

Wiltshire and Swindon Waste Site Allocations Development Plan Document

Waste management directory

January 2012

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1 Introduction

- 1.1** The aim of this report is to provide guidance on the various types of potential waste management facilities that Wiltshire and Swindon currently advocate through the Waste Development Framework. The document provides an overview of the most common waste technologies in operation, outlining their strengths and weaknesses, and identifying specific site and land use requirements for each type of facility. It should be noted that the list of technologies covered here is not exhaustive, and that waste management is an area of rapid change and as such it is likely that new types of facilities will develop as technology continues to evolve.
- 1.2** The structure of the report has been divided into five main sections, identifying waste management facilities in relation to the following:
- Recycling (Household Recycling Centre, Materials Recovery Facility, Waste Transfer Station, Local Recycling, Inert Waste Recycling / Transfer)
 - Composting
 - Treatment (Mechanical Biological Treatment, Anaerobic Digestion, Energy from Waste, Combined Heat and Power)
 - Landfill / landraise
 - Waste water treatment
- 1.3** A table is presented for each waste management facility, to include the following information:
- A definition of the facility
 - Brief description of the technology / process involved
 - List of advantages of the facility
 - List of disadvantages of the facility
 - Description of the typical scale and capacity of the facility
 - Outline of the typical location and site requirements of the facility
 - Any other relevant information considered to be of value
 - Existing examples of this type of facility in Wiltshire and Swindon
 - Planning issues common to this sort of facility and potential measures to mitigate against these issues.
- 1.4** The guidance provided in this report has been sourced from various government policy guidance documents on waste management in addition to information from the waste management industry.

- 1.5** Key policies to consider in relation to waste management facilities can be found in the Wiltshire and Swindon Waste Core Strategy Development Plan Document (DPD) adopted July 2009 and Development Control Policies DPD adopted September 2009.
- 1.6** Appendix 1 lists the relevant policy and guidance to take into account when considering waste management facilities. A glossary of terms, including relevant waste streams, is listed in Appendix 2.

2 Recycling

2.1 Household Recycling Centre (HRC)

Picture 2.1 Amesbury Household Recycling Centre



Table 2.1 Household Recycling Centre (HRC)

Definition	A Household Recycling Centre (HRC) is a centralised collection facility to which the public can bring a host of materials for recycling and recovery.
Description of technology	<p>There are currently eleven HRCs located across Wiltshire, all of which can deal with a range of materials including the following:</p> <ul style="list-style-type: none">• food and drink cans, aerosols and foil• mixed glass• mixed textiles and clothes• plastics• fridges and freezers• large and small appliances• mobile phones, computers, televisions and monitors• fluorescent tubes, low energy light bulbs• printer cartridges and batteries

	<ul style="list-style-type: none"> • car batteries, tyres and used engine oil • garden waste, soil, hardcore and rubble • wood, timber and scrap metal • household and garden chemicals, gas bottles and paint • furniture • spectacles • excess household waste • used domestic cooking oil. <p>Where licensed, HRCs may also receive hazardous wastes (such as asbestos) as well as non-hazardous and inert wastes. Waste collected at HRCs is, where possible, recycled (after sorting, possibly at a Materials Recovery Facility) or composted.</p>
Advantages	<ul style="list-style-type: none"> • Accessible to local residents • Provides somewhere for public recycling of larger items which would not be accepted by kerbside recycling collection • Provides a valuable supply of source separated waste • Diverts waste from landfill and maximises recycling performance • Recycling reduces the need for raw materials as the life of existing materials are being extended • Recycling leads to a reduction of energy use (for example 95% less energy is needed to make a recycled aluminium can than it does to make one from virgin materials) • Recycling helps to reduce the habitat damage, pollution and waste associated with the extraction of raw materials • It creates a personal responsibility for the waste we create • Relatively low set up costs in comparison to other waste management options.
Disadvantages	<ul style="list-style-type: none"> • Potential for increased traffic movement close to site due to public access and some HGV movements • Potential for a significant increase in both noise and vibration as a result of increased traffic and/or machinery • Potential for negative impact on local air quality and increased dust, odours and fume levels due to increased traffic and as a result of on site operations • Potential for negative impact on biodiversity as increased levels of traffic, dust and therefore atmospheric pollution may affect water quality and / or habitats • Increases the number of journeys made by car and may not be accessible to the majority of households without cars (although to some extent, these factors are mitigated by the extensive network of local 'bring sites', kerbside recycling collections, and bulky waste collection services).
Scale and capacity	<p>HRCs are generally small scale (0.5 - 1ha) and may be ancillary to an existing waste management operation, providing 'front - end' recycling⁽¹⁾. The capacity</p>

1 ODPM (2004) Planning for Waste Management Facilities: A Research Study
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

	of HRCs can vary, ranging up to 25,000 tonnes of waste processed each year. However, each of Wiltshire's eleven HRCs handle less than 10,000 tonnes per annum (tpa) (average 6,500tpa).
Location and site requirements	Facilities should be located near to centres of population or on the edge of urban areas to maximise accessibility and ensure usage. Appropriate locations for HRCs can include industrial and employment areas, or areas of degraded, contaminated or derelict land. HRCs need a hardstanding area to site recycling bins, skips and possibly compactors which can be fully / partially enclosed or open. Surfacing needs to be impermeable if HRCs are to cater for potentially polluting waste such as oil or car batteries and surface water drainage is routed via an interceptor.
Other information	<p>A HRC must be accessible to members of the public, who are responsible for transferring waste from their vehicles to the correct collection bay. HRC sites can attract large numbers of people and therefore careful thought is needed to maximise the space given to both recycling areas and traffic management. Often sites are open every day of the year (with the exception of Christmas and New Year), operating during daylight hours.</p> <p>HRCs are also usually complemented by a larger number of smaller 'bring sites' for mainstream household recyclables (such as bottles and paper). Wiltshire Council currently operates over 200 'bring sites' (also known as 'Mini Recycling Sites') in partnership with Hills Waste Solutions at various locations such as schools, village hall car parks, and large supermarkets. The provision of such facilities does not necessarily raise land-use planning issues for the Waste Planning Authorities. However this neighbourhood level of recycling facilities could be expanded, together with additional recycling facilities that may be provided within major new development opportunities such as proposed residential uses. These sites should be accessible to the public, facilitated in part by clear signage and good public information.</p>
Case studies	There are currently eleven HRCs in operation across Wiltshire, including the facility at Amesbury (pictured). In March 2011 a new, purpose-built HRC was opened in the Salisbury Road Business Park, Marlborough. It is expected at least 70 percent of the material taken to the site by local residents will be recycled ⁽²⁾ .
Planning issues and potential mitigation	<ul style="list-style-type: none"> • Traffic (especially queueing at peak times) - transport, access and safety concerns can be reduced to a certain extent by maximising available space, whilst providing a clear, safe, clean and practical layout to the HRC site. Sites should incorporate a queueing lane / parking spaces to reduce the likelihood of vehicles being held up on public roads. • Access - a clear road layout and one way flow of traffic will help to reduce congestion and queueing. Clear signage will enable cars to access the part of the site they require. Co-location with other waste management facilities may be appropriate for new HRC facilities to help minimise the transportation of waste. Waste management sites should have good access to the HGV Route Network.

2 Wiltshire Council (2011) Recycling centres and mini sites <http://www.wiltshire.gov.uk/rubbishrecycling/recycling/recyclingcentres.htm>

- Noise - in sensitive locations, such as sites within residential areas, careful design of internal arrangements is essential. Noisy activities such as vehicle manoeuvring areas and glass bottle banks should be located as far away from noise sensitive receptors as possible. Noise may also be reduced by sound proofing features in addition to limiting opening hours⁽³⁾.
- Litter - containers should be emptied frequently to prevent overspill. Litter is also commonly reduced by perimeter fencing.
- Visual impacts - may be reduced by appropriate siting and sensitive building design.

3 ODPM (2004) Planning for Waste Management Facilities: A Research Study
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

2.2 Materials Recovery Facility (MRF)

Picture 2.2 Lower Compton Materials Recovery Facility



Table 2.2 Materials Recovery Facility (MRF)

Definition	A Materials Recovery Facility (MRF) is where recyclable waste, which can include hazardous (where licensed), non-hazardous and inert wastes, is mechanically or manually separated, baled and stored prior to reprocessing.
Description of technology	<p>There are two distinct types of MRF; 'clean' and 'dirty'.</p> <p>A 'clean' MRF is a facility where dry recyclables are taken for secondary sorting and processing prior to export to specialist industry processing facilities⁽⁴⁾. Essentially, 'clean' MRFs deal with pre-separated waste received from HRCs, 'bring sites', and kerbside collections. Following the sorting of materials in the MRF, balers are used to compress the recyclate into dense bales for transport to a materials reprocessor. There will inevitably be a minor rejection element of contrary materials passing through the plant which cannot be easily recycled and therefore will typically go to landfill, however it is considered that a 'clean' MRF can recover over 90% of incoming waste material.</p> <p>A 'dirty' MRF is a facility which combines a number of screening / sorting techniques to divide previously unsorted, residual 'black bag' municipal solid waste (MSW) into two streams: a recyclable material stream and non-recyclable residual waste stream disposed to landfill. As a result, 'dirty' MRFs will recover</p>

4 ODPM (2004) Planning for Waste Management Facilities: A Research Study
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

	<p>a significantly lower proportion (typically 10 - 15%) of material as recyclables in contrast to 'clean' MRFs which have already been through a stage of sorting. More advanced plants may incorporate a third stream of either primary biodegradable waste for composting or a high calorific value stream for conversion to Refuse Derived Fuel (RDF).</p>
<p>Advantages</p>	<ul style="list-style-type: none"> ● Potential to generate revenue from sale of materials ● Application of proven technology ● Mechanical sorting technology is becoming increasingly sophisticated, enabling more efficient separation of a wider range of materials ● Potential for job creation ● Reduces waste to landfill. <p>'Clean' MRF</p> <ul style="list-style-type: none"> ● Relatively high processing efficiency ● Recyclate generally of high quality therefore attractive to reuse / reprocessing markets. <p>'Dirty' MRF</p> <ul style="list-style-type: none"> ● Relatively low set up costs in comparison to other waste management options ● Can be used as part of an integrated system to gain energy and materials out of the residual waste stream.
<p>Disadvantages</p>	<ul style="list-style-type: none"> ● Potential for an increase in noise, vibration and atmospheric pollution as a result of increased traffic numbers and operations ● Potential for an increase in odour, dust and fume levels from operations on site ● Sale of materials is exposed to market fluctuations ● Relies on efficiency of mechanical equipment ● May require some hand-sorting of waste which has associated health concerns for staff involved ● Potential fire risk from storage of materials on site. <p>'Clean' MRF</p> <ul style="list-style-type: none"> ● Relies on households to participate in recycling and the separation of recyclates. <p>'Dirty' MRF</p> <ul style="list-style-type: none"> ● Any biodegradable stream derived from the plant will be subject to the Animal by-products legislation ● Outputs from the plant will still be classified as biodegradable municipal waste (BMW) under the Landfill Directive and active waste under Landfill Tax ● Low quality of recyclables output can render material of low value.

