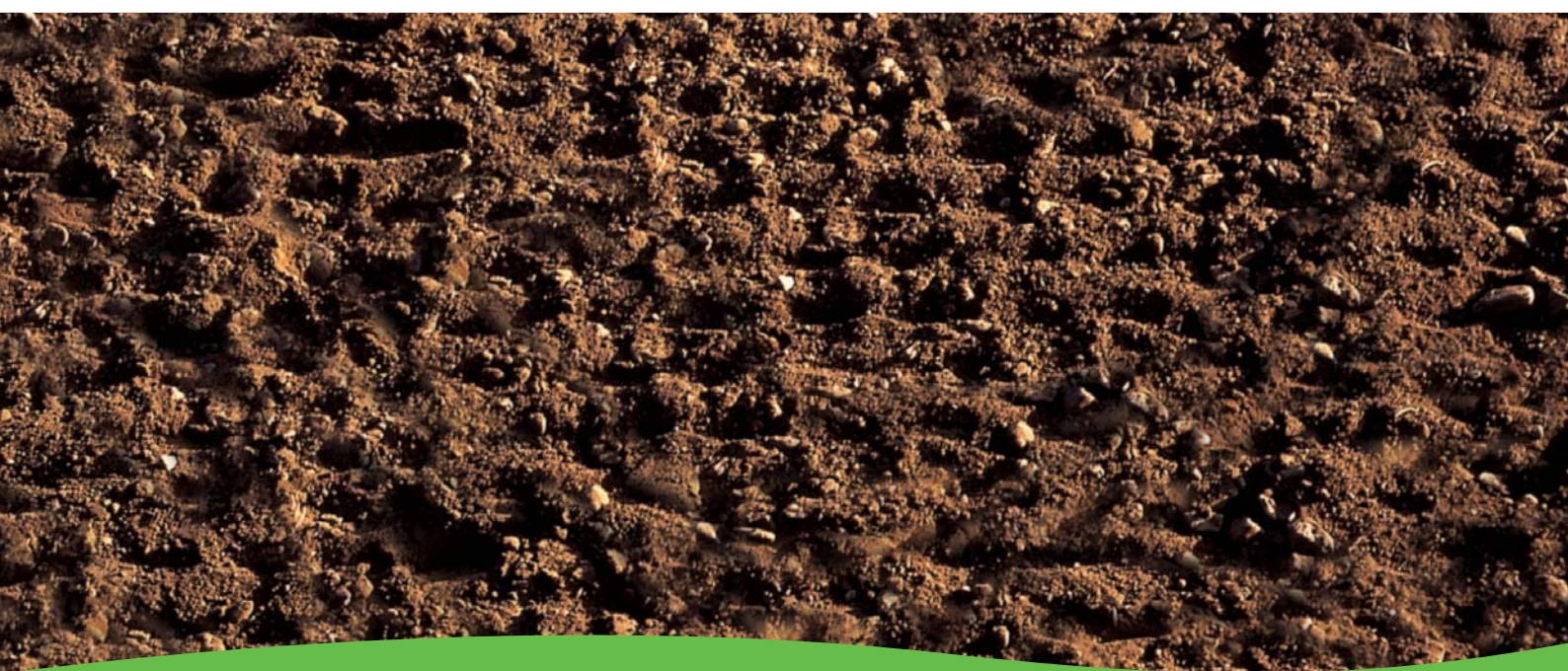




# Nutrient Management Plan

*Created by the industry, for the industry*





# Introduction

In this second edition of the *Tried & Tested Nutrient Management Plan*, the industry (AIC, FWAG, LEAF, NFU and CLA) has worked together to deliver an aid to making nutrient planning and recording simple and practical for you and your farm.

By using this plan you can manage your nutrients efficiently to save money and reduce environmental risks. The plan will also help you meet the latest NVZ regulations in a step-by-step, manageable way.

By working together we believe we can ensure we remain a profitable and responsible industry.

The guidance is an aid to nutrient management planning and can help users meet the requirements of the NVZ regulations, where these apply. Whilst the Professional Nutrient Management Group (Industry) has used its best endeavours to ensure the accuracy of the guidance, we cannot accept any responsibility or liability from its use.

Supported by –



Ensure any adviser you use for crop nutrient decisions is a current FACTS Qualified Adviser.



This Nutrient Management Plan is designed to be used in conjunction with Defra Fertiliser Manual (RB209). For specific guidance In Northern Ireland, Scotland and Wales consult the relevant national body (see page 16).





# Nutrient Management Plan

This *Nutrient Management Plan* is intended to be used alongside the *Defra Fertiliser Manual (RB209)* and the series of *Guidance for Farmers in Nitrate Vulnerable Zones* leaflets. The *Fertiliser Manual* gives detailed nutrient recommendations for crops and grass together with standard values for the nutrient contents of organic manures. NVZ rules described in this plan are those introduced in January 2009.

Good nutrient management is one of the keys to farm profitability. Broadly, applying nutrients at recommended rates doubles the yield of most crops. Getting things wrong risks yields, profits, the environment and compliance with regulations. Statutory rules for nitrogen management apply in NVZs.

The Nutrient Management Plan includes two recording sheets:

- Farm Record Sheet, for the whole farm;
- Field Record Sheet, for each field.

Completing these forms through the season creates a record of nutrient planning and use.

The Plan also provides useful information sources on nutrient spreading guidance, soil analysis services, professional advice, nutrient storage and fertiliser security.

Priorities in nutrient management change during the season. The *Tried & Tested Nutrient Management Plan* takes you through the main stages in the season, identifying priorities at each stage. While this nutrient plan is designed for farmer use, if in doubt complete with your FACTS Qualified Adviser (FQA).

Some general points will help you get the best from nutrients you apply and avoid unnecessary losses:

- **Do incorporate** poultry manure, slurry or liquid digested sludge spread onto stubble or bare ground within 24 hours of application at the latest (unless slurry is applied by band spreader or injected). This helps minimise run-off and nitrogen loss to air. It is a requirement in NVZs (Guidance Leaflet 8).
- **Do incorporate** any other organic manures as soon as possible and within 24 hours if land is sloping or within 50m of surface water that could receive run-off (NVZ Guidance Leaflet 8).

- **Do not** apply manufactured nitrogen fertilisers, or organic manures, if there is a high risk of run-off, taking account of the slope of the land, land drains, ground cover, proximity to surface water, weather conditions and soil type. Again, this is a requirement in NVZs (Guidance Leaflets 8 and 9) and a sensible precaution to prevent nutrient waste.
- **Do not** apply organic manures within 10m of surface water or within 50m of a borehole, well or spring. (NVZ requirement – Guidance Leaflet 8).
- **Do not** apply manufactured nitrogen fertilisers within 2m of surface water (NVZ Guidance Leaflet 9) or any fertilisers within 2m of the centre of a hedgerow or ditch (Cross-compliance requirement).

