



Meath Local Authorities



Protocol for the Use of Biosolids in Agriculture in County Meath



Foreword

The Urban Waste Water Treatment Directive (UWWTD) states that "Sludge arising from waste water treatment shall be re-used whenever appropriate. Disposal routes shall minimise the adverse effects on the environment." The safe reuse of sewage sludges in agriculture represents the most environmentally sustainable method of dealing with the sludge we generate as a society today.

The European Union and the Department of Environment, Heritage & Local Government have provided a legislative framework for ensuring that the practice of reusing sewage sludges in agriculture is done in such a way as to prevent harmful effects on soil, vegetation, animals and man.

The aim of this protocol is to provide a clear and concise guide to all wastewater treatment plant operators, sludge handling contractors, consultants and landowners of the standards considered appropriate by Meath Local Authorities. The protocol aims to clarify that only 'treated sludges' may be applied to agricultural lands in County Meath. The protocol outlines the lands it can be spread on and explains the procedure of application for permission to landspread this material in the county.

The overall objective is to ensure compliance with the legislative requirements and Codes of Practice already in existence for the use of sewage sludge. The Protocol also outlines the controls in place to give a confidence to landowners in the use sewage sludge on their lands.

Meath Local Authorities commit to ensuring that best practice is carried out in this regard across our key functional areas and will continue to make Meath a green place to live, work and visit.



*Tom Dowling
County Manager*

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Cathaoirleach*

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1. Introduction

The organic by-product of wastewater treatment is commonly known as sewage sludge. Sewage sludge is the residue collected after treatment of the contents of urban drainage systems. The bulk of its content derives mainly from human wastes, but there are significant contributions from discharges to sewer of industrial effluents and animal or vegetable processing wastes as well as from run-off of storm water from roads and other paved areas. In addition to organic waste material sludge therefore contains traces of many of the contaminating substances used in our modern society. Some of these substances can be phytotoxic and some toxic to humans or animals at certain concentrations in the soil or in food. Where sludge is used in agriculture, it is therefore necessary to monitor and control the concentrations in the soil of these potentially toxic elements and their rate of application to the soil, so as to preserve the yield of crops and to ensure that animal or human health is not put at risk through the food chain.

Sludge is however, rich in nutrients such as nitrogen and phosphorous and contains valuable organic matter that is useful when soils are depleted or subject to erosion. The organic matter and nutrients are the two main elements that make the spreading of this kind of waste on land as a fertiliser or an organic soil improver suitable. This sludge, when used in agriculture, is generally referred to as biosolids.

Biosolids in agriculture shall be only be used in accordance with the following legislation:

- *Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 & 2001*
- *EC (Good Agricultural Practice for the Protection of Waters) Regulations, 2010*

And should follow the guidance set out in:

- *Code of Good Practice for the Use of Biosolids in Agriculture: Guidelines for Local Authorities and Wastewater Treatment Plant Operators (DoELG, 1999)*
- *Code of Good Practice for the Use of Biosolids in Agriculture: Guidelines for Farmers (DoELG, 1999)*

The increased numbers of Wastewater treatment plants in recent years contributes to a reduction in water pollution from municipal wastewater. However as a consequence it is important that the sludge generated does not contribute to another form of pollution. Meath County Council wish to ensure that the best scientific data available is used to ensure the use of biosolids is compatible with good agricultural practice, and does not pose a threat to human, animal or plant

life, but maintains the integrity of the soil ecosystem and avoids air and water pollution, and minimizes public inconvenience. Other matters to be taken into account are local road conditions, prevailing weather and soil type so that public nuisance from smell or heavy traffic is minimised and there is no risk of damage to soil structure by untimely application or use of unsuitable spreading equipment.

This protocol document has been prepared by Meath County Council to inform wastewater treatment plant operators, contractors and landowners alike of the proper use of Biosolids in agriculture within the Council's functional area. The protocol relies on the *Code of Good Practice for the Use of Biosolids in Agriculture* together with European and National legislation associated with the use of sewage sludge and the experience / knowledge of the Meath County Council staff relating to its functional area.

In the event of any new legislation arising with a direct relevance to sewage sludge management, the said legislation, once enacted, shall take precedence over the requirements of this protocol in relation to a control of an element of protocol that may have been modified.

The implementation date for this protocol is 31st March, 2011.

