

Executive Summary



Introduction

Management of municipal solid waste (MSW) is one of the most important and challenging environmental issues we face today. The change to more sustainable waste management systems and long term global environmental protection is now backed by substantial legislation and guided by detailed policies at European, national and regional level.

In response to these new drivers, the GMWDA and its partner Authorities¹ have formulated a Municipal Waste Management Strategy (MWMS) based on joint working and a integrated waste management system; driven by a fundamental desire to change waste into useable resources, to minimise the generation of waste and to maximise recycling and composting.

Through introducing this strategy there will be economic benefits through the creation of jobs in kerbside collection services, development of new and emerging environmental technology and the reprocessing of the recyclates and compostables extracted from the waste stream. The environmental benefits would reduce the current levels of carbon emissions, the need for virgin materials and the requirement for future landfill sites.

The strategy is designed to meet all known and anticipated duties of the Authorities and is an overall approach based on the aim of managing Greater Manchester's waste high in the waste management hierarchy. Recycling and composting targets exceed current statutory requirements and national performance targets.

The MWMS takes into account the types and quantities that make up municipal solid waste and the policy and guidance, statutory targets and objectives. Implementation of the strategy is based on assessments of the available waste management methods and options together with performance and cost modeling of integrated scenarios designed to achieve the MWMS targets and objectives. Implementation of the strategy will require land use planning issues to be addressed.

Municipal Waste Growth

The municipal waste stream in Greater Manchester originates from a range of sources; WCA collected household waste (weekly, bulky, hazardous) and other waste (e.g. street cleansing, parks and gardens, Council office waste); WCA collected commercial waste; waste from civic amenity sites; waste collected for recycling; and difficult waste.

¹ Throughout this document, references made to Greater Manchester refer to the area covered by the nine District Councils which participate in the GMWDA

In the last five years (1998 to 2003) MSW has grown by an average of over 2% per year to **1,483,323 tonnes**. The annual increase was 3% in the year ending April 2003. Subject to continued economic growth in the UK as a whole it would not be unreasonable to conclude that MSW arisings will continue to grow at a rate of at least 2% unless action is taken.

Greater Manchester MWMS – Targets and Objectives

The strategy is designed to meet all known and anticipated duties of the Authorities based on the aim of managing Greater Manchester's waste high in the waste management hierarchy. Key elements of the strategy are;

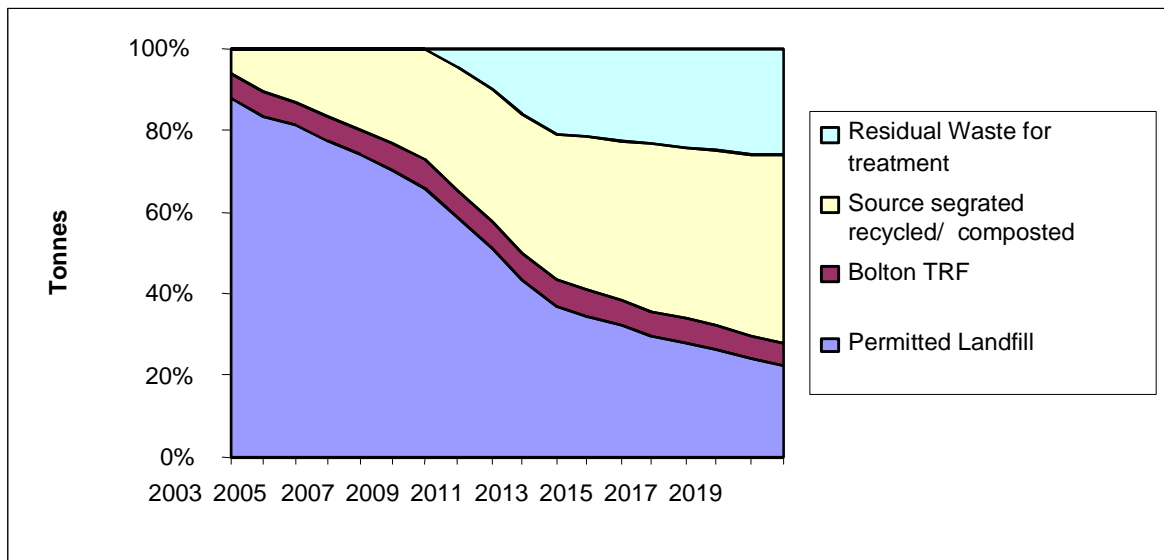
- Waste reduction and minimisation has the highest priority. The target is to arrest the increases in MSW arisings to no more than 2% per annum by 2010 and zero by 2020
- Reduce non-household waste by 50% in proportion to current MSW arisings, which will reduce total tonnage by 10%
- A commitment to adopting a recycling and composting led approach to waste management with no restriction to the development of recycling and composting
- Targets of recycling and composting 50% of household waste for 2020. The target for 2005/6 is recycling and composting 20% of household waste and 33% for 2010
- Develop an approach that takes account of new and emerging technologies
- Meeting landfill permit allowances and bio-diversion targets through implementation of residual waste treatment processes with use of refuse derived fuels (RDF)
- Collect adequate and reliable data on individual waste streams and management methods to provide the basis for strategy and financial planning
- Adoption of partnership waste management working arrangements at a strategic and operational level between the GMWDA and other partners
- Develop and integrate waste collection, processing, treatment and disposal systems to ensure "Best Value" is delivered from WCA and WDA services
- Working with external agencies and partner authorities to develop and provide facilities and markets for waste derived materials in accordance

with the Best Practicable Environmental Option for Greater Manchester and the region as a whole

- Building on synergies of dealing with commercial and industrial waste where these will assist in the delivery of the waste management strategy as a whole
- Retain and optimise the use of Bolton Thermal Recovery Facility (TRF) throughout the life of the strategy

Waste Strategy Summary

Figure 1 - this illustrates the level of treatment and source separation required to meet future permitted landfill targets



Waste Strategy Implementation

Options that move waste management as far up the waste hierarchy as practicable

GMWDA preference is to move waste management as far up the waste hierarchy as practicable. This means that waste reduction and minimisation heads the hierarchy and will have priority in the strategy followed by source segregation, waste recycling and composting.

After removal of materials for recycling and composting, residual material will remain that cannot be easily and effectively recycled or composted. Achievement of the challenging targets for recycling and composting targets **will not avoid** the need for a significant amount of **residual waste** to be dealt with.

Residual waste treatment considered includes Mechanical and Biological Treatments (MBT) and a number of closely related technologies such as high pressure steam sterilisation. Scenarios that combine available technical options into practical integrated systems for managing Greater Manchester's MSW have been modelled for performance in meeting the MWMS targets and for costs. Full details of the options and are contained within the content of the strategy report.

Costs Summary for the Greater Manchester MWMS

Table 1 – This table sets out the costs of implementation of the waste management strategy as outlined in the targets and objectives. Costs modelled are benchmark costs derived from current industry standard estimates. The models are therefore illustrative on the basis of the best known information and assumptions. Full details of the basis of costs and assumptions are contained within the content of the strategy report.

Scenario		Annual Cost £m @ 2003 values				
		2002/3	2005/6	2009/10	2012/13	2019/20
Strategy targets achieved 50% reduction in non Household waste	WCA Costs	£26	£48	£60	£63	£65
Early introduction of residual waste treatment and MRF Recyclables sorting	WDA Costs	£72	£78	£99	£101	£107
	Integrated Costs	£98	£126	£147	£162	£171

Table 2 – This table sets out the cost of continuing with the 2002/03 activities without adopting the targets and objectives and illustrates the projected cost taking into account increased landfill tax, landfill costs and penalties. Full details of the basis of costs and assumptions are contained within the content of the strategy report.

Scenario		Annual Cost £m @ 2003 values				
		2002/3	2005/6	2009/10	2012/13	2019/20
Do nothing 6.1% diversion from Landfill no non HH waste reduction, current waste management arrangements	WCA Costs	£26	£28	£30	£32	£33
	WDA Costs	£72	£88	£140	£148	£167
	WET Fines		(£19)	£49	£91	£126

	Total Costs (Inc fines)	£98	£116 (£135)	£170 (£219)	£180 (£271)	£200 (£326)
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Performance and Cost Modelling Conclusions

- Do nothing is not an option. By 2005/6 this will only transfer costs from collection to disposal and from thereon increasing landfill disposal costs and penalties rapidly escalate costs beyond more sustainable waste management options
- Waste collection costs show the most significant increases and demonstrate a need for early investment in increased source segregated collection capacity if early targets are to be met
- Early investment and improvement in recycling and composting from Civic Amenity sites is both productive and cost effective
- Early investment in increased composting capacity is required
- MRF sorting of mixed dry recyclable collection in the long term will assist in maximising the separation of recyclates and reduces overall integrated costs. Early decisions on investment in new facilities are required to maximise this benefit
- Early implementation of residual waste treatment will reduce costs since rises in landfill tax and gate fee costs can be expected to exceed treatment costs by 2010. Introduction of residual waste treatment will also increase the amount of recyclate removed from the waste stream
- In-vessel composting of source segregated waste including kitchen waste may be needed by 2020 if the challenging target of 50% recycling and composting is to be achieved
- The Authority continues to operate with the nine constituent district councils and costs models are based on obtaining best value through a partnership approach
- Current assets are used enabling residual treatment and the integration of waste disposal facilities to be introduced within the required timescales and where required planning approval obtained for new facilities

Key Action plan

- Secure reduction of 50% in non household municipal waste, principally collected commercial waste, Council waste and unauthorised deposits at Civic Amenity sites
- Investment in reduction and minimisation of all MSW waste streams including promotion and education on minimisation to households
- Investment in increased composting capacity
- Early decision on investment in new MRF sorting facilities is required to maximise long term dry recyclable collection and reduce overall integrated costs
- Early investment in increased source segregated collection capacity
- Early decision on implementation of residual waste treatment to reduce costs and increase the amount of recyclate removed from the waste stream
- Undertake a study of current capacity in the region of fossil fuelled power plants/high energy consumers that can either be converted or increase their capacity for RDF
- Investigate and secure landfill capacity as required post 2008 for the strategy

Cross cutting Actions

- Collecting adequate and reliable data on individual waste streams and management methods
- Review of the role of the community sector involvement and the provision of waste and recycling services
- Develop best practice in kerbside collection infrastructures at a district level
- Examine potential for maximising recyclates diversion from the bulky waste stream
- Review the policies for charging for waste collection services across the partnership including charges for commercial waste
- Adoption of partnership waste management working arrangements at a strategic and operational level between the GMWDA and other partners

- Review existing assets and future needs and where possible seek planning approval for new facilities
- Review the equity and provision of facilities for waste treatment and civic amenity sites for the partnership
- Address the future role of the LAWDC
- Establishing a procurement strategy for the provision of the GMWDA's main waste disposal services post the expiry of existing contracts on 31 March 2006
- Develop integrated disposal services for recyclates and joint bulking and composting facilities for materials
- Review the available markets and processing capacity for recyclates and compostables locally, regionally and nationally and develop opportunities for processing of waste locally



1.0 Introduction

- 1.1 Management of municipal solid waste (MSW) is one of the most important and challenging environmental issues we face today. The change to more sustainable waste management systems and long term global environmental protection is now backed by substantial legislation and guided by detailed policies at European, national and regional level.
- 1.2 This legislation sets constraints and limitations on the way that MSW can be managed and targets that must be achieved. At a national level the UK government faces heavy fines if targets are not complied with. The government has deployed a number of levers and incentives together with guidance to Waste Disposal and Collection Authorities to ensure that this does not happen.
- 1.3 In response to these new drivers, the GMWDA and its partner Authorities² have formulated a Municipal Waste Management Strategy (MWMS) based on joint working and a integrated waste management system; driven by a fundamental desire to change waste into useable resources, to minimise the generation of waste and to maximise recycling and composting.
- 1.4 Through introducing this strategy there will be economic benefits through the creation of jobs in kerbside collection services, development of new and emerging environmental technology and the reprocessing of the recyclates and compostables extracted from the waste stream. The environmental benefits would reduce the current levels of carbon emissions, the need for virgin materials and the requirement for future landfill sites.
- 1.5 A draft “Strategy Discussion Document” was issued in December 2002 indicating an overall strategic direction based upon a waste minimisation, recycling and composting led approach. However, the discussion document raised a number of issues and questions that would have to be addressed to take this strategy forward. Drawing on the background of this draft strategy a consultation paper was produced in January 2003 including seventeen key questions and a public consultation undertaken through Waste Collection Authority (WCA) civic newspapers and leaflets distributed to all households in the WCA areas. This strategy takes the responses to this consultation into account.
- 1.6 The legislative and policy background within which waste strategy must be developed has also seen important new developments since the

² Throughout this document, references made to Greater Manchester refer to the area covered by the nine District Councils which participate in the GMWDA

consultation was undertaken. These will have major implications for how waste can be managed in the future. A summary of key legislation and statutory targets including the Waste and Emissions Trading Bill consultation and Animal-By-Products Regulations is given at Appendix A.

- 1.7 The strategy is designed to meet all known and anticipated duties of the Authorities and is an overall approach based on the aim of managing Greater Manchester's waste high in the waste management hierarchy. Recycling and composting targets set in the MWMS exceed current statutory requirements and national performance targets.
- 1.8 This document gives background information on the types and quantities that make up municipal solid waste and sets out the framework of policy and guidance within which the strategy has been developed. The targets and objectives are clearly stated followed by chapters setting out how the strategy will be implemented. These include assessments of the available waste management methods and options together with performance and cost modelling of integrated scenarios designed to achieve the MWMS targets and objectives. Land use planning issues that will be important to strategy implementation also need to be addressed.

2.0 How much MSW is produced and what happens to the waste now?

- 2.1 The municipal waste stream in Greater Manchester originates from a range of sources;
 - Waste Collection Authority collected household waste (weekly, bulky, hazardous) and other waste (e.g. street cleansing, parks and gardens, Council generated waste);
 - Waste Collection Authority collected commercial waste;
 - waste from civic amenity sites (Household Waste and Recycling Centres);
 - material collected for recycling; and
 - difficult waste.
- 2.2 Historically data collected by GMWDA was based on the requirements of a disposal orientated system (recently supplemented by those of Government BVPI recycling targets) rather than the requirements of a new waste strategy based on minimising waste arisings whilst maximising recycling and composting and reducing residual waste for treatment or disposal.
- 2.3 Figures for street sweepings, special collections, fly tipping, and dedicated trade waste were not separated, so that it is not possible to track or project trends in each of these waste streams or indeed to project the impact of particular policies and plans upon them.

2.4 The quantity of trade and commercial waste collected is probably the greatest uncertainty. **Whilst commercial waste is reported as making up less than 7% of the total of MSW arisings there are strong indications that this quantity could be in the order of or exceed 20%.**

Table 1 - The Municipal Waste Stream in 2002/03

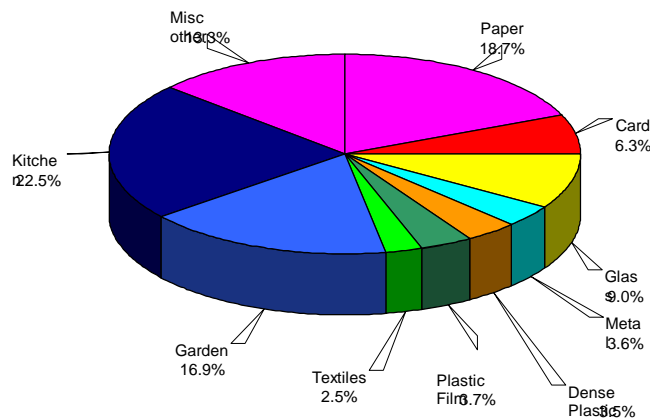
Waste Stream	2002/3	%
Household Collections		
Total Household Collected	805,623	54
Total Recycled from Households	56,633	4
Bulky& Trade Waste		
Bulky & Clinical Waste	293,338	20
Commercial Waste (est; inc in hsehd/blky/clncl)	(98,167)	(7)
Civic Amenity Sites		
Total Disposed	293510	19
Total Recycled	34,219	2
Total Waste	1,483,323	100

2.5 The municipal waste collected by the WCAs is managed on behalf of the GMWDA by Greater Manchester Waste Ltd (GM Waste Ltd), the Authority's Local Authority Waste Disposal Company (LAWDC).

2.6 GM Waste Ltd operates a range of waste management facilities, (including material recovery facilities (x4), transfer stations (x3), a thermal recovery facility and civic amenity sites (x25)), prior to landfill disposal outside the conurbation. Almost 90% of Greater Manchester's waste, through contracts with Biffa Waste Services Ltd, are sent to landfill, principally to sites in Warrington and on Humberside.

2.7 The following Figure 1 shows an estimate of the composition of Greater Manchester's kerbside collected household waste, provided to the GMWDA by Ecologika (December 2001) and adopted by Enviros in their work on the strategy (spring 2002).

Figure 1 - Composition of Greater Manchester Kerbside Collected Household Waste



2.8 A number of key challenges face Greater Manchester. Current collection infrastructure is inadequate to capture more than a small proportion of the *theoretically* recyclable or compostable household waste. Even when such infrastructure is in place, public participation rates will have to be improved significantly over those achieved by current schemes for it to have a major impact. Markets for collected recyclate and compost must be developed for many materials.

3.0 Future projections of waste growth

3.1 Whilst the total for municipal waste arisings was 1,483,323 tonnes for year 2002/3 future planning for the management of MSW must take into account changes in the quantities and composition of the municipal waste streams. In particular historic data has shown a relentless growth in the quantities of MSW generated.

3.2 This growth approximates, if imprecisely, to overall levels of economic growth although Government statistics on municipal waste show that the quantity of waste managed by local authorities is growing at a rapid pace. A generally accepted estimate is that municipal waste is growing by an average of 3% per year in the UK, a significant majority of which is attributed to growth in CA site arisings; this is equivalent to municipal waste doubling every 25 years.

3.3 In the last five years (1998 to 2003) MSW in Greater Manchester has grown by an average of over 2% per year. The annual increase was 3% in the year ending April 2003. Subject to continued economic growth in the UK as a whole it would not be unreasonable to conclude that MSW arisings will continue to grow at a rate of at least 2% unless action is taken.



4. Policy and Guidance

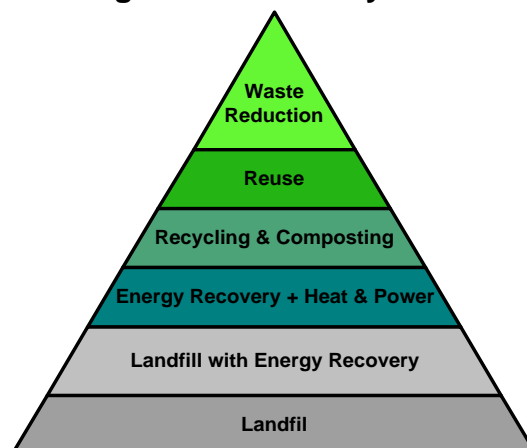
4.1 The European Commission (EC), the Executive of the EU, have adopted through the Council of Ministers the following guiding principles on which they base all aspects of their Environmental Policy. These principles are highlighted below:

- **The Precautionary Principle** - Potential problems must be anticipated.
- **The Polluter Pays Principle** - Those who cause pollution must pay to clean it up.
- **The Prevention Principle** - Waste production must be minimised where possible.
- **The Proximity Principle** - Waste should be disposed of as closely as possible to where it is produced.

