



Assured Biosolids Limited  
Biosolids Assurance Scheme

# STANDARD GUIDANCE NOTES

GUIDANCE NOTES FOR  
SCHEME APPLICANTS AND MEMBERS  
AND THE CERTIFICATION BODY

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## Document purpose and overview

These Standard Guidance Notes are intended as supporting documents to the BAS Standard to provide background information on more complex topics. They are not an integral part of the requirements of the BAS Standard and therefore should not be used for auditing purposes. Some information in the Standard Guidance Notes provides templates that may be used as the basis for providing evidence to the auditor.

## 1. Trade Effluents Prescribed Substances

### SCHEDULE 1

#### PRESCRIBED SUBSTANCES (1989)

- Mercury and its compounds
- Cadmium and its compounds
- gamma-Hexachlorocyclohexane
- DDT
- Pentachlorophenol
- Hexachlorobenzene
- Hexachlorobutadiene
- Aldrin
- Dieldrin
- Endrin
- Carbon Tetrachloride
- Polychlorinated Biphenyls
- Dichlorvos
- 1, 2-Dichloroethane
- Trichlorobenzene
- Atrazine
- Simazine
- Tributyltin compounds
- Triphenyltin compounds
- Trifluralin
- Fenitrothion
- Azinphos-methyl
- Malathion
- Endosulfan

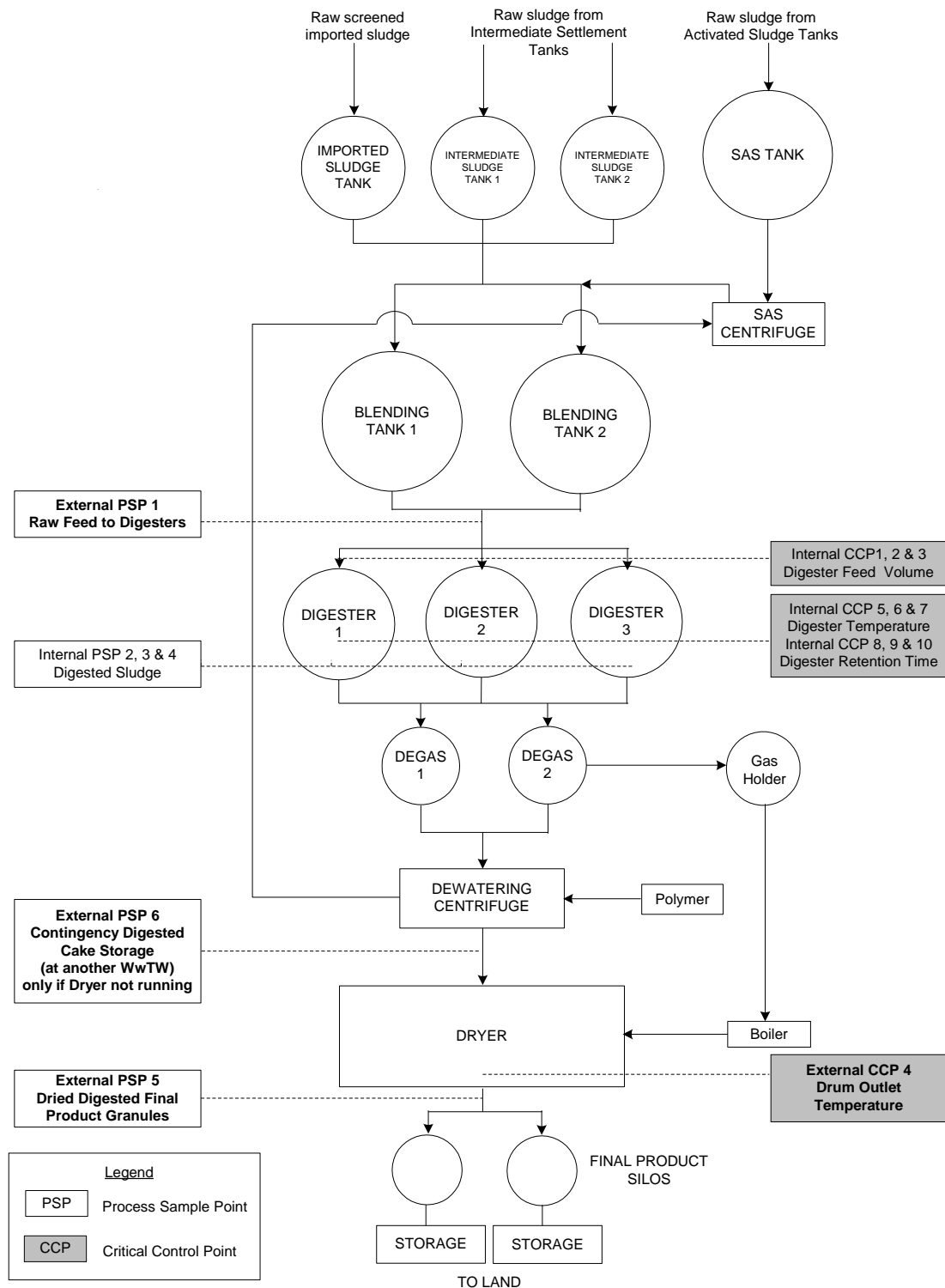
## 2. Effective Sludge Treatment Processes

For guidance/information only

Process	Descriptions
Thickening	Sludge can be thickened by removing water to reduce volume and facilitate greater efficiency in subsequent treatment processes. Thickening processes produce liquid sludge typically up to 8 or 9% dry solids.
Pasteurisation	Sludge may be pasteurised at temperatures of typically 55°C for 4 hours or 70°C for 30 minutes. Pasteurisation is carried out in order to reduce microbiological parameters prior to anaerobic digestion, to stabilise the organic matter and to increase gas production.
Mesophilic Anaerobic Digestion (MAD)	Sludge is digested with the absence of oxygen by allowing naturally occurring bacteria to breakdown biodegradable material releasing methane and carbon dioxide. Temperatures are typically in the range 32 to 40°C with a retention time of around 12 to 30 days. Digested sludge may be held as batches (secondary digestion) at ambient temperature for a further 14 to 21 days to reduce microbiological parameters if no pasteurisation stage precedes digestion. Alternatively, to achieve a conventionally treated product (Safe Sludge Matrix) sludge can be stored as 'cake' (for 2 to 3 months) or lime may be added after digestion and dewatering (see lime stabilisation).
Thermophilic Anaerobic Digestion	Sludge is digested with the absence of oxygen by allowing naturally occurring bacteria to breakdown biodegradable material releasing methane and carbon dioxide. Temperatures are typically around 55°C with a retention time of at least 7 days.
Advanced Anaerobic Digestion: Biological Hydrolysis	Prior to Mesophilic or Thermophilic Anaerobic Digestion (as above), sludge is held for 2 to 3 days at temperatures of 38 to 42°C, to allow naturally occurring bacteria to hydrolyse the biodegradable material.
Advanced Anaerobic Digestion: Thermal Hydrolysis	Prior to Mesophilic or Thermophilic Anaerobic Digestion (as above), sludge is heated to around 160°C at 5.5 to 6 bar pressure for typically 30 to 45 minutes. Subsequent pressure release causes physical cell disintegration, freeing up nutrients for the digestion process.
Lime Stabilisation	Lime (e.g. calcium oxide, calcium hydroxide) can be used on untreated or digested sludge to reduce microbiological parameters by raising the pH (and temperature), for example >12 pH.
Dewatering	Treated sludge can be dewatered by, for example, centrifuge or belt press. Dewatering processes produce a 'cake' product, usually in the range 20 to 35% dry solids.