2. Treatment

Sewage Sludge contains pathogenic bacteria, viruses and protozoa together with other parasites which could create a potential hazard to the health of humans, animals and plants. Amongst organisms of most concern to be found in sludge are salmonellae, the eggs of the beef tapeworm *Taenia saginata*, potato cyst nematodes and a range of viruses. The numbers of pathogenic organisms in sludge can be substantially reduced before application to the land by appropriate sludge treatment processes (see Sludge Treatment below) and the potential health hazard is further reduced by the effects of the weather and soil micro-organisms after the sludge is applied to the soil.

Sewage sludge, before being used in agriculture in County Meath, must be subjected to biological, chemical or heat treatment. Treated sludges are considered to be those which have received one or more of the treatment processes listed below. In this context the contents of septic tanks and sludges from secondary biological treatment such as humus sludge, surplus activated sludge and residual sludge from extended aeration plants, cannot be considered to be biologically treated.

Only treated sewage sludges (hereafter called 'biosolids') may be used in agriculture in County Meath.

Recommended treatment processes for biosolids production

Process	Descriptions
Mesophilic Anaerobic Digestion with pre- or post-pasteurisation	<p>Mean retention period of at least 12 days primary digestion in temperature range $35^{\circ}\text{C} \pm 3^{\circ}\text{C}$ or of at least 20 days primary digestion in temperature $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$</p> <p>Pasteurisation phase must achieve a retention period of at least 1 hour at a temperature $\geq 70^{\circ}\text{C}$ or 2 hours at a temperature $\geq 55^{\circ}\text{C}$.</p>
Thermophilic Anaerobic Digestion	<p>Mean retention period of at least 48 – 72 hours in temperature range $50 - 55^{\circ}\text{C}$. Must include a retention period of at least 1 hour at a temperature greater than 70°C followed by a minimum retention period of at least 2 hours at a temperature $\geq 55^{\circ}\text{C}$ or of at least 4 hours at a temperature $\geq 50^{\circ}\text{C}$</p>
Thermophilic Aerobic Digestion	<p>Mean retention period of at least 7 days. All sludge to be subject to a temperature $\geq 55^{\circ}\text{C}$ for at least 4 hours. Must achieve a reduction in volatile solids of $\geq 38\%$.</p>
<p>Composting</p> <p>1. Windrows</p> <p>2. Static pile or in-vessel</p>	<p>To be held at 55°C for at least 15 days during which time, a temperature of $\geq 55^{\circ}\text{C}$ must be maintained over 5 turnings of the windrow</p> <p>A temperature of $\geq 55^{\circ}\text{C}$ must be achieved and maintained uniformly for at least 3 days</p>
Alkaline Stabilisation	<p>1. Addition of lime to raise pH to greater than 12.0 and an accompanying rise in temperature to 70°C for 30 minutes</p> <p>2. Addition of lime to raise pH to greater than 12.0 and to maintain the pH above 12 for 72 hours and to achieve a temperature $\geq 52^{\circ}\text{C}$ for at least 12 hours. At the end of the 72 hour period, air dry to a dry solid content of $\geq 50\%$</p>
Thermal drying	<p>Drying by direct or indirect contact with hot gases. Moisture content of the dried Biosolid to be $\leq 10\%$. Either the temperature of the Biosolid $> 80^{\circ}\text{C}$ or the wet bulb temperature of the gas in contact with the Biosolids as the Biosolids leaves the drier is $> 80^{\circ}\text{C}$.</p>

This protocol shall be agreed in writing and signed-off by all producers, contractors and landowners on whose land it is proposed to spread biosolids.

3. Landbank/Site Suitability

The suitability of a land bank should be assessed for biosolids application. The programme of evaluation shall include soil type, soil quality, soil heavy metals, soil nutrient status, local topography and the status of groundwater. Guidance on choosing spread lands can be found in the following publications:

- *Land spreading of Organic Waste – Guidance on Groundwater Vulnerability Assessment of Land* (EPA, 2004)
- *BATNEEC Guidance Note for the Pig Production Sector* (EPA, 1998)
- *Groundwater Protection Schemes* (GSI, 1999)

In general there should be no land spreading of Biosolids over:

1. Groundwaters identified by the Geological Survey of Ireland (GSI) as Extremely Vulnerable unless soil cover is proven to be >2m for Regionally Important Aquifers and >1m for other aquifer classes.
2. Lands included in Inner Source Protection Areas.
3. Lands included in Outer Source Protection Areas where the vulnerability rating is Extreme and subject to conditions where other vulnerability ratings apply.
4. Areas with rock outcrops and/or a shallow depth to bedrock.
5. Gravel or cracked soil overlying pipe or mole drains.
6. Surface gradient of greater than 11% adjacent to a watercourse and/or well.
7. Areas prone to flooding.

