,681	29,558	32,468	35,378	38,021	40,665	43,309	45,953	48,597
Total BMW Diverted	109,965	121,362	132,759	144,698	149,953	155,207	160,461	165,885	171,309	175,654	180,000	184,345	188,690	193,036
Treatment Diversion														
MSW to Facility (Stoke Incinerator)	100,000	100,000	100,000	100,000	100,460	101,298	102,133	103,018	103,900	105,089	106,278	107,467	108,656	109,845
Treatment Total BMW Diverted	68,000	68,000	68,000	68,000	68,313	68,883	69,450	70,052	70,652	71,461	72,269	73,078	73,886	74,695
LATS Surplus / Deficit	**47,277**	**52,585**	**57,527**	**62,647**	**44,051**	**25,693**	**7,318**	**4,381**	**1,424**	**-1,206**	**-3,836**	**-6,466**	**-9,096**	**-11,726**
Total BMW to Landfill	142,026	135,396	128,801	121,698	119,775	117,613	115,469	113,139	110,829	108,192	105,555	102,918	100,281	97,644

Table 2-5: BMW Diversion for Option 3 (55% recycling and composting) with an additional residual treatment plant (EfW) on line from 2013 onwards in Staffordshire only

Year	2006/07	2007/08	2008/09	2010	2010/11	2011/12	2013	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2020
MSW arisings	470,576	477,585	484,646	491,759	497,118	502,503	507,913	513,348	518,808	522,510	526,211	529,913	533,614	537316
BMW arisings	319,992	324,758	329,559	334,396	338,041	341,702	345,381	349,077	352,790	355,307	357,824	360,341	362,858	365,375
BMW diversion required	130,689	136,777	143,231	150,051	174,215	198,396	222,594	231,557	240,537	248,321	256,105	263,889	271,673	279,457
Recyclables (biodegradables)	44,493	48,943	53,393	57,842	59,498	61,153	62,809	64,592	66,376	67,581	68,787	69,992	71,197	72,402
Green (biodegradables)	62,485	64,200	65,916	65,929	66,651	67,373	68,095	68,825	69,555	70,052	70,548	71,044	71,540	72,037
Kitchen (biodegradables)	2,987	8,219	13,451	20,927	23,804	26,681	29,558	32,468	35,378	38,021	40,665	43,309	45,953	48,597
Total BMW Diverted	109,965	121,362	132,759	144,698	149,953	155,207	160,461	165,885	171,309	175,654	180,000	184,345	188,690	193,036
Treatment Diversion														
MSW to Facility (Stoke + additional facility in 2013)	100,000	100,000	100,000	100,000	100,460	101,298	261,343	259,409	257,475	254,384	251,292	248,200	245,109	242,017
Treatment Total BMW Diverted	68,000	68,000	68,000	68,000	68,313	68,883	177,713	176,398	175,083	172,981	170,879	168,776	166,674	164,572
LATS Surplus / Deficit	**47,277**	**52,585**	**57,527**	**62,647**	**44,051**	**25,693**	**115,581**	**110,727**	**105,855**	**100,314**	**94,773**	**89,232**	**83,691**	**78,150**
Total BMW to Landfill	142,026	135,396	128,801	121,698	119,775	117,613	7,206	6,793	6,398	6,672	6,946	7,220	7,494	7,768

Table 2-6: BMW Diversion for Option 3 (55% recycling and composting) with an additional residual treatment plant (Autoclave) on line from 2013 onwards in Staffordshire only

Year	2006/07	2007/08	2008/09	2010	2010/11	2011/12	2013	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2020
MSW arisings	470,576	477,585	484,646	491,759	497,118	502,503	507,913	513,348	518,808	522,510	526,211	529,913	533,614	537316
BMW arisings	319,992	324,758	329,559	334,396	338,041	341,702	345,381	349,077	352,790	355,307	357,824	360,341	362,858	365,375
BMW diversion required	102,957	102,322	100,371	97,106	127,164	157,238	187,329	197,805	208,297	217,594	226,891	236,188	245,484	254,781
Recyclables (biodegradables)	43,604	47,163	50,723	57,842	59,498	61,153	62,809	64,592	66,376	67,581	68,787	69,992	71,197	72,402
Green	62,563	63,935	65,308	65,929	66,651	67,373	68,095	68,825	69,555	70,052	70,548	71,044	71,540	72,037
Kitchen	2,390	6,575	10,760	20,927	23,804	26,681	29,558	32,468	35,378	38,021	40,665	43,309	45,953	48,597
Total BMW Diverted	108,556	117,674	126,791	144,698	149,953	155,207	160,461	165,885	171,309	175,654	180,000	184,345	188,690	193,036
Treatment Diversion														
Autoclave														
MSW to Facility	0	0	0	0	0	0	159,210	156,378	153,575	149,294	145,014	140,733	136,452	132,172
BMW diversion	0	0	0	0	0	0	69,323	68,090	66,870	65,006	63,142	61,278	59,414	57,550
Sub total	0	0	0	0	0	0	69,323	68,090	66,870	65,006	63,142	61,278	59,414	57,550
Energy from Waste (Stoke)														
MSW to Facility	100,000	100,000	100,000	100,000	100,460	101,298	102,133	103,018	103,900	105,089	106,278	107,467	108,656	109,845
BMW diversion	68,000	68,000	68,000	68,000	68,313	68,883	69,450	70,052	70,652	71,461	72,269	73,078	73,886	74,695
Sub total	68,000	68,000	68,000	68,000	68,313	68,883	69,450	70,052	70,652	71,461	72,269	73,078	73,886	74,695
Treatment Total BMW Diverted	68,000	68,000	68,000	68,000	68,313	68,883	138,773	138,143	137,522	136,466	135,411	134,356	133,300	132,245
LATS Surplus / Deficit	**73,600**	**83,352**	**94,420**	**115,592**	**91,102**	**66,851**	**111,906**	**106,223**	**100,534**	**94,527**	**88,520**	**82,513**	**76,507**	**70,500**
Total BMW to Landfill	143,435	139,084	134,768	121,698	119,775	117,613	46,146	45,049	43,959	43,186	42,413	41,640	40,867	40,094

Figure 2-1: BMW Diversion for 'Do Nothing' Scenario (Business as Usual Situation) in Staffordshire only

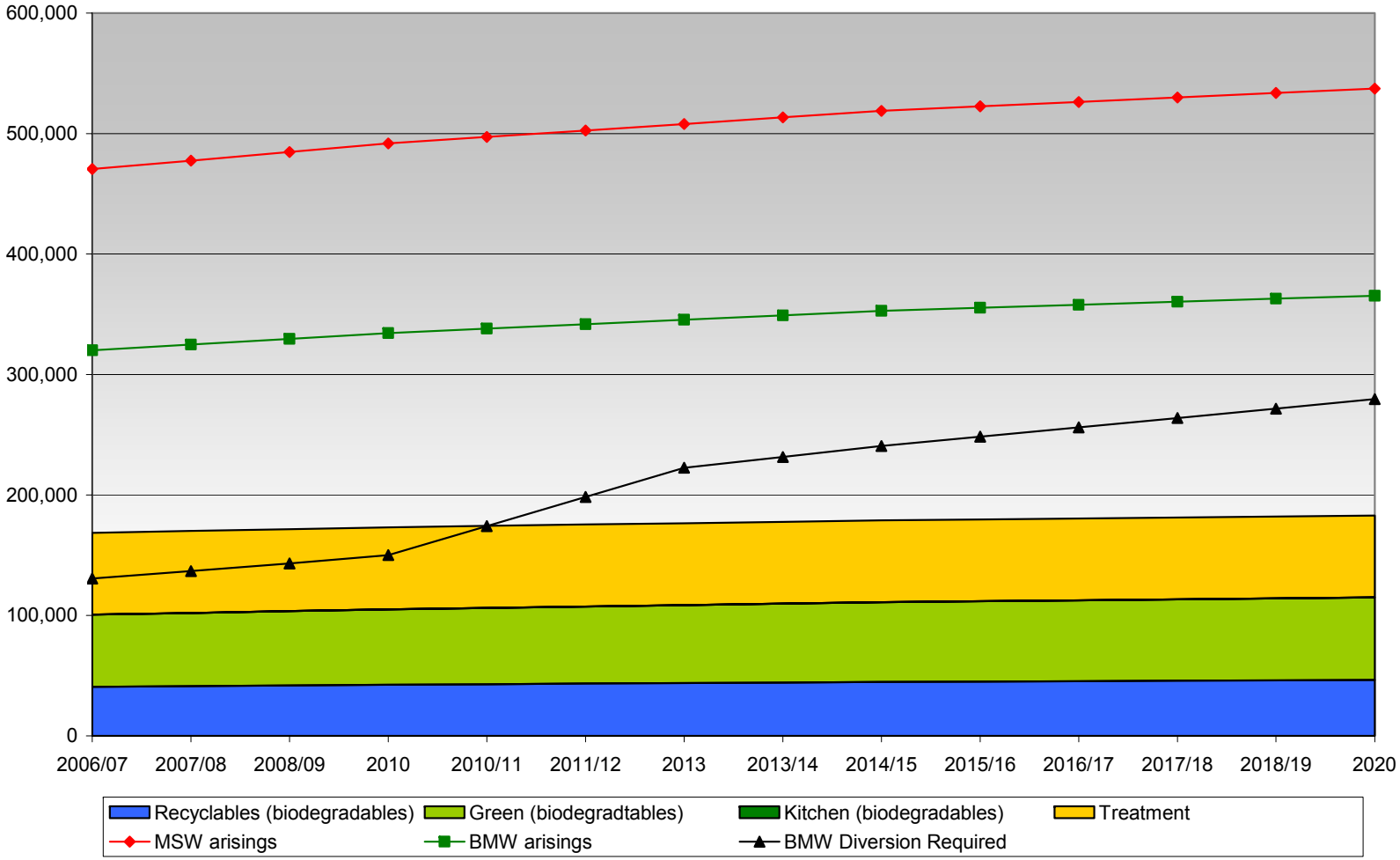


Figure 2-2: BMW Diversion for Option 3 (55% recycling and composting) with no additional residual treatment plant in Staffordshire only