- **Never** apply manufactured nitrogen fertilisers, or organic manures, if soil is water-logged, flooded or snow-covered or has been frozen for more than 12 of the preceding 24 hours. This is a requirement in NVZs (Guidance Leaflets 8 and 9). Nitrogen applied under such conditions would be at high risk of loss by leaching or run-off.





# Late Summer/Autumn

## General

### 1. Enter details of all fertiliser and organic manure applications in Part B of the *Field Record Sheets*.

Nutrient content of organic manures – both total and crop available nutrient contents – are given in section 2 of the *Fertiliser Manual*.

In NVZs, the standard values in Guidance Leaflet 3 must be used to calculate the crop available N content of livestock manures for N<sub>max</sub>. Use the Organic Manure Sheet for planned and completed manure applications before transferring information to the *Field Record Sheet*. Total nitrogen is needed for checking NVZ field limit and crop available nitrogen (equivalent to fertiliser nitrogen) for adjusting fertiliser application rates. If the soil is at target Index (2 for P; 2- for K) or higher, the total P<sub>2</sub>O<sub>5</sub> or K<sub>2</sub>O content should be used to adjust fertiliser applications. If the Index is lower than target, the available P<sub>2</sub>O<sub>5</sub> or K<sub>2</sub>O should be used.

### 2. Ensure there is a current (less than four years old) soil analysis report for every field. If not, get samples taken and analysed for P, K, Mg and pH.

Fields should be sampled every 3 to 5 years (see page 16 for soil analytical laboratories). Always take samples for a particular field at the same time of year. Autumn is usually most convenient for arable crops but spring may be better for grassland. Enter P and K Indices in the *Field Record Sheet*.

Target soil Indices for P are 2 and for K are 2-. Try to avoid Indices falling below these targets – it is expensive to raise Indices and full yield may not be achieved at low Indices even where nutrient recommendations are followed.

*Indices higher than the target are unnecessary and there may be greater risk of phosphorus-enriched soil particles moving to surface waters.*

On some sand soils, leaching over winter can lead to significant potassium loss. It may not be possible to maintain these soils at K Index 2- and a target Index of 1+ (100mg K/l) is more suitable. If so, apply the potash maintenance rate at this Index.

### 3. Start completing the *Farm Record Sheet* for the coming crop.

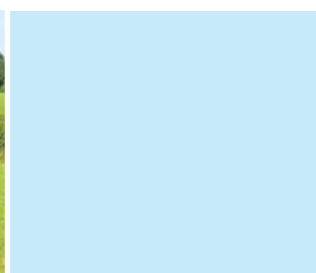
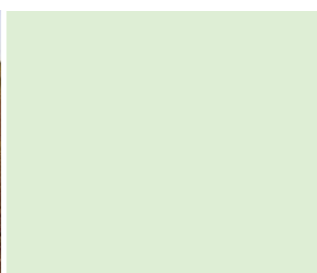
Ensure any adviser you use for crop nutrient decisions is a current FACTS Qualified Adviser (FQA).

If you calibrated or tray tested any fertiliser spreaders during the past year, enter dates in the *Farm Record Sheet*.

High rainfall means a total of over 700mm (28 inches)/year; medium is 600–700mm (24–28 inches); low is under 600mm (24 inches). If you have a rain gauge or access to local weather data, it is best to leave this entry until spring as current winter rainfall may differ from the average. Rainfall over winter affects how much soil nitrogen carries over to spring and hence a crop's fertiliser requirement.

### 4. Start completing *Field Record Sheets* for current or coming crops.

Use one sheet for each field and enter field name, area, current and previous crop and last liming date.





## Late Summer/Autumn

### Grassland

Closed periods in NVZs for spreading organic manures with high readily-available nitrogen (eg. slurry and poultry manure) begin on 1 September on sandy or shallow soils and on 15 October on all other soils (NVZ Guidance Leaflet No. 8).

Closed period in NVZs for applying manufactured nitrogen fertilisers begins on 15 September. Limited applications are permitted until 31 October – up to 40 kg N/ha at any one time (NVZ Guidance Leaflets 3 and 9).

#### 5. Decide when to stop applying nitrogen to grazed grass.

Grass can take up nitrogen in autumn but the dry-matter yield response usually is smaller than earlier in the year. Don't confuse grass greening with growth and try to leave short grass over winter.

#### 6. Decide which fields will be used for first cut silage next year.

If any have a soil K Index of 0 or 1, apply some potash (30–60 kg K<sub>2</sub>O/ha) this autumn.

### Arable

Closed periods in NVZs for spreading organic manures with high readily-available nitrogen (eg. slurry and poultry manure) begin on 1 August on sandy or shallow soils and on 1 October on all other soils (NVZ Guidance Leaflet 8). On sandy or shallow soils, the closed period begins on 15 September if a crop has been planted on or before 15 September.

Closed period for applying manufactured nitrogen fertilisers begins on 1 September. Applications are permitted for some crops during the closed period (NVZ Guidance Leaflets 3 and 9).

#### 7. Use soil P, K and Mg Indices to decide on applications to every field. Enter the recommended applications of phosphate and potash in Part A of the Field Record Sheet.

Recommendations for applying phosphate, potash and magnesium are in Section 4 of the *Fertiliser Manual*. It is not necessary to apply the exact amount of phosphate or potash required for each crop in a given year but, over a rotation, total amounts applied should meet the crops' total requirements. So, for example, a small over-application in one year can be adjusted by applying less than the recommended amount the next year.

#### 8. If soil Index is 0 or 1, apply phosphate or potash and mix into the seedbed of autumn-sown crops. At higher Indices, phosphate or potash can be applied either in autumn or in spring for autumn-sown crops.

If soil is sandy, some potash could be lost by leaching over winter. In this case, potash application could be delayed until spring at K Index 1.



## General

Closed period in NVZs for applying organic manures with high readily available nitrogen (eg. slurry and poultry manure) ends on 31 December on sandy or shallow soils and on 15 January on all other soils (NVZ Guidance Leaflet 8).

Between end of the closed period and the last day of February, do not apply more than 50 cu. m/ha of slurry or 8t/ha of poultry manure at any one time with at least three weeks between applications (NVZ Guidance Leaflet No. 8).

