

# **THE SAFE SLUDGE MATRIX**

*Guidelines for the  
Application of Sewage  
Sludge to Agricultural Land*

**BRC**  
BRITISH RETAIL CONSORTIUM  
The Voice of British Retailing

  
**WATER UK**

  
**ADAS**  
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## **INTRODUCTION**

This leaflet provides guidance on the agreement made between Water UK representing the 14 UK Water and Sewage Operators and the British Retail Consortium (BRC) representing the major retailers. This agreement affects all applications of sewage sludge to agricultural land and came into force on 31 December 1998. The provisions of the agreement will be incorporated into legislation in the Sludge (Use in Agriculture) Regulations and in the Code of Practice for Agricultural Use of Sewage Sludge, both to be revised during 2001.

### **What are the Provisions?**

The "Safe Sludge Matrix" commonly referred to as the ADAS Matrix forms the basis of the agreement and consists of a table of crop types, together with clear guidance on the minimum acceptable level of treatment for any sewage sludge (often referred to as biosolids) based product which may be applied to that crop or rotation.

The agreement was driven by the desire to ensure the highest possible standards of food safety and to provide a framework which gives the retailers and Food Industry confidence that sludge reuse on agricultural land is safe. The Matrix enables farmers and growers to continue to utilise the beneficial properties in sewage sludge as a valuable and cost effective source of nutrients and organic matter.

### **Who was involved?**

The agreement (reached in September 1998) was made between Water UK and BRC, and included inputs from the Environment Agency (EA), Department of Environment Transport and Regions (DETR) and Ministry of Agriculture Fisheries and Food (MAFF). The negotiations were managed by ADAS and followed a year of intensive consultation, including discussions with other interested parties such as the National Farmers Union (NFU), Country Landowners Association (CLA), food manufacturers and food processors.

### **What are the main Impacts?**

**Phasing out of untreated sewage sludge use** - The main impact has been the phasing out of raw or untreated sewage sludge use on agricultural land for food production. As from 31st December 1999, all untreated sludges have been banned from application to food crops. However, it is still permissible to apply untreated sludge to a limited range of non-food crops, including Willow and Poplar for coppicing, Hemp for fibre, Miscanthus for biomass and High Erucic Acid Rape (HEAR), grown under contract for a non-food use and subject to agreed harvest intervals. **The end date for the use of untreated sewage sludge on agricultural land used to grow non-food crops is 31 December 2005.** Further details of harvest intervals will be found in the revised Code of Practice for Agricultural Use of Sewage Sludge or from your Sewage Operator.

**Conventionally Treated sewage sludge to surface of grassland** - The surface spreading of conventionally treated sludge on grazed grassland was banned from the 31st December 1998. Conventionally treated sludge can only be applied to grazed grassland where it is deep injected into the soil. The regulations require that there will be no grazing or harvesting within 3 weeks of application. Where grassland is reseeded, sludge must be ploughed down or deep injected into the soil. Conventionally treated sewage sludge can be applied to the surface of grassland or for forage crops such as maize, which will subsequently be harvested, but there can be NO grazing of that land within the season of application (ie it is not permissible to graze any grass regrowth or aftermath in the season that the sludge was applied).

**Vegetable crops** - More stringent requirements apply where sludge is applied to land growing vegetable crops and in particular those crops that may be eaten raw (e.g. salad crops). Conventionally treated sludge can be applied to agricultural land which is used to grow vegetables in the rotation, provided that at least 12 months has elapsed between application and harvest of the following vegetable crop. Where the crop is a salad which might be eaten raw, the harvest interval must be at least 30 months. Where enhanced treated sludges are used, a 10 month harvest interval applies.



## THE SAFE SLUDGE MATRIX

CROP GROUP	UNTREATED SLUDGES	CONVENTIONALLY TREATED SLUDGES	ENHANCED TREATED SLUDGES
FRUIT	X	X	✓
SALADS	X	X (30 month harvest interval applies)	✓
VEGETABLES	X	X (12 month harvest interval applies)	✓
HORTICULTURE	X	X	✓
COMBINABLE & ANIMAL FEED CROPS	X	✓	✓
GRASS & FORAGE	X	X (Deep injected or ploughed down only)	✓
- GRAZED	X	✓	✓
- HARVESTED	X	✓ (No grazing in season of application)	✓

Additional notes from the table:  
 - For Fruit, Salads, Vegetables, and Horticulture: 10 month harvest interval applies.  
 - For Grazed Grass & Forage: 3 week no grazing and harvest interval applies.  
 - For Harvested Grass & Forage: 3 week no grazing and harvest interval applies.