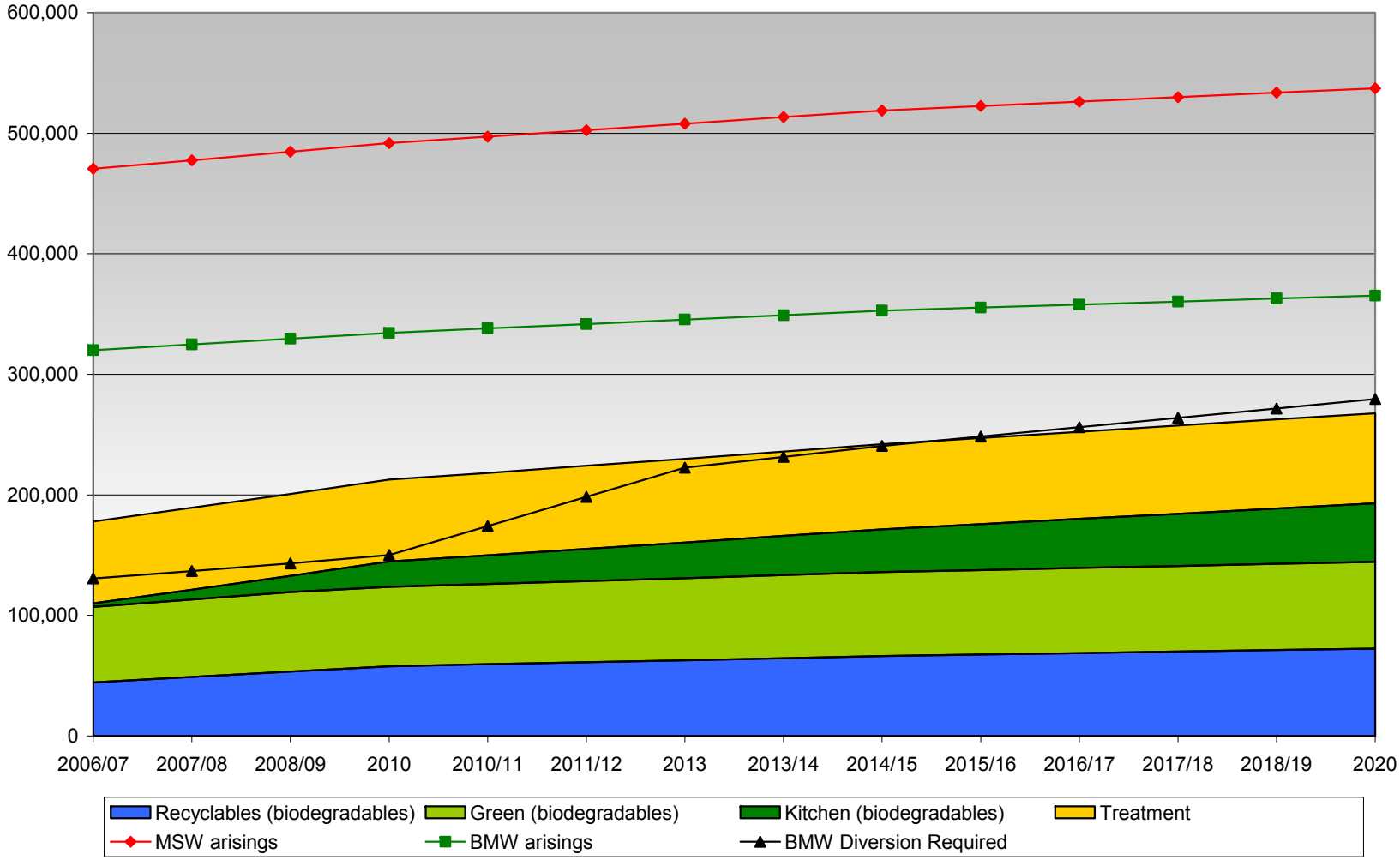


Figure 2-3: BMW Diversion for Option 3 (55% recycling and composting) with an additional residual treatment plant (EfW) on line from 2013 onwards in Staffordshire only

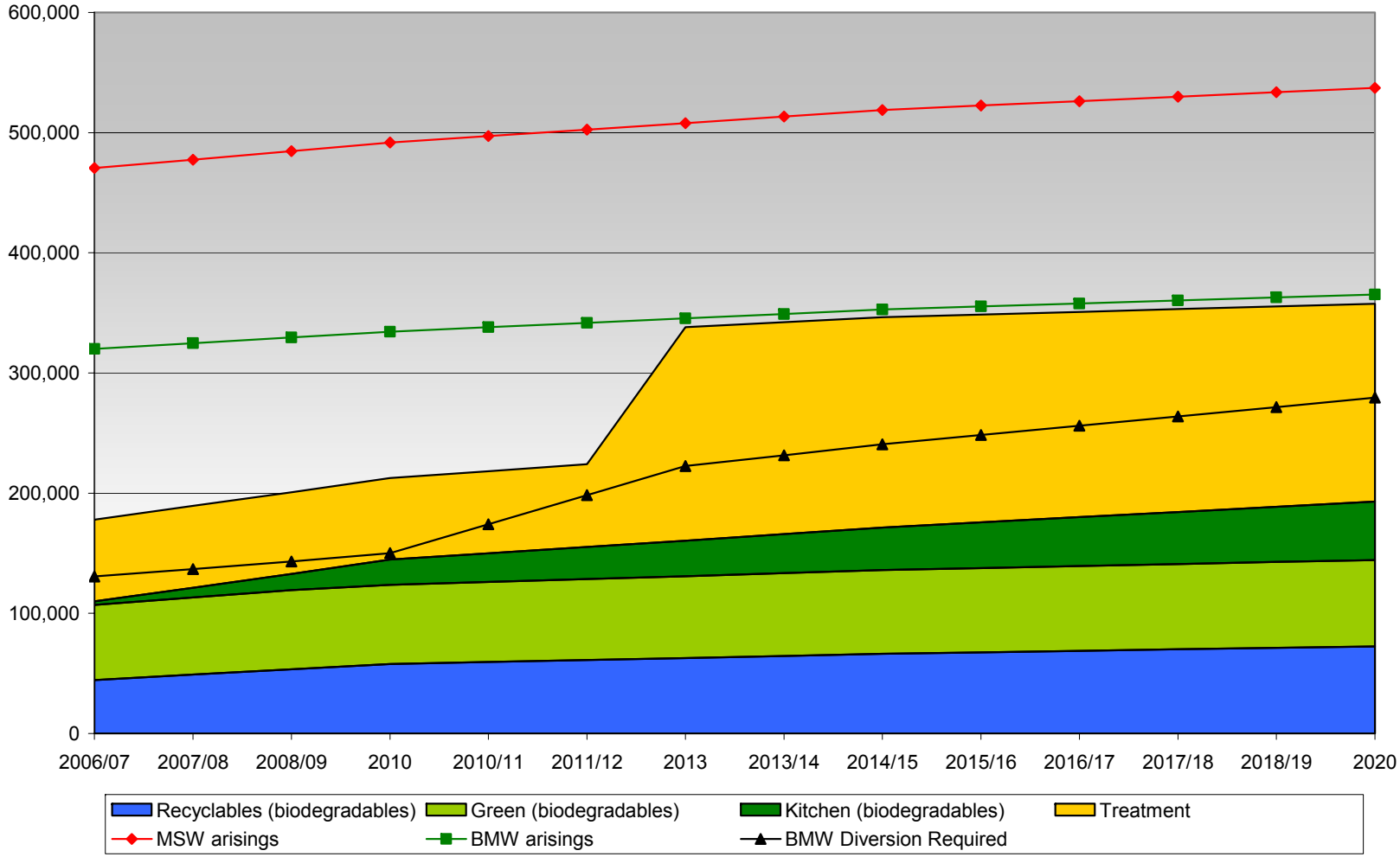


Figure 2-4: BMW Diversion for Option 3 (55% recycling and composting) with an additional residual treatment plant (Autoclave) on line from 2013 onwards in Staffordshire only

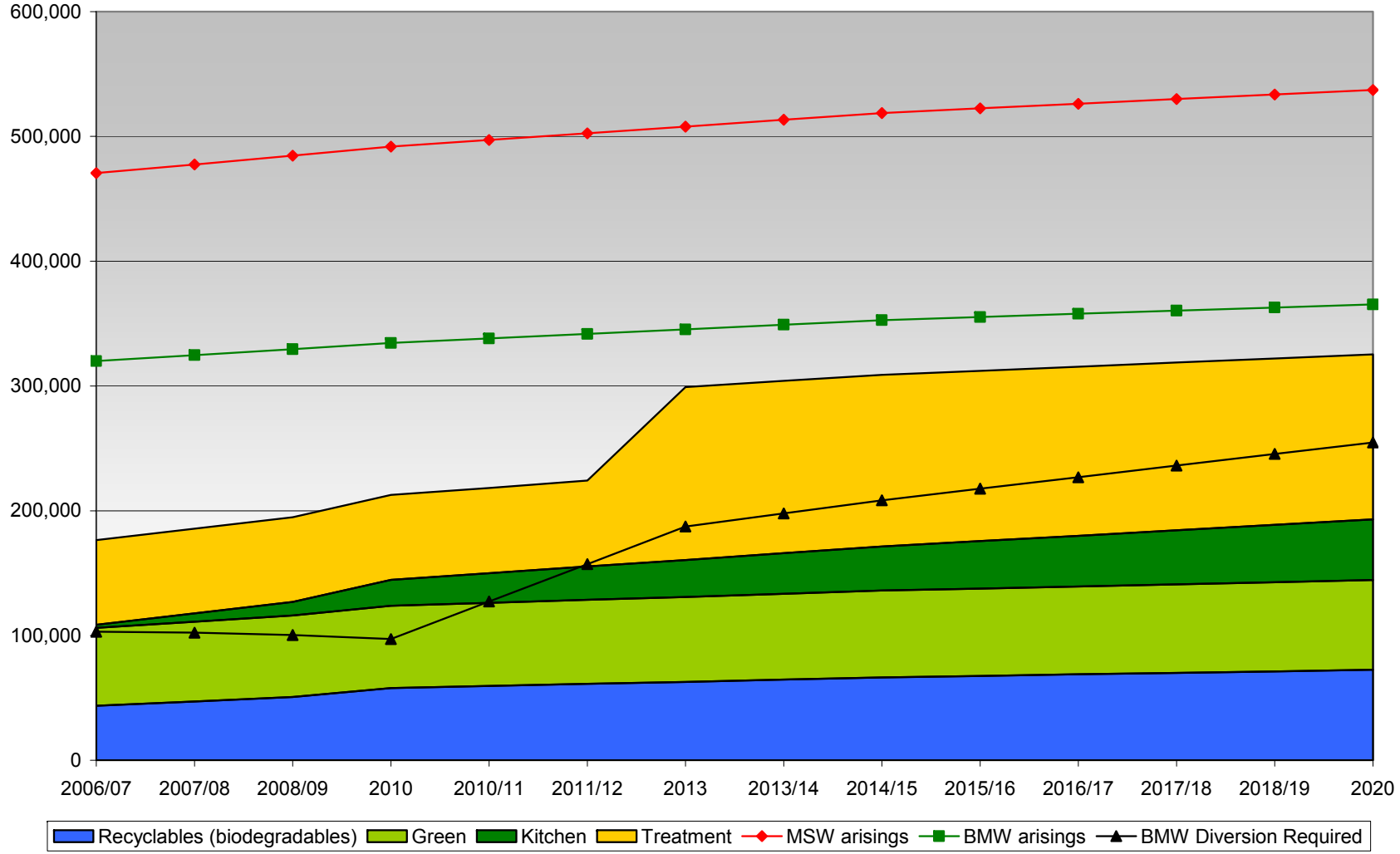


Table 2-7: BMW Diversion for 'Do Nothing' Scenario (Business as Usual Situation) in Stoke-on-Trent only