Closed period for applying manufactured nitrogen fertilisers ends on 15 January (NVZ Guidance Leaflet No. 9).

### 9. Complete final entries in Farm Record Sheet and Field Record Sheets for the past crop. If in an NVZ, check compliance with the Nmax limit and the livestock manure N limits for the past calendar year.

To check compliance with Nmax use NVZ Guidance Leaflet 7, *The Nmax limit*. The information you will need for each crop in each field for which Nmax applies, is the crop area and the amount of N applied in manufactured fertilisers plus the amount of crop available N applied in livestock manures (take from the Grey box in Part B of the Field Record Sheet). If livestock manure is to be applied to the field, and not just manufactured nitrogen fertilisers, you must first establish the total amount of nitrogen in the manure (using the standard values in NVZ Guidance Leaflet 3, Table 7 or by sampling and analysis) and calculate the available nitrogen in it using the percentages provided in NVZ Guidance Leaflet 3, Table 8.

To check compliance with the farm limit, use the procedure and tables in NVZ Guidance Leaflet 5. You will need records of any organic manure imported to, or exported from, the holding. If you keep livestock, you will need records of livestock types and the time they were kept on farm together with standard figures for production and nitrogen content of livestock manure (NVZ Guidance Leaflet 3).

### 10. If in an NVZ, check the field limit for organic manure nitrogen 250kg total N/ha was not exceeded in any field during any 12 month rolling period (see *Field Records Sheets*).

### 11. Make sure documents you might need in the coming year are available.

Defra Fertiliser Manual, Guidance for Farmers in Nitrate Vulnerable Zones (whichever of the nine Leaflets are relevant), Guide to Cross Compliance, ELS Handbook and Defra Protecting our Water, Soil and Air: A code of Good Agricultural Practice for Farmers, Growers and Land Managers. All are available in hard copy or can be downloaded free from Defra's website ([www.defra.gov.uk](http://www.defra.gov.uk)).

### 12. Make sure you have a recording system for information you need to keep during the year.

The *Farm Record Sheet* and *Field Record Sheets* will hold much of this information, but you also need to record:

- Livestock: numbers and types; days spent on the holding and manure nitrogen produced. This is for the livestock manure nitrogen farm limit calculation (NVZ Guidance Leaflets 3 and 5).
- Any movement of organic manures to, or from, the farm together with details of manure type, amount, nitrogen content and supplier, or recipient (NVZ Guidance Leaflet 5).
- Details of a contingency plan if manure export arrangements fail.
- Manure storage calculation showing capacity for poultry manure and slurry (NVZ Guidance Leaflet 4).
- Fields in which poultry or other organic manures are stored (show on a risk map and record dates of site use) (NVZ Guidance Leaflet 4).
- Copy of the Field Risk Map.

### 13. Check the condition of fertiliser and manure spreaders. Organise any necessary repairs or maintenance. Enter dates of checks in the *Farm Record Sheet*.

### 14. Calibrate fertiliser spreaders/sprayers for every different type and batch of fertiliser that each machine will apply in spring. This helps ensure that the intended rate is applied. Enter calibration dates in the *Farm Record Sheet*.



## Winter

**15. Consider tray tests for fertiliser spreaders to check evenness of spread. Calibration will not check evenness of spread. Enter test dates in the *Farm Record Sheet*.**

Tray-testing is best done by an experienced technician so there may be a cost involved. Bearing in mind the cost of fertiliser and the extra yield good spreading brings, professional tray-testing can be worthwhile. Results are given as a 'coefficient of variation' or 'CV' expressed as a percentage. The higher the CV, the less evenly fertiliser spreads. A CV of 10–15% is acceptable in a tray-test and will prevent crop striping. Surveys indicate that CVs of 30% or more are common for spreaders in use. Improving CV from 30% to 10% will bring a yield benefit of around 0.25t/ha in wheat. (See *Fertiliser Spreaders – Choosing, Maintaining and Using* available from AIC).

**16. Take a longer-term look at application methods used for any organic manures.**

A large proportion of readily available nitrogen in manures can be lost to air if it remains on the soil surface, even for a few hours. Rapid incorporation or use of shallow injection, trailing hose or trailing shoe equipment will minimise nitrogen loss and help get best value from manure.

**17. Where any livestock are kept, examine all feeds used to ensure protein (N) and phosphorus contents do not exceed animal requirement.**

Nutrients from manufactured feeds can be a large proportion of the farm's total input. Some nutrients end up in manures and can be difficult to use efficiently without loss of nitrogen or phosphorus to water or air.

**18. Examine your fertiliser storage and security arrangements.**

Apart from being valuable products, some fertilisers (nitrogen-based) can be a security risk in the wrong hands. There is advice at [www.secureyourfertiliser.gov.uk](http://www.secureyourfertiliser.gov.uk) and a *Ten Point Plan for Fertiliser Security* available free from AIC. It is recommended that fertilisers are purchased from a FIAS (Fertiliser Industry Assurance Scheme) registered supplier.

## Grassland

**19. Decide on the amount of nitrogen, phosphate and potash needed in every field and enter this in Part A of the *Field Record Sheet*.**

Recommendations for nitrogen, phosphate and potash use are in section 7 of the *Fertiliser Manual*.

## Arable

**20. If you intend to use soil mineral nitrogen testing to find the Soil Nitrogen Supply (SNS) Index, organise this before first application, ideally in February or March.**

The Soil Mineral Nitrogen measurements described in the *Fertiliser Manual* involve soil sampling to 90cm. At least 15–20 individual soil cores should be bulked to give one sample representing the field. This is difficult to do manually and mechanised soil sampling is advisable.

**21. Where you know the SNS Index for a field, decide on the amount of nitrogen needed in every field. Enter this and the Index in Part A of the *Field Record Sheet*.**

Recommendations for nitrogen use in different crops are in section 4 of the *Fertiliser Manual*.



## Spring/Early Summer

### General

**22. Enter details of all fertiliser and organic manure applications in Part B of the *Field Record Sheets*.**

Nutrient contents of organic manures (both total and crop available) are given in section 2 of the *Fertiliser Manual*.

In NVZs, the standard values in Guidance Leaflet 3 must be used to calculate the crop available N content of manures for N<sub>max</sub>. Use the *Organic Manure Sheet* for planned and completed manure applications before transferring information to the *Field Record Sheet*. Total nitrogen will be needed for checking the NVZ field limit and crop available nitrogen (equivalent to fertiliser nitrogen) for adjusting fertiliser application rates. If soil is at target Index (2 for P, 2- for K) or higher, total P<sub>2</sub>O<sub>5</sub> or K<sub>2</sub>O content should be used to adjust fertiliser applications. If the Index is lower than target, use available P<sub>2</sub>O<sub>5</sub> or K<sub>2</sub>O.

