



waste

# Contents

Hertfordshire waste facts	1
Basic principles	2 - 6
Solutions	7 - 11
Case studies	12 - 21
Futher information and references	22 - 24

## Key

Different development sectors are colour coded below. To aid navigation through the case studies in this Guide, the colour codes denote the applicability of case study sustainability solutions to each of the various development sectors. The colour coding can be found in the bottom corners of each of the case studies.



# Hertfordshire waste facts

**The only landfill in Hertfordshire currently accepting waste is Westmill in Ware, and this only has permission to continue receiving waste until 2017.**

The **construction industry consumes 420 million tonnes of materials** each year. Of these materials, **120million tonnes is wasted**. Of this waste, 25 million tonnes is disposed of in landfill. Landfill sites are in short supply, produce local environmental impacts, and the transport of waste to landfill sites creates more CO2 emissions.

The amount of **waste produced in Hertfordshire is approximately 2.4 million tonnes per year**, around ¼ (600,000 tonnes) of which is household waste.

**Within the construction industry 13% of waste is new, unused material. (BRE)**

Typically, more than **85% of demolition waste materials from construction processes can be reused or recycled.**

Recent studies of housing projects show that **by taking care in selecting and specifying commonly used house-building materials, it is possible to increase the use of recycled material by up to 600% - 8% by value - avoiding over 60 tonnes of waste being landfilled; without spending more.**

**The European Landfill Directive set targets requiring a progressive decrease in the amount of biodegradable waste landfilled.**

The volume of construction and **demolition waste going to landfill has decreased substantially**, by more than 60%, since the landfill tax was introduced in 1996.

The **County and District Councils spend more than £54 million each year collecting and disposing of municipal waste**, and the costs are still increasing. Comparatively, the costs of recycling are falling.

In 2006-07, the County and District Councils spend more than **£54 million collecting and disposing of municipal waste**. These costs are increasing significantly each year in line with the landfill tax escalator.

**Over 50% of renewable energy is generated from waste:** 28% comes from landfill gas and 23% from waste facilities. ([www.esauk.org/waste/facts](http://www.esauk.org/waste/facts))

In **2009/10, 44.5% of Hertfordshire's municipal solid waste was recycled and composted**, with a further 4.9% going into energy recovery plants.

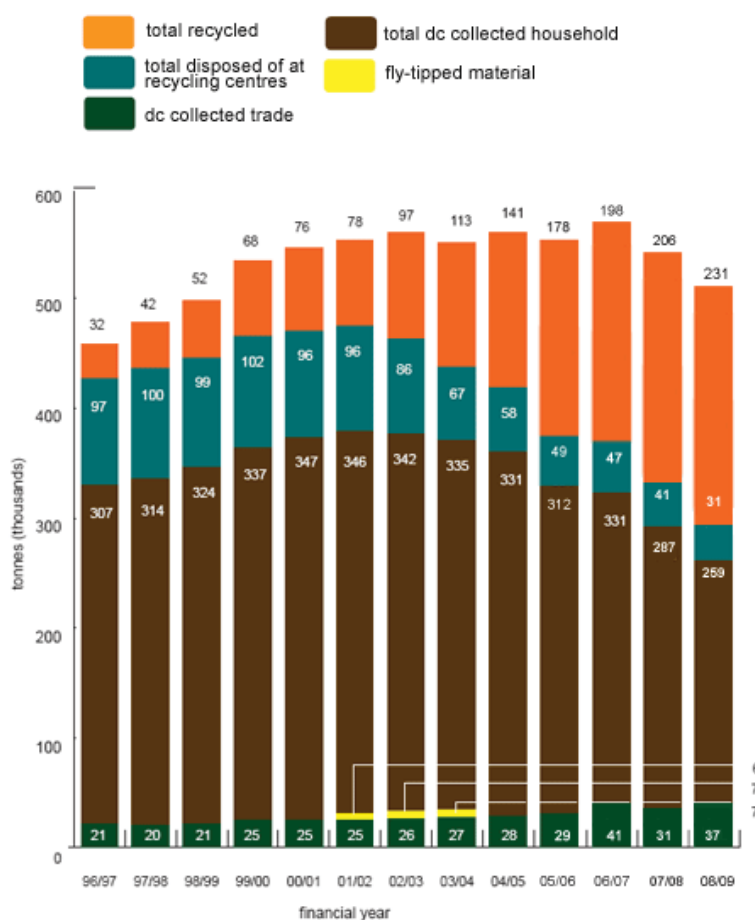
# Basic principles

## Principles of waste

Waste generation is an inevitable consequence of consumerism. As the costs of waste disposal increase (due to rising landfill tax, the increasing fuel costs associated with waste transportation and increasingly stringent environmental legislation), waste is being more actively managed at source.

Recycling rates in Hertfordshire are higher than the national average. However, the volume of waste being generated is increasing and a significant proportion of Hertfordshire's waste is still landfilled. Of the waste Hertfordshire sends to landfill, most is exported outside of the county. This cannot continue, the county must tackle its waste issues within county boundaries.

