Out of date

This guidance has been withdrawn because it is out of date. Use the guidance on ‘landfill classification by waste types’ in the landfill operators: environmental permits manual.

Environmental Permitting Regulations (England and Wales) 2010

Regulatory Guidance Series, No LFD 1

Understanding the Landfill Directive

Version 2.0 March 2010

Record of changes

Version	Date	Changes
2	March 2010	General update to reflect current state of regulatory interpretation
		Removal of guidance on recovery v disposal that is now the subject of separate guidance

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A Quick Guide

This is our high level legal and policy guide. It builds on guidance issued by Defra/ WAG, to provide more clarity to our staff and the landfill industry to help them understand how we intend to regulate landfills under the Landfill Directive (99/31/EC) and Environmental Permitting (England and Wales) Regulations 2010.

This guidance sets out our positions on:

- Lagoons and pet cemeteries,
- The separation of landfills of different classes, including;
  - previously deposited wastes
  - stable, non-reactive hazardous waste, asbestos and gypsum and other high sulphate waste,
- Financial Provision,
- Landfill bans,
- Landfill location, with reference to the requirements of groundwater legislation,
- Landfill engineering, including Annex 1 to the Directive and the standards required for;
  - Geological barrier
  - Leachate collection and sealing liner,
  - Groundwater entry,
- Landfill Closure;
  - Progressing to definite closure;
    - Agency initiated,
    - Operator initiated,
- Existing landfills;
  - Previously deposited waste,
  - Closing existing sites,
  - Re-opening closed sites.

Contents

1. Introduction

1.1. This note provides guidance on understanding the Landfill Directive (99/31/EC) for the purposes of the Environmental Permitting (England and Wales) Regulations 2010 ("the Regulations").

1.2. The Landfill Directive ("the Directive") was adopted by the European Community (EC) in 1999. It sets tough operational and technical requirements for disposal of waste by landfill, with the aim of reducing the negative effects of landfilling. Every Member State of the European Union (EU) was required to implement it from 16 July 2001.

1.3. A Council Decision (2003/33/EC) was published in 2003 establishing requirements for landfill waste acceptance criteria and procedures.

1.4. The Department for the Environment, Food and Rural Affairs (Defra) and Welsh Assembly Government (WAG) have issued guidance on the legal requirements for permitting under the Landfill Directive (Environmental Permitting Guidance The Landfill Directive – "the LFD guidance"). This note provides more detail where we think this will aid understanding.

1.5. Defra and WAG have also produced guidance on the Waste Framework Directive ("the Waste FD Guidance").

2. What is a landfill?

2.1. Chapter 2 of the LFD Guidance addresses the definition of "landfill", but this section provides some more detailed practical explanations.

2.2. Article 2(g) of the Directive defines a "landfill" as "*a waste disposal site for the deposit of the waste onto or into land*".

2.3. The scope of the Directive is limited by the definition of waste in the Waste Framework Directive[1] (article 2(a) of the Landfill Directive) and applies only to disposal.

2.4. Extractive waste (as defined by the Mining Waste Directive 2006/ 21/EC), is not waste framework directive waste and therefore not covered by this guidance.

Lagoons and pet cemeteries

Lagoons

2.5. Many sludges and liquids are deposited in lagoons[2]. These can be either specially constructed containment structures or adaptations of disused mineral voids.

2.6. Most if not all such sites are capable of falling within the broad definition of a landfill set out in article 2(g) of the Directive, i.e. "a waste disposal site for the deposit of waste onto or into land". This broad definition is however also limited by article 2(g), which excludes from the definition of "landfill" sites where waste is stored for:

- less than 3 years prior to recovery or treatment; or
- less than 1 year prior to disposal.

2.7. The manner in which a particular lagoon is operated is therefore relevant. There are three basic modes of operation for lagoons, which illustrate the practical application of the definition:

2.7.1. The deposit of sludge or liquid into a containment structure until it is full, and allowing the waste to dry out and stabilise / solidify, with the result that some form of restoration of the land can ultimately take place (It may be a requirement of the planning permission that the site is filled in this fashion). Because the waste is deposited permanently, this type of lagoon is landfill.

2.7.2. The deposit and periodic removal of waste once it has dried / solidified sufficiently. If this takes place within the timescales in the article 2(g) definition of "landfill", then the activity will not constitute a landfill.

[1] See the Government consultation on the definition of waste – released March 10
[2] See the LFD guidance for the exclusion of dredgings from the scope of the Landfill Directive

2.7.3. A lagoon established on a temporary basis for storing waste prior to its disposal or recovery elsewhere. Any lagoon in which waste is stored for less than a year (or less than three years if the waste is to be recovered or treated) will not be regarded as a landfill.

Pet cemeteries

2.8. Pet cemeteries fall within the Directive definition of "landfill" and are landfills for non-hazardous waste. Where pet crematoria dispose of their ash on-site, that activity is also a landfill for non-hazardous waste. A permit will not be required for ash from individual cremations placed in a memorial garden.

2.9. If the activity can meet certain criteria the pet cemetery can operate under a standard rules permit. More details are available on our website[3].

Separation of landfills

2.10. The LFD Guidance (paragraphs 2.23 and 2.24) considers the separation between landfills of different classes in its chapter on "what is a landfill?". The issue of separation is important in defining what, for the purposes of permitting, a landfill should actually comprise.

2.11. There are two principal types of separation:

- to divide two areas of the same installation (internal separation), or
- to create an external boundary to permit two separate landfill activities (for example where there are two operators) (external separation)

Internal separation

2.12. This separation does not have to be compliant with the engineering requirements of the Directive, annex 1. It may however, need to be sufficient to direct the products of waste degradation into an area that is compliant. Internal separation is sometimes referred to as an, 'internal lining system' or 'over-tip'. Also see sections 5 and 7.

External separation

2.13. This separation must be compliant with the engineering requirements of the Directive, annex 1 as it is forming a boundary between two distinct landfill activities. External separation may also be referred to as, 'permit boundary separation'

2.14. Whether certain landfill areas can be excluded for permitting purposes depends on whether they can be adequately separated from the operational area. The separate areas must be able to operate independently.

2.15. Where it is proposed to establish separate, different classes of landfill at the

[3] Standard rules permits; Pet cemeteries. http://www.environment-agency.gov.uk/business/topics/permitting/106521.aspx.

same location, for example where there is a proposal to operate adjacent landfills for non-hazardous and hazardous waste, these must be separate, independent and self-contained waste disposal sites.

2.16. The separate landfill activities must be capable of being managed, monitored and regulated independently. If the separation does not create self-contained landfills, then although there may appear to be two activities, they will constitute a single landfill. Whether the necessary degree of separation has been achieved between landfills is a question of judgement for each case.

2.17. In addition to the issues considered for all landfill proposals (for instance compliance with the engineering requirements of the Directive), the key points to be considered for landfill separation are:

- the stability and durability of any engineered structure which separates landfills;
- the potential for movement of waste degradation by-products (leachate and landfill gas) across any engineered separation;
- the effect of an overlying landfill on any underlying waste mass and on the management and monitoring of degradation by-products within the underlying waste mass;
- the ability to undertake environmental monitoring (i.e. groundwater and landfill gas) outside the proposed landfills.

2.18. The movement of leachate and landfill gas across the separation boundary must be prevented to the extent necessary to ensure that these degradation by-products can be managed and monitored independently.

Financial Provision

2.19. The LFD guidance (paragraphs 3.190 – 3.194) summarises the Directive requirements for financial provision.

2.20. The provision must be ‘adequate’. This means it must be **sufficient** in monetary terms to meet the obligations arising from the permit. It must be **secure** for the duration of the permit including the aftercare phase and **available** when needed to ensure that the environment is protected.

