Landspreading of industrial wastes.

Epandage des déchets industriels.

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Abstract

The legislative framework for waste management in the European Union together with the landfill tax, promote waste recovery by landspreading where this is environmentally acceptable. Landspreading can represent an economical and environmentally safe way to recover value from a variety of wastes such as farm slurries and manures, as well as a range of non-farm wastes such as sewage sludge and controlled industrial wastes. In the UK, The Waste Management Licensing Regulations (1994) exempt a number of wastes in the latter category for landspreading. This is in accordance with the principles of the 'Waste Framework Directive' 91/156/EEC amending 75/442/EEC. This legislation permits certain controlled industrial wastes to be spread on the land without a waste management licence although the Environment Agency (the UK regulatory authority) must be notified in advance of the proposed operation which must be carried out in a manner that is :

- *demonstrably beneficial to agriculture or provides ecological improvement;*
- *consistent with the principles of sustainable development; and*
- *protects human health and the environment.*

Much legislation and guidance already exists for the management on land of fertilisers, farm wastes and sewage sludge. WRc and ADAS have just completed for the UK Environment Agency, Department of the Environment, and Ministry of Agriculture, Fisheries and Food a guidance document which was intended to explain the criteria above in general and specific terms for the 13 categories of exempted wastes (Davis and Rudd 1998). This paper describes the principles of landspreading as a guide to regulators and operators to facilitate beneficial recycling of suitable wastes.

If landspreading of wastes is to be seen as acceptable recycling of secondary products as opposed to wastes, and is to be viable in the long-term as an economic outlet, then there needs to be investment in such aspects as quality control, treatment, storage and agricultural trials.

Keywords : Guidance, criteria, landspreading, industrial wastes

Résumé

Le cadre réglementaire de gestion des déchets dans l'Union Européenne, ainsi que la taxe sur les décharges, conduit au recyclage des déchets par épandage sur les terres. L'épandage présente en effet une approche économiquement rentable, sans risque pour l'environnement et une possibilité de valorisation d'un large panel de déchets tels que les lisiers et fumiers d'élevage, ainsi que des déchets non-agricoles tels que les boues de station d'épuration et des déchets industriels contrôlés.

Au Royaume-Uni, les réglementations autorisant la gestion des déchets (1994) excluent un certain nombre de déchets industriels de possibilité d'épandage.

Le centre de recherche sur l'eau (WRC) ainsi que le service de développement et conseil pour l'agriculture (ADAS) ont établi récemment à la demande de l'Agence pour l'Environnement, un guide qui explique les critères et les conditions spécifiques de 13 catégories de déchets.

Si l'épandage des déchets s'avère une approche acceptable de recyclage de produits dérivés et si cette approche apparaît viable sur le long terme, alors il faudra investir sur des aspects tels que le contrôle qualité, le traitement, le stockage ainsi que des essais en conditions de plein champ.

Mots-clés : recommandations, critères, épandages, déchets industriels.

1. Introduction

The 'Waste Framework Directive' 91/156/EEC included the principle of the waste hierarchy which ranked the different waste management options in order of preference as :

- reduction;
- re-use;
- recovery- recycling, composting and energy; and
- disposal.

The broad waste recovery category at the third level incorporates materials recycling, composting and recovery of energy from waste. This is to indicate that no one of these should automatically be preferred to any other, as this will depend on the Best Practicable Environmental Option (BPEO) for a particular waste stream.

Landspreading can represent an economical and environmentally safe way to recover value from a variety of wastes, such as farm slurries and manures, as well as a range of non-farm wastes, such as sewage sludge, food processing wastes, lime and gypsum.

Potential advantages of landspreading include :

- recovers waste which in the past might have been dumped at sea or landfilled;

- replaces chemical fertilisers - a potentially more sustainable approach than reliance on continuous supplies of nitrogenous fertilisers from energy-intensive processes, and phosphate fertiliser and peat soil conditioners from finite sources;
- improves soil structure; and
- economic advantage in terms of savings on more expensive alternatives for both waste producer and farmer.