Scale and capacity	MRFs can operate at various sizes, from small-scale local sites through to strategic scale sites. As a result waste throughputs range widely from 3,000 to 200,000tpa. Depending upon waste throughputs, typical site areas will require land of anywhere between 0.5 and 4ha. Research suggests that 'clean' MRFs are typically likely to be smaller in scale and capacity than 'dirty' MRFs.
Location and site requirements	<p>Locations close to waste sources would optimise collection and minimise transport impacts. Appropriate locations could include existing industrial and employment areas, and areas of degraded, contaminated or derelict land. MRFs may also be ancillary to an existing waste management operation.</p> <p>This type of facility is usually housed in warehouse-style / industrial buildings of sufficient size to accommodate a tipping hall for the deposit and loading of materials. Accommodation is also required for a range of equipment to wash, sort, grade, crush and bale materials as well as storage facilities (possibly in the open) for recovered materials, skips and vehicles.</p>
Other information	<p>There has been a steady increase in the numbers of MRFs in the UK as more separate recycle collections have been introduced and overall recycling tonnages have increased ⁽⁵⁾.</p> <p>Smaller facilities may deal with just one specific type of waste, whereas larger facilities may sort in excess of thirty different types of material.</p>
Case studies	An example of a 'clean' MRF in the plan area is the facility at the Lower Compton waste management site (pictured), which in 2009/10 handled over 30,000 tonnes of waste. This waste included paper, cardboard, plastic and cans which was bulked up and transferred to re-processors for re-use ⁽⁶⁾ .
Planning issues and potential mitigation	<ul style="list-style-type: none"> ● Traffic - mitigation may involve locating sites and vehicle routes away from sensitive areas. Waste management sites should have good access to the HGV Route Network ● Air emissions - limitation of journey distances and sensitive routing / siting may help reduce traffic related air quality effects ● Noise - commonly reduced by sound proofing features in addition to limiting opening hours ● Dust and odour - containing operations within a building is cited as the primary means of preventing odour and dust impacts ● Flies, vermin and birds - discouraged by containing operations within a building ● Litter - restricted by enclosing operations within a building ● Water resources - avoidance of areas close to sensitive water resources and provision of a drainage system separating dirty and clean waters and

5 Last, S. (2008) The Mechanical Biological Treatment Web Site <http://www.mbt.landfill-site.com/index.html>

6 Hills Group. Lower Compton General Information Fact Sheet <http://www.hills-group.co.uk/documents/CBexhibitionflyer.pdf>

transferring dirty waters to sewer or other appropriate treatment will prevent any serious water pollution

- Visual impacts - may be reduced by appropriate siting and sensitive building design.

Picture 2.3 Lower Compton Materials Recovery Facility



2.3 Waste Transfer Station (WTS)

Picture 2.4 Waste Transfer Station, Bangor, Northern Ireland (image courtesy of Heron Bros.Ltd)



Table 2.3 Waste Transfer Station (WTS)

Definition	A Waste Transfer Station (WTS) is usually a depot to which waste is delivered for bulking / handling / sorting prior to transfer to another facility for recycling, treatment or disposal.
Description of technology	Waste from collection vehicles is stored temporarily in a WTS before being transported in bulk to a treatment or disposal site. A WTS is likely to involve the storage of a whole range of waste including special / clinical, household, industrial / commercial, construction and inert wastes. A WTS can also include different methods of waste transfer e.g. skip transfer or road to rail.
Advantages	<ul style="list-style-type: none"> ● Waste can be bulked up for transfer allowing for more efficient transportation ● Provides for delivery of materials to reprocessing industries ● Can reduce the overall number of vehicular movements ● Potential for job creation ● Reduces waste to landfill.
Disadvantages	<ul style="list-style-type: none"> ● Potential for an increase in noise, vibration and atmospheric pollution as a result of increased traffic numbers and operations (unless the operation is housed in a purpose built building)

	<ul style="list-style-type: none"> • Potential for an increase in odour, dust and fume levels from operations on site • Poor control of flies at a WTS can lead to fly infestations further down the waste stream.
Scale and capacity	Facilities vary in scale but generally deal with waste capacities of between 5,000 and 50,000tpa. The size of the site can vary as it is entirely dependent upon the level of waste throughput, but a WTS can cover an area of up to one hectare (typical site area is 0.7ha).
Location and site requirements	<p>Appropriate locations for a WTS can include industrial and employment areas, or areas of degraded, contaminated or derelict land. Good access is fundamental to the siting of a WTS, as facilities need to be able to efficiently receive delivery of collected waste and to transfer it in bulk by road, rail or water to other waste management or reprocessing facilities. Preference should be given to co-location with other waste facilities to minimise net transport distances⁽⁷⁾.</p> <p>A WTS dealing with greater than 5,000tpa of waste is required by the Environment Agency (EA) to operate inside a building on an impermeable surface with sealed drainage⁽⁸⁾.</p>
Case studies	<p>An example of a WTS in the plan area is at Thorney Down in south Wiltshire. This facility has been operational for a number of years and is used to hold MSW collected in the Salisbury area, which is transported to Compton Bassett Waste Management Facility.</p> <p>An example of a more modern, completely self-contained facility is the WTS in Bangor, Northern Ireland (pictured above). This facility, opened in 2009, incorporates cutting-edge technology to remove dust and smells.</p>
Planning issues and potential mitigation	<ul style="list-style-type: none"> • Traffic and noise - mitigation may be to locate sites and vehicle routes away from sensitive areas in addition to limiting operation hours. Waste management sites should have good access to the HGV Route Network • Air emissions - limitation of journey distances and sensitive routing / siting may help reduce traffic related air quality effects • Dust and odour - enclosure of operations within a building is the primary means of preventing odour and dust impacts • Flies, vermin and birds - discouraged by containing operations within a building • Litter - commonly reduced by perimeter fencing in addition to enclosing operations within a building • Water resources - avoidance of areas close to sensitive water resources, and provision of a drainage system separating dirty and clean waters, as

7 ODPM (2004) Planning for Waste Management Facilities: A Research Study
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

8 Environment Agency (2011) Standard permits for waste operations
<http://www.environment-agency.gov.uk/business/topics/permitting/118404.aspx>

well as transferring dirty waters to sewer or other appropriate treatment, will prevent any serious water pollution

- Visual impacts - may be reduced by appropriate siting and sensitive building design.

Picture 2.5 Waste Transfer Station, Bangor, Northern Ireland (image courtesy of Heron Bros.Ltd)



2.4 Local Recycling

Picture 2.6 WEEE recycling facility, Mallusk, Northern Ireland (image courtesy of AMI)



Table 2.4 Local Recycling

Definition	Local recycling facilities collect, store and bulk particular waste materials prior to transfer. They can also include metal recycling, car de-pollution and Waste Electrical and Electronic Equipment (WEEE facilities).
Description of technology	<p>Scrap yards</p> <p>Scrap yards are essentially facilities that concentrate on the recovery and bulking of metals, providing a high quality feedstock to the smelting industry.</p> <p>There are three main sources of scrap metal:</p> <ul style="list-style-type: none"> ● waste from industrial and manufacturing processes ● scrap and obsolete plant (e.g. vehicles) ● light scrap from post-consumer goods. <p>Scrap is sorted to remove high value non-ferrous metals and then bulked into standard classes of material. Vehicle breakers / dismantling yards operate on a more ad hoc basis, stripping required parts and crushing the shell ready for recycling. Recent emphasis on changes in vehicle design to allow for greater value / recycling have led to more sophisticated vehicle dismantling facilities being established.</p>

	<p>Waste Electrical and Electronic Equipment (WEEE) facilities</p> <p>WEEE has been identified as one of the fastest growing waste streams in Europe, comprising 4% of total municipal waste and increasing on average three times as fast as the growth in MSW⁽⁹⁾. This increase in the WEEE stream has put added emphasis on the need to deal with it in a safe and efficient manner.</p> <p>WEEE Directive (2002/96/EC), which was transposed into UK law through the WEEE Regulations 2006 (as amended), lists the following types of products as WEEE:</p> <ul style="list-style-type: none"> • Household appliances • IT and telecommunications equipment • Consumer products such as televisions and Hi-Fis • Lighting, electrical and electronic tools • Toys, leisure and sports equipment • Medical devices (these are exempt from the WEEE recycling and recovery targets) • Monitoring and control instruments⁽¹⁰⁾⁽¹¹⁾.
<p>Advantages</p>	<ul style="list-style-type: none"> • Bulking up can reduce the overall number of vehicular movements • Reduces the amount of inert waste to landfill • Reduces need for raw materials as the life of existing materials are being extended • Reduces energy use of new materials • WEEE facilities deal directly with one of the fastest growing streams of waste in the UK and Europe.
<p>Disadvantages</p>	<ul style="list-style-type: none"> • Potential for increase in noise, vibration and atmospheric pollution as a result of increased traffic and operations • Potential for an increase in levels of vermin, pests, light pollution and litter • Recycling rates for most types of WEEE (other than for large 'white goods' such as fridges and washing machines) are very low • Level of use linked to economic conditions • WEEE may contain hazardous substances such as mercury in some switches, lead in solder and cadmium in batteries.
<p>Scale and capacity</p>	<p>Local recycling facilities can vary in size depending on the location and the range of wastes accepted.</p> <p>A small metal recycling facility can be accommodated as part of a larger waste management scheme.</p> <p>WEEE facilities can vary in size depending on the location, capacity and range of wastes accepted.</p>

9 ODPM (2004) Planning for Waste Management Facilities: A Research Study

<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

10 DEFRA (2008) Electrical and electronic equipment waste <http://www.defra.gov.uk/environment/waste/producer/electrical/index.htm>

11 Environment Agency (2010) Waste electrical and electronic equipment <http://www.environment-agency.gov.uk/business/topics/waste/32088.aspx>

Location and site requirements	<p>Modern scrap yard facilities require industrial buildings, which are able to accommodate workshops and storage space in addition to metal processing and sorting equipment.</p> <p>WEEE facilities require impermeable surfaces, covered areas for storage of potentially bulky equipment and facilities for the treatment of water.</p>
Other information	<p>Metal recycling in Great Britain is a very well established and efficient £4 billion business processing approximately 15 million tonnes of secondary scrap metal for industry annually. In 2010 it was estimated that Great Britain exports 60% of its recycled metals⁽¹²⁾.</p>
Case studies	<p>An example of a Local Recycling facility in the plan area is Metal Dealers Ltd based in Salisbury. This firm has been established in its present location for more than ten years, dealing with all grades of ferrous and non-ferrous metals.</p> <p>An example of a major WEEE facility in the UK is the environCon plant in Grantham, Lincolnshire. This ten acre facility has the capacity to process 100,000 tonnes of large and small domestic appliances per annum (approximately 10% of the UK's WEEE waste output).</p>
Planning issues and potential mitigation	<ul style="list-style-type: none"> • Traffic and noise - mitigation may be to locate sites and vehicle routes away from sensitive areas in addition to limiting operation hours. Waste management sites should have good access to the HGV Route Network • Air emissions - limitation of journey distances and sensitive routing / siting may help reduce traffic related air quality effects. Enclosing operations will help to reduce environmental impacts • Visual impacts - may be reduced by appropriate siting and sensitive building design (where required).