4.2 Government policy also embraces the concept of Best Practicable Environmental Option (BPEO). BPEO is “the option that provides the most benefits or least damage to the environment as a whole, at an acceptable cost in the long and short term.” The principle is based upon broad consultation between stakeholders, i.e. the waste industry, waste collection and disposal authorities, the Environment Agency and community groups. Different waste streams will have different BPEO waste management options.

4.3 The Government’s policies and guidance on waste management strategy have been set out in their Waste Strategy 2000, its Guidance on Municipal Waste Management Strategies and in its response to the report to the Cabinet Office document “Waste Not, Want Not” (December 2002). The key principles of the Government’s vision for sustainable waste management are based on moving waste up the adopted Waste Hierarchy, (see Figure 2 below) the higher levels of which reflect more sustainable waste and resource management.

Figure 2 - The Waste Management Hierarchy³



³ ‘Waste Not, Want Not’, Cabinet Office Strategy Unit, November 2002

- 4.4 At a regional level the North West Regional Waste Strategy sets out a strategic direction over a number of issues most of which reflect national policies or are already encompassed in Greater Manchester's waste strategy development. The adoption of the proximity principle is perhaps the most significant for Greater Manchester given the essentially urban character of the conurbation and the fact that most of the MSW arisings are disposed of at landfill sites outside of the Greater Manchester area.

5.0 GMWDA Policy, Aims and Objectives



- 5.1 The GMWDA has undertaken policy and strategy development and since 1996 has been working in partnership with its' key stakeholders. Agreed corporate aims of the Authority have been set out as follows;
- To provide quality services
 - To establish sustainable waste management services
 - To optimise the provision of integrated waste management services

The Strategic Objectives of the Authority are:

- To continue to reduce the amount of waste that is currently landfilled, principally at sites outside the Authority's area
 - To manage the municipal waste stream higher up the waste hierarchy, based on the descending options of waste reduction, re-use, recovery and disposal
 - To seek to maximise environmental benefits from its services at a cost which is affordable
 - To achieve the objectives and targets of the integrated waste management strategy
 - To derive best value through its contractual arrangements
 - To ensure that completed landfill sites under the control of the Authority do not cause harm to human health or pollution of the environment
- 5.2 The Authority intends to achieve its corporate aims and strategic objectives by working in partnership with others;
- To fulfill all of it's statutory obligations in accordance with the principles of sustainability and Best Value
 - To consult with and be responsive to service users

- To recognise the need for the conservation of natural resources and the protection of the natural environment
 - To provide encouragement and opportunity for community involvement
 - To ensure equality of access for all service users
 - To invest in and promote the training and development of its' employees
 - To review and seek to continuously improve its' performance
- 5.3 Joint working between the Authority and the nine constituent WCAs of Greater Manchester is a crucial factor in the establishment of a MWMS for the conurbation. Consequently, in September 2001 the Authority invited the District Councils and other organisations to participate in the Greater Manchester Waste Forum (Waste Forum) under a formalised structure that would consider a recycling and composting led strategy in the context of a wider reassessment of waste management options.
- 5.4 In July 2002 the Authority and Waste Forum came to an initial view of the short-term objectives of the MWMS. In broad-terms it was agreed that the MWMS should be led by maximising amounts of recycling and composting and by adopting national and international best practice.
- 5.5 As part of the continuing process of development of a municipal waste management strategy for Greater Manchester, assurances were given to the Association of Greater Manchester Authorities Council (AGMA) at the end of December 2002 which reaffirmed the Authority's wish to consult each District Council on the preferred way forward.
- 5.6 The Consultation Paper set out the key issues facing Greater Manchester in developing a MWMS that offered a realistic route for compliance with the legislation. These included;
- arresting the increases in the quantities of municipal waste arisings;
 - dealing with the issues of commercial waste both collected and at CA sites
 - collecting adequate and reliable data on individual waste streams and management methods
 - a commitment to adopting a recycling and composting led approach to waste management;
 - a desire for integrated waste collection, treatment and disposal services;

- implementing a residual waste treatment process consistent with meeting landfill allowances and bio-diversion targets
- adoption of partnership waste management working arrangements at a strategic and operational level between the GMWDA and other partners;
- adoption of a method of apportionment of the waste disposal levy on a basis that is acceptable to the District Councils;
- addressing the issue of existing GMWDA contractor costs to ensure that value for money can be attributed to provision of these services when compared with other service providers; and,
- establishing a procurement strategy for the provision of the GMWDA's main waste disposal services post the expiry of existing contracts on 31 March 2006

5.7 The Consultation Paper was circulated to Members of the Authority and to all other elected Members and selected Officers of the constituent District Councils during December 2002 and January 2003.

5.8 In general terms, the WCAs supported the aims of establishing vertically integrated services, based upon partnership working, but commitment to these principles would mainly be dependant upon, for example, Best Value and levy apportionment considerations.

5.9 All of the WCAs supported the principles of the waste hierarchy and the need to develop a strategy, which recognises the primacy of waste reduction and reuse. There was also general support for the recycling and composting led approach, which has been the foundation for the work that has been completed to date.

5.10 It was also accepted that the pursuit of a more sustainable approach to the management of municipal waste would continue to need to be realistic and achievable and, at the same time, remain flexible. In particular, the future strategy must take account of the known barriers to recycling and composting, as well as the emerging technologies alongside those that are established in the UK and elsewhere.

6.0 The Greater Manchester MWMS – Targets and Objectives

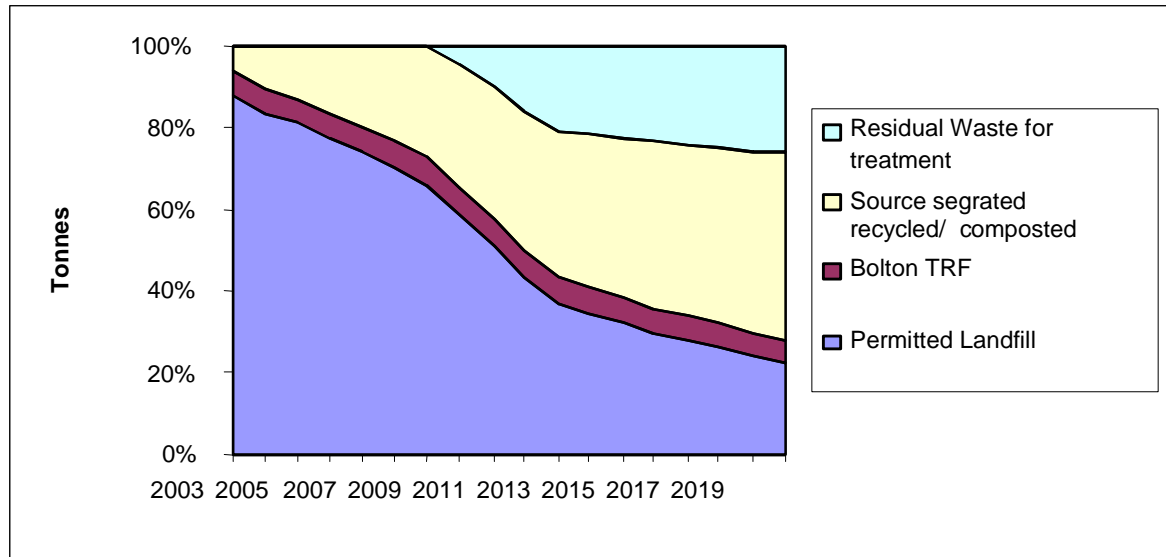


6.1 The strategy is designed to meet all known and anticipated duties of the Authorities based on the aim of managing Greater Manchester's waste high in the waste management hierarchy. Key elements of the strategy are;

- Waste reduction and minimisation has the highest priority. The target is to arrest the increases in MSW arisings to no more than 2% per annum by 2010 and zero by 2020
- Reduce non-household waste by 50% in proportion to current MSW arisings, which will reduce total tonnage by 10%
- A commitment to adopting a recycling and composting led approach to waste management with no restriction to the development of recycling and composting
- Targets of recycling and composting 50% of household waste for 2020. The target for 2005/6 is recycling and composting 20% of household waste and 33% for 2010
- Develop an approach that takes account of new and emerging technologies
- Meeting landfill permit allowances and bio-diversion targets through implementation of residual waste treatment processes with use of refuse derived fuels (RDF)
- Collect adequate and reliable data on individual waste streams and management methods to provide the basis for strategy and financial planning
- Adoption of partnership waste management working arrangements at a strategic and operational level between the GMWDA and other partners
- Develop and integrate waste collection, processing, treatment and disposal systems to ensure "Best Value" is delivered from WCA and WDA services
- Working with external agencies and partner authorities to develop and provide facilities and markets for waste derived materials in accordance with the Best Practicable Environmental Option for Greater Manchester and the region as a whole
- Building on synergies of dealing with commercial and industrial waste where these will assist in the delivery of the waste management strategy as a whole
- Retain and optimise the use of Bolton Thermal Recovery Facility (TRF) throughout the life of the strategy

Waste Strategy Summary

Figure 1 – this illustrates the level of treatment and source separation required to meet future permitted landfill targets



7.0 Waste Strategy Implementation



Options that move waste management as far up the waste hierarchy as practicable

- 7.1 GMWDA preference is to move waste management as far up the waste hierarchy as practicable. This means that waste reduction and minimisation heads the hierarchy and will have priority in the strategy followed by source segregation, waste recycling and composting.
- 7.2 After removal of materials for recycling and composting residual material will remain that cannot be easily or effectively be recycled or composted. Achievement of the challenging targets for recycling and composting targets **will not avoid** the need for a significant amount of **residual waste** to be dealt with. Residual waste treatments include Mechanical and Biological Treatments (MBT) and a number of closely related technologies such as high pressure steam sterilisation. Scenarios that combine available technical options into practical integrated systems for managing the Greater Manchester's MSW are set out in the tables below.
- 7.3 Technical options that rely on traditional mixed waste collections, without source separation, include mass burn Energy from Waste and Dirty MRFs. Mass burn EfW plants are able to accept mixed waste from household waste collection but bulky, difficult and hazardous waste must be screened and processed or excluded from the process. The role for Dirty MRFs will probably diminish or be eliminated as the products

fall short of meeting recycling and landfill bio-diversion targets. Existing plants may possibly be converted to various forms of MBT plant and may be used to manage and bio-stabilise residual mixed MSW streams.

- 7.4 There are also some new technologies that in principle can process mixed collected household waste. However, most of these new technologies present only a theoretical ability to deal with unsegregated MSW. A review of these options shows that most of these technologies are not fully developed or evaluated and have technical issues that have to be overcome or the outputs from the processes may not meet statutory and strategic targets.
- 7.5 Whilst collected household waste is the largest component of Greater Manchester's MSW and has the highest focus of attention, other waste streams must be considered in any integrated scenario. These "other" waste arisings make up almost 42% of the total MSW. These waste arisings include:
- Street sweepings and litter
 - Site clearance & fly tipping
 - Highways waste
 - Parks and gardens waste
 - Waste from schools
 - Commercial waste
 - Hazardous Household Waste
 - Civic Amenity waste
 - Domestic refrigerators and freezers
 - Tyres
 - Automotive vehicles

8.0 Integrated Waste Management Models

- 8.1 Scenarios that move waste management as far up the waste hierarchy as practicable are achieved by the integration of three main components. These are:
- *Waste reduction and minimisation;*
 - *Source segregation for waste recycling and composting;*
 - *Treatment and disposal of the residual waste including energy recovery.*

The role that these components play in integrated scenarios is set out below.

9.0 Waste Reduction and Minimisation



- 9.1 Investment in waste reduction can be made independently of other model components. Decisions on the options are essentially about which initiative will prove most effective in local circumstances and what level of investment can be afforded.

9.2 MSW falls into two main categories as household waste and non-household waste.

Household waste is defined as waste from:-

- Regular household collection - waste collected by refuse collection vehicles;
- Other household sources - e.g. separate waste collections from households of bulky wastes, clinical waste, street sweepings, litter collections, etc;
- Waste brought to civic amenity sites; and
- Household waste collected for recycling and composting.

Non-household municipal waste may include:-

- Construction and do-it-yourself (DIY) waste collected as rubble at civic amenity sites;
- Waste collected from municipal parks and gardens;
- Waste that the local authority collects from industrial and commercial premises; and
- Waste resulting from the clearance of fly-tipped material from private land and Council land (other than the highway)

To be successful in reducing the overall amount of municipal waste the strategy addresses both of these main categories.

10.0 Minimising household waste

10.1 Minimising household waste could make an important contribution to curbing the growth in municipal waste. However this will require a widespread willingness of householders to participate and a significant cultural shift in household waste practices.

10.2 Preventing waste production will include:

- Changes in public attitudes and behaviour to change the "out of sight, out of mind culture."
- Education campaigns to reinforce cultural shift changes
- Home composting is probably the single most effective way of minimising municipal waste
- Development of clean production technologies more sparing in their use and wastage of natural resources.

- Developing and marketing products designed to make no or little environmental impact from their manufacture, use or disposal (e.g. so that they last longer before they become waste, or they are capable of refurbishment)
- Reduction and minimisation of waste production and hazardousness
- Ensure efficient use of resources within existing processes through tighter management control (e.g. within an Environmental Management System);

10.3 Options for Action on Waste Reduction and Minimisation include:

- Relying on national/UK initiatives – such as the Waste Awareness Initiative, Encams and WRAP etc
- Participating in regional or national educational and promotional campaigns
- Undertaking ‘market research’ to establish how the local communities will be best persuaded to change behaviour
- Promoting waste minimisation and recycling in schools and colleges, e.g. through ‘All Schools Can Recycle’, ‘Schools Recycling Network’ and ‘Eco Schools’;
- Providing incentives for public participation in minimisation and composting
- Promoting waste minimisation and recycling to the wider community, especially those able to initiate changes, such as shoppers. This will include using the procurement practices of the local authority as examples of how to promote waste minimisation and recycling;
- Developing home and community composting
- Working with business and commercial organisations to reduce and minimise waste
- Working with major local retail outlets by providing information to shoppers that will assist them to purchase their requirements in a manner that minimises waste.

10.4 In attempting to plan for the types of waste management techniques that will be required in Greater Manchester up until 2020, the assumptions made about the quantity and nature of waste to be managed are critical. However, these assumptions are made against a background of data and information that does not reflect strategic business needs.

.1 Minimising non-household waste

10.5.1 Perhaps the most significant uncertainty lies between the quantification of household and non-household waste within the total amount of MSW. Comparative analysis and practical observations indicate that the quantities of commercial non household waste are significantly higher than shown in the recorded estimates.

.1.1 There is considerable uncertainty surrounding the prediction of waste arisings in future. Across England, there is a perhaps surprising variation in per capita waste arisings between local authorities. Waste collection authority arisings of household waste (i.e. excluding CA site waste) varied between 250 and 1,000 Kg per capita in 2000/01, and waste disposal authority household waste from 400 to 1,300 Kg.

Table 2 **Greater Manchester authorities waste arisings compared with English averages.**

Household Waste Kg. per Head of Population	
Bolton	416
Bury	450
Manchester	627
Oldham	414
Rochdale	405
Salford	448
Stockport	407
Tameside	478
Trafford	556
GM WCA Average (household & commercial)	467
<i>English WCA Average</i>	397
GMWDA (Total Collected and Civic Amenity)	592
<i>English WDA Average</i>	528

.1 As can be observed from Table 2, all of the Greater Manchester authorities have waste arisings per capita above the national average and in some cases considerably so. The average for the GMWDA waste collection authorities is 467 Kg/capita, which is 18% above the national average. Taken as a whole including civic amenity waste the GMWDA household waste arisings per capita are 12% above the national average – equivalent to 140,000 additional tonnes when extrapolated across the conurbation.

- 10.7 Research over recent years has established a clear link between affluence and waste production and given the fact that Greater Manchester has relatively high average indices of multiple deprivation score, it would be logical to assume that Greater Manchester's waste arisings would fall below the national average.
- 10.8 A number of factors may be involved. Urban areas in the north of England tend to have slightly higher waste arisings than their rural counterparts, which may have a distorting affect on the national average. Also, it has been shown by various research projects that the use of wheeled bins for refuse collection can cause waste arisings to increase, in some cases dramatically. As most households in Greater Manchester have wheeled bins, this may be a contributory factor, but is not likely to be that significant as a large proportion of English councils now also use wheeled bins.

There are some local authorities that have robust waste collection statistics where commercial waste has been excluded or is known with good precision. Chester CC and Halton BC, both within the NW Region, are examples of such authorities. These examples from different ends of the socio-economic spectrum show significant consistency in waste arisings.

Chester is an example where trade waste is not collected by the City Council. There is source segregated collection with residual waste collected in black bags. Here collected waste was recorded at 381 Kg/capita and 851kg per household in year 2000/1 (inclusive of street sweepings). A further example is Halton BC where the figure for collected household waste arisings was 391 Kg/capita and 946kg per household (2000/1 inclusive of street sweepings). Halton BC has very limited source separated collection and wheeled bins are used throughout the borough. Comparative analysis with average household waste collection arisings for GMWCAs (467 Kg/capita) indicates a level **over 20% higher** than would be expected if commercial waste were not included.

This analysis is consistent with the most likely explanation of the high levels of waste arisings i.e. higher than average levels of non-household waste are entering the Greater Manchester household waste stream, both on CA sites and at WCA level.

- 10.9 Given the imperative of reducing total MSW arisings, the option to reduce or even cease to collect and dispose of commercial waste presents an opportunity to make a significant contribution to meeting statutory and legal limits for the management of MSW in Greater Manchester.
- 10.10 Significant reductions in commercial waste collection cannot be achieved without considering the social and economic factors involved and without ensuring that adequate and more sustainable arrangements are in place to service the commercial sector that currently relies on municipal waste disposal.

- 10.11 The changing costs of commercial waste collection should also be borne in mind. WCA commercial waste collection services may become uncompetitive, if charges for commercial waste are set at a level that reflects the true costs of municipal waste disposal in future years. Private waste contractors will not be constrained by municipal waste landfill allowances and may be able to offer cheaper collection and disposal.
- 10.12 Food retail, restaurants and any commercial or institutional waste that includes catering waste will be banned from landfill from the end of 2005 and will have to be treated by specified means. Therefore this waste will have to be subject to separate collection and treatment with substantial additional costs.
- 10.13 Consideration can also be given to developing recycling and perhaps composting of commercial waste either through source segregated collection or through commercial equivalents to civic amenity facilities.

11.0 Reuse Recycling and Composting



- 11.1 We can make better use of the waste by recycling and composting. However, there are limits on the types and amounts of materials that can be readily and economically recycled, whilst the waste producer has to make more effort to keep waste clean and separated. Materials that can be recycled include metals, paper, cardboard, plastics, textiles and glass.
- 11.2 Options for waste recycling and composting through source segregation turn essentially on choices of systems of waste collection (collected household waste) and delivery (“bring sites” and civic amenity facilities etc.) as well as the types of materials segregated as recycle
- 11.3 Another main consideration is the balance between “collection” and “bring facilities” as the means of delivery of the recyclable and compostable materials. Experience with high performing recycling authorities is that investment is needed in both collect and bring systems in order to maximise recycling performance
- 11.4 Choices of options for composting have been significantly constrained by the Animal By-Products Order, which reflects environmental and health concerns over biological contamination. This limits the range of suitable waste types and promotes higher technology in-vessel composting. Costs for windrow and in-vessel composting are given in the section on modelling assumptions although it is recognised that windrow technology may only be permitted for green garden waste compostable materials.
- 11.5 The choices for recycling and composting cannot wholly be divorced from the choices for treating and disposing of the residual wastes. The

extent to which the waste stream is source segregated by the removal of green waste and dry recyclates will alter the character of the residual waste and therefore impact on the products of any further treatment. However, in practice the viable choices for residual treatment will have to be able to deal with a wide range of residual waste reflecting variable performance on source segregation that can be expected from differing socio-economic localities.

