Environment Agency

# Treatment of non-hazardous wastes for landfill

# your waste – your responsibility

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The Environment Agency. Out there, making your environment a better place.

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## Overview

From 30 October 2007, non-hazardous waste must be treated before it can be landfilled. This requirement stems from the Landfill Directive, which aims to reduce our reliance on landfill as a waste management option and minimise the environmental impact of landfill sites. To meet this aim it is important that waste producers find better ways to manage their waste. Now is a good time for waste producers to review how they manage their waste, including whether it needs to be produced at all and whether what they do produce needs to be landfilled.

## What the Environment Agency expects from industry

The Environment Agency wants waste producers to take responsibility for their waste and make simple improvements in resource and waste management to deliver a better environment.

Many wastes currently landfilled are already treated beforehand and therefore already comply with the law. Even in these cases it is still good practice to consider if there are cost-effective ways to increase the amount of waste that is recovered and hence not sent for landfill.

There are many straightforward ways to treat waste that give real environmental benefits. For example, by collecting waste streams separately and recycling one or more of the separated components. Alternatively waste management companies can treat the waste on behalf of waste producers before it is sent to landfill. Again, for many wastes a suitable treatment might be to sort the waste at a transfer station with a proportion of the sorted waste being recycled. For waste that is sent to landfill, we consider it good practice for a written declaration to be given to landfill operators confirming that treatment has taken place.

## What industry can expect from the Environment Agency

We will take a reasonable and proportionate approach to the introduction of this new requirement and will focus on achieving better environmental outcomes. In doing so we will concentrate our efforts towards the top end of the waste management chain by advising waste producers on the new requirements and emphasising the opportunity this presents to improve their overall environmental performance. For the waste management industry our focus will be on improving management systems and waste acceptance procedures across the sector rather than seeking out minor technical breaches at individual facilities.

## Status of guidance

We have been greatly assisted in developing this guidance by members of the Landfill Regulation Group who represent waste producers and waste management companies. This document is intended to help both sectors adapt to the new requirements by giving practical examples of how waste can be treated. The document consists of two parts:

- **Part A**: sets out the regulatory framework and responsibilities. It also addresses the most frequent questions that have been raised with us over this new requirement.
- **Part B**: provides practical examples of how to treat non hazardous waste based on the experiences of waste producers and waste managers.

This guidance supplements existing *Guidance on Waste Destined for Disposal in Landfills* which was published in 2005 and addresses many of the key questions about the new requirement. This existing guidance is available on the Environment Agency website[1] and is referred to here as WDFDL (**W**aste **D**estined **F**or **D**isposal in **L**andfills).

The Landfill Regulation Group will review this document in the light of practical experience gained as the new requirement takes effect and will update the document as necessary. This review will also involve looking more closely at waste management practices within particular industry sectors and identifying opportunities to drive improvements in their environmental performance.

1 http://www.environment-agency.gov.uk/commondata/acrobat/wacv2_1006008.pdf

# Contents

# List of acronyms

| | |
|---|---|
| **ABPR** | Animal By-products Regulations |
| **AD** | anaerobic digestion |
| **C&D** | construction and demolition |
| **C&I** | commercial and industrial |
| **CHP** | combined heat and power |
| **EfW** | energy-from-waste |
| **ELV** | end-of-life vehicle |
| **EMS** | environmental management system |
| **EWC** | European Waste Catalogue |
| **FEL** | front end loader |
| **HACCP** | Hazard Analysis Critical Control Points |
| **HSAC** | Health Services Advisory Committee |
| **LTTD** | low temperature thermal desorption |
| **MBT** | mechanical biological treatment |
| **MFSU** | manufacture, formulation, supply and use |
| **MHT** | mechanical heat treatment |
| **MRF** | materials recovery facility |
| **MSW** | municipal solid waste |
| **NOS** | not otherwise specified |
| **RDF** | refuse-derived fuel |
| **REL** | rear end loader |
| **VOC** | volatile organic compound |
| **WAC** | waste acceptance criteria |
| **WDFDL** | Waste Destined For Disposal in Landfills [guidance document] |
| **WEEE** | waste electrical and electronic equipment |

# Part A: Regulatory Framework and responsibilities

Section 1

# Introduction

**Part A of this guidance explains the legal framework and summarises what waste producers and waste management companies are expected to do. It also answers the most commonly raised questions on how the requirement applies to non-hazardous waste. Part B gives practical examples of treatment options for commonly-occurring waste streams.**

## What is the new requirement?

From 30 October 2007, waste must be treated before it is disposed of at non-hazardous and inert landfills. This requirement already applies to hazardous waste.

## Who is affected?

Landfills cannot accept untreated waste. Waste producers therefore have a choice. They can treat the waste themselves or ensure that it is treated elsewhere before being landfilled.

In practice, everyone involved in the decision to send waste to landfill must understand who is going to treat it. This issue is dealt with in more detail below.

## What is the legislation behind this?

The new rules are a result of a European – wide requirement in the Landfill Directive, applied by the Landfill (England and Wales) Regulations 2002 (referred to in this guidance as the Regulations).

## Why is this happening?

European legislation is driving a more sustainable approach to waste management across the EU. The Landfill Directive is intended to reduce our reliance on landfill and ensure that any future landfilling has less impact on our health and the environment.[2] These aims will be achieved in a number of ways. The requirement to treat waste before it is landfilled is just one of them.

2 Article 1 of the Directive sets out its aims as:
*With a view to meeting the requirements of Directive 75/442/EEC [The Waste Framework Directive], and in particular Articles 3 [encourage the prevention, recycling and processing of waste] and 4 [ensure that waste is disposed of without endangering human health and without harming the environment] thereof, the aim of this Directive is, by way of stringent operational and technical requirements on the waste and landfills, to provide for measures, procedures and guidance to prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, and on the global environment, including the greenhouse effect, as well as any resulting risk to human health from landfilling waste, during the whole life-cycle of the landfill.*

# The structure of this guidance

The guidance is organised as follows:

### Part A: Regulatory framework

- **Section 1** provides a brief introduction to the regulatory framework
- **Section 2** outlines what you need to consider to ensure you meet the legal requirement for treatment. It builds upon the guidance contained within WDFDL.
- **Section 3** discusses issues of interpretation that people have raised regarding non-hazardous wastes.
- **Section 4** provides guidance for waste producers.
- **Section 5** provides advice to landfill operators on how they can check that treatment has occurred.
- **Section 6** provides advice for waste collectors or other people who may handle the waste between the producer and the landfill operator.

### Part B: Examples of treatment options

- **Section 7** considers the principles of identifying an appropriate treatment for a particular waste.
- **Section 8** provides a simple summary on treatment opportunities for some common non-hazardous waste streams.
- **Section 9** contains examples of treatment provided by industry, which demonstrate good practice.
- **Annex 1** provides an example written declaration developed by representatives of the waste management industry
- **Annex 2** summarises the potential treatment options for wastes according to their entry in the European Waste Catalogue

Section 2

# Choice of treatment method

**This section explains the legal aspects of choosing a treatment option. Section 7 deals with the environmental, practical and technical considerations of this choice.**

## Regulatory requirements

### The Regulations require:[3]

'10. – (1) The operator of a landfill shall ensure that the landfill is only used for landfilling waste which is subject to prior treatment unless:

a) it is inert waste for which treatment is not technically feasible; or

b) it is waste other than inert waste and treatment would not reduce its quantity or the hazards which it poses to human health or the environment.'

### Regulation 2 defines treatment as:

physical, thermal, chemical or biological processes (including sorting) that change the characteristics of waste in order to reduce its volume or hazardous nature, facilitate its handling or enhance recovery.

Although the Regulations place the obligation on the landfill operator, they will need to liaise with waste carriers and producers to ensure that this requirement has been met. This is discussed further in sections 4–6.

## Compliance with the Regulations

Guidance on what the Regulations mean is given in *Guidance for Waste Destined for Disposal in Landfills*. The important points are:

A treatment option must comply with the definition of treatment. This involves a 'three-point test' against which you must assess the proposed treatment option:

1 It must be a physical, thermal, chemical or biological process including sorting.

2 It must change the characteristics of the waste; and

3 It must do so in order to:

a) reduce its volume; or

b) reduce its hazardous nature; or

c) facilitate its handling; or

d) enhance its recovery.

- Some wastes being landfilled may already be the product of a treatment process. You do not have to provide additional treatment for such wastes.
- There are some, very limited, exceptions to the need for treatment because there are sometimes no treatments available that would contribute towards the aim of the Directive. These exceptions[3] are:

  'a) it is inert waste for which treatment is not technically feasible;

  b) it is waste other than inert waste and treatment would not reduce its quantity or the hazards that it poses to human health or the environment.'

**Section 3 below answers some of the common questions on how this test should be applied.**

3 See Regulation 10(1) of the Landfill (England and Wales) Regulations 2002 (as amended).

Section 3

# Interpretation of the three-point test

## The purpose of treatment

Treatment is intended to:

- reduce the amount of waste going to landfill
- reduce the impact of waste when it is landfilled

This purpose originates from the overall aims of the Landfill Directive and should be kept in mind when applying the 3-point test to potential treatment options. This will ensure that the new treatment requirement delivers appropriate environmental outcomes.