4. Nutrient Management Plans

Biosolids shall only be used in agriculture in accordance with a Nutrient Management Plan (NMP) as per the *Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 & 2001*.

The NMP for lands proposed to receive biosolids must be approved by Meath County Council prior to any biosolids being applied. A NMP is required for each and every spreading year.

The NMP shall follow the guidance for crop nutrient requirements contained in *EC (Good Agricultural Practice for the Protection of Waters) Regulations, 2010*, and must include all nutrients spread on the farm. The NMP shall include the following information:

1. Landowner's name, address, contact telephone number (land bank address if different) plus signed declaration.

2. Name , address and contact telephone number of person leasing land (if applicable)
3. Map of land bank at 1:50000 scale.
4. Map of land bank at no greater than 1:2500 scale indicating the location of land spreading areas and field codes, all sensitive features including dwelling houses and sensitive buildings, roads, watercourses, rock outcrops, sources of water supplies on and in the vicinity of the land and the buffer zones required.
5. Total area and total usable area of the land bank and of each plot within the land bank.
6. Soil analysis as specified in Table 1 accompanied by certificates of analysis for all samples referencing the location of the plot that the sample(s) was taken from. Please note that notwithstanding Table 1 (soil sampling requirements) the acceptance of P availability < 100% is conditional on the sampling and testing for soil available P for each year of application.
7. Biosolids analysis as specified in Table 3 accompanied by certificates of analysis.
8. Crop type and current crop cycle.
9. Current P and N soil indices and target P and N soil indices.
10. P and N requirements of the crop.
11. Quantity, type and treatment status of biosolids to be used.
12. Number and type of livestock units.
13. On-farm nutrients and details of available land bank.
14. Other nutrient/fertiliser requirements and quantities.

The soil sampling and analysis included in the NMP shall meet the following requirements, set out in Part III of the *Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 & 2001*:

1. Soil samples shall be representative of the soil on the site and shall be made up by mixing together twenty five core samples taken over each area of 5ha or less used for the same agricultural purpose.
2. Samples shall be taken to a depth of 25cm or the depth of the surface soil if less, provided that such lesser sampling depth is at least 10cm.
3. Soils shall be analysed at a minimum frequency of once every 2 years with the exception of heavy metals which shall be analysed once every 5 years as specified in Table 1.

All analysis shall be performed by an INAB accredited laboratory or a laboratory approved under the EPA Intercalibration Programme. A Certificate of Analysis from the laboratory must accompany all soil sample results submitted and must include:

1. The farmers name and landbank address.
2. The date and time that the sample was taken.

3. The person that took the sample.
4. A description of the sample.
5. The location that the sample was taken from (as per field codes and including the location of all composite cores).
6. The date that the sample was analysed.

Table 1 Soil Sampling Requirements

Parameter	Units	Minimum Frequency of Analysis*
Organic Matter	TOC as % dry solids	Every 2 years
pH		Every 2 years
Clay Content	% of dry solids	Every 2 years
Total Phosphorous	% of dry solids	Every 2 years
Total Nitrogen	% of dry solids	Every 2 years
Total Potassium	% of dry solids	Every 2 years
Cadmium	mg/kg dry solids	Every 5 years
Chromium	mg/kg dry solids	Every 5 years
Copper	mg/kg dry solids	Every 5 years
Lead	mg/kg dry solids	Every 5 years
Mercury	mg/kg dry solids	Every 5 years
Nickel	mg/kg dry solids	Every 5 years
Zinc	mg/kg dry solids	Every 5 years

* Meath County Council may alter the frequency of analysis where deemed necessary.

Biosolids may not be used on soils where the following soil heavy metal values are exceeded:

Table 2 Maximum Values for Concentrations of Heavy Metals in Soil

Parameter	Maximum Value*	Units
Cadmium	1	Mg/kg of dry matter in a representative sample of soil with a pH of 5 to 7
Copper	50	
Lead	50	
Mercury	1	
Nickel	30	
Zinc	150	

* Where the pH of the soil is consistently higher than 7, the values set may be exceeded by not more than 50%, provided that there is no resulting hazard to human health, the environment, or in particular, groundwater.

