South East England Development Agency (SEEDA)

Market Development Data Research Scoping Study

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Contents

List of tables

Main report

Appendices

1 Executive Summary

This report represents the results of a Data Research Scoping Study to collate, review and analyse existing data and determine how adequate it is for strategic planning in the South East in line with the objectives of the SEEDA Waste Market Development group. As a scoping study this research is, by its nature, incomplete. It's purpose being to identify what information is needed to aid decision making and to identify gaps in that information rather than to provide the information needed to make such decisions.

The research and analysis on which this study is based consisted of:

- A survey of stakeholders in the reprocessing and waste management sector (chapter 3)
- A detailed desk based literature and data review to ascertain the extent of current information and data (appendix 1)
- An assessment of the implications of these data findings and potential costs and benefits arising from reprocessing in the Region (chapter 4)
- Strategic level SWOT analyses for each priority waste stream (chapter 5)
- Recommendations and conclusions arising from the data scoping assessment, data and information needs identified by stakeholders and market SWOT analyses (chapter 6)
- A prioritisation exercise as to the relative importance of the recommendations in terms of importance, urgency and scale.

The waste streams explored in the report were prioritised based on the priorities of *No Time to Waste* - the SEERA Regional Waste Management Strategy - European Commission prioritisation based on potential environmental threat, and, the results of the stakeholder survey. The streams examined are: plastics, paper & board, construction and demolition, fe metal, aluminium, wood, organics, tyres, WEEE, ELV & textiles.

1.1 *Implications for the South East*

The lack of regional data makes it difficult to accurately assess the potential for increased recycling in the South East, with data gaps occurring for all waste streams, particularly non-municipal waste, include waste composition, quantities of different types of waste, the costs of collection and processing and the value and size of the potential markets. Despite these problems, it has been possible to provide broad estimations of the potential of some of the waste streams, and to provide an idea of the type of data improvements needed.

In total the current level of recycling is estimated to have a net value of £41.4 to £110.4 million/year (table 1.1). The greatest potential values are from the recovery of commercial and industrial plastics and aggregates, however there is considerable uncertainty surrounding the quantities of these materials.

Table 1.1: Summary of estimated values of current levels of recycling in the South East and potential levels of recycling.

	Quantity in waste stream tonnes/year	Current recycling %	Current value £m/year	Potential recycling %	Potential value £m/year	Net value £m/year[1]
Plastic bottles (PET/HDPE)	100,536	5.5	0.48	50	4.33	0.33 - 3.95
C&I plastics	1,368,200	22.4	15.32	50	34.21[2]	34.21
Glass	438,600	36	2.60	50	3.62	3.62[3]
Newspaper & mags	547058	65	16.00	80	19.69	-14.00 - +17.51
C& I board	194308	65	1.07-5.05	80	1.32 – 6.22[2]	1.32 – 6.22
Mixed paper	783002	65	3.05 – 13.49	80	3.76 – 16.6	-13.94 - +15.03
Aggregates	13,444,000	43.4	5.83[1]	60	29.04[1]	29.04[4]
Wood (CA)	229,998	?		10	0.34	0.34
Total			**44.35-58.77**			**41.4 – 110.4**

[1] Net value is calculated from the potential value plus the savings from final disposal to landfill, less the cost of collection and sorting. Further details are provided in appendix 1.
[2] Based on the net costs
[3] Based on 80% bring and 20% kerbside collection
[4] Only includes savings from landfill tax and the aggregate tax.

1.2 *Prioritisation of recommendations*

The conclusions arrived at by this research have been considered in terms of recommended outcomes (needs) and processes (actions) by which the 'needs' could be addressed. They have been prioritised according to their relative importance (1=high), urgency (A=high) and scale (**L**ocal, **R**egional & **N**ational). **Importance** is based on the ease of addressing the issue, the potential for increasing recycling or market and likely contribution to the region's economy (and the likely cost of inaction). **Urgency** addresses how critical is the issue in terms of current or imminent environmental, social and economic impacts and meeting new or emerging legislation. The '**scale**' identifies whether the issue or action can be effectively addressed at the sub-regional, regional or national scale.

However, SEEDA also needs to consider:

a) whether its role is to develop markets for materials that have the greatest economic value, even though the markets will develop commercially without any assistance; or
b) whether they should be supporting waste streams that are less likely to develop through natural market forces due to their low economic value, low volume or high costs of recovery.

Table 1.2 Prioritisation of recommendations

Needs	Actions	Prioritisation		
1. Data and information gaps		**Importance (1,2,3)**	**Urgency (A,B,C)**	**Scope (L,R,N)**
Waste composition & quantities Identify opportunities for recycling by obtaining current data on the quantity and composition of recyclable waste streams	Municipal waste survey: SEEDA to work with local authorities to initiate waste surveys to gather composition data on municipal waste.	1	A	R/L
	Waste survey of C&I and C&D businesses to collect data on quantities and composition	1	A	R/L
Establish if national data represents the situation in the South East and if any variation is significant enough to make a difference to the waste streams	Statistical comparison between regional and national composition data	2	B	R
	Socio-economic analysis of municipal waste arisings	2	C	R
Determine the processing and re-processing capacity of the region	A regional mapping exercise to identify the scale and location of current and planned reprocessing capacity This could be undertaken as one project or as part of the material specific studies identified below.	1	A	R
Develop markets for recyclate and processed waste materials. Especially materials likely to have higher economic return (refer to chapter 4)	Material specific market studies to include current and future reprocessing, markets and economics.	1	A	R
Develop markets for potential but more difficult recyclate.	Focus, through research and market studies (as above) on identifying and removing barriers to development in SE	1	A	R
Economics. Establish cost of collecting and sorting municipal recyclate and monitoring the value of the markets	Local authorities encouraged to provide cost data on waste collection and sorting, and the current sale prices.	1	A	R/L
2. Other market support actions				
Stabilise markets	Encourage local authorities and businesses to form groups and make contracts directly with large scale reprocessors.	1	B	R
Identify and monitor potential markets	Monitor markets for WEEE, ELVs and farm plastics particularly as new legislation is adopted.	2	B	R

Needs	Actions	Prioritisation		
Localise the recycling process where possible: Develop local reprocessing facilities and markets.	Work with regional partners to develop a region wide green procurement programme to stimulate regional business development	1	A	R/L
	Regional and local planning should consider a greater emphasis on sustainable construction practices.	2	B	R/L
Optimise the economic benefits from reprocessing. Identify the optimal geographic location for large scale reprocessing within or outside region.	This could be undertaken as part of the specific materials analyses identified above.	1	A	R/N
3. Other research priorities				
Regional training and employment creation	Monitor the training and employment opportunities generated by increased recycling and reprocessing in the region.	3	C	R
	The development of a user-friendly guide to current and emerging waste legislation.	3	C	R/N
4. Communication of information				
Support market development by providing information on the quality and quantities of recyclate and marketing opportunities. Plus provide opportunities for exchange of information.	Co-ordinate seminars for council staff, waste management companies & businesses involved in recycling and reprocessing. Ensure opportunities for discussions	1	A	R
Provide material specific information on markets, emerging technologies and the development of new products	Organise material specific seminars to promote process and product R&D and information on innovations, new technologies and products. These could be provided in collaboration with organisations such as WRAP or CIRIA.	1	B	R
Provide an effective means of providing current information on waste streams, recyclate, processors and reprocessors, markets and R&D opportunities.	Establishment of a dedicated web site that is regularly monitored and kept up to date.	2	A	R

2 Introduction

This research based report has been produced by Environmental Futures Ltd in response to a project brief from the Waste Market Development Group of the South East England Development Agency (SEEDA). The brief called for a Data Research Scoping Study to collate, review and analyse existing data and determine how adequate it is for strategic planning in line with the Groups' objectives. These objectives are:

- Quantifying the characteristics of the key resource streams and flows;
- Establishing the regional and local dimensions in processing and market terms;
- Determining what changes are needed to maximise recovery potential (e.g. processing capacity, scope for expanding outputs, need for new product development);
- Quantifying the potential for new jobs, sustainable transport linkages, etc; and
- Identifying priorities and opportunities for quick wins.

In line with the brief, the focus of this scoping study has been on the data and information needs of potential businesses and investors who may be considering entry or expansion into the reprocessing / recycling sector. The methodology used included a combination of desk-based data and literature assessment and a postal, email and phone survey of selected stakeholders.

The literature and data review sought to identify and analyse the following information for eight priority waste streams (plastics, glass, paper, card, metals, wood, organic, construction and demolition wastes).

- The quantity of waste both nationally and (where available) locally;
- Current levels of recycling, and an assessment of recycling and reprocessing potential;
- A breakdown and assessment of specific sources of recyclate and analysis of their properties in terms of reprocessing and recycling;
- An assessment of the market value of the stream; and
- Identification of key barriers, opportunities and where relevant potential future markets for the stream.

The aim of the survey was to identify current and emerging stakeholder priorities, the data and information needs of reprocessing companies, and barriers and opportunities for the expansion of capacity both in specific waste sectors and streams and for the development of the Regional reprocessing market in general.

In addition the 'final destination' of reprocessing routes for each waste stream and related recyclate was sought in order to build an understanding of the flows of waste within and beyond the Region and help in the assessment of potential reprocessing market opportunities for the South East.

The questionnaire was tailored to focus on three key stakeholder groups:

- Existing local and regional reprocessing companies;
- The seven County Councils, who play a key role in the regional waste market as Waste Disposal Authorities; and
- A number of agencies and organisations who have a leading role in the promotion of and research into waste market development nationally and in the South East.

It needs to be emphasised that this is a scoping study and therefore, by its nature, is incomplete. The aim is to identify what information is needed for decision making purposes and to identify gaps in that information rather than to provide the information needed to make the decisions.

3 Stakeholder survey

The aim of this survey was to obtain a general idea of what information various stakeholders involved in recycling were aware of, what information they considered they need to make decisions, and to identify the barriers and opportunities to increased recycling and reprocessing. This small survey is not intended to be representative of all the stakeholder groups. To meet this requirement a larger survey involving greater numbers of stakeholders would be needed.

With the aim of gaining a balanced and informative range of input, ideas and views to guide and inform this study, contacts were made with stakeholders from three main groups:

- Regionally based waste reprocessing companies representing the full range of priority waste streams
- Agencies with a role in waste management and recycling promotion (including a national waste management company)
- County Councils with responsibility as the Waste Disposal Authorities for the Region.

A number of national waste management companies were also contacted, but only one response was received. As noted above the single response received was included for reporting purposes with the waste agency responses.

In total 52 stakeholders were contacted. Details are provided in Appendix 2. Response rates are summarised in table 3.1. Following initial high refusal of telephone interviews, local reprocessing companies were sent a postal questionnaire, while the waste agencies, companies and the County Council responses were collected through a combination of telephone interviews and email correspondence. The total number of completed questionnaires received by email and post or completed over the phone was eighteen, an overall positive response rate of 35%, which is about average for this kind of survey work.

Table 3.1: Stakeholder response rate summary

Group	Initial contact	Responses	Positive response rate
Local Reprocessing Companies	35	9 positive	26%
Agencies with role in waste management	6	4 positive	66%
County Councils (WDAs)	6	4 positive	66%
National Waste Management Companies	5	1 positive	20%

3.1 *Reprocessor survey*

Initially a telephone-based survey of reprocessors was undertaken. However this was unsuccessful as potential respondents felt unable to respond to our questions over the phone. Stakeholders were identified from the South East Environmental Suppliers Directory, and were chosen to provide coverage of all the major waste streams, as well as broad geographical scope. All but one of the responses received were from small and medium sized enterprises (SMEs).

The discussion below focuses on the key issues and responses arising from the questionnaires returned by reprocessors. Sections 3.2 and 3.3 cover the waste promotion agencies and County Council responses respectively. The identification of barriers and opportunities is central to this research and in each section it is this we seek to highlight.

Table 3.2: Respondents to reprocessor questionnaire

	Sector / Stream	Location	Description / Size
1	Glass	Kent	SME. Accredited reprocessor. Reprocessing bottle glass suitable for re-melt and aggregate uses.
2	Furniture I.T. Paints Aluminium (cans)	Kent	Community enterprise and SME. Provides collection and sorting service to facilitate reuse and reprocessing. Furniture and IT equipment refurbished for re-use. Cans/metals sorted for reprocessing elsewhere.
3	Paper, Card Fluorescent Tubes I.T. Equipment and Electrical Appliances Cans, Cups Furniture	West Berkshire	SME. Provide small-scale collection facilities to businesses to facilitate recycling and re-use. Do not reprocess in house but offer collection, sorting and reselling of broad range of commercial and domestic wastes.
4	Soils Aggregates Construction and Demolition wastes	Berkshire	SME. Collection, screening and crushing of soil, hardcore, concrete and brick from all sectors (commercial, industrial and domestic).
5	Green waste	Oxfordshire	SME. Accredited reprocessor. Reprocesses all forms of clean, uncontaminated green waste. Municipal and domestic.
6	Oil (food oil)	Surrey	SME. Collection of waste cooking oil for reprocessing. Currently reprocessing conducted outside of South East due to lack of facilities.
7	Plastics	Kent	SME. Accredited reprocessor. Plastics in the form of car bumpers and plastic food barrels are sorted a reprocessed for sale and reuse in the car industry and other commercial uses.
8	Demolition waste Bulky earthworks and soil remediation Asbestos	Kent	Accredited reprocessor. Segregation, screening and crushing of wastes arising from demolition and excavation in relation to redevelopment of sites. Remedial activities. Product – aggregates recycled / reused in construction.

3.1.1 Material Requirements

All respondents stressed the vital importance of clean, uncontaminated, good quality and consistent supplies of recyclate. For glass reprocessing it was noted that the process itself can remove many impurities, however for many streams (such as plastics and construction waste) mechanical separation is either difficult or costly. This clearly influences the economic viability of recycling, and quality also limits or hinders the possible end uses of recyclate.

Though not specifically stated by the respondents, this may also contribute to prevailing attitudes that products containing recyclate are of inferior quality to virgin products.

3.1.2 Information and Data Needs

Data and information are key for all businesses – for planning and decision making as well as market assessment. This was reflected by responses to questions concerning data and information in the questionnaire.

Information identified as vital at both ends of the reprocessing cycle were:

- More detailed, specific and up-to-date data on the supply (quantity, quality reliability and location) of recyclate; and
- Real-time market information such as the likely scale of demand for the final product of reprocessing.

Respondents also saw as key the need for market information such as the identification of potential purchasers and the likely scale of demand for recycled products:

- One respondent suggested that the Region requires a major recycling information web-presence, suggesting that existing web resources remain too fragmented and partial in terms of market information.
- The need for data relating to the end uses and market for recyclate products was also emphasised.

One respondent noted that their process was ‘closed-loop’ in that they took industrial waste (plastics) and after reprocessing sold the product back to the original source (in this case bumper plastics for the car industry). The respondent felt that developing other markets / applications of such technology would be possible, but that little or not information was available to support this assertion / proposition.

Intuitively, the potential for win-win outcomes from such processes seems large. Increasing the amount of material recycled through closed-loop processes may be of major benefit to the Region.

3.1.3 Capacity and Feedstock Sufficiency Issues

Two respondents reported that they are currently operating at full capacity, although both also stated that they had plans for expansion. This appears to indicate that capacity constraints are not the primary limiting factor in developing many existing reprocessing streams within the Region. These streams included glass, plastics, furniture, paper, card, cans, IT equipment, electrical equipment and food oil. As this survey considered responses from current reprocessors it is not possible to draw conclusions about streams not currently reprocessed.

A number of issues / barriers were noted surrounding the availability of sufficient feedstock:

- Finding sufficient, good quality feedstock at viable prices is also a major issue: the cost of acquiring such feedstock can limit the viability of reprocessing.
- Unpredictability of supply due to market conditions was noted by respondents. Recyclate arising for example from re-development projects or construction will depend to a large extend on prevailing market conditions in the housing sector. This in turn makes strategic planning for expansion based on known levels of feedstock difficult. This view was supported by a respondent who reprocesses / composts green waste for resale as soil improver, stating that tonnages of green waste are unpredictable and not guaranteed.
- Perception of recyclate suppliers was seen as an important issue by one respondent (PPR WIPAG – Plastics), who noted that there is at times reluctance, or lack of 'willingness' to provide materials for reprocessing.
- The community re-use scheme was concerned that while the potential for suitable feedstock is very large, it often encounters problems as suppliers perceive it as a waste disposal route as opposed to a refurbishment, re-sale and re-use service and therefore often provide waste which is unsuitable, contaminated or un-segregated.

3.1.4 Expansion Plans and Future Market Potential

Only one respondent stated categorically that they were not seeking to expand their throughput / business, though the reason stated was lack of desire for expansion, stated simply as *'we're happy as we are'*, rather than lack of opportunity. Some expressed that expansion plans were unclear or remained largely dependent on sufficient feedstock (see above), market conditions and the availability of suitable and predictable waste arisings.

The majority view is that the future market for reprocessing and related products was potentially huge. However a number of issues were raised relating to this. To reflect the aims of this study these are divided into barriers and opportunities.

Barriers:

- Legislative uncertainty or inconsistency [perhaps due to insufficient information]:
  - One respondent revealed how previous plans to expand (into bio-remediation of soils) had failed due to the granting of a landfill tax exemption for historically contaminated soils. The importance of legislation and regulation in dictating market conditions is of particular relevance to the waste industry. Knowledge of, and changes in such factors may act as a significant barrier to future market potential.
  - A plastics reprocessor considered that where a reprocessing route for a material is available and viable, landfilling should be made illegal, or at the very least very costly, to support the market for alternatives:

  "To us that would be the ultimate assistance, i.e. if there were an alternative to landfilling materials that was cost effective and environmentally correct. It should be illegal to landfill. That's the barrier – it's not illegal for most of these manufacturers to landfill their waste. Although we can offer them a saving on money they don't necessarily want the extra hassle…we need legislation to avoid landfill where there is an alternative and landfill costs to rise dramatically by hundreds of pounds a tonne, not by three pounds a tonne every year or so."
- Lack of information on and promotion of new products and technology:
  - One respondent expressed interest in producing new products and new end uses for their reprocessed outputs, but stated that lack of knowledge, research and information on these possibilities remained a major barrier.
  - Another respondent, from the construction and demolition sector, felt that the market for some recycled building materials could overtake that for virgin materials, but that

this was currently prevented by a combination of client expectations / specifications and a lack of research into the uses of recyclate.

- Culture and prevailing attitudes remain a major barrier to the success of reprocessing businesses:
  - Two respondents felt that some purchasers of products containing recyclate still perceive them as being of inferior quality.
  - One of these respondents also noted that labelling recyclate as 'waste' immediately influenced opinions and stigmatised the business of reprocessing. Industry perception must be changed so that buyers view recycled products as of same quality as virgin.
- Two respondents considered that the ability to plan or expand was often influenced by planning problems and council approval / permission for sites and facilities. One stated simply that their most important barriers were *"location options, site availability and skills."*
- A post consumer plastics reprocessor stated that the density of certain wastes makes it very hard to build up viable volumes, thus once there are a few 'players' in the market it is very hard to enter. For certain streams therefore, product / recyclate characteristics can act as a barrier to entering and competitiveness in the market.

Opportunities:

- All respondents felt that the potential regional market is very large. Some also considered that international markets offered great potential as well – one respondent expressed interest in links with China, Africa and Europe, expressing that the potential scale of these markets was *"very large indeed".*
- There is a genuine desire among regional reprocessors to exploit opportunities and increase both capacity and range of processes. A number of respondents expressed the desire to expand by entering new sectors related to their current expertise. Exploiting such interest among existing regional reprocessors, and the possible process / market expertise synergies, may offer major opportunities for rapid expansion of reprocessing activity in the Region.
- The localisation of reprocessing is perceived as a possible major opportunity, however this is reliant on overcoming barriers in planning and the siting of new facilities. One respondent thought that their model of small scale, on-site collection of a broad range of commercial and industrial waste streams could have potentially huge impact nationally, supporting the importance of SMEs and localisation of materials management wherever possible.
- Research into uses of recyclate in order to 'open' new market opportunities. Many respondents felt that there exists considerable un-exploited market potential, but that a lack of market intelligence is preventing these markets from developing. Research and improved product information is seen as a major step towards exploiting potential opportunities.

3.2 *Agency survey*

For this part of the research interviews were carried out with representatives from the following key 'stakeholder' organisations:

- The Environment Agency;
- CIRIA (Construction Industry Research and Information Association);
- GOSE (Government Office for the East of England); and
- WRAP (Waste and Resources Action Programme).

3.2.1 Key issues for materials reprocessing in the South East

Respondents were asked to identify three key issues relating to the current situation for reprocessing and recycling industries and markets in the region. In addition they were asked to describe how these barriers and opportunities related to waste market development and the expansion of current reprocessing capacity. Interestingly no single issue was given more than once. Some of these issues are clearly outside the scope of SEEDA's individual influence, however many could be tackled, at least in part, through co-ordinated strategic effort and co-operation between organisations within the region.

Each respondent cited different 'key issues', as follows:

- **Stability of markets**. In the opinion of one respondent the main barrier is the uncertainty of the market. If the market is unstable it can discourage enterprise and private individuals in the industry from investing in new facilities. Conversely if the market can be stabilised there are prospects for significant development and financial opportunities.

- **Waste strategies** for the collection and disposal authorities – the Municipal Waste Management Strategies. One respondent considered that problems are likely arise when a coherent strategy has not been formulated:

  "If you haven't got a strategy then it's going to be very difficult to let a contract to allow collection, recycling and re-use of materials within the market. Or you can let a contract but it will cost you lots of money."

  Therefore without the strategy less innovative contracts are likely to arise especially if there is an attempt to drive the prices down.

  By contrast a clear strategy can enable the development of more innovative contracts leading to greater opportunities for recycling and reprocessing. There are opportunities for collection and disposal authorities to work together more, seeking larger markets and therefore increasing market stability.

- **Permitting** – once the need has been identified for a facility a key issue involves planning consent and a waste management license or a PPC permit. The barriers include the need for a review of the exemptions that are currently taking place at by DEFRA which the Environment Agency are involved in:

  "We need to get the review out, we need to get the new exemptions out i.e. new guidance on permitting – what's going to need a permit, what's going to need an exemption? Once you've done that you can then make it straightforward and simple."

  This will facilitate the establishment of new facilities. The respondent considered that although planning will continue to be an issue, once planning consent has been granted, and provided the facility complies with regard to environmental pollution, a permit will be given. The only remaining issue being the cost. How much will it cost to put the controls in place to ensure that problems do not arise? Key issues here include collection, storage, and simple pre-treatment which are not going to involve too many pollution control issues and 'fairly straightforward things' such as making sure there is proper surface drainage.

- Increases in **infrastructure and processing technologies** related to recycling facilities.

- **Cultural change within the industry.** Providing targeted information to those individuals capable of bringing about change within organisations could facilitate cultural change. The information should focus on the possibilities and capabilities of managing materials

better, recycling and getting value out of waste materials. The cultural change might result in improvements to on-site materials separation and a renewed sense of considering

- **Targeted support** for the market and the industry.

- Provision of **many more new facilities** to enable compliance with the new regulations and to meet increasingly demanding targets. The facilities need to be planned soon due to fairly long lead times, but that will be affected by the new planning laws.

- **Procurement**. The creation of demand through public sector purchasing.

- A need to review **composting capacity** and if necessary to promote and encourage further market development.

- The region has significant **wood waste arisings** that are currently mainly being landfilled. This issue needs to be addressed.

3.2.2 Quality of waste streams:

"In your experience do reprocessors require the waste streams to be of a high quality? e.g. low levels of contamination"

Responses to this question were divided between those who thought materials entering the reprocessing system need to be of high quality and those who were less certain about the necessity for high levels of purity.

3.2.3 Responses advocating the need for high quality waste streams

Materials with lower levels of contamination realise a better value in the market place, and this provides one of the main reasons for trying to achieve better separation rates or less contamination.

> *"If you've got good clean paper it's fairly easy to separate it into various grades. If it's mixed up in municipal refuse and is contaminated with food and worse bits and pieces, it is almost impossible to separate it out and it has to be disposed of rather than recycled."*

It was also recognised that recyclate needs to be of the right quality for the reprocessor in question. This will be material specific and dependent upon the degree of decontamination undertaken by the reprocessors.

One of the respondents who discussed the need for quality waste streams described how WRAP has developed publicly available specifications for certain collected recyclables. For instance, PAS 103 is a classification and grading system for the quality of collected waste plastics packaging intended for recycling. Through this system it is anticipated that the value of materials being bought and sold will increase, markets for waste will expand and the trading process will be simplified through the adoption of a common language.

A central issue in this regard is information; the better the information a supplier can provide to a potential buyer about the waste plastics being offered for sale, the easier it is for the buyer to value the consignment. The plastics waste is also likely to have a higher value and greater market opportunities.