### Municipal waste generation in Hertfordshire



source: Hertfordshire County Council (2010)

# Principles of waste

## types of waste

Waste generated by development is produced through three main activities: construction, operation and demolition:

- construction waste: major components include soils (often mixed with other materials), concrete, masonry, brickwork, stone, metal (largely steel), glass, plasterboard, bituminous materials such as road planings and architectural features

Waste Stream	Percentage (%) of waste by volume in comparison to the total volume
Canteen/office/ad hoc	11.2
Ceramics/bricks	9.4
Concrete	12.4
Electrical equipment	1.0
Furniture	0.5
Hazardous	0.4
Inert	4.4
Insulation	7.1
Liquids and oils	0.3
Metals	3.8
Plastics	6.8
Timber	12.3

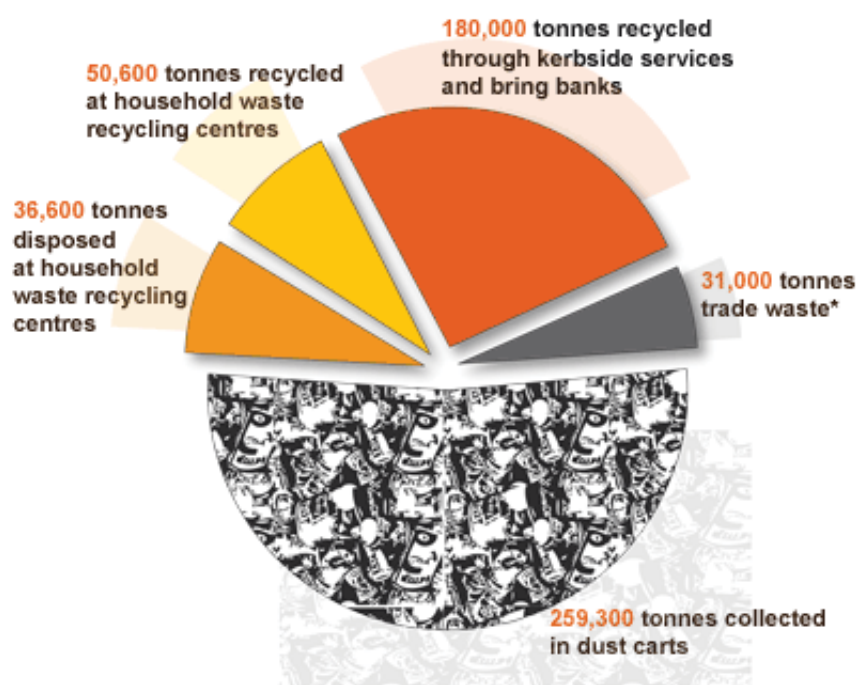
Source: ODPM, Waste Aware Construction (2006)

- Operational waste: the largest share of waste can be generated by building operations, i.e. building occupation. Although operational waste management practices are at the discretion of the building user, effective operations are strongly influenced by the design and fit out of a building.
- refurbishment/demolition waste: includes all building materials, building services, furniture and landscape materials and features.

The construction industry is responsible for some 120 million tonnes of construction, demolition and excavation waste every year – around one third of all waste in the UK. Many organisations in the industry are publicly supporting the sector goal of halving the amount of construction, demolition and excavation waste being sent to landfill by 2012. The 'Halving Waste to Landfill' initiative is championed by WRAP (the Waste & Resources Action Programme). More information on WRAP and the initiative is available at [www.wrap.org.uk/construction/halving\\_waste\\_to\\_landfill/index.html](http://www.wrap.org.uk/construction/halving_waste_to_landfill/index.html).

# Principles of waste

## recycling rates in Hertfordshire



\* from businesses (collected by district councils)

source: Hertfordshire County Council (2010)

# Principles of sustainable waste management

Population and household growth in Hertfordshire will put increasing pressure on waste management in the county. Consequently, the need to actively manage waste streams in Hertfordshire has never been more significant.

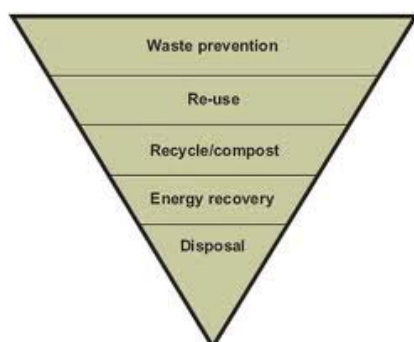
Sustainable waste management can be actively addressed through the planning process in the following ways:

- reducing the quantity of materials required for the building
- reducing the amount of waste generated
- management of construction and demolition wastes
- materials specifications (e.g. use of reclaimed and recycled materials)
- provision of recycling space/facilities

The nationally accepted framework or approach for achieving reductions in waste arisings and sustainable waste management is the Waste Hierarchy.

## waste hierarchy

The waste hierarchy provides a framework within which the most desirable waste management options are set out. This hierarchy is applied to all waste streams, not only those directly influenced by this Guide.



## Waste reduction:

By preventing waste before it occurs, money can be saved on the collection, treatment or disposals costs of waste. It also reduced the environmental impact and costs of extracting more raw materials, production and use.

## Materials reuse:

Reusing products and materials for the same (or alternative) purpose is the next preference. Before a material can be reused it should be assessed for its quality as it may be necessary to make minor repairs or additions before the product can reach the required standard.

## Recycling and composting:

Recycling involves the collection, separation and processing of wastes to make new products, e.g. newspapers are regularly recycled either to make new newspapers or eco-friendly home insulation. Composting is the same process but with organic wastes, e.g. food waste composted to make new fertiliser products. Recycling and composting processes usually require some energy to work well; however, the energy and cost to alternatively make new products from scratch are usually much greater. The economic viability of recycling/composting depends on factors such as the quality of the waste stream, the transport distances involved and the market price for the recycled materials which can fluctuate significantly. The aim should be to recycle construction wastes as close to their source as possible as they are typically heavy mass and volume to transport.

# Principles of sustainable waste management

## Energy recovery:

Energy from waste incineration is the last option to consider when avoiding landfill. Incineration recovers a proportion of energy from the waste stream; however, usually much less than by recycling/composting, reusing or reducing the waste generated in the first instance.

## Landfill disposal:

Disposal is the option we are trying to avoid. The only landfill in Hertfordshire currently accepting waste (Westmill in Ware) could reach full capacity as soon as 2020.

## designing out waste

By using alternative design solutions, the quantity of materials required can be reduced, which in turn will reduce the quantity of wastage. Alternative design solutions might also remove the need to undertake on site activities that produce waste.