- 11.6 Finding markets for recycled materials and compost will also be a key factor in the success of the strategy. If the target of 33% of recycling and composting by 2010 is to be achieved, markets will have to be found for an eight fold increase in the amounts of material processed.
- 11.7 For the purposes of building up the cost and performance model scenarios for evaluation, source segregation with recycling and composting is included in all scenarios.

29.0 Household Collected Waste

- 12.1 The two principle variants for collected household waste are kerbside sorting of pre-segregated dry recyclable materials or sorting and packaging for transportation at a clean "MRF". Analysis given below illustrates significant differences in costs for these methods. Actual collection methods, specification of material types, container use and frequency of collections represent a significant number of variables and are modelled in detail. However, it must be noted that high levels of recycling performance will dictate that the widest range of materials are source segregated. This together with the need to secure high levels of participation across all areas of Greater Manchester including those with high levels of socio-economic deprivation, will have a significant impact on costs.
- 12.2 The collection system assumed can be summarized over time as follows;
- develop recycling infrastructure and management systems on CA sites;
 - focus on improving participation in existing kerbside collection schemes;
 - implement multi-material kerbside collection programmes for dry recyclables;
 - introduce 'high density bring' and other schemes for multi-occupancy dwellings;
 - introduce collection services for source separated garden "green" waste and eventually kitchen waste; and,

- introduce systems for capturing bulky waste, street sweepings and schools waste for recycling and composting

12.3 Modelling a number of systems shows that by collecting most recyclable materials mixed together and sorting them at central Materials Reclamation Facilities (MRFs) would have a lower net cost per tonne than sorting material at the kerbside. It has therefore been assumed that up to 2010, waste is sorted at the kerbside (in line with WCA plans and the successful bid to DEFRA for kerbside collection infrastructure) and that after 2010 a co-mingled collection takes over. This is not intended to suggest that all WCAs will necessarily be using similar systems for collection. Whilst MRF based systems have a lower overall cost, they are reliant on the development of waste treatment facilities which will require a significant timescale in planning and introduction, in advance of commissioning.

12.4 The basic collection systems will be supported by policies and investments to allow cost optimisation and maximised use of 'source separation' services by the public. These measures will include major, ongoing and cross media programmes of public education and awareness-raising. It is estimated that a budget of between £1 and £2 per household per annum will be required in order to achieve the target recycling and composting rates. Alternating recycling and residual waste collections may be introduced both in order to maximise participation and optimise cost.

13.0 Civic Amenity Sites

13.1 Civic amenity sites, now re-badged as household waste recycling centres, can prove to be very efficient in the rates of recovery of recyclate and green waste. Diversion from landfill to recycling and composting of over 50% are now reported by many authorities, whilst diversion rates of up to 80% have also been reported. Exclusion of commercial wastes from civic amenity sites and a high standard of operation have been key factors in high performing sites.

13.2 The GMWDA receives in excess of 300,000 tonnes per annum of wastes and materials delivered by members of the public to 25 sites across Greater Manchester (at least two in each District). Maximising recycling and composting from this waste stream is a key feature of the strategy. The recycling rate achieved in 2002/03 was 11.0%. With the full support of the partnership and DEFRA funding the sites will be transformed into major recycling centres and specific objectives have been set to improve performance to;

- 2005/6 – 20% recyclate, 20% compostable green waste
- 2009/10 – 25% recyclate, 20% compostable green waste,
- 2019/20 – 35% recyclate, 20% compostable green waste,

- 5% soils and rubble (non counting for performance outputs at all years)
- 13.3 Recycling on CA Sites is, by definition, cost effective when compared to other means of increasing the capture of household recyclables (e.g. kerbside collection). As part of a proposal to pool statutory performance targets for 2003/04, the GMWDA and the WCAs agreed to fund radical improvements to the CA site network described below.

14.0 Investment Proposals

14.1 Investment is planned in a number of key areas, all of which are intended to either facilitate recycling and composting, or to prevent waste arising in the first place.

- **Fabric and layout of sites;** almost all sites are in need of basic investment in recycling facilities and associated infrastructure. Those sites have been redesigned to change the layout and image to make source separation as convenient as possible compared to disposal
- **Site staffing levels;** it has been shown on the best performing UK sites that high diversion is about a combination of having the right facilities and 'customer services'. The staff complement is to be increased from the current average of 3 operatives per site to 5.5 (i.e. 62.5 additional staff during 2003/04 to 2005/06). All site operatives will receive customer services and sustainable waste management training in order to "meet and greet" site users and assist them to divert materials for reuse, recycling and composting.
- **Incentives;** clear responsibility to maximise recycling will be set out in the contractual arrangements. Best practice elsewhere has demonstrated the effectiveness of providing performance related incentives such as attainment of specific recycling/composting targets and target reductions in waste.
- **Trade Waste Prevention;** with the exception of a site in Tameside, the CA sites are confined to the deposit of household sourced materials. It is recognised that illegal deposits of trade waste take place at a number of sites. A package of measures will be deployed based on an analysis of best practice in the UK, and involving physical deterrents and a potential combination of commercial vehicles bans, a system of permits, limits on trailer sizes and the vigorous prosecution of offenders who demonstrate obstructive and violent behaviour. Trade waste prevention will be supported by increased staffing levels and the incentives under the contractual arrangements.
- **Customer awareness;** it is recognised that a major factor behind Greater Manchester's low performance in recycling is a lack of participation of the public where good services are offered. In order that the investments outlined above prove effective, it is planned to place two education officers permanently on CA sites, allowing each

site to benefit from a dedicated awareness raiser for one month per year.

- **Community/voluntary sector involvement;** the GMWDA intends to work in partnership with a number of furniture/white goods projects on a major reuse initiative, linked to identified market outlets.
- **Development of markets for recycled materials and compost**
Significant increases in the markets for recycled materials and compost will have to be achieved in order to make effective use of the recovered materials. This will be important to:
 - ensure that fit for purpose standards are developed for recycled materials and compost;
 - develop local markets for recycled materials
 - develop new business opportunities and innovation
 - reduce the environmental damage caused by transporting recyclable materials;
 - procurement in the public sector to prefer recycled products and materials

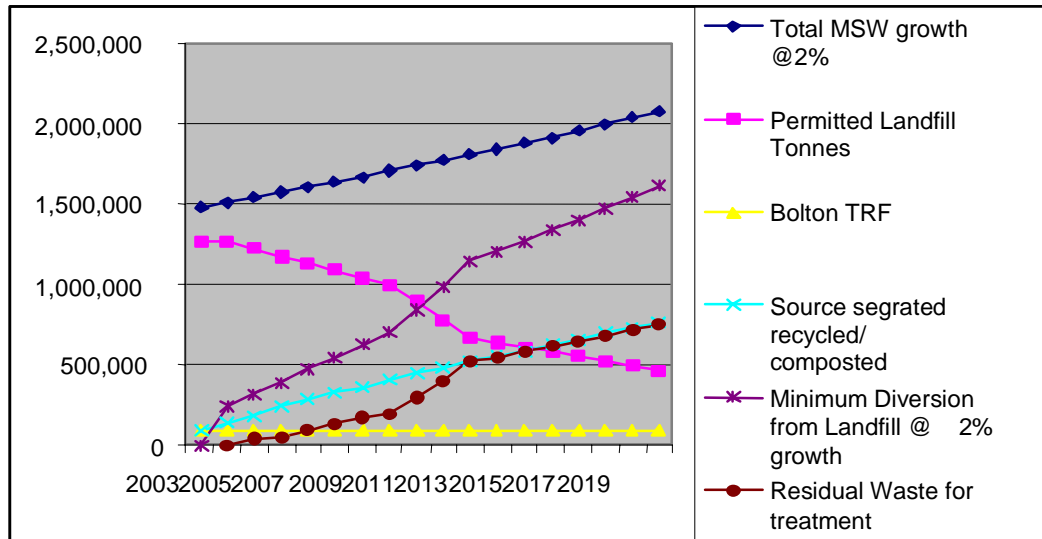
14.2 In addition to the initiatives emerging from the nationally based WRAP programme, the GMWDA is exploring a recyclables market development programme in Greater Manchester. The programme will build upon a consolidated database of sources (quantities of materials being collected and potential end users) that can be linked and developed to generate local market demand. This project will need financial support.

15.0 Residual Waste Management



- 15.1 By focusing heavily on collection/sorting systems and driving forward separation at source, considerable inroads can be made into reducing the volume of residual waste generated. However, it is likely that for the lifetime of this strategy, plans will need to be considered for at least a significant minority of municipal waste to be managed as residual waste.
- 15.2 Figure 4 shows a projection in which recycling and composting targets for household waste 2006/2010/2020 are achieved (20%, 33% and 50% respectively). In this scenario the permitted landfill allocation has been taken as the tonnage of waste landfilled in 2002/3 and a straight line projection from 2004 to 2010. This is based as an equivalent proportion of the total waste landfilled in England (the proportion of biodegradable waste is taken at 68% as provisionally indicated by Government). The actual landfill allocations may vary from this estimate as the relevant scheme is currently at consultation.
- 15.3 The figure shows that even if projected recycling and composting rates are achieved excess residual waste that cannot be landfilled could be generated as early as 2005/6 if additional measures are not taken.

Figure 4 - Biodegradable Waste to be excluded from landfill



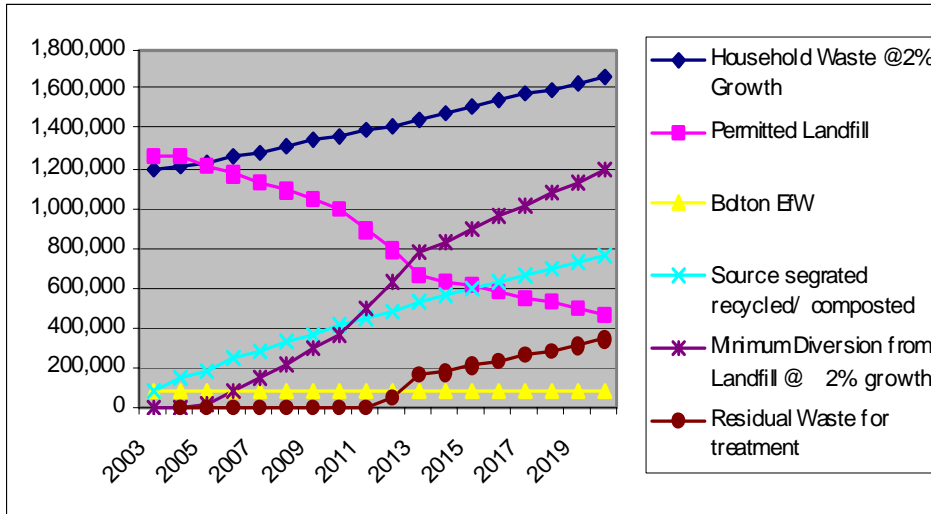
16.0 Landfill Allowances and Biodegradable Municipal Waste Diversion

- 16.1 The Waste and Emissions Trading Act, when implemented will limit the proportion of biodegradable municipal waste that will be permitted to be disposed of by landfill. The proportion will be restricted progressively between 2004 and 2020. Introduction of finite limits on the amount of biodegradable MSW that can be disposed of to landfill places an increased focus on the need to reduce the rate of growth in waste arisings and to develop alternative waste management solutions. Actual landfill allocations have not yet been published by Government although provisional indicators have been given on the basis for the calculation.
- 16.2 In terms of bio-diversion targets the introduction of allocated landfill allowances places a significant shift of focus of targets from percentages of waste arisings to specific tonnages. This arises because the allocated allowance will be a fixed tonnage in each year from 2004. The target for bio-diversion will be the remaining tonnage of MSW arisings, i.e. the total waste arisings in the year minus the permitted quantity for landfill.
- 16.3 The biodegradable element of MSW in England has been estimated at 68% for those purposes of the allowance scheme. The estimate may be amended following further research by the Environment Agency. The calculation used in the projections given below use 68% as the percentage of bio-degradable material. Any rise in the percentage estimate used could have a significant impact on the achievement of projected targets.
- 16.4 Since the baseline for calculating reductions in biodegradable waste sent to landfill is 1995, the interim and continued growth in waste arisings is a major consideration. Figure 5, illustrates the scale of the problem in showing the quantity of biodegradable waste which will have

to be excluded from landfill, assuming that waste arisings continue to grow at the (5 year historic) rate of 2%.

- 16.5 Residual waste in excess of the landfill quota may not arise so early in the projection if the Government decide not to use a straight line regression in the permitted landfill quantities and allow high rates of landfill disposal in the early years. It may also be possible to borrow permit quantities by up to 5% from subsequent years but this would mean early full implementation of residual waste treatment.
- 16.6 Alternative options for dealing with this issue include the option of reducing or ceasing trade and commercial waste collection and disposal at CA sites. Whilst the permitted landfill allowance will be based on the amount of waste landfilled up to 2002/3, the need for landfill is reduced by the reduction in non household waste, which currently all goes to landfill. If there is a 50% reduction in non household MSW, the projection is that it will be possible to meet all recycling and composting targets whilst excess residual waste does not arise before 2011.
- 16.7 The need for residual waste treatment may be delayed if the allowance scheme provides more flexibility than indicated in the consultation and or there is a significant reduction in commercial waste or early implementation of recycling and composting targets.

Figure 5 Biodegradable Waste Diversion – Excluding Commercial waste



17.0 Residual Waste Treatment Options

17.1 There has been a considerable lack of confidence in alternatives to landfill such as anaerobic digestion and composting often perpetuated by mistakes that have been made in the past elsewhere. For example, previous attempts to produce compost have often been based on using mixed waste as input to mechanical separation, resulting in contaminated output (plastic pieces and glass shards being the troublesome contaminants).

- 17.2 However, the technologies for dealing with residual waste are constantly evolving. Organic and biodegradable waste can be used to produce energy in the form of heat or electricity. Processes such as Anaerobic Digestion, Autoclave and Mechanical and Biological Treatment (MBT) may be used to treat residual wastes (after separation of recyclable and compostable waste) to produce solid and gaseous fuels for energy production. New technologies such as gasification and conversion of waste to pellets or briquettes for use as fuel in power generation and cement kilns, offer options alongside more conventional energy from waste plants.
- 17.3 The primary aims of residual treatments are to reduce weight, volume and toxicity/pollution potential of residual waste. These ends are broadly achieved through either breaking down the residual waste materials biologically ('composting'), thermally and mechanically or combusting it (or converting it into more combustible compounds) or in various combinations.
- 17.4 Residual waste treatment processes considered in the scenarios are MBT with Refuse Derived Fuel (RDF) used for energy recovery, Steam Sterilisation and Mechanical Treatment (SSMT) with RDF used for energy recovery and traditional Energy from Waste (EFW). Landfilling of residual waste is included as a scenario in the residual options for comparison as it is the current method of disposal.
- 17.5 Technologies such as anaerobic digestion or pyrolysis are not considered in the detailed modelling analysis as these technologies remain unproven with regard to treatment of mixed residual waste. However, the procurement policy for residual waste treatment will eventually be based on an output specification. This leaves the opportunities open for new and emerging technologies to be used should they be able to maximise recycling and energy recovery whilst minimising landfill and environmentally damaging by-products.

18.0 Mechanical-Biological Treatment (MBT)ⁱ

18.1 MBT is a generic name for a range of processes. In its simplest form waste is bio-stabilised followed by landfill. More complex plants provide bio-stabilisation followed by recyclate recovery, aerobic treatment of the organic fraction and energy recovery, followed by landfilling of the residues. Available data is from European plants treating mixed MSW.

- **Technology status:** technology proven in mainland Europe with 70 plants in operation.
- **Implementation timescales:** The status of Refuse Derived Fuel and whether this is burnt for energy recovery or landfilled could have a major impact on overall timescales, in particular if some form of energy recovery plant is co-located with the MBT plant

- **Economies of scale:** Considerable economies envisaged on larger plants on account of automation. Technology maturation also expected to lead to considerable economies on specialised buildings

Advantages:

- Suitable for treatment of residual MSW stream after targeted level of source segregated recycling and composting.
- Acts to bio-stabilise residual waste fraction and promotes bulk reduction through degradation and evaporation
- Potential for significantly reduced landfill gas and leachate production due to bio-stabilisation.
- RDF produced is a cleaner and more consistent feedstock for energy recovery (e.g. by gasification) than mixed MSW in traditional EfW plants
- The quantity of residual waste disposed of to landfill is reduced, particularly where RDF is beneficially utilised
- The need for landfill should be substantially reduced
- RDF use could help displace virgin fossil-fuel use and assist in reducing long distance transport/import of coal

Disadvantages and Concerns:

- Uncertainty of the contribution towards BVPIs for secondary recyclates
- Little operational experience in the UK. Plants operating similar processes at Doncaster and Byker have had mixed success though the latter remains operational
- Represents a significant investment that may only help comply with the Landfill Directive through volume reduction
- Residue disposal requirements to landfill may exceed permitted landfill limitations
- Limited landfill if resulting RDF is used for energy recovery.
- Some concerns that if waste is not sufficiently bio-stabilised, methane production could still result in landfill.
- RDF combustion plants will have to meet Waste Incineration Directive controls
- Has significant emissions and requires emission controls
- Bio-aerosols/odours may form
- Spent emission control residues may be hazardous waste

18.2 There are a number of different MBT systems available quoting different outputs. Output data is only available for mixed MSW inputs. Source segregation of recyclables and composts may be predicted to significantly affect MBT outputs and may reduce outputs of recyclate. Outputs are typically in the following ranges.

Table 3 MBT systems outputs

Range of outputs	Outputs modelled in Scenarios
Loss to air and sewer 20-30%	25%

Organic Fuel/RDF 45-55%	50%
Recyclables 3-12%	5%
Residual Waste 0-25%	20% residual and inert
Residual Inert 15%	

- 18.3 The higher figures for recycling include glass and plastics whilst the lower figures are for metals only. Recovery of plastics and glass may require additional hand picking of the wastes and/or may produce low value recyclate with limited end use or may require significant additional processing of separated fractions. For the purposes of developing viable scenarios and reflecting source segregation within the proposed scenarios, recyclate recovery from MBT is considered for metals only.
- 18.4 Performance with respect to landfill bio-diversion targets will be highly dependent on the extent to which the residual output if landfilled, can be described as biologically stabilised. Systems with more intensive biological processes would increase the potential for disposal of residues to landfill and/ or may produce “cleaner” RDF but increased retention times and processing will have consequences for the physical size of a plant and operational costs.
- 18.5 Treatment of MSW by MBT could reduce the environmental impact of the waste, with respect to landfill gas emissions and leachate, by more than 90 % but still not achieve the EU landfill threshold values. If organic material separated as RDF were landfilled and not used for energy recovery, it is very likely that this organic material would be classified as biodegradable and thus fail EU Landfill Directive obligations.
- 18.6 A number of studies about waste management alternatives show that from a system specific point of view, landfill is the least favourable option in terms of environmental impacts and efficient use of resources and that for each waste type; no net benefit can be obtained from the final disposal of that waste. As long as any kind of well managed recovery – ranging from recycling to energy recovery even reclamation of energy in a municipal incinerator – deliver environmental benefits, the lack of benefit from the landfill option clearly devalues the landfill alternative. In particular, this type of assessment shows that high calorific value wastes are literally wasted when landfilled. Applying the landfill option for a possible RDF waste stream should only be considered for waste material for which the energy recovery might cause a high environmental impact.