Another respondent emphasised the opportunity for improving the quality of plastic waste before it enters the reprocessing cycle. A number of ways in which the quality of plastics could be improved was suggested, including washing and cleaning domestic and commercial waste. However this could have resource and cost implications.

An underlying message here is the clarity of information; if it could be made clearer to plastic waste processors how clean plastics need to be, this might present a greater opportunity to realise high grade streams and subsequently greater flexibility to do more with it, moving forward to a situation of less processing and more reuse.

The viability of collection systems was another important aspect that was discussed. It was felt that this is dependent upon the value of the material collected, the cost of collection and separation, whether materials are collected separately or co-mingled and the scale of the operation. Other factors identified included:

- Are additional materials and separation being added to an existing collection or are the scheme a new start up?
- The need for collection authorities and organisations to consider the end markets for the collected material when designing their collection scheme.

3.2.4 Responses not advocating the need for high quality waste streams

Responses in this vein focused on the ability of available technologies to cope with contaminated waste streams, as the following quotation illustrates:

> *"I think you can do something with most waste streams even if they are not of a particularly high quality. You can put in stages of processing and take out contaminants. The message is you can do something with everything. The cleaner you keep it (i.e. the more segregated and less contaminated you maintain it) the better."*

It was recognised however that although many options are available it is better for higher quality materials to go to high value applications. The way in which materials are used needs to be taken into consideration, as there are probably many more possibilities than are currently realised, particularly with regard to aggregates material. It was pointed out that there are certain streams of aggregate construction and demolition wastes that are particularly difficult to deal with, especially very messy, mixed and contaminated wastes. This problem can be avoided to some extent by better on-site management.

3.2.5 Priority Waste Materials:

"*What waste materials do you consider to be the most important to recycle, in terms of*
a) Environmental damage
b) Ease of recycling?
c) Which materials provide the greatest recycling opportunity in the SE?"

This question elicited a range of responses with virtually all listed waste streams being cited as a priority under the three key headings, summarised in Table 3.3.

Table 3.3: Table of combined priority waste materials responses

	Importance		
	Environmental damage	**Ease of recycling**	**Greatest opportunity SE**
Glass	✔	✔	✔
Paper	✔	✔	✔ ✔
Cardboard	✔	✔	
Plastic - film	✔ ✔	✔	✔
Plastic - rigid	✔ ✔	✔	✔
Fe cans	✔	✔	
Aluminium	✔	✔	
Kitchen waste	✔	✔	✔
Garden waste	✔	✔	✔
Textiles			
Batteries	✔		
Oil			
Aggregates		✔ ✔	✔ ✔
PVC (windows)	✔		✔
Wood		✔	✔

Note: the 'scores' given in this table are an indicative assessment of importance based on a simple summing of responses given during our survey.

The respondents also gave further details on their understanding of the three headings in relation to particular waste streams. Highlights from these details are listed below.

Priority waste materials and the environment

- Recycling has to be considered in the context of a life cycle approach. There will be environmental costs from the impacts of collecting material, but when compared with the total environmental benefits of avoided resource use, reduced energy use and avoided disposal, the overall benefit may be greater in most cases.

- Glass recycled through a melt process significantly reduces energy use. Recycling plastic significantly reduces fossil fuel use through both conserving the resource and reducing energy use compared with creating polymers from a crude oil source. There are also energy savings with paper, iron and aluminium recycling. Recovering garden and kitchen waste to create a quality compost product avoids production of carbon dioxide and methane from landfill[1] and can reduce peat and fertiliser use and lead to less soil erosion.

Priority waste materials and ease of recycling

- Understanding of the term 'ease of recycling' was broken down into proven collection/recovery systems; materials reprocessed within the UK; and markets that are readily available and/or further opportunities that exist to expand and diversify.

- There is a need to look at both large volume waste types (like aggregates) and low volume, high impact wastes (e.g. paints, adhesives and PVC). With regard to PVC it is a waste stream that is low in mass but problematic in terms of disposal.

  "What are we going to do with all the PVC windows in twenty years time when they are beyond their life and need to be replaced? Also paints and adhesives – very relevant to construction – low volume but potentially high impact from contaminants."

[1] Composting that uses an aerobic system does not produce methane but it does produce carbon dioxide.

Priority waste materials and opportunities in the South East

- Increasing the recycled content in development projects was highlighted as a key area to be addressed with the greatest opportunity lying in the public sector. It was suggested, for example, that a minimum requirement for developments financed by SEEDA could be adopted, such as 10% of the project materials to be derived from recycled resources (including mainstream products with recycled content as well as re-used, reclaimed and innovative products). This would establish a specific requirement for using recycled materials and products that in turn might help to create a demand for recycled material in construction products.

- Mainstream products such as blocks and board containing recyclate are widely available and should be promoted in addition to innovative products. It was stated that a requirement of 10% is achievable, has substantial benefits in terms of resource efficiency and diversion from landfill, and allows for other sustainability criteria to be met simultaneously.

- Two respondents thought that there are further opportunities to examine construction and demolition waste arisings and the potential to establish and expand regional recycled aggregates production. It was suggested that this could be linked to public sector use and the creation of a supply network.

- One respondent outlined currently un-exploited opportunities for the reuse of glass. It was acknowledged that this would need *"a great mind to change in the industry"*, but could involve a move from recycling to reuse for glass containers (including bottles, jars etc.). Bottle deposit schemes and milk collection were cited as an example of how this might work enabling the reuse of containers rather than relying solely on the more energy intensive recycling approach. This approach is quite common in other EU countries. It was suggested that consideration of the financial markets and the incentives to encourage supermarkets and major retailers to develop take back systems could be an important step forward. The cultural and societal dimensions to this opportunity are considered very important.

3.2.6 Data availability and reliability:

This area of questioning was split into two parts:

i) "In your opinion has expanding the recovery and reprocessing of waste been hampered by a lack of reliable data?"

Respondents initially expressed a great deal of uncertainty in answering to this question (three replied 'unsure' and one 'no'). However, the majority of follow-up discussion proved that on the whole respondents felt that there is some good data available but that more is required. The following initial comments given in response to the question provide a useful summary to the respondents' position on this issue.

> *"I wouldn't say hampered. It's not been helped. There is a lack of reliable data, there's no doubt about that."*

> *"My feeling is that things have really moved on quite a lot."*

"While some people clamour for as much detail of data as possible there are others who are suggesting that what we have got is probably enough to base decisions on. The truth lies somewhere between the two I suspect."

"*In particular, the data on commercial and industrial waste arisings is very poor."*

ii) "Does the lack of reliability have an impact in terms of data on commercial, industrial, municipal and construction & demolition waste?"

This part of the question received three 'no' replies and one 'yes'. The respondent who replied 'yes' thought that there is an impact for all the waste streams included in the question. It was generally agreed that there is currently insufficient data on the waste being produced. Although the UK undertakes national waste surveys it was considered that there needs to be more effort put into the monitoring approach. It was suggested that there are examples of other European countries where the analysis and collection of data receives substantially more attention and higher levels of resources than is currently the case in the UK.

A more structured and thorough approach to data collection and assessment would enable a far greater level of detail and timeliness in data, which corresponds to the data needs expressed by reprocessors in the Region.

There may therefore be benefit to SEEDA in exploring best practice from elsewhere in data collection and dissemination as an aid to the development of waste market potential in the South East.

3.2.7 Maximisation of recovery potential:

"*What changes are needed to maximise recovery potential? (In terms of processing capacity, scope for expanding outputs and need for product development)."*

Responses to this question are summarised in the bulleted list below.

- Establishment of waste strategies and development of markets.
- More research on the reuse and recycling of materials from industry. Ongoing work needs to be drawn together more quickly to better inform and prepare people to invest in new facilities.
- A need to reduce the amount of movement of waste is one of the most important issues to address.
- Cultural change, an increase of infrastructure and processing technologies and targeted support for the market and industry.
- A clearly defined regional market development plan needs to be developed with input from WRAP. This should map out what support is available for market development activities and what opportunities arise to exploit regional and local variations, such as regional economics, markets and infrastructure.

3.2.8 The Future

"*How would you like to see reprocessing develop over the coming months and years in the South East?"*

The following bullet points and quotations summarise each respondent's key points:

Respondent 1:

- Considerably more stable markets for plastics in particular.
- Reuse of glass containers. The establishment of a 'pump priming' scheme to encourage manufacturers to take back materials (e.g. jam jars, beer bottles and wine bottles) encouraging reuse with a deposit system.

"It's a question of trying to get more out of the container as it is without it having to go through the transformation stages involved in the recycling process."

Respondent 2:

- Increased confidence in recycled products.
- Develop the capacity of the markets and really address the nature of the demand.
- The size of some of the 'players' needs to grow and there needs to be some consolidation.
- Greater consideration as to the role of primary materials.

"Sometimes primary materials are the most appropriate materials in the particular circumstance, so let's not get too hung up on the rhetoric around recycled and secondary."

Respondent 3:

"It's not so much how, it's that it [reprocessing] needs to develop – obviously we need to move forward on it. The whole gamete from minimising the arisings of all waste streams, to using, recovering and recycling that which we still do produce. It all needs to be addressed.

Respondent 4:

"With assistance from the support and activities identified through the Regional Market Development Plan."

3.3 *Council survey*

The region consists of the seven County Councils: Buckinghamshire, East Sussex, Hampshire, Kent, Oxfordshire, Surrey and West Sussex, which act as Waste Disposal Authorities (WDAs) plus twelve Unitary Authorities: Milton Keynes, West Berkshire, Reading, Wokingham, Slough, Windsor and Maidenhead, Bracknell Forest, Medway, Brighton and Hove, the Isle of Wight, Portsmouth and Southampton.

Six of the seven County Councils acting as WDAs within the South East Region agreed to participate in the questionnaire. Despite many attempts, no contact was established with Surrey.

3.3.1 Commercial and Industrial waste surveys

Councils were initially asked if they have carried out recent commercial and industrial waste market surveys or scoping studies. With the exception of Hampshire and Oxfordshire commercial and industrial waste studies have not been conducted.

There was however general consensus that local authorities would in future need to be more aware of, and involved in commercial and industrial waste management, particularly as part of more integrated 'materials' as opposed to simply 'waste' management processes.

Hampshire Council has established an integrated waste management initiative entitled Project Integra which centres around an internet-based resource and information tool which supports the vision and goals of the Hampshire Waste Strategy.

In addition Hampshire has recently produced *More from Less – How to Make Better Use of Hampshire's Material Resources,* which sets out a framework for the effective and sustainable management of material resources that can be achieved by the environment, the economy and the local community.

The report is the result of an active, stakeholder led process involving community and industry representatives, working in partnership with Hampshire County Council, Portsmouth and Southampton City Councils, and Project Integra. It is intended as a primary reference point to guide and integrate three key work areas:

- Production of the statutory joint minerals and waste development framework
- Development of plans for managing municipal waste under Project Integra
- Implementation of societal change objectives via the Hampshire Natural Resources Initiative

Oxfordshire has just completed a large scale commercial recycling questionnaire based study, involving over 15,000 Oxfordshire based businesses, that seeks to understand their recycling and waste practices, priorities and needs. This project is still in progress (questionnaire return deadline was 28th January 2005) and full results are expected to be published later in the year.

3.3.2 Key issues for materials reprocessing in the South East

Respondents were asked to identify key issues relating to the current reprocessing market in the South East. In particular views on barriers and opportunities were sought with respect to waste market development and expansion of current reprocessing capacity in the Region.

Barriers:

- Costs associated with reprocessing and the transport / logistics of materials were frequently identified by respondents as the main barrier for the development of reprocessing facilities.

- Conflict between alternative land-uses and the availability of land for waste facilities is seen as another key barrier. In particular the pressure on land availability in the Region, as a result of the increasing demand for housing and related infrastructure, has meant that making land available for waste facilities is not perceived as a high priority. It is unclear whether this response related to the granting of planning permission, or simply the limited availability of land, however one respondent also noted that the current planning system mitigates *against* sustainable waste management, though it was felt that forthcoming statutory changes may amend this.

- Lack of clear information:
  - Poor knowledge of funding opportunities among business
  - Confusion among stakeholders over which agencies offer which services and support (i.e. WRAP, SEEDA, CIRIA)
  - Lack of link up between demand and supply in relation to waste and recycled products

  - Government bodies' failure to provide serious co-ordinated effort in the area of resource efficiency, particularly DTI and the Treasury.[1]

- Education is required to change behaviour and attitudes to waste management and recycled / reprocessed materials, both for the general public and in terms of business acceptance of green procurement and recycling behaviour

Other barriers noted in questionnaires were:

- Lack of local markets for recyclate and waste reprocessing end products and integrated communication systems.
- The need to recognise the value of stronger enforcement of the segregation of waste.
- The process of awarding contracts for waste collection and disposal can lead to uncertainty in the medium to long term planning for investments and reprocessing facilities.
- The contamination of waste acting as a barrier to reprocessing.

Opportunities:
The opportunities identified all relate to developing a reprocessing / materials market which reflects the broad sustainability agenda. The overall message seems to be that waste management / reprocessing can be encouraged and supported through community initiatives and public sector action.

Specific opportunities identified were:

- Promoting understanding of the environmental footprint of certain industries and waste streams in the Region or local areas, to aid the promotion of reprocessing and the acceptance of facilities.
- Linking waste market development to existing regional strengths by promoting material reuse and recycling within and between existing SMEs in the region.
- The potential for a demand-pull process led by comprehensive public procurement in the South East, whereby local-authorities and regional organisations co-ordinate efforts to purchase recycled and green products and thus give both a clear message that such purchasing patterns are acceptable practice and provide a substantial and reliable market for the reprocessing sector. The introduction of comprehensive public procurement is seen as a fundamental opportunity for the development of local markets. Furthermore, as part of a broad public procurement programme, the development of local markets is seen as a critical opportunity.
- Developing and encouraging an integrated approach to resources (linking waste with water, energy etc.)
- Linking the promotion of a broader sustainable communities agenda with opportunities to develop reprocessing facilities in the South East. What is required is leadership from government and public bodies.

[1] This was a specific comment raised by a respondent to our survey and does not necessarily reflect the views of the authors.

3.3.3 Quality of waste streams

The quality (cleanliness / purity) of waste was felt by all respondents to be an issue in terms of potential for reprocessing and in particular the cost implications of poor quality waste.

It was also noted that once a waste material has become contaminated it may well become too expensive for companies to reprocess cost-effectively. This was supported by other respondents noting that contaminated waste streams, and related products will clearly attract a lower price. This is turn may influence the commercial viability of reprocessing. Taking the example of plastics one respondent noted that low-grade plastics will inevitably have low-grade (or even "no-grade") uses.

To improve knowledge and understanding of these quality issues, and their effects on the potential market, one respondent suggested cost-benefit studies are needed to examine the delivery of high quality and accredited products. This could help understand and promote the economic issues surrounding material recovery.

3.3.4 Priority waste materials

Councils were asked to consider which waste materials they perceived as most important to recycle based on environmental damage, ease of recycling and in terms of opportunities for market development in the South East.

Responses are summarised in table 3.4, with ticks indicating consensus over environmental damage, ease of recycling and opportunity for the Region.

A general comment was that while these considerations are important, the significance of meeting statutory / local authority Best Value Performance Indicator targets in driving waste management should not be overlooked. For example the Landfill Directive requirement to reduce bio-degradable waste to landfill, and the necessity to meet national recycling targets, are significant drivers for local authorities. This has fostered the focus of service delivery on composting and paper collection, which contribute significantly to meeting these targets.

Identifying priority waste streams (meaning those causing the greatest environmental damage, being easy to recycle or that will provide the greatest economic opportunities for the Region) was felt by some respondents to over-simplify the issue. For example Oxfordshire County Council noted that *"all waste streams will have an environmental impact, which is why as a County Council we have a proactive focus on waste reduction: all streams can and should be recycled."* This was supported by another respondent: short-term focus can be on particular niches, but in the long-term the issue requires a holistic approach.

One respondent felt that a big opportunity for the South East would be to develop wood and 'kitchen waste' processing facilities, and their associated markets.

Table 3.4: Summary of which waste streams councils identified as most important

	Importance		
	Environmental Damage	**Ease of Recycling**	**Opportunity for SE**
Glass	✔	✔ ✔	✔
Paper	✔	✔ ✔	✔
Cardboard	✔	✔ ✔	✔
Plastic - film	✔		
Plastic - rigid	✔		
Fe cans	✔	✔	
Aluminium	✔	✔	
Kitchen waste		✔	✔ ✔
Garden waste		✔	✔ ✔
Textiles			✔
Batteries	✔ ✔	✔	
Oil	✔ ✔		✔
Wood		✔	✔

Note: the 'scores' given in this table are an indicative assessment of importance based on a simple summing of responses given during our survey.
Only three respondents completed this table, of these one ticked every box – expressing that all materials should be viewed as a priority so was omitted from this summary.

3.3.5 Data availability and reliability

Councils were asked if they considered a lack of reliable data hampered the development of sustainable waste management. The response was that commercial and industrial waste data is extremely limited. While local authorities often hold a large amount of information regarding household waste arising, collection and progress towards targets, such information is lacking in the commercial, industrial and construction and demolition sectors.

It was felt that in general the availability and relevance of data on municipal solid waste was improving, particularly driven by Defra's Waste Implementation Programme (WIP), though it was also noted that there is current uncertainty as to how much commercial and industrial waste is contained in the MSW stream.

One respondent emphasised the importance of data specifically in relation to the expansion of reprocessing facilities, noting that it is difficult to put together business cases if you do not have baseline data.

Two specific data-related needs identified were the need for better data collection in relation to waste arisings and the need for information on which materials originate from which Standard Industrial Classification (SIC) listed industries.

As noted above two Councils have commissioned research into commercial waste data and markets (Oxfordshire and Hampshire). The aim of these surveys is to try and develop some form of baseline to assist planning for and management of commercial waste.

3.3.6 Maximisation of recovery potential

The councils provided a variety of responses when asked what changes are needed to maximise recovery potential, in terms of processing capacity, scope for expanding outputs and other issues such as product development.

- There needs to be a greater link between government funded bodies and local authorities to provide the necessary support for SMEs to improve their product designs, as well as improving processing capacity.

- Financial and legislative changes are required to favour the use of recyclates over raw materials.
- Greater emphasis on stimulating markets – in particular the need to develop market demand for products containing recyclate.

A number of respondents felt this question related directly to the key issues for materials reprocessing (see above), as the optimisation of materials recovery will be achieved through tackling these key issues.

3.3.7 The future

Finally, councils were asked to consider how they would like to see reprocessing develop over the coming months and years in the South East. Again a broad variety of responses were received, however clear themes and priorities emerge from these.

Future themes:

- Reduce the need to transport waste and encourage the localisation of reprocessing. Ensure that local companies use the recyclates available i.e. ensuring local facilities are suitable for local companies. Where successfully implemented there can be a virtuous cycle of local demand, local markets and local employment.
- A more prominent role for local authorities in promoting better waste management facilities for SMEs, such as enabling multi-business on site waste storage and sorting facilities to encourage / allow small companies to collect economically viable quantities of materials.
- More partnership working with government funded bodies and local authorities in developing markets for recycled materials.
- Development of industrial resource recovery parks, where good practice in energy efficiency, water use and the management of material resources are combined, providing exemplars in waste management and reprocessing (education and awareness) and incubator opportunities for fledgling / innovative reprocessing companies.
- A move towards 'true sustainability' – by reflecting the broader sustainable development agenda, in particular building on the prominence given to sustainable consumption and production in the Governments' new Sustainable Development Strategy (HM Government, 2005).

3.4 *Where municipal recyclate is reprocessed*

Four Councils returned information on the destination of municipal recyclate (collected from kerbside schemes, bring sites and recycling banks). None of the Councils could provide information on the routes or destinations of commercial and industrial recyclate.

The picture that emerges is one of a high degree of waste mobility particularly within the UK. The summary table (Table 3.6 in section 3.5 below) lists the end destinations for each stream arising in the Southeast based on an overview of the responses received.

Individual Council destination overview are provided in Appendix 3.

Councils were also asked whether (to their knowledge) the current destination reprocessors had excess capacity available to meet increased recycling / collection and diversion from landfill. Only Buckinghamshire provided a clear response to this question. All other respondents stated that capacity was dictated by market demand, and that capacity was available "as far as they were aware" at present reprocessors.

Kent has an active policy to seek to use recycling facilities within its county boundaries wherever possible. Their achievement of this aim, by and large, would seem a very positive model for other counties – especially given the important role the public sector can play.

3.5 *Summary of results*

A summary of the survey results is provided followed by detailed write-ups of the results from each stakeholder group. The summary is arranged as follows:

- barriers and opportunities
- waste stream importance
- destination of recyclate

3.5.1 Barriers and opportunities

The following summary draws out the key comments on barriers to and opportunities for the expansion of reprocessing capacity and markets in the South East from all respondents. There was a large degree of overlap between the barriers and opportunities identified by the three groups. As a result they are grouped here by nature of barrier / opportunity rather than by stakeholder group.

Opportunities suggested by survey respondents are all at a relatively high, strategic level. This was true both of Council and individual reprocessor responses.

Barriers

Market and material barriers (supply)

- Costs associated with reprocessing and the transport / logistics of materials were frequently identified as the main barrier for the development of reprocessing facilities.
- Lack of local markets for recyclate and reprocessing products
- Inadequate enforcement of waste segregation
- Contamination of recyclate which has both cost and end-use implications
- Market instability:
  Unpredictable supply of materials suitable for recycling / reprocessing

Market and material barriers (demand)

- Current culture and prevailing attitudes to recyclate and recycled products suppresses potential demand. Need for education and cultural change both within businesses and among general public, to see recyclate as 'materials' rather than waste, so that the stigma attached to 'waste' is avoided
- Lack of market intelligence leading to 'information failure' within the market: there is little link between demand and supply in relation to waste and recycled products

Data and information barriers

- Related to the bullet above, there is a need for market information – suppliers need to know who potential purchasers are and what is the scale of demand at any given time?

- Need for good information about the cleanliness and quality of materials and the quantity and reliability of supply

- Current web-based waste market information / data resources fragmented / not user friendly

- Poor knowledge of funding opportunities among business

- Confusion among stakeholders over which agencies (i.e. WRAP, SEEDA, CIRIA) offer which services and support

- Lack of research and development tailored to waste markets, particularly relating to new technologies and innovative products. Poor dissemination of results of existing R&D.

Planning and legislative barriers

- Conflict between alternative land-uses and the availability of land for waste facilities. Planning approval for sites and facilities was identified by both Councils and Reprocessors as a major barrier. Typically due to lengthy and complex proceedings with little certainty over results.

- Lack of coherent waste strategies (waste collection and disposal authorities)

- Government bodies' failure to provide serious co-ordinated effort in the area of resource efficiency, particularly DTI and the Treasury[1].

- Financial and legislative changes are required to favour the use of recyclates over raw / virgin materials. Legislative 'uncertainty and inconsistency' was identified by reprocessors as a key barrier.

- Co-ordinated regional or sub-regional green procurement does not currently occur. Comprehensive public procurement programme could have a strong demand-pull effect on the development of local material reprocessing markets.

- A lack of stability in the market which is required to provide more attractive investment proposition and opportunities.

- Developing a reprocessing / materials market which reflects the broad sustainability agenda. The need for an integrated approach to resources – linking waste with water, energy and so on.

- Further development of 'closed-loop' reprocessing – manufacturing waste is reprocessed and sold back to original source and fed back into production.

[1] This was a specific comment raised by a respondent to our survey and does not necessarily reflect the views of the authors.

Opportunities: a view of the future
Expectations and hopes for the future development of the materials reprocessing market in the South East

- There is genuine desire among local reprocessors to exploit opportunities and 'be involved'.
  The majority of reprocessors interviewed expressed having excess capacity and plans to expand current capacity – the potential for reprocessing within the region is not being fully exploited

- There was agreement between the groups of respondents that there is generally excess capacity for reprocessing most recyclate streams.

- Reduce the need to transport waste and encourage the localisation of reprocessing activities and facilities

- A more prominent role for local authorities – particularly through co-ordinated procurement programmes

- More partnership between government funded bodies, local authorities and businesses

- The development of integrated resource recovery industrial 'parks' where energy, water and material resources are all linked

- Research leading to identification of new market opportunities for existing recyclate

- Expansion abroad of market for end-use products
  (note – this seems to contradict other comments concerning the need to localise materials markets)

3.5.2 Waste stream importance

Table 3.5 combines responses from the Waste Disposal Authorities and organisations / agencies with a role in waste management when asked which they considered the most important waste streams in terms of environmental damage, ease of recycling and opportunity for the South East.