To support design teams WRAP have published a guidance document explaining how to 'design out' construction waste. The document contains five principles:

1. Design for reuse and recovery.
2. Design for off site construction.
3. Design for materials optimisation.
4. Design for waste efficient procurement.
5. Design for deconstruction and flexibility.

The document can be downloaded for free from [www.wrap.org.uk/construction/tools\\_and\\_guidance/designing\\_out\\_waste/index.html](http://www.wrap.org.uk/construction/tools_and_guidance/designing_out_waste/index.html).

WRAP have also created a Designing out Waste Tool for Buildings (DoWT-B), which is an online options appraisal tool to indicate the opportunities to 'design out waste'. The DoWT-B provides an overview of the value of the materials typically consumed and wasted and investigates the benefit of waste reduction actions. More information is available at <http://dowtb.wrap.org.uk>

## proximity principle

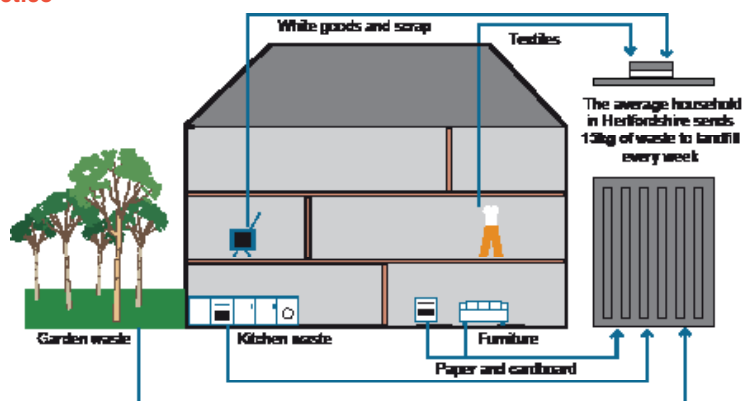
The transportation of waste can incur significant environmental and nuisance impacts plus unwanted additional cost. Therefore, waste should be processed or disposed of as near as possible to the point of its production.

# Benefits of sustainable waste management

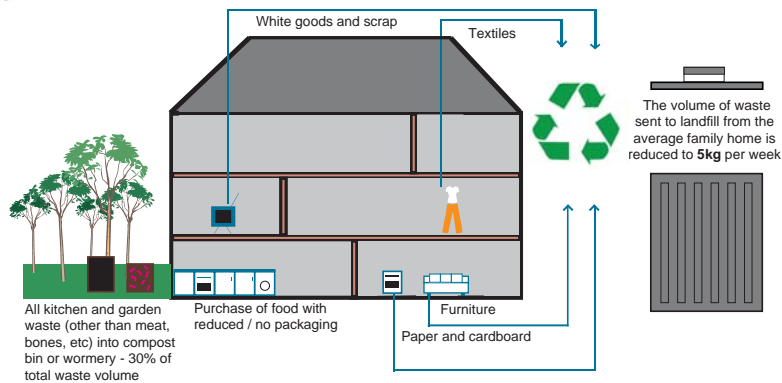
Sustainable waste management delivers lots of benefits!

- reduced waste disposal costs (notably Landfill and Aggregates taxes)
- reduced pressures on non-renewable resources, such as virgin aggregates
- reduced greenhouse gas emissions from landfill and incineration
- reduced energy consumption from the manufacturing process
- increased economic productivity
- reduced requirement for additional landfill capacity
- reduced nuisance created by odour and visual intrusion from landfill sites
- improved corporate reporting and green credentials for business

## Typical Practice



## Good Practice



# Solutions

The following pages detail construction and design solutions that reduce waste generation in the development process. These solutions should be read in conjunction with the guidance contained in the Materials module. Most approaches are relevant to all types of site.

For more information on many of the solutions described in this section go to Hertfordshire Waste Aware ([www.wasteaware.org.uk/](http://www.wasteaware.org.uk/)) and the national Waste and Recycling Action Programme (WRAP) ([www.wrap.org.uk](http://www.wrap.org.uk)).

## Construction best practice

### site waste management/action plans and monitoring

The Site Waste Management Plan (SWMP) should identify who is responsible and training requirements and communication methods. Best practice includes setting targets for the reduction of waste and recycling rates using Key Performance Indicators (KPIs).

This is required to gain extra points for the Code for Sustainable Homes and BREEAM. Best practice guidance KPIs and guidance on how to use them can be found at [www.kpizone.com](http://www.kpizone.com) and [smartwaste.co.uk](http://smartwaste.co.uk).

It is now a legal requirement in England for all construction projects costing over £300,000 to write and implement a Site Waste Management Plan (SWMP).

A plan should:

- Consider waste minimisation actions especially at the design stage
- Forecast the amount and type of waste that is likely to be produced and how it will be managed
- Ensure all existing waste legislation is complied with
- Monitor and record waste arisings and how much is reused, recycled, recovered and disposed of.



*Construction of Olympic White Water facility, Broxbourne*

Source: [London2012.com](http://London2012.com)

### Did you know?

There are a number of best practice guidance documents and tools available to assist with site waste monitoring. These include the BRE's SMARTWaste Plan which is a SWMP web-based tool with an integrated measurement function. Further information can be found on the WRAP website and at [smartwaste.co.uk](http://smartwaste.co.uk).

# Construction best practice

## adopting 'just in time' delivery

Stockpiling of materials on site increases the likelihood of their damage and thus transforms them into waste material. Just-in-time delivery ensures that materials are on site only when they are needed. In addition to reducing the risk of damage, it also reduces storage space requirements and makes way for space for waste segregation and storage.

However, consideration should also be given to the potential increases in vehicle movements that 'Just In Time' delivery can incur.