Samples of biosolids for analysis shall be representative of the final product and shall be taken before delivery to the end user. Biosolids shall be analysed at least once every month for bacteriological parameters and at least once every 6 months for chemical parameters as specified in Table 3.

Table 3 Biosolids Sampling Requirements

Parameter	Units	Minimum Frequency of Analysis*
Faecal coliforms	MPN/g dry solids	Every 2 months
Salmonella sp.	MPN/g dry solids	Every 2 months
Dry Solids	%	Every 6 months
Organic Matter	TOC as % of dry solids	Every 6 months
pH		Every 6 months
Total Nitrogen	% of dry solids	Every 6 months
Ammonium-nitrogen	% of dry solids	Every 6 months
Total Phosphorous	% of dry solids	Every 6 months
Total Potassium	% of dry solids	Every 6 months
Cadmium	mg/kg dry solids	Every 6 months
Chromium	mg/kg dry solids	Every 6 months
Copper	mg/kg dry solids	Every 6 months
Lead	mg/kg dry solids	Every 6 months
Mercury	mg/kg dry solids	Every 6 months
Nickel	mg/kg dry solids	Every 6 months
Zinc	mg/kg dry solids	Every 6 months
Polychlorinated biphenyls (PCB)	mg/kg dry solids	Every 12 months
Polychlorinated dibenzodioxins /dibenzofurans (PCDD/F)	ng TEG/kg dry solids	Every 12 months
Polyaromatic Hydrocarbons (PAH)	mg/kg dry solids	Every 12 months
Nonylphenol	mg/kg dry solids	Every 12 months

* Meath County Council may alter the frequency of analysis where deemed necessary.

Bacteriological analysis results for biosolids to be spread must be submitted to Meath County Council before spreading.

All analysis shall be carried out by an INAB accredited laboratory or a laboratory approved under the EPA Intercalibration Programme. The Certificate of Analysis from the laboratory must include the following additional information:

1. The date and time that the sample was taken.
2. The person that took the sample.
3. A description of the sample (including type of treatment).
4. The location that the sample was taken from.
5. The date that the sample was analysed.

Biosolids sample results may be submitted in spreadsheet format, however in this case, results must be fully audited and original Certificates of Analysis should be retained for inspection when required.

Phosphorous availability in Biosolids applied to agricultural land

In accordance with Article 15(4) of the *EC (Good Agricultural Practice for the Protection of Waters) Regulations, 2010* Meath County Council may determine, or agree to the determination of, the amount of phosphorous (P) available to a crop from biosolids. An application may be made to Meath County Council to make such a determination.

An application to use a P availability figure of <100% shall be accompanied by a report giving a detailed description of the treatment process applied to the biosolids. This report must be signed-off by the local authority or its agent responsible for the production of the biosolids.

5. Biosolids Quality Assurance

The producer of biosolids for use in County Meath shall provide a Certificate of Analysis of the biosolids quality to Meath County Council. This Certificate shall provide information on the following:

- Date on which samples were taken
- Origin of the wastewater treatment plant from which the biosolids was produced
- Treatment process used to achieve the Biosolids product
- Presence of faecal coliforms and *Salmonella* sp.
- Nutrient status of the biosolids
- Concentration of heavy metals in the biosolids
- Concentration of organic micropollutants in the biosolids

6. Notification

Prior to spreading of biosolids in County Meath, NMPs for all proposed landbanks shall be submitted to Meath County Council's Environment Section for approval as per *Section 3 Nutrient Management Plans* (see above). Once plans have been approved by the Council the following further notification must be given:

1. **Notification of Transportation and/or Intention to Spread Biosolids:**

Notification by email/fax/post to the Environment Section of Meath County Council of transportation and/or intention to spread biosolids shall be provided on a weekly basis and at least 3 days prior to date of delivery. This shall include:

- a. Farmer's name, address and contact telephone number.
- b. Location of the land bank or storage facility.
- c. Date to be hauled and date to be spread.
- d. Field ID number.
- e. Spreader/Contractor details.
- f. Quantity of sewage biosolids to be delivered.
- g. Type of sewage biosolids and the type of treatment it has received (Quality Assurance Certificate to be included).

