

## **FAS technical article – Slurry storage requirements**

This article aims to provide practical guidance on the manure storage requirements to ensure farmers have the information they need to get the best from their manures and comply with regulations. The article discusses the benefits of maintaining slurry storage capacity, the legal requirements of slurry storage, and the practicalities of what you need to store, how to store it and, importantly, cost-efficient mechanisms to minimise storage requirements.

### **What are the benefits of maintaining slurry storage capacity?**

Having sufficient and well-maintained, on-farm, slurry storage enables farmers to schedule spreading at the optimal time to meet crop requirements and avoids being forced into spreading because of storage capacity limitations. Spreading at the optimal time increases nitrogen uptake by crops, which in turn, lowers the need for artificial fertiliser and reduces the loss of nitrate and other pollutants to ground or surface water. Further benefits of having sufficient storage capacity include giving farmers more resilience to cope with wet or freezing weather, when the risk of slurry runoff and causing soil structural damage through trafficking, and subsequent soil wash/runoff, can be very high.

Not only is it good practice to have sufficient storage in place, but it is also a legal requirement under the following regulations:

- [The Nitrate Pollution Prevention Regulations 2008 as amended \(NVZ Regulations\)](#)

The purpose of these Regulations is to reduce the amount of nitrates, derived from the application of nitrogen fertiliser and organic manures, entering surface and groundwater in Nitrate Vulnerable Zones (NVZs) in England. It is a legal requirement to comply with the Regulations, and if you are a Single Payment Scheme (SPS) claimant and fail to comply, you could also have your payment reduced.

In England, 59% of all farms are now within a designated NVZ. During 2012, the Department for Environment, Food and Rural Affairs undertook a review of the Regulations. This saw the total amount of designated land reduce slightly with some areas being de-designated and new areas being proposed. If you are affected by these changes, you should have received a letter from Defra notifying you of this. You can also view a map of the proposed NVZ areas for 2013 on the Environment Agency [website](#).

- [The Water Resources \(Control of Pollution\) \(Silage, Slurry and Agricultural Fuel Oil\) \(England\) Regulations 2010, as amended \[SSAFO Regulations\]](#)

The SSAFO Regulations set out the minimum standards for location, design and construction of all farm storage facilities for these materials.

### **What are the slurry storage requirements?**

The NVZ Regulations establish a 'closed period' (see Figure 1), during which the application of manures with high readily available nitrogen content, such as slurry and poultry manure, is not permitted. This is due to the high risk of nitrate loss experienced if these materials are put on the land during this period in the year. (There is also a closed period for manufactured fertiliser for the same reason.)

Figure 1 – NVZ closed periods (dates inclusive)

	Grassland	Tillage land
<b>Sandy or shallow soils</b>	1 Sep to 31 Dec	1 Aug to 31 Dec*
<b>All other soils</b>	15 Oct to 15 Jan	1 Oct to 15 Jan

\*If a crop is sown on tillage land with sandy or shallow soils on or before 15 September, applications will be permitted between 1 August and 15 September inclusive.

It is also unacceptable to spread manures onto land that is waterlogged, frozen or snow-covered, or when heavy rain is forecast in the next 24 hours, and these conditions are not uncommon in the winter months. Therefore there is a requirement to provide adequate storage for manure. For poultry manure and pig slurry, there must be **six months'** storage capacity, and at least **five months'** storage capacity for slurry from other types of livestock for farms in NVZs. This must also take into account average rainfall. The new NVZ Regulations will extend **the closed period for spreading organic manures to 31 January (except for sandy and shallow soils) from 2016 onwards**. The application rates of slurry permitted at the end of the closed period will also be **reduced from 50m<sup>3</sup>/ha to 30m<sup>3</sup>/ha and this will come into force in January 2014**.

Regardless of NVZ status the practical effect of the SSAFO Regulations requires you to have four months' slurry storage. This includes making allowance for any rain that will enter the store during the four months with the highest rainfall that is likely to happen once in every five years. This should mean that the storage capacity will be sufficient to cope with rainfall during wetter than normal winters. It is expected that, in the great majority of cases, meeting the NVZ requirements will also satisfy the SSAFO capacity requirements.

In some locations, for example where the soils stay wet for longer than average and to cope with adverse weather conditions, a larger storage capacity is advisable to allow you to store slurry until conditions are right, to prevent pollution, and to allow your business to operate safely and efficiently.

