Options Report

Final Report

January 2005

www.erm.com

FINAL REPORT

East London Waste Authority

Options Report

January 2005

Reference 0022671.04

Prepared by: Sarah Sanders Hewett

For and on behalf of
Environmental Resources Management

Approved by: Simon Aumônier

Signed: 

Position: Partner

Date: 28th January 2005

I HEADLINE RECOMMENDATIONS OF REPORT

The existing strategy has proven to be moving ELWA in the right direction to meet new requirements for waste management. However, some changes will be needed to meet Waste and Emissions Trading Act requirements. Recommendations for the strategy are:

1. a new objective to be inserted within the strategy under objective 2 to accommodate the requirements of the Waste and Emissions Trading Act;

2. a new set of targets to be inserted within the strategy to accommodate the requirements of the Landfill Allowance Trading Scheme;

A number of actions will be required in order to secure a robust, long term strategy for ELWA, the key actions identified are:

1. to seek further clarification from the Environment Agency regarding how the outputs of the Bio-MRF plants at Jenkins Lane & Frog Island will be monitored;

2. to investigate the potential to boost separate collections of biodegradable materials (paper, textiles, garden waste etc.) for recycling and composting;

3. to work with Shanks.east London to reduce the amount of biodegradable waste sent to landfill from the Bio-MRFs (through recovering more fuel or through other means); and

4. to work with Shanks.east London to examine the possibility of introducing a new technology to manage outputs from the Bio-MRFs.

CONTENTS

ANNEXES

ANNEX B	*EVIDENCE BASE, BASELINE DATA (OPEN)*
ANNEX C	*EVIDENCE BASE, WASTE FORECASTS (OPEN)*
ANNEX D	*REVIEW OF LEGISLATION, POLICIES AND TARGETS (OPEN)*
ANNEX E	*ASSUMPTIONS FOR MASS FLOW ANALYSIS (OPEN)*
ANNEX G	*RESULTS OF OPTION ANALYSIS: MASS FLOW (OPEN)*
ANNEX I	*BIBLIOGRAPHY, GLOSSARY AND ABBREVIATIONS (OPEN)*

1 INTRODUCTION

In October 2004, the Department for Environment, Food and Rural Affairs (Defra) and the East London Waste Authority (ELWA) commissioned Environmental Resources Management Limited (ERM) to support the development of a revised Municipal Waste Management Strategy for East London.

ELWA's existing Municipal Waste Management Strategy was approved in 1996, and formed the framework for development of the Integrated Waste Management Contract, subsequently awarded to Shanks.east London. Although this high-level strategy has proven to be a good tool for guiding the development of municipal waste management in the area since 1996, and is consistent with waste policy at the time of its development (including *Waste Strategy 2000*), it does not reflect more recent developments in legislation and policy at European, National and regional level, particularly:

- the Waste and Emissions Trading Act 2003 (the WET Act) requirements to reduce significantly the amount of biodegradable municipal waste (BMW) sent to landfill beyond the levels anticipated in *Waste Strategy 2000*;
- the emerging guidance on developing Municipal Waste Management Strategies from Defra;
- the policies set out in the Mayor's Municipal Waste Management Strategy (*Rethinking Rubbish in London*) to which ELWA must have regard; and
- the anticipated major growth in development, and therefore municipal waste generation, in the Thames Gateway and the potential for further growth should London be successful in its bid for the Olympics in 2012.

This initial options appraisal report forms the first stage in the revision of the ELWA strategy. It focuses particularly on the development and evaluation of a range of options that could help ELWA to achieve requirements under the WET act. It also undertakes the legislative and baseline data review required in order to produce a revised strategy and to feed into the emerging wasteLocal Development Document. This report will feed into work to prepare the final waste strategy and statement to Defra on strategy progress by April 2005 (1).

(1) Defra have recently clarified the need to provide a waste strategy for approval by April 2005 and have confirmed that a complete, updated strategy is not required by this date, but rather a brief statement of progress to date and summary of plans for completion of the strategy. http://www.defra.gov.uk/environment/waste/localauth/pdf/wetact-letter.pdf.

1.1 REPORT STRUCTURE

This options report is structured as follows:

- *Section 1*: Introduction;
- *Section 2*: Review of current waste management situation & evidence base;
- *Section 3*: Requirements for the updated strategy;
- *Section 4*: Potential solutions: option identification and analysis; and
- *Section 5*: Conclusions, recommendations and next steps.

Annexes that provide supporting information are appended to this document. A number of these annexes are confidential and these are marked in the list below:

- *Annex A*: Executive summary to confidential report *(confidential)*;
- *Annex B*: Evidence base - baseline data;
- *Annex C*: Evidence base - waste forecasts;
- *Annex D*: Review of legislation, policies and targets;
- *Annex E*: Assumptions for mass flow analysis;
- *Annex F*: Assumptions for cost analysis *(confidential)*;
- *Annex G*: Results of the options analysis – mass flow;
- *Annex H*: Results of the options analysis – performance against LATS and costs of each option *(confidential)*;
- *Annex I*: Bibliography, Glossary and Abbreviations.

2 REVIEW OF CURRENT WASTE MANAGEMENT SITUATION & EVIDENCE BASE

East London Waste Authority (ELWA) covers the area of the four London Boroughs: Barking and Dagenham; Havering; Newham; and Redbridge. ELWA is responsible for the treatment and disposal of household and municipal waste arising from each of the Borough's activities.

2.1 OVERVIEW

In the financial year 2003/04, ELWA generated a total of 520,500 tonnes of municipal waste. Of this waste, 87% can be classified as 'household', whilst the remaining 12% was generated from commercial premises ('trade' waste) and other activities.

Figure 2.1 shows a breakdown in municipal waste in 2003/04 and *Figure 2.3* shows how these waste types have changed since 1996.

Figure 2.1 Municipal Waste Arising in 2003/04

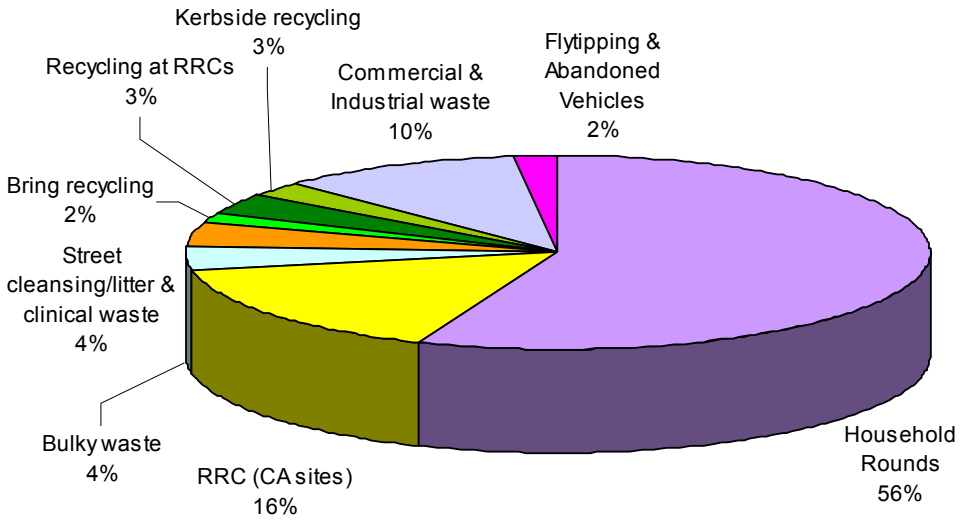
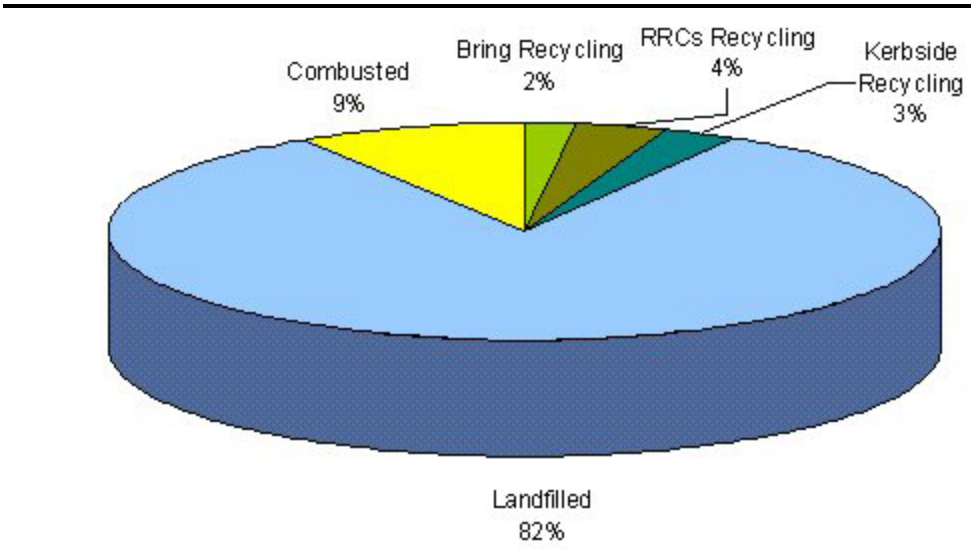


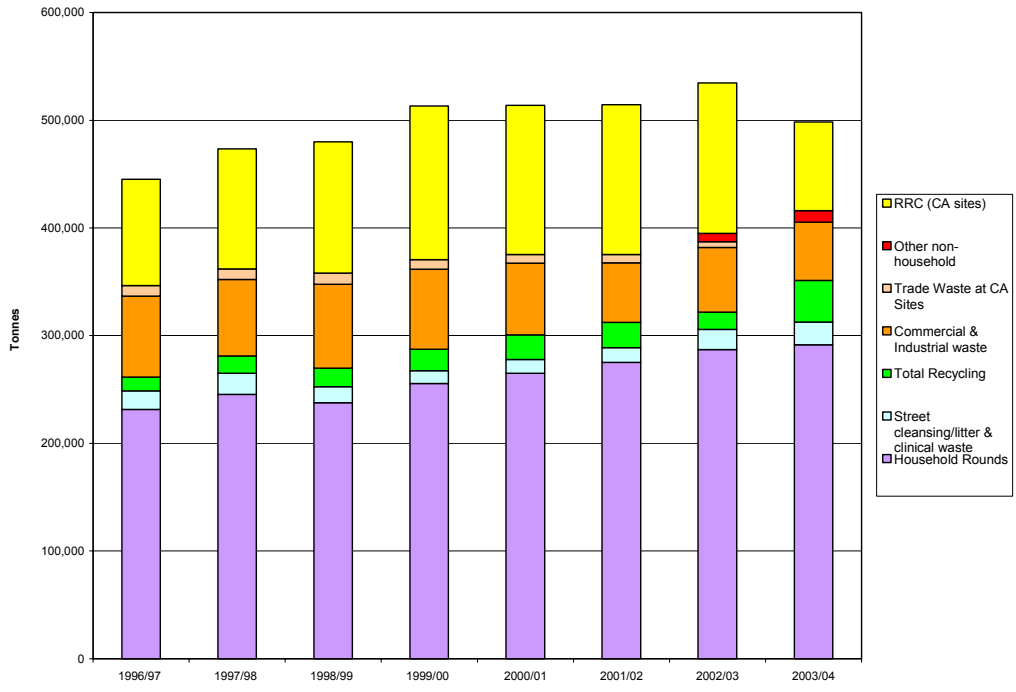
Figure 2.2 ***Household Waste Arisings in 2003/04***



Of household waste arisings within ELWA in 2003/04, 9% was recycled, a further 9% was combusted by conventional incineration at Edmonton, and the remaining 82% was disposed to landfill.

Analysis of the recent trends in municipal waste arisings (*Figure 2.3*) within ELWA shows that there has been a continued growth in refuse collected through household rounds and that total municipal waste arisings have increased throughout the period, with the exception of the financial year 2003/04, which saw a modest reduction in the total quantities of waste managed.

Figure 2.3 ***Trends in Waste Generated in ELWA between 1996/07 and 2003/04***



The decrease in overall municipal waste arisings for 2003/04 was due to a significant reduction in RRC site refuse generated. This reduction came about as a result of the introduction of trade waste restrictions, which introduced controls to prevent commercial waste from being disposed of as household waste. In the same year, quantities of trade waste being disposed of at RRCs did not increase, which suggests that this waste was managed outside of the municipal waste stream.

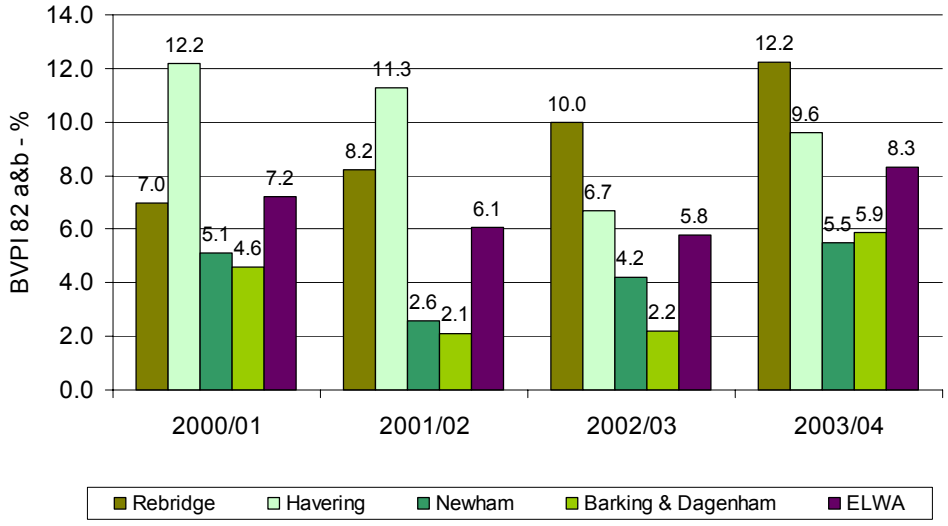
In addition, in the same year a considerable amount of construction and demolition work was undertaken at each of the old civic amenity sites in order to develop the new reuse and recycling centres. This may also have impacted on the quantities of waste generated.

2.2 *DETAILED EVALUATION OF CURRENT ARRANGEMENTS*

2.2.1 *2003/04 Performance*

Figure 2.4 presents the performance of each of the individual boroughs against Best Value Performance Indicator 82 (a&b) for recycling and composting since 2000/01.

Figure 2.4 Best Value Performance Indicator 82 a&b, Recycling and Composting



From the graph in *Figure 2.4*, it can be seen that ELWA's overall recycling and composting rate remained around 6% for 2001/02 and 2002/03. In 2003/04, ELWA's overall recycling rate increased substantially to 8%. In this year, all four of the constituent boroughs improved their recycling rate, which was primarily due to the start of ELWA's Integrated Waste Management Service (IWMS) Contract with Shanks.east London in December 2002.

ELWA fell short of its Best Value Performance Target of 10% for 2003/04. However, it was during 2003/04 that significant improvements were being made to all the civic amenity sites, which have subsequently been re-badged Reuse and Recycling Centres. Although the sites remained operational during the construction and demolition work, only a limited recycling service was provided, which hampered the Authority's ability to meet its BVPI target.

ELWA's prospects for meeting its 2005/06 Statutory Performance Standard of 18% are good. The construction of the materials recycling facility (MRF) at Frog Island, alongside key changes in recycling collections within the four boroughs, is expected to lead to a recycling rate of 23%. The installation of Biological Materials Recycling Facilities (Bio-MRFs), which will separate out recyclable materials, will further boost recycling levels in the future.

3 REQUIREMENTS FOR THE UPDATED STRATEGY

3.1 ELWA'S EXISTING WASTE MANAGEMENT STRATEGY

ELWA's existing waste management strategy was designed to meet relevant legislation and targets at the time of drafting (1996) and has been updated since to take account of, amongst other issues, the objectives of the national waste strategy, *Waste Strategy 2000*. Certain issues, including the Statutory Performance Standards (Best Value targets) set by Government for individual English waste collection authorities were introduced later, and therefore post-date ELWA's strategy.

ELWA's Best Value Performance Plan for 2004/5 sets out the latest position with respect to how ELWA intends to manage its waste. It sets out ELWA's vision:

> *"To provide an effective and efficient waste management service that is environmentally acceptable and delivers services that local people value".*

The over-arching waste strategy now needs to be updated to include changes in policy and legislation.

3.2 INTEGRATED WASTE MANAGEMENT CONTRACT

ELWA's existing waste management contract is based on the strategy and placed a requirement on the contractor (Shanks.east London) to achieve the following targets:

- 25% recycling and composting in the period 2005/06 to 2009/10;
- 30% recycling and composting in the period 2010/11 to 2014/15;
- 33% recycling and composting beyond 2015/16;

- 40% recovery in the period 2005/06 to 2009/10;
- 45% recovery in the period 2010/11 to 2014/15; and
- 67% beyond 2015/16.

Progress under the Contract has been to schedule, with planning permissions for two major sites and four reuse and recycling sites being granted. The four Civic Amenity Sites have been improved into Reuse and Recycling Centres. The completion of two major Bio-MRF facilities, Frog Island and Jenkins Lane, will enable the Contractor to provide a minimum recycling level of 22% and recovery targets to meet the national waste strategy.

3.3 NEW REQUIREMENTS

The need to develop a revised strategy has arisen primarily from the introduction of one key piece of national legislation, the Waste and Emissions Trading Act (2003) (the WET Act). Nevertheless, it is important to include and to review a wider range of legislation to ensure full understanding of statutory obligations, and to ensure that any impending legislation is considered in making revisions to the existing strategy. *Annex D* provides such a review of which the key issues for ELWA and its constituent Waste Collection Authorities are:

- the policies within the Mayor's Municipal Waste Management Strategy;
- increasing costs of waste disposal due to increases in landfill tax;
- a requirement to achieve statutory performance standards for each borough that are higher in some areas than the targets within the Integrated Waste Management Contract;
- the requirements of the Household Waste Recycling Act;
- the Animal By-products Regulations; and
- the Hazardous Waste Directive.

The authorities will also need to monitor progress on the development of other legislation and policy including:

- the introduction of a Batteries Directive;
- the introduction of a Biowaste Directive or similar instrument;
- changes in policy on the Landfill Tax (for example, a greater than £3 per tonne per year increase); and
- changes in Landfill Allowance allocations for ELWA (published figures are provisional).

The potential development of a Local Development Document for waste in east London is also a key issue for ELWA and the constituent boroughs. Such a document would need to cover wastes outside the municipal category. Further research into the likely arisings of this waste is needed in the short term.

3.3.1 *Requirements for Biodegradable Municipal Waste landfilled*

The WET Act is intended to ensure the country meets its national targets for reducing the amount of BMW disposed to landfill. It is implemented through the Landfill (Scheme Year and Maximum Landfill Amount) Regulations 2004, which came into force on 22 July 2004. The Act provides a framework for the Landfill Allowance Trading Scheme (LATS), a system whereby tradable landfill allowances will be allocated to Waste Disposal Authorities each year. Each Waste Disposal Authority will be able to determine how to use its allocation of allowances in the most effective way. It enables allowances to be traded with other authorities, saved for future years (banked) or use some of its future allowances in advance (borrowed).

Inter-year trading may be allowed ie authorities can expend allowances issued in one year in a different year. However, in each of the three 'target' years (2010, 2013 and 2020), authorities will only be able to use the allowances issued in that specific year. This will ensure that the country as a whole meets its obligations under the Landfill Directive.

A fixed penalty of £150 per tonne [(1)] of excess BMW landfilled is likely to be enforced if local authorities do not have sufficient permits for the waste they landfill.

LATS will be launched in full on 1 April 2005 and has significant implications for ELWA's waste management strategy. Defra has released a provisional allocation of landfill allowances to each waste disposal authority in England. For ELWA these are shown in *Table 3.1*.

Table 3.1 ELWA's Provisional BMW Allocation [(2)]

Financial Year	Provisional Allocation (tonnes BMW)
2005/06	301,565
2006/07	286,760
2007/08	267,021
2008/09	242,346
Target Year 2010 (2009/10)	**212,737**
2010/11	189,057
2011/12	165,377
Target Year 2013 (2012/13)	**141,698**
2013/14	135,620
2014/15	129,541
2015/16	123,463
2016/17	117,385
2017/18	111,307
2018/19	105,229
Target 2020 (BMW)	**99,105**

3.4 HOW WELL ELWA PERFORMS AGAINST THESE REQUIREMENTS

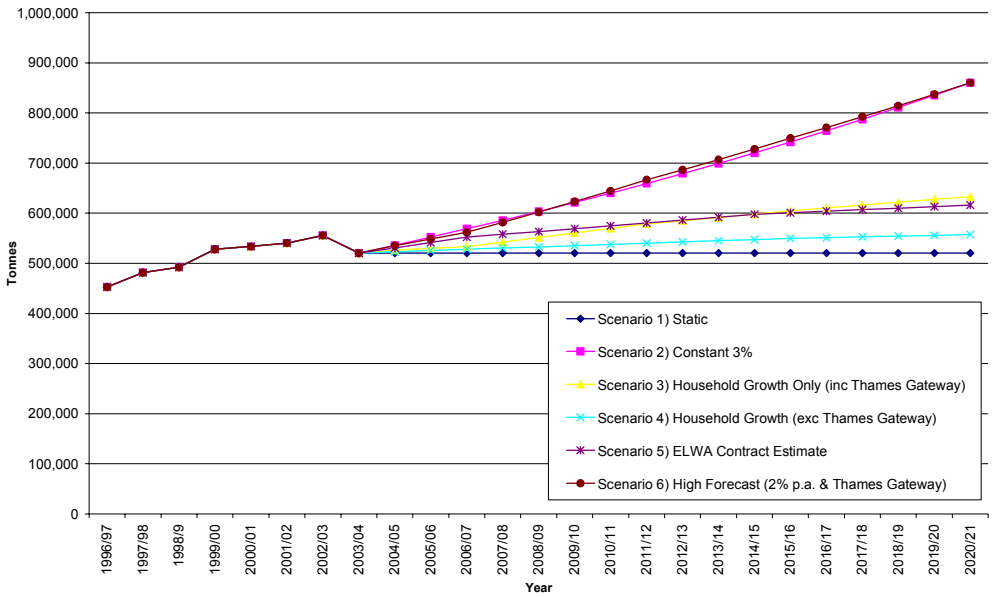
The requirement to reduce the amount of biodegradable municipal waste landfilled is absolute rather than relative: ie it is set in terms of tonnes rather than as a percentage of total arisings (as recycling targets currently are). This feature means that if waste grows, ELWA could move further away from the requirements regardless of how waste is currently being managed. Forecasting waste arisings can be complex, but is a key underlying assumption for the review of potential options and for the strategy as a whole. *Annex C* provides further detail of six potential waste forecasts that have been explored for this report. These include:

(1) http://www.defra.gov.uk/environment/waste/localauth/managewaste/ Viewed December 2004. Note, will be subject to amendments to Landfill Allowance and Trading Scheme (England) Regulations 2004.
(2) http://www.defra.gov.uk/environment/waste/localauth/lats/pdf/allocationdata.pdf.