19.0 Higher performance residual waste treatment

- 19.1 Residual waste treatment processes consist essentially of a process that breaks down the organic components of the waste, which then allows different material types such as fibres, metals, plastic, glass and inert residues to be separated mechanically. The more complete the

breakdown of the organic material, the easier it is to separate the principal components.

- 19.2 The use of biological processes in conventional MBT systems limits the degree of separation that is possible to some extent. Other processes use techniques such as sterilisation, followed by mechanical treatment which involves heating or “cooking” the waste in a rotating vessel using high temperature and pressure steam. Paper and non woody organic materials are reduced to a fibre. The sterile product of this process is treated mechanically to separate recyclables from fibres and residues (trials indicate about 10%residual waste). The fibres produce a consistent and homogeneous RDF that may be use for energy recovery by gasification. The recovered fibres may have a number of potential uses other than RDF, including fibre board production.

Table 4 High performance residual waste treatment outputs

Range of outputs	Outputs modelled in Scenarios
Organic Fuel/RDF 55-65%	60%
Recyclables 15-20%	18%
Aggregate10-15%	12%
Residual non bio-degradable 10%	10% residual and inert

19.3 Technology Status

An operational scale plant (combined with gasification of RDF) is currently under evaluation in South Wales. Similar type processes are also under development in the USA.

Implementation timescales

Subject to successful evaluation, implementation timescales should be similar to those projected for MBT projects.

Economies of Scale

The thermal processing vessels are batch process and thus modular but mechanical processing plant and Advanced Thermal Treatment (ATT) (gasification) elements will benefit from economies of scale.

Advantages:

- Can process both mixed MSW and residual waste after source separation
- Relatively efficient in both recovery of recyclate and energy
- Minimal residuals for disposal by landfill
- Process products sterile and more efficiently separated than from crude or biologically treated processes
- TS plus ATT could in theory be used as a ‘one stop shop’ approach to MSW waste target delivery under the Landfill Directive
- Produces homogeneous RDF which may enhance the viability of ATT technologies, in particular for gasification.
- Competitive quoted costs

Disadvantages:

- New technology not yet routinely operational in the UK
- Lack of available independent evaluation and assessment

- Mechanical treatment may require further development
- Markets for recyclate materials will require substantial development in order to make use of quantities and types of recyclate generated
- Limited landfill still required for residues and ash, flue gas/gas scrubbing residues
- Aesthetics are of industrial-style plants with chimney stack, but significantly smaller-scale than for mass-burn incineration

20.0 Energy Recovery from RDF

- 20.1 A number of studies about waste management alternatives show that from a system specific point of view, landfill is the least favourable option in terms of environmental impacts and efficient use of resources and that for each waste type, no net benefit can be obtained from the final disposal of that waste. As long as any kind of well managed recovery – ranging from recycling to energy recovery via incineration – delivers environmental benefits, the lack of benefit from the landfill option clearly devalues the landfill alternative. In particular, this type of assessment shows that high calorific value wastes are literally wasted when landfilled. Applying the landfill option for a possible RDF waste stream should only be considered for waste material for which the energy recovery might cause a high environmental impact.
- 20.2 The MBT and Steam Sterilisation and Mechanical Treatment (SSMT) processes can both produce RDF for energy recovery. Process technology for utilising the RDF can vary from advance thermal treatment (ATT) processes such as gasification and pyrolysis to conventional heat and power generation plant. Different MBT and related treatment processes such as SSMT will produce a significant range of variety in the physical and chemical nature of the RDF and thus, the suitability of any RDF to a specific energy recovery process will vary accordingly.
- 20.3 At the lower end of the scale, energy recovery processes may require emission control similar to that for incineration, whilst more refined RDF may be used as conventional fuel. Processes that produce a very “clean” RDF will have wider applications and higher value. Cost or revenues from RDF production remain problematic to predict thus projections used in this scenario are neutral with respect to the costs of RDF disposal. However it must be recognised that there could be significant additional capital and operational costs involved in the development and running of plant disposing of relatively unrefined RDF.
- 20.4 MBT or related treatment processes may be considered as a more flexible solution than mass-burn incineration. Not only can the biological treatment aspect of the process be made modular (to allow switching away from treatment of mixed waste to composting of source separated waste) but also the use of RDF in co-incineration plants removes the

need to invest in capital intense, dedicated incineration (or thermal treatment) facilities.

- 20.5 RDF from MSW can be utilised in other processes than incineration and combustion.
- 20.6 Gasification and pyrolysis processes are generally promoted as “greener” alternatives to incineration or energy-from-waste. Via gasification, the energy content of the waste is transformed into a syn-gas, which can be re-used as chemical feedstock or to produce power.
- 20.7 Pyrolysis produces from waste a bio-fuel and syn-gas, which again can be used as chemical feedstock and/or for power production. However, the major negative factor about adopting gasification and pyrolysis for waste treatment is that they are less proven in operation than mass burn incineration and can be just as inflexible as mass burn incineration. In contrast to mass burn incineration, which is optimised around large-scale single site implementation, many gasification and pyrolysis processes lend themselves to economic implementation at smaller scale.
- 20.8 Use of RDF in industrial processes offers more flexibility than incineration. It leaves more opportunity for future recycling programmes. It does not need to be fed with a constant amount of waste and it does not require investment in capital intensive dedicated incineration facilities.
- 20.9 RDF used in coal power plants and cement works, due to the effective substitution of primary fossil fuels, shows a large number of ecological advantages when they are compared with the alternative combustion in a MSWI as long as the plants comply with the new Waste Incineration Directive 2000/76.

21.0 Energy from Waste (EfW) Mass-Burn incineration

- 21.1 Energy from Waste (EfW) Mass-Burn incineration is the combustion of unsorted MSW under strictly controlled operating conditions, converting input material into energy (for power and/or heat recovery) and ash. The process results in bulk reduction and stabilisation of MSW. EfW is not a substitute for recycling. Plants should be sized for residual waste streams after targeted levels of source segregated material recycling and/or composting have been achieved.

Technology status:

This is the most developed waste treatment and processing technology and is used extensively in mainland Europe.

Implementation timescales: Unpopularity results in long lead-times. As a result, plants at design stage today are unlikely to meet 2010

commissioning. Smaller plant capacities may aid progress on grounds of proximity (design to commissioning 1 to 5 years).

Economies of scale: There are significant economies with large plant sizes.

Advantages:

- EfW could in theory be used as a 'one stop shop' approach to MSW waste target delivery under the Landfill Directive, but this approach is neither politically deliverable nor advantageous for nutrient and wider materials recovery.
- Produces a stabile residual
- Allows secondary recycling from (non-)ferrous metals and bottom ash (used as a secondary aggregate), displacing virgin raw resources
- Energy recovery – in the form of heat and/or power – can help to reduce fossil-fuel dependency and renewable CO₂
- Beneficial outlets exist for bottom ash as a secondary aggregate
- Risks to public health of exposure to pollutant releases regarded as insignificant in recent NSCA report (NSCA 2000) whilst Waste Incineration Directive requires stringent EU control of releases to air and water.
- Releases from combustion of the biogenic fraction of MSW are conducive with Climate Change policy

Disadvantages and Concerns:

- This technology suffers from poor public perception with public concern over dioxins and deterioration of local air quality, however
- Poor aesthetics as large-scale industrial-style plant require use with chimney stack
- May discourage recycling and composting if oversized in capacity
- High capital and operating costs
- Lack of flexibility once the commitment to EfW is made

22.0 Performance Models for Integrated Waste Management Scenarios



22.1 This section sets out the viable scenarios for integrating the available waste management methods and options that will meet the Greater Manchester strategy objectives and targets. Performance models have been developed for the selected scenarios for specified target years 2005/6, 2009/10, 2012/13 and 2019/20.

22.2 Options can be considered in which the components of minimisation, recycling and composting and residual waste treatment described above can be used to develop an integrated scenario that will be practical and effectively deliver strategic objectives. Scenarios take into account projected increases in waste arisings in accordance with the specified waste strategy targets.

Technical Scenarios Modelled

1. Do nothing with 6.1% diversion from landfill, no non HH waste reduction and current waste management arrangements

This scenario is considered for comparative purposes as this reflects the status quo for disposal of residual waste. However, this scenario is not viable as a long-term strategy as it will fail to meet permitted quantities under the Waste and Emissions Trading legislation and Landfill Directive requirements. Costs can be predicted to increase significantly.

2. Source segregated recycling and composting only as a means of meeting the waste strategy targets

This scenario, which relies on source segregated recycling and composting to meet the strategy targets is viable for target year 2005/6 and has the potential to satisfy strategic performance targets until year 2010/11 if waste reduction and minimisation targets are met.

3. Source segregated recycling and composting, treating residual waste by MBT or related processes with similar output specification with energy recovery from RDF

This scenario (assessment) is based on MBT or related processes, with similar output specification, producing RDF which is used for energy recovery and recycle together with some treated residues disposed of to landfill that are classified as biologically degradable.

4. Source segregated recycling and composting, treating residual waste by SSMT (MBT/BMT/ and related processes) with higher output specification with energy recovery from RDF

This scenario (assessment) is based on SSMT (MBT/BMT/ and related processes or related processes which are currently under development and may be able to achieve better separation of materials from the residual waste thus producing more and higher quality recycle and a more consistent quality of RDF, whilst reducing the quantities of residues for landfill to non biodegradable status.

5. Source segregated recycling and composting, treating residual waste by Energy for Waste through a traditional Thermal Recovery Facility

Under this scenario recycling and composting targets are achieved almost entirely through source segregated collection whilst thermal treatment ensures that landfill bio-diversion targets are met.

22.3 It is recognised in this evaluation that assumptions must be made which are generic in nature and by no means precise. What can be predicted is continuing improvement in technical capacity and performance

specification, particularly for waste treatment technology, ongoing change in the areas of legislation and policy, and variations in costs. Therefore assumptions about unproven technologies and environmental or sustainability performance levels must be taken as indicative and not clear cut predictions. The methodology used recognises these difficulties and addresses the practicality of potential scenarios and technical options, the environmental considerations and sustainability and the risks involved in forward planning based on the assumptions made.

23.0 Evaluation of Models – The Tests

23.1 Development of conclusions about the choice of preferred scenario is influenced by a number of factors. These factors have been considered both with respect to relevant individual technical options or approaches and the scenario as a whole.

- proven performance levels and overall delivery of strategy targets for recycling, composting, recovery and bio-diversion
- participation rates,
- operational criteria, reliability and technical suitability to local circumstances
- Capital costs (operational with short, medium and long term projections)
- Cost and practicality of change
- Capital and revenue funding options
- Procurement and contract policy implications e.g. analyse market stability for recyclables, and make recommendations to reduce risks and secure long-term contracts with reprocessors
- Consideration of securing waste management sites and infrastructure, including land-use planning
- Key stakeholders and partnerships and any additional players in the delivery of new waste management options, together with their roles and responsibilities
- Consultation including the public as well as key stakeholders
- Best Practicable Environmental Option analysis
- Risk management analysis

- Business needs analysis
- 23.2 Output performance scenarios are modelled in Appendix A. Options and scenarios that fail to meet the long term targets have not been modelled or considered in detail beyond the point where it can be reasonably concluded that the scenario/option will fail to meet the long term GMWDA waste strategy targets
- 23.3 Of the five scenarios considered above, Scenario 1 “do nothing” represents the status quo in waste management techniques and will undoubtedly fail to meet the targets. Costs are modelled through to 2020 to illustrate that “do nothing” is in fact a high cost option. Scenario 2 – “Source separated recycling and composting with residual waste disposed of to landfill without further treatment” also fails to comply with long term GWWDA targets and Landfill Directive legislation and is therefore not given detailed consideration as a long term option.
- 23.4 Scenarios 3 and 4 can be judged as representing two ends of a spectrum of residual waste treatment processes that rely on a range of biological and thermal treatments (including “cooking under pressure”) to effectively eliminate pathogens by biological activity or sterilisation and break down of the organic components of the residual waste so that these can be separated from inert material, glass and metals. Depending on the nature of the process and the nature of material produced, various mechanical processes can also be used to separate materials such as plastics, textiles, organic fibres, compost etc. Product materials may be variously suitable as raw material for manufacture from recycle, compost/soil substitute manufacture or for use as refuse derived fuel. In some cases, treatments offered by branded manufacturers may be tuned to meet different output specifications for recycle, compost type materials or RDF. Therefore whilst scenarios 3 and 4 have some fundamental differences ie in scenario 3, the treatment is essentially a biological process with an element of bio-stabilised waste disposed of to landfill, it may be the case that any specific branded technology could be tuned to produce a different mix of outputs.

Table 5 Assessment of Scenario in Compliance with Strategy Targets
(R/C = Recycling and Composting Targets)

Scenario	Compliance with targets			
	2006	2010	2013	2020
1. “Do nothing” with 6.1% diversion from Landfill no non HH waste reduction and current waste management arrangements	Meets R/C Fails Landfill Permit	Fails R/C Landfill Permit/Directive	Fails Landfill Permit/Directive	Fails Landfill Permit/Directive
2. Source segregated recycling and composting only as a means of meeting the waste strategy targets	Meets R/C Meets Landfill Permit	Meets R/C Meets Landfill Permit	Fails Landfill Permit/Directive	Fails Landfill Permit/Directive

3. Source segregated recycling and composting, treating residual waste by MBT or related processes with similar output specification with energy recovery from RDF	Meets R/C Meets Landfill Permit	Meets Landfill Permit/Directive	Meets Landfill Permit/Directive	Just Meets Landfill Permit/Directive
4. Source segregated recycling and composting, treating residual waste by SSMT (MBT/BMT/ and related processes) with higher output specification similar output specification with energy recovery from RDF	Meets R/C Meets Landfill Permit	Meets Landfill Permit/Directive	Meets Landfill Permit/Directive	Meets Landfill Permit/Directive

29.0 BPEO, Sustainability Ranking Assessment

24.1 BPEO, sustainability and risks assessments are set out in Appendix C.

- 1 Source segregated recycling and composting, treating residual waste by SSMT (MBT/BMT/ and related processes) with higher output specification with energy recovery from RDF (Ranking points 33).
This scenario achieves the highest rank on the basis of the highest level of potential recycle recovery and lowest levels of emissions of the three scenarios considered.
- 2 Source segregated recycling and composting and in-vessel composting plus residual waste treatment by Mechanical Biological Treatment and advanced thermal treatment of Refuse Derived Fuel, with some residual treated waste to landfill. (Ranking points 28)
Potential air emissions and spent emission control residues, together with residual landfill, reduce option ranking.
- 3 Source segregated recycling and composting plus Energy recovery from Waste from mass burn incineration. (Ranking points 21).
This scenario produces the lowest ranking through its low recycle recovery rates and poor public perception and acceptability together with high capital costs

30.0 Development of the Preferred Waste Management Options

- 25.1 The conclusion of the evaluation of scenarios is that Scenario 4 (based on source segregated recycling and composting and high performance residual waste treatment by Steam Sterilisation or Mechanical Biological Treatment and related advanced treatments with Refuse Derived Fuel) is the preferred option, with Scenario 3 ranking closely in second place. Scenario 5, based on EfW, is evaluated as the least favoured option.
- 25.2 This methodology for assessment, including sustainability, business needs, risk assessment and consultation, has essentially been based on

evaluation of technologies within projected scenarios. This assessment has essentially informed and brought into focus the key issues that separated the scenarios considered and that must underpin the decision making process.

- 25.3 The key issues that separated the scenarios in the overall assessment were essentially the process outputs, in terms of maximising recycling and recovery, together with costs. (Public acceptability was also a significant factor in the scenario based on EfW as well as cost).
- 25.4 Assessments for Scenarios 3 and 4 produced a close score on ranking points. This is because the technical options identified for treating residual waste represented two ends of a spectrum of residual waste treatment processes. Scenario 4 essentially ranks higher because of its process outputs (potential for maximising (the production of) recycling and recovery), whilst it may also produce the lowest levels of process emissions. However, specific branded processes within the range of processes commercially available (and under development) may also be able to meet similar output specifications to those assumed for Scenario 4, whilst remaining within the envelope of technical assumptions that underpinned the assessment process and outcome.
- 25.5 The primary technical options within Scenarios 3 and 4 are technologies that have only been recently developed or are currently still under development. Whilst these options produced the highest overall ranking, it must be recognised that these rankings are achieved on the basis of performance assumptions that cannot yet be tested against the proven performance of current operation at plant in the UK. The risk assessment clearly identifies some significant risks concerning the assumptions underpinning these technologies. In adopting a strategy and implementation plan, this will include specific risk management actions to ensure that these risks are fully addressed.
- 25.7 **Development and implementation of this strategy will therefore be based on prescribing the type of outputs required from the treatment process (maximising recycling and recovery from residual waste) rather than a specific prescription of the process technology. These outputs from the residual waste treatment process will be consistent with those projected within Scenario 4.**

26.0 Cost Models for Integrated of Waste Management Options



- 26.1 This section sets out the costs of implementation of the waste management strategy. Costs modelled are benchmark costs derived from current industry standard estimates. The models are therefore illustrative on the basis of the best known information and assumptions.

27.0 Assumptions made in the Scenarios for Performance and Cost Modelling

27.1 Precise modelling of quantitative requirements and costs are limited by the quality of information and data currently available. It must be noted that there is continuing development in the detailed implementation of legislation in which apparently small and detailed variances in statute and interpretation can have significant impacts in terms of changes to required management techniques and costs.

28.0 Waste Arisings and quantities

- Baseline waste arisings figures are the actual for year ending April 2003.

- Waste streams are classified as:

Collected Household waste (inclusive of door step collections, recycling and composting, including any bring recycling by WCAs)	863,000 tonnes
Civic Amenity Waste (inclusive of recycling and composting)	328,000 tonnes
Bulky and non household waste (Includes commercial waste collected by WCAs)	292,000 tonnes
(20% of total MSW arisings)	
Recycled and composted 6.1%	(91,000) tonnes
Total MSW arisings year ending April 2003	<u>1483,000</u> tonnes

- Waste growth projections are taken as the same growth rate for each waste stream with the exception of -
- Bulky and non-household waste which is reduced by 50% reflecting a reduction in the collection of commercial waste
- A growth in waste arisings is projected at **2% up to 2010**. It should be noted that a growth rate of 2% is less than the current national average and its achievement is in line with Cabinet Office Strategy Unit recommendations on waste growth limitation.
- From 2010 waste growth is projected to fall at a linear year on year rate until growth is stabilised at **nil growth by 2020**

Table 6 Waste Growth Projections @ 2% until 2009/10 and Zero by 2020

Waste Arisings - tonnes Year ending April	2003	2006	2010	2013	2020
Collected Household Waste	863,000	919,000	994,000	1,046,000	1,091,000
Civic Amenity Waste	328,000	345,000	374,000	402,000	420,000

Non Household Waste including commercial waste	292,000	141,000	154,000	163,000	168,000
Total MSW arisings	1,483,000	1,419,000	1,535,000	1,610,000	1,679,000

29.0 Targets

- The assumption is made that all targets for recycling and composting are met
- Recycling and composting targets (these exceed publish BVPI targets) are
 - 20% for 2005/6
 - 33% for 2009/10
 - 50% for 2020
- Waste and Emissions Trading (WET) landfill allowances have been calculated using the published national target figures and making the presumption that GMWDA will have an equivalent proportion of the national allowances to that of its current (2002/3) share (6.1%) of the total quantity of waste landfilled in England at key target dates and extrapolating linear projections for intermediate years. Allowances have been made in the calculations such that the figures shown represent the total waste quantity as it arises, not just the biodegradable fraction (given as 68%) in the DEFRA consultation.