12 Metal Dealers Ltd (2010) Scrap metal dealers in Salisbury <http://www.metaldealers.co.uk/>

2.5 Inert Waste Recycling / Transfer (IWR/T)

Picture 2.7 Secondary Aggregate IWR/T in Trowbridge



Table 2.5 Inert Waste Recycling / Transfer (IWR/T)

Definition	Inert Waste Recycling / Transfer (IWR/T) is the processing, screening, blending and crushing of inert wastes (for example, demolition rubble) to produce quality recycled aggregates for the construction market.
Description of technology	Inert waste is waste that is non-biodegradable, non-hazardous and free from known contaminants. Waste types managed at IWR/T facilities include uncontaminated topsoil, subsoil, clay, sand, brickwork, stone and glass. IWR/T facilities may be established on permanent sites but more frequently occur on a development site for a temporary period of time (e.g. during construction) where a number of measures are undertaken to manage waste more sustainably. These measures include re-use of excavated material on site, segregation and recycling of waste produced on site and use of recycled or long life construction materials.
Advantages	<ul style="list-style-type: none"> ● Inert waste is often suitable for recycling and as such leads to a reduction in the need for further new raw materials ● Reduction in energy usage as inert waste can simply be crushed to produce recycled aggregates

	<ul style="list-style-type: none"> • Potential job creation from processing and transfer of inert waste to recycled aggregates • Reduces environmental impacts of large-scale raw material extraction by reusing existing materials • Reduces the amount of inert waste for landfill • On a landfill site, IWR/T represents one of the last chances for recovery • The use of mobile facilities reduces transportation and double handling of the material.
Disadvantages	<ul style="list-style-type: none"> • Potential for increased noise and vibration due to operational machinery and increased traffic levels from transfer of inert waste to and from the facility • Potential for increased dust levels, which may affect surrounding receptors depending on the direction and strength of wind • Potential for an increase in atmospheric pollution due to increased dust and traffic levels • Possibility of some delay in mineral workings restoration by landfill if large volumes of inert materials are removed from the waste stream by recycling.
Scale and capacity	The scale and capacity of a IWR/T facility can vary widely depending on the size of the site and proposed timescale of operations.
Location and site requirements	<p>Some elements of the operation may be enclosed but it is mostly undertaken in the open air.</p> <p>Facilities can be permanent or mobile. Permanent facilities may be located in general industrial or employment areas, previously used or developed land, in conjunction with waste management development or at existing minerals working and landfill sites. Mobile facilities are generally used on large development sites (as pictured in the above image) where there is space for sorting, crushing and storage prior to their re-use on site or their distribution.</p>
Case studies	A permanent inert recycling site in the plan area is proposed at Sands Farm, near Calne. This would take over 50,000 tonnes of imported and on-site material per annum. Waste types include construction and demolition wastes such as crushed concrete and asphalt road planings, mineral wastes and industrial wastes.
Planning issues and potential mitigation	<ul style="list-style-type: none"> • Traffic - waste management sites should have good access to the HGV Route Network • Noise - may be mitigated against by restricting hours of operation • Dust - vehicle / wheel washing is commonly used to reduce impact of dust • Visual impacts - may be reduced through sensitive site planning and by hoardings around construction / demolition sites.

3 Composting

Picture 3.1 Windrow composting in Wiltshire. Source: Hills Waste Solutions



Table 3.1 Composting

Definition	Composting is a biological, aerobic process in which micro-organisms convert biodegradable organic matter into a stabilised residue known as compost ⁽¹³⁾ .
Description of technology	<p>Materials suitable for composting typically include green waste and putrescible wastes with pre-sorting and screening to remove non-compostables, plus other enriched organic waste streams (sewage sludge, agricultural, food processing wastes). The decomposition process uses oxygen drawn from the air and produces carbon dioxide and water vapour as by-products.</p> <p>Composting processes for municipal waste management fall principally into two categories; windrow composting and in-vessel composting.</p> <p>Windrow composting is an established technology for dealing with green wastes in the UK. The process involves the aerobic decomposition of 'windrows', which are typically 3m high and 4 - 6m long linear heaps of shredded and mixed organic waste. These heaps of material are aerated through either periodical mechanical turning of the waste or by forcing air through the material until the desired temperature and residence times are achieved to enable effective</p>

13 ODPM (2004) Planning for Waste Management Facilities: A Research Study <http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

	<p>degradation. This results in a stabilised residue known as compost. The windrow composting process generally lasts from 8 to 16 weeks (although in many cases longer). The windrows may be located either indoors or outdoors.</p> <p>In-vessel composting differs from windrow composting in that the aerobic digestion is undertaken within an enclosed container, where the control systems for material degradation are fully automated. Moisture, temperature and odour can be regulated and this process produces a stable compost more quickly than outdoor windrow composting is able to. In-vessel composting usually takes between 7 and 21 days, with a maturation time commonly between four and ten weeks⁽¹⁴⁾.</p> <p>In-vessel techniques generally require less space than windrow composting and, because these systems are enclosed, all food waste including meat and dairy products can be composted and the potential to attract pests is reduced.</p>
Advantages	<ul style="list-style-type: none"> ● Reduces volume of organic wastes to landfill ● Produces a valuable source of organic matter (usable product) otherwise lost from the natural environment ● Potential for co-location with operations involving other waste streams e.g. paper and sewage sludge ● Relatively low set up costs in comparison to other waste management options ● Allows various scales and methods of production ● May be sited in a variety of locations.
Disadvantages	<ul style="list-style-type: none"> ● Can lead to an increase in odours, release emissions (bioaerosols) and contaminants ● Potential for an increase in litter and vermin which can have an adverse effect on people living or working in close proximity operations ● Potential for leachate production if not managed carefully ● Treats only the organic fraction of the waste stream ● Sensitive to cross-contamination by glass and plastics, requiring careful source segregation or further post-treatment ● Liable to combust if poorly managed ● Less experience of in-vessel composting in the UK.
Scale and capacity	<p>The size of a composting site is dependent on the scale of operation, which can vary from small community schemes and on-farm sites to large scale centralised commercial facilities of up to five hectares. As a result, composting facility capacity varies largely, although typical capacity for both windrow and in-vessel plants is around 50,000tpa⁽¹⁵⁾.</p>
Site and location requirements	<p>Basic equipment requirements for any composting scheme include a shredder, aeration plant (either a purpose built machine or a tractor with a loading shovel) and screening equipment for the finished product.</p>

14 ODPM (2004) Planning for Waste Management Facilities: A Research Study

<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

15 Last, S. (2008) The Mechanical Biological Treatment Web Site <http://www.mbt.landfill-site.com/index.html>

	<p>Appropriate locations for composting facilities include existing waste management sites, industrial areas, degraded, contaminated or derelict land, farmland and mineral working sites.</p> <p>Windrow operations are best suited to existing landfill sites and non-sensitive rural sites. Traditional windrow composting plants are able to blend in with suburban and rural development due to their low profile structures, comparable in size with agricultural land uses (such as farm buildings). Such facilities would not normally be compatible with a hi-tech business park or urban setting.</p> <p>In-vessel composting facilities may be sited in a variety of rural or industrial locations.</p>
<p>Case studies</p>	<p>There is a composting facility at the Hills Resource Recovery Centre at Lower Compton. At this site approximately 25,000 tonnes of green waste is collected annually from HRCs across Wiltshire and is delivered to the composting facility for shredding and processing. The entire composting process takes approximately 14 weeks from delivery through to final screening and product bagging. The compost is certified by both the Composting Association and the Soil Association for use by organic growers.</p>
<p>Planning issues and potential mitigation</p>	<ul style="list-style-type: none"> ● Traffic - vehicles should be routed away from inappropriate roads, such as sensitive residential areas and schools. Locating the site at a suitable distance from sensitive receptors can also assist in the control of airborne microbes and noise. Waste management sites should have good access to the HGV Route Network ● Noise - sites can be positioned a reasonable distance from sensitive receptors to achieve effective noise control. Other common measures include fitting machinery with silencers and limiting operation to specific times of day ● Dust - should be regularly monitored and can be controlled by avoiding windrow composting operations in windy conditions, regularly damping down the site, and maintaining machinery to avoid dust generation ● Odour - a creation of natural odours cannot be completely avoided at composting facilities. However the physical containment involved with in-vessel composting helps to reduce the risk of odour which can be a problem with windrow composting facilities. Fabric covers and absorbent cover materials may be used on static windrows to contain odours ● Litter - can be alleviated by using natural or man-made barriers to contain the litter ● Atmospheric pollution - composting can produce harmful bioerosols and spores. Therefore the EA requires that if operations are within 250m of workplaces or dwellings they must carry a Site Specific Bioaerosol Risk Assessment (SSBRA) in support of their application ● Water resources - Water resources - adequate site surfacing, segregated drainage and containment are essential in the control of leachate. Any leachate not recirculated should be collected and taken away, or directed

to a sewer or watercourse with the appropriate consent or a works inlet at a wastewater treatment plant

- Visual impact - careful site selection and appropriate orientation of the building footprint together with appropriate screening (e.g. tree planting) can help to minimise any potential adverse impact a composting facility may have⁽¹⁶⁾.

16 ODPM (2004) Planning for Waste Management Facilities: A Research Study
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

4 Waste Treatment

4.1 Mechanical Biological Treatment (MBT)

Figure 4.1 Mechanical Biological Treatment Flow Diagram

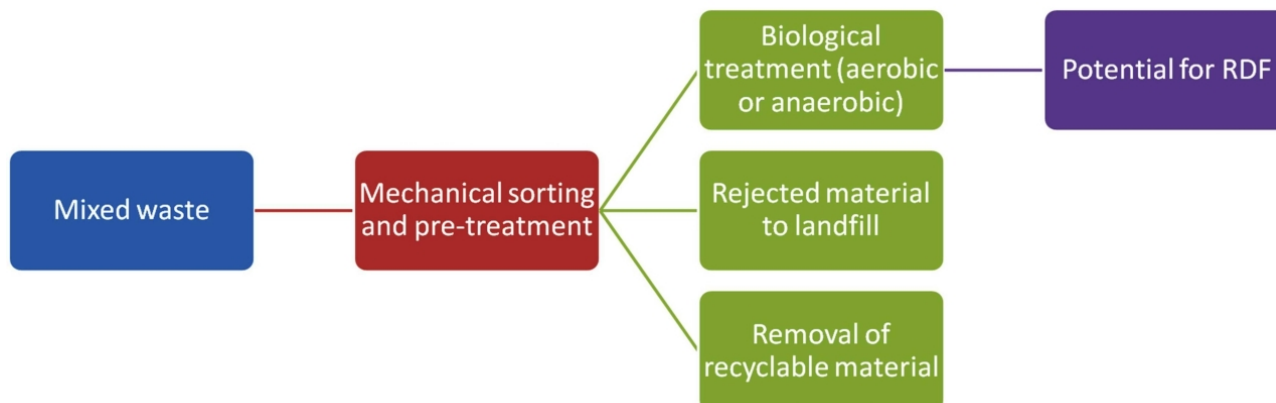


Table 4.1 Mechanical Biological Treatment (MBT)

Definition	The term Mechanical Biological Treatment (MBT) describes a process which combines mechanical and biological techniques to sort and separate MSW ⁽¹⁷⁾ .
Description of technology	<p>The process is split into two stages. In the mechanical stage waste is broken down into smaller parts and any recyclable material is removed, in a sorting process similar to a 'dirty' MRF. In the biological stage waste is composted or digested, usually in an enclosed system.</p> <p>Depending on how the biological input is treated the process will result in either a low grade stabilised residue that has potential to be used in a limited number of applications, for example as daily cover at landfill sites (also known as 'biostabilisation'), or a digestate similar in quality to low grade compost and a biogas, which can be burnt to produce renewable energy.</p> <p>However, if the biological input is treated, dried, shredded and compacted (pelletised) the output can be used as a fuel to produce a renewable form of energy (RDF).</p> <p>MBT reduces the amount of biodegradable waste going to landfill, due to the removal of materials for recycling and both carbon and moisture losses. Typically, for every tonne of waste input to a MBT plant, approximately 0.6 tonnes will be left as residue⁽¹⁸⁾.</p>
Advantages	<ul style="list-style-type: none"> • Potential renewable source of energy (process generates potentially useful methane gas) • May be located near to urban centres, minimising transport impacts