2.21. Financial provision agreements may include a clause that provision must be, 'adequate, secure and available to the Environment Agency'. We changed our policy in February 2006 so that the provision is, 'adequate, secure and available to the site operator’. We will amend agreements to reflect this change when permits are reviewed for other purposes.

2.22. For the purpose of any legal agreements, the definition of ‘termination date’ means the date on which we agree that the site is definitely closed rather than the date on which the restoration of all phases is complete.

3. Landfill classification

3.1. Article 4 of the Directive requires every landfill to be classified as being for hazardous, non-hazardous or inert waste.

3.2. Classification in this way aims to ensure that engineering, operational and waste acceptance standards are appropriate for the type of waste to be landfilled.

4. Wastes that cannot be landfilled

4.1. Some wastes cannot be disposed of at a landfill (article 5(3)). The LFD Guidance deals with this topic in paragraphs 3.13 to 3.29.

4.2. In addition to the wastes banned through the permit, waste industrial or automotive batteries and accumulators are banned from landfill from 1 January 2010 by direct application of regulations[4].

Liquid waste and lagoons

4.3. The Directive bans liquid wastes from acceptance in landfills (article 5(3)(a)). Lagoons may appear to accept liquid waste in a landfill. However, the LFD Guidance indicates (see paragraph 3.20) that waste, to which water has been added in order to facilitate its transport in the form of a suspended solid, should not be regarded as liquid waste providing that liquid is only carrying the suspended solid and is removed at the disposal site.

[4] The Waste Batteries and Accumulators Regulations 2009 (SI 2009, No. 890)

5. Wastes acceptable in each landfill class

5.1. The LFD Guidance sets out the wastes that can be accepted in each class of landfill (paragraphs 3.54 to 3.59). The requirements for separate cells for some categories of waste are set out in paragraphs 3.111 to 3.119 of the LFD Guidance.

5.2. The following paragraphs describe the detailed requirements for separate cells in a landfill for the disposal of stable non-reactive hazardous waste, asbestos and sulphate bearing wastes.

Stable non-reactive hazardous waste

5.3. Landfills for non-hazardous waste can accept stable non-reactive hazardous waste if certain criteria are met. The LFD Guidance sets these out (paragraphs 3.111 to 3.113 and 3.117 to 3.119).

5.4. These criteria include the requirement that stable non-reactive hazardous waste may only be disposed of in landfills for non-hazardous waste in *cells* where no biodegradable waste is accepted (article 6(c)(iii) of the Directive).

5.5. Landfills are commonly operated as a series of cells to assist in the controlled filling and management. A “cell” is defined here as;

a portion of the landfill surrounding a topographic low point encompassing all points from which it would collect free draining liquid.

An individual cell would normally be expected to have a discrete basal leachate collection and extraction system, and to be separated from other cells by an engineered bund or internal separation system.

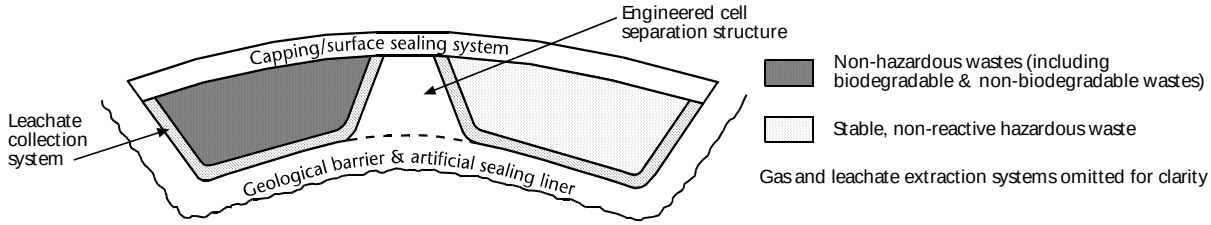
5.6. Separation of cells can be achieved either by:

- construction of dedicated separating structures; or
- managed placement of wastes to segregate waste inputs.

5.7. The engineering requirements of the landfill cells must comply with the requirements of the Directive (paragraphs 3.137 to 3.172 of the LFD Guidance). However it is recognised that the design and specification requirements may be different for the differing waste types and should be determined on the basis of a risk assessment. Any separation proposal submitted to us for approval must detail how it meets the separation principles listed in the LFD Guidance as well as basic engineering requirements such as stability.

5.8. The simplest option is to construct a separation barrier between the cells. Such a system might connect the basal lining system to the surface sealing or cap (Figure 1). This is likely to comply with the principles stated above and would be easier to construct in shallower landfills. The design and specification of the elements of the engineered system must be appropriate to the wastes in each cell.

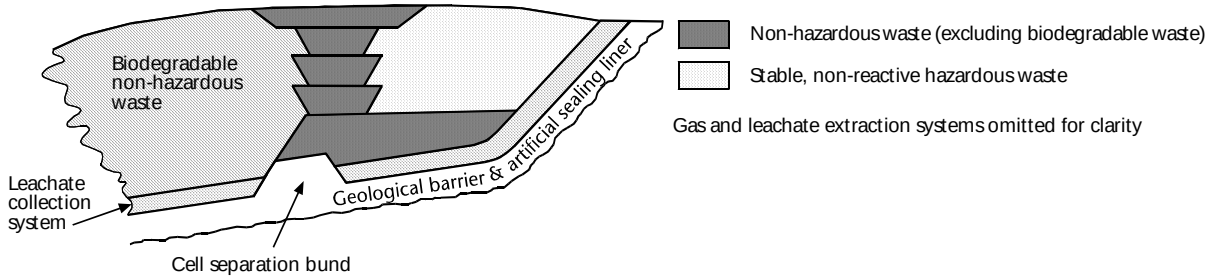
Figure 1: Schematic illustration of engineered separation of cells



Managed cell separation by segregation of waste placement

5.9. An alternative is to separate the stable, non-reactive hazardous wastes from biodegradable non-hazardous wastes using non-biodegradable, non-hazardous wastes as the separating medium (Figure 2). The separating element of non-biodegradable, non-hazardous waste must ensure no contact between the biodegradable wastes and the stable, non-reactive, hazardous wastes or any of their products (e.g. landfill gas and leachate). To meet the separation principles, a significant width of non-biodegradable, non-hazardous waste is likely to be required. There must be a sufficient thickness of non-biodegradable, non-hazardous waste beneath the stable, non-reactive hazardous wastes to ensure it is well above the maximum level of leachate produced by the biodegradable wastes. Maintaining the base of the stable, non-reactive hazardous wastes above the leachate level must also be a consideration where an engineered separation is proposed.

Figure 2: Schematic illustration of managed cell separation by segregation of waste placement



5.10. The design and construction of such an arrangement depends upon the types and properties of the non-biodegradable, non-hazardous waste. In order to meet the principles of separation given in the LFD Guidance, such an approach is likely to require tight operational controls.

Asbestos

5.11. Asbestos waste can be deposited in a separate cell in a landfill for non-hazardous waste, but only if the cell is sufficiently self-contained. The ‘asbestos cell’ can only contain suitable wastes, construction material containing or contaminated with asbestos, and those waste materials used for the purposes of covering these wastes. To prevent the uncontrolled release of asbestos fibres there must be no drilling through the asbestos cell.