This paper describes some of the guidance developed in the UK, on behalf of the Department of the Environment, Transport and the Regions, Environment Agency and Ministry of Agriculture, Fisheries and Food, to enable landspreading of industrial wastes within the requirements of the Directive 91/156/EEC. Full details of the guidance are to be published shortly.

2. Principles of waste recycling to land

Waste legislation in Europe is based on the Waste Framework Directive 75/442/EEC as amended by 91/156/EEC. Article 3 of this Directive encourages :
the prevention or minimisation of waste; and secondly :

- the recovery of waste by means of recycling, re-use or reclamation or any other process with a view to extracting secondary raw materials; and
- the use of waste as a source of energy.

Article 4 requires Member States to take the necessary measures to ensure that waste is recovered or disposed of without endangering human health and without using processes or methods which could harm the environment, and in particular:

- without risk to water, air, soil and plants and animals;
- without causing a nuisance through noise or odours; and
- without adversely affecting the countryside or places of special interest.

Article 4 concludes by requiring Member States to take the necessary measures to prohibit the abandonment, dumping or uncontrolled disposal of wastes.
The Waste Framework Directive therefore sets out the basic rules for waste recovery.

In Annex IIB, it lists recovery operations as they are carried out in practice. It repeats at this point that, in accordance with Article 4, waste must be recovered without endangering human health and without the use of processes or methods likely to harm the environment. This further emphasises the importance that the Directive gives to protection of human health and the environment. One of the operations which may lead to recovery listed in Annex IIB is number R10. This is, spreading on land resulting in benefit to agriculture or ecological improvement, including composting and other biological transformation processes, except in the case of waste excluded under Article 2 (1) (b) (iii) - animal carcasses and the following agricultural waste: faecal matter and other natural, non-dangerous substances used in farming. Benefit to agriculture and ecological improvement are

not defined any further but need practical explanation in order to enable satisfactory implementation and development of recovery by recycling to land of suitable wastes. These terms are central to the acceptability of landspreading of industrial wastes. Following on from the definitions, it should be possible to decide whether agricultural benefit or ecological improvement would be achieved by a proposed landspreading operation on the basis of the properties of the waste, the quantity to be applied, method of application and location, and overriding need to protect human health and the environment.

3. Agricultural benefit

Where do the benefits apply, and what are they?

This applies to agricultural and other land managed for profit which would normally receive applications of fertilisers and manures.

Agricultural benefit will be achieved when the application of a waste to land improves soil conditions for crop growth whilst ensuring the protection of environmental quality in the broadest sense.

The benefits can be measured in terms of :

- **Crop yield and quality.** The most important indicator of agricultural benefit to which the other benefits each make some contribution;
- **Soil chemical properties.** Benefits that the waste will bring to the soil in terms of addition of plant nutrients in particular, and improvements in soil pH value;
- **Soil physical properties.** Addition of organic matter; improvements in water holding capacity, porosity, stability, tilth, and workability. Addition of chemicals such as gypsum can also improve the workability of some soils;
- **Soil biological properties.** Addition of organic matter improves water retention and aeration, conditions for root growth and populations of worms and micro-organisms;
- **Soil water content.** Application of watery wastes can bring benefit when there is a soil moisture deficit limiting crop growth;
- **Land levelling.** The bulk application of waste to raise the level of the land can bring benefit by improving soil conditions for agricultural use. Simply raising the level of the land does not qualify, there has to be added benefit. Suitable waste for levelling would be waste soil or compost and dredgings from inland waters.
- These benefits must be achieved in compliance with Article 4 of the Waste Framework Directive 91/156/EEC. That is, without endangering human health and without using processes or methods which could harm the environment, and in particular:
  - without risk to water, air, soil and plants and animals;
  - without causing a nuisance through noise or odours; and
  - without adversely affecting the countryside or places of special interest.