It is accepted the meeting the first bullet can have the effect of increasing the impact of the residual waste when it is landfilled – because in diverting some fraction of a waste away from landfill, polluting substances may be more concentrated in the residual waste for example. In determining if something has been treated it is therefore important to consider the total waste steam (i.e. before and after treatment) not just the impact of the residual waste. Otherwise this new requirement will drive perverse decisions on treatment that will have a net environmental dis-benefit.

## Principles

It is for waste producers and their managers to satisfy landfill operators that waste has been treated and this means meeting the 3-point test. All three need to be satisfied. The following principles should help in applying the test.

- **All of the waste must have been pretreated.** Collection services that mix treated and untreated waste are not meeting the new requirement and all the waste will need further treatment before landfill. In many cases it will be easier to pretreat the waste before collection or undertake separate collection rounds. If the treatment option is to separate out certain recyclable material, one could reasonably expect all of that material to have been removed, not just one or two items.
- **Sorting is an acceptable form of treatment** – because if it is carried out properly it will change the characteristics of the waste and meet one of the four strands of the 3rd criteria. Source segregation meets the same criteria and is acceptable treatment. Compaction isn't an acceptable form of treatment as it doesn't change the characteristics of the waste which will therefore have the same impact on the environment as un-compacted waste.
- **Waste that was already being treated prior to October 2007 doesn't need further treatment.** Although the legal requirement to pretreat is new, it is not intended to require additional measures provided the treatment option satisfies the 3 point test. It is not intended to penalise forward thinking companies.

Section 4

# Responsibilities of waste producers

The waste producer should either:

- treat their own waste and provide information about the treatment for subsequent holders; or
- ensure that the waste will be treated by a subsequent holder before it is landfilled.

Producers are not obliged to treat their waste themselves and many will simply buy this service from a waste contractor. Individual producers will need to decide the option that best suits the waste and their circumstances. In some cases, the producer may opt to have the waste treated elsewhere for practical reasons such as lack of space for storing separated materials.

If a producer wants to send their waste to landfill they will need to provide confirmation to the landfill operator that the waste has been treated. In some cases, other parties may be involved between the original waste producer and the landfill operator.

It is good practice for the waste producer or holder to always complete a written declaration stating:

- the type of treatment; and
- if relevant, the amount of waste sorted out for recovery or alternative treatment;

In the case of doubt, the landfill operator should presume that the waste has not been treated. It will therefore be in the producer's or current waste holder's own interest to provide a written declaration to confirm the above. This can be incorporated into a waste transfer note or a declaration of the kind provided in Annex 1.

The landfill operator is also responsible for checking the 'basic characterisation' of the waste (see WDFDL). Basic characterisation includes information about the waste treatment applied or reasons why the waste has not been treated. If the landfill operator is not treating the waste, then they will be relying on the producer or holder for this information. This reinforces the need for written evidence such as a declaration of the kind provided in Annex 1.

The responsibility for basic characterisation of the waste placed on the producer by the Landfill Directive is implemented by the Landfill (England and Wales) Regulations 2002. Government is currently consulting on possible changes to the existing Duty of Care including the obligations of waste producers and waste holders when waste is sent to landfill.

Section 5

# Responsibilities of landfill operators

**The Regulations require landfill operators to ensure that waste is treated prior to landfill and they have a duty to reject waste unless they are sure it has been treated. But unless they are treating the waste for the producer, landfill operators have to rely on others for the information to allow them to be confident that the waste has been treated.**

In some cases, it will be obvious at the landfill that the waste has been treated. For example, it might be from an incinerator and it will be clear from looking at it that the waste is incinerator ash. But in other cases, particularly from sorting and segregation, the waste may show no outward sign of having been treated.

The following options are routinely included within Waste Acceptance Procedures and will help operators to check whether a waste has been treated:

- initial discussions with the waste producer or contractor about the nature of the waste and any contractual arrangements regarding its treatment;
- checking the paperwork accompanying the load (including the declaration on treatment which is suggested good practice);
- initial visual inspection of waste;
- inspection when loads are deposited;
- periodic 'audit' of the producer's arrangements for treatment.

Waste producers and landfill operators will need to agree the administrative arrangements, including any charges, for checking compliance with the law. For example, landfill operators will need to decide whether:

- they require a declaration in respect of each load; or
- they will accept a 'season ticket' arrangement similar to those for transfer notes under the Duty of Care.

**In the case of municipal waste,** there are specific statutory diversion targets in place that local authorities must meet. Therefore landfilled municipal waste can be regarded as treated waste that does not require further treatment. Accordingly, landfill operators do not need to make checks on municipal waste.

Where other (non-municipal) wastes could be added during the transport or transfer of municipal waste, on-site verification procedures carried out by landfill operators should be sufficient to detect any obviously non-municipal materials. Although materials of this type may be allowed under the permit they will need to be treated before landfilling. If they have not been pre-treated they should be handled in the same way as other non-permitted wastes.

For other wastes, the landfill operator should seek evidence that the waste has been treated (unless they are providing treatment themselves). Evidence contained in a transfer note or a declaration of the kind provided in Annex 1 would be acceptable.

Where landfill operators collect waste from a treatment plant (e.g. residues from incineration), it may also be obvious from a visual inspection that the waste is treated.

Where waste has passed through a treatment plant (including thermal, biological or chemical treatment, or mechanical sorting), then the landfill operator can be confident that the waste has been treated. Further checks are not needed unless the operator has good reason to suspect that the waste has simply been passed on rather than subjected to the treatment process.

In both situations it is good practice to obtain a written declaration from the producer or holder that the waste is treated.

Where waste has been segregated at source or hand-sorted, it will be more important to verify treatment. Again, a written declaration of the kind provided in Annex 1 would be acceptable evidence.

Section 6

# Responsibilities of waste collectors and other waste holders

**The advice given in sections 4 and 5 assumes that the landfill operator is in contact with the waste producer. In practice, there may be a chain of holders including, for example, a collector, transfer station or treatment plant.**

All holders should liaise to ensure that the landfill operator is provided with sufficient evidence that the waste has been treated.

If concern over commercial confidentiality stops the landfill operator receiving a declaration of the kind shown in Annex 1 from the producer, then each waste holder in the chain can reasonably:

- ask for a declaration for their own benefit; and
- provide the next holder with their own declaration.

Where multiple collections are being made,[4] the collector can check whether any untreated waste is included. The collector will therefore determine whether the load should be treated or can go to landfill.

4 See also section 3.

# Part B: Examples of treatment options

Section 7

# Choosing a suitable treatment option

**The practical experience of waste producers and waste management companies has been invaluable in developing Part B of this guidance document. This is not intended to be a comprehensive guide to the technicalities of waste treatment. It is intended to illustrate a range of treatment methods applicable to a number of common waste streams. There are many other sources of technical guidance, and if you are a waste producer your waste contractor should also be able to advise you further.**

## Choosing a treatment option: environmental considerations

The Environment Agency expects you to comply with the Regulations as explained in Part A of this document. But when deciding how best to comply and in selecting treatment options we recommend that you consider the aims of the Landfill Directive to:

- encourage the prevention, recycling and processing of waste;
- ensure that, where landfill is used for the disposal of waste, measures are taken to reduce as far as possible negative effects on the environment as well as any resulting risk to human health during the whole life-cycle of the landfill.

Government policy and strategy for waste management should also be a consideration in the decision-making process. The Government wants the management of waste to 'move up the waste hierarchy'. In order of preference, the waste hierarchy is:

- waste reduction
- reuse
- recycling and composting
- energy recovery
- disposal

While the hierarchy is intended as a simple guide, life-cycle assessment (LCA) software tools[5] are available that can be used to evaluate the relative environmental performance of alternative waste management options.

5 See the information on the NetRegs website at http://www.netregs.gov.uk/netregs/275207/663774/?lang=_e

For a waste previously sent to landfill, which must now be treated, it makes sense not just to focus on how to treat it before it is landfilled, but to review the overall chain of production and management of the waste, in particular whether it is possible to recover more value from the waste.

## Choosing a treatment option: practical considerations

You need to consider the following practical aspects of the available treatments:

- cost
- availability
- reliability
- sensitivity to waste composition changes
- technical difficulty

For example, the options for biodegradable food waste might be in-vessel composting or incineration. As well as any environmental considerations, the choice would depend on:

- the overall costs of transport, treatment and landfill; and
- whether suitable composting or incineration facilities are available locally.

## Choosing a treatment option: technical considerations

A suitable treatment for your waste is likely to depend on:

- the exact physical form and chemical composition of your waste;
- whether a particular treatment facility can accept it.

It may also depend on the amount you produce in relation to the other wastes being accepted by the treatment plant. For example, a composting process may be able to accept a small proportion of animal waste or wood shavings, but this may be limited.