- a scenario of no growth (Scenario 1);
- a scenario based on the historic 3% per annum increase quoted in *Waste Strategy 2000* (Scenario 2);
- a scenario based on household growth including the Thames Gateway development (Scenario 3);
- a scenario based on household growth excluding the Thames Gateway development (Scenario 4);
- a scenario based on rates used within the ELWA integrated contract (Scenario 5); and
- and a scenario based on a high forecast (Scenario 6).

Figure 3.1 shows these different forecasts graphically.

Figure 3.1 ELWA's Forecasted Municipal Waste Arisings



Two of the six forecasts (Scenario 2, 3% increase and Scenario 6, high forecast) exceed the 700,000 tonne contract threshold, above which re-tendering takes place. If waste totals exceed this level, the default method of management is likely to be landfill: a method that will have major impacts on the ability of ELWA as a whole to achieve LATS.

The scenario based on rates used within the ELWA integrated contract has been used here. Sensitivity analyses for key modelling results using Scenarios 1 (no growth) and 6 (high growth) have also been undertaken.

3.4.1 *The existing contract*

The existing contract goes some way to achieving reduction in the amount of biodegradable municipal waste sent to landfill through recycling and composting and through the activity of the Bio-MRF. However, as the existing contract was developed before the LATS scheme was proposed and is based on achieving rates of recycling and recovery (as per the targets in *Waste Strategy 2000*) rather than on reduction of BMW to landfill, indications are that this may not be sufficient to meet LATS requirements in all years. Not hitting these requirements will incur significant financial penalties.

Figure 3.2 gives an indicative representation of the 'gap' between what the existing contract is likely to deliver and what the LATS scheme requires of ELWA. The size of this gap will depend upon:

- how fast waste grows;
- performance in terms of recycling and composting;
- performance of the Bio-MRFs (ie how much material can be prevented from being landfilled);
- how the Environment Agency monitor the output of Bio-MRFs; and
- Defra's final LATS figures for ELWA.

Figure 3.2 Estimated Gap between Current Contract and LATS

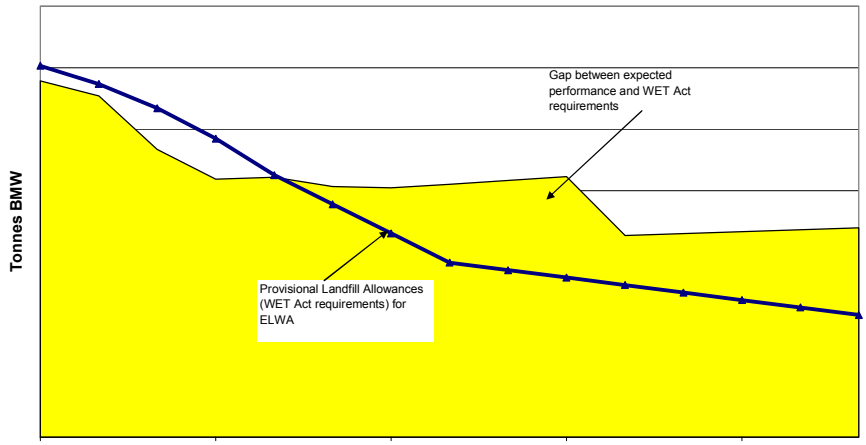
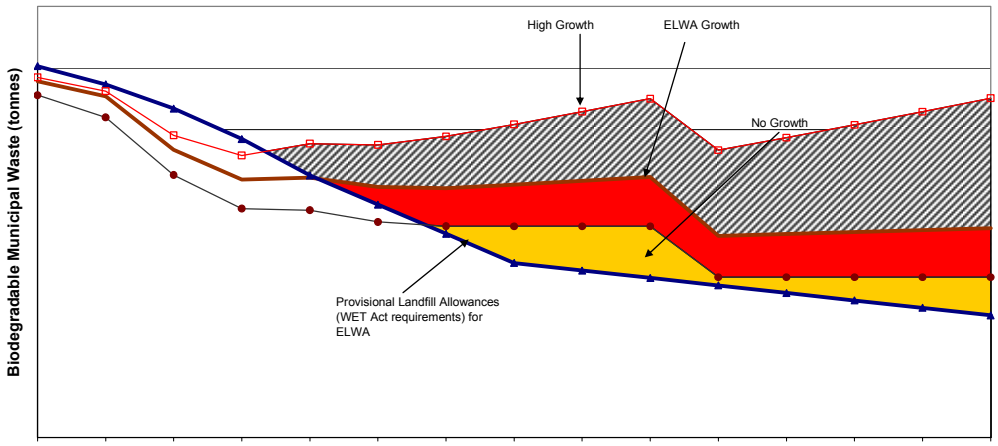


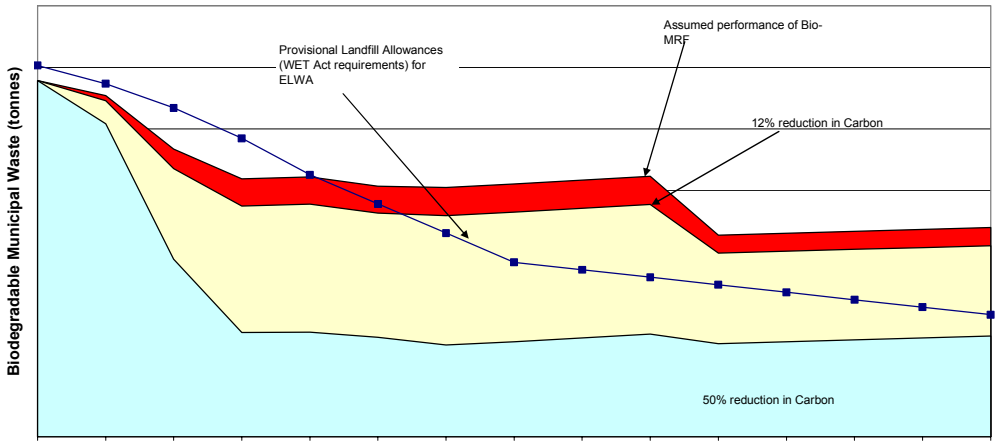
Figure 3.3 explores some of the implications of differing growth in waste: high growth provides a significant gap, whilst the low growth rate provides a significantly smaller gap. Increased performance in terms of recycling and composting will provide further diversion from landfill.

Figure 3.3 Impact of different growth rates on size of 'gap'



The performance of the Bio-MRFs and the way in which the output of the Bio-MRFs will be monitored is currently under review. The Environment Agency's consultation document is currently examining how this will be measured (1). *Figure 3.3* examines three options for how the Bio-MRF may perform. *Section E2* of *Annex E* provides further explanation of this issue and how it impacts on the results of the options analysis.

Figure 3.4 Impact of different levels of Bio-MRF Performance on 'gap'



(1) Environment Agency (2004) Assessing the diversion of biodegradable municipal waste from landfill by mechanical biological treatment and other options: A consultation paper related to monitoring the utilisation of landfill allowances.

4.1 POTENTIAL SOLUTIONS

There are a number of potential options available to ELWA in order to address this issue. *Table 4.1* sets out an initial scoping of the options that could enable ELWA to achieve LATS requirements. This table provides a description of the option, plus a commentary on whether this is likely to be feasible and an indication (tick/cross) of whether the option will be pursued further in this report.

Table 4.1 Initial Scoping of Options

	Option	To pursue?
A.	**Terminate Contract:** terminate existing contract and let a new contract for a technology that will meet LATS requirements eg mass-burn incinerator. There are three major disadvantages of this approach (1) benefits of the existing recycling/Bio-MRF contract and strategy will be lost (2) the timescale by which a new contract could be put in place is likely to be well-after the first target LATS year of 2009/10) (3) the costs of managing such a change and the costs associated with new construction would be prohibitive.	X
B.	**Borrowing and trading:** the LATS trading scheme allows authorities to bank (from earlier years) borrow (from later years) and trade allowances in order to meet their LATS requirements. The limits put on borrowing (5% of the following year's allowances), the fact that allowances cannot be banked across target years (ie be used to meet 2009/10 targets) and the fact that there is considerable uncertainty about whether there will be any allowances to trade and the cost at which they can be purchased, means that this is not a robust long-term strategy for ELWA.	X
C.	**Increase composting and recycling of biodegradable waste:** existing recycling systems collecting BMW including the paper and textiles collected through door-to-door and bring collections and the paper, textiles, garden waste and wood collected through the RRCs all help avoid landfill of BMW. It may be possible: through expanding collections and through working with the public to increase participation in recycling schemes, to remove more biodegradable waste this way. This option is worthy of further exploration.	✓
D.	**Modify Bio-MRFs to produce a 'compost' material to be spread on land.** The fine material produced by the Bio-MRFs resembles a 'compost' product. In other countries where the Ecodeco process is operational, this product has been spread on land as a soil improver. If the fine material produced by ELWA's bio-MRFs were of a suitable quality to spread on land, this would offer a good, if partial, solution to ELWA achieving LATS. However, current information suggests that the quality of this material will not be suitable for spreading on land. The potential for the introduction of a Biowaste directive (currently in preparation) by Europe would put additional restrictions on use of this material and would make this option unworkable. This options has therefore not been explored further here.	X

	Option	To pursue?
E.	**Modify Bio-MRFs to reduce biodegradability of material sent to landfill:** the bio-drying process included within the Bio-MRFs will have an impact on the biodegradability of material sent to landfill. Through alteration of this process, or through additional maturation (composting) of outputs that would be sent to landfill from the bio-MRF, the biodegradability of the output material could be reduced. This option has not been explored further here as initial indications suggest that changes will be insufficient to meet the gap as it currently stands. However, this option could be explored further with Shanks.east London to determine if sufficient diversion could be achieved.	?
F.	**Modify Bio-MRFs to recover more of the coarse fraction of the output:** the Bio-MRFs produce a material that can be used as a fuel in other processes such as cement kilns and power stations. By increasing the proportion of material sent for recovery, further reductions in BMW to landfill could be achieved.	✓
G.	**Add conventional combustion (incineration) facility to Bio-MRF:** additional facilities could be added to the Bio-MRF to treat materials to be sent to landfill. An incinerator would reduce the biodegradability of the output material so that LATS requirements could be achieved. However, there are major limitations in introducing this is a long-term strategy for ELWA (1) An incinerator is likely to be incompatible in size and nature with the Bio-MRF (2) construction of an incinerator would not be in line with the objectives of the Mayor's Municipal Waste Strategy which promotes new technologies such as anaerobic digestion and gasification for residual waste treatment (1) (3) construction of an incinerator is likely to require a long timescale, by which time LATS target years (2009/10 and 2012/13) are likely to have passed. However, ELWA should keep under review how any additional London incineration capacity proposed could assist the authority in meeting LATS.	X?
H.	**Add 'new technology' anaerobic digestion facility to Bio-MRF:** using an anaerobic digestion facility to process the outputs from the Bio-MRF is likely to be unfeasible. Anaerobic digestion facilities rely on feedstock material being biodegradable in order to generate energy, the pre-processing through the Bio-MRF will reduce the ability of the AD plant to do this. The outputs of the AD plant are likely to be sent to landfill and similar concerns over the ability to significantly reduce biodegradability as are experienced with the Bio-MRF outputs would be in place.	X
I.	**Add 'new technology' advanced thermal treatment (ATT) facility to Bio-MRF:** using an advanced thermal treatment (ATT) gasification plant to manage outputs from the Bio-MRF would have the advantage of reducing the biodegradability of the eventual output sent to landfill significantly. This type of facility also meets the Mayor's policy aims to introduce new technology. This option is worthy of further exploration.	✓

(1) Proposal 36 of the Mayor's Municipal Waste Management Strategy (Rethinking Rubbish in London) states "Having regard to existing incineration capacity in London, and with a view to encouraging an increase in waste reduction, reuse, recycling and composting and the development of new and emerging advanced conversion technologies for waste and new waste treatment methods such as Mechanical Biological Treatment, the Mayor will support and encourage these waste management methods in preference to any increase in conventional incineration capacity."

Four options have been taken forward from this initial scoping exercise for further examination in this report:

1. increase the composting and recycling of biodegradable waste;
2. modify the Bio-MRFs to recover more material as fuel (RDF);
3. add a 90,000 tonne per annum gasification facility to Bio-MRF; and
4. add a larger gasification facility to Bio-MRF.

Two options have not been examined further here, but are worthy of exploration outside this report, namely, working with Shanks.east London to identify whether changes can be made to the Bio-MRFs to reduce the amount of BMW sent to landfill and monitoring progress on development of any other recovery facilities in London.

4.2 SOLUTIONS INVESTIGATED FURTHER

4.2.1 How the Options have been tested

Recent consultation guidance from Defra indicates that a full Best Practicable Environmental Option (BPEO) assessment is no longer needed for strategy development. New guidance on the potential need for Strategic Environmental Assessment or Sustainability Appraisal for waste strategies is currently being drafted by Defra. As ELWA's revised strategy is being developed between these two stages, a reduced BPEO-type process has been used here, with a brief qualitative assessment of environmental issues included that can act as a scoping study for any future SEA or SA work. The criteria that have been used in this evaluation are:

- requirement for construction/contracting of new capacity;
- ability to achieve LATS allowances;
- comparative additional cost;
- likely risks and benefits of implementation; and
- likely environmental issues.

For the purposes of the analysis, a single waste growth rate, the same as employed in ELWA's contract has been used for all of the options.

Sensitivity analyses have been developed for waste growth rates.

4.3 DESCRIPTION OF THE OPTIONS

4.3.1 Option 0: Baseline

Option 0 models the waste management arrangements set out in the contract. This option includes:

- progressive increases in source-segregated recycling, through the orange bag and black box recycling systems, bring sites and the dry recyclables sorting facility (MRF);
- progressive increases in recycling and recovery of household and non-household refuse through the use of two Bio-MRFs (at Jenkins Lane and Frog Island) to extract recyclables (metal and glass), to produce a refuse derived fuel (RDF) and to process biologically the waste in order to reduce the biodegradability of the resulting material to be sent to landfill;
- a major increase in recovery of materials for fuel (RDF) at 2015/16 in order to meet the high recovery targets at this date; and
- progressive increases in recycling and recovery of waste from Reuse and Recycling Centres (RRCs) by passing refuse through a dirty-MRF where recyclables (such as metals and glass) are extracted.

Annex E provides further detail of the assumptions made within this option.

4.3.2 Option 1: Use more of output of the Bio-MRFs as fuel in earlier years

The Bio-MRFs produce a coarse and a fine fraction output. The coarse output is suitable to be recovered as fuel in other processes: in cement kilns or power stations, for example. This material is likely to be largely comprised of paper, plastics, textiles and other wastes of a high calorific value. By diverting this material (which contains biodegradable waste) from landfill, the production and recovery of material as fuel (RDF) can help ELWA achieve its LATS allowances.

The level of recovery of refuse derived fuel has been set within the contract. *Annex F* sets out the levels of recovery set within the contract. Option 1 assumes that a higher level of recovery (40%) than the minimum in the contract can be achieved earlier in the project life (by 2009/10), by diverting more of the Bio-MRF outputs to other processes such as cement kilns and power stations rather than by sending this to landfill.

4.3.3 Option 2: Separately collect and recycle or compost more material

Option 2 focuses on achieving reductions in biodegradable municipal waste sent to landfill by increasing the composting and recycling of biodegradable wastes such as paper. This is in addition to the source segregated recycling of paper through kerbside collections and of green waste collection through the RRCs that is included in the existing contract. The introduction of a door-to-

door green waste and/or kitchen waste collection has not been explored as part of this option as initial indications are that this would not be compatible with the Bio-MRFs. This option focuses on increasing paper collection from door-to-door collections and on increasing green waste collections at RRC sites.

4.3.4 *Option 3: Add an 'advanced thermal treatment' plant to the Bio-MRFs to manage both the fine outputs*

Option 3 models the existing configuration of waste management facilities as under Option 0 (baseline), but introduces an 'advanced thermal treatment' (gasification) plant to mange some of the outputs from the Bio-MRF. This option assumes that:

- recycling from the Bio-MRF will remain as in the baseline option;
- refuse derived fuel will be produced and recovered from the Bio-MRF;
- a maximum of 90,000 tonnes of bio-MRF output will be sent to the advanced thermal treatment plant; and
- some material (eg bulky waste) is still sent directly to landfill.

This option assumes that the facility will have a maximum capacity of 90,000 tonnes per annum and will come online in 2009/10, allowing a lead time of four to five years to obtain planning permission and construct the facility (1). It is assumed that the facility would be located within east London (the technology could, however, be developed outside ELWA if appropriate but would have greater impacts in terms of transport).

4.3.5 *Option 4: Add an 'advanced thermal treatment' plant to the Bio-MRFs to manage all bio-MRF outputs*

Option 4 models a similar scenario to Option 3. However, here both the material that would have been separated into an RDF (the coarse fraction) and the material that would have been sent to landfill (the fine fraction) are assumed to be sent to gasification. This could be one 260,000 tonne per annum plant or potentially two smaller facilities. If one facility were introduced at 260,000 tonnes per annum, this would be towards the upper end of the capacity of plants currently operating, though similar in size to the Karlsruhe plant in Germany (225ktpa).

(1) GLA/AiIE (2003) City Solutions quotes 24 months from receipt of planning permission to operation for the Thermoselect plant and 30 months from order placement to commercial operation for the Mitsui Babcock Energy Ltd. plant. Allowing one to two years to obtain planning permission.

4.4 RESULTS OF THE OPTIONS ANALYSIS

Annexes G and *H* provide further detail on the results of the options analysis, this is summarised in *Table 4.2*.

Table 4.2 Summary of Assessments

	1: Use more output of the Bio-MRFs as fuel in earlier years	2: Recycling & Composting	3: Smaller-Scale Gasification	4: Larger-Scale Gasification
Capacity	Requires capacity to accept RDF as fuel to be found earlier	Requires additional MRF and composting capacity. Drop in throughput of Bio-MRF and RRC MRF.	Requires site and capacity for 90,000 tpa gasification plant	Requires site and capacity for larger gasification plant
LATS	May not meet LATS in later years under current assumptions. Provides good solution for short term.	May not meet LATS after 2011/12 under current assumptions.	May not meet LATS between 2012/12 and 2014/15 and 2018/19 to 2019/20 under current assumptions.	Will meet LATS and will have allowances to sell with the exception of 2007/8 and 2008/9 when allowances will need to be purchased.
Cost	Less costly than baseline (Option 0) (by £11m over lifetime of contract, £27m if LATS can be sold) Due to avoidance of landfill costs.	More costly than baseline (Option 0) (by £27m over lifetime of contract, but only by £6m if LATS can be sold). Due to avoidance of landfill costs.	Less costly than baseline (Option 0) (by £5m over lifetime of contract, by £8m if LATS can be sold).	Significantly more costly than baseline (Option 0) (by £48m over lifetime of contract) but significantly less costly (by £43m) if LATS can be sold.
Risks/Benefits	Finding Outlet for RDF, already difficult. No guarantee of long term market. Non-performance will result in LATS penalties.	Will help authorities to achieve BVPIs and meets London Waste Strategy policies. Non-participation by residents could result in LATS penalties. May also increase waste arisings.	May not be sufficiently large to meet LATS in all years. Must still find a market for RDF. Planning permission required. Timescale for implementation could be long. Small quantity of hazardous outputs must be disposed of.	Will hit LATS in all years. Planning permission required. Timescale for implementation could be long. Small quantity of hazardous outputs must be disposed of.
Environmental	Saving fossil fuels. Similar to baseline. Transport impacts of moving RDF to suitable market	Bio-aerosols. Transport impacts of collecting further recyclables and moving products to recyclables markets.	Visual impact, some local traffic impact of providing a facility in east London.	Visual impact, some local traffic impact of providing a facility in east London.

Option 1 has the advantage of requiring only a limited variation to the current contract (for example, introducing new incentives to Shanks.east London) and will meet LATS allowances in earlier years. However, beyond this, additional solutions will be needed to reduce biodegradable waste sent to landfill still further, given the estimated size of the gap. If the Environment Agency consultation proves that the Bio-MRFs perform better than the assumptions used here, this solution has the potential (as other options) to meet LATS in later years as well. Importantly, there are significant risks associated with finding, securing and maintaining a market for refuse derived fuel. Further exploration of the potential to increase recovery of the coarse fraction of the Bio-MRF output in the short term in order to help bridge any gap before new facilities come online would be appropriate.