4. Properties of wastes that can bring benefits

Content of nutrients
The major nutrients are nitrogen, phosphorus, potassium and magnesium, calcium and sulphur. Information should be sought on the total concentration of nutrients in the waste and also on how much of the total content is soluble and therefore likely to be available for crop uptake in the same year in which the waste is applied to the land. At least part of the content of these elements supplied in wastes should be available, or become available, for plant uptake within three years provided this does not introduce deficiencies in the meantime. The rate of application of the waste to the land should be determined on the basis of the nutrient content of the waste and the nutrient requirements of the crop as defined in agricultural advisory information. Nutrient requirements, and hence rates of application, vary according to the type of crop, type of fertiliser material, time of application, type of soil and soil index. The latter is an estimate of the current nutrient content of the soil based on previous cropping history (for nitrogen) and soil analysis. For some nutrients, such as phosphorus, no further addition may be needed or justified if the index shows that adequate reserves are already in the soil. For most of the exempted wastes there is little or no evidence from field experience or trials with which to optimise rates of application to the land to meet crop requirements for nutrients. Until this information is available, 'properly qualified advice' PQA should be sought to estimate suitable rates of application to the land of those wastes whose intended agricultural benefit is to contribute to crop requirements for nutrients.

Trace elements
Wastes may also provide the trace elements iron, manganese, copper, zinc, molybdenum, boron and chloride required by crops in small quantities.

Organic matter
This will generally improve soil conditions for plant root growth, increase moisture-holding capacity and stabilise light soils. Instability of structure can develop when soil organic matter falls below 3% so for these soils in particular, application of organic matter is likely to bring agricultural benefit. For soils with an organic matter content of more than 5%, benefit will be confined mainly to the nutrients in the added organic matter. **Applications of organic matter of 20 t. (D.M. basis) ha^{-1} y^{-1} or more will be needed to improve soil conditions**. Organic matter contains plant nutrients which will be of benefit to crop growth if they are released slowly into the soil as the organic matter stabilises. The plant nutrient content of organic wastes should be taken into account when estimating suitable rates of application to the land. Field trials are needed to test the availability of the nutrients in these wastes in order to justify the operational use of rates of application based on the organic matter content rather than the nutrient content of the wastes.

Lime potential
This application would make use of the lime potential of a waste to raise the pH value of acid soils to a level more beneficial for crop growth. This will be of benefit

only to acid soils with a lime requirement. The efficacy of a waste to satisfy the lime requirement of a soil is estimated on the basis of its neutralising value (NV). There may be occasional circumstances where an acidic waste, such as one rich in sulphur, could be used beneficially on the land to reduce soil pH value.

Chemistry that improves soil structure
For example, gypsum (calcium sulphate) application to heavy land will make the soil more workable. Calcium and other soluble sulphates can also be beneficial in the reclamation of saline and alkaline soils.

Soil forming properties
Soil forming properties for land levelling as described above. The only types of waste suitable for this purpose are likely to be waste soil or compost and dredgings from inland waters.

Irrigation
Use of watery wastes for irrigation. This will be of benefit only at times of the year when there is a soil moisture deficit.

5. Properties of wastes that can bring disbenefits

Content of nutrients
This can be a constraint because content of nutrients will often be the factor limiting quantities of waste that can be applied to the land. Rates of application need to be based on crop requirements as set out in fertiliser recommendations to obtain a beneficial crop response and protect water quality.

Content of potentially toxic contaminants
Various contaminants may occur according to the type of waste and the process which produced it. Those monitored in sewage sludge spread on the land are a starting point as to what to consider monitoring in other wastes and include: cadmium, copper, nickel, zinc, mercury, lead, chromium, arsenic, selenium, molybdenum and fluoride. All of these will accumulate in top soil so their concentration in soil will increase progressively following repeated applications of wastes that contain them. Guidance on this subject in terms of permissible limits and monitoring requirements are described in the ‘sewage sludge to land’ Directive 86/278/EEC. Using the information in the Directive and the known concentration of contaminant in the waste, a permissible maximum rate of application of the waste to land can be calculated based on contaminant content. This can then be compared with the maximum permissible rate of application based on the nutrient content of the waste. If contaminant content would be the principal limiting factor determining the rate of application of a waste to land then agricultural benefit would not be achieved.