**23. If in an NVZ, check you can comply with N<sub>max</sub> this year.**

To check compliance with N<sub>max</sub> use NVZ Guidance Leaflet 7, *The N<sub>max</sub> limit*. The information you will need for each crop in each field for which N<sub>max</sub> applies, is the crop area and the amount of N required by the crop (take from the Grey shaded box in Part A of the *Field Record Sheet*). If livestock manure is to be applied to the field, and not just manufactured nitrogen fertilisers, you must first establish the total amount of nitrogen in the manure (using the standard values in NVZ Guidance Leaflet 3, Table 7 or by sampling and analysis) and calculate the available nitrogen in it using the percentages provided in NVZ Guidance Leaflet 3, Table 8.

### Grassland

**24. Decide when first to apply nitrogen. This will normally be about one month before livestock are turned out. Enter the expected amount to be applied over the season in Part A of the *Field Record Sheet*.**

Nitrogen should first be applied when grass growth starts and ground conditions allow. Start of growth can be established using the T200 method – average daily temperatures from 1 January, in °C, are added (treating any negative numbers as zeros) until 200 degrees are reached. However, don't apply nitrogen unless ground is dry enough to allow spreading without soil damage.

### Arable

**25. Identify the SNS Index for every field and enter this in Part A of the *Field Record Sheet*.**

The Soil Nitrogen Supply (SNS) Index is the basis for nitrogen recommendations and will be needed for every field. There are two ways to find the SNS Index – from tables in the *Fertiliser Manual* or through soil testing. To use the tables (Section 3, *Fertiliser Manual*), you need to know soil type, crop grown last year and rainfall. There are three tables (A, B and C), for low, moderate and high rainfall, use the appropriate table for all fields. Ideally, excess winter rainfall for the current winter is needed but in most cases, it is adequate to use average rainfall and adjust the table used if the current winter is exceptionally drier or wetter than average.

If the field has been ploughed out from grass in the past three years, you will need to look also at Table D (Section 3, *Fertiliser Manual*). Check the SNS Index in this table, compare it with the one in Table A, B or C and use the highest of the two values.

Soil testing for available nitrogen can involve sampling to 90cm for use with the *Fertiliser Manual* (full details in Section 3 and Appendix 2) or to shallower depths for some commercial recommendation systems.

**26. Use the SNS Index to decide on the amount of nitrogen needed in every field and enter this and the Index in Part A of the *Field Record Sheet*.**

Recommendations for nitrogen use in different crops are in section 4 of the *Fertiliser Manual*.

## Farm Record Sheet

(Complete as appropriate. Superscripts refer to numbered points in the text.)

Farm address and occupier:
Total cropped/grass area (excluding woodland, roads and hard standing) ha:
FACTS Qualified Adviser: <sup>3</sup> (name and number)

Rainfall (high/medium/low): <sup>3</sup>	All, or part, farm in NVZ: Yes / No
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Any of these used on the farm? (tick or enter):

Fertiliser Manual <input type="checkbox"/>	PLANET <input type="checkbox"/>	MANNER <input type="checkbox"/>	Code of Good Agricultural Practice <input type="checkbox"/>
ELS handbook <input type="checkbox"/>	NVZ Guidelines <input type="checkbox"/>	Industry guidance <input type="checkbox"/>	

Last fertiliser spreader/sprayer(s) checks before this crop year:

Model	Date inspected	Date calibrated	Date tray-tested

Fertiliser spreader/sprayer(s) checks during this crop year:<sup>14, 15</sup>

Model	Date inspected	Date calibrated	Date tray-tested

Manure/slurry spreader(s):<sup>16</sup>

Model	Capacity	Date inspected

### Spreaders/sprayers

- Check the mechanical condition of equipment in spring and at intervals through the season.
- Calibrate fertiliser spreaders/sprayers to check rate of application before use in spring and whenever the type or batch of fertiliser product being applied changes.
- Check fertiliser spread pattern using trays every year. Also, check after equipment has been serviced or parts replaced or when adapting the machine for headland applications.
- Ensure operators are properly trained to use equipment.
- Avoid application when conditions are poor; for example, windy or too humid.

Notes (include any requirements identified for next season):



# Nutrient Management Plan

## Field Record Sheet

(Complete as appropriate, one sheet per field. Superscripts refer to numbered points in the text.)

### PART A: PLANS

Field name/ref:		Total area (ha):	
Soil type:	Subsoil (eg clay):	Cropped area (ha):	Soil depth (cm):

Last soil analysis <sup>2</sup> date:	pH:	P Index:	K Index:	Mg Index:
Last limed (month/year):		SNS Index <sup>21,26</sup> :		

Last crop (if arable):	Yield (t/ha):	Residues removed: Yes / No
Last management (if grass):	This season's crop:	Expected yield if arable (t/ha):

N recommendation system used (Fertiliser Manual, PLANET etc):	
P <sub>2</sub> O <sub>5</sub> policy: maintenance / run-down / build-up:	K <sub>2</sub> O policy: maintenance / run-down / build-up:

	Amount (kg/ha):				
	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	MgO	SO <sub>3</sub>
Nutrients required <sup>7, 19, 26</sup> <b>(A)</b>					
Allowance for livestock manure nutrients (from Organic Manure Sheet) <b>(B)</b>					
Allowance for other organic manure nutrients <b>(C)</b>					
Nutrients needed from fertilisers <b>(A) minus (B) minus (C)</b>					

Notes (include planned use of sodium, micronutrients, etc, and any problems identified during the season or requirements for the next season.):



# Nutrient Management Plan

## Field Record Sheet

(Complete as appropriate, one page per field. Superscripts refer to numbered points in the text.)

