

Catchment Sensitive Farming

Nitrate Vulnerable Zone (NVZ)

Record Keeping and My Farm Business



A step-by-step guide to Nitrate Vulnerable Zone (NVZ) record keeping for farmers



**A clear solution
for farmers**

CATCHMENT SENSITIVE FARMING



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Slurry spreader with trailing shoe applicator. © Steve Marston Natural England

This guide is to be used alongside the NVZ guidance provided by Defra:

<https://www.gov.uk/government/collections/nitrate-vulnerable-zones>

See the Farming Advice Service (FAS) Back to Basics publication on NVZ rules:

<http://farmingadvice.org.uk/events/assets/Uploads/Technical-articles/FAS-NVZ-Back-to-Basicsfinalv1-3.pdf>

Farmers also need to follow the Farming Rules for Water, whether your farm is within an NVZ or not:

<https://www.gov.uk/guidance/rules-for-farmers-and-land-managers-to-prevent-water-pollution>

Farmers must also follow the guidance on the rules for storing slurry:

<https://www.gov.uk/storing-silage-slurry-and-agricultural-fuel-oil>

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NVZ SUMMARY

Nitrate Vulnerable Zones (NVZs) have been designated by Defra to protect water quality from nitrates from agricultural sources which affects life in our streams, rivers, ponds, lakes and sea and impacts drinking water abstractions.

If you are farming in an NVZ, under the Nitrate Pollution Prevention Regulations, you need to take **action** to store, plan and apply organic manure and nitrogen fertilisers within specific times, areas and application **limits** and keep **records** of this, as below.

ACTIONS

- Spreading restrictions when applying organic manures and manufactured fertiliser to land
- Requirements for the storage of slurry and other organic manure
- Planning nitrogen applications before spreading

LIMITS

- 250 kg total Nitrogen per hectare (N/ha) "Field Limit" for applying organic manures
- 170 kg N/ha from livestock manure "Farm Loading Limit"
- "N-max" average Nitrogen application limits for most crop types across the farm

RECORDS

- Farm Risk map
- Livestock Manure Nitrogen Farm limit calculation
- Storage calculation
- Nitrogen Management Plan
- Field records
- N-max calculation

ACTIONS - SPREADING

Carry out a field risk assessment before spreading manufactured fertiliser or organic manures to assess the risk of fertiliser or organic manure entering surface water. You must not spread if you identify there is a significant risk of manure or fertiliser or run off getting into surface water.

- Do not spread fertiliser or organic manure if the field is:
 - waterlogged, flooded or covered in snow
 - frozen for more than 12 hours in the previous 24 hours
- Do not spread nitrogen fertiliser within 2 metres of surface water.
- Do not spread organic manure within 10m of surface water (can be reduced in certain circumstances - see full regulations) or 50m from a spring, well or borehole.
- Some organic manures have more than 30% of their total nitrogen content immediately available to crops. These are called 'high readily available nitrogen manures' such as poultry manure (layer manure and broiler litter), cattle and pig slurry or anaerobic digestate.

Closed Periods

YOU MUST NOT spread organic manures with a high readily available N content (i.e. more than 30% of the total N content is in a form that can be readily taken up by the crop) to land in the following periods (dates are inclusive). See Table 14, Annex 2 for a definition of sandy or shallow soils:

	Grassland	Tillage land
Sandy or shallow soils	1 Sep to 31 Dec	1 Aug to 31 Dec
All other soils	15 Oct to 31 Jan	1 Oct to 31 Jan

YOU MUST NOT spread manufactured nitrogen fertiliser between the following dates:

Grassland	Tillage land
15 September to 15 January	1 September to 15 January

Exceptions for precision spreading equipment for organic manures:

You can spread slurry, sewage sludge and anaerobic digestate no less than 6 metres from surface water if you use precision manure spreading equipment like:

- band spreaders (trailing hose or trailing shoe)
- shallow injectors (that inject no more than 10cm below the surface)
- dribble-bar applicators

Exception for early-sown crops

If you sow a crop on sandy or shallow tillage land on or before 15 September, you can apply manures with high readily available nitrogen between 1 August and 15 September inclusive.

Exceptions for straw-based solid manure

You can spread straw-based solid manure (such as farmyard manure) within 10 metres of surface water on land that's notified as a Site of Special Scientific Interest (SSSI) or managed under an agri-environment scheme if you meet certain conditions at certain times.

<https://www.gov.uk/guidance/using-nitrogen-fertilisers-in-nitrate-vulnerable-zones#where-you-cant-spread-manufactured-fertilisers-or-organic-manures>

See NVZ guidance for exceptions to the closed periods for manufactured nitrogen fertiliser on certain crops, greenhouses and low intensity farming:

<https://www.gov.uk/government/collections/nitrate-vulnerable-zones>

Restrictions on applications outside the closed period

You must not spread more than 30 m³ /ha of slurry or 8 tonnes/ha of poultry manure in a single application from the end of the closed period until the end of February. You must allow at least 3 weeks between each individual application.

The poultry manure limit remains the same but the slurry limit has been reduced from 50 m³ to 30 m³.

<https://www.gov.uk/guidance/using-nitrogen-fertilisers-in-nitrate-vulnerable-zones#work-organic-manures-into-the-soil-after-spreading>

LIMITS

Organic Manure Nitrogen Field Limit

There is a limit to the amount of nitrogen that you can apply (spread) to land as organic manure.

This limit is set at 250 kg of total nitrogen per hectare from all organic manures spread in any 12 month period.

