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OPTIMISING THE USE OF RECYCLED AND SECONDARY AGGREGATES IN HAMPSHIRE

Version: 3

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Executive summary

This report presents the results of Stage 1 of the project ‘Demonstration project to optimise resource usage in a defined geographical area’. The project is being undertaken by Viridis through the Department of Trade and Industry’s Partners in Innovation (PII) scheme, contract number STBF/004/00090C, cc2504. The aim of the project is to provide technical information to enable the maximum use to be made of recycled and secondary aggregates (RSA) in Hampshire and the associated urban areas of Southampton and Portsmouth. Stage 1 consists of a review of the current and potential use of RSA in Hampshire. Stage 2 will consist of a series of demonstration projects to illustrate the use of the materials in a range of applications in construction.

This report summarises the current situation with regard to the use of RSA in Hampshire, describes the factors that control and affect their use, sets out realistic, evidence-based targets for their use in the future and describes the actions that need to be taken to achieve them. Two scenarios were considered, ‘stretching best practice’ and ‘business as usual’ and predictions were made for 2010 and 2020. A summary table is given below. The current use is estimated to be 686,000 tonnes/year, approximately 13.4% of the total aggregate use in Hampshire. The ‘stretching best practice’ targets for 2010 are 1,005,000 tonnes/year (19.6% of total aggregate use) and for 2020 1,104,530 tonnes/year (21.6% of total aggregate use), whereas the ‘business as usual’ estimates only show a small increase on current levels. The percentages are based on a constant level of demand for aggregate over the period to 2020, in line with predictions by ODPM.

In addition to overall targets, specific targets for use in bound applications (asphalt and concrete) have been given for construction, demolition and excavation waste (CD&EW) and railway ballast. It is also anticipated that all of the incinerator bottom ash aggregate (IBAA) and most of the glass will be used in bound rather than unbound applications. RSA are almost entirely used in unbound applications in Hampshire at present, although many of them can be used in bound applications under existing specifications. It is important that aggregates are used to their maximum potential, and that the profile of use of RSA more closely matches that of primary aggregates, with about 20% being used in high value bound applications.

The proposed increase in recycled aggregates will require the development of additional CD&EW Recycling Centres to produce the material. The current distribution of CD&EW Recycling Centres shows them mainly around the periphery of the Southampton-Portsmouth and Aldershot areas. Several areas appear under provided in relation to their population, such as Basingstoke, Andover and Winchester, though there are waste transfer stations in these areas that collect CD&EW and send it on to CD&EW Recycling Centres elsewhere. New CD&EW Recycling Centres will have to meet strict requirements on control of noise, dust, vibration, traffic and visual impact. They will also have to operate according to quality control protocols if they are to produce aggregates that are acceptable under modern specifications. CD&EW Recycling Centres should be located close to where the material arises and to the proposed market, in accordance with the proximity principle. Excessive transport distances will also make the materials uneconomic in relation to primary aggregates.

There will also be a requirement for a site to enable the IBAA from the three incinerators in Hampshire to be weathered and processed. This should ideally be located centrally to the incinerators, so that the product would be available to all parts of the county without excessive transport distances. The site would need to be at least 4 ha in size and would need to have arrangements to contain the drainage water from the IBAA during the weathering phase.

There is need for market development in several areas, particularly for the use of RSA in bound applications. The use of RSA can be encouraged by the use of targets in contracts and planning controls, but the most productive approach is likely to be the development of partnerships such as the existing Public Service Agreement, where all parties can feel ownership of the project and work towards common goals. This arrangement could usefully be extended to other areas.

Education is a major requirement if the targets for RSA use are to be met. This is partly a case of dissemination of information about specifications, quality control, regulations and what is possible with the materials, and partly making the business case for recycling. There is a need to target all
sectors of the construction industry and the public with appropriate messages. Some of these may be best done on a national basis, but local initiatives will also be important.

**Summary Table: Current and Future Use of Recycled and Secondary Aggregates in Hampshire**

<table>
<thead>
<tr>
<th>Material</th>
<th>Estimated Amount Recycled in 2004 (tonnes per year)</th>
<th>Scenario</th>
<th>Estimated Amount Recycled in 2010 (tonnes per year)</th>
<th>Estimated Amount Recycled in 2020 (tonnes per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recycled Aggregates from Inert CD&amp;EW</td>
<td>500,000</td>
<td>Stretching Best Practice</td>
<td>654,000</td>
<td>750,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>525,000</td>
<td>550,000</td>
</tr>
<tr>
<td>Highway New Works and Maintenance</td>
<td>45,000</td>
<td>Stretching Best Practice</td>
<td>100,000</td>
<td>102,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>47,500</td>
<td>50,000</td>
</tr>
<tr>
<td>Spent Railway Ballast</td>
<td>140,000</td>
<td>Stretching Best Practice</td>
<td>140,000</td>
<td>140,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>140,000</td>
<td>140,000</td>
</tr>
<tr>
<td>Incinerator Bottom Ash Aggregate</td>
<td>1,000</td>
<td>Stretching Best Practice</td>
<td>90,000</td>
<td>90,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>2,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Recycled Glass</td>
<td>0</td>
<td>Stretching Best Practice</td>
<td>15,000</td>
<td>15,400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Recycled Plastic</td>
<td>0</td>
<td>Stretching Best Practice</td>
<td>1,000</td>
<td>2,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Recycled Tyres</td>
<td>0</td>
<td>Stretching Best Practice</td>
<td>5,000</td>
<td>5,130</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td>686,000</td>
<td>Stretching Best Practice</td>
<td>1,005,000</td>
<td>1,104,530</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>714,500</td>
<td>745,000</td>
</tr>
<tr>
<td>Total Aggregate Use in Hampshire</td>
<td>5,119,500</td>
<td>Zero growth in total aggregate use assumed</td>
<td>5,119,500</td>
<td>5,119,500</td>
</tr>
<tr>
<td>Proportion of Recycled and Secondary Aggregates</td>
<td>13.4%</td>
<td>Stretching Best Practice</td>
<td>19.6%</td>
<td>21.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>14.0%</td>
<td>14.6%</td>
</tr>
</tbody>
</table>

The report shows that there is considerable potential for increasing both the amount of RSA used in Hampshire and the value of the applications for which they are used. The targets should not be regarded as precise estimates but as goals to aim for, which should be reviewed periodically. Recycling should not be seen as an end in itself but as part of the overall process of developing a more sustainable construction industry, which will benefit industry and the general public.
1 Introduction

1.1 Project outline

The project ‘Demonstration project to optimise resource usage in a defined geographical area’ is being undertaken by Viridis through the Department of Trade and Industry’s Partners in Innovation (PII) scheme, contract number STBF/004/00090C, cc2504. The aim of the project is to provide technical information to enable the maximum use to be made of recycled and secondary aggregates (RSA) in Hampshire County and the associated urban areas of Southampton and Portsmouth. This is a linked research, development and demonstration project which will proceed in two phases:

- Stage 1: A review of information on current and potential use of recycled and secondary aggregates and the technical and regulatory mechanisms by which these are controlled, leading to identification of requirements for processing and other infrastructure to enable the maximum potential use to be achieved.
- Stage 2: A series of research and demonstration projects involving the use of recycled and secondary aggregates in a variety of applications that will illustrate how the potential can be achieved and how obstacles can be overcome. A final report will be produced that will demonstrate how Hampshire can act as an exemplar to other Local Authorities in maximising the potential for recycling aggregates.

The project is complementary to other initiatives such as the Hampshire Natural Resources Initiative (HNRI) and will feed into the Materials Resource Strategy (MRS) and the development of the Hampshire Minerals and Waste Development Framework (HMWDF). It is a collaborative project in which Viridis are working, via a Steering Group alongside a number of public and private organisations including:

- Hampshire County Council (various departments)
- Raynesway Construction Southern Ltd
- Foster Yeoman Ltd
- Dean & Dyball
- Environment Agency

1.2 Report Structure and Content

This report represents the final output from Stage 1 of the project. It summarises the current situation with regard to the use of recycled and secondary aggregates in Hampshire, describes the factors that control and affect their use, sets out realistic, evidence-based targets for their use in the future and describes the actions that need to be taken to achieve them. It is divided into two parts:

- Part 1 provides background information and context on the issues associated with recycled and secondary aggregate use in Hampshire.
- Part 2 provides targets for specific recycled and secondary aggregate use and the strategy to achieve them, taking account of the necessary infrastructure, need for market development and other factors.

The project will feed directly into Hampshire’s Material Resource Strategy (MRS). To aid this process the MRS format has been adopted in Part 2 of this report.
1.3 Hampshire County Council Initiatives

1.3.1 Material Resource Strategy (MRS)

The Material Resources Strategy (MRS) aims to address the use of all material resources, including municipal, construction, commercial and agricultural waste in Hampshire. The partners involved in MRS development are: Hampshire County Council; Project Integra; Hampshire Natural Resources Initiative; and the two unitary authorities of Portsmouth and Southampton.

The strategy has started by tackling Hampshire's waste problem by seeking to minimise the extraction and production of primary resources, such as gravel, by better process and product design, and by maximising the use of secondary and recycled materials.

1.3.2 Hampshire Minerals and Waste Development Framework (HMWDF)

The Hampshire, Portsmouth and Southampton Minerals and Waste Local Plan was adopted by the three councils in December 1998. The Plan period was to December 2001 with provision for a seven year landbank for sand and gravel to 2008. A review of the Plan has commenced, and the three authorities have reconsidered the approach to the review in the light of comments arising from the stakeholder dialogue and the implications of the Planning and Compulsory Purchase Bill. They now consider that a review of waste policies should be urgently progressed and that an integrated Hampshire Minerals and Waste Development Framework (HMWDF) be prepared. It is now likely that the new HMWDF will be submitted to Government in 2005.

1.3.3 Project Integra

Hampshire’s integrated household waste strategy, Project Integra, has been developed through a partnership between the County Council, the two City Councils, the 11 District Councils and the private waste disposal contractor, Hampshire Waste Services Ltd. It is an aim of the strategy to increase recycling of household waste eventually to 40%. The Project Integra Strategy will examine household waste collection and disposal arrangements up to 2020, including the Hampshire Household Waste Recycling Strategy.

The areas of activity of Project Integra include materials marketing, waste minimisation, research, biowaste, performance monitoring, and member training. A further step change is required from the integrated waste management of the 1990’s to material resource management in this decade. The resource management approach has to be based on three key elements:

- Energising the process chain
- Establishing materials recovery systems
- Facilitating delivery on the ground.

The resource management approach is being implemented through the Materials Resource Strategy (MRS) (ALG, 2003).

1.3.4 Hampshire Natural Resources Initiative (HNRI)

The Hampshire Natural Resources Initiative (HNRI), launched in September 2002, aims to achieve a step change in the way natural resources are perceived and used in Hampshire. Natural resources encompass minerals and waste, as well as energy, water, air, soils, biodiversity and climate change. The HNRI seeks to work in partnership with individuals, community groups, commerce and industry to influence and create positive actions at global, national, regional and local levels to implement real change. By working together, HNRI can improve the environment and enhance the quality of life of
all those who live and work in Hampshire, having regard to those who will follow in the future. The Hampshire Natural Resources Initiative (HNRI) outlines the following goals:

- Maximise the role of commerce and industry in driving forward the more efficient and cost effective use of natural resources.
- Promote the concept of ‘Consumer responsibilities’ by ensuring that people have the information to make informed lifestyle choices.
- Reduce the impact of natural resource consumption on Hampshire environment and climate change.
- Establish the public sector as an example of best practice in natural resource use.
- Influence change at EC/UK government levels.

The most relevant goal to this project is the third point which is hoped to be achieved by:

- Increasing the contribution from renewable resources.
- Promote best practice in ‘sustainable’ construction, agriculture, industrial, commercial and service operations.
- Adopting the use of ‘green’ industrial processes and innovative waste management technologies and systems.
- Seeking to reduce the impact of transport.
- Anticipating the impact of climate and other change on resource use

1.3.5 Public Service Agreement (PSA)

Hampshire County Council signed a Public Service Agreement with the Government in April 2002 covering the period until March 2005. The Public Service Agreement requires Hampshire County Council to achieve more demanding performance targets than would otherwise be expected. One of the targets was to divert an additional 40,000 tonnes per annum of household, commercial & industrial waste from landfill through development of the natural resource management approach by 2004/05.
Part 1: Background and Data Collection

2 Aggregate Planning and Use

2.1 National planning and trends

The National and Regional Guidelines for Aggregates Provision and Supply in England 2001 – 2006 (ODPM, 2003) was published in June 2003. The guidance revised the national position in the Minerals Planning Guidance Note 6 - Guidelines for Aggregates Provision in England, 1994 (MPG6). The new guidelines take account of the fall in national demand for aggregates and a substantial increase in use of alternatives to primary aggregates, notably construction and demolition waste. Table 2.1 shows a comparison of the old and new guidelines and Figure 2.1 identifies the broad split between different end uses of construction aggregates.

Table 2.1: Comparison between 1994 and present aggregates guidelines for England (ODPM, 2003)

<table>
<thead>
<tr>
<th>Element of supply</th>
<th>Million tonnes per annum</th>
<th>% difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land won sand and gravel</td>
<td>81</td>
<td>67</td>
</tr>
<tr>
<td>Crushed rock</td>
<td>127</td>
<td>101</td>
</tr>
<tr>
<td>Assumptions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine sand and gravel</td>
<td>21</td>
<td>14</td>
</tr>
<tr>
<td>Net imports to England</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>Alternative materials</td>
<td>35</td>
<td>57</td>
</tr>
<tr>
<td>Total</td>
<td>280</td>
<td>250</td>
</tr>
</tbody>
</table>

Figure 2.1: End uses of Construction Aggregates (Barritt, 2003)
2.2 Recycled and Secondary Aggregates

The following definitions are commonly used (AggRegain web site, www.aggregain.org.uk):

**Recycled aggregates**: derived from reprocessing materials previously used in construction. Examples include demolition arisings and excavation material.

**Secondary aggregates**: usually by-products of other industrial processes not previously used in construction. Examples include china clay waste, used foundry sand and metallurgical slags.

The usage of recycled and secondary aggregates in construction in England has risen considerably in recent years, from 32 million tonnes per annum (Mta) in 1989 to 46 Mta in 1999 and 50 Mta in 2001 (Barritt, 2003). This accounts for approximately 23% of the total market for aggregates, of which 19% is recycled aggregates and 4% secondary aggregates. The majority of the recycled and secondary aggregates are used in low value applications with 70% used as general fill, see Figure 2.2. The challenge for recycled and secondary aggregate is to have a similar profile of end use to that of primary aggregates, with more material used in the higher value applications such as concrete and asphalt.

![Figure 2.2: End uses of Recycled and Secondary Aggregates (Barritt, 2003)](image)

2.3 Future National Demand for Aggregates

Sales of primary aggregates in Great Britain peaked at 300 million tonnes (Mt) in 1989. However, sales have exceeded 200 Mta in all but 4 years since 1970 (ODPM, 2000). ODPM assumptions of aggregate demand for MPG6 were much higher than the production data suggested and so the guidance was revised. For the present guidelines the ODPM model to forecast future demand was based on two factors:

- construction activity; and
- intensity of aggregate use.

Although the intensity of aggregate use is expected to fall over that time the expected increase in construction activity will keep the demand for aggregates up. The present guidelines of aggregate provision anticipate an average demand of 250 Mt per annum over the 16 year period 2001 to 2016. The guidelines take account of a revised target of 60 Mta by 2011 for alternatives. (ODPM, 2003). However, because of increasing uncertainty about construction activity and intensity of use towards the end of the period, demand has been assumed to be constant between 2011 and 2016 (ODPM, 2002a).
2.4 South East Regional Strategy

The draft Regional Minerals Strategy for South East England was published by the Regional Assembly (SEERA) for consultation in September 2003. The Strategy seeks to apportion the reduced levels of production of land-won aggregates and increased use of alternatives suggested in National and Regional Guidelines for Aggregate Provision in England, 2001-2016. The Strategy, which focuses on the period to 2016, sets out policies and proposals to strike a balance between the essential requirements of the regional economy for minerals and manufactured products with the environmental impact arising from their extraction, processing and transport. The core strategy for minerals seeks to:

- encourage more efficient use of minerals;
- make significantly more use of recycled materials;
- import sufficient minerals that cannot be supplied from indigenous resources;
- make use of an anticipated increase in aggregate resources from the English Channel; and
- meet the residual portion of anticipated demand for minerals from sites in the region, subject to demanding extraction, transport and restoration standards.
3 Aggregate Use in Hampshire

3.1 Current Supply and Use

The data has been compiled from a number of sources, including publicly available documents, business surveys and analysis of data supplied by members of the Steering Group. Meetings have been held with various members of the Steering Group to try to ascertain the most reliable figures and the uncertainties associated with them. The main source for data on primary aggregates was the Aggregates Monitoring (AM) Report 2002 (South East England Regional Assembly, 2003). The best available data on recycled and secondary aggregates was collated from a number of sources including:

- Project Integra
- Environment Agency
- Onyx
- Hampshire County Council
- Raynesway Construction
- Viridis
- Foster Yeoman

A summary of the current aggregate use in Hampshire is given in Table 3.1. The figures should be viewed as indicative, with large margins of uncertainty, not as accurate estimates (see section 3.2 Data limitations). The figures suggest that at present recycled and secondary aggregates account for about 13% of all aggregates consumed in Hampshire. As with the national trend, the material is predominantly used for relatively low value end uses as unbound aggregates.

The potential targets for future recycled and secondary aggregate use are summarised in section 6. Part 2 of this report discusses how these targets can be achieved. The following sections provide further information on the materials listed and the sources of data used to estimate the volume.
Table 3.1: Current Aggregate Use in Hampshire (tonnes/year)

<table>
<thead>
<tr>
<th>Material</th>
<th>Amount Arising in Hampshire (Produced in Hampshire or imported into the County)</th>
<th>Amount Used in Hampshire</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land based sand and gravel</td>
<td>2,193,000</td>
<td>2,010,500</td>
</tr>
<tr>
<td>Marine dredged sand and gravel</td>
<td>1,715,000</td>
<td>1,638,000</td>
</tr>
<tr>
<td>Rail import of crushed rock</td>
<td>600,000</td>
<td>500,000</td>
</tr>
<tr>
<td>Marine imports of crushed rock</td>
<td>436,000</td>
<td>286,000</td>
</tr>
<tr>
<td><strong>Total sand and gravel</strong></td>
<td><strong>3,908,000</strong></td>
<td><strong>3,648,500</strong></td>
</tr>
<tr>
<td><strong>Total crushed rock</strong></td>
<td><strong>1,036,000</strong></td>
<td><strong>786,000</strong></td>
</tr>
<tr>
<td><strong>Total primary aggregates</strong></td>
<td><strong>4,944,000</strong></td>
<td><strong>4,434,500</strong></td>
</tr>
<tr>
<td><strong>Recycled &amp; Secondary aggregates</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recycled Aggregate from Inert CD&amp;EW</td>
<td>750,000</td>
<td>500,000</td>
</tr>
<tr>
<td>Highways New Works and Maintenance</td>
<td>Not Known</td>
<td>45,000</td>
</tr>
<tr>
<td>Spent Railway Ballast</td>
<td>140,000</td>
<td>140,000</td>
</tr>
<tr>
<td>Incinerator Bottom Ash Aggregate (IBAA)</td>
<td>30,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Recycled Glass</td>
<td>36,500</td>
<td>0</td>
</tr>
<tr>
<td>Recycled Plastics</td>
<td>33,500</td>
<td>0</td>
</tr>
<tr>
<td>Recycled Tyres</td>
<td>10,400</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total recycled and secondary aggregates</strong></td>
<td>1,000,400</td>
<td>686,000</td>
</tr>
<tr>
<td><strong>Total aggregate use in Hampshire</strong></td>
<td><strong>5,119,500</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Proportion of recycled and secondary aggregates</strong></td>
<td></td>
<td><strong>13.4%</strong></td>
</tr>
</tbody>
</table>

3.1.1 Primary aggregates

Primary sources account for over 86% of aggregate used in Hampshire during 2004 and come from four sources:

- Land based sand and gravel
- Marine dredged sand and gravel
- Rail import of crushed rock
- Marine imports of crushed rock

When looking at the geology of the county, the main primary aggregate resource in Hampshire appears to be land based sand and gravel. There are no sources of crushed rock within Hampshire so all of the county’s needs must be met by sources outside the county. Information was collated from AM Report 2002, AM 2001 collation report (British Geological Survey, 2003), and Hampshire County Council to provide the data presented in Table 3.1. Information from AM Report 2002 was supplemented by the Steering Group to provide the locations of the primary aggregates sources, shown in Map 1.
Map 1: Location of Sand and Gravel Pits, Wharves supplying Marine Dredged Sand and Gravel and Crushed Rock, and Rail Depots.