## re-use of materials

High value materials such as bricks, slates, tiles, beams and architectural details can often be re-used for the same function. This is common practice in refurbishment projects (depending on the integrity of the material following segregation) where particular components are re-used in the same building or sold for re-use.

## examples of waste material reuse

Broken brick or concrete	On-site levelling or filling holes
Cladding material	Use to refit another property
Components of old buildings (roof or floor tiles, beams)	Renovation of similar buildings or new 'mock-aged' construction
Fittings (door and window frames)	Fit in new or renovated building
Surplus construction materials	Return to place of purchase or use on another site

## sorting of waste on site

Thorough sorting of construction wastes is essential practice to enable effective re-use and recycling. It can also help to identify actions and priorities to reduce waste. Identifying the waste streams and causes of waste generation should be considered at an early stage, and space for segregated waste storage should be allocated on-site as appropriate. The end use of the sorted waste materials can be planned before the construction process commences.

Sorted waste can be compacted onsite to reduce the void space in skips, which reduces the number of skips required and the associated transport. For instance this can be done by chipping or crushing plasterboard waste or by baling cardboard and polythene waste.

Since October 2007, it has been necessary for businesses to 'treat' waste before it goes to landfill as a last resort. Treating waste includes:

- Collecting waste streams separately to recycle of the separated components
- Biological treatment such as composting or anaerobic digestion
- Thermal treatment such as incineration

Examples of the materials that can be collected on-site and their potential end treatment are listed in the following table:

Material	Reusable / Recyclable
Bricks	Reusable*/recyclable
Concrete	Recyclable
Hardboard	Recyclable
Packaging	Reusable/Recyclable
Insulation	No
Glass	Recyclable
Timber	Reusable**/recyclable
* costs permitting      ** depending on end use	

# Construction best practice

Although segregation of waste on site is typically the most practical waste management route, site conditions do not always permit it. Consequently, off-site segregation and recycling can be pursued.

## Did you know?

Hertfordshire has a number of permanent waste sites that recycle and dispose of construction wastes. Some are listed on the WasteAware website at [www.wasteaware.org.uk](http://www.wasteaware.org.uk) and on BREMAP at [bremap.co.uk](http://bremap.co.uk).

## on-site recycling of waste

A site waste management license must be applied for if active on-site reprocessing of waste is to be pursued (e.g. crushing and screening of inert waste). For more information on licence applications and the application process go to [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk).

Not all sites are suitable for waste reprocessing, as it can present nuisance impacts for neighbouring sites and the costs of equipment rental can be high. In some cases it may be more cost effective to transport waste to a local recycling site. However, if more than approximately 30km away, the environmental benefits of recycling construction materials may be reduced.

## return of materials to manufacturing facilities

Waste material can be returned to the supplier for re-integration into the manufacturing process. This is especially applicable in large projects where a significant amount of waste is produced.

This is a practical solution since the same lorry that brings the products onto the site can return to the manufacturer with the waste material. A number of UK manufacturers are now happy to adopt this approach. They include all of the UK plasterboard manufacturers (British Gypsum, Knauf and Lafarge). Pallets and packaging can also be taken back by suppliers and reused.

## Did you know?

Information on good procurement practice, manufacturers that take products back, and products that have a high recycled content can be found on the WRAP website here: [www.wrap.org.uk/procurement/products/index.html](http://www.wrap.org.uk/procurement/products/index.html)

## demolition

The treatment of demolition waste and its destiny is best covered in the Demolition Protocol (published by the Institution of Civil Engineers). The protocol sets a method based on a resource efficiency model explaining how material can be recovered from demolished structures and used in new build projects.

The protocol can be found on the ICE website at: <http://icextra.ice.org.uk/tlml/demolition>

Best practice in demolition should take into consideration all the possibilities of diverting waste from landfill including the reclamation, re-use and recycling of waste. A pre-demolition audit should be undertaken to identify the type, quantity and recovery potential for the materials present.

More information on the reuse of materials can be found in the Materials module.

## Operational waste management

The effectiveness of building operational waste management is largely dependant on the willingness of the building occupants to actively manage waste. However, as detailed earlier, sustainable operational waste management can be actively encouraged through design. Notably by providing suitable designed and located waste storage facilities, and linking up with Hertfordshire's recycling schemes.



Further information on operational waste management and the schemes available to Hertfordshire residents, employers, etc can be found at [wasteaware.org.uk](http://wasteaware.org.uk)

# Design

## use of pre-cast/pre-fabricated materials and modular construction

Pre-fabricated and modular components (e.g. pre-cast concrete beams, insulated wall panels, bathroom pods) reduce the amount of waste generated as they typically eliminate the most labour intensive (and wasteful) processes. In the case of modular construction, standardised components and repeat construction processes are also pursued, which typically lead to less generation of waste.

By using alternative design solutions, the quantity of materials required can be reduced, which in turn will reduce the quantity of wastage. Alternative design solutions might also remove the need to undertake on site activities that produce waste.

To support design teams, WRAP have published a guidance document explaining how to 'design out' construction waste. The document contains five principles:

1. Design for reuse and recovery.
2. Design for off site construction.
3. Design for materials optimisation.
4. Design for waste efficient procurement.
5. Design for deconstruction and flexibility.

WRAP have also created a Designing out Waste Tool for Buildings (DoWT-B), which is an online options appraisal tool to indicate the opportunities to 'design out waste'. The DoWT-B provides an overview of the value of the materials typically consumed and wasted and investigates the benefit of waste reduction actions.