Thermal drying	Untreated or primary digested sludge can be dried at high temperature to reduce microbiological parameters and produce a granular or pellet product of typically 90 to 98% dry solids.
Composting	Dewatered sludge can be mixed with, for example green waste, woodchip or straw to add bulk and enable aeration. It is typically composted at 45 to 60°C for 2 to 4 weeks followed by a further 4 to 12 weeks stabilisation at lower temperatures. The initial high temperature phase should reduce microbiological parameters. Woodchip and other bulking materials can be screened out at the end of the treatment and reused for further composting. Composting can use either raw sludge or treated biosolids.

### 3. HACCP Process Schematic example

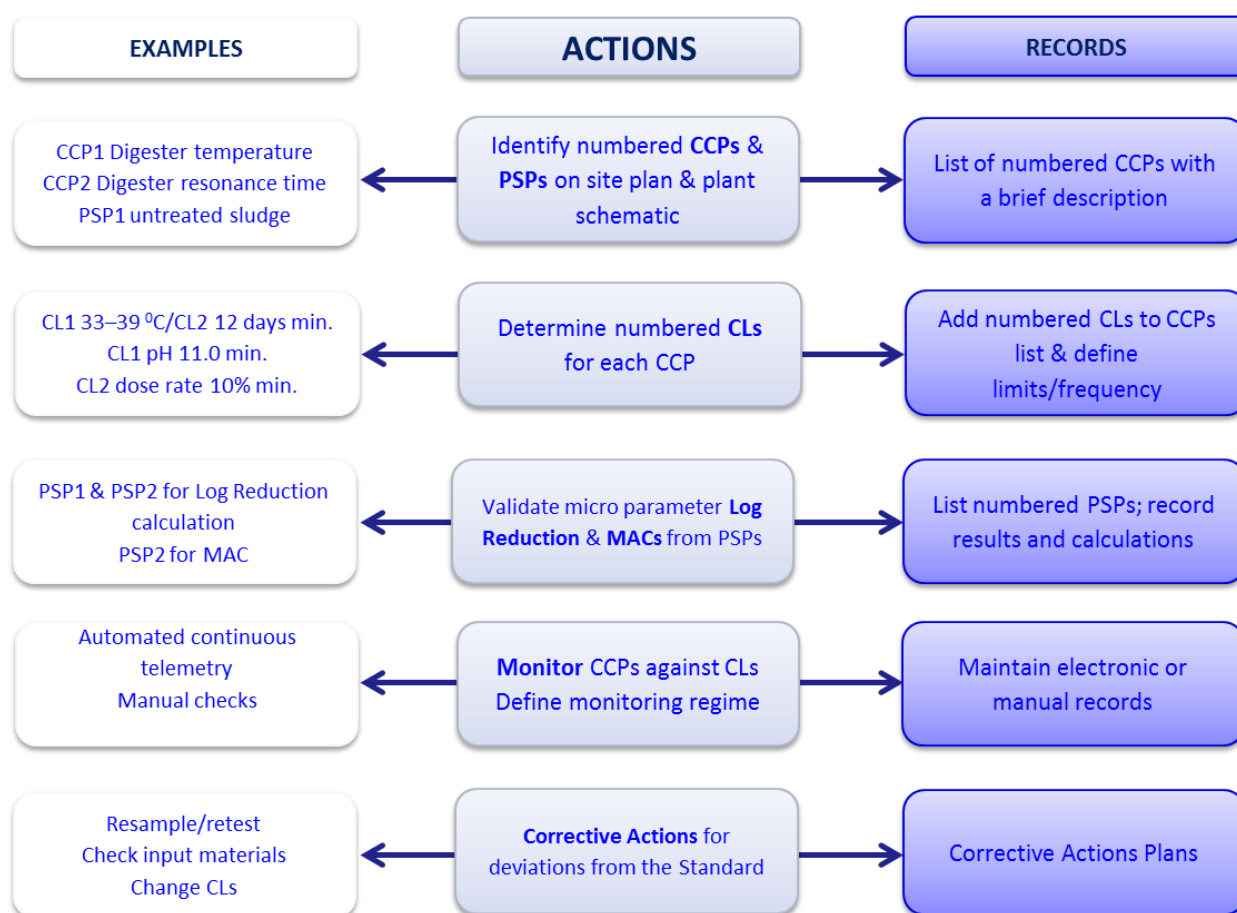


## 4. HACCP Plan Action and Records schematic

Site HACCP plans should be based on the Water UK HACCP guidance document; *The application of HACCP procedures in the water industry: biosolids treatment and use on agricultural land* (WRc, 2004) and conform to the BAS Standard.

HACCP plans may contain more information than is required by the BAS Standard. This additional voluntary information is not part of the Standard and should not be part of the BAS audit.

The schematic shows the ACTIONS as part of a HACCP plan that must be demonstrable to the auditor with associated RECORDS as determined by the Standard. Note the EXAMPLES are only a guide as to what information or activity may be seen.



CCP = Critical Control Point, CL = Critical Limit, PSP = Process Sample Point, MAC = Maximum Allowable Concentration



The table below shows a checklist that may be used as a guide for audit preparation.

	Site Plan	Plant Schematic	Numbering	List & describe	Records
CCPs	✓	✓	✓	✓	
CLs			✓	✓ & define frequency	
PSPs	✓	✓	✓	✓	
Monitor CCPs					✓
Process Validation					✓
Corrective Action Plan				✓	✓

## 5. Process Validation Procedure data record example

Process Validation Procedure data record example for six<sup>1</sup> sampling events.