KEY
- Sand and Gravel Pits and Processing Plants
- Rail Depots
- Wharves
3.1.2 Recycled aggregates from inert construction demolition and excavation waste

3.1.2.1 Inert construction demolition and excavation waste

The total volume of inert CD&EW in Hampshire is estimated to be **1.54 Mt per year**, based on Environment Agency figures. These are figures based on returns made by sites operating under a waste management license; the operators of these sites are required by legislation to provide data to the Environment Agency on the amount and nature of material accepted at their sites. This represents the only comprehensive data on CD&EW arisings in Hampshire, but it has a number of limitations and has to be interpreted with caution.

The data collected by the EA is collected using two coding systems, the new European Waste Catalogue (EWC) coding system and the old UK coding system. Of the European coding system the classes 17 and 20 are the most relevant in respect of construction and demolition waste. Of the old UK coding system the categories which were thought to be inert C&DW were chosen and agreed with the EA that they were similar classifications as the European inert C&DW. These were assigned to Class 21.

The data that the Environment Agency supplied was analysed by first selecting the waste streams defined as inert waste in EA Regulatory Guidance Note 2 (November 2002). These classes have since been confirmed in Appendix C of the WRAP document ‘The Quality Protocol for the production of aggregates from inert waste’ (WRAP, June 2004). The wastes were then split into those that were marked as ‘final disposal’ and those that were marked as ‘not final disposal’. The materials marked ‘final disposal’ were generally accepted at landfill sites, whereas those marked ‘not final disposal’ were accepted at waste transfer stations, physical treatment facilities and landfill sites. The results are shown in Table 3.2. The ‘final disposal’ material accepted at landfill sites will either be disposed of in the landfill or used for daily cover or landfill engineering. The ‘not final disposal’ material is either recycled or may be stored pending disposal to a landfill site. The total in this column thus gives an upper bound figure for the material that potentially could be recycled as aggregate from sites with a Waste Management Licence.

The figures indicate roughly similar amounts of inert material going to landfill and potentially available for recycling, about 650,000 tonnes each giving a total arising of about 1,300,000 tonnes. The data was provided in aggregated format so that individual sites were not identified. The main categories of material potentially available for recycling were ‘soil and stones’ (170504) and ‘inert natural rocks and subsoil’ (210100) rather than any of the categories where brick, concrete, tiles or ceramics were identified as the primary constituents. This suggests that much of the material may be excavation waste. It may thus contain silt, clay or weak rock fragments and may have high moisture content, and thus be less suitable for recycling than demolition or construction waste. It could also be that material is categorised into one or two categories that are known to be acceptable and that the full range of possible codes is not used because it is too complex.

The figures in Table 3.2 underestimate the total for Hampshire because they relate to the part of Hampshire in the Environment Agency’s Southern Region. This follows river catchment boundaries, and excludes part of north and north east Hampshire, where the rivers flow north to the River Thames. This includes the heavily populated areas around Basingstoke, Aldershot, Farnborough and Fleet. Given the uncertainties associated with the figures, however, we have not attempted to apply a correction factor to the figures.
Table 3.2: Inert Waste monitored by the EA as going to landfill and waste recycling/ treatment facilities

<table>
<thead>
<tr>
<th>Waste Class</th>
<th>Description</th>
<th>Final Disposal: Accepted at Landfill Sites</th>
<th>Not Final Disposal: Accepted at Waste Transfer Stations/ Treatment Facilities and Landfill Sites</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>170102</td>
<td>Bricks</td>
<td>262</td>
<td>0</td>
<td>262</td>
</tr>
<tr>
<td>170107</td>
<td>Mixtures of concrete, tiles and ceramics other than those mentioned in 170106</td>
<td>11,357</td>
<td>13,106</td>
<td>24,463</td>
</tr>
<tr>
<td>170504</td>
<td>Soil and stones other than those mentioned in 170503.</td>
<td>259,852</td>
<td>399,210</td>
<td>659,062</td>
</tr>
<tr>
<td>200102</td>
<td>Glass</td>
<td>516</td>
<td>4,302</td>
<td>4,819</td>
</tr>
<tr>
<td>200202</td>
<td>Soil and stones.</td>
<td>80</td>
<td>9,682</td>
<td>9,762</td>
</tr>
<tr>
<td>210000</td>
<td>Inert unspecified</td>
<td>250,410</td>
<td>27,073</td>
<td>277,073</td>
</tr>
<tr>
<td>210100</td>
<td>Inert-natural rocks and sub-soil.</td>
<td>68,537</td>
<td>209,743</td>
<td>278,280</td>
</tr>
<tr>
<td>210101</td>
<td>Inert rocks and stone</td>
<td>5,944</td>
<td>2,440</td>
<td>8,384</td>
</tr>
<tr>
<td>210102</td>
<td>Inert sub-soils</td>
<td>31,179</td>
<td>2,022</td>
<td>33,201</td>
</tr>
<tr>
<td>210200</td>
<td>Inert- ceramic and/or cemented</td>
<td>5,173</td>
<td>216</td>
<td>5,389</td>
</tr>
<tr>
<td>210201</td>
<td>Inert glass</td>
<td>913</td>
<td>5,713</td>
<td>6,626</td>
</tr>
<tr>
<td>210203</td>
<td>Inert concrete and or mortar</td>
<td>1,996</td>
<td>4,342</td>
<td>6,342</td>
</tr>
<tr>
<td>210300</td>
<td>Inert – processed mineral materials</td>
<td>1,996</td>
<td>2,215</td>
<td>4,210</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>636,222</td>
<td>680,068</td>
<td>1,316,286</td>
</tr>
</tbody>
</table>

The following limitations with the figures were highlighted during a meeting with the Environment Agency (EA):

- Forms are filled in by either the drivers or the weigh bridge operators. The weigh bridge operators are not always consistent in their coding of the waste type.
- There is potential for under reporting of figures to keep the site licence fees at a minimum.
- If there is any doubt as to which code to describe a waste, the more expensive option is likely to be chosen.
- The terms used to describe the waste are for the purposes of classification under the Waste Management Licensing Regulations and do not indicate the potential for recycling of the material.
- Waste described as ‘not final disposal’ option does not mean that the waste is recycled but that it is not going to landfill directly. It could be going to a waste transfer station for bulking and then on to a landfill site for final disposal.
- Glass is rarely collected separately; the real quantities of glass arising in the county are likely to be a lot higher than shown in the EA figures because it is mixed within a number of other waste streams.
- The Environment Agency data does not cover the north of the county, because their area boundaries follow river catchments.
Material accepted at a landfill site may not be disposed of in the landfill, but may be used as daily cover or for landfill engineering purposes.

The figures in Table 3.2 only relate to sites operating under a waste management license. This includes a number of sites where CD&EW is recycled as aggregate in Hampshire, as a number of them are located at landfill sites. However, the production of aggregate from CD&EW can also be carried out under an exemption from the Waste Management Licensing Regulations, and there are a number of sites operating in this way in Hampshire. The owners of these sites are not required to send details of the amount and nature of the material they handle to the EA, so the amount of material processed at these sites has to be estimated by other methods. The category of exempt sites also includes sites where materials are deposited for the purposes of reclamation or redevelopment.

The amount of CD&EW recycled as aggregate at sites operating under an exemption from the Waste Management Licensing Regulations can be estimated from the total amount of recycled aggregate produced in Hampshire minus that produced at sites operating under a Waste Management License. Figures for recycled aggregate production are not available directly and were estimated from a number of sources, including discussions with operators, planners, consultants, trade directories and registers. Much of the information is commercially confidential, and it was only possible to gain a general indication of the amounts of recycled aggregate produced. The general consensus was that about 500,000 tonnes per year of recycled aggregate is produced in Hampshire, of which about 275,000 tonnes is at sites operating under a Waste Management License and 225,000 tonnes from sites operating under an exemption. Adding this figure of 225,000 tonnes to the 1,316,000 tonnes in Table 3.2 gives a total of 1,540,000 tonnes of inert CD&EW per year. This excludes material deposited at exempt sites and also material recycled on site during redevelopment.

It should be noted that the figures relate only to inert CD&EW. Non-inert materials, such as contaminated soils or organic materials are not included.

3.1.2.2 Recycled Aggregates derived from inert construction demolition and excavation waste

The total volume of inert CD&EW is less important than the amounts that are potentially suitable for recycling in various forms: an important differentiation needs to be made between the waste stream and the products that can be recovered from it. In bulk terms, the most important product is recycled aggregate. This arises principally from the demolition sector of the waste stream, with smaller amounts from the construction and excavation streams. Hence the amount of inert CD&EW that is potentially recyclable as aggregate will be considerably less than the total figure of 1.54 Mta for the whole waste stream.

Discussions with relevant stakeholders and examination of relevant literature gave an estimate of about 500,000 tonnes per year of inert CD&EW currently being recycled as aggregate in Hampshire. Several operators felt that this was close to the maximum that could easily be recovered from the waste stream. It is estimated that about 275,000 tonnes was produced at sites operating under a Waste Management License. Comparing this figure with the ‘not final disposal’ figure of 680,000 tonnes for sites operating under a Waste Management License in Table 3.2 leaves about 400,000 tonnes. Some of this material may be suitable for recycled aggregate production. However, some will be excavation waste, as suggested by the classifications used in Table 3.2, and will consist of material unsuitable for aggregates, such as clay, silt and Chalk. Some of this material can be rendered suitable for use in construction by treatment with cement, lime, pulverized-fuel ash or other binders; however, this is not considered as aggregate for the purposes of this report, as it involves chemical treatment rather than mechanical separation. However, a significant amount will consist of granular material, either natural or construction and demolition material, that can be recycled as aggregate.

Material that is suitable for recycling as aggregate will also currently be disposed of at exempt sites for the purposes of land reclamation. This will become a less easy route in the future, as revisions to the exemption system to be introduced by the EA in 2005 will require more detailed information on the nature, use and quantities of material. Charges will also be introduced for registering exempt sites.
and renewing the registration on an annual basis. More of this material will therefore become available for recycling.

Taking all aspects into consideration, it has been estimated that a further 250,000 tonnes of inert CD&EW suitable for recycling as aggregate is available in Hampshire, giving a total of 750,000 tonnes per year.

As the CD&EW arises mainly from urban areas, the potential supply will be related to population density. The correlation is not exact, as the amount of CD&EW will be related to the amount of redevelopment going on in the area, which is heavily affected by economic and political factors. Also, there is likely to be more material available in older urban areas, such as Southampton, Portsmouth, Aldershot and Farnborough than in areas of recent urban growth such as Basingstoke and Andover. However, the distribution of population will give a good general indication of the likely supply of CD&EW.

The locations of known sites where recycled aggregates are produced (CD&EW Recycling Centres) are shown on Map 2. They indicate a close correlation with areas of high population density; the sites are mostly either in or around the fringes of the urban areas. Some urban areas, such as Basingstoke, Andover and Winchester, appear to be under-served with respect to CD&EW Recycling Centres, though it is known that there are some waste transfer stations in these areas that collect CD&EW and send it to the CD&EW Recycling Centres for processing. Some of the CD&EW Recycling Centres are located in the countryside; these are often at existing sand and gravel pits or landfill sites.

A check on the amount of recycled aggregate can be made from the relative proportions of recycled aggregate in the ODPM survey of CD&EW arisings and use in England and Wales (ODPM, 2002b). The ODPM survey figures are broken down by region, and include categories such as material used as recycled aggregate. Taking the total of 1.54 Mt CD&EW for Hampshire and distributing it with the percentages shown for the South East gives an estimate of 561,000 tonnes of recycled aggregate in Hampshire. This agrees well with the direct estimate of 500,000 tonnes. The breakdown is shown in Table 3.3.

Table 3.3: Estimate of Breakdown of CD&EW in Hampshire from Comparison with ODPM Survey

<table>
<thead>
<tr>
<th>Material route</th>
<th>South East (Data from ODPM Survey for 2001)</th>
<th>Arisings in Hampshire Assuming Same % as for the South East</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tonnes</td>
<td>%</td>
</tr>
<tr>
<td>Recycled as aggregate</td>
<td>4,898,000</td>
<td>36.43</td>
</tr>
<tr>
<td>Recycled as soil</td>
<td>945,000</td>
<td>7.03</td>
</tr>
<tr>
<td>Landfill engineering</td>
<td>1,792,000</td>
<td>13.33</td>
</tr>
<tr>
<td>Backfill quarry voids</td>
<td>2,202,000</td>
<td>16.38</td>
</tr>
<tr>
<td>Registered exempt sites</td>
<td>2,828,000</td>
<td>21.04</td>
</tr>
<tr>
<td>Disposed of at landfills</td>
<td>779,000</td>
<td>5.79</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13,444,000</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
A further check on the arisings of recycled aggregate can be made by comparison with data on the composition of CD&EW. Hurley and McGrath (2001) of BRE reviewed the available information on CD&EW and estimated the amount annually arising in the UK. The review lists the composition of construction and demolition waste separately and describes excavation waste to be soil/clay waste. Tables 3.4 and 3.5 use the composition estimates to apportion the total volume of CD&EW in Hampshire.

**Table 3.4: UK Breakdown of CD&EW by Origin Applied to Hampshire**

<table>
<thead>
<tr>
<th>BRE %</th>
<th>Hampshire (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.4</td>
<td>221,760</td>
</tr>
<tr>
<td>42.8</td>
<td>659,120</td>
</tr>
<tr>
<td>42.8</td>
<td>659,120</td>
</tr>
<tr>
<td><strong>100.0</strong></td>
<td><strong>1,540,000</strong></td>
</tr>
</tbody>
</table>
Table 3.5: UK Material Composition of Construction and Demolition Waste Applied to Hampshire

<table>
<thead>
<tr>
<th>Material</th>
<th>BRE %</th>
<th>Hampshire (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber</td>
<td>19</td>
<td>42,134</td>
</tr>
<tr>
<td>Concrete</td>
<td>6</td>
<td>13,306</td>
</tr>
<tr>
<td>Inert</td>
<td>11</td>
<td>24,394</td>
</tr>
<tr>
<td>Ceramic</td>
<td>3</td>
<td>6,653</td>
</tr>
<tr>
<td>Insulation</td>
<td>3</td>
<td>6,653</td>
</tr>
<tr>
<td>Plastic</td>
<td>13</td>
<td>28,829</td>
</tr>
<tr>
<td>Packaging</td>
<td>25</td>
<td>55,440</td>
</tr>
<tr>
<td>Metal</td>
<td>3</td>
<td>6,653</td>
</tr>
<tr>
<td>Plaster &amp; cement</td>
<td>3</td>
<td>6,653</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>14</td>
<td>31,046</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>221,760</strong></td>
</tr>
</tbody>
</table>

Demolition waste composition:

<table>
<thead>
<tr>
<th>Material</th>
<th>BRE %</th>
<th>Hampshire (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>4</td>
<td>263,648</td>
</tr>
<tr>
<td>Masonry</td>
<td>24</td>
<td>158,189</td>
</tr>
<tr>
<td>Paper, cardboard, plastic and other</td>
<td>17</td>
<td>112,050</td>
</tr>
<tr>
<td>Asphalt</td>
<td>15</td>
<td>98,868</td>
</tr>
<tr>
<td>Wood based</td>
<td>3</td>
<td>19,774</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>6,591</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>659,120</strong></td>
</tr>
</tbody>
</table>

This provides an estimated volume of other materials in the CD&EW stream. Table 3.6 totals the estimated volume for each material. The totals for wood, plastic, metal, paper and card include a nominal 5,000 tonnes from the 112,050 tonnes estimated for the Paper, cardboard, plastic and other in demolition waste.

Table 3.6: Estimates of Components of CD&EW in Hampshire Based on UK Figures

<table>
<thead>
<tr>
<th>Material</th>
<th>Tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inert (suitable for aggregate)</td>
<td>565,057</td>
</tr>
<tr>
<td>Wood*</td>
<td>66,908</td>
</tr>
<tr>
<td>Plastic*</td>
<td>33,829</td>
</tr>
<tr>
<td>Metal</td>
<td>6,653</td>
</tr>
<tr>
<td>Paper and card*</td>
<td>5,000</td>
</tr>
</tbody>
</table>

* Total includes 5,000 tonnes from the Paper, cardboard, plastic and other total in Table 1.3

The figure of 565,000 tonnes for inert material, suitable for recycled aggregate, again agrees well with the direct estimate of 500,000 tonnes.
3.1.3 **Highways maintenance and new construction**

The supply of materials from highway works depends greatly on the amount of highway works that take place within the County. This is decided by Hampshire County Council depending on how much renewal works/ new construction needs to be carried out each year. This is likely to be determined by the available budget as well as by what needs to be done.

Raynesway Construction Southern Ltd currently holds the term maintenance contract for Hampshire to carry out all necessary highway repairs in the County. This does not include motorways or trunk roads. Raynesway Construction Southern Ltd then contract out the work to sub contractors. All major works carried out in the county are contracted on a case by case basis, Raynesway also carry out some of this work. The information can therefore be split into two categories:

- Small projects and everyday maintenance; and
- Large contracted out projects.

The figures that are available for Highways work carried out in Hampshire for large contracted out projects are based on the Bills of Quantities at pre-contract stage rather than the ‘as-built’ figures. Actual figures could be significantly higher but at present this information is not available. It is thought that the quantities quoted for the large projects are likely to be consistent, so the same tonnages per year will keep arising under new projects. The figures available for the small projects and everyday maintenance are mainly estimates apart from the haunch recycling.

The supply of highways material is difficult to quantify at the moment because of the way the information from the projects has been collected. However the present level of recycling is estimated from the categories to total **45,000 tonnes per year**.