## The composition of the waste

Considering the composition of the components of the waste will give you a broad indication of the types of process that will meet the first criterion of the three-point test (see section 2). This may narrow the range of possible treatments to consider. Examples are provided in Table 1, which also explains the difference between reuse, recycling and recovery.

Table 1 Example treatment processes for different types of waste

| Composition of the waste | Potential treatment processes |
|---|---|
| Insoluble inorganic (e.g. concrete, bricks) | Direct reuse (e.g. as bricks)<br>Physical treatment (e.g. size reduction or screening) to make the waste suitable for use (e.g. as aggregate)<br>If there is no outlet for reuse even after such treatment, then the waste may be landfilled without treatment. |
| Soluble /partially soluble inorganic (e.g. soils or thermal process residues that are not hazardous waste) | For non-hazardous inorganic wastes, consider reuse or recovery.<br>If this is not possible and if the waste contains no treatable organic fraction, it would not contribute to the Landfill Directive objective to treat the waste unless the risk assessment shows a clear benefit. For example, if a waste contains heavy metals below the hazard thresholds, then it is not necessary for the heavy metals to be immobilised to comply with the treatment requirement unless risk assessment shows that their acceptance for landfilling would result in a risk to groundwater. |
| Biodegradable organic (e.g. food waste) | Biological treatment:<br>• If there is a lot of vegetable matter, consider composting at a plant producing quality compost for further use.<br>• If there is a lot of animal matter, consider anaerobic digestion.<br>• If the waste is mainly liquid, then a sewage works or a similar plant operated in-house or by the waste industry may be suitable.<br>Thermal treatment: usually incineration. |
| Non-biodegradable organic (e.g. plastics) | Consider reuse or recovery. Otherwise, thermal treatment (usually incineration) is likely to be necessary. |
| Recyclable (e.g. paper) | Reuse means using a product again – either for the same purpose or another with only minimal processing (e.g. washing).<br>Recycling means using a product again after reprocessing.<br>Recovery means recovering materials or energy (it includes recycling or composting) and includes the use of wastes to improve land.<br>These options generally apply to single component wastes and mixtures will usually have to be separated before reuse or recycling. |
| Mixture (e.g. household waste) | Separation (including dewatering) (see below) |

Examples of the non-hazardous waste entries in the List of Wastes Regulations (2005) are reproduced in Table A1 in Annex 2 to illustrate how these principles can identify the technical possibilities for treating each waste. Where there is more than one possibility, section 2 gives advice on issues you should consider in choosing between them.

Most wastes are mixtures for which you will have two options:

- to separate the components; or
- to treat the whole waste stream.

For example, the options for general waste might include separate collection at source or separation of the waste components at a materials recovery facility (MRF). Alternatively, all the mixed general waste could be incinerated.

Separation of the waste components may allow some components to be reused or recycled, and/or to be further treated. For example, washing a contaminated soil may result in an aggregate for reuse and an organic fraction for thermal treatment. For separation to meet the third criterion of the three-point test (see section 2) will usually require one or more of the separated fractions to be diverted from landfill.

The treatment of some common waste types is discussed in section 8.

## Future developments

Developments in the waste industry are expected to result in a wider range of treatments becoming available at a greater number of facilities. Waste producers and holders need to:

- be aware of such developments;
- review regularly whether new options have become available for waste being sent to landfill.

Faced with stringent targets and penalties for sending biodegradable municipal waste to landfill, local authorities are developing alternatives. The Government is encouraging them to consider making these available for commercial and industrial (C&I) waste.

A range of technologies is available or being developed to treat those wastes that cannot be recycled or composted. These include:

- **Thermal treatment.** This includes incineration, usually with energy recovery and preferably at a combined heat and power (CHP) facility. It also includes the new technologies of pyrolysis and gasification. The technology is usually referred to as energy-from-waste (EfW), although other processes such as landfill gas utilisation and burning refuse-derived fuel (RDF) from mechanical biological treatment processes (see below) are also sometimes referred to as EfW.

- **Mechanical biological treatment (MBT).** This covers a range of technologies. They involve combinations of shredding and screening the waste, and then treating it biologically by composting or anaerobic digestion (see below). A variation is mechanical heat treatment (MHT), where the waste is heated by hot air or steam to sterilise it and prepare the organic content for further treatment. Such MHT systems are sometimes described as thermal, but they operate at a lower temperature than the processes mentioned above. MBT and MHT aim to separate further recyclables and to produce an organic material that can be used in a variety of ways such as reuse of the fibre, production of bioethanol, use as a fuel, application to land, or disposal to landfill of a material with a reduced biodegradable content.
- **Anaerobic digestion (AD).** This is sometimes grouped with MBT. It processes mixed and shredded waste to produce useable gas and an organic residue, which can be used as described above for MBT.

These processes are designed to:

- extract value;
- divert biodegradable material from highly mixed wastes.

They are therefore appropriate for similar C&I wastes that are mixed but are not suitable for simple segregation and sorting.

Section 8

# Guidance on some common non-hazardous waste streams

**This section provides generic treatment advice for common types of non-hazardous waste. Where relevant, reference is provided to guidance given above about the interpretation of the three-point test, responsibilities and checking up.**

## Municipal waste

Environment Agency guidance document, *Waste destined for disposal in landfills*,[6] provides guidance on municipal solid waste (MSW).

MSW is subject to landfill diversion targets and, in England, to statutory recycling and composting targets imposed on local authorities, which are responsible for managing MSW. Local authorities are subject to heavy penalties and Government intervention if these targets are not met. These targets effectively form additional requirements for pre-treatment and therefore all the residues that are landfilled can be regarded as treated waste. Typical treatment methods for MSW are described in section 7.

## Mixed commercial and industrial waste

The position for C&I waste is not comparable with that for MSW. There are no separate targets and penalties for producers of C&I waste and no single authority is responsible for its management. It is for individual producers to treat the waste or ensure that it is treated.

Options will be:

- source segregation;
- sorting the waste elsewhere;
- processing the waste elsewhere using the types of treatment described in section 7.

The process of sorting or segregating C&I waste should be optimised to remove as many recyclables as possible (see section 3).

## Mixed construction and demolition waste

Construction waste typically contains materials such as bricks, concrete, plasterboard, timber, plastic film, packaging and surplus materials. It may contain site clearance waste such as soil and vegetation. Demolition waste may also include the contents of buildings and the residues from the provision of services.

6 http://www.environment-agency.gov.uk/commondata/acrobat/wacv2_1006008.pdf

Mixed waste can either be separated or the whole waste stream treated. The latter will not usually be appropriate because of the high content of material such as bricks and concrete, and the low content of readily combustible or biodegradable material.

Government policy, supported by research and guidance, strongly favours the minimisation and recycling of C&D wastes. Separation is therefore the normal option. Separation and the role that Site Waste Management Plans have in encouraging the recovery of construction and demolition waste are described in example 5 in section 9.

WDFDL sets out the Environment Agency's views on the source segregation of mixed wastes. If producers segregate waste at source, segregation should be optimised to remove as many recyclables as possible (see section 3).

## Contaminated soil

Contaminated soil is a mixture of soil materials with contaminants. The contaminants may be a wide range of substances from the site's former use. For example, a typical mixture might be complex cyanides, hydrocarbons, heavy metals and asbestos in a matrix of soil, brick and demolition rubble. However, some soils may contain only a single contaminant from a specific spill or leak.

Contaminated soils are often classed as hazardous waste, but may not be. Example 6 in section 9 provides a more detailed discussion and an example of options for contaminated site clearance.

As the waste is usually a mixture, the options are to separate the components or to treat the bulk soil.

Redevelopment of contaminated sites usually follows a desk study of the site history and ground investigation of the likely contaminants. Contaminants may have been spread around the site during site operations and waste disposal, or may be confined in limited areas.

The site investigation should identify the potential for segregation by separate excavation of areas with different contaminants and areas with no contaminants, or their subsequent separation. Such separation would be classed as treatment provided the third criterion of the three-point test is met (i.e. reduce volume, enhance recovery or facilitate handling).

As stated above, if wastes are non-hazardous inorganics, it may not always contribute to the objectives of the Landfill Directive to treat them. The example declaration in Annex 1 includes a space for recording why a waste has not been treated. The landfill operator should be satisfied that the reason is valid; if necessary, they should investigate the options further with the waste holder or producer.

If a contaminated soil is non-hazardous, treatments should aim to either recover some fraction such as aggregate or to deal with any organic fraction.

## Packaging and contaminated packaging

It is difficult to give generic advice about contaminated packaging due to the range of packaging materials and types (drums, sacks, pallets, jars, etc.) and potential contaminants.

The treatment options will be either to separate the contaminant from the packaging or to treat the whole waste stream. This might be thermal treatment, but not necessarily. For example, paper sacks may contain a biodegradable material that can be biologically treated.

Another example relates to the treating hazardous waste contaminants in packaging by adding a catalyst to harden the residues or by air-drying them. This is a process. It does change the characteristics of the waste from hazardous to non-hazardous, and it does reduce the hazardousness of the waste. It therefore is a treatment. Air-drying implies there may be fugitive emissions of volatile organic compounds (VOCs) from the process, which could be subject to other statutory controls.