Table 3.5: Importance of specific waste streams

	Importance		
Stream	**Environmental Damage**	**Ease of Recycling**	**Opportunity for SE**
Glass	✔ ✔ ✔	✔ ✔ ✔ ✔	✔ ✔ ✔
Paper	✔ ✔	✔ ✔ ✔ ✔	✔ ✔ ✔ ✔
Cardboard	✔ ✔	✔ ✔ ✔ ✔	✔ ✔
Plastic - film	✔ ✔ ✔ ✔	✔	✔
Plastic - rigid	✔ ✔ ✔ ✔	✔	✔
Fe metals	✔ ✔ ✔	✔ ✔ ✔	✔
Aluminium	✔ ✔ ✔	✔ ✔ ✔	✔
Kitchen waste	✔	✔ ✔	✔ ✔ ✔ ✔
Garden waste	✔	✔ ✔	✔ ✔ ✔ ✔
Textiles			✔ ✔
Batteries	✔ ✔ ✔	✔	✔
Oil	✔ ✔ ✔		✔ ✔
Tyres		✔	✔
Wood		✔ ✔	✔ ✔
Aggregates		✔ ✔	✔ ✔
End of Life Vehicles (ELVs)		✔	✔
PVC (windows)	✔		✔

Note: the 'scores' given in this table are an indicative assessment of importance based on a simple summing of responses given during our survey.

3.5.3 Destination of recyclate

Table 3.6 summarises the destinations of recyclate identified by those councils responding, showing that there is considerable transport of waste, and that a proportion of all the major streams is reprocessed outside the Region.

Mapping complete material flows would require an in-depth survey of all regional administrative bodies, as well as a far more detailed picture of commercial and industrial waste data and disposal routes than is currently available.

Table 3.6: Indicative summary of destinations of municipal waste recyclate

Material	Destinations	
	Within region	**Outside region/ international**
Glass	East Sussex (Battle) Kent (Faversham)	Essex Southampton
Paper	Kent (Aylesford)	Belgium
Cardboard	Kent (Rochester)	Deeside (Cheshire)
Plastics	Kent (Crayford)	Merseyside Essex (Stratford)
Fe metal	Kent Sussex	Wales (Port Talbort)
Aluminium	Kent (Crayford)	Wales Bedfordshire Warrington Cheshire
Kitchen waste	Local composting / windrow	
Garden waste	Local composting / windrow	
Textiles / shoes	Local facilities	Wellingborough, Northamptonshire Southampton Export to developing countries (Africa)
Batteries	Kent	Avonmouth France
Fridges / Freezers	Kent	
ELV	Kent	
Car tyres	Kent	
Fluorescent tubes		Manchester

4 Implications for the South East

The lack of regional data, identified by the survey of stakeholders, and detailed assessments of each priority waste stream (appendix 1) makes it difficult to accurately assess the potential for increased recycling in the South East.

The data gaps occurring for all waste streams, particularly non-municipal waste, include waste composition, quantities of different types of waste, the costs of collection and processing and the value and size of the potential markets. Despite these problems, it has been possible to provide broad estimations of the potential of some of the waste streams, and to provide an idea of the type of data improvements needed.

The current prices paid for recyclate are available on the Letsrecycle web site (www.letsrecycle.co.uk) but these values vary over time. For this assessment Jan 2005 data has been used. A more precise assessment would require an examination of the historical data and a prediction of future markets, which is outside the scope of this study. Also our estimates do not consider any impact on the price of recycled materials arising through increase volumes of recycling. While it may be true that recycling levels in the SE have little impact on prices where there is an international or even national market for recyclate, this is not true where the markets are more local. In addition, it must be assumed that recycling in other UK regions and other international competitors will not be static. Greater volumes of recyclate might be expected to reduce values. On the other hand, greater reliability of recyclate streams, and related changes such as new technologies and improved acceptability of recycled products, might expand markets and increase demand. Overall the changes could be rather complex and require a study of considerably greater scope than the current one. What must be noted here is that we have assumed prices for recyclate which are likely to change over time in ways which we cannot predict easily, so the figures should be read with this caveat in mind.

4.1 *Costs*

The cost of collection and sorting of recyclable materials varies considerably and to some extent is confidential, as it is part of a competitive tendering process. Also what is included in the costs available in the literature is often unclear. The variation in costs depends on the type of collection (e.g. blue box, co-mingled, kerbside sort, weekly or fortnightly collection), the quantity collected, transport distances and the local cost of disposal to landfill and incineration. Much of the research that has been done is out of date, with even recent studies quoting data from the 1990s. The cost of recycling needs to include capital costs (vehicles, bins etc), collection, sorting, disposal of contraries, transport to reprocessing, savings of disposal to landfill or incineration (including landfill tax saved), and income from sales of recyclates.

Ideally the marginal and average cost of collection needs to be calculated for each material recovered and each type of collection system, but for this scoping study an average collection and sorting cost for all recycled materials has been calculated from the limited data that are available. The cost of collection varies with the methods used and the frequency of collection. Hummel (2002) undertook a study on domestic waste collection costs for the Strategy Unit of the Cabinet Office. It appears that the costs (table 4.1) are for additional collections; alternate weekly collections of refuse and recyclate would be cheaper.

Table 4.1: The cost of waste collection

	£ per tonne
Refuse	22
Kerbside – total	146
Kerbside – paper	132
Kerbside sorted	165
Kerbside co-mingled	87
Kerbside – compost	67
Bring (excl CA)	22

Source: Hummel, 2002

The cost of sorting and processing at a MRF was estimated as £40/tonne for co-mingles and £10.26/tonne for kerbside sorted (Hogg, 2002).

In their analysis of the future of the waste industry Biffa (2002) provide costs that are similar to Hummel (2004) for collection (logistics) but lower for recycling and sorting (£55/tonne) (Hogg, 2002) but it is not clear what type of collection this is based on or if the value of the recovered materials is included. For the present analysis, to take into consideration the range of costs the Hummel (2003) data have been used as maximum estimates of the cost of kerbside recycling, while the Biffa (2002) data (table 4.2) are taken as the minimum estimates. Therefore the maximum value is based on co-mingled collection (£87/tonne) plus MRF sorting of £40/tonne, a total of **£127/tonne**, while the minimum value considered is **£55/tonne**.

Table 4.2: Cost of waste collection, transport and disposal (£/tonne)

	Logistics	Logistics & sorting	Disposal (2002)	Landfill tax	Total
Landfill	25		13	15	**53**
Compost	25		20		**45**
Incineration	25		40		**65**
Municipal recycling		55			**55**
C&I recycling		25			**25**
Construction		10			**10**

Source: Biffa (2002)

4.2 *Benefits*

The benefits of recycling include the savings from not having to landfill or incinerate the recyclate as well as the value of the materials. For this analysis the total cost of disposal to landfill is assumed to be £22/tonne for collection, £13/tonne for disposal, plus £15/tonne landfill tax, a total of **£50/tonne**.

Arguably, the landfill tax should be included in a financial assessment for the WDAs, but not in a social cost-benefit calculation. This is because it is a transfer payment from one agent to another (in this case, WDA to government) and so is cost-benefit neutral for society overall. However the tax might be seen as a proxy for the difference between market and true landfill cost, in which case inclusion is acceptable, provided care is taken to avoid double counting.

4.2.1 Plastic bottles

The costs and benefits of recycling plastic bottles from household waste in the South East (table 4.3) have been estimated for both the currently level of recycling and for 50% recovery (assuming the national composition of household waste and 5% contamination). The net benefit of the current level of recycling is calculated to be £36,614 to £434,736 and for 50% recycling between £332,852 and £3,952,143 per year depending on the cost of collection and sorting.

The recycling of other plastic waste streams is more difficult to estimate as it is not known what proportions of polymers are in the C & I waste. However if the Biffa collection data of £10/tonne is used, plus saving half the municipal landfill cost (£25/tonne), then a saving is possible of £15/tonne, although additional transport costs (to the reprocessors) plus the costs of storage, sorting and baling will reduce or eliminate this. However the costs will easily be absorbed by the value of clean baled plastic recyclate. LetsRecycle give a range of values (table A7), averaging £195/tonne for HDPE and £220/tonne for LDPE. However some polymers will have a lower value, and contamination will also reduce the value. To take this and the unknown costs into consideration a value of £50/tonne has been assumed.

With a total quantity of 1,792,200 tonnes of plastic packaging in the South East, less 424,000 tonnes in the municipal waste stream, the current recycling level of 22.4% (including exports) has a value of £15.3 million. If this were increased to 50% it would represent a potential £34.2 million for the region. It must be emphasised that this is just an estimate and further data is needed for more accurate calculation.

Table 4.3: Net benefits of increasing plastic bottles recycling to 50% in the South East (tonnes/year)

	Polymers (%)	Polymers (tonnes)	50% recycling	Less 5% contam.	Value/cost (£/tonne)	£/year
Total SE plastic		424000				
Bottles						
PET- clear	8.60	36474	18237	17325	100.00	1732521
PET- coloured	1.76	7471	3736	3549	52.50	186312
HDPE- clear	7.83	33203	16601	15771	100.00	1577123
HDPE - mix	5.52	23388	11694	11109	75.00	833197
Total			50268	47755		**4329152**
Landfill savings				47755	50	2,387,726
						6,716,878
less recycling costs						
£127/tonne			50268		127	6,384,026
Net benefits						**332,852**
£55/tonne					**55**	2,764,736
Net benefits						**3,952,143**

4.2.2 Glass

The majority of waste glass arises in the municipal waste stream, with an estimated 438,600 tonnes in the South East municipal waste stream, and a current national recycling rate of 36% of glass containers and 30% flat glass (appendix 1).

Concentrating on glass containers, and assuming the national level of recycling, approximately 219,300 tonnes of glass is currently recycled in the South East. The national mix of glass recyclate is 49% green, 11% amber and 40% clear, however a proportion of the glass would be mixed, thus reducing its value. If 20% of the clear glass stream is mixed, the value of the glass recyclate is £2.6 million, £16.49/tonne. However this does assume there is a market for the green and mixed glass. If the level of recycling increased to 50% this represents a value of £3.62 million per year.

The cost of collecting this glass depends on the method used. Glass is often collected in bring schemes instead of kerbside due to problems of contamination. Hummel (2004) assumes a bring collection rate of £22/tonne, while Enviros (2004) estimates £10-20/tonne. If a range of £15 -22/tonne is used plus the landfill saving rate of £50/tonne, the net regional benefit is £9.7 million to £11.3 million. However this value could be reduced through transport costs.

In contrast, if the glass were collected through a kerbside scheme, and were sorted at the kerbside to avoid contamination, a net loss of around £108 tonne would occur. If it is assumed that 20% of glass is collected by kerbside collection and the remainder via bring sites, a 50% level of recovery would represent a net profit to the region of £3.62 million.

4.2.3 Paper

Two examples of recycling paper and board have been calculated, newsprint and magazines from the municipal waste stream, and board from the commercial waste stream. With 547,058 tonnes newspapers & magazines in the SE municipal waste stream (table A17) and a national recycling rate of 65%, 355,588 tonnes are currently recycled with a value of £16M if sold to the mills (£45/tonne) but less from merchants. If the recycling rate increased to 80%, this would increase to 437,646 tonnes/year with a potential value of £19.7 million/year.

Using a recycling cost of £127/tonne, combined with landfill savings, this would result in a net loss of £11.38 million for current levels of recycling and £14 million for 80% recycling. However the lower cost of collection (£55/tonne) would produce a potential profit of £14.22 million for current recycling and £17.51 million/year for 80% recycling. This illustrates how important it is for local and regional data to be collected.

In 1998 the quantity of paper and board in the South East commercial waste stream was estimated to be 1.94 million tonnes. It is not known what proportion of this is board, but if 10% is assumed (194,308 tonnes) and the current national recycling rate of 65% packaging is applied, the current value of recycling is £1.07 - £5.05 million depending on whether it is sold to a merchant (£8.50/tonne) or to a mill (£40/tonne). Increasing the level of recycling to 80%, the value would increase to £1.32 million from a merchant to £6.22 million from a mill. The collection costs and avoided landfill (£25/tonne) are thought to be broadly similar so the net benefits remain the same.

Apart from newspapers, ‘other recyclable paper’ in the municipal waste stream is estimated to be 30% of the municipal paper waste stream, 391,501 tonnes/year in the South East that could be sold to merchants and the mills as mixed paper. In addition at least a similar amount, if not more, is likely to be recoverable from the commercial waste stream. It is not known what proportion is currently recycled although there is a 65% recovery for paper

packaging. If 65% recovery is assumed and the paper is sold as mixed papers for £6/tonne from merchants, and £26.50/tonne from paper mills, its value would be £3.05 million to £13.49 million. If this proportion was increased to 80% the value would increase to £3.76 to £16.6 million. The cost of collection less the savings from landfill are assumed to be of a similar order for commercial waste, while for the municipal paper the cost would vary according to the type of collection scheme. Overall, if the high collection cost is assumed a net loss could occur of £7.52 to £20.36 million/year, whereas if the cheaper collection cost is used a profit results of £2.19 - £15.03 million/year. Although this is an approximate estimation it is clear that the cost of collection is highly important, and also that support is needed to develop new markets for mixed paper (identified in appendix 1) that will provide a more valuable market.

One of the advantages for individual or groups of local authorities or businesses to increase the quantity of recovered paper is that they have more potential to be able to deal directly with the mills thus obtaining a better price for the recyclate. In the case of municipal waste this is good for the tax-payer but not so good for local merchants

4.2.4 Recycled aggregates

The South East produces approximately 13.44 million tonnes of aggregate and soil waste per year of which 43.4% is recycled and 26.8% is landfilled or disposed at a registered exempt (table A21). The savings from the current level of recycling are £5.83 million based on the savings of landfill tax and the aggregates levy. If recycling were increased to 60% the tax savings would be £29 million for the South East. If it is assumed that the cost of collection, crushing and screening is broadly similar to the value of the material this would be a net saving (to the South East taxpayer, though not to UK society as a whole, since the Exchequer receipts fall by the same amount). However high transport costs could reduce this benefit. A more detailed study needs to be carried out to determine more accurate estimates.

4.2.5 Wood recycling

The wood waste arising in the South East is estimated to be on average 67,984 tonnes/year in household waste, 229,998 tonnes/year from CA sites, plus 5,111 tonnes from trade waste, a total of 303,093 tonnes. However a cost for collecting wood from the municipal and trade waste streams is not available and could be considerable. Therefore only the CA waste has been considered assuming a recycling rate of 50%. The ‘logistics and sorting’ cost of £10/tonne (Biffa, 2002) and an avoided landfill cost of £28/tonne was used in the estimation. Although the value of wood is negative (£-3 - £15/tonne) an overall net benefit of £340,589/year was estimated for the South East from the landfill savings.

4.2.6 Composting

In the South East a total of 1,171,000 tonnes of garden and food waste is estimated to be in the municipal waste stream, 258,000 tonnes of which is composted (22%). Using national waste composition data approximately 500,000 tonnes of the total is garden waste. The cost of collection of garden waste is £67/tonne, the cost of composing £23/tonne and avoided landfill costs are £50/tonne, a net cost of £40/tonne, nearly £2 million for 10% recycling. The value of compost is about £28/tonne but it is assumed that this is included in the cost of composing. Therefore the cost of composting municipal waste would appear not to be viable on a strictly financial basis, using the Hummel (2002) data. However using the Biffa (2002) value of £25/tonne for collection would result in the cost of composting to break even.

The cost of recycling green waste from a CA site results in a net benefit of £7/tonne if a CA cost of £20 is used, a net benefit of nearly £60,000 for the South East. This would be greater if the cost of operating the CA site were lower, however, high transport costs could reduce the benefit.

The cost of in-vessel anaerobic digestion costs between £40 and £60/tonne. Therefore the disposal of the nearly 300,000 tonnes of Commercial and Industrial food waste in the South East would cost approximately £15 million plus collection and transport costs. This is similar to the avoided landfill cost of municipal waste, however the collection cost of municipal waste is likely to be higher than Commercial and Industrial waste. Currently the Landfill Directive only applies to municipal waste, but this is likely to extend to other waste streams in the future, thus providing an opportunity.

4.3 *Summary of potential market opportunities*

The previous examples of potential benefits to the South East illustrate the detail of data required if more robust estimates are to be calculated. In addition they show the sensitivity of the data to variations in costs, particularly where large quantities of low value wastes are being considered. Numerous other waste streams, particularly commercial and industrial waste, have value as secondary resources but it has not been possible to make many estimates of their value because data on the quantities of waste, its composition and in some cases the value of the recyclate are not available.

For the waste streams for which it is possible to estimate the current and potential value of the recycling market, a summary is provided in table 4.4. In total the current level of recycling is estimated to have a value of £44.35 – £58.77 million/year, while the potential market has a net value of £41.4 to £110.4 million/year. The greatest potential values are from the recovery of commercial and industrial plastics and aggregates, however there is considerable uncertainty surrounding the quantities of these materials. In case of plastics the quantity currently recycled and the potential markets are uncertain. In the case of aggregates the levels of contamination and the proximity of markets are unknown.

Although this is just a broad estimate of the potential value of the recyclate market it gives some indication of the potential opportunities that are available to the waste recovery and reprocessing sectors. Detailed studies based on individual materials will provide more accurate information of potential levels of recycling, values and markets.

Table 4.4: Summary of estimated values of current levels of recycling in the South East and potential levels of recycling.

	Quantity in waste stream tonnes/year	Current recycling %	Current value £m/year	Potential recycling %	Potential value £m/year	Net value £m/year[1]
Plastic bottles (PET/HDPE)	100,536	5.5	0.48	50	4.33	0.33 - 3.95
C&I plastics	1,368,200	22.4	15.32	50	34.21[2]	34.21
Glass	438,600	36	2.60	50	3.62	3.62[3]
Newspaper & mags	547058	65	16.00	80	19.69	-14.00 - +17.51
C& I board	194308	65	1.07-5.05	80	1.32 – 6.22[2]	1.32 – 6.22
Mixed paper	783002	65	3.05 – 13.49	80	3.76 – 16.6	-13.94 - +15.03
Aggregates	13,444,000	43.4	5.83[1]	60	29.04[1]	29.04[4]
Wood (CA)	229,998	?		10	0.34	0.34
Total			**44.35-58.77**			**41.4 – 110.4**

[1] Net value is calculated from the potential value plus the savings from final disposal to landfill, less the cost of collection and sorting. Further details are provided in appendix 1.
[2] Based on the net costs
[3] Based on 80% bring and 20% kerbside collection
[4] Only includes savings from landfill tax and the aggregate tax.

The economic value of recycling is not limited to the sale of recovered materials and savings associated with final disposal. Other benefits include increased employment and training, while community schemes are also thought to contribute to social cohesiveness and development. In this scoping study it is not possible to study the full range of costs and benefits but the potential benefits of job creation are explored in the next section.

4.4 *Job creation*

Changing patterns of waste management and reprocessing can create regional benefit through the creation of jobs. There is limited recent information on employment creation in recycling and reprocessing, however two studies have been conducted, *Jobs from Waste* (Waste Watch 1999) and *Estimating Job Creation from Recycling and Reprocessing* (London Remade 2002).

The reports identify that there are limitations to the predictive estimations of employment creation due to a lack data. However they do make broad judgements of the number of jobs likely to be created by changes in the quantity of waste recycled and the new employment sectors this would imply (i.e. jobs in sorting waste).

Waste Watch (1999) estimate that in 1997 there were 17,339 jobs in the UK collection, sorting and reprocessing of municipal waste, from collection and civic amenity sites to reprocessing of individual materials. The total figure for all recycling and reprocessing related industries is likely to be considerably higher than this, though accurate estimation of this is not possible.

The same report predicts that if the current 30% recycling target (for municipal waste) is met by 2010 there is potential for 45,000 jobs to be created (9,200 in collection, 26,000 in sorting and 9,300 in reprocessing: Table 4.5).[1]

These data are based on calculations made using an assessment of current waste industry employment against current tonnage in each material as a rule of thumb for future employment creation. This is clearly not accurate but is indicative of the potential scale of employment creation, and the importance of the reprocessing sector in the future. Based on the current proportion of national municipal waste produced in the South East it can be estimated that this could lead to the creation of just under 7000 jobs in the South East region.

Table 4.5: Estimate of UK job creation based on 30% recycling target for municipal waste by 2010

Material	Estimated tonnes for recycling 2010	Estimated re-processing capacity	Extra capacity required	Sorting job creation	Re-processing job creation	Total job creation
Paper	4,710,751	1,840,000	2,870,751	13,421	5,417	18,838
Glass	2,612,794	670,000	1,942,794	7,444	607	8,051
Al.	122,730	75,000	47,730	350	51	401
Steel	1,282,283	144,000	1,138,283	3,653	542	4,195
Plastics	553,485	150,000	403,485	1,577	2,690	4,267
Totals	9,282,042	2,879,000	6,403,042	26,445	9,307	35,752
			Employment in collection of waste (cannot be segregated by material)			9,280
					Total	**45,032**

Source: Waste Watch 1999

These data are only based on municipal waste. It is likely that far more jobs could be created in the recycling of the other waste streams.

[1] These estimates do not account for possible 'job displacement' and the possible influence of technology changes.

5 Strategic Level SWOT Analyses

Chapter 4 and the detailed data and market assessment (appendix 1) emphasise the incomplete nature, uncertainty and estimation, which characterises much of the current data for most priority waste streams.

Given these data deficiencies a SWOT (strengths, weaknesses, opportunities and threats) analysis has been undertaken of the priority waste streams in the South East with the aim of highlighting key characteristics and identifying critical further research and information needs for the development of reprocessing capacity in the Region. A recent study by the London Development Agency (2003) entitled Green Alchemy was also referred to in this analysis.

Due to the current level of information available on specific streams this SWOT analysis concentrates at the overarching material stream level. For example we consider plastics as one material for the purposes of this analysis rather than carrying out multiple SWOTs for specific types of plastics.

In future, if particular materials are considered a regional priority it is recommended that similar analysis is conducted at the sub-stream level, as reprocessing characteristics, needs, costs and thus potential value can differ widely.

The lack of reliable and accurate regional data and information for many waste streams, particularly in the case of commercial and industrial waste, identified by this scoping study, means this SWOT analysis relies on estimates drawn from multiple sources and / or extrapolated from nationally available data. A more detailed data based assessment of waste arisings and reprocessing nationally and in the region is contained in appendix 1.

These SWOT analyses are based on a combination of these data assessments as well as information on such factors as emerging legislation and policy.

ELV has been omitted from the following analyses as most end products fall into other priority streams. Textiles have also been omitted due to the established re-use network through international aid organisations and charity shops.

5.1 *Plastics*

Strengths

- Large quantities of plastics in waste stream
- Relatively established and accepted collection and recycling processes
- Commercial and industrial plastics most likely to be uncontaminated and consistent
- Public support / awareness of plastics recycling

Weaknesses

Market

- Different polymers need specific treatment and are recycled into different products
- Different polymers represent different investment and market challenges
- Costs of collection, sorting and marketing
- Much of the 'easy' plastic waste streams are already being recycled

Data

- Lack of information on specific polymers particularly in the commercial and industrial waste streams

Opportunities (including drivers)

- Excess of demand over supply of plastic (PET) bottles provides opportunity to increase recovery from municipal and business waste.
- Potential for mixed plastics markets due to new technologies, such as wood-polymer composites in construction
- Innovative / new collection techniques and practices
- Regional / sub-regional procurement programmes
- Packaging waste targets and PRN support
- Development of small scale reprocessing operations possible in SE
- Agricultural plastics (changes to landfill requirements). A farm plastics scheme could present specific market opportunities for the SE depending on how the new legislation is drafted.

Threats

- Price fluctuations
- Perceptions of quality

5.2 *Glass*

Strengths

- Large amounts of glass cullet in the regional waste stream
- Established collection and sorting processes particularly municipal and hospitality sectors

Weaknesses

Market

- Contamination and mixed glass may act as barrier
- Excess green glass
- Need for investment in collection infrastructure
- Dominance of low value sectors

Data

- Lack of commercial and industrial and specific type data at regional level
- Lack of regional data on reprocessing facilities

Opportunities (including drivers)

- Excess demand over supply – especially for post consumer glass. Indication is that far greater re-use is possible.
- Predicted surplus of green glass in stream
- Emergence of new markets requiring large amounts of cullet
- WEEE obligations may increase viability of CRT and lighting glass
- Separation and recovery from ELV and construction and demolition sectors

Threats

- Easiest uses (in construction) that are close to markets tend to be lower value uses.