This calculation does not include livestock manures deposited by grazing animals.

It is best to use a lab analysis to determine the nitrogen content of any organic manures that you plan to spread. Alternatively, you can use average figures of nitrogen content (see Field Records section).

There are specific rules in place for compost. Please see Defra guidance on NVZ regulations if you use compost: <https://www.gov.uk/government/collections/nitrate-vulnerable-zones>



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Organic Manure N Field Limit

Livestock Manure Nitrogen Farm Limit

You must ensure that, in any calendar year (i.e. a year beginning 1 January), that the nitrogen produced from livestock on your farm and/or nitrogen that you import in livestock manure does not exceed 170 kg N/ha (Total N). This loading limit is averaged over the area you farm within an NVZ.

This loading limit only applies to livestock manure and is separate from the field limit explained above.

For farms that have grazing livestock and more than 80% of the agricultural area is grass, it may be possible to apply for a derogation from the Environment Agency to increase the loading limit from 170 kg N/year/ha to 250 kg N/year/ha.

If part of your farm is outside an NVZ, you will still need to ensure that the average loading for the part of your farm in the NVZ is no more than 170 kg N/ha, or 250 kg N/ha if you hold a derogation.



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Livestock manure N farm limit

N-max Limit

There is a limit on the average amount of nitrogen you can apply to the most commonly grown crops (including grassland) in England. This is known as the N-max limit and includes nitrogen from manufactured fertiliser and crop-available nitrogen from organic manure. Each crop has a specific N-max limit averaged across the NVZ area on the farm (Table 13). Please see N-max section of this document for more details.



© Maize Growers Association

N-Max crop limits

RECORDS

An overview of the NVZ rules is set out below, with the details on what you need to do in the corresponding sections of this booklet.

NVZ REQUIREMENT	WHO <i>needs to complete these records?</i>	WHAT <i>needs to be done?</i>	WHEN <i>do the records need completing?</i>
FARM RISK MAP	Farms that have land in an NVZ and spread organic manures.	Produce a risk map of the farm showing the land you may spread organic manure on, depending on circumstances, and where manures should NEVER be spread.	Where land is designated as an NVZ. Maps should be updated within 3 months of any changes.
LIVESTOCK MANURE NITROGEN FARM LIMIT	Farms for which at least one of the following applies: <ul style="list-style-type: none"> • Keep livestock • Import/export livestock manure • Have animals grazing or housed on their land that is in an NVZ. 	Complete a calculation to demonstrate compliance with the Livestock Manure N Farm Limit.	Needs completing by 30th April each year for the previous calendar year. It is recommended that you complete a draft calculation before the year end to be confident that you will be compliant.
STORING ORGANIC MANURES	Farms that: <ul style="list-style-type: none"> • Collect and store excreta from cattle, pigs or poultry and other livestock during the storage periods • Import organic manures during the storage period 	Calculate the capacity of your slurry storage facilities on your farm and how much you need to store to ensure sufficient appropriate storage is available to meet NVZ rules. Record the dates and location of any temporary fields heaps used for storing solid manures on the Farm Risk Map.	Update any changes to the records within a week of the change taking place. If livestock is introduced onto your farm for the first time complete calculations within 1 month.

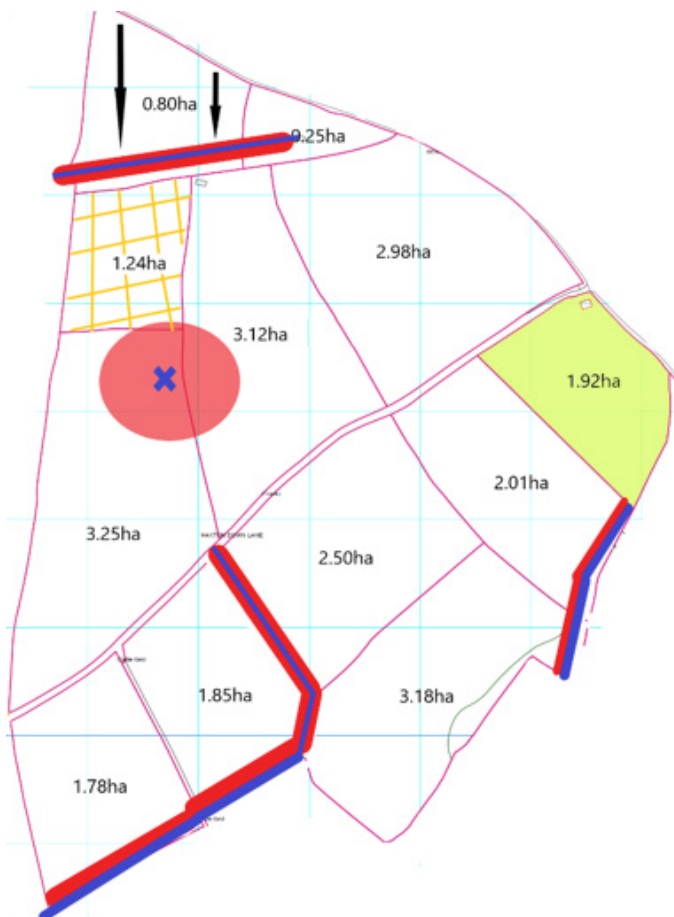
NVZ REQUIREMENT	WHO <i>needs to complete these records?</i>	WHAT <i>needs to be done?</i>	WHEN <i>do the records need completing?</i>
PLANNING NITROGEN USE	Farms that spread organic manures and/or manufactured nitrogen fertilisers.	Produce a 4-step nitrogen plan taking into account: <ol style="list-style-type: none"> 1. Nitrogen in the soil, 2. Crop N requirement, 3. Crop available Nitrogen contained in organic manure and 4. Nitrogen contained in manufactured fertiliser that you plan to apply to the crop. 	Before any manufactured Nitrogen fertiliser or organic manure is spread to a field where you are going to plant a crop or have planted a crop. For permanent grass make a plan before spreading, based on the farming year starting 1 January.
FIELD RECORDS	Farms that spread organic manures and/or manufactured nitrogen fertilisers	Record the field, crop type, sowing date and manure and fertiliser application details. Record yield of arable crops fertilised with nitrogen.	Records should be updated within 1 week of the manure or fertiliser application, sowing or harvesting a crop.
N-MAX LIMIT	Farms growing crops with an N-max limit on which you spread: <ul style="list-style-type: none"> • organic manures and/or • manufactured nitrogen fertiliser 	Produce records and calculations (if necessary) to demonstrate that you have complied with the N-max limit. N-max is derived from field records and does not require a separate record.	Records should be updated within 1 week of the manure or fertiliser application, sowing or harvesting a crop.