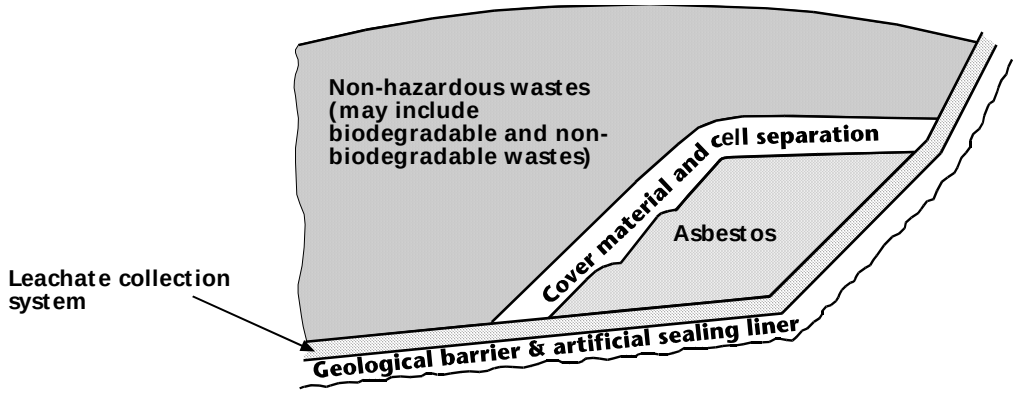
5.12. The design of the containment for the asbestos cell is to provide a physical separation and isolate the asbestos so that it remains undisturbed.

5.13. There may be situations where the collection of leachate and landfill gas from within an asbestos cell is necessary. The cell design and operation must ensure that collection can be achieved without drilling into the waste. This could include the use of large diameter extraction pipework to enable replacement pipework to be inserted without the need to drill into the waste. In circumstances where any leachate or gas collected from the asbestos cell feeds into the collection system of an adjacent cell, the risk of asbestos fibres in the extraction pumps and their potential release to air must be considered.

5.14. Asbestos may be separated from other waste as shown in Figure 3. Here, the basal liner below the asbestos must comply with the requirements for a non-hazardous site although the cell separation above the asbestos need not include a geological barrier as it is ‘internal separation’. Although not shown, leachate collection and extraction facilities and engineered cell separation bunds are likely to be required.

5.15. The upper surface of the asbestos cell must be covered with at least 2 metres of suitable material. Additionally, the asbestos wastes and the cover materials must provide a stable formation on which the overlying cell separation liner and waste deposits can be placed without a threat to their integrity or stability. Consideration must be given to the selection of the asbestos wastes in the base of the cell to minimise the risk of asbestos fibres escaping from the leachate collection system e.g. asbestos bound by a binding agent (for example cement) rather than bagged fibrous asbestos.

Figure 3 A schematic illustration of a possible alternative separate cell arrangement for asbestos wastes



Gas and leachate extraction systems omitted for clarity

Gypsum and high sulphate wastes

5.16. Wastes with high sulphate content must be deposited in a separate cell from any biodegradable waste in a landfill for non-hazardous waste to prevent unacceptable emissions of hydrogen sulphide gas.

5.17. The Council Decision specifies that non-hazardous 'gypsum' based materials must be landfilled in cells where no biodegradable waste is accepted. The Regulations extend this requirement to all 'high sulphate bearing waste'. The Council Decision specifies the limits for total organic carbon (TOC) and dissolved organic carbon (DOC) that must be achieved. Biodegradable wastes that exceed these limits include the more putrescible wastes such as paper, card, food waste and garden wastes.

5.18. If waste with high sulphate content is hazardous it must be disposed of in a landfill for hazardous waste.

5.19. The example of engineered separation of cells in Figure 1 is likely to be the best option. If managed cell separation as in Figure 2 is used then the properties of the non-biodegradable, non-hazardous wastes providing cell separation must prevent contact between leachate and gas from the biodegradable wastes, and the high sulphate content wastes.

6. **Landfill location**

6.1. The LFD Guidance addresses landfill location at paragraphs 3.133 to 3.139.

6.2. With respect to groundwater, our policy for landfill location is contained in Groundwater Protection: Policy and Practice[5]. The policy states

> The Environment Agency will object to any proposed landfill site in groundwater Source Protection Zone 1.
>
> For all other proposed landfill site locations, a risk assessment must be conducted based on the nature and quantity of the wastes, and the natural setting and properties of the location.
>
> Where this risk assessment demonstrates that active long-term site management is essential to prevent long-term groundwater pollution, the Environment Agency will object to sites:
>
> - below the water table in any strata where the groundwater provides an important contribution to river flow or other sensitive surface waters;
> - on or in a Major/Principal Aquifer;
> - within Source Protection Zones 2 or 3.

6.3. This policy reflects the position at paragraphs 3.134 to 3.136 of the LFD Guidance, and the following paragraphs provide our detailed interpretation of the policy. Schedule 1 to this guidance provides a flowchart which illustrates the decision framework for the landfill location policy.

6.4. The risk assessment should be undertaken on the basis of the proposed risk management measures at the landfill i.e. the corrective measures (paragraph 1 of Annex I of the Directive) which, for groundwater, will also be the technical precautions required by the Groundwater Directives (1980 and 2006). The risk assessment must consider the long-term degradation of these corrective measures, in particular the leachate collection system, including the artificial sealing liner and any active groundwater management systems.

6.5. The groundwater risk assessment guidance (in preparation) adopts a tiered approach, where the level of effort put into the risk assessment is proportionate to the complexity of the situation and the decisions that risk assessment will support. The level of detail required in the risk assessment will therefore differ at the different stages of a landfill proposal. Subsequent sections below give guidance on the level (tier) of risk assessment which might be expected to support particular decisions. The criterion against which a risk assessment must be determined such that there is no likelihood of an unacceptable discharge from the site.

[5] Available at: http://www.environment-agency.gov.uk/subjects/waterres/groundwater/1734242/?version=1&lang=_e

6.6. The risk assessment needs to be of high quality and auditable, as the water protection part of it is included in the required reporting on implementation of the Landfill Directive to the European Commission. It is necessary to consider the engineering required to mitigate the risks posed by landfill gas as well as leachate before permitting a site. Hydrogeological risk cannot be considered in isolation and the interactions with landfill gas risk must be recognised.

Active site management

6.7. This means the infrastructure, operation and maintenance (i.e. the corrective measures) necessary to mitigate the environmental risk. With respect to water this refers to the control of water entry (e.g. groundwater pumping) and the collection (e.g. pumped leachate extraction), treatment and disposal of water and leachate. Although the term “passive measure” is not used in the policy this means to the attenuation provided by the geological barrier and any other pollution mitigation processes that require no intervention or maintenance.

Long-term

6.8. This means throughout the aftercare period and up until completion and the surrender of the permit. This will be an undefined (and site specific) period which may extend for many decades until monitoring indicates that the site no longer presents a hazard to the environment. The policy refers to “active long-term site management” which highlights that it is the site management over the long-term which is important. Therefore, the collection and extraction of leachate to minimise leachate accumulation in the operational phase up to definite closure is not the main concern. It is the active measures necessary to prevent groundwater pollution in the long aftercare period that are most significant. The following are examples of active, long-term site management where they are essential to prevent groundwater pollution:

- the reliance on pumped extraction of leachate more than thirty years following closure;
- the pumping of groundwater to suppress the water table until the landfilled waste “stabilises”.

6.9. Many active site management measures will degrade over time, resulting in a reliance on the geological barrier to provide long-term protection of the groundwater. The importance of the geological barrier in the prevention of long-term groundwater pollution is emphasised in the Directive, Annex I, paragraph 3.1; that groundwater is to be protected by the geological barrier combined with a top liner (i.e. a cap) during the aftercare period.

Source Protection Zone 1

6.10. The Environment Agency will object to any proposed landfill site in groundwater Source Protection Zone 1. This applies to landfills for inert wastes as well as landfills for non-hazardous and hazardous wastes.

6.11. Source Protection Zones are defined in Groundwater Protection: Policy and Practice (GP3), and shown on maps available at Environment Agency offices or via our website in What’s in Your Backyard (www.environment-agency.gov.uk).