The present level of recycling meets the Hampshire County Council’s Public Service Agreement with Central Government in early 2002, which set 13 targets for the County to achieve by 2004/5. The target set for Waste management stated “40,000 tonnes of household, commercial and industrial waste, to be recycled through the Natural Resource Initiative during the year 2004/5”

3.1.4 **Spent railway ballast**

The current quantities of railway ballast used in the county amount to **140,000 tonnes per year** according to a member of the Steering Group. Not all of this arises in the county but it is all used within the county. The depot that all of the railway ballast arrives at is Eastleigh (shown on Map 1) in the south of the county.

Currently all of the railway ballast is reused; 90,000 tonnes is used as unbound granular fill and 50,000 tonnes is used as Type 1 sub base. Some of the unbound granular fill is used for higher value uses such as capping.

3.1.5 **Incinerator Bottom Ash Aggregate (IBAA)**

At present in the county there is only one incinerator, at Chineham in north Hampshire. This has been operational since July 2003 and has a capacity to handle 90,000 tonnes of waste per year. It generates approximately **22,000 tonnes of IBAA per year** (Onyx, 2004). This is either landfilled or used as daily cover in landfills.

There are plans for two further incinerators in the area; one in Portsmouth and one in Marchwood, Southampton. These will both have the capacity to handle 165,000 tonnes of waste per year. This will result in over **100,000 tonnes of IBAA** being produced in the county. All three plants will be operational by 2005 so provisions for the increased IBAA in the county should be made with this in mind. The locations of the incinerators can be seen on Map 3.
### Recycled glass

There are two main sources of glass arising in Hampshire, the household and commercial. Glass arising from household sources is approximately 25,000 tonnes. The arising figure is based on data gathered by Project Integra, the integrated waste management strategy in Hampshire.

About 10,000 tonnes of glass were identified as going to waste transfer stations, with about 1,500 tonnes going to landfill. A significant amount of glass is handled by landfill and waste transfer stations. Most of this is probably ‘flat’ glass from electrical appliances, cars and windows rather than the household glass – bottles – listed in the table above. This gives a total of about **36,500 tonnes of glass per year**. Further amounts of glass may be mixed in with other construction and demolition waste, and hence not identified.

### Recycled plastics and tyres

There are no processing facilities for tyres or plastic in the county at present. In the future it might be a possibility but there would need to be an assurance of supply. Hampshire County Council could set a lead in these markets with a similar system as that which they have done for glass. A collection system is already in place for fly-tipped tyres with Waste Tyre Solutions. Plastic is collected for recycling as part of Project Integra. Potentially a large supply of both tyres and plastic is available in Hampshire.

Plastics arise in a variety of forms and form a component of a number of different waste streams. Estimates for total arisings of plastic in Hampshire range up to 335,000 tonnes per year, based on analyses of the composition of different waste streams (Viridis, 2003). However, it is not clear how
much of this would be potentially available to recycle as aggregate. We have assumed that at most 10\% of this, **33,500 tonnes**, would be suitable to be used as recycled aggregate.

Arisings of tyres in the South East Region were estimated to be about 60,000 tonnes in 2001 (ODPM, 2002c). This would give about **10,400 tonnes per year** for Hampshire on the basis of population (Viridis, 2003). There is therefore an abundant source of tyres in the area, and with the progressive banning of tyres from landfill there will be increasing pressure to use them in civil engineering applications.

### 3.2 Data limitations

#### 3.2.1 Project estimates

Much of the data used in this project is incomplete, some of it is contradictory, some refers to different time periods and all of it comes with a number of caveats and large, generally unknown error margins. The conclusions and recommendations drawn from the data have to reflect these limitations. Factors affecting the data are indicated in the text.

One of the major sources of potential recycled aggregate is construction and demolition waste. The limitations listed demonstrate the problems that exist when estimating waste volumes. Information has been provided to us by the Environment Agency (EA) on construction and demolition waste produced within the county for the period 2001/02. All of the licensed sites within the EA’s area are required to supply information either monthly or quarterly with a breakdown of the waste by type that has been accepted at their site. The following limitations were highlighted during a meeting with the EA:

- Forms are filled in by either the drivers or the weigh bridge operators. The weigh bridge operators are not always consistent in their coding of the waste type.
- There is potential for under reporting of figures to keep the site licence fees at a minimum.
- If there is any doubt as to which code to describe a waste, the more expensive option is likely to be chosen.
- The terms used to describe the waste are for the purposes of classification under the Waste Management Licensing Regulations and do not indicate the potential for recycling of the material.
- Waste described as ‘not final disposal’ option does not mean that the waste is recycled but that it is not going to landfill directly. It could be going to a waste transfer station for bulking and then on to a landfill site for final disposal.
- Glass is rarely collected separately; the real volume of glass in the county is likely to be a lot higher than shown in the EA figures because it is mixed within a number of other waste streams.
- The EA data does not cover the north of the county, because their area boundaries follow river catchments.
- Material accepted at a landfill site may not be disposed of in the landfill, but may be used as daily cover or for landfill engineering purposes.

#### 3.2.2 Proxy data

Data has also been generated with the use of proxy measures such as apportionment by population. This method was used to produce the C&D waste distribution map (Chapter 6) and when apportioning the estimates of C&D waste volume within the sub-region based on the ODPM survey. This method is open to debate, but it is the most accurate method that can be employed within the scope of the
project. However, for the purposes of this report this data will be classified as having a Low-Medium confidence level, see next section.

### 3.2.3 Confidence levels

The totals data used are from the best available sources, County and City Council, Environment Agency, Office of National Statistics (ONS), Office of the Deputy Prime Minister (ODPM), and have been reviewed by the project Steering Group, who have expert knowledge of the individual material streams. However once the data are factored or applied to another piece of data inaccuracies begin to be generated. It has not been possible to quantify the level of these inaccuracies. In order to provide an assessment of the level of accuracy within the audit, data were classified in terms of confidence:

- High confidence – data recognised as being accurate and robust and for which sources can be established.
- Medium confidence – data based on expert judgement or assessment, not necessarily verifiable, but accepted as being reasonable. Data may not be based on a large data set.
- Low confidence – best estimates calculated by the Project Team and Steering Group. The original source of data having high or medium confidence but the level of data manipulation reduces its accuracy.

Table 3.7 describes the levels of confidence in the different data sets within the audit.

#### Table 3.7 Data sources and level of confidence

<table>
<thead>
<tr>
<th>Data</th>
<th>Source</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land based sand and gravel</td>
<td>Aggregates Monitoring (AM) Report 2002</td>
<td>High</td>
</tr>
<tr>
<td>Marine dredged sand and gravel</td>
<td>AM Report 2002</td>
<td>High</td>
</tr>
<tr>
<td>Rail import of crushed rock</td>
<td>AM Report 2002</td>
<td>High</td>
</tr>
<tr>
<td>Marine imports of crushed rock</td>
<td>AM Report 2002</td>
<td>High</td>
</tr>
<tr>
<td>Recycled aggregates from inert CD&amp;EW</td>
<td>AM Report 2002, Steering Group, Environment Agency</td>
<td>Medium</td>
</tr>
<tr>
<td>Material used in exempt sites and backfill</td>
<td>ODPM, ONS</td>
<td>Low</td>
</tr>
<tr>
<td>Spent railway ballast</td>
<td>Steering Group</td>
<td>High – Medium</td>
</tr>
<tr>
<td>Recycled glass</td>
<td>Project Integra, Environment Agency</td>
<td>High</td>
</tr>
<tr>
<td>IBAA</td>
<td>Onyx, Steering Group</td>
<td>High – Medium</td>
</tr>
<tr>
<td>Highways new construction and maintenance</td>
<td>Hampshire County Council, Raynesway Construction</td>
<td>Medium</td>
</tr>
<tr>
<td>Recycled plastics</td>
<td>Viridis</td>
<td>Low</td>
</tr>
<tr>
<td>Recycled tyres</td>
<td>Viridis</td>
<td>Low – Medium</td>
</tr>
</tbody>
</table>
4 Controls on Use of Recycled and Secondary Aggregates

Regulatory controls examined included a number of commonly used specifications, environmental and health and safety issues, the planning system and the waste management licensing system. General issues and ones specifically important in Hampshire were examined. Economic factors, in terms of costs of production and transport were investigated and related to the location of CD&EW Recycling Centres for aggregates in Hampshire relative to the source of and market for the materials. Other factors such as the environmental impact of various forms of transport were also looked at. The impact of external drivers such as the imposition of targets for recycling by government and other clients, and the possible use of the planning system to encourage the maximum recycling of material in redevelopment schemes was then considered.

4.1 Specifications and quality control protocols

Most of the major specifications, especially those in the highways sector, have been updated in recent years and allow the use of recycled and secondary aggregates subject to quality control of the production of the materials. Further updates are underway to accommodate the European Standards for aggregates, which do not discriminate against recycled or secondary aggregates. In this area, the main issue would be the use of old versions of the specifications that do not allow the use of these materials.

Specifications in other areas, such as the water industry and house building, are less advanced and may present a barrier to the use of recycled and secondary aggregates. However, these specifications should also be updated to reflect the European Standards, and this should remove the discrimination. The main issue is thus likely to be lack of awareness of current specifications. However, the fact that the aggregate industry has been operating to the European Standards since 1 January 2004 should force clients and consultants to move to the new specifications. A period of turbulence may be anticipated until the industry becomes familiar with the European Standards, after which there should be less opposition to the use of recycled and secondary aggregates on the grounds of inadequate specifications.

4.2 Environmental concerns

The main issues relating to recycled and secondary aggregates are likely to concern potential leaching of contaminants into groundwater. This is particularly sensitive in Hampshire because so much of the county’s water supply comes from the Chalk aquifer. Materials that are classed as inert are unlikely to cause problems, but there may be concern over materials with potentially high concentrations of contaminants, in particular incinerator bottom ash aggregate (IBAA). Studies by AEA Technology, the Environment Agency and CIRIA have shown that problems are unlikely if the material is used in bound form in asphalt or concrete, but that there may be concerns if it is used as an unbound fill material. Any proposal to use IBAA is likely to be subject to close scrutiny by the EA, and a risk assessment will be required. There may be concerns with other materials, particularly railway ballast, in sensitive locations. Only CD&EW that is classed as inert waste should be used processed to produce recycled aggregates (WRAP, 2004), so by definition this is unlikely to present a risk to the environment. Specifications that permit the use of recycled aggregates, such as the Specification for Highway Works (MCHW 1) generally impose an upper limit of 1% by weight for the sum of non-conforming materials such as wood, metal, plastic, paper and organics. This provides further reassurance that use of these materials will not cause harm to the environment.

Specific issues may arise with some materials. For instance, it is important that glass is crushed properly before being used in construction, and recycled asphalt should be checked to ensure it does not contain tar before being reused in new hot mix bituminous material. Concerns over factors such as dust and noise are common to all aggregates when used in construction.
4.3 Waste management licensing regulations

Recent cases in the European Court have caused the Environment Agency to redefine the point at which recycled and secondary aggregates cease to be waste. Previously this was when they had been processed so that they could be used in the same way as primary aggregates. However, the new interpretation is that they remain waste until incorporated in a product, such as concrete or asphalt, or an engineering structure such as a highway embankment or sub-base. The implication is that the Waste Management Licensing Regulations would apply to any construction site that used recycled and secondary aggregates in unbound form. The use of many materials, such as construction demolition and excavation waste, is covered by exemptions from the Regulations, but the requirement to register the exemption and the threat of possible future liabilities is a major disincentive to the use of these materials. The regulations governing exemptions are being tightened to deal with concerns about some exempt sites being used as unlicensed landfills rather than for reclamation, with the introduction of charges and requirements for more information and justification for the exemption. The new requirements for exemptions are expected to be introduced during 2005.

WRAP have been working with the Environment Agency, the Quarry Products Association, the Highways Agency and the Department for the Environment, Food and Rural Affairs to produce a protocol, based on the existing BR 392 protocol for the production of recycled aggregates, that will allow material classed as inert waste and processed in accordance with the protocol to be regarded as a product. Hence a waste management licence or exemption will not be required for the use of the recycled aggregates on a construction site. This protocol was published in June 2004 (WRAP, 2004), and the process will be extended to cover secondary aggregates including slags and IBAA. This will remove a major barrier to the use of recycled and secondary aggregates. However, it will only apply to materials that have been produced in accordance with the protocol. This will force suppliers to improve their facilities and processes in order to comply. The long term result will be an improvement in the quality of the aggregates produced, and higher prices for them, but in the short term there may be a loss of companies at the bottom end of the market, who may not be willing or able to make the necessary investments.

4.4 Planning permission for CD&EW recycling facilities

Hampshire County Council, Portsmouth City Council and Southampton City Council are the Mineral Planning Authority and Waste Planning Authority for their areas. The three Authorities are responsible for:

- formulating minerals and waste policies;
- determining planning applications for minerals and waste development in their areas; and
- ensuring that development is carried out in accordance with conditions attached to planning permissions and with associated legal agreements.

The present Plan encourages planning permission for facilities to process construction demolition and excavation waste provided they comply with basic requirements regarding location and do not cause unacceptable levels of noise, dust or traffic (Policy 26 and 46). However, Policy 46 restricts sites to the following areas:

- Existing industrial areas or land zoned for industrial development;
- Land in the countryside that has already been developed (brownfield sites); or
- Existing landfill waste disposal sites.

These restrictions are relaxed in Policy M3 of the Regional Minerals Strategy for the South East. Policy M3 states that planning authorities should make positive provision for an adequate number of suitably located minerals recycling facilities. Development in the open countryside including green belt, and in exceptional circumstances AONBs and national parks, should not be precluded where this is consistent with the proximity principle.
Most of the CD&EW Recycling Centres identified seem to be consistent with the requirements of Policy 46, being located at landfills, sand and gravel pits or industrial estates (see Map 2, Section 3.1.2).

4.5 Economics
Recycled and secondary aggregates require similar processing to that of primary aggregates. They require crushing and screening to produce gradings in accordance with the specification for the intended end use. In some cases recycled aggregates may require more processing than primary aggregates to remove minor constituents such as wood, paper, metal, plastic and organics. This processing has an associated cost.

There are economic factors that are working in favour of recycled and secondary aggregates in Hampshire. The Aggregates Levy positively discriminates in favour of recycled and secondary aggregates by applying a tax of £1.60 a tonne on all primary aggregate in the UK. This goes some way to making recycled and secondary aggregates more cost competitive with primary sources.

The location of processing centres for recycled and secondary aggregates in Hampshire may a significant effect on the cost to the user (Map 2). Recycled aggregates generally arise from CD&EW in urban areas, and if processed locally the material is available to construction projects in the same urban area. This will significantly reduce the transport costs associated with its supply. This could have a large impact on the crushed rock market in Hampshire, with all of the county’s supply sourced from outside the county with large transport distances. If properly processed recycled aggregate could replace a percentage of this crushed rock with significant savings on transport.

On the other hand, if CD&EW Recycling Centres are located in the country, with long haulage distances from the place of origin to the processing facility and then back to market, the cost will be increased relative to land won sand and gravel which only has to travel from the point of extraction to market. This can be mitigated by using the lorries delivering sand and gravel to bring back CD&EW to the CD&EW Recycling Centres for processing.

The price that can be gained for aggregates seems to depend mainly on the application, with higher prices for higher value applications reflecting the greater amount of processing required. There does not appear to be any significant differential between the price charged for primary and recycled or secondary aggregates. Anecdotal evidence suggests that customers expect a reduction in price for recycled aggregates, reflecting the perception of these materials as inferior to primary aggregates.

The use of in situ recycling such as in highway maintenance, reduces transport costs to zero and has significant savings in time and energy compared to traditional methods using primary aggregates.

4.6 Summary
The regulatory position has become much more supportive to recycling and the use of recycled and secondary aggregates in recent years. Specifications are available which allow materials to be used; quality control protocols are available to ensure materials are consistent and fit for purpose; and environmental and health and safety concerns have been identified and addressed. The current Minerals and Waste Local Plan for Hampshire positively encourages the use of recycled and secondary aggregates and the provision of facilities for their production, and subsequent developments in the planning system have extended the range of sites where aggregate recycling can be carried out. There are still issues to be resolved relating to the Waste Management Regulations, but these are in hand, and there do not seem to be any major economic hurdles to the use of the materials other than excessive transport distances in parts of the county. The Aggregates Levy positively discriminates in favour of recycled and secondary aggregates and the increasing difficulty of disposing of material to landfill works in favour of recycling. In situ and ex situ techniques in highway maintenance and new construction potentially offer large savings in time, energy and cost over traditional methods. In theory, there should be no serious barriers to considerably increasing the use of recycled and secondary aggregates.
In practice the situation is not quite so simple or so rosy. Although many specifications are available they are not all used, and some sectors of construction, particularly the water industry and house building may still be working to specifications that do not encourage the use of recycled materials. Most of the use of recycled aggregates seems to be for low value applications, and in some cases it may be questioned whether any specification is involved at all. Despite the potential for recycled aggregates to be used for much higher value applications, there is little evidence of this happening as yet. This may be due to the costs of the necessary processing equipment and a well-established market for primary aggregates, which clients, contractors and designers are unwilling to disturb. The possible requirement to obtain exemptions from the Waste Management Licensing Regulations for use of unbound recycled and secondary aggregates, and the potential ramifications for environmental liabilities may be acting as a deterrent to clients, contractors and designers. This issue has now been resolved, but the perception may linger for some time. There are also particular concerns from regulators with the use of incinerator bottom ash in a county underlain by the major Chalk aquifer. Given the complex nature and increasing complexity of regulatory controls, clients, designers, contractors and producers will need to work in close partnership with the Environment Agency and other regulatory bodies to maximise the reuse of recycled and secondary materials.

Despite these issues, the use of recycled and secondary aggregates is expected to increase with time. This is due to a number of drivers, including local and national government policies, and also to the diminishing availability of local sand and gravel in Hampshire. The introduction of targets and planning controls on redevelopment will probably lead to a significant increase in the quantity and quality of recycling over the next few years. The development of several large areas within the county for housing according to sustainability principles will offer opportunities for more use of recycled and secondary aggregates.
5  Procurement Options

5.1  Options
The methods by which aggregates are procured can have a large effect on whether recycled or secondary aggregates are used. If the client is involved from the outset and committed to recycling, there is a much greater chance than if the choice of aggregates is left purely to market forces. Involvement of the entire supply chain also helps, as all parties have ownership of the project and are acting to an agreed set of priorities.

A number of different arrangements are currently operating in Hampshire. Some of these are reviewed below, and suggestions made for models that may be helpful in encouraging greater use of recycled and secondary aggregates in the future.

5.2  Joint ventures
In 1995 Onyx Environmental won a 25 year waste management contract with Hampshire County Council. Part of the contract involves the incinerators at Chineham, Marchwood and Portsmouth. Onyx formed a joint venture with Hanson Aggregates to process and market the IBA produced from these incinerators. HCC have also set up an IBAA working group to develop applications for the IBA, including Foster Yeoman and Onyx/Hanson. This led to a trial of IBAA as aggregate in foamix in 2003. The IBAA in this trial did not come from incinerators in Hampshire, but from SELCHP in London.

Arrangements such as this, where the producer of a recycled or secondary aggregate combines with an aggregate supplier, have many advantages. The aggregate supplier has an assured source of material, and both parties have an incentive to develop markets for the material to ensure that it is used at as high value an application as possible. Resources can be made available to deal with regulatory requirements and to pay for processing and storage during weathering, which might not be available otherwise, with the result that the IBAA would be landfilled.

The arrangement between Network Rail and Foster Yeoman for railway ballast is another example of this kind of joint venture.