Table 7 Estimated Waste and Emissions Trading Allowances

Target Years	2004	2006	2010	2013	2020
Estimated WET Landfill Allowances (MSW with 68% biodegradable content)	1,266,000	1,177,000	1,000,000	669,000	465,000

- The value of tradable WET landfill allowances is estimated at a nominal £20 per tonne. Income from WET trading at a nominal £20 per tonne is included in the projected costs.
- Penalties for failure to meet WET targets are estimated at £100 per tonne

30.0 Waste Management Methods and Performance

- Performance of source segregated **waste collection** will be that required by the target dates
- 2005/6 – 10% recyclate, 10% compostable green waste, 110k tonnes per annum treatment by TRF, remaining waste is residual
- 2009/10 – 18% recyclate, 15% compostable green waste, 110k tonnes per annum treatment by TRF, remaining waste is residual
- 2019/20 – 30% recyclate, 15% compostable green waste, 5% in-vessel compostable bio-waste, 110k tonnes per annum treatment by TRF, remaining waste is residual
- Recycling and composting performance at **Civic Amenity sites** is projected as
 - 2005/6 – 20% recyclate, 20% compostable green waste
 - 2009/10 – 25% recyclate, 20% compostable green waste,
 - 2019/20 – 35% recyclate, 20% compostable green waste,
 - 5% soils and rubble (non counting for performance outputs at all years)
- Performance of residual waste treatment process outputs are based primarily on government's Cabinet Office Strategy Unit report studies, published studies and industry provided performance data (Set out in separate table)
- Scenarios that model the performance of integrated waste management methods which will implement the requirements of the strategy have been completed for each target year. These models take into account waste growth and required performance in accordance with the strategy targets. These performance models are given in Appendix B.

31.0 Cost Modelling

- Input and output tonnages from the performance models in Appendix B have been used to estimate costs in each of the target years.
- The cost estimates per tonne are **benchmark costs** derived from current industry standard estimates. Actual implementation costs may vary according to local factors and the capabilities of specific service providers. Current cost estimates - GMWDA costs estimates are used for year 2003/4.

32.0 Waste Collection Costs

- Current cost assumption for kerbside waste collection at current recycling rates is taken as an indicative £30 per tonne.

- Cost for kerbside sorted collection is taken as an indicative £75 per tonne (2.5 times current indicative cost). For year 2019/20 the multiple is taken as 2.75 giving an average cost of £82.50 to take into account the high levels of recyclate diversion required and additional collection of kitchen waste. The estimated figures are net of costs and income from recyclate and include all WCA costs of delivery of materials and residual waste to WDA designated facilities. It should be noted that actual costs may vary for individual waste collection authorities. It should also be noted that kerbside sorting is labour intensive and it may be difficult to secure long term cost efficiencies. Securing high source segregated recycling rates under difficult socio economic conditions may introduce additional cost pressures as high recycling levels are achieved.
- Cost for comingled recyclate with MRF is taken as an indicative £60 per tonne (doubling the current indicative cost). This is consistent with national waste industry estimates and empirical data from pilots and implemented collection schemes. The figure is net of costs and income from recyclate and includes all WCA costs of delivery of materials and residuals waste to WDA designated facilities. This costs estimate is also consistent with that given for long term costs in the report by Enviro. Actual costs may vary for individual waste collection authorities. Whilst it should be possible to gain long term cost efficiencies securing high source segregated recycling rates under difficult socio economic conditions will introduce additional cost pressures.
- For year 2005/6 it is assumed that full source segregated collection services will apply to 50% of households
- From year 2009/10 full source segregated collection services are assumed for all households

33.0 Waste processing and disposal

- Transfer costs currently add £20 per tonne to collection and disposal costs. Whilst some waste transfer costs will still apply to waste taken to landfill outside of Greater Manchester, these costs will be eliminated when wastes are removed for recycling and composting or processed by residual waste treatment. Waste transfer costs are therefore only retained within the model for those waste streams disposed of to landfill outside of Greater Manchester. The model assumes that WCA waste processing facilities are within Greater Manchester and that WCAs will deliver waste directly to these facilities where this is the case.
- MRF costs are estimated at £40 per tonne based on Cabinet Office Strategy Unit report studies and supplementary investigation reports.

- TRF costs have been estimated on basis of Bolton fixed costs plus Bolton adjustment – this gives £47.25 as an operational cost. TRF costs are projected to rise by 50% from 2013 to take into account the capital costs of refurbishment
- Long term landfill costs from 2010 are based on £65 per tonne - £35 tax plus £30 gate fee. This tax level is taken as the minimum and could be increased. Gate fees are predicted to at least double through increased landfill specification and environmental controls required by the Landfill Directive and scarcity of landfill provision due to difficulty in securing new long term landfill site developments.
- MRF costs are estimated at £40 per tonne and green waste composting costs are estimated at £23 per tonne. In-vessel composting costs are estimated at £45 per tonne. These costs are estimated as net of income from recyclate and compost which are taken as essentially neutral with respect to process costs. There are significant uncertainties on long term market stability, costs and income that cannot be accurately factored into cost projection models since markets for recyclates must increase by more than 5 fold to accommodate the increased levels of recyclate extracted from source segregated waste.
- Residual waste treatment costs at £48 are based on industry quotes and the government's Cabinet Office Strategy Unit report studies in line with industry standard estimates. Costs are modelled on the basis of a nominal average MBT performance taken from Cabinet Office Strategy Unit report studies and industry published material. Gate fee costs for higher performance specification technologies have been quoted within similar estimates to those for more established MBT processes. Costs modelling therefore does not differentiate between these processes, despite some differences in output performance other than for residual landfill costs, which are taken as additional to process costs. Higher performance residual waste treatment processes may reduce costs.
- However, most of these processes have not yet progressed beyond demonstrator projects and reliance on such high performance levels would represent a significant risk. Costs and values associated with RDF are included as net within the residual waste treatment gate fee price.
- Other waste costs as at 2003 costs. These may increase with WEEE requirements but these should not be highly significant when compared with main cost elements and long term uncertainties in cost projections. Other WDA costs are based on the current GWWDA cost model.

34.0 Commissioning of MRF residual waste treatment technologies

- 34.1 A considerable amount of time must be allowed for between the point of decision making on the implementation of residual waste treatment and the date when the process can become operational.
- 34.2 The models assume that any new MRF facilities will not be completed in time to meet 2005/6 target year commissioning.
- 34.3 Given issues such as finding sites, obtaining planning permissions and licences as well as tendering, contract design, building and commissioning, it may be expected that these processes may take a period in the order of 5 years or so, dependent on any issues emerging out of this wide range of variables. In considering the scenarios below, it is assumed that residual waste treatment technologies can be implemented by year 2009/10.

Table 8 Costs Summary for Greater Manchester MWMS Implementation

Scenario		Annual Cost £m @ 2003 values				
		2002/3	2005/6	2009/10	2012/13	2019/20
Do nothing 6.1% diversion from Landfill no non HH waste reduction, current waste management arrangements	WDA Costs	£72	£88	£140	£148	£167
	WET Fines		(£19)	£49	£91	£126
	WCA Costs	£26	£28	£30	£32	£33
	Total Costs (Inc fines)	£98	£116 (£135)	£170 (£219)	£180 (£271)	£200 (£326)
Strategy targets achieved 50% reduction in non Household waste No Residual waste treatment Kerbside Sorting	WDA Costs		£78	£105	Fails Targets	Fails Targets
	WCA Costs		£48	£75	Fails Targets	Fails Targets
	Integrated Costs		£126	£180	Fails Targets	Fails Targets
Strategy targets achieved 50% reduction in non Household waste No Residual waste treatment MRF Recyclables Sorting	WDA Costs			£112	Fails Targets	Fails Targets
	WCA Costs			£60	Fails Targets	Fails Targets
	Integrated Costs			£172	Fails Targets	Fails Targets
Strategy targets achieved 50% reduction in non Household waste Early introduction of residual waste treatment Kerbside Sorting	WDA Costs			£81	£92	£93
	WCA Costs			£75	£78	£90
	Integrated Costs			£155	£170	£183
Strategy targets achieved 50% reduction in non Household waste Early introduction of residual waste treatment MRF Recyclables sorting	WDA Costs			£99	£101	£107
	WCA Costs			£60	£63	£65
	Integrated Costs			£147	£162	£171

Cost of meeting full strategy Implementation (2020 targets) based on Nil growth (2003 Waste Arisings) Kerb side sort collection	WDA Costs	£66
	WCA Costs	£72
	Integrated Costs	£138
Cost of meeting full strategy Implementation (2020 targets) based on Nil growth (2003 MSW Arisings) MRF Recyclables sorting	WDA Costs	£74
	WCA Costs	£52
	Integrated Costs	£126

35.0 Performance and Cost Modelling Conclusions

- Do nothing is not an option. By 2005/6 this will only transfer costs from collection to disposal and from there on increasing landfill disposal costs and penalties rapidly escalate costs beyond more sustainable waste management options
- Waste collection costs show the most significant increases and demonstrate a need for early investment in increased source segregated collection capacity if early targets are to be met
- Early investment and improvement in recycling and composting from Civic Amenity sites is both productive and cost effective
- Early investment in increased composting capacity is required
- MRF sorting of mixed dry recyclable collection in the long term will assist in maximising the separation of recyclates and reduces overall integrated costs. Early decisions on investment in new facilities are required to maximise this benefit
- Early implementation of residual waste treatment will reduce costs since rises in landfill tax and gate fee costs can be expected to exceed treatment costs by 2010. Introduction of residual waste treatment will also increase the amount of recyclate removed from the waste stream

- In-vessel composting of source segregated waste including kitchen waste may be needed by 2020 if the challenging target of 50% recycling and composting is to be achieved
- The Authority continues to operate with the nine constituent district councils and cost models are based on obtaining best value through a partnership approach
- Current assets are used enabling residual treatment and the integration of waste disposal facilities to be introduced within the required timescales and where required planning approval obtained for new facilities

36.0 Disposal, Land Use and Transportation of Waste



- 36.1 The Town and Country and Country Planning system regulates the development and use of land in the public interest, and has an important role to play in achieving sustainable waste management. Through national and regional planning guidance and policies contained within development plans, the planning system must be ready to evaluate and implement, where acceptable, the new facilities that will be required to meet national and local waste management requirements. There is no doubt that the number of new waste management facilities will increase significantly as waste handling and treatment processes become more complex and sophisticated.
- 36.2 The role of Local Plans will be critical to the delivery of the overall waste management strategy for Greater Manchester. It will important that these plans reflect the need to develop adequate local waste management infrastructure reflecting principles of proximity and long term sustainability. The facilities that are needed will include waste handling, processing and treatment but landfill will also continue to be required for treated residues and inert materials.
- 36.3 **The North West Regional Assembly draft regional waste strategy**
The North West Regional Assembly is developing a North West regional waste management strategy. The regional strategy informs revised regional planning guidance on waste management, as well as presenting a regional, cross boundary framework within which waste management needs can be considered.
- 36.4 The North West Regional Assembly regional waste strategy states that local authorities should review development plans in order to specifically identify sites that they consider are suitable for waste management facilities. This will be either through the review of existing Waste Local Plans or through local development documents covering individual or combined unitary authority areas.

- 36.5 It is supported that waste local plans should be developed to identify the strategic placement of facilities for waste management. It is considered that facilities for bulking of recyclables from kerbside collections and neighbourhood/household recycling centres need to be included. Within Greater Manchester the bulky/civic waste arisings account at present for forty two percent of waste arisings and facilities for the recovery of materials will be required.
- 36.6 The strategy proposes that WDAs in the region should take responsibility for the management and disposal of their municipal waste arisings wherever possible in their own administrative areas. However, partnership working between neighbouring WDAs will be an important consideration to work towards wider sub-regional self-sufficiency and in providing practical implementation of the proximity principle across traditional local boundaries.
- 36.7 Whilst it is acknowledged that the proximity principle should generally prevail, the markets for recyclables and waste derived products e.g. compost and RDF will be subject to market forces. The market for recyclables in particular is national, if not international, and it will be just as important to obtain long-term sustainable outlets to enable the introduction of new facilities to go ahead. Increased working on a regional basis with North West Development Agency to attract industry will be needed to cater for the high volumes of recyclables forecast. Government should be encouraged to provide support to industries using recyclables and provide taxation benefits for products to encourage the market. The use of RDF requires a study to be undertaken of current capacity in the region of fossil fuelled power plants that can either be converted or increase their capacity for RDF.
- 36.8 It is recognised that a key regional issue affecting the Greater Manchester MWMS is regional landfill capacity for final disposal of non-recovered municipal waste. However effective Greater Manchester becomes in diverting waste from landfill, there is likely to be a considerable reliance on landfilling of residual waste for the lifetime of the proposed Strategy. In 1999 the Environment Agency estimated that the region only had five years capacity left. It is this shortage of landfill that is ultimately the primary driver for European and National progress towards sustainable waste management.

Table 9 - Regional Landfill Capacity

Capacity available in open-gate sites				Inputs 000s tonnes		Life expectancy (years)
Sub-region	Void- space at 1/4/99	Capacity 1998-99				
		Cap/cover 000s m2	Waste 000s m3			
				All	Degradable	

Cheshire	7,907	3,163	4,744	904	811	4.9
Cumbria	8,631	3,452	5,179	819	524	8.2
GMWDA	12,111	4,844	7,267	1,593	1,316	4.2
Lancashire	13,155	5,262	7,893	2,598	1,513	4.3
Merseyside	3,757	1,503	2,254	583	427	4.4
Mid Mersey	18,554	7,422	11,132	1,916	1,846	5.0
TOTAL	64,115	25,646	38,469	8,413	6,437	5.0

36.9 The GMWDA supports the Government's wishes to manage municipal waste in a sustainable way within the geographic region from which it originates. The GMWDA arranges for the initial reception, intermediate handling and treatment of municipal wastes within the Greater Manchester boundaries. In accordance with the "Proximity Principle", the impact of transporting waste on the environment should be reduced through the location of waste management facilities close to existing transport infrastructure such as canals, railways and major roads. However, it has to be recognised that an urban conurbation like Greater Manchester is faced with practical difficulties in securing sufficient landfill capacity to meet its needs within its boundaries. In order to offset this, wherever possible, road movements have been reduced by the use of bulk haulage and long distance haulage has been carried out by rail.

36.10 The regional waste strategy recognises the need to develop recycle processing industries and markets for recycled materials and includes recommendations that support further research into and development of the integrated waste/reprocessing park concept through engagement with local authorities, the North West Development Agency, private landowners and other regional partners.

36.11 The Strategy promotes the use of recycled construction and demolition waste in construction projects and encourages developers and contractors to specify these materials wherever possible in the construction process. Contractors are also encouraged to minimise the amount of waste that occurs on construction sites through over ordering and to separate waste materials of different types to facilitate recycling and reuse.

37.0. Greater Manchester MWMS Implementation Action Plans



- Secure reduction of 50% in non household municipal waste, principally collected commercial waste, Council waste and unauthorised deposits at Civic Amenity sites
- Investment in reduction and minimisation of all MSW waste streams including promotion and education on minimisation to households
- Investment in increased composting capacity

- Early decision on investment in new MRF sorting facilities is required to maximise long term dry recyclable collection and reduce overall integrated costs
- Early investment in increased source segregated collection capacity
- Early decision on implementation of residual waste treatment to reduce costs and increase the amount of recyclate removed from the waste stream
- Undertake a study of current capacity in the region of fossil fuelled power plants/high energy consumers that can either be converted or increase their capacity for RDF
- Investigate and secure landfill capacity as required post 2008 for the strategy

Cross cutting Actions

- Collecting adequate and reliable data on individual waste streams and management methods
- Review of the role of the community sector involvement and the provision of waste and recycling services
- Develop best practice in kerbside collection infrastructures at a district level
- Examine potential for maximising recyclates diversion from the bulky waste stream
- Review the policies for charging for waste collection services across the partnership including charges for commercial waste
- Adoption of partnership waste management working arrangements at a strategic and operational level between the GMWDA and other partners
- Review existing assets and future needs and where possible seek planning approval for new facilities
- Review the equity and provision of facilities for waste treatment and civic amenity sites for the partnership
- Address the future role of the LAWDC
- Establishing a procurement strategy for the provision of the GMWDA's main waste disposal services post the expiry of existing contracts on 31 March 2006

- Develop integrated disposal services for recyclates and joint bulking and composting facilities for materials
- Review the available markets and processing capacity for recyclates and compostables locally, regionally and nationally and develop opportunities for processing of waste locally

1.0 Legislation and Statutory Targets

- 1.1 The primary statutory drivers for change have come through European Directives. Whilst there are a number of directives that will have a significant influence on the development of MSW strategies, it is the Landfill Directive that is currently the primary driver of change.
- 1.2 The aim of this Directive is to prevent, or reduce as far as possible, the negative effects of landfill waste disposal on human health and the environment. As well as being the least sustainable waste disposal option available, landfilling biodegradable waste is also a major source of the greenhouse gas methane.
- 1.3 The EU Landfill Directive places a legal responsibility on member states to reduce the amount of biodegradable waste that is disposed of by landfill. Article 5 of the Directive poses the greatest challenge in the UK. It specifies quantities of biodegradable municipal waste (BMW) that must be diverted away from landfill by target dates as part of a wider strategy to combat global climate change.
- 1.4 The Directive requires the UK to meet and maintain the relevant BMW reduction targets by 16 July in 2010, 2013 and 2020. If the UK fails reduce its BMW landfill levels to meet these requirements in target years, or if it increases its level of BMW landfill above the required targets in subsequent scheme years, the UK as a whole would be liable to incur EU penalties of up to £0.5 million per day. The Government is committed to meeting these targets for reducing the UK's dependence on landfill. The reduction targets set by the Directive are:
- By 2010 to reduce the amount of BMW going to landfill to 75% of that produced in 1995;
 - By 2013 to reduce the amount of BMW going to landfill to 50% of that produced in 1995;
 - By 2020 to reduce the amount of BMW going to landfill to 35% of that produced in 1995.
- 1.5 The Waste and Emissions Trading Bill introduces a landfill allowance trading scheme in which the total quantity (by weight) of BMW that local authorities will be allowed to landfill in each year between 2004 and 2020 will be limited to set quantities. The Bill is currently the subject of UK wide consultation by DEFRA. Landfill allowances will be allocated to each Waste Disposal Authority (WDA).
- 1.6 The allocation of allowances to WDA's in the first year would be based on current BMW landfilled. Each WDA will be able to determine how to use its allocation of allowances in the most effective way for them. They will be able to save unused allowances for use in later years (banking), or use a proportion of their future allocation of allowances in advance (borrowing). This will allow individual WDAs to use their allowances in

accordance with their investment strategy. The Government intends to launch the scheme at the earliest opportunity, and the Waste and Emissions Trading Bill provides for the scheme to start in 2004.