5.3 *Paper and Card*

Strengths

- Regional strength in paper production and recycling (Aylesford)
- Established collection infrastructure
- Maturity of markets for recyclates

Weaknesses

Market

- Price fluctuations and uncertainty
- Contamination, lack of segregation and lack of markets for mixed paper

Data

- Lack of regional data, particularly for different paper and card types

Opportunities (including drivers)

- Value to be gained from better segregation practices
- Newsprint Bill (80% recycled content by 2010)
- New technological innovations present possible regional opportunities – such as use of paper / card in construction
- Public sector green procurement programmes to increase purchase of recycled paper
- Encourage increased collection of high quality paper from businesses
- Concentration in top-end of market – would support investment in better sorting facilities for the SE
- Landfill Directive

Threats

- Public and business perceptions of recycled paper products
- International demand from buoyant Asia market
- Over specification of paper products in design, graphic and printing sector

5.4 *Construction, Demolition and Excavation Waste (CD&EW)*

Strengths

- Proximity to London (both supply and demand strength)
- Very active construction market in the SE

Weaknesses

Market

- Complex composition and contamination
- Low levels of on-site separation
- Low value of recyclate
- Transport costs and logistics
- Need for storage, crushing and sorting facilities
- Fragmentation of market and number of small independent businesses / builders

Data

- Critical lack of regional and local market and recyclate data

Opportunities (including drivers)

- Education of all C&D stakeholders
- Local supply of secondary aggregates
- Emerging aggregates information services, particularly web-based (but need to raise awareness)
- Development of data collection methodologies
- Links to other streams, particularly plastics, wood and paper
- Considerable highway maintenance and concrete applications
- Legislation pushing for use of reclaimed C&D materials
- Aggregates Tax & Landfill tax
- Window replacement sector (WRAP study)
- Public sector green procurement of secondary aggregates (highways and construction)

Threats

- Mechanisation of demolition has led to difficulties in material separation
- Business perceptions of quality
- Conservative nature of construction sector

Note – many elements of C & D waste are also considered in other streams (glass, plastics, wood etc)

5.5 *Metal*

Strengths

- Established collection and processing market
- Significant value added possible
- Main limiting factor to market development is the quantity collected

Weaknesses

Market

- Large scale reprocessing facilities concentrated outside SE region

Opportunities (including drivers)	***Threats***
• Export markets in Asia, especially for aluminium • Aluminium and steel can collection and recovery (driven by PRNs)	• Export markets susceptible to exchange rate fluctuations (esp. high value of pound)

5.6 *Wood*

Strengths

- Variety of end-use opportunities / potential markets
- Relatively homogeneous product

Weaknesses

Market

- Complex supply chain and variety of waste streams
- Limited collection infrastructure from the municipal waste stream
- Contamination and supply fluctuations
- Storage and segregation costs and logistics
- Lack of cross-industry classifications / standards for wood waste
- Lack of local outlets for recycled wood

Data

- Critical lack of detailed regional data and of specific streams within the wood sector

Opportunities (including drivers)	***Threats***
• Large volume of wood waste in waste stream and current low reuse / recycling levels represents an opportunity in itself • Awareness and education raising among wood users / stakeholders • Development / encouragement of local markets • Landfill Directive & Tax	• Mixed effects of legislation, such as Packaging Waste Regulations (recycling but NOT recovery) on pallets actually encouraging disposal through incineration over re-use

5.7 *Organics*

<table>
<tr><td colspan="2">Strengths
• Considerable scope to increase green waste composting</td></tr>
<tr><td colspan="2">Weaknesses

Market
• Relatively low value products
• Transport costs relative to product value
• Land / space requirements

Data
• Very limited data at regional level</td></tr>
<tr><td>Opportunities (including drivers)
• Development of local suppliers networks / markets
• Potential large demand in organic farming, horticultural, landscaping and bio-remediation sectors
• Phasing out of peat in larger garden / DIY stores likely to increase demand for compost
• EU Landfill Directive – expansion of anaerobic digesters</td><td>Threats
• Legislative – Animal By-Products order
• Difficulties in gaining planning permission for new sites
• Perceptions of low quality</td></tr>
</table>

5.8 *WEEE*

Strengths

Market

- Established network / process among a number of charity and not-for-profit organisations involved in WEEE refurbishment

Weaknesses

Market

- Complexity of stream and reprocessing requirements

Data

- Very limited data at regional level and for individual streams within the WEEE sector

Opportunities (including drivers)	***Threats***
• Legislation rising out of the WEEE directive will lead to market opportunities in the medium term • Opportunities in specific areas such as CRTs and WEEE plastics • Sub-regional need for dismantling, disassembly and re-manufacturing facilities • Export demand for used electrical appliances • Refurbishment and disassembly of WEEE is labour intensive • High value / skill opportunities in design and technology to develop easy to recycle products	• Uncertainty on timing of regulatory change • Lower cost reprocessing possible in Asia / Eastern Europe

5.9 *Tyres*

Strengths

Market

- Large and reliable regional supply due to nature of product
- Predicted increases in road traffic would lead supply rising over time

Weaknesses

Market

- Logistics: costs of storage and transport
- Opportunities (drivers) will require new facilities within the Region

Data

- Lack of regional and sub-regional data

Opportunities (including drivers)	***Threats***
• EU Landfill Directive and related regulations (landfill ban on whole tyres in 2003 and shredded tyres by 2006) • ELV Directive will also increase recovery • Current processing capacity shortfall (opportunity) • Non-traditional end-uses emerging (e.g. construction and road building)	• Current processing capacity shortfall (threat – where capacity shifts elsewhere) • Lack of extent infrastructure to handle large amounts of tyre waste

6 Conclusions and Recommendations

This scoping study has:

- Explored the data available for the South East on waste streams, current levels of recycling and reprocessing
- Identified the data needs of a range of stakeholders
- Assessed the economic costs and benefits of recycling
- Identified the strengths, weaknesses, opportunities of and threats to increased recycling in the Region

Gaps in this information have been identified and recommendations are made in this chapter concerning how to fill these gaps. A prioritisation exercise has been carried out as to the relative importance of the recommendations in terms of importance, urgency and scale (table 6.1).

6.1 *Information and data requirements*

One of the main aims of this scoping study is to determine what data are required to help businesses develop markets for recycled materials in the South East. From our research it seems that four categories of information are needed:

- the quantity and composition of recyclable waste streams;
- scale and mapping of current processing and re-processing capacity;
- the size of new and alternative markets;
- the cost of collecting and processing the material and the value of the markets.

Different data gaps occur for different waste streams. Composition analysis is needed for municipal waste while data on both quantities and composition is needed for the other waste streams, especially commercial and industrial waste. Some of this information is available but either not specifically for the South East, is out of date and/or includes insufficient detail. The Environment Agency is due to publish an update to the current (1999) Strategic Waste Management Survey in 2005. However it is unlikely to include sufficient detail for the purpose of identifying future waste markets.

To use national data as a proxy for the region it is necessary to establish if the national data represents the situation in the South East and if any variation is significant enough to make a difference to the waste streams. For example, if the average quantities of specific municipal waste components (e.g. PET bottles) in the South East are similar to the national average? This may not be the case due to differences in the average socio-economic structure of this region, compared with the national average, which has a strong relationship with waste arisings.

If there are sufficient regional composition studies, a statistical comparison between regional and national composition data could be undertaken. Alternatively detailed national data on the relationship between waste arisings and socio economic groups (Parfitt, 2002) could be applied to the socio-economic structure of the regional population. Regional local authorities need to be encouraged to carry out detailed surveys on the composition and quantities of the waste they collect and to provide cost data for collection and sorting.

Current regional and national data for commercial and business waste are based on a 1998/9 survey, so it is necessary to obtain primary data based on surveys, such as that currently being carried out by Oxfordshire County Council. It is important to ensure that the surveys include all types of businesses in the region, including construction and demolition firms, and that sufficiently detailed information is requested rather than broad categories such as 'paper and board'.

There are a number of waste management facilities in the Region but limited information is available on flows and capacity of these facilities. A regional mapping exercise to identify the scale and location of current waste management / reprocessing capacity could play a crucial role in the future strategic management and planning of market development. Identifying current gaps in capacity and facility provision would highlight potential market opportunities.

Recyclate reprocessing, markets and economics needs to be analysed through individual waste stream studies, i.e. looking at all three categories for one waste material such as 'plastics'. The materials with the most potential are clean, uncontaminated waste streams (offcuts from industry) or those that are collected separately (clear glass) or are easy to separate (Fe metal) or have a high value (aluminium cans). There is a strong demand for some low value materials (secondary aggregates) provided they have low levels of contamination or are used for low value recycling. Within a broad category of waste there are often waste products that are easy to collect and there is already a demand for (e.g. PET bottles) and items that are less easy to recycle (e.g. mixed plastics). Therefore it is important that any future market analysis includes all the different types of waste material within one category.

6.2 *Quick wins and specific materials based opportunities*

For some materials, such as steel, aluminium, glass and paper, large scale reprocessing is well established. In some instances the recycling system operates though a network of merchants that may undertake a sorting and initial processing stage before the waste is transported to the reprocessors or manufacturers. In some cases, however, councils have the opportunity to form groups and make contracts directly with, for example, the paper mills. This can lead to longer contracts and higher, more stable prices.

For many materials spare reprocessing capacity is available, although not usually within the region, and some materials (such as metals) are exported depending on the global market. However, initial processing stages are often located within the region and so still provide business opportunities in the South East. The demand for processing and reprocessing facilities will increase, particularly with the higher targets of the Packaging Directive.

Overall waste materials likely to have a higher economic return in the South East are:

- newspapers, high quality office paper and board
- municipal and commercial and industrial plastic bottles & commercial and industrial plastics.
- clear and amber glass
- aggregates
- metals

Materials that have potential but are currently more difficult to market include:

- mixed paper
- mixed plastics
- organics
- green glass
- wood

Reprocessing and markets for Waste Electrical and Electronic Equipment (WEEE) and End of Life Vehicles (ELVs) may continue to develop commercially, and by community groups for WEEE, particularly as the legislation is adopted. However this needs careful monitored in case barriers to development occur in the South East. This is also the case for the management of farm plastics for which the legislation is currently being developed.

Existing estimates of employment creation related to recycling and reprocessing suggest that further developing regional capacity in paper, glass, plastics and metals could produce a significant net increase in employment for the region. Training opportunities, particularly for unskilled workers are likely to be linked to this employment.

6.3 *Communication of information*

Market intelligence is vital to support businesses wishing to enter or expand in the reprocessing sector. The identification of suppliers (of recyclate) and purchasers (of end product) was cited as a critical barrier to market potential in the Region. Equally information on the quality and quantities of recyclate is key in business decisions, and market uncertainties present a major obstacle.

Many companies in the reprocessing sector are relatively new or have traditionally specialised in specific reprocessing methods. Support for market expansion could be aided by providing specific sectors with clear information on the application of new and emerging technologies and the development of new products with market potential.

It has also been suggested that some waste management and recycling council staff, being focused on the collection of recyclate and the achievement of targets, lack knowledge about recyclate markets and more specially the need for well-sorted waste streams. The provision of seminar groups that include council staff, waste management companies involved in recycling and local reprocessors could both inform and stimulate new and improved recycling.

Seminars and/or information packs could also be provided to promote process and product R&D and providing access to information on innovations, new technologies and products. These could be material specific and provided in collaboration with organisations such as WRAP and/or trade associations such CIRIA.

A method of improving access to recyclate market information, and at the same time raising awareness, would be the establishment of a dedicated web site that would include up-to-date information on waste streams and processing/reprocessing facilities and markets. It would be important for the web site to be kept up to date and where possible to provide information on the quantities and composition of waste streams. Links could be provided to relevant reports and important web sites, such as the price information provided by Letsrecycle and the guide to waste legislation (NetRegs) provided by the Environment Agency (www.environment-agency.gov.uk/netregs/). The site could also include further information on the waste legislation aimed at the key reprocessing sectors in the South East, identifying any local opportunities.

Remade Kent & Medway have a good web site (http://www.remade-kentmedway.co.uk/remade/index.html) containing locations and contact details of reprocessors and some useful information on specific materials reprocessing. However for marketing and business development purposes much more detailed information is needed for the whole region.

The web site could be an output of a commissioned project to bring current reprocessing information together and work with regional and national partners to improve the 'resource' value of information and data sources.

There are already several web based waste exchanges sites for the region but most are under utilised or contain limited information in spite of well designed and structured interfaces / pages. This indicates that it is not sufficient just to create web sites, they also need effective promotion possibly using workshops or through demonstrations at conferences and trade events, and need to be maintained with up-to-date information and data.

An actively managed waste exchange is provided by the National Industrial Symbiosis Project (NISP) that also holds seminars and meetings to encourage the exchange and marketing of 'waste' materials. After a successful introduction in the Midlands and Humberside NISP is currently being 'rolled out' to other regions. SEEDA could usefully link up with NISP to encourage businesses to both minimise their waste and to identify new markets for their waste streams.

Improved communication can also help stimulate markets by changing attitudes towards recycled materials and products. All stakeholders noted that current perceptions of recyclate and recycled products being inferior to 'new' materials and products remain a barrier to expanding the market.

6.4 *Market development*

Strategic decisions will be required at the regional level as to the nature of the future reprocessing market for the South East. Some streams (such as WEEE) will necessarily be reprocessed largely in the Region, however for other streams (such as large scale glass reprocessing) the Region may realise more economic benefit from establishing consolidation, sorting and initial processing facilities, with the physical act of 'reprocessing' occurring outside the region. Value can be added to waste materials at a number of stages of the reprocessing cycle. Research into the benefits of specific stages for individual materials could assist SEEDA in its strategic planning for regional market development.

Legislation and planning factors have a considerable influence on the market in both positive and negative ways. While regulation such as the Packaging Regulations have supported and promoted the development of many markets, reprocessors were concerned that legislation and regulations often made the market uncertain and unpredictable, suggesting that the development of a user-friendly guide to current and emerging waste legislation may be of benefit.

SEEDA as the RDA also needs to consider carefully whether its role is to develop markets for materials that have the greatest economic value, even though the markets will develop commercially without any assistance, or whether they should be supporting waste streams that are less likely to develop through natural market forces due to their low economic value, low volume or high costs of recovery.

6.5 *Further actions to support regional reprocessing capacity*

Green procurement of products was identified as a significant driver to increase markets for products made from secondary (recycled) materials. A public sector green procurement programme can play a key role in supporting the reprocessing sector in the South East. As part of the National Procurement Strategy for Local Government (2003), SEEDA may wish to work with local authorities and other agencies to co-ordinate such procurement initiatives and to ensure that they provide opportunities for local and regional businesses. Although not primarily focused on environmental issues or the use of recyclate in products and projects, the Strategy does call for the inclusion of "environmental requirements in the user needs and specification at the earliest stages of the procurement process." Such an approach is also a key element of the new UK Government Sustainable Development Strategy, Securing the Future (HM Government, 2005).

There may also be a role for SEEDA to assist in the procurement of contracts for the sale of larger quantities of recovered materials from several local authorities.

All stakeholders noted that planning for new waste facilities and sites is one of the key barriers to the further expansion of some reprocessing sectors in the region. A key opportunity (and challenge) for the Region is the localisation of reprocessing wherever possible. Co-ordinated local waste collection and recovery, recyclate supply, reprocessing and then demand for end products is a common sense model. However it is also one which remains elusive both for the UK and the Region.

Planning can also play a key role in encouraging industry to use recycled or re-used resources. In particular regional and local planning should consider a greater emphasis on sustainable construction practices. Combined with a co-ordinated procurement strategy such elements could help the Region realise a virtuous cycle of demand and supply of recycled material, encouraging and supporting markets while helping to change attitudes and behaviour.

6.6 *Prioritisation of recommendations*

The conclusions arrived at by this research have been considered in terms of recommended outcomes (needs) and processes (actions) by which the 'needs' could be addressed. They have then been prioritised according to their relative importance, urgency and scale by providing a comparative assessment of the actions identified through our research. The scores given here are based on the judgement of the authors in light of the data and literature assessment carried out and the results of stakeholder survey.

The **'importance'** or 'payoff, is based on the ease of addressing the issue, the potential for increasing recycling or market and likely contribution to the region's economy (and the likely cost of inaction). Scores:
1 = High
2 = Medium
3 = Low

However, SEEDA also needs to consider:
a) whether its role is to develop markets for materials that have the greatest economic value, even though the markets will develop commercially without any assistance; or
b) whether they should be supporting waste streams that are less likely to develop through natural market forces due to their low economic value, low volume or high costs of recovery.

The **'urgency'** addresses how critical is the issue in terms of current or imminent environmental, social and economic impacts and meeting new or emerging legislation.
Scores:
A = High
B = Medium
C = Low

'Scale'
The 'scale' identifies whether the issue or action can be effectively addressed at the regional or sub-regional scale, or if it is a National issue (i.e. that SEEDA should work with stakeholders / partners to achieve / influence). Categories (can be combination)
L = Local (sub-regional)
R = Regional
N = National

Table 6.1 Prioritisation of recommendations

Needs	Actions	Prioritisation		
1. Data and information gaps		**Importance (1,2,3)**	**Urgency (A,B,C)**	**Scope (L,R,N)**
Waste composition & quantities Identify opportunities for recycling by obtaining current data on the quantity and composition of recyclable waste streams	Municipal waste survey: SEEDA to work with local authorities to initiate waste surveys to gather composition data on municipal waste.	1	A	R/L
	Waste survey of C&I and C&D businesses to collect data on quantities and composition	1	A	R/L
Establish if national data represents the situation in the South East and if any variation is significant enough to make a difference to the waste streams	Statistical comparison between regional and national composition data	2	B	R
	Socio-economic analysis of municipal waste arisings	2	C	R
Determine the processing and re-processing capacity of the region	A regional mapping exercise to identify the scale and location of current and planned reprocessing capacity This could be undertaken as one project or as part of the material specific studies identified below.	1	A	R
Develop markets for recyclate and processed waste materials. Especially materials likely to have higher economic return (refer to chapter 4)	Material specific market studies to include current and future reprocessing, markets and economics.	1	A	R

Needs	Actions	Prioritisation		
Develop markets for potential but more difficult recyclate.	Focus, through research and market studies (as above) on identifying and removing barriers to development in SE	1	A	R
Economics. Establish cost of collecting and sorting municipal recyclate and monitoring the value of the markets	Local authorities encouraged to provide cost data on waste collection and sorting, and the current sale prices.	1	A	R/L
2. Other market support actions				
Stabilise markets	Encourage local authorities and businesses to form groups and make contracts directly with large scale reprocessors.	1	B	R
Identify and monitor potential markets	Monitor markets for WEEE, ELVs and farm plastics particularly as new legislation is adopted.	2	B	R
Localise the recycling process where possible: Develop local reprocessing facilities and markets.	Work with regional partners to develop a region wide green procurement programme to stimulate regional business development	1	A	R/L
	Regional and local planning should consider a greater emphasis on sustainable construction practices.	2	B	R/L
Optimise the economic benefits from reprocessing. Identify the optimal geographic location for large scale reprocessing within or outside region.	This could be undertaken as part of the specific materials analyses identified above.	1	A	R/N
3. Other research priorities				
Regional training and employment creation: .	Monitor the training and employment opportunities generated by increased recycling and reprocessing in the region.	3	C	R
	The development of a user-friendly guide to current and emerging waste legislation.	3	C	R/N
4. Communication of information				
Support market development by providing information on the quality and quantities of recyclate and marketing opportunities. Plus provide opportunities for exchange of information.	Co-ordinate seminars for council staff, waste management companies & businesses involved in recycling and reprocessing. Ensure opportunities for discussions	1	A	R

Needs	Actions	Prioritisation		
Provide material specific information on markets, emerging technologies and the development of new products	Organise material specific seminars to promote process and product R&D and information on innovations, new technologies and products. These could be provided in collaboration with organisations such as WRAP or CIRIA.	1	B	R
Provide an effective means of providing current information on waste streams, recyclate, processors and reprocessors, markets and R&D opportunities.	Establishment of a dedicated web site that is regularly monitored and kept up to date.	2	A	R

References

AF-QPS & NLK Associates (2002) UK paper mills: review of current recycled paper usage. WRAP, Banbury, UK.

Aluminium Can Recycling Association (2001) Aluminium can recycling 1989-2001. Table 16, E-digest Statistics, Waste and Recycling.

APT Environmental (2002) A demonstration project to increase the use of recycled resources, in construction, in the Greater Nottingham area. www.apt-env.org.

Arthur D. Little (2004) Assessment of the demand for green waste compost in the UK landscaping industry, WRAP, Banbury, UK.

BFM & BRE (2004) Evaluation of the market development potential of the waste wood and wood products reclamation and reuse sector. WRAP, Banbury, UK.

Biffa (2002) Future Perfect, Biffa Services Ltd.

Defra (2003) e-Digest of Environmental Statistics, http://www.defra.gov.uk/environment/statistics/waste/index.htm

Defra (2003) Municipal Waste Management Survey 2002-03, ONS and Defra, 2003

Defra (2003[2]) Packaging waste recovery and recycling targets for 2004-2008, information bulletin.

Defra (2004) Agricultural waste regulations, a consultation paper.

Defra (2004[2]) Agricultural waste regulations: a consultation paper. Summary for farmers and growers.

Defra (2005) ELV Guidance Notes, online: http://www.defra.gov.uk/environment/waste/topics/elvehicledir.htm

DETR (1999) A way with waste, HMSO.

DTI (2001) Wood Recycling Factsheet, http://www.dti.gov.uk/sustainability/downloads/wood.pdf

DTI (2001) Tyre Recycling Factsheet, DTI, January 2001

EcoSys (2000) Taking Stock – Managing our Impact. An Ecological Footprint for the South East Region. Supported by Biffaward and SEEDA.

Environment Agency ELV Directive website (http://www.environment-agency.gov.uk/business/444217/444663/591015/?version=1&lang=_e#)

Envrionment Agency, WEEE Directive web page (http://www.environment-agency.gov.uk/business/444217/444663/602520/?version=1&lang=_e#)

Environment Agency (1999) EA National Waste Production Survey. Defra e-Digest of Environmental Statistics.

Environment Agency (2000) Strategic waste assessment 2000 South East, WRc, Swindon.

Enviros (2004) Recycled glass market study & standards review –2004 update. WRAP, Banbury, UK

Enviros (2003) Survey of applications, markets & growth opportunities for recycled plastics in the UK, WRAP, Banbury, UK

Enviros (2002) Potential Markets for Waste Electronic and Electrical Equipment (WEEE), Enviros and the Environment Agency for Remade London, June 2002

Enviros (1999) Developing markets for recylable materials in Scotland: a prioritisation study. Enviros Services.

Environmental Resources Management (ERM) (2002) Textile Recycling, Department of Trade & Industry.

EXCELAR Ltd (2002) Wood Market Study – Municipal wood waste arisings, Excelar Ltd for WRAP, December 2002

Forestry Commission (2004) Forestry Facts and Figures 2004, ONS, 2004

Hampshire County Council (2005) More from Less – How to Make Better Use of Hampshire's Material Resources, Draft February 2005

HM Government (2005) Securing the Future, Delivering UK Sustainable Development Strategy, March 2005

Hogg (2002) The legislative-driven economic framework promoting MSW recycling in the UK. Final report to the NRWF, Eunomia OBID.

Hummel, J. (2002) Collection cost projections Prepared for Strategy Unit, Cabinet Office, Eco Alternatives.

Hummel, J. (2004) Evaluation of the costs and benefits of collecting metal packaging in multi-material kerbside collection, Eco Alternatives Ltd, DTI.

Hurley, J.W., McGrath,C., Fletcher, S.L. & Bowes, H.M. (2001) Deconstruction and reuse of construction materials. BR418. CRC Ltd, London.