17 ODPM (2004) Planning for Waste Management Facilities: A Research Study <http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

18 Friends of the Earth (2008) Mechanical Biological Treatment Briefing Paper http://www.foe.co.uk/resource/briefings/mchnical_biolo_treatmnt.pdf

	<ul style="list-style-type: none"> • Reduces reliance on fossil fuels, which would assist in reducing overall carbon dioxide emissions • Plant design can be flexible to allow for increases in capacity or changes to processes • Plant design can be integrated with other waste management sites / processes (e.g. utilising RDF to power CHP) • Technology based on combinations of existing proven technologies • Designed to extract additional recycle from the residual waste stream • Reduces the biodegradability of waste, thus reducing the methane and leachate production once the residue is landfilled • Indoor operations improve the ability to be able to control potential pollutants • Stabilisation of waste reduces side effects at landfill sites such as odour, dust and windblown paper and plastics • Environmental benefits compared to landfill / incineration (supported by Friends of the Earth).
Disadvantages	<ul style="list-style-type: none"> • Potential for an increase in noise and vibration due to increased traffic and machinery use • Potential for increased atmospheric pollution from emissions release and dust due to increased traffic and operations • Potential for an increase in odour, vermin, litter, light pollution and pests • Relatively little experience of technology within the UK • Process produces residues rather than eliminating waste • System is reliant on other treatment / disposal processes for the residues • The recycled materials recovered are likely to be of poorer quality / lower value as they have been derived from a mixed residual stream • Potential contamination issues • Potential high costs associated with more aesthetically pleasing architecture • Potential for dust if a drying process is used in an MBT system.
Scale and capacity	<p>There is varying advice available on the most appropriate size and capacity of MBT facilities. However, it is considered that a typical MBT facility has a capacity of between 25,000 and 200,000tpa. In terms of land requirements, small facilities (25,000 - 60,000tpa) can be between one and two hectares whilst larger facilities (with a capacity of around 180,000tpa) are typically three to four hectares in size⁽¹⁹⁾.</p>
Location and site requirements	<p>Appropriate locations for MBT plants may include industrial and employment areas, areas of degraded, contaminated or derelict land or existing waste management sites, near to sources of waste. Small scale community based schemes can also be located on a wide range of sites. Larger scale MBT facilities are likely to induce high volumes of traffic and as such should be located close to the main road / rail network.</p>

19 Last, S. (2008) The Mechanical Biological Treatment Web Site <http://www.mbt.landfill-site.com/index.html>

	<p>MBT plants can be stand-alone facilities or integrated into larger waste management sites. Site requirements will reflect the combination of preferred techniques, for instance depending on whether or not the MBT scheme incorporates RDF process facilities. Buildings at MBT facilities will generally be industrial in nature and enclosed, with a maximum height of 10 - 20m.</p>
<p>Case studies</p>	<p>In March 2009 planning permission was granted for a new 60,000tpa capacity MBT plant in Westbury.</p>
<p>Planning issues and potential mitigation</p>	<ul style="list-style-type: none"> ● Traffic - may include locating sites and vehicle routes away from sensitive areas in addition to limiting operation hours. Waste management sites should have good access to the HGV Route Network ● Air emissions - limiting journey distances and sensitive routing / siting may help to reduce traffic related air quality effects. The EA requires a buffer of up to 250m between sites and dwellings or work places ● Dust, litter and odour - enclosure of operations within a building is the primary means of preventing these impacts ● Flies, vermin and birds - rodent and fly control may be affected by rapid turnaround of waste materials. Birds are discouraged by containing operations within a building ● Noise - mitigation may include sensitive siting and regular maintenance of equipment. Fencing and bunds may also be used ● Water resources - avoidance of areas close to sensitive water resources and provision of a drainage system separating dirty and clean waters and transferring dirty waters to sewer or other appropriate treatment will prevent any serious water pollution ● Visual impact - may be reduced by appropriate siting, tree and hedgerow planting and sensitive building design.

4.2 Anaerobic Digestion (AD)

Picture 4.1 Anaerobic Digestion Flow Diagram

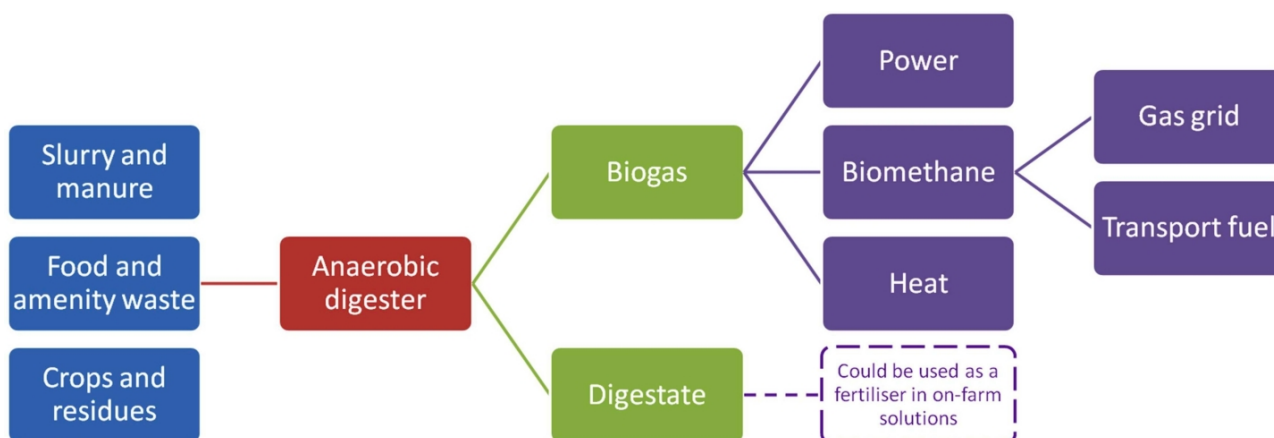


Table 4.2 Anaerobic Digestion (AD)

Definition	Anaerobic digestion (AD) is a treatment process in which biodegradable material (such as agricultural manure, sewage sludge and food waste - as well as non-waste feedstocks grown specifically for the purpose) is encouraged to break down through the action of bacteria in the absence of oxygen. This process takes place in an enclosed vessel under controlled conditions, resulting in the production of biogas and a residue known as digestate.
Description of technology	<p>The figure above illustrates the AD process. The biogas produced through AD can be used as a source of energy that can be combusted to provide heat, electricity or both. Biogas can also be upgraded / scrubbed by removing the carbon dioxide and impurities to produce biomethane, which can be injected into the mains gas / electricity grid or used as a road fuel. ⁽²⁰⁾</p> <p>The AD process also produces digestate, a nutrient-rich substance made from left over indigestible materials and dead micro-organisms, which can be beneficially applied to farmland as a fertiliser and soil conditioner. ⁽²¹⁾</p>
Advantages	<ul style="list-style-type: none"> • Process generates biogas, a renewable source of energy • May be located near to urban centres, minimising transport impacts • Reduces reliance on fossil fuels, which would assist in reducing overall carbon dioxide emissions • Plant design can be flexible to allow for increases in capacity or changes to processes • Plant design can be integrated with other waste management sites / processes • A proven technology in global use • Relatively low capital costs in comparison to other thermal processes • Eligible for Renewables Obligation Certificates on electricity that is generated (and other funding incentives)

20 Environment Agency (2010) Anaerobic digestion (biogas) <http://www.environment-agency.gov.uk/business/sectors/32601.aspx>

21 National Non-Food Crops Centre (NNFCC) (2010) The Official Information Portal on Anaerobic Digestion <http://www.biogas-info.co.uk/>

	<ul style="list-style-type: none"> • Diverts organic waste that may otherwise go to landfill • Weekly food collections have improved household recycling rates • Produces digestate which can be used to benefit soil / agriculture • Control of potential pollutants is significant as it is an enclosed system.
Disadvantages	<ul style="list-style-type: none"> • Potential for increase in noise and vibration due to increased traffic and machinery use • Increased atmospheric pollution and dust due to increased traffic and operations • Potential for an increase in vermin, litter and light pollution • Potential for increased odour • Relatively little experience with AD technology in the UK • Capital intensive (more so than composting) • Uncertainties over commercial viability and practical applications of AD to treat MSW • Marketing challenges • AD of MSW will require comprehensive pre-processing of the waste or source separation to produce a marketable product • Treats only the organic fraction of waste stream • Visual impacts due to industrial nature of buildings and possibly high stacks • Potential for contamination of final product • Costly gas handling, storage and clean up facilities required.
Scale and capacity	<p>AD plants can be established at two broad scales. Large, centralised facilities can be developed, which may co-digest source-separated municipal wastes with other wastes, such as agricultural residues, sewage sludge and industrial organic wastes. There are approximately fifty substantial AD plants in Europe, dealing with waste capacities ranging from 13,000 - 80,000 tonnes each year. At the smaller end of the scale, AD plants can be designed to treat the household biodegradable waste of a village or group of villages, or situated on a farm to treat its agricultural residues⁽²²⁾.</p> <p>In larger waste management sites, the plant and ancillary development may take up to one hectare of land, with the highest structure being the digester which can measure 10 - 25m in height. Plants always require an engineered vessel and digester tank to ensure that oxygen is excluded. The tank is usually circular and can be up to 15 metres high.</p>
Location and site requirements	<p>Due to site requirements, the location of larger centralised facilities will be limited to sites suitable for large-scale built development (where the scale and massing of the digestion tanks could co-exist amongst similar sized structures) and supported with the necessary transport infrastructure. Depending on scale, appropriate locations could include industrial and employment areas, areas of degraded, contaminated or derelict land or existing waste management sites. The facility can be incorporated in an integrated waste management facility providing household waste recycling, composting and materials recovery within its boundaries.</p>

22 ODPM (2004) Planning for Waste Management Facilities: A Research Study
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

	<p>More common in the UK, small scale community based schemes can be located on a wide range of sites including agricultural locations (providing that appropriate environmental measures are put into place).</p>
<p>Other information</p>	<p>In the UK, AD is most firmly established as a treatment technology for sewage sludge (66% of all sewage sludge in the UK was treated in this way in 2007), although there are currently few AD plants used for treating other materials (such as food wastes)⁽²³⁾.</p> <p>AD has the potential to be an established technology for the treatment of organic waste (particularly food waste), although there is presently limited experience of it in the UK. AD can be combined with mechanical sorting systems to process residual mixed municipal waste (see MBT). AD plants can contribute to the recovery of energy from waste and divert organic waste from landfill.⁽²⁴⁾</p> <p>The UK produces approximately 100 million tonnes of food, farm and other organic waste each year, which could generate up to 7% of the renewable energy required in the UK by 2020.⁽²⁵⁾</p>
<p>Case studies</p>	<p>There are currently approximately 37 AD plants using food and farm waste in the UK, with around 60 planned or under construction⁽²⁶⁾. One of these planned developments is for a small scale anaerobic digester (and Combined Heat and Power facility) at Bore Hill Farm near Warminster, which was granted planning permission by Wiltshire Council in July 2010. There are no other AD plants in the plan area at this stage but it is expected that more will be planned.</p>
<p>Planning issues and potential mitigation</p>	<ul style="list-style-type: none"> • Traffic - impact can be minimised by ensuring that delivery vehicles are routed away from inappropriate roads and sensitive areas such as schools. Careful location of the digestion facility and the storage tanks can minimise distances travelled between the production of the feedstock, the storage tanks and the digester • Air emissions - carefully handling reliable feedstocks will help to ensure that the plant operates in a safe manner • Noise - sensitive design of the main buildings and tanks, along with noise reduction features on specific plant components should ensure that noise levels are kept to reasonable levels • Dust and odours - appropriate siting of the facility along with effective site and plant management can minimise odour impacts. Vehicle wheel washing is likely to be necessary at centralised facilities, to minimise dust levels and reduce the potential for cross contamination. A biofilter in treatment buildings can remove odours at 90% efficiency for AD

23 Environment Agency (2010) Anaerobic digestion (biogas) <http://www.environment-agency.gov.uk/business/sectors/32601.aspx>

24 Department of Trade and Industry (2007) Meeting the energy challenge: a white paper on energy <http://www.berr.gov.uk/files/file39387.pdf>

25 DEFRA (2009) Anaerobic Digestion: Shared Goals <http://www.defra.gov.uk/environment/waste/ad/documents/ad-sharedgoals-090217.pdf>

26 DEFRA (2010) Anaerobic Digestion: Realising the potential <http://ww2.defra.gov.uk/news/2010/07/06/anaerobic-digestion/>

- Water resources - the EA require that all tanks and digesters are surrounded by containment bunding of either concrete or clay
- Visual impacts - may be reduced by appropriate siting (for instance, co-locating the facility close to existing buildings of a similar scale) or through partial burial of the digester to reduce its perceived height. Although design is limited to an extent, it should be reflective of style and treatment of the surrounding built environment⁽²⁷⁾.