Improving recovery of biodegradable materials, though increased paper collection and recovery of green waste through the RRCs, Option 2, will help to achieve LATS in earlier years and will help all ELWA authorities achieve statutory performance standards (BVPIs) for recycling. Like Option 1, Option 2 is unlikely to achieve LATS in later years, given current estimations of the size of the gap (given assumptions on how the outputs of the Bio-MRF will be monitored) and given current estimates of recycling and composting performance. Further, as this option is heavily reliant on high, voluntary, public participation, there is a significant risk that this option will not perform in terms of LATS. Option 2 could, however, form an important component of a hybrid option: supporting other initiatives to reduce the amount of BMW landfilled. There is clearly a need to clarify how source-segregated collections can help ELWA as a whole achieve LATS, and in particular:

- how individual borough-level plans for separate collections will contribute to the overall ELWA strategy; and

- whether introducing a kerbside kitchen and garden waste collection would be feasible for ELWA.

Options 3 and 4, introducing a gasification plant to manage outputs from the Bio-MRFs, provide potentially viable solutions to achieving LATS allowances. Option 3 has the associated risk of not providing sufficient capacity to manage outputs and will not meet LATS in all years, it also maintains the risk of finding a separate market for RDF. Option 4 has the disadvantage of being more costly to introduce and significantly larger in scale. However, potentially it would reap benefits in terms of LATS available to sell and the additional merchant capacity available to the operator that could reduce unit costs to ELWA. Both options would require significant lead time to implement and are likely to need the support of other solutions (increase in recycling, recovery of RDF) to enable LATS to be achieved in the first target year (2009/10).

5.1 CONCLUSIONS

This initial options appraisal report has examined wide range of potential options that could help ELWA to achieve requirements under the WET Act.

Six options were evaluated and rejected at the scoping stage, these were:

i. **Terminating the contract and substituting a different technology**: the timescale by which a new contract could be put in place, the costs of managing such a change and the loss of the benefits associated with the existing contract (in terms of recycling and Bio-MRF diversion from landfill) make this option unfeasible;

ii. **Banking and borrowing allowances**: the cap on borrowing and the fact that there will be insufficient surplus LATS to borrow from later years make borrowing unfeasible. The uncertainty surrounding the price at which LATS will be traded, coupled with the limits of trading in target years, mean that trading in isolation is an inappropriate strategy;

iii. **Modify Bio-MRFs to reduce biodegradability of material sent to landfill**: initial indications suggest that changes will be insufficient to meet the gap between expected performance and WET act requirements as it currently stands. However, this option could be explored further with Shanks.east London to confirm whether sufficient diversion could be achieved;

iv. **Modify Bio-MRFs to produce a 'compost' material to be spread on land:** the compost-type product is unlikely to be of a suitable quality to spread on land, particularly in the light of the potential Biowaste Directive;

v. **Add conventional combustion (incineration) facility to Bio-MRF**: this option is not in accordance with the Mayor's Municipal Waste Management Strategy, however, ELWA should keep new proposals on London incineration under review; and

vi. **Add 'new technology' anaerobic digestion facility to Bio-MRF**: rejected as anaerobic digestion would not be compatible with the Bio-MRF and the outputs of AD are likely to have similar problems with biodegradability as the Bio-MRF outputs.

Four options were examined in more detail:

1. increase composting and recycling of biodegradable waste;
2. modify Bio-MRFs to recover more material for thermal treatment in early years; and
3. add 'new technology' gasification facility to Bio-MRF at 90,000tpa;

4. add new technology gasification facility to Bio-MRF at a larger scale.

These options were tested against the following criteria:

- requirement for construction/contracting of new capacity;
- ability to achieve LATS allowances;
- comparative additional cost;
- likely risks and benefits of implementation; and
- likely environmental issues.

Options 1 and 2 provided good solutions for meeting the LATS gap in earlier years, but only options 3 and 4 could meet the gap in later years (notwithstanding the fact that if the Bio-MRFS are given further credit for reducing BMW landfilled, as explained in *Section E2* the dates when LATS are achieved could be extended). Options 3 and 4 have the highest capital costs.

5.1.1 How should the strategy be amended?

The integrated waste management strategy document should be updated to include new information and data and to reflect changes in legislation and policy. The supporting report should be drafted to Defra's emerging guidelines for developing municipal waste management strategies.

A new objective should be added into the waste strategy under Section 2 (underlined below):

Box 5.1 Objectives for Waste Strategy

1. the services shall be both reliable and achievable in terms of managing and disposing of the waste;

2. the services shall be environmentally and economically sustainable in terms of:
   i. encouraging waste minimisation initiatives by providing an education service throughout the term of the contract;
   ii. seeking to maximise waste recycling and composting opportunities potentially supported by recovery of energy;
   iii. <u>seeking to reduce biodegradable waste landfilled in order to meet the requirements of the Waste and Emissions Trading Act</u>
   iv. contributing to local economic development

3. the most cost effective delivery of the services; and

4. the services shall be sufficiently diverse and flexible and not dependent upon a single method of waste treatment so as to ensure that ELWA complies with the statutory duty to dispose of waste.

New targets should be added into the waste strategy (underlined below), but existing targets must be retained:

Box 5.2 Targets for Waste Strategy

Recycling

- 25% recycling/composting in the period 2005/06 to 2009/10
- 30% recycling/composting in the period 2010/11 to 2014/15
- 33% recycling composting in the period form 2015/16

Recovery

- 40% recovery in the period 2007/8 to 2009/10
- 45% recovery in the period 2010/11 to 2014/15
- 67% recovery in the period 2015/16

Reduce biodegradable waste landfilled to (preliminary figures):

- 212,737 tonnes by financial year 2009/10
- 141,698 tonnes by financial year 2012/13
- 99,150 tonnes by financial year 2019/20

5.1.2 What Actions Should Be Taken?

The following actions should be taken to ensure a long-term strategy for ELWA that meets LATS:

- consult upon proposals made;
- develop remainder of the detailed waste strategy documents and assist collection authorities in development of their strategies;
- undertake additional analyses into kitchen and green waste collection, collection from flats and non-municipal waste arisings and management;
- prepare a joint strategy statement;
- continue monitoring waste growth and contract performance in order to identify opportunities to trade landfill allowances (buy or sell) early;
- obtain clarification from the Environment Agency on MBT issues;
- explore, with the current contractor, how greater diversion from landfill by the Bio-MRF can be achieved;
- for the short to medium term (2005/6 – 2009/10), improve recovery of paper from the kerbside collection, and green waste through the RRCs though funding and supporting campaigns to increase participation and capture (incentives, publicity, door-knocking etc.); and

- for the medium to long term (2009/10 - 2019/20), explore whether it would be appropriate to construct a downstream waste management facility to add to the Bio-MRFs. This facility should be compatible with the aims of the Mayor's Municipal Waste Management Strategy and should produce outputs of a very low biodegradability (eg gasification or other type of advanced thermal treatment). The facility should come online to achieve 2012/13 LATS targets at the latest.

5.2 RECOMMENDATIONS

The existing strategy has proven to be moving ELWA in the right direction to meet new requirements for waste management. However, some changes will be needed to meet WET Act requirements. These changes may include the following:

1. A new objective to be inserted within the Strategy under objective 2, as follows:
   Seeking to reduce biodegradable waste landfilled in order to meet the requirements of the Waste and Emissions Trading Act
2. A new set of targets to be inserted within the Strategy:
   Reduce biodegradable waste landfilled to (preliminary figures):
   i) 212,737 tonnes by financial year 2009/10
   ii) 141,698 tonnes by financial year 2012/13
   iii) 99,150 tonnes by financial year 2019/20

A number of actions will be required in order to secure a robust, long term strategy for ELWA, these are:

1. Continue to monitor progress on the delivery of the contracted collections and facilities and fine tune the Strategy's action plan to deliver required outputs.

2. Continue to monitor waste growth and tailor the Strategy and the contract to deliver the best performance outcomes to ELWA.

3. Seek further clarification from the Environment Agency regarding its monitoring of the Jenkins Lane & Frog Island outputs sent to landfill.

4. Survey non-municipal wastes in order to allow the MSW strategy to interface with the emerging requirements for planning authorities.

5. Investigate the introduction of a separate collection for kitchen and garden waste. This should take into account the risks associated with non-participation, the Animal By-products Regulations, links with the Mayor's Municipal Waste Management Strategy and the compatibility of such systems with Jenkins Lane & Frog Island.

6. Explore the potential to boost the separate collection of biodegradable materials (paper, textiles, green waste). Though not a complete solution for ELWA, this will help to bridge the gap whilst other options are put in place and will also assist authorities in achieving 2005/6 statutory performance standards.

7. Explore the potential to use more of the output from Jenkins Lane & Frog Island as fuel in earlier years as a method to meet the gap in the short to medium term. This may require a variation to the existing contract in order to introduce further incentives to Shanks.east London to recover additional fuel.

8. Examine the possibility of introducing a new technology to manage the outputs from Jenkins Lane & Frog Island (fine and potentially also coarse fraction) in the very short term. New plant will need to be compatible with the Mayor's Municipal Waste Management Strategy, to have outputs of a very low biodegradability and will need to be wholly compatible with the existing facilities. Gasification would form one of these options. This strategy may also require a variation to the existing contract in order to introduce further incentives to Shanks.east London to make these changes.

Annex B

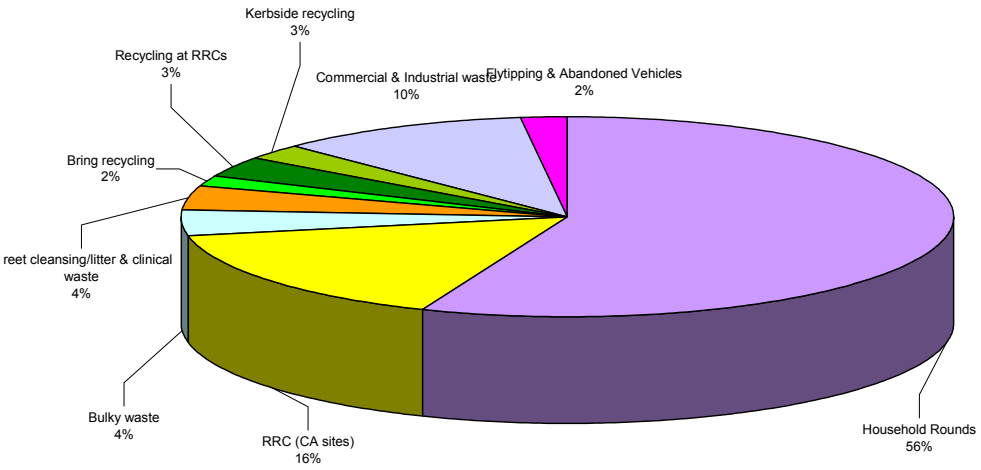
Evidence Base – Baseline Data

Baseline figures used during the strategy relate to the financial year ended April 2004 (2003/04). The following annex provides some further detail on the nature of existing collections and the breakdown of arisings from individual authorities.

In the financial year 2003/04, the ELWA generated a total of 520 500 tonnes of municipal waste. 87% of this waste can be classified as 'household', whilst the remaining 12% was generated from commercial premises ('trade' waste) and other activities such as fly tipped waste ('other non household' waste).

Figure B1.1 shows a breakdown in municipal waste in 2003/04.

Figure B1.1 Municipal Waste Arising in 2003/04

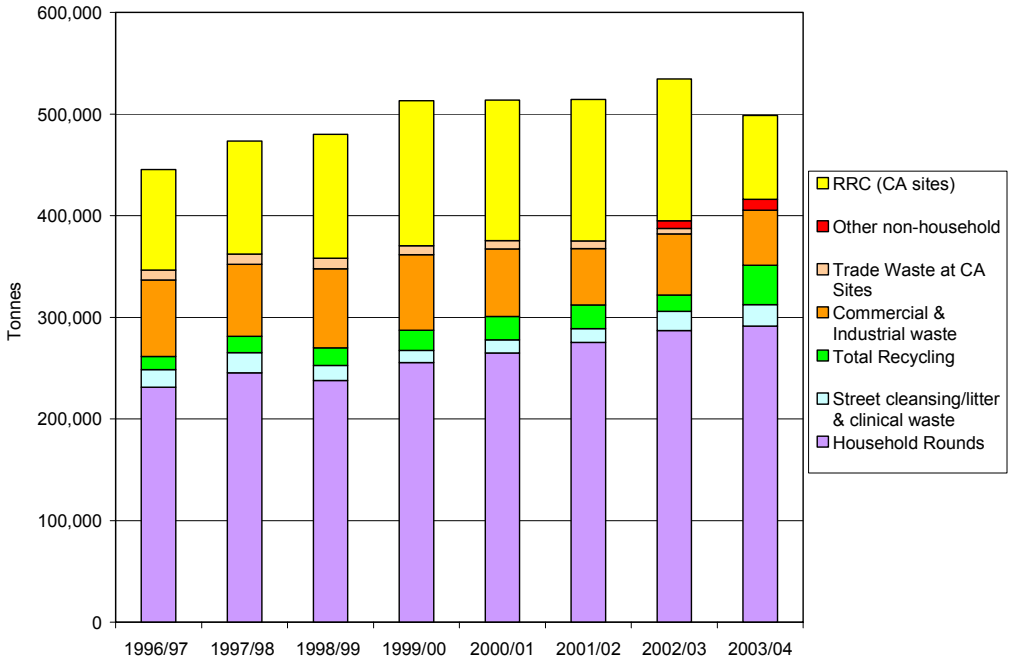


Over half of ELWA's municipal waste arisings are generated through household refuse collection, with a further 16% being household waste collected through RRCs.

Of household waste arisings within ELWA, 8.5% was recycled in 2003/04, a further 9% was combusted by conventional incineration at Edmonton, and the remaining 82.5% was disposed to landfill.

Figure B1.2 shows how municipal waste arisings within ELWA have changed since 1996.

Figure B1.2 Trends in Waste Generated in ELWA between 1996/07 and 2003/04



Analysis of the recent trends in municipal waste arisings (*Figure B1.2*) within ELWA shows that:

- there has been a continued trend of growth in refuse collected through household rounds since 1996/97; and

- total municipal waste arisings have increased throughout the period, with the exception of the 2003/04, which saw a reduction in the total quantities of waste managed.

The reduction in total MSW arisings for 2003/04 is not thought to be indicative of a change to the general trend of waste growth. In this year, total MSW arisings can be seen to have decreased, as a result of reduced quantities of waste being managed through RRCs. The reasons for this have been examined in sections below, together with further details on the services provided and waste management infrastructure within ELWA.

B1.1 SERVICES PROVIDED

In December 2002, ELWA entered into an integrated waste management contract with Shanks. The contract extends for 25 years, with the contract to be re tendered if municipal waste arisings exceed 700 000 tonnes per annum.

B1.1.1 Refuse Collection

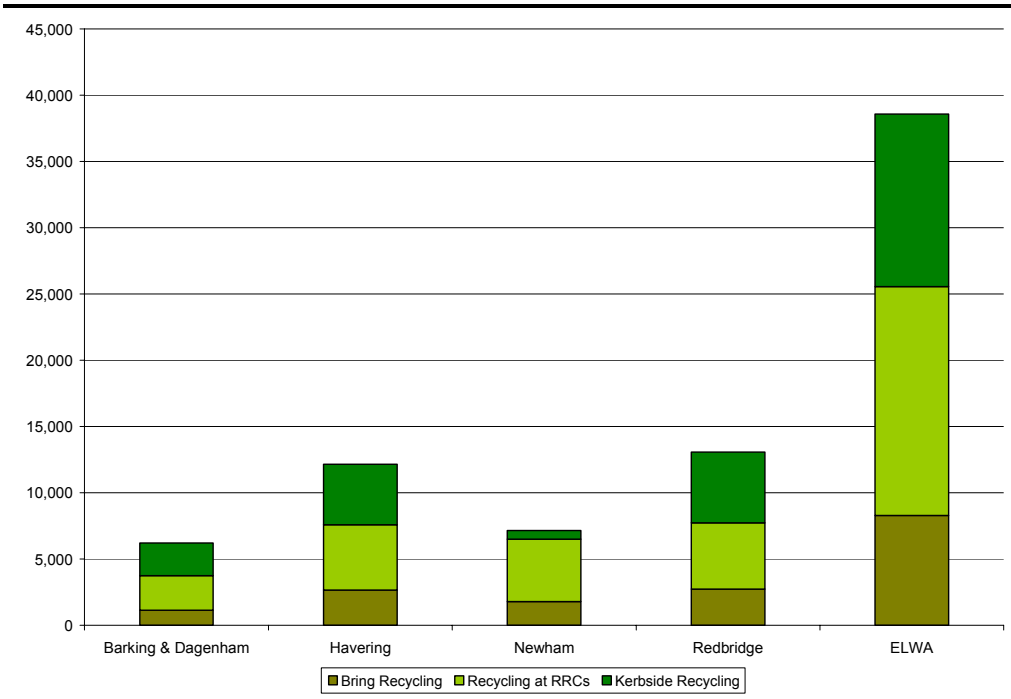
Each of four boroughs provides a weekly refuse collection service to all residential properties in the authority. Residents in flats and estates often use communal bins which are provided for a group of residents. These are also emptied weekly.

B1.1.2 Recycling and Composting

In 2003/04 approximately 38 700 tonnes of material was separated from ELWA's municipal waste stream for recycling or composting, enabling the authority to reach a household recycling rate of 8.5%. This represents an increase from 5.8% in 2002/03, which has resulted in part from the redevelopment of civic amenity sites (now called Reuse and Recycling Centres or RRCs) within ELWA. Materials were collected via a number of different routes, including kerbside collections, local bring banks and CA sites.

Figure B1.3 shows a breakdown of ELWA's recycling and composting arisings in 2003/04.

Figure B1.3 Recycling and Composting Arisings 2003/04



Note: This graph excludes materials collected through 'direct recycling', which accounted for 70 tones of recyclables within ELWA (62 tonnes collected from Newham and 9 tonnes arising in Redbridge).

Kerbside Collections

Shanks have introduced a 'survival bag' system in Havering and Newham. This scheme, which uses orange bags to collect recyclables, is currently being introduced through the London Recycling Fund in Barking and Dagenham. Under the orange bag recycling scheme, residents are provided with 13 sacks every 13 weeks. A range of recyclables are collected through this scheme including newspapers and magazines, food and drink cans, junk mail, catalogues and directories and cardboard such as cereal boxes. Recyclables are collected on the same day as black bag refuse.

The Havering scheme is currently utilising the Cleanaway MRF at Rainham to recover and sort survival bag materials.

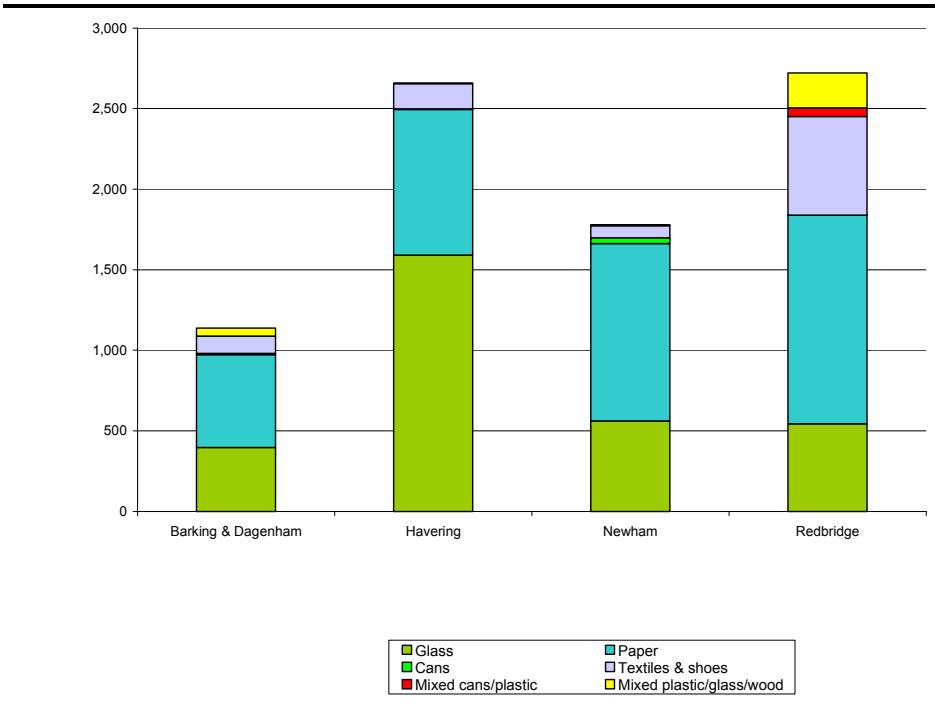
Redbridge has a separate black box collection. There is one recycling service for all houses in Redbridge (a separate service is available for residents in flats). All households receive a fortnightly multi-material collection service, which includes collection of glass, cans, plastic bottles and paper.

B1.1.3 Bring Sites

Shanks is responsible for the management of the majority of bring schemes in all four boroughs. From over 300 bring sites situated across all four boroughs a total of 8300 tonnes of recyclables was collected in 2003/04. The recycling bring sites located within ELWA provide recycling for cans, plastic bottles, glass, paper and textiles/shoes.

Figure B1.4 presents a breakdown of materials collected from bring sites across the four boroughs in 2003/04.

Figure B1.4 Breakdown of Materials Collected at Bring Sites for Recycling 2003/04



B1.1.4 Reuse and Recycling Centres (RRCs)

The following reuse and recycling centres are in operation within ELWA:

- **Ilford Reuse and Recycling Centre (IRC**) supports Redbridge's kerbside box collection scheme.