Untreated (raw) sludge input			Treated sludge/biosolids output			
Date	<i>E. coli</i> / gDS	Equivalent as log <sub>10</sub>	Date	<i>E. coli</i> / gDS	Equivalent as log <sub>10</sub>	Log <sub>10</sub> reduction
26/05/2008	5.5 x 10 <sup>6</sup>	6.7	10/07/2008	7.6 x 10 <sup>2</sup>	2.9	<b>3.8</b>
07/07/2008	2.6 x 10 <sup>6</sup>	6.4	11/07/2008	2.0 x 10 <sup>3</sup>	3.3	<b>3.1</b>
09/07/2008	4.6 x 10 <sup>6</sup>	6.7	15/07/2008	7.2 x 10 <sup>2</sup>	2.9	<b>3.8</b>
09/07/2008	4.8 x 10 <sup>6</sup>	6.7	19/08/2008	7.7 x 10 <sup>2</sup>	2.9	<b>3.8</b>
10/07/2008	4.8 x 10 <sup>6</sup>	6.7	19/08/2008	7.8 x 10 <sup>2</sup>	2.9	<b>3.8</b>
11/07/2008	3.0 x 10 <sup>6</sup>	6.5	19/08/2008	7.8 x 10 <sup>2</sup>	2.9	<b>3.6</b>
				9.3 x 10 <sup>2</sup>	3.0	<b>3.7</b>
			<sup>2</sup>	Inverse of log <sub>10</sub> mean	mean	<b>mean</b>

### Notes

<sup>1</sup> For process validations completed prior to 1<sup>st</sup> January 2015, at least 3 sampling events are acceptable. From 1<sup>st</sup> January 2015, at least 5 sampling events are required.

<sup>2</sup> Note the mean of the output is 3.0 log<sub>10</sub>, which inversely is 9.3 x 10<sup>2</sup> (or 930 *E. coli*/gram dry solids).

## 6. Sampling Methods for Bulk Biosolids

### Sample containers:

Sample containers should be clean and clearly labelled with details including site, batch reference, and date.

### Representative sampling methods (modified from RB209 - Defra, 2010 for livestock manures) and sample preparation for analysis of micro-biological parameters:

#### **Cake in heaps:**

Identify at least five locations which are representative of the heap. After clearing away any weathered material with a spade or fork, dig a hole approximately 0.5 m deep and take a sample from each point. Samples can also be taken on mechanical movement of the heap (e.g. by tractor shovel).

Representative samples for analysis must be either:

- i. A composite sample, which is then sub-sampled to provide 3 triplicate samples for analysis or;
- ii. Five separate samples with each sample being analysed.

#### **Thermally dried granules:**

Identify at least five locations which appear to be representative of the bagged/bulk stored granules and take a sample from each point.

Representative samples for analysis must be either:

- i. A composite sample, which is then sub-sampled to provide 3 triplicate samples for analysis or;
- ii. Five separate samples with each sample being analysed.

#### **Liquid digested:**

Take at least five samples that represent each batch of liquid digested sludge. Representative samples for analysis must be either:

- i. A composite sample, which is then sub-sampled to provide 3 triplicate samples for analysis or;
- ii. Five separate samples with each sample being analysed.

### Analysis:

For analysis of microbiological parameters, samples should be stored in the dark at 1-8 °C and should be analysed within 24 hours (where practicable) of being taken.

For analysis of non-microbiological parameters (pH, dry matter, organic matter, nitrogen, phosphorus, cadmium, chromium, copper, lead, mercury, nickel and zinc) a single analysis of a composite sample will be sufficient.

Each composite sample should be analysed in an ABL Approved Laboratory (reference ABL Approved Laboratory List).

### Health and Safety:

Note: it is the responsibility of the member company and its contractors to ensure sampling is performed with due regard to health and safety requirements.

## 7. Biosolids Transportation and Storage evidence document template (England and Wales)

<b>BIOSOLIDS TRANSPORTATION AND STORAGE EVIDENCE DOCUMENT TEMPLATE (England and Wales)</b>		
<b>Overview (I – II):</b>		
<p>I. This form has two purposes:</p> <ul style="list-style-type: none"> <li>• If you (or an organisation that you sub-contract) have internal documents in place that already demonstrate how a storage site is selected (to minimise diffuse pollution, odour or other potential nuisance), this form can be used by you to cross-check that all of the criteria required by the BAS Standard are included in them. Note the BAS does not require that this form supersedes, or is used instead of your existing internal documents, it should be used as a reference to cross-check your documents and revise them if required.</li> <li>• If you do not have an internal document to demonstrate your conformance with the Standard sections three or four, this form can be used as a template, by you or your sub-contractor.</li> </ul> <p>II. Your own internal documentation may include other best practice requirements (for example, health and safety considerations) which is not part of the BAS Standard and is therefore not included in this form.</p>		
<b>Please read the notes (I – II) below before completing this form:</b>		
<p>I. This form or an equivalent form must be completed <u>before</u> biosolids are stored in either temporary biosolids field storage or permanent biosolids storage.</p> <p>II. Your answers should be provided in the light brown shaded fields. If a red ‘yes’ or ‘no’ is indicated, the proposed area must not be used to store Certified Biosolids and a new site or area must be selected or other action (indicated for some questions) must be taken.</p>		
<b>Field transportation and storage record number:</b>		
<b>Associated application record number:</b>		
1. Source: Indicate the name/reference of the Sludge Treatment Centre or Processing Facility where the biosolids to be stored have been produced:		
2. Biosolids description: Indicate the biosolids characteristics:	Biosolids type:	
	Dry solids content:	
	Treatment standard:	
3. Transport: Are biosolids transported from the Processing Facility by registered waste carriers in vehicles that adequately contain and cover the biosolids? (Requirement 3.1).	Yes:	<b>No:</b>  → ENSURE BIOSOLIDS ARE ADEQUATELY TRANSPORTED TO AVOID SPILLAGE AND MINIMISE ODOUR NUISANCE.
4. Permanent storage: Are biosolids transported from the Processing Facility to permanent storage areas before temporary field storage?  If ‘yes’ indicate where the permanent storage site(s) are located:	Yes:  Location:	No:

<p>5. Permanent storage: Does the permanent storage site(s) that are utilised have an impermeable base (surface) that enables run-off liquid (drainage) to be collected and contained? (Requirement 3.2)</p> <p>If 'yes' indicate where the permanent storage sites are located (including permanent storage at the Processing Facility):</p>	<p>Yes:</p> <p>Location:</p>	<p>No:</p> <p>→ ENSURE PERMANENT STORAGE SITES ENABLE RUN-OFF LIQUID (DRAINAGE) TO BE COLLECTED AND CONTAINED.</p>
<p>6. Permanent storage: Does the permanent storage adequately contain the biosolids and are members of the public unable to gain access to it? (Requirement 3.3)</p>	<p>Yes:</p>	<p>No:</p> <p>→ ENSURE PERMANENT STORAGE SITES CONTAIN THE BIOSOLIDS AND THAT THE PUBLIC ARE UNABLE TO ACCESS TO IT.</p>
<p>7. Temporary field storage: Are the biosolids (cake) dispatched for temporary field storage solid enough to be stored in a free draining heap, and unlikely to allow free drainage from within the stacked material to minimise the risk of temporary diffuse pollution during the intended period of storage? (Requirement 3.5)</p> <p>Indicate the intended storage period (Requirement 3.13):</p>	<p>Yes:</p> <p>Intended storage period:</p> <p>→ BIOSOLIDS MUST NOT BE STORED FOR LONGER THAN 12 MONTHS IN TEMPORARY FIELD STORES</p>	<p>No:</p> <p>→ BIOSOLIDS IN TEMPORARY FIELD STORAGE MUST NOT RISK CAUSING DIFFUSE POLLUTION</p>
<p>8. Will the biosolids be placed in temporary field storage sites at the place where they are to be used? (Requirement 3.4)</p> <p>If 'yes' indicate the name and reference of the fields where the biosolids are to be temporarily stored:</p>	<p>Yes:</p> <p>Field name and reference:</p>	<p>No:</p> <p>→ BIOSOLIDS MUST ONLY BE PLACED IN TEMPORARY FIELD STORAGE AT THE PLACE WHERE THEY ARE TO BE USED.</p>
<p>9. Indicate the name and address of the customer (farmer/grower) whose land will be used to temporarily store biosolids:</p>		
<p>10. Will the biosolids be placed in temporary field storage that will be no greater than 1,250 tonnes (fresh weight)? (Requirement 3.8)</p>	<p>Yes:</p>	<p>No:</p> <p>→ ENSURE STOCKPILES ARE NO GREATER THAN 1,250 TONNES</p>
<p>11. Will the biosolids be placed in temporary field storage further than 10 metres from any watercourse (Requirement 3.9) and further than 50 metres from any spring, well, or any borehole <u>not</u> used to supply water for domestic or food production purposes? (Requirement 3.10)</p>	<p>Yes:</p>	<p>No:</p> <p>→ ENSURE STOCKPILES ARE FURTHER THAN 10 METRES FROM ANY WATERCOURSE AND 50 METRES FROM ANY SPRING, WELL OR BOREHOLE NOT USED TO SUPPLY WATER FOR DOMESTIC OR FOOD PRODUCTION.</p>
<p>12. Will the biosolids be placed in temporary field storage further than 250 metres from any borehole used to</p>	<p>Yes:</p>	<p>No:</p>

supply water for domestic or food production purposes? (Requirement 3.11)		→ ENSURE STOCKPILES ARE FURTHER THAN 250 METRES FROM ANY SPRING, WELL OR BOREHOLE USED TO SUPPLY WATER FOR DOMESTIC OR FOOD PRODUCTION.
13. Will the biosolids be placed in temporary field stockpiles outside of an Environment Agency Groundwater Source Protection Zone 1? (Requirement 3.14)	Yes:	<b>No:</b>  → ENSURE STOCKPILES ARE NOT POSITIONED IN AN ENVIRONMENT AGENCY GROUNDWATER SOURCE PROTECTION ZONE 1.
14. Will the biosolids be placed in temporary field stockpiles at a suitable distance (depending on biosolids condition, prevailing wind direction, etc.) from domestic, public, recreational and industrial properties so as not to cause odour nuisance? (Requirement 3.15)  State the distance between field storage sites and domestic, public, recreational and industrial properties:	Yes:  Distance to properties  Domestic: Public: Recreational: Industrial:	<b>No:</b>  → SELECT NEW STORAGE AREA - THE PROPOSED SITE MUST NOT BE USED FOR TEMPORARY STORAGE
15. Nitrate Vulnerable Zones (NVZs): Is the proposed storage area within a designated Nitrate Vulnerable Zone?	Yes:	<b>No:</b>
	If 'Yes' – answer questions 16 – 18	If 'No' – go to question 19
16. NVZs: Will the biosolids (cake) temporary field storage heaps occupy as small a surface area as is practically required to support the mass of the heap and prevent it from collapsing? (Requirement 3.6)	Yes:	<b>No:</b>  → BIOSOLIDS TEMPORARY FIELD HEAPS MUST OCCUPY AS SMALL A SURFACE AREA AS IS PRACTICALLY REQUIRED.
17. NVZs: Have at least two years passed since the proposed site was previously used for temporarily storing biosolids? (Requirement 3.7)	Yes:	<b>No:</b>  → SELECT NEW STORAGE AREA - THE PROPOSED SITE MUST NOT BE USED FOR TEMPORARY STORAGE
18. NVZs: Is the proposed storage area within 10 metres of a surface water course, or an effective field drain, or within 30 metres of a water course where the land has a slope of >12°? (Requirement 3.11)	<b>Yes:</b>  → SELECT NEW STORAGE AREA - THE PROPOSED SITE MUST NOT BE USED FOR TEMPORARY STORAGE	<b>No:</b>
19. Sign and date to confirm the information you have provided in 1 – 18 is true and accurate:	Sign:	
	Date:	

## 8. Biosolids Transportation and Storage evidence document template (Scotland)

<b>BIOSOLIDS TRANSPORTATION AND STORAGE EVIDENCE DOCUMENT TEMPLATE (Scotland)</b>		
Overview (I – II):		
<p>III. This form has two purposes:</p> <ul style="list-style-type: none"> <li>If you (or an organisation that you sub-contract) have internal documents in place that already demonstrate how a storage site is selected (to minimise diffuse pollution, odour or other potential nuisance), this form can be used by you to cross-check that all of the criteria required by the BAS Standard are included in them. Note the BAS does not require that this form supersedes, or is used instead of your existing internal documents, it should be used as a reference to cross-check your documents and revise them if required.</li> <li>If you do not have an internal document to demonstrate your conformance with the Standard sections three or four, this form can be used as a template, by you or your sub-contractor.</li> </ul> <p>IV. Your own internal documentation may include other best practice requirements (for example, health and safety considerations) which is not part of the BAS Standard and is therefore not included in this form.</p>		
Please read the notes (I – II) below before completing this form:		
<p>III. This form or an equivalent form must be completed <u>before</u> biosolids are stored in either temporary biosolids field storage or permanent biosolids storage.</p> <p>IV. Your answers should be provided in the light brown shaded fields. If a red ‘yes’ or ‘no’ is indicated, the proposed area must not be used to store Certified Biosolids and a new site or area must be selected or other action (indicated for some questions) must be taken.</p>		
<b>Field transportation and storage record number:</b>		
<b>Associated application record number:</b>		
1. Source: Indicate the name/reference of the Sludge Treatment Centre or Processing Facility where the biosolids to be stored have been produced:		
2. Biosolids description: Indicate the biosolids characteristics:	Biosolids type:	
	Dry solids content:	
	Treatment standard:	
3. Transport: Are biosolids transported from the Processing Facility by registered waste carriers in vehicles that adequately contain and cover the biosolids? (Requirement 4.1).		
	Yes:	No:
		→ ENSURE BIOSOLIDS ARE ADEQUATELY TRANSPORTED TO AVOID SPILLAGE AND MINIMISE ODOUR NUISANCE.