27 ODPM (2004) Planning for Waste Management Facilities: A Research Study
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

4.3 Energy from Waste (EfW)

Picture 4.2 Lakeside Energy from Waste Facility



Table 4.3 Energy from Waste (EfW)

<p>Definition</p>	<p>Energy from Waste (EfW) is the process of burning waste in order to generate energy (e.g. electricity or steam).</p>
<p>Description of technology</p>	<p>This process involves the combustion, heating or bacterial treatment of waste under controlled conditions in which the gases or liquids released are recovered to generate heat and/or electricity, for industrial or domestic users.</p> <p>There are a number of different EfW technologies, including direct combustion (incineration with energy recovery), pyrolysis and gasification.</p> <p>Direct combustion (incineration with energy recovery)</p> <p>Incineration is the most common form of EfW technology in the UK and the rest of the world. The majority of incinerators currently operating in the UK are moving grate EfW plants designed to handle large volumes of household wastes with no pre-treatment. In these EfW plants, the waste is slowly propelled through a furnace by a moving mechanical grate (composed of interlocking bars to facilitate movement. Waste continuously enters the furnace at one end and ash is discharged at the other. As the waste descends it goes through a three stage process of drying, combustion and burnout. Energy is recovered from the hot</p>

flue gases in order to generate electricity and provide hot water for heating. The flue gases are treated in order to remove pollutants. The solid residues are disposed of within landfills or recycled.

Pyrolysis

Pyrolysis is a thermal process whereby organic materials in waste are broken down under heat pressure in the absence of oxygen to produce a liquid residue and gaseous output which may be combusted to generate electricity. The process also produces a solid inert residue / slag (consisting predominantly of carbon) which may require disposal or additional processing. Pyrolysis works most effectively when input waste is carbon-rich and has been sorted (into organic material). Pyrolysis usually requires a consistent waste stream such as tyres or plastics to produce a usable fuel product.

Gasification

Gasification works in a similar way to pyrolysis, although generally operating at a higher temperature range (greater than 700°C) and with the addition of an oxidant (either air or oxygen). The output from a pyrolysis plant may also be fed into the gasification process. Gasification of organic derived wastes will produce a fuel-rich gas which can be combusted to generate electricity and a char that usually requires disposal if no markets for it are available⁽²⁸⁾.

Advantages

- Technologies have capability to recover energy from waste
- EfW facilities may be located near to urban centres, minimising transport impacts
- Reduces reliance on fossil fuels, which would assist in reducing overall carbon dioxide emissions
- Significant reduction in the amount of waste to landfill
- Sophisticated facilities which ensure a high level of control over the process
- High temperatures may make the system more flexible to other waste streams (e.g. Clinical waste).

Direct combustion (incineration with energy recovery)

- Proven and commercially viable technology (including pollution control technology)
- Can handle waste without pre-treatment.

Pyrolysis and Gasification

- Plant design can be flexible to allow for increases in capacity or changes to processes
- Plant design can be integrated with other waste management sites / processes (such as the output from MBT/RDF production)
- Potential to recycle large proportion of residues.

<p>Disadvantages</p>	<ul style="list-style-type: none"> ● Potential for an increase in noise and vibration due to increased traffic and machinery use ● Potential for increased atmospheric pollution from emissions release and dust due to site operations and traffic ● Potential for an increase in vermin, litter, light pollution and odour ● Capital intensive technology. <p>Direct combustion (incineration with energy recovery)</p> <ul style="list-style-type: none"> ● Negative public perception (and lack of understanding of incineration with EfW technology) ● Disposal of residues (ash) required, including landfill of hazardous fly ash residues (although bottom ash can be reused as a source of secondary aggregates) ● Low level of materials recovery, except for ferrous materials ● Minimum or guaranteed tonnage may be required by the operator to cover high costs ● Visual impact due to industrial nature and high stacks ● Potential high costs associated with more aesthetically pleasing architecture <p>Pyrolysis and Gasification</p> <ul style="list-style-type: none"> ● Pyrolysis and gasification are emerging technologies and only limited information is available on their use - less mature technologies than direct combustion ● Relatively unproven performance with regard to MSW ● Requirement for extensive pre-treatment to be able to handle MSW ● Public concerns over emissions / impacts on health ● More expensive than other EfW technologies and unproven on commercial scale ● More sensitive system than moving grate incineration technology ● A large capacity plant could divert waste for which recycling capacity is available.
<p>Scale and capacity</p>	<p>The size and location of the sites will vary depending on the scale and nature of the facility.</p> <p>Direct combustion plant capacities are commonly classified as small scale (less than 150,000tpa), medium scale (150,000 - 250,000tpa) or large scale (more than 250,000tpa) based on available throughputs. A typical facility with a throughput of 100,000tpa would require around 2.5ha and generate electricity (which would be exported to the national grid) roughly equivalent to the electricity usage of 10,000 houses⁽²⁹⁾. Any heat produced can be used in industrial or district heating schemes if appropriate to the need and infrastructure that can be developed.</p>

	<p>Of the pyrolysis and gasification plants that are in operation around Europe, capacity is typically between 20,000tpa and 100,000tpa. A 50,000 - 60,000tpa capacity plant will generally require 0.5 - 2ha of land. Although a gasification plant in Karlsruhe, Germany, caters for 225,000tpa on a 6ha site.</p>
<p>Location and site requirements</p>	<p>Direct combustion plants generally contain buildings of a significant size (including a stack up to 75m tall) which require large site areas (EfW plants with a throughput of 400,000tpa typically have a land-take of five hectares). As such, plants of this scale will not easily blend in with surrounding development. Such facilities would not normally be compatible with a hi-tech business park environment or a rural / semi rural setting where no existing large built structures are present. It would normally be necessary to apply different design benchmarks where the building will be seen as a prominent landmark feature.</p> <p>Pyrolysis and gasification plants may also require a stack up to 75m tall. The Government 'Planning for Waste Management Facilities'⁽³⁰⁾ document advises that siting criteria should be linked to the scale and form of proposals, although preference should be given to areas allocated for business use or traditional industrial / commercial areas. Facilities may stand alone but are more likely to be integrated into a larger waste management site. Pre-processing of waste is required for these treatment systems, and as such they are well suited to being co-located with mixed waste processing and recycling facilities.</p>
<p>Other information</p>	<p>According to the UK Renewable Energy Association (REA), 'waste to energy conversion is an increasingly recognised approach to resolving two issues in one - waste management and sustainable energy'⁽³¹⁾. Although more common in other parts of Europe, EfW accounts for approximately 10% of MSW in England but is expected to increase to a targeted 25% by 2020⁽³²⁾. The previous Government recognised a need for generating EfW in a 2007 Energy White Paper⁽³³⁾, which offered greater support for various EfW technologies. The new coalition Government has also committed to promote a huge increase in EfW, specifically through AD techniques (see previous chapter).</p> <p>The Government⁽³⁴⁾ recommends that preference should be given to co-location with mixed waste processing operations. EfW schemes may be incorporated into an integrated waste management facilities providing household waste recycling, composting and materials recovery.</p>
<p>Case studies</p>	<p>There are currently no direct combustion municipal waste incinerators operating within Wiltshire and Swindon. However, there are a number of large scale treatment facilities in the UK including Billingham (Teesside), SELCHP (London) and Lakeside (Colnbrook, Berkshire).</p>

30 ODPM (2004) Planning for Waste Management Facilities: A Research Study

<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

31 Renewable Energy Association (2009) Biomass and Bioenergy <http://www.r-e-a.net/power/biomass-bioenergy/energy-from-waste>

32 DEFRA (2007) Waste Strategy for England 2007

<http://www.defra.gov.uk/environment/waste/strategy/strategy07/documents/waste07-strategy.pdf>

33 Department of Trade and Industry (2007) Meeting the energy challenge: a white paper on energy

<http://www.berr.gov.uk/files/file39387.pdf>

34 ODPM (2004) Planning for Waste Management Facilities: A Research Study

<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

The Lakeside EfW plant (pictured) located in Berkshire has been fully operational since January 2010 and is capable of recovering energy from over 410,000 tonnes of residual waste per year from local authorities and businesses, generating 37MW (megawatts) of electricity. A small amount of the electricity is used to power the plant itself while the vast majority is exported to the National Grid, proving enough electricity to meet the needs of approximately 50,000 homes. Lakeside EfW has also been designed with the potential to export surplus heat, thus making it a Combined Heat and Power (CHP) plant⁽³⁵⁾. Wiltshire Council has a 25 year contract (beginning in 2009) with Hills Waste Solutions Ltd to deliver 50,000tpa of residual municipal waste to the Lakeside plant.

Pyrolysis and **gasification** processes are still in development, and there is only limited (and mixed) experience of the technology in use at a commercial scale in the UK or the rest of Europe. In the UK, the first gasification system for the combustion of RDF (30,000tpa) from municipal waste was opened on the Isle of Wight in 2008. However, operation of this facility, which was partly funded through DEFRA's New Technologies Demonstrator Programme, has been suspended since May 2010 due to elevated dioxin emissions. New Earth Energy has recently secured planning permission to develop its first large-scale EfW facility. The £15m, 7.5MW gasification and pyrolysis plant will be located alongside the MBT plant currently in construction at Avonmouth, Bristol. The firm is also in the process of planning for a 10MW stand-alone pyrolysis plant at the Dorset Green Technology Park in Winfrith, to act as a merchant facility in taking residue from the Canford MBT.

Planning issues and potential mitigation

- Traffic - mitigation may be to locate sites and vehicle routes away from sensitive areas in addition to limiting operation hours. Waste management sites should have good access to the HGV Route Network
- Air emissions - plants must meet the limits set out in the EC Waste Incineration Directive 2000. Most facilities can only achieve the required limits by use of proprietary air pollution control (APC) systems
- Noise - Appropriate site layout design and siting of particularly noisy pieces of plant such as air cooled condenser units is recommended
- Dust and litter - negative air pressure generated by inward flow of air over the waste reception area and waste pit minimises releases of dust and litter
- Visual impact - detrimental visual impact may be reduced by appropriate siting, planting and sensitive building design. Although there is often limited potential for architectural enhancement, detail may be applied such as colour treatment⁽³⁶⁾.