5.3  Public Service Agreement
Hampshire County Council signed a Public Service Agreement with the Government in April 2002 covering the period up to March 2005. The Public Service Agreement requires Hampshire County Council to achieve more demanding performance targets than would otherwise be expected. One of the targets was to recycle 40,000 tonnes of household, commercial and industrial waste through the Hampshire Natural Resource Initiative. In return the government gave Hampshire County Council £2,002,570 in the form of a pump priming grant. There is also an added incentive to reach the set targets in the form of a performance grant to the Council if all targets are met. If the council shows a substantial improvement but does not actually meet the targets a percentage of the performance grant will be paid (Hampshire County Council 2003).

This type of agreement is likely to be successful because extra funds have been given to the Council to implement change. There is the added benefit if the targets are met, which is good encouragement. Also there is a significant time for the changes to be put in place and targets to be met.

Feedback from the Steering Group suggests that the PSA has worked well in Hampshire, with all parties feeling that they are working to common goals. Stable relationships have developed between the partners, leading to extensions of working arrangements into other areas such as the IBAA.
working group (see 5.2). The setting of target levels for recycling at the start of contracts was important, as it became very difficult if these had to be negotiated once the contract was under way.

5.4 Glass recycling: Project Integra

Midland Glass and Project Integra are a good example of the type of a partnership which encourages and achieves successful recycling. In 2003 Michael Meacher opened a £2 million glass processing facility, owned by Integra partner Midland Glass and located within Southampton Docks. This project was the result of private inward investment made possible by Project Integra’s joint commitment to supply the site with all glass cullet collected in Hampshire for ten years. This partnership was awarded the “Best partnership for recycling” category at the National Recycling Awards 2003. It was the unique features of the partnership that won them this award (Integra 2003). This project is an example of good management practice which achieves results and encourages enterprises to work together.

The partnership is special because it involves 14 District Councils within Hampshire. This has enabled them to ensure a large quantity of glass can be supplied to Midland Glass each year. This arrangement would not have been possible for one District to do alone. The contract was given to Midland Glass because they proposed to locate the recycling facility within Hampshire. Once this had been decided the problem was to find a suitable location for the plant. This was found at Southampton Docks, operated by Associated British Ports (ABP). The Midland Glass processing facility is a grant aided facility and the port of Southampton was only the second UK port to receive funding for such a facility when ABP, along with port stevedoring company, Solent Stevedores, successfully secured the £800,000 grant in 2001 (ABP, 2003).

5.5 Targets

An alternative to partnerships and joint ventures is the use of targets. There has not as yet been much experience of the use of targets for use of recycled and secondary aggregates in contracts, but it is thought that government will start to introduce these during 2004, not just for aggregates but for all materials. The use of targets may have appeal for clients, as they can use them without having to get involved in partnership arrangements. However, they are likely to be fairly blunt instruments, especially if they are expressed simply as a minimum percentage to be achieved regardless of the circumstances of the particular contract. Unthinking use of targets can be counter-productive, and may limit the amount of recycling that can be achieved in many cases. More flexible targets, such as the proposed Demolition and New Build Recovery Indices available by using the Envirocentre demolition protocol (www.ice.org.uk), may be more appropriate. This mechanism can operate via the planning system, and could be a way of influencing house builders and others to use more recycled materials. However, direct involvement by clients with contractors and suppliers is likely to yield better results than remote imposition of targets.

5.6 Market forces

The alternative to partnership or similar arrangements is to leave everything to market forces. This will favour the cheapest option, and also the one with least regulatory or other complications, i.e. the simplest option. This may often work against recycled and secondary aggregates. On economic terms recycled and secondary aggregates may have an edge in some situations, such as reusing material on site during redevelopment and supplying new construction in urban areas. However, this may be offset by actual or perceived difficulties with the waste management regulations, planning or building control. In many construction projects the programme is very tight, and anything that could delay the work will be avoided if possible. This is particularly important for small contracts, such as many house building projects.

The fact that most recycled aggregates are sold for low prices, for low value applications, means that there is little money available to invest in plant for processing the materials to a higher standard that would attract higher prices. Help with purchase of capital equipment for recycling is available from
WRAP (see [www.wrap.org.uk](http://www.wrap.org.uk)). Without the assurance of a guaranteed supply or market, companies opening and operating infrastructure for recycled and secondary aggregates are entirely at the mercy of market forces. As a result, many of the smaller companies may be unwilling or unable to invest in up-to-date machinery and may be stuck in a ‘vicious circle’ of producing low cost, low quality materials. This is less likely to be a problem with the larger national mineral or waste companies. They are likely to have the resources to invest in the appropriate infrastructure, and to be anxious to safeguard their reputation by producing high quality products and operating in a responsible manner. Without the incentive of a partnership or similar arrangement to provide some security of supply and demand, however, they may be reluctant to invest in infrastructure to produce recycled aggregates suitable for high value applications.

5.7 Others

It is likely that a number of other formal and informal partnership/joint ventures operations are ongoing in Hampshire that can affect the use of recycled and secondary aggregates. Many of the utilities may have arrangements with other companies to treat or recycle the material from their excavations. The maximum reuse of material and minimisation of material sent to landfill will be a prime concern for these companies. Demolition contractors and developers may have long term arrangements for redevelopment of sites to maximise the use of materials available on site. Examples of these types of relationships can be found in the case studies on the AggRegain web site ([www.aggregain.org.uk](http://www.aggregain.org.uk)).

An area where these types of relationship may not be in existence is in house building. With the potential for large scale housing developments in Hampshire over the next 5 to 10 years, it would be helpful if these types of relationship could be formed. This will depend on the particular organisations involved, particularly the District Councils and the extent to which they are able or willing to direct the developers towards more sustainable practices, of which the use of recycled and secondary aggregates is only a part.
6 Recycled and Secondary Aggregate Targets

The section provides background information for the individual material targets given in Part 2. A summary of all the material targets is shown in Table 6.1 at the end this section.

6.1 Objective

To achieve Hampshire’s MRS objectives individual strategies and targets are required for each resource stream. This project seeks to set out realistic, evidence-based targets for the increased use of recycled and secondary aggregates in Hampshire. Targets are provided for 2010 and 2020 to match the time periods proposed for the MRS.

6.2 Future Demand

6.2.1 Total aggregate demand

As highlighted by the recent revision of MPG6, predicting future aggregate demand is difficult (See Chapter 2.3). National demand has been assumed constant between 2001 and 2016 (ODPM, 2002a). The same uncertainty about construction activity and intensity of use exists in this project. For this reason the assumption has been made that the total aggregate demand measured in Hampshire for 2004 will remain constant over the periods to 2010 and 2020.

6.2.2 Development areas

The development of several large areas within the county for housing will offer opportunities for more use of recycled and secondary aggregates. The location of major development areas is important when siting any new infrastructure for recycled and secondary aggregate production to minimise transport distances.

The long-term development of Hampshire is to be met by large-scale development in four areas: Waterlooville; Eastleigh; Basingstoke; and Andover. These areas are described in the Hampshire County Structure Plan 1996-2011 as Major Development Areas (MDAs). However, discussions with Hampshire’s planning department have indicated that the Eastleigh development will not be classified as a Major Development Area, but will contain significant areas of development. The development areas are shown in Map 4. These developments will incorporate housing, roads, and industrial and commercial development. In addition, large areas of MoD land in the Aldershot/Farnborough area are likely to be released for development in the near future.
Hampshire’s local plans should make provision for up to 94,290 dwellings in the period from April 1996 to March 2011. Out of the total provision, 12,000 dwellings will be met by the development of new communities within the four development areas, distributed as follows:

<table>
<thead>
<tr>
<th>Development Area</th>
<th>Dwelling Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basingstoke (MDA)</td>
<td>4,000</td>
</tr>
<tr>
<td>South East of Eastleigh</td>
<td>3,000</td>
</tr>
<tr>
<td>Andover (MDA)</td>
<td>3,000</td>
</tr>
<tr>
<td>West of Waterlooville (MDA)</td>
<td>2,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12,000</strong></td>
</tr>
</tbody>
</table>

The MDAs provide particular opportunities for the use of recycled and secondary aggregates as they are to be developed according to sustainability principles.

In addition to the MDAs, there will be a number of smaller housing developments throughout the county, plus redevelopment of existing urban and suburban areas.
6.3 Supply

To make reasonable targets for future recycled and aggregate use, a prediction of future supply of the materials within Hampshire must be made. The total potential volumes of some materials such as IBA, Rail ballast and Highway maintenance materials have limiting factors. These are, respectively: the processing capacity of the incinerators; the size of the rail network; and available maintenance budgets.

For the other material streams predictions of future arisings are based on Hampshire’s population increase over that period. Although the correlation is not exact it provides a reasonable mechanism for predicting the increase of material available within Hampshire for 2010 and 2020.

Based on the population predictions for Hampshire, Southampton and Portsmouth published by the Office of National Statistics (ONS) an average increase of 2.5% was chosen for both the periods 2004-2010 and 2010-2020 (ONS, 2003).

6.4 Targets

Targets shown in Table 6.1 are based on the assumptions discussed above and are designed to stretch best practice. Although stretching targets, they should be possible to achieve with concerted effort regarding the state of the art approaches to material processing and application. The figures should be viewed as indicative, with large margins of uncertainty, not as accurate estimates (see section 3.2 Data limitations). Assuming a constant level of demand for aggregates, the proportion of recycled and secondary aggregate could rise to over 20%, and the materials could be used for higher value end uses than at present in a number of situations, particularly as aggregates in hot and cold bitumen bound material and concrete.

While there is potential for growth in all the materials, the ones where the greatest impact can be achieved are recycled aggregates (construction demolition and excavation waste), incinerator bottom ash and highway works.
Table 6.1: Summary of material arising, current use and potential use in Hampshire
(tonnes/year)

<table>
<thead>
<tr>
<th>Material</th>
<th>Amount Arising in Hampshire (Produced in Hampshire or imported into the County)</th>
<th>Amount Used in Hampshire</th>
<th>Potential Use in 2010</th>
<th>Potential Use in 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land based sand and gravel</td>
<td>2,193,000</td>
<td>2,010,500</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Marine dredged sand and gravel</td>
<td>1,715,000</td>
<td>1,638,000</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Rail import of crushed rock</td>
<td>600,000</td>
<td>500,000</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Marine imports of crushed rock</td>
<td>436,000</td>
<td>286,000</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td><strong>Total sand and gravel</strong></td>
<td><strong>3,908,000</strong></td>
<td><strong>3,648,500</strong></td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Marine imports of crushed rock</td>
<td><strong>1,036,000</strong></td>
<td><strong>786,000</strong></td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td><strong>Total crushed rock</strong></td>
<td><strong>4,944,000</strong></td>
<td><strong>4,434,500</strong></td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td><strong>Recycled &amp; Secondary aggregates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recycled aggregate from inert CD&amp;EW</td>
<td>750,000</td>
<td>500,000</td>
<td>654,000</td>
<td>750,000</td>
</tr>
<tr>
<td>Highways new works and maintenance</td>
<td>Not Known</td>
<td>45,000</td>
<td>100,000</td>
<td>102,000</td>
</tr>
<tr>
<td>Spent railway ballast</td>
<td>140,000</td>
<td>140,000</td>
<td>140,000</td>
<td>140,000</td>
</tr>
<tr>
<td>IBAA</td>
<td>30,000</td>
<td>1,000</td>
<td>90,000</td>
<td>90,000</td>
</tr>
<tr>
<td>Recycled glass</td>
<td>36,500</td>
<td>0</td>
<td>15,000</td>
<td>15,400</td>
</tr>
<tr>
<td>Recycled plastics</td>
<td>33,500</td>
<td>0</td>
<td>1,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Recycled tyres</td>
<td>10,400</td>
<td>0</td>
<td>5,000</td>
<td>5,130</td>
</tr>
<tr>
<td><strong>Total recycled and secondary aggregates in Hampshire</strong></td>
<td><strong>1,000,400</strong></td>
<td><strong>686,000</strong></td>
<td><strong>1,005,000</strong></td>
<td><strong>1,104,530</strong></td>
</tr>
<tr>
<td><strong>Total aggregate use in Hampshire</strong></td>
<td><strong>5,119,500</strong></td>
<td><strong>5,119,500</strong></td>
<td><strong>5,119,500</strong></td>
<td><strong>5,119,500</strong></td>
</tr>
<tr>
<td><strong>Proportion of recycled and secondary aggregates</strong></td>
<td><strong>13.4%</strong></td>
<td><strong>19.6%</strong></td>
<td><strong>21.6%</strong></td>
<td></td>
</tr>
</tbody>
</table>

ND: Not determined
Part 2: Individual Recycled and Secondary Aggregates

7 Structure

This part of the report reviews the current and potential supply and use of a number of recycled and secondary aggregates in Hampshire, Portsmouth and Southampton. The format has been designed to be compatible with the information required by HCC for the MRS technical reports on individual waste streams. There are chapters on the following materials:

- Recycled aggregates from inert construction demolition and excavation waste
- Highway maintenance and new construction
- Spent railway ballast
- Incinerator bottom ash aggregate (IBAA)
- Recycled glass
- Recycled plastic
- Recycled tyres

For each material, the chapter will have the following headings:

- Volumes: Volumes of arisings for 2004, 2010 & 2020. Note that these figures are for arisings that are potentially suitable for recycling, not the total volume of arisings for the material stream. Mixed and contaminated CD&EW has been excluded.
- ‘Stretching Best Practice’ Targets for 2010 & 2020. These are ‘stretching best practice’ targets rather than ‘maximum achievable’ targets. With current technologies, reaching the ‘maximum achievable’ targets for recycling as aggregates would be prohibitively expensive, and may not be the most environmentally sustainable option.
- Business as usual estimates: The ‘business as usual’ figures are generally based on a small increase but no substantial change. Generally an increase of 5% for 2010 and 10% for 2020 was used.
- Collection: What changes/additions to collection systems are needed to achieve the targets?
- Infrastructure: What new handling/processing infrastructure is needed to achieve the targets and a broad indication of spatial needs. Infrastructure must be able to produce material that can meet specification and quality control requirements.
- Market Development: Is achieving the targets dependent on market development? If so, what?
- Education: What needs to happen in terms of information, education and other societal changes to meet the targets?
- Financial Issues: What are the key financial/affordability issues?
- Risks: What are the main risks in the targets not being achieved?
- Wider Issues: Are there any issues where we need EU, UK Government, regional action, help?

An overall summary is given in Chapter 15 and in the Executive Summary.

The arisings are assumed to increase at a slow rate over the period to 2010 and 2020 in line with population estimates for Hampshire, Portsmouth and Southampton (ONS, 2003). An average increase of 2.5% was chosen for both the periods 2004 – 2010 and 2010 to 2020.
8 Recycled Aggregates from Inert Construction Demolition and Excavation Waste

Summary Table

<table>
<thead>
<tr>
<th></th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2004</td>
</tr>
<tr>
<td><strong>Volume of suitable aggregate material (tonnes)</strong></td>
<td>750,000</td>
</tr>
<tr>
<td><strong>‘Stretching Best Practice’ Targets (tonnes)</strong></td>
<td></td>
</tr>
<tr>
<td>(66% of potential)</td>
<td>500,000</td>
</tr>
<tr>
<td>all unbound applications</td>
<td></td>
</tr>
<tr>
<td>of which</td>
<td></td>
</tr>
<tr>
<td>‘Business as Usual’ Estimates (tonnes)</td>
<td>500,000</td>
</tr>
<tr>
<td>All unbound</td>
<td></td>
</tr>
</tbody>
</table>

Collection
- Better segregation on site to minimise contamination.

Infrastructure
- Provide new recycling sites and increase capacity of some existing sites. Need to meet stringent environmental standards.
- Processing will depend upon the intended final use and the specification.
- Additional processing required to remove contaminants such as wood, metal, paper and plastic.
- Encourage and increase the number of ventures such as that of Recycled Rock and Aggregate Ltd which sort builders waste and inert materials.

Market Development
- Higher value markets, such as concrete and asphalt, require significant development in Hampshire.
- Research and development of market for surplus fines required to increase the efficiency of CD&EW processing.

Education
- Remove the perception that Waste Management Licensing Regulations and specifications restrict the use of CD&EW as aggregate. Promote their use as a positive benefit.
- Promote the new WRAP/EA protocol for recycled aggregates and specifications that permit the use of recycled aggregates.

Financial Issues
- Processing materials to a higher standard would attract higher prices. Help with purchase of capital equipment for recycling is available from WRAP (see www.wrap.org.uk).

Risks
- Without the assurance of a guaranteed supply or market, companies opening and operating infrastructure for recycled and secondary aggregates are entirely at the mercy of market forces.

Wider Issues
- Planning system needs to encourage an adequate number of well controlled high quality recycling sites to serve local needs across the county.
- Utilise demolition protocols and indices as part of the planning process for redevelopment of sites.

8.1 Volumes

The main source of material recycled as aggregate is assumed to be demolition material with smaller amounts of construction and excavation waste. The type and amount of material available is liable to vary rapidly in quality and quantity because the source material changes.

Derivation of the figures for arisings is described in Chapter 3. Taking account of all the available evidence, we consider that it is likely that about **500,000 tonnes** of recycled aggregate are being
produced and used in Hampshire per year at present, probably mostly from construction and demolition waste rather than excavation waste. This figure does not include material recycled on site during redevelopment projects, which might add considerably to the total of recycled material. The recycled aggregate mostly appears to be used as relatively low value general fill, with some being used for slightly higher value applications such as capping and unbound sub-base in roads. These are all applications as unbound granular materials.

Examination of the figures suggests that there are potentially significant amounts of material that could be recycled. There are some questions about the quality of this material, but we have assumed that a further 250,000 tonnes could be recycled as aggregate, giving a potential total volume of some 750,000 tonnes per year. This includes the processing of some excavation waste to obtain recycled aggregate. In Hampshire, much of the excavation waste will consist of Chalk, clay and silt rather than sand and gravel, and in urban areas some of it may be contaminated. The amount of excavation waste that can potentially be recycled as aggregate is thus considerably less than the total arisings of the material.

As the CD&EW arises mainly from urban areas, the potential supply will be related to population density. The correlation is not exact, as the amount of CD&EW will be related to the amount of redevelopment going on in the area, which is heavily affected by economic and political factors. Also, there is likely to be more material available in older urban areas, such as Southampton, Portsmouth, Aldershot and Farnborough than in areas of recent urban growth such as Basingstoke and Andover. However, the distribution of population will give a good general indication of the likely supply of CD&EW.

It is assumed that the volume of CD&EW suitable for use as recycled aggregate will rise in proportion to population to give 769,000 tonnes per year for 2010 and 788,000 tonnes per year for 2020.

Map 2 shows the potential supply of CD&EW in Hampshire by postcode sector, based on the distribution of population and the potential supply of CD&EW suitable for processing as recycled aggregate (estimated to be 750,000 tonnes per year). The colours relate to the total population in each sector rather than the population density, as the sectors are not equal in area, but it gives an indication of the distribution of population and potential arisings of suitable CD&EW across the county.

The locations of known CD&EW Recycling Centres are also shown on Map 2. They indicate a close correlation between areas of high population density and CD&EW Recycling Centres (see Part Section 3.1.2).

