

Guidance for Farmers in Nitrate Vulnerable Zones

The N max limit

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The guidance in this series of leaflets is designed to help farmers be compliant with The Nitrate Pollution Prevention Regulations 2008 (SI2349 September 2008). The guidance has been produced in association with the Environment Agency, who is responsible for assessing farmers' compliance with these Regulations.

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The N max limit

Part 4 of the Regulations establishes a number of rules limiting the amount of nitrogen that can be applied to specified crops. These are summarised below.

YOU MUST:

- **Ensure that the average nitrogen application rate to a specified crop type does not exceed the N max limit for that crop type**
- **Follow a defined process when calculating your compliance with this limit**
- **Keep annual records to demonstrate your compliance**

If you are in an NVZ originally designated in 2002, you will need to comply with these rules from 1 January 2009. However, if you are in an NVZ newly designated by the 2008 Regulations, you will have until 1 January 2010.

The boxes below describe the limit in more detail and the following paragraphs provide further explanation. A step-by-step guide is provided at the back of this Leaflet to help you calculate and record your compliance.

1. The N max limit

YOU MUST ensure that the average nitrogen application rate (from manufactured nitrogen fertiliser and crop available nitrogen from livestock manure) to the following crops does not exceed the N max limit for that crop type:

- winter wheat, spring wheat, winter barley, spring barley, winter oilseed rape, sugar beet, potatoes, forage maize, field beans, peas and grass.

Note – the N max limits for these crops are provided in Table 5, Leaflet 3.

The N max limit applies to the average nitrogen application rate for that crop type across your farm. This means that it may be possible, in one or more individual fields with the same crop type, to apply nitrogen at a rate that is higher than the N max limit, provided that the average application rate across the whole area of the crop type on your farm does not exceed the N max limit.

In the majority of cases you should be applying considerably less than the N max limits and in line with your plan of nitrogen applications (as developed in accordance with the rules described in Leaflet 6).

There are only N max limits for the crop types listed in the above box. Although nitrogen application rates to other crops are not limited, you will need to plan the applications of nitrogen to these crops and are encouraged to balance nitrogen inputs from all sources with the foreseeable nitrogen requirements of the crop (see Leaflet 6).

The N max limit

2. Calculating your compliance

The Regulations set out the factors you must take into account when calculating your compliance with the N max limit.

You can adjust the N max limits that apply to the crops grown on your farm to take account of local information relating to the field or crop (e.g. higher than standard yields, grain quality targets, shallow soil type). The notes to Table 5, Leaflet 3 describe the permitted adjustments.

When determining the amount of nitrogen available for crop uptake from applications of livestock manure, YOU MUST:

- First establish the total amount of nitrogen in the manure using the standard values in Table 7, Leaflet 3 or by sampling and analysis; and
- Then calculate the amount of crop available nitrogen using the minimum percentages provided in Table 8, Leaflet 3.

It is recommended that you take account of the N max limits when planning your use of nitrogen (see Leaflet 6). If you only do the calculation after harvest you may find that you have already exceeded the limit.

To help with your calculation, you can use the step-by-step guide at the back of this Leaflet (Annex 1) or the PLANET software. The Environment Agency will accept either as a valid record of your calculation.

Important points to note when calculating compliance with the N max limit:

- If your field records demonstrate that the nitrogen application rate to each field growing a particular crop type is lower than the N max limit for that crop type, then you can be confident that you have complied with the N max limit and do not need to complete the full calculation described in Annex 1.
- The N max limit only applies to nitrogen from applications of manufactured nitrogen fertiliser and the crop available nitrogen from applications of livestock manure. You do not need to allow for the nitrogen from:
 - livestock manure that is directly deposited by grazing animals;
 - applications of other types of organic manure that are not from livestock (e.g. sewage sludge, compost); or
 - applications of other types of nitrogen-containing materials (e.g. dredging from ditches).
- You should include any crops grown on land (in an NVZ) which is rented by you and is under your control during the growing season of the crop.
- If you want to adjust the N max limit for a crop on the basis that you expect to achieve a higher than standard yield, you should have written evidence from at least two previous crops to show that this is a realistic estimate of the likely crop yield.
- The minimum percentages for calculating crop available nitrogen in livestock manure (provided in Table 8, Leaflet 3) will increase from 1 January 2012. This is when applications of livestock manure must shift to times of the year when more nitrogen will be supplied to the crop (as this is the latest date from which the closed periods for organic manures (Leaflet 8) will apply).