35 Grundon (2010) Energy from Waste <http://www.grundon.com/how/energyFromWaste.htm>

36 ODPM (2004) Planning for Waste Management Facilities: A Research Study <http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

Picture 4.3 Visualisation of proposed energy facility, including pyrolysis units, at Dorset Green Technology Park. Source: New Earth Energy



4.4 Combined Heat and Power (CHP)

Picture 4.4 Bore Hill Landscape Master Plan. Source: Malaby Biogas



Table 4.4 Combined Heat and Power (CHP)

Definition	Combined Heat and Power (CHP) is a highly fuel efficient technology which produces electricity and heat from a single facility ⁽³⁷⁾ .
Description of technology	All power plants emit heat, but CHP facilities capture this heat by-product for heating purposes. It is for this reason that CHP schemes are considered to be among the most efficient of EfW facilities. CHP is the cooperative production of heat and power (usually in the form of steam and electricity respectively) for export to the national grid. There are a variety of types of CHP plants which deal with variable feedstock including biomass, wood and waste.
Advantages	<ul style="list-style-type: none"> ● Renewable source of energy ● May be located near to urban centres, minimising transport impacts ● Reduce reliance on fossil fuels, which would assist in reducing overall carbon dioxide emissions ● Plant design can be flexible to allow for increases in capacity or changes to processes ● Plant design can be integrated with other waste management sites / processes ● Proven and reliable technology ● Supported by European legislation ● Potential for local economic benefits ● Highly-efficient and cost-effective ● Flexible and responsive heat supplies - the thermal energy (heat or cooling) produced by CHP can be stored to meet later demand ● Reduced overall demand from central power stations, therefore reducing stress on the electricity grid.
Disadvantages	<ul style="list-style-type: none"> ● Potential for an increase in noise and vibration due to increased traffic and machinery use ● Potential for an increase in vermin, litter, light pollution and odour ● Visual intrusion of an industrial facility ● Potential effects on health, local ecology or conservation from airborne and water borne emissions ● Viability linked to location in proximity to urban neighbourhood or facility and demand for energy
Scale and capacity	<p>CHP comes in a variety of sizes and configurations, designed to meet the needs of the energy consumers. The typical range for CHP is 5 to 30MW of thermal energy output, although larger industrial plants and some smaller schemes of a few hundred kilowatts have also been built in the UK.</p> <p>CHP sites can range from less than one hectare up to two hectares, with on site building height between 15 and 25m high and a stack up to 70m depending on the process proposed.</p>

37 ODPM (2004) Planning for Waste Management Facilities: A Research Study
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

Location and site requirements	<p>CHP is most efficient when the heat can be used on site or in close proximity to it. This is because efficiency is reduced when heat has to be transported over long distances using heavily insulated pipes (which are expensive and inefficient in comparison to electricity transmission along a simple wire). Associated with this, the viability of CHP depends on local heat demands, for instance if it can be linked to a nearby facility which consistently requires heat (e.g. a hospital).</p> <p>CHP schemes may be more applicable in an urban context, given that they are best suited to users requiring consistently high levels of heat throughout the year⁽³⁸⁾. Biomass CHP plants can also be the drivers of district heating systems, whereby a number of neighbouring properties are linked to a central heat CHP facility to share its output.</p>
Other information	<p>The EC Directive 2004/8/EC on the promotion of cogeneration (the CHP Directive) works to ensure that Member States analyse the state of CHP in their own countries, demonstrate that CHP is being promoted, and to track progress of high-efficiency CHP within the energy market.</p>
Case studies	<p>There are currently no CHP facilities in Wiltshire and Swindon. However, in July 2010 Wiltshire Council granted planning permission for the redevelopment of Bore Hill farm in Warminster (pictured), to include a biogas plant treating food waste and animal slurry using AD and CHP technology. From 2012, it is estimated that 12,000 tonnes of food waste and 5,000 tonnes of farm slurry are set to be processed by the Bore Hill plant each year. Surplus electricity will be sent to the local grid, generating enough renewable electricity for around 1,000 properties⁽³⁹⁾.</p>
Planning issues and potential mitigation	<ul style="list-style-type: none"> • Traffic - appropriate mitigation may be to locate sites and vehicle routes away from sensitive areas in addition to limiting operation hours. If the CHP plant operates using feed from on-site waste traffic issues will be limited • Air emissions - small scale thermal treatment facilities must meet the limits set out in the EC Waste Incineration Directive 2000. Most plants can only achieve the required limits by use of proprietary APC systems • Dust - negative air pressure generated by inward flow of air over the waste reception area and waste pit minimises releases of dust • Noise - Appropriate site layout design and siting of particularly noisy pieces of equipment is recommended • Visual intrusion - detrimental visual impact may be reduced by appropriate siting and sensitive building design. Although design is limited to an extent, it should be reflective of the style and treatment of the surrounding built environment⁽⁴⁰⁾.

38 ODPM (2004) Planning for Renewable Energy: A Companion Guide to PPS22
<http://www.communities.gov.uk/publications/planningandbuilding/planningrenewable>

39 New Energy Focus (2010) Wiltshire Council grants consent for Warminster biogas plant
http://www.newenergyfocus.com/do/ecco/view_item?listid=1&listcatid=32&listitemid=4160

40 ODPM (2004) Planning for Waste Management Facilities: A Research Study
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

5 Landfill / landraise

Picture 5.1 Lower Compton Landfill



Table 5.1 Landfill / landraise

Definition	Landfill / landraise involves the deposit of waste to land.
Description of technology	<p>The term 'landfill' relates to waste disposal predominantly below ground level whereas 'landraise' (although often generically referred to as landfill) relates to the disposal of waste above pre-existing ground levels.</p> <p>The nature of the waste that can be deposited in landfill is dependent on the geology of the site. Waste types can include inert waste, non-inert waste and hazardous waste. Most types of waste may be disposed of via landfill, however the landfill route is being discouraged both through the EC Landfill Directive⁽⁴¹⁾, and Landfill Regulations⁽⁴²⁾ in order to encourage more sustainable waste management practices such as minimisation, re-use, recycling and energy recovery. Nevertheless, landfill will still be required to dispose of the residues of other waste management operations including incinerator ashes and MRF rejects for the foreseeable future.</p>

41 EC Directive 1999/31/EC of 26 April 1999 on the landfill of waste

42 The Landfill (England and Wales) Regulations 2002

	<p>Landfills produce methane gas which can be managed in such a way to produce energy or where not enough is produced it is flared off. This gas can actually account for 2% of the UK's energy resource. This is encouraged under the Non-Fossil Fuels Obligation and Renewables Obligation Certificates.</p>
<p>Advantages</p>	<ul style="list-style-type: none"> • Landfill / landraise can take various types of waste • Tried and tested method • Landfill can be a way of restoring old quarries and mineral workings to beneficial after-uses (for example, agriculture or public open space) • Modern engineered landfills can utilise the higher quality methane to produce power • Better control over migration of landfill gas and leachate with landraise.
<p>Disadvantages</p>	<ul style="list-style-type: none"> • Potential for a significant impact on noise and vibrations due to the scale of operations leading to increased machinery use and traffic • Increased odour and atmospheric pollution from the operation (putrescible waste) and the potential increase in traffic numbers • Significant increases in vermin and pests is likely • Potential for disturbance of habitats in close vicinity and surrounding area • Potential for significant pollution of local soils and ground water (leachate contamination) with landfill • Landfill / landraise is becoming an increasingly expensive option due to rising taxes, increasing maintenance costs and scarcity of suitable sites • In the UK an estimated 20% of methane comes from landfill (landfill gas) -methane is twenty times more powerful than carbon dioxide as a greenhouse gas • Potential for litter travelling out of site if not properly controlled • Once landfilled, no value (other than gas) can be recovered from the waste • Visually intrusive features in landscape • Restrictive Landfill Directive requirements (for example, restricting particular waste streams and the banning of co-disposal of certain wastes). <p>Landraise</p> <ul style="list-style-type: none"> • Greater visual impact than landfill • Concern over the relationship with the adjoining landscape • Difficulties with after-use of the restored landform.
<p>Scale and capacity</p>	<p>Landfill sites can range in size from just a few hectares to over 100ha. Waste throughputs can also vary in terms of type of waste stream and quantity, with landfill sites receiving anywhere between 10,000 - 1,000,000tpa. A typical site would have a throughput of around 250,000tpa on a site of up to 50ha.</p> <p>The approximate size of typical landraise sites vary, although the area of a major site may be between 20 and 40 hectares depending on topography.</p>
<p>Location and site requirements</p>	<p>Landfill sites have to be sited where an existing void is available, such as in existing mineral workings, or in areas where suitable material may be excavated either for commercial sale or to provide engineering material for the landfill itself. Given the requirement either for mineral void or disused / marginal land, or</p>

	<p>issues relating to potential amenity concerns, landfill sites tend to be located in rural areas. Sites close to housing and other potentially sensitive locations should generally be avoided where possible unless risk assessment maintains that any impacts would be acceptable. Other location criterion includes proximity to water sources, as areas overlying major aquifers or close to potable waters should also be avoided unless significant buffer zones / intervening impermeable geology or improved containment is available. Land stability is also an issue in relation to landfills in that unstable local geology may potentially compromise containment and environmental management systems.</p> <p>Landraise sites are normally dome-shaped - contoured to blend in within the natural surrounding area. A concern of any landraise proposal will be its relationship with the adjoining landscape and the final intended after-use of the restored landform. The location of landraise sites is less constrained than potential landfill sites and may include derelict land, extensions to existing landfills and greenfield sites. However, landraising on virgin land will generally be considered unacceptable because of the environmental harm that may be rendered by any such activity.</p>
<p>Other information</p>	<p>Commonly, a landfill site would incorporate operations such as landfill gas extraction and flaring / utilisation, leachate extraction and treatment / export to sewer, and minerals extraction. Furthermore, legislation dictates that landfill pollutants (including landfill gas and liquid / leachate emissions) are to be controlled.</p> <p>Landfill Tax, introduced in 1996, currently increases the price of landfill per tonne each year. Also, as void space becomes scarce the cost of landfill will rise further.</p> <p>In the UK, over the last 10 years local authority collected waste sent to landfill has decreased from 79.0 per cent in 2000/01 to 47.0 per cent in 2009/10⁽⁴³⁾.</p>
<p>Case studies</p>	<p>Landfill sites within the plan area include Lower Compton in north Wiltshire and Chapel Farm Landfill in Swindon. An example of a landraise operation site in Wiltshire is Park Grounds Farm, Wootton Bassett, which deals with industrial and commercial wastes.</p>
<p>Planning issues and potential mitigation</p>	<ul style="list-style-type: none"> • Traffic - vehicles should be routed away from inappropriate roads, such as sensitive residential areas and schools. Other forms of transport such as rail are unlikely to be economically viable for input rates less than 100,000tpa, unless infrastructure is already in place. Waste management sites should have good access to the HGV Route Network • Air emissions - Landfill gas emissions are dealt with via abstraction and flaring or burning for power production purposes • Dust and litter - generally controlled by water bowsing, road sweeping, effective sheeting of vehicles and vehicle wheel-washing

43 DEFRA (2011) LOCAL AUTHORITY COLLECTED WASTE MANAGEMENT STATISTICS FOR ENGLAND – PROVISIONAL QUARTER 1 OF 2010/11

- Odour - commonly dealt with via landfill gas abstraction and flaring or utilisation for power production purposes. Daily cover also acts as an odour suppressant on fresh waste
- Flies, vermin and birds - pests are primarily controlled by waste compaction and the use of daily cover along with minimising the area of exposed waste. Falconry is sometimes used to deter birds
- Noise - mitigation measures may include the construction of noise bunds, regular plant maintenance, vehicle / plant silencing and limitation of operating hours
- Water resources - groundwater resources are protected in modern landfills by providing a clay and / or geomembrane liner to the site. Leachate is usually collected either for on-site treatment or discharged to a sewer. Separating dirty and clean run-off with the dirty waters being dealt with as leachate also assists
- Land stability / geology - carrying out land stability investigations prior to construction of the landfill will identify engineering works required to enable design of cells with suitable flank gradients
- Nature conservation - rapid restoration of completed areas may encourage colonisation by various species. Avoidance of sensitive habitats during site selection and design will also minimise impacts
- Explosion / asphyxiation - landfill gas hazards are controlled by gas abstraction and combustion systems along with containment lining. Sites should also be located over 250m from housing
- Visual impact - particularly with landraise, potential for impact on the landscape needs to be taken into consideration in examining potential landfill sites
- Restoration - usually phased and designed to reflect previous land-uses and complement the surrounding landscape⁽⁴⁴⁾.