FARM RISK MAP

If you are spreading organic manures, a farm risk map (FRM) needs to be drawn up for the whole farm. The map does not need to be to scale. The FRM is useful to give to contractors or new staff members who are not familiar with the farm to highlight areas on farm where organic manure should not be spread. This section describes the requirements of a farm risk map for NVZ records but it is good practice to produce a colour-coded map based on field risk assessment, as described in Annex 1.

What To Mark On Your Map – for land within an NVZ









- Each field and its area in hectares
- Areas with sandy or shallow soils
- Land with a slope greater than 12 degrees
- Land drains (except if they are sealed and impermeable)
- Surface waters (for example, streams or ponds)
- Sites where you plan to use temporary field heaps to store manure
- Springs, wells and boreholes on your land or within 50 metres of the boundary of your land
- Areas where manure should not be spread. This is within 10m of surface water and 50m from a spring, well or borehole. (Generally, these are marked on the map in red).
- Low run-off risk land (if you intend to spread to this land to reduce the amount of storage you need to provide)



You may have a similar farm map for a farm assurance scheme or a farm waste management plan. You can use these maps as a base as long as you add all the details needed for the NVZ rules. The Farm Risk Map can also be used to help demonstrate that you have met the [Farming Rules for Water](#) and GAEC 1 under cross compliance.

Make sure you update your map within 3 months of any changes.

Example Key to Farm Risk Map

-  Surface water
-  Borehole
-  No spread areas
-  Shallow soil
-  Sandy soil
-  Land with a slope of more than 12 degrees
-  temporary field manure heap
-  land drains

LIVESTOCK MANURE NITROGEN FARM LIMIT

This calculation is easiest to describe as a “stocking rate calculation”. The land area of your farm is compared with the nitrogen produced by livestock on your farm and/or the nitrogen contained within **livestock manure** imported or exported. This calculation must be completed by 30th April each year for the previous calendar year.

This calculation is separate from, and should not be confused with the field limit of 250 kg N/ha from organic manures.

The loading limit for farms within an NVZ is 170 kg Nitrogen per hectare from livestock manure averaged over the area of farm.

4 steps to complete your calculation:

1. Record the area of your farm in an NVZ and calculate the livestock manure N capacity of your farm (Table 1).
2. Record the number and type of livestock on your farm and calculate the average number in the calendar year that you are calculating for. Calculate the amount of nitrogen produced by these livestock (Table 2 and Tables 6-9).
3. Record any imports or exports of livestock manure in the calendar year that you are calculating for. Calculate the amount of livestock manure nitrogen that was imported or exported (Table 3).
4. Compare the nitrogen permitted on your farm (Step 1) with the total loading of livestock manure N (steps 2 and 3) on your farm (Table 5). For farms without a derogation the loading should not exceed 170 kg N/ha.

Information to collect:

- The area of your farm during the year. Exclude areas such as surface water, buildings, yards and woodland unless used for grazing. In most situations, using the Basic Payment eligible area of each field is appropriate.
- Number and type of livestock – this should be the average number of livestock in each category type kept on your farm in the calendar year that you are calculating for (see table 2 below).
- For livestock manure brought onto/sent off the farm you need to record the following:
 - Type of livestock manure
 - Quantity
 - Nitrogen content
 - Date of transfer
 - Name and address of supplier / recipient

An example method for completing this calculation is given in this booklet (Tables 1-5) along with the figures to calculate the amount of nitrogen produced by livestock on your farm (Tables 6-9).

If your farm is part in and part out of an NVZ you will need to ensure that the average loading for the part of your holding in the NVZ is no more than 170 kg N/ha unless you hold a derogation.

It is good practice to also ensure that the land you farm outside of an NVZ is not loaded at more than 250 kg N/ha.

For farms part in and part out of an NVZ you may find it simpler to allow for your whole farmed area to be stocked at 170 kg N/year/ha in this calculation so you can be sure to demonstrate your compliance with the 170 kg N/ha limit for the land within an NVZ.

It is possible for certain farms with grazing livestock to apply to the Environment Agency for a “grassland derogation” to increase the loading limit from 170 kg N/ha to 250 kg N/ha. Please see the Defra NVZ guidance for more details.

Non-livestock organic manure such as green compost, biosolids or digestate from crop-fed anaerobic digesters do not need to be included in this calculation.