### Do you need to store it?

The NVZ and SSAFO Regulations refer to the storage of 'slurry'. To distinguish slurry from other types of manure for the purposes of the NVZ Regulations, the following definitions have been provided:

- **Slurry** – excreta produced by livestock (other than poultry) while in a yard or building (including any bedding, rainwater and washings mixed with it) that has a consistency that allows it to be pumped or discharged by gravity. The liquid part of separated slurry is also defined as slurry.
- **Dirty water** – lightly-contaminated run-off from lightly fouled concrete yards or from the dairy/parlour that is collected separately from slurry. (Although Defra guidance allows dirty water to be managed differently from slurry, in legal terms it is still defined as slurry.)
- **Farm yard manure (FYM)** – livestock excreta that is mixed with straw bedding material, which can be stacked in a freestanding heap without slumping or free drainage.

The definition of dirty water is important. If it has been collected and stored separately from slurry, it can be excluded from the NVZ storage calculations (but only from these calculations). Although it can be excluded from the NVZ storage calculations, dirty water can still be a significant source of pollution, and so it must be stored and applied only at times when it is safe to do so. If the NVZ rules do not apply, the storage of dirty water must be calculated under SSAFO. Below are examples of slurry and dirty water.

Examples of slurry	Examples of dirty water
<ul style="list-style-type: none"> <li>• Liquids from weeping-wall stores, strainer boxes, and slurry separators.</li> </ul>	<ul style="list-style-type: none"> <li>• Run-off from yards lightly trafficked by livestock where the yards are regularly scraped or cleaned.</li> </ul>

<ul style="list-style-type: none"> <li>• Effluent arising from over-wintering pads (e.g. woodchip corrals and stand-off pads).</li> <li>• Run-off from loafing yards and other yard areas where livestock are fed (e.g. feeding face of silage clamps).</li> <li>• Diluted slurry – slurry that has been diluted to give it low total nitrogen content will still be considered as slurry.</li> </ul>	<ul style="list-style-type: none"> <li>• Run-off from the surface of fully sheeted silage clamps, provided it does not contain silage effluent or slurry.</li> </ul>
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Further clarification regarding the classification of slurry and dirty water can be obtained from the Environment Agency publication '[NVZ Fact Sheet 1: Slurry and dirty water](#)'.

### Calculating storage requirements

First work out how much storage you think you will need to operate your business efficiently and legally. This may be more than the regulatory minimum, allowing for the amount of slurry produced, as well other material entering the store, such as washings/other liquids and rainfall. If you are not sure how to do this, speak to your farm advisor, or if you are in a Catchment Sensitive Farming Area, your local CSF Officer. When you have done this, you need to check that it is not less than the minimum volume that is required by law.

In [leaflet 4](#) of the NVZ guidance pack, there is a full step-by-step guide to calculating the minimum storage required in NVZ areas. [Leaflet 3](#) in the NVZ guidance pack provides standard figures for the amount of total nitrogen (kg/year) and the volume of excreta produced (m<sup>3</sup>/month) by livestock to help complete the calculations.

Operational requirements may mean that more storage than the minimum amount specified by the regulations is required. For example, if cows are housed over winter (October to mid-April) and spreading is not possible until after the first cut, this could require 6.5 months' storage capacity, assuming that the store was empty at the beginning of the closed period. If there are plans to increase stocking rates in the future, it is sensible to take this into account when calculating storage capacity.

In an NVZ area, you do not need to provide storage facilities for the volume of poultry manure or slurry:

- Exported from the farm during the storage period, but you must be able to show that this export can happen every year.
- Applied to land with a low risk of run-off following the end of a closed period provided:
  - you comply with certain restrictions on the rate and frequency of these applications (Leaflet 8);
  - the land with a low run-off risk\* is marked on a map for inspection purposes;
  - you provide, as a contingency measure, additional storage capacity equivalent to one week's production of manure.

\*Low-risk land is defined as land with an average slope of less than 3°, with no land drains except for sealed carriers and situated 50m from a watercourse or conduit. Low-risk land must be marked on your risk map.

### Reducing storage requirements

If there is not sufficient slurry storage in place, first consider what you may be able to do to reduce the need for additional storage.