- 1.7 The implications of the Waste and Emissions Trading Bill are that whilst the landfill allowance will commence in 2004 the permitted quantity will then reduce in each subsequent year. This means that only a finite tonnage of residual waste can be disposed of to landfill and a change in the focus of the MWMS from the BVPI percentage targets to achievement of a specific tonnage of MSW residues. Whilst the BVPI targets will remain they will undoubtedly be achieved if the landfill allowances are met. An accelerated implementation of the MWMS will be needed if these limits are to be met.
- 1.8 Other directives that will impact on local authorities include Directives on End-of-life Vehicle, Batteries, Hazardous Household Waste and on Waste Electrical and Electronic Equipment (WEEE) and Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (ROHS) These directives affect household appliances, IT and telecoms equipment, audiovisual equipment (TV, video, hi-fi), lighting, electrical and electronic tools, toys, leisure and sports equipment all of which will require specific recycling and disposal outlets when separately collected.
- 1.9 Other significant new legislation includes the new EU Animal By-Products Regulation (EC 1774/2002) that will be coming into force in April 2003. The EU Regulation is directly applicable in Member States. Under this legislation catering waste containing meat and low-risk animal by-products will only be permitted to be composted subject to permit and stringent specified composting conditions and will be banned from landfill. Exceptions from this ban are cooked meat from retail outlets (until 2006) and domestic kitchen waste.
- 1.10 The Animal By-Products Regulations have significant implications for commercial waste collection from food retail, restaurants and any commercial or institutional waste that includes catering waste. These wastes will be banned from landfill disposal from the end of 2005 and therefore will have to be subject to separate collection and treatment in accordance with the ABP Regulations. Street litter including waste from food retail appears to be included in this provision and therefore excluded from landfill and thus subject to the same treatment requirements.
- 1.11 The general direction of Government policy in recent years has been to impose an increasing number of statutory duties and fiscal drivers on municipal waste managers and it is highly likely that this trend will continue. Statutory levers deployed by the UK government include the raising of Landfill tax by at least £3 per tonne per annum until it reaches

a level of at least £35 per tonne⁴ and the requirement for WDAs and WCAs to meet BVPI performance standards for recycling and composting of Household Waste.

Table 1 – BVPI Performance Standards for Recycling & Composting

Authority	2001/2 Recycling & Composting Rate (%)	2003/4 Recycling & Composting Target (%)	2005/6 Recycling & Composting Target (%)
Bolton	5.76	10	18
Bury	5.6	10	18
Manchester	3.09	10	18
Oldham	4.54	10	18
Rochdale	2.93	10	18
Salford	5.45	10	18
Stockport	11.09	22	33
Tameside	7.46	10	18
Trafford	5.9	10	18
GMWDA	6.62	10	18

2.0 The North West Regional Assembly draft Regional Waste Strategy

- 2.1 The Strategy sets an initial target for reducing growth in municipal waste across the North West to 2% by the end of 2006 in line with the recommendation of the Strategy Unit. Whilst this target is a realistic aspiration additional early reductions may be less easy to achieve in the light of ongoing economic development. However, progressive reduction from 2010 to zero by 2020 is considered to be a realistic if challenging target within the GMMWS.
- 2.2 The regional strategy targets in respect of recovering value from municipal waste are the same as those promoted nationally:
- recover value from 40% of MSW by 2005/6 (including recycling targets)
 - recover value from 45% of MSW by 2010
 - recover value from 67% of MSW by 2015
- 2.3 The Greater Manchester MWMS targets will not reach the recovery of value from 40% of MSW by 2005/6, however the regional targets will be exceeded in years 2010 and 2015.
- 2.4 The Strategy sets the following recycling/composting targets for household waste across the North West:
- recycle and/or compost 25% of household waste by 2005 (WS2000)

⁴ The Chancellor's Pre-Budget Report, 27 November 2002

- recycle and/or compost 35% of household waste by 2010
 - recycle and/or compost 45% of household waste by 2015 (SU)
 - recycle and/or compost 55% of household waste by 2020
- 2.5 The increased level of recycling from kerbside collection combined with development of household waste recycling centres will enable achievement of the 2005/6 target. Regional targets for 1010 and 2015 will be achieved with early implementation of high performance residual waste treatment. The target for Greater Manchester is 50% by 2020 and it is considered that this level is in excess of present Government targets.
- 2.6 All local authorities in the North West are advised that they should now be planning and implementing changes to waste management practices under their control in order to work towards achieving national statutory targets. This will include engaging the public, local businesses and the waste management industry in all aspects of change, from behavioural change to the development of new infrastructure. It will also include reviewing plans and strategies to take into account the importance of waste management in local areas.

Waste arisings 2005/6 @ 2% growth – 50% Non Household waste reduction

	Waste Management options			
Waste Arisings Tonnes	Recycling Tonnes	Composting Tonnes	Residual waste Bolton TRF	Residual waste Landfill treatment
Collected Household waste (HHW) 919,000 tonnes	Separate source collection 10% 92,000 tonnes	Separate source collection and composting 10% 92,000 tonnes	Residual waste for energy recovery 7.4% 110,000 tonnes Landfilled Residues 33,000 tonnes (non biodegradable)	Collected household waste produces 625,000 tonnes residual collected plus 33,000 tonnes TRF residues Residual waste for landfill is 71% of collected HHW 658,000 tonnes
Civic Amenity 345,000 tonnes	Soil rubble and hardcore 5% (non counting) 18,000 327,000 tonnes Recyclables 20% 65,000 tonnes	Green Waste Composting 20% 65,000 tonnes		Residual waste for landfill 197,000 tonnes
Non Household and Bulk Waste 155,000 tonnes (50% reduction)				Residual waste for landfill 100% 155,000 tonnes
Totals 1,419,000 tonnes	Recyclables 157,000 tonnes	Compost 157,000 tonnes	Energy Recovery 77,000 tonnes	Biodegradable landfill 977,000 tonnes (1m. tonnes permitted) Total Landfill 1010,000 tonnes
Total Recycled and Composted 314,000 = 22.1% of MSW (24.8% of Household waste) Total Recovery (Gross 110,000) = 7.3% Total Landfill 1,075,000 = 71% Biodegradable landfill 977,000 tonnes - WET permitted amount 1,177,000				

2010 Waste arisings @ 2% growth - 33% source segregated recycling & composting - 50% Non Household waste reduction

[Maximising residual landfill]

Waste Arisings 1,535,000 Tonnes	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by MBT & use of RDF (tonnes)	Residual waste Landfill
Collected Household waste (HHW) 994,000 tonnes 33% recycled & composted	Separate source collection 18% 179,000 tonnes	Separate source collection and composting 15% 149,000 tonnes	Residual waste for energy recovery - 110,000 tonnes Landfilled Residues 33,000 tonnes (non biodegradable)	nil	Untreated residual collected 556,000 tonnes plus 33,000 tonnes TRF residues Total 589,000 tonnes
Civic Amenity 374,000 tonnes	Soil rubble and hardcore 5% (non counting) 19,000 tonnes 355,000 tonnes Recyclables 35% 124,000 tonnes	Green Waste Composting 20% 71,000 tonnes			Residual waste for landfill 160,000 tonnes
Bulky Waste 167,000 tonnes (50)% reduction)					Residual waste for landfill 100% 166,000 tonnes
Totals 1,535,000 tonnes	Recyclables 303,000 tonnes	Compost 220,000 tonnes	Energy Recovery 436,000 tonnes		Biodegradable landfill 882,000 tonnes (1m. tonnes permitted) Total Landfill 915,000 tonnes
Total Recycled and Composted 523,000 = 34% of MSW (38.2% of Household Waste) Total Recovery (Gross 110,000) = 7.1% of MSW Total Landfill (inc TRF residues) 915,000 tonnes Biodegradable landfill 882,000 tonnes - WET permitted amount 1,000,000					

2010 Waste arisings @2% growth 33% source segregated recycling and composting, 50% Non Household waste reduction

Maximising residual waste treatment by MBT

Waste Arisings 1,535,000 Tonnes	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by MBT & use of RDF (tonnes)	Residual waste Landfill
Collected Household waste (HHW) 994,000 tonnes 33% recycled & composted	Separate source collection 18% 179,000 tonnes	Separate source collection and composting 15% 149,000 tonnes	Residual waste for energy recovery - 110,000 tonnes Landfilled Residues 33,000 tonnes (non biodegradable)	556,000 tonnes residual collected household waste produces loss to air & sewer 25% - 139,000 RD Fuel 50% - 278,000 Recyclables 5% - 28,000 Residual waste for landfill 20% - 111,000	MBT residues 111,000 tonnes residual collected plus 33,000 tonnes TRF residues 144,000 tonnes
Civic Amenity 374,000 tonnes	Soil rubble and hardcore 5% (non counting) 19,000 tonnes 355,000 tonnes Recyclables 35% 124,000 tonnes	Green Waste Composting 20% 71,000 tonnes		Assumes waste capable of treatment by MBT 25% of residual Civic Amenity waste 40,000 tonnes loss to air and sewer 25% - 10,000 RD Fuel 50% - 20,000 Recyclables 5% - 2,000 MBT residues for landfill 20%- 8,000	Residual waste for landfill 128,000 tonnes
Bulky Waste 167,000 tonnes (50)% reduction)					Residual waste for landfill 100% 166,000 tonnes
Totals 1,535,000 tonnes	Recyclables 333,000 tonnes	Compost 220,000 tonnes	Energy Recovery 408,000 tonnes		Biodegradable landfill 405,000 tonnes (1m. tonnes permitted) Total Landfill 438,000 tonnes
<p>Total Recycled and Composted 553,000 = 36% of MSW (40% of Household Waste) Total Recovery (Gross 408,000) = 26.5% of MSW</p> <p>Total Landfill (inc TRF residues) 438,000 Biodegradable landfill 405,000 tonnes - WET permitted amount 1,000,000</p>					

2010 Waste arisings @2% growth 33% source segregated recycling and composting, 50% Non Household waste reduction

Maximising residual waste treatment by High performance residual waste treatment

Waste Arisings 1,535,000 Tonnes	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by steam sterilisation (SSMT) and mechanical treatment producing RDF	Residual waste Landfill
Collected Household waste (HHW) 994,000 tonnes 33% recycled & composted	Separate source collection 18% 179,000 tonnes	Separate source collection and composting 15% 149,000 tonnes	Residual waste for energy recovery - 12.0% of collected HHW, (7.0% MSW) 110,000 tonnes Landfilled Residues 33,000 tonnes (non biodegradable)	556,000 tonnes residual collected household waste produces RD Fuel 60% - 333,000 Recyclables 18% - 100,000 Aggregate 12% - 66,000 Residual waste landfilled 10% - 57,000 (treated non biodegradable)	SSMT residues 57,000 tonnes residual collected plus 33,000 tonnes TRF residues 90,000 tonnes (treated non biodegradable)
Civic Amenity 374,000 tonnes	Soil rubble and hardcore 5% (non counting) 19,000 tonnes 355,000 tonnes Recyclables 35% 124,000 tonnes	Green Waste Composting 20% 71,000 tonnes		Assumes waste capable of treatment by SSMT 25% of residual Civic Amenity waste 40,000 tonnes RD Fuel 60% - 24,000 tonnes Recyclables 18% - 7,000 tonnes Aggregate 12% - 5,000 tonnes Residual waste landfilled 10% - 4,000 (treated non biodegradable)	Residual waste for landfill 128,000 tonnes 4,000 tonnes (treated non biodegradable)
Bulky Waste 167,000 tonnes (50)% reduction)					Residual waste for landfill 100% 167,000 tonnes
Totals 1,535,000 tonnes	Recyclables 413,000 tonnes	Compost 220,000 tonnes	Energy Recovery Gross 7.0% (Net figure 4.9%) 467,000 tonnes		Biodegradable landfill 295,000 tonnes (1m. tonnes permitted) Total Landfill 389,000 tonnes
Total Recycled and Composted 633,000 = 41.2% of MSW (46.2% of Household Waste) Total Recovery (Gross 467,000) = 30.4% of MSW Total Landfill (inc treated non biodegradable residues) 389,000 Biodegradable landfill 295,000 tonnes - WET permitted amount 1,000,000					

2013 Waste arisings, 50% Non Household waste reduction, with residual waste treatment by MBT

Waste Arisings Tonnes	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by MBT & production of RDF (tonnes)	Residual waste Landfill
Collected Household waste (HHW) 1046,000 tonnes Recycling @35%	Separate source collection 20% 209,000 tonnes	Separate source collection and composting 15% Green Waste 157,000 tonnes	Residual waste for energy recovery – 110,000 tonnes Landfilled Residues 33,000 tonnes (non biodegradable)	570,000 tonnes residual collected household waste produces loss to air & sewer 25% - 142,000 RD Fuel 50% - 285,000 Recyclables 5% - 29,000 Residual waste for landfill 20% - 114,000	MBT residues 114,000 tonnes residual collected plus 33,000 tonnes TRF residues Residual waste for landfill is 147,000 tonnes
Civic Amenity 402,000 tonnes	Soil rubble and hardcore 5% (non counting) 23,000 tonnes 382,000 tonnes Recyclables 35% 133,000 tonnes	Green Waste Composting 20% 76,000 tonnes		Assumes waste capable of treatment by MBT 25% of residual Civic Amenity waste 43,000 tonnes loss to air and sewer 25% - 10,000 RD Fuel 50% - 22,000 Recyclables 5% - 2,000 MBT residues for landfill 20% - 9,000	Residual waste for landfill 139,000 tonnes
Bulky Waste 162,000 tonnes					Residual waste for landfill 100% 162,000 tonnes
Totals 1610,000 tonnes	Recyclables 373,000 tonnes	Compost 233,000 tonnes	Energy Recovery 417,000 tonnes		Biodegradable landfill 415,000 tonnes Total Landfill 448,000 tonnes

Total Recycled and Composted 606,000 = 37.6% of MSW (41.8% of Household Waste)

Total Recovery (Gross 417,000) = 26% of MSW

Total Landfill (inc TRF residues) 448,000

Biodegradable landfill 415,000 tonnes - WET permitted amount 669,000

2013 Waste arisings - 50% Non Household waste reduction with High performing residual waste treatment

Waste Arisings	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by steam sterilisation and mechanical treatment producing RDF	Residual waste Landfill
Collected Household waste (HHW) 1046,000 tonnes Recycling @35%	Separate source collection 20% 209,000 tonnes	Separate source collection and composting 15% Green Waste 157,000 tonnes	Residual waste for energy recovery 110,000 tonnes Landfilled Residues 33,000 tonnes (non biodegradable)	570,000 tonnes residual collected household waste produces RD Fuel 60% - 342,000 Recyclables 18% - 102,000 Aggregate 12% - 68,000 Residual waste landfilled 10% - 58,000 (treated non biodegradable)	Residual waste landfilled 58,000 (treated non biodegradable) 33,000 tonnes TRF residues Residual waste for landfill is 91,000 tonnes
Civic Amenity 402,000 tonnes	Soil rubble and hardcore 5% (non counting) 23,000 tonnes 382,000 tonnes Recyclables 35% 133,000 tonnes	Green Waste Composting 20% 76,000 tonnes		Assumes waste capable of treatment 25% of residual Civic Amenity waste 43,000 tonnes of residual waste produces: RD Fuel 60% - 26,000 Recyclables 18% - 8,000 Aggregate 12% - 5,000 Non bio-active landfilled 10% - 4,000	Residual waste for landfill 130,000 tonnes Non bio-active landfilled 10% - 4,000
Bulky Waste 162,000 tonnes					Residual waste for landfill 100% 162,000 tonnes
Totals 1610,000 tonnes	Recyclables 452,000 tonnes	Compost 233,000 tonnes	Energy Recovery 478,000 tonnes		Biodegradable landfill 292,000 tonnes Total Landfill 387,000 tonnes
<p>Total Recycled and Composted 685,000 = 42.5% of MSW (47.3% of Household Waste)</p> <p>Total Recovery (Gross 478,000) = 29.7% of MSW</p> <p>Total Landfill (inc TRF residues) 387,000</p>					

Biodegradable landfill **292,000** tonnes - WET permitted amount **669,000** tonnes

2020 Waste arisings with growth reduced to zero and 50% recycling & composting of household waste with residual waste treatment by MBT

Waste Arisings Tonnes	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by MBT & production of RDF (tonnes)	Residual waste Landfill
Collected Household waste (HHW) 1,091,000 tonnes 50% recycled & composted	Separate source collection 30% 327,000 tonnes	Separate source collection and composting 15% Green Waste 163,000 tonnes 5% in vessel composted 55,000 tonnes Total 218,000 tonnes	Residual waste for energy recovery - 12.0% of collected HHW, (7.0% MSW) 110,000 tonnes Landfilled Residues 33,000 tonnes (non biodegradable)	445,000 tonnes residual collected household waste produces loss to air & sewer 25% - 111,000 RD Fuel 50% - 223,000 Recyclables 5% - 22,000 Residual waste for landfill 20% - 89,000	MBT residues 89,000 tonnes residual collected plus 33,000 tonnes TRF residues Residual waste for landfill is 122,000 tonnes
Civic Amenity 420,000 tonnes	Soil rubble and hardcore 5% (non counting) 21,000 tonnes 399,000 tonnes Recyclables 35% 140,000 tonnes	Green Waste Composting 20% 80,000 tonnes		Assumes waste capable of treatment by MBT 25% of residual Civic Amenity waste 45,000 tonnes loss to air and sewer 25% - 11,000 RD Fuel 50% - 23,000 Recyclables 5% - 2,000 MBT residue for landfill 20% - 9,000	Total residual waste for landfill 143,000 tonnes
Bulky Waste 168,000 tonnes					Residual waste for landfill 100% 168,000 tonnes
Totals 1,679,000 tonnes	Recyclables 491,000 tonnes	Compost 298,000 tonnes	Energy Recovery 466,000 tonnes		Biodegradable landfill 400,000 tonnes Total Landfill 433,000 tonnes
<p>Total Recycled and Composted 789,000 = 47 % of MSW (52.2% of Household Waste) Total Recovery (Gross 466,000) = 27.7% of MSW</p> <p>Total Landfill (inc TRF residues) 433,000 Biodegradable landfill 400,000 tonnes - WET permitted amount 465,000 tonnes</p>					

2020 Waste arisings with growth reduced to zero, 50% recycling & composting of household waste with high performing residual waste treatment

Waste Arisings	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by steam sterilisation and mechanical treatment producing RDF	Residual waste Landfill
Collected Household waste (HHW) 1,091,000 tonnes 50% recycled & composted	Separate source collection 30% 327,000 tonnes	Separate source collection and composting 15% Green Waste 163,000 tonnes 5% in vessel composted 55,000 tonnes Total 218,000 tonnes	Residual waste for energy recovery - 12.0% of collected HHW, (7.0%o MSW) 110,000 tonnes Landfilled Residues 33,000 tonnes (non biodegradable)	445,000 tonnes residual collected household waste produces RD Fuel 60% - 267,000 Recyclables 18% - 80,000 Aggregate 12% - 53,000 Residual waste landfilled 10% - 45,000 (treated non biodegradable)	residues 45,000 tonnes residual collected plus 33,000 tonnes TRF residues Residual waste for landfill non- biodegradable 78,000 tonnes
Civic Amenity 420,000 tonnes	Soil rubble and hardcore 5% (non counting) 21,000 tonnes 399,000 tonnes Recyclables 35% 140,000 tonnes	Green Waste Composting 20% 80,000 tonnes		Assumes waste capable of treatment by SSMT 25% of residual Civic Amenity - 45,000 tonnes of residual waste produces: RD Fuel 60% - 27,000 Recyclables 18% - 8,000 Aggregate 12% - 5,000 Non bio-active landfilled 10% - 5,000	Residual waste for landfill 134,000 tonnes Non bio-active landfilled 5,000
Bulky Waste 168,000 tonnes					Residual waste for landfill 168,000 tonnes
Totals 1,679,000 tonnes	Recyclables 555,000 tonnes	Compost 298,000 tonnes	Energy Recovery 404,000 tonnes		Biodegradable landfill 302,000 tonnes Total Landfill 385,000 tonnes
Total Recycled and Composted 853,000 = 50.8% of MSW (56.4% of Household Waste) Total Recovery (Gross 404,000) = 24% of MSW Total Landfill (inc TRF residues) 385,000 Biodegradable landfill 302,000 tonnes - WET permitted amount 465,000 tonnes					