Table 1: Livestock Manure Nitrogen Farm Limit Calculation

Livestock Manure N farm limit kg N			
Area of the farm in an NVZ (ha) (A)		Livestock manure N farm limit (kg N/ha)	Livestock manure N capacity kg N (B)
	x	170	=

Table 2: Manure N produced by Livestock on your Farm (How many animals you have and what they produce)

Livestock type	Average number of livestock	Total N produced by 1 livestock unit*	Total N produced by all these livestock
Total N produced by livestock on farm		C	kg N/year

* See tables 6, 7, 8 and 9 below

Note: if you hold a grassland derogation your loading limit from grazing livestock (not imports) can be increased from 170 to 250 Kg N/ha. See NVZ guidance: <https://www.gov.uk/guidance/grassland-derogations-for-livestock-manure-in-nitrate-vulnerable-zones>

Table 3: Livestock Manure Nitrogen Imported or Exported on or off the Farm

3a. IMPORTED

Manure Type	Quantity t or m ³	Rate per ha	Date of Import	Name and Address of Supplier	Total N content (kg/m ³ or kg/t)	Total N (kg N)
Total N of all imported livestock manure					D	kg N/year

3b. EXPORTED

Manure Type	Quantity t or m ³	Application Rate	Date of Import	Name and Address of Recipient	Total N content (kg/m ³ or kg/t)	Total N (kg N)
Total N of all exported livestock manure					E	kg N/year

Table 4: Livestock Manure N Loading on your Farm

Calculate from total N sums in Tables 2, 3a and 3 b.

C	+	D	-	E	=	F	Livestock manure N loading	kg N/year

Table 5: Have you got enough land for the number of animals you have?

Box A	The livestock manure N loading kg N/year (F)	Box B	Manure N capacity of your farm kg N/year (B)
	(See Table 4)		(See Table 1)

If the figure in **Box B** is higher than in **Box A** you are OK. If not you need to either reduce the number of animals that you have, increase the area of land that you farm or export some manure to another farmer.

Standard figures for calculating manure nitrogen produced by livestock on your farm

Table 6: Cattle	Total N produced by cattle (kg/year) (a) (b)
1 calf (all categories) younger than to 2 months	1.4 (c)
1 dairy cow from 2 months and less than 12 months	29 (d)
1 dairy cow from 12 months up to first calf	61
1 dairy cow after first calf (over 9,000 litres milk yield)	115
1 dairy cow after first calf (6,000 to 9,000 litres milk yield)	101
1 dairy cow after first calf (up to 6,000 litres milk yield)	77
1 beef cow or steer (castrated male) from 2 months and less than 12 months	28 (d)
1 beef cow or steer from 12 months and less than 24 months	50
1 female or steer for slaughter 24 months and over	50
1 female for breeding 24 months and over weighing up to 500 kg	61
1 female for breeding 25 months and over weighing over 500 kg	83
1 non-breeding bull 2 months and over	54
1 bull for breeding from 2 and less than 24 months	50
1 bull for breeding from 24 months	48

(a) Includes an allowance for N losses from livestock housing and manure storage.

(b) Different units are used for cattle less than 12 months – see notes (c) and (d) below.

(c) Total N produced (kg) during the 2 months that the animal is in this category. This is calculated from 23 g x 60 days (2 months).

(d) Total N produced (kg) during the 10 months that the animal is in this category. This is calculated from 95 g x 300 days (10 months).

You can also use the **blank field records and standard values tables** to calculate how much nitrogen is available in different types of livestock manure:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/403382/nvz-guidance-blank-completion-data-tables-201312.xlsm

Table 7: Pigs	Occupancy (%)	Total N produced (kg/year)
1 weaner place, 7 to 13 kg	71	1
1 weaner place, 13 to 31 kg	82	4.2
1 grower place, 31 to 66 kg (dry fed)	88	7.7
1 grower place, 31 to 66 kg (liquid fed)	88	7.7
1 finisher place, 66 kg and over (dry fed)	86	10.6
1 finisher place, 66 kg and over (liquid fed)	86	10.6
1 maiden gilt place, 66 kg and over	80	11.1
1 sow place, 66 kg and over, with litter, up to 7 kg, fed on diet supplement with synthetic amino acids	100	16
1 sow place, 66 kg and over, with litter, up to 7 kg, diet without synthetic amino acids (low protein diet)	100	18
1 breeding boar from 66 kg to 150 kg	100	12
1 breeding boar, 150 kg and over	100	17.5

Table 8: Poultry	Occupancy (%)	Total N produced (kg/year)
1,000 replacement layer pullet places, up to 17 weeks	89	210
1,000 laying hens in cages, 17 weeks and over	97	400
1,000 laying hen places, free range, 17 weeks and over	97	530
1,000 broiler places	85	330
1,000 replacement broiler breeder pullet places, up to 25 weeks	92	290
1,000 broiler breeder places, 25 weeks and over	95	700
1,000 turkey places (male)	90	1,230
1,000 turkey places (female)	88	910
1,000 duck places	83	750
1 ostrich	100	1.4

Table 9: Sheep, Goats, Deer, Horses	Total N produced (kg/year)
1 lamb, 6 to 9 months	0.5 (a)
1 lamb, 9 months and over, to first lambing, first tugging or slaughter	0.7 (b)
1 sheep, less than 60 kg, after lambing or tugging. For ewes this includes one or more suckled lambs up to 6 months	7.6
1 sheep, over 60 kg, after lambing or tugging. For ewes this includes one or more suckled lambs up to 6 months	11.9
1 goat	15
1 deer for breeding	15.2
1 deer, other	12
1 horse	21

(a) Total N produced (kg) during the three months that the animal is in this category.