44 ODPM (2004) Planning for Waste Management Facilities: A Research Study
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

6 Waste Water Treatment

Picture 6.1 Mogden Sewage Treatment Works, West London. Source: Thames Water.



Table 6.1 Waste Water Treatment

Definition	The purpose of waste water treatment is to remove organic matter, bacteria and chemicals to protect the environment and eradicate potential public health issues.
Description of technology	<p>Urban waste water, commonly referred to as sewage, is typically a mixture of domestic waste water, industrial waste water and rainwater run-off from roads and other surfaces⁽⁴⁵⁾. Every day in the UK approximately 347,000km of sewers collect over eleven billion litres of waste water. This waste water is treated at around 9,000 sewage treatment works before the treated effluent is discharged to inland waters, estuaries and the sea.</p> <p>Sewage works reproduce what would occur in the environment, settling out much of the solid matter (primary treatment), and using bacteria that ‘digest’ and break down the organic substances (secondary treatment). Sometimes, further treatment (tertiary) is required to protect sensitive water environments. Tertiary treatment can involve disinfecting the treated effluent to protect bathing</p>

45 Defra (2002) UK Implementation of the EC Urban Waste Water Treatment Directive <http://www.defra.gov.uk/environment/quality/water/waterquality/sewage/uwwtd/documents/uwwtreport2.pdf>

	<p>or shellfish waters. It can also involve the removal of phosphorus or nitrates (nutrients present in sewage) to protect waters that are threatened by eutrophication.</p> <p>There is a wide variety of waste water treatment technologies available, which include aerobic, anaerobic, mechanical and biological forms of treatment. AD has a well established track record in the UK for the treatment of waste water, with 220 plants including AD facilities for sewage. Anaerobic systems work at ambient temperature and require additional organic matter such as sludge or other waste. A by-product of this is biogas. Sludge incineration can also produce heat, which in turn can be used to heat digester's to dry sludge. According to the NNFC AD currently treats 66% of the UK's sewage sludge⁽⁴⁶⁾.</p>
Other information	<p>There are several EU Directives that influence sewage treatment levels, in particular the Urban Waste Water Treatment Directive (91/271/ECC) which was transposed into UK legislation in 1995. The objective of this Directive is to protect the environment from the adverse effects of sewage discharges. By the end of 1998 the UK had stopped all disposal of the sewage sludge left over from treatment processes at sea or to other surface waters in accordance with its requirements.</p>
Planning issues and potential mitigation	<p>Planning issues include traffic, odour, air quality and visual impacts. A buffer is likely to be required between waste water treatment facilities and residential areas due to potential amenity issues such as odour and air quality. Sensitive site planning, facility design and planting may help to alleviate landscape and visual impacts.</p>

46 National Non-Food Crops Centre (NNFCC) (2010) The Official Information Portal on Anaerobic Digestion <http://www.biogas-info.co.uk/>

Appendix 1: Policy and guidance for waste planning

European Policy

- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (The Waste Framework Directive)
 - The Waste Framework Directive (WFD) establishes an overarching legislative framework for the treatment of 'waste' (defined as 'any substance or object which the holder discards or intends or is required to discard') within the Community. The Directive aims to protect the environment and human health through the prevention of the harmful effects of waste generation and waste management. As part of this objective, the WFD states that Member States should take measures for the treatment of waste in line with the following which is listed in order of priority: prevention; preparing for reuse; recycling; other recovery (notably energy recovery); disposal. Directive 2008/98/EC repeals the directives 75/439/EEC (the Waste Oil Directive), 91/689/EEC (the Hazardous Waste Directive) and 2006/12/EC.
- Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control (The IPPC Directive)
 - Replacing Directive 96/61/EC, the IPPC Directive requires industrial and agricultural activities with a high pollution potential to have a permit
- Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (The Landfill Directive)
 - This Directive, as amended, is intended to prevent or reduce the adverse effects of the landfill of waste on the environment
- Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste
 - This Directive, as amended, recognises the effects that incineration of both hazardous and harmless wastes may have on the environment and human health. In order to limit these risks, the EU imposes strict operating conditions and technical requirements on waste incineration plants and waste co-incineration plants
- Directive 94/62/EC of the European Parliament and of the Council of 20 December 1994 on packaging and packaging waste
- Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls [as amended]
- Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC
- Council Directive 75/439/EEC of 16 June 1975 on the disposal of waste oils [as amended]

- Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles
- Directive 2005/64/EC of the European Parliament and of the Council of 26 October 2005 on the type-approval of motor vehicles with regard to their re-usability, recyclability and recoverability and amending Council Directive 70/156/EEC
- Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment [as amended] (The WEEE Directive)
- Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment [as amended] (The RoHS Directive)
- Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries [as amended]
- Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC
- Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel
- Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment (The Urban Waste Water Directive)
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive)
- Regulation on Substances that Deplete the Ozone Layer EC 2037/2000
- Animal By-Products Regulation (EC) 1774/2002
- EC Working Document on Biological Treatment of Bio-waste, Second Draft
- EC Directive on the assessment of environmental effects (85/337/EEC as amended by 97/11/EC)
- EC Directive 2001/42/EC on the effects of certain plans and programmes on the environment (The SEA Directive)

National Policy & Legislation

Legislation

- Planning and Compulsory Purchase Act 2004
- Environmental Protection Act 1990
- Environment Act 1995
- Finance Act and Landfill Tax Regulations 1996

- Waste Minimisation Act 1998
- Waste and Emissions Trading Act 2003
- Control of Pollution (Amendment) Act 1989
- Environmental Permitting (England and Wales) Regulations 2010
- Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991
- Special Waste Regulations 1996
- Producer Responsibility Obligations (Packaging Waste) Regulations 1997 [as amended]
- Animal By-Products Order 1999 and Animal By-Products (Amendment) (England) Order 2001
- Landfill (England and Wales) Regulations 2002
- Renewable Obligation Order 2002 (England and Wales)
- Conservation (Natural Habitats, &c)(Amendment)(England and Wales) Regulations 2007
- Urban Waste Water Treatment (England and Wales) (Amended) Regulations 2003
- Hazardous Waste (England and Wales) (Amendment) Regulations 2009
- Waste (England and Wales) Regulations 2011
- Contaminated Land (England) Regulations 2000 as amended
- Town and Country Planning (Environmental Impact Assessment) Regulations 1999
- Environmental assessment of plans and programmes Regulations 2004

Policy and Guidance

- Planning Policy Statement 1: Delivering Sustainable Development (2005)
- Planning Policy Statement 10: Planning for Sustainable Waste Management (2005)
- Planning Policy Statement 23: Planning and Pollution Control (2004)
- Waste Strategy for England (2007)
- Securing the future 'delivering UK sustainable development strategy' (2005)

Local Policy

Wiltshire Core Strategy DPD (in preparation)

Wiltshire and Swindon Waste Development Framework

- Waste Core Strategy DPD (adopted July 2009)

- Waste Development Control Policies DPD (adopted September 2009)
- Waste Site Allocations DPD (in preparation)

Other Useful Information Sources

- Association of Directors of Environment, Economy, Planning and Transport (ADEPT) (2010) Making Space for Waste - Designing Waste Management in New Developments: A Practical Guide for Developers and Local Authorities
<http://www.cssnet.org.uk/documents/ADEPTMakingspaceforwaste.pdf>
- DEFRA (2008) Designing Waste Facilities: A Guide to Modern Design in Waste
<http://www.defra.gov.uk/environment/waste/localauth/documents/designing-waste-facilities-guide.pdf>
- Environment Agency (2010) Waste
<http://www.environment-agency.gov.uk/business/topics/waste/default.aspx>
- ODPM (2004) Planning for Waste Management Facilities: A Research Study
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.Pdf>
- ODPM (2004) Planning Policy Statement 22: Renewable Energy
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/147444.pdf>
- ODPM (2004) Planning for Renewable Energy: A Companion Guide to PPS22
<http://www.communities.gov.uk/publications/planningandbuilding/planningrenewable>
- Wiltshire Council (2009) Waste Core Strategy DPD 2006-2026
http://www.wiltshire.gov.uk/waste_core_strategy_july_2009.pdf
- Wiltshire Council (2010) Recycle for Wiltshire
<http://www.recycleforwiltshire.com/index.php>

Appendix 2: Glossary of terms

	Aerobic - An environment in which oxygen is available.
APC	Air Pollution Control - Air pollution is contamination of the atmosphere by noxious gases and particulates.
AD	Anaerobic Digestion
BMW	Biodegradable municipal waste - The portion of the municipal waste stream that is capable of undergoing anaerobic or aerobic decomposition, such as food and garden waste, and paper and paperboard.
	Biodegradable waste - Materials which can be chemically broken down by naturally occurring microorganisms into simpler compounds. In the context of this document it refers principally to waste containing organic material which can decompose giving rise to gas and leachate and other byproducts.
	Biofilter - Removes odours from gaseous emissions by passing the gas through layers of peat, heather or similar substrate on which microorganisms grow.
	Biogas - A mixture of methane (CH ₄) and carbon dioxide (CO ₂), produced by the anaerobic digestion of sludges or organic material in landfill sites; can be used to generate heat or power.
	Biomass - The amount of organic material of biological origin in a given area or volume.
	Biomethane - The biofuel equivalent of Compressed Natural Gas. It is generally produced by collecting methane naturally emitted from landfill sites or other forms of rotting vegetation.
	Bund - An outer wall or tank designed to retain the contents of an inner tank in the event of leakage or spillage.
	Burnout - The reduction of a fuel or substance to nothing through use or combustion.
CO₂	Carbon dioxide - A colourless, odourless gas produced by burning carbon and organic compounds and by respiration.
	Clinical waste - Derived largely from hospitals, medical and other related practices and defined as blood, tissue and other bodily fluids and excretions from humans and animals; drugs and medical equipment; and any other waste which, unless rendered safe, may prove hazardous or infectious to persons coming into contact with it.
CHP	Combined Heat and Power
	Combustion - The process of burning something.
	Commercial waste - Waste arising from premises which are used wholly or mainly for trade, business, sport, recreation or entertainment, excluding municipal and industrial waste.