### PART B: RECORDS

If arable, date crop established:	Yield achieved (t/ha):
If grass, management (eg grazing, silage, hay):	

Fertilisers applied <sup>1,23</sup>							
Name/analysis	Date	Fertiliser rate applied (kg/ha)	Amount (kg/ha)				
			N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	MgO	SO <sub>3</sub>
		Total	Ⓓ				

Nutrients applied in livestock manures (from Organic Manure Sheet B) (kg/ha) <sup>1,23</sup> :	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	MgO	SO <sub>3</sub>
Total	Ⓔ				
Crop available	Ⓕ				

Nutrients applied in other organic manures (from Organic Manure Sheet) (kg/ha) <sup>23</sup> :	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	MgO	SO <sub>3</sub>
Total	Ⓖ				
Crop available	Ⓖ				

Total applied in organic manures <sup>10</sup>	Ⓔ plus Ⓖ				
Total applied in fertilisers+organic manures (kg/ha)	Ⓓ plus Ⓔ plus Ⓖ				
Crop available N supplied in fertilisers+livestock manures (kg/ha) <sup>9,24</sup>	Ⓓ plus Ⓕ				

Crop available supplied in fertilisers+organic manures (kg/ha)	Ⓓ plus Ⓕ plus Ⓖ				
Phosphate and potash removed in crop (Appendix 5 RB209)	Ⓘ				
Phosphate and potash balance (kg/ha)	Ⓓ plus Ⓔ plus Ⓖ minus Ⓘ				
Grain protein % (if cereals):					

If you are in an NVZ:

Total nitrogen applied in organic manures (Ⓔ plus Ⓖ above) must not exceed 250kg N/ha.

For planning nitrogen use (NVZ Guidance Leaflet 6), where organic manure is to be applied, you can use the crop available N percentages from the *Fertiliser Manual*. However, if you are calculating compliance with Nmax in an NVZ where livestock manure is applied, you must use the crop available N percentages provided in NVZ Guidance Leaflet 3, Table 8.

**PLEASE PHOTOCOPY TO CREATE YOUR OWN FARM RECORDS**

## Organic Manure Sheet

Livestock and other organic manures are valuable sources of crop nutrients. A little time spent calculating nutrient contents and application rates will be re-paid many times over. Two general points:

- You need to calculate nitrogen application rates separately for livestock manures and other organic manures (eg sewage sludge, compost, industrial waste etc). This is because in NVZs, the field limit is based on all organic manures but the whole farm limit is based only on livestock manures.

*Livestock manures = FYM, slurry and poultry manures*

*Organic manures = Livestock manures plus sewage sludge, compost and organic wastes applied*

- When calculating the fertiliser-equivalent of phosphate and potash in manures, use the total contents where soil Indices are at, or higher than, the target (2 for P and 2 or 2- for K) but use available contents where Indices are below target. This is because at target Indices or higher, phosphate or potash are applied to replace amounts removed in the crop (no yield response is expected in the current crop). Where Indices are below target, some response could occur and it is better to use available phosphate or potash to calculate the manure's fertiliser value.

Typical nutrient contents for different organic manure types are in Section 2 of the *Fertiliser Manual*.

**In NVZs, the standard values in Guidance Leaflet 3 must be used to calculate the crop available N content of manures for Nmax; not the values in the *Fertiliser Manual*.**

The table overleaf is intended to help organise the information you need and to calculate nutrient application rates. To complete the table overleaf, follow these steps:

- For every planned, or completed, manure application enter: application date; manure type; application rate; and incorporation method.
- Nutrient contents in the *Fertiliser Manual* are in kg/t or kg/m<sup>3</sup>. For conversions from gallons and acres, see Appendix 8, of the *Fertiliser Manual*.
- Find the heading for the manure type in Section 2 of the *Fertiliser Manual*.
- The first table under the heading shows total nitrogen content in the manure. Multiply this content by the application rate and enter the total nitrogen application rate in kg/ha.
- The second table under the heading in the *Fertiliser Manual* shows the percentage of total nitrogen that is crop available (fertiliser-equivalent) in different situations. Enter the appropriate '% available' value in the table and multiply this by the total nitrogen application rate to give the rate of crop available nitrogen applied. Enter this in the table.
- The next table under the heading in the *Fertiliser Manual* shows typical total and available phosphate and potash contents of the manure. Multiply the total P<sub>2</sub>O<sub>5</sub> and total K<sub>2</sub>O contents by the manure application rate to give the rates of total phosphate and potash applications. Enter these in the table.
- Take the '% available' values for phosphate and potash from the *Fertiliser Manual* and multiply these by the rates of total phosphate and potash application to give rates of available phosphate and potash applied. Enter these in the table.
- Once details for all planned or completed manure applications are entered, add up the columns of total and available nutrient applications to give total amounts of total and available nutrients applied in livestock and other organic manures. These totals should be transferred to the Field Records Sheet.



# Nutrient Management Plan

## Organic Manure Sheet

(see section 2 of the *Fertiliser Manual* or in NVZ Guidance Leaflet 3, table 8.)

### PART A: PLANNING

Field name/ref:	Soil type:
Crop:	

Livestock manures only				Nutrients to be applied									
				N		P <sub>2</sub> O <sub>5</sub>		K <sub>2</sub> O					
Date	Type	Rate t/ha	Method <sup>a</sup>	Slurry DM %	Total (kg/ha)	% avail.	Avail. (kg/ha)	Total (kg/ha)	% avail.	Avail. (kg/ha)	Total (kg/ha)	% avail.	Avail. (kg/ha)
Nutrients in livestock manures (kg/ha)													

Other organic manures				Nutrients to be applied									
				N		P <sub>2</sub> O <sub>5</sub>		K <sub>2</sub> O					
Date	Type	Rate t/ha	Method <sup>a</sup>	Total (kg/ha)	% avail.	Avail. (kg/ha)	Total (kg/ha)	% avail.	Avail. (kg/ha)	Total (kg/ha)	% avail.	Avail. (kg/ha)	
Nutrients in other organic manures (kg/ha)													
Total nutrients to be applied													

**PLEASE PHOTOCOPY TO CREATE YOUR OWN FARM RECORDS**

a. Surface applied, incorporated within 6 or 24 hours, broadcast, shallow injected etc.



# Nutrient Management Plan

## Organic Manure Sheet

(see section 2 of the Fertiliser Manual or in NVZ Guidance Leaflet 3, table 8.)

### PART B: RECORDING

Field name/ref:	Soil type:
Crop:	

Livestock manures only				Nutrients to be applied									
				N		P <sub>2</sub> O <sub>5</sub>		K <sub>2</sub> O					
Date	Type	Rate t/ha	Method <sup>a</sup>	Slurry DM %	Total (kg/ha)	% avail.	Avail. ((kg/ha)	Total (kg/ha)	% avail.	Avail. ((kg/ha)	Total (kg/ha)	% avail.	Avail. ((kg/ha)
Nutrients in livestock manures (kg/ha):													

Ⓐ

Other organic manures				Nutrients to be applied								
				N		P <sub>2</sub> O <sub>5</sub>		K <sub>2</sub> O				
Date	Type	Rate t/ha	Method <sup>a</sup>	Total (kg/ha)	% avail.	Avail. ((kg/ha)	Total (kg/ha)	% avail.	Avail. ((kg/ha)	Total (kg/ha)	% avail.	Avail. ((kg/ha)
Nutrients in other organic manures (kg/ha):												
Total nutrients to be applied:												

Ⓑ

Ⓐ plus Ⓑ

**PLEASE PHOTOCOPIY TO CREATE YOUR OWN FARM RECORDS**

a. Surface applied, incorporated within 6 or 24 hours; banded, shallow injected etc.



