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Waste Audit

Proposed Housing Development

High St, Dunstable

June 2007

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Issue and Revision Record

Rev	Date	Originator	Checker	Approver	Description
A	June 2007	E M Maltby	A Booth	A Booth	Final

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Chapters and Appendices

1 Introduction

Mott MacDonald was commissioned by JS Bloor (Northampton) Ltd (referred to hereafter as Bloor Homes) to undertake a waste audit for a proposed development in Dunstable. The site is a former car parts manufacturing facility that has recently been demolished to slab level. Bloor homes intend to redevelop the site as residential housing and recreational open space. The residential dwellings will comprise a mixture of apartments and houses.

The objectives of the waste audit were:

1. to document the waste management design features and practices that will be used during the construction and occupational phases of the development;

2. compare waste design features and practices to relevant benchmarks; and

3. where appropriate, to make recommendations to Bloor Homes on additional opportunities to reduce, reuse and recycle waste.

2 Site Location

The Former Trico Works site is located at the junction of High Street North (A5) and Brewers Hill Road, Dunstable, Bedfordshire. The site location is shown in Figure 2.1. The site is centred on National Grid Reference 500900, 222800.

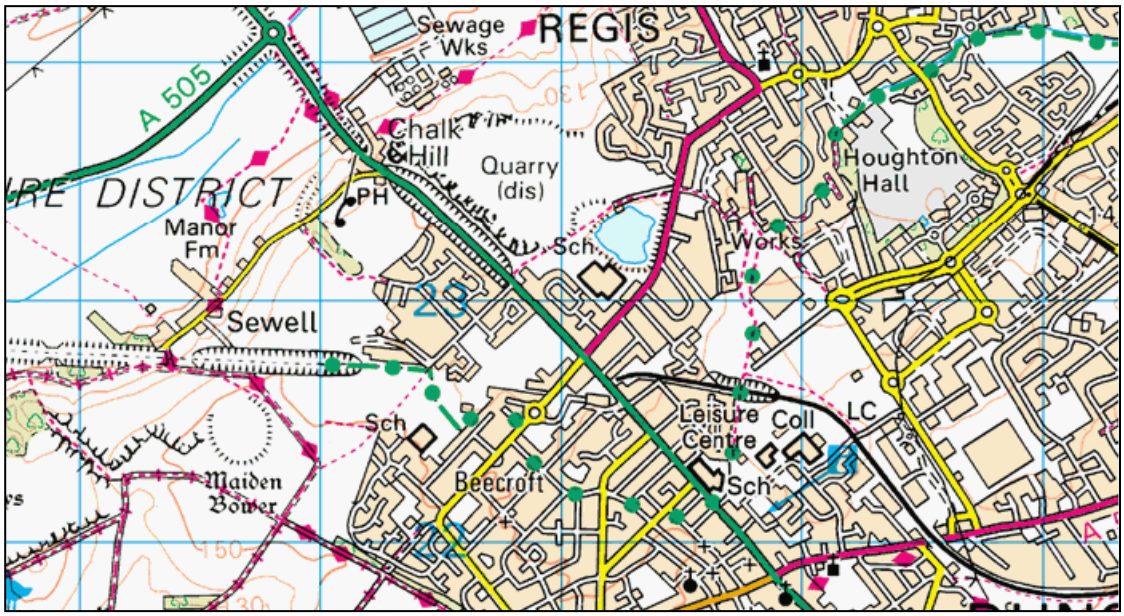

Figure 2.1: Site Location

3 Site Description

The site occupies an area of roughly 7.2 hectares. It comprises land that previously housed a motor vehicle components manufacturer. The factory buildings have previously been demolished and presently the site is unoccupied and covered in the most part by concrete and asphalt hardstanding.

The site is bounded to the north by High Street North (A5) with housing beyond. To the south lies a disused railway line, council depot, with further light industrial/ commercial premises including a gas holder station beyond. To the west runs Brewers Hill Road with a fire station and housing situated beyond this. To the east is newly built housing.

The site is formed of two levels. The change in ground level is marked by brick built retaining walls of between 1.2m and 3m in height; concrete and rough tarmac surfaced vehicle access ramps were present in two locations. The boundary between the two terraces runs in a north west to south east direction (approximately parallel to the A5) in the southern third of the overall site area.

The site has become contaminated through its previous industrial use and will require remediation prior to its redevelopment for housing.