Vigilance is needed also to be aware of other contaminants, including toxic organic compounds, which could be present in some wastes according to their origin. If

information is lacking and their presence in a waste is suspected then PQA should be sought before any decision is taken about landspreading.

Excessive acidity or alkalinity
A waste with a pH value of <5.0 should not be applied to the land. Alkaline wastes should only be applied to soils with a lime requirement.

Sodium content and conductivity
Although sodium enhances the growth of some crops excessive amounts can adversely affect soil structure and crop growth as can excess salinity from other soluble salts. These parameters should be measured in wastes and the findings checked against recommended limits.

Smell
Wastes with strong or offensive odours should either be treated by a stabilisation process, such as anaerobic digestion or composting, which will reduce their odour potential, or otherwise managed on the land so that odour emission is minimised. In practical terms this means that odorous wastes should be applied to the land by subsurface soil injection or incorporated (ploughed in) immediately after surface application.

Visual appearance including colour and litter content
This is likely to be a potential problem with septic tank waste, paper sludges and some food and other wastes which may contain strong dyes. Wastes such as septic tank sludge which may contain litter, including non-degradable plastics, should be screened to remove it before landspreading.

Microbiological quality; content of human, animal and plant pathogens
The UK Department of the Environment (DETR) Code of Good Practice for the Agricultural Use of Sewage Sludge (1996) provides guidance on how to prevent disease transmission when wastes potentially containing pathogens are used on the land. A dual barrier approach has been adopted based on treatment of sludge to reduce the numbers and infectivity of pathogens combined with land management practices to be followed according to whether or not the sludge has been treated. There has been no recorded incident of disease transmission where these precautions have been followed. Untreated sludges have to be applied to the land by subsurface soil injection or otherwise worked into the soil so as not to cause nuisance. It should be noted that for these purposes septic tank sludge is untreated sludge and must therefore be injected or ploughed into the soil and must not be applied to the surface of grassland.

Operators need to be fully advised of the nature of wastes they are handling, made aware of precautions they should be taking, and equipped with the necessary protective clothing and facilities.

Diseased plant waste should not be spread on agricultural land.

Texture and handleability
Operational problems may arise from, for instance, wastes which are dusty or gelatinous or oily and greasy in texture. Dust may be hazardous to operators or cause nuisance when the waste is spread on the land. Gelatinous or greasy wastes may block spreading equipment and remain as an unsightly residue on the surface of the soil or cause anaerobicity in the soil if excessive amounts are ploughed in. Smothering of grass which has received surface applications may occur and can cause die-back due to light exclusion.

High carbon/ nitrogen ratio
High carbon/nitrogen ratio. This is a problem likely to be associated with organic wastes from wood, paper or sugar production. The cells of soil bacteria have a C/N ratio of about 10/1. Nitrogen is the limiting factor to degradation by bacteria in the soil of wastes with a C/N of >10/1. As they degrade such wastes, the bacteria will draw on soil reserves of nitrogen which could otherwise be used by crop plants. In reality, this problem is unlikely to occur until the C/N ratio of the waste exceeds at least 20/1. Application of such wastes can immobilise soil nitrogen supplies thereby inducing nitrogen deficiency and reduced yields of crops. The C/N ratio of the waste can be adjusted to make it more favourable for landspreading by composting it or adding a source of nitrogen.

Biological oxygen demand (BOD)
Organic wastes are very likely to have a high BOD, often at the level of 1000 mg l^{-1}. Such wastes will be highly polluting if they contaminate water and care must be taken to prevent runoff or spillage into surface water in particular. Operational experience with sewage sludge has shown that soils can satisfactorily stabilise wastes high in BOD but there is some risk of anaerobicity if rates of application are excessive.