- **Chigwell Road Reuse and Recycling Centre** provides household recycling for paper, cardboard, plastic bottles, cans, garden waste, fridges, freezes, scrap metal, wood etc. No commercial waste is accepted.

- **Jenkins Lane Reuse and Recycling Centre** is being developed to include a survival bag MRF, which will support the survival bag collection schemes for Havering, Newham, and Barking and Dagenham from 2006/07.

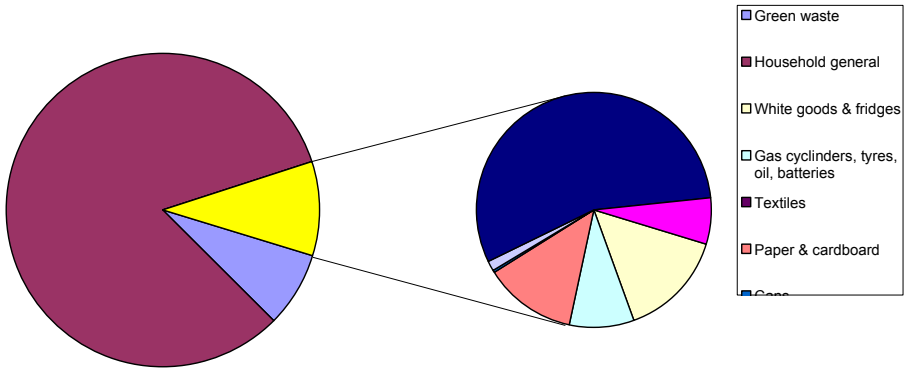
- **Gerpins Lane Reuse and Recycling Centre** is a household recycling facility provides recycling services for glass, cans, cardboard, and garden waste. Up to half a tonne of household building rubble may also be disposed of free of charge. Commercial waste is also accepted at a cost of £100 per tonne.

- **Frizlands Reuse and Recycling Centre** provides a household recycling service for the following materials: site cardboard, green waste, fridges/white goods, metal, paper, textiles, car batteries, wood, oil, rubble, cans and tins, glass and plastic containers.

All sites have been significantly modified by Shanks since the start of the Integrated Waste Management Service Contract. Jenkins Lane has been relocated within the Jenkins Lane site to enable an improved disposal and recycling service.

These RRCs generated approximately 99 600 tonnes of municipal waste in 2003/04, of which around 17 300 tonnes were recycled. This total excludes 5300 tonnes of waste that was generated through Redbridge's kerbside box recycling scheme and managed at Ilford Recycling Centre.

Figure B1.5 Breakdown of Waste Generated at RRCs during 2003/04



These figures exclude 5300 tonnes of waste managed at Ilford Reuse and Recycling Centre, which supports Redbridge's kerbside box collection scheme.

As *Figure B1.5* shows, approximately 10% of waste generated at RRCs was recyclables, green waste accounted for a further 8% of arisings, with the remaining 83% of arisings classified as being 'general household waste'.

Analysis of recent trends in waste arisings (*Figure B1.2*) shows a significant decrease in the total quantity of waste generated through RRCs. In 2003/04, approximately 82 000 tonnes of (non-recycled) 'general household waste' was managed through these sites, compared with over almost 140,000 tonnes in the previous year. This represents a decrease of over 40%.

This significant decline has contributed to the overall reduction in municipal waste arisings for 2003/04 and is likely to be a direct result of measures implemented at RRCs since the start of the Shanks Integrated Waste Management Contract. These measures include the installation of barriers to prevent unauthorised access by trade, which may only be opened by staff for residents with vehicles higher than 1.72 metres who can prove that they are not depositing commercial waste.

B1.1.5 Green Waste Composting

Shanks uses Cleanaway Limited's Rainham green waste composting facility and a composting facility at Aveley Landfill for green waste recovered from ELWA's RRCs.

B1.1.6 Other Recycling Facilities

Development of Bio MRFs

Two Bio MRFs, at Frog Island and Jenkins Lane, are currently being developed. The substructure for the Jenkins Lane facility is in place, the site is due to be completed by 2005. Once complete, each facility will comprise of three Ecodeco units, each with the capability to receive and treat 60 000 tonnes of waste per annum. The front end of the Bio MRF will allow for the separation of the survival bags from the mixed waste stream delivered. The survival bags will then be transported to the survival bag MRF at Jenkins Lane for processing.

The remaining black bag waste will be shredded before being placed in the bio drying unit. The Bio MRF system is expected to recycle 8.4% of inputs and recover up to 83%.

Reuse and Recycling Centre MRF

Developments for Frog Island also include the construction of a reuse and recycling centre MRF in order to maximise the recycling potential of the materials delivered to the site. Mixed outputs from the RRC sites that cannot be sent direct for recovery/reprocessing will be sent to the RRC MRF for further sorting. This facility will comprise a mix of mechanical processing equipment together with manual picking belts to sort through the mixed RRC arisings.

B1.1.7 Other Household Waste

Street Sweepings

15 700 tonnes of street sweepings and 4800 tonnes of gully detritus were collected in ELWA in 2003/04. This represents an increase of over 13% since the previous year, which generated 18 100 tonnes of street sweepings and gully detritus. These figures do not include fly tipped waste which accounted for 5500 tonnes in 2003/04.

Bulky Waste

A bulky waste collection service is provided by each of the councils, by arrangement. Approximately 22 000 tonnes of bulky waste items were collected in 2003/04.

Clinical Waste

A clinical waste collection service is operated, which disposes of medical waste arising from treatment at home. Collection is normally arranged as a result of a referral by a hospital, GP, or health visitor. Approximately 560 tonnes of clinical waste was collected within ELWA in 2003/04.

B1.2 NON-HOUSEHOLD MUNICIPAL WASTE

In 2003/04, non-household waste arisings in ELWA totalled 64 800 tonnes. The non household waste stream includes commercial waste arisings, trade waste collected at RRCs, and other non household waste (such as fly tipped waste and abandoned vehicles).

In the baseline year (2003/04), 5600 tonnes of separately collected fly-tipped materials were generated within ELWA and 5,000 tonnes of waste generated through the collection of abandoned vehicles.

Trade waste can be deposited at RRCs but is subject to a charge according to weight. As shown in *Figure B1.2*, there has been a decline in the quantity of trade waste deposited at RRCs (formerly civic amenity sites) since 1996/97, which is a reflection of the substantial increase in charges. Whilst trade waste managed at RRCs has seen a decline in recent years, commercial waste collections within the borough have remained relatively static since 1996/97.

B1.3 WASTE DISPOSAL

All non recycled household waste collected by ELWA is sent to landfill facilities or incinerated. Shanks is responsible for waste disposal under ELWA's Integrated Waste Management Services Contract. In 2003/04, some 377 000 tonnes (83% of ELWA's waste) were disposed of to landfill.

Contract terms with Edmonton incinerator are that the facility will accept up to 100 000 tonnes per annum. In 2003/04, 40,000 tonnes, the equivalent of 9% of ELWA's to municipal waste, was disposed of at this facility.

Annex C

Evidence Base – Waste Forecasts

C1 WASTE GROWTH FORECASTS

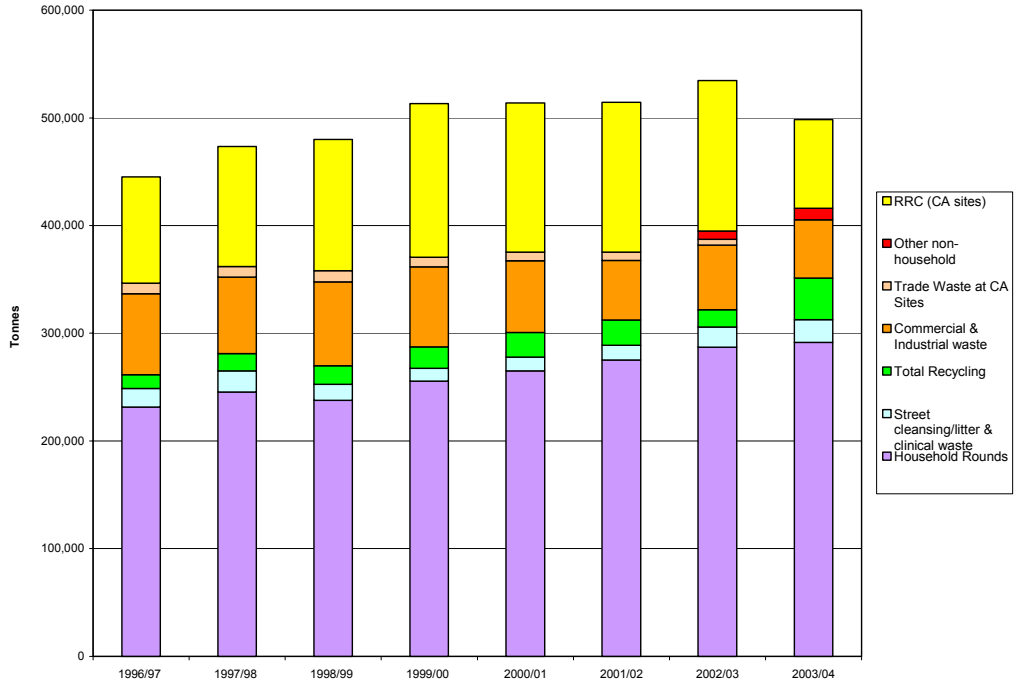
C1.1 INTRODUCTION

Forecasting the likely increase in waste arising within ELWA is a key underlying assumption for the baseline review. At a national level, forecasts for municipal waste range from 2% to 3% per annum. Last year, Defra's Municipal Waste Management Survey estimated that there were 29.3 million tonnes of municipal waste in England in 2002/03, up from 28.8 million tonnes in 2001/02. This represents an increase of approximately 1.8%. Work previously undertaken by Shanks East London suggested that the total waste arising from each of the four constituent boroughs would be likely to increase by between 5% and 0.5% over the next 25 years, based on increases in the amount of waste generated in the past. Since that time, total waste arisings have been lower than anticipated and there have been changes in forecasted household growth. This appendix seeks to explore some possible forecasts of waste arisings and to suggest a forecast which can be used for options development.

C1.2 ANALYSIS OF PREVIOUS YEARS' DATA

Figure C1.1 presents the trends in municipal waste arisings between 1996/97 and 2003/04.

Figure C1.1 Trends in Waste Arisings



Detailed analysis of the recent trends in municipal waste arisings within ELWA shows that:

- there has been an continued increase in refuse collected through household rounds;
- there has been a significant increase in the waste collected for recycling, through kerbside, bring and RRCs over the past five years;
- trade waste collected at CA sites has remained relatively stable throughout the period;
- there has been a increase in refuse collected at civic amenity sites throughout the period, with the exception of the last year (2003/04), in which there has been a significant decrease in civic amenity site refuse generated; and
- total municipal waste arisings have increased throughout the period, with the exception of the 2003/04, which saw a modest reduction in the total quantities of waste generated overall.

In 2003/04, the significant reduction in refuse generated at Reuse and Recycling Centres was due to the introduction of trade waste restrictions, which introduced controls to prevent commercial waste being disposed of as household waste. In the same year, quantities of trade waste being disposed of at RRCs have not increased, which suggests that this waste is now being managed outside of the municipal waste stream.

In addition, within the same year considerable construction and demolition work was undertaken at each of the RRCs, which may also have impacted on the quantities of waste generated.

C1.3 HOUSEHOLD WASTE GROWTH FORECASTS

In addition to more waste being generated by each householder as the economy prospers another major contributor to waste growth in any waste collection or disposal authority is the forecasted change in the number of households. Typically, future waste growth is correlated more closely to growth in households than growth in population: household growth trends have the advantage of taking account of typical household size as well as changes in population. For ELWA, the underlying growth in households will also be coupled with a number of major developments being undertaken in the Thames Gateway area.

Table C1.1 presents forecasted growth in the number of households within each of the four boroughs and ELWA between 2004/05 and 2020/21. The predicted increases in the number of households are based on general growth and exclude proposed Thames Gateway developments.

Table C1.1 Forecasted Households (general growth)

Year	Barking & Dagenham	Havering	Redbridge	Newham	ELWA
2004/05	68,000	93,500	97,200	94,200	353,000
2005/06	68,200	94,000	97,700	95,000	355,000
2006/07	68,400	94,300	98,300	95,900	356,900
2007/08	68,600	94,600	98,800	96,700	358,700
2008/09	68,800	94,900	99,400	97,500	360,600
2009/10	69,000	95,200	99,900	98,300	362,400
2010/11	69,200	95,500	100,500	99,100	364,300
2011/12	69,400	95,800	101,100	99,900	366,100
2012/13	69,500	96,100	101,600	100,700	368,000
2013/14	69,700	96,400	102,200	101,500	369,800
2014/15	69,900	96,700	102,700	102,300	371,700
2015/16	70,100	97,000	103,300	103,100	373,500
2016/17	70,300	97,300	103,800	103,300	374,700
2017/18	70,500	97,600	104,400	103,500	375,900
2018/19	70,700	97,800	104,900	103,700	377,100
2019/20	70,900	98,100	105,500	103,900	378,300
2020/21	71,100	98,400	106,000	104,000	379,500

Source: Figures sourced from Scenario 7.9 - Greater London Authority (2003) Population and Household Forecasts Based on the First Results from the 2001 Census. SDS Technical Report Twenty Three.

C1.3.1 Implications of Thames Gateway Development

Thames Gateway has been identified by government as a priority area for development, regeneration and infrastructure improvement. The development of a minimum of 120,000 new dwellings has been proposed, of which around 60,000 would be in London during the period 2003 to 2016. Development of this region is expected to continue beyond this date as the impacts of major new transport infrastructure, such as Crossrail 1, stimulate further development.

Table C1.2 presents forecasted household growth, including additional homes proposed as part of the Thames Gateway developments, within ELWA between 2004/05 and 2020/21.

Table C1.2 Forecasted Households Including Thames Gateway Developments

Year	Barking & Dagenham	Havering	Redbridge	Newham	ELWA
2004/05	68,318	93,656	97,200	95,976	355,250
2005/06	68,624	94,208	97,700	97,368	358,000
2006/07	68,930	94,560	98,300	98,860	360,650
2007/08	69,504	95,378	98,800	103,448	367,130
2008/09	70,078	96,196	99,400	108,036	373,710
2009/10	70,652	97,014	99,900	112,624	380,190
2010/11	71,226	97,832	100,500	117,212	386,770
2011/12	71,800	98,650	101,100	121,800	393,250
2012/13	72,046	100,621	101,600	123,833	398,200
2013/14	72,391	102,592	102,200	125,867	403,050
2014/15	72,737	104,563	102,700	127,900	408,000
2015/16	73,082	106,534	103,300	129,933	412,850
2016/17	73,428	108,506	103,800	131,367	417,100

Year	Barking & Dagenham	Havering	Redbridge	Newham	ELWA
2017/18	73,773	110,477	104,400	132,800	421,350
2018/19	74,119	112,348	104,900	134,233	425,600
2019/20	74,464	114,319	105,500	135,667	429,850
2020/21	74,810	116,290	106,000	137,000	434,100

Source: Figures sourced from Scenario 7.9 - Greater London Authority (2003) Population and Household Forecasts Based on the First Results from the 2001 Census, SDS Technical Report Twenty Three, and Thames Gateway (2004) Development and Investment Framework.

C1.4 WASTE GROWTH SCENARIOS

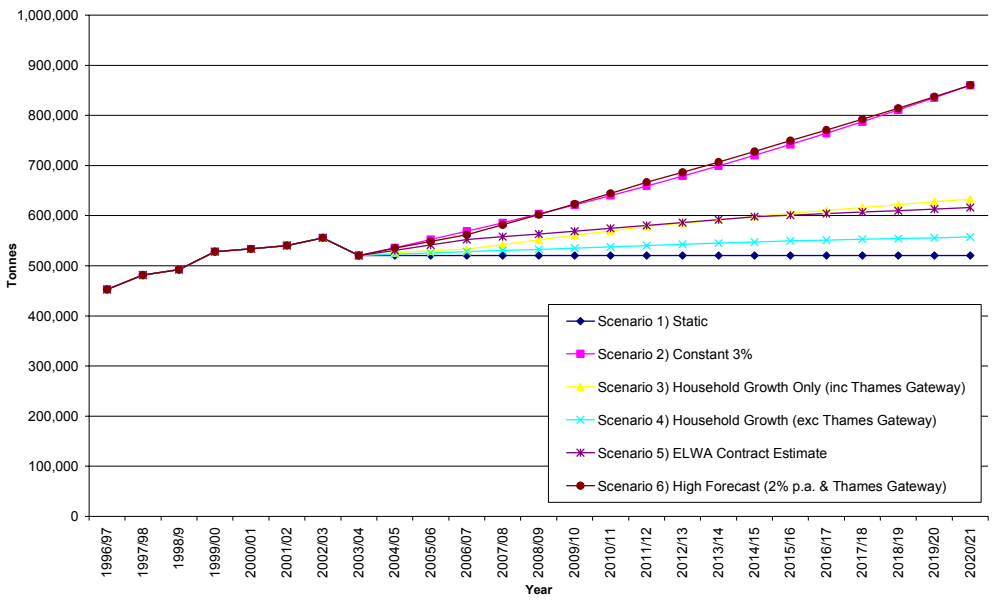
A number of scenarios have been examined for how MSW waste should be forecasted, these are:

- ***Scenario 1* - Static**: forecast no growth in municipal waste arisings (static);
- **Scenario 2 – Constant 3%**: forecast municipal waste arisings based on a constant 3% increase per annum, in line with Waste Strategy 2000;
- **Scenario 3 – Household Growth Only (including Thames Gateway)**: forecast household waste arisings based on household forecasts including Thames Gateway developments (Table 1.2). Assume that non household municipal waste arisings remain static;
- **Scenario 4 - Household Growth Only (excluding Thames Gateway)**: forecast household waste arisings based on household growth forecasts excluding major Thames Gateway developments (Table 1.1). Assume that non household municipal waste arisings remain static;
- **Scenario 5 – ELWA Contract Estimate**: forecast municipal waste arisings based on waste growth assumptions as set out in ELWA's Integrated Waste Management Contract with Shanks (which assumes a growth rate of 2% per annum until 206/07, from 2007/08 a growth rate of 1%, and from 2015/16 a growth rate of 0.5%); and
- **Scenario 6 – High Forecast**: forecast household waste arisings based on household forecasts including Thames Gateway developments (Table 1.2) and assuming waste growth per household grows at a high rate (2% pa). This scenario also assumes that non-household municipal waste arisings remain static.

These scenarios have been applied to a baseline of 2003/4 total municipal waste arisings (520,500 tonnes). Arisings in 2003/4 were significantly lower than those in 2002/3 (555,800 tonnes), due largely to specific changes introduced at RRCs (see *Section B1.2*). 2003/4 therefore provides a more appropriate year's data on which to base future forecasts.

The implication of these different scenarios is shown in *Figure C1.2*.

Figure C1.2 ELWA's Forecasted Municipal Waste Arisings



A waste scenario with a high growth rate will call for increased capacity to manage arisings. Furthermore, the existing Integrated Waste Management Contract has a threshold limit of 700,000 tonnes per annum. Above this level, the contract may be re tendered. This limit is reached before 2020 under scenarios 2 and 6. Under waste growth scenario 2 (static 3% increase per annum), the 700,000 tonne threshold is reached by 2014/15. For waste growth scenario 6 (high forecast 2% including Thames Gateway developments), this threshold is reached by 2013/14.

Table C1.3 presents a summary of the municipal waste arisings under each of the waste forecasts.

Table C1.3 Forecasted Municipal Waste Arisings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Year	Static	Constant 3%	HH Growth Only (inc Thames Gateway)	HH Growth (exc Thames Gateway)	ELWA Contract Estimate	High Forecast (2% pa & Thames Gateway)
2004/05	520,500	536,100	526,100	523,100	530,900	535,400
2005/06	520,500	552,200	529,800	525,700	541,500	548,600
2006/07	520,500	568,700	533,500	528,100	552,300	562,200
2007/08	520,500	585,800	542,400	530,500	557,800	581,800
2008/09	520,500	603,400	551,500	533,000	563,400	602,200
2009/10	520,500	621,500	560,500	535,400	569,100	623,000
2010/11	520,500	640,100	569,600	537,800	574,700	644,600
2011/12	520,500	659,300	578,600	540,200	580,500	666,800
2012/13	520,500	679,100	585,000	542,600	586,300	686,500
2013/14	520,500	699,500	591,600	545,100	592,200	707,000
2014/15	520,500	720,400	598,200	547,500	598,100	728,000
2015/16	520,500	742,100	604,800	549,900	601,100	749,600

Year	Scenario 1 Static	Scenario 2 Constant 3%	Scenario 3 HH Growth Only (inc Thames Gateway)	Scenario 4 HH Growth (exc Thames Gateway)	Scenario 5 ELWA Contract Estimate	Scenario 6 High Forecast (2% pa & Thames Gateway)
2016/17	520,500	764,300	610,500	551,400	604,100	770,700
2017/18	520,500	787,200	616,200	552,900	607,100	792,400
2018/19	520,500	810,900	621,800	554,400	610,100	814,400
2019/20	520,500	835,200	627,500	555,900	613,200	837,300
2020/21	520,500	860,200	633,100	557,400	616,200	860,500

C1.5 SUMMARY OF FORECASTED ARISINGS

The strategy must balance the need to balance the requirements to minimise waste, with the need to plan for potential waste growth in terms of providing adequate capacity in waste treatment facilities. To base ELWA's strategy on the assumption that there will be no increase in waste arisings would leave the authority open to the possibility of not providing sufficient capacity.