8.2 ‘Stretching Best Practice’ Targets

Examination of the figures suggests that there are potentially significant amounts of material that could be recycled. There are some questions about the quality of this material, but we have provisionally assumed that a further 250,000 tonnes could be recycled as aggregate, giving a potential total of some 750,000 tonnes in 2004. At present it is believed that 500,000 tonnes is recycled or 66% of the potential 750,000 tonnes. The targets for 2010 and 2020 will increase the volume of material recycled to 95% of the potential available by 2020.

All of the recycled aggregate is currently used in unbound (low value) applications. The targets set for 2010 and 2020 not only aim to increase the total volume of material recycled, but also to increase the volume used in high value bound applications. WRAP estimate that over 30% of recycled and secondary aggregates have the potential to be used in bound applications (Barritt, 2004). A significant proportion of this is made up of secondary aggregates such as slags, china clay sand and slate that are not available in Hampshire. A lower figure of 20% of recycled aggregates having the potential to be used in bound applications has therefore been assumed for Hampshire, and the aim is to reach this level by 2020. The ‘stretching best practice’ target for 2010 is 654,000 tonnes per year (85% of potential) of which 65,400 tonnes (10%) will be in bound applications and 588,600 tonnes in unbound applications. The target for 2020 is 750,000 tonnes per year (95% of potential) of which 150,000 tonnes (20%) will be in bound applications and 600,000 tonnes in unbound applications.
From 2004 to 2020, it is assumed that greater efficiency in isolating and processing ‘hard’ CD&EW and easily processed excavated material will result in an increase from current levels of about 500,000 tonnes of recycled aggregate to about 750,000 tonnes. This is much less than the total volume of CD&EW, but represents the maximum that is ‘hard’ CD&EW that can be readily recycled as aggregate. Processing of the remaining excavated material to yield recycled aggregate is likely to be expensive, and would only yield material suitable for low value applications, so is unlikely to be economic. However, industry sources may consider that most of the material that can be recycled is already being recycled. This may mean that further processing of the additional material may be required to render it suitable as recycled aggregate, compared to that undertaken at present. We have assumed that more excavation material will be processed to obtain the target of 750,000 tonnes per year.

8.3 ‘Business as Usual’ Estimates

Discussions with industry suggest that almost all the material that can easily be recycled as aggregate is already being recycled. With the introduction of the WRAP protocol (WRAP, 2004) removing the problem of waste management licensing or exemptions, and greater ability to use recycled aggregates under new specifications, it is likely that some growth in use is likely, though it will be constrained by the availability of easily recyclable material. Growth of 5% by 2010 and 10% by 2020 has been assumed, giving totals of 525,000 tonnes by 2010 and 550,000 tonnes by 2020. It is likely that the use of the recycled aggregate will continue to be in unbound applications under this scenario.

8.4 Collection

All CD&EW is collected at present but not all is destined for recycling. The manner in which the material is collected may need to be adapted to better suit recycling. In some cases merely changing the destination of the material from landfill to the nearest recycling site will achieve the required volumes. However, better segregation on site to minimise contamination would greatly improve the efficiency of processing CD&EW. To recover the maximum amount of usable material it is important to remove the internal furnishings and fittings before demolition takes place. This type of activity must be promoted by the demolition companies to encourage customers to take the extra time and recover the materials from the site for recycling. On construction sites, it is important to keep inert and non-inert waste separate, so that they can more easily be recycled. It is anticipated that the overall volume of construction waste will decrease as a result of the adoption of waste minimisation procedures and the increasing cost of sending material to landfill, but that this will be compensated by an increase in demolition and excavation waste diverted from exempt sites and landfill.

8.5 Infrastructure

Processing of CD&EW is similar to primary aggregates and involves the stages of crushing and screening to produce a usable product. It is important for recyclers to stockpile concrete, brick and asphalt separately as far as possible, in order to obtain the maximum value from the materials. The amount of crushing and screening will depend upon the intended final use and the specification. In addition to these processes there will be a need to separate the aggregates from contaminants such as wood, metal, paper and plastic. There are several methods for doing this such as screening with trommels, washing, air blowing, flotation and skip separation. Most fixed sites have permanent screeners but use a mobile crusher, which is only on site for short periods to process stockpiled material. Many sites have little or no facilities for removing contaminants, and considerable upgrading of facilities will be required if the materials are to meet specification requirements for high value end uses.

Recycled Rock and Aggregate Ltd is a joint venture owned by Raymond Brown Ltd and Foster Yeoman Ltd. Their site at Warren Farm has a skip recycling operation which receives 35/40 4.6 m³ skips per day of builders waste and inert materials. The material is processed through a picking station
and trommel where all the hardcore, soil and metals are recovered. Any residual material is then sent to landfill. The current recovery rate for waste is 63% (Recycled Rock and Aggregate Ltd). This type of venture is encouraged to increase the volume of recycled aggregate use in Hampshire.

The companies that undertake the processing are a mixture of large aggregate producers and smaller companies. The smaller companies which only hold an exemption under the Waste management Licensing regulations will only be able to store to crush grind or screen 20,000 tonnes of waste at any time (ref. Waste Management Licensing Regulations 1994). Companies that operate under a Waste Management License may be able to store and handle greater amounts; these will be specified in the Waste Management License for the site.

It is likely that a number of new sites for processing CD&EW into recycled aggregates will be required between now and 2020, both to accommodate the expected increase in material and as a result of some existing sites closing and new ones opening. The main concerns relating to the processing of CD&EW are traffic, noise, dust and visual intrusion, and measures have to be put in place to mitigate the impacts. For noise and dust, one option is to enclose the whole operation. This is initially expensive, but then gives the operator much greater freedom to run the plant according to his requirements. It would also encourage production of aggregates for higher value applications, to justify the expense. Enclosed facilities might be acceptable at a much wider range of sites than open ones.

The location of sites which have planning permission to produce recycled aggregates in Hampshire at present is shown on Map 2. Not all of these sites are active, and the total capacity is not known; it will be in excess of the current production of 500,000 tonnes per year, but is likely to be less than the stretching best practice target of 750,000 tonnes per year by 2020. Further sites are likely to be necessary to meet this target, especially as it may be anticipated that some of the sites may close as a result of commercial pressures between now and 2020.

There appears to be a shortage of sites in the central part of the county, around Winchester, Basingstoke and Andover. It is known, however, that there are a number of waste transfer stations in these areas that take CD&EW and bulk it up before sending it on to one of the recycling sites shown on Figure 1.

Planning guidance has moved on from the Hampshire Minerals and Waste Local Plan of 1998. The problem in the past has been that in urban areas recycling sites were restricted to high value industrial land, for which they could not compete. A wider range of sites is now available to operators of recycling plant. The proximity principle – that materials should be processed near to where they arise and where they will be used – appears to be generally accepted; however, with an increase in the number of sites likely in the next 5 years, problems may be encountered in some areas. An alternative may be to increase the capacity of some existing sites, where this is possible. However many sites, particularly those in the centre of urban areas, are restricted in size, and hence in the amount of material they can process.

### 8.6 Market Development

At present all recycled aggregate in Hampshire is used in low value unbound applications. This reflects experience elsewhere that recycled aggregates are not widely used for high value applications such as aggregate in concrete and asphalt (Barritt, 2003), although specifications are in place that enable them to be used for these applications. To meet the targets for higher value markets, such as concrete and asphalt, will require significant market development in Hampshire.

After crushing and screening there may be problems in finding markets for, or disposing of surplus fine materials. If an effective market can be established for the fine material, the efficiency of CD&EW processing will be greatly improved. There is also a need to find markets for the materials removed during processing such as wood, plastic, metals, paper and card or they may end up being disposed of to landfill.
8.7 Education

The regulatory position has become much more supportive to recycling and the use of recycled and secondary aggregates in recent years. Specifications are available which allow materials to be used, and quality control protocols are available to ensure materials are consistent and fit for purpose. The new WRAP quality protocol for the production of aggregates from inert waste (WRAP, 2004) will remove the barrier presented by the Waste Management Licensing Regulations when using recycled aggregates. If inert CD&EW is processed in line with the new protocol then it will generally no longer be classified as a waste. This means contractors can use recycled aggregate without having to obtain a Waste Management Licence or register an exemption. The perception that the Waste Management Licensing Regulations and specifications still restrict the use of recycled aggregate may linger and this perception must be removed. Education is required for all sectors of construction in this area; perhaps particularly for small to medium enterprises (SMEs) who may be much less aware of recent specifications and quality control requirements than larger companies. Education of construction clients, particularly in sectors such as house building, is essential to enable wider use of recycled aggregates and meet the targets. HCC and other Local Authorities can play a leading role by ensuring their specifications permit the use of recycled aggregates and by encouraging their contractors to use them.

8.8 Financial Issues

The fact that most recycled aggregates are sold for low prices, for low value applications, means that there is little money available to invest in plant for processing the materials to a higher standard that would attract higher prices. Help with purchase of capital equipment for recycling is available from WRAP (see www.wrap.org.uk). Production of high value aggregates for use in bound applications will enable higher prices to be charged, justifying the investment in the necessary infrastructure. It is envisaged that this investment will be made by individual companies rather than Local Authorities. However, it may be advantageous for the operators to enter into agreements with Local Authorities or other suppliers to ensure both a reliable source of material and a market for the resulting recycled aggregates.

8.9 Risks

Without the assurance of a guaranteed supply or market, companies opening and operating infrastructure for recycled and secondary aggregates are entirely at the mercy of market forces. As a result, many of the smaller companies may be unwilling or unable to invest in up-to-date machinery and may be stuck in a ‘vicious circle’ of producing low cost, low quality materials. This is less likely to be a problem with the larger national mineral or waste companies. They are likely to have the resources to invest in the appropriate infrastructure, and to be anxious to safeguard their reputation by producing high quality products and operating in a responsible manner. Without the incentive of a partnership or similar arrangement to provide some security of supply and demand, however, they may be reluctant to invest in infrastructure to produce recycled aggregates suitable for high value applications.

8.10 Wider Issues

Hampshire’s planning system needs to encourage an adequate number of well controlled high quality recycling sites to serve local needs across the county. The demolition protocols and indices (see Part 1, Chapter 5.5) should be utilised as part of the planning process for redevelopment of sites.
9 Highway Maintenance and New Construction

Summary Table

<table>
<thead>
<tr>
<th></th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2004</td>
</tr>
<tr>
<td>Volume</td>
<td>Not Known</td>
</tr>
<tr>
<td>‘Stretching Best Practice’ Targets</td>
<td>45,000</td>
</tr>
<tr>
<td>‘Business as Usual’ Estimates</td>
<td>45,000</td>
</tr>
<tr>
<td>Collection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Collection of material will remain the same but the material would need to be taken to CD&amp;EW Recycling Centres rather than landfill sites.</td>
</tr>
<tr>
<td></td>
<td>• Increased sorting of material prior to being collected would be required.</td>
</tr>
<tr>
<td></td>
<td>• The collection of road sweepings is already being undertaken.</td>
</tr>
<tr>
<td>Infrastructure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Bulking of some wastes prior to use will be required to ensure sufficient supply of material, e.g. road sweepings will need to be collected from a number of sources to ensure enough high quality material is available for use.</td>
</tr>
<tr>
<td></td>
<td>• Secure storage facilities will be required for the collecting material to ensure that no trespassing occurs on the site.</td>
</tr>
<tr>
<td></td>
<td>• In-situ and ex-site recycling is the preferred option where possible.</td>
</tr>
<tr>
<td></td>
<td>• There is a requirement to separate materials to ensure a high grade product; much of this could be done at CD&amp;EW Recycling Centres.</td>
</tr>
<tr>
<td>Market Development</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The use of recycled materials and the requirement to recycle waste from roads needs to be written into tenders and contracts before bids are accepted.</td>
</tr>
<tr>
<td></td>
<td>• Developers and other clients need to insist on the use of recycled materials in projects. Risk sharing arrangements should be put in place.</td>
</tr>
<tr>
<td></td>
<td>• The PSA has already gone a long way in market development. It needs to be continued and expanded.</td>
</tr>
<tr>
<td></td>
<td>• The PSA could be rolled out and used as a model for developing new housing estates or business development areas etc.</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increased education of the smaller maintenance companies will be necessary to ensure they start recycling waste road material and use recycled materials in repairing the roads.</td>
</tr>
<tr>
<td></td>
<td>• Education to all maintenance operators on changes in specifications that allow the use of secondary and recycled aggregates.</td>
</tr>
<tr>
<td>Financial Issues</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• No significant direct costs for the council are foreseen. However, HCC should consider risk sharing arrangements with contractors to encourage recycling.</td>
</tr>
<tr>
<td></td>
<td>• Some financial costs might be borne through contractors by increasing the amount of equipment they need to process all of the material. This will be recovered through higher prices for the higher quality material.</td>
</tr>
<tr>
<td>Risks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Success is dependent on all parties in the PSA playing a full part in the process. This will require commitment and provision of adequate resources by all parties.</td>
</tr>
</tbody>
</table>

9.1 Volumes

The supply of materials from highway works depends greatly on the amount of highway works that take place within the County. This is decided by Hampshire County Council depending on how much renewal works/ new construction needs to be carried out each year. This is likely to be determined by the available budget as well as by what needs to be done.

The amount of material arising in the county is largely unknown. Raynesway Construction Southern Ltd (Raynesway) are responsible for the term maintenance contract for Hampshire. They contract some of the work out to smaller sub-contractors. The waste material produced by the sub-contractors is unknown and so it is uncertain as to what volumes of materials are arising. It is thought that they
dispose of the waste materials to landfill at present. Raynesway could introduce a requirement for recycling in their subcontract arrangements.

Raynesway undertake some of the term maintenance programme but do not have figures available on the quantities of materials arising from the work they undertake.

The volumes of material arising from large scale projects that are being undertaken by various operators are largely unknown. The quantities of recycled materials that are written into the Bill of Quantities at the start of the project are the only figures available. It is thought that the actual quantity of material recycled is likely to be a lot higher than that quoted in the Bill of Quantities.

It is understood that much of the information needed to make an assessment of the volume of highway work arisings could be obtained from records held by various parties, but the resources are not available to collate this information.

9.2 ‘Stretching Best Practice’ Targets

A target of an additional 40,000 tonnes of household, commercial and industrial waste diverted from landfill through development of the natural resource management approach was set under the Public Service Agreement (PSA), which was comfortably met in the period 2003/4. A higher stretching best practice target of 100,000 tonnes per year should be set for 2010. This could further be stretched to 102,500 tonnes per year by 2020. The lower increase in target set for 2020 is based on a big drive to get to a high level of recycling by 2010 and then the target set for 2020 is based on increased levels of road maintenance related to population increase. These targets are set assuming the required volume of material arises.

To achieve these high targets the following techniques could be used to increase the quantity of recycled material being used:

- In situ cold recycling of road pavements
- Ex situ cold recycling of road pavements and footways
- Use of recycled asphalt as a constituent in new asphalt
- Use of crushed concrete from kerbs as unbound sub-base or aggregate for asphalt
- Use of recycled asphalt as unbound sub-base
- Use of excavated material as recycled asphalt
- Recycling of concrete lighting columns as recycled aggregate
- Reuse of existing kerbing and paving in maintenance contracts
- Incinerator bottom ash use in cold recycled asphalt applications
- Use of surface dressing sweepings in Foamix for patching
- Use of glass as aggregate in the base and binder course
- Reclaimed bituminous materials could be used in new asphalt

The targets are based on materials recycled on site during the works, and hence do not overlap with the figures for CD&EW in Chapter 6. They also relate only to roads that are the responsibility of Hampshire County Council, hence they do not include trunk roads and motorways or service roads for new housing, commercial or industrial developments built by developers.

9.3 ‘Business as Usual’ Estimates

The PSA runs until 2005. The extent of recycling in highways that takes place beyond that date depends to a large extent on what arrangements are put in place to succeed it. If these are not
 favourable to recycling, the amounts could decrease from the current levels. We have assumed an increase of 5% by 2010 and 10% by 2020 to represent a continuation of the current situation with little attempt to increase the level of recycling. This gives ‘business as usual’ estimates of 47,500 tonnes for 2010 and 50,000 tonnes for 2020. Given the commitment shown by all parties in the current situation, however, we think it likely that levels of recycling would continue to increase at a greater rate than indicated by these figures, although possibly not to the level of the ‘stretching best practice’ figures.

9.4 Collection

The collection of material will largely remain the same, although the material should be transferred to a recycling depot rather than a landfill site. It would generate a higher quality product if the material was sorted prior to collection.

9.5 Infrastructure

In-situ and ex-site recycling are the preferred options for using recycled material in highways maintenance. They require no or little transport to be used and therefore are the most environmentally friendly and economically sound option.

The collection of sweepings from roads is already taking place for re-use in foamix for patching. It is necessary to find a suitable place for storing the sweepings because it could take a long period of time to get a large enough quantity of material suitable for use. If this type of use is to be adopted more frequently in the future it would be necessary to allocate enough areas across the county for the material to be stockpiled. The sites would have to be properly secured to prevent trespassers. The sites are generally in quiet rural areas. They are not permanently manned and are only occasionally visited by HCC personnel; hence they are particularly susceptible to occupation by travellers.

The material collected from highways maintenance will need to be separated into different materials which should be done to a certain extent on site prior to collection. Once the material has been removed from the road it will need further processing such as washing, grinding, sieving and crushing to meet required specifications. Treatment for in-situ and ex-site recycling will be by mobile plant.

Any surplus material should be sent to the existing CD&EW Recycling Centres throughout the county. If the amount of highways maintenance material diverted from landfill sites to recycling site increases there might be a need for increased numbers of recycling sites.

9.6 Market Development

In the contracts which go out to tender for highway works it needs to be stated that preference will be given to companies that propose to use recycled and secondary materials in the road maintenance projects and to specify that any waste produced should be taken to a CD&EW Recycling Centre to be re-used if possible.

HCC has entered into a Public Service Agreement (PSA) with government (see sections 1.4.5 and 5.3) and has been working in Hampshire towards meeting targets for diversion of material from landfill. It has established a strong working group that particularly encourages the use of recycled materials in highway works. It has established strong links between members of the steering group and this has helped them achieve the target set. This type of working group needs to continue to work together to meet even higher targets by working together in the same way.

The PSA has worked well for highways maintenance so far and it would also be beneficial if a similar scheme could be rolled out to be used to encourage developers of housing estates to use recycled materials in the new roads within the housing estates. Another area for development could be in building new business parks to encourage them to use secondary and recycled materials in roads built on new business estates.
9.7 Education

Education of the small scale operators is needed to show them the location of recycling plants and to show them that it is economically viable to use recycled products in road construction.

It is important that any changes in specifications of materials to be used in highways work are widely publicised to ensure that all operators are aware of which materials can be used in each application. As research progresses and different materials are found to be suitable for different applications, it is important that engineers find out about them.

Education should be extended to the developers to ensure that they are writing into contracts that contractors including the use of recycled and secondary materials will be chosen over other contractors.

9.8 Financial Issues

There are unlikely to be any significant capital financial costs needed from the Council to ensure that the targets are met. Any potential costs, such as increased quantities of equipment required by CD&EW Recycling Centres to process the increased volumes of material, will be incurred by the recycling plant operator and recovered through their charges for the work. It will be necessary to provide sufficient resources to ensure the PSA works properly and that the amounts recycled are recorded.

9.9 Risks

To reach the proposed targets it will be necessary to introduce a number of new techniques. Most of these, such as cold in-situ and ex site recycling, are well tried and established and do not pose a significant risk. However, some will involve new materials and methods, for example the use of IBA and sweepings in foamix. There is always a learning curve associated with such activities, and appropriate time and resources must be allowed.