If the residues are non-hazardous, it is possible that the three-point test can be met, but this would have to be assessed on a case-by-case basis. For example, it may be possible to show that the hardened product results in some reduction in the negative impact on the environment or health arising from the landfilling of the particular waste.

## Sewage sludge

WDFL provides advice on sewage sludge. The dewatering of primary sludge is treatment provided the characteristics of the waste are changed. According to the definition in WDFDL, this would be at the point where the liquid waste becomes non-liquid.

## Sewage screenings

Sewage screenings usually consist of a mixture of materials and can be unpleasant to handle. Therefore manual sorting or separation is unlikely to be an option.

Dewatering may be an option provided:

- the waste is subject to such a process after becoming a waste (as defined by the Waste Framework Directive);
- this results in the liquid effluent being diverted from landfill.

Section 9

# Industry examples of good practice

**These examples provided by industry illustrate good practice and some of the principles discussed above. They mainly show simple source segregation in practice, with one example involving sorting of waste at transfer stations. You can also follow the guidance on source segregation given in section 3.**

Segregation and sorting both help to minimise and recover waste. But waste holders should not forget that there are other opportunities of treating waste, which can also be considered.

It is good practice to keep the management of the residual waste under review to see whether, as markets and national treatment infrastructure evolve, it can be moved up the waste hierarchy. For example, there may be scope for further separation of the mixed waste. Alternatively, the mixed waste could be treated outside the site by biological treatment, MBT or thermal treatment (see section 7).

An environmental management system (EMS) reinforces the need to keep the site's waste management under review. EMS documentation normally incorporates waste handling and disposal methods, including treatment requirements for non-hazardous wastes. If there is no site EMS, you can consult appropriate internal documentation on waste handling and disposal. In the food industry, for example, site HACCP[7] documentation will cover the separation of cooked from non-cooked waste as appropriate.

## Example 1

This is an example of retail compliance. Table 2 summarises how a major grocery retailer has implemented source segregation with only a small amount of mixed residual waste going to landfill. Column 7 is intended to make it easy to decide whether any other components of the waste could be treated separately.

## Example 2

This example is also from the retail sector.

Many smaller shops and offices have separate collections, in particular for waste paper and toner cartridges from printers. The source segregation of such wastes, which are then collected for recycling and not destined for landfill, results in the remaining mixed general waste having satisfied the pre-treatment requirement.

The waste transfer note or written declaration should indicate that the general waste has been pre-treated through source segregation.

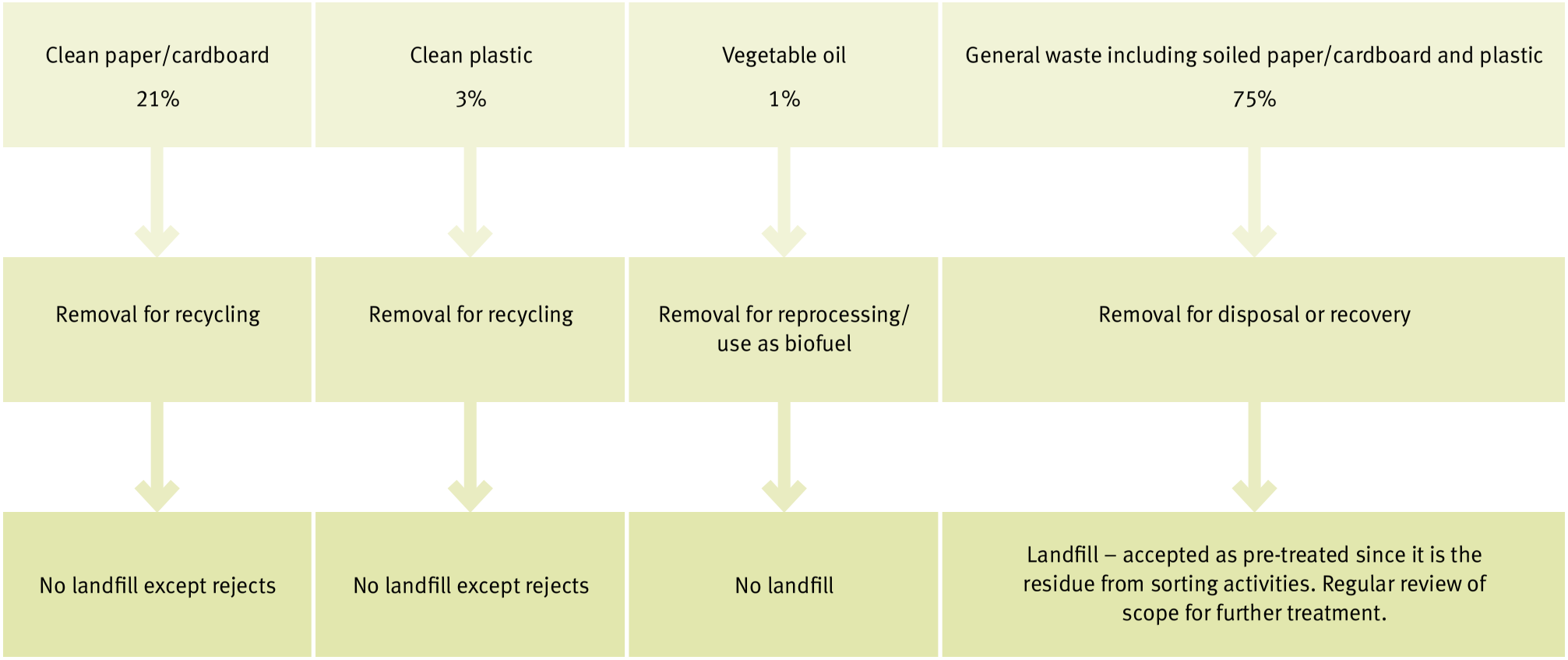
7 Hazard Analysis Critical Control Points

| Waste streams currently separated in store* | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7... |
| Animal by-products (e.g. raw meat, raw fish) 2% | Cardboard (e.g. boxes) 65% | Plastic (e.g. shrink wrap) 5% | Residual non-hazardous mixed waste (e.g. food, packaging) 28% | Plastic carrier bags ‹1% | Single use cameras ‹1% | And others . |
| Further treatment (composting or incineration) | Removal for recycling | Removal for recycling | Removed for disposal from store | Removal for recycling | Removal for sorting and recycling | |
| Minimal landfill (incinerator ash) | No landfill. Minimal landfill would be allowable (e.g. rejects). | No landfill. Minimal landfill would be allowable (e.g. rejects). | Landfill – accepted as pre-treated since it is the residue from sorting activities. | No landfill. Minimal landfill would be allowable (e.g. rejects). | Minimal landfill – cameras without batteries are non-hazardous and could be landfilled. But they are likely to require prior treatment as it is not reasonable to assume that they would otherwise have been mixed with general waste (collected separately for photo processing). | |

Percentage figures denote fraction of the overall waste production that has been achieved in this specific example.

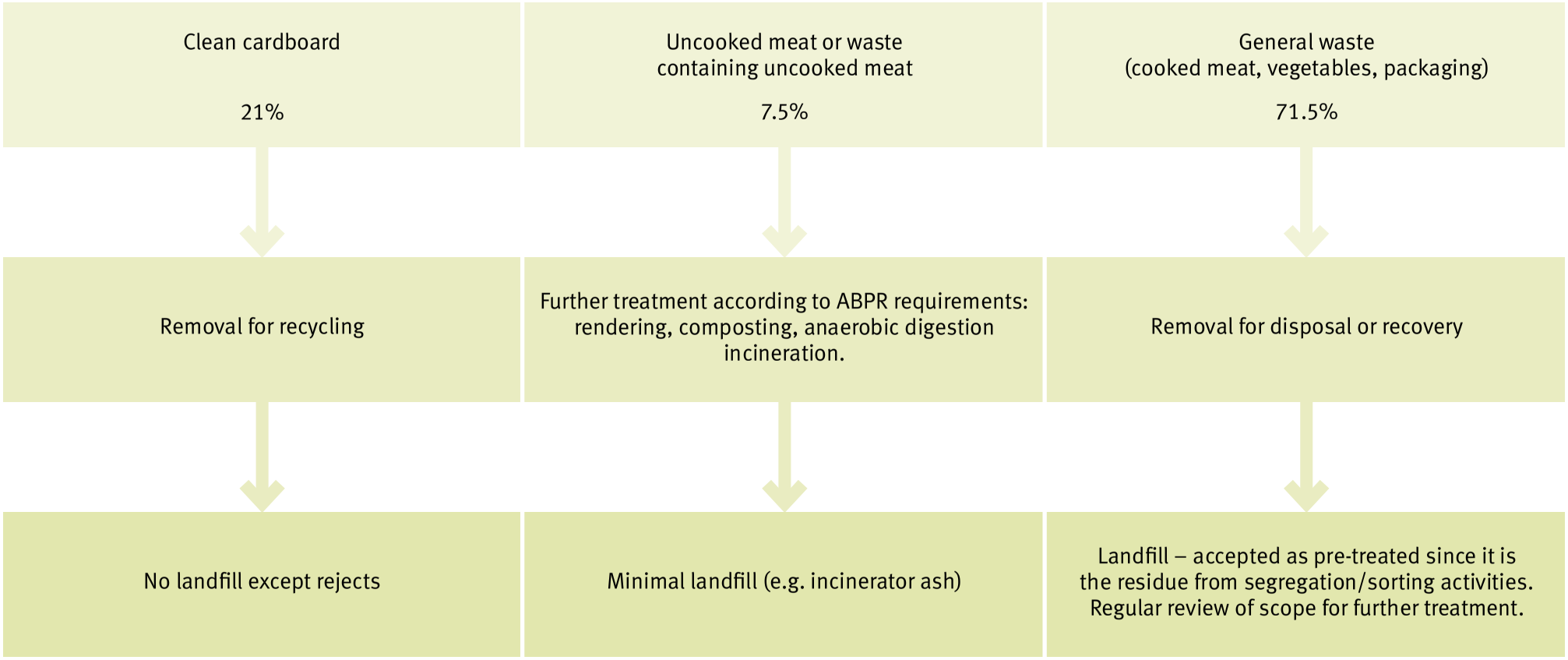
*Excludes hazardous waste that is also separated at source.