Quantities based on 2003 Waste arisings and no growth, 50% recycling and composting of household waste 2020 Targets

High performance residual waste treatment

Waste Arisings Tonnes	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by MBT & use of RDF (tonnes)	Residual waste Landfill
Collected Household waste (HHW) 863,000 tonnes 50% recycled & composted	Separate source collection 30% 259,000 tonnes	Separate source collection & composting 15% Green Waste 129,000 tonnes 5% in vessel composted 43,000 tonnes Total 172,000 tonnes	Residual waste for energy recovery -) 110,000 tonnes Landfilled Residues 33,000 tonnes (non biodegradable)	322,000 tonnes residual collected household waste produces loss to air & sewer 25% - 80,000 RD Fuel 50% - 161,000 Recyclables 5% - 16,000 Residual waste for landfill 20% - 65,000	MBT residues 65,000 tonnes residual collected plus 33,000 tonnes TRF residues Residual waste for landfill is 98,000 tonnes
Civic Amenity 327,000 tonnes	Soil rubble and hardcore 5% (non counting) 16,000 tonnes 311,000 tonnes Recyclables 35% 109,000 tonnes	Green Waste Composting 20% 62,000 tonnes		Assumes waste capable of treatment by MBT 25% of residual Civic Amenity waste 35,000 tonnes loss to air and sewer 25% - 9,000 RD Fuel 50% - 18,000 Recyclables 5% - 2,000 MBT residues for landfill 20% - 6,000	Residual waste for landfill 111,000 tonnes
Bulky Waste 147,000 tonnes (50% reduction)					Residual waste for landfill 100% 147,000 tonnes
Totals 1,337,000 tonnes	Recyclables 386,000 tonnes	Compost 234,000 tonnes	Energy Recovery 289,000 tonnes		Biodegradable landfill 323,000 tonnes Total Landfill 356,000 tonnes
Total Recycled and Composted 620,000 = 46.4% of MSW (52% of Household Waste) Total Recovery (Gross 289,000) = 21.6% of MSW Total Landfill (inc TRF residues) 356,000 tonnes Biodegradable landfill 323,000 tonnes - WET permitted amount 465,000 (2020 Allowances) tonnes					

BPEO/Sustainability Analysis Matrix

The BPEO/Sustainability Analysis Matrix is used to compare the potential performance of each on the three potentially viable scenarios and awards a ranking of 1 to 3 against each indicator.

The weighting of each indicator does of course vary and this variation can generally only be evaluated by using professional judgement in specific cases. In some cases the evaluation showed little or no significant difference in the performance against each indicator, in which case no or reduced ranking points were awarded. Where significant differences were seen in the scenario's performance the relative ranking points were varied to reflect these differences. The matrix includes commentary on the performance of the scenarios for each question of indicator.

Most importance was placed on the four indicators: percentage of recycled and composted followed by percentage of energy recovered, direct and indirect emissions and environmental impacts, costs, proven practicality and reliability. This emphasis was determined in order to balance significant environmental indicators with deliverability of a workable solution to the choice of scenario and options.

It should be noted that BPEO assessment methodology has essentially been based on evaluation of technologies within projected scenarios. The BPEO assessment together with sustainability, business needs, risk assessment and consultation set out in this strategy document essentially inform and focus the decision making process on the key issues underpinning the choice of options. For the development and implementation of this strategy, including the specification for any tenders and contracts, it will be important to base these on prescribing the type of outputs required from the treatment process rather than a simple prescription of the process technology.

This BPEO assessment acknowledges the various tools that have been developed to aid in decision making. These include:

- Multi Criteria Assessment: A Manual, DETR February 2001;
- Best Practicable Environmental Option, SEPA September 2000;
- Guidance on Policies for Waste Management Planning, DTLR May 2002;
- WISARD (Waste Integrated Systems Assessment for Recovery and Disposal) a life cycle assessment tool, Environment Agency.
- CIWM Working Party on BPEO assessment

BPEO Analysis Matrix			
Scenario	2 Source segregated recycling and composting and in-vessel composting plus residual waste treatment by MBT and related processes with similar output specification with energy recovery from RDF	3 Source segregated recycling and composting, treating residual waste by SSMT (MBT/BMT/ and related processes) with higher output specification with energy recovery from RDF	4 Source Segregated recycling and composting plus EfW
Does the option comply with legislation and policy?	Narrowly meets long term and Landfill Directive targets.	Meets long term and Landfill Directive targets	Narrowly meets long term and Landfill Directive targets.
Ranking	2	3	2
What are the pollution impacts, including emissions which are injurious to public health, to air water and land of each option?	There are significant emissions from the biological processes that require emission controls, bio-aerosols/odours may form Spent emission control residues may be hazardous waste RDF combustion plants will have to meet Waste Incineration Directive controls	No significant emissions from sterilisation and mechanical processing. Emission controls required for RDF gasification plant that will have to meet Waste Incineration Directive controls	Waste Incineration Directive requires most stringent EU control of releases to air and water.
Ranking	3	2	2
What is the effect of each option on the built environment including the potential extent of visual and landscape Impacts? to conserve landscapes and townscapes?	Processing plant consistent with industrial manufacturing process	Processing plant consistent with industrial manufacturing process	Poor aesthetics as large-scale industrial-style plant required with chimney stack
Ranking	2	2	1

What is the effect on the local ecology?	Minimal impacts on local ecology subject to process emission controls. Biological processes present significant risk if emission controls inadequate or fail	Minimal impacts on local ecology subject to process emission controls for RDF gasification plant	Compliance with waste Incineration Directive results in minimal impacts on ecology subject to process emission controls
Ranking	2	3	3
What will be the global impact of each option i.e. the greenhouse gas impacts and quantity of emissions contribution to depletion of the ozone layer	Some concerns that if waste is not sufficiently bio-stabilised, could still produce methane when landfilled.	Relatively efficient in both recovery of recycle and energy Energy recovery – in the form of heat and/or power – can help to reduce fossil-fuel dependency, renewable CO2	Releases from combustion of the biogenic fraction of MSW are conducive with Climate Change policy. Energy recovery – in the form of heat and/or power – can help to reduce fossil-fuel dependency, renewable CO2
Ranking	1	2	2
What are the positive and negative impacts of each option on the local environment i.e. noise, odour, dust, litter and vermin also minimise local transport impacts (congestion, severance, fear and intimidation, physical damage)	Processing plant consistent with industrial manufacturing process. Deliveries of residual waste will have similar traffic impacts. Additional traffic will be generated by removal of recycle and haulage of RDF if fuel use for energy recovery is sited at a different location.	Processing plant consistent with industrial manufacturing process. Deliveries of residual waste will have similar traffic impacts. Additional traffic will be generated by removal of recycle and haulage of RDF if fuel use for energy recovery is sited at a different location.	Processing plant consistent with industrial manufacturing process. Deliveries of residual waste will have similar traffic impacts. However this scenario will have the least traffic impact for removal of small quantities of recycle and residual ash.
Ranking	2	2	3
What is the use of non-renewable resources?	RDF use could help displace virgin fossil-fuel use and assist in reducing long distance transport/import of coal Limited landfill if resulting RDF is used for energy recovery.	Net energy recovery reduces overall use of non renewable resources RDF use could help displace virgin fossil-fuel use and assist in reducing long distance transport/import of coal	Net energy recovery reduces overall use of non renewable resources

		Higher potential recyclate recovery reduces use of non renewable resources	
Ranking	2	3	1
What are the risks from accidents? (Environmental effects and health and safety)	Generic risks from failure of emission control. Safety and accident risk are subject to specific plant Health and Safety assessments and management measures.	Generic risks from failure of emission control. Safety and accident risk are subject to specific plant Health and Safety assessments and management measures.	Generic risks from failure of emission control. Safety and accident risk are subject to specific plant Health and Safety assessments and management measures.
Ranking	2	3	1
What is the total cost of each option?	Wide variation in costs (below EfW) depending on branded technology options and diverse outputs	The least cost scenario on the basis of current information projected costs (but marginally and with uncertainty)	High capital and operating costs Lack of flexibility once the commitment to EfW is made
Ranking	2	2	1
Is the project finance-able, affordable, deliverable, flexible and low risk? To ensure reliability of delivery, likelihood of planning permission being obtained (Operational flexibility/Risk in delivery)	See risk assessment Location of site and securing planning may attract significant public opposition	See risk assessment Location of site and securing planning may attract significant public opposition.	See risk assessment Public opposition to the location of the site and securing planning may be strongest of all scenarios.
Ranking	2	2	1
What are the impacts on the local economy?	Facilities may be unattractive to business neighbours if located in industrial/commercial area	Facilities may be unattractive to business neighbours if located in industrial/commercial area	EFW facilities will be unattractive to business neighbours if located in industrial/commercial area
Ranking	2	2	1
What will be the effect on local employment & diversity of skill	Recovery of recyclate (additional to source segregation) and energy	Significant recovery of recyclate (additional to source segregation)	Minimal additional recovery of recyclate but potential product uses

levels?	presents opportunities for new business and local employment	and energy presents opportunities for new business and local employment	for ash
Ranking	2	3	1
Are waste producers encouraged to take responsibility for their own waste?	Source segregation and minimisation of waste encourages producers to take responsibility for their waste.	Source segregation and minimisation of waste encourages producers to take responsibility for their waste.	Source segregation and minimisation of waste encourages producers to take responsibility for their waste. EfW may only discourage recycling and composting if oversized in capacity
Ranking	2	2	1
Will this meet with public approval?	Public largely unaware of the process technology and implications RFD more acceptable than mass burn incineration	Public largely unaware of the process technology and implications RFD more acceptable than mass burn incineration	Public opposition particularly from green pressure groups to mass burn incineration to recover energy from waste
Ranking	2	2	1
What are the implications for the welfare of local people?	Minimal impacts subject to process emission controls and effective regulation	Minimal impacts subject to process emission controls and effective regulation	This technology suffers from poor public perception with public concern over dioxins and deterioration of local air quality, however Risks to public health of exposure to pollutant releases regarded as insignificant in recent NSCA report
Ranking	Any ranking given on this indicator would suggest that operating parameters, regulation of the sites and facilities is ineffective in protecting the welfare of local people. Global impacts of process emissions are ranked under other indicators.		
Total	28	33	21

Overall Ranking Assessment

1 Source segregated recycling and composting, treating residual waste by high performance MBT or related processes with similar output specification with energy recovery from RDF (Ranking points 33).

This scenario achieves the highest rank on the basis of the highest level of potential recyclate recovery and lowest levels of emissions of the three scenarios considered.

2 Source Segregated recycling and composting and in-vessel composting plus residual waste treatment by Mechanical Biological Treatment and advanced thermal treatment of Refuse Derived Fuel, with some residual treated waste to landfill. (Ranking points 28)

Potential air emissions and spent emission control residues, together with residual landfill, reduce option ranking.

3 Source Segregated recycling and composting plus Energy recovery from Waste from mass burn incineration. (Ranking points 21).

This scenario produces the lowest ranking through its low recyclate recovery rates and poor public perception and acceptability together with high capital cost.

Risk Management Analysis

The risk management analysis set out below reviews the risks and assumptions made for the main option components of the 3 viable scenarios. This method highlights the risk and the potential management options that are available to mitigate identified risk. The potential management options also identify many of the significant considerations that must be in place in developing the implementation plan for the proposed strategy.

Source segregated recycling and composting has some significant risks in terms of delivery of targets and objectives. However, this option is included in all scenarios considered and therefore management actions will be put in place to ensure the mitigation of such risks.

EfW ranks least favourably against the other two viable scenarios in terms of BPEO assessment. Whilst EfW represents the option with the least risk in terms of proven technology, public and pressure group opposition to the establishment of any new EfW plant must be recognised as a major obstacle to the delivery of a strategy based on mass burn EfW.

Scenarios 3 and 4 produce a higher ranking than EfW in terms of BPEO and sustainability assessment. However this ranking is based on assumed and theoretical performance and outputs. There are risks in terms of their capability to deliver the assumptions made on performance and outputs (allied to this are costs). Some of these technologies are operational outside the UK but there is lack of experience with these options in the UK as a whole and specifically in dealing with residual municipal waste streams as projected by these strategy scenarios. In order to develop strategies based in scenarios 3 or 4 risk management actions will have to be taken. These actions will include; ensuring that there is comprehensive and conclusive demonstration of projected performance whilst any contracts for residual waste treatment have conditions that ensure that performance and out puts are met.

Risk Management Analysis

All Scenarios – Source segregated recycling and composting	
Proven to be effective but risks and uncertainties arise in securing high levels of participation and waste diversion with associated implications for costs	
Risk	Risk Management Options
<ul style="list-style-type: none"> • Source segregated recycling and composting of collected household waste and civic amenity waste fails to reach projected diversion rates • Public participation fails to meet projected levels 	<ul style="list-style-type: none"> • Increase investment in publicity campaigns, incentives and education to secure required participation rates • Increase or introduce minimisation, source separation and recycling and composting of commercial and “other waste” • Review waste collection and segregation systems to ensure these are in accordance with best practice.
<ul style="list-style-type: none"> • Difficulty in securing markets for recyclate and compost 	<ul style="list-style-type: none"> • Investment in market development required

Scenario 3 - Residual waste treatment by MBT with RDF and landfill	
Uncertainties over the status of the technology which is not operationally proven in the UK (design specifications are generally based on total MSW and continental European waste combine with uncertainties over the quantities and qualities of process outputs and productive end uses of product) produce a significant risk to be addressed	
Risk	Risk Management Options
Technology proven in mainland Europe with 70 plants in operation but mixed experience of attempts to develop similar technology in the UK. At least 7 different MBT processes suppliers are available, each with specific process characteristics and outputs. Different waste characteristic for Greater Manchester may result in significantly different performance and or outputs.	Full evaluation of potential MBT outputs is required from the wide range of branded technologies to ensure that the specific process selected could deliver the required outputs based on the waste characteristics of residual source separated MSW of Greater Manchester.
Implementation timescales: The status of RDF and whether this is burnt for energy recovery or landfilled could have a major impact on overall timescales, in particular if some form of energy recovery plant is co-located with the MBT plant	Implementation timescale, including securing site and permissions must be built into implementation project planning
If waste is not sufficiently bio-stabilised, potential for biological activity in residues will remain, in particular methane may be produced from these landfilled residues. Thus if MBT residues are landfilled this represents a significant investment that may only help comply with the Landfill Directive through volume reduction and residue disposal to landfill may exceed permitted landfill limitations	Select MBT process that enhances RDF production for energy recovery or alternatively select MBT that uses enhanced processes to produce more stable product (longer and more intensive processes will have significant cost implications as well as impacting on the scale of plant required)
Has significant emissions and requires emission controls, bio-aerosols/odours may form. The requirements of abatement technology could increase costs.	Biologically processed RDF combustion plants will have to meet Waste Incineration Directive controls. Spent emission control residues may be treated as hazardous waste
Difficulties in finding markets for recycle produced	Market research and investment in market development required in advance of contract commitments
Difficulties in finding markets for RDF produced or ATT technology	Investment in market development for RDF and full evaluation of ATT (Advanced Thermal Treatment) options and implementation planning required to minimise risk of inadequate markets for RDF or inability to deliver recovery of energy through ATT
Costs - Capital and running costs may be higher than anticipated. Un proven technology in the UK with limited evaluation of treatment of source separated residues mean a wide envelope of uncertainty with regard to capital and operational costs may result.	Effective procurement and contract procedures will be required to ensure that costs are contained within projected budgets

Scenario 4 - Residual waste treatment SSMT/MBT or related processes with similar high performance output specification with RDF	
Uncertainties over the status of the technology which is not operationally proven in the UK (design specifications are based on total MSW) produce a significant risk to be addressed	
Risk	Risk Management Options
Technology status is not fully proven for the treatment of source separated residual MSW although an operational scale plant (combined with Gasification of RDF) is currently under evaluation in South Wales and similar type processes are also under development in the USA. Lack of available independent evaluation and assessment	Full evaluation of technical SSMT would be required to ensure that this could deliver the required outputs based on the waste characteristics of residual source separated MSW. This would include evaluation of emission controls particularly from the ATT element of the plant.
Implementation timescales: The status of RDF burnt for energy recovery could have a major impact on overall timescales, in particular if the energy recovery plant is co-located with the SSMT plant	Implementation timescale, including securing site and permissions must be built into implementation project planning
Markets for recycle materials will require substantial development in order to make use of quantities and types of recycle generated	Market research and investment in market development required in advance of contract commitments
Costs - Capital and running costs may be higher than anticipated. Un-proven technology in the UK with limited evaluation of treatment of source separated residues mean a wide envelope of uncertainty with regard to capital and operational costs may result.	Effective procurement and contract procedures will be required to ensure that costs are contained within projected budgets

Scenario 5- Source Segregated recycling and composting plus EfW	
Has status as proven technology; however there are significant risks in delivery of this option in terms of securing a site and planning permissions in the light of predictable public opposition.	
Risk	Risk Management Options
Has significant emissions and requires emission controls. Any future additional requirements of abatement technology could increase costs.	EfW combustion plants will have to meet Waste Incineration Directive
Implementation timescales may be protracted in the light of generic public opposition to EfW plants and could have a major impact on overall timescales	Implementation timescale, including securing a site and permissions must be built into implementation project planning
Costs - Capital and running costs may be higher than anticipated. Un-proven technology in the UK with limited evaluation of treatment of source separated residues mean a wide envelope of uncertainty with regard to capital and operational costs may result.	Effective procurement and contract procedures will be required to ensure that costs are contained within projected budgets

Evaluation of Scenarios – Business Needs Analysis

This business needs analysis is primarily focused on the practical business needs of the GMWDA and the practicality of implementing a strategy based on one of the scenarios considered in this document. It also takes into account the BPEO/sustainability assessment and risk assessment. Development of conclusions about the choice of preferred scenario is influenced by a number of factors. The factors are considered both with respect to relevant individual technical options or approaches and the scenario as a whole include

- proven performance levels and overall delivery of strategy targets for recycling, composting, recovery and bi-diversion
- operational criteria, reliability and technical suitability to local circumstances
- Capital and revenue funding options
- Capital costs of operations of short, medium and long term projections
- Costs and practicality of change
- Procurement and contract policy implications e.g. analyse market stability for recyclables, and make recommendations to reduce risks and secure long-term contracts with reprocessors
- Consideration of securing waste management sites and infrastructure including land-use planning
- public and community participation in minimisation, recycling and composting,
- Key stakeholders and partnerships and any additional players in the delivery of new waste management options together with their roles and responsibilities
- Consultation including the public as well as key stakeholders
- Risk management analysis

Rankings from the business needs evaluation

The rankings from the business needs evaluation are much closer in scoring than for the BPEO/sustainability assessment, although the ranking remains the same. This closer relative comparison of the scenarios arises principally from the status of EfW as proven technology, whilst assumptions and uncertainties remain about the MBT and thermal treatment technologies. EfW technologies are also less dependent on stakeholders and uncertain markets for recycle products.