Nature of the waste

6.12. The policy requires that for all proposed landfill site locations other than inside Source Protection Zone 1, a risk assessment must be conducted based on the nature and quantity of the wastes, and the natural setting and properties of the location. This section considers the nature of the wastes.

6.13. Inert wastes are defined in the Directive. Article 2(e) provides that the total leachability and pollutant content of the wastes, and the ecotoxicity of the leachate produced, must be insignificant and in particular not endanger the quality of surface water or groundwater. Landfills for inert wastes can be considered as potentially suitable for any locations other than inside Source Protection Zone 1. Inert landfills may be considered in sensitive locations provided the permit ensures that strict waste acceptance procedures are put in place.

6.14. When considering the nature of waste, reference should be made to the Agency's Groundwater Risk Assessment guidance (section on Hydrogeological Risk Assessments for Landfills). Landfills for hazardous and non-hazardous waste should be regarded as having the potential to produce leachate containing hazardous substances and non-hazardous pollutants (EPR 2010 Schedule 21 Part 1 Para 4) to which the Groundwater directives would apply. The consideration of the presence of hazardous substances and non-hazardous pollutants would normally take place at the risk screening stage.

Principal Aquifers and Source Protection Zones 2 and 3

6.15. As well as the nature and quantity of wastes, the risk assessment must be based on the natural setting and the properties of the location. Principal Aquifers (formerly referred to as Major Aquifers) and designated Source Protection Zones represent the areas of our groundwater resources that are critical to existing or future public water supplies. In these areas we would normally wish to preserve the high quality of the groundwater immediately under a proposed landfill site. Risk screening should identify the Aquifer and Source Protection Zone designation.

Circumstances where a Principal Aquifer or Source Protection Zone 3 may be a suitable landfill location

6.16 There may be cases where substantial natural low permeability geological barriers overlie Principal Aquifers or a Source Protection Zone 3. These may be sufficient to prevent long-term pollution and satisfy the requirements of the Groundwater Directive, taking account of uncertainties in the longevity of artificial liners, leachate collection systems and other active long-term site management. This might for example occur where Principal Aquifer designation is shown on the Groundwater Vulnerability Maps but the aquifer is actually known to be overlain by a significant thickness of low permeability clay. For such circumstances to be considered, the following must apply:

- the site must be located outside any designated Source Protection Zone 2; and
- the presence of the natural low permeability geological barriers should be demonstrated by site specific investigation; and
- the site must be above the water table where groundwater provides an important contribution to river flow or other sensitive surface waters.

6.16. Where such natural geological barriers are shown to exist it must be demonstrated by quantitative risk assessment (Simple or Complex risk assessment) that they reduce the groundwater vulnerability by compensating for the long-term degradation of artificial sealing layers, leachate collection systems and other active management control systems. In some cases it may be appropriate to consider the natural geological barrier in conjunction with the artificially established mineral barrier component of a liner for this purpose.

6.17. The aquifer materials themselves will not be considered part of a low permeability geological barrier when considering a proposed landfill on Principal Aquifers or within Source Protection Zone 3. A landfill in these locations is only potentially suitable where there is a separate natural low permeability geological barrier which is acting to protect the aquifer.

6.18. In the policy a simple distinction has been made between Major Aquifer or Source Protection Zones 2 & 3 and all other groundwater. However, there could be areas designated as Principal Aquifer where, according to the professional judgement of our hydrogeologists, circumstances of poor natural groundwater quality or geological structure mean that local significance to water resources is very limited. As an example, this might include areas of natural saline intrusion or where the strata involved only occupy a small isolated faulted block. These local circumstances in a Principal Aquifer should be taken into consideration at the Strategic Waste Planning phase or a later phase, providing there is adequate evidence to justify this position and a decision should be supported by a quantitative risk assessment (Simple or Complex risk assessment).

6.19. The location of a landfill on a Principal Aquifer due to poor groundwater quality must only be considered on the basis of the natural hydro-geochemistry and not poor quality due to existing landuse such as landfill.

Secondary Aquifers and unproductive strata outside Source Protection Zones

6.20 For both Secondary Aquifer (formerly referred to as minor aquifers in many cases) and Unproductive strata (formerly referred to as non-aquifers in most cases) outside Source Protection Zones the impact of long term pollution should be considered on a site by site, risk assessment basis. This is to account for variability in the local significance of these formations for water supply in a wide range of strata with differing natural groundwater quality, hydraulic properties and ability to attenuate contaminants. In these locations it may be possible to place greater reliance on natural geological barriers and/or artificial mineral barriers for long term protection of groundwater, depending on the particular geological and hydrogeological circumstances. However, requirements to

mitigate the long-term degradation of artificial sealing layers and management control systems and to protect groundwater in accordance with the Groundwater directives will need to be satisfied.

6.20. There may be Secondary Aquifer situations where groundwater resources have a particular local significance and a more precautionary stance is justified on our part. This means that where the consideration of the site specific risk justifies the action we should object to landfill developments even though the location is not on a Principal Aquifer or within Source Protection Zones 2 and 3.

Sites below the water table in any strata where groundwater provides an important contribution to river flow or other sensitive surface waters

6.21. Groundwater forms an integral part of the water cycle and to varying degrees it supports the baseflow of rivers; in some cases having a dominant influence on flows and quality, particularly in dry periods. Groundwater may also support sensitive ecological sites such as wetlands where small changes in quality or level could be detrimental.

6.22. The Directive indicates that sub-water table landfill development needs careful consideration. Particular attention needs to be paid to the risk of direct discharge and the implications with respect to the requirements of the Groundwater directives.

6.23. Where not otherwise captured by the Principal Aquifer or Source Protection Zone 2 or 3 criteria of the policy, we will object to sites below the water table in any strata where groundwater provides an important contribution to river flow or other sensitive surface waters.

6.24. For simplicity the general term “water table” has been used in the policy. This should be taken to apply equally to a piezometric head within a confining layer over an aquifer where there is sufficient connectivity to the underlying aquifer to allow free flowing water to enter the landfill void. The aquifers concerned could include Secondary aquifers within low permeability strata such as glacial drift. The first consideration should be whether or not the underlying aquifer provides an important contribution to river flow or other sensitive surface waters. If so, the acceptance of the landfill development below the piezometric head level in an overlying confining layer will depend on site specific investigation and quantitative risk assessment (Simple or Complex risk assessment) demonstrating that the degree of connectivity to the aquifer is sufficiently low to prevent long term pollution.

6.25. Risk screening would normally identify whether the proposed landfill is below the water table and whether groundwater provides an important contribution to river flow or other sensitive surface waters.

6.26. Where geological barriers or other factors mitigate against the contribution of the groundwater to surface water we are likely to require detailed risk assessment (Simple or Complex risk assessments) based on site-specific information.

6.27. The policy uses the terms “important contribution” and “sensitive surface waters”. The identification of such sites is necessarily a matter of site-specific professional judgement but in general we should only identify sites as falling within these categories where the reasons for doing so are clear and transparent. The relevant factors to be considered in “important contribution” and “sensitive” include the following:

- proximity of the surface water;
- directness of the hydraulic connection;
- quality and quantity of both the groundwater and the receiving surface water;
- the consequences of the potential impact on the surface water quality;
- the consequences of the potential impact on the ecology of the surface water due to changes in quality or level.

6.28. For example some cases may arise from the close proximity to ecologically sensitive sites such as wetlands or rivers where there is direct continuity and sensitivity to quality or water level changes. In other cases, the close proximity of a river may raise concern about the potential for rapid or high volume flow connection or impacts on the headwaters to important, high quality catchments. We would not wish to raise objections to sub-water table landfill developments on the basis of small scale, distant or trivial hydraulic connections or where natural geological barriers mitigate against the risk.

7. Landfill engineering

7.1. The LFD Guidance describes the engineering requirements contained in Annex I to the Directive. We have produced guidance on the requirements for landfills for inert waste[6].