Year	2006/07	2007/08	2008/09	2010	2010/11	2011/12	2013	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2020
MSW arisings	143,862	145,351	146,846	148,348	149,340	150,335	151,333	152,335	153,339	153,822	154,305	154,788	155,271	155,754
BMW arisings	97,826	98,838	99,855	100,877	101,551	102,228	102,906	103,588	104,271	104,599	104,928	105,256	105,584	105,913
BMW diversion required	70,094	64,383	56,995	47,932	54,500	61,070	67,641	69,836	72,031	73,872	75,714	77,555	79,395	81,237
Recyclables (biodegradables)	12,426	12,554	12,683	12,813	12,899	12,985	13,071	13,158	13,244	13,286	13,328	13,369	13,411	13,453
Green (biodegradtables)	18,329	18,518	18,709	18,900	19,027	19,153	19,281	19,408	19,536	19,598	19,659	19,721	19,782	19,844
Kitchen (biodegradables)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total BMW Diverted	30,754	31,073	31,392	31,714	31,926	32,138	32,352	32,566	32,781	32,884	32,987	33,090	33,194	33,297
Treatment Diversion														
MSW to Facility (Stoke Incinerator)	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
Treatment Total BMW Diverted	54,400	54,400	54,400	54,400	54,400	54,400	54,400	54,400	54,400	54,400	54,400	54,400	54,400	54,400
LATS Surplus / Deficit	**15,060**	**21,089**	**28,797**	**38,182**	**31,825**	**25,469**	**19,110**	**17,130**	**15,150**	**13,412**	**11,673**	**9,935**	**8,198**	**6,460**
Total BMW to Landfill	12,672	13,366	14,063	14,763	15,226	15,689	16,155	16,622	17,090	17,315	17,541	17,766	17,991	18,216

Table 2-8: BMW Diversion for Option 3 (55% recycling and composting) with no additional treatment facility in Stoke-on-Trent only

Year	2006/07	2007/08	2008/09	2010	2010/11	2011/12	2013	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2020
MSW arisings	143,862	145,351	146,846	148,348	149,340	150,335	151,333	152,335	153,339	153,822	154,305	154,788	155,271	155,754
BMW arisings	97,826	98,838	99,855	100,877	101,551	102,228	102,906	103,588	104,271	104,599	104,928	105,256	105,584	105,913
BMW diversion required	70,094	64,383	56,995	47,932	54,500	61,070	67,641	69,836	72,031	73,872	75,714	77,555	79,395	81,237
Recyclables (biodegradables)	13,586	14,873	16,161	17,449	17,871	18,292	18,714	19,166	19,618	19,892	20,166	20,440	20,714	20,988
Green (biodegradables)	19,411	19,848	20,285	19,889	20,022	20,155	20,289	20,423	20,558	20,623	20,687	20,752	20,817	20,882
Kitchen (biodegradables)	867	2,446	4,024	6,313	7,144	7,976	8,807	9,632	10,456	11,182	11,909	12,635	13,361	14,087
Total BMW Diverted	33,864	37,167	40,470	43,651	45,037	46,423	47,810	49,221	50,632	51,697	52,762	53,827	54,891	55,956
Treatment Diversion														
MSW to Facility (Stoke Incinerator)	80,000	80,000	80,000	80,000	79,540	78,702	77,867	76,982	76,100	74,911	73,722	72,533	71,344	70,155
Treatment Total BMW Diverted	54,400	54,400	54,400	54,400	54,087	53,517	52,950	52,348	51,748	50,939	50,131	49,322	48,514	47,705
LATS Surplus / Deficit	**18,170**	**27,184**	**37,875**	**50,119**	**44,624**	**38,871**	**33,118**	**31,733**	**30,349**	**28,764**	**27,179**	**25,594**	**24,010**	**22,424**
Total BMW to Landfill	9,562	7,271	4,985	2,826	2,427	2,287	2,147	2,019	1,891	1,963	2,035	2,107	2,179	2,252

Figure 2-5: BMW Diversion for 'Do Nothing' Scenario (Business as Usual Situation) in Stoke-on-Trent only

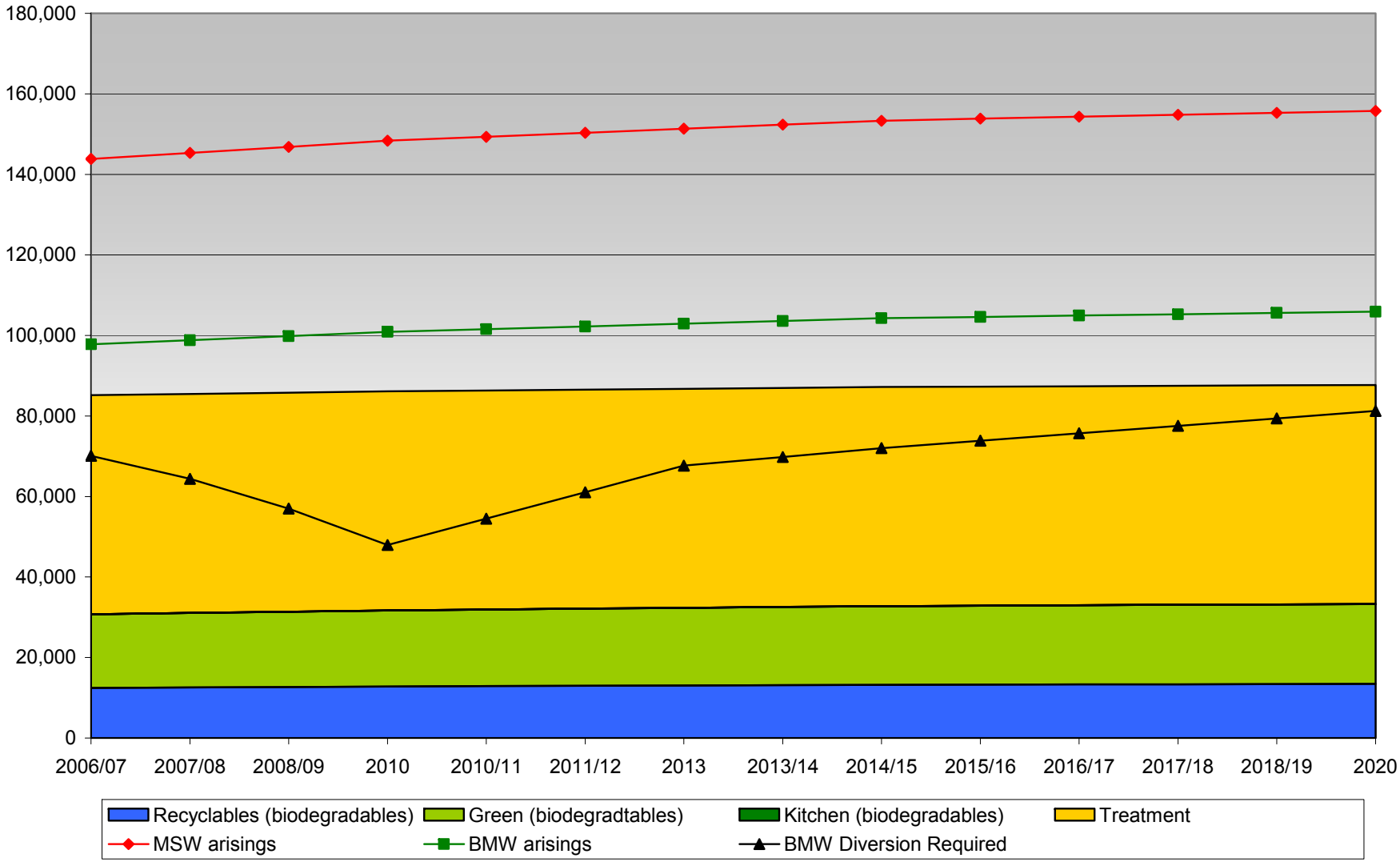


Figure 2-6: BMW Diversion for Option 3 (55% recycling and composting) with no additional residual treatment plant in Stoke-on-Trent only

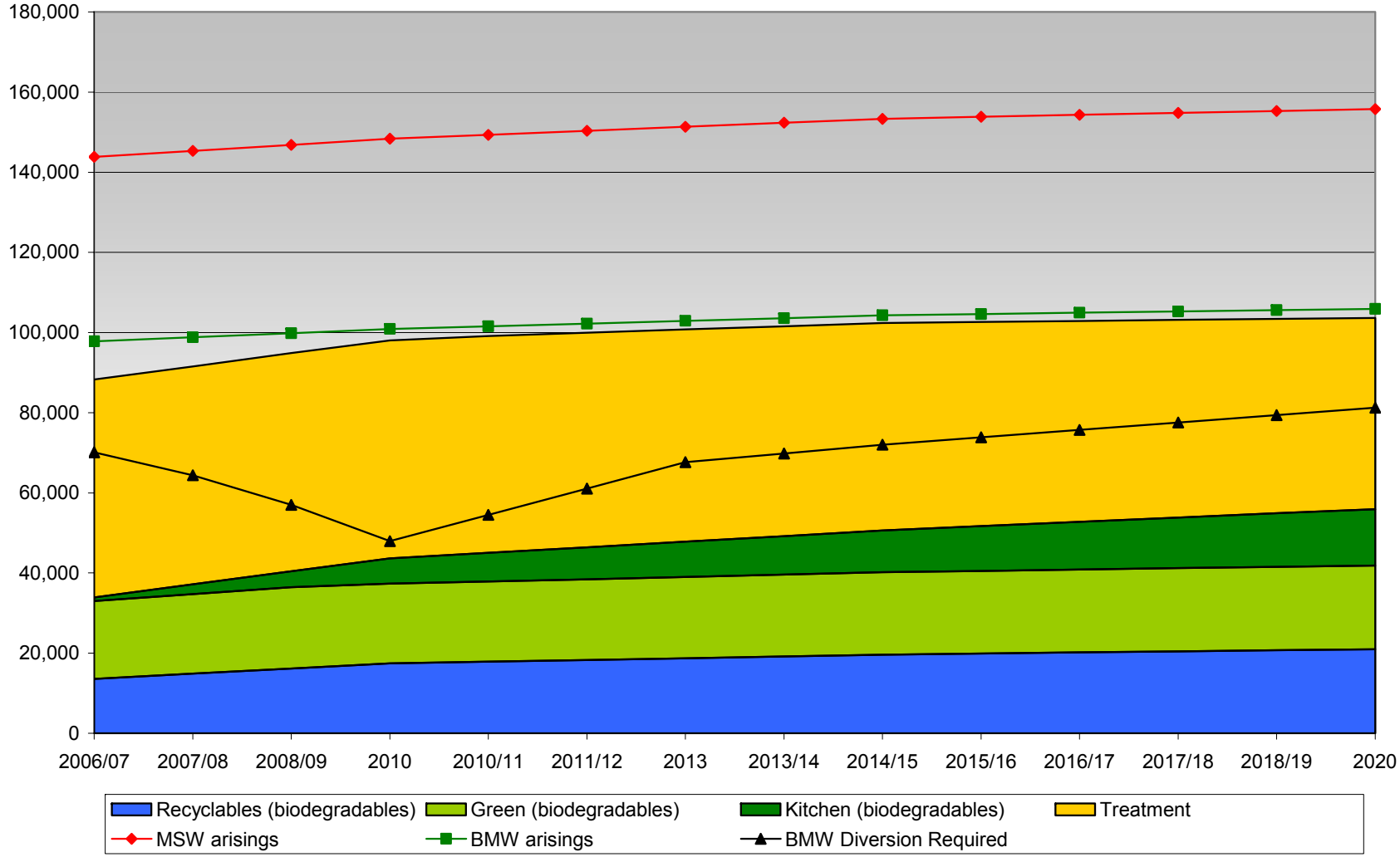


Table 2.3 and Figure 2.1 for the baseline scenario of maintaining the existing recycling and composting rate, continuation of some residual waste to the Stoke on Trent incinerator and the remaining material to landfill results in the meeting of landfill allowance targets until 2011/12. From 2011/12 Staffordshire County Council exceed their allowance by approximately 23,000 tonnes of BMW (and 46,000 in the 2013 target year) increasing to in excess of 96,500 tonnes of BMW (in the 2020 target year).