3. Record keeping

The Environment Agency will check your compliance with the N max limit by inspecting your field records and checking that the average nitrogen application rate made to a particular crop type is less the N max limit for that crop type.

The Regulations require that you keep the following records:

For each crop in each field, YOU MUST record:

- details of the actual applications of organic manure and manufactured nitrogen fertiliser; and
- details of the crop grown.

Note – A full description of the required records is provided in Annex 1 of Leaflet 6.

It is recommended that you keep a record of your calculation of your compliance with the N max limit. The step-by-step guide at the back of this Leaflet (Annex 1) can be used to keep a record of your calculation and the Environment Agency will accept this as a valid record of your calculations.

4. Further information

- The Fertiliser Manual (RB209), due to be released by Defra in 2009, and subsequent editions. The Fertiliser Manual (RB209) is the revised version of Defra's Fertiliser Recommendations for Agricultural and Horticultural Crops (RB209) publication (7th edition, 2000), available electronically at: www.defra.gov.uk or in hard copy from The Stationery Office, PO Box 29, Norwich, NR3 1GN or: www.thestationeryoffice.com
- A free copy of the PLANET software can be obtained by going to www.planet4farmers.co.uk or by ringing the PLANET Helpline on 08456 023864.

The N max limit – Annex 1

Step-by-Step Guide for Calculating Compliance with the N Max Limit

N max limits have been established for the following crop types (see Table 5, Leaflet 3):

- winter wheat, spring wheat, winter barley, spring barley, winter oilseed rape, sugar beet, potatoes, forage maize, field beans, peas and grass.

It is recommended that you take account of the N max limits when planning your use of nitrogen (see Leaflet 6). If you only do the following calculation after harvest you may find that you have applied too much nitrogen and already exceeded the limit.

You will need to carry out the following 6 steps for **each of the specified crop types grown on your farm** where at least one field has received, or is expected to receive, a higher rate of nitrogen application than the N max limit listed in Table 5, Leaflet 3.

- Step 1** Collect your information
- Step 2** Calculate the maximum limit for N applications to the specified crop type, taking account of any relevant adjustments (see Leaflet 3)
- Step 3** Calculate the crop available nitrogen supplied to the crop type from all livestock manure applications
- Step 4** Calculate the nitrogen supplied to the crop type from all applications of manufactured nitrogen fertiliser
- Step 5** Calculate the total amount of nitrogen applied to the crop type (from manufactured nitrogen fertiliser plus the crop available nitrogen from livestock manure)
- Step 6** Compare the total amount of nitrogen applied to the adjusted N max limit for this crop type

Step 1 Collect your information

You will need to have available the following basic information:

- a. Leaflet 3 – Specifically Table 5 for the N max limits and Tables 7 and 8 for the N content of livestock manures;
- b. The results of sampling and analysis of livestock manure (if undertaken);
- c. Field records of actual applications of livestock manure and manufactured nitrogen fertiliser;
- d. The cropped area of the fields on your farm.

Note: If you only know the field area in acres you will need to convert them to hectares. To do this multiply the number of acres by 0.405 (e.g. 276 acres = 112 ha).

The N max limit – Annex 1

Step 2 Calculate the maximum limit for N applications to the crop type taking account of any relevant adjustments

Complete **Table 1** to calculate the maximum limit for N applications to the crop type.

Enter the crop type, harvest year and N max limit (before adjustments) in the spaces provided above the table (see Leaflet 3 for the N max limits). Then complete columns 1 to 9 for each field growing that crop type.

Column 1 Enter the field name/reference.

Column 2 Enter the cropped area of the field (ha).

Column 3 Enter your expected yield.

Column 4 Enter +20 if the soil type is 'shallow' and the crop type is autumn or early winter sown wheat or winter barley.

Column 5 Enter an appropriate adjustment (see Leaflet 3) to the N max limit if your justifiable expected yield is above the standard yield for the crop type.