ICER (2005) Status Report on Waste Electrical and Electronic Equipment in the UK, Interim Report January 2005.
Lets Recycle (2005) www.letsrecycle.com/index
Letsrecycle (2005) Prices of material waste streams. www.letsrecycle.com/prices.
London Development Agency (2003) Green Alchemy Turning Green to Gold: Creating Resource from London's Waste
London Remade (2002) Estimating Job Creation from Recycling and Reprocessing
Magin (2001) An introduction to wood waste in the UK, Dr G. Magin, Fauna and Flora International, Cambridge
Marcus Hodges Environmental Ltd (2001) Towards sustainable agricultural waste, Resource Recovery, Environment Agency.
NAPD (2005) www.napd.co.uk
National Procurement Strategy for Local Government (2003) ODPM www.odpm.gov.uk/stellent/groups/odpm_localgov/documents/divisionhomepage/029685.hcsp
Northants (2002) Waste management strategy.
ODPM (2002) Survey of arisings and use of construction and demolition waste as aggregate in England and Wales, 2001. www.planning.odpm.gov.uk/material
Ogilvie, S.M. & Poll, A.J. (2002) Developing markets for recycled materials, AEA Technology. DTI, London.
Online Resource, sponsored by the Government Offices for the South East, London and Eastern Regions, Friends of the Earth, the Environment Agency and BRE. www.recycle.mcmail.com
Organic Resource Agency Ltd, Soil Association Producer Services Department, Henry Doubleday Research Association & Elm Farm Research Centre (2004) UK market assessment for composted materials in organic farming, WRAP, Banbury, UK.
Parfitt, J. (2002) Analysis of household waste composition and factors driving waste increases. WRAP, Banbury, UK.
Paul Waller & Goldenbrown Consulting (2003) Compost and growing media manufacturing in the UK, opportunities for the use of composted materials, WRAP, Banbury, UK.
PPIC (2004) Pulp and paper Information Centre, Confederation of Paper Industries. www.ppic.org.uk.
Project Integra (2004) Press release: It's not rubbish – this is how it is recycled in Hampshire.
Recoup Website: http://www.recoup.co.uk
Recoup (2003) Plastics recycling in Scotland; an outline of the current infrastructure and potential for plastic bottle recycling in Scotland. Remade Scotland.
Recoup (2003[2]) Cost-effective collection of plastic bottles, fact sheet.
Recoup (2004) UK plastic bottle recycling survey. WRAP, Banbury, UK.
Recycle Wood (2005) wood information service from WRAP, http://www.recyclewood.org.uk
Remade Kent & Medway (2004) Pioneering new markets for recyclable materials
Remade Scotland (2000) Barriers to the use of recovered paper and alternative markets.
Remade Scotland (2003) Glass recycling handbook; assessment of available technology,
Remade Scotland (2004) Wood Waste Arisings in Scotland – Assessment of available data on wood waste arisings in Scotland, May 2004
Reward (2001) Regional and Welsh Appraisal of Resource Productivity and Development: Key Industrial Environmental Pressures – Waste Arisings
Scottish Executive (2004) Consulation paper on producer responsibility for non-packaging waste agricultural plastics. www.scotland.gov.uk/consultations/environment/nwapc-04.asp
SEERA (2004) Proposed alterations to Regional Planning Guidance: Regional Waste Management Strategy – No Time To Waste, March 2004
Smith, R.A., Kersey, J.R. & Griffiths, P. (2002) The construction industry mass balance: resource use, wastes and emissions. Viridis Report VR4, Crowthorne, TLR Ltd.
Steel Construction Institute (2004) R&D promoting recycled paper (cellulose) insulants in metallic/modular construction projects, interim report 3. WRAP, Banbury.
Symonds Group (2002) Survey of arisings and use of construction and demolition waste 2001.
Symonds Group (2004) The impacts of planning controls on recycled and secondary aggregates, WRAP, Banbury, UK.
TRL (2003) Data Required to Monitor Compliance with the ELV Directive, report for Defra, Kollamthodi, A B Hird, L Elghali, K Johnstone, M Wayman, and V McColl
A N (TRL Limited), TRL 2003
UTWG (2004) Sixth Report Of The Used Tyre Working Group (August 2001 – July 2003)
UTWG (2001) Used Tyre Working Group Statistics Summary 2001. Available at http://www.tyredisposal.co.uk/reports.asp

Viridis (2003[2]) A strategy for construction, demolition and excavation waste as recycled aggregates, WRAP, Banbury, UK.
Viridis (2003) Estimated waste arisings in the South East Region, SEEDA, Guildford.
Waste Book (2005) The Wastebook recycling and waste management guide:
Waste Management Paper 25, HMSO
Waste online (2004) Metals – aluminium and steel recycling. www.wasteonline.org.uk/resources/informationsheets/metals.
Waste Online, ELV Information Sheet, http://www.wasteonline.org.uk/resources/InformationSheets/vehicle.htm
Waste Watch (1999) Jobs From Waste
Waste Watch (2003) Plastics in the UK Economy
WRAP (2002) Wood Market Study – Municipal wood waste arisings, Excelar Ltd for WRAP, December 2002
WRAP (2003) Assessment of quality arising from existing paper collection methods against European Recovered Paper Grades listed in BS EN 643. Waste & Resources Action Programme, Banbury, UK.
WRAP (2004) Stakeholder update: paper, WRAP, Banbury, UK.
WRAP (2004[2]) Stakeholder update: aggregates, WRAP, Banbury, UK
WRAP (2004[3]) Specifying recycled in local authority contracts for highways maintenance: good practice. WRAP, Banbury.
www.remade-kentmedway.co.uk/remade/docs/materials/paper

Appendix 1 – Priority Waste Streams: Data and Market Review

1.1 *Waste arisings in the South East*

The opportunities that arise from the reprocessing of waste depend on the quantities in the various waste streams, levels of segregation, contamination and availability.

The lack of sufficient measurement of the quantities of waste produced and disposed of has been a matter of discussion for many years. The availability of data for municipal waste has improved considerably, but this is not the case for other waste flows, particularly industrial and commercial waste. The Environment Agency National Waste Production Survey for 1998/9 was a significant step forward, but this has not been repeated. The waste streams and methods of management are likely to have changed in the last six years.

In addition, the waste survey, although providing a good overview of waste production, did not provide detailed information on, for example, types of paper and board or plastic. As emphasised by the responses in this survey, this type of detailed information is required by existing reprocessors to enable them to identify specific waste streams they can process, or for planning any expansions of their facilities.
The same would hold for potential investors in the waste reprocessing market. The topic of need for data was addressed as part of the survey carried out for this scoping study, as discussed in chapter 3.

An updated National Waste Management Survey is due to be published by the Environment Agency in spring 2005, however the results have not been available for this study.

The data that are available on the total quantities of waste are summarised in table A1, with details of specific waste streams given in subsequent tables.

Priority waste streams can be defined as those identified by the European Commission as posing a potential threat to the environment. Other waste streams can be recognised as having potential for increased recycling. In the case of this study a survey of regional stakeholders also considered priority waste streams as those representing an opportunity for the South East. This report has also considered the priority streams for the Region as identified in the SEERA Regional Waste Management Strategy – No Time To Waste (2004).

Therefore a comprehensive list of waste streams (table A2) has been identified and investigated in this report to determine if the streams, or part of the streams, have potential for increased recovery and reprocessing.

There is significant national data available for municipal waste and some other waste streams, but this is often not broken down into regional data. Thanks to the Viridis (2003) report some data are available for the South East, but they are generally not sufficiently detailed for identifying specific reprocessing markets. For example, plastics are not broken down into types (e.g. PET, PVC). This becomes significant in making investment or expansion decisions, as different types or sub-streams will often have different applications when recycled, and require different methods of reprocessing. Nationally, the data on packaging are more available than those for other waste streams due to the Producer Responsibility (packaging) legislation.

Table A1: Quantities of waste arising for the UK and South East region (000s tonnes)

Waste stream	England & Wales[1]	Data year	SE	Data year
Municipal	29,309	2002/3	4,504[1]	2002/3
Municipal recycled[2]	4,026	2002/3	965[1]	2002/3
Commercial	24,802	1998/9	4,043[3]	1998/9
Commercial re-used	416	1998/9	55[3]	1998/9
& recycled[2]	5,508		898[3]	
Industrial	50,050	1998/9	4,958[3]	1998/9
Industrial re-used	5,135	1998/9	196[3]	1998/9
& recycled[2]	16,961		1,613[3]	
Construction, demolition & excavation[4]	93,910	2001	13,440	2001
C&DW & soil recycled	50,920	2001	5,850	2001
& beneficially re-used[4]	71,860		3.990	
Agricultural			4,957[3]	1998

Table A2: Waste streams investigated in this report

Plastics	Including agricultural plastics
Glass	
Paper and card	
Construction and demolition	
Metal	Fe metal, aluminium
Wood	
Organics	Green waste, food waste
Tyres	
Waste electrical and electronic equipment (WEEE)	
End of life vehicles (ELV)	
Textiles	

[1] DEFRA (2003)
[2] Recycled data included in total arisings for each stream
[3] Environment Agency (2000)
[4] ODPM, DEFRA (2003)

1.2 *Plastics*

1.2.1 Quantities of plastics in the waste streams

The main source of UK waste plastic is packaging followed by waste from the building and construction sector (Waste Watch, 2003). The quantities of plastics in the waste stream (table A3) are provided by Defra (2005), but, apart from the municipal waste stream, the data are six years old, so the current situation is likely to be different. Also the data only give the total quantities of plastics and are not broken down into polymer types. Using composition data for municipal waste, it is possible to estimate the types of plastics in the municipal waste stream for the South East (table A4) but these data are not available for other waste streams. This is a particular problem for plastics, as different polymers are often recycled into different products, and thus represent different investment and market challenges.

Table A3: Quantities of waste plastics in different waste streams (0000s tonnes)

	England & Wales	Data year	South East	Data year
Municipal	1,833.7[1]	2003	424[2]	
Commercial		1998/9	896[2]	
Industrial		1998/9		
C&D waste	800[3]		243.2[2]	
Agricultural	58,087[4]			1998/9
Medical			155[5]	1998/9

Table A4: Estimated composition of plastic waste in UK municipal waste streams applied to plastics in South East municipal waste streams

	UK composition municipal plastic waste (%)[6]	Estimated plastics in SE municipal waste stream[7]
Film	42.11	178,542
Bottles (PET, HDPE, PVC)	24.81	105,200
Other packaging	18.86	79,955
Other dense plastics	14.22	60,303
Total		**424,000**

1.2.2 Current Recycling

Post-use recycling of plastics in the UK is made up almost entirely of packaging, apart from 7,000 tonnes polypropylene from battery cases, with approximately 35% of packaging recyclate being recycled back into packaging (Enviros, 2003). The main source of plastic recyclate is the commercial and industrial sector as the waste is more likely to be uncontaminated and consistent in type. The most common recyclate is polythene film that is mainly supplied by large retailers and distributors (Waste Watch, 2003).

The main recyclate sourced from municipal waste is plastic bottles, 51% of which is PET and 44% PE. Other plastic wastes such as plastic wrappers and yoghurt pots are not generally collected, as there are as yet few viable recycling routes. However there is an interest in

[1] Defra (2004)
[2] Viridis (2003)
[3] Smith (2002)
[4] Marcus Hodges Environmental Ltd (2001)
[5] Waste Management Paper 25
[6] Enviros (2003)
[7] Calculated from Enviros (2003) and Defra (2004)

developing markets for mixed plastic recyclates. Table A5 provides a summary of the quantities of plastics reprocessed in the UK, the main sources and examples of recyclate uses.

Table A5: Polymers currently reprocessed in the UK

	tonnes	%	material source	recyclate uses
LDPE	101670	46.59	Film - supermarkets	Bin liners, film & damp proof sheeting, rubbish & compost bins, wood/polymer composites
PP	39750	18.21	48% crates, 18% battery casings, 10% film, 24% car bumpers, reel cores	Pipes & pipe fittings, bottle crates, injection moulding components, plant trays/pots, picnic tables & fencing
PS	23226	10.64	41% EPS packaging - C&D, 3% HIPS-cups, 20% coat hangers, 15% plant pots/seed trays	Packaging, sheeting, plant trays/pots, imitation wood, coat hangers
HDPE	25340	11.61	29% bottles & drums, 19% crates	Liquid detergent containers Drainage pipes, water butts Recycling & rubbish bins Picnic tables, fencing
PVC	12140	5.56	From used cables	Traffic management equipment pipes, sapling protectors
PET	2450	1.12	90% household 10% other packaging	Fibre, clothing, bottles, furniture, carpet insulation foam, injection moulded components
Other	13670	6.26		
Total	**218246**	100.00		

Source: Adapted from Enviros (2003)

Packaging waste

The quantity of packaging waste available in the South East is estimated to be 1,792,200 tonnes, with 287,660 tonnes recycled in 2003 and 114,430 exported for recycling (DEFRA, 2004). These data give a rate of 16.1% for recycling, and 22.4% for recycling and exporting for recycling.

In the UK there are 69 accredited plastic packaging reprocessors, and 35 exporters (Waste Watch, 2003). The Recoup web site (www.recoup.co.uk) identifies 3 plastic reprocessors in the SE, but there are thought to be more.

By the end of 2003 plastic bottle collection levels in the UK had risen to 24,300 tonnes/year, a recycling rate of 5.5%. Bring schemes for plastic bottles are available in 45% of local authority areas, with kerbside collections that include plastic bottles operating in 35% of local authority areas. In England 60% of local authorities offer at least one type of plastic bottle collection.

The recycling of plastic bottles from the municipal waste stream is limited only by the quantity collected so offers specific opportunities for growth. For maximum sale value (table A6) the bottles must be sorted by polymer type. However the key factors for maximising income are the quantity of non-bottle contaminants, tonnage commitment to the reprocessor and

tonnage shipped per load, which is a function of bale density and loading arrangements (Recoup, 2003). The main barriers to recycling are the real and perceived costs of plastic bottle collection (Recoup, 2003), however the introduction of an alternate weekly collection of dry recyclables and residual refuse can result in significant levels of recycling at little additional cost (Recoup, 2003[2]). It is important that plastic bottles, which account for 10% of the volume of household waste, are included in the recyclables bin in order to create similar fill rates of the bins (Recoup, 2003[2]). The current prices paid for clean, uncontaminated baled plastic film is given in table A7.

Table A6: Prices paid for plastic bottles delivered to a reprocessor in the UK or overseas

	£ per tonne (Jan 2005)
clear and light blue PET	80 - 120
coloured PET	40 - 65
HDPE single colour	80- 120
HDPE mixed colour	60 - 90
PVC	10 - 25
mixed	20 - 50

Source: Let's recycle (2005)

Table A7: Prices paid for clean, uncontaminated, baled plastic film delivered to an established merchant business

	£ per tonne (Jan 2005)
HDPE (high density polyethylene)	
mixed colour/printed	150 - 210
single colour/natural	200 - 240
LDPE (low density polyethylene)	
mixed colour/printed	180 - 220
single colour/natural	230 - 260

Source: Let's Recycle, 2005

Construction and demolition plastics

Of the 800,000 tonnes C&D plastics used, it has been estimated that 575,000 tonnes (72%) are potentially recoverable (Smith, 2002). Currently very little is recycled in the UK, with a European wide recycling rate of less than 5% in 1995 (Waste Watch, 2003). The construction and demolition section is an important growing market for plastics, but the opportunities for recycling are limited due to the lack of separation of waste streams at the building site.

Agricultural plastics

In 2005 agricultural waste will be brought into line with other wastes by the introduction of agricultural waste regulations. Currently agricultural waste is excluded from national waste controls and this contravenes the Waste Framework Directive and the Landfill Directive (Defra, 2004[2]). A consultation processes (Defra, 2004) is taking place seeking comments on the proposed regulations that will include waste plastics. The questions include whether a voluntary or statutory scheme is preferred, who should be the 'producers' obligated under the scheme, and how much farmers will be prepared to pay. The introduction of a farm plastics scheme could provide significant market opportunities for recycling facilities in the South East.

In 1998 these were estimated to include 20,734 tonnes packaging, 16,405 tonnes non-packaging film and 20,948 tonnes of other plastics, a total of 58,087 tonnes (Marcus Hodges Environment Ltd, 2001). More recently, a consultation paper from the Scottish Executive (2004) estimated the UK non-packaging agricultural waste plastics to be 103,006 tonnes per year, 72,500 tonnes to be contaminated film. The consultation paper considers that a majority of this plastic is either illegally buried or burnt (soon also to be illegal) on the farms.

The National Waste Production Survey of 20,000 businesses, carried out by the Environmental Agency in 1998/9, estimated that 6,000 tonnes per year of farm plastics/ polymers waste were produced in the South East region. Recent increases in the use of farm plastics, particularly from wrapping silage, have almost certainly increased this quantity over the last seven years.

Efforts to recycle agricultural plastics have concentrated on film. The main barriers to recycling are that a low quantity is produced per enterprise and there is usually heavy contamination (estimated 57%). There are thought to be two agricultural film reprocessors in the UK that can reprocess contaminated silage wrap. One is operated by British Polyethylene Industries in Dumfries. It has not been possible to obtain details of the second plant. Currently there are three grant subsidised schemes to collect farm films in Wales, Cumbria & Scotland. The Dumfries plant has a capacity to recycle 12,000 tonnes of post-use agricultural plastic waste into 5,000 tonnes of polythene granules. Therefore a considerable increase in capacity is required if more agricultural plastics are to be recycled.

Automotive sector
There is a need for the cost-effective separation of plastics types in sufficient quantities, plus the marketing of the derived products.

WEEE waste
Relatively small quantities can be recovered. 50% plastic WEEE would only amount to 100,000 tonnes nationally (Waste Watch, 2003).

1.2.3 Economics of plastics recycling

The value of plastics recyclate, which is inflated by the PRN system, can vary considerably. The prices given in table 4.6 are a guide price for material delivered to UK merchant businesses that either send plastics for recycling within the UK or export it. Manufacturers that use recycled plastics tend to be located in the North West and central England.

A survey by Enviros (2003) found that the main or only reason manufacturers use recyclate is price as long as the quality is satisfactory. In addition there needs to be a continuous supply and a consistent quality. The survey also showed that 90% of plastic recyclate was used to replace virgin polymers, the remainder replacing wood and paper.

1.2.4 Future opportunities

Higher targets for packaging waste recycling will lead to more plastics being collected from the waste stream. Financially viable commercial and industrial waste stream recycling is already well established with a 50% recovery. However the increasing support of the PRN system will provide additional financial subsidies for new reprocessing and expanded reprocessing facilities. Hopefully this will lead to further plastics waste streams becoming viable to reprocess. This will be particularly important for the more challenging municipal waste stream. Although plastic bottles are already extensively recovered from household waste for recycling, it is the processing of mixed plastics into commercial products that will be more of a challenge. For example, the manufacture of construction industry products from mixed waste that will replace concrete & aggregates.

Markets that have been identified as growth areas are as follows:

Stream	Recyclate Uses / Market	Issues
• **PET**	street furniture and signage	
	strapping	currently imported PET
• **HDPE**	refuse and compost bins, recycling boxes, water butts	(mainly from domestic bottles
	piping and ducting	high quality recyclate needed to ensure long lifetime
• **stationery**	envelopes and bags	
• **plastic lumber**		slow growth
• **LDPE**	refuse sacks and construction film	slow growth.

Most of these markets are likely to be stimulated by local government green procurement campaigns, but this has been slow in developing. Investment is needed to improve collection infrastructures for municipal, commercial & industrial plastic waste streams.

1.3 *Glass*

1.3.1 Quantities of glass in the waste stream

It is estimated that there is approximately 3.4 million tonnes of glass in the waste stream (table A8). The majority of this is containers produced in the municipal waste stream (table A9). The quantities of glass in the commercial and industrial waste streams have been difficult to quantify, as glass is not separately identified. For the South East the Viridis (2003) report stated that 28% of the industrial waste stream is 'general industrial' (Environment Agency, 2000) and that 1% of that is glass. In the same way 72.4% of the commercial waste stream is thought to be 'general commercial' (Environment Agency, 2000) and approximately 2% of that is glass.

Table A8: Quantities of waste glass in different waste streams (tonnes)

	UK[1]	Data Year	South East[2]	Data Year
Municipal waste			438,600	1998/9
Commercial			58,000[1]	1998/9
Industrial			13,600	1998/9
C & D				
Total	**3,395,000[1]**	**2003**	**510,000[2]**	

[1] estimated

Table A9: Types of glass in the waste stream (tonnes)

Types of arisings:	UK[1]	Data year	South East	Data year
Container	2,400,000	2003		
Flat	760,000	2003		
Fibre	60,000	2003	1,600[2]	1998/9
Lighting	15,000			
CRT	100,000			
Tableware	40,000			
Heat resistant	20,000			
Total	**3,395,000**			

Table A10: Estimated flat glass waste arisings

C&D	500,000
motor vehicles	80,000
process scrap	180,000 tpa
total	**760,000tpa[1].**

1.3.2 Current recycling

It is estimated that approximately 33% of waste glass is recycled (36% of containers and 30% of flat glass) (Enviros, 2004). As shown in table A11, glass recycling is mainly from post-consumer containers from households or pubs and restaurants. There is a relatively well-developed collection and processing infrastructure that is financially supported by the PRN system. The quantities recycled are limited largely by the quantities of post-consumer material collected, and there are indications that far greater re-use levels are possible, provided that there are improvements in the economic advantages to producers.

Table A11: Quantities of glass collected for recycling (tonnes)

	UK	Data year
Total	1,105,000	2003
Container	875,000	2003
Flat	230,000	2003
Other (fibre/lighting/CRT/ tableware/heat resistant)	*Negligible	2003

Source: Enviros (2004)

[1] Enviros (2004)
[2] Viridis (2003)

Table A12: End Use of Recycled Container Glass (UK 2002/3)

End Use	Tonnes 2003	% of total 2003
Container	616,700	**71%**
Export	100,00	**11%**
Aggregates	140,000	**16%**
Glass fibre	15,000	**1.7%**
Other (e.g. abrasives, water filtration, decorative)	3300	**0.3%**
TOTAL	**875,000**	**100%**

Source: Enviros (2004)

The primary market for recycled glass is the container sector (70%) but it is also exported and used for aggregates, glass fibre and other purposes (table A12). In recent years the market for feedstock for new containers has fluctuated due to competition from use in aggregates, which can tolerate higher levels of impurity and colour mixing. This is important as in the UK 69% of the manufactured glass is clear but only 52% of the collected glass, due to the green glass imported into UK as wine bottles (Remade Scotland, 2003). It is estimated that by 2008 there will be an annual surplus of 550,000 of green glass in UK waste stream[1]. Therefore there is a need to promote high value end-use markets for mixed coloured/green.

Flat glass recyclate is usually process glass, off-cut or reject materials from factories that process flat glass, e.g. window and windscreen manufacturers. Very little glass is recovered from demolition sites or ELVs (Remade Scotland, 2003). In general it is only this process recyclate glass that is used in flat glass production as there can be problems obtaining sufficiently high quality post consumer glass at an economical cost. Flat glass recyclate is also used for containers and other products (table A13).

Table A13: Estimated end uses of flat glass recyclate (tonnes/year)

Container	110,000
Flat	70,000
Fibre glass/other	50,000
TOTAL	**230,000**

Other glass products

Non-container/non-flat glass products, especially tableware and heat resistant glass, have significantly different chemical composition and are therefore not suitable for inclusion in the production process with cullet from container/flat sources. A major problem with other post consumer products is contaminants (e.g. ceramic/ electronic). Partly due to these complications, collection provision has not been easy to develop, and remains poor, with limited prospects for increase. Possible exceptions may be CRT and lighting glass where

obligations under WEEE directive may increase incentives for improved post consumer collection infrastructure and separation of components.

1.3.3 Economics of glass recycling

Collected container glass is usually delivered to a processor who cleans and sorts the glass for the main glass manufacturers (Enviros, 2004). The prices in table A14 reflect the sum that may be paid at the weighbridge by the aggregates sector and glass industry recyclers.

A variety of contractual arrangements exist with local authorities who are the main provider of glass for recycling. Bottle banks are usually owned by the local authority or leased from a glass collector or waste management company. It costs between £10-20 per tonne for the glass to be collected, which is deducted from the value of the glass, resulting in a net charge or profit to the council depending on the current market value (Enviros, 2004).

Table A14: Glass containers delivered to a collector (£ per tonne)

	January 2005
Clear	27 - 30
Green	8 - 12
Mixed	11 - 15

Source: Letsrecycle web site

1.3.4 Future opportunities

There is still considerable scope for increasing the recovery of container glass from the municipal and hospitality sectors with capacity available at glass container manufacturers (table A15). However there is a need for further investment in collection infrastructure (main current investor is DEFRA's £140 million National Waste Minimisation and Recycling Fund). Despite the gradual annual increase in glass recycling, future targets are unlikely to be met without major extension in collection provision, especially in the commercial sector.

There are also opportunities for glass recovery from ELVs and the construction and demolition sector. For the latter, considerable effort is needed to introduce and maintain the concept of source separation of waste on site.

The use of processed recyclate in non-glass end uses is significant and increasing, but there is a need for further investment in new high value end use applications, which are less likely to suffer from primary material market value fluctuations. Processes that will provide future opportunities include:

'Glasphalt' (road construction) 30% of natural aggregate substituted with processed recyclate

Glass sharp sand, crushed and milled recycled glass, followed by recently developed fine sifting techniques, is a source for BS graded sharp sand, and for a substrate for groundwork construction

Glass abrasives for shot blasting (recently developed technologies)

A fluxing agent in brick and ceramic manufacture (recently developed technologies)

Decorative applications

Filtration systems (recently developed technologies)

Table A15: Projected UK glass recycling by end use application

Application	2002	2004	2008
Containers (green from green)	242,000	250,000	275,000
Containers (amber from amber)	55,000	100,000	170,000
Containers (clear from clear)	197,000	350,000	560,000
Containers (from flat)	60,000	40,000	30,000
Fibre glass (from flat)	50,000	70,000	90,000
Fibre glass (from container)	15,000	17,000	20,000
Flat glass (from flat)	70,000	75,000	85,000
Aggregates - concrete	25,000	30,000	80,000
Aggregates – General Fill	55,000	60,000	60,000
Aggregates – Bound road base course	90,000	100,000	100,000
Aggregates - decorative	2000	2000	2000
Water filtration – drinking	0	10,000	50,000
Water filtration - waste	200	10,000	40,000
Abrasives	2000	10,000	40,000
Fluxing agent for bricks and ceramics	0	30	120
Art/craft	20	50	300
Export	64,000	50,000	50,000
TOTAL	927,000	1204,000	1772,000

Source: Enviros (2003)

Reprocessing capacity
The Enviros Report (2004) includes considerable information on glass processors and reprocessors and other users of glass recyclate such as aggregate companies. Hampshire glass recyclate is processed by Midland Glass Reprocessing Company at a new facility in Southampton Docks, that includes the most up to date coloured glass sorting equipment in Europe (Project Integra, 2004). It is then shipped for remanufacturing.