If Staffordshire were to adopt the recycling and composting rate of 55% but did not procure additional residual waste treatment capacity (see Table 2.4) then they will reach a LATS deficit by 2015/16 of 1,200 tonnes and increasing to 12,000 tonnes by 2020. By adopting a strategy to improve recycling and composting rates, and introduce an additional residual facility to treat the remaining residual waste (which can not be handled by the existing EfW facility in Stoke on Trent) the Councils will generate surplus landfill allowances year on year through to the 2020 target. The amount of surplus landfill allowance permits produce depend on the final choice of residual treatment for the remaining residual waste not recycled or composted or treated at the Stoke on Trent EfW facility. Tables 2.5 to 2.6 and Figure 2.3 and 2.4 illustrate that the Energy from Waste process is more efficient at diverting BMW from landfill than Autoclave, with EfW diverting an additional 39,000 tonnes of BMW in 2013 and 32,000 tonnes of BMW in 2020.

Table 2.7 shows that in the case of Stoke-on-Trent, the existing Energy from Waste facility means that even without an increase in recycling the facility has the capacity to meet LATS up to 2020, with a surplus of 6,000 tonnes. However, by adopting the strategy recycling and composting target of 55% Stoke-on-Trent will have surplus LATS with which to trade (up to 33,000 tonnes in 2013 and 23,000 tonnes in 2020).

2.4 Consequences of Failing to Meet Targets

The UK Government has a responsibility to ensure that it meets its obligations under the EC Landfill Directive, not least to ensure that it does not incur infraction fines. The Government is therefore concerned that any penalties imposed on authorities for exceeding their landfill allowance allocations should encourage future compliance. In the first instance the Government will attempt to work with any failing waste disposal authority to ensure that remedial action allows the authority to meet its targets in future years. If, however, an authority demonstrates an inability to achieve its landfill allowance targets, the Government will initiate penalty procedures as follows:

- An audit of the waste disposal authority's performance and future plans for compliance to identify the reason for failure. Where an audit report highlights failings in an authority's performance which make future failure likely, and a waste disposal authority demonstrates an inability to take remedial action, then the Government may initiate further action, namely;

    - a financial penalty on a waste disposal authority failing to meet its landfill allowance targets, equivalent to £150 for each tonne of BMW landfilled, in excess of the landfill allowance limit. This level of penalty has been chosen to exceed the highest likely cost of diverting BMW from landfill. The Government will increase this financial penalty if necessary; and
    - where the audit procedure and the financial penalty fail to encourage a waste disposal authority to ensure compliance with the landfill allowance scheme, the Government will take this as evidence that the waste management service in the authority is failing to conform to its obligations under the Best Value requirements of the Local Government Act 1999 and may initiate steps to remove the waste management function from the authority.

Where the failure of a waste disposal authority results in the Government incurring infraction fines, the Government may pass on the fines, in part or whole, to the authority.

An additional fine of £1,000 may be levied for instances where a waste disposal authority fails to maintain records, gather prescribed information, make prescribed returns or produce records for inspection.

A landfill site operator failing to comply with the Regulations will be liable to:

- On summary conviction, a fine not exceeding the statutory maximum.
- On conviction or indictment, either imprisonment for a term not exceeding 2 years, a fine, or both.

3 APPENDIX 3: SYNOPSIS OF RELEVANT WASTE LEGISLATION

3.1 Summary of Environmental Protection Act 1990 (Part IV)

Section 87	**Offence of Leaving Litter** Criminal offence of dropping, throwing, leaving or depositing litter in a public place and causing defacement (litter is "any thing" and may include commercial waste). Summary offence only. Maximum fine £2,500. Prosecutions by police or local authority. Average fine £115 (97/98)
Section 88	**Fixed Penalty Fine for Littering** Same offence as in section 87. £75 fixed penalty fine. Ticket given 'on the spot', with 14 days to pay. Issued by "authorised officer" of litter authority. Not intended for 'dumping' of trade waste.
Section 89	**Duty to Keep Land and Highways Clear of Litter, etc**. Sets out the legal duty to clear litter and refuse (including dog faeces) from relevant land and highways, placed upon local authorities, educational institutions, designated statutory undertakers and other duty bodies. The Code of Practice on Litter and Refuse introduced herein. This section does not contain any legal remedy. If the duty body fails, section 91 and 92 can be used. The Code can be obtained from the Government's website (www.detr.gov.uk) or from HMSO (ISBN 011 753479 X) £17.99
Section 90	**Litter Control Areas** Principal Litter Authorities can designate as Litter Control Areas certain types of littered land to which the public has access. Includes car parks, cinemas, motorway service stations and camping sites. (Full description under SI 1991 No 633 and SI 1997 No 1325). There has to be detriment to the amenity of the area. Persons affected have 21 days to appeal. No legal remedy with this section, but sections 91 and 92 can subsequently be used.
Section 91	**Summary Proceedings by Persons Aggrieved by Litter** Enables members of the public to apply to Magistrate's Court for a Litter Abatement Order to get an area that is under the control of a duty body cleared of litter and refuse. Non-compliance can lead to a fine up to £2,500.
Section 92	**Summary Proceedings by Litter Authorities** Principal Litter Authorities can serve a Litter Abatement Notice against owners or occupiers of certain types of relevant land (including land designated as Litter Control Area) that is defaced by litter, or if defacement is likely to recur.
Sections 93 and 94	**Street Litter Control Notices** Principal Litter Authorities can require owners or occupiers of certain types of commercial premises to prevent or remove accumulations of litter or refuse in streets and adjacent open land, where litter is related to their activities.
Section 99	**Powers in Relation to Abandoned Shopping Trolleys** Principal Litter Authorities can retrieve trolleys and charge for their return, or dispose of them.

3.2 Summary of Environmental Protection Act 1990 (Part II)

Section 33	**Prohibition on unauthorised or harmful deposit, treatment or disposal, etc. of waste** Foundation of waste licensing system; prohibits the deposit, treatment, keeping or disposal of controlled waste in or on land or whilst in transit, except under and in accordance with a waste management licence.
Section 34	**Duty of Care, etc. as respects waste** Places responsibility on any person producing or having control of waste; cannot rid themselves of that responsibility by transferring the waste to someone else.
Section 45	**Collection of controlled waste** Waste collection authorities must collect household waste, and do so free of charge. They can collect commercial waste if requested and make a charge. Any waste collected belongs to the authority. Also states types of household waste for which a charge may be made e.g. garden waste and clinical waste.
Section 46	**Receptacles for household waste** The waste collection authority can say how and where household refuse should be placed for collection. Non-compliance is an offence. Authorities may also make a charge for collections.
Section 47	**Receptacles for commercial or industrial waste** The waste collection authority can supply waste bins; it can require the premises owner to provide bins if their waste is likely to cause a nuisance. Non-compliance is an offence.
Section 48	**Duties of waste collection authorities regarding disposal** The waste collection authority will deliver all waste in accordance with the directions of the waste disposal authority. Waste can be retained for recycling.
Section 55	**Powers for recycling waste** Waste disposal and waste collection authorities can recycle waste, or sell it.
Section 59	**Powers to require removal of waste unlawfully deposited** Waste collection and waste regulation authorities can deal with fly-tipped controlled waste by serving a notice on the occupier of the land to remove the waste. In the event of non-compliance the authority can recover the costs of doing so from the recipient of the notice.
Section 60	**Interference with waste sites and receptacles for waste** Without consent no one may sort through or disturb waste in bins or waste deposited by the waste collection authority.

These summaries are advisory and intended only as a synopsis of the law on litter and waste. It must not be relied upon to cover all the legal issues involved. The full texts must be consulted and legal advice sought before instigating action based on the above.

Further Information on the Environmental Protection Act 1990:
http://www.opsi.gov.uk/acts/acts1990/Ukpga_19900043_en_1.htm

3.3 Environment Act 1995

Apart from the requirement to produce a National Waste Strategy, this Act was largely concerned with changes to the legal and institutional arrangements for waste management. Some important points include:

- the establishment and empowering of the Environment Agency to take on the role of Competent Authority under **EU** Directive 91/156/EEC on waste. The Environment

Agency is a central authority replacing; the National Rivers Authority, Her Majesty's Inspectorate of Pollution, Waste Regulation Authorities and sections of the Department of the Environment;
- the prioritisation of selected waste streams such as tyres and construction wastes
- the introduction of the Producer Responsibility Obligations Section 93 (Packaging Waste) Regulations; and
- the repealing of **waste disposal plans** set up by local waste authorities under the 1990 Environmental Protection Act.

Further Information on the *Environment Act 1995*:

http://www.opsi.gov.uk/acts/acts1995/Ukpga_19950025_en_1.htm

3.4 Clean Neighbourhoods and Environment Act 2005

This Act extends existing legislation in some cases and introduces new offences in others in order to improve the quality of the local environment. The act provides local authorities and the Environment Agency additional powers to deal with fly-tipped waste; litter; nuisance alleys; fly posting and graffiti; abandoned and nuisance vehicles; dogs; noise; nuisance from artificial lighting and insect; and other issues affecting the local environment. The key areas of importance for waste management include:

Fly-tipped waste:
- removing the defence of acting under employer's instructions;
- increasing the penalties; and
- enabling the recover of costs by the local authority or Environment Agency.

Power to issue fixed penalty notices:
- to businesses that fail to produce a waste transfer notice;
- to waste carriers that fail to produce registration details or evidence that they do not require registration; and
- for waste left out on the street.

Litter:
- making it an offence to drop litter anywhere, including private land, rivers, ponds and lakes;
- strengthening of powers to require local businesses to clear up litter they generate;
- enabling local authorities to restrict distribution of flyers, hand outs and pamphlets that may end up as waste; and
- confirming that cigarette butts and discarded chewing gum are litter.

Further information on the *Clean Neighbourhoods and Environment Act 2005*:

http://www.opsi.gov.uk/ACTS/acts2005/20050016.htm

3.5 Controlled Waste Regulations

These regulations provide legal definitions of the controlled wastes (household, commercial and industrial wastes). The regulations also state that certain types of litter and refuse are to be treated as controlled waste. Exemptions from the requirement for licensing under the Environmental Protection Act 1990 are specified.

Further Information on the *Controlled waste Regulations 1992:*

http://www.opsi.gov.uk/si/si1992/Uksi_19920588_en_1.htm

3.6 Landfill Directive

The Landfill Directive was brought into force in the UK on the 15th June 2002 as the Landfill (England and Wales) Regulations 2002 and since then has been introduced bit by bit to give UK industry time to adapt. The Landfill Directive is seen as providing the principal legal framework influencing MSW management and strategy development in the UK. The Directive seeks to prevent or reduce negative environmental effects from the landfilling of waste by introducing uniform standards throughout the European Union. The main regulatory provisions of the Directive stipulate:

- classes of landfill;
- requirements for obtaining a permit for operating a landfill;
- waste acceptance procedures;
- control and monitoring procedures for operating a landfill; and
- closure procedures.

The first requirement of the Regulations was for all landfill operators to submit a conditioning plan by 26th July 2002, which reclassified the site as inert, hazardous or non-hazardous. This is one of the key provisions of the Directive as previously UK landfills had either been inert or practiced co-disposal of hazardous and non-hazardous material. Co-disposal was banned in 2004.