CLG	Communities and Local Government - UK Government department for communities and local government in England, since May 2006. The department originated in 2001 as the Office of the Deputy Prime Minister (ODPM).
	Composting Association - The Composting Association is a British organisation aimed at promoting composting and the sustainable development of organic resources.
CD&E	Construction, Demolition and Excavation waste - Includes waste arising from the construction, repair, maintenance and demolition of building and structures.
	Controlled waste - Comprised of household, industrial, commercial, hazardous (special), clinical and sewage waste which require a waste management license for treatment, transfer and disposal. The main exempted categories comprise mine, quarry and agricultural wastes. The government is currently consulting on the extension of controls to farm wastes. However, materials used for agricultural improvement, such as manure and slurry, will not become controlled. Radioactive and explosive wastes are controlled by other legislation and procedures.
CS	Core Strategy DPD - This will be one of the most important DPDs to be produced. Wiltshire Council and Swindon Borough Council have produced joint Minerals and Waste Core Strategies to define the long term strategic vision and policies for minerals and waste development in the plan area.
Defra	Department for Environment, Food and Rural Affairs - The government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities in the UK.
	Development Plan, The - The government is committed to ensuring that planning decisions on proposals for development or the change of use of land should not be arbitrary. The statutory development plan will continue to be the starting point in the consideration of planning applications (Section 38(6) of the Planning and Compulsory Purchase Act 2004).
DPD	Development Plan Document - Spatial planning documents that are subject to independent examination. They will have 'development plan' status (please see the explanation of 'the development plan').
	Digestate - The solid material remaining after the anaerobic digestion of a biodegradable feedstock.
	Digester - A container in which substances are treated with heat, enzymes, or a solvent in order to promote decomposition or extract essential components.
	Dust - Solid particles about 1-10µm in size.
	EC Directive - A European Community legal instruction, which is binding on all Member States, but must be implemented through legislation of national governments within a prescribed timescale.
EfW	Energy from Waste
EA	Environment Agency - Established in April 1996, combining the functions of former local waste regulation authorities, the National Rivers Authority and Her Majesty's Inspectorate

	of Pollution. Intended to promote a more integrated approach to waste management and consistency in waste regulation. The Agency also conducts national surveys of waste arising and waste facilities.
	Ferrous metals - Metals composed mostly of iron. Cans, automobiles, refrigerators, and stoves all contain ferrous metals. Ferrous metals are magnetic.
	Friends of the Earth - An international pressure group established in 1971 to campaign for a better awareness of and response to environmental problems.
	Greenfield site - A site previously unaffected by built development.
	Green waste - Biodegradable waste that can be composed of garden or park waste, such as grass or flower cuttings and hedge trimmings, as well as domestic and commercial food waste.
	Hazardous waste - Waste which by virtue of its composition, carries the risk of death, injury or impairment of health, to humans or animals, the pollution of waters, or could have an unacceptable environmental impact if improperly handled, treated or disposed of, as controlled in the EC Directives on Hazardous Waste and defined by Special Waste Regulations 1996 (as amended) (schedule 2).
HGV	Heavy Goods Vehicle - A lorry/truck weighing more than 3.5 tonnes.
	Highways Agency - An executive agency, part of the Department for Transport in England.
HRC	Household Recycling Centre
	Household waste - As a major component of the municipal waste stream, household waste includes waste from household collection rounds, bulky waste collection, hazardous household waste collection, garden waste collection, civic amenity site waste, and wastes collected through council recycling schemes.
	Incineration - The controlled burning of waste, either to reduce its volume, or its toxicity. Energy recovery from incineration can be achieved by utilising the calorific value of paper, plastic, etc to produce heat or power. Current flue-gas emission standards are very high. Ash residues still tend to be disposed of to landfill.
	Industrial waste - Waste from any factory and from any premises occupied by an industry (excluding mines and quarries).
	Inert waste - Waste which, when deposited into a waste disposal site, does not undergo any significant physical, chemical or biological transformations and which complies with the criteria set out in Annex 111 of the EC Directive on the Landfill of Waste.
IWR/T	Inert Waste Recycling / Transfer
	Landfill gas - A gas produced by the decomposition of biodegradable waste. It consists primarily of a mixture of methane and carbon dioxide.
	Land use planning - The Town and Country Planning system regulates the development and use of land in the public interest, and has an important role to play in achieving sustainable waste management.

	Leachate - Liquids that have percolated through a soil and that carry substances in solution or suspension.
LDD	Local Development Document - The Town and Country Planning system regulates the development and use of land in the public interest, and has an important role to play in achieving sustainable waste management.
LDF	Local Development Framework - The LDF comprises a portfolio of LDDs that will provide the framework for delivering the spatial planning strategy for the area. District and Unitary Authorities will prepare LDFs for their area.
LDS	Local Development Scheme - The LDS sets out a three year programme for the preparation of LDDs. As a unitary Planning Authority, Wiltshire Council have prepared separate but complimentary Development Schemes, setting out a timetable for preparation of all planning policy documents including Minerals Development Documents and Waste Development Documents. Schemes must be submitted to the Secretary of State for approval and monitored annually through the AMR system.
LPA	Local Planning Authority - The local authority or council that is empowered by law to exercise planning functions for a particular area of the UK
	Non-inert waste - Organic waste that decomposes after disposal to land. May include household, industrial, commercial and special waste.
MRF	Materials Recovery Facility
MBT	Mechanical Biological Treatment
CH₄	Methane - A colourless, odourless flammable gas that is the main constituent of natural gas.
MSW	Municipal Solid Waste - Includes all wastes collected by the Waste Collection Authorities, or their agents, such as all household waste, street litter, municipal parks and gardens waste, and some commercial and industrial wastes.
NNFCC	National Centre for Biorenewable Energy, Fuels and Materials
	Non-inert waste - Includes all wastes collected by the Waste Collection Authorities, or their agents, such as all household waste, street litter, municipal parks and gardens waste, and some commercial and industrial wastes.
ODPM	Office of the Deputy Prime Minister - Government department disbanded in 2006 when renamed as the Department for Communities and Local Government (CLG).
	Organic - Of, relating to, or derived from living matter.
PPG	Planning Policy Guidance - Government policy statements on a variety of issues that are material considerations in determining planning applications.
PPS	Planning Policy Statement - Guidance documents which set out national planning policy. They are being reviewed and updated and are replacing PPGs.

	Putrescible waste - Includes household food waste; green waste and certain wastes arising from commercial and industrial sources. This kind of waste will easily decompose and breakdown.
	Recovery - The process of extracting a product of value from waste materials, including recycling composting and energy recovery.
	Recycled aggregates - Aggregates produced from recycled construction waste such as crushed concrete, road planning's etc.
	Recycling - Involves the reprocessing of wastes, either into the same product or a different one. Many non-hazardous industrial wastes such as paper, glass, cardboard, plastics and scrap metal can be recycled. Hazardous wastes such as solvents can also be recycled by specialist companies, or by in-house equipment.
	Reduction - Achieving as much waste reduction as possible is a priority action. Reduction can be accomplished within a manufacturing process involving the review of production processes to optimise utilisation of raw (and secondary) materials and recirculation processes. It can be cost effective, both in terms of lower disposal costs, reduced demand from raw materials and energy costs. It can be carried out by householders through actions such as home composting, re-using products and buying goods with reduced packaging.
RDF	Refused Derived Fuel - Also referred to as Solid Recovered Fuel (SRF), is a fuel product derived from the combustable fraction of non-inert waste that can be stored and transported, or used directly on site, to produce heat and/or power ⁽⁴⁷⁾ . The RDF process involves sorting and removing inert and often valuable recyclable materials, such as metal (all ferrous and non-ferrous metals) and glass, from MSW before reducing its moisture content to produce RDF.
RSS	Regional Spatial Strategy - A regional level planning framework for the regions of England, outside London where spatial planning is the responsibility of the Mayor. They were introduced in 2004. Their revocation was announced by the new Conservative/Liberal Democrat government on 6 July 2010. On 10th November 2010 Mr Justice Sales ruled in the case of Cala Homes (South) Ltd v Secretary of State for Communities and Local Government that The Secretary of State for Communities and Local Government was not entitled to use the discretionary power to revoke regional strategies contained in s79(6) of the Local Democracy, Economic Development and Construction Act 2009 to effect the practical abrogation of the regional strategies as a complete tier of planning policy guidance.
	Renewable Energy - Energy that comes from sources that can be replaced, such as sun, wind, waves, biofuels.
REA	Renewable Energy Association - Represents the UK's renewable energy industry, covering all renewable power, heat and fuels.
RO	Renewables Obligation - Designed to encourage generation of electricity from eligible renewable sources in the UK.
	Residual - A quantity remaining after other things have been subtracted or allowed for.

47 ODPM (2004) Planning for Waste Management Facilities: A Research Study
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/148385.pdf>

	Residue - A substance that remains after a process such as combustion or evaporation.
	Restoration - The methods by which the land is returned to a condition suitable for an agreed after-use following the completion of tipping operations.
	Re-use - The reuse of materials in their original form, without any processing other than cleaning. Can be practised by the commercial sector with the use of products designed to be used a number of times, such as re-useable packaging. Householders can purchase products that use refillable containers, or re-use plastic bags. The processes contribute to sustainable development and can save raw materials, energy and transport costs.
	Sewage - A suspension of water and solid waste, transported by sewers to be disposed of or processed.
SSBRA	Site Specific Bioaerosol Risk Assessment - Bioaerosols are airborne particles of biological origin including bacteria, viruses, fungi and yeasts, pollens and organic matter.
	Soil Association - A charity founded in 1946, its activities include the certification of organic food and campaign work on issues including opposition to intensive farming, support for local purchasing and public education on nutrition.
SRN	Strategic Road Network - The Highways Agency is responsible for operating the SRN in England which consists of most motorways and significant trunk A roads.
SPD	Supplementary Planning Document - Whilst not having 'development plan' status, SPDs can form an important part of the LDF of an area. They can be used to expand policy or provide further detail to policies in DPDs. Community involvement will be important in preparing SPDs but they will not be subject to independent examination.
	Sustainable waste management - This means using material resources efficiently, to cut down on the amount of waste we produce. And where waste is generated, dealing with it in a way that actively contributes to economic, social and environmental goals of sustainable development.
	Sustainable development - Development which is sustainable in that it meets the needs of the present without comprising the ability of future generations to meet their own needs.
	Throughput - The amount of material or items passing through a system or process.
tpa	Tonnes per annum
	Void space - The remaining capacity in active or committed landfill or landraise sites.
	Waste - Is the wide ranging term encompassing most unwanted materials and is defined by the Environmental Protection Act 1990. Waste includes any scrap metal, effluent or unwanted surplus substance or article that requires to be disposed of because it is broken, worn out, contaminated or otherwise spoiled. Explosives and radioactive wastes are excluded.
	Waste arising - The amount of waste generated in a given locality over a given period of time.
WDD	Waste Development Document - The replacement to the existing Waste Local Plan as well as constituting other 'non-development plan' documents.

WEEE	Waste Electrical and Electronic Equipment - The Waste Electrical and Electronic Equipment Directive (WEEE Directive) aims to minimise the impact of electrical and electronic goods on the environment, by increasing re-use and recycling and reducing the amount of WEEE going to landfill.
	Waste hierarchy - Suggests that the most effective environmental solution may often be to reduce the amount of waste generated – reduction. Where further reduction is not practicable, products and materials can sometimes be used again, either for the same or a different purpose – re-use. Failing that, value should be recovered from waste, through recycling, composting or energy recovery from waste. Only if none of the above offer an appropriate solution should waste be disposed.
WTS	Waste Transfer Station
WWT	Waste Water Treatment
	Wiltshire Council - The new unitary authority for Wiltshire as of 1 April 2009.