## Sources of Information

### ADAS

Gleadthorpe Research Centre, Meden Vale, Mansfield,  
Nottingham, NG20 9PF. Tel. 01623 844331

*Managing Livestock Manures Leaflets (Revised 2001)*

1. Making better use of livestock manures on arable land
2. Making better use of livestock manures on grassland
3. Spreading systems for slurries and solid manures
4. Managing manure on organic farms

MANNER computer programme to show the crop available nutrients from a manure application

[www.adas.co.uk](http://www.adas.co.uk)

*The Safe Sludge Matrix – Guidelines for the Application of Sewage Sludge to Agricultural Land (2001), AMPU 1234/C/2*

### Agricultural Industries Confederation (AIC)

[www.agindustries.org.uk](http://www.agindustries.org.uk)

(Select Fertilisers; then Publications and Reports; then For farmers and advisers)

*Fertiliser Spreaders – Choosing, Maintaining & Using*

*Code of Practice for the prevention of water pollution from the storage and handling of solid/fluid fertilisers*

*Phosphorus in Agriculture and in Relation to Water Quality*  
A E Johnston and C J Dawson (2005). (See section 15 Recommendations)

*Secure your Fertiliser – Ten Point Plan for Fertiliser Security*

### BPEX

[www.bpex.org.uk](http://www.bpex.org.uk)

[www.bpex.org.uk/articles/295822/Added\\_Value\\_From\\_Pig\\_Manures\\_\\_Slurries.aspx](http://www.bpex.org.uk/articles/295822/Added_Value_From_Pig_Manures__Slurries.aspx)

### DairyCo

[www.dairyco.org.uk](http://www.dairyco.org.uk). Email: [info@dairyco.org.uk](mailto:info@dairyco.org.uk)

*grass+ Grassland Management Improvement Programme*  
(revised March 2009)

*Dairy Wizard*, which includes *Slurry Wizard*

### Defra

[www.defra.gov.uk/farm/environment/landmanage/nutrient/fert/pubs.htm](http://www.defra.gov.uk/farm/environment/landmanage/nutrient/fert/pubs.htm)

*The Fertiliser Manual (RB209)*

[www.planet4farmers.co.uk](http://www.planet4farmers.co.uk)

*Planet nutrient management software*

*Controlling soil erosion – A manual for the assessment and management of agricultural land at risk of water erosion in lowland England (1999), PB4093.*

*Waste Minimisation Manual: Opportunities for saving MONEY by reducing WASTE on your farm (2004), PB4819.*

[www.defra.gov.uk/farm/environment/cogap/index.htm](http://www.defra.gov.uk/farm/environment/cogap/index.htm)

*Protecting our Water, Soil and Air: A Code of Good Agricultural Practice for Farmers, Growers and Land Managers*

Hard copies can be ordered free of charge from The Stationery Office, PO Box 29, Norwich, NR3 1GN. [www.tso.co.uk](http://www.tso.co.uk)

[www.defra.gov.uk/farm/environment/water/csf](http://www.defra.gov.uk/farm/environment/water/csf)

Information on Catchment Sensitive Farming

**CSF Helpline 0845 955 600**

[www.defra.gov.uk/environment/water/quality/nitrate](http://www.defra.gov.uk/environment/water/quality/nitrate)

**NVZ Helpline 0845 345 1302**

Leaflets also available in hard copy from Defra Publications, Admail 6000, London SW1A 2XX tel. 08459 556000.

Quote the document title and code.

*Guidance for Farmers in Nitrate Vulnerable Zones (2008).*

There are nine Guidance Leaflets, you may not need them all.

1. Summary of the guidance for farmers in NVZs (PB12736 a).
2. Implementing the rules – scope, timing and enforcement (PB12736 b).
3. Standard values, manure sampling protocol and glossary (PB12736 c).
4. Storage of organic manure (PB12736 d).
5. The livestock manure N farm limit (PB12736 e).
6. Planning nitrogen use (PB12736 f).
7. The Nmax limit (PB12736 g).
8. Field application of organic manures (PB12736 h).
9. Field application of manufactured nitrogen fertilisers (PB12736 i).

### Environment Agency

[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

*thinksoils*, a manual for assessment of soil to avoid erosion and run-off (£8.50)

[www.environment-agency.gov.uk/bestfarmingpractices](http://www.environment-agency.gov.uk/bestfarmingpractices)

*Best Farming Practices, What's in it for you... Profit from a good environment*

### FACTS

[www.basis-reg.com](http://www.basis-reg.com). Tel. 01335 343945

Qualified Advisers Directory, training courses etc.

FACTS Information Service: [www.factsinfo.org.uk](http://www.factsinfo.org.uk)

### HGCA

[www.hgca.com](http://www.hgca.com)

*Topic Sheet 101 Decision support on sulphur application to wheat*

*Topic Sheet 103 Managing oilseed rape canopies for yield*

### LEAF

[www.leafaudit.org](http://www.leafaudit.org)

*LEAF Audit (An Integrated Farm Management tool)*

### Potato Council

[www.potato.org.uk](http://www.potato.org.uk). Email: [gcollins@potato.org.uk](mailto:gcollins@potato.org.uk)

*PCL guide to potato nutrient management (in press)*

### RSPB

[farm-advice@rspb.org.uk](mailto:farm-advice@rspb.org.uk)

*Farming to protect soil, water and wildlife*



## Sources of Information

### For specific guidance in Northern Ireland

Department of the Environment: [www.ehsni.gov.uk](http://www.ehsni.gov.uk)  
DARD: [www.darni.gov.uk](http://www.darni.gov.uk)

Guidance Booklet For Northern Ireland Farmers on the Requirements of the Nitrates Action Programme (Northern Ireland) Regulations 2006 and the Phosphorus (Use in Agriculture) (Northern Ireland) Regulations 2006

### For specific guidance in Scotland

The Scottish Government Publications  
[www.scotland.gov.uk/Topics/Agriculture/Environment/NVZintro/NVZguidance](http://www.scotland.gov.uk/Topics/Agriculture/Environment/NVZintro/NVZguidance)

### For specific guidance in Wales

Welsh Assembly Government  
<http://new.wales.gov.uk/topics/environmentcountryside/epq/>

## Soil sampling and analysis

A list of laboratories is maintained on the [nutrientmanagement.org](http://nutrientmanagement.org) website, or call 02476 858896.