(b) Total N produced (kg) assuming the animal is in this category for six months.

STORING ORGANIC MANURES

If part, or all of your farm buildings are within an NVZ, the regulations require you to be able to store all the slurry (e.g. cattle and pig slurry) and poultry manure produced on your farm during the storage period, unless you reduce the volume by sending it off your farm or spreading some of it on fields with a low risk of runoff. There are also restrictions and record keeping requirements for storing poultry and other solid organic manures such as farmyard manure, separated slurry and digestate solids within an NVZ.

Farms with Slurry

If your farm produces slurry you will need to provide sufficient facilities to store all slurry produced on the holding, and all poultry manure produced in a yard or building, during the following 'storage periods':

- 1 October to 1 April (six months) in the case of pigs and poultry
- 1 October to 1 March (five months) in the case of other livestock

If you have any slurry on your farm you must store it in a tank, lagoon or other suitable facility. Slurry stores must have the capacity to store, in addition to the slurry, rainfall expected, allowing for wetter than average rainfall years (1 in 5 year) to enter the store during the storage period and any wash water or other liquids that enter the store during that period.

There are additional rules that cover the construction standards of slurry stores. These are part of the Silage, Slurry and Agricultural Fuel Oils (SSAFO) regulations and can be found at:

<https://www.gov.uk/guidance/storing-silage-slurry-and-agricultural-fuel-oil>

Farms with solid manure e.g. cattle FYM or poultry manure

If you have poultry manure or other types of solid manure you must store them either:

- in a vessel (e.g. unused impermeable slurry store, impermeable trailer)
- on an impermeable base, with appropriate collection and containment of runoff
- in a roofed building
- in a suitably located and constructed temporary field heap

Storage Records Required

It is important to read the information on storing solid manures including location of temporary manure heaps in the NVZ guidance: <https://www.gov.uk/guidance/storing-organic-manures-in-nitrate-vulnerable-zones>

You must:

- Calculate and record the capacity of the slurry storage facilities on your farm
- For farms producing slurry calculate and record the volume of manure that will be produced by the livestock you keep in a building or on hard standing during the storage period. If you always export slurry or spread on low risk land, you can reduce the volume you need to store accordingly. In the case of spreading on low risk land, you must add a contingency of 1 week's extra storage.
- Record the location of temporary field manure heaps on the Farm Risk Map and dates of their use

Use the Agriculture and Horticulture Development Board (AHDB) Slurry Wizard to produce your slurry storage calculation. Download the Slurry Wizard from <https://ahdb.org.uk/knowledge-library/slurry-wizard>

The benefits of using this wizard are:

- It calculates the M5 rainfall (allowing for wetter than average rainfall years (1 year in 5) for your farm location. This is now a requirement of the NVZ rules.
- For dairy farmers it will calculate the slurry your cows will produce, rainwater collected and washings or other liquids that enter the store during the storage period.
- The wizard is a recognised calculation process which complies with the current NVZ requirements.

Remember you may need a greater storage volume if in some years if you cannot empty the store before the start of the closed period.



PLANNING NITROGEN USE

You must plan all your applications of nitrogen on each crop in each field (including grass). This is your 4-step nitrogen plan which you should keep as part of your farm records and should follow the steps below:

4-step Nitrogen Plan

- Step 1** Calculate the amount of nitrogen in the soil that is likely to be available for uptake by the crop during the growing season (the Soil Nitrogen Supply or SNS);
- Step 2** Calculate the optimum amount of nitrogen that should be applied to the crop, taking into account the soil nitrogen supply (the crop nitrogen requirement);
- Step 3** Calculate the amount of nitrogen, from any planned applications of organic manure, that is likely to be available for crop uptake in the growing season in which it is spread (the crop available nitrogen); and
- Step 4** Calculate the amount of manufactured fertiliser required.

When planning your applications, you must take into account other parts of the NVZ rules that may restrict how much nitrogen you can apply to the crop and when you apply it such as:

- The N-max limit which is an upper limit on the amount of nitrogen from organic manure and manufactured fertiliser that can be applied to the major crop types. See N-max section for more details.
- The Organic Manure N Field limit which limits total N from all organic manures that are applied to land in any 12 month period to 250 kg/ha. See NVZ limits section for more details.
- Restrictions on the timing and rates of nitrogen applications from manufactured fertiliser and organic manures with high readily available nitrogen. See NVZ Actions section.

Help Preparing your Nitrogen Plan

There are various sources of information to help produce a 4-step nitrogen plan for your farm. It is recommended that if you do not have a plan for your farm that you look at the following resources:

- Tried & Tested – A step by step guide and templates for a Nutrient Management Plan and supporting toolkit, guidance and resources produced by the agriculture industry aiming to help farmers to improve nutrient management planning :
<http://www.nutrientmanagement.org/>
- Catchment Sensitive Farming (CSF) – farms within CSF priority areas can request a farm advice visit and attend events on nutrient management planning to reduce water and air pollution: <https://www.gov.uk/guidance/catchment-sensitive-farming-reduce-agricultural-water-pollution>
- FACTS Qualified Advisers will be able to work with you to produce your nitrogen plan. To find a FACTS qualified adviser: <http://www.factsinfo.org.uk/facts/home.eb>

FIELD RECORDS

The NVZ rules require you to keep a record for each crop grown in each field. These records should be updated within a week of you carrying out the operation and kept for 5 years. An example paper-based template for keeping these records is given in this booklet (Table 10).