The most significant part of the Directive is Article 5 which proposes a strict timetable for reductions in landfilling biodegradable municipal waste. These are onerous requirements and have been the principal influence on the formulation of *'Waste Strategy 2000'* which is now superseded by *'Waste Strategy 2007'*. The EC Landfill Directive sets mandatory targets which, for the UK, require the following (the targets include the 4 year extensions granted to the UK.):

- *By 2010 to reduce BMW landfilled to 75% (by weight) of that produced in 1995*
- *By 2013 to reduce BMW landfilled to 50% (by weight) of that produced in 1995*
- *By 2020 to reduce BMW landfilled to 35% (by weight) of that produced in 1995.*

Further Information on the *Landfill Directive (99/31/EC):*

http://europa.eu.int/eur-lex/lex/LexUriServ/LexUriServ.do?uri=CELEX:31999L0031:EN:HTML

3.7 Waste and Emissions Trading Act (WET) 2003

On the 10th November 2003, Parliament gave its final seal of approval to the Waste and Emissions Trading Bill. This will implement Articles 5(1) and 5(2) of the EC Landfill Directive in the UK. This new legislation will lead to waste disposal authorities trading allowances for the amount of biodegradable waste they can send to landfill each year. The Act is the first stage of introducing the landfill allowances trading scheme (LATS), which will be the Government's key measure in meeting landfill reduction targets as required by the Landfill Directive.

By allowing Local Authorities to trade landfill space, it is hoped that some flexibility will be provided while the total UK landfill rate is guaranteed to meet European targets of 75% of 1995 waste levels by 2010, 50% by 2013 and 35% by 2020. Opposition parties had warned that the WET bill could lead to an increase in the amount of waste going to incinerators in the UK as Local Authorities urgently seek to divert material away from landfill.

LATS has two functions in the UK:

- landfill allowances will be allocated to each waste disposal authority (WDA), at a level that will enable England to meet its targets, as a contribution to the UK targets under the landfill directive; and
- trading mechanism will allow these targets to be met in the most cost effective manner through the trading, banking and borrowing of allowances.

The LATS scheme formally commenced on 1st April 2005 and Waste Disposal Authorities have now been allocated landfill allowances for each year up to 2020. The WDA can bank unused allowances for use in later years or use a proportion of their future allowance in advance (borrowing). The Allowances convey the right for a WDA to landfill a certain amount of BMW in a specified scheme year.

Authorities will be fined £150 for every tonne they landfill beyond the limit set by the allowances they hold.

Further Information on the *Waste and Emissions Trading Act 2003:*

http://www.opsi.gov.uk/acts/acts2003/20030033.htm

3.8 Waste Minimisation Act 1998

The Waste Minimisation Act, introduced in the UK in November 1998, encourages local authorities to promote incentives for reduction strategies for household waste, allowing local authorities to:

"do or arrange for the doing of, anything which in its opinion is necessary or expedient for the purpose of minimising the quantities of controlled waste, or controlled waste of any description, generated in its area".

The intention behind the Act, which was promoted by the Women's Environmental Network, was to clear up any legislative uncertainty about whether councils could actually carry out initiatives to reduce the amount of waste (as opposed to recycle it).

The Act does not place any obligation on authorities to carry out such initiatives, nor does it allow councils to impose any requirements on businesses or householders in their area. Existing legislation does however allow authorities to determine both the form of collection and the receptacle from which rubbish is collected.

Authorities may wish to consider what simple measures they could take. These can be straightforward such as:

- Raising awareness about how to stop direct mail (for example through the Mailing Preference Service). The Government is also working on a direct mail and promotions initiative which will also look at reduction;
- Promoting the use of refill schemes and encouraging the use of organic box schemes, farm shops, farmers markets, ordinary markets and smaller markets which all help to reduce packaging;
- Publicising local community schemes that recycle/reuse furniture and household goods, bicycles, computers and tools;
- Working with those who have consumer information obligations under the Packaging Regulations (e.g. large retailers and schemes on behalf of retailers) to develop information on reduction, reuse and recycling for consumers

Further Information on *The Waste Minimisation Act 1998*:

http://www.opsi.gov.uk/acts/acts1998/19980044.htm

3.9 Household Waste Recycling Act 2003

The Household Waste Recycling Act 2003 was the result of a private members bill introduced to parliament by Joan Ruddock, the MP for Lewisham and Deptford, in December 2002. Backed by pressure group Friends of the Earth, and originally know as the "doorstep recycling bill" and later the "municipal waste recycling bill".

The Household Waste Recycling Act 2003 makes it the legal responsibility of English waste collection authorities to collect at least two types of recyclable waste separate from general refuse from December 31, 2010. There are get-out clauses for authorities where the cost of complying with the law would be unreasonably high or comparable alternative arrangements are available. The aim of the Act is to increase the recycling rate of household waste, which in 2002/03 was 14.5% and by 2015 the Government wants to be 33%.

In July 2004, the Government issued clarifying guidance on how waste collection authorities should implement the Act. This draft guidance stated that "the decision on what should be counted as one material within the Act is based upon how the material is processed during recycling and the final use of the product". Thus cardboard and paper represent two types of recyclable waste, while green, amber and clear glass only count as one type of recyclable waste.

The guidance added that "the municipal collection of home-produced compost can not count as a material under the Act". But garden waste collected free of charge will count as a material. Also, "the use of materials recycling facilities to separate unsorted household waste is not an acceptable alternative to the separate collection of recyclables".

Finally, it said that the exceptions that would allow councils to get out of collecting two materials were "narrowly drawn". The guidance added: "Waste collection authorities should bear in mind that any decision to rely on the exceptions could be challenged in the courts."

Further Information on the *Household waste recycling Act 2003:*

http://www.opsi.gov.uk/acts/acts2003/20030029.htm

3.10 Animal By-Products Regulations (ABPR) 2003

The new EU Animal By-Products Regulation (enforced in the UK since 1 July 2003) affects all those who deal with animal by-products, including the waste disposal industry, the animal feed industry, slaughterhouse operators, farmers, food manufacturing premises, catering outlets, zoos and hunt kennels. The main aim of the Animal By-Products Regulation is to reduce the risk of the transmission of disease to humans and animals. This aim is achieved by new rules for the collection, transport, storage, handling, processing and use or disposal of animal by products. It is also achieved by the placing on the market, export and transit of animal by-products.

The ABPR divides animal by-products into three categories and stipulates the means of disposal for each category.

Category 1 is the highest risk category and includes materials infected or suspected of being infected by BSE. Permitted disposal methods include incineration or rendering in an appropriate plant

Category 2 is also high risk material, and includes diseased animals and animals which are not slaughtered for human consumption. Permitted disposal methods include incineration or rendering in an appropriate plant.

Category 3 is essentially material which is fit for human consumption and includes parts of slaughtered animals, blood, raw milk, fish caught in the open sea, and shells. Permitted disposal methods include incineration, treatment in an approved biogas or composting plant and (in case of material of fish origin) ensiling or composting in accordance with specified procedures.

The animal by-products which will generally be subject to the controls of the ABPR include:

- animal carcasses, parts of animal carcasses (including blood, shells, feathers, hides, skins, hooves, horns, wool, hair and fur) and products of animal origin which are not intended for human consumption;
- manure and gut contents;
- former foodstuffs of animal origin which are no longer intended for human consumption; and
- catering waste which comes from international transport is destined for animal consumption or which is intended for use in a biogas plant or for composting.

The ABPR does not generally apply to:

- raw pet food;
- liquid milk and colostrums disposed of or used on the farm of origin;
- entire bodies or parts of wild animals not suspected of bring infected with communicable diseases;
- ova, embryos and semen intended for breeding purposes; and transit by sea or air.

Further Information on *Animal by-products Regulations 2003:*

http://www.netregs.gov.uk/netregs/275207/587394/?version=1&lang=_e

3.11 IPPC Directive (96/61/EC)

The Integrated Pollution Prevention and Control (IPPC) Directive established in August 2000, requires a range of prescribed processes (including many waste management processes) to obtain an authorisation (permit) from the licensing authorities within the Member States. Without the permit, they are not allowed to operate. These permits are based on the concept of Best Available Techniques (BAT – as defined by the Directive) for the prevention, or where not possible, reduction of pollution.

The permits must consider the environmental performance of the installation, assessing emissions to air, water and land, generation of waste, use of raw materials, energy efficiency, noise, prevention of accidents, risk management etc. As from October 1999, the Directive applies to all new installations, as well as existing installations that intend to carry

out changes which may have a significant effect on human health or the environment. Other installations have been granted a further 8 year period of grace.

Waste management processes will also need to satisfy the principles of 'Best available techniques and environmental quality standards'[11] which, in addition to controlling emissions, specifically requires cross-media pollution considerations (for example, ensuring process residues, when finally discharged, do not result in the transfer of harmful pollutants).

Further Information on the *IPPC Directive (96/61/EC):*

http://europa.eu.int/eur-lex/lex/LexUriServ/LexUriServ.do?uri=CELEX:31996L0061:EN:HTML

3.12 Packaging Waste Directive (94/62/EC)

The Packaging Waste Directive is implemented in England and Wales by i) the Producer Responsibility Obligations (Packaging Waste) Regulations 1997 (as amended) and ii) the Packaging (Essential Requirements) Regulations 1998. Any business handling more than 50 tonnes of packaging and with a financial turnover of more than £2 million is obligated under the Packaging Regulations if, it is involved in manufacturing raw materials for packaging; converting materials into packaging; filling packaging; selling packaging to the final user; or, importing packaging or packaging materials into the UK.

The Packaging (Essential Requirements) Regulations 1998 require that packaging (which eventually may become waste) must:

- be kept to a minimum subject to health and safety;
- contain minimal noxious or hazardous substances;
- be recoverable through either material recycling, incineration with energy recovery, and/or composting; and
- be designed to specified product design standards.

The Producer Responsibility Obligations require qualifying organisations to:

- register with the EA or SEPA, providing them with packaging information[21];
- take reasonable steps to recover and recycle packaging waste; and
- provide evidence, usually in the form of Packaging Recovery Notes (PRNs) that the necessary recovery and recycling has been carried out.

The packaging recovery targets are given in terms of tonnes as well as a percentage. Therefore, the targets can be met by reducing the overall amount of packaging produced in the first place. Packaging recovery targets are revised every 5 years, with the latest version coming into force on the 1st January 2004. The targets for 2004-2008 are shown in Table 3-1.

[11] Article 10

[21] Registration for an individual producer is currently £768 if registering with the EA, or £558 if joining a scheme

Table 3-1: UK Packaging Business Recovery and Recycling Targets 2004-2008

Material	2004		2005		2006		2007		2008	
	%	mtpa	%	mtpa	%	mtpa	%	mtpa	%	mtpa
Paper	65	3.215	66	3.218	68	3.219	69	3.219	70	3.219
Glass	49	2.040	55	2.040	61	2.040	66	2.040	71	2.040
Aluminium	26	0.128	28	0.128	30.5	0.128	33	0.128	35.5	0.128
Steel	52.5	0.601	55	0.601	58	0.596	60	0.592	61.5	0.587
Plastic	21.5	1.660	22	1.850	22.5	1.900	23	1.960	23.5	2.020
Wood	18	0.982	19	1.030	20	1.030	20.5	1.030	21	1.030
Overall recovery	63	8.650	65	8.890	67	8.940	69	8.990	70	9.050
Minimum (%)recovery by materials recycling (excluding energy recovery)	94	-	94	-	94	-	95	-	95	-

(Note - mtpa, million tonnes per annum)

Producers may join a compliance scheme that can arrange for the reprocessing of packaging waste. The reprocessor will supply the customer with a Packaging Recovery Note (PRN) or Packaging Export recovery Note (PERN) as proof of compliance with the regulatory target. There are approximately 14 compliance schemes in the UK, which play an important part in achieving the overall EU packaging targets. To issue PRNs the compliance scheme must be approved by the Secretary of State and meet competition standards and must be accredited with the EA.