1.4 *Paper and card*

1.4.1 Quantities of paper and card in the waste stream

Defra (2004) and the Viridis (2003) report provide quantities of paper and card in various waste streams both nationally and for the South East (table A16) but neither provide quantities of the different types of paper and card. For reprocessing purposes this information is necessary as different types of paper and card can be used for different purposes. Average composition data available for both household and civic amenity paper and card waste streams (Parfitt, 2002) have been applied to the Viridis (2003) data to provide average streams of different types of paper and card in the municipal waste streams (table A17). However similar compositional data are not available for the other waste streams.

Table A16: Quantities of waste paper and card in different waste streams (000s tonnes per year)

	UK	Data year	South East[1]	Data year
Municipal		2002	1,313.70	
Commercial	2,502[2]		1,943.08	1998
Industrial	2,744[1]		984.00	1998
C&D waste			800.00	1998
Agricultural			88.00	1998
			4,328.78	

Table A17: Composition of paper and card in UK municipal waste stream applied to South East municipal waste stream.

	UK composition (%)	S-E municipal waste stream (000's tonnes)
newspapers/magazines	41.64	5,470.58
other recyclable	29.80	3,915.01
cartons	2.07	271.44
board packaging	8.42	1,106.64
card/paper packaging	17.17	2,255.05
other card	0.90	118.32
Total		**13,137.04**

1.4.2 Current Recycling

As a proportion of UK consumption there was an estimated national recovery level of 47.8% of paper and board in 2003 compared with an average 55.7% in Europe (PPIC, 2004). However this varies significantly with far higher levels for newsprint (58%) and case materials (69.7%), while for 'printings and writings' only 25.3% are recovered. Paper and board recyclate originates from two sources; pre-consumer (e.g. offcuts from printers) and post-consumer (municipal and commercial waste). The majority of paper and board currently recycled is pre-consumer waste that is generally clean and homogeneous in quality. Table A18 indicates the types of paper that are recycled and the products they are reprocessed into.

[1] Viridis (2003)
[2] Environment Agency (1999)

As mentioned earlier the main data are available on current levels of recycling are associated with packaging waste. As shown in table A18, the majority of paper in the municipal waste stream is newspapers and magazines, but approximately 25% is packaging. In 2003 1,979,215 tonnes of paper packaging was reprocessed and 449,378 tonnes were exported for reprocessing, a recycling rate of 65.2% based on an assumption of 128,000 tonnes paper packaging in the waste stream (Environment Agency web site, 2005). This already achieved the 65% recycling target for 2004, which will increase to 70% by 2008 (DEFRA, 2003).

In a WRAP report (2003) 560 samples of paper and card collected for recycling were analysed to compare the compliance with a standard (BS EN 643:2001) using different types of collection system. It was found that most samples approached the requirements of the standard with little difference in the collection systems.

Table A18: Types of paper recovered and the recycled products

Paper recovered	Recycled products
Newspapers, Magazines, Directories (white)	Newspapers, Cartons, Corrugated boxes
Other printed/unprinted (e.g. junk mail)	Newspapers
Photocopy	Printing paper
Computer	Writing paper
	Photocopy paper
	Computing paper
	tissues
Cartons, boxes, bags sacks, tubes, corrugated boxes	Cartons, boxes, bags, tubes, corrugated boxes
Any paper, cartons, boxes	Food packaging
Directories - colour	packaging
Beverage cartons, packaging	Packaging, Heavy tubes, plasterboard

Source: Remade (2000)

1.4.3 The economics of paper and card recycling

Waste paper is usually sold via a waste paper merchant or the merchanting arm of a waste management company. However some local authorities have formed groups that deal directly with a paper mill, thus obtaining a better price. The value varies according to the type of paper and card (Table A19), the quantities being sold in and its quality. Table A19 highlights that many local authorities as well as businesses could receive better prices for their waste paper if they segregated it into different types.

Table A19: UK prices paid for paper and card (£ per tonne, Jan 2005)

	Domestic mill prices	Export prices	Merchant prices
Mixed paper	25-28	38-40	2-10
Old kis (cardboard)	39-41	51-54	3-14
News and pams	44-46	46-51	
Over-issue news	50-52	68-71	
Sorted office waste	63-65		
Coloured paper	65-68		
Coloured best pams	64-69		
Light letter	82-87		
White letter	120-125	123-130	
Computer paper	130-140		
Mixed coloured office waste			10-22
White office paper			30-42

Source: Let's Recycle (2005)

1.4.4 Barriers to the increased use of recycled paper

In a study on the barriers to the use of recovered paper and alternative markets (Remade, 2000) three types of barriers were explored: economic barriers, technical barriers and public perceptions. In the intervening five years the financial situation has changed with increased investment, supported by grants, in paper reprocessing infrastructure (see below). Price fluctuations remain an issue, but long term contracts and the development of the market are likely to stabilise prices to some extent. Also regulations, such as the Newsprint Bill (Recycled Content Directive) that will require newsprint to have recycled content of 80% by 2010, increase the demand for recycled newsprint, resulting in the cost-competitiveness of recovered paper being less important.

Demonstrations of product quality, publicity campaigns, and awareness strategies were identified as essential to changing public perceptions and to stimulate market demand. Green procurement was, and still is, identified as having a key role to stimulating market demand.

A further barrier, identified by wastepaper merchants and paper mills, is that of unsorted paper grades and high levels of contamination.

1.4.5 Future opportunities

The reprocessing of paper is dominated by the large paper mills with increased collection being stimulated by increases in their capacity. However opportunities are also available for smaller scale reprocessing, particularly in the construction sector.

New capacity: a new paper recycling facility opened at UPM-Kymmene's Shotton paper mill in July 2004, producing 100% recycled newsprint. The £128 million facility was part funded by WRAP with a grant of £17 million. The facility, which includes the world's largest de-inking plant, will process 321,000 tonnes of recovered paper and magazines per year. This now means that all UK newsprint can be made from 100% recycled paper.

Market de-inked pulp: Approximately 80% of market de-inked pulp consumed in the UK is imported. A feasibility study (WRAP, 2003) assessed that a UK based MDIP plant would be economically feasible only if a 25% grant were available, the plant was co-located with another mill, and a recovered fibre price of £65/tonne were available.

Paper tissue: Although UK tissue manufacture currently uses 50% recovered fibre, there is room for growth. The barriers to this growth are quality requirements, over specifications and poor public perceptions (WRAP, 2004). It is a WRAP target (2004-2006) to increase the use of recovered fibres for tissue manufacture by 40,000 tonnes per year. R&D research on this topic is the subject of a current WRAP funded study.

Construction products: cellulose insulation
The development of cellulose insulation, usually manufactured from over issued news, print works and telephone directories (Remade Scotland, 2000) is currently being researched by the Steel Construction Institute (2004) for WRAP. Block insulation is also manufactured by Homatherm Insulation (see www.londonremade.com).

Waste paper can also be made into other construction products such as panel board, fibreboard, acoustic panels, and gypsum wallboard panels (Remade Scotland, 2000; Enviros, 1999). A company in the Medway area manufactures wood chip wallpaper from recovered office paper (Remade Kent & Medway, 2004)

Moulded pulp
There are now several companies that manufacture products (such as disposable bedpans) and packaging from moulded pulp using 100% waste paper. This is a potential area of growth particularly in the replacement of expanded polystyrene packaging.

Animal Bedding
Shredded waste paper provides a dust free, absorbent bed for horses and other animals, that is biodegradable and unpalatable to eat (Remade Scotland, 2000). Betta Bedding operates in Worcestershire and Halifax.

Briquetting
Waste paper can be compressed into blacks and used as a fuel.

Remade are undertaking a study to identify the current barriers to the local use of recycled paper fibre that will identify new market opportunities, review technical limitations, costs, and explore customer views and concerns over contamination (Remade Kent & Medway, 2004).

1.5 *Construction, demolition and excavation waste (CD&EW)*

1.5.1 Quantities of CD&EW in the waste stream

Construction and demolition (C&D) waste is identified by the EC as a priority waste stream. This waste has in the past been disposed of in landfill sites, but the introduction of the Landfill and Aggregates Taxes has lead to considerably increased recycling. It is estimated that a total of 93,911,000 tonnes per year of hard C&D and excavation waste is produced in England and Wales of which 38,016,000 tonnes are recycled as aggregates (41%) and 7,052,000 tonnes are recycled as soils (Symonds, 2002) (table A20). Although the majority of CD&EW waste is aggregates, soil and rocks etc, many other materials arise from construction and demolition such as wood and plastic packaging (table A20). Waste produced from road construction and maintenance will also have a different composition.

Table A20: Composition of construction, demolition and excavation waste delivered to a transfer station

Waste group	Construction waste %	Demolition waste %	Waste transfer station %
Timber	19.3	3.3	12.44
Concrete	5.9	40	13.72
Inert[1]	11.1	24	40.85
Asphalt	0[3]	15	1.35
Ceramic	3	0[2]	1.35
Insulation	2.5	0[2]	0.81
Plastic	13.0		1.90
Packaging	25.7	17	1.51
Metal	2.6		5.69
Plaster & cement	3.1	0	1.93
Miscellaneous	13.8	0.7	18.02

[1] inert material includes brinks, masonry, rubble, hardcore sand and stone
[2] included in figure for miscellaneous [3] included in figure for inert
Source: (Hurley, 2001).

The South East region produced 15% of the total recycled aggregate and soil (table 2.21), the highest of all the regions. This is mainly due to the movements of waste out of London and the high level of economic activity in the region (Symonds, 2002). Of the total 13,444,000 tonnes 36.4% was crushed or screened for aggregates and 7% was screened for soil (table A21). Approximately 275 million tonnes of aggregates are currently used in the UK, with 65 million tonnes from secondary (recycled) sources.

Table A21: Estimated recycled aggregate and soil production in 2001 (000s tonnes)

	England & Wales	**South & East**
Crushed/screened aggregates	38,016	4898
Excavation waste/screened CDEW for soil	7,052	945
Sub-total recycled aggregates & soil	45,068	5,843
Material used for landfill engineering or restoration	9,409	1,792
Material used to backfill quarry voids	11,531	2,202
Material used at registered exempt sites	23,682	2,828
Landfilled material	4,222	779
Total	**93,911**	**13,444**

Source: Symonds (2002)

1.5.2 Barriers to recycling

Data from the ODPM survey (2002) suggests that most hard CD&EW that can be recycled is being recycled and that there is limited scope for increasing the amount due to mixing with soils and contaminated materials (Viridis, 2003). However it has been estimated by WRAP (2004[2]) that an additional 20-25 million tonnes secondary aggregates could be recycled.

The on-site mixing identified by the ODPM study is an important barrier to recycling as it increases contamination levels and the cost of disposal making it far more difficult to recycle. The on-site separation of C&D wastes is particularly poor for small scale builders and repair and maintenance markets (Viridis, 2004). This often stems from a lack of understanding of the potential financial benefits of recycling, but is also due to a lack of time and facilities for source separation.

Education of all C&D stakeholders is also an important factor in increasing the use of secondary materials, particularly aggregates (Viridis, 2003). The lack of information is another key barrier that has been addressed to some extent by the introduction of initiatives such as the Aggregates Information Service, AggRegain, CIRIA register of recycling sites and various Internet based waste material exchanges.

The surveys that have been carried out provide a fairly good picture of CD&EW waste at national level but at regional level the error margins on the estimates are very high due to the low response rate. This makes it difficult to plan for change particularly as data are not available at a local level or at individual sites. This is particularly important for aggregates due to the high cost of transporting low value material (Viridis, 2003).

1.5.3 Future Opportunities

Increasing the opportunities for recycling C&D waste is highly dependent on obtaining local and regional data on production and reprocessing facilities. This is important for highway maintenance as well as building sites. There is a need to develop a standardised methodology for data collection. A detailed study was carried out for Greater Nottingham

(APT Environmental, 2002). County or regional based waste audits would also be useful as would site based audits. There is a need to develop and promote pre-demolition audits.

Increasing the value of the recovered waste streams will provide a more consistent market and a better return for time spent on source separation but requires 'cleaner' recyclate streams. Also markets for the non aggregates parts of the construction waste stream (42% in the Nottingham study) such as wood, plastics and paper, need to be developed, as they will support the viability of the aggregates. For some waste streams an 'income' will not be available but the 'disposal' cost will be lower or even free. As discussed earlier the development of a market for mixed plastics is important for C&D plastic waste.

The use of secondary aggregates in concrete is limited even though the British Standard BS 8500 permits the use of up to 20% recycled aggregate into concrete, and reclaimed bituminous material into new asphalt, without altering the composition of the designated mixes (Viridis, 2003). This would be a good opportunity for ready mix concrete producers but most do not have the equipment to introduce the recyclate into the mix in a controlled manner. Therefore capital investment is needed.

Using recycled materials for highways maintenance has been shown to be cost neutral or, in some cases, financially beneficial when taking into consideration the avoidance of waste disposal charges, Landfill Tax and Aggregates Levy payments (WRAP, 2004[3]). Transport cost savings can also be made when secondary materials are used that are sourced locally. In addition some maintenance techniques have lower costs and improved performance. WRAP (2004[3]) has identified 'crack and seal', Rhinopatch and cold-lay foamed asphalt mix.

Hampshire County Council has a target to divert 40,000 tonnes of aggregate waste from landfill at a saving of £80,000 on landfill tax alone. The Newport Southern Distributor Road Scheme saved £1million by using 450,000 tonnes of secondary instead of primary aggregates (WRAP, 2004[3]).

1.6 *Metal*

1.6.1 Quantities of metals in the waste stream

In 2004 13.8 million tonnes of steel was produced in the UK incorporating 40% recycled steel. Aluminium production is, on average 340,000 tonnes per year. The National Waste Production Survey (1998/9) estimated 4.254 million tonnes of waste were produced by industry and 0.537 million tonnes of waste by commerce (Environment Agency, 2000).

Of the UK market 5% of steel production was used for packaging, with around 13 billion steel cans used each year (equivalent to 455,000 tonnes) and 5.3 billion aluminium cans (82,000 tonnes) (Aluminium Can Recycling Association, 2001).

According to the National Waste Production Survey of 1998/9, the South East produced 313,000 tonnes of waste metal by the industrial sector and 98,000 tonnes by commerce, a total of 414,000 tonnes, 8.6% of the England and Wales arisings (Environment Agency, 2000).

1.6.2 Current recycling

The recycling of metals is a well established process with significant environmental and financial benefits. In 2001 9.67 million tonnes were deposited at metal recycling facilities in England and Wales with 902,798 tonnes treated at licensed metal recycling and vehicle dismantling sites in the South East (DEFRA, 2004). This total excludes exempt metal recyclers and scrap yards as they are not required to provide site input returns. The major inputs in the South East were to facilities in Hampshire (192,829 tonnes), Kent (235,952 tonnes) and East Sussex (133,659 tonnes).

The majority of metal for recycling is produced by industry and commerce (97.6%). Scrap metal is divided into two types, ferrous and nonferrous. Ferrous scrap is sourced predominantly from End of Life Vehicles (ELVs), household appliances, steel beams, railroad tracks, ships and packaging. In addition to aluminium nonferrous scrap includes metals such as copper, lead, zinc, nickel, titanium etc. New legislation on the recycling of fridges and ELVs will change the way these waste streams are managed.

There is ample capacity for ferrous metal to be reprocessed in the UK although there is also a significant export market. Aluminium is reprocessed at secondary foundries. Unusually the arisings of aluminium scrap more than meets the needs of the UK foundries so secondary refiners have developed an export market that is currently affected by the high value of UK sterling. There is also a flourishing export market of scrap aluminium to China.

Packaging waste
Recent years have seen a steady growth in steel recycling rates - with 44% of all steel packaging being recycled in 2003 (table A22). Steel and aluminium containers are mainly collected from the municipal waste stream with other products such as aerosol cans and aluminium foil (Waste Online, 2004). In 2003 304,000 tonnes of steel cans were recycled, but 350,000 tonnes were still sent to landfill (personal communication, Steel Can Recycling Information Bureau, 2005) despite a strong market for scrap metal.

Table A22: Recycling of packaging metals (tonnes per year)

Packaging	UK reprocessing	Exported for reprocessing	UK tonnes accepted for recycling	Recycling rate 2003 (%)
Steel	129,219	175,301	304,520	44.5
Aluminium	25,382	6,449	31,831	24.9

1.6.3 Economics of metal recycling

In a report for the DTI (Hummel, 2004) the sorting and processing costs at a MRF were estimated as £20 per tonne for kerbside sorted metals, £40 per tonne for 2-stream metals and £55 per tonne for co-mingled metals. The revenues from the sale of metals delivered to a regional centre are on average £60 per tonne for steel cans (£75 in Jan 2005), £700 per tonne for aluminium cans and £450 per tonne for aluminium foil (Hummel, 2004). The report concluded that the collection of metals, even at a low level of recovery, can have a positive benefit on the cost of kerbside recycling and MRF processing.

The value of ferrous scrap from the industrial waste stream in Jan 2005 ranged from £29/tonne for light iron to £139 for 4A low residual bales. Copper prices were up to £1,250/tonne, brass up to £1000/tonne and aluminium cuttings £650/tonne (Letsrecycle, 2005). Lead scrap was worth £360/tonne and batteries £25/tonne.

1.6.4 Future opportunities

Metal scrap is a global commodity with ample reprocessing capacity in the UK or for export. The main limiting factor is the quantity collected. For packaging waste although there has been a significant increase in both aluminium and steel can recovery for recycling this will need to increase further if the packaging target of 35.5% for aluminium and 61.5% for steel are to be achieved by 2008.

1.7 *Wood*

1.7.1 Quantities of wood in the waste stream

In 2002 the UK consumed in the region of 45million m^3 of wood raw material (Forestry Commission 2004). Around half of this is consumed as wood and board material, while half is accounted for by paper and paperboard applications. It is estimated that approximately two-thirds of the UK softwood consumption is used by the joinery and construction sector, with a further 12% being utilised for pallet and packaging production, 10% for fencing and 4% for furniture production (Remade Scotland 2004).

There are thus large amounts of wood waste arising in a number of different streams. However the majority of wood and board material passes through a complex supply chain before becoming waste (BFM and BRE 2004). Due to the variety of uses of wood, wastes can be of widely differing quality, quantity and levels of contamination.

There is little accurate information documenting wood waste arisings (Remade Scotland 2004). A further issue is the lack of cross-industry standard specifications for wood recycling (Lets Recycle, 2005) as most wood recyclers will accept nearly all soft and hardwoods. In contrast with the majority of major streams, Defra does not report data on wood or wood waste in England and Wales or the regions.

Viridis (2003) estimate that the total recorded wood waste arisings in the South East are approximately 540,000 tonnes per annum, although this figure is prone to fluctuation with economic and property market changes.

A recent WRAP report (BFM & BRE, 2004) into wood waste, reclamation and reuse, divides wood waste into five sectors: construction, demolition, refurbishment, end of life furniture and packaging, and estimates arisings based on a broad literature review and stakeholder consultation (table A23). A second report (Excelar, 2002), estimates wood waste is between 0.2% and 3.0% of collected household waste. This would suggest that the total wood waste collected with household waste in the South East in 2002-03 was between 8,498 tonnes and 127,470 tonnes based on Defra (2003) municipal waste data 2002-03.

Table A23: Quantities of wood in different waste streams (000's tonnes)

	UK	Data year	South East	Data year
Municipal	1,762[1]	2002		
Construction	1,053[2]	2003		
Demolition & Refurbishment	1,033[2]	2003		
End of Life Furniture	2,050[2]	2003		
Packaging	1,400[2]	2003		
Forestry	378[3]	2001	54[3]	2001

Table A24: Estimated municipal wood waste in the South East.

Tonnes based on % of total HH and CA waste: [4]	wood content HH waste	timber content CA sites	woody content CA sites	furniture content CA sites	wood content CA sites	wood content trade waste	wood content bulky HH waste
	1.5%	11%	6.5%	5%	22.5%	0.5%	6%
Total tonnes for South East Region[5]	-	112,437	66,440	51,107	229,988	5,111	-

Source: calculated from BRM & BRE (2004) HH – Household Waste CA – Civic Amenity sites

1.7.2 Current Recycling

DTI (2001) categorises wood waste into five categories and identifies recovery options, as summarised in table A25.

Table A25: Categories of wood waste

Category	Description	Recovery option
Green waste	By-product of management of trees – thinning and pruning	Decomposition in-situ; chipping for land spreading and mulch
Untreated wood	Mostly packaging wood	Reuse; recycling; energy recovery
Structural wood	Construction wood including rail sleepers and telegraph poles and C&D waste (generally treated)	Reuse; limited recycling and energy recovery
Process waste	Sawdust, chippings, off-cuts	Reuse; recycling; energy recovery
Waste manufactured products	Products made entirely, or partly of wood, such as furniture	Reuse and refurbish; recycling; energy recovery

Approximately 5.5 million tonnes/year of wood waste are produced with 9.6% reused and 25.4% recycled (BFM & BRE, 2004) with wide variation between sectors (table A26). Based on these data 64.5% of wood waste in the UK is disposed of in landfill or incineration without heat recovery, suggesting that there is very large potential for reuse, recycling and recovery of wood waste.

[1] Exelar LTD (2002) – England, Scotland and Wales only
[2] BFM & BRE (2004)
[3] Reward (2001) – England and Wales only
[4] Gaps in data where total waste figures incomplete, making estimation impossible
[5] Excludes Reading for which no data available

Table A26: Current and potential wood waste reuse, recycling and recovery

Sector	Wood waste arisings (tonnes)	Tonnage reclaimed for reuse	Tonnage recycled or recovered	Rate of reuse, recycling and recovery	Potential rate of reuse, recycling and recovery	Potential tonnage or reuse, recycling and recovery (estimated 2004)
Construction	1,053,000*	135,000	377,000	51%	83%	870,000
Demolition and refurbishment	1,033,000	133,000	240,000	36%	84%	868,000
End of life furniture**	2,050,000	212,500	24,500	9%	71%	1,447,000
Packaging	1,400,000	50,000***	767,000	58%	90%	1,267,000
Totals	5,536,000	530,500	1,408,500	36%	80%	4,452,000

*Includes 26,000 tonnes for 'other' uses
**Furniture figure does not include production wood waste, estimated 482,000 tonnes p.a.
***This figure only includes packaging wood waste reclaimed for reuse and excludes the weight of reusable packaging such as pallets which are reused.

Source: (BFM & BRE, 2004)

The majority of wood wastes have the potential to be recovered, reused or recycled, but this potential depends largely on the quality and composition of the wood waste arisings. Where there is a large degree of contamination, which can often be the case with post-consumer waste, the material will often require some degree of sorting and or processing. The degree of contamination and condition of material can greatly influence processing costs (Remade Scotland 2004).

The Lets Recycle website identifies 83 wood recyclers and reprocessors in the UK, of which 7 are based in the South East. However it is likely the actual figure is larger than this.

Construction, Demolition and Refurbishment
The main forms of wood waste from construction include scaffolding planks, joinery off-cuts, temporary fencing / hoarding, sheet materials, formwork and packaging. Of these scaffolding planks, hoardings and fencing and packaging are the most commonly reused. It is estimated that 26% of waste generated at construction sites is composed of wood waste (WRAP 2004).

Demolition can produce many wood products suitable for reuse both in renovation and new build. Examples are large beams, doors, flooring and windows (WRAP 2004). Reclamation typically follows two routes: either the demolition contractor re-sells the reclaimed stock themselves, or it is sold to dealers. Where wood waste from demolition is not reclaimed it is normally segregated for recycling or disposed of through waste transfer stations (WRAP 2004).

Refurbishment wood waste is generally similar to that generated by construction and demolition. For example windows, doors, skirting boards, decking, flooring, display counters as well as off- cuts, sheet materials and packaging etc. Much of the waste generated through refurbishment will already be accounted for in the demolition stream, however wood waste from shop-fitting was estimated at 66,000 tonnes (WRAP 2004).

Detailed data are not available for wood waste generated however BFM & BRE (2004) summarises a range of estimates of the quantity of construction and demolition wood waste produced in the UK, Table A27. Also outlets for construction, demolition and refurbishment wood waste are identified (table A28).