**NOTE:** ✓ All applications must comply with the *Sludge (Use in Agriculture) Regulations and DETR Code of Practice for Agricultural Use of Sewage Sludge (to be revised during 2001)*.

X Applications not allowed (except where stated conditions apply)

### What is meant by Conventionally Treated Sludge?

There are a range of different treatment processes used to reduce the fermentability and possible health hazards associated with sewage sludge. These rely on biological, chemical or heat treatment. The most common form of treatment is anaerobic digestion. Conventionally treated sludge has been subjected to defined treatment processes and standards that ensure at least 99% of pathogens have been destroyed.

### What is Enhanced Treated Sludge?

Enhanced treatment, originally referred to as "Advanced Treatment", is a term used to describe treatment processes which are capable of virtually eliminating any pathogens which may be present in the original sludge. Enhanced treated sludge will be free from *Salmonella* and will have been treated so as to ensure that 99.9999% pathogens have been destroyed (a 6 log reduction).

Your local Sewerage Operator will be able to provide further details of the treatment method used as this may affect where and when sludge can be applied, as well as the fertiliser and soil conditioning value.

The latest version of the *Safe Sludge Matrix* can be found using the search facilities on the *Water UK* and *ADAS* websites:  
[www.water.org.uk](http://www.water.org.uk) and [www.adas.co.uk/matrix](http://www.adas.co.uk/matrix)

## MATRIX CROPPING CATEGORIES

Fruit	Salad (e.g. ready to eat crops)	Vegetables	Horticulture	Combinable and animal feed crops	Grassland and forage	
					Harvested	Grazed
Top fruit (apples, pears, etc.)	Lettuce Radish Onions	Potatoes Leeks Sweetcorn	Soil based glasshouse and polythene tunnel production (including tomatoes, cucumbers, peppers etc.)	Wheat Barley Oats Rye Triticale Field peas Field beans Linseed/flax Oilseed rape Sugar beet Sunflower Borage	Maize silage Grass silage Haylage Hay Herbage seeds	Grass Forage Swedes/turnips Fodder mangolds/ beet/kale Forage rye and Triticale Turf production
Stone fruit (plums, cherries etc.)	Beans (including runner, broad and dwarf French) Vining peas	Brussels sprouts Parsnips Swedes/turnips Marrows	Mushrooms Nursery stock and bulbs for export Basic nursery stock			
Soft fruit (currants and berries)	Mangetout Cabbage Cauliflower Calabrese/broccoli	Pumpkins Squashes Rhubarb Artichokes				
Vines	Courgettes		Seed potatoes for export Basic seed potatoes			
Hops	Celery Red beet					
Nuts	Carrots Herbs Asparagus Garlic Shallot Spinach Chicory Celeriac		Basic seed production			

### Further information

Applications of sewage sludge to farmland are strictly controlled and the regulations require that where sludge is used on agricultural land, usage will be registered and the soil tested by the sludge producers. Your local Sewerage Operator will be able to provide you with further information on the products available in your area. The following publications also contain detailed information and guidance on the use of sewage sludge on agricultural land.

- **Code of Practice for Agricultural Use of Sewage Sludge (to be revised during 2001)** - Available from DETR Publication Sales Unit, 01709 891 318
- **Codes of Good Agricultural Practice for the Protection of Water, Air and Soil** - All three Codes available free of charge from MAFF Publications, 0645 556 000.
- **Prevention of Environmental Pollution from Agricultural Activity** - Scottish Office Agriculture, Environment and Fisheries Department (SOAEFD) (1997). Available from Scottish Executive Rural Affairs Department (SERAD), 0131 2440312

Please note that "The Safe Sludge Matrix", cropping categories and treatment processes described in this leaflet are regularly reviewed as part of an ongoing process and are subject to possible change and amendment. If a particular crop is not specifically listed or you wish to ensure that you have the latest version, please refer to Brian Chambers of ADAS.