An estimated £400 million is needed to fund the necessary infrastructure to meet the 94/2 Directive 2008 packaging waste recycling targets. According to some the deadline is feasible, but the only way the target will be met is through 'doorstep collections for every household in the country, if not for every local authority[22]', although it is hoped that companies will reduce the amount of packaging produced in the first place.

Further Information on the Packaging Waste Directive 1994 as amended 2004:

http://europa.eu.int/eur-lex/pri/en/oj/dat/2004/l_047/l_04720040218en00260031.pdf

Producer Responsibility Obligations (2005):

http://www.opsi.gov.uk/si/si2005/20050717.htm

Packaging Essential Requirements Regulations (2004):

http://www.opsi.gov.uk/si/si2004/20041188.htm

3.13 Waste Electrical and Electronic Equipment (2002/96/EC)

WEEE (Waste Electrical and Electronic Equipment) legislation requires that producers take responsibility for treating and recycling their electrical products when they become waste. There are various criteria that have to be met; the removal of banned substances is one aspect. The need to mark electrical products that fall under the legislation with the recycling

[22] quote from Labour MEP David Bowe

symbol, (A crossed-out wheely bin) will apply from the date that the directive is adopted into UK law. Following a number of delays the regulations came into force on 2 January 2007 and full responsibility for treating and recycling household WEEE began on 1 July 2007.

This Directive will affect those organisations involved in manufacturing, selling, distributing, recycling or treating electrical and electronic equipment (including household appliances, IT and telecommunications equipment, audiovisual equipment, lighting equipment, electrical and electronic tools, toys, leisure and sports equipment, medical devices and automatic dispensers.

The Directive aims to reduce the waste arising from electrical and electronic equipment as well as improve the environmental performance of all those involved in the life cycle of electrical and electronic equipment. The Directive covers WEEE used by consumers and for professional purposes.

The responsibility for meeting the requirements of the WEEE Directive falls directly on the producer. Specific initiatives include:

- prevention of waste, through minimising the use of dangerous substances, improved design, manufacture and coding;
- collection and treatment by establishing collection systems, including free take back systems, and selective treatment of equipment;
- recovery and re-use systems to be established, including specific targets for different categories of WEEE, ranging from 70-80%; and
- strengthen producer responsibility requirements.

From July 2007:

- private householders will be able to return their WEEE to collection facilities free of charge;
- producers (manufacturers, sellers, distributors) will be responsible for financing the collection, treatment, recovery and disposal of WEEE from private households deposited at these collection facilities; and
- producers will be responsible for financing the collection, treatment, recovery and disposal of WEEE from products placed on the market after 13th August 2005. However, it may be possible for all or part of these costs to be recovered from users other than private householders.

From July 2007, producers will be required to achieve a series of demanding recycling and recovery targets for different categories of appliance and the UK must have reached an average WEEE collection rate of four kilograms for each private householder annually.

It is estimated that approximately 900,000 tonnes of WEEE is produced annually within the UK, with large household appliances (fridges, washing machines and cookers) producing 43% of the waste and computer hardware producing 39%.

Further Information on the *WEEE Directive (2002/62/EC):*

http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_037/l_03720030213en00240038.pdf

3.14 Batteries Directive

In 2003 the European Commission adopted a proposal for a new Directive which would aim to reduce the quantity of hazardous and non hazardous waste batteries going to landfill and increase the recovery of the materials they contain. The Directive will require a much higher

proportion of spent batteries to be collected and recycled and will apply to all types of batteries irrespective of their shape, weight composition or use. Key points likely to be included within the forthcoming Directive include;

- collection and recycling targets set in two stages: 25% of waste portable batteries to be recycled by 2012, rising to 45% by 2016;
- battery collection schemes should be established by 2008. Producers will be required to take back all waste portable batteries free of charge regardless of when the batteries were placed on the market.

The Batteries Directive was agreed in the EU on 2nd May 2006 and it is expected that the Directive will come into force domestically in 2008.

Further information on the *Proposed Batteries Directive*:

http://www.defra.gov.uk/environment/waste/topics/batteries/

3.15 The Restriction of Hazardous Substances in Electrical and Electronic Equipment (ROHS) Directive (2002/95/EC)

This Directive will affect manufacturers, sellers, distributors and recyclers of electrical and electronic equipment containing lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers. The Directive aims to protect human health and the environment by restricting the use of certain hazardous substances in new equipment and is designed to complement the WEEE Directive.

Since 1st July 2006 new electrical and electronic equipment can not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers. The Annex to the Directive lists certain applications that are exempt from the requirements of the Directive including mercury in certain types of fluorescent lamps, lead in the glass of cathode ray tubes, electronic components and fluorescent tubes, lead in ceramic parts and hexavalent chromium as an anti-corrosion of the carbon steel cooling system in absorption refrigerators. Item 10 of the Annex, as published, states that the Commission shall evaluate 'as a matter of priority in order to establish as soon as possible whether these items are to be amended accordingly'. On the basis of the provision of Article 5(1)(b) the Commission has received from Member States and Industry additional requests for applications to be exempted from the requirements of the Directive.

On 30th July 2004 the Government published a final consultation (including draft implementing legislation and non-statutory guidance) which ran until the 29th October 2004. The Government had expected to bring the Directive into effect through UK Law later in the year. Before the 13th February 2005 the European Commission reviewed the terms of the Directive to take into account any new scientific evidence.

Further information on *RoHS (2002/95/EC):*

http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_037/l_03720030213en00190023.pdf

3.16 Hazardous Waste Regulations 2005

There are four sets of Regulations applicable to England and Wales that came fully into force on 16 July 2005:

- The Hazardous Waste (England and Wales Regulations) 2005 and the Hazardous Waste (Wales) Regulations 2005 (together referred to as Hazardous Waste Regulations);and
- The List of Waste (England) Regulations 2005 and the List of Waste (Wales) Regulations 2005 (together referred to as List of Waste Regulations)

These pieces of legislation;

- implement a definition of hazardous waste into domestic legislation.
- require producers of hazardous waste to notify their premises (with some exceptions);
- end the requirement to pre-notify wastes to the Environment Agency, as previously required under the revoked Special Waste Regulations
- ensure safe management of hazardous wastes;
- provide cradle-to-grave documentation for the movement of hazardous waste;
- require consignees to keep thorough records of hazardous waste and provide the Environment Agency with quarterly disposal and recovery information.

From 16 July 2005 all treated hazardous waste accepted into hazardous or special cells' of a non-hazardous landfill site must comply with the full Waste Acceptance Criteria (WAC), as required by the Landfill Regulations 2002.

The EC Hazardous Waste Directive (91/689/EEC) provides the framework for the control of hazardous waste identified as displaying highly flammable, irritant, harmful, toxic, carcinogenic or corrosive properties. This Directive affects everyone who produces, transports, stores or disposes of waste. The aim of the Directive is to provide a precise and uniform definition of hazardous waste which will apply across the European Union.

In 1994 a catalogue of wastes was produced known as the European Waste Catalogue. This catalogue was updated in 2002. In the UK the Hazardous Waste Directive was originally implemented through the Special Waste Regulations 1996, as amended. It is important to note that the Hazardous Waste Directive is directly referred to in some currently in force UK environmental legislation i.e. The Landfill Regulations and the Pollution Prevention and Control Regulations. Household wastes that have hazardous properties, such as bleach, paints, garden chemicals and some batteries are currently excluded from the Directive. The European Commission (EC) is therefore intending to introduce a separate Directive dealing specifically with household hazardous waste.

It should be noted that where hazardous household waste material is collected separately, this will need to be managed as hazardous waste.

Further Information on the *Hazardous Waste Regulations 2005:*

http://www.opsi.gov.uk/si/si2005/20050894.htm

3.17 End of Life Vehicle Directive (2000/53/EC)

The End of Life Vehicles (ELVs) Directive (2000/53/EC) passed into European law in October 2000. It is concerned with cars, vans and certain three-wheeled vehicles. The main requirements are for Member States to ensure that producers limit the use of certain hazardous substances in the manufacture of new vehicles and automotive components whilst promoting the recyclability of their vehicles. It must also be ensured that ELVs are subject to de-pollution prior to dismantling, recycling or disposal. The Directive also covers treatment facilities and requires that they operate at higher environmental standards and have permits if they want to deal with non de-polluted ELVs. The Directive also sets certain

recovery and recycling targets, namely by 2006, 85% recovery and 80% recycling by weight, and by 2015, 95% recovery and 85% recycling by weight. The Directive contains a provision that by 2007, producers pay 'all or a significant part' of the costs of treating negative or nil value ELVs at treatment facilities.

Lower targets of 75% reuse and recovery and 70% for reuse and recycling will be acceptable between 2006-2014 for vehicles produced before 1st January 1980.

The Directive was supposed to be transposed into national law in all member states by 21st April 2002. The UK and most other Member States missed this deadline. The End of Life Vehicles Regulations 2003 (SI No. 2635) came into effect on the 3rd November 2003. These Regulations transposed Articles 2, 3(1) to (5), 4(2); Annex II, 5(3), 5(4) with respect of vehicles put on the market on or after the 1st July 2002, 6(1) to 6(4). And Annex I, 8 and 9(2). These provisions generally concern permitting, de-pollution and Certificate of Destruction arrangements. They also implement the restrictions on the use of heavy metals in new cars along with provisions on coding of plastic and rubber components.

Further Information on the *End of Life Vehicles Directive:*

http://europa.eu.int/scadplus/leg/en/lvb/l21225.htm

3.18 Waste Incineration Directive (2000/76/EC)

The Waste Incineration Directive adopted by the EC on 4 December 2000 aims to prevent, or where not practicable to reduce as far as possible, negative effects on the environment caused by the incineration and co-incineration of waste. In particular, it aims to reduce pollution caused by emissions into the air, soil, surface water and groundwater, potentially posing a risk to human health. Stringent operational conditions and technical requirements are being implemented, introducing far stricter provisions than those defined in the existing Municipal Waste Incineration Directives (89/369/EEC and 89/429/EEC) and Hazardous Waste Incineration Directive (94/67/EC).

The Waste Incineration Directive came into force for all existing UK incinerators from December 2002, and will apply to new incinerators from December 2005. It covers all waste incineration and co-incineration plants.[20]

The Directive is being implemented through the Pollution Prevention and Control regime. The Directive will eventually cover some 2,600 incinerators, around 70% of which are waste oil burners in vehicle service garages. It is worth noting that legislation is not concerned with the place that incineration has in waste management strategies, but with ensuring that incinerators are regulated to a high standard.