2. **Confirmation of Biosolids Application:**

Within one week after spreading the biosolids, confirmation shall be sent by email/fax/post to the Environment Section of Meath County Council confirming that the spreading took place. This shall include:

- a. Farmer's name, address and contact telephone number.
- b. Location of the land bank.
- c. Date hauled and date spread and permit number.
- d. Field ID number.
- e. Spreader/Contractor details.
- f. Delivery docket details (including receipt of acceptance and transporter details).
- g. Quantity of biosolids delivered.
- h. Type of biosolids and the treatment it has received.

Correspondence by email shall be sent to the following address:
biosolids@meathcoco.ie

Meath County Council may request further information from the producer and/or user of biosolids at any time.

Meath County Council advises contractors involved in the spreading of biosolids, to notify immediate neighbours of their intention to spread biosolids.

7. Land spreading of Biosolids

The following notification, regulations and codes of practice should be followed when land spreading biosolids:

- *Meath County Council NMP Approval Letter and Conditions*
- *Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 and 2001*
- *EC (Good Agricultural Practice for the Protection of Waters) Regulations, 2010*
- *Code of Good Practice for the Use of Biosolids in Agriculture: Guidelines for Farmers (DoELG, 1999)*
- *Code of Good Agriculture Practice to Protect Waters from Pollution by Nitrates (DoEHLG/DAFF, 1996)*
- *Draft Code of Practise for Protection of Groundwater from the Land spreading of Organic Wastes (EPA/GSI, 1997)*

The rate of application is limited to the lowest of the following:

1. Maximum permissible rate of application of nutrients (as per NMP).
2. Maximum permissible rate of application of metals (as per soil & Biosolids analysis).
3. Maximum permissible hydraulic loading (as determined by hydraulic capacity of the soil in Programme of Evaluation and in general not greater than 50m³ per hectare in one application).

Biosolids with a dry solids content greater than or equal to 25% may be applied using a muck spreader. All contractors engaged in the land spreading of biosolids must be provided with a map of the landbank where the application is to be made. This map shall demonstrate buffer zones and other prohibited areas, areas of rock outcrop, other possible hazards and the clearly identify the plots where biosolids can and cannot be applied.

Buffer strips are required when land spreading biosolids as follows:

Table 5 Buffer Strip Requirements

Feature	Buffer (m)*
Sensitive Buildings (hospitals, schools and churches)	200
Dwelling Houses	100
Lakes and main river channels	20
Small watercourses	10
Public Roads	10
Domestic wells	50
Public water supplies	25 -200 [†]

* Meath County Council may increase buffer distances where deemed necessary.

† Buffer distances for public water supplies shall be specified by Meath County Council.

Biosolids shall not be spread if heavy rain is forecast within 48 hours. Spreading in unsuitable weather conditions can cause loss of nutrients to both surface and groundwater.

In addition to the above, biosolids shall not be applied to:

1. Waterlogged land.
2. Frozen or snow covered land.
3. Free draining sites with a high or exposed water table at the time of application.

Biosolids applied to tillage land shall be directly injected or ploughed/incorporated into the land within a maximum of 24 hours of spreading.

8. Transport of Biosolids

1. Persons involved in the collection and transportation of biosolids must hold a valid Waste Collection Permit in accordance with the Waste Management (Collection Permit) Regulations, 2007 as amended in 2008.
2. All biosolids shall be transported in closed containers which will minimize odour nuisance and prevent spillages. Liquid sludges must be transported in a closed tanker.
3. Routes should be chosen to minimise nuisance to the public and should not create a traffic hazard when entering/exiting fields or parked on public roads.
4. The carrying of mud from a site onto a public road is prohibited. It may be necessary to wash wheels before leaving the site and/or clean the road of any mud deposits.

9. Storage of Biosolids

Storage facilities intended for holding Biosolids shall hold a certificate granted by Meath County Council under the *Waste Management (Registration of Sewage Sludge Facilities) Regulations, 2010*. Untreated sludges, which are imported into County Meath from another county, must be treated to the biosolid standard within one week of arrival in County Meath. Where a treatment process is provided, the operator/contractor must demonstrate separation between the treatment area and the storage area and both processes must not take place in the same building. The use of any such facilities must comply with all Environmental, Planning, Health and Safety or other statutory legislation applicable. In addition, sludges from different sources should be stored separately.