Section 9 Table 3 Example 2: plant bakery




Percentage figures denote fraction of the overall waste production that has been achieved in this specific example.

Section 9 Table 4 Example 3: meat pie manufacturer




Percentage figures denote fraction of the overall waste production that has been achieved in this specific example

ABPR = Animal By-products Regulations

## Examples 3 and 4

Both these examples illustrate food manufacturer compliance and provide further examples of source segregation.

In example 3 (see Table 3), the ongoing review of the management of the residual waste might, for example, decide that the general mixed waste is suitable for further segregation to allow biological treatment of the cooked product. Alternatively, all this waste might be considered for MBT, AD or thermal treatment (see section 7).

Like example 3, the general waste in example 4 (see Table 4) contains significant organic matter which could be treated biologically. Whether this is feasible depends on:

- the quantities produced;
- whether the waste can be separated from its packaging or the packaging can be processed as well (e.g. through MBT or thermal treatment).

As a simple example, let us assume that the reject product is breakfast cereal packaged in a cardboard box with an inner plastic bag. It is assumed not to be feasible to separate these materials by hand. But in a typical MBT process, the waste would be shredded and treated biologically in bulk, sometimes with energy recovery. Plastic would be extracted mechanically before and/or after biological treatment, and the treatment product used on land or as fuel. Alternatively the waste could be incinerated with recovery of the significant energy content.

## Example 5

This example describes the principles for dealing with C&D waste by source segregation. A typical project might involve the demolition of a derelict building and the erection of a new office block. In the past, such a project would have resulted in the creation of a large heap of waste which would have been disposed of to landfill.

Today, the first task is a site investigation to determine whether there was any contamination left on the site that might affect, among other things, the workforce, the local environment or the structure and stability of the new building once completed. Example 6 deals with a case in which there is such contamination.

Such an investigation enables the developer to budget more effectively, since disposal costs can significantly affect the overall cost of development. Integral to this process is the production of a Site Waste Management Plan.[8] Such a plan identifies the various wastes on the site and considers the most appropriate way to deal with them, including the potential risks that the waste might pose to the environment and the workforce.

8 See the guidance at http://www.constructingexcellence.org.uk//resources/publications/view.jsp?id=2568

The next task might be to demolish the building and break up the concrete slab on which it was founded. If the brickwork and concrete can be kept separate, this material could be crushed and screened and retained on-site for use as hardcore in the forthcoming construction work.

If soils have to be removed for new foundations, etc., then topsoil should be segregated and either stored for subsequent use on-site or exported for reuse elsewhere.

Subsoil can then be removed and dealt with in several ways such as:

- use on-site to construct a landscape or acoustic bund;
- taken to an exempt operation for recovery; taken to an inert or non-hazardous landfill for disposal without treatment (as the remaining materials on the site have been segregated and dealt with separately).

Other waste materials (wood, plaster, glass, metal, etc.) should also be segregated and recycled where possible; any reduction in the total amount of waste sent to landfill will represent a cost saving and there may even be a small income from the recycled materials.

But because there has already been some segregation of the wastes generated by the project, the remaining waste is considered to have been treated and can be disposed of to a non-hazardous landfill without further treatment. If significant quantities of glass are present in this residual waste, the glass could be segregated and either sent for recycling (e.g. in glasphalt) or disposed of to an inert landfill.

## Example 6

This example first discusses the treatment of contaminated soils in general before presenting a specific example.

### Discussion

Contaminated soil is a mixture of soil materials with contaminants. The contaminants may be a wide range of substances from the former use of the site; they may be at such a level that they make the waste hazardous waste, or not. The following discussion and example are intended to refer to non-hazardous waste. The principles are generally applicable to hazardous wastes, and for hazardous wastes the additional option of “reducing hazardousness” is available as a way of meeting the third criterion of the three point test.

WDFDL sets out the Environment Agency’s views on the options of either separating the contaminated soil mixture or treating the whole waste stream. An important question is whether segregation is an acceptable process for the treatment of contaminated soils. Where some component is diverted from landfill (thus reducing volume or hazardousness or enhancing recovery), the three-point test is met. However, this is subject to the views stated in section 3 on the amount of separation that must take place.

The redevelopment of a contaminated site usually follows a desk study of the site history and on-site investigation of the likely contaminants. Many sites will be composed of areas of heavy contamination interspersed between areas of light or no contamination.

Treatment options might be:

- source segregation;
- treatment of the whole waste by:
  - biological treatment;
  - thermal treatment;
  - stabilisation;
  - separation.

These options are discussed below.

### Source segregation

Often, it is possible to segregate sites according to the level of contamination or type of contamination by carefully considering analytical results, site history and geological conditions. It may be possible to divert some of these fractions away from landfill to direct reuse or treatment.

Where source segregation is carried out, the remaining material can be considered to be pre-treated for the purposes of landfill disposal. However, the material being segregated must already be considered a waste (i.e. there must be an intent or a requirement to discard it). This means that fractions of the contaminated soil sent for direct reuse either on- or off-site must also be treated as a waste; their reuse would therefore have to be in accordance with a suitable authorisation or exemption. The segregation of clean materials that are not waste (i.e. there was never any intent to discard them) from contaminated (waste) materials does not constitute pre-treatment.

### Treatment of the whole waste

Treatment of the whole waste is usually by biological or thermal processes. Both may be in-situ or ex-situ, on- or off-site. Stabilisation and chemical treatment could also be considered.

Regulation 9(2) precludes the deliberate dilution of contaminated material with uncontaminated material in order to meet waste acceptance criteria (WAC).[9] Landfill disposal of contaminated soils that have simply been diluted to change their classification from hazardous to non-hazardous is not acceptable.

- A range of **biological treatment** technologies is available. Their objective is to reduce the concentrations of biodegradable organic compounds, usually hydrocarbons and derivatives. Typically, biological treatment reduces organic contaminants rather than eliminating them. It will have little or no effect on contaminants such as heavy metals.
- **Thermal treatment** usually involves the excavation of the soil for high-temperature treatment in a mobile plant or at remote incinerators. The treatment is effective in removing organics but inorganics such as heavy metals will remain. Inorganics in general may become more leachable as a result of the removal of organic matter to which they may previously have been adsorbed.

  Thermal treatment by in-situ vitrification is possible, though it is little used due to its cost and energy requirements. Thermal desorption has also been used to separate organic compounds. This process involves lower temperatures than incineration.
- **Stabilisation** can be used to immobilise specific contaminants, subject to acceptable quality controls. Chemical treatments are also being investigated, but may often be more appropriate for treating separated contaminants.
- **Separation** usually involves washing the soil with a solvent (often water) or removing volatiles by heating; the latter is known as low temperature thermal desorption (LTTD). Organics and heavy metals are often bound to fine particles. This means that size separation in association with soil washing or LTTD can sometimes produce a large-size fraction without significant contamination.

  Separation can therefore reduce the levels of volatile and semi-volatile organics. It can also produce a useable aggregate, leaving the fine-grained material for landfill as a treated waste, or for further treatment once the large-size material has been removed.

Table 5 summaries the options available for the treatment of non-hazardous contaminated soil prior to its disposal to landfill.

9 See WDFDL

**Table 5** Summary of non-hazardous contaminated soil treatment options

| Process | Purpose |
|---|---|
| Physical (separation or segregation) | Enhance recovery*<br>Reduce quantity landfilled*<br>Facilitate handling* |
| Biological | Facilitate handling**<br>Reduce quantity landfilled (via reuse of treated material)* |
| Thermal | Facilitate handling**<br>Reduce quantity landfilled**<br>Enhance recovery** |
| Stabilisation (physicochemical) | Facilitate handling** |
| Chemical | Facilitate handling** |

* Depends on what is done with the separated fractions.