Further information on the *Waste Incineration Directive:*

http://www.netregs.gov.uk/netregs/275207/1108823/?version=1&lang=_e

3.19 Towards a Thematic Strategy for Soil Protection

In response to concerns about the degradation of soils, the EU Commission has outlined the first steps in a Strategy to protect soils with the publication of a Communication "Towards a Thematic Strategy for Soil Protection" and urges, inter alia, the Commission to draw up a

[20] There are exemptions for vegetable waste, radioactive waste and animal carcasses (the latter is covered by the 1774/2002 EC Animal by-products Regulation)

Directive on compost, stressing the need to intensify research in this field so as to boost the potential for its recovery of soil lacking in organic matter and bring together waste management and soil protection.

Further Information on '*Towards a Thematic Strategy for Soil Protection':*

http://europa.eu.int/comm/environment/soil/index.htm

4 APPENDIX 4: DESCRIPTION OF BEST VALUE PERFORMANCE INDICATORS

4.1 BV 82a – Percentage of Household Waste Recycled

'Recycled' means reprocessed in a production process for the original purpose, or for other purposes, but excluding energy recovery. Waste recycled to form compost should only be included under BV 82b.

'Household Waste' means all waste collected by Waste Collection Authorities (WCAs) under section45(1) of the Environmental Protection Act 1990, plus all waste arisings from Civic Amenity (CA) Sites, and waste collected by third parties for which collection or disposal recycling credits are paid under Section 52 of the Environmental Protection Act 1990.
For the avoidance of doubt household waste shall include:

- Waste collection rounds (including separate rounds for collection for recyclables)
- Street cleansing and litter collection
- Bulky waste collections
- Hazardous household waste collections
- Household clinical waste collections
- Garden waste collections
- Drop-off/bring systems
- Any other household waste collected by the authority.

Community recycling programmes of household waste can be included in the recycling rate.
Note; the following are excluded:

- Incinerator residues
- Beach cleansing wastes
- Rubble
- Home composted waste
- Clearance of fly-tipped wastes
- Abandoned vehicles
- Re-used waste material.

'Civic Amenity Site' means places provided by the WDA at which persons resident in the area may deposit their household waste (services provided under Section 51(1)(b) of the Environmental Protection Act).

4.1.1 Calculation of Recycling Rate

For Waste Collection Authorities calculate as:

X/Y x 100, where:

X = Tonnage of household waste collected by the WCA which is sent for recycling (including private/voluntary collections of household waste for recycling).

Y = Total tonnage of household waste collected by the WCA (including private/voluntary collections of household waste for recycling).

For Waste Disposal Authorities, calculate as:

X/Y x 100, where:

X = Tonnage of household waste collected by the WDA which is sent for recycling plus tonnage of household waste which is sent for recycling by the constituent WCAs (including private/voluntary collections of household waste for recycling).

Y = Total tonnage of household waste collected at Civic Amenity sites by the WDA plus total tonnage of household waste collected by constituent WCAs (including private/voluntary collections of household waste for recycling).

For Unitary Authorities, calculate as:
X/Y x 100, where:

X = Tonnage of household waste collected by the authority which is sent for recycling (including private/voluntary collections of household waste for recycling).

Y = Total tonnage of household waste collected by the authority (including private/voluntary collections of household waste for recycling).

4.2 BV 82b – Percentage of household waste composted

Composted means, the controlled biological decomposition and stabilisation of organic waste, under conditions that are predominantly aerobic and that allow the development of thermophilic temperatures as a result of biologically produced heat. It results in a final product that has been sanitised and stabilised, is high in humic substances and can be used as a soil improver, as an ingredient in growing media, or blended to produce a top soil that will meet British Standard BS 3882, incorporating amendment No 1. In the case of vermicomposting these thermophilic temperatures can be substituted by the introduction of worms.

Calculation of this indicator includes composting undertaken at a central, or community, composting facility. Home composting is not to be included. The tonnage to be used in calculation is the material sent for composting to these facilities.

4.3 BV 82c – Percentage of heat, power and other energy recovered from household waste

To be completed by Waste Disposal Authorities.
Categories are exclusive: 'Heat, power and other energy recovered' means:

- The controlled combustion of waste in specialised plant specifically to generate power and/or heat from the waste feedstock.
- The controlled combustion of refuse derived fuel (RDF) in specialised plant specifically to generate power and/or heat from the waste feedstock.
- The production of gaseous fuels by reacting hot carbonaceous waste with air, steam or oxygen (gasification).
- The thermal decomposition of organic waste to produce gaseous, liquid and solid products by pyrolysis.
- The biological degradation of organic wastes by anaerobic digestion.

The following shall not be included:

- Methane recovery from landfill.

4.4 Other BVPIs

Other relevant BVPIs for Waste Collection Authorities and Waste Disposal Authorities are:

- BV 82d: Percentage of household waste sent to landfill
- BV 84: Kilograms of household waste collected per head of population
- BV 86: Cost of waste collected per household
- BV 87: Cost of waste disposal per tonne for municipal waste
- BV 90: User satisfaction (every three years and next due in 2006/07)

5 APPENDIX 5: WASTE TREATMENT AND DISPOSAL TECHNOLOGIES

5.1 Materials Recycling Facilities (MRFs)

MRF's can be 'low tech', whereby there may only be one sorting belt with several line pickers and perhaps an over-band electro-magnet to remove steel cans; these are normally specified in conjunction with 'kerbside' segregation schemes. Alternatively, they can have any number of additional items of equipment for sorting co-mingled dry recyclates.

The success of a 'Clean' MRF is dependent on being able to introduce effective segregation at source, which in turn requires that the public are committed to making it work. There are many examples throughout the UK where 'Clean' MRF's have been shown to be effective, and the development and use of such facilities may need to be considered in future rollout of the waste strategy.

5.2 Composting

There are four main types of composting process:

- Windrow composting
- In-vessel composting
- Vermiculture
- Anaerobic digestion

5.2.1 Windrow Composting

Material for windrow composting is first shredded to reduce the material to a more manageable size and also to increase its surface area, as this leads to higher activity by the micro-organisms which drive the process. Materials are usually mixed to produce the ideal composting substrate and are constructed into elongated piles called windrows. Microbial activity in the windrows causes temperatures to rise to between 55-70°C. The windrows are monitored throughout the composting process to ensure that the optimum temperature, oxygen concentration and moisture content are maintained. The windrows are turned periodically, to introduce fresh air, and watered to maintain the ideal conditions for composting.

The high-temperature (thermophillic) phase at the beginning of the composting process usually lasts about 2-4 weeks as the microbes use up the available nutrients in the feedstock materials. During this stage, animal and plant pathogens which may be dangerous for animal and human health are destroyed, ensuring that the final product is safe to use. Composting continues after this initial phase at lower temperatures resulting in the destruction of compounds which might be toxic to plants (phytotoxins). This active phase lasts for a total of about 12-16 weeks, and once this is complete, the compost is allowed to mature for between 1 and 3 months. Once the compost has been matured, it is screened to remove the larger pieces of material, such as stones and pieces of wood. Compost sold as a soil improver is usually screened to a particle size of 10 mm diameter and smaller.

5.2.2 In-Vessel Composting

The principles of in-vessel composting are the same as open-air windrow composting, in that the process relies on the action of micro-organisms to break down feed stocks. However, in-vessel systems allow a greater degree of control over the process and can automatically adjust the temperature, oxygen and moisture regimes within the material by being within an enclosed environment. There are many different designs of in-vessel system such as a hall,

tunnel or container and the most appropriate system for any given application depends on a variety of factors including nature of feedstock, degree of automation/ flexibility required, and financial and spatial constraints, with many of these systems involving forced aeration of the compost rather than aeration by mechanical turning.

5.2.3 Vermicomposting

Vermicomposting relies on the actions of earthworms, and the micro-organisms in their gut, to break down organic materials, and produce a nutrient rich product. Vermicomposting is different to composting in that an environment is established in which the worms can thrive and reproduce rather than being killed off. The worms process organic materials and excrete them as castings, similar to finely textured soil.

There are three types of vermicomposting;

- Windrow system;
- Stacked bins; and
- Continuous flow reactors.

Vermicomposting is less robust than in vessel composting and is therefore not practised widely in the UK.

5.2.4 Anaerobic Digestion (AD)

AD is a process which breaks down organic matter into simpler materials, under aqueous conditions and in the absence of oxygen. The main product of the digestion process is a methane rich bio-gas which is suitable as gas engine feedstock with subsequent energy recovery. Alternatively, the bio-gas can be further refined as a vehicle fuel.

AD is a process with a good track record, however this record has been built on the treatment of mainly source specific waste streams such as farm slurries, sewage sludges, botanical wastes and food or industrial organic wastes.

AD systems come in a wide variety of sizes and operating parameters, although as stated earlier, there is no track record of their ability to treat MSW in the UK, although a new facility is operational at Wanlip by Biffa Leicester. This facility has been designed to process the organic material from their recycling facility at Bursom. The composting process is carried out in cylindrical digestion tanks where the organic waste is liquefied, heated, and broken down by bacteria, with the methane gas produced used to generate electricity.

Additionally, there are approximately 12 plants operating in Europe, using MSW as their primary organics feedstock. A good reference plant is the plant installed by Valorga at La Coruna in Northern Spain**,** which has a design capacity of 140,000tpa of MSW. Western Isles Council, Scotland, has specified AD for the treatment of their organic waste from MSW, with the plant due to be built and commissioned during 2005.

Of the companies who have built AD plants for MSW, the one with the most experience is **Valorga, from France**.

Other companies include:-

- **Waasa/WABIO(Finland),**
- **Wehrle Werk (Germany),**
- **Ionics Italbia, Snamprogetti and BTA from Italy, and**
- **Dranco in Spain**

These companies are responsible for the 12 plants currently using MSW in AD plants.

5.3 Residual Treatment Technologies (Thermal and Non-thermal)

5.3.1 Energy from Waste (EfW)

Energy from Waste is a well established, reliable, cost-effective means of treating MSW and thereby diverting biodegradable materials from landfill disposal. It is a process which is used by most countries in Europe, with plants in such locations as the centres of Paris, Barcelona and Copenhagen. The majority of these plants make use of Moving Grate technology within the main furnace chambers, although Fixed Gate and Fluidised Bed systems are also in use.

Reference plants (all UK) are many and varied, both in size and location. There are currently thirteen operational Energy from Waste incinerators in the UK, with a number of others at various stages in the planning process.

5.3.2 Gasification and Pyrolosis

This is a technology which has been much researched for the treatment of a variety of organic materials. It has, so far, proven to be capable of reliably operating with specific, mainly homogenous materials, such as wood waste or chicken feathers, but has little or no track record when faced with the diverse materials that comprise MSW.

A pilot plant, of a capacity of approximately 8,000tpa, has been operating in Bristol by Compact Power. Planet Advantage also has planning permission for a 60,000tpa plant in Dumfries, which is currently under construction. This plant will be designed to take MSW and other waste streams, including clinical waste and animal by-products.

An example of small scale thermal treatment is ENERGOS AS, a Norwegian company who currently has 8 projects in Scandinavia and South Korea, using a combination of gasification and pyrolysis on a small scale. These plants, which have capacities typically in the order of 10,000 – 50,000 tonnes per annum, provide an economic solution for small scale, local MSW treatment.

5.3.3 Autoclaving

Autoclaving (AC), as an MSW treatment technology has mainly been developed in the USA, and in the UK is marketed by a 6 main suppliers.

The system comprises a sealed, rotating chamber into which un-segregated waste is loaded. The waste is sterilised via application of pressurised steam, which together with mechanical agitation, gives rise to a physical breakdown of the organic materials and sterilisation of the waste mass, making for more easily processed materials and healthier conditions for the management of the recovered products.