The success of the PSA is dependent on all parties continuing to play a full part and devoting the necessary resources to enable the aims of the agreement to be achieved. Raynesway construction has the term maintenance contract for Hampshire it then contracts out some of the projects to small contractors. There is no requirement written into the term maintenance contract for Raynesway to recycle any of the materials or use recycled aggregates in the maintenance works. Raynesway also do not require the contractors they employ to use recycled materials and do not know what they do with the material that they remove, but suspect it goes to landfill.

The larger projects that are commissioned by Hampshire County Council could include a clause in the contract which requires recycled materials to be used in the project and requires as much material as possible to be taken to CD&EW Recycling Centres.

9.10 Wider Issues

None identified. The waste/product issue does not arise because the materials are recycled in-situ or ex site.
10 Spent Railway Ballast

Summary Table

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2010</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Volume</strong></td>
<td>140,000</td>
<td>140,000</td>
<td>140,000</td>
</tr>
<tr>
<td>‘Stretching Best Practice’ Targets</td>
<td>90,000 tonnes of unbound granular fill &amp; 50,000 tonnes of Type 1 sub base</td>
<td>90,000 tonnes of Type 1 sub base, 40,000 tonnes of unbound granular fill &amp; 10,000 tonnes of concrete or asphalt aggregate</td>
<td>90,000 tonnes of Type 1 sub base, 25,000 tonnes of unbound granular fill &amp; 25,000 tonnes of concrete or asphalt aggregate</td>
</tr>
<tr>
<td>‘Business as Usual’ Estimate</td>
<td>90,000 tonnes of unbound granular fill &amp; 50,000 tonnes of Type 1 sub base</td>
<td>70,000 tonnes of Type 1 sub-base &amp; 70,000 tonnes of unbound granular fill</td>
<td>90,000 tonnes of Type 1 sub-base and 50,000 tonnes of unbound granular fill</td>
</tr>
<tr>
<td><strong>Collection</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No change to the collection scheme will be needed to achieve the targets.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Infrastructure is already in place for producing Type 1 material.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Infrastructure for processing the material for concrete or asphalt aggregate would be brought in as mobile plant when needed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Market Development</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>The Type 1 specifications allow railway ballast to be used as a secondary aggregate as long as per the requirements. Existing specifications also allow use of the material in concrete or asphalt.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>The market for sub-base is already developed and 50,000 tonnes of railway ballast is currently used as Type 1 sub base. There is a need to develop the market for use of the material in concrete and asphalt.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Education of construction clients to accept the use of the material in concrete and asphalt; also applies to other recycled and secondary aggregates.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spent railway ballast is covered by the WRAP quality protocol for the production of recycled aggregates from inert waste; need to ensure clients, designers and contractors are aware of this and do not assume that a waste management licence or exemption is required for the use of the material.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Financial Issues</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The processing plant for Type 1 is already set up. Any financial cost incurred by processing material for concrete and asphalt would be offset against profits for a higher value product and would be minimised by use of mobile plant.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Risks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Material available may not be of sufficient quality to meet the standards for concrete and asphalt aggregate. Given that the original primary aggregates used as railway ballast are high strength and high quality, this is not considered likely, however the material will need to be processed to remove fines and contaminants.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The cost of processing the material for concrete or asphalt aggregate could be uneconomic compared with using other materials, especially primary aggregates. Not thought to be likely.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of market development for concrete and asphalt applications.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wider Issues</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Network Rail could switch to another supplier at some point, who may be less willing than Foster Yeoman to encourage high value uses for spent railway ballast.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10.1 Volumes

The current quantities of railway ballast in the county amount to **140,000 tonnes per year** according to a member of the Steering Group. Not all of this arises in the county but it is all used within the county. The depot that all of the railway ballast arrives at is Eastleigh (shown on Map 1) in the south of the county.
Currently all of the railway ballast is reused; 90,000 tonnes is used as unbound granular fill and 50,000 tonnes is used as Type 1 sub base. Some of the unbound granular fill is used for higher value uses such as capping.

After discussions with the Steering Group it was felt that the quantity of railway ballast arising in the county is unlikely to increase. Therefore the predicted volumes available in 2010 and 2020 will remain the same. We have been unable to get confirmation from Network Rail on what quantities of spent railway ballast they expect to arise in the future.

10.2 ‘Stretching Best Practice’ Targets

The ‘stretching best practice’ targets set for reuse of spent railway ballast should be set at 100% of arisings. The main change should be targets set for increasing the use in higher value applications. Targets set to stretch best practice will require an increase in the railway ballast used as Type 1 sub base to 90,000 tonnes and the amount used as unbound granular fill be reduced to 40,000 tonnes by 2010, with 10,000 tonnes being processed for use as concrete or asphalt aggregate. For 2020, it is proposed that the amount used as sub-base stays the same at 90,000 tonnes, unbound granular fill decreases to 25,000 tonnes and concrete and asphalt aggregate increases to 25,000 tonnes.

10.3 ‘Business as Usual’ Estimates

‘Business as usual’ estimates have also been based on using 100% of the arisings, as at present. Foster Yeoman has indicated that they would like to use more of the material as Type 1 sub-base, so the estimates allow for the distribution changing to 70,000 tonnes of Type 1 sub-base and 70,000 tonnes of unbound granular material by 2010 and 90,000 tonnes of Type 1 sub-base and 50,000 tonnes of unbound granular material by 2020.

10.4 Collection

No changes to the collection system will be needed to achieve the targets set because it is only a change in final application needed to meet the targets. Foster Yeoman has the whole market for railway ballast and so are responsible for collecting the material.

10.5 Infrastructure

The infrastructure is already in place to process railway ballast to produce acceptable Type 1 material; it needs to be ensured that there is enough space at existing facilities to manage the additional crushing and grading of the material. A plant for processing the spent ballast for use in concrete or asphalt would be brought in as necessary as mobile plant. Space has to be reserved for this plant and for stockpiling the various products. Infrastructure for cleaning the ballast may be required. This may involve washing, and the disposal of the wash water may pose problems and could be costly.

10.6 Market Development

Railway ballast is a high quality material and it can be readily used as Type 1 sub base. The specifications allow Type 1 Sub base to be made from recycled aggregate materials as long as they meet the specifications. There is already a market which uses 50,000 tonnes of railway ballast as Type 1 sub base so it should be possible to extend the market.

Specifications are already in place for use of the material in concrete and asphalt. However, it will be necessary to develop the market for these products, as they are not currently used in Hampshire.
10.7  Education

Education of clients and their designers about the use of processed spent railway ballast in concrete and asphalt will be needed in order to overcome unfavourable perceptions of the material. This is common to all recycled and secondary aggregates.

Spent railway ballast is included as one of the categories of inert waste covered by the WRAP quality protocol (WRAP, 2004), provided that there is no suspicion of contamination. There is a need to inform clients, designers and contractors of this to ensure they do not perceive that a waste management licence or exemption is required for the use of the material.

10.8  Financial Issues

There should not be any financial problems with increasing the quantity of Type 1 material produced. The material produced will be of high enough quality to ensure that the market will pay for the extra processing. Costs for producing aggregate suitable for concrete and asphalt will be offset by the use of mobile plant and by the significantly higher price the product will command. The cost of washing the ballast and disposing of the wash water may be significant.

10.9  Risks

There is a risk the available material is not able to meet the criteria set for concrete and asphalt aggregates. However, as the primary aggregates used for railway ballast are high strength and quality, it is likely that most of the spent ballast will be suitable for these applications after processing, certainly in relation to the relatively modest targets.

It could prove uneconomic to process the ballast for the concrete and asphalt applications. This will depend on the relative costs of primary aggregates and other recycled or secondary aggregates that could be used for these applications. Conversely, if the price of imported rock increases significantly, it may be so economic to use railway ballast that the targets could be exceeded.

The biggest risk is likely to be failure to develop the market for the higher value applications. This applies to all recycled and secondary aggregates, not just railway ballast.

10.10 Wider Issues

Network Rail could switch to another supplier at some point, who may be less willing than Foster Yeoman to encourage high value uses for spent railway ballast.
11 Incinerator Bottom Ash Aggregate (IBAA)

### Summary Table

<table>
<thead>
<tr>
<th></th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2004</td>
</tr>
<tr>
<td><strong>Volume</strong></td>
<td>30,000</td>
</tr>
<tr>
<td>‘Stretching Best Practice’ Targets</td>
<td>1,000</td>
</tr>
<tr>
<td>‘Business as Usual’ Estimates</td>
<td>1,000</td>
</tr>
<tr>
<td><strong>Collection</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>From the Incinerators to weathering site should be done by sheeted lorries.</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weathering – A site of approximately 4 ha in size will be required to weather the ash. It should be located centrally to the three incinerators.</td>
</tr>
<tr>
<td></td>
<td>Processing facilities to incorporate the ash into a product. Crusher, screener, metal separation, etc.</td>
</tr>
<tr>
<td><strong>Market Development</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A commitment of supply and demand for IBAA will be needed to ensure targets are met.</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>To educate the public, construction companies and regulatory bodies that IBAA used as a secondary aggregate will not cause any problems to human health or the environment.</td>
</tr>
<tr>
<td><strong>Financial Issues</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The initial cost of setting up a weathering site could be off set against the cost of paying for disposal of potentially hazardous IBAA.</td>
</tr>
<tr>
<td><strong>Risks</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If a continuous supply of weathered IBAA is not produced this could reduce the use of IBAA.</td>
</tr>
<tr>
<td></td>
<td>The use of IBAA as a secondary aggregate must be incorporated into specifications so that construction firms can use it in a number of different projects.</td>
</tr>
<tr>
<td><strong>Wider Issues</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waste product issue is particularly important. Any changes in legislation could affect the waste licensing of the weathering site.</td>
</tr>
</tbody>
</table>

11.1 Volumes

The current supply of incinerator bottom ash (IBA) in Hampshire arises at the Chineham incinerator near Basingstoke. This plant produces approximately 25,000 tonnes per year of IBA which is currently landfilled. In 2005 when the second incinerator at Marchwood is operational there will be an extra 40,000 tonnes of IBA available to use. The location of the incinerators can be seen on Map 3 (Chapter 3.1.4). By the end of 2005 all three proposed incinerators in Hampshire should be operational and **approximately 100,000 tonnes per year of IBA will be arising** in the County. This supply is likely to be very consistent and so it can be depended upon to be a resource. Once weathered and processed, the IBA can be turned into incinerator bottom ash aggregate (IBAA).

In addition to the IBAA arising in Hampshire, there is the possibility of IBAA from an incinerator at Guildford, Surrey becoming available for use in Hampshire in the future. This has not been included in the estimates of future arisings, which are based on the capacity of the three incinerators for 2010, and then assumed to stay constant to 2020. Increasing difficulty in sending municipal waste to landfill will lead to more of it being diverted to the incinerators, but this will be counterbalanced by household recycling schemes which will reduce the organic content of the waste, and hence its calorific value for waste-to-energy plants.

11.2 ‘Stretching Best Practice’ Targets

The target that should be set for 2010 should be based on the county producing 100,000 tonnes of IBA per year from the three operational incinerators. Not all of the IBA will be suitable for recycling; the oversize items will still have to be disposed of to landfill. **A target of 90%** of the IBA produced in the
county, i.e. **90,000 tonnes per year to be recycled as IBAA** is a realistic target that could be achieved by **2010**. It is envisaged that most of this will be used as coarse aggregate in bound form, partly because this is a higher value product and partly because of concerns about potential environmental risks if the material is used as unbound granular fill.

The **target for 2020 should also be 90%** of the total IBA produced in the county. If an additional incinerator has been built in the county by 2020 the target should remain at 90% of the IBA produced in the county because the remaining 10% that will not be recycled will be too large to make a useful product.

An increased target of 95% could be set if it became economically viable for some of the larger fractions to be crushed as most of this is broken bricks.

### 11.3 ‘Business as Usual’ Estimates

A nominal figure of 1,000 tonnes has been chosen for use of IBAA in 2004. For the ‘business as usual’ scenario we have assumed that use of IBAA will be restricted to occasional special projects or trials and will only amount to a small fraction of the total. This scenario also assumes that a weathering and processing site for IBAA in Hampshire is not constructed, so all the ash is sent to Rainham Marshes in Hampshire. Under these circumstances we estimate that **2,000 tonnes per year** would be used by **2010** and **5,000 tonnes per year** by **2020**.

### 11.4 Collection

Only covered lorries should be used in the transportation of IBA and IBAA to prevent material escaping and causing a health and safety risk. The collection and treatment of the IBA and IBAA will be the responsibility of the incinerator operators rather than HCC.

### 11.5 Infrastructure

#### 11.5.1 Location of weathering site

For the IBAA to be used as a useful product it must first be weathered. This involves the IBA from the incinerator being stockpiled to first cool the material and then expose it to the atmosphere. Water is sprayed at the IBA to accelerate the weathering and prevent dust from being blown from the piles. Aeration and the addition of water to the IBA reduces the leachability of a large amount of the contaminants, which enables the ash to be used as a product.

Currently the IBA from Chineham is sent to a landfill site at Rainham Marshes, Essex where it is weathered. Once all three sites are operational, it would be appropriate to set up a site in Hampshire where the IBA could be weathered, to avoid sending 100,000 tonnes per year to Essex and back. The weathering sites should be located between the three incinerators and preferably near to development areas. The IBA weathering site will have to be quite large, approximately 4 ha. The site will also have to be located on a landfill site or the whole site would have to have a concrete base to retain the leachate produced during weathering, which would then have to be tankered off site to a treatment works or treated on site.

#### 11.5.2 Health safety and environment considerations

The health and safety considerations with the use of IBAA are one of the largest concerns with the product. The transport from the incinerator to the weathering site must be done in covered lorries to prevent IBAA dust blowing off the top of the truck.
The weathering site will require a leachate capture system as described above to prevent from contaminants escaping. In the EA-Solid residues from municipal waste incinerators in England and Wales report (Environment Agency, 2002) the weathering of IBA was investigated to determine if there are any environmental or health concerns with the process. Of the four sites investigated no problems were noted from windblown dust, even the stockpiles of finer particles on a windy day did not prove cause for concern. The sites were all equipped with water sprays and bowsers to combat dust arising from roadways and other surfaces.

11.5.3 Process and testing required

The weathered ash should be regularly tested to ensure that there are no elevated levels of leachable contaminants present. The IBAA produced is very dependant on what the incinerator has been burning. The testing should be agreed with the EA and should be in line with the regime at other incinerators such as SELCHP.

11.6 Market Development

Currently there is no market using IBAA in aggregates in Hampshire. A demonstration project using IBAA in foamix was carried out in 2003 in Hampshire. The quality of the product has already been established; it can be used as a secondary aggregate and performs as well as any primary aggregate.

There have not been many tests which have tested the leaching potential of IBAA in bound applications. Any leaching potential of contaminants from IBAA in bound applications will be significantly lower than unbound applications. IBAA should be used as a coarse aggregate in the base or binder courses of roads, rather than in the surface course or as unbound granular material. The IBAA does not have sufficient skid resistance for use in the surface course, and there would also be concerns about emissions of dust from abrasion of the exposed aggregate and leaching by surface runoff. The material is suitable in terms of its mechanical properties for most applications as unbound granular fill in road construction. However, there may be greater concerns about leaching from unbound granular applications than from bound applications.

In the future to ensure that the IBAA targets are met it will be necessary to ensure a continuous supply of the weathered IBAA is available for use. This will only be achieved if the appropriate weathering site is made available in Hampshire and that it is efficiently operated. At the other end of the operation construction firms will need to commit to using the IBAA. It is suitable for use in foamix and other asphalt bound applications, and can be used as an aggregate in block manufacture. Use as unbound aggregate is unlikely to be widely acceptable in Hampshire because so much of the county is underlain by the major Chalk aquifer.

A partnership could be set up between the incinerator operator and a construction firm so that the IBAA is a guaranteed supply and the weathered product will have a market to be used in.

11.7 Education

IBAA is perceived as being harmful to the environment and not a product that should be used lightly in construction. To make the public, contractors and regulatory bodies aware that IBAA can be used effectively in a number of applications without causing harm to human health or the environment it will be necessary to prove it can successfully be used. The reports produced by the Environment Agency, CIRIA and AEA Technology have all shown IBAA not to be harmful to human health or the environment.

11.8 Financial Issues

IBAA is a product which can be readily be used once weathered. The weathering process will be the largest outlay at the start of the project. To set up a site which is approximately 4 ha which must be
able to collect any leachate produced has a large initial capital outlay, plus running costs associated with treatment of the runoff during weathering.

The Incinerator operator currently has to pay landfill tax for the IBA to be disposed of to landfill. The cost of sending 100,000 tonnes of IBA to landfill each year would be high. IBA can be classed either as a non-hazardous or a hazardous waste depending on its composition and leaching test results. Therefore if it was disposed of it might require treatment to be classed as a non-hazardous waste, and this would incur considerable costs. It is therefore economic to weather the material so that it can be used in construction. The incinerator operators could establish a weathering station within the county and then sell the IBAA on to construction companies. This would eventually pay for the cost of setting up a weathering site.

11.9 Risks
The main risks when it comes to IBAA that could prevent the targets from being met are if an appropriate weathering site is not found in the county. The material would then be transported to Rainham Marshes, and the weathered material would be sold from there for use in construction rather than in Hampshire.

If a product cannot be guaranteed engineers will not use it. Bad publicity at the start could damage the long term use of IBAA as a product. Demonstration projects to illustrate the safe, efficient and economic use of IBAA are therefore important to build confidence in potential users, contractors and regulators.

Contractors must be able to use the IBAA within the projects they undertake so it would need to be included in contract specifications.

11.10 Wider Issues
The waste/product issue is particularly important when it comes to IBAA. Currently IBAA is not considered a product until it is incorporated into a bound application. This means that while the IBA is being weathered the site will require a waste management licence. Also the transport of the weathered IBAA to a location where the IBAA will be incorporated into a product should be carried out by a registered waste carrier. If the weathering site also had facilities to process the IBAA into a product such as foamix then this would not apply. This is not always going to be suitable though because the site at which the product might be required for might be some distance away and the site might require a large amount of foamix.

Once the IBAA has been incorporated in a bound material such as foamix it is classed as a product. Hence the site where the foamix is placed does not require a waste management licence. If IBAA is used as an unbound granular material, however, then at present the site where it was used would require a waste management licence. WRAP and the Environment Agency are working to develop a protocol for the weathering and processing of IBAA, along the lines of the WRAP quality protocol for the production of recycled aggregates from inert waste (WRAP, 2004), which would enable material processed in accordance with the protocol to be classed as a product, and hence sites using the material would not require a waste management licence.