Adding in both BPEO assessment rankings and risk assessment rankings again produces the same relative ranks although the actual score level of ranking points remain close.

Most importance was placed on the five indicators: percentage of recycled and composted followed by percentage of energy recovered, direct and

indirect emissions and environmental impacts, capital and operating costs and proven practical reliability. This emphasis was determined in order to balance

significant environmental indicators with deliverability of a workable solution to the choice of scenario and options.

Overall ranking assessment

However it the conclusion of all three approaches to assessment is that Scenario 4 has the highest ranking closely followed by Scenario 3 whilst Scenario 5 is assessed as the least favoured practical option.

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Evaluation of Scenarios – Business Needs Analysis

Scenario	3 Source segregated recycling and composting and in-vessel composting plus residual waste treatment by MBT and related processes with similar output specification with energy recovery from RDF	4 Source segregated recycling and composting, treating residual waste by SSMT (MBT/BMT/ and related processes) with higher output specification similar output specification with energy recovery from RDF	5 Source Segregated recycling and composting plus EfW
Delivery of strategy targets for recycling, composting, and bi-diversion & compliance with policy and legislation	Narrowly meets long term and Landfill directive targets.	Meets long term and Landfill directive targets.	Narrowly meets long term and Landfill directive targets.
	2	3	2
Public participation rates.	Important to ensure source segregation is successful in meeting targets	Overall recycling rates can be achieved even if performance rates in source segregation fall below projections	Important to ensure source segregation is successful in meeting targets
	2	3	1
Technically proven and operational reliability	Operational in Europe but little experience in the UK although considerable interest by UK local authorities	Requires full technical development of mechanical separation and proving on residual MSW	Technically proven
	2	1	3
Costs capital, operational short, medium and long term	Capital costs and running costs are significant and typically require write off of capital investment over 20 year period	Capital costs and operational costs are significant uncertainties remain over projected operational costs and financing of investment costs	Highest cost option significant capital investment required
	2	2	1
Cost of change	Consistent with current plans for extended source segregation for recycling and composting Modular phased development possible	Consistent with current plans for extended source segregation for recycling and composting Modular phased development possible	Consistent with current plans for extended source segregation for recycling and composting
	2	2	1
Procurement and contract	Increased quantities of recyclates and	Increased quantities of recyclates and	Increased quantities of recyclates and

policy implications e.g. analyse market stability for recyclables,	compost from source segregation will require additional market development with some additional market development for recyclates from the MBT process	compost from source segregation will require additional market development with significant additional market development for recyclates from the residual waste treatment process	compost from source segregation will require additional market development. Recyclate from EfW residues should find ready markets
	1	1	3
Securing site infrastructure & land-use planning	Processing plant consistent with industrial manufacturing process	Processing plant consistent with industrial manufacturing process	Location of site and securing planning may attract significant public opposition
	3	3	1
Key stakeholders and partnerships	Public and other waste producers for source segregation, residue process providers, recyclate & compost markets	Public and other waste producers for source segregation, residue process providers, recyclate & compost markets. Partnership	Public and other waste producers for source segregation, residue process provides, recyclate & compost markets Least requirement for partnership
	2	2	3
Ranking – BPEO See table above	2	3	1
Risk management analysis	See risk management table	See risk management table	See risk management table
Ranking – Risk management	2	2	3
Totals	21	22	19

CONSULTATION REPOSESES

1.0 WASTE COLLECTION AUTHORITY CONSULTATION

- 1.1 Visits were made to WCA's in January and February this year to discuss the strategy consultation paper following which each district submitted a response to the seventeen questions contained in the document.
- 1.2 Detailed below is a summary of the responses from the Districts.

Question 1 - Do you agree to undertake a review of household and non-household (especially commercial) waste in your authority, in conjunction with the WDA?

All Districts agreed to undertake a review with special mention of Commercial and Civic Amenity Site waste. The Joint Officer Group has since reached agreement across all WCA's on a revised categorisation to be introduced in October 2003 which will provide detailed management information on waste arisings by source.

Monthly statistics are now being provided by GMWDA of the tonnages being delivered to Greater Manchester Waste Limited (GMWL) facilities. From the information provided for 2003/4 to date it is clear that there is a insignificant increase in the residual waste from household collections and an increased tonnage of bulky waste arisings.

This information will be used to develop the strategy and procurement options for the future minimisation and treatments of waste by source. Furthermore it is clear that policies vary between WCA's as to the categorisation of waste between households and commercial, a review will be required to be undertaken during the next three months to identify variances.

Question 2 - An approach to waste arisings projection could be to plan for reducing Greater Manchester's waste arisings to the national average over a number of years, and then projecting a rate of growth based on Enviros's work after that. Do you agree with such an approach?

All Districts agreed with a programme to reduce arisings and it was suggested that a waste reduction target should be set. Bearing in mind the Strategy Unit proposal for a reduction to 2% by 2005 and the proposal within the North West Regional Waste Strategy to strive further towards a reduction of 1% before 2010 and 0% before 2014 across the region the Authority may wish to introduce progressive targets for waste reduction.

Question 3 - Whilst the benefits resulting from success would be considerable, waste arisings will only be reduced if policies are put in place at WDA and WCA level which would facilitate such a change, including policies concerning commercial waste. Do you agree that, on balance, such policies are desirable?

WCA's supported the introduction of policies but recognition of local variations and the provision of suitable alternatives for trade waste disposal are requested. There is concern over fly tipping and a request to increase enforcement action across Greater Manchester.

Question 4 - Should residual waste collection frequency be reduced to fortnightly, once comprehensive recycling and composting services are put in place?

WCA's indicated that this is a local decision and would need a viable system to ensure public health implications are addressed. Authorities have indicated this would be subject to Public Consultation but in no case was the possible introduction totally ruled out.

Question 5 - Do you agree with the concept of direct 'Pay As You Throw?' Would you support a proposal for piloting it in your and other Greater Manchester authorities if Government introduced legislation allowing direct householder charging?

Most WCA's had reservations over introducing "Pay as you throw" and several said they would not. Reservations included the administration, fly-tipping, additional costs to the Council tax payer and some would prefer an incentive based scheme for recycling rather than charging.

Question 6 – There is compelling evidence that suggests that introducing penalties and incentives within CA site contracts is a key to succeeding in rapidly building recycling rates. Do you have any views on this issue?

There was support across all districts with comments relating to a preference for it to be based on partnership principles and a corresponding penalty for failure to reach targets should be included.

Question 7 - Would you support the introduction of tough new policies for controlling trade waste deposits based on UK best practice in Greater Manchester's CA sites?

All WCA's agreed with the introduction of new policies and most expressed concern though that this should be a structured approach to avoid risk of increased fly tipping.

Question 8 - Would you support the development, by the Greater Manchester authorities, of a Greater Manchester Remade market development initiative?

All Authorities supported this in principle but had reservations over the cost implications. Several considered this should be linked to existing local schemes and the introduction of green purchasing policies. All WCA's recognise that with the increased levels of recycling the development of local markets was essential.

Question 9 - Do you think the projected recycling /composting rates adequately reflect the recycling and composting led concept? Do you think they are achievable, or unrealistic?

All WCA's recognised they were achievable most considered them to be challenging but realistic. It was also considered that links need to be made to change public attitude and raise awareness to achieve these targets.

Question 10 - Do you agree that biological treatment of residual waste should have a prominent place in the MWMS?

There was considerable support for the prominence of biological treatment but concern was expressed that other options should not be excluded. Some WCA's had concerns over the locations of facilities.

Question 11 - *Do you think that energy recovery through anaerobic digestion (producing biogas) should be prioritised over biological treatments which do not produce energy?*

There was a mixed response to this question with a range of Authorities agreeing and disagreeing or reserving judgment which indicates that there are concerns over these new technologies and a lack of knowledge which needs to be addressed.

Question 12 - *What role should energy from waste have in the Strategy? Should it be restricted to particular 'clean' technologies such as anaerobic digestion? Or should all options be kept open, but decisions delayed until emerging technology has become proven?*

WCA's considered options should be kept open and requested more detailed information. One Authority considered there should be a higher prominence within the options for energy from waste.

Question 13 - *When designing and commissioning major new waste management facilities, would you support a policy of specifying equipment which conforms to the highest environmental standards available, rather than to the minimum allowed?*

WCA's agreed subject to cost benefit analysis, best practicable environmental option (BPEO) and best value considerations.

Question 14 - *Do you agree with the long term strategic option of continuing to strive for the development of a waste transportation infrastructure which minimises reliance on road haulage?*

All WCA's recognised the need to reduce road haulage but BPEO should be taken into consideration along with local traffic considerations and planning policies.

Question 15 - *Does the approach outlined above to reform the current Levy arrangements represent a position which you would like to see developed further?*

The Authority has agreed with WCA's, in principle, for the introduction of tonnage based levy systems and introduced in the current year a new arrangement. This is now subject to review and will require resolution to enable improved partnership working for future years.

Question 16 - *Do you agree that a review of existing arrangements with GM Waste Ltd should be undertaken to help in establishing clearly the advantages and disadvantages of retaining a direct interest in the service delivery vehicle?*

All WCA's supported a review with indications this should be independent, full and open, concurrent with best value and subject to market testing.

Question 17 - *Do you agree that the range of procurement options outlined all merit further investigation and development?*

There was a range of responses from the WCA's with some in full agreement and others indicating alternatives including best value principles and full and open market testing.

Since the consultation with WCA's discussions have indicated that support for a fully integrated waste contract is not supported by most Districts. The collection infrastructure is required to be kept with the WCA but there have been approaches to the Authority to undertake a wider remit of disposal for recyclable and compostable materials arising from kerbside household collection systems. This would provide a fully integrated waste disposal service with the benefits of volume being provided to all WCA's and could attract industry and employment to Greater Manchester for the reprocessing and production of recyclable products.

2.0 PUBLIC CONSULTATION

- 2.1 During the period January – July 2003 a public consultation process on the Municipal Waste Management Strategy was undertaken. The consultation involved the distribution of pre paid postage leaflets to all of Greater Manchester's households, advertisements and special features in each of the WCA's civic reviews. The public consultation was also publicised through the WCA local press, area committees, websites, road shows and community forums.
- 2.2 The closing date for the consultation was 31st July 2003 and by then 11,748 responses had been received. In marketing terms this is considered to be a good response rate.
- 2.3 Detailed below are the results illustrated in percentage terms for each of the questions and information on the implications of the response.

Question One - Do you agree with the proposed recycling and composting led approach?

Strongly Agree	Agree	Neither agree or disagree	Strongly Disagree	Disagree	Don't know	%age Total	Total Number of Respondents to Question
74.28	23.03	1.52	0.34	0.39	0.44	100	11196

97.31% of those questioned agree or strongly agree with a recycling and composting led approach. Less than 1% of people disagreed with this approach which is encouraging for future recycling and composting services.

Question Two (a) - Are you willing to:

Reduce the amount of rubbish which you create, e.g., buying products with less packaging, using refills, reusing paper as scrap?

Already Do So	Very Willing	Willing	Not Sure	Unwilling	Not able to	%age total	Total number of respondents to question
53.76	26.54	14.67	3.5	0.6	0.9	100	11391

53.76% of those questioned feel that they already reduce the amount of rubbish they produce whenever they can which is very encouraging as it is far higher than envisaged.

41.21% stated they would be very willing or willing to reduce the amount of rubbish they create.

Only 0.6 % felt they were unwilling to reduce the amount of waste they create.

Question Two (b) - Are you willing to:

Compost grass, hedge clippings, vegetable peelings in your own garden?

Already Do So	Very Willing	Willing	Not Sure	Unwilling	Not able to	%age total	Total number of respondents to question
41.69	22.92	12.18	6.85	3.13	13.23	100	11185

41.69% of respondents claim to already compost in their own gardens.
 35.1% would be very willing or willing to do so which would indicate that there is a considerable market still available for home composting.
 Only 3.13% are unwilling to compost.
 13.23% were not able to do so and it is assumed that these householders were either in flats or did not have gardens.

Question Two (c) - Are you willing to:

Separate out your recycling, e.g., newspapers, glass, cans and plastic so that it can be picked up at the doorstep by your Council.

Already Do So	Very Willing	Willing	Not Sure	Unwilling	Not able to	%age total	Total number of respondents to question
31.46	53.31	11.06	1.76	1.02	1.39	100	11346

31.46% stated that they already use a doorstep Council recycling service.

64.37% of respondent state that they would be very willing or willing to use a doorstep service if offered by their Local Authority which is very encouraging for the new kerbside recycling services being introduced. Only 1.02% are unwilling to use doorstep service. Potentially therefore 98% of all households could eventually be participating in doorstep collections.

Question Two (d) - Are you willing to:

Separate out your recycling ie, newspapers, glass, cans and plastic and take it yourself to a Bring bank or Local Civic Amenity Site.

Already Do So	Very Willing	Willing	Not Sure	Unwilling	Not able to	%age total	Total number of respondents to question
49.74	10.31	10.56	8.73	6.87	13.79	100	11113

49.74% of respondents claim to be utilising the bring bank and Civic amenity site facilities already to dispose of their recycling.
 20.87% would be very willing or willing to use the “bring” facilities
 13.79% are not able to use “bring” facilities.
 6.87% are unwilling to separate their waste and take to a bring bank or CA site.

Question Three (a) – When recycling services improve my Council should look at reducing the number of collections of residual waste?

Strongly Agree	Agree	Neither agree or disagree	Strongly Disagree	Disagree	Don't know	%age Total	Total Number of Respondents to Question
19.21	32.43	15.97	20.78	8.47	3.14	100	11373

51.64% have strongly agreed or agreed that Council's should consider reducing the number of residual collections when recycling services have been improved.

29.25% strongly disagreed or disagreed with this approach.

19.11% neither agree or disagree or don't know.

This would suggest that when introducing such a scheme education prior to the change and awareness of waste costs will be essential.

Question Three (b) - When recycling services have improved my Council should look at introducing "Pay as you throw" charging or rewards

Strongly Agree	Agree	Neither agree or disagree	Strongly Disagree	Disagree	Don't know	%age Total	Total Number of Respondents to Question
19.20	27.02	15.66	19.49	13.31	5.32	100	11331

46% of those questioned think Council's should look at introducing a "Pay as you throw" or reward initiatives.

32.8% strongly disagreed or disagreed with this proposed initiative.

This indicates that it will be difficult to introduce a charging or reward scheme.

Question Three (c) - Tougher measures should be introduced to stop traders from using Civic Amenity Sites provided for householders only.

Strongly Agree	Agree	Neither agree or disagree	Strongly Disagree	Disagree	Don't know	%age Total	Total Number of Respondents to Question
54.48	28.22	8.61	4.09	2.17	2.43	100	11545

82.7% strongly agree or agree with tougher measures being introduced at Civic amenity sites.

6.26% strongly disagreed or disagreed with tougher measures being introduced.

This indicates a high level of support for introducing tougher measures.

Question Four (a) – After maximising recycling I would support the development of the following new facilities in Greater Manchester for the treatment of the rest of my rubbish:

Material Reclamation Plants (MRF'S)

Strongly Agree	Agree	Neither agree or disagree	Strongly Disagree	Disagree	Don't know	%age Total	Total Number of Respondents to Question
59.96	33.30	3.46	0.49	0.24	2.55	100	11237

93.26% would strongly agree or agree with the development of MRF facilities after the maximisation of recycling.

0.73 would strongly disagree or disagree with these facilities.

This is very encouraging and supports future investment for recycling.

Question Four (b) – After maximising recycling I would support the development of the following new facilities in Greater Manchester for the treatment of the rest of my rubbish:

Composting Plants

Strongly Agree	Agree	Neither agree or disagree	Strongly Disagree	Disagree	Don't know	%age Total	Total Number of Respondents to Question
60.09	32.95	3.79	0.57	0.29	2.31	100	11244

93.04% strongly agreed or agreed with the development of composting plants after recycling had been maximised.

0.86% had a disagree or strongly disagree opinion with regards to the establishment of composting plants.

This indicates a high level of awareness of waste issues and should assist when introducing new facilities.

Question Four (c) – After maximising recycling I would support the development of the following new facilities in Greater Manchester for the treatment of the rest of my rubbish:

Bio Mechanical Treatment Plants

Strongly Agree	Agree	Neither agree or disagree	Strongly Disagree	Disagree	Don't know	%age Total	Total Number of Respondents to Question
52.73	32.77	7.06	1.10	0.59	5.75	100	11111

85.5% strongly agree or agree with the introduction of Biomechanical treatment plant after recycling has been maximised.

1.69% strongly disagreed or disagreed with this option.

There are a high number of people neither agree/disagree or don't know which indicates a lack of knowledge with regards to this treatment method.

Question Four (d) – After maximising recycling I would support the development of the following new facilities in Greater Manchester for the treatment of the rest of my rubbish:

Incinerators

Strongly Agree	Agree	Neither agree or disagree	Strongly Disagree	Disagree	Don't know	%age Total	Total Number of Respondents to Question
40.20	30.05	10.56	7.50	5.50	6.19	100	11153

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70.25% strongly agreed or agreed with an incineration option after recycling had been maximised.

13% strongly disagreed or disagreed with incineration as an option.

This result indicates that there would be support after maximising recycling for incineration facilities.

3.0 EXTERNAL ORGANISATION AND OTHER BODIES

3.1 There have been various responses from organisations, other Authorities and individuals. A summary of the key points is detailed below:

North West Regional Assembly - A response has been received from the NWRA. The document is a report that went to their Planning, Environment and Transportation Key Priority Group on 13th March 2003, it advises the consultation paper is an informative document and highlights where the suggested strategy is weakest is in providing no mechanisms to deliver facilities if participation rates are below expectations and growth rates exceed those predicted.

The only additional main comments not highlighted previously in this report by WCA's is the NWRA considers the date of 2013 is far too late to determine where the new thermal facilities will be needed and delivered through the planning system to make any contribution to the life of the strategy. They suggest the decision needs to be made in the next three years.

3.2 North West Waste Forum – The forum suggests there is a need for an action plan with specific targets for minimising waste together with developments in recycling and composting infrastructure. The forum suggests the recycling and composting target is a very conservative estimate and would look to increasing this to 60% for 2020 and bringing forward the target of 46% to 2012.

The forum supports suggestions about the potential to create “reuse and recycling waste exchange centres” in the place of CA sites and recommend extending the targets to 80% by 2015.

3.3 Friends of the Earth - FOE have expressed in the main opposition to incineration and supports the North West Forum 60% recycling and composting target together with zero waste growth.

- 3.4 Individual letters and correspondents raised similar points as the aforementioned, several though have requested the improvement of collection services to their areas and are critical of the overflowing bring bank facilities.
- 3.5 Greater Manchester Waste Limited – GMWL have responded to the seventeen questions and the response is considered to be in line with the opinions of the WCA's.

ⁱ The Scenarios in this analysis use output performance data from; W. MÜLLER, H. BULSON." Does MBT aid compliance with EU and UK waste reduction and facilitate low environmental impact landfills?"; Dr C Coggins, "Conversion Technology, Future Vision", Resource publication Jan-Feb 2003; Dr Stuart RB McLanaghan, "Delivering the Landfill Directive: The role of new and emerging technologies" November 2002: Juniper Technology Reviews "Mechanical Biological Treatment Systems" 2002.