** Depends on the nature of the contaminants, the specific process applied and the effect on contaminant composition and concentration.

### Example

A site investigation found that a disused chemical works consisted of 50 per cent uncontaminated land and 50 per cent contaminated land.

The plan is to segregate the uncontaminated material and reuse it on-site. Since there is no intention to discard this material (i.e. it is not waste), it will not need to be treated.

The remaining half of the site (the contaminated portion) contains areas of:

- general hydrocarbon contamination;
- made ground that consists mostly of brick rubble, ash and broken reinforced concrete;
- remnants of brick bases of disused dipping tanks containing a non-hazardous sludge.

It is decided that these areas are candidates to be removed from the site and disposed of. They are waste. The treatment options for this remaining material are outlined below.

#### Brick rubble

This could be separated to sort out the bricks and concrete for recycling as hardcore. The remaining ash material could then be disposed of to landfill as pre-treated waste, along with the concrete reinforcement – though this material should be considered for recycling (depending on its suitability for reprocessing).

### Hydrocarbon contaminated soil

Provided that there is no risk of pollution, contaminated soils not requiring treatment or containment could be used in the same way as uncontaminated soils.

Where contaminated materials produced on-site during construction works (including excavated soils and materials resulting from demolition) are used on-site according to the planning permission authorising their use as part of the site's development, the Environment Agency does not regard them as being discarded provided:

- they are suitable for that use and require no further treatment;
- only the quantity necessary for the specified works is used (otherwise it becomes a disposal activity);
- their use is a not a mere possibility but a certainty.

Use on-site can include activities such as:

- site regrading;
- use of materials beneath cover layers, capping layers, buildings and hard-standing.

The hydrocarbon contaminated soil may thus require further investigation. As part of the remediation action plan, a hydrogeological risk assessment and human exposure modelling will produce limits for material that can safely be reused on-site.

Further chemical investigation may show that some of the material meets this specification. Its reuse on-site therefore becomes a possibility. However, its status as a waste will require careful reconsideration at this point.

Soil that fails the reuse specification could be:

- incinerated;
- subjected to vapour extraction;
- treated biologically either in-situ or ex-situ (the ex-situ treatment could be on- or off-site).

Following such treatment, the waste could be disposed of to landfill (provided that the three-point test is met) or be reused on site, or a mixture of both.

### Chemically contaminated tanks

The remnants of the brick-built chemical dipping tanks contain a non-hazardous sludge. After the sludge is removed from the tank, the bricks could be decontaminated and then reused, recycled or landfilled.

The sludge could be treated using a chemical, solidification or stabilisation process in order to meet the three-point test, with the residue being landfilled.

# Example 7

This example relates to the sorting of wastes at transfer stations. A large proportion of the waste accepted at landfills comes from transfer stations (particularly the landfills serving conurbations). Many of these transfer stations now carry out sorting for recycling and recovery. Significant levels of segregation can occur at such transfer stations.

The heavier materials usually collected in skips are the main wastes dealt with in this way. Soils, hardcore and concrete are typically separated together with metals (ferrous and non-ferrous). At many transfer stations, clean wood such as pallets and cardboard are also removed. The inert materials are usually separated using mechanical equipment (including screens with blowers) or picking belts used to separate paper and plastics.

The lighter fractions arriving in collection vehicles tend to be subject to less separation due to the nature of the materials. However, hand sorting offers a potential source of more clean wood and cardboard.

Segregation at the transfer station might remove at least 50 per cent of the heavy materials and perhaps 5 per cent of the lighter materials for recovery. Some recyclable materials will already have been removed by segregation at source.

## Annex 1:

# Example pre-treatment confirmation form

Note: you can also incorporate the information contained within this pre-treatment confirmation form into your pre-existing Waste Transfer Notes.

### Pre Treatment Confirmation Form

**Company name**

**Company address**

**Waste description**

**Intended disposal site**

**EWC Code**

**How has the waste been treated**

**What processes are employed?**

| | | |
|---|---|---|
| Is there any segregation of waste? | ☐ yes | ☐ no |
| Separate collection | ☐ yes | ☐ no |
| Screening | ☐ yes | ☐ no |
| Hand picking | ☐ yes | ☐ no |
| Magnetic segregation | ☐ yes | ☐ no |
| Thermal | ☐ yes | ☐ no |

Other (please specify)

**What materials are segregated?**

| | | |
|---|---|---|
| Wood | ☐ yes | ☐ no |
| Paper | ☐ yes | ☐ no |
| Cardboard | ☐ yes | ☐ no |
| Glass | ☐ yes | ☐ no |
| Plastics | ☐ yes | ☐ no |
| Green waste | ☐ yes | ☐ no |
| Ferrous | ☐ yes | ☐ no |
| Non-ferrous | ☐ yes | ☐ no |
| Waste electrical and electronic equipment (WEEE) | ☐ yes | ☐ no |

Other (please specify)

**Which of the wastes are sent for recovery or recycling?**

| | | |
|---|---|---|
| Wood | ☐ yes | ☐ no |
| Paper | ☐ yes | ☐ no |
| Cardboard | ☐ yes | ☐ no |
| Glass | ☐ yes | ☐ no |
| Green waste | ☐ yes | ☐ no |
| Ferrous | ☐ yes | ☐ no |
| Non-ferrous | ☐ yes | ☐ no |
| Waste electrical and electronic equipment (WEEE) | ☐ yes | ☐ no |

Other (please specify)

**What percentage of the total waste is sent for recovery recycling?**

**If treatment has not been carried out, please state why treatment is not considered necessary:**

I/We confirm that the waste delivered by the above named company and herein described has been treated as detailed above. Note: Treatment is a physical/chemical/thermal or biological process including sorting that also changes the characteristics of the waste and must do so in order to:

i reduce its volume; or

ii reduce its hazardous nature; or

iii facilitate its handling; or

iv enhance its recovery

**Name**

**Signature**

**Position in the company**

**Date**

**Annex 2:**

# Consideration of potential treatment processes for non-hazardous wastes

**Examples of the non-hazardous waste entries from the List of Wastes Regulations (2005) are reproduced in Table A1 to illustrate how these codes can help to identify the technical possibilities for treating each waste type. It is important to use the correct methodology to determine the most appropriate code for your waste. Guidance *Using the list of wastes* to code waste is available from our web-site to support your assessment. Where there is more than one treatment possibility, section 2 of this guidance gives advice on issues you should consider in choosing between them.**

## Notes on Table A1

i Table A1 does not include all the non-hazardous entries. Rather a considerable number have been extracted to illustrate the wide range of waste types involved and the range of issues to be considered.

ii Chapter 13 and 14 wastes are hazardous.

iii It might be thought that all of Chapter 19 would be 'already treated' wastes, but this is not the case. Some of the entries are for rejects prior to treatment and some are for wastewaters or emissions to atmosphere under the Waste Framework Directive.

iv '99' codes are not included as their composition is unknown.

v The first column reproduces the six-digit description, with clarification of the four- and two-digit levels if necessary.

vi The second column describes what the waste might be.

vii The third column gives some consideration as to whether the waste might already be a treated waste. If blank, it is not.

viii The next six columns consider the composition of the waste (as discussed in section 7) as an aid to identifying possible processes. The following column considers whether other legislation might affect treatment selection, for example, the packaging waste, animal by-product, end-of-life vehicle (ELV) or waste electrical or electronic equipment (WEEE) regulations. The key to these columns is provided above the table.

ix Biodegradable wastes may become subject to further UK implementation of Article 5.1 of the Landfill Directive, which requires diversion of such wastes from landfill. This could affect the selection of a treatment process.

x Chapter 20 entries relate to MSW and similar C&I wastes. For MSW, our guidance given in WDFDL and in this document is applicable.

xi The final column identifies possible treatment processes. Some of these may be an alternative to landfill, while some are a suitable treatment prior to landfill. For many wastes, there will be several options. Section 2 gives advice on choosing between them. As well as the environmental and practical issues, all three criteria of the three-point test must be met. This is particularly relevant in considering separation of wastes as this must result in the third criterion being met.

