

# Biosolids Nutrient Management Matrix



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**WATER UK**



**ADAS**

## Background

There was a recognised need to clarify the interpretation of Cross Compliance Statutory Management Requirement (SMR) No. 3 - Sewage Sludge “You must take account of the nutrient needs of the plants when applying sewage sludge”, which is based on the requirements of the “Sludge Use in Agriculture Regulations 1989”, Section 3(7) “The sludge shall be used in such a way that account is taken of the nutrient needs of the plants and that the quality of the soil and surface and groundwater is not impaired”.

## Recycling to land

Biosolids are a valuable source of two major crop available nutrients - nitrogen and phosphorus (plus sulphur, potassium, magnesium and trace elements etc.), stable organic matter and lime, which can be beneficially recycled to agricultural land to improve soil quality and fertility, and to complete natural nutrient and carbon cycles. The recycling of biosolids to agricultural land is a necessary part of sustainable strategies for preserving the earth’s natural resources (e.g. rock phosphate) and safeguarding future food security in the UK.

**Biosolids recycling to agricultural land must comply with numerous pieces of legislation and best practice guidance:**

- The Sludge (Use in Agriculture) Regulations 1989;
- The Sludge (Use in Agriculture) (Amendment) Regulations 1990;
- Code of Practice for Agricultural Use of Sewage Sludge (1996);
- The ADAS Safe Sludge Matrix (2001);
- Cross Compliance Single Payment Scheme - SMR3;
- The Nitrates Regulations (2008; 2013);
- Codes of Good Agricultural Practice;
- The Fertiliser Manual (RB209) - 8th edition;
- EA Technical Guidance Note EPR 8.01.



## Nutrient (nitrogen and phosphate) Management Matrix

Research underpinning best practice guidance on the management of biosolids nutrients for optimum crop growth is summarised in the “Fertiliser Manual (RB209)””; pages 74-79. The Biosolids Nutrient Management Matrix is consistent with the good practice advice in RB209.

The aim of the Matrix is to clarify the interpretation of SMR No.3 - Sewage Sludge and to more clearly define good practice in biosolids management. Notably, the Matrix provides a clear and simple way of managing biosolids phosphorus (P) inputs over crop rotations that is self-limiting. Applying biosolids at a rate of 250 kg/ha total N will typically supply 200-400 kg/ha phosphate -  $P_2O_5$  (depending on the type of biosolids being used). This means that the soil P status of individual fields may increase at the maximum potential application rates in the Matrix. If this occurs, the frequency of biosolids P applications would decrease and at ADAS soil P Index 5 applications would not be permitted.

The agronomic benefits (i.e. nitrogen, phosphate and organic matter etc.) and risks to water quality of recycling biosolids to land were reviewed by ADAS and Bangor University. Based on this review and discussions between Water UK (representing Water and Sewage Operators in England and Wales), the Environment Agency and Rural Payments Agency, the Biosolids Nutrient Management Matrix was agreed as providing the ‘best’ agronomic and environmental balance for recycling all types of biosolids (e.g. digested cake/liquid, thermally dried, lime stabilised, composted) to agricultural land. The Matrix should be used to complement, and not replace, nutrient management planning for both nitrogen and phosphate on farms where biosolids are used, and will be effective for applications from 1 January 2014.

# Biosolids Nutrient Management Matrix

ADAS soil P Index	Maximum potential application of <i>lime stabilised</i> biosolids <sup>a</sup>	Maximum potential application of <i>all</i> other biosolids types
0/1/2	250kg/ha total N in any twelve month period	250kg/ha total N in any twelve month period
3	250 kg/ha total N in any twelve month period - application 1 year in 4 on sandy soils and 1 year in 2 on all other soils	250 kg/ha total N in any twelve month period - application 1 year in 2 on sandy soils <sup>b</sup>
4	250 kg/ha total N in any twelve month period - application 1 year in 5 on sandy soils and 1 year in 3 on all other soils	250 kg/ha total N in any twelve month period - application 1 year in 4 on sandy soils <sup>c</sup> and 1 year in 2 on all other soils
5 and above	No application	No application

<sup>a</sup> Lime addition rate >5% w/w on a dry solids basis

<sup>b</sup> Composted biosolids can be applied annually and <sup>c</sup> can be applied 1 year in 2

## Notes:

- Soil extractable P analysis must be less than 5 years old (0-15cm soil sampling depth on arable land; 0-7.5cm on grassland).
- Soil types based on Cross Compliance soil categories.
- No biosolids applications directly in front of legumes (e.g. peas, beans), except for composted biosolids which is very low in readily available N.
- Septic tank sludge is not included within the scope of the Matrix.