Routine soil analysis will cover P, K, Mg and pH. In England and Wales, soil indices are based on the Olsen method of analysis for soil P and on ammonium nitrate extraction for soil K and Mg.

Guidance on soil sampling and analysis is contained in: *Soil Analysis, key to nutrient management planning* (Potash Development Association, Leaflet 24)

### The professional nutrient management group:



**Agricultural Industries Confederation**  
Confederation House  
East of England Showground  
Peterborough PE2 6XE  
Tel: 01733 385230  
Email: [enquiries@agindustries.org.uk](mailto:enquiries@agindustries.org.uk)  
[www.agindustries.org.uk](http://www.agindustries.org.uk)



**NFU**  
Agriculture House  
Stoneleigh Park  
Stoneleigh  
Warwickshire CV8 2TZ  
Tel: 02476 858 896  
Email: [nutrientmanagement@nfu.org.uk](mailto:nutrientmanagement@nfu.org.uk)  
[www.nfuonline.com](http://www.nfuonline.com)



**Country Land and Business Association**  
16 Belgrave Square  
London SW1X 8PQ  
Tel: 020 7235 0511  
Email: [mail@cla.org.uk](mailto:mail@cla.org.uk)  
[www.cla.org.uk](http://www.cla.org.uk)



**LEAF**  
The National Agricultural Centre  
Stoneleigh Park  
Warwickshire CV8 2LZ  
Tel: 0247 6413 911  
Email: [enquiries@leafuk.org](mailto:enquiries@leafuk.org)  
[www.leafmarque.com](http://www.leafmarque.com)



**Farming and Wildlife Advisory Group**  
Stoneleigh Park  
Kenilworth  
Warwickshire CV8 2RX  
Tel: 02476 696699  
Email: [info@fwag.org.uk](mailto:info@fwag.org.uk)  
[www.fwag.org.uk](http://www.fwag.org.uk)

### Supported by:

**Agriculture & Horticulture Research Forum**  
[www.appliedresearchforum.org.uk](http://www.appliedresearchforum.org.uk)

**British Beet Research Organisation**  
Email: [jean@bbro.co.uk](mailto:jean@bbro.co.uk)  
[www.uksugarbeet.co.uk](http://www.uksugarbeet.co.uk)

**BPEX**  
Email: [info@bpex.org.uk](mailto:info@bpex.org.uk)  
[www.bpex.org.uk](http://www.bpex.org.uk)

**DairyCo**  
Email: [info@dairyco.org.uk](mailto:info@dairyco.org.uk)  
[www.dairyco.org.uk](http://www.dairyco.org.uk)

**Defra**  
[www.defra.gov.uk](http://www.defra.gov.uk)

**EBLEX**  
Email: [admin@eblex.org.uk](mailto:admin@eblex.org.uk)  
[www.eblex.org.uk](http://www.eblex.org.uk)

**Environment Agency**  
Email: [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)  
[www.environment-agency.gov.uk/bestfarmingpractices](http://www.environment-agency.gov.uk/bestfarmingpractices)

**FACTS**  
Email: [facts@admin.usf.edu](mailto:facts@admin.usf.edu)  
[www.facts.org](http://www.facts.org)

**HDC**  
Email: [hdc@hdc.org.uk](mailto:hdc@hdc.org.uk)  
[www.hdc.org.uk](http://www.hdc.org.uk)

**HGCA**  
Email: [research@hgca.com](mailto:research@hgca.com)  
[www.hgca.com](http://www.hgca.com)

**Natural England**  
[www.naturalengland.org.uk](http://www.naturalengland.org.uk)

**Potato Council**  
Email: [marketing@potato.org.uk](mailto:marketing@potato.org.uk)  
[www.potato.org.uk](http://www.potato.org.uk)

**Processors and Growers Research Organisation**  
Email: [info@pgro.org](mailto:info@pgro.org)  
[www.pgro.org](http://www.pgro.org)

**Royal Society for Protection of Birds**  
Email: [farm-advice@rspb.org.uk](mailto:farm-advice@rspb.org.uk)  
[www.rspb.org.uk](http://www.rspb.org.uk)



# Nutrient management glossary I

<b>Biosolids</b>	Treated sewage sludge.
<b>Broiler/turkey litter</b>	A mixture of bedding material and poultry excreta which is sufficiently dry to be stored in a stack without slumping.
<b>Closed period</b>	Period of the year when nitrogen fertilisers or certain manures should not be applied unless specifically permitted. Closed periods apply within NVZs.
<b>Coefficient of variation (CV) (fertiliser or manure spreading)</b>	Measure of the unevenness of application of fertilisers or manures. CV of 0% indicates perfectly even spreading, unachievable in practice. Correct operation of a well set-up spreader should give a CV of 10% for fertilisers and 25% for manures under field conditions.
<b>Compost</b>	Organic material produced by aerobic decomposition of biodegradable organic materials.
<b>Crop available nitrogen</b>	The total nitrogen content of organic manure that is available for crop uptake in the growing season in which it is spread on land.
<b>Crop nitrogen requirement</b>	The amount of crop available nitrogen that must be applied to achieve the economically optimum yield.
<b>Denitrification</b>	Microbial conversion of nitrate and nitrite in anaerobic soil to nitrogen gas and some nitrous oxide.
<b>Deposition</b>	Transfer of nutrients from the atmosphere to the soil or to plant surfaces. The nutrients, mainly nitrogen and sulphur, may be dissolved in rainwater (wet deposition) or transferred in particulate or gaseous forms (dry deposition).
<b>Dirty water</b>	Lightly contaminated run-off from lightly fouled concrete yards or from the dairy/parlour that is collected separately from slurry. It does not include liquids from weeping-wall stores, strainer boxes, slurry separators or silage effluent which are rich in nitrogen and regarded as slurries.
<b>Economic optimum (nitrogen rate)</b>	Rate of nitrogen application that achieves the greatest economic return from a crop, taking account of crop value and nitrogen cost.
<b>Efficiency factor (manures)</b>	Percentage of total nitrogen in a manure that is available to the next crop. There are mandatory minimum values in NVZs for use when estimating the nitrogen contribution of manures.
<b>Eutrophication</b>	Enrichment of ecosystems by nitrogen or phosphorus. In water it causes algae and higher forms of plant life to grow too fast. This disturbs the balance of organisms present in the water and the quality of the water concerned. On land, it can stimulate the growth of certain plants which then become dominant so that natural diversity is lost.
<b>Excess rainfall</b>	Rainfall between the time when the soil profile becomes fully wetted in the autumn (field capacity) and the end of drainage in the spring, less evapo-transpiration during this period (i.e., water lost through the growing crop).
<b>Farmyard manure (FYM)</b>	Livestock excreta that is mixed with straw bedding material and can be stacked in a heap without slumping.
<b>Fluid fertiliser</b>	Pumpable fertiliser in which nutrients are dissolved in water (solutions) or held partly as very finely divided particles in suspension (suspensions).