<p>4. Permanent storage: Are biosolids transported from the Processing Facility to permanent storage areas before temporary field storage?</p> <p>If 'yes' indicate where the permanent storage site(s) are located:</p>	<p>Yes:</p> <p>Location:</p>	<p>No:</p>
<p>5. Permanent storage: Nitrate Vulnerable Zones (NVZs) only: Does the permanent storage site(s) that are utilised have an impermeable surface and either have a facility to collect, store and recover run-off or the biosolids must be covered with waterproof covering? (Requirement 4.2)</p> <p>If 'yes' indicate where the permanent storage sites are located (including permanent storage at the Processing Facility):</p>	<p>Yes:</p> <p>Location:</p>	<p>No:</p> <p>→ ENSURE PERMANENT STORAGE SITES HAVE AN IMPERMEABLE SURFACE AND ENABLE EITHER RUN-OFF LIQUID (DRAINAGE) TO BE COLLECTED OR THE BIOSOLIDS ARE COVERED.</p>
<p>6. Permanent storage: Does the biosolids in storage take up less than ninety per cent of the available capacity of the storage facility? (Requirement 4.3)</p>	<p>Yes:</p>	<p>No:</p> <p>→ ENSURE THE VOLUME OF BIOSOLIDS DOES NOT EXCEED NINETY PER CENT OF THE AVAILABLE CAPACITY OF THE STORAGE FACILITY.</p>
<p>7. Permanent storage: Does the permanent storage adequately contain the biosolids and are members of the public unable to gain access to it? (Requirement 4.4)</p>	<p>Yes:</p>	<p>No:</p> <p>→ ENSURE PERMANENT STORAGE SITES CONTAIN THE BIOSOLIDS AND THAT THE PUBLIC ARE UNABLE TO ACCESS TO IT.</p>
<p>8. Temporary field storage: Are the biosolids (cake) dispatched for temporary field storage solid enough to be stored in a free draining heap, and unlikely to allow free drainage from within the stacked material to minimise the risk of temporary diffuse pollution during the intended period of storage? (Requirement 4.6)</p> <p>Indicate the intended storage period (Requirement 4.12):</p>	<p>Yes:</p> <p>Intended storage period:</p> <p>→ BIOSOLIDS MUST NOT BE STORED FOR LONGER THAN 6 MONTHS IN TEMPORARY FIELD STORES</p>	<p>No:</p> <p>→ BIOSOLIDS IN TEMPORARY FIELD STORAGE MUST NOT RISK CAUSING DIFFUSE POLLUTION</p>
<p>9. Will the biosolids be placed in temporary field storage sites at the place where they are to be used? (Requirement 4.5)</p> <p>If 'yes' indicate the name and reference of the fields where the biosolids are to be temporarily stored:</p>	<p>Yes:</p> <p>Field name and reference:</p>	<p>No:</p> <p>→ BIOSOLIDS MUST ONLY BE PLACED IN TEMPORARY FIELD STORAGE AT THE PLACE WHERE THEY ARE TO BE USED.</p>



10. Indicate the name and address of the customer (farmer/grower) whose land will be used to temporarily store biosolids:		
11. Will the biosolids be placed in temporary field storage further than 10 metres from any inland or coastal waters (Requirement 4.8)	Yes:	<b>No:</b> → ENSURE STOCKPILES ARE FURTHER THAN 10 METRES FROM ANY INLAND OR COASTAL WATERS.
12. Will the biosolids be placed in temporary field storage further than 50 metres from any well, borehole or similar work sunk into underground strata for the purpose of any water supply other than a domestic water supply? (Requirement 4.9)	Yes:	<b>No:</b> → ENSURE STOCKPILES ARE FURTHER THAN 50 METRES FROM ANY WELL, BOREHOLE OR SIMILAR WORK SUNK INTO UNDERGROUND STRATA FOR THE PURPOSE OF ANY WATER SUPPLY OTHER THAN A DOMESTIC WATER SUPPLY.
13. Will the biosolids be placed in temporary field storage further than 250 metres from any well, borehole or similar work sunk into underground strata for the purpose of a domestic water supply? (Requirement 4.9)	Yes:	<b>No:</b> → ENSURE STOCKPILES ARE FURTHER THAN 250 METRES FROM ANY WELL, BOREHOLE OR SIMILAR WORK SUNK INTO UNDERGROUND STRATA FOR THE PURPOSE OF A DOMESTIC WATER SUPPLY.
14. Will the biosolids be placed in temporary field stockpiles at a suitable distance (depending on biosolids condition, prevailing wind direction, etc.) from domestic, public, recreational and industrial properties so as not to cause odour nuisance? (Requirement 4.13)  State the distance between field storage sites and domestic, public, recreational and industrial properties:	Yes:  Distance to properties  Domestic: Public: Recreational: Industrial:	<b>No:</b>  → SELECT NEW STORAGE AREA - THE PROPOSED SITE MUST NOT BE USED FOR TEMPORARY STORAGE
15. Nitrate Vulnerable Zones (NVZs): Is the proposed storage area within a designated Nitrate Vulnerable Zone?	Yes:	<b>No:</b>
	If 'Yes' – answer questions 16 – 18	If 'No' – go to question 19
16. NVZs: Have at least two years passed since the proposed site was previously used for temporarily storing biosolids? (Requirement 4.7)	Yes:	<b>No:</b> → SELECT NEW STORAGE AREA - THE PROPOSED SITE MUST NOT BE USED FOR TEMPORARY STORAGE.
17. NVZs: Is the proposed storage area on any area of land that slopes down toward a body of surface water and has a slope of 12 degrees or more? (Requirement 4.10)	<b>Yes:</b>  → SELECT NEW STORAGE AREA - THE PROPOSED SITE MUST NOT BE USED FOR TEMPORARY STORAGE	<b>No:</b>

<p>18. NVZs: Is the proposed storage area located in any area identified on the risk assessment map (prepared under Regulation 5(4) of the NVZ Scotland Regulations 2008), as being of high risk to the water environment or in any other location where there is a significant risk of nitrogen from the field heap entering a body of surface water? (Requirement 4.11)</p>	<p>Yes:</p> <p>→ SELECT NEW STORAGE AREA - THE PROPOSED SITE MUST NOT BE USED FOR TEMPORARY STORAGE</p>	<p>No:</p>
<p>19. Sign and date to confirm the information you have provided in 1 – 18 is true and accurate:</p>	<p>Sign:</p>	
	<p>Date:</p>	

## 9. Soil Sampling Guidelines

### Biosolids Nutrient Management Matrix

#### *Soil Sampling Guidelines*

##### **1. Field sampling**

The soil sample must be representative of the area sampled. Areas of land known to differ in some important respects (e.g. soil type, previous cropping, applications of manures, fertiliser or lime) should be sampled separately. Small areas known to differ from the majority of a field should be excluded from the sample.