7.2. The following paragraphs provide a more detailed description of some of these requirements.

The overall approach

7.3. Containment engineering for the purposes of groundwater protection cannot be undertaken in isolation from gas management. As well as the interaction between the necessary containment barriers, leachate management can directly impact upon gas management. What may be acceptable for groundwater protection may not be acceptable for landfill gas management.

7.4. In assessing the landfill engineering proposals for all landfill sites there must be:

- compliance with the LFD, Annex 1 engineering requirements,
- no likelihood of unacceptable discharge / emission over the entire lifecycle of the landfill (i.e. Landfill Directive and Groundwater Directive compliant – see paragraph 9.5 below for the position for permitting existing sites);
- structural / physical stability over the entire lifecycle of the landfill.

7.5. The LFD Guidance makes it clear that the requirements of Annex I, paragraph 3.1 of the Directive must be met in all cases other than where a particular requirement would provide a negligible contribution to the protection of soil and water. The LFD guidance explains that 'negligible contribution' means that, for certain landfills, we may consider that the necessary conditions are in place to protect soil and water and the addition of the barrier or liner in question would add little or nothing to environmental protection.

7.6. In the vast majority of new landfill areas, the Annex I, paragraph 3.1 requirements will contribute to the protection of soil and water and will therefore be required. The need for a geological barrier, bottom or top liner can only be removed where it is evident from a risk assessment (i.e. considering the site conceptual model) that the inclusion of one of those elements would not contribute to environmental protection. Where the risk assessment shows that inclusion of one of those elements is likely to provide a negligible contribution to the protection of soil and water we may accept that element is unnecessary.

The geological barrier

[6] 'Standards and measures for the deposit of inert waste on land' http://publications.environment-agency.gov.uk/pdf/GEHO0509BPWJ-e-e.pdf

7.7. A geological barrier is a fundamental requirement for all landfills. The geological barrier is required up the landfill sides as well as across the base.

7.8. The geological barrier must provide sufficient attenuation to prevent a potential risk to soil and groundwater. A risk assessment[7] will be required to demonstrate the performance of the proposed geological barrier for a site against the requirements of the Landfill and Groundwater Directives.

7.9. The LFD Guidance (paragraph 3.158) sets out that where leachate collection is not required, the hazard posed by the waste in that location may be such that the attenuation requirements are so low that a geological barrier is not required. The example given is where a landfill for inert waste is in a low sensitivity setting, but without a natural geological barrier, and the waste will be well characterised from a single source.

7.10. We are only likely to accept the removal of a geological barrier at some landfills for inert waste although it is possible that a risk assessment could indicate that a geological barrier is not required at a landfill for non-hazardous waste. In addition to meeting the test for not requiring leachate collection (see the water control and leachate management section of the LFD guidance) the risk assessment must demonstrate that the waste would all be well characterised. This would typically mean a single source with a known (and very low hazard) leachate quality. The requirement for a geological barrier cannot be removed where the risk assessment shows that the landfill is in a sensitive location (see paragraph **Error! Reference source not found.**).

Leachate collection and sealing system

7.11. At landfills for hazardous and non-hazardous waste, a leachate collection and sealing system is required in addition to the geological barrier wherever the collection of leachate is necessary. There are two elements to the leachate collection and sealing system, an artificial sealing liner and a leachate drainage layer.

7.12. The requirement for an artificial sealing liner is most likely to be met by a liner system such as a geomembrane or dense asphaltic concrete (DAC) liner.

7.13. There may, however, be site specific circumstances (for instance in some Secondary aquifers and Unproductive Strata) where other sealing systems that, in combination with the leachate collection system, could ensure the necessary leachate removal. These systems could comprise some geosynthetic clay liners; bentonite enriched soil or artificially established compacted clay.

7.14. The selection of any artificial sealing liner should be made on the basis of a risk-based design (in conjunction with the geological barrier). For all containment systems it must be demonstrated, through the risk assessment process, that

[7] See the Groundwater Risk Assessment Guidance (Hydrogeological Risk Assessments for Landfills) for the level of risk assessment required.

there will be no likelihood of unacceptable discharges from the landfill over its entire lifecycle.

7.15. The LFD guidance (paragraph 3.163) sets out that where the geological barrier alone will provide the necessary conditions for preventing pollution of soil and water and - in combination with a leachate drainage system – will ensure sufficient collection of leachate, then the artificial sealing liner may not be required. The example given is where a landfill is located on a significant depth of consistently low permeability stratum (such as clay) which could provide a bottom sealing system. In these cases the addition of an artificial sealing liner to provide additional bottom sealing would provide a negligible contribution to the protection of soil and water and so may not be required.

7.16. The requirement for an artificial sealing liner can only potentially be removed where the risk assessment identifies that the landfill is within a non-aquifer.

7.17. What constitutes a significant depth and consistent strata will have to be assessed on a site specific basis using the risk assessment.

7.18. Landfills below the water table which are operated on the principle of hydraulic containment will not require an artificial sealing liner if it can be demonstrated in the risk assessment that the containment system performs as well or better in the absence of such a liner.

7.19. Annex I paragraph 3.3 requires an artificial sealing liner and leachate drainage layer, but does not specify that these should extend all the way up the sides of the site. Therefore, the requirement for the artificial sealing liner to extend all the way up the side slopes should be based upon a site-specific risk assessment that must consider landfill gas in addition to potential leachate emissions.

7.20. An effective leachate drainage system is at least as important as the lining system in managing the groundwater risk. The Directive, Annex 1 requires a 0.5m thick drainage blanket. However, the Directive does not mention pipe work so the inclusion of pipe work that can be inspected and maintained may allow a reduction in this standard. The ability to abstract leachate from the drainage layer is essential over the entire lifecycle of the landfill and is therefore required. Operators should refer to our technical guidance note for landfill (EPR 5.02)[8].

[8] How to comply with your environmental permit. Additional guidance for Landfill (EA, 2009) http://publications.environment-agency.gov.uk/pdf/GEHO0409BPUT-e-e.pdf

Groundwater entry

7.21. We interpret the requirement in Annex I paragraph 2 to prevent groundwater from entering into the landfilled waste based on risk. Groundwater must be prevented from entering the landfill as far as is necessary to ensure that there is no unacceptable risk to the stability or effectiveness of engineering controls (e.g. the lining and leachate collection systems), other environmental protection measures and the environment. What constitutes acceptable risk must be determined on a site-specific basis through risk assessments that satisfy the requirements for groundwater activities under the Regulations. This must address:

- the geotechnical stability of the lining system, wastes and underlying geological strata;
- the efficacy of the leachate collection system (e.g. drainage layer, pipework, pumps and abstraction chambers);
- the effectiveness of any groundwater control systems (e.g. drainage layers, pumps, abstraction points);
- the ability to maintain operational and management control of the leachate and groundwater regimes in the long term (i.e. until the permit may be surrendered); and
- the ability to effectively collect landfill gas and control the migration of landfill gas.

8. Closure

8.1. The LFD Guidance sets out the article 13 requirements for closure (paragraphs 3.210 to 3.214).

8.2. The following paragraphs explain the detail of the closure requirements.

Progressing to definite closure

8.3. The closure procedure for a landfill (or part of a landfill) can begin:

a) when the conditions specified in the permit are satisfied;
b) when the Environment Agency approves the initiation of the closure procedure following a request from the operator; or
c) by reasoned decision of the Environment Agency.

8.4. Closure can apply to the whole landfill or to parts of it. In order for a site to be regarded as 'definitely closed' we must carry out a final on-site inspection, assess all the reports submitted by the operator and communicate to the operator our approval for the closure.