Further more detailed information on the use of sewage sludge on Industrial Crops is available in the following leaflet, available from ADAS, Water UK, your local Water Company, Scottish Water Authority or Department of Environment, Northern Ireland.

- **Guidelines for the Application of Sewage Sludge to Industrial Crops**

For technical queries relating to the interpretation and application of "The Safe Sludge Matrix" contact:

Dr Brian Chambers, ADAS Gleadthorpe Research Centre - Tel: 01623 844331  
Gordon Hickman, ADAS Environment - Tel: 01428 683014 or  
Mark Aitken, SAC Auchincruive - Tel: 01292 525330





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# Biosolids for Agricultural Benefit

## Biosolids for sustainable crop production

Biosolids are a nutrient-rich alternative to costly, inorganic fertilisers that can be used in agriculture, and land restoration.

**Product characteristics** – Our biosolids are available as whole digestate, a dewatered digestate cake, or a dewatered lime stabilised cake. The type of biosolids depends on which Treatment centre that they are sourced.

Your Local Sludge Treatment Centre is	The biosolid type produced here is	Approx %DS
<b>Stornoway</b>	<b>Lime Cake</b>	<b>45.40%</b>

## Biosolids Benefits

- Provide valuable organic content to soils
- Are a cost effective natural alternative to expensive chemical fertilisers
- Can help reduce your carbon footprint
- Are a valuable sustainable source of phosphate
- Can help reduce costs



## Land Use Restrictions

There are restrictions on land use after application of biosolids e.g. livestock exclusions, or harvest intervals; these are detailed in the Safe Sludge Matrix. Your Scottish Water advisor can give advice on any restrictions that may

Your Scottish Water Contact is:	Ewan Huc
mobile:	07484 510439
email:	ewan.huc@scottishwater.co.uk

Alternatively call the Scottish Water Helpline (0800 077 8778) and ask to speak to a member of the Waste Management Team





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# Biosolids for Agricultural Benefit

	Nitrogen (N)	Phosphate (P <sub>2</sub> O <sub>5</sub> )	Potash (K <sub>2</sub> O)	Total (£/t)
Market Price of fertilisers (£/kg)	£0.68	£0.57	£0.38	
Fertiliser equiv (kg/t in biosolids)	0.95	4.91	0.52	
Value of Nutrients in biosolids (£/t)	£0.64	£2.82	£0.20	£3.66
<i>N values available 1st year, total phosphate and potash content valued</i>				
Lime content in biosolids is	22%	of agricultural ground lime.		
At current market value the lime value in biosolids is				£6.62
<b>The value of nutrients in biosolids (not inc. organic content) is</b>				<b>£10.28</b>

*Values quoted are for illustration only. Prices are as per current market value, these are subject to change.*

Nutrient Availability – Not all of the nutrient content is available in year 1. Approximate available nutrients available in the first year are  
 Approx 10% of total nitrogen (N)  
 Approx 50% of total phosphate (P)  
 Approx 90% of total potash (K)

## Nutrient Content

			Available in 1st year
Nitrogen (N)	9.51	kg/t	0.95
Phosphate (P <sub>2</sub> O <sub>5</sub> )	4.91	kg/t	2.46
Potash (K <sub>2</sub> O)	0.52	kg/t	0.47
Organic Material	40.30	%	

*Typical Values are mean averages on an 'as received' basis*

## PTE & MicroNutrient Content

Fluoride	20	(mg/kg available F)
Arsenic	2.1	(mg/kg dry mass)
Cadmium	0.7	(mg/kg dry mass)
Chromium	12.3	(mg/kg dry mass)
Copper	79.2	(mg/kg dry mass)
Lead	28.1	(mg/kg dry mass)
Mercury	0.21	(mg/kg dry mass)
Molybdenum	10.9	(mg/kg dry mass)
Nickel	8.8	(mg/kg dry mass)
Selenium	0.87	(mg/kg dry mass)
Sulphur	0.47	(%)
Zinc	212	(mg/kg dry mass)

*Typical values are mean averages in dry matter unless otherwise stated*