## design flexibility

Flexibility in design reduces the need for major refurbishments and gives the building a longer life span by ensuring that buildings readily accommodate new functions, (without requiring demolition and creation of new structures), thus eliminating the waste generation process. Examples of flexible design include:

- ceiling heights that accommodate changes of room use and associated servicing requirements
- use of non-load bearing partitions

## specification of materials with a recycled content

Materials with a recycled content incorporate a particular level of waste during manufacturing, the waste being post-consumer or pre-consumer. Many product manufacturers incorporate a high level of waste into the manufacturing process and create products that present the same performance and cost as materials with no recycled content.

Consideration should also be given to the use of reclaimed materials.

More information on materials specification can be found in the Materials module.

### Did you know?

Hertfordshire County Council offers discounted home compost bins to Hertfordshire residents. More information on this and other waste initiatives can be found at [www.wasteaware.org.uk](http://www.wasteaware.org.uk)

## Design

### allocation of appropriate recycling storage facilities

Recycling is facilitated by ensuring that sufficient space is provided, whether for domestic kerbside collection boxes and composting facilities, or larger commercial waste recycling facilities.

The draft Code for Sustainable Homes suggests that 0.8m<sup>3</sup> should be provided for waste (recycling) storage in new homes. This is already a standard requirement for many district councils in the county.



In larger residential buildings, and non domestic buildings, waste and recycling storage areas should be designed in and the design layout must demonstrate adequate space to facilitate waste recycling through separation, storage, handling, bulking and collection of waste generated within the property.

If a BREEAM certificate is being sought then the technical guidance for the specific scheme should be reviewed as there might be credits available for recycling storage facilities.

For instance, for a school building with a floor area of 5,000 square metres or less, BREEAM credits are rewarded if there is at least 2 square metres of recyclable waste storage for every 1,000 square metres of net floor area. The requirements change for larger schools so reviewing the manual carefully is recommended.

New developments should be flexible enough to accommodate different collection systems and the potential for future changes.

In particular, full consideration should be given to:

- the location and design of facilities to ensure minimal visual impact and full integration into the scheme design
- access to ensure waste containers can be easily accessed (and moved) by development occupiers and local authority/private waste contractors
- safety to ensure that bins do not obstruct pedestrian, cyclist or driver sight lines
- provision of facilities for composting household waste

#### Did you know?

30% of household waste can be composted (70% of total organic waste)

#### Did you know?

A number of Hertfordshire local authorities have produced detailed advice notes on the storage of refuse at residential developments.

# Construction best practice

## introduction

Farnborough Business Park is a 126-acre site owned by Slough Estates. When complete it will include 22 office blocks, retail and leisure units.

The site had historic significance to the aviation industry and the local context, a number of listed buildings were retained and restored. Phase 1 of development included the demolition of over 100 buildings, the construction of site infrastructure and two commercial buildings. Construction of Phase 2 began in 2005.

Carillion was the main contractor for the first phase which included a number of on-site waste management initiatives.

## description

Initiatives for addressing waste issues were considered during the planning stage and included:

- introducing auditing to monitor resource use through industry software. The BRE SMARTstart™ tool was used which enables all contractors involved to consider waste reduction measures where applicable
- establishing an Environmental Liaison Committee to ensure commitment to environmental management best practice principles

Once on site the following initiatives were pursued:

- materials from demolition of on-site buildings were retained on site and re-used for raising the levels of development plots

---

### Environmental benefits

significant waste saving & less traffic movements to/from site

---

### Cost

re-using materials saved £27/m<sup>3</sup> compared to disposing of waste material & purchasing additional structural fill  
Phase 1 savings of £673,250

- unsuitable brick and concrete from demolition were recycled in plants where they were screened and compacted on site
- soil and concrete excavated during infrastructure works were re-used. Soil was re-used in site landscaping and concrete was stockpiled for crushing and re-used on site
- a local waste management company was hired to provide skips for waste generation on site. Once full with the main materials types the skips were collected for recycling

## project team

Carillion plc  
Slough Estates

## further information

[www.innovateloocate.com](http://www.innovateloocate.com)  
[www.carillionplc.com](http://www.carillionplc.com)

---

### Application

refer to key

---

### Other considerations

N/A



# Construction best practice, reclaimed materials and prefabrication

## introduction

Sherwood Park is a new 92 bedroom hotel and office complex located in north Nottingham. Construction was carried out by Simons Construction Ltd, a company with an environmental policy to minimise the environmental impact of construction operations and to implement waste management practices.

## description

The contractor worked with a waste management company, Wastecycle, who advised on how to implement the waste management and waste minimisation strategy.

- construction waste was segregated into general, inert, metal, timber, plasterboard and hazardous waste
- reclaimed materials were reused wherever practical; e.g. the use of recycled crushed material for a piling platform and reclaimed brick for internal feature walls
- timber waste was reused two or three times as shuttering, window linings, dummy frames, propping and packing
- a small reclaim area was designated where surplus usable materials could be returned for reuse by other operatives on the site
- returnable transit packaging was re-used for items such as the glass façade
- old oil drums were filled with concrete and used as relocatable bollards to prevent damage to finished works from moving vehicles
- the use of prefabricated bathroom pods reduced the amount of waste generated on site

---

### Environmental benefits

68% waste recycled rather than sent to landfill

---

### Cost

1631m<sup>3</sup> waste removed from site (13.5m<sup>3</sup> per £100,000 expenditure)



A waste management awareness campaign was carried out amongst all site employees and sub-contractors. Briefings on waste minimisation were given to all site employees along with a construction-specific environmental awareness/law course. All sub-contractors involved were contractually obliged to follow on-site waste management procedures.

In addition to financial savings, the best practice management enabled improved environmental performance and improved health and safety on site.

In terms of Best Practice Programme Key Performance Indicators for waste, the project was placed in the top 20% of UK projects for low waste. In addition, the extensive waste management on site won Simons Construction Ltd the Gold Award in the Green Organisation's 2004 "Green Apple Awards".