**Table 6** Key to columns 4–10 of Table 1 (see (viii) above)

| Table reference | Composition |
|---|---|
| 1 | Mixture |
| 2 | Insoluble inorganic |
| 3 | Soluble/partially soluble inorganic |
| 4 | Biodegradable organic |
| 5 | Non-biodegradable organic |
| 6 | Recyclable |
| 7 | Other legal provisions may affect the decision |

Annex 2: **Table A1** Examples of non-hazardous entries with consideration of potential treatment processes. See section 3.2 before using the table.

| Code | What is it? | Already treated? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Conclusion/comment |
|---|---|---|---|---|---|---|---|---|---|---|
| **02 02 01** sludges from washing and cleaning (from food of animal origin) | Aqueous sludges of blood, excrement, hair, scales, etc.<br>A mixture of water with biodegradable material. | | Y | - | - | Y | - | - | Y | To sewer<br>Dewater before landfill.<br>Biological treatment – probably AD unless small quantities<br>Incineration (preferably with energy recovery) after dewatering |
| **02 02 02** animal tissue waste | Meat or fish inc bones, hair, etc. | | - | - | - | Y | - | Y | Y | Possible rendering and recovery<br>Biological treatment – probably AD<br>Incineration (preferably with energy recovery) |
| **02 02 04** sludges from on-site effluent treatment | Effluent sludge with high organics. | Probably not – effluent is likely to be wastewater under Waste Framework Directive, not waste. | Y | - | - | Y | - | - | Y | Dewater before landfill.<br>Incineration (preferably with energy recovery) |
| **02 03 01** sludges from washing, cleaning, peeling, centrifuging and separation (from fruit, vegetable, tea, tobacco, etc.) | Aqueous sludges of plant peel, husks, stalks and other plant material with some soil. | | Y | - | - | Y | - | - | - | Dewater before landfill.<br>Composting or AD<br>Incineration (preferably with energy recovery) |
| **02 03 04** materials unsuitable for consumption or processing unwanted vegetable material or product. | | | - | - | - | Y | - | - | - | Composting<br>AD<br>Incineration (preferably with energy recovery) |
| **02 04 01** soil from cleaning and washing beet | Wet topsoil. Not inert, but not susceptible to biological treatment. | | - | - | - | - | - | Y | - | Reuse as topsoil<br>If no reuse outlet, non-hazardous landfill without treatment |
| **03 01 01** waste bark and cork (from wood and furniture production) | Bark and cork | | - | - | - | Y | - | Y | - | Recovery as mulch<br>Composting<br>Incineration (preferably with energy recovery) |

| Code | What is it? | Already treated? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Conclusion/comment |
|---|---|---|---|---|---|---|---|---|---|---|
| **03 01 05** sawdust, shavings, cuttings, wood, particle board and veneer other than those mentioned in 03 01 04 | Wood particles | | - | - | - | Y | - | - | - | Reuse (particle board, etc.)<br>Composting<br>Incineration (preferably with energy recovery) |
| **03 03 01** waste bark and wood (from paper production) | Bark and wood | | - | - | - | Y | - | - | - | Recovery as mulch<br>Composting<br>Incineration (preferably with energy recovery) |
| **03 03 07** mechanically separated rejects from pulping of waste paper and cardboard | Scraps of plastic with some paper and card. May be on 'wire ropes'. | Yes – from treatment of waste paper and cardboard | - | - | - | - | Y | - | - | Landfill – already treated<br>Incineration (preferably with energy recovery) |
| **03 03 08** wastes from sorting of paper and cardboard destined for recycling | Unsuitable material (e.g. plastic, foil, wire) | Yes – from treatment of waste paper and cardboard | Y | - | - | - | - | - | - | Landfill – already treated<br>Incineration (preferably with energy recovery) |
| **03 03 10** fibre rejects, fibre-, filler- and coating-sludges from mechanical separation | 'Paper pulp' – short wood fibres, china clay and other fillers, possibly with some ink/dye. | No if from virgin wood pulp.<br>Yes if from recycled paper and cardboard | Y | - | - | - | - | - | - | There have been many attempts at reuse or recovery (e.g. landfill cover).<br>Dewater before landfill.<br>High water and clay fines content likely to cause problems in incineration (preferably with energy recovery) – possibly co-incineration (preferably with energy recovery) (e.g. cement kiln)<br>Otherwise landfill without treatment |
| **04 01 04** tanning liquor containing chromium (leather industry) | Liquid waste with both biodegradable and chemical content | | Y | - | Y | Y | - | - | - | Physico-chemical treatment |
| **04 01 05** tanning liquor free of chromium (leather industry) | Liquid biodegradable waste | | Y | - | - | Y | - | - | - | Sewer<br>Biological treatment at liquid waste treatment plant |

| Code | What is it? | Already treated? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Conclusion/comment |
|---|---|---|---|---|---|---|---|---|---|---|
| **04 02 09** wastes from composite materials (impregnated textile, elastomer, plastomer) (textile industry) | Waste composite textiles | | - | - | - | - | Y | - | - | Incineration (preferably with energy recovery)<br>Recycle |
| **04 02 10** organic matter from natural products (e.g. grease, wax) (textile industry) | Material from cleaning (e.g. wool – wool scour liquor, grease, wax, excrement, detergents) | | Y | - | - | Y | - | - | - | Dewater before landfill.<br>Possible biological treatment (e.g. AD)<br>Incineration (preferably with energy recovery) |
| **04 02 21** wastes from unprocessed textile fibres | Could be animal, vegetable or synthetic textile fibres. | | - | - | - | - | - | - | - | Vegetable (e.g. cotton) – compost or incineration (preferably with energy recovery)<br>Animal (e.g. wool) – in-vessel composting or incineration (preferably with energy recovery)<br>Synthetic (e.g. rayon) – incineration (preferably with energy recovery)<br>Recycle |
| **04 02 22** wastes from processed textile fibres | As unprocessed.<br>May have been dyed. | | - | - | - | - | - | - | - | As unprocessed |
| **05 01 17** bitumen (from oil refining) | Bitumen | | - | - | - | - | Y | - | - | Reuse in coating, etc.<br>Incineration (preferably with energy recovery) |
| **06 13 03** carbon black (inorganic chemicals NOS) | Finely divided carbon | | - | - | - | - | - | - | - | Regeneration<br>Incineration (preferably with energy recovery) |
| **07 02 13** waste plastic (MFSU plastic) | Plastic | | - | - | - | - | Y | - | - | Reuse or recycling<br>Incineration (preferably with energy recovery) |
| **08 01 12** waste paint and varnish other than those mentioned in 08 01 11 (MFSU paint and varnish) | Water-based paint with pigments and fillers | | Y | - | - | - | Y | - | - | Dewater before landfill.<br>Incineration (preferably with energy recovery) |

| Code | What is it? | Already treated? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Conclusion/comment |
|---|---|---|---|---|---|---|---|---|---|---|
| **08 01 14** sludges from paint or varnish other than those mentioned in 08 01 13 (MFSU paint and varnish) | Water-based pigments and fillers | | Y | - | - | - | Y | - | - | Dewater before landfill.<br>Incineration (preferably with energy recovery) |
| **08 01 16** aqueous sludges containing paint or varnish other than those mentioned in 08 01 15 (MFSU paint and varnish) | Water-based pigments and fillers | | Y | - | - | - | Y | - | - | Dewater before landfill.<br>Incineration (preferably with energy recovery) |
| **09 01 07** photographic film and paper containing silver or silver compounds | Plastic film with silver coating | | - | - | - | - | - | Y | - | Processing for silver recovery – film may then be landfilled after that treatment.<br>Incineration (preferably with energy recovery) |
| **09 01 10** single-use cameras without batteries | Composite, mainly dense plastic, articles | | Y | - | - | - | Y | - | - | May be subject to WEEE regulations (flash and connections).<br>Incineration (preferably with energy recovery)? |
| **09 01 12** single-use cameras containing batteries other than those mentioned in 09 01 11 | Composite, mainly dense plastic, articles with alkaline batteries | | Y | - | - | - | Y | - | - | May be subject to WEEE regulations – crush and recover batteries and electronic components |
| **10 01 02** coal fly ash | PFA – fine particles of silicates with some soluble inorganics (e.g. boron) | | - | Y | Y | - | - | - | - | Recover as a construction material.<br>May be wetted to control dust, but does not change characteristics.<br>If co-fired with waste, it is the residue from a treatment process and needs no further treatment. |
| **10 01 17** fly ash from co-incineration (preferably with energy recovery) other than those mentioned in 10 01 16 | Fly ash from combustion processes including waste. | | - | - | - | - | - | - | - | It is the residue from a treatment process and needs no further treatment. |

| Code | What is it? | Already treated? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Conclusion/comment |
|---|---|---|---|---|---|---|---|---|---|---|
| **10 09 08** casting cores and moulds which have undergone pouring other than those mentioned in 10 09 07 (ferrous metallurgy) | Non-hazardous foundry sand | | - | Y | Y | - | - | - | - | Reuse, recover<br>Non-hazardous landfill without treatment |
| **10 11 03** waste glass-based fibrous materials (glass manufacture) | Glass fibre | | - | Y | - | - | - | - | - | Inert – recycle or landfill without treatment. |
| **10 11 12** waste glass other than those mentioned in 10 11 11 (glass manufacture; excluding glass powder/heavy metals) | Glass | | - | Y | - | - | - | - | - | Inert – recycle or landfill without treatment. |
| **10 13 14** waste concrete and concrete sludge (from manufacture of articles from cement and lime) | a) Solid concrete<br>b) Aqueous mixture of cement and sand/gravel | | - | a)Y | b)Y | - | - | - | - | a) Inert – reuse as aggregate; if no reuse outlet, landfill without treatment.<br>b) Dewater and non-hazardous landfill. |
| **12 01 05** plastics shavings and turnings | Plastic particles | | - | - | - | - | Y | - | - | Recycle<br>Reuse in plastic products.<br>Incineration (preferably with energy recovery) |
| **12 01 21** spent grinding bodies and grinding materials other than those mentioned in 12 01 20 | Abrasives and non-hazardous binders, with non-hazardous metal particles | | - | Y | - | - | - | - | - | No obvious treatment Possible metal recovery and then landfill abrasives, or landfill without treatment |
| **15 01 01** paper and cardboard packaging | Paper and cardboard with adhesives | | - | - | - | Y | - | - | Y | Packaging waste – recovery targets apply.<br>Recycling<br>Composting<br>Incineration (preferably with energy recovery) |