4 Proposed Development

The housing development is being undertaken in two phases. Phase one comprises 167 residential units, of which 96 are apartment and 71 are houses. Phase two comprises 211 residential units, of which 110 are apartments and 101 are houses.

5 Waste Audit Methodology

5.1 Information Sources

The following information sources were used to assist in writing the waste audit.

- An on-site assessment of current waste management practices at Broughton Atterbury, an existing Bloor Homes development in Milton Keynes.
- review of Bloor Homes design specifications and policies.
- discussions with the Dunstable scheme Architects, Peter Taylor and Associates regarding design features and incorporation of waste management requirements.
- discussions with the engineer preparing the remediation design to identify how waste management and sustainability requirements will be accounted for in their design.
- review of Bedfordshire County Council Supplementary Planning Guidance (ref.1), which is in line with policies W5 and W6 of the adopted Bedfordshire and Luton Waste Local Plan 2005 (ref. 2).
- review of Department for Environment, Food and Rural Affairs (Defra) household waste arisings statistics (ref. 3).
- review of local recycling amenities within the vicinity.

5.2 Waste Audit Process

For the purposes of the waste audit, the development was divided into three distinct phases:

- remediation;
- construction; and
- occupation.

For each phase, the main waste related activities have been identified and reviewed against:

- performance benchmarks taken from information sources given above;
- benchmarks for good industrial practice based on our own experience; and
- the waste hierarchy i.e. reduce, reuse, recycle, energy recovery, disposal.

6 Remediation Phase

In order to redevelop the site it will be necessary to undertake some form of remedial action to deal with chemical contaminants. Additionally, it will be necessary to remove existing concrete slabs, foundations, basements, and buried services.

A separate Remediation Strategy Report will be produced that will be submitted to South Bedfordshire District Council which will discuss the proposed remediation works in detail. The following section provides a brief outline of the different materials present at the site, for which waste management options have been appraised.

6.1 Topsoil

Any topsoil will be stripped and retained on-site for reuse.

6.2 Vegetation

Any vegetation will be cleared and shredded/chipped for beneficial use as mulch or compost. No material will be burnt on-site.

6.3 In-situ Concrete

The residual slabs, foundations and basements at the site represent a considerable amount of mass concrete that will require removal as part of the remediation works. The total amount of concrete is estimated to be approximately 9000m^3 including hardstanding and foundations. It is intended that mass concrete will be excavated and crushed on site to create an engineering fill which will be reused within the development. Any surplus concrete will be sold as a beneficiary secondary material. Any concrete contaminated with chemicals or oil will be disposed of to landfill.

6.4 Asphalt Hardstanding

Any asphalt hardstanding will be excavated and tested for tar. Asphalt hardstanding with high levels of tar will be removed from site and sent to landfill. Asphalt hardstanding with low levels of tar is capable of beneficial reuse and will be sold to a specialist contractor for recycling.

6.5 Contaminated Soil

Areas of soil on the site have been identified to be contaminated with petroleum hydrocarbons and heavy metals. The total volume of contaminated soils has been estimated to be 6750m^3. These soils will require remediation before the site can be redeveloped for housing. Given the sensitive nature of the end use and the types of contamination, there are only limited opportunities to treat contaminated soils on-site and reuse them in the housing development. Hence, it is proposed that contaminated soils will in general be disposed to landfill.

Efforts will be made to reduce the amount of contaminated soil that will be sent to landfill. Contaminated soils will be carefully excavated and separated from adjacent clean soils to minimise the volume of waste produced. Where contaminated soils are considered hazardous waste due to their petroleum hydrocarbon content, it is intended to subject them to bioremediation to reduce their classification to non-hazardous waste before disposal. It is possible that some of this bioremediated soil will be able to be cleaned to an extent that it is capable of reuse within the development.

6.6 Earthworks

The site requires very little earthworks. The development will not require the importation of significant volumes of soil, with the exception of clean sub and topsoil for gardens and landscaped areas. The development has been designed to utilise and reuse existing materials where possible.

6.7 Brickwork

There are some brick structures on site. Where opportunities arise these will be reused on-site, otherwise they will be removed from site and sent to landfill.

6.8 Asbestos

A small amount of asbestos piping has been found on-site. This will be removed and disposed of by specialist contractors. The asbestos will be stored in a lock up skip and double bagged before disposal.