Concerns may be raised about potential release of contaminants when the material is reused in the long term, e.g. when the road is reconstructed. The ideal solution would be to use in situ or ex situ cold recycling which would retain the material on site in bound form and no more accessible to the atmosphere and leaching than before. Even if the road is broken up and used as planings in an unbound application, the fact that the IBAA is still bound with bitumen will greatly reduce the potential leaching of contaminants compared to unbound IBAA.
## 12 Recycled Glass

### Summary Table

<table>
<thead>
<tr>
<th></th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2004</td>
</tr>
<tr>
<td><strong>Volume</strong></td>
<td>36,500</td>
</tr>
<tr>
<td>‘Stretching Best Practice’ Targets</td>
<td>0</td>
</tr>
<tr>
<td>‘Business as Usual’ Estimates</td>
<td>0</td>
</tr>
<tr>
<td><strong>Collection</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Household – Kerbside collection</td>
</tr>
<tr>
<td></td>
<td>Commercial – Expansion of “Represco” scheme</td>
</tr>
<tr>
<td></td>
<td>Flat – Expand collection to include sources of flat glass; segregation required to prevent contamination</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Household – Additional crushers / tumblers to be located at Southampton docks</td>
</tr>
<tr>
<td></td>
<td>Commercial – Bottles to use existing and proposed household glass infrastructure</td>
</tr>
<tr>
<td></td>
<td>Flat – Window glass if segregated could utilise existing and proposed household glass infrastructure. Greater knowledge required to ascertain material processes requirements for contaminated glass (e.g. TV screen)</td>
</tr>
<tr>
<td><strong>Market Development</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glasphalt – potential large market for the surplus colour glass</td>
</tr>
<tr>
<td></td>
<td>Market for flat / WEEE / ELV glass requires additional research</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Public education to increase recycling rates</td>
</tr>
<tr>
<td></td>
<td>Educate private companies to inform them of their responsibilities under the WEEE / ELV / and Packaging directives.</td>
</tr>
<tr>
<td><strong>Financial Issues</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Midland Glass sole agent for collection of household glass. Their involvement in scheme devolvement is essential.</td>
</tr>
<tr>
<td><strong>Risks</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contractual commitments of stakeholders</td>
</tr>
<tr>
<td><strong>Wider Issues</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of recycled glass as aggregate has to be placed in the context of the overall strategy for glass. This will tend to favour recycling glass as glass wherever possible.</td>
</tr>
</tbody>
</table>

### 12.1 Volumes

There are two main sources of glass arising in Hampshire, the household and commercial. Glass arising from household sources is approximately 25,000 tonnes. The arising figure is based on data gathered by Project Integra, the integrated waste management strategy in Hampshire.

From Environment Agency data on material accepted at sites operating under a waste management licence, about 10,000 tonnes of glass were identified as going to waste transfer stations, with about 1,500 tonnes going to landfill. A significant amount of glass is handled by landfill and waste transfer stations. Most of this is probably ‘flat’ glass from electrical appliances, cars and windows rather than household glass (bottles). This gives a total of about 36,500 tonnes of glass per year. Further amounts of glass may be mixed in with other construction and demolition waste, and hence not identified.

The amount of household glass produced in the county will increase with population increases. Therefore the amount of household glass collected in Hampshire which goes to the Southampton Dock Recycling Plant will also increase by 2010. If the population is increasing the amount of extra glass produced should increase by the same proportion.

There is no information on the quantities of commercial glass produced in the county or what is currently done with it. It is difficult to know whether commercial glass has been included in the figures for glass arising in the county or whether it is not disposed of within the county.
12.2 ‘Stretching Best Practice’ Targets

Currently no glass is used for aggregate in Hampshire as far as we are aware. Targets for glass recycling should be set based on existing activity. Midland Glass has a contract with Hampshire County Council to collect and recycle all of the household glass in the county. It is uncertain what quantities are currently recycled at Midland Glass. It is assumed that the quantity of household glass collected is going to increase at the same rate as with population increase.

At present all the glass collected via Project Integra is handled by Midland Glass Limited and is colour screened and stored at Southampton Docks. Potentially, much of this material could be reused in Hampshire as a partial replacement for primary aggregate in asphalt (‘Glasphalt’) or as bedding sand for blocks and paving slabs. Both applications have been carried out successfully in other parts of the country and may be regarded as established techniques. While clear glass and brown glass can be recycled as glass in the UK, there is only a small UK market for green glass. As it accounts for the largest arising there is a surplus of green glass. This fraction at least could justifiably be recycled in civil engineering applications in Hampshire. This could account for approximately 50% of the 25,000 tonnes of glass collected via Project Integra, and could be augmented by some of the glass collected at household waste transfer stations, giving a potential of about 15,000 tonnes per year of glass available for recycling as aggregate. This has been set as the target for 2010. The target for 2020 is based on the expected increase in population from 2010 to 2020, giving 15,400 tonnes per year.

Targets should be set to increase the amount of glass sent to the recycling facility. There is still glass going to landfill in people’s dustbins. It is difficult to quantify this figure.

12.3 ‘Business as Usual’ Estimates

It is assumed that if positive measures are not taken to encourage recycling of glass as aggregate the current situation will continue, i.e. no glass being recycled as aggregate in Hampshire. Estimates of 0 tonnes per year have therefore been made for 2010 and 2020 under the ‘business as usual’ scenario.

12.4 Collection

12.4.1 Household glass collections

Glass is currently not collected from householders homes, people take their glass to recycling banks or household waste recycling centres and place their glass in colour coded recycling bins. In the future a higher glass recycling rate might be achieved if glass was collected by kerbside collection with other materials such as paper and plastics. The glass would not need to be colour separated in Hampshire if a kerbside collection was set up because the facilities at Southampton can effectively sort the glass into its different colours.

A pilot kerbside scheme launched in January 2004 in Rushmoor Borough involves a household glass collection service which is already working very well. It is recycling approximately twice as much glass as it was expecting to. If the year long trial continues to do well the scheme will be used across the county (Rushmoor Borough Council 2004).

12.4.2 Commercial glass collections

The commercial glass in Hampshire is not generally collected and not much is known about quantities that occur. In the HNRI news October 2003 it was noted that Midland Glass were going to trial a commercial glass collection and reprocessing. Under the banner “Represco”, Midland Glass is trialling a commercial glass collection scheme in East Hampshire district. The scheme is involving two Golf courses, social clubs, public houses and a conference centre. They are also in the process of finalising a partnership with a major Hampshire brewery which will involve the collection of used
glass from 46 pubs (Letsrecycle, 2003). Further expansion of this scheme could increase considerably the amount of glass available for recycling in Hampshire.

12.4.3 Flat glass collection scheme

Flat glass is found mixed in with construction and demolition waste from windows of buildings. It is unlikely that the collection of flat glass from buildings before demolition will become economically viable in the near future because of the time it takes to remove the glass from buildings.

With the introduction of the End of Life Vehicle directive (ELV) and Waste Electronic and Electronic Equipment Directive (WEEE) there will a need to collect glass from cars and television and computer screens.

The collection and use of glass from ELV’s is not yet well established. It has been found that the glass is not suitable for re-melting and use back as windscreens or car windows. The glass currently accounts for about 3% of an ELV and the glass is usually not removed from the vehicle before being sent to the shredders. The removal of the glass is time consuming and the value of glass is relatively low which makes the process economically unviable (DTi).

Improved collection schemes of glass in Hampshire could considerably increase the quantity of glass arising.

12.5 Infrastructure

12.5.1 Household Glass

The infrastructure for processing glass within Hampshire is already well established. Midland Glass have a partnership with Hampshire whereby Midland Glass own the Southampton dock processing facility and Project Integra’s joint commitment to supply with all glass cullet collected in Hampshire for 10 years.

The glass screening and crushing plant at Southampton docks processes the glass and ships the clear and brown glass to Londonderry, Ayr and Jarrow to make new bottles. Green glass is currently stockpiled at the plant, some of which has been used as secondary aggregate but not in Hampshire.

The glass that is being used for remaking new bottles and jars is being used at its highest value and therefore should continue to be used in this way. The green glass that is collected in the county could be used as a secondary aggregate inside the county. The glass might require further crushing to obtain the correct size fractions so that it can be a useful product. To use the green glass as an aggregate for glasphalt would be very good but it would require a processing plant to be located near the docks to make the glasphalt.

12.5.2 Commercial glass

Commercial glass is going to include a large amount of different types of glass such as bottles from businesses and window pane glass. The glass bottles from commercial premises could also be sent to Southampton docks for processing in the same way in which household glass is processed.

12.5.3 Flat glass

Flat glass which comes from car windows or household windows could be screened and crushed to the correct sizes and used in the following applications.

The most promising applications to date include:

- Bound road sub-base courses, this requires crushed glass sized below 20mm.
Fine sized crushed glass (<5mm) used as a substitute for bedding sand, for applications such as block paving and pipes.

Backfill material for pipes, walls, drains etc. Most of the experience in the USA has been using blends of glass and natural aggregates in this type of application.

Glasphalt (use in base and binder course of road pavements as substitute for primary aggregate)

These types of glass are not the easiest to recycle, the television screens are contaminated and although research carried out for WRAP has shown that some of the television screens could be used in the manufacture of new televisions this will only use about 10% of the glass produced. Four potential uses identified, in the report, for significant volumes of Cathode Ray Tube (CRT) glass were:

- Glass bricks and tiles
- New CRTs
- Use as a fluxing agent in brick and ceramics manufacture
- Use as a fluxing agent in smelting operations.

There are two types of screens: lead containing funnel glass screens; and non lead containing screens. The use of screen glass in the UK needs more research to develop technologies to separate the glass and more research into possible uses for the product (WRAP 2004).

12.6 Market Development

The market for clear and brown glass is well established, it is the area of green glass that requires the most market development. It might be possible for an agreement to be set up involving Midland Glass and a Glasphalt manufacturer such as RMC whereby a guaranteed supply of glass from Midland glass would ensure that the Glasphalt manufacturer would also be a guaranteed buyer.

The market for flat glass will be developed over the next 20 years. The WEEE directive and ELV directive are coming into force soon and they will make producers responsible.

The use of ELV glass is unlikely to be able to be re-melted and reused in vehicles again, but it could be used as an aggregate.

12.7 Education

Further education/promotion directed towards the general public to increase recycling levels of glass. It will also be necessary to provide information about what people should do with their old televisions and computer monitors.

Education for the vehicle manufacturers is also needed to ensure that they are aware of ways to recycle glass and their responsibilities.

Education is required for the electrical companies, especially television manufacturers, about ways in which they can recycle television screens. In WRAP’s ‘what’s new’ web page ‘new life for old TV screens’ it identifies that old television screens could be used in the manufacture of new television screens. It is important that the manufacturers are aware of how they can successfully use old screens in new televisions.

The recycling of flat glass from buildings, television screens and vehicles needs to be developed. This will largely depend on education to lead the way and show manufacturers how they can effectively recycle the waste glass.
12.8 Financial Issues
Costs for processing infrastructure are likely to be fairly minor, as much of the basic machinery is already in place at the Southampton Docks site. The main issue will be ensuring the supply. This may require ongoing expenditure in education for all the streams of household, commercial and flat glass.

12.9 Risks
The household glass collection is a secured supply to Midland Glass so there are not many risks associated with this.

12.10 Wider Issues
The development of new markets for flat glass needs to be encouraged to reduce the quantities going to landfill.

Ensuring that the WEEE and ELV directives are implemented and enforced correctly could lead to increased recycling.
13 Recycled Plastic

Summary Table

<table>
<thead>
<tr>
<th>Volume (potential as aggregate)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2004</td>
</tr>
<tr>
<td></td>
<td>33,500</td>
</tr>
</tbody>
</table>

‘Stretching Best Practice’ Targets

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1,000</td>
<td>2,000</td>
</tr>
</tbody>
</table>

‘Business as Usual’ Estimates

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Collection

- Research and development required to develop market and technologies before recommendations can be made for appropriate collection. However, it is likely that the following could be required:
  - Mixed plastics – Establish mixed plastics collection;
  - Thermosets – Small volumes so may not be economic to collect;
  - Shredder waste – Collection would be from ELV processors.

Infrastructure

- Research and development required to develop market before recommendations can be made for infrastructure improvements

Market Development

- Significant market and material development required

Education

- Highlight aggregates as a possible market opportunity for low value waste plastics.

Financial Issues

- Project Integra collects high value plastic bottle waste. High value prohibits use as aggregate.

Risks

- Dependent on market and product development
- Competition from higher value markets

Wider Issues

- Plastic is half the density of primary aggregate and any products manufactured would be lighter and so could benefit from reduced transport and costs.

13.1 Volumes

Plastics arise in a variety of forms and form a component of a number of different waste streams. Estimates for total arisings of plastic in Hampshire range up to 335,000 tonnes per year, based on analyses of the composition of different waste streams (Viridis, 2003). However, it is not clear how much of this would be potentially available to recycle as aggregate. We have assumed that at most 10% of this, 33,500 tonnes, would be suitable to be used as recycled aggregate. Growth to 2010 and from 2010 to 2020 is assumed to be proportional to population growth.

Suitable material for use as aggregate will have to match the following criteria.

1. The waste stream should have zero or negative value. This would be material that currently goes to landfill and would be subject to landfill tax.
2. There should be sufficient volumes of material to supply the aggregate application i.e. thousands of tonnes per year.

Alternatively the recycled plastic must be able to add value to the asphalt or concrete to a point where the cost of the recyclate becomes lost in the value of the new product. However, these are unlikely to account for significant amounts of material in the near to medium term.

There are some waste plastics that currently have no viable recycling route and these may prove to be suitable.

13.1.1 Mixed plastics

Many dismantlers, recyclers, scrap dealers collect mixed plastic waste from various sources. This material is usually large articles e.g. storage tanks, furniture, batches of dismantled equipment and it
tends to be of any plastic type. However, this type of material is only collected on a small scale at sites spread all over the country.

13.1.2 Thermoset composite materials
Most plastic recycling deals with thermoplastic materials. Thermosets are generally considered to be non recyclable and always go to landfill. Most of these materials are used in composite applications with glass fibre reinforcement. However, again this material only arises in relatively small quantities. The arising of this material may rise with the pressure to recycle electrical goods is increased by the WEEE directive.

13.1.3 Shredder waste
About 2 million end of life vehicles (ELVs) occur every year in UK. Generally, they are dismantled & crushed with most of the metals already recycled but about 450,000 tonnes of non-metallic material (shredder waste) from ELVs is landfilled in the UK each year. The total ELV waste arising estimated in Hampshire in 2000 was 66 000 tonnes. (Fieldgate, 2004). Approximately one quarter of this material, 15,000 tonnes, would be non-metallic material (shredder waste). One of the opportunities to meet the MRS vision is to develop markets for materials derived from ELVs e.g. plastics and glass. Investigations would be required to determine the suitability of this material for use as aggregate.

13.2 ‘Stretching Best Practice’ Targets
Currently no plastic is used as aggregate in Hampshire as far as we are aware. A nominal target of 1,000 tonnes per year for 2010 has been set for the use of recycled plastics as aggregates. This is very much dependent on the identification of a suitable plastic waste stream, and its development as an aggregate. A nominal target of 2000 tonnes per year for 2020 is dependant on achieving the 2010 target and expanding the market.

13.3 ‘Business as Usual’ Estimates
It is assumed that if positive measures are not taken to encourage recycling of plastic as aggregate the current situation will continue, i.e. no plastic being recycled as aggregate in Hampshire. Estimates of 0 tonnes per year have therefore been made for 2010 and 2020 under the ‘business as usual’ scenario.

13.4 Collection
There are no processing facilities for plastic in the county at present. In the future it might be a possibility but there would need to be an assurance of supply. Hampshire County Council could set a lead in these markets with a similar system as that which they have done for glass. Plastic is collected for recycling as part of Project Integra.

Project Integra only collects plastic in the form of plastic bottles. These are shredded or crushed to produce high value raw material for the plastics industry. The high cost of the material would prohibit its use in all but high value products such as street furniture.

Research and development are required to develop market and technologies before recommendations can be made for appropriate collection. However, the following factors could be taken into consideration:

- Mixed plastic – Collection could be established through Project Integra
- Thermosets – Small arisings so may not be economic to collect
- Shredder waste – Collection could be from ELV processors.
13.5 Infrastructure
Research and development are required to develop market before recommendations can be made for infrastructure improvements.

13.6 Market Development
Recycled plastic can be used as an aggregate, when shredded to sand to fine gravel size, in applications where particle strength is not critical. It is already widely used in applications such as street furniture and has potential applications in other areas such as railway sleepers. Priority should be given to recycling plastic as plastic or in innovative applications such as sleepers that take advantage of its unique properties, but it may also be appropriate to use it as substitute for aggregates in certain situations, such as bedding sand or as fine aggregate in concrete. It is not thought to be widely used in Hampshire at present. Significant research and development is required to establish an appropriate market and material source to meet the targets for aggregate use.

13.7 Education
Education required to highlight aggregates as a possible market opportunity for plastic materials that at present have no market value.

13.8 Financial Issues
Aggregates are supplied in vast quantities for a few pounds per tonne. However, thermoplastics tend to cost in the region of several hundred to several thousand pounds per tonne. Recycled plastics also have a value of up to hundreds of pounds a tonne. Therefore, it does not make economic sense to use plastics as an alternative aggregate, unless a waste stream can be identified that currently has no value. Alternatively the recycled plastic must be able to add value to the asphalt or concrete to a point where the cost of the recyclate becomes lost in the value of the new product.

13.9 Risks
The largest risk is if a suitable material can not be identified and an appropriate aggregate application developed. There is significant competition from higher value markets for pure polymer waste streams.

13.10 Wider Issues
Plastic is half the density of primary aggregate and any products manufactured would be lighter and so could benefit from reduced transport and costs.
14 Recycled Tyres

Summary Table

<table>
<thead>
<tr>
<th></th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2004</td>
</tr>
<tr>
<td><strong>Volume</strong></td>
<td>10,400</td>
</tr>
<tr>
<td><strong>’Stretching Best Practice’ Targets</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>’Business as Usual’ Estimates</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Collection</strong></td>
<td>• Research and development required to develop market and technologies before recommendations can be made for appropriate collection.</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td>• Tyre baling plant mobile or fixed – minimum processing costs</td>
</tr>
<tr>
<td></td>
<td>• Fixed plant required for producing shred or crumb – high costs</td>
</tr>
<tr>
<td><strong>Market Development</strong></td>
<td>• Significant market and material development required</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td>• Highlight aggregate replacement as a possible market opportunity for tyre products.</td>
</tr>
<tr>
<td><strong>Financial Issues</strong></td>
<td>• Production of rubber crumb is expensive but it can be used for high value products.</td>
</tr>
<tr>
<td></td>
<td>• Production of chips and shreds expensive and end uses generally low value.</td>
</tr>
<tr>
<td></td>
<td>• Tyre baling lowest cost, can use mobile plant.</td>
</tr>
<tr>
<td><strong>Risks</strong></td>
<td>• Dependent on market and product development</td>
</tr>
<tr>
<td></td>
<td>• Competition from higher value markets</td>
</tr>
<tr>
<td><strong>Wider Issues</strong></td>
<td>• EC Landfill directive prohibits the disposal of tyres: whole tyre 2003 and shreds 2006</td>
</tr>
<tr>
<td></td>
<td>• Tyres not covered by exemption from Waste Management Licensing Regulations, so licence required for their storage and use in construction. Exemptions are being developed, but not likely to be available in short term.</td>
</tr>
</tbody>
</table>

14.1 Volumes

At present the use of tyres as aggregates in Hampshire is thought to be negligible, not least because of the requirement for a waste management license to handle, store or use recycled tyres. However, arisings of tyres in the South East Region were estimated to be about 60,000 tonnes in 2001 (ODPM, 2002a). This would give about 10,400 tonnes per year for Hampshire on the basis of population (Viridis, 2003). There is therefore an abundant source of tyres in the area, and with the progressive banning of tyres from landfill there will be increasing pressure to use them in other applications. Growth from 2010 to 2020 is assumed to be proportional to population growth.