| Code | What is it? | Already treated? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Conclusion/comment |
|---|---|---|---|---|---|---|---|---|---|---|
| **15 01 05** composite packaging | Usually coated materials (e.g. plastic coated cardboard, jiffy packs) | | Y | - | - | - | - | - | Y | Packaging waste – recovery targets apply.<br>Separate and recycle<br>Incineration (preferably with energy recovery) |
| **15 02 03** absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02 | a) Particles with absorbed contaminants (but not hazardous/ oil). Could be biodegradable or mineral particles.<br>b) Textiles with some dirt/ contamination | a) Unlikely – if from waste treatment, should be Chapter 19. | a)Y<br>b)Y | - | - | - | - | - | - | a)Depends on both matrix (absorbent) and contaminant.<br>b) Launder and reuse.<br>Launder and landfill.<br>Incineration (preferably with energy recovery).<br>Possible biodegradation, if textile or contaminants biodegradable. |
| **16 01 03** end-of-life tyres | Tyres | | - | - | - | - | Y | - | - | Recycling, including cryogenic, crumb production<br>Shredding and co-incineration (preferably with energy recovery)<br>Pyrolysis or incineration (preferably with energy recovery) |
| **16 01 06** ELVs, containing neither liquids nor other hazardous components | Composite articles of metal, plastic, glass, rubber, etc. | | Y | - | - | - | - | Y | Y | ELV regulation requirements.<br>Dismantling/shredding followed by recovery/ recycling. Landfill of some residues. |
| **16 01 20** glass (from ELVs) | Glass, probably laminated or toughened. Possibly with wire aerials or heating elements. | | - | Y | - | - | - | - | - | Possible recovery<br>If not, landfill (possibly inert but must be assessed on a case by case basis). |
| **16 05 09** discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08 | Can be either organic or inorganic, but non-hazardous. May often be in small containers. | | Y | - | - | - | - | - | - | Sorting and bulking, followed by treatment. Inorganic, probable physico-chemical. Organic probable incineration (preferably with energy recovery). |

| Code | What is it? | Already treated? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Conclusion/comment |
|---|---|---|---|---|---|---|---|---|---|---|
| **17 01 01** concrete (from C&D) | Concrete, possible reinforcing wire | | - | Y | - | - | - | - | - | Crush and recover as aggregate.<br>If no recovery outlet, inert/non-hazardous landfill without treatment |
| **17 01 07** mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06 | NB This is mixed inerts c.f. 17 09 04 | | - | Y | - | - | - | - | - | Crush and recover as aggregate.<br>If no recovery outlet, inert/non-hazardous landfill without treatment |
| **17 04 03** lead (from C&D) | Solid lead | | - | Y | - | - | - | Y | - | Recycling |
| **17 05 04** soil and stones other than those mentioned in 17 05 03 (from C&D) | Soil and stones. As there are no separate categories, this category could be all soil or all stones. | | Y | - | - | - | - | - | - | Stones – recover as aggregate.<br>If no recovery outlet, inert/ non-hazardous landfill without treatment<br>Subsoil – recover as aggregate.<br>If no recovery outlet, inert/ non-hazardous landfill without treatment<br>Topsoil or peat – reuse as topsoil.<br>If no reuse outlet, non-hazardous landfill without treatment<br>Mixtures – separate and proceed as above. |
| **17 05 06** dredging spoil other than those mentioned in 17 05 05 (from C&D) | As soil and stones above. May be wet/liquid. | | Y | - | - | - | - | - | - | Dewater and landfill.<br>As soil and stones above |
| **17 08 02** gypsum-based construction materials other than those mentioned in 17 08 01 (from C&D) | Plaster and plasterboard | | - | Y | - | - | - | Y | - | Recycling<br>Separate landfill cell from biodegradable waste, without treatment |
| **17 09 04** mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03 | Mixed inerts with soil, tarmac, cables, vegetation, plaster, etc. | | Y | - | - | - | - | - | - | Separate and recover aggregate. If no outlet for recovered material, non-hazardous landfill without treatment |

| Code | What is it? | Already treated? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Conclusion/comment |
|---|---|---|---|---|---|---|---|---|---|---|
| **18 01 02** body parts and organs including blood bags and blood preserves (except 18 01 03) | Animal matter | | - | - | - | Y | - | - | - | Follow current HSAC guidance (currently under revision). |
| **18 02 08** medicines other than those mentioned in 18 02 07 | Various | | - | - | - | - | - | - | - | Follow current HSAC guidance (currently under revision). |
| **19 02 03** premixed wastes composed only of non-hazardous wastes | Various | No – presumably have been mixed for treatment, but then not treated. Although a mixture, would not consider separation. | - | - | - | - | - | - | - | Depends on reasons for not treating. Main option likely to be incineration (preferably with energy recovery) if the mix was unsuitable for physico-chemical (19 02). Possibly solidification.<br>May be necessary to landfill without treatment. |
| **19 07 03** landfill leachate other than those mentioned in 19 07 02 | Leachate. May be from hazardous or non-hazardous landfill, but leachate is non-hazardous. Liquid waste | No | - | - | - | - | - | - | - | Sewer<br>Liquid waste treatment – biological, reverse osmosis, electrolytic, etc.<br>Evaporation<br>Incineration (preferably with energy recovery) |
| **19 08 01** screenings (from wastewater treatment) | Solids removed from inflow to works – bricks, wood, plastic, paper, condoms, etc. | No – from wastewater treatment | Y | - | - | - | - | - | - | Cannot be readily sorted due to contaminants, or composted due to plastic, etc.<br>Incineration (preferably with energy recovery) |
| **19 09 01** solid waste from primary filtration and screenings (from potable or industrial water (i.e. not wastewater) treatment | Usually flocculants (e.g. alum) with some soil and biological material | No – from water treatment | - | - | - | - | - | - | - | May be possible to recover on land.<br>If recovery not possible, non-hazardous landfill without treatment<br>Separate cell from biodegradable if high-sulphate content |

| Code | What is it? | Already treated? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Conclusion/comment |
|---|---|---|---|---|---|---|---|---|---|---|
| **19 12 01** paper and cardboard (from mechanical treatment of waste) | Paper and cardboard | Possibly, if third criterion is then met (e.g. by recovering the paper and cardboard). | - | - | - | Y | - | - | - | Recycling<br>Landfill if third criterion has otherwise been met.<br>Composting<br>Incineration (preferably with energy recovery) |
| **19 13 06** sludges from groundwater remediation other than those mentioned in 19 13 05 | likely to be organic liquid | | Y | - | - | - | - | - | - | Dewater and non-hazardous landfill. |
| **20 01 01** paper and cardboard (MSW, household, C&I) | Paper and cardboard | | - | - | - | Y | - | - | - | May contribute to packaging waste recovery obligations.<br>Recycling Composting<br>Incineration (preferably with energy recovery) |
| **20 01 02** glass (MSW, household, C&I) | Glass | | - | Y | - | - | - | - | - | May contribute to packaging waste recovery obligations.<br>Recycling Recover as aggregate.<br>Inert landfill without treatment if none of these possible |
| **20 01 41** wastes from chimney sweeping (MSW, household, C&I) | Soot | | - | - | - | - | - | - | - | Recovery on land<br>Composting<br>Non-hazardous landfill if these not available |
| **20 02 01** biodegradable waste (MSW, household, C&I, parks and gardens) | Vegetation and timber | | - | - | - | Y | - | - | - | Composting<br>Incineration (preferably with energy recovery) |

| Code | What is it? | Already treated? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Conclusion/comment |
|---|---|---|---|---|---|---|---|---|---|---|
| **20 03 02** waste from markets (MSW, household, C&I) | Depends on market – packaging, sawdust, vegetable material, animal/fish material | | Y | - | - | Y | - | - | - | Composting unless high animal content for the composting facility<br>AD<br>Incineration (preferably with energy recovery) |
| **20 03 07** bulky waste (MSW, household, C&I) | Various furniture, white goods | | Y | - | - | - | - | - | - | Reuse<br>Recycling<br>Crushing/ dismantling/ sorting<br>Incineration (preferably with energy recovery) |

HSAC = Health Services Advisory Committee

MFSU = manufacture, formulation, supply and use

MMMF = man-made mineral fibres

NOS = not otherwise specified

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