6. Management factors that influence agricultural benefit and disbenefit

Management can make all the difference between a successful and disastrous landspreading operation. Consequently, consideration should be given to authorising operators for landspreading, on the basis of suitable qualifications and experience, as an alternative to exempting individual operations. Management factors are discussed in more detail in Section 9 on best practice. Some factors to consider are:

Risk assessment
The need to do a risk assessment for the proposed operation. This should take the form of three phases:
1. Is the waste of a generic type capable of providing agricultural benefit or ecological improvement?

2. Bearing in mind the type of waste, what further information should be provided concerning chemical analysis etc. of the actual sample of waste to be spread on land in the proposed operation? In the light of this information, is the operation still permissible?
3. On the basis of inspection of the proposed landspreading site, what special precautions are required to ensure compliance with Article 4 of the Waste Framework Directive 91/156/EEC concerning protection of human health and the environment?
4.

Land use and management

This must be taken into account for determining rates of application of wastes to the land on the basis of fertiliser recommendations and, for wastes containing pathogens, actions to prevent disease transmission (UK DETR Code of Practice for the Agricultural Use of Sludge, 1996).

Topography of the site

This would include type of soil, drainage, slope, occurrence of ditches and watercourses, and access for vehicles. This information is needed to protect water quality. It is also necessary for planning to avoid damage and nuisance from vehicles to be used in the operation.

Time, method and rate of application

This needs to be considered to protect surface and groundwater quality and to avoid odour nuisance and pathogen transmission (UK DETR Code 1996). There will be times in the winter when waste cannot be spread due to the unacceptable risk of soil damage or leaching/runoff of nutrients. Farmers have had to install storage facilities for their slurry and other liquid wastes to avoid the need for landspreading at inappropriate times of the year; waste producers using the landspreading option should be prepared to do likewise. Failure to do so may lead to the operation being regarded as disposal.

Quality and consistency of waste product

Agricultural benefit depends largely on suitable rates of application of waste calculated to deliver to the land the right amount of plant nutrients or other beneficial components to meet crop and soil requirements. This can only be done if the waste in question is of consistent quality particularly in terms of its properties which may influence agricultural benefit or disbenefit. The onus should be on the waste producer to demonstrate by statistically based sampling and analysis that the waste product for landspreading will be of suitable quality to achieve the agricultural benefit for which it is intended.

Notification, consultation, monitoring and record keeping

The waste producer or spreader should notify the environmental protection authority of proposed landspreading operations and provide the information necessary for the authority to decide whether or not the proposed operation will achieve agricultural benefit or ecological improvement. The authority can then decide whether or not to authorise the operation. PQA should be considered to assist with deciding on suitable rates of application of waste and other operational

matters. Appropriate monitoring and analysis of waste product (to check its quality) and soil from the receiving farmland will be needed. Records should be kept of the farm location and details of the waste type, quality and rate of application.

7. Ecological improvement

Where is it achieved?
Demonstrating potential for ecological improvement where wastes are to be spread on the land is very much associated with identifying those managed environments (beyond designated agricultural land) which will benefit from inputs of nutrients, organic matter or other beneficial component of the waste. Also central to identifying sites where landspreading of wastes could bring ecological improvement is Article 4 of the Waste Framework Directive 91/156/EEC with its concern for the protection of human health and the environment, and in particular the requirement that waste is to be recovered 'without adversely affecting the countryside or places of special interest'.

Ecological improvement is associated with the maintenance of habitats and their biodiversity where these would otherwise deteriorate, the provision of new habitats for wildlife and the development or restoration of existing habitats to give greater biodiversity and sustainability.

In terrestrial ecosystems, species-rich habitats of high ecological value tend to have a finely balanced nutrient budget on which their biodiversity depends. Examples of habitats of high ecological and nature conservation value include chalk grassland, flower-rich meadows and mixed woodland, but this is not an exclusive list. The addition of nutrients, organic matter and other constituents in applications of waste, albeit of benefit for agriculture, would upset this fragile balance and lead to reduced biodiversity and loss of ecological value.