Table A27: Variety of estimates for construction and demolition wood waste

Source and Data Year[1]	Quantity (tonnes)
DTI, 2001	750,000
WRAP, 2001	1,000,000
McGrath et al, 2000	1,000,000 (demolition only)
CIRIA, 1999	2,500,000
Hurley, 2002	3,100,000

Table A28: Waste management method for different wood waste streams (%)

Disposal method	Construction	Demolition	Refurbishment (shop-fitting)
Landfill	38	35	85
Sent for recycling	20		4
Recycled into production (on site)	15		
Reused internally	14		8
Burnt (no heat recovery)	13	29	2
Burnt with energy recovery	5		
Burnt with heat recovery and recycling in situ.			2
Reclaimed beams		5	
Reclaimed flooring		5	
Reclaimed antiques (architectural)		2.5	
Salvaged wood (for recycling)		18.5	

End of Life Furniture

It is estimated that of the total stock of wood contained in UK furniture (36 million tonnes) between 1.9 and 2.2 million tonnes/year ends up as wood waste (BFM & BRE, 2004). The reuse and recycling of end of life furniture in the UK is estimated to be 237,000 tonnes/year, only 12% of the total (table A29). There is thus seen to be large potential for increased reuse and re-manufacturing (table A30).

Table A29: Estimated end of life furniture reuse and recycling rates

	Total tonnage segregated	Estimated reuse tonnes	Estimated recycling tonnes	Notes
Civic amenity sites	33,000	16,500	16,500	Even split assumed in absence of actual data
Local authority bulky waste	20,000	19,000	1,000	5% of these wastes deemed suitable only for recycling
Charitable organisations	100,000	95,000	5,000	
Office furniture	50,000	50,000	0	Office furniture typically only reclaimed if suitable for reuse
Manufacturer seconds	34,000	32,500	2,000	95% assumed to go for reuse
Total	**237,000**	**212,500**	**24,500**	

[1] All sources cited in WRAP, 2004

Source: adapted from BFM & BRE, 2004

Table A30: Potential to increase the reuse and recycling of end of life furniture arisings in the UK

Source	Tonnage available	Current reuse and recycling	Potential increase (estimates)
Household waste	12,000	0	6,000
Civic amenity sites	329,000	33,000	181,000
Bulky waste collection	40,000 (LAs)	20,000	18,000[1]
	100,000 (Charitable orgs)	100,000	
Household clearances	220,000 (domestic kitchens)	0	165,000
	700,000 (contract furniture)	0	165,000
Commercial clearances	250,000 (office furniture)	50,000	138,000
	700,000 (contract furniture)	0	525,000
Manufacturer and retailer waste	50,000	34,000	12,000
Total	**1,900,000**	**237,000**	**1,210,000**

Source: adapted from BFM & BRE, 2004

Case study: Furniture Reuse Network
Established in 1989, the Furniture Reuse Network (FRN) is the national co-ordinating body for 300 furniture and appliance reuse and recycling organisations in the UK that collect a wide range of household items to pass onto people in need. FRN members are spread across the country from Cornwall to the north of Scotland with a concentration around the major conurbations. Operations range in size from one man and a van through to schemes involving 50+ people.

Around 1.26 million items of furniture were reused and passed onto low income families by FRN members in 2002. This resulted in the diversion of 53,000 tonnes of furniture from landfill as well as providing jobs for 5000 people. 160 of the organisations conduct refurbishment for reuse (Anderson, 2004), though there is very little activity which could be described as remanufacturing. FRN recognises that supply rather than demand is a serious barrier to the expansion EOL furniture reuse. If supply was adequate, the volume of material handled could be doubled or quadrupled in a short space of time

(Anderson – cited in WRAP 2004)

Packaging Wood
Wooden packaging includes a variety of products such as pallets, pallet collars, crates, boxes and barrels. It has been estimated that of 1,417,379 tonnes of wooden packaging produced in 2002, 767,230 tonnes (54%) was recycled (Defra 2003). Of the remaining 650,000 tonnes it is estimated that 50,000 tonnes are used to repair damaged packaging, with the remaining 600,000 tonnes 'unaccounted for'. It is estimated that around 450,000 tonnes of this waste could be used for recycling each year (BFM & BRE, 2004).

[1] Bulky waste disposal collections have the potential to be expanded considerably through the diversion of material currently disposed of through household clearances.

From January 2000 wood packaging was included in the Packaging Waste Regulations encouraging the use of light-weight non-reusable packaging, and an overall increase in recycling of 94,000 tonnes in 1998 to 767,230 in 2002. However it has also been estimated that an average annual decrease of 17% (2000 – 2002) has occurred in re-use or repair of wood pallets, due to the increased use of weaker one-trip pallets (NAPD, 2005).

1.7.3 Economics of wood recycling

Letsrecycle.com produces an estimated recycling guide price of -£4 to -£15 which equates to the sum that may be paid by a wood waste recycling business for mixed wood waste. This is different from the figure that may be paid by a boardmaker for processed and graded material. Letsrecycle suggest this figure should be seen as a wood disposal cost as it is generally a negative number to cover processing and transport costs to a boardmaker or other reprocessed wood user. Clearly the viability and value of the wood waste market depends on the value of reprocessed wood as well as this 'disposal' cost.

1.7.4 Barriers to increased wood recycling

As with most waste materials the quantity and condition of wood waste generally dictates the final disposal route. BFM & BRE (2004) and Remade Scotland (2004) identify a number of barriers to wood recycling and reuse:

- Problems of space, time and labour for the identification, segregation and storage of waste wood.
- Lack of segregation, leading to patchy availability of certain types of reclaimed wood product. This limited and / or sporadic supply acts as a disincentive to potential buyers.
- Low degree of awareness of wood waste issues at the company level, particularly cost of wood waste and potential revenues.
- Legal barriers, such as fire regulations limiting the re-use of end of life furniture, and PRNs for packaging leading to the chipping rather than reuse of pallets.
- Demolition rather than deconstruction (also influenced by health and safety legislation which has lead to greater mechanisation of demolition)
- Lack of quality data.
- The treatments used in wood limiting reuse and recycling options.

A survey of 63 local authorities identified barriers to increased wood recycling (Magin, 2001) (table A31).

Table A31: Barriers to wood recycling, as identified by local authorities

Barrier	% of respondents[1]
Lack of local outlet for material	62
Lack of resources	38
Lack of space at sites	37
Contamination of material	24
Logistics / infrastructure	6
Tendering process	3
Lack of political will	2

Source: Magin, 2001

[1] Note: % add to more than 100, as many respondents identified more than one constraint

1.7.5 Future opportunities

Board manufacturing
Board production has increased its share of the UK building and furnishing market in recent years, replacing the use of solid timber with 75% of the board products consumed in the UK (1999) being produced in the UK. The mix of fibres used in board products varies but proportion of recycled fibres are increasing with a potential for 100%. This represents a potentially large market for recycled woodchip and sawdust. (Remade Scotland, 2004).

Biofuels and charcoal production
Technological advances are increasing the potential to use wood as a source of heat and energy, for example more advanced filters for the removal of dioxins present in wood treatments. Thermal conversion offers the opportunity to generate heat and power from wood waste, while diverting this waste from landfill. (Remade Scotland 2004)

Another option is the carbonisation of wood waste, particularly of hard wood waste. The Waste Book (2005) estimates that around 50,000 tonnes of charcoal are used in barbecues in the UK annually. This market is expanding, but current production is mainly from about 200 small operators. A two tonne 'burn', that takes a week and produces 0.33 tonnes charcoal has a wholesale value of £200. This market is expected to expand with a potential market for 300,000 tonnes of hard-wood waste, particularly with the introduction of new technology (portable kilns) and greater market development and support from major retail chains (The Waste Book, 2005).

Animal Bedding
Sawdust and shavings are used widely as animal bedding and flooring. It is estimated that the current market for animal bedding in the UK is 450,000 tonnes per annum (Remade Scotland 2004). Due to relatively high moisture content, virgin wood may have lower absorption properties and be susceptible to mould. Recycled fibre conversely generally has much lower moisture levels, however other contaminants (metals, plastics or chemicals) are prohibited in animal bedding.

Composite materials
Wood / plastic composites can be formed of 100% recycled fibre. Applications include door and window frames, fencing, signs and construction uses, though the market is at present very much in its infancy (Remade Scotland 2004). Wood plastic composite, manufactured by combining finely ground wood (known as wood flour) with plastics such as polyethylene is already produced in significant quantities in the USA and this market is expected to increase over coming years (Recycle Wood 2005).

1.8 *Organics*

1.8.1 Quantities of organics in the waste stream

The many different waste streams that can be included in the term 'organics', are usually defined according to their source. Green waste originates from gardens and parks, while kitchen waste may include cooked food in addition to vegetable peelings. There are also wastes from the food industry and commercial kitchens, that includes cooking oil, plus bio-solids from the sewage treatment process and farm waste.

It was estimated that the UK produced 5 million tonnes of green waste per year (DETR, 1999), while the National Waste Production Survey (Environment Agency, 2000) estimated 2.744 million tonnes of food waste from industry and 2.502 million tonnes from commercial sources (table A32).

Table A32: Organic waste production (tonnes/year)

	England & Wales[1]	Data year	South East[2]	Data year
Municipal – food and garden	9,768[3]	2003	1171[4]	2003
Green waste- collected			570	
Industry - food	2,744	1998/9	232	1998/9
Commerce - food	2,502	1998/9	65	
Sewage sludge			20	
Agricultural			4943	

1.8.2 Current recycling

Very little information is available on the quantities of organic waste that are composted. The majority of agricultural waste and significant quantities of treated sewage sludge are spread on farmland. However under the Animal By-Products Order amended in 2001 'all catering waste, which could contain, or have been in contact with meat or other products of animal origin must be disposed of so that livestock and wild birds cannot gain access to them' (Defra, 2004). This means that compost produced from kitchen waste cannot be spread onto land. However the composting and use of green waste from gardens and parks are not affected by this regulation.

A WRAP project (Paul Waller & Goldenbrown Consulting, 2003) identified 55 green compost production sites in the UK that had average inputs of 10,000 tonnes of green waste per year and produced about 740,000 tonnes of compost overall.

For the South East the Viridis report (2003) estimates a total of 570,000 tonnes of green waste collected for recycling, while Defra (2004) gives a value of 258,000 tonnes 'compost' from household waste (kitchen and garden) recycled in 2002/3.

1.8.3 Economics of organics recycling

The average prices paid for green waste compost is £16/m^3, approximately £28/tonne. This compares with £13 – 22/m^3 for forestry residues, spent mushroom compost and shredded green waste, while peat and peat based products have a price of about £35/m^3 (Arthur D. Little, 2004). However the cost is highly dependent on the haulage cost, with the green waste having the benefit of short distances compared with the alternatives.

1.8.4 Future opportunities

The demand for organic matter is estimated as 1.565 million tonnes including 314,000 tonnes of green waste compost. Half of this is from landscape contractors, the remainder from other users (Arthur D Little, 2004). Currently only 18% of organic material used for mulching, planting and bedding by landscape contractors is green waste compost. So there are considerable opportunities to increase this proportion.

Key to increasing the opportunities are to develop local suppliers in order to keep the haulage costs low and to increase the customers' preferences for green waste compost. This can be achieved by developing local markets and by actively marketing and tailoring

[1] Environment Agency (2000)
[2] Viridis (2003)
[3] calculated using 2003 municipal data and Parfitt (2002) composition data
[4] calculated using 2003 municipal data and Northants (2002) composition data

products to local needs (Arthur D. Little, 2004). To develop local markets a network of suppliers are needed.

In the UK the growing media manufacturing sites are mainly in Northern Ireland, North East and North West England and Somerset, with no significant growing media operation in the South East. This is a disadvantage for the sale of compost to the growing media manufacturers and unless a growing media plant can be attracted to the South East it will be necessary to look for alternative markets.

Other opportunities include substituting green waste compost for imported topsoils in land reclamation schemes and other specialist applications such as turf dressing for golf courses (Arthur D Little, 2004).

There are also considerable opportunities in the organic farming and horticultural sector, with an estimated growth of 303% if concerns about quality are addressed. Opportunities have been particularly identified in the South East and other traditional horticultural areas, where the production cycle was most intensive and where there was an absence of other abundant, low cost sources of organic matter such as farmyard manure (Organic Resource Agency Ltd et al, 2004).

1.9 *Tyres*

1.9.1 Quantities of waste tyres in the waste stream

Viridis (2003) report that between 50,000 and 80,000 tonnes of post consumer tyres are produced in the South East each year. These estimates come from two sources, the lower from Viridis themselves, and the higher from the Environment Agency Strategic Waste Management Assessment. The SEERA Waste Regional Strategy estimates arisings at the lower end of the scale and predicts that this is likely to rise to 67,000 tonnes by 2012. (SEERA, 2004)

What is clear is that the scale of this stream is very large, and is fed by a constant supply of used tyres, approximately 100,000 per day (Used Tyre Working Group[1]), around 40 million tyres per year. In 2001 it is estimated the total UK arisings to be in the region of 480,000 tonnes, 7% higher than 2000 (UTWG, 2001).

It is difficult to predict with any accuracy future levels of used tyre arisings or the levels of different types of recovery. However, road traffic is predicted to grow significantly over the next twenty years (between 29 and 63 per cent according to DETR forecasts), and as a result it is likely that used tyre arisings will also increase. (DTI, 2001)

1.9.2 Current recycling

In 2001 the total tonnage of tyres recovered in the UK was 290,000 tonnes representing an overall recovery rate of 60% (table A33) (Used Tyre Working Group, 2001) with the balance largely disposed of to landfill. No regional data on reuse or recycling have been identified. Given new legislation the market will need to recover 100% of used tyres by mid-2006 when the landfill ban takes full effect.

[1] The Used Tyre Working Group was formed in 1995 to act as a link between industry and Government on used tyre recovery issues. It is formed of the Directors of the four tyre trade associations, together with a number of industry representatives, and officials from the Environment Agency and the Department of Trade and Industry.

Table A33: Disposal routes for used tyres, UK 2001

Disposal method	Tonnes	Percentage
Total		
Recovered	481,496	
Recovery rate	290,496	60.3
Reuse	78,217	16.0
Retreading	49,179	9.9
Recycling	107,000	22.2
Landfill engineering	16,100	3.3
Energy recovery	40,000	8.3

Source: Adapted from UTWG 2001

The Used Tyre Working Group estimates there to be thirty used tyre recycling facilities in the UK, while Lets Recycle lists thirteen used tyre collectors in the South East (www.letsrecycle.com).

1.9.3 Economics of tyre recycling

Economic information relating to the disposal of tyres emphasises that there is a cost associated with the disposal and recovery of used tyres. The Used Tyre Working Group estimate this to be in the region of £100 - £140 per tonne of tyres in 2003 which includes retailer's costs, including providing for storage of used tyres, transport costs in getting used tyres to disposal and recovery facilities and the gate fee raised by such facilities for accepting used tyres.

The Working Group also notes that as a rule of thumb, landfill costs, for disposal or engineering, are significantly cheaper than the other options available. (UTWG 2004). However with the introduction of new legislation and the banning of tyre disposal through landfill this situation will inevitably change, and the economics of tyre recycling will be altered fundamentally. Clearly the viability and value of the reuse and recycling of tyres in the market will depends on the value of materials arising from reprocessing as well as 'disposal' costs.

1.9.4 Future opportunities and barriers

The Landfill Directive requires the diversion of waste tyres from landfill. Whole tyres were banned from landfill in 2003, with shredded tyres banned by 2006. This enforced change in available disposal routes means that alternative tyre waste management facilities will be required across the country.

SEERA (2004) report that there is an existing processing capacity shortfall in the region and forecasts that this situation is likely to worsen. As summarised in Table A33 above, the current management routes, which may have potential for expansion in the Region are (UTWG, 2004 and SEERA, 2004):

- re-use and re-treading,
- re-use in construction,
- recycling (crumb used as road, playground or sport surfaces and in manufacturing),
- combustion (tyres used as a fuel in cement or lime kilns or for energy recovery).

Traditional markets such as carpet underlay and sports and safety surfacing remain stable, and that FIFA have recently approved a surface containing rubber crumb which is hoped to

lead to new market opportunities UTWG (2004). Furthermore the use of the material for equine uses has shown notable growth in recent years.

There is active research into other end-use markets such as rubber crumb in road surfaces and as an aggregate replacement in concrete (UTWG 2004). The UTWG also note that a stretch of 'rubber road' has been laid near Battle, East Sussex and that the use of rubber in concrete, although at an early stage, is a potentially promising market opportunity.

The SEERA Strategy suggests that the Region should plan for pyrolysis at the regional level. The process, which effectively amounts to cooking the tyres in the absence of oxygen, breaks down the constituent parts of the tyre into carbon char, oil, steel and gas. The gas is used to fuel the process.

The Used Tyre Working Group (www.tyredisposal.co.uk) identifies a number of issues surrounding tyre recycling and the forthcoming ban on the landfill of tyres:

- The need for the development of a robust recovery infrastructure capable of handling all tyres that would previously have been disposed of in landfill. This includes the development of the logistics support to enable tyres to be efficiently delivered into the recovery infrastructure.

- The need for recovery infrastructure to actually receive the tyres it needs to operate effectively. Businesses currently receiving used tyres must progressively manage the transition away from landfill. The UTWG expresses that it is impractical to assume that tyres can move en masse from disposal at landfill to recovery overnight.

- Cost of recovery is the prime factor on which both the development of adequate recovery facilities, and delivery of tyres into those facilities hinges. Businesses will inevitably take their own view as to the immediate costs of supporting recovery now compared to the relative cost of disposal to landfill presently available. The UTWG urges businesses to carefully weigh the perceived attractiveness of lower cost landfill disposal against the need for a managed transition away from landfill. If it appears this balance is not right, there is a real danger that Government may intervene with an imposed solution, with the loss of flexibility and increased costs this would be likely to bring.

1.10 *Waste electrical and electronic equipment (WEEE)*

1.10.1 Quantities of WEEE in the waste stream

The Environment Agency estimates that householders and businesses in the UK throw at least one million tonnes of electrical and electronic equipment away each year. This amount is thought to be growing by up to 80,000 tonnes annually. (Environment Agency, WEEE Directive webpage)

Taking Stock mass balance report for the South East estimated that householders in the Region consumed 100,000 tonnes of household electrical appliances in 2000, an average of 13 kg per person. Washing machines make up 22,000 tonnes, fridges and TVs each 10,000 tonnes and personal computers 6,000 tonnes. (EcoSys, 2000)

The SEERA Strategy (2004) estimates the regional generation of waste electrical and electronic equipment to be 140,000 tonnes per year which is consistent with the Viridis (2003) estimate of 136,000 tonnes per year.

Due to the nature and variety of appliances and articles included as WEEE waste, SEERA suggest that there will be a need for several dismantling, disassembly and re-manufacturing facilities at the sub-regional level.

Detailed data on the composition (categories) of WEEE waste is only available at the national level. However applying the relative proportions of each category to the overall total for the South East allows us to calculate approximate figures for regional WEEE categories (Table A34). It should be noted that the data available at the national level is for domestic WEEE only, whereas the South East figure (to the best of the authors' knowledge) is for total WEEE waste, including commercial.

Table A34: Quantities of WEEE Waste in each category

Category of domestic WEEE	National tonnes discarded (000s tonnes)	Percentage	Approximate tonnes discarded in South East (% x SE Total)
Large household appliances	644,000	69%	96,600
Small household appliances	80,000	8%	11,200
IT / Telecoms	68,000	7%	9,800
Consumer equipment	120,000	13%	18,200
Tools	23,000	2%	2,800
Toys / leisure / sports	2,000	0.2%	280
Lighting	2,000	0.2%	280
Monitoring and control equipment	<1,000	<0.1%	<140
Total	939,000	100%	-

Source: ICER 2005

1.10.2 Current recycling

Letsrecycle currently identifies nine WEEE recyclers in the South East. However by its nature WEEE is a complex waste stream that requires several levels of reprocessing and recycling expertise to ensure the maximum value is recovered. There are mature markets for many of the products from WEEE, however in the area of plastic and cathode ray tubes the end use markets need to be developed (Enviros 2002) – this is expanded on under future opportunities below.

The Industrial Council for Electronic Equipment Recycling (ICER) reports that the only types of domestic WEEE currently being recycled on a large scale are in the large household appliance category (refrigeration equipment, large white goods and microwave ovens). Such appliances tend to have a large metal content, and follow similar routes to ELV due to their scrap metal value (ICER 2005). Around 12% of recycled WEEE is IT and office equipment. This is processed by around 50 UK companies using manual dismantling for the separation of individual materials and components or by granulation. Some equipment is also refurbished for resale. (SEERA 2004). Ozone depleting substances (ODS) regulations introduced in 2002 mean that refrigeration equipment is required to be separately collected for recycling.

ICER's data suggest that around 49% by weight of WEEE is recycled although volumes of arisings are thought to be underestimated (SEERA 2004).

In addition to recycling routes a significant amount of WEEE is reused in the UK. ICER (2005) estimate that over 600,000 items of equipment were refurbished in 2003/4 by the four major community sector organisations; CREATE, FRN, Remploy and RENEW Trust. These

organisations estimate that they account for between 50 and 70 per cent of the UK reuse market for domestic equipment (ICER 2005). The total number of items re-used in the UK seems likely to exceed 1 million. This is because of the large number of independent operators (e.g. repairers, second-hand shops and totters) who also sell equipment for reuse. Car boot sales, and donations between friends also account for some WEEE reuse.

There is also a notable amount of WEEE exported to non-OECD countries, where demand for used appliances is high, and where refurbishment and repair costs are generally lower (ICER 2005)

Research conducted for the Environment Agency identified around 28,000 tonnes of household WEEE (over a million items) exported from the UK in 2003 to non-OECD countries, made up of four types of equipment (ICER 2005):

- Televisions — 11,000 tonnes (500,000 units)
- refrigeration equipment — 7,500 tonnes (150,000 units)
- other large household appliances — 9,000 tonnes (150,000 units)
- video recorders — 400 tonnes (100,000 units)

However it is considered that the total amount of exports is likely to be considerable higher than this figure (ICER 2005). Regional breakdown of these data are not available.

An introduction to the WEEE Directive
The Directive covers WEEE used by consumers and for professional purposes.

By 13 August 2005:

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

By 31 December 2006:

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

Adapted from the Environment Agency website http://www.environment-agency.gov.uk/netregs/legislation/380525/473094/?version=1&lang=_e

1.10.3 The economics of WEEE recycling

ICER (2005) reports the costs of treatment and recycling, but note that these costs will vary considerably for different groups of equipment.

Estimated costs are shown in Table A35. These estimates are based on current prices (ICER 2005), although prices for some types of equipment may be misleading as treatment and recycling is not yet being carried out on a commercial scale. With the exception of lighting, the estimates do not include the costs of transporting equipment from a designated collection facility to a treatment operator.

Table A35: Costs of treating WEEE

WEEE grouping	Estimated costs
Refrigeration equipment	£5 per unit
Large Household Appliances (excluding fridges and heating)	Varies widely depending on treatment required
Equipment containing Cathode Ray Tubes	£7 per unit
Lighting	30-40 pence per unit
All other WEEE	£100-£200 per tonne

Source: adapted from table in ICER 2005

A number of factors affect the costs of treatment and recycling (ICER, 2005)

- The location of treatment facilities
- The degree of sorting required
- The amount of manual labour required to dismantle equipment
- How much processing is required to prepare material streams for recycling
- The composition of equipment entering a treatment facility
- The market value of the resulting material streams
- Technology required to add value, e.g. to plastics streams

1.10.4 Future opportunities

The WEEE Directive sets a number of targets for the recycling of WEEE, and the SEERA Strategy (2004) notes that meeting these target will require additional recycling in the Region, although the Strategy also concludes that it is not possible to predict what sites or technologies may be required. It does however emphasise the need to focus on the plastic and glass content of WEEE particularly present in smaller household appliances, electrical goods and toys, both of which are currently not recycled in any significant quantities.

Traditional end uses of WEEE are reuse and refurbishment or recycling to extract value from ferrous metals (cookers, washing machines, fridges), Non-ferrous metals (aluminium, copper, tin) and precious metals (gold, silver and platinum are all found in WEEE – circuit boards) contained within appliances. A report for Remade by Enviros (2002) identifies a number of potential market opportunities related to plastics within WEEE. These are summarised below:

- Plastic from WEEE. Generally, the plastics used in EEE are engineering thermoplastics (ETP)[1], Virgin ETPs are often high-value specialised polymers and recovered ETPs have the potential to attract a high price in line with virgin prices if reprocessed to the required specifications. The consumption of ETPs in the UK has grown by about 140% in the last few years (Enviros 2002). This growth is predicted to continue, but at a lower rate. The UK now consumes approximately 16% of the plastics for electronic and electrical equipment in Europe, equivalent to 240,000 tonnes.