7 Construction Phase

7.1 Waste Management Practices

Current waste management practices were observed during a site visit to Broughton Atterbury in Milton Keynes, another Bloor Homes development.

Observations made on-site coupled with discussions with Bloor Homes architects, Peter Taylor and associates, have provided a good understanding of the range of practices/considerations incorporated into the development with regard to waste management and the waste hierarchy. These include:

- efficient design (building form and shape) to minimise the use and waste of materials e.g. sizing rooms to allowing fitting of standard size plasterboard sheets;
- a 'whole life approach' to the proposed development i.e. flexibility in design for future building expansion and alterations;
- avoiding over specification and composite material specifications;
- segregation and recycling of used plasterboard. Bloor Homes have a takeback agreement with British Gypsum who collect used plasterboard and reuse it as a replacement for virgin gypsum;
- segregation and reuse of hardcore on-site. Material is crushed on-site and incorporated into the development e.g. construction of driveways and foundations;
- use of timber sourced from legal and sustainable suppliers;
- providing communal bin storage areas for apartment units;
- use of secure storage containers for timber storage;
- storage of all plaster and cement under waterproof cover;
- return of undamaged pallets to the supplier; and
- provision of induction training, and regular toolbox talks so that everyone understands the need for waste segregation and the opportunities for reusing/reusing/recycling wastes.

The findings of the waste audit illustrated that waste management practices, both at the design stage and construction stage are generally in line with industry good practice, and allow for the avoidance, minimisation and reduction of construction waste. However, it was noted that, at the Milton Keynes site, a significant proportion of waste was being disposed of in 'mixed waste' skips. Mixed waste skips contained significant proportions of paper, cardboard, timber and scrap metal.

Based on this observation there may be scope at the Dunstable site for additional segregation of wastes and to maximise opportunities for reuse and recycling, particularly timber, paper and cardboard and scrap metal. Separate skips could be provided for some or all of these waste streams.

7.2 Quantity and Type of Waste

The main waste streams expected to be generated during the construction phase are shown in Table 7.1 below.

Material	%
Packaging	25.0
Timber	13.8
Plaster & cement	11.5
Miscellaneous	9.6
Ceramic	8.6
Insulation	7.5
Inert	7.1
Metal	4.0
Plastic	3.2

Table 7.1: Breakdown of Waste Types from UK Construction Sites (ref.4)

Based on the visit to the Milton Keynes site and our knowledge of waste management practices we estimate that the waste arisings at the Dunstable site will equate to roughly 7.5 tonnes per house. The proposed development will comprise 378 housing unit, hence it is estimated that the construction phase will generate approximately 2,850 tonnes of construction waste.

8 Occupational Phase

8.1 Design

Bloor Homes, in consultation with Bedfordshire County Council have allowed for incorporation of waste management facilities and requirements within the development design. The building design has taken into consideration the waste management issues associated with a development of this size. An assessment of waste arisings has been made to ensure the design capacity meets the predicted household waste arisings.

To successfully incorporate waste management issues into the housing unit design the following have been included:

- each house will have a screened enclosure located at the front of the house for waste/recycling storage (see Figure 8.1);
- an enclosed communal bin stores will be provided for apartments (see Figure 8.2);
- storage areas have been designed to avoid blocking views between occupied rooms and the street;
- the kitchen design for all housing units includes an integrated recycling bin systems- which comprises a bin with three separate compartments for different recyclable materials;
- composting units will be provided in all private gardens;
- the down pipes from all housing units will interlink and allow for water butt collection; and
- roads have been designed to accommodate refuse collection vehicles (RCVs) and collection points have be positioned so that collection crews do not have to transport two wheeled containers far to the RCV.