## Nutrient management glossary 2

Frozen hard	Soil that has been frozen for more than 12 of the preceding 24 hours. Days when soil is frozen overnight but thaws out during the day do not count.
Granular fertiliser	Fertiliser in which particles are formed by rolling a mixture of liquid and dry components in a drum or pan. Typically, particles are in the 2–4mm diameter range.
Greenhouse gas	Gas such as carbon dioxide, methane or nitrous oxide that contributes to global warming by absorbing infra-red radiation that otherwise would escape to space.
Layer manure	Poultry excreta with little or no bedding.
Leaching	Process by which soluble materials, such as nitrate or sulphate, are removed from soil by drainage water passing through it.
Lime requirement	Amount of standard limestone needed in tonnes/ha to increase soil pH from the measured value to a higher specified value (often 6.5 for arable crops). Determined by a chemical test.
Livestock manure	Dung and urine from livestock or a mixture of litter; dung and urine, even in processed organic form. Includes FYM, slurry, poultry litter, poultry manure, separated manures, granular or pelletised manures.
Maintenance application (phosphate or potash)	Amount of phosphate or potash that must be applied to replace the amount removed from a field at harvest (including that in any straw, tops or haulm removed).
Major nutrient	Nitrogen, phosphate and potassium that are needed in relatively large amounts by crops (see also Secondary nutrients and Micronutrients).
Manufactured fertiliser	Any fertiliser that is manufactured by an industrial process. Includes conventional straight and NPK products (solid or fluid), organo-mineral fertilisers, rock phosphates, slags, ashed poultry manure, liming materials that contain nutrients.
Micronutrient	Boron, copper, iron, manganese, molybdenum, zinc that are needed in very small amounts by crops (see also <b>Major nutrients</b> ). Cobalt and selenium are taken up in small amounts by crops and are needed in human and livestock diets.
Mineral nitrogen	Nitrogen in ammonium and nitrate forms.
Mineralisable nitrogen	Organic nitrogen that is readily converted to ammonium and nitrate, for example during spring.
Mineralisation	Microbial breakdown of organic matter in the soil, releasing nutrients in available, inorganic forms.
Neutralising value (NV)	Percentage calcium oxide (CaO) equivalent in a material. 100kg of a material with a neutralising value of 52% will have the same neutralising value as 52kg pure CaO. NV is determined by a laboratory test.
Nitrogen uptake efficiency	Uptake of nitrogen from soil, fertiliser or manure expressed as a percentage of nitrogen supply from that source.
Nitrogen use efficiency	Ratio of additional yield produced to the amount of nitrogen applied to achieve that increase. Often expressed as kg additional yield per kg N applied.

<b>Nitrous oxide (N<sub>2</sub>O)</b>	A strong greenhouse gas that is emitted naturally from soils. The amount emitted is related to supply of mineral nitrogen in the soil so increases with application of manures and fertilisers, incorporation of crop residues and growth of legumes and is greater in organic and peaty soils than in other soils.
<b>Nutrient budget</b>	An account of gains and losses of nutrients in an agricultural system, often used in <b>Nutrient management</b> .
<b>Nutrient management</b>	A process for ensuring that nutrient supplies match, but do not exceed, crop needs on a farm so optimising financial performance while minimising impact on the wider environment.
<b>Offtake</b>	Amount of a nutrient contained in the harvested crop (including straw, tops or haulm) and removed from the field. Usually applied to phosphate and potash.
<b>Olsen P</b>	Concentration of available P in soil determined by a standard method (developed by Olsen) involving extraction with sodium bicarbonate solution. The main method used in the UK and the basis for the Soil Index for P.
<b>Organic manure</b>	Any bulky organic nitrogen source of livestock, human or plant origin, including livestock manures.
<b>Readily available nitrogen</b>	Nitrogen that is present in livestock and other organic manures in molecular forms that can be taken up immediately by the crop or is released in these forms in the year in which it is applied (ammonium or nitrate or, in poultry manure, uric-acid N). Equivalent to fertiliser nitrogen. High in slurries and poultry manures (typically 35 – 70% of total N) and low in FYM.
<b>Safe Sludge Matrix</b>	Guidance on sewage sludge use for different crops agreed by Water UK and the British Retail Consortium.
<b>Secondary nutrient</b>	Magnesium, sulphur, calcium or sodium that are needed in moderate amounts by crops.
<b>Slurry</b>	Excreta of livestock (other than poultry), including any bedding, rainwater and washings mixed with it, that can be pumped or discharged by gravity. The liquid fraction of separated slurry is also defined as slurry.
<b>SNS Index</b>	Soil Nitrogen Supply expressed in seven bands or Indices, each associated with a range in kg N/ha.
<b>Soil Index (P, K or Mg)</b>	Concentration of available P, K or Mg, as determined by standard analytical methods, expressed in bands or Indices.
<b>Soil Mineral Nitrogen (SMN)</b>	Ammonium and nitrate nitrogen measured by the standard analytical method and expressed in kg N/ha.
<b>Soil Nitrogen Supply (SNS)</b>	The amount of nitrogen (kg N/ha) in the soil that becomes available for uptake by the crop in the growing season, taking account of nitrogen losses.
<b>Solid manure</b>	Organic manure which can be stacked in a freestanding heap without slumping.
<b>Target Soil Index</b>	Lowest soil P or K index at which there is a high probability crop yield will not be limited by P or K supply. See Soil Index (P, K or Mg).
<b>Volatilization</b>	Loss of nitrogen as ammonia from the soil to the atmosphere.
<b>Water-soluble phosphate</b>	Phosphate, expressed as P <sub>2</sub> O <sub>5</sub> , that is measured by the statutory method for fertiliser analysis. Not necessarily a measure of available phosphate – high water-solubility indicates high availability but low water-solubility does not necessarily indicate low availability.



**For a printed copy of this booklet, please contact:**

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## A clear solution for farmers

ENGLAND CATCHMENT SENSITIVE FARMING DELIVERY INITIATIVE

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