## project team

Simons Construction Ltd  
Wastecycle

## further information

[www.simongroup.com](http://www.simongroup.com)  
[www.wastecycle.co.uk](http://www.wastecycle.co.uk)

---

### Application

refer to key

---

### Other considerations

N/A



# Construction best practice, supply chain management and green specification

## introduction

The Greenwich Millennium Village (GMV) is a housing development under construction since 1999, providing 1400 new homes. The development is designed to minimise environmental impacts and maximise the sustainability of the project. GMV is a joint venture development by Countryside Properties and Taylor Woodrow Developments, in association with English Partnerships. In addition to sustainable waste management, GMV presents best practice in a number of other areas, including use of materials, energy consumption and provision of wildlife habitat.



## description

GMV exceeded its target to reduce on-site construction waste by 50%. The waste reduction strategy involved the use of SMARTAudit™, part of the BRE SMARTWaste™ tools.

SMARTAudit™ enables waste streams to be benchmarked and categorised by source, type, quantity, cause, cost, quality, condition and potential. This data is used as a springboard to identify and prioritise actions to reduce waste arisings (producer responsibility), reuse at source and to maximise recovery to extend material life cycles.

The waste management strategy included project management and site management measures. The implementation process was smooth and all targets were met due to early planning and consideration.

To implement the waste management strategy and realise the targets, several actions were taken during the early stages to:

- establish a company or site benchmark against which to measure results
- contractually oblige sub-contractors to co-operate with waste minimisation

- ensure that all suppliers of materials provide returnable or recyclable packaging
- engage all site workers with toolbox talks and briefings
- identify key waste products likely to arise during construction and implement waste reduction plans
- partner with waste management contractor to maximise recycling and reduce disposal costs
- agree on-site re-use and recycling as part of quality management
- monitor and publish waste performance figures

## design/specification

Waste reduction was considered from the outset with the incorporation of offsite manufactured products such as bathroom pods, cladding panels, balconies, precast stairs, timber frame and rainscreen panels. A prefabrication plant on site for lightweight structural components was erected during Phase 2, where elements were manufactured to size.



# Cont...

## supply chain

- British Gypsum, the plasterboard supplier, took away all segregated plasterboard offcuts to be processed and put back into the manufacturing process
- rockwool collected all unusable insulation offcuts from the site and where possible, offcuts were used to fill gaps rather than cutting from a fresh roll
- all timber pallets that arrived on site with plasterboard were returned to the local plasterboard merchant for further re-use

## construction best practice

- a comprehensive segregation and recycling scheme was set up on site and included timber, cardboard, paper, concrete, site metals and drinks cans
- timber formwork which was generated in large quantities was shredded to form a ground covering mulch

## occupation

All residents were provided with internal and external recycling facilities. Internal recycling bins are integrated into kitchen units.

---

### Environmental benefits

50m<sup>3</sup> waste produced/dwelling would have produced 3178 waste skips; 1469 skips were used, a 53% reduction waste management practices led to cleaner, tidier and safer site conditions.

---

### Cost

not available

## project team

Taylor Woodrow Developments  
Countryside Properties  
English Partnerships

## further information

[www.smartwaste.co.uk](http://www.smartwaste.co.uk)  
[www.greenwich-village.co.uk](http://www.greenwich-village.co.uk)

---

### Application

refer to key

---

### Other considerations

N/A



# Construction best practice, supply chain management and green specification

## introduction

Warwick House is a refurbishment and new build project comprising 18 council flats. The existing flat block was cut in half, the remaining half was refurbished and a building in a different configuration provides the other half.

## description

Successful waste minimisation was a result of the London Borough of Lambeth client commitment to sustainable construction. In addition to waste minimisation, the project incorporated rainwater harvesting and solar panels. Specific solutions implemented to secure waste minimisation included:

## construction best practice

- demolition waste was mostly composed of brick and concrete, which was crushed and taken to a nearby site to store until required for reuse in foundations, road sub-base and crane base
- reclaimed concrete roof tiles from the demolished section were used to repair the refurbished section of roof
- the BRE SMARTWaste™ tool was used to monitor site waste and identify waste streams and methods for dealing with them. Bins for timber, plastics and metals were located on site for waste separation

## design/specification

- materials with a high percentage of recycled content were also specified; including boards made from timber waste and forest thinnings, plasterboard with a high recycled content percentage,

## Environmental benefits

use of materials with high recycled content  
minimal site waste generation

## Cost

return of recycled aggregates to site incurred no cost as this was a demolition sub-contract requirement



- and prefabricated timber panels with recycled newspaper cellulose insulation
- offsite manufacturing was used, e.g. timber frame and concrete floors

Not all crushed aggregates were returned to site, the remainder was set aside for use elsewhere in the Angell Town area.

To ensure the smooth flow of recycled aggregates between this project and other projects, the same demolition contractor was used for other works in Angell town.

Together with other sustainability solutions, waste minimisation and recycling led Warwick House to be a flagship development.

## project team

London Borough of Lambeth  
Sandwood Contractors  
Anne Thorne Architects  
Demo One (Demolition Contractor)

## further information

[www.ciria.org](http://www.ciria.org)  
London Borough of Lambeth

## Application

refer to key

## Other considerations

N/A



# Construction best practice, supply chain management and green specification

## introduction

Great Western Hospital is a £100m scheme with 55,000m<sup>2</sup> of floor space, built and managed through a PFI contract extending for 27 years. The building was completed in 2002. The consortium for the project was led by Carillion plc, who put sustainability issues at the forefront of the brief, with cost effective measures to implement sustainability solutions.