For the purpose of this strategy, forecasts have been based on Scenario 5, as this scenario employs a moderate growth rate that declines over time. Scenario 3 generates similar waste arisings to Scenario 5, which considers household waste growth including predicted Thames Gateway developments. A sensitivity analysis has been undertaken for a higher growth forecast and also Scenario 1 (static), in order that the implications of varying growth rates may be understood.

Table C1.4 Waste Growth Scenario 5 – Total Municipal Waste Arisings

Year	Barking & Dagenham	Havering	Redbridge	Newham	ELWA
2004/05	109,400	137,300	125,100	159,100	530,900
2005/06	111,600	140,000	127,600	162,300	541,500
2006/07	113,800	142,800	130,200	165,600	552,300
2007/08	114,900	144,200	131,500	167,200	557,800
2008/09	116,100	145,700	132,800	168,900	563,400
2009/10	117,200	147,100	134,100	170,600	569,100
2010/11	118,400	148,600	135,500	172,300	574,700
2011/12	119,600	150,100	136,800	174,000	580,500
2012/13	120,800	151,600	138,200	175,700	586,300
2013/14	122,000	153,100	139,600	177,500	592,200
2014/15	123,200	154,600	141,000	179,300	598,100
2015/16	123,800	155,400	141,700	180,200	601,100
2016/17	124,500	156,200	142,400	181,100	604,100
2017/18	125,100	157,000	143,100	182,000	607,100
2018/19	125,700	157,700	143,800	182,900	610,100
2019/20	126,300	158,500	144,500	183,800	613,200
2020/21	127,000	159,300	145,200	184,700	616,200

Table C1.4 provides a summary of the municipal waste arising forecasts used in this strategy and *Table C1.5* presents household waste arisings under this scenario.

Table C1.5 Waste Growth Scenario 5 – Household Waste Arisings

Year	Barking & Dagenham	Havering	Redbridge	Newham	ELWA
2004/05	95,100	125,000	108,800	135,900	464,700
2005/06	97,000	127,500	110,900	138,600	474,000
2006/07	98,900	130,100	113,100	141,400	483,500
2007/08	99,900	131,400	114,300	142,800	488,400
2008/09	100,900	132,700	115,400	144,200	493,200
2009/10	101,900	134,000	116,600	145,700	498,200
2010/11	102,900	135,300	117,700	147,100	503,200
2011/12	104,000	136,700	118,900	148,600	508,200
2012/13	105,000	138,100	120,100	150,100	513,300
2013/14	106,100	139,400	121,300	151,600	518,400
2014/15	107,100	140,800	122,500	153,100	523,600
2015/16	107,700	141,500	123,100	153,900	526,200
2016/17	108,200	142,300	123,800	154,600	528,800
2017/18	108,700	143,000	124,400	155,400	531,500
2018/19	109,300	143,700	125,000	156,200	534,100
2019/20	109,800	144,400	125,600	157,000	536,800
2020/21	110,400	145,100	126,200	157,700	539,500

Annex D

Review of Legislation, Policies and Targets

D1 LEGISLATION, POLICIES AND TARGETS

D1.1 NATIONAL LEGISLATION, POLICIES AND TARGETS

The need to develop a revised strategy has arisen primarily from the introduction of one key piece of national legislation, the Waste and Emissions Trading Act (2003) (the WET Act). Nevertheless, it is important to include and to review a wider range of legislative information to ensure full understanding of statutory obligations, and to ensure that any impending legislation is considered in making revisions to the existing strategy. The WET Act, together with other national policies that are shaping waste management in ELWA, have been summarised below.

D1.1.1 Environmental Protection Act 1990 (and Environment Act 1995)

The Environment Protection Act (EPA) 1990 is a regulatory regime that is designed to implement an integrated (air, land and water) approach to environmental regulation and protection. It sets out a wide range of environmental legislation and is the primary act (along with the associated regulations) that controls how waste is managed.

Part II of the Act sets out the main legislation for dealing with duties and responsibilities in relation to waste management.

Duty of Care

Section 34 of the EPA 1990 introduces a statutory Duty of Care applicable to all those producing and handling waste. This places a general duty on anyone who has responsibility for controlled (1) waste (waste producers, or anyone else who imports, carries, keeps, treats or disposes of it) to ensure that it is managed properly and recovered or disposed of safely. This includes ELWA as a waste disposal authority as well as the constituent waste collection authorities.

The Duty of Care Regulations 1991 provides the basis for a mandatory system of transfer notes, which must be completed when waste is transferred between parties. However, the Duty of Care is designed to be self-regulating system, based on a code of good practice. In order to meet their duty, ELWA are required to: prevent the escape of waste in their control; transfer waste only to someone who is authorised to accept it; ensure that waste is handled lawfully by others; and, upon transfer, provide details of the waste including a written description.

(1) 'Controlled Waste' is defined in section 75 of the EPA 1990. It includes: household waste; industrial waste; and commercial waste. Wastes handled by local authorities are controlled wastes and subject to regulation.

Local Authority Responsibilities

Sections 45-61 of the EPA 1990 set out the roles of waste collection and disposal authorities, which must be reflected in the joint East London Waste Strategy. These were amended by Section 62 of Schedule 22 of the Environment Act 1995.

D1.1.2 Landfill Regulations 2002

The Landfill (England and Wales) Regulations 2002 came into force in 2002. They implement the requirements of the EU Landfill Directive (1999/31/EC) in the two countries.

The Landfill Directive aims to deal with the social, environmental and economic impacts of landfill over its whole life cycle. It contains a mix of strategic objectives for reducing the amount and nature of wastes going to landfill, together with strict provisions for the regulation and management of landfills.

Key Directive provisions for local authorities relate to the gradual reduction biodegradable municipal waste (BMW) (1) going to landfill and the promotion of alternatives such as recycling, composting and energy recovery from waste. To this effect, the Directive contains three targets at the national level that will reduce the amount of BMW disposed to landfill (2):

- by 2010: reduce the amount of BMW landfilled to 75 percent of that produced in 1995;
- by 2013: reduce the amount of BMW landfilled to 50 percent of that produced in 1995; and
- by 2020: reduce the amount of BMW landfilled to 35 percent of that produced in 1995.

To ensure that the UK will meet these targets, the Government has set BMW disposal allowances for each waste disposal authority. These are controlled by provisions made under the WET Act, and have a direct impact on ELWA's strategy for management of BMW (see *Section 1.3.4*).

(1) The Directive defines BMW as that which is capable of undergoing anaerobic or aerobic digestion, such as food and garden waste, paper and cardboard.
(2) The target dates include a four-year derogation for the UK allowed because of the proportion of BMW landfilled in the base year of 1995.

The Directive has also brought other changes in waste management that have implications for ELWA, including:

- a complete ban on the landfill of liquid wastes, infectious clinical wastes and certain hazardous wastes;
- a complete ban on the landfill of tyres by 2006 (by July 2003 for whole tyres, and by July 2006 for shredded tyres);
- the requirement for separate landfills for hazardous, non-hazardous and inert wastes; and
- the introduction of a requirement for treatment of waste prior to landfill and the establishment of acceptance criteria for waste arriving at sites.

Meeting the requirements of the Landfill Regulations 2002 will increase the cost of using landfill as a means of disposal, which may have significant implications for ELWA's budgets, particularly for the landfill of hazardous waste.

D1.1.3 Landfill Tax Regulations 1996

In addition to the increased costs of using landfill that will result from the Landfill Regulations 2002, the Landfill Tax Regulations 1996 impose a duty on landfill based on the weight of waste deposited. The rate of tax varies according to the type of waste disposed, with a lower rate set for inert waste than active wastes.

Since 1996, the Landfill Tax has been increasing for active wastes at a rate of £1 per tonne per year. From April 2005, the tax will increase from a base of £15 per tonne by a rate of at least £3 per year, to reach a ceiling of £35 per tonne by 2011/12 at the latest (earlier if increments are greater than £3 per tonne).

D1.1.4 Waste and Emissions Trading (WET) Act 2003

The WET Act is intended to ensure the country meets its national targets for reducing the amount of BMW disposed to landfill. It is implemented through the Landfill (Scheme Year and Maximum Landfill Amount) Regulations 2004, which came into force on 22 July 2004.

The Act provides a framework for the Landfill Allowance Trading Scheme (LATS), a system whereby tradable landfill allowances will be allocated to waste disposal authorities each year. Each waste disposal authority will be able to determine how to use its allocation of allowances in the most effective way. It enables allowances to be traded with other authorities, saved for future years (banked) or use some of its future allowances in advance (borrow).

Inter-year trading may be allowed ie authorities can expend allowances issued in one year in a different year. However, in each of the three 'target' years (2010, 2013 and 2020), authorities will only be able to use the allowances issued in that specific year. This will ensure that the country as a whole meets its obligations under the Landfill Directive.

A fixed penalty of £150 per tonne [1] of excess BMW landfilled is likely to be enforced if local authorities do not have sufficient permits for the waste they landfill.

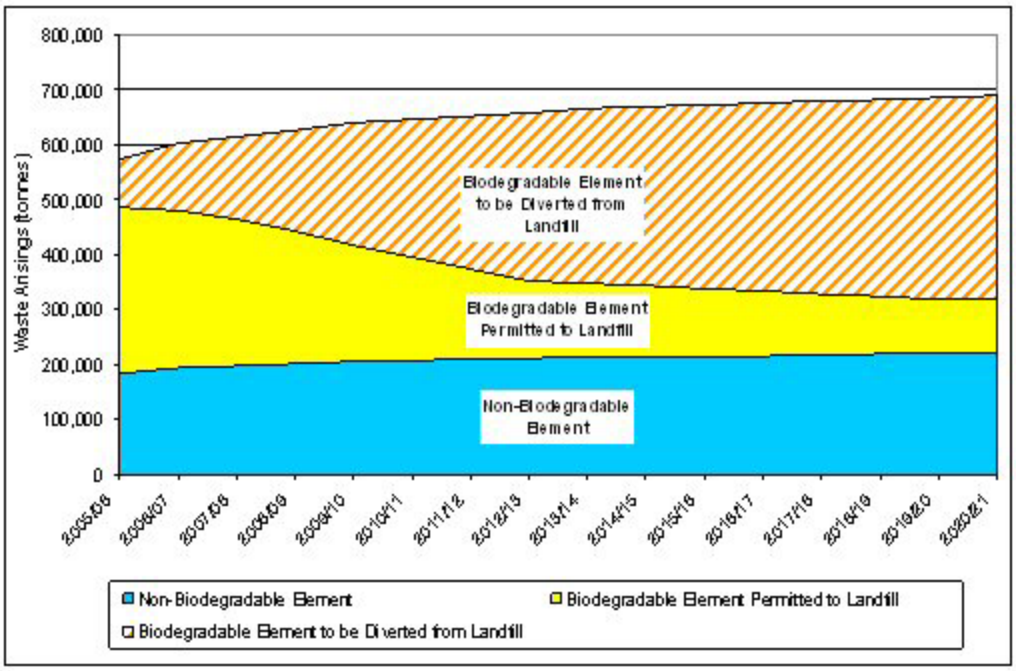
LATS will be launched in full on 1 April 2005 and has significant implications for ELWA's waste management strategy. Defra has released a provisional allocation of landfill allowances to each waste disposal authority in England. For ELWA these are shown in *Table D1.1*. The implications of the allowances will be dependent on how fast waste grows. *Figure D1.1* shows the implications of LATS if ELWA's waste grows according to the central growth rate examined in *Annex B* (Scenario 5, ELWA growth rate).

Table D1.1 ELWA's Provisional BMW Allocation [2]

Financial Year	Provisional Allocation (tonnes BMW)
2005/06	301,565
2006/07	286,760
2007/08	267,021
2008/09	242,346
Target Year 2010 (2009./10)	**212,737**
2010/11	189,057
2011/12	165,377
Target Year 2013 (2012/13)	**141,698**
2013/14	135,620
2014/15	129,541
2015/16	123,463
2016/17	117,385
2017/18	111,307
2018/19	105,229
Target 2020 (BMW)	**99,105**

(1) http://www.defra.gov.uk/environment/waste/localauth/managewaste/ Viewed December 2004. Note, will be subject to amendments to Landfill Allowance and Trading Scheme (England) Regulations 2004.
(2) http://www.defra.gov.uk/environment/waste/localauth/lats/pdf/allocationdata.pdf.

Figure D1.1 Requirement to Divert Material from Landfill



D1.1.5 National and Statutory Recycling and Composting Standards

In order to contribute to the Landfill Directive targets for the diversion of BMW, the Government and National Assembly for Wales established a series of recycling and recovery targets for household and municipal wastes in Waste Strategy 2000. Government recognised that an essential part of achieving diversion would be the drive towards greater recycling and composting of household waste. The key national targets are:

- by 2005: recycle or compost at least 25% of household waste and recover value from 40% of municipal waste (through recycling, composting, other forms of material recovery or energy recovery via waste combustion);
- by 2010: recycle or compost at least 30% of household waste and recover value from 45% of municipal waste; and
- by 2015: recycle or compost at least 33% of household waste and recover value from 67% of municipal waste.

In order to achieve the national recycling and composting level of 25% of household waste across the country by 2005, statutory Best Value performance standards have been set for both waste collection and waste disposal authorities. The intention of these standards is to increase the national recycling rate to around 25% in 2005/06.

D1.1.6 Local Government Act 1999

All local authorities with responsibility for waste management, including ELWA, were designated Best Value authorities under the Local Government Act 1999, and are subject to the duty of Best Value. Under this duty, ELWA is required to deliver services to clearly defined standards, including cost and quality. This must be done by the most effective, efficient and economic means available, with a view to continuously improving services.

Performance standards for recycling and composting household waste were set for 2003/04 and 2005/06. ELWA achieved 8% recycling and composting in 2003/04, slightly lower than the statutory target of 10 %. The following target still remains to be met:

- to recycle/compost 18 per cent of household waste in 2005/06.

It is an important objective of ELWA's municipal waste management strategy to meet and to exceed this target.

Under Best Value, ELWA has also been set a number of other Best Value Performance Indicators (BVPI) targets for its waste management services (see *Table D1.2*). These provide measures that indicate improvement or otherwise in the services provided. The BVPIs that ELWA must report against cover a wide range of services and include the statutory recycling and composting targets.

Table D1.2 ELWA's Best Value Performance Indicators

Best Value (BV) Number	Description	Actual 20030/4	Target 2003/04	Target 2004/05	Target 2005/06	Target 2006/07
BV82a	Percentage of total tonnage of household waste: recycled	8%	6.51%	9%	12%	17%
BV82b	Percentage of total tonnage of household waste: composted	2%	1.62%	3%	6%	8%
BV82c	Percentage of total tonnage of household waste: used to recover heat, power and other energy source.	7.5%	7.59%	7.5%	7.5%	7.5%
BV82d	Percentage of total tonnage of household waste: landfilled.	82.5%	84.28%	80.5%	74.5%	67.5%
BV84	Kg of household waste collected per head.	570kg	536.6kg	593kg	605kg	617kg

Best Value (BV) Number	Description	Actual 20030/4	Target 2003/04	Target 2004/05	Target 2005/06	Target 2006/07
BV87	Cost of waste disposal per tonne of municipal waste (£).	£52.05	£48.25	£56.50	£59.50	£66.00

ELWA's BVPIs provide residents with clear targets and indicators on which to judge services, in accordance with strategy objectives.

D1.1.7 Household Waste Recycling Act 2003

The Household Waste Recycling Act 2003 came into force on the 30 October 2003. It requires English waste collection authorities, including ELWA, to collect at least two recyclable materials from households separate from residual waste by 31st December 2010. Shanks.east London's orange bag scheme and Redbridge's black box scheme will help to achieve this requirement.

D1.1.8 Waste Minimisation Act 1998

The Waste Minimisation Act became law in November 1998. It gives a local authority the power 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, of any description, generated in its area".

ELWA are not obliged to carry out any initiatives relating to controlled waste minimisation. However, each of the constituent Councils embraces waste minimisation and is active in this area. Current measures include: encouraging waste minimisation measures within the home; promoting reuse through charity shops, jumble sales and local organisations; and promoting home composting through the sale of subsidised composting bins.

D1.1.9 Animal By-Products Regulations 2003

The Animal By-Products Regulations (ABPR) 2003 came into force in England on 1 July 2003 following the Foot and Mouth disease outbreak. This is the enforcing legislation for the EU Regulation on Animal By-Products (No. 1774/2002), laying down health rules concerning animal by-products not intended for human consumption.

These regulations impose a number of restrictions on the handling and treatment of waste that contains, or potentially contains, animal by-products. It is likely to affect all those who deal with animal by-products, including ELWA, as a waste disposal authority.

The ABPR divide animal by-products into three categories and stipulate the means of collection, transport, storage, handling processing and use or disposal for each category. The issuing of approvals is the responsibility of the State Veterinary Service.

The regulations are likely to have implications on recycling and composting through the different controls placed on composting processes (depending on the types of waste being composted). They have particular implications for composting kitchen waste. ELWA must take this into account when developing composting services.

D1.1.10 Hazardous Waste Regulations

Changes in the way that hazardous wastes are classified are likely to enlarge the proportion of Municipal Solid Waste that is classed as hazardous. Hazardous materials need separated from other household and commercial waste and dealt with through separate collection arrangements. This will have implications for the cost of management of this was and for capacity at existing facilities (particularly RRCs) for accepting this material.

The municipal waste stream contains waste that may have hazardous properties and require special handling and disposal arrangements as part of the waste collection service. There are increasing legislative requirements for the separate collection of specific hazardous household wastes that have implications for ELWA's waste management strategy.

An important piece of legislation that will impact hazardous household waste is the Hazardous Waste Directive (HWD) (91/689/EEC), which aims to provide a precise and uniform European-wide definition of hazardous waste and to ensure the correct management and regulation of such waste.

The HWD defines hazardous waste as wastes featuring on a list, the European Waste Catalogue (EWC), drawn up by the European Commission, because they possess one or more of the hazardous properties set out in the HWD. The EWC is subject to periodic review, the most recent being in 2002.

The EWC 2002 came into force on January 2002. Its introduction means that some waste streams previously defined as non-hazardous are classified as hazardous. EWC 2002 has yet to be formally transposed into UK law but, when it is, certain household items such as fridges and items with cathode ray tubes (television and computer monitors) will be classified as hazardous. Defra is considering how these items will be treated under proposed new regulations for hazardous waste. Two sets of regulations are currently being proposed and are subject to public consultation: the List of Wastes Regulations, which will transpose the EWC and; the Hazardous Waste Regulations, which will replace the Special Waste Regulations 1996.

D1.1.11 End of Life Vehicles Regulations 2003

The EU End of Life Vehicles (ELV) Directive 2000/53/EC aims to reduce, or prevent, the amount of waste produced from ELVs and increase the recovery and recycling of ELVs that do arise.

The Directive became European law on 21 October 2000 and Member States should have transposed it into national law by 21 April 2002, but none were able to do this. Instead, the End-of-Life Vehicles Regulations 2003 (SI 2003/2635) came into effect on 3 November 2003. These regulations transpose most of the Directive's provisions into national law. In particular they:

- require that certain components are marked to aid recovery and recycling, and that information is provided to facilitate dismantling;
- contain challenging targets for reuse and recycling of ELV components (by 2006 reuse or recycle at least 80% and recover at least 85% of ELVs; by 2015 reuse or recycle at least 85% and recover at least 95% of ELVs);
- require the establishment of adequate systems for the collection of ELVs, and specifies the site, storage and operating standards that must be met by businesses permitted to treat ELVs;
- require that ELVs can only be scrapped ('treated') by authorised facilities, which must meet specified environmental treatment standards; and
- introduce a Certificate of Destruction to improve vehicle agency records.

The remaining Directive provisions, articles 5 and 7 relating to producer responsibility, have not yet been transposed in to UK law, but will shortly be implemented through the End-of-Life Vehicles (Producer Responsibility) Regulations 2004. These state that:

- owners must be able to have their complete ELVs accepted by collection systems free of charge, even when they have a negative value, from 1 January 2007 at the latest; and
- producers (vehicle manufacturers or professional importers) must pay 'all or a significant part' of the costs of take back and treatment for complete ELVs.

London currently has an existing network of around 69 metal recycling sites that are authorised to manage waste. Some of these may be in a position to offer waste authorities ELV pre-treatment services and vehicle collections, under contract. However, as well as these two services, waste collection authorities within ELWA will need to plan how they will deal with the almost certain increase in the number of requests from their residents for the collection or disposal of ELVs.

D1.1.12 Ozone Depleting Substances Regulation 2000 (2037/2000)

ELWA have entered into an agreement with Shanks to ensure that fridges and freezers are recovered appropriately. The introduction of the Ozone Depleting Substances Regulation 2000 (2037/2000) brought about new requirements for the disposal of fridges and freezers. The regulations came into effect on the 1 January 2002 and require that CFCs are extracted from the insulation foam in domestic fridges and freezers prior to final disposal or recovery. This recovery is in addition to the 'degassing' of cooling circuits that ELWA have carried out for some time.

D1.1.13 Waste Incineration Regulations 2002

The Waste Incineration Regulations 2002 came into effect on 28 December 2002, in order to implement the EC Waste Incineration Directive (WID) (2000/76/EC).

The main aim of the WID is to 'prevent and limit negative environmental effects by emissions into air, soil, surface and ground-water, and the resulting risks to human health, from the incineration and co-incineration of waste'. It seeks to achieve this by requiring the setting and maintaining of stringent operational conditions, technical requirements and emission limit values for plants incinerating and co-incinerating waste. As such, it is not directly concerned with the place of incineration in waste management strategies, but with ensuring that incinerators continue to be tightly regulated.