Whilst agricultural benefit from landspreading of wastes can readily be demonstrated there will be comparatively few instances where landspreading of wastes can be justified on the basis of ecological improvement. In this sense at least, agricultural benefit is more important than ecological improvement as a justification for landspreading of wastes.

Ecological improvement in the context of landspreading is confined to managed environments associated with planned soil improvement. These will be sites where the application of fertiliser/soil conditioner is considered essential for the planned land use which would not be possible without it. For example, restoration of soil of poor structure and nutrient status on land destined for agricultural or amenity use, and on derelict land resulting from human activities, e.g. mining and mineral exploitation, for the purpose of landscaping, amenity development or agriculture. In these cases landspreading can meet the criterion of ecological improvement by providing new habitats or improving the status of existing ones. However, each case must be taken on its merits as, for example, some derelict land is of nature

conservation value due to the specialised habitats that can be found in such sites and thus would not benefit from improvement.

Landspreading in commercial forest land managed for timber production can also be acceptable and associated with a combination of benefit to timber production, from increased tree growth, and ecological improvement of the biomass and species diversity of the ground cover. Soils under coniferous forest are often of low nutrient status which limits tree growth unless fertiliser can be applied with phosphate being particularly beneficial. Utilisation of sewage sludge on forest land is well -established and the experience gained provides a basis for using other wastes for this purpose. Guidance is given in 'A manual of good practice for the use of sewage sludge in forestry' (UK Forestry Commission Bulletin 107, 1992). Landspreading of wastes would not be acceptable in many areas of forest and woodland because of the sensitive ecosystem, recreational value and public access. Proposals would need to be considered on a site-by-site basis.

It has been widely demonstrated that the reclamation or improvement of land is greatly improved by the addition of bulky organic manures and wastes (e.g. Wolstenholme and Hall 1996). Soils on such sites are often very deficient in organic matter and nutrients, and the use of wastes can achieve ecological benefit through improving soil conditions, enhancing plant establishment and generally providing long-term mitigation of the environmental impacts of derelict land sites, at reasonable cost. To achieve these benefits, the wastes may need to be applied at higher rates than for agricultural soils, and this may for instance result in soil concentrations of contaminants in excess of the limit values for agricultural soils.

PQA may be necessary to decide on whether the balance of such potential benefits and disbenefits of waste use constitutes ecological improvement on a site-by-site basis. Consideration would have to be given to other remediation options or the lack of them, and the continuing or likely adverse environmental, health or visual impacts if no remediation was carried out.

8. Deciding on whether a proposed landspreading operation will achieve agricultural benefit or ecological improvement.

This section discusses the basis for a sound but practical and straightforward factsheet for the purpose of deciding whether or not a proposed waste landspreading operation will achieve agricultural benefit or ecological improvement. It should be the responsibility of the waste producer to supply the necessary information for the factsheet and to ensure that it is correct, and this responsibility should remain with the waste producer even if a contractor is used to supply the information. The regulator (the Agency) would use the completed factsheet to decide whether the proposed operation will achieve agricultural benefit or ecological improvement (see also Appendices A and B).

The questions to be completed in providing the necessary information for the factsheet are set out below together with guidance notes of explanation.