[1] ETP includes the following types High impact polystyrene (HIPS), Acrylonnitrile Butadiene Styrene (ABS), Polycarbonate (PC), PC/ ABS blends, Polyphenylene Oxide blends (PPO)

Table A36: End uses for plastic recyclate from WEEE

Market	Use
Telecommunications	Spools; novelty phones; fax machines; modems - hubs for networks.
Automotive	Bumpers, mirror housings; liners on pick-up trucks; low temperature engine parts.
Electrical	Fuse boxes, enclosures, connectors, wire nuts, wire coating
Construction	Flooring, counter tops, artificial timber, concrete additives, etc
Material handling / packaging	Pallets, totes
Computer/ data processing	-
Household appliances	vacuum cleaners, power tools, TVs
Gardening	Tool handles
Traffic control	Speed bumps, parking stops etc.

Other opportunities identified by Enviros (2002) are:

- Mercury Lamps
  A new company called Recyclite has recently opened in The East of England (Norfolk) to provide mercury lamp and sodium lamp recycling services to London and South East. http://www.recyclite.co.uk/index.html

- Cathode Ray Tubes
  The following markets for glass from CRT are available or under development
  -After cleaning re-use glass as CRT
  -Use CRT glass in lead smelting as flux agent and to recover lead
  -X-ray shielding products
  -Decorative tile products

1.11 *End of life vehicles (ELV)*

1.11.1 Quantities of ELV in the waste stream

Viridis (2003) estimate that the regional generation of ELV is about 330,000 vehicles, or the equivalent to 310,000 tonnes per year.

There were around 30 million motor vehicles in the UK in 2002 (Waste Online). The Environment Agency estimates that approximately 2 million new vehicles are registered each year, and a similar number scrapped. Around 1.2 million of these go to vehicle dismantlers in the first instance, the remaining 0.6 million go directly to scrap yards (Defra, 2005). The average life-span of a car is 13.5 years (Waste Online).

The composition of a typical car has changed substantially in recent years, with the ferrous metal content decreasing significantly as lighter, more fuel-efficient materials such as plastics have been incorporated into vehicle design (Waste Online, 2004). The Automotive Consortium on Recycling and Disposal (ACORD) provide a breakdown of the materials (by weight) which go to make a typical car (based on 1998 models). It seems likely in the seven intervening years that the metal content will have reduced, however given the life-span of cars entering the waste market as ELVs this should provide a fair estimate of material quantities. Waste Online

Applying this breakdown to the total arisings in the South East enables us to estimate the quantities of each material arising from current ELVs (table A37).

Table A37: Estimated quantities of ELV materials in the South East

Material contained in ELV	Percentage	Estimated quantity in South East (based on 2003 total of 310,000 tonnes)
Ferrous metal	68%	210,800
Non ferrous metal	8%	24,800
Plastics	9%	27,900
Glass	3%	9,300
Tyres	3%	9,300
Rubber	2%	6,200
Fluids	2%	6,200
Process polymers,	1%	3,100
Carpets	1%	3,100
Electrical parts	1%	3,100
Batteries	1%	3,100
Other	1%	3,100

1.11.2 Current recycling

Of the 2 million ELVs arising in the UK each year, approximately 74-80% (by weight) are currently re-used or recycled. (Environment Agency ELV Directive website). (ACORD: 80%)

An introduction to the ELV Directive
The Directive's main requirements are for Member States to ensure that:

- producers limit the use of certain hazardous substances in the manufacture of new vehicles and automotive components, and promote the recyclability of their vehicles;
- ELVs are subject to de-pollution prior to dismantling, recycling or disposal;
- treatment facilities operate to higher environmental standards and have permits if they want to deal with undepolluted ELVs;
- certain recovery and recycling targets are met by 1 January 2006 and 1 January 2015;
- by 2007, producers pay 'all or a significant part' of the costs of treating negative or nil value ELVs at treatment facilities.

Adapted from Environment Agency ELV Website

The ELV directive targets require the achievement of 85% recovery, of which 80% is to be re-use or recycling, by 2006 rising to 95% and 85% respectively by 2015.

Though simplifying the process, current recycling from ELV waste can be categorised into four main streams: metals, plastics, batteries and glass. Of these streams metals, plastics and glass are covered in greater detail in separate sections.

The Transport Research Laboratory (TRL 2003) state that a range of materials can be recovered but at present there are limited (or no) market outlets for reprocessing and hence it is not commercially viable to recover or reprocess these materials (TRL include plastics and glass in this category).

Metals
As the data above show approximately 76% by weight of the average car is metal and the majority of this is sheet steel, although the amount of non-ferrous metals has increased. Currently about 98% of the metals are recycled, recovered by the vehicle shredding industry and subsequently utilised by the steel industry and re-smelting plants. (Waste Online ELV Information Sheet).

Plastics
The proportion of ELV plastics being recovered is currently very low (Waste Online). The wide variety of polymer types used is a contributing factor in this low recycling level.

However an estimated 14,000 tonnes of automotive plastics were recycled in 1998, including 5,000 tonnes of plastic battery cases. However in the same year 121,000 tonnes of ELV plastic waste was also landfilled (Waste Online ELV Information Sheet).

Batteries
The recycling rate for car batteries is estimated to exceed 90%, although is it also estimated that a significant number of batteries are not recovered and recycled (many scrap cars still contain batteries when they are shredded, although this is now illegal).

Glass
Due to costs associated with the removal of glass from ELVs, currently, in the UK the majority of ELV glass is sent to landfill and only a small proportion is recycled. In addition, as the value of glass is relatively low (approximately £0.48 per ELV), it is currently not possible to recover the cost of removal glass. (Waste Online)

1.11.3 Future opportunities

Under the Directive dismantlers will need to be authorised and will have to follow strict environmental treatment standards. As some facilities may close due to these new standards and associated costs, SEERA (2004) predicts that due to economies of scale new facilities are likely to be large-scale, serving a wide catchment,

As high levels of metals are already recycled the Directive's requirements may have to be met through additional recycling of other materials, principally tyres, glass and plastics (SEERA 2004). The reprocessing of all of these materials is covered in detail elsewhere in this report.

A market opportunity may exist in reprocessing catalytic converters. Catalytic converters have been fitted as standard in new petrol injected-engine cars since 1992. Technology for their recovery is still being developed, however the US has a well established network for their collection. The steel from the exhaust and the precious metals from the converter can be recovered when the unit is replaced. Platinum, rhodium and palladium can be recovered for reuse, either in new auto cats or for some other purpose, and as 68% of platinum and 90% of rhodium used in Western Europe go into the production of catalysts, this business is extremely viable. The ceramic casing is also recovered as a powder for refining. (Waste Online ELV Information Sheet.

1.12 *Textiles*

1.12.1 Quantity of textiles in the waste stream

The majority of textile waste is in the domestic waste stream with about 550- 900,000 being produced in total per year (Waste online, 2004). Defra (2002-3) estimates approximately 1% of English domestic waste is textiles (54,000 tonnes), while Parfitt, (2002) calculates it is closer to 3%. In addition to household sources about 100,000 tonnes textile waste are produced by industry as pre-consumer waste and by the retail industry (Ogilvie & Poll, 1999). About 400-700,000 tonnes, worth approximately £400 million, are landfilled each year, 50% of which are recyclable.

In the South East approximately 14,000 tonnes of textiles (2%) are in the domestic waste stream (Defra, 2002-3). The total of municipal and commercial Regional arisings of waste clothing and textiles have been estimated in the order of 130,000 tonnes per annum (Viridis 2003).

1.12.2 Current recycling

It is estimated that approximately 25% textiles are currently recycled, the majority being collected by charities such as the Salvation Army, Scope and Oxfam. Reusable clothing is sold in charity shops but as supply outstrips demand a significant quantity is now exported to developing countries. The Salvation Army, the largest operator of textile banks in the UK, collects about 17,000 tonnes of clothing a year. Non reusable items are sold for recycling or for wiping cloths. Oxfam Wastesaver processes about 100 tonnes of unusable clothing a week.

Clothing that cannot be reused as clothing is sent to merchants for re-use and recycling (table A38). Post industrial textiles such as offcuts are often reprocessed in-house, although are also recycled as fibre. Recovered fibre is used to make new clothes or products such as carpets, pencils, paper, felt, insulating material, fillings and wadding for mattresses and car upholstery (Waste up to Waste, 2003). It is claimed that only 7% is rejected usually because it consists of items such as broken zips etc.

Table A38: Breakdown of recovered post-consumer textiles

Application	%
Second hand clothing	43
Filing materials	22
Wiping cloths	12
Second-hand shoes	9
Fibre reclamation	7
Rejection landfill	7

Source: Environmental Resources Management (2002)

1.12.3 Economics of textile recycling

The top 10% of textile recyclate can be resold as nearly new or in charity shops. This is the most profitable option for textile recovery with values as high as £10,000 per tonne (Olgivie & Poll, 2002). However the typical resale price is very low, so only large scale operations can make a profit due to economies of scale. The prices paid for textile recyclate is given in table A39. The banks price may be higher if the local authorities hire the banks.

Table A39: Prices paid for textile recyclate

	Jan 05 £/tonne	
Banks	25 - 45	Paid to local authorities
Charity rags	100-180	Unsold by charity shops
Shop collections	80-140	Delivered to factory

1.12.4 Opportunities

Although there is a large network of textile banks across the UK, a lack of consumer awareness means that they are not used to their full potential (Ogilvie & Poll, 2002), resulting in clothes still being disposed of to landfill. However opportunities for new businesses are limited. Although several charities and companies operate textile recycling programmes, the labour-intensive nature of collection and sorting are major barriers to new market entrants (ERM, 2002).

The import of cheap clothing from abroad makes the sale of reused clothes less viable. In addition the high value of sterling makes it difficult for UK reuse clothing to compete with

Europe in the export market (ERM, 2002). However textiles are classified as biodegradable so are subject to the Landfill Directive, therefore local councils will need to be encouraging their re-use and recycling. This will lead to increasing quantities coming onto the market.

New markets will need to be developed particularly for clothing that cannot be sold as second hand clothing. An opportunity could develop from a pilot study in Germany that is looking at reprocessing techniques to recycle textiles into products such as sound insulation board.

Appendix 2 - List of stakeholders contacted

Business / Agency Name	Sector / Market	Contact Details / Comments
Government Agencies / Waste Management Promotion Organisations		
WRAP	National Waste and Resources Action Programme (DTI/Defra)	Steve Creed Director Business and Procurement Programmes 01295 819621 Member of SEEDA WMD Team
Environment Agency		John Gower Environmental Management 01903 832194 john.gower@environment-agency.gov.uk
REMADE Kent and Medway	Recycling market development	Diana Lock Programme Manager 01732 876618 diana.lock@kent.gov.uk Member of SEEDA WMD Team
Government Office of the South East (GOSE)		Terry Clarke Sustainable Business Team 01483 882531 tclarke.gose@go-regions.gov.uk Member of SEEDA WMD Team
Envirowise South East	Government initiative to promote environmental performance in business	Regional Agent: Dr Mick Lynn 01580 201308
CIRIA	Construction research and innovation in the UK	New Project: Business Data for Recycling Facilities http://www.ciria.org/rp706.htm Contact: Jeff Kersey Jeff.kersey@ciria.org Project Manager 020 7549 3326
County Councils – Waste Disposal Authorities		
Buckinghamshire	Council Waste Management office	Mark Tipton 01296 387783 Mtipton@buckscc.gov.uk
Oxfordshire	Commercial Waste reduction officer	Sue Kent 01865 815959 077 899 23206 Susan.Kent@Oxfordshire.gov.uk
Hampshire	Hampshire Council waste services	Campbell Williams 01962 845661 Bob Lisney 01962 846647 bob.lisney@hants.gov.uk
East Sussex	Council Waste Management Group	David Greenfield 01273 482153
West Sussex	Council Waste Management office	Colin McHale Phil Russell 01243 777595
Surrey	Council Waste	Mariane Cole, Manager Waste Policy

Business / Agency Name	Sector / Market	Contact Details / Comments
	Management	0208 541 9341
Kent	Kent County Council Waste Management	Nick Gill, Planning and Environment Manager 01622 605976
West Berkshire	West Berkshire Waste Services	Jackie Ward 01635 519216
Regional / Local Reprocessing / Waste Management and Related Companies (including SMEs) The list below is a representative list of waste reprocessing / recycling related business in the South East. These have been selected from the South East Environmental Suppliers Directory as published by SEEDA.		
Aylesford Newsprint	Recycling used paper	Newsprint House, Bellingham Way, Aylesford, Kent ME20 7DL AS McKendrick 01622 796000 alan.mackendrick@aylnews.com www.aylesford-newsprint.co.uk
Baileys Waste Paper	All grades of cardboard recycling	28 Stirling Avenue, Grange Farm Estate, Upper Halliford Road, Shepperton, Surrey TW17 8TH Simon Bailey 01932 786045 www.baileyswastepaper.co.uk
CD Services	Waste paper merchants and collectors	Walsh Manor Farm, Walshes Road, Crowborough, East Sussex TN6 3RB Chris Dillon 01892 669787 cdwaste@dillon.fsbusiness.co.uk
Waste Away	Recycle all grades of waste paper and advise on paper recycling	Unit 4, Henley Business Park, Medway City Estate, Rochester, Kent ME2 4ER Mr Simon Whybrow 01634 296176 simonwhybrow@wastaway.co.uk www.wastaway.co.uk
Woodside Recycling	Paper recycling	Woodside Farm, Goodboys Lane, Reading, Berkshire RG7 1ND Mr Richard Foster 01189 834327 info@woodside-recycling.fsnet.co.uk www.woodsiderecycling.com
Glass		
Industrial Reclamations	Glass recycling and processing	Glass Recycling Depot, Oare Creek, Faversham, Kent ME13 7TX Mr Kell Clark 01580 766395
Plastics		
Save a Cup Recycling Company Ltd	Collection and recycling of polystyrene vending cups	Suite 2 Bridge House, Bridge Street, High Wycombe, Buckinghamshire HP11 2EL Graham Pascoe 01494 510167 hq@save-a-cup.co.uk www.save-a-cup.co.uk
Surrey Springboard	Arranges the collection of plastics / toner cartridges for recycling.	Book House, Glebeland Centre, Vincent Lane, Dorking, Surrey RH4 3HW

Business / Agency Name	Sector / Market	Contact Details / Comments
	Reclaims furniture for redistribution; training / work experience for long term unemployed	Steven Hawkins 01306 741359 email@SurreySpringboard.co.uk www.surreyspringboard.co.uk
Metals		
CF Sparrowhawk Ltd	Ferrous and non-ferrous metals	24 Epsom Lane North, Tadworth, Surrey, KT20 5EH Mr Pile 01737 352 889 cfsparrowhawkltd@btconnect.com
EMR Ltd	UK's largest metal recycler	Manor Road, Erith, Kent DA8 2AD Cherry Read 01322 336970 info@emrltd.com www.emrltd.com
GD Townsend	Metal and textile recycling	Briardene, Hempstead Lane, Hailsham, East Sussex BN27 3PR Richard Townsend 01323 841632
Metal Recycling Ltd	Metal recycling	Elmfield, Downash, Hailsham, East Sussex BN27 2RP Mr Clarke 01323 840287 www.metalrecyclingltd.co.uk
Stevemar Metals Reclamation Ltd	Metal recycling - all types	Old Forest Road, Wokingham, Berkshire, RG41 1XA Mr Les Stovens 0118 978 0476
WEE and Computer		
Computer Salvage	Waste taken includes televisions, audio equipment	Contact: Helen Dickenson 5 Abex Road Bone Lane Industrial Estate Newbury, Berks RG14 5EY Tel: 01635 552666 www.computersalvagespecialists.com
Charterhouse Mueller plc	IT & electronic equipment	Littlejohns Lane, Reading, Berkshire, RG30 1RA Mr Ray Johnson 0118 9569000 www.cmplc.com
Computer Salvage Specialists	Computers, printers and circuit boards	5 Abex Road, Bone Lane Industrial Estate, Newbury, Berkshire RG14 5EY Rachel Martin 01635 552 666 enquires@computersalvagespecialists.com www.computersalvagespecialists.com
Jade Re-Marketing Ltd	Specialising in the environmental disposal of all computer and IT related equipment	Unit 2, Angeldown Farm, Manor Road, Wantage, Oxfordshire OX12 8NQ Mr David Eyley 01235 763999 dave@jaderml.co.uk www.jaderml.co.uk
Organics		
Organic Resource Management		Clayhanger Hall, Chislet Forstal, Canterbury, Kent CT3 4DT Stephen Muggleton 01227 860901 stephen@organic-resources.com
Phalanx Worms Ltd	Waste management; composting.	Eastwood Stud Farm, Graffham, West Sussex GU28 0QF

Business / Agency Name	Sector / Market	Contact Details / Comments
		Mr Tim Twelvetree 01243 536311 phalanx.worms@ntlworld.com
Terra EcoSystems	Biosolids recycling: organic composts, soil improvers etc supplied and spread	Clearwater Court, Vastern Road, Reading, Berkshire RG1 8DB Victoria Zolkiewka 0118 923 6647 www.terraecosystems.com
Worton Park Composting (Worton Farms Ltd)	Centralised composting facility for garden trimmings. Sell compost products	Worton Park, Worton, Cassington, Oxfordshire OX29 4SU Mrs Pauline Nelson 01865 882644 pnelson@wortonfarms.co.uk www.wortonfarms.co.uk
Oils		
Cooking Oil Services	Oil recycling and disposal services	Wood Lane Farm, Wood Lane, Iver, Buckinghamshire SL0 0LD Mr Peter O'Hara 01753 651223
Goldsmith and Evans	Reprocess waste cooking or edible oils	Mandalay House, Stroude Road, Egham, Surrey TW20 9UW Miss L Evans 01784 471079 goldsmithandevans@postmaster.co.uk
Demolition and Construction		
Site 77	Handle and sell reclaimed building materials from demolition waste.	College Road Business Park, College Road North, Aston Clinton, Buckinghamshire HP22 5EZ Mr Mike Meiris 01296 631717 mike@site77.co.uk www.site77.co.uk
RH Ovenden Ltd	Crusher and dumptruck hire; construction and demolition waste recycling	Wellhead Farm, Wingham Well, Canterbury, Kent CT3 1NS R Ovenden 01227 720777 mo@ovendens.fsnet.co.uk
General Commercial / Industrial		
Britania Crest Recycling Ltd	General commercial waste recycling	26 Reigate Road, Hook Wood, Surrey RH6 0HJ Mr Ray Foss 01293 820021
General Waste Management		
Christian Environmental Consultants	Management of waste from individual facilities includes waste minimisation, separation, reuse, recycling and cost effective disposal	27 Lower Mere, East Grinstead, West Sussex RH 19 4TB Dr Peter Lingwood 01342 313597 info@ceconsultants.co.uk www.ceconsultants.co.uk
Elite Environmental Ltd	Waste management and recycling services	Honey Pot Farm, Hailsham Rd, Polegate, East Sussex, BN26 6QL Richard Taylor 01323 488808 info@eliteenvironmental.co.uk www.eliteenvironmental.co.uk
Environmental Support Services	Environmental Support Services offers fully	Sondes Place Farm, Dorking, Surrey RH4 3EB

Business / Agency Name	Sector / Market	Contact Details / Comments
	integrated cleaning, recycling and waste management.	George Broom 01306 740 743 info@cleanest.co.uk www.cleanest.co.uk
Erith Group	Contaminated land remediation; recycling and waste management.	Riverside House, Maypole Crescent, Darent Industrial Park, Erith, Kent DA8 2JZ Mr Barry Menzies 01322 346811 information@erith.net www.erith-group.co.uk
Phoenix Reycling	Office waste collections for recycling shredding and incineration.	Unit E, Bridge Farm, Reading Road, Arborfield, Reading, Berkshire RG2 9HT Mr Roderick Baker 0118 973 7200 collection@phoenix-security.com www.phoenix-security.com
Sericol Ltd	Waste collection and disposal scheme; publish Safety Environmental News	Pysons Road, Broadstairs, Kent CT10 2LE Mr Kenneth Boyd 01843 866668 Kenny.Boyd@sericol.com www.sericol.co.uk
Thames Waste Management Ltd	Provides dry and liquid integrated waste management and recycling services, and contaminated land remediation.	Swan House, Swan Court, Leatherhead, Surrey KT22 8AH Mr Stephen Ivanec 01372 376777 info@twm.co.uk www.twm.co.uk
Vines Centre Trust	Recovery and recycling.	Vineswood House, Gas House Road, Rochester, Kent ME1 1PN Mr Paul Robinson 01634 406245 trust@vinescentre.org.uk www.vinescentre.org.uk
National Waste Management Companies		
Biffa Waste Service Ltd	Commercial Waste Management	Peter Jones Director - Development & External Relations 01494 556426 peter.jones@biffa.co.uk Member of SEEDA WMD.
Onyx Environmental Group / Onyx UK Ltd	Commercial and household waste, recovery and disposal, recycling and reduced packaging services.	49 Dolphin Road, Shoreham By Sea, West Sussex BN43 6PB 01273 731557 info@onyxgroup.co.uk www.onyxgroup.co.uk
Shanks	Waste management company; collection, transport, recycling, treatment, cleaning and disposal services. Landfill gas electricity generators and fuel-from-waste products.	Astor House, Station Road, Bourne End, Buckinghamshire SL8 5YP Customer Services 01628 524523 info@shanks.co.uk www.shanks.co.uk
SITA	Resource and waste management services to businesses and residents throughout the	SITA House, Grenfell Road, Maidenhead, Berkshire SL6 1ES 01628 513100 enquiries@sita.co.uk www.sita.co.uk

Business / Agency Name	Sector / Market	Contact Details / Comments
	UK.	
Viridor Waste Management	Leading waste management company.	Malling House, Town Hill, West Malling, Kent ME19 6QL 01732 220044 rturner@viridor-waste.co.uk www.viridor-waste.co.uk

Appendix 3 – Destinations of recyclate

East Sussex

East Sussex comprises five districts – Eastbourne, Hastings, Lewis, Rother, and Wealdon.

Material / Recyclate	Districts	Destinations
Glass	Eastbourne	United Glass, Harlow, Essex
	Hastings	RMC aggregates, Battle (local)
	Lewis, Rother, Wealdon	British Glass, Harlow, Essex
Paper	Eastbourne	Aylesford Newsprint, Kent
Cardboard		UPM, Deeside
	Hastings	Aylesford newsprint
		Newport Paper – end destination
		Spora Enso – Belgium
	Lewis	Aylesford Newsprint
	Rother and Wealdon	Aylesford Newsprint
Plastics	Hastings, Rother	Grovenors, Crayford, Kent
	Lewis	Roydons, St Helens, Merseyside
Fe cans	Eastbourne, Lewis, Wealdon	AMG, Wales
Aluminium	Eastbourne	AMG, Wales
	Hastings, Rother	Grovenors, Crayford, Kent Firbank,
	Lewis, Wealdon	Bedfordshire
Kitchen waste		
Garden waste	Composted locally	
Textiles / shoes	All districts	Salvation Army, Wellingborough, Northamptonshire
		Oxfam, Southampton

6.6.1 West Berkshire

The main reprocessor in West Berks is Grundons Material Recovery Facility in Newbury.

Material	Destinations
Glass	Harlow, Essex
Paper	Aylesford
Cardboard	no info given
Plastic – film	no info given
Plastic – rigid	no info given
Fe metal	Port Talbot
Aluminium	Warrington

6.6.2 Kent

Material	Destinations	
	Location	**Business**
Glass	Faversham Essex	Industrial reclamations, Berryman
Paper	Kent	Aylesford
Cardboard	Rochester	Smurfit Severnside Brett Waste
Plastic – film	Stratford	Brett Waste
Plastic – rigid		
Fe metals	Kent Sussex	Ling Metals, Reclamet, Zen metals, EMR H Ripley and son.
Aluminium	Kent	APM Metals Kent Community Recycling
Garden waste	Essex and Kent	
Textiles	Developing countries	Steve's Export
Batteries (Car)	Kent	Ling Metals
Oil	Rochester	Tanker waste
Others:		
Spectacles	Overseas	
Hearing Aids		Help the Aged
Fridges / Freezers	Kent	Ling Metals
ELV	Kent	Ling Metals and others
Car tyres	Kent	Ling Metals
Fluorescent tubes	Manchester	Mercury Recycling

6.6.3 Buckinghamshire

Material	Destinations	Excess capacity?
Glass	Southampton	Yes
Paper	Kent, Cheshire	Yes
Cardboard	Various	Yes
Plastic – film	Various MRF's	Yes
Plastic – rigid	Various MRF's	Yes
Fe cans	Wales	Yes
Aluminium	Cheshire	Yes
Kitchen waste	Local facilities	Yes, but market demand
Garden waste	Local facilities	Yes
Textiles	Northamptonshire, local facilities	?
Batteries	Avonmouth, France, local landfill	?
Oil	Local bulkers, then kilns, WID compliant facilities, local burners	Yes