When determining the total nitrogen content of organic manures, you can either:

- Use laboratory analyses showing the total nitrogen content from a sample of the manure.
- Use standard values that are given in the NVZ guidance (values for commonly used organic manures are given in Table 11 of this booklet).

When determining the crop available nitrogen from organic manure:

- For livestock manure use the nitrogen availability figures in the NVZ regulations (see Table 12)
- For other organic manures you can use either the supplier's technical analyses, standard figures in the Nutrient Management Guide (RB209) or by sampling and analysis of the manure.
- For each field record:
 - Crop
 - Sowing date
- For manufactured nitrogen fertiliser applications record:
 - Date of application
 - Rate of nitrogen applied (kg N/ha)
- For organic manure applications record:
 - Application rate (tonnes or m³/ha)
 - Date of spreading
 - Method of spreading
 - Type of manure
 - Total nitrogen content of the manure (kg N/tonne or kg N/m³)
 - The amount of nitrogen that was available to the crop (kg N/ha) at the time of spreading (Nitrogen availability figures shown in Table 12)

Low intensity farmers

Low intensity farmers do not need to keep records of manure and fertiliser applications made to fields. However, they will need to record sufficient information to show compliance with the low intensity farmer criteria. You should still undertake the 4-step nitrogen plan (as described above).

You qualify as a low intensity farmer if:

- at least 80% of your land is grassland; **and**
- no more than 100 kg N/ha per year is applied as organic manure (including any N in manure applied directly to the field by animals); **and**
- you spread no more than 90 kg N/ha per year as manufactured fertiliser; **and** you do not bring any organic manure onto your holding.

Table 10: Farm Applications of Manure and Fertiliser Records for the Year

Field Information				Manufactured Fertilisers				Organic Manures														
Linhay Field (D258)	Field Name and No.			5.2	Field Area (ha)			Grass	Crop			Drilling date if applicable										
	Date of Application				01/04/19	15/05/19	26/07/19		27%	125	125	34	15/03/19	20/08/19	Cattle Slurry	33	25	Surface Spread	2.6	86	40%	34
	Nitrogen Content of Fertiliser (%)				27%	27%	25%		125	125	34	20/08/19	20/08/19	Cattle Slurry	33	25	Surface Spread	2.6	86	40%	34	
	Quantity of Fertiliser Applied per ha				125	125	125		125	125	34	20/08/19	20/08/19	Cattle Slurry	33	25	Surface Spread	2.6	86	40%	34	
Nitrogen Applied (kg/ha)			34	34	31	99	99	99	236	49	148					TOTAL Crop Available N per ha (kg N/year/ha)						

Table 11: Total Nitrogen content of organic manures and maximum application rates to supply 250 kg N/ha/year of total nitrogen

Manure type	Total N content	The maximum application rate to supply 250 kg N/ha	
		Metric Units	Imperial Units
Solid manure	Kg/m ³ or kg/t	Tonnes/ha	Tons/acre
Cattle farmyard manure	6	42	17
Pig farmyard manure	7	36	14.5
Sheep farmyard manure	7	36	14
Duck farmyard manure	6.5	38	15
Poultry layer manure	19	13 (note a)	5.2
Poultry broiler litter	30	8	3.2
Poultry turkey litter	30	8	3.2
Horse farmyard manure	7	36	14
Goat farmyard manure	6	42	17
Slurry	Kg/m ³ or kg/t	M ³ /ha	Gallons/acre
Cattle	2.6	96 (note b)	8,600
Pigs	3.6	69 (note b)	5,700
Separated manures	Kg/m ³ or kg/t	M ³ /ha	Gallons/acre
Separated cattle slurry, liquid fraction, strainer box	1.5	167 (note b)	14,900
Separated cattle slurry, liquid fraction, weeping-wall	2	125 (note b)	11,200
Separated cattle slurry, liquid fraction, mechanically separated	3	83 (note b)	7,500
Separated cattle slurry, solid fraction	4	63	25
Separated pig slurry, liquid fraction	3.6	69 (note b)	6,200
Separated pig slurry, solid fraction	5	50	20

- (a) Applications must not exceed 8 t/ha of poultry manure from the end of the closed spreading period until the last day of February
- (b) Applications must not exceed 30 m³/ha between the end of the closed spreading period until the last day of February, with 3 weeks between each individual application

Table 12: The percentage of total nitrogen content of livestock manure available for crop uptake in the growing season in which it is spread

Manure type	Crop-available N (% of total N applied)
Cattle slurry	40
Pig slurry	50
Poultry manure	30
Other livestock manures	10

N-MAX LIMITS

There is a limit on the average amount of manufactured nitrogen fertiliser and crop-available nitrogen from organic manure that you can apply to the most commonly grown crops (including grassland) in the UK. This is known as the N-max limit (maximum nitrogen application limit) and the limits are shown in Table 13 below.

The N-max limit applies to the average nitrogen application rate for that crop type across your farm. In other words, you may apply fertilisers at a rate higher than N-max to some fields provided that on other fields of the same crop the loading is low enough to ensure the average is at or below the N-max limit.