The requirements of the WID apply to virtually all waste incineration and co-incineration plants, going beyond the requirements of the 1989 Municipal Waste Incineration (MWI) Directives (89/429/EEC and 89/369/EEC). The WID also incorporates the Hazardous Waste Incineration Directive (94/67/EC) forming a single text on waste incineration. The WID will repeal these three Directives from 28 December 2005.

D1.1.14 Producer Responsibility Obligations (Packaging Waste) Regulations 1997

The Producer Responsibility Obligations (Packaging Waste) Regulations 1997 came into force in the UK in March 1997. They aim to achieve a more sustainable approach to packaging waste, reduce the amount of packaging waste going to landfill and implement the recovery and recycling targets set out in the EC Directive 91/62/EC on Packaging and Packaging Waste.

The regulations place legal obligations on businesses with a turnover of more than £2 million and who handle more than 50 tonnes/year of packaging to recover and recycle certain tonnages of packaging waste each year. Companies can reduce their obligation by reducing the amount of packaging they handle.

Obligated producers need to obtain Packaging Recovery Notes (PRNs) from an accredited reprocessor as evidence that recycling or recovery has occurred. An accredited reprocessor is a company that performs a recognised reprocessing activity (for example, glass recycling or energy recovery), which has been accredited by the Environment Agency.

Accredited reprocessors sell most PRNs to compliance organisations (eg Valpak, Wastepack) who need high numbers of PRNs to meet their members' legal obligations. PRNs can also be bought on the market through trading organisations.

In the early years of the system, it was difficult to gauge the number of PRNs available and this unpredictable supply lead to an increase in PRN prices. Prices have generally stabilised at lower levels in recent years.

PRN prices do not directly reflect the cost of reprocessing waste. For example, PRN revenue does not offset the costs of collecting waste (although some reprocessors now recognise the benefits of supporting collection infrastructure). PRN prices are determined primarily by the demand from obligated companies and their schemes.

Compliance schemes and reprocessors generally favour the PRN system, although individual companies often criticise the system believing it places too much power in the hands of recyclers. In a national context, it has been shown to provide a low cost method of meeting the Directives targets.

The regulations have no direct obligations for ELWA. ELWA is not considered a reprocessor of waste and can therefore not issue PRNs. However, in order for the UK to meet increased targets for packaging waste, more packaging waste will need to be extracted from the domestic waste stream. The four constituent waste collection authorities have a role to play in achieving this, by expanding kerbside recycling collection and promoting other recycling schemes and facilities.

D1.1.15 Forthcoming Legislation

The EU Directive on Waste Electrical and Electronic Equipment (WEEE) became European law in February 2003 and should have been transposed into UK law by 13 August 2004. However, the Government has yet to transpose this Directive. A final round of stakeholder consultation ended in October 2004.

In terms of WEEE in the household waste stream, the Directive sets a collection target of 4kg per householder per year. It requires the UK to establish separate collection systems to allow householders to return WEEE free of charge – a so-called network of designated collection facility (DCFs)

DCFs are likely to include take back facilities at retailers and civic amenity sites. The criteria for becoming a DCF have not yet been established.

The Government are currently proposing that retailers (who have collection obligations under the Directive) pay into a fund to help local authorities provide improved WEEE collection facilities at civic amenity sites.

All WEEE which is separately collected must be transported for specialist treatment and recycling although importantly producers (importers and manufacturers of goods) will be required to meet both these onward transport costs and processing costs.

There are practical difficulties associated with requiring producers to organise the collection of WEEE from DCFs. Problems include the high number of producers relative to the number of DCFs, the need to ensure sites are cleared quickly and efficiently, contractual arrangements between DCFs and producers etc.

Developing legislation which is both workable and enforceable is complex and this is the reason for the delay in implementation. We expect a Government announcement in late January 2004 on their plans for implementation.

Batteries Directive Proposals

Proposals for a new Directive on batteries and accumulators were issued by the European Commission on 24 November 2003. The reasons proposed for a new Directive are that existing legislation on batteries (Directive 91/157/EEC on Batteries and Accumulators Containing Dangerous Substances) only covers an estimated 7% of consumer batteries on the EU market. These are batteries with a certain mercury, lead and cadmium content. The new Directive will apply to all types of batteries irrespective of their shape, weight, composition or use.

The main aspects of the legislation that are likely to affect ELWA are the following proposed collection and monitoring obligations:

- collection schemes for used consumer batteries are to be established. These are to be free of charge to the consumer;

- a collection target of 160 grams per inhabitant for spent consumer batteries is to be met within four years of the Directive being transposed into UK law;

- 80% of portable nickel cadmium batteries are to be collected within four years of the Directive being transposed; and

- the quantity of spent portable nickel cadmium batteries entering the municipal solid waste stream is to be monitored.

There are also recycling obligations, including a proposed 90% of collected consumer batteries to be recycled, with a 55% recycling efficiency.

Although it is undecided who is to finance the collection and recycling of batteries, ELWA are likely to see some increased costs through monitoring and reporting requirements.

Defra anticipate that, if adopted, the Directive would need to be transposed into national law by 2007. The collection, monitoring and recycling efficiency targets for all battery types would then need to be reached by 2011.

EC Working Document – Biological Treatment of Biowaste

The European Commission has published a discussion document on the biological treatment of biowaste, which is expected to be proposed as an EU Directive, possibly through the Soils Thematic Strategy. The paper raised the prospect of establishing rules and targets on the safe use, collection, recovery, recycling and disposal of biowaste, in order to control potential land contamination and to encourage the use of certified compost. Any Directive that emerges is likely to focus on BMW and complements the BMW diversion targets of the Landfill Directive.

The Commission is investigating whether an obligation to separately collect biowaste (greenwaste and kitchen waste) should be introduced across the EU. This would have implications for the constituent boroughs of ELWA, as a collection service for biowaste is not currently operated in the boroughs and as the introduction of such a collection is unlikely to be compatible with the Bio-MRF technology being constructed.

The separately collected biowaste would be subject to a defined composting process, encompassing time and temperature requirements, in order to produce compost meeting specified quality standards (maximum tolerable levels of certain pollutants and pathogens).

Any Biowaste Directive would also be likely to address the biological treatment of catering waste, which is currently controlled by the Animal By-Products Regulations 2003. Once a Directive is in force, its provisions would supersede the requirements of the Animal By-Products Regulation with regard to the composting of catering waste.

D1.2 REGIONAL POLICIES AND PROPOSALS

Regional policies and priorities are important in the development of a municipal waste management strategy. Key policies, plans and other strategies that have influenced the development of ELWA's waste management strategy are outlined below.

D1.2.1 Mayor of London's Municipal Waste Management Strategy

In his Municipal Waste Management Strategy (1), the Mayor of London sets out a number of policies and proposals that are needed to achieve the objectives of his strategy for London's waste. ELWA must consider these in the development of a revised Municipal Waste Management Strategy and *Annex D* provides a summary of these policies.

The Mayor is given a power to direct waste authorities in how they exercise their statutory functions, but only after consultation and full consideration of the circumstances within that authority. As such, the proposals laid out in the Mayor's strategy are not prescriptive about the specific measures needed, but outline actions considered necessary to achieve policy objectives and to meet targets. If a proposal is not implemented, ELWA will need to demonstrate that, due to local circumstances, there is a better way to meet the policy objective.

The timescales for implementing the proposals will vary, depending on the current situation in each authority. Each proposal is given a priority, 'high', 'medium' or 'low' (2). As the authorities within ELWA have traditionally had lower recycling and composting performance than other boroughs in London, ELWA will be required to implement the high priority proposals first to ensure that their targets are met. In comparison, authorities starting from a higher baseline level, are expected to have many of the high priority proposals in place and will need to implement proposals with a medium or low priority to meet their targets.

The Mayor has been closely involved in the developments within ELWA to date and has been engaged at an early stage in the strategy revision process.

D1.3 SUMMARY OF MAJOR ISSUES

The key issues for ELWA and constituent waste collection authorities are:

- to reduce BMW sent to landfill in order to achieve landfill allowances, in the context of rapidly growing waste arisings;
- the policies within the Mayor's Municipal Waste Management Strategy;
- increasing costs of waste disposal due to increases in landfill tax;
- a requirement to achieve statutory performance standards for each borough that are higher in some areas than the targets within the Integrated Waste Management Contract;
- the requirements of the Household Waste Recycling Act;
- the Animal By-products Regulations; and
- the Hazardous Waste Directive.

(1) GLA (2003). Rethinking Rubbish in London: The Mayor's Municipal Waste Management Strategy. http://www.london.gov.uk/mayor/strategies/waste/docs/wastestrat_all.pdf.
(2) The Implementation Plan in Chapter 5 of the Mayor's Strategy sets out the level of priority of proposals.

The authorities will also need to monitor progress on the development of other legislation and policy including:

- the introduction of a Batteries Directive;
- the introduction of a Biowaste Directive or similar instrument;
- changes in policy on the Landfill Tax (for example, a greater than £3 per year increase); and
- changes in Landfill Allowance allocations for ELWA (published figures are provisional).

Annex E

Assumptions used in Options Analysis for Mass Flow Modelling

E1 MASS FLOW ASSUMPTIONS

The options analysis includes an analysis of the tonnages of materials arising within ELWA, the types and tonnages of materials likely to be managed through source-segregated recycling, the RRC MRF and the Bio-MRFs and the amounts and types of material sent to landfill. This analysis allows the following to be determined:

- the amount of biodegradable municipal waste likely to be sent to landfill, relevant to performance against LATS allowances;

- the throughput of waste to the various existing and planned facilities (RRC MRF, Bio-MRFs), relevant to the calculation of comparative costs; and

- additional capacity required at existing facilities or the scale of new facilities that are needed (green waste composting, gasification etc.).

The mass flow analysis is undertaken in nine stages, shown in *Figure E1.1*. These are as follows.

- Stage 1 - arisings: analysis of household arisings, including household collected, RRC and non-household municipal waste.

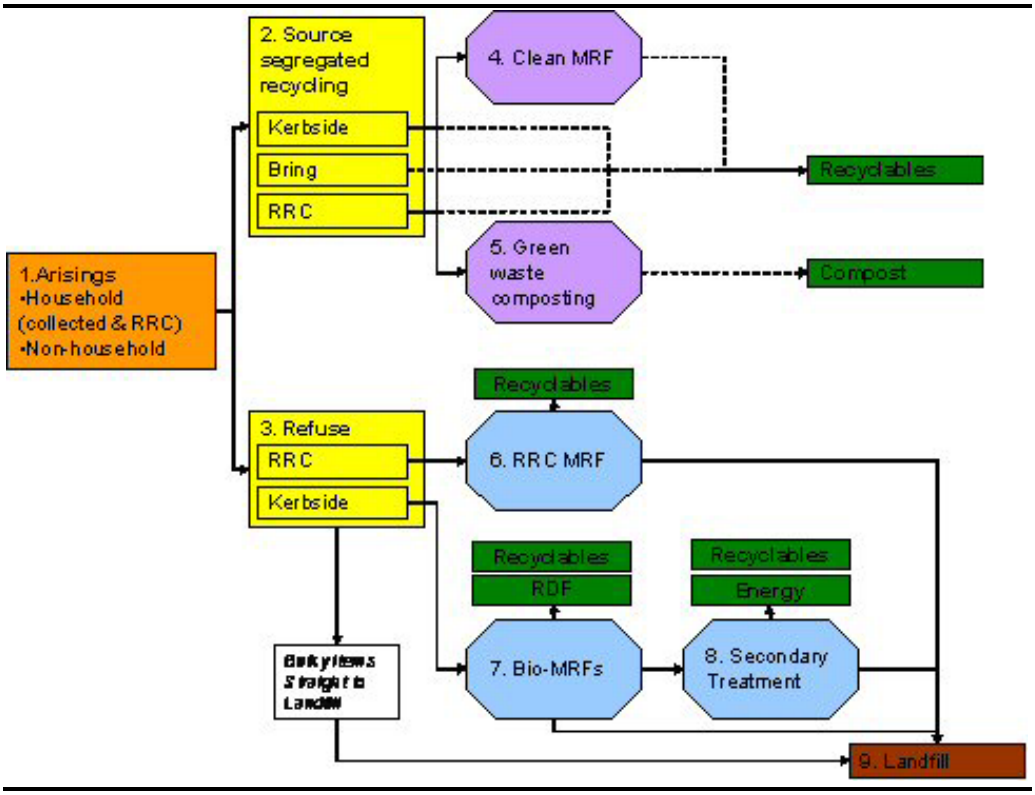
- Stages 2 & 3 - collection:
  - Stage 2: source segregated recycling including kerbside, bring and RRC recycling; and
  - Stage 3: refuse collection through RRC and rounds.

- Stages 4 & 5 – processing of recyclables collections:
  - Stage 4: clean MRF for processing orange bag recyclables; and
  - Stage 5: green waste composting for green waste collected at the kerbside and through RRC.

- Stage 6, 7, and 8 – treatment of residual waste:
  - Stage 6: RRC 'dirty' MRF for processing unsorted waste from RRCs;
  - Stage 7: Bio-MRFs for processing household 'black bag' and non-household trade waste (bulky wastes are sent directly to landfill); and
  - Stage 8: secondary processing for Bio-MRF outputs (eg gasification).

- Stage 9 - landfill: including analysis of the likely composition of landfilled material.

Figure E1.1 Schematic of Mass Flow Analysis



E1.1.1 Stage 1: Arisings

The mass flow analysis uses the baseline waste tonnages provided by ELWA (*Annex A*), waste forecasts from *Annex B* and a waste composition analysis developed for the Strategy Unit report Waste Not Want Not and also included as an annex [(1)]. This review considered 70 sets of compositional data and integrated data from Local Authority analyses with national Defra statistics [(2)] in order to determine a best, current national estimate. It provides a composition in terms of household 'dustbin' waste and civic amenity site waste. This composition forms a good basis for analysis of ELWA's waste.

However, the review itself identifies that there are limitations in the compositional data currently available, and in particular, the data available for civic amenity sites. The composition therefore remains only a guide for ELWA. It has been assumed, for the purposes of this analysis, that non-household waste has the same composition as household waste.

(1) Parfitt, J. (2002). Analysis of household waste composition and factors driving waste increases. WRAP, Banbury. http://www.number-10.gov.uk/su/waste/report/downloads/composition.pdf.
(2) Department for Environment, Food and Rural Affairs (2002) Municipal Waste Management Survey 2000/01.

Table E1.1 Waste Composition Analysis used in Mass Flow

	Composition			Recyclable (%)
	% household waste[2]	% CA site waste	% non-household waste (assumed)	
Paper	23%	4%	23%	65%
Garden	15%	38%	15%	90%
Kitchen	22%	0%	22%	90%
Textiles	3%	2%	3%	95%
Plastics	9%	1%	9%	33%
Metals	6%	10%	6%	95%
Glass	8%	1%	8%	90%
Other [1]	13%	44%	13%	65%

[1] includes wood, furniture, nappies, other miscellaneous combustibles, other miscellaneous non-combustibles, batteries, oil, soil, fines.
[2] totals do not sum due to rounding

E1.1.2 Stage 2: Source Segregated Recycling

The source separated recycling component of the mass flow is divided into recyclable materials collected at the kerbside and bring recycling and RRC recycling.

Kerbside and Bring Recycling

In order to determine the quantities of each material collected for recycling through kerbside and bring systems, assumptions are made regarding:

- the percentage of material that is recyclable (drawn from Parfitt [1], see *Table E1.1*);
- the number of households served by collections;
- the level of participation by householders and
- the proportion of material within each participating householder's bin that is captured for recycling;

For the baseline option, adjustments have been made to ensure that recycling meets contract target levels.

RRC Recycling

RRC recycling estimates are made on a similar basis to those for kerbside and bring, making assumptions on the percentage of material that is recyclable (see *Table E1.1*) and the percentage recycled. Again, percentages recycled are varied in order to meet contract requirements.

(1) Parfitt, J. (2002). Analysis of household waste composition and factors driving waste increases. WRAP, Banbury. http://www.number-10.gov.uk/su/waste/report/downloads/composition.pdf.

E1.1.3 Stage 3: Refuse Collection

It is assumed that wastes not collected for recycling are collected by the refuse collection. This allows the composition of non-household, household and household RRC refuse to be calculated.

E1.1.4 Stages 4 & 5: Clean MRF and Green Waste Composting

It is assumed that all kerbside collected recyclables are sent to the clean MRF, or IRC for Redbridge's materials, and that all green waste collected is sent for green waste composting. Levels of rejects at the MRF and composters are not considered as they are assumed to be de minimis for the purposes of the analysis.

E1.1.5 Stage 6: RRC MRF

It is assumed that all non-recycled waste from the RRCs is sent to the RRC-MRF and that metals and glass are removed for recycling. Remaining material is sent to landfill. However, it is understood that there is the potential to send this material, where it is of an appropriate composition, to the Bio-MRFs.

E1.1.6 Stage 7: Bio-MRFs

It is assumed that all remaining household and non-household refuse is sent to the Bio-MRFs. Remaining material is sent straight to landfill. Given the current construction schedule, it is assumed that the Frog Island Bio-MRF will be operational at the end of October 2006 (therefore running for 5 months within 2006/7), and that the Jenkins Lane facility will be operational by around August 2007 (therefore running for 6 months of 2007/8) (1) .

Assumptions regarding the outputs of the Bio-MRFs have been based on internal models and other published information. It is assumed that:

- 5% of the input material is recycled as metal or as glass aggregate (wasteflow.xls used to calculate likely recovery of metals and glass);
- 12% of the Bio-MRF input is made into refuse derived fuel until 20015/16, and thereafter this percentage increases to around 40% (approximate numbers from wasteflow.xls) (2): RDF is comprised of paper, plastics, textiles and other wastes;
- 24% of the input tonnage of material is lost through the biodrying process and that this tonnage is derived from kitchen and garden waste, textiles and paper; of which
    - 19% is moisture
    - 5% is carbon
- remaining material is landfilled or sent to secondary treatment.

(1) It is understood that the Bio-MRFs have a combined maximum capacity of 360,000 tonnes per year.
(2) It is understood that a greater proportion of RDF can be manufactured from the Bio-MRFs.

The percentage outputs are similar to those published in the GLA's (2003) City Solutions document [1], where the Shanks/Eco-deco Bio-MRF system is reported to be able to produce around 45% Refuse Derived Fuel (as compared with 10-39%% here), 14.5% recycling (compared with 1%-10% here) and 15.5% compostable fines (which has been assumed to be sent to landfill here).

E1.1.7 Stage 8: Secondary Treatment (gasification)

The secondary treatment considered in this mass flow exercise is gasification. The facilities are sized as per the requirements of each option. Outputs are assumed to be:

- no recycling (the majority of metals/useful glass is assumed to have been recovered by the Bio-MRFs);
- slag and other materials sent to landfill (20%);
- gas for generating energy (80%); and
- small quantity of hazardous material from gas cleaning.

These percentage outputs are similar to the mass flow for the Thermoselect process published in Capital Solutions [2]. The Compact Power process also has similar mass flows: 7% metal extracted for recycling, 17% slag and remaining material as gas.

E1.1.8 Stage 9: Landfill

Material is sent to landfill from:

- household and non-household refuse not sent to the Bio-MRFs (this is a limited amount in later years);
- output of RRC MRF;
- output of Bio-MRFs; and
- output of secondary treatment.

This stage allows the resulting composition of the landfilled material to be determined, which then permits calculation of whether LATS allowances have been achieved. For the purposes of LATS, evaporated moisture relating to tonnages of materials landfilled is added back in.

E1.2 OPTIONS

The options assessed require amendment to the mass flow analysis.

E1.2.1 Option 1

Recycling as baseline, bring forward the increase in RDF recovery up to a maximum of 40% in 2005/6.

(1) GLA/AiIE (2003) City Solutions, New and Emerging Technologies for Sustainable Waste Management.
(2) GLA/AiIE (2003) City Solutions, New and Emerging Technologies for Sustainable Waste Management.

E1.2.2 Option 2

For option 2, the following changes were made:

- increase participation and household served under the kerbside and bring systems to 80%;
- increase capture of paper and garden waste to 80%; and
- increase capture of paper and garden waste at RRC to 80%.

E1.2.3 Option 3

Recycling as baseline. Divert up to 90,000 tonnes of Bio-MRF output to ATT.

E1.2.4 Option 4

Recycling as baseline. Divert all Bio-MRF output to gasification. No RDF recovered other than material sent to gasification.

E2 BIO-MRF

E2.1 MECHANICAL BIOLOGICAL TREATMENT/BIO-MRFS

The 'biological' element that constitutes one part of a mechanical biological treatment (MBT) plant is the decomposition of readily-degradable components of the incoming waste stream through a composting process (1). A separate mechanical process (or processes) is used to separate certain fractions of the waste stream for recycling and/or use as a refuse-derived fuel (RDF). This may occur before or after the composting process.

In the composting process, micro-organisms consume organic material, and through respiration, release most of this as carbon dioxide to the atmosphere, although a proportion becomes micro-organism biomass, which itself may be consumed. As a result, the residual organic content is reduced, and the extent to which reduction occurs depends on the composition of the waste, the duration of the composting process, and environmental factors such as temperature, moisture content and air flow (which are inter-related).

Reduction of organic content is analogous to diversion of Biodegradable Municipal Waste (BMW) from the residual waste stream. Any MBT plant employing a biological process should contribute to meeting the LATS allowances of any waste disposal plant using the facility. However, the contribution will depend on the factors mentioned above, and the extent of decomposition achieved.