All such storage facilities shall conform to *EC (Good Agricultural Practice for the Protection of Waters) Regulations, 2009*, and the following general requirements:

1. Liquid sewage sludges should be stored in either steel or concrete tanks. Concrete tanks should be constructed in accordance with *S123: Minimum Specification for Bovine Livestock Units and Reinforced Tanks*. Steel tanks should be constructed on an impermeable concrete base.
2. Biosolids with a dry solid content greater than or equal to 25% can be stockpiled on a hardstand area constructed in accordance with *S108: Minimum Specification for Manure Pits and Dungsteads*. These hardstand areas must be covered by a roof and walls to prevent leachate generation due to rainwater ingress. Any self generated leachate should be subject to collection and controlled disposal as per *EC (Good Agricultural Practice for the Protection of Waters) Regulations, 2006*.
3. Storage facilities should not be readily accessible to the public or livestock and secure fencing shall be provided around storage tanks or storage areas.
4. Biosolids shall only be held in a field during the land spreading process and shall be kept in a compact heap. Biosolids shall not be stored in a field for more than 3 days and spreading should commence on the day of delivery to a field except in exceptional circumstances to be notified to Meath County Council.
5. Biosolids shall not be stored within the buffer distances of the features outlined in Table 5.
6. Storage facilities for Biosolids shall not pose a risk to either surface waters or groundwaters. nor pose a threat to human, animal or plant life, and should avoid air pollution, and minimize public inconvenience.

10. Septic Tank (On-Site Wastewater Treatment Plant) Sludges

Sludges from septic tanks and on-site wastewater treatment plants may not be spread on agricultural lands. Persons involved in the collection of septic tank sludges must obtain a Waste Collection Permit under the Waste Management (Collection Permit) Regulations, 2007 as amended (SI 820 of 2007 and SI 87 of 2008).

Sludges from septic tanks must be delivered to local authority-operated Wastewater Treatment Plants for appropriate treatment. This must be done through prior arrangement with the local authority or its agent.

11. Agreement

AGREEMENT made this day of 20 between **MEATH COUNTY COUNCIL** of County Hall, Navan, County Meath of the One Part (hereinafter called “the Council”) and of the Other Part (hereinafter called “the Contractor”)

WHEREAS

1. This Protocol sets out the Council’s requirements for the proper treatment and use of biosolids in agriculture in County Meath.
2. The Contractor agrees to be bound by all of the terms of this Protocol.

SIGNED by

DIRECTOR OF SERVICES
For and on behalf of:
MEATH COUNTY COUNCIL

SIGNED by

For and on behalf of
THE CONTRACTOR

12. Land Owner Consent Letter

I / We _____
(Name / Company Name in which ownership of lands is registered)

Of _____
(Townland)

In County Meath.

am/are aware of the protocol for use of biosolids in agriculture in County Meath
and hereby give my consent for the use of my lands for spreading of the biosolids.

I am aware of all fertilisers applied to my lands and the proposed crops identified
in the Nutrient Management Plan submitted by:

(Name of person or company who prepared the Nutrient Management Plan)

and agree I will comply with the terms of the plan.

Signed: _____
(Name of Landowner or Director of ownership Company)

Print Name: _____

Pollution of waters or failure to comply with Environmental legislation and the
Nutrient Management Plan may result in prosecution under the Water Pollution
Acts.

References

Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 & 2001

Waste Management (Registration of Sewage Sludge Facilities) Regulations, 2010

EC (Good Agricultural Practice for the Protection of Waters) Regulations, 2010

Code of Good Practice for the Use of Biosolids in Agriculture: Guidelines for Local Authorities and Wastewater Treatment Plant Operators (DoELG, 1999)

Code of Good Practice for the Use of Biosolids in Agriculture: Guidelines for Farmers (DoELG, 1999)

Note of the Availability and Fate of Phosphorus in Biosolids when applied to Agricultural Land (DoHELG, 2008)

Nutrient and Trace Element Advice for Grassland, Tillage, Vegetable and Fruit Crops (Teagasc, 2004)

Code of Good Agricultural Practice to Protect Waters from Pollution by Nitrates (DoE and DAFF, 1996)

Land spreading of Organic Wastes: Guidance on Groundwater Vulnerability Assessment of and (EPA 2004)

BATNEEC Guidance Note for the Pig Production Sector (EPA, 1998)

Groundwater Protection Schemes (GSI, 1999)

S123: Minimum Specification for Bovine Livestock Units and Reinforced Tanks

S108: Minimum Specification for Manure Pits and Dungsteeds

Department of the Environment (United Kingdom) Code of Practice For Agriculture Use Of Sewage Sludge