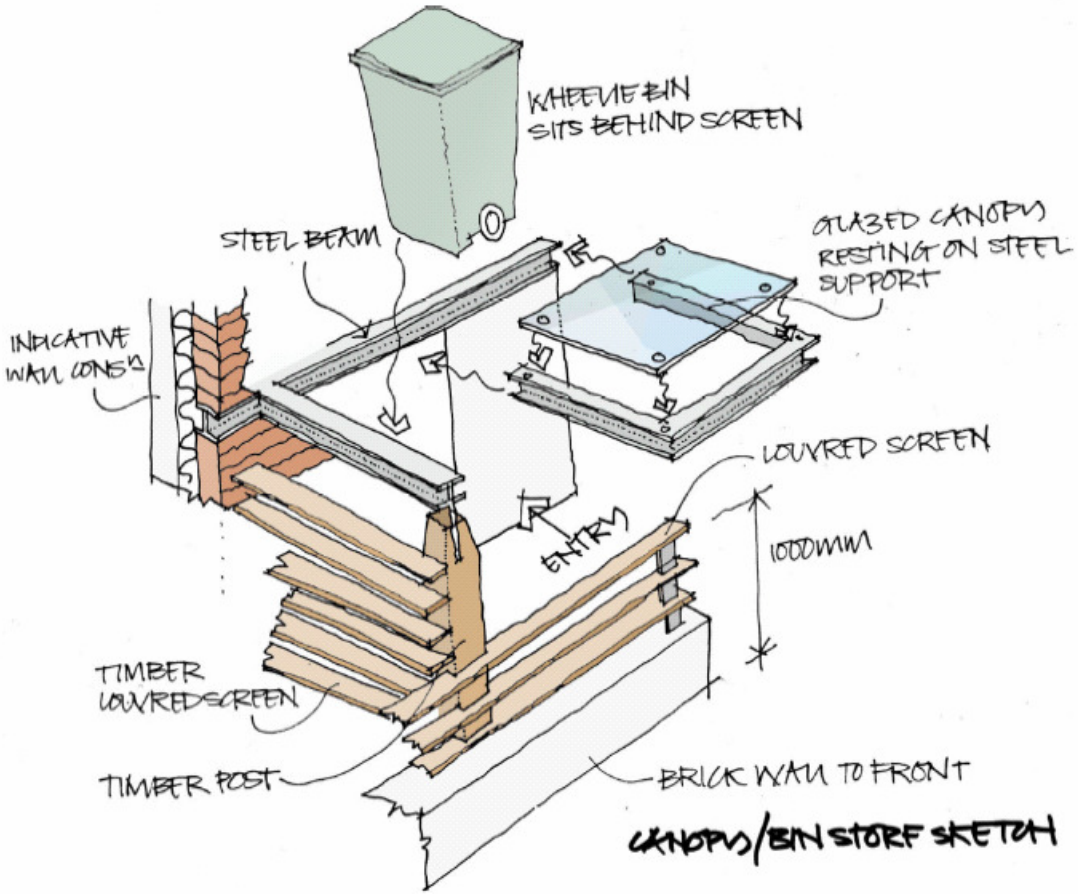

Figure 8.1: Architects Design for Waste Storage for Houses

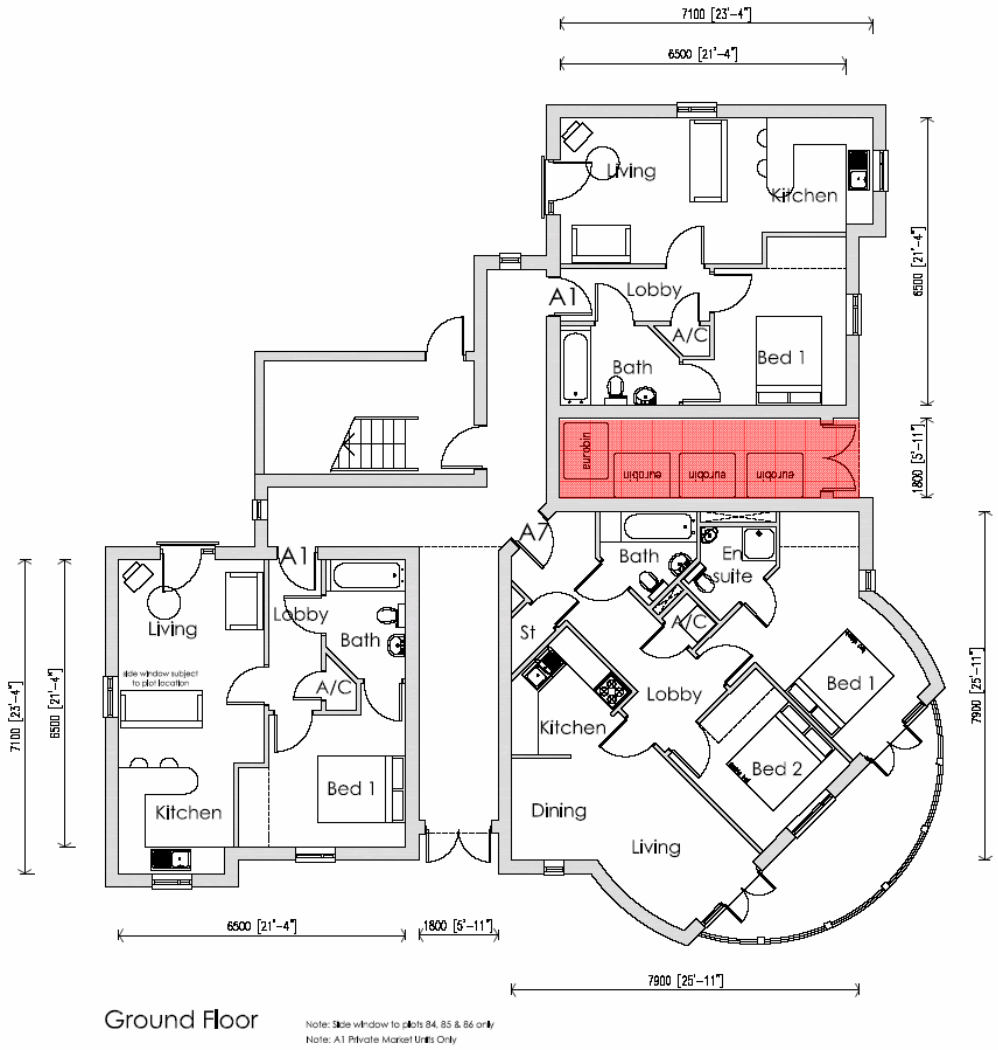

Figure 8.2: Example of Architects Design for the Ground Floor of Apartment Blocks showing Waste Storage Area

8.2 Assessment of Expected Household Waste Quantities

The 2005/2006 municipal waste management statistics published by DEFRA (ref.3) show that the average quantity of household waste collected was 505kg/person/year, comprising 370kg/person/year of mixed refuse and 135kg/person/year of separated recyclables. Therefore the total volume of waste generated by an individual is estimated at 2.52m^3/yr (assuming a conversion factor of 0.2 tonnes/m^3).

The Chartered Institution of Building Services Engineers (CIBSE ref.5) provides estimates of occupancy rates for residential buildings. These are shown in Table 8.1 below.

Residence Size	Occupancy Rate
1 bedroom	1.8 people
2 bedroom	3 people
3 bedroom	4 people
4 bedroom	5 people

Table 8.1: Normal Occupancy Rates for residential Buildings (from ref. 1)

Using these norms the total occupancy for the Dunstable High Street development is estimated to be 1202 people. Therefore, the total weight of mixed waste generated for all housing units combined per week is estimated to be 11.7 tonnes (58.5m^3). this breaks down as 8.6 tonnes (43m^3) of mixed waste and 3.1 tonnes (15.5m^3) of recycled waste.