A sample of 25 individual sub-samples (cores) will be adequate for a uniform area. The sub-sampling points must be selected systematically, with an even distribution over the whole area. This may be achieved by following the pattern of a letter 'W' and taking sub-samples at regular intervals. Do not take samples in headlands, or in the immediate vicinity of hedges, trees or other unusual features.

##### **2. Precision farming sampling**

A number of companies (e.g. SOYL, Soil Quest, Courtyard etc.) undertake the precision mapping of soil P (plus pH, K and Mg) status, usually based on one hectare blocks. In the case of manufactured fertiliser P and K inputs, variable rate applications are made to each one hectare (or group of one hectare blocks). In the case of biosolids application, such variable rate applications are not made presently, hence, the biosolids application policy should be based on the highest Soil P Index of each management unit, as this is the most representative approach for the unit of land.

- **Sampling depth**

Uniformity of sampling depth is particularly important where crops are established without ploughing or in established grassland. Where there is little or no mixing of the topsoil, nutrients from fertiliser and manures tend to remain in the surface few centimetres of the soil.

Standard depth for sampling (depending on the crop rotation):

Arable and field vegetables	Sample to 15 cm depth
Long term grassland	Sample to 7.5 cm depth

- **Sampling equipment**

A gouge corer or screw auger may be used when sampling in arable or vegetable systems, or for fruit, vines and hops.

In grassland systems or where the soil is not cultivated, only use a gouge or pot corer which can take an even core of soil throughout the sampling depth. This is not possible using a screw auger which should *not* be used in these situations.

- **Sampling frequency**

Sampling for nutrients and pH status should be undertaken at least every 5 years.

Sampling must be carried out at a time when the soil nutrient status is in a settled state. To allow meaningful comparison between analysis results from different 3-5 year cycles, a sampling strategy should be developed, so that samples are taken at the same point in the rotation and with respect to recent fertiliser or manure applications and soil cultivations.

- Leave as long as possible between the last fertiliser or manure application. If possible, sample *after* the last fertiliser or manure application has been cultivated into the soil.
- Do *not* sample within six months of a lime or fertiliser application (except nitrogen).
- Sample at the same point in the rotation and well before growing a sensitive crop (e.g. sugar beet).
- Avoid sampling when the soil is very dry.

## 10. Safe Sludge 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.)  Stone fruit (plums, cherries etc.)  Soft fruit (currants and berries)  Vines Hops  Nuts	Lettuce Radish Onions Beans (including runner, broad and dwarf French) Vining peas Mangetout Cabbage Cauliflower Calabrese/broccoli Courgettes Celery Red beet Carrots Herbs Asparagus Garlic Shallot Spinach Chicory Celeriac	Potatoes Leeks Sweetcorn Brussels sprouts Parsnips Swedes/turnips Marrows Pumpkins Squashes Rhubarb Artichokes	Soil based glasshouse and polythene tunnel production (including tomatoes, cucumbers, peppers etc.) Mushrooms Nursery stock and bulbs for export Basic nursery stock  Seed potatoes for export Basic seed potatoes  Basic seed production	Wheat Barley Oats Rye Triticale Field peas Field beans Linseed/flax Oilseed 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

## 11. Biosolids Nutrient Management Matrix, 2014

### 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<sub>2</sub>O<sub>5</sub> (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<sup>st</sup> 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 other</i> biosolids types
0/1/2	250 kg/ha total N in any twelve month period	250 kg/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

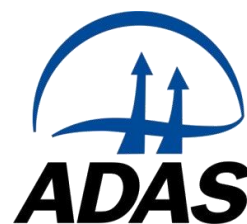
<sup>b</sup> Composted biosolids can be applied annually and <sup>c</sup> can be applied 1 year in 2

## 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.

**JANUARY 2014**





## 12. Field Application evidence document template (England and Wales)

<b>FIELD APPLICATION EVIDENCE DOCUMENT TEMPLATE (England and Wales)</b>		
Overview (I – II):		
<p>V. This form has two purposes:</p> <ul style="list-style-type: none"> <li>If you (or an organisation that you sub-contract) have internal documents in place that already demonstrate how field application sites are selected (to minimise diffuse pollution, odour or other potential nuisance), this form can be used by you to cross-check that all of the criteria required by the BAS Standard are included in them. Note the BAS does not require that this form supersedes, or is used instead of your existing internal documents, it should be used as a reference to cross-check your documents and revise them if required.</li> <li>If you do not have an internal document to demonstrate your conformance with the Standard sections six or seven, this form can be used as a template, by you or your sub-contractor.</li> </ul> <p>VI. Your own internal documentation may include other best practice requirements (for example, health and safety considerations) which is not part of the BAS and is therefore not included in this form.</p>		
Please read the notes (I – II) below before completing this form:		
<p>V. This form or an equivalent must be completed <u>before</u> biosolids are applied to a field or any land area.</p> <p>VI. Your answers should be provided in the light brown shaded fields. If a red ‘yes’ or ‘no’ is marked, biosolids must not be applied to the proposed land area or field and a new site must be selected.</p>		
<b>Field Application record number:</b>		
<b>Associated transportation and storage record number:</b>		
20. Source: Indicate the name/reference of the Sludge Treatment Centre or Processing Facility where the biosolids to be applied have been produced:		
21. Indicate the name and address of the customer (farmer/grower) whose land is to be applied with biosolids:		
22. Indicate the name/reference of the fields or ‘part of fields’ and the field size (effective area - Ha) which biosolids are to be applied:		
23. Are the biosolids to be applied between March and August in advance of stock fodder crops (not including maize for silage) for consumption before winter frosts? (Requirement 5.9)	Yes:  → APPLICATION MUST NOT PROCEED	No:
24. Is the application area water logged, flooded, frozen hard or snow covered? (Requirement 6.4)	Yes:	No:

	→ APPLICATION MUST NOT PROCEED	
25. Has advice been provided to the farmer that solid biosolids (sludge cake/granules) are incorporated into the soil within 24 hours of application (or as is reasonably practicable thereafter) and liquid biosolids are incorporated within 6 hours of application? (Requirement 6.11) Record the planned time of application: Record the intended time of incorporation:	Yes:  Application: Incorporation:	No:  → APPLICATION MUST NOT PROCEED
26. Can you ensure biosolids will not be applied within 50 metres of an identified spring, well or borehole used for human consumption or for dairies? (Requirement 6.3)	Yes:	No:  → APPLICATION MUST NOT PROCEED
27. Can you ensure biosolids will not be applied within 10 metres of the surface water course (or within 6 metres if precision liquid application equipment is used)? (Requirement 6.2)	Yes:	No:  → APPLICATION MUST NOT PROCEED
28. Will the application conform to the requirements of the Biosolids Nutrient Management Matrix? (Requirement 6.6)	Yes:	No:  → APPLICATION MUST NOT PROCEED
29. Can you ensure biosolids will not be applied in the Environment Agency Groundwater Source Protection Zone 1? (Requirement 6.8)	Yes:	No:  → APPLICATION MUST NOT PROCEED
30. Can you ensure the aerosol effect from liquid biosolids will be kept to a minimum including use of equipment with low discharge points? (Requirement 6.10)	Yes:	No:  → APPLICATION MUST NOT PROCEED
31. Can you ensure biosolids will be applied at a suitable distance (depending on biosolids condition, prevailing wind direction, etc.) from domestic, public, recreational and industrial properties so as not to cause odour nuisance and taking account of any odour complaints previously received (odour complaints should be used as corrective action)? (Requirement 6.12)  State the nearest distance between the field application area and domestic, public, recreational and industrial properties:	Yes:  Distance to properties  Domestic:  Public:  Recreational:  Industrial:	No:  → APPLICATION MUST NOT PROCEED
32. Nitrate Vulnerable Zones (NVZs): Is the proposed application area within a designated Nitrate Vulnerable Zone?	Yes:	No:

	If 'Yes' – answer questions 14 – 16	If 'No' – go to question 16
33. Does the proposed application area have a slope greater than 12° where there is significant risk of nitrogen getting into surface water? (Requirement 6.5)	<b>Yes:</b>  → APPLICATION MUST NOT PROCEED	<b>No:</b>
34. Can you ensure biosolids with high readily available nitrogen (>30%) will not be applied during the specified 'closed periods'? (Requirement 6.7)	<b>Yes:</b>	<b>No:</b>  → APPLICATION MUST NOT PROCEED
35. Sign and date to confirm the information you have provided in 1 – 15 is true and accurate:	Sign:	
	Date:	

### 13. Field Application evidence document template (Scotland)

<b>FIELD APPLICATION EVIDENCE DOCUMENT TEMPLATE (Scotland)</b>		
Overview (I – II):		
<p>VII. This form has two purposes:</p> <ul style="list-style-type: none"> <li>If you (or an organisation that you sub-contract) have internal documents in place that already demonstrate how field application sites are selected (to minimise diffuse pollution, odour or other potential nuisance), this form can be used by you to cross-check that all of the criteria required by the BAS Standard are included in them. Note the BAS does not require that this form supersedes, or is used instead of your existing internal documents, it should be used as a reference to cross-check your documents and revise them if required.</li> <li>If you do not have an internal document to demonstrate your conformance with the Standard sections six or seven, this form can be used as a template, by you or your sub-contractor.</li> </ul> <p>VIII. Your own internal documentation may include other best practice requirements (for example, health and safety considerations) which is not part of the BAS and is therefore not included in this form.</p>		
Please read the notes (I – II) below before completing this form:		
<p>VII. This form or an equivalent must be completed <u>before</u> biosolids are applied to a field or any land area.</p> <p>VIII. Your answers should be provided in the light brown shaded fields. If a red ‘yes’ or ‘no’ is marked, biosolids must not be applied to the proposed land area or field and a new site must be selected.</p>		
<b>Field Application record number:</b>		
<b>Associated transportation and storage record number:</b>		
36. Source: Indicate the name/reference of the Sludge Treatment Centre or Processing Facility where the biosolids to be applied have been produced:		
37. Indicate the name and address of the customer (farmer/grower) whose land is to be applied with biosolids:		
38. Indicate the name/reference of the fields or ‘part of fields’ and the field size (effective area - Ha) which biosolids are to be applied:		
39. Are the biosolids to be applied between March and August in advance of stock fodder crops (not including maize for silage) for consumption before winter frosts? (Requirement 5.9)	<b>Yes:</b>  → APPLICATION MUST NOT PROCEED	<b>No:</b>

<p>40. Is the proposed application area on steeply sloping fields or is the soil wet or waterlogged, or is there a risk of flooding, or has the soil has been frozen for 12 hours or longer in the preceding 24 hours, or is the land is covered by snow? (Requirement 7.4)</p>	<p>Yes:</p> <p>→ APPLICATION MUST NOT PROCEED</p>	<p>No:</p>
<p>41. Has advice been provided to the farmer that solid biosolids (sludge cake/granules) are incorporated into the soil within 24 hours of application (or as is reasonably practicable thereafter) and liquid biosolids are incorporated within 6 hours of application? (Requirement 7.12) Record the planned time of application: Record the intended time of incorporation:</p>	<p>Yes:</p> <p>Application: Incorporation:</p>	<p>No:</p> <p>→ APPLICATION MUST NOT PROCEED</p>
<p>42. Can you ensure biosolids will not be applied within 50 metres of any spring, well, borehole or similar work sunk into underground strata for the purposes of any water supply? (Requirement 7.3)</p>	<p>Yes:</p>	<p>No:</p> <p>→ APPLICATION MUST NOT PROCEED</p>
<p>43. Can you ensure biosolids will not be applied within 10 metres of a surface water-course or body of water? (Requirement 7.2)</p>	<p>Yes:</p>	<p>No:</p> <p>→ APPLICATION MUST NOT PROCEED</p>
<p>44. Will the application conform to the requirement that the application must not impair the quality of soil or surface water or ground water? (Requirement 7.6)</p>	<p>Yes:</p>	<p>No:</p> <p>→ APPLICATION MUST NOT PROCEED</p>
<p>45. Will the application take account of the nutrient requirements of crops? (Requirement 7.6)</p>	<p>Yes:</p>	<p>No:</p> <p>→ APPLICATION MUST NOT PROCEED</p>
<p>46. Can you ensure the aerosol effect from liquid biosolids will be kept to a minimum including use of equipment with low discharge points? (Requirement 7.11)</p>	<p>Yes:</p>	<p>No:</p> <p>→ APPLICATION MUST NOT PROCEED</p>
<p>47. Can you ensure biosolids will be applied at a suitable distance (depending on biosolids condition, prevailing wind direction, etc.) from domestic, public, recreational and industrial properties so as not to cause odour nuisance and taking account of any odour complaints previously received (odour complaints should be used as corrective action)? (Requirement 7.10)  State the nearest distance between the field application area and domestic, public, recreational and industrial properties:</p>	<p>Yes:</p> <p>Distance to properties</p> <p>Domestic: Public: Recreational:</p>	<p>No:</p> <p>→ APPLICATION MUST NOT PROCEED</p>