Closure by reasoned decision of the Agency

8.5. We consider a closure notice to be similar to a revocation notice that may be used for other sectors under the Regulations. A closure notice allows for managed closure of the site while retaining the necessary pollution prevention controls through the permit.

8.6. We must set out any reasoned decision in a notice served on the operator (a 'closure notice'). The notice must specify:

- Our reasons for requiring initiation of the closure procedure,
- the steps the operator is required to take to initiate the procedure; and
- the period within which they must be taken.

8.7. The operator has a right of appeal against the closure notice that must be made within 2 months of the date of issue. The requirements of the notice stand, pending determination of the appeal.

8.8. We may withdraw a closure notice at any time by further notice served on the operator. Closure of a landfill does not relieve the operator of liability under the conditions of the environmental permit.

8.9. Priority must be given to the protection of human health and the environment, which might reasonably include the receipt of a limited amount of additional wastes to achieve an acceptable landform. It may be necessary to restrict the types of additional wastes to be accepted to those with a low pollution potential, depending on the reason for the closure and potential impact on the environment.

8.10. We must also consider the strategic need for the site. In some areas of the country there are no or only few alternative sites permitted to take similar waste streams. We will to ensure that a consistent approach is taken both regionally and nationally in terms of which sites close and when.

8.11. For landfills where we have initiated closure, the ‘steps to be undertaken’ will in the first instance be a request for the provision of information in the form of reports.

8.12. The period within which the steps must be undertaken will be defined by an end date by which time the steps must be complete. For the provision of reports, in the first instance, 3 months is recommended although if information needs to be obtained, for example background data for a risk assessment, a longer period may be necessary.

8.13. The notice may specify that tipping can continue in accordance with the permit. The notice will state that any additional tipping is allowed only until the reports have been compiled, submitted, reviewed by us and a decision made about a date by which tipping must cease.

8.14. We must then make the decision about closing the site as soon as possible with reference to the objectives in paragraphs 3.224 to 3.227 of the LFD Guidance.

8.15. Where the operator of a landfill proposes to accept waste for disposal to meet government objectives, the closure report must include any information they consider necessary to enable us to assess whether continued acceptance of waste is in accordance with those objectives having regard to the negative environmental consequences of immediate closure. The following information, to satisfy us that any additional tipping will not result in pollution of the environment or harm to human health should be provided as a minimum:

- Hydrogeological Risk Assessment
- Stability Risk Assessment
- Landfill Gas Risk Assessment
- Nuisance Risk Assessment
- Proposed quantity and type of waste to be accepted
- Plans and drawings of proposed revised landform (where necessary)
- An assessment of the benefit of any additional deposit against the risk posed

8.16. Once the reports have been submitted to and reviewed by us, a decision can be made about how long waste disposal may be allowed to continue, if at all. We will then withdraw the original closure notice and issue a second notice. The reason for the closure in this second notice will make reference to the reports provided under the first notice and the steps will specify that the acceptance of waste for disposal must cease immediately or by a specified date.

8.17. Where the receipt of additional waste is approved, the conditions of the existing permit will be reviewed and may need to be varied to limit the waste types to prevent pollution or harm.

Closure when the conditions specified by the permit are satisfied, or where the Agency approves initiation of closure on request of the operator

8.18. The operator will need to take the following steps to progress to definite closure. These details can be provided at any stage of the closure process.

8.19. The information provided to us to demonstrate definite closure must be in a report ('closure report') and must be sufficient to confirm to us:

1. the area of the site to which closure application relates,
2. that the waste mass is stable,
3. that the infrastructure and procedures are in place for management and monitoring (for example, landfill gas, leachate, groundwater and stability/ settlement) during the aftercare phase,
4. that procedures are in place for reporting any significant environmental effects during the aftercare phase.

8.20. We should not approve definite closure until we are satisfied that the site can safely enter the aftercare phase, that is, when we no longer need to monitor the site as frequently. This will normally be; once the cap, cap drainage and cap protection layer has been installed, all the gas and leachate management infrastructure is in place and control and monitoring procedures are approved (including that 'significant environmental effects' will be notified to us).

8.21. The information to be provided is covered in more detail in the following paragraphs.

Area of closure

8.22. The operator will need to identify which parts of the site are to be considered definitely closed. A plan or drawing of the site indicating these areas will need to be submitted.

8.23. The plan should also identify the location of any monitoring infrastructure (boreholes, wells, survey locations, etc.). If the whole site is to be closed, the plan associated with the permit may be appropriate provided that it is up to date and of a suitable scale.

Site stability and final landform

8.24. The operator will need to demonstrate that the waste mass is stable, that there will be no slippage and that any movement due to settlement will not have an impact on the site's infrastructure (for example, monitoring boreholes, leachate and / or landfill gas abstraction wells). The operator will need to provide a final level survey as a baseline. Further surveys during the aftercare period will need to be undertaken to confirm settlement rates (see below).

8.25. Information must be provided to satisfy us that any uncompleted phases or cells are physically stable and as described, that all the conditions of the permit are being complied with to protect the environment and human health. Incomplete cells may need to be further engineered to ensure long-term stability and profiled and capped to control water ingress and uncontrolled landfill gas

egress. The operator will need to detail how this is to be achieved in the closure report.

8.26. In some cases, operators may wish to close, or be required to close their sites before the waste has reached the final levels specified in the planning permission. In such circumstances the operator is advised to discuss the matter with the relevant Waste Planning Authority (WPA). Should the WPA decide that the site must be completed in accordance with the planning permission, it will be for them to agree with the operator how this is to be achieved in the first instance. However, this decision will doubtless involve discussions with us. Operators proposing to close sites under these circumstances are advised to discuss their intentions with us and the WPA at the earliest opportunity.

Management and monitoring

8.27. From April 2010, when waste disposal at a site ceases, we expect the landfill operator to apply to vary their permit. This will allow us to;

- review the closure report,
- vary the permit to remove unnecessary conditions (for example, those relating to waste acceptance),
- incorporate the aftercare plan,
- assign appropriate emission limit values
- assign appropriate monitoring requirements, and
- undertake the final site inspection.

If the operator does not apply to vary once waste disposal ceases, the site will continue to be considered 'operational' for the purpose of the annual subsistence charge.

8.28. The operator will need to confirm that any post-closure management and monitoring accords with the Directive, including Annex III. The operator will need to comply with them until such time as we accept surrender of the permit. Similarly where other monitoring is carried out or considered necessary, such as monitoring dust emissions to ensure there is no adverse effect on a European Site for nature conservation, the continuation of management and monitoring during and after closure must be continued.

8.29. The amount and design of monitoring required at sites must be based on an assessment of the risk the site poses to the local environment. One of the objectives of monitoring is to collect the information likely to be required to support an application to surrender the permit. Further guidance is available in our landfill technical guidance note (TGN), EPR, RGN 9 guidance on demonstrating land and groundwater are protected to assist surrender of an environmental permit and our guidance on 'the surrender of permits for the permanent deposit of waste on land'.

8.30. In the closure report the operator must detail the monitoring protocol for the site in accordance with Annex III of the Directive. It may be that such a protocol has already been agreed through the site's operational procedures, but this may need to be amended in accordance with the requirements of Annex III. For sites

where no monitoring protocol exists, one must be proposed as part of the closure report.

8.31. The closure report must include a procedure for inspection and maintenance and the operator's method for recording and reporting such inspections and maintenance during the aftercare period. The operator will need to maintain the infrastructure and inspect and report on the site to ensure that monitoring and abstraction points are not damaged or falling into disrepair. The efficiency of the landfill gas abstraction systems will need to be regularly checked (Annex III, suggests monthly during the operational phase and six-monthly during the aftercare period). Suggested rates of checking during the aftercare period may need to be increased for sites which continue to produce significant quantities of gas. Inspections should include the effectiveness of the cap where present. Our guidance on the management and monitoring of landfill gas must be followed.