At present there are no full scale plants operating in the UK.

AC plants are modular, with typically two AC chambers, fitted in parallel, capable of handling 100,000tpa of MSW in total, being installed. The main advantage of AC is its ability to maximise the quantity of organics separated as sterilised fibre for composting, biogas production, RDF production or any other potential use. Technology providers, being aware of the likely limitation on the outlets for RDF in the UK, are developing products, (and markets), made from the sterilised fibre produced from the AC plant.

5.3.4 Mechanical-Biological Treatment (MBT)

MBT plants have been operated in Europe since the early 90's, particularly in Italy, The Netherlands, Germany, Austria and the Scandinavian countries as a means of pre-treating MSW prior to landfill. MBT can be simply described as a process that takes mixed residual wastes from the domestic and commercial waste streams and through various screening, conditioning and sanitising processes extracts recyclable materials and produces a stabilised biowaste. Within the UK, there has been a significant interest in this type of technology by the private sector waste management companies and by Local Authorities as a potential means of converting residual waste to compost or an RDF for combustion in cement kilns, power stations or other high temperature plants. Contracts have been confirmed over the last 2/3 years which make use of MBT, such as Shanks-ELWA with the Ecodeco process and Biffa-Leicester with the Hese Umwelt system. Others are expected to be confirmed in the near future, so there is evidence that MBT is becoming an acceptable treatment process which appears to satisfy the technical needs of the LA's, the commercial requirements of the private sector waste management companies and the financial risk criteria of the banks. The main technology suppliers are as follows:

Table 5-1: Technology Suppliers

Company	UK Plants	Other plants
Ecodeco, Italy	Marketed by Shanks in the UK Proposed 5 plants in East London, one in Dumfries.	6 plants in Italy
Sorain Cecchini, Italy	WRG may market in the UK	Malagrotta, Rome (300,000 tpa)
Helector SA, Greece (previously Herhof Umwelttechnik, Germany)	None at present	Many plants in Germany and Italy ranging from 85,000 to 150,000 tpa
Vandenbrook/ Grontmij, Netherlands	None at present	Reference plant at Vagron (230,000 tpa) combined with AD
Haase Energietechnik AG, Germany	None at present	Existing plants in Germany and Spain. 2 new plants in Luebek, Germany (150,000 tpa) & Leon, Spain (200,000 tpa)
Babcock Borsig/Steinmuller Valorga, Austria	None at present	Plants in Austria, Switzerland and other European locations
Hese Umwelt, Germany	Leicester on behalf of Biffa 140,000 tpa	Many plants in Germany
Global Renewables	Awarded Lancashire waste contract	Eastern Creek, Australia

In total it is estimated that there are over 70 operational MBT plants in mainland Europe, with another 20 or so expected to be constructed in the next 2/3 years, including the ones in the UK already discussed. In addition to the six companies listed, there are a further 20 (approximate) companies, mainly German, Austrian, Italian or Dutch who market MBT plants for MSW treatment.

Juniper Consultancy Services produced a report in 2005 that analyses all known MBT systems. The report provides a useful guide to the companies, their processes and the way they produce different end products (Juniper Consultancy Services (2005) MBT: A guide for Decision Makers - Processes, Policies, and Markets).

5.4 Landfill

Although many measures are being introduced in the UK and Europe to discourage the reliance on landfill it is inevitable that there will always be residues and waste that cannot be recovered/recycled or treated that will need to be disposed of to landfill. Landfill will therefore always remain an essential element of any fully integrated waste management strategy, whether on a local, regional or national scale, albeit at a much reduced rate.

5.5 Outline of Waste Management Technologies

Table assumptions;

- Small – Medium Scale (up to 80,000 tonnes per annum) Applications; and
- Large Scale (from 80,000 tonnes per annum) Applications

Table 5-2: Waste Treatment Issues and Requirement

Technology	Pre-treatment requirements	Land requirements m^2	Environmental Issues	Visual Considerations	Other Information
Waste Transfer					
Transfer station road/rail/ water	None	Up to 10,000 (small – medium) 10,000 upwards (large) depending on throughput	Odour (not inert sites) and significantly reduced by being in a building with air treatment (unless using intermodal units for collection). Noise, traffic.	Bunkers of materials awaiting transport (inert sites); for biodegradable wastes, it is best if enclosed in a standard industrial type building with air control (unless using intermodal units for collection then storage of ISO containers)	Convenient way of bulking materials for transport purposes – intermodal collection and transport currently being trialled which makes transfer no more than a pile of ISO containers
Transfer station hazardous waste	None	Up to 10,000 (small – medium) 10,000 upwards (large) depending on throughput	Water pollution, safe storage of chemical wastes, depending on size may require COMAH and/or hazardous substances planning regulations. Odour, noise, traffic	Stacked and palletised drums, and bulk tanks – could be housed in standard industrial type building	Convenient way of bulking materials for transport purposes – care must be taken in storage of hazardous wastes
Household Waste Recycling Centre (Civic Amenity Site)	None	1,200 minimum	Traffic, litter, noise	Split level facility with at least 10 roll-on/off skips and vehicle parking	Convenient way of segregating waste for recycling and composting
Recycling and composting					

Technology	Pre-treatment requirements	Land requirements m^2	Environmental Issues	Visual Considerations	Other Information
Composting – invessel	Pre-sorting to ensure biowaste only	75 – 120,000	Risk of odour and bio-aerosols but should be eliminated through process controls and containment, noise, traffic	Very wide range of potential visual appearances from industrial buildings with external maturation of compost product to containerised units with external pipework; external maturation area	Large variety of options including small community or large industrial/commercial producer scale options
Composting – windrow	Pre-sorting to ensure biowaste only; probably only applicable for green wastes in the long term	7,500 – 80,000 plus	Risk of odour and bio-aerosols – should not be located within 250m of occupied property, noise, traffic, windblown material, water pollution risks	Open air composting – rows of waste in various states of composting resulting in a brown earth like material, situated on a concrete pad – should have a water treatment plant to deal with run off.	7,500m^2 just sufficient space for 5,000tpa green waste 80,000 m^2 required for 80,000t
Anaerobic digestion	Pre-sorting to ensure biowaste and size reduction only preferred feedstock but can operate on unsorted waste. However, gives rise to more residuals to dispose of, also can be used for organic industrial wastes	2,000 upwards (small – medium) 26,000 upwards (large)	Traffic, risk of odour and water pollution but both should be controlled through process control,	Sewage works type installation, tanks both enclosed and open, could be housed in an industrial type building with shredder for basic pre-treatment, gas collection pipe-work and gas storage	2,000 m^2 sufficient space for 500m^3 tank processing 6,000tpa – also generates power

Technology	Pre-treatment requirements	Land requirements m^2	Environmental Issues	Visual Considerations	Other Information
Clean Materials Recycling Facility	Pre-sorting via separate collection for dry recyclables	Depends on waste collection method Up to 14,000 (small – medium) 14,000 upwards (large)	Traffic, noise, risk of odour and water pollution but both should be controlled through process control,	Standard industrial type building	
Dirty Materials Recycling Facility	None	Up to 14,000 (small – medium) 14,000 upwards (large)	Traffic, noise, risk of odour and water pollution but both should be controlled through process control	Standard industrial type building	May have long term problems with marketing recyclates
Waste Treatment					
Mechanical biological treatment	Pre-sorting of recyclables preferable through source segregation	10,000 (small – medium) 16,000 upwards (large)	Risk of odour but should be eliminated through process controls. Traffic, noise	High Industrial building	Modular units available at 60,000t size – slight saving on land take per unit when more than one sited together

Technology	Pre-treatment requirements	Land requirements m^2	Environmental Issues	Visual Considerations	Other Information
Gasification	Pre-sorted to remove recyclate & size reduction preferred feedstock	4,500 –7,500 (small – medium) 15,000 upwards (large)	Risk of odour but should be eliminated through process controls, noise, traffic, air emissions well inside Waste Incineration. Directive standards, small quantities of hazardous wastes generated from flue gas treatment and water treatment, residuals can be treated as aggregate	Industrial building with stack (typically 30 – 35m high)	Modular units, 7,000 – 50,00tpa. Power generation
Pyrolysis	Pre-sorted to remove recyclate & size reduction preferred feedstock	4,500 – 7,500 (small – medium) 15,000 upwards (large)	Risk of odour but should be eliminated through process controls, noise, traffic, air emissions well inside Waste Incineration Directive standards, small quantities of hazardous wastes generated from flue gas treatment and water treatment, residuals can be treated as aggregate	Industrial building with stack (typically 30 – 35m high)	Modular units, 20,000 – 50,00tpa. Power generation
Waste to Energy	Only residual waste will be combusted	30,000 – 50,000	Risk of odour but should be eliminated through process controls, air emissions well inside Waste Incineration Directive standards, small quantities of hazardous wastes generated from flue gas treatment and water treatment, noise, traffic, water pollution	Industrial plant with stack – height of stack dependant on topography	50,000 m2 area will handle 250,000tpa plant
Final Disposal					
Landfill biodegradable	Source segregation to ensure no hazardous materials	Dependant on depth of fill and length of anticipated life	Dust, noise, traffic, water pollution risk, odour, landfill gas, litter	Similar to quarries but with additional litter problems	Should not be sited within 250m of occupied property

Table 5-3: Advantages and Disadvantages of Residual Treatment Technologies

Technology	Suitable collection types	Advantages	Disadvantages
Mechanical Biological Treatment, MBT	• mixed waste collection	• ability to accept a wide variety of waste inputs • achieves a weight reduction of the biodegradable fraction of the MSW of up to 25% • ability to accept non source segregated putrescibles from the residual waste • recovery of additional material for recycling • residue stream is reduced, saving on landfill disposal costs	• no discernable track record in the UK • markets for RDF, the main output product from the process are very limited in the UK. • the quality of some of the recyclates can be unacceptable to reprocessors due to the levels of contamination.
Autoclaving	• mixed waste collection	• maximises recovery of organic material as sterilised fibre with a range of potential markets • sterility of product aids manual sorting and reduces H&S issues • mobile demonstration unit available	• not proven in the UK but working plants elsewhere. • sterilised fibre market is immature
Anaerobic Digestion	• source separated organic waste collections • mixed waste collection	• process is easily controlled • high throughput relative to area of plant footprint • proven track record in Europe • potential sales of energy generated from the biogas produced • unlikely to encounter the planning resistance of incineration • high recovery rates of materials.	• potential odours and emissions • difficulty in maintaining biological activity under certain physical conditions • not proven in the UK on MSW but working plants elsewhere • waste from mixed collection rounds cannot be spread on agricultural land and can only be used in land reclamation for non agricultural after uses
Pyrolysis and Gasification	• mixed waste collection	• low output of hazardous emissions • compact facilities	• little track-record operating on MSW • may be perceived as incineration
Waste to Energy	• mixed waste collection	• accepts a wide variety of waste inputs • proven track record over many years and in many locations • can make full use of the energy available within the waste to produce power • significant reduction in the weight of material from the original MSW going to landfill • bottom ash can be recycled in the construction industry	• public perception, and thereby political pressure, against new facilities • fly ash produced is a hazardous material, which requires specific, though manageable, treatment • recent rulings from the European courts which suggest that facilities built solely for the purpose of incinerating waste will not qualify as recovery.