	Industrial:	
48. Nitrate Vulnerable Zones (NVZs): Is the proposed application area within a designated Nitrate Vulnerable Zone?	Yes:	No:
	If 'Yes' – answer questions 14 – 19	If 'No' – go to question 19
49. NVZs: Is there a significant risk of pollution particularly where the slope of the land is >12°? (Requirement 7.5)	<b>Yes:</b> → APPLICATION MUST NOT PROCEED	No:
50. NVZs: Will applications of biosolids to individual fields not exceed 250 kg/ha of total nitrogen in any twelve month period? (Requirement 7.6)	Yes:	<b>No:</b> → APPLICATION MUST NOT PROCEED
51. NVZs: Can you ensure biosolids with high readily available nitrogen (>30%) will not be applied during the specified 'closed periods'? (Requirement 7.7)	Yes:	<b>No:</b> → APPLICATION MUST NOT PROCEED
52. NVZs: Can you confirm that biosolids with high readily available nitrogen content (>30%) will only be applied to bare ground and stubble during the months of July, August and September if the land to which it is applied will be drilled with a crop within six weeks of the first application? (Requirement 7.8)	Yes:	<b>No:</b> → APPLICATION MUST NOT PROCEED
53. NVZs: Can you confirm that biosolids with high readily available nitrogen content (>30%) will not be applied to land in excess of 30 m <sup>3</sup> per hectare during the specified 'closed periods'? (Requirement 7.9)	Yes:	<b>No:</b> → APPLICATION MUST NOT PROCEED
54. Sign and date to confirm the information you have provided in 1 – 18 is true and accurate:	Sign:	
	Date:	

## Glossary

Biosolids	Sewage sludge and; or organic material that contains sewage sludge that is processed and treated at Processing Facilities according to legislative and good practice requirements to produce biosolids.
Certification Body	Organisations appointed by the Scheme Company to assess an organisation's conformance to the requirements of the Scheme standards and Scheme Protocols.
Certified biosolids	Biosolids that have been treated and recycled by a single organisation or multiple organisations that have been issued with a Certificate of Conformity by a Certification Body for the full scope of the Scheme.
Certificate of Conformity	The document issued by the Certification Body verifying conformity with the Standard for the elected scope of activities.
Conventionally treated	As described in the Safe Sludge Matrix, this applies to biosolids with a maximum allowable concentration (MAC) of <u>100,000</u> <i>E. coli</i> per g dry solids. This is sometimes referred to as achieving 5 Log.
Corrective action	Action taken to remedy deviations from HACCP Critical Limits and other requirements in the Standard.
Curtilage	Land adjacent to a sludge treatment centre managed by the Processing Facility.
Duty of care	A legal obligation where the organisation must take responsibility for providing services to a reasonable standard of care.
Enhanced treated	As described on the Safe Sludge Matrix, this applies to biosolids with a maximum allowable concentration (MAC) of <u>1,000</u> <i>E. coli</i> per g dry solids (This is sometimes referred to as achieving 3 Log) and the absence of <i>Salmonella spp.</i>
Effective field drain	A field drain that is in working order and will be functional under suitable conditions
Log reduction	The extent of microbiological parameter destruction during the sludge treatment process. For example, a 2-log <i>E. coli</i> reduction is 100-fold lower than the original value.
Permanent biosolids storage	Biosolids storage facilities that are not within the curtilage of the Processing Facility and are intended for continuous use.
Processing Facility	Sites where sludge and other materials are treated.
Quarantined sludge	The physical isolation of sludge by separate storage from other treated sludge for treated sludge that has failed a routine schedule sample or for a deviation outside HACCP critical limits or a plant failure, the potentially non-conforming material must be quarantined, where it is destined for recycling to agricultural land.

Sludge treatment centre (STC)	Processing Facility where untreated sludge is treated to a prescribed standard to produce biosolids.
Temporary biosolids field storage	Short term biosolids field storage at the place where they are to be used.
Validation Period	This is the period of time allowed to demonstrate conformity with the Standard.
Validation Phase	This is the phase during which microbiological parameters log reduction evidence of the sludge treatment process is compiled.
Verification	Confirmation of compliance with all the elements of the HACCP plan.
Wastewater	Waste water from domestic premises and/or industrial waste water and/or run-off rain water.
Wastewater treatment works (WWTW)	Processing Facilities used to treat sewage (wastewater) where the effluent is returned to a water course and untreated sludge is collected.



## Abbreviations

CCP	Critical Control Point –a step in a process where a specified hazard can be eliminated or minimised to an acceptable level.
Cfu/g	Colony forming units per gram.
CL	Critical Limit – a specific value that determines acceptable limits at Critical Control Points.
CoGAP	Code of Good Agricultural Practice.
COP	Code of Practice.
Defra	Department for Environment, Food and Rural Affairs.
<i>E. coli</i>	<i>Escherichia coli</i> .
EA	Environment Agency.
GW SPZ	Groundwater Source Protection Zone.
HACCP	Hazard analysis critical control point – a food industry based system for identifying, assessing and controlling potential hazards.
MAC	Maximum allowable concentration.
MCERTS	Environment Agency monitoring certification scheme.
N	Nitrogen.
NVZ	Nitrate Vulnerable Zone.
P	Phosphorus.
P <sub>2</sub> O <sub>5</sub>	Phosphate. Can be calculated as P x 2.215
PTE	Potentially toxic element.
<i>Salmonella</i> spp.	<i>Salmonella</i> species.
SEPA	Scottish Environment Protection Agency.
SMR	Statutory management requirement.
SSM	Safe Sludge Matrix.
STC	Sludge Treatment Centre.
STW	Sewage Treatment Works.
UKAS	United Kingdom Accreditation Service.
UKWIR	United Kingdom Water Industry Research.
WWTW	Wastewater treatment works.

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