Reporting significant environmental effects

8.32. Conditions will require significant environmental effects to be reported. For groundwater quality the compliance limits (trigger levels) to be reported in accordance with Annex III of the Directive will be used as the basis for reporting significant environmental effects. The Directive makes no reference to what constitutes a significant adverse environmental effect for landfill gas or leachate quality. It is suggested that best practice for identifying landfill gas migration (The Management of Landfill Gas) and leachate management be used to trigger action. The appropriate compliance limit will be included in the varied permit condition.

Assessment of reports

8.33. Table 1 summarises the information which the Operator must provide in support of their proposal to progress to definite closure and what action we will take in response.

Table 1

	Submission	**Details**	**Agency Action**
1.	Site Plan	Area of site for which closure is proposed to identify capped areas and monitoring infrastructure.	Consider on the basis of existing knowledge whether the area proposed is reasonable and what action will be required to apply requirements of the Directive, particularly with regard to capping and monitoring. To be confirmed by site inspection.
2.	Level Survey	Plan of site to identify final landform	Identify areas of the site where slopes are excessive and areas of uneven settlement (dips and hollows). Consider whether any remediation of slopes and uneven settlement is necessary. Where disputes over slopes ensue, require application of slope stability analysis.
3.	Monitoring	Current locations identified on site plan, including monitoring infrastructure and survey points.	Consider whether existing infrastructure is adequate in accordance with the Directive (summarised above). Require addition of monitoring infrastructure and survey points by permit variation.
		Monitoring protocols in place	Consider whether current protocols for monitoring are adequate with reference to Annex III and the above notes. Require additional details by permit variation.
		Aftercare inspection of site by operator	Consider whether protocols for inspecting the closed site are adequate and include capping, monitoring infrastructure, site security, gas and leachate management, and unauthorised deposits. Require additional information by permit variation.

4.	Reporting	Inspection, environmental and stability data	Consider whether protocols for reporting monitoring data, site survey data, maintenance issues are adequate. Require additional information by permit variation.
		Reporting Significant Effects	Consider whether appropriate trigger levels have been determined and assigned for groundwater, leachate and landfill gas in accordance with the Directive and best practice. Consider whether a mechanism for reporting exceedance of trigger levels is in place. Require additional reporting by permit variation.

Final site inspection

8.34. The objective of the final site inspection is to confirm that the information provided by the operator in the closure report adequately addresses all the issues required by the Directive and as a final check to confirm that all the permit conditions are being complied with. The Compliance Assessment Report (CAR) form and guidance should be used as a guide to final inspection, but the additional issues for the purposes of the Directive also need to be considered. The inspection should be undertaken by the person(s) with the most appropriate experience / knowledge of the site and issues to be addressed.

8.35. For the purposes of determining definite closure, restoration shall mean the installation of the cap, drainage layer and such soils as are required to protect the cap, that is, the pollution prevention structures. It need not include full restoration, planting and contouring as may be required by any planning permission.

8.36. Issues to be addressed by the final inspection for the purposes of the Directive will be as detailed above. In particular, we need to be satisfied about the following:

- that the area of the site for which closure is proposed is clearly identifiable on the site;
- the current location and quality of any monitoring and abstraction infrastructure (for landfill gas and leachate) associated with the proposed area to be closed;
- that the condition of the site surface is identified; and
- that monitoring and abstraction infrastructure are inspected and their location is correctly identified

8.37. If any doubt remains that the monitoring and abstraction infrastructure is inadequate, the operator must provide a justification for the current level of monitoring / abstraction against the requirements of our monitoring guidance and the Directive, or to install additional equipment.

8.38. While the level survey will provide an overview of conditions on the site, the inspection should identify dips and hollows on the site surface, particularly those in which there is or has been evidence of standing water (tide marks). It should also identify for example, slopes where there is evidence of slippage, or cracks along the tops of batters where failure may be commencing. Should uneven settlement or potential slope failures be identified, the operator must prepare a scheme for remediation prior to definite closure being agreed.

8.39. During the site inspection the monitoring and abstraction infrastructure (borehole headworks, pipework, sampling points, etc.) must be inspected to determine their current state of repair and that their location is as identified in the closure report. The operator must ensure that an adequate number of monitoring and abstraction boreholes are in place and in a suitable condition to comply with the requirements of Annex III.

8.40. Following the inspection, we will write to the operator identifying that the site is in a suitable condition for definite closure to apply, or to notify what further action is required before we can agree definite closure.

Aftercare

8.41. Once we notify the operator in writing that we approve the closure, the site will be definitely closed and will enter the aftercare phase.

8.42. The aftercare period will last until the permit is successfully surrendered. During the aftercare period the operator remains responsible for:

- maintenance, monitoring and control of the site for as long as we consider the site presents a hazard to the environment; and
- monitoring and analysing landfill gas and leachate from the site and groundwater in the vicinity of the site.

8.43. A variation will ensure:

- the monitoring is undertaken in accordance with Article 13 and Annex III to the Directive;
- the operator is responsible for notifying us of any adverse environmental effects revealed by the control procedures and that they take appropriate remedial measures as required or approved by us;
- the operator is responsible for monitoring stability of the waste mass; and
- the operator is responsible for ensuring that fly-tipping at the site is prevented.

8.44. The appropriate aftercare procedures will be in place when the operator has provided all appropriate maintenance, monitoring and control procedures as outlined above and, the permit conditions have been amended to include such measures.

8.45. The permit for the site will remain in force and can be varied or reviewed in the future.

Temporary Closure

8.46. An operator may decide to cease accepting waste at a site for an extended period, (also known as ‘moth-balling’). In order to benefit from a reduced subsistence charge during this period the site must be completed to the same standard as is required for definite closure (see paragraphs 8.18 – 8.31).

9. Existing landfills

9.1. The LFD Guidance (paragraph 3.217 *et seq.)* sets out the Directive requirements of Article 14 for existing landfill sites.

9.2. Existing landfills are regarded as those that were in operation or which had a Waste Management Licence (WML) or PPC permit that was granted before 16 July 2001. These sites were required to close as soon as possible in accordance with the requirements of the Directive, or make a PPC permit application for a landfill permit to continue to operate.

9.3. Sites that permanently stopped taking waste for disposal prior to 16 July 2001 are closed. The Directive does not apply to these sites and they will continue to be regulated according to the provisions of the Waste FD as 'waste operations'.

9.4. Landfills that were operational on 16 July 2001 or have been granted a landfill permit have to comply with the relevant requirements of the Directive.

Previously deposited wastes

9.5. Where there are existing deposits of waste within the landfill, there may be landfilled areas that do not have an engineered basal liner and / or leachate collection system. For these sites we accepted that for the purposes of permitting, a geological barrier and basal engineering (artificial sealing liner and leachate collection layers) could not be installed retrospectively below previously deposited waste. We may therefore have granted a permit providing groundwater was protected and the waste mass was stable. Existing landfills were required to meet all the requirements of the Directive (other than location) by 16 July 2009.

9.6. Deposits of waste into new cells or phases (where no permanent waste deposit has taken place) must meet the basal engineering requirements of the Directive (Annex I, paragraph 3).

Tipping over previously deposited wastes

9.7. The requirements of the Directive had to be met, 'as soon as possible' for existing sites and by 16 July 2009 at the latest. This means that after that date we cannot accept any proposals to reopen "closed" phases unless there is appropriate separation or the basal and side wall engineering meets the requirements of the Directive.

Leachate collection

9.8. Leachate collection systems may need to be constructed on top of existing waste deposits within the landfill. An example of this could be where a new phase involves landfilling on the slope of an older phase constructed to a lower standard.