Table 8.2 below shows the estimated volumes of wastes generated by dwelling type per week.

Dwelling type	**Mixed waste generated per week (litres)**	**Recyclable waste generated per week (litres)**	**Total waste generated per week (litres)**
1 bedroom	87.4	64.0	23.4
2 bedroom	145.7	106.7	38.9
3 bedroom	194.2	142.3	51.9
4 bedroom	242.8	177.9	64.9

Table 8.2: Waste Volume Breakdown by Size of Household for High St, Dunstable Development

Bedfordshire County Council Supplementary Planning Guidance (SPG) (ref.1) regarding waste and residential developments indicated that the basic requirements for new dwellings are:

- minimum space for waste/recycling storage per individual property of 0.75m x 2.04m (i.e. 3 x 240 litre wheeled bins); and
- where appropriate communal bin stores should be provided which cater for 180 litre storage for 1-2 bedroom dwellings and 240 litre storage for more than two bedrooms.

By comparison, to the expected waste volumes given in Table 8.2 it can be seen that the expected waste volumes match the design requirements in the SPG that has been adopted in the development design. Although, in the case of four bedroom houses, it should be noted the expected waste volume slightly exceeds the volume given in the SPG (240 litres design cf. 242.8 litres calculated arisings). This slight discrepancy is expected to be within the margin of error of the estimates and is not considered significant.