In consuming organic material, micro-organisms generate heat through respiration. The temperature of the waste is raised as a result, leading to evaporation and water loss, which is added to by the release of moisture by the micro-organisms themselves. The loss of moisture reduces the mass of the waste throughput, but this is not a contribution to the diversion of BMW.

Nevertheless, the loss of moisture will influence the propensity of the waste to decompose further. This is because the micro-organisms need a suitable medium in which to live, breed, disperse and colonise new sites within the waste mass. Indeed, it is the wetter, putrescible elements of the waste stream, kitchen scraps in particular, that decompose first, and most rapidly, partly because they are already moist, although partly because of the type of organic molecule of which they are composed (2). As the waste dries, decomposition slows and may stop. However, once the waste is landfilled, and a wet medium achieved once more, decomposition may recommence if suitable organic components remain in the residual waste.

(1) In certain configurations an anaerobic digestion process may be employed in the place of composting.
(2) In this note, we generally exclude organic molecules from fossil fuel sources from the discussion for simplicity. Clearly, these are organic, but do not decompose in a similar way to biomass sources of organic material, although they respond to combustion in a similar way.

As the more readily degradable elements of the waste stream are decomposed, the organic molecules that are left are increasingly less easily degradable. Some organic molecules from biomass sources may not decompose at all in any normal composting or digestion process, and are often considered to remain in landfills after decomposition of other organic materials is complete. Lignins, present in wood and paper, are one such group of molecules. The inclusion of such molecules within the broad categorisation of BMW is unhelpful: paper is classified as 100% BMW, and indeed much of it will degrade; but paper also contains lignin, which does not degrade, yet is classified as BMW.

Because different configurations of MBT plant may result in varying levels of decomposition of BMW through their biological processes, the Environment Agency, responsible for monitoring performance on the Landfill Allowance Trading Scheme (LATS) is considering how best to measure, calculate or otherwise assign 'credit' for BMW diversion to waste put through individual facilities. The Agency is currently consulting on these issues (1), and expects to issue guidance in spring 2005. The consultation specifically deals with ways of measuring the reduction of biodegradability achieved by MBT plant.

E2.2 ECODECO

The EcoDeco facilities employed by Shanks.east.london in the Bio-MRFs at Jenkins Lane and Frog Island will achieve some diversion of BMW from the incoming waste stream through composting. Further diversion can also be achieved through combustion of a separated RDF stream. Because the Agency consultation is not complete, and its subsequent guidance not formulated or issued, the extent to which the facilities can contribute to ELWA's LATS allowances is uncertain.

The ways in which the Agency suggests the reduction of biodegradability achieved by MBT might be measured, and therefore how the contribution made by the Bio-MRFs would be assessed, vary considerably. Of the methods, two are based on physical measures, *mass balance* and *loss on ignition* (LOI). These are the most certain and reproducible of the tests, and those that the Agency appears to favour. However, these tests measure loss of organic carbon *in toto* (2), and do not account for the very low degradability of some molecules, for example lignin, as explained above. For this reason, they are a precise measure of loss of BMW, as defined as a proportion of the waste stream, but they are a poor measure of the loss of biodegradability.

In comparison, the other tests, *assessing biodegradable carbon content* and using a '*dynamic respiration index*' (DRI) are more difficult to reproduce, and are less certain. However, these respond to the actual degradability of the residual waste (and incoming waste, if that is tested), and reflect the lower, or zero, degradability of some organic molecules, for example lignin.

(1) *Assessing the diversion of biodegradable municipal waste from landfill by mechanical biological treatment and other options: a consultation paper related to monitoring the utilisation of landfill allowances*. The consultation closes on 21st February 2005.
(2) LOI will record fossil fuels as well as biomass carbon, but this can be accounted for through correction.

The Agency will respond to responses from its consultations and its own deliberations, as well as the context, in terms of the definition of BMW and the intentions of the Landfill Directive and implementing legislation in England and Wales, in formulating and publishing its guidance on these issues. Until the guidance is published, forecasting the BMW diversion that the Bio-MRFs will deliver is not without hazard. ERM's approach has been to adopt a 'worst case' scenario based on *LOI/mass balance*, since this will not underestimate performance, and appears to be the Agency's favoured method. Data on the performance of the Bio-MRFs is not complete, particularly in relation to the more sophisticated tests of BMW reduction.

Should the guidance adopt a method that allocates greater credit to MBT in terms of BMW diversion, the Bio-MRFs will make a larger contribution to ELWA's LATS targets. This outcome should be sought through a response to the Agency's consultation document. If a favourable result occurs, the need for additional capacity to meet LATS is likely to fall, and a re-assessment of capacity needs over the timescale of the strategy would be required, unless ELWA was content to project a LATS surplus, and seek to exploit this through the trading system.

As discussed above, the performance of the biological element in MBT processes will vary, dependent on a number of factors, including operating temperature, moisture loss and air flow. The EcoDeco Bio-MRFs in east London are designed to operate with a high air flow whilst the biological process is underway, maximising moisture loss and minimising mass of the residue. They are not, currently, configured to optimise the reduction of BMW, which would require a lower air flow, retaining moisture to assist decomposition. A longer residence for waste in the biological process would also promote decomposition under these conditions.

ERM understand that there could be potential for manipulating the operating environment to deliver different performance characteristics, and that Shanks and EcoDeco have recently discussed these issues. Nevertheless, although decomposition might be enhanced as a result of lower air flow and/or longer residence time, there would also be consequences for the contract in terms, *inter alia*, of the mass of waste that required landfill (since moisture is retained), landfill tax, and throughput. Further BMW decomposition might also be achievable through windrow composting of MBT residues prior to landfill at the disposal site, although the BMW diverted would depend on the operating regime, and there is currently no information available on what additional contribution could be made.

If operational changes do prove feasible, the likely benefits of increase decomposition of BMW, in the context of the outcome of the Agency's guidance, should be assessed, and balanced against the potential costs. As above, the result may be to suggest revision of the future capacity needs profile, or to accept that a LATS surplus is likely.

Operational changes might not be envisaged for all the MBT capacity available through Jenkins Lane and Frog Island. Since the facilities are composed of six cells, and these are operated independently, each could be configured to deliver different products. For example, half the capacity might be used as envisaged in the contract, with RDF production, whilst the remainder was re-designed to deliver a higher level of BMW diversion prior to landfill. Essentially, the changes would be as described in more detail above, but the number of operating cells gives flexibility in terms of how much BMW is diverted, and by which means. This potentially offers the prospect of fine-tuning the management of the Bio-MRFs to deliver to the LATS profile whilst avoiding a LATS surplus and incurring additional costs. Nevertheless, this would be dependent on satisfactory changes to the contract, on the balance of other costs and benefits being favourable, and determined to a degree by the outcome of the Agency's consultation.

Annex G

Results of Options Analysis: Mass Flow

G1.1 WASTE FLOWS

Figure G1.1 sets out the waste flows in Option 1 between 2004/05 and 2019/20, highlighting the amount of material separated at source, the wastes managed through the two Bio-MRFs, the quantity of RDF combusted, and the disposal of residues to landfill. From the graph, the increase in RDF production can be clearly seen in 2015/16.

Figure G1.1 Option 0: Existing Contract

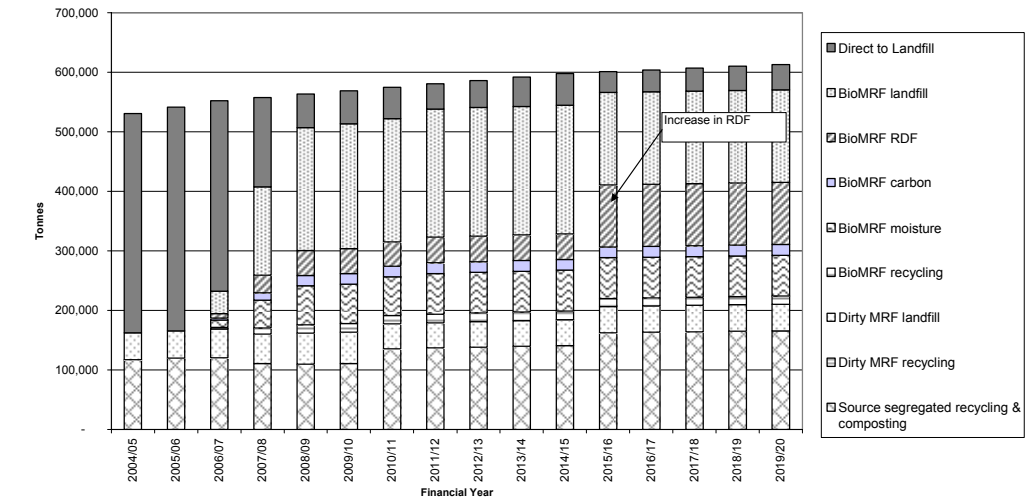


Figure G1.2 Option 0: Existing Contract

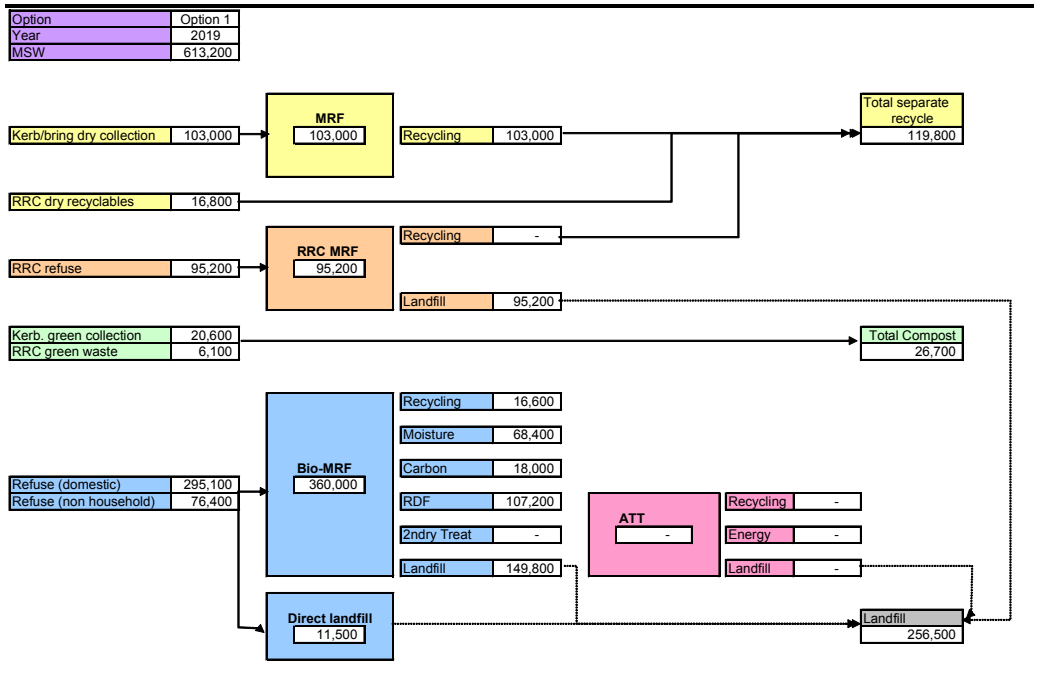
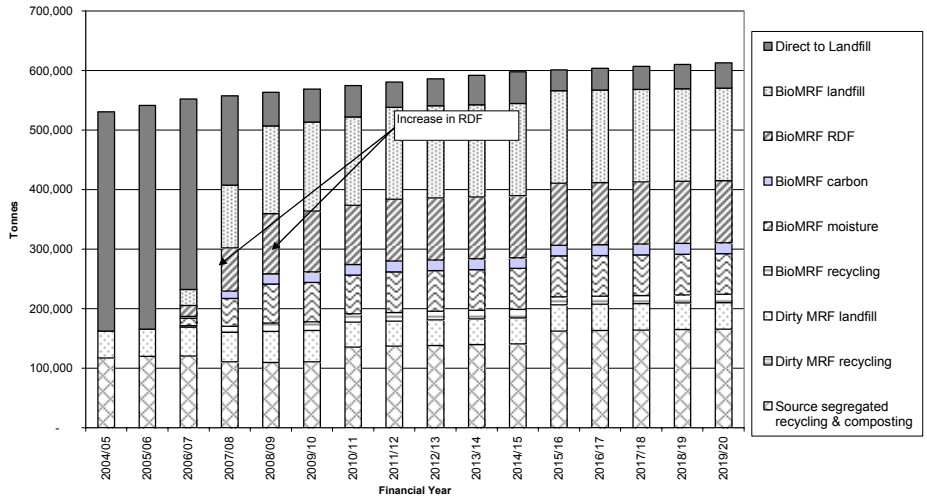


Figure G1.3 shows the quantity of wastes managed via different routes under Option 1. The earlier increase in the quantity of RDF drawn from the Bio-MRF can be seen from this figure.

Figure G1.3 Option 1: Use more of output of the Bio-MRFs as fuel in earlier years



The increases in source segregated composting and recycling within Option 2 can be seen in *Figure G1.4*.

Figure G1.4 Option 2: Separately collect and recycle or compost more material

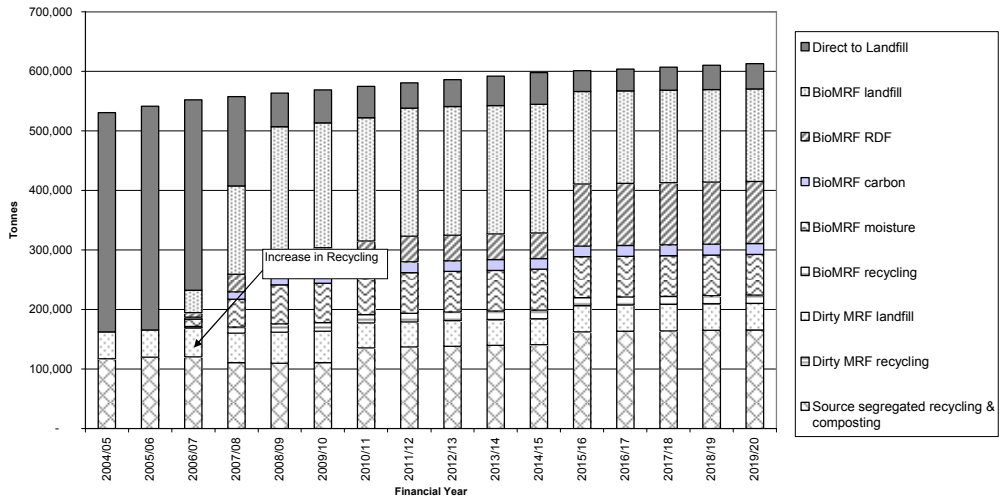


Figure G1.5 shows the quantity of waste managed through a small-scale gasification plant. The fluctuation in capacity needed just to meet the LATS allowances is clear from this figure.

Figure G1.5 ***Option 3: Add an 'advanced thermal treatment' plant to the Bio-MRFs to manage the fine output***

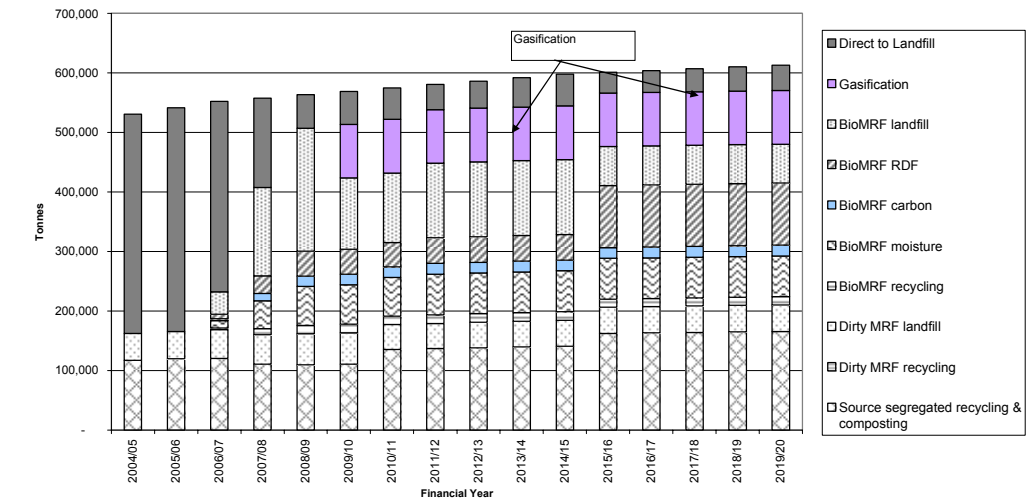
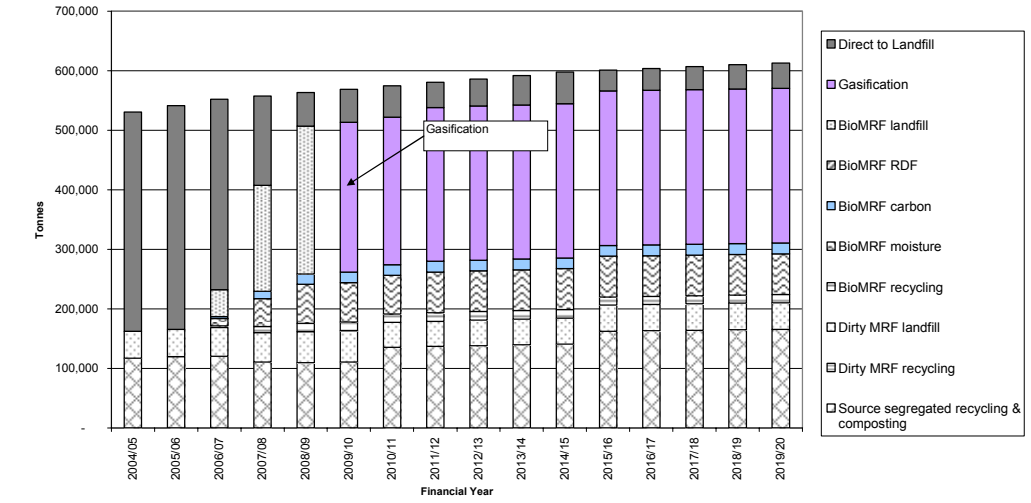


Figure G1.6 shows the tonnages of wastes managed by different means if a larger gasification plant were to be introduced to manage all non-recyclable outputs from the Bio-MRF (both the coarse and the fine fraction).

Figure G1.6 ***Option 4: Add an 'advanced thermal treatment' plant to the Bio-MRFs to manage both the coarse and fine outputs***



G1.1.1 Capacity Requirements

The annual facility requirements for each option have been presented below in *Table G1.1* to *Table G1.4*. These requirements have been evaluated through consideration of the likely change in waste quantities, the composition of waste and the types of material that will be extracted through kerbside collections, or will require disposal from the Bio MRFs or other treatment technologies.

Table G1.1 Option 1 – Additional Capacity Requirements

Capacity Type	Additional Capacity Required (tpa)[1]			Total or Maximum Capacity Required
	2009/10	2012/13	2019/20	
MRF capacity	0	0	0	0
Composting Capacity	0	0	0	0
RRC MRF	0	0	0	0
Bio-MRF throughput	0	0	0	0
Gasification throughput	0	0	0	0
RDF capacity needed	60,400	61,000	0	0[4]
Landfill [2]	-60,400	-61,000	0	-475,600
LATS shortfall [3]	0	26,200	70,700	383,400

[1] Beyond the existing contract

[2] Total landfill required 2004 - 2020

[3] Shortfall between requirements under LATS and achievement of option. If number is shown then option will not achieve LATS requirements.

[4] No additional capacity needed as this option just recovers RDF earlier than originally anticipated

Table G1.1 shows that, for this option, additional capacity is only required for RDF recovery, and in the medium-term. By 2019/20, the total capacity needed for RDF is equivalent to that assumed in the baseline, and there is therefore no additional capacity required.

Table G.2 Option 2 – Additional Capacity Requirements

Capacity Type	Additional Capacity Required (tpa)[1]			Total or Maximum Capacity Required
	2009/10	2012/13	2019/20	
MRF capacity	23,400	21,500	10,600	10,600
Composting Capacity	14,300	12,000	7,000	7,000
RRC MRF	0	0	0	0
Bio-MRF throughput	0	0	0	0
Gasification throughput	0	0	0	0
RDF capacity needed	0	0	-2,000	-2,000
Landfill [2]	-38,200	-33,500	-15,900	-455,600
LATS shortfall [3]	0	38,100	58,900	372,100

[1] Beyond the existing contract

[2] Total landfill required 2004 - 2020

[3] Shortfall between requirements under LATS and achievement of option. If number is shown then option will not achieve LATS requirements.

[4]) Reduction in RDF a material is removed through source-segregated recycling

The increased composting and MRF capacity required to accommodate changes in source-segregated recycling collections in Option 2 are reflected in *Table G.2*. The consequent decreases in RRC dirty MRF capacity required (as green waste is moved out to composting) and in Bio-MRF throughput (as paper and textiles are moved out to recycling) are also evident. The increases in recycling and composting also influence the reduction in landfill capacity required.

Table G1.3 Option 3 – Additional Capacity Requirements

Capacity Type	Additional Capacity Required (tpa)[1]			Total or Maximum Capacity Required
	2009/10	2012/13	2019/20	
MRF capacity	0	0	0	0
Composting Capacity	0	0	0	0
RRC MRF	0	0	0	0
Bio-MRF throughput	0	0	0	0
Gasification throughput	90,000	90,000	90,000	90,000
RDF capacity needed	0	0	0	0
Landfill [2]	-72,000	-72,000	-72,000	-792,000
LATS shortfall [3]	0	22,400	15,600	120,500

[1] Beyond the existing contract

[2] Total landfill required 2004 - 2020

[3] Shortfall between requirements under LATS and achievement of option. If number is shown then option will not achieve LATS requirements.