14.2 ‘Stretching Best Practice’ Targets

We understand that at present fly-tipped tyres in Hampshire are collected by Hampshire County Council via household waste transfer stations, and are then disposed of by Waste Tyre Solutions. Currently some 25,000 vehicle tyres are collected in this way per year; this amounts to approximately 165 tonnes. Fly tipped tyres are also disposed of by District and Unitary authorities and other landowners such as the Forestry Commission, so the total quantities are likely to be much greater than the figures for HCC alone. Waste Tyre Solutions also collect recycled tyres from other tyre recycling operators in Hampshire. We have estimated that up to 5,000 tonnes per year could be used in civil engineering applications in Hampshire by 2010. Growth from 2010 to 2020 is assumed to be proportional to population growth, giving 5,130 tonnes per year by 2020.
14.3 ‘Business as Usual’ Estimates

It is assumed that if positive measures are not taken to encourage recycling of tyres as aggregate the current situation will continue, i.e. no tyres being recycled as aggregate in Hampshire. Estimates of 0 tonnes per year have therefore been made for 2010 and 2020 under the ‘business as usual’ scenario.

14.4 Collection

Research and development required to develop market and technologies before recommendations can be made for appropriate collection.

14.5 Infrastructure

Tyre bales require a minimal amount of processing and produce lightweight blocks approximately 1.35 m x 1.5 m x 0.75 m. Tyre baling plant can be fixed or mobile, enabling transport distances to be minimised. At the other end of the scale, mobile plant is available for production of asphalt incorporating crumb rubber, but this is highly expensive and only likely to be justifiable in special circumstances. Three treatment plants to shred tyres have been set up in Hampshire (one at Basingstoke, one at Gosport and one at Havant), but all failed on financial grounds.

14.6 Market Development

Tyres can be used in a variety of ways in civil engineering, both as a direct substitute for primary aggregate and in ways that utilise their particular properties (Hylands and Shulman, 2004). The processing requirements vary depending on the application. The finer-grained the product, the more expensive the processing; thus crumb rubber is more expensive then chips or shred. One form of processing that is particularly suited to civil engineering, however, is the production of tyre bales. These have been used for road construction, flood defence embankments, beach recharge, artificial reefs and landfill engineering projects in the UK. A beach recharge project has been carried out at Pevensey, East Sussex (www.pevensey-bay.co.uk) and an artificial reef installed in Poole Harbour (Hylands and Shulman, 2003). Used tyres are capable of a wide range of uses in civil engineering, from lightweight fill to beach recharge and as a constituent in asphalt and concrete (Hylands and Shulman, 2003). They can be used either as a direct substitute for primary aggregates or as an alternative to them, utilising their unique properties. Significant market and material development will be required to successfully achieve the target of 5,000 tonnes per year.

14.7 Education

Education required to highlight aggregate replacement as a possible market opportunity for tyre products. The implications of the Waste Management Licensing Regulations should be made clear to potential users.

14.8 Financial Issues

Fine grade rubber crumb is expensive to produce and so may not be a suitable market for large tonnages of waste tyre. Plant for shredding tyres or production of crumb rubber is fixed and expensive, and is likely to serve a wider area than Hampshire for each plant. The cost of these processing requirements limits the uptake of these materials for civil engineering applications, and much of the current arisings of used tyres are used as fuel in cement kilns. Three plants to shred tyres have been set up in Hampshire and all have failed on financial grounds.
Tyre baling would be the lowest cost option with civil engineering potential for recycled tyres.

14.9 Risks
The greatest risk is that the project is dependent on market and product development in a market where there is competition from higher value markets.

14.10 Wider Issues
The banning of tyres from landfill under the EC Landfill directive prohibits the disposal whole tyres from 2003 and shreds from 2006. This increases pressure for the further application of waste tyre in civil engineering applications.

Currently tyres are classed as waste by the Environment Agency, and a waste management licence is required for sites where tyres are used. This is a major disincentive to their use in civil engineering. However, the Environment Agency is working with the Used Tyres Group to develop a series of exemptions to the Waste Management Licensing Regulations for the use of tyres. If this is successful, it will greatly increase the potential use of tyres in construction.
15 Summary

The previous sections have set out the general situation for recycled and secondary aggregates in Hampshire and looked at the individual materials in detail. A summary table is given below, showing the current volumes suitable for use as aggregates, the current (2004) estimated use as recycled aggregates and the proposed targets for use as aggregates in 2010 and 2020 for each material and the overall totals. The current use is estimated to be 686,000 tonnes/year, approximately 13.4% of the total aggregate use in Hampshire. The targets for 2010 are 1,005,000 tonnes/year (19.6% of total aggregate use) and for 2020 1,104,530 tonnes/year (21.6% of total aggregate use). The percentages are based on a constant level of demand for aggregate over the period to 2020, in line with predictions by ODPM (Chapter 2.1).

A number of issues were identified where action is required to meet the targets. These were often similar for the different material streams. The main issues are summarised below, using the same headings as for the individual material streams.

15.1 Volumes

The figures for volumes are in many cases uncertain, and represent the best estimate available from existing data and information supplied by the Steering Group. They should not be regarded as precise or accurate figures, but rather as ‘ball park’ estimates (See Chapter 3.2). The figures given are for material suitable for recycling as aggregate rather than the total material stream. This is often much lower than the total material stream, especially for CD&EW, glass, plastic and tyres. However, this is felt to be a more useful figure than the total material stream, as using the latter might give the impression that there was a lot more material that could be recycled as aggregate than is actually the case.

15.2 ‘Stretching Best Practice’ Targets

The figures for 2004 represent estimates of the amount of material currently being recycled as aggregate in Hampshire, and like the figures for volumes (Chapter 15.1) they have considerable uncertainty associated with them and should be regarded as ‘ball park’ figures rather than precise estimates. The targets for 2010 and 2020 are based on ‘stretching best practice’; that is working with existing or readily foreseeable technology, not on ‘maximum achievable’ levels. The latter would involve much more processing of the material, which would be prohibitively expensive under present conditions. In any case, use as aggregates might not be the most environmentally sustainable end use for some waste streams such as glass, plastic and tyres.

For most materials it has been assumed that the main increase in recycling as aggregate will take place between 2004 and 2010, with increases thereafter linked to increases in population. We have allowed for a slower increase for CD&EW because it is such a large material stream, and much of it will have to be used in areas which to date have been slow to take up recycled and secondary aggregates. Most of the other streams can be more directly influenced by the County Council, hence a more rapid increase is possible.

In addition to overall targets, specific targets for use in bound applications (asphalt and concrete) have been given for CD&EW and railway ballast in the relevant chapters. Recycled and secondary aggregates are almost entirely used in unbound applications in Hampshire at present, although many of them can be used in bound applications under existing specifications. This means that the materials are not used to their potential, but are stuck in low-value applications which do not generate sufficient profit to enable the operators to invest in processing infrastructure to enable them to be used for high-value applications. The profile of use of recycled and secondary aggregates should more closely match that of primary aggregates, with significant amounts used in high-value bound applications. About 20% of the targets for CD&EW for 2020 have been set as bound applications, with about 10% by 2010. Similar targets have been set for railway ballast. It is also assumed that almost all of the IBA
will be used in bound applications, partly because of potential concerns about the environmental impact if it is used unbound.

Summary Table: Current and Future Use of Recycled and Secondary Aggregates in Hampshire

<table>
<thead>
<tr>
<th>Material</th>
<th>Estimated Amount Recycled in 2004 (tonnes per year)</th>
<th>Scenario</th>
<th>Estimated Amount Recycled in 2010 (tonnes per year)</th>
<th>Estimated Amount Recycled in 2020 (tonnes per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recycled Aggregates from Inert CD&amp;EW</td>
<td>500,000</td>
<td>Stretching Best Practice</td>
<td>654,00</td>
<td>750,00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>525,00</td>
<td>550,00</td>
</tr>
<tr>
<td>Highway New Works and Maintenance</td>
<td>45,00</td>
<td>Stretching Best Practice</td>
<td>100,00</td>
<td>102,00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>47,500</td>
<td>50,000</td>
</tr>
<tr>
<td>Spent Railway Ballast</td>
<td>140,00</td>
<td>Stretching Best Practice</td>
<td>140,00</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>140,00</td>
<td>140,00</td>
</tr>
<tr>
<td>Incinerator Bottom Ash Aggregate</td>
<td>1,000</td>
<td>Stretching Best Practice</td>
<td>90,000</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>2,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Recycled Glass</td>
<td>0</td>
<td>Stretching Best Practice</td>
<td>15,000</td>
<td>15,400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
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<td>0</td>
</tr>
<tr>
<td>Recycled Plastic</td>
<td>0</td>
<td>Stretching Best Practice</td>
<td>1,000</td>
<td>2,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Recycled Tyres</td>
<td>0</td>
<td>Stretching Best Practice</td>
<td>5,000</td>
<td>5,130</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td>686,00</td>
<td>Stretching Best Practice</td>
<td>1,005,000</td>
<td>1,104,530</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>714,500</td>
<td>745,000</td>
</tr>
<tr>
<td>Total Aggregate Use in Hampshire</td>
<td>5,119,500</td>
<td>Zero growth in total aggregate use assumed</td>
<td>5,119,500</td>
<td>5,119,500</td>
</tr>
<tr>
<td>Proportion of Recycled and Secondary Aggregates</td>
<td>13.4%</td>
<td>Stretching Best Practice</td>
<td>19.6%</td>
<td>21.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business as Usual</td>
<td>14.0%</td>
<td>14.6%</td>
</tr>
</tbody>
</table>

15.3 ‘Business as Usual’ Estimates

These are generally based on the figures for usage in 2004, with increases of 5% for 2010 and 10% for 2020. Where current usage is zero, this has been assumed to remain the case under the ‘business as usual’ scenario. As with the other figures, these estimates are subject to a lot of uncertainty.
15.4 Collection

Collection of some material streams, such as glass and plastic, is carried out under Project Integra, but these materials are not primarily a source of aggregates. For the other materials, collection is not the responsibility of the Local Authorities. Neither is it the primary issue, other than to ensure that the materials go to a recycling centre rather than landfill. For demolition and construction waste, however, there is a requirement for action before the material is generated. Internal furnishings and soft materials should be stripped out prior to demolition of existing buildings, so that the ‘hard’ material – bricks, concrete, masonry, etc. – is not contaminated by timber, paper, plastic, metal, plasterboard and similar materials. This maximises the amount and quality of recycled aggregate that can be obtained. In construction, inert and non-inert waste should be stored separately, so that, as for demolition material, the amount and quality of recycled aggregate can be maximised. There is a great deal of existing guidance from CIRIA, BRE, ICE, WRAP, Envirocentre and others on these topics. The planning system can be used to encourage these practices by means of the demolition protocols recently developed by Envirocentre (see Chapter 5.5).

15.5 Infrastructure

The proposed increase in recycled aggregates will require the development of additional CD&EW Recycling Centres to produce the material. The current distribution of CD&EW Recycling Centres (Map 2) shows them mainly around the periphery of the Southampton-Portsmouth area in the south of the county and the Basingstoke-Aldershot area in the north. Several areas appear under provided in relation to their population, such as Basingstoke, Andover and Winchester, though it is known that there are waste transfer stations in these areas that collect CD&EW and send it on to CD&EW Recycling Centres elsewhere.

New CD&EW Recycling Centres will have to meet strict requirements on control of noise, dust, vibration, traffic and visual impact. They will also have to operate according to the WRAP quality control protocol if they are to produce aggregates that are acceptable under modern specifications. In addition to standard crushing and screening equipment, they are likely to require plant to screen out contaminants such as paper, timber, plastic and metal from CD&EW. This may require washing plant, particularly if excavation waste is to be processed, as it often contains excess fines. Arrangements will need to be made with the regulatory authorities for disposal of the wash water. However, most contaminants can be removed by dry techniques such as screening with trommels, air blowing and hand picking, thus avoiding the problems of generating wash water. Additional crushing and screening plant will be needed to produce aggregate for high value bound applications. Crushers are generally mobile plant; they move between a number of facilities rather than being permanently located at one site. In some cases, it may be preferable to locate all the plant inside a building, so that noise, dust and other impacts can be controlled more easily. There is evidence that a number of operators of CD&EW Recycling Centres in Hampshire are looking at enclosed facilities for future developments.

CD&EW Recycling Centres should be located close to where the material arises and to the proposed market, in accordance with the proximity principle. Excessive transport distances will also make the materials uneconomic in relation to primary aggregates. The periphery of urban areas is thus likely to be the most appropriate location for new sites.

Existing facilities exist for railway ballast and glass. Most highways operations work out of temporary sites, but there is a requirement for a network of secure sites across the county for storing sweepings from surface dressings, recycled asphalt, kerbs and other materials. There will also be a requirement for a site to enable the IBAA from the three incinerators in Hampshire to be weathered and processed. This should ideally be located centrally to the incinerators, so that the product would be available to all parts of the county without excessive transport distances. The site would need to be at least 4 ha in size and would need to have arrangements to contain the drainage water from the IBAA during the weathering phase.
15.6 Market Development

A recurring theme is the need for market development, particularly for high-value bound applications. There is some overlap with education (Chapter 15.6), as this is often required to overcome perceptions of recycled and secondary aggregates as dirty, variable and inferior to primary aggregates.

First, it should be stated that specifications are not a barrier to the use of recycled and secondary aggregates. Most specifications have been updated in recent years to allow the use of these materials in a variety of applications, subject to quality control of the production process. The main barrier is likely to be that many clients and their advisers are not aware of recent developments and are still working to old versions that restrict the use of these materials.

The regulatory position adopted by the Environment Agency, that recycled materials remain waste until they are incorporated into a product, has been a barrier recently, but this has now been overcome by the quality protocol for the production of recycled aggregates from inert waste developed by WRAP (WRAP, 2004). Aggregates produced in accordance with this protocol will generally not be regarded as waste, and hence the requirements of the Waste Management Regulations will not apply to construction sites using these materials. It is the intention of WRAP to extend the protocol to cover secondary aggregates such as slag, pulverized-fuel ash and IBAA in the near future, which will simplify the use of these materials in construction. The Environment Agency and the Used Tyre Working Group are also working on a series of exemptions for recycled tyres, which will encourage their use in construction.

Production of high-value aggregates for concrete and asphalt will require investment in plant to produce the necessary tight grading envelopes for these applications. There is therefore reluctance by operators to invest in this unless they can be sure there will be a market for the product. This is an area where the County Council can lead the way by using recycled aggregates in bound applications, first in demonstration projects, then as a target or requirement in contracts. Targets can be used as a way of encouraging contractors to use more recycled and secondary aggregates, but it can be more productive to enter into partnering arrangements such as the existing PSA. This enables all parties to come together and feel part of a team with a common goal, and is likely to produce better results in the long term. The establishment of similar arrangements in other areas will increase the use of recycled and secondary aggregates.

There is also a need to develop markets for the surplus fines produced during processing of CD&EW, particularly for bound applications, and for the contaminants such as timber, metal and paper extracted from the CD&EW during processing.

15.7 Education

This is a major requirement if the targets for recycled and secondary aggregates are to be met. This is partly a case of dissemination of information about specifications, quality control, regulations and what is possible with the materials, and partly making the business case for recycling. Just as there is a perception in some quarters that recycled aggregates are inferior, so there is a perception that they will be more expensive than primary aggregates. Both these perceptions need to be addressed, by means of dissemination of information and demonstration projects.

There is a requirement for education about recycling throughout the supply chain:

- Clients need to be convinced it is not going to be more expensive or of inferior quality;
- Designers and specifiers need to be convinced it will do the job as well as primary aggregates;
- Contractors need to be convinced it can be cheaper, more effective and that adequate supplies of material will be available to meet the construction programme;
- Suppliers need to be convinced there will be a market at a good price and a reliable supply of raw material to persuade them to invest in the necessary infrastructure;
• Regulators need to be convinced the materials will be produced under proper quality control procedures and will not cause pollution of the environment;
• Planners need to be convinced that applications for CD&EW Recycling Centres adequately address all the relevant issues and will not cause unacceptable nuisance to nearby residents;
• The public needs to be convinced that using recycled and secondary aggregates is something positive, like recycling glass and plastic.

A number of initiatives will need to be developed to address all these sectors. Some of these will be more appropriately done on a national basis, as they are national issues. Others will be best addressed locally, through ongoing initiatives like HNRI, MRS and Project Integra.

15.8 Financial Issues

In most cases, the cost of infrastructure will be borne by the operator, and will be recovered by higher charges for the higher quality products. Assistance with funding for capital infrastructure for producing recycled and secondary aggregates is available from WRAP at present; the current call for proposals closes on 18th June 2004, and it is not clear whether there will be further calls in the future.

15.9 Risks

A number of potential risks to achieving the targets were identified. These include:

• The price of primary aggregates remaining low and making recycled and secondary aggregates uncompetitive;
• Failure to develop a market for high-value applications leading to most recycled and secondary aggregates continuing to be used in low-value unbound applications;
• Key individuals or organisations failing to participate in efforts to increase the quantity and quality of use of recycled and secondary aggregates;
• Difficulties in finding a suitable site for IBAA weathering and processing in Hampshire resulting in all the material being sent to Rainham Marshes and the products used elsewhere;
• Railway ballast being too heavily contaminated for processing as concrete and asphalt aggregate to be economic;
• Local opposition preventing the establishment of CD&EW Recycling Centres in the most effective locations, leading to long transport distances or lack of capacity;
• Inappropriate use of recycled or secondary aggregates giving recycling a bad name and leading to reluctance to use the materials;
• Unforeseen effects of regulation from Europe or in the UK that, deliberately or not, makes the use of recycled and secondary aggregates more difficult.

Against these possible risks are many drivers to greater use of recycled and secondary aggregates, both financial, such as the Aggregates levy, and in terms of the general drive towards greater sustainability in construction.

15.10 Wider Issues

The situation in Hampshire has to be seen against the bigger picture of the overall situation in the UK and Europe. Government policies are very much in favour of sustainability, and this is not likely to change in the short to medium term, so the overall trend is likely to favour increased recycling. Any problems that do occur, such as the recent waste/product issue, are likely to be resolved before they pose major obstacles.
15.11 Conclusion

This report has shown that there is considerable potential for increasing both the amount of recycled and secondary aggregates used in Hampshire and the value of the applications for which they are used. The targets should not be regarded as precise estimates but as goals to aim for, which should be reviewed periodically. Recycling should not be seen as an end in itself but as part of the overall process of developing a more sustainable construction industry, which will benefit all involved and the general public. Long before 2020, further developments will render these targets obsolete, so there will be a continuing need to review progress and revise targets on the road to sustainability.

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*BS EN 13139:2002* Aggregates for mortar

*BS EN 13383-1:2002* Armourstone

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AMENDMENT - November 2003

*Volume 0: Model contract document for major works and implementation requirements (MCHW 0).*

*Volume 1: Specification for Highway Works (MCHW 1).*

*Volume 2: Notes for Guidance on the Specification for Highway Works (MCHW 2).*

*Volume 3: Highway Construction Details (MCHW 3).*

*Volume 4: Bills of Quantities for Highway Works (MCHW 4).*


*Volume 1: Highway maintenance code*.

*Volume 2: Routine and winter maintenance code*