8.3 Local Waste Management Facilities

In addition to household collections there are a wide range of other waste facilities locally that provide opportunities for recycling and disposal of wastes. Local facilities include:

- *Social Club. St Marys Church West Street, Dunstable, LU6 1NY.* - Glass Bottles/Jars (Mixed) - 1.01 miles
- *Yum Yum Car Park. St Mary's Gate, Dunstable, LU6 3SW* - Glass Bottles/Jars (Mixed), Mixed Paper (incl Newspapers, Junkmail, Magazines) - 1.15 miles
- *The Priory PH. Chiltern Road, High St North, Dunstable, LU6 1EP.* - Mixed Metal Food & Drink Cans, All Textiles - 1.34 miles
- *Dunstable Town Cricket Club. Dunstable Road, Totternhoe, LU6 1QP.* - Glass Bottles/Jars (Mixed) - 1.39 miles
- *Car Park at rear of Glider Public House. 65 Lowther Road, Dunstable, LU6 3NL.* - Glass Bottles/Jars (Mixed) - 1.63 miles
- *Hungry Horse Car Park. Church Street, Dunstable, LU5 4HP* - All Textiles - 1.75 miles
- *Dunstable Household waste recycling centre. French's Avenue, Dunstable LU6* - Car Batteries, Domestic Batteries, Bulky Garden Waste, Christmas Trees, Garden Waste, Bricks, Rubble, Concrete, Scrap Wood, Soil, Tyres, Glass Bottles (Amber), Glass Bottles (Clear), Glass Bottles (Green), Car Oil, Domestic Oils, Bikes, Aluminium Cans, Mixed Scrap Metal, Cardboard, Christmas Cards, Mixed Paper (incl Newspapers, Junkmail, Magazines), Phone Directories & Yellow Pages, All Textiles, Cookers & Ovens, Flourescent Lamps, Fridges & Freezers, Microwaves, Washing Machines, Dryers & Dishwashers - 1.90 miles
- *J Sainsbury car park. Luton Road, Dunstable, LU5 4RF* - Glass Bottles/Jars (Mixed), Aerosols, Aluminium Foil, Mixed Metal Food & Drink Cans, Steel Food & Drink Cans, Mixed Paper (incl Newspapers, Junkmail, Magazines), All Textiles, Shoes - 1.99 miles
- *Ewe & Lamb 140 Luton Road Dunstable LU5 4LE.* - All Textiles - 3.00 miles
- *Coop High Street, Houghton Regis, Dunstable, LU5 5QT* - Glass Bottles/Jars (Mixed), Aerosols, Steel Food & Drink Cans, Mixed Paper (incl Newspapers, Junkmail, Magazines), All Textiles, Shoes - 3.08 miles

9 Summary

Bloor Homes are redeveloping a former industrial site in Dunstable for residential housing. A waste audit was carried out to identify how waste management requirements are intended to be integrated into the development.

For the purpose of the audit, the development was considered as three phases: contamination remediation phase; construction phase; and the occupational phase.

The waste audit was conducted by interviewing key staff involved in the development design and visiting a current Bloor Homes development in Milton Keynes to review waste management practices. To benchmark the findings of the interviews and site visit, references were made to the following: Bedford County Council Supplementary Planning Guidance regarding integration of waste management requirements into residential developments; UK research regarding waste arisings from residential developments and Mott MacDonald experience of industry norms.

In general, it was found that waste management requirements have been given detailed consideration and integrated into the development design where possible. There was evidence for this identified in all three development phases. Overall, good waste management practice makes economic sense so and is consistent with good business practice. Hence, the integration of good waste management practice into the design is not unexpected.

During the site visit to the Milton Keynes development, it was noted that there was only limited segregation of some construction wastes (mainly packaging) and it is recommended that at the Dunstable development consideration be given to additional waste separation through providing separate skips for cardboard, paper, wood and metal.

10 References

1. Managing Waste in New Developments. Supplementary Planning Document. Bedfordshire and Luton Waste Local Plan. Bedford County Council. April 2006.

2. Bedfordshire and Luton Minerals and Waste Local Plan First Review: Adopted 2005.

3. Department for Environment, Food and Rural Affairs. Municipal Waste Management Statistics 2005/6. http://www.defra.gov.uk/environment/statistics/wastats/index.htm

4. Construction and Demolition Waste. Good Building Guide 57, Part 2. BRE. July 2003.

5. CIBSE Guide D Transportation systems in buildings. 3rd edition. Chartered Institution of Building Services Engineers, 2004.