Type of waste from those listed as being potentially suitable for landspreading. In the UK these are :
Waste soil or compost.
Waste wood, bark or other plant matter.
Waste food, drink or materials used in or resulting from the preparation of food or drink.
Blood and gut contents from abattoirs.
Waste lime.
Lime sludge from cement manufacture or gas processing.
Waste gypsum.
Paper waste sludge, waste paper and de-inked paper pulp.
Dredgings from any inland waters.
Textile waste.
Septic tank sludge.
Sludge from biological treatment plants.
Waste hair and effluent treatment sludge from a tannery

Benefits intended from its application to land
One or more of the following should be confirmed.
Crop yield and quality
(*To demonstrate agricultural benefit a **yes** reply will almost always be required here*)
Soil chemical properties
Soil physical properties
Soil biological properties
Soil water content
Land levelling

The properties of waste associated with benefit
These should be listed according to the benefit the landspreading operation is intended to bring. Section 8 and Appendix D will indicate to the Regulator which parameters to insist on for particular types of waste. Usually, only some of the parameters will be needed.
Analytical results are to be supplied as required for the determinands listed.
Crop yield and quality - concentrations (dry matter basis) of plant nutrients in the waste: N, P, K, Mg, Ca, S and trace elements to be specified.
Soil chemical properties - dry solids content and neutralising value (NV) of the waste
Soil physical properties -organic matter and calcium sulphate content of the waste
Soil biological properties - organic matter content of the waste
Soil water content- water, conductivity and soluble salt content of the waste
Land levelling- stability of the waste
(*Likely to be confined to waste soil and compost, and dredgings from inland waters)*

Quality - is the waste of consistent quality? If so, how was this checked and how frequently?
(*Consistent quality of product is needed to achieve agricultural benefit or ecological improvement. The statistical basis for the stated waste quality should be described*)

The properties of waste associated with disbenefit

Details of only some of these determinands will be required for each waste according to the guidance in Section 8.

Contaminants - concentrations (mg kg^{-1} ds basis) in the waste of potentially toxic elements and persistent organic compounds where the origin of the waste indicates their possible presence.

See Section 8, Appendix D and the DoE Code of Practice for the Agricultural Use of Sewage Sludge (1996) for details of contaminants that should be determined for particular wastes)

pH value of the waste.

Conductivity and content of sodium and soluble salts.

C/N ratio of the waste, ds basis

BOD

Oil and fat content

Microbiological quality

(*Does the waste contain human, animal or plant pathogens. If so, which and in what numbers?*)

Odour potential

(*Is the waste smelly or not?*)

Litter content

(*Has the waste been screened to remove litter or not?*)

Site factors

The final source of information needed to make the assessment of whether or not agricultural benefit or ecological improvement will result from the proposed landspreading of waste operation.

Location of site

Landowner agreement

(*Obtained or not?)*

Does it include, or is it part of, a designated site (biological or heritage)? *(If it does, landspreading will probably not achieve ecological improvement and not be acceptable)*

If so, what is the designation?

Specify existing land use

(*Agriculture (arable or grassland), reclamation etc.)*

List details of soil texture, soil nutrient indices, pH value and lime requirement

Proposed rate of application and how this is expected to achieve agricultural benefit or ecological improvement

Typically, this will have been derived for the crop to be grown according to fertiliser recommendations and soil conditioning benefit, taking account of the need to protect water quality.

Has PQA been given, if so supply details including name and address of adviser?
Time and method of application
Will the operation adversely affect the countryside or places of special interest by damage to visual quality or amenity and landscape value?
Construction or widening of roads, destruction of walls or hedges or trees and destruction and widening of gateways may adversely affect the countryside)
Arrangements for storage of waste
What monitoring of the operation is to be done?
What is the principal factor limiting the rate of application of waste to the land? (*If this is content of contaminants or other negative factor, then agricultural benefit or ecological improvement will not be achieved.)*
What additional steps will be taken to ensure that agricultural benefit or ecological improvement will be obtained without endangering human health and without using processes or methods which could harm the environment, and in particular:
- without risk to water, air, soil and plants and animals;
- without causing a nuisance through noise or odours;
- without adversely affecting the countryside or places of special interest?
A reminder to the waste producer of statutory obligations)

9. Conclusions

The 'Waste Framework Directive' 91/156/EEC requires that waste recycling to land must achieve agricultural benefit or ecological improvement. These terms have now been defined to provide the basis for guidance to facilitate the recycling to land of suitable industrial waste materials.

10. References

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