Table 13: N-max limits by crop

Crop	Standard N-max limit (kg N/ha)	Standard crop yield (tonnes per hectare)
Autumn or early winter-sown wheat	220	8
Spring-sown wheat	180	7
Winter barley	180	6.5
Spring barley	150	5.5
Winter oilseed rape	250	3.5
Sugar beet	120	-
Potatoes	270	-
Forage maize	150	-
Field beans	0	-
Peas	0	-
Grass	300	-
Vegetables and horticultural crops	Various	See full NVZ Guidance

NOTE: There may be some situations where applying standard N-max limits shown above to a particular crop or field is justified. Please see the Defra NVZ guidance for details **and** where applicable retain written advice from a FACTS qualified adviser to justify exceeding the N-max.

If your field records demonstrate that the nitrogen application rate to each individual field growing a particular crop is lower than the N-max limit for that crop type you can be confident that you have complied with the N-max limit and do not need to complete the full calculation.

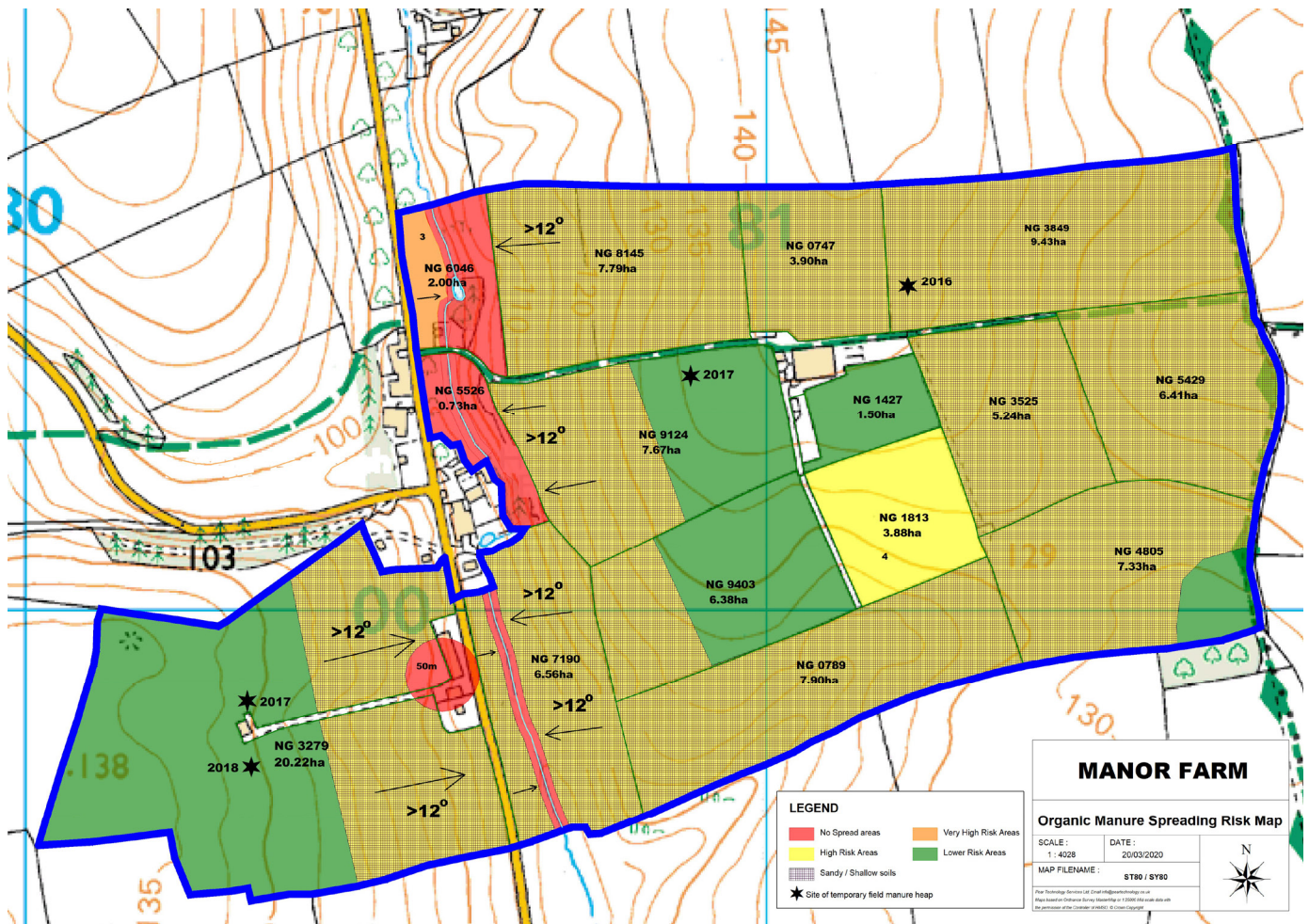
ANNEX 1: FIELD BY FIELD RISK ASSESSMENT & FARM RISK MAP

The Farm Risk Map described on page 10 is required to comply with NVZ rules, which will show the areas of the farm where manure should NEVER be spread in red (see page 5). It is good practice to carry out a field by field risk assessment for the risk of nitrogen contained in organic manure reaching surface water and produce a colour-coded map. Below is a recognised method of completing this risk assessment. Fields should be graded as “very high risk” or “high risk” depending on proximity to a watercourse, gradient, field drainage, soil depth and soil conditions such as compaction or waterlogging as shown in the table below. Other fields can then be identified as lower risk on the risk map (green).