Column 6 Enter +40 if a milling wheat variety is being grown.

Column 7 Enter +80 if the current or previous crop has had straw or paper sludge applied to it.

Column 8 For grassland, enter +40 if three or more cuts of grass are taken from the field.

Column 9 Calculate the adjusted N max limit (kgN/ha) for each field. To do this, add the numbers in columns 4 to 8 to the N max limit (before adjustments) that you entered at the top of the table.

Column 10 Calculate the maximum limit for N applications (kgN) for each field (multiply column 2 by column 8). Add up the values in column 9 for all fields and enter this number in box **A** at the bottom of column 10 to give the maximum limit for N applications to the crop type.

Examples of completed versions of Table 1 are provided overleaf.

Note: You can convert the total limit for N applications given in box A into an average and adjusted N max limit for the crop type by:

Dividing the figure in Box A by the total area of the crop type (i.e. the sum of column 2)

This average and adjusted N max limit could prove useful when planning your applications of nitrogen at the start of the growing season to ensure that you do not breach the N max limit.

The N max limit – Annex 1

Step 3 Calculate the crop available nitrogen supplied from all livestock manure applications to the crop type

Complete **Table 2** for each field growing the crop type and receiving one or more applications of livestock manure.

Column 1 Enter the field name/reference receiving the application of livestock manure. If the same field receives more than one application of livestock manure, use one row per application.

Column 2 Enter the cropped area of the field (ha).

Column 3 Enter the type of livestock manure applied (the different types are described in Table 7 in Leaflet 3).

Column 4 Enter the application rate of the manure (t/ha or m³/ha).

Column 5 Calculate the total quantity of manure applied to the field (multiply column 2 by column 4) and enter in column 5.

Note: *If you already know the total quantity of manure applied, you can enter this directly into column 5 and do not need to enter information in columns 2 or 4.*

Column 6 Enter the total nitrogen content of the manure. This must be based on either standard values for the manure type (see Table 7, Leaflet 3) or on the results of sampling and analysis.

Column 7 Enter the percentage of the manure total nitrogen content that is assumed to be available for crop uptake (see Table 8, Leaflet 3 for the standard values that must be used).

Column 8 Multiply column 5 by column 6, then multiply by the percentage value in column 7 to calculate the quantity of crop available nitrogen. Add up the values in column 8 for all applications of livestock manure to the crop type for all fields and enter this number in box **B** at the bottom of the column.

Note: *When multiplying using percentages you should first divide the percentage figure by 100 (e.g. 20% / 100 = 0.2).*

Example

A grass field of 8 ha receives an application of 35m³/ha of dairy slurry in late September. Therefore, the total amount of slurry applied is 35 m³/ha x 8 ha = 280 m³.

The total nitrogen content of this manure type is 3 kg N/m³ (from the standard values in Table 7, Leaflet 3). Therefore, the total amount of N applied to the field is 280 m³ x 3 kg N/m³ = 840 kg N.

You must assume that 20% of this nitrogen is available for crop uptake (see Table 5b, Leaflet 3). Therefore, the total amount of crop available N applied to the field is 840 kg N x 0.2 = 168 kg N.

The N max limit – Annex 1

Step 5 Calculate the total amount of nitrogen applied to the crop type

1. Enter the total amount of crop available N from livestock manure (from **B**) and the total amount of N from manufactured nitrogen fertiliser (from **C**) in the relevant boxes below.
2. Add together **B** and **C** and record the result in box **D**. This figure represents the total amount of nitrogen applied to the crop type across the farm.

Total amount of crop available N from livestock manure			Total amount of N from manufactured nitrogen fertiliser			Total amount of N applied to the crop type	
B		+	C		=	B	kg N

Step 6 Compare the total amount of nitrogen applied to the crop type to the maximum limit for N applications to the crop type

1. Use the boxes below to compare the total amount of N applied to the crop type (**D** from Step 5) with the maximum limit for N applications to the crop type (**A** from Step 2).
2. If **D** is larger than **A**, then you have breached the N max limit for this crop type. This means that you are not compliant with the Regulations.

The total amount N applied to the crop type (from **D**)

kg N

The maximum limit for N applications to the crop type (from **A**)

kg N

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