Table G1.3 and *Table G1.4* show the capacity requirements under each of the gasification options. Option 3 shows a fluctuating requirement for gasification capacity, reflecting both the increasing LATS requirements over time (to 2012/13) and the introduction of increased RDF production in 2015/16. Option 4 shows a relatively steady profile for gasification capacity and a reduction in the capacity required for RDF recovery, particularly beyond 2015/16, as this material is now sent to the gasification plant.

Table G1.4 Option 4 – Additional Capacity Requirements

Capacity Type	Additional Capacity Required (tpa)[1]			Total or Maximum Capacity Required
	2009/10	2012/13	2019/20	
MRF capacity	0	0	0	0
Composting Capacity	0	0	0	0
RRC MRF	0	0	0	0
Bio-MRF throughput	0	0	0	0
Gasification throughput	251,800	259,200	259,900	259,900
RDF capacity needed	-42,000	-43,200	-104,500	-104,500
Landfill [2]	-159,500	-164,200	-103,400	-1,411,100
LATS shortfall [3]	0	0	0	45,900[4]

[1] Beyond the existing contract

[2] Total landfill required 2004 - 2020

[3] Shortfall between requirements under LATS and achievement of option. If number is shown then option will not achieve LATS requirements.

[4] Will not achieve LATS requirements in early years, therefore a small shortfall is shown

In determining the overall strategy to be adopted, the environmental and socio-economic impacts, both positive and negative, of the different options will need to be considered. At this stage, it is not appropriate to undertake detailed environmental impact assessments but the potential environmental and socio-economic issues associated with each option need to be identified.

The criteria used for this initial scoping exercise have been based on the recommended objectives and indicators for options appraisal as presented in the ODPM Strategic Planning for Sustainable Waste Management guidance document, see *Table G2.1*. These criteria link closely to the Sustainability Criteria developed by the Mayor in the London Plan, as shown in the last column of the table. The Mayor has stated that these criteria will be used in developing Sub-Regional Development Frameworks, when considering UDPs and when considering planning applications. It is likely that this will also be used when evaluating any East London Waste Local Development Document. It is therefore appropriate to consider these criteria here. Three more site-specific criteria have been excluded at this stage, however:

- taking account of the objectives of preventing major accidents and limiting their consequences;
- ensuring that development occurs in locations that are accessible to town centres, employment, housing, shops and services; and
- using a design-led approach to optimise the potential of sites.

Table G2.1 Objectives and Indicators for Options Appraisal

Environmental Objectives	Indicators[A]	London Plan[B]
1. To ensure prudent use of land and other resources.	• Depletion of resources, such as wood, water, fuels and ores. • Landtake	• Optimising the use of previously developed land and vacant or underused buildings.
2. To reduce greenhouse gas emissions.	• Greenhouse gases emitted.	
3. To minimise adverse impacts on air quality and public health.	• Emissions which are injurious to public health. • Emissions contributing to air acidification. • Emissions contributing to depletion of the ozone layer. • Extent of odour problems. • Extent of dust problems.	• taking account of the impact that development will have on London's natural resources, environmental and cultural assets and the health of local people.
4. To conserve landscapes and townscapes.	Extent of visual and landscape impacts.	

Environmental Objectives	Indicators[A]	London Plan[B]
5. To protect local amenity.	• Extent of noise, litter and vermin problems.	
6. To minimise adverse effects on water quality.	• Emissions contributing to eutrophication. • Extent of water pollution.	• taking account of the physical constraints on the development of land, including, for example, flood risk, ensuring that no significant harmful impacts occur, or that such impacts are acceptably mitigated.
Socio-economic Objectives		
7. To minimise local transport impacts (congestion, severance, fear and intimidation, physical damage).	• Total waste kilometres (by mode). • Transport along roads other than motorways.	• ensuring that development takes account of the capacity of existing or planned infrastructure including public transport, utilities and community infrastructure, such as schools and hospitals taking account of the impact that development will have on London's natural resources, environmental and cultural assets and the health of local people
8. To provide employment opportunities.	• Number of jobs likely to be created.	
9. To provide opportunities for public involvement and education	• Extent of opportunities for public involvement and education (concerning sustainable waste management practices).	• taking account of the suitability of sites for mixed use development and the contribution that development might make to strengthening local communities.
Operational Objectives		
10. Costs of waste management.	• Costs of collection, management and disposal, including material and energy revenues.	

Environmental Objectives	Indicators[A]	London Plan[B]
11. Reliability of delivery	• Likelihood of implementation within required timescale, taking account of maturity of technology, necessary level of public participation, and the need for planning permission (taking account of scale of development and likely perceived adverse impacts).	
Waste Management Policy Objectives		
12. Conformance with waste policy	• Percentage recovery. • Percentage recycled	

(A) Taken from ODPM guidance document on Strategic Planning for Sustainable Waste Management (objectives 10 – 12, and associated indicators, are covered in sections 4.5 and 4.6.

(B) London Plan (2004) Policy 2A.1 Sustainability criteria.

Table G2.2 to *Table G2.3* consider each of the options in turn against the above indicators in order to determine which aspects are likely to be key issues in any subsequent, more detailed, assessment.

Table G2.2 ***Option 1: Risks Associated With using more of output of the Bio-MRFs as fuel in earlier years***

Environmental Objectives	Indicators	Comment
1. Use of land and other resources	• Depletion of resources, such as wood, water, fuels and ores. • Landtake.	• No additional land use above that of Baseline. • Production of RDF results in potential saving in use of fossil fuels (assuming suitable use is established).
2. Greenhouse gas emissions	• Greenhouse gases (GHG) emitted	• Use of RDF as an alternative fuel will result in overall decrease in GHG emissions compared with landfilling of organic waste and use of fossil fuel – therefore slight reduction in overall emissions compared with baseline by bringing increased RDF on line earlier.
3. Impacts on air quality and public health	• Emissions which are injurious to public health • Emissions contributing to air acidification. • Emissions contributing to depletion of the ozone layer. • Extent of odour problems. • Extent of dust problems.	• Minimal impact on local or global air quality assuming that the combustion plant burning the RDF is equipped with appropriate gas cleaning equipment and that the alternative landfill is fitted with appropriate gas collection and modern gas flaring equipment (the plant will need to meet requirements of the Waste Incineration Directive) • Minimal impacts due to traffic emissions compared with baseline. Depending on the distance over which the RDF is transported there may be slightly more air emissions due increased traffic movements.
4. Landscapes and townscapes conservation	• Extent of visual and landscape impacts.	• No additional impacts over baseline.
5. Local amenity	• Extent of noise, litter and vermin problems.	• No additional impacts over baseline.
6. Effects on water quality	• Emissions contributing to eutrophication. • Extent of water pollution.	• No additional impacts over baseline. • Very minor potential reduction in water pollution through reduced quantity of landfilled wastes.

Environmental Objectives	Indicators	Comment
Socio-economic Objectives		
7. Local transport impacts	• Total waste kilometres (by mode). • Transport along roads other than motorways.	• No additional impacts over baseline.
8. Employment	• Number of jobs likely to be created.	• Minimal impacts compared with baseline.
9.Public involvement and education	• Extent of opportunities for public involvement and education (concerning sustainable waste management practices).	• No significant difference compared with baseline, although publicity about the earlier introduction of increased RDF generation could be used to stimulate public participation in other schemes such as kerbside recycling.

Assuming that the potential impacts associated with the development and use of the RDF plant are to be assessed anyway (ie under the baseline scenario) there should only be minimal impact of bringing forward the date of the increased RDF production.

Table G2.3 ***Option 2: Risks Associated with separately collecting and recycling/ composting more material***

Environmental Objectives	Indicators	Comment
1. Use of land and other resources	• Depletion of resources, such as wood, water, fuels and ores. • Landtake.	• The option may require an additional centralised composting plant (if capacity at Avely and Rainham is insufficient). An additional plant will require land either within the ELWA area or in another nearby authority's area. In the longer term, this will be offset by a reduced consumption of landfill void space (on the basis of the volume of waste diverted for both recycling and composting) thereby, ultimately, reducing the land area required for landfill. • The use of waste-derived compost as a soil enhancer results in saving in the consumption of other, potentially non-renewable, soil conditioners.

Environmental Objectives	Indicators	Comment
2. Greenhouse gas emissions	• Greenhouse gases emitted.	• Composting of organic waste (if undertaken properly) does not generate methane emissions. Thus, composting results in an overall decrease in GHG emissions compared with the landfilling of organic waste because there are inevitably fugitive emissions of methane from landfill sites. Similarly, recycling of waste generally results in a reduction of GHG emissions compared with the use of natural resources. There will therefore be a reduction in overall emissions compared with baseline scenario.
3. Impacts on air quality and public health	• Emissions which are injurious to public health. • Emissions contributing to air acidification. • Emissions contributing to depletion of the ozone layer. • Extent of odour problems. • Extent of dust problems.	• There has been recent research into the potential impacts of bio-aerosols (1) generated by composting processes. In general, any such adverse impacts should be very localised in nature (generally a health and safety issue for employees rather than the public). However, a detailed assessment of potential impacts would need to be undertaken as part of an environmental assessment when the location and type of any new composting plant is being considered.

(1) For example, see Enviros Consulting Ltd and University of Birmingham with Risk and Policy Analysts Ltd, Open University and Maggie Thurgood (2004) Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes, Table 3.5 Epidemiological studies of potential health effects associated with composting sites.

Environmental Objectives	Indicators	Comment
4. Landscapes and townscapes conservation	• Extent of visual and landscape impacts	• The construction of any new centralised composting facility would inevitably cause some additional visual/landscape impact. The extent will depend on exactly where the facility is located. The potential impact may be significantly reduced by locating the composting operation with one of the other waste treatment /disposal facilities. The feasibility of this will depend on space constraints. In the longer term, the diversion of more waste away from landfill will reduce the need for future landfill sites and hence will reduce the visual intrusion associated with them.
5. Local amenity	• Extent of noise, litter and vermin problems.	• The compost plants used, assuming that they are operated correctly, should create minimal impacts in terms of noise, litter or vermin. Again, this would need to be considered in more detail as part of an EIA of any new facility or extension in use of an existing facility.
6. Effects on water quality	• Emissions contributing to eutrophication. • Extent of water pollution	• The reduced quantity of waste going to landfill as a result of increased recycling and composting may lead to a potential reduction in water pollution due to leachate from the landfilled waste.

Environmental Objectives	Indicators	Comment
Socio-economic Objectives		
7. Local transport impacts	• Total waste kilometres (by mode). • Transport along roads other than motorways	• Increasing the level of kerbside and RRC recycling should have minimal additional impacts on transport because each of the boroughs already has some form of kerbside recyclables collection and RRCs are already in operation.
8. Employment	• Number of jobs likely to be created	• The potential introduction of another facility, the composting plant, will result in the creation of a small number of additional jobs (2-3 staff).
9.Public involvement and education	• Extent of opportunities for public involvement and education (concerning sustainable waste management practices)	• The increase in kerbside and RRC recycling will require an increased level of public participation and an appropriate public education / awareness raising campaign will be essential if the increased recycled targets are to be achieved.

The major environmental / socio-economic issues to be considered if Option 2, increased source-separated recycling and composting, is pursued relate to the need for the construction and operation of a centralised composting facility and the need for a much higher level of public participation to achieve the levels of recycling required.

The potential local impacts of a centralised composting facility on landtake, visual intrusion and air quality would need to be considered as part of a detailed environmental assessment. However, there should be a net global environmental benefit through the reduced quantity of organic and organic waste going to landfill.

An appropriately timed public education/awareness campaign will be required in order to ensure a sufficient level of public participation in the kerbside recycling scheme.

Table G2.4 ***Option 3: Risks Associated with introducing an 'advanced thermal treatment' plant to the Bio-MRFs to manage the fine output***

Environmental Objectives	Indicators	Comment
1. Use of land and other resources	• Depletion of resources, such as wood, water, fuels and ores. • Landtake.	• An additional facility, the gasification plant, will be required which will require land either within the ELWA area or in another authority's area. This will be at least partially offset by a reduced consumption of landfill void space (as the resultant char has a smaller volume than the Bio-MRF residue) thereby, ultimately, reducing the land area required for landfill. • Gasification of waste to generate gas and ultimately electricity results in saving in the consumption of fossil fuels.
2. Greenhouse gas emissions	• Greenhouse gases emitted	• Gasification of waste to generate electricity will result in an overall decrease in GHG emissions compared with the landfilling of organic waste and use of fossil fuels to generate electricity. There will therefore be a reduction in overall emissions compared with baseline scenario.
3. Impacts on air quality and public health	• Emissions which are injurious to public health. • Emissions contributing to air acidification. • Emissions contributing to depletion of the ozone layer. • Extent of odour problems. • Extent of dust problems.	• Although there should be minimal impact on local or global air quality if the gasification plant is equipped with appropriate gas cleaning equipment, a detailed assessment of potential impacts would need to be undertaken as part of an environmental assessment. • Minimal impact due to traffic emissions compared with baseline depending on the relative distance between the Bio-MRF and the gasification plant and that between the landfill and the Bio-MRF. Again, this would need to be confirmed by a detailed assessment when the location of the gasification plant is known.

Environmental Objectives	Indicators	Comment
4. Landscapes and townscapes conservation	• Extent of visual and landscape impacts	• The need to construct a gasification plant will inevitably cause some additional visual/landscape impact. The extent will depend on exactly where the facility is located. In the longer term, the diversion of more waste away from landfill will reduce the need for future landfill sites and hence will reduce the visual intrusion associated with them.
5. Local amenity	• Extent of noise, litter and vermin problems	• The gasification plant, assuming that it is operated correctly, should create minimal impacts in terms of noise, litter or vermin.
6. Effects on water quality	• Emissions contributing to eutrophication. • Extent of water pollution.	• The reduced quantity of waste going to landfill may result in a potential reduction in water pollution due to leachate from the landfilled waste.
Socio-economic Objectives		
7. Local transport impacts	• Total waste kilometres (by mode). • Transport along roads other than motorways.	• Impacts due to transport of waste to the gasification plant rather than the landfill will depend on the relative distance of each facility from the Bio-MRF. • Some of the outputs of the facility may be regarded as hazardous waste and, hence, will require disposal at a hazardous waste landfill. The scarcity of such sites may result in these wastes being transported over large distances.
8. Employment	• Number of jobs likely to be created.	• The introduction of another facility, the gasification plant, will result in the creation of additional skilled and unskilled employment opportunities.
9. Public involvement and education	• Extent of opportunities for public involvement and education (concerning sustainable waste management practices).	• The introduction of the gasification plant will provide the opportunity for ELWA to advise the public of its commitment to more sustainable waste management practices which may have a knock-on effect in terms of public participation in other schemes such as kerbside recycling.

The major environmental / socio-economic issues to be considered if Option 3 is pursued relate to the need for the construction and operation of an additional facility, the gasification plant. In particular, the local impacts of this on landtake, visual intrusion and air quality would need to be considered as part of a detailed environmental assessment.

Table G2.5 Option 4: Risks Associated with introducing an 'advanced thermal treatment' plant to the Bio-MRFs to manage the fine and coarse output

Environmental Objectives	Indicators	Comment
1. Use of land and other resources	• Depletion of resources, such as wood, water, fuels and ores. • Landtake.	• As for Options 2 and 3, an additional facility, the gasification plant, will be required which will require land either within the ELWA area or in another authority's area. In the case of Option 4, because all of the Bio-MRF will be processed in the gasification plant, a larger facility (a number of smaller facilities) will be required and so the landtake will be greater. In the longer term this will be offset by a reduced consumption of landfill void space (as the resultant char has a smaller volume than the Bio-MRF residue) thereby, ultimately, reducing the land area required for landfill. • Gasification of waste to generate gas and ultimately electricity results in saving in the consumption of fossil fuels. By gasifying more of the waste, the savings in fossil fuel will be greater.
2. Greenhouse gas emissions	• Greenhouse gases emitted.	• Gasification of waste to generate electricity will result in an overall decrease in GHG emissions compared with the landfilling of organic waste and use of fossil fuels to generate electricity. There will therefore be a reduction in overall emissions compared with the baseline scenario and also compared with Option 2.

Environmental Objectives	Indicators	Comment
3. Impacts on air quality and public health	• Emissions which are injurious to public health. • Emissions contributing to air acidification. • Emissions contributing to depletion of the ozone layer. • Extent of odour problems. • Extent of dust problems.	• Although there should be minimal impact on local or global air quality if the gasification plant is equipped with appropriate gas cleaning equipment, a detailed assessment of potential impacts would need to be undertaken as part of an environmental assessment. • Minimal impact due to traffic emissions compared with baseline depending on the relative distance between the Bio-MRF and the gasification plant and that between the landfill and the Bio-MRF. Again, this would need to be confirmed by a detailed assessment when the location of the gasification plant is known.
4. Landscapes and townscapes conservation	• Extent of visual and landscape impacts.	• The need to construct a gasification plant will inevitably cause some additional visual/landscape impact. The extent will depend on exactly where the facility is located. Clearly, as this will be a larger facility than that for Option 2, the visual impact will be greater. In the longer term, the diversion of more waste away from landfill will reduce the need for future landfill sites and hence will reduce the visual intrusion associated with them.
5. Local amenity	• Extent of noise, litter and vermin problems.	• The gasification plant, assuming that it is operated correctly, should create minimal impacts in terms of noise, litter or vermin.
6. Effects on water quality	• Emissions contributing to eutrophication. • Extent of water pollution.	• The reduced quantity of waste going to landfill may result in a potential reduction in water pollution due to leachate from the landfilled waste.

Environmental Objectives	Indicators	Comment
Socio-economic Objectives		
7. Local transport impacts	• Total waste kilometres (by mode). • Transport along roads other than motorways.	• Impacts due to transport of waste to the gasification plant rather than the landfill will depend on the relative distance of each facility from the Bio-MRF. • Some of the outputs of the facility may be regarded as hazardous waste and, hence, will require disposal at a hazardous waste landfill. The scarcity of such sites may result in these wastes being transported over large distances.
8. Employment	• Number of jobs likely to be created	• The introduction of another facility, the gasification plant, will result in the creation of additional skilled and unskilled employment opportunities. A larger plant (compared with Option 3) may require slightly more staff but the difference will be small.
9. Public involvement and education	Extent of opportunities for public involvement and education (concerning sustainable waste management practices)	• The introduction of the gasification plant will provide the opportunity for ELWA to advise the public of its commitment to more sustainable waste management practices which may have a knock-on effect in terms of public participation in other schemes such as kerbside recycling.

The major environmental / socio-economic issues to be considered if Option 4 is pursued relate to the need for the construction and operation of the large gasification plant. In particular, the local impacts of this on landtake, visual intrusion and air quality would need to be considered as part of a detailed environmental assessment.

Annex I

Bibliography, Glossary and Abbreviations

I1 BIBLIOGRAPHY

Aylesford Newsprint, (2000). Achieving recycling target: Best practice in Materials Recycling. www document (accessed 13 December 2004) http://www.aylesford-newsprint.co.uk/pdf/recyclerep2000a.pdf

CapitalWasteFacts, (2004a). Download Data: cwf_arisings.csv. www document (accessed 08 December 2004) http://www.capitalwastefacts.com/datacentre/csvMASTER.php4?dataArea=1&auth=All&year=2003

DETR, (2000). Waste Strategy 2000

GLA, (2003). Rethinking Rubbish in London: The Mayor's Municipal Waste Management Strategy

GLA, (2004). The London Plan

Enviros Consulting Ltd and University of Birmingham with Risk and Policy Analysts Ltd, Open University and Maggie Thurgood, (2004). Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes

Defra, (2004a). Guidance for waste authorities in two-tier areas on application of duty to have a Joint Municipal Waste Management Strategy

http://www.defra.gov.uk/environment/waste/localauth/managewaste. Viewed December 2004. Note, will be subject to amendments to Landfill Allowance and Trading Scheme (England) Regulations 2004.

http://www.defra.gov.uk/environment/waste/localauth/lats/pdf/allocationdata.pdf.

Maggie Thurgood (2004) Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes.

Term	Description
Best Value	The duty on local authorities to deliver effective, economic and efficient services and seek improvement in the quality and standard of their service provision.
Biodegradable waste	Waste which is able to decompose through the action of bacteria or other microbes. This includes materials such as paper, food waste and green garden waste.
Composting	The degradation of organic wastes in the presence of oxygen to produce a fertiliser or soil conditioner.
Dry recyclables	Materials such as paper, textiles and cans that can be collected through kerbside schemes or bring banks.
Hazardous waste	Defined in the Landfill Regulations as any waste defined in Article 1 (4) of Directive 91/689/EEC on hazardous waste.
Household waste	Waste from domestic properties including waste from RRCs, material collected for recycling and composting, plus waste from educational establishments, nursing and residential homes and street cleansing waste.

Abbreviation	Description
Bio-MRFs	Biological Materials Recycling Facilities - A Bio-MRF is a term for a combination of technologies that extracts recyclables (such as metals) from the refuse stream, biologically treats waste (through composting and drying) to reduce its biodegradability, and creates a fuel (RDF) for combustion. In this option, the Bio-MRF process has been modelled on the assumption that refuse is put through a biological process (biodrying), then recyclables are removed, and a compost and fuel product are produced.
BMW	Biodegradable municipal waste
Defra	Department for Environment Food and Rural Affairs
ELWA	East London Waste Authority
LATS	Landfill Allowance Trading Scheme
MRF	materials recycling facility
RDF	Refuse Derived Fuel
RRC	Reuse and Recycling Centre (refurbished CA sites)
The WET Act	The Waste and Emissions Trading Act

ERM's London Office

8 Cavendish Square
London W1G 0ER
T: +44 20 7465 7200
F: +44 20 7465 7272

www.erm.com