Conditions leading to very high and high risk areas	Colour on map	Numbers on coloured areas
Fields or part fields next to a watercourse, spring or borehole when the surface is severely compacted (note a) or waterlogged	Orange	1
Fields or part fields that are likely to flood sometime in most winters.	Orange	2
Field of part fields next to a watercourse, spring or borehole when the soil is at field capacity (in winter) (note b) and there is: <ul style="list-style-type: none"> - a steep slope or - a moderate slope and a slowly permeable soil (i.e. a clay soil or one through which water passes only slowly), 	Orange	3
Field of part fields next to a watercourse, spring or borehole when the soil is at field capacity (in winter) (note b) and there is: <ul style="list-style-type: none"> - a moderate slope and a well-drained soil or - a slight slope and a slowly permeable soil 	Yellow	
All fields or part fields with effective pipe or mole drains (but see extra limitations below (note c)) or Very shallow soils (less than 30 cm) over gravel or rock, e.g. limestone, chalk, slates and shales.	Red/Yellow/ Orange	4







Notes

- a) “Severely compacted”: rain stays on the surface after rainfall.
- b) “Field capacity”: fully wetted soil where more rain would cause water loss by drainage. Normally occurs from autumn and lasts until spring.
- c) Fields or part fields which in the last 12 months have been pipe drained, mole drained or sub-soiled over drains should not be used for spreading.



Example of a Farm Risk Map for manure spreading

Example Colour key for a farm risk map

-  Orange areas (numbered 1,2,3 or 4 *)
Very high risk
-  Yellow areas (numbered 4 as necessary)
High risk
-  Green areas
Lower risk
-  Cross-hatched areas identified
sandy or shallow soils
-  Red areas (numbered 4 as necessary)
Land where organic manure should never be spread
-  White areas land not normally
used for spreading

Key for numbered coloured areas:

1. Do not spread on these fields when the surface is compacted or water-logged.
2. Do not spread when there is a risk of flooding.
3. Do not spread when the soil is at field capacity i.e. when the soil is fully wetted.
4. A field or part-field with effective pipe or mole drains.

ANNEX 2: SOIL TYPES FOR SPREADING RESTRICTIONS

Table 14: Soil types

Your soil is shallow if it's less than 40cm deep. Your soil is sandy if it lies over sandstone or it has all the characteristics shown in this table:

Layer of soil	Up to 40cm	From 40cm to 80cm
Content of the soil	more than 50% by weight of particles from 0.06mm to 2mm in diameter	more than 70% by weight of particles from 0.06mm to 2mm in diameter
Content of the soil	less than 18% by weight of particles less than 0.02mm in diameter	less than 15% by weight of particles less than 0.02mm in diameter
Content of the soil	less than 5% by weight of organic carbon	less than 5% by weight of organic carbon



Shallow injection of dairy slurry between cuts of silage. © Natural England

FURTHER INFORMATION

1. Nitrate Vulnerable Zones (NVZ) guidance: <https://www.gov.uk/government/collections/nitrate-vulnerable-zones>
2. Farming Advice Service (FAS) Helpline: 03000 200 301: <https://www.gov.uk/government/groups/farming-advice-service>
3. Farming Advice Service Back to Basics publication on NVZ rules: <http://farmingadvice.service.org.uk/events/assets/Uploads/Technical-articles/FAS-NVZ-Back-to-Basicsfinalv1-3.pdf>
4. Farming Rules for Water: <https://www.gov.uk/guidance/rules-for-farmers-and-land-managers-to-prevent-water-pollution>
5. Silage, Slurry and Agricultural Fuel Oil (SSAFO) regulations: <https://www.gov.uk/guidance/storing-silage-slurry-and-agricultural-fuel-oil>
6. Catchment Sensitive Farming (CSF): <https://www.gov.uk/guidance/catchment-sensitive-farming-reduce-agricultural-water-pollution>
Your local Catchment Sensitive Farming Officer (CSFO) can help with training and advice to reduce water and air pollution from agriculture support for applications for Countryside Stewardship capital grants to improve water and air quality.
To find your local Catchment Sensitive Farming Officer (CSFO), visit: www.gov.uk/government/publications/catchment-sensitive-farming-officer-contact
7. Wessex Water catchment management: <https://www.wessexwater.co.uk/environment/catchment-management>
8. Environment Agency: <https://www.gov.uk/government/organisations/environment-agency#org-contacts>
9. Checking for Drinking Water Safeguard Zones and NVZs: <https://environment.data.gov.uk/farmers/>
10. Natural England: <https://www.gov.uk/government/organisations/natural-england>
11. FACTS qualified advisers: <http://www.factsinfo.org.uk/facts/home.eb>
12. Tried & Tested nutrient management guidance and tools: <http://www.nutrientmanagement.org/>
13. Agriculture and Horticulture Development Board (AHDB) - The Nutrient Management Guide and other information and tools on crop nutrient planning: <https://ahdb.org.uk/nutrient-management-guide-rb209>
14. AHDB Slurry Wizard: <https://ahdb.org.uk/knowledge-library/slurry-wizard>
15. PLANET and Manner NPK tools: <http://www.planet4farmers.co.uk/Manner.aspx>
16. Championing the Farmed Environment: <http://www.cfeonline.org.uk/>

This booklet has been produced by Creedy Associates Ltd with Catchment Sensitive Farming and Wessex Water to provide guidance to farmers on Nitrate Vulnerable Zone record keeping but we do not accept any liability for its use. Please note that changes to the Nitrate Vulnerable Zone requirements may be introduced following the publication of this guide and further details are in the full NVZ guidance. Always follow the NVZ guidance published by Defra on [www.gov.uk](https://www.gov.uk/government/collections/nitrate-vulnerable-zones): <https://www.gov.uk/government/collections/nitrate-vulnerable-zones>



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