9.9. Constructing any form of structure within the waste body is not considered to be best practice as it can cause practical problems for gas and leachate

management at a site, for example, the creation of perched leachate that may potentially increase lateral leakage through the sidewalls.

9.10. Any low permeability layer to collect leachate within the waste body is internal separation and not covered by the requirements of the Directive. The need for and specifications of any such layer within the waste body must be based on the site specific risk assessment.

9.11. A risk assessment must demonstrate that the placement of waste over previously deposited waste will not result in an unacceptable discharge from the existing or proposed wastes. The stability and integrity of any leachate collection system constructed above previously deposited waste will form an important consideration in the risk assessment. The leachate collection system must remain fit for purpose for as long as necessary, as identified by the risk assessment to ensure that leachate continues to flow into a LFD compliant basal area.

9.12. The implications for landfill gas management must be considered whenever there is a proposal to line above previously deposited waste. The management of risk to one media must not compromise the management of risk to another. Where the proposals would mean that gas can not be managed as required by paragraph 4 of Annex I of the Directive then the landfill permit should not be granted.

Unacceptable discharges from existing waste deposits

9.13. Where ‘closed’ areas of existing waste deposits form part of the installation, the onus will be on the operator to demonstrate that the overall impact of the installation on groundwater will be acceptable i.e. that;

- All necessary measures to prevent the input of hazardous substances to groundwater have been taken; and
- There is no pollution of groundwater by non-hazardous pollutants, including no deterioration in groundwater chemical status and no significant and sustained upward trends in pollutants)

See the Sections of the Regulations dealing with groundwater activities (EPR 2010 Schedule 21 Part 1 para 3) and Government guidance to us on the implementation of the Groundwater Directive.

9.14. If an application requires the discharge of pollutants from the site to controlled waters, then this would normally be included in the EP permit, dependent on the relationship of the discharge point to the site.

9.15. However, where a risk assessment indicates that existing areas of the installation are giving rise to an unacceptable discharge to groundwater it may still be possible to issue a landfill permit provided that the further deposits of waste would not:

1. cause or increase an unacceptable discharge from the existing landfill area; **nor**
2. of itself give rise to an unacceptable discharge; **nor**
3. hinder action that may be required to mitigate an unacceptable discharge from the existing landfill area.

9.16. The operator must demonstrate that these three criteria for further deposits are met through a fully quantified risk assessment. Where new waste is to be deposited on top of older areas of fill, the risk assessment must include the quantification of the impact of the release of leachate from the existing waste as a result of the placement of further waste above it.

9.17. Where there is separation between the existing landfill and a new landfill and the operator is responsible for both, he must propose actions so that the discharges from the old landfill comply with or get as close as possible to compliance with the Groundwater Directive by applying all technically feasible and proportionate measures. Where the operators of the existing and new landfills are different, each will be responsible for compliance with the Groundwater Directive by applying appropriate technically feasible and proportionate measures.

Closing existing landfills

9.18. The LFD Guidance describes that sites that can not be brought into line with the Directive must be closed as soon as possible.

9.19. The transitional arrangements for closing sites under the Landfill (England and Wales) Regulations 2002 (the ‘Landfill Regulations’) are no longer applicable. In future, closure notices will be issued in accordance with the Regulations, schedule 10, paragraph 10.

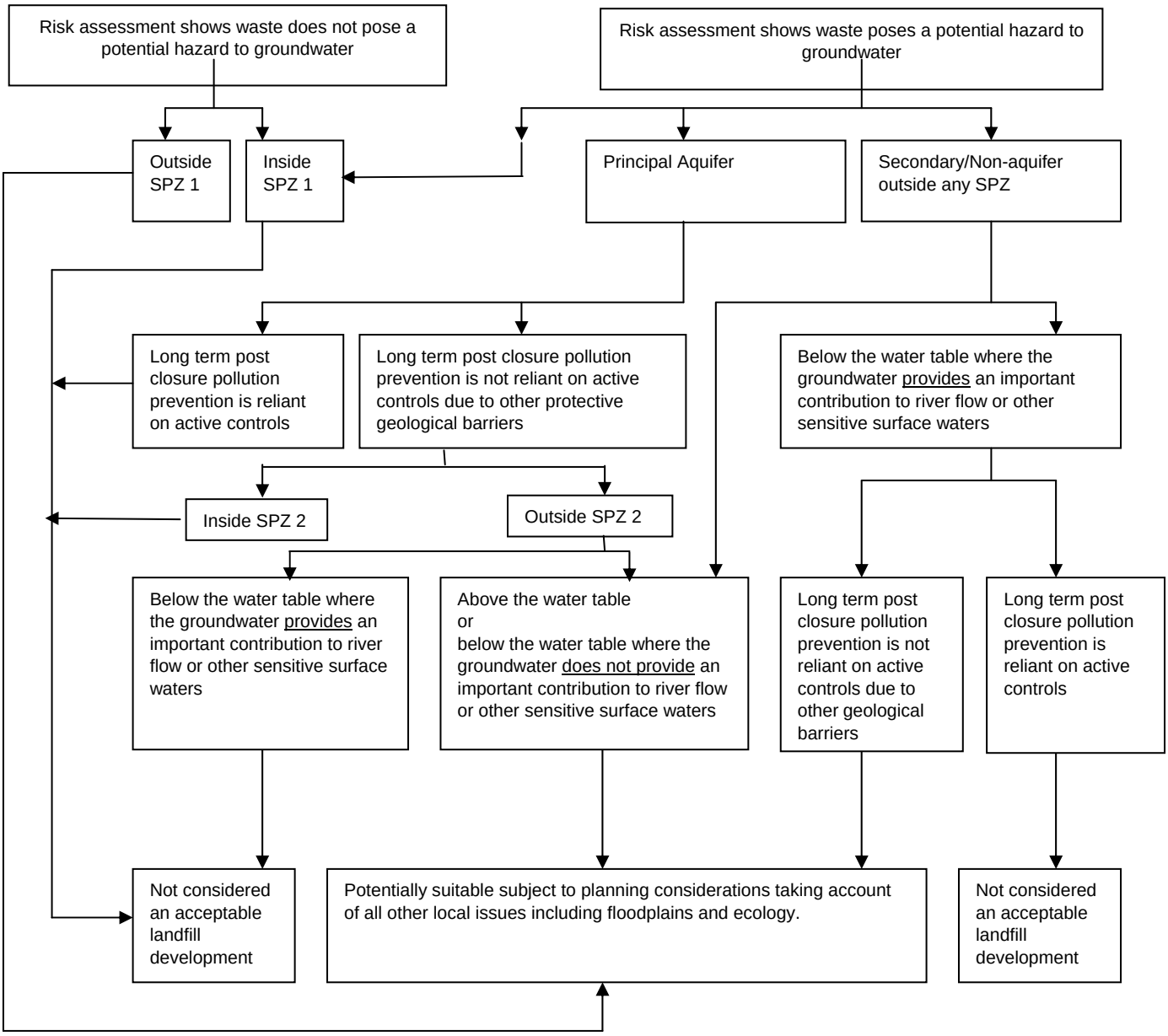
Re-opening closed landfills

9.20 Sites that closed before July 2001 and did not submit a conditioning plan can not accept waste for disposal because that right was removed by the Landfill Regulations. Sites that have closed since July 2001 will have been issued a closure notice to prevent the acceptance of waste after a specified date.

9.21 These sites have an environmental permit under the Regulations and may therefore apply to vary their permit to allow them to re-commence operations. Operator must apply for a new ‘activity’ to show that they are compliant with the Directive.

Schedule 1 - Landfill Location Flowchart

FLOWCHART SHOWING THE DECISION FRAMEWORK OF THE LOCATION AND IMPACT ASSESSMENT OF LANDFILL LOCATION POLICY[9]



[9] The flowchart must be read in conjunction with Section 6 of this guidance