## description

Sustainability Action Plans were adopted that addressed all sustainability issues including waste minimisation. A target was set to reduce waste to landfill from development construction and operation by 50%. The following set of measures and solutions were implemented:

### construction best practice

- waste minimisation best practice was shared throughout the supply chain and all partners were engaged from inception and briefed with waste minimisation requirements
- plasterboard waste was reduced to zero, compared to representing 20% of waste sent to landfill on similar projects. A dedicated plasterboard recycling skip was transported directly back to the manufacturer for re-use
- plasterboard was delivered on plasterboard pallets instead of traditional wood pallets, which were sent back to the manufacturer

### design/specification

- the design phase incorporated a whole life approach to specification. The use of long-lifespan materials was adopted, thus reducing replacement and future waste generation. The flooring material chosen

### Environmental benefits

waste to landfill reduced by more than 50%  
prefabricated components improved the speed and accuracy of construction

### Cost

using a single plasterboard layer and recycling the plasterboard waste achieved a cost saving of £304,800 in construction rising to £433,800 over the 27 year concession period.



- was a mix of linoleum and rubber which needs to be replaced only once during the 27 years, thus permitting minimal replacement and minimal waste generation
- prefabricated components were used extensively, e.g. concrete walling panels with windows and insulation pre-installed
  - specifications were adjusted to reduce waste generation. Plasterboard was specially designed and made by the manufacturer to use a single rather than double skin, i.e. one 15mm panel rather than two 12.5mm panels. Panels were designed to withstand wear and tear and were pre-sealed, thus eliminating skimming and reducing the amount of paint used

### project team

Carillion plc  
Swindon and Marlborough NHS Trust  
Lafarge Plasterboard

### further information

[www.carillionplc.com](http://www.carillionplc.com)  
[www.swindon-marlborough.nhs.uk](http://www.swindon-marlborough.nhs.uk)

### Application

refer to key

### Other considerations

N/A



# Construction best practice, supply chain management and prefabrication

## introduction

The £58 million redevelopment of BP's site at Sunbury was designed and constructed with waste minimisation and environmental performance as core elements. The office and laboratory comprised the first phase of the full redevelopment of the 13 hectare site.

## description

As part of the redevelopment process, work included demolition of buildings followed by construction of three office buildings and a chemical technology building with laboratory facilities. Buildings used a steel structure and glass curtain wall construction.

## construction best practice

- as part of the waste management plan, a waste reduction initiative booklet was produced and staff were trained as part of the site's induction process
- waste produced was segregated into timber, metal, paper/cardboard and general waste

## supply chain

- trade contracts specified that only suppliers that actively minimised packaging would be chosen
- glazing was delivered in re-usable metal containers and lighting came in bulk package rather than in individual boxes

---

### Environmental benefits

use of off-site manufacture accounted for additional waste savings of 15% by weight

---

### Cost

40% of packaging waste was diverted at no additional cost

## design/specification

- off-site manufacture was also applied to the glass curtain walling, suspended ceilings, raised floors, boiler room and roof plant pipework

## project team

Schal, part of Carillion Plc

## further information

[www.schal.com](http://www.schal.com)

CIRIA: Report C536: Demonstrating Waste minimisation benefits in construction  
[www.ciria.org.uk/acatalog/c536.html](http://www.ciria.org.uk/acatalog/c536.html)

---

### Application

refer to key

---

### Other considerations

N/A



# Construction best practice and contractor monitoring

## introduction

Galliford Try Construction rebuilt a 6 storey office in Stanhope Gate, London and achieved substantial waste savings despite being in a location where no space was available outside the building footprint for waste and materials management.

## description

Solutions found to achieve these savings included a comprehensive materials management policy with just-in-time deliveries and procedures to reduce late variations.

Staff awareness and training on-site were promoted through different measures including:

- an introductory site booklet with waste minimisation concepts
- site posters calling "no space for waste"
- bad practice corrected by trade contractors

Materials ordered and used were rigorously audited and controlled, and contractual arrangements included economic penalties if targets were not met.

## project team

Galliford Try Construction

## further information

WRAP case study: Saving money through good waste management on small sites  
[www.wrap.org.uk](http://www.wrap.org.uk)



Case study - Office in Stanhope Gate, London

---

### Environmental benefits

4% of bricks wasted compared to industry standard of 5-8%  
5% of blocks wasted compared to industry standard of 10%

---

### Cost

£500 savings from disposal costs. £2,000 savings if purchase and transport costs are included

---

### Application

refer to key

---

### Other considerations

N/A



# Integrated waste and recycling facilities

## introduction

Telford Millennium Community is a joint venture 750 home mixed use development by English Partnerships, Taylor Woodrow Developments and Telford and Wrekin Borough Council. The scheme also incorporates a school, commercial space, a new community centre and significant open space and parkland.

Sustainability is inherent to the scheme and all buildings are required to achieve BREEAM or EcoHomes Excellent. A further project requirement was to provide all residents with sufficient infrastructure to recycle 50% of their waste and that waste facilities should be well designed and not detrimentally impact upon the streetscape. The first homes will be occupied in 2007.

## description

Waste management has been fully integrated into designs as follows:

- each home will have facilities within the kitchen to split recycled waste
- houses will use the Borough of Telford & Wrekin three bin refuse collection system; one wheelie bin for household waste, one for garden waste and a further box for dry recyclables
- refuse and recycling bins for houses will be located within purpose designed garden sheds, garages or within the ground floors of the mews buildings

Wheelie bins and storage boxes will be taken by householders to a designated refuse pickup point within 25m of the dwelling on the day of collection. Following collection, the receptacle will be returned by the householder to its storage area. Elderly or infirm residents will

be given appropriate assistance in moving the rubbish bins by the Local Authority.

- apartments have one 1100 litre eurobin per six to eight units for household waste, located within a dedicated refuse storage area
- a dry recyclable box is also provided in each apartment

Within the school square there are four underground storage bins for recycled waste; these will collect recycled waste currently not available under the local authority refuse collection system.