#### 1. Maximise existing capacity

- Eliminate clean/roof water from the slurry system.
- Divert genuine dirty water to separate storage and a low-rate irrigation system.
  - Parlour washings are typically almost 40% of slurry production (20 litres/cow/day washings and 53 litres/cow/day slurry). If washings go to the slurry store, 30% of the store will be filled with parlour washings;
  - Run-off from open yards can double the volumes to be handled. On a 100-cow unit an open yard with an area of 1,000m<sup>2</sup> is common. This could generate 400m<sup>3</sup> of winter run-off or as much as 700m<sup>3</sup> in an area with high rainfall.

## 2. Reduce slurry production

- Roof open feed yards.
- Rationalise your yard areas to minimise livestock access.
- Move to fully bedded system (straw or woodchip).
- Roof or cover store.
- Reduce numbers.
- Extend grazing/out-wintering if this will not damage you soils or cause other pollution problems.

## 3. Reduce volume to be stored:

- Export slurry.
- Separate solids.

Not only will these measures reduce the amount of storage that is required, but they can also provide significant cost savings. Based on the National Association of Agricultural Contractors (NAAC) average contract costs for 2012, slurry spreading with a 2,500 gallon tanker at £40 per hour costs around £1.80 per/m<sup>3</sup>. Therefore, diverting 500m<sup>3</sup> of parlour washings away from the slurry store could save £900 over the year.

If you have done all you can to reduce your storage needs and additional storage is still needed, the table below describes a number of different approaches you could take.

### Providing additional slurry storage capacity

Type of store	Considerations – detailed advice on all of these can be obtained from CIRIA 126 <sup>1</sup>
<b>Earth-banked lagoon</b>	<ul style="list-style-type: none"> <li>• Low cost, versatile (can deal with solids and liquids) and in some instances can be easily extended.</li> <li>• Need to have suitable soil (tested in accordance with CIRIA 126) and 750mm of freeboard at all times.</li> <li>• Collect large volumes of rainfall and occupy large areas of ground.</li> </ul>
<b>Lined lagoon</b>	<ul style="list-style-type: none"> <li>• Two main approaches – natural (clay) or artificial (low-density polyethylene (LDPE)/Butyl). Concrete/liner hybrid systems are also possible.</li> <li>• More expensive than earth-banked lagoons, but can be a cost-effective approach.</li> <li>• Clay liner must meet the SSAFO impermeability standard set out in guidance, and be at least 1m thick.</li> <li>• Transport costs can be significant if clay is not available locally.</li> <li>• Artificial liners are vulnerable to mechanical damage. Therefore, they are ideal for dirty water, but not suitable for all types of slurry, such as high dry matter</li> </ul>

<sup>1</sup> Farm waste storage - guidelines for construction (R126). Currently available as a pdf download from [www.ciria.org](http://www.ciria.org). This publication is currently being reviewed for re-publication in late 2013.

	<p>slurry or sand bedding. Moderately low cost.</p> <ul style="list-style-type: none"> <li>• Concrete floors with clay or artificial liners improve versatility and durability of stores.</li> <li>• Lined stores can be difficult to extend.</li> </ul>
<b>Steel stores</b>	<ul style="list-style-type: none"> <li>• The above-ground store has limited land-take, with minimal rainwater collection.</li> <li>• Moderate to high cost, and in some instances can be easily extended if necessary.</li> <li>• Monitoring and periodic maintenance of joints and panels required to reduce the risk of failure.</li> <li>• Can deal with a range of materials, whole slurry to dirty water, but is not suitable for sand bedding.</li> </ul>
<b>Blockwork store</b>	<ul style="list-style-type: none"> <li>• Moderate to high cost. However, costs can be reduced by using farm labour to construct the store.</li> <li>• Extremely versatile and can deal with all materials.</li> <li>• Limited surface area, but there is flexibility in the shape of the store.</li> </ul>
<b>Concrete panel store</b>	<ul style="list-style-type: none"> <li>• Moderate to high cost.</li> <li>• Less easy to extend.</li> <li>• Durable, suitable for liquids and solids and quick to erect.</li> </ul>

Please remember, if you are constructing new facilities or substantially increasing the size of existing slurry storage, you must provide written notification to the Environment Agency at least 14 days in advance of the work commencing. This applies to all farms, whether the NVZ rules apply or not. You may avoid costly rebuilding work if you discuss your proposals in advance of building.

In conclusion, this article aimed to provide practical guidance on the manure storage requirements to ensure farmers have the information they need to get the best from their manures and comply with regulations.

If you require further advice on slurry management or have specific queries, please contact the Farming Advice Service technical advice line on 0845 345 1302 or [advice@farmingadvice.org.uk](mailto:advice@farmingadvice.org.uk)