The eurobins will be emptied directly by the bin men and the underground bins will be emptied by dedicated refuse trucks.

## project team

English Partnerships  
Taylor Woodrow Developments Ltd  
Borough of Telford and Wrekin Council  
Lifschutz Davidson Sandilands Architects

## further information




[www.tmc-eastketley.info/home.htm](http://www.tmc-eastketley.info/home.htm)  
[www.englishpartnerships.co.uk/tmc.htm](http://www.englishpartnerships.co.uk/tmc.htm)



Cont...



Phase 1 refuse and recycling areas

- underground recycling bins 
- collection point 
- 25m travel distance radius 

**Environmental benefits**

EcoHomes Excellent  
all residents to have infrastructure to recycle 50% of waste

**Cost**

not available

**Application**

refer to key

**Other considerations**

N/A



# Further information and references

- 1** Waste Strategy, revised 2007 for England and Wales  
Department of Environment, Food & Rural Affairs  
Nobel House  
17 Smith Square  
London SW1P 3JR  
Telephone: 08459 33 55 77

[www.defra.gov.uk/environment/waste/strategy/cm4693/index.htm](http://www.defra.gov.uk/environment/waste/strategy/cm4693/index.htm)
- 2** East of England Regional Waste Management Strategy 2002  
East of England Regional Assembly  
Flempton House  
Flempton  
Bury St Edmunds  
Suffolk IP28 6EG  
Telephone: 01284 728151

[www.eera.gov.uk/Text.p?cat=128&id= SX84A0-A77F8F87](http://www.eera.gov.uk/Text.p?cat=128&id= SX84A0-A77F8F87)
- 3** Planning Policy Statement 10: Planning for Sustainable Waste Management  
Department for Communities and Local Government  
Eland House  
Bressenden Place  
London SW1E 5DU  
Telephone: 020 7944 4400

[www.dclg.gov.uk](http://www.dclg.gov.uk)
- 4** Hertfordshire WasteAware  
Telephone: 08457 425000

[www.wasteaware.org.uk](http://www.wasteaware.org.uk)
- 5** Hertfordshire Waste Strategy: A Joint Municipal Waste Management Strategy, November 2007  
Waste Management  
Hertfordshire County Council  
County Hall  
Pegs Lane  
Hertford SG13 8DQ  
Telephone: 01438 737555

[www.wasteaware.org.uk/strategy](http://www.wasteaware.org.uk/strategy)

# Further information and references

- 6 Hertfordshire Waste Local Plan (1995 - 2005)  
Adopted 1999  
Hertfordshire County Council  
County Development Unit  
County Hall  
Pegs Lane  
Hertford SG13 8DN

<http://www.hertsdirect.org/envroads/environment/plan/hccdevplan/wasteplanning/>
- 7 Site Waste Management Plans  
Department of Environment, Food &  
Rural Affairs  
Nobel House  
17 Smith Square  
London SW1P 3JR  
Telephone: 08459 33 55 77
- 8 Environmental/construction regulation guidance  
Environment Agency  
Apollo Court  
2 Bishops Square Business Park  
St Albans Road West  
Hatfield AL10 9EX  
Telephone: 08708 506 506

[www.environment-agency.gov.uk/subjects/waste/?lang=\\_e](http://www.environment-agency.gov.uk/subjects/waste/?lang=_e)  
[www.netregs.gov.uk/](http://www.netregs.gov.uk/)
- 9 Waste minimisation in construction  
CIRIA  
Classic House  
174 - 180 Old Street  
London EC1V 9BP  
Telephone: 020 7549 3300

[www.ciriabooks.com](http://www.ciriabooks.com)
- 10 Code for Sustainable Homes -  
A step-change in sustainable home  
building practice  
Department for Communities and Local Government  
Eland House  
Bressenden Place  
London  
SW1E 5DU

[www.communities.gov.uk](http://www.communities.gov.uk)

# Further information and references

- 11 Construction Industry KPI Pack  
Constructing Excellence  
FREEPOST Ang1618  
Westcliffe-on-Sea  
Essex SS0 9HS  
Telephone: 01702 393 200  
[www.kpizone.com](http://www.kpizone.com)
- 12 The Demolition Protocol  
Institution of Civil Engineers  
1 Great George Street  
London SW1P 3AA  
Telephone: 020 7222 7722  
[www.cextra.ice.org.uk/tlml/demolition](http://www.cextra.ice.org.uk/tlml/demolition)
- 13 WRAP (Waste & Resources Action Programme) & Aggregain (Sustainable Aggregates Information Service)  
Telephone: 0808 100 2040  
[www.wrap.org.uk](http://www.wrap.org.uk)  
[www.aggregain.org.uk](http://www.aggregain.org.uk)
- 14 Considerate Constructor Scheme  
PO Box 75  
Ware  
Hertfordshire  
SG12 9UY  
Telephone: 01920 485959  
[www.considerateconstructorsscheme.org.uk](http://www.considerateconstructorsscheme.org.uk)
- 15 Guidance on Sections 35-54 of the Clean Neighbourhoods & Environment Act 2005 (Section 54 is Site Waste Management Plans)  
Department for Environment, Food & Rural Affairs  
Nobel House  
17 Smith Square  
London SW1P 3JR  
Telephone: 08459 33 55 77  
[www.defra.gov.uk/environment/localenv/legislation/cnea/waste.pdf](http://www.defra.gov.uk/environment/localenv/legislation/cnea/waste.pdf)
- 16 SMARTWaste  
BRE  
Bucknalls Lane  
Watford  
WD29 9XX  
Telephone: 01923 664471  
Fax: 01923 664786  
[smartwaste@bre.co.uk](mailto:smartwaste@bre.co.uk)  
[www.smartwaste.co.uk/](http://www.smartwaste.co.uk/)