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 your slurry storage capacity?

Having sufficient and well-maintained, on-farm, slurry storage enables farmers to schedule spreading at the optimal time to meet soil and 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 avoids 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, is significant.

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 2015**

- 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 Basic Payment Scheme (SPS) claimant and fail to comply, you could also have your payment reduced.
- In England, approximately 55% of all agricultural land are within a designated NVZ. The NVZ designation was reviewed during 2016 and the new designations for 2017 to 2020 began on 31 December 2016. These revised designations include areas that are newly designated as NVZs and exclude areas that have been de-designated.
- You can check if you are in a designated area by entering your postcode into the Environment Agency's mapping tool.

- **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. Please go to GOV.UK for more information on the requirements.
- If you are constructing a new store, you must contact the Environment Agency at least 14 days before you start the work. You can also contact them for advice on planning and building a store.

What are the slurry storage requirements?

The NVZ Regulations establish a 'closed period' (see Table 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 if these materials are put on the land during these periods. There is also a closed period for manufactured fertiliser for the same reason.

Table 1 – NVZ closed periods (all dates inclusive)

	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

* 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 if you are located in an NVZ:

- For poultry manure and pig slurry, there must be **six months**' storage capacity.
- For other types of livestock, there must be at least **five months'** storage capacity.

It is important to remember that even if you are not located in an NVZ, the practical effect of the SSAFO Regulations requires you to have at least four months' slurry storage. This includes making sure that the storage capacity will be sufficient to cope with rainfall during wetter than normal winters (1 in every 5 years).

You may need more than the SSAFO/NVZ storage capacity to comply with wider Farming Rules for Water (FRFW) requirements to ensure you do not exceed the needs of the soil and crop need, or give rise to a significant risk of diffuse pollution. The Environment Agency recommends all farms should aim for at least 6-month capacity.

Under FRFW, organic manure applications must be planned so that they do not exceed the needs of the soil and crop, or give rise to a significant risk of diffuse pollution. This applies to all organic manures not just those with a high readily available nitrogen content. Advise on soil and crop need can be found in the AHDB Nutrient Management Guide (RB209).

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.
- **Lightly fouled water (LFW) slurry (formally dirty water)** - a dilute form of slurry produced from any water collected from yards and buildings used by livestock where, as far as reasonably practicable, the yard or building is scraped or brushed down immediately after use to minimise contamination with livestock excreta. Source: Livestock manure and silage storage infrastructure for agriculture (C759F).
- **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 EA may allow a lower storage capacity for water lightly contaminated with livestock excreta that meets the definition of LFW, which is spread, for example, through a low rate irrigation system, and it can be evidenced it would not pollute surface water or groundwater. Please note, that a standard Manure Management Plan (MMP) is unlikely to provide such evidence alone as it primarily addresses direct slurry runoff to surface water. A more detailed plan that adequately quantifies diffuse pollution risk is likely to be required along with the production of a nutrient management plan (NMP).

Table 2 - Examples of slurry and LFW

Examples of slurry	Examples of lightly fouled water
• Liquids from weeping-wall stores, strainer boxes, and slurry separators. • Effluent arising from over-wintering pads (e.g. woodchip corrals and stand-off pads). • Run-off from loafing yards and other yard areas where livestock are fed (e.g. feeding face of silage clamps). • Diluted slurry – slurry that has been diluted to give it low total nitrogen content will still be considered as slurry.	• Run-off from yards lightly trafficked by livestock where the yards are scraped or brushed, as far as reasonably practicable, immediately after use. • Run-off from the surface of fully sheeted silage clamps, provided it does not contain silage effluent or slurry.

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.

To calculate the slurry storage capacity you need, you can use the Agriculture and Horticulture Development Board (AHDB) slurry wizard. In this tool you can calculate the amount of:

- slurry your livestock will produce;
- rain falling directly into the store and from contaminated yards;
- washings or other liquids that enter the store during the storage period.

The slurry wizard will convert your average rainfall into wetter than average. You can also use it to calculate and compare your existing capacity with your needed capacity, indicating if you will need to reduce the volume of slurry or provide additional capacity.

To find out how much manure your animals will produce, you can also use the standard value tables available to download from GOV.UK.

Compliance with FRFW and operational requirements may require more than the minimum storage amount specified in SSAFO/NVZ the regulations. 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, subject to compliance with FRFW, provided:

- you comply with certain restrictions on the rate and frequency of these applications;
- 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 lightly fouled water slurry to separate storage and a low-rate irrigation system.
  - Parlour washings are typically almost 40-50% of slurry production (20-30 litres/cow/day washings and 53-64 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 add considerably to the volumes to be handled. On an average 150 cow unit this can generate 400m^3 of winter rainfall run-off, or more if you have a larger than average yard area and/or farm in a high rainfall area.

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.

The average cost of slurry storage is £45m^3, and any volume reduction that can be make can result in a substantial saving and/or bring you into compliance with your slurry storage capacity requirements.

Providing additional slurry storage capacity

Table 3 – types of slurry store and their considerations

Type of store	Considerations
Earth-banked lagoon	• Low cost, versatile (can deal with solids and liquids) and in some instances can be easily extended. • Need to have suitable soil (tested in accordance with CIRIA C759F) and 750mm of freeboard at all times. • Collect large volumes of rainfall and occupy large areas of ground.
Lined lagoon	• Two main approaches – natural (clay) or artificial (low-density polyethylene (LDPE)/Butyl). Concrete/liner hybrid systems are also possible. • More expensive than earth-banked lagoons, but can be a cost-effective approach. • Clay liner must meet the SSAFO impermeability standard set out in guidance, and be at least 1m thick. • Transport costs can be significant if clay is not available locally. • 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 slurry or sand bedding. Moderately low cost. • Concrete floors with clay or artificial liners improve versatility and durability of stores. • Lined stores can be difficult to extend. • A leak detection system may be require in sensitive areas.
Steel stores	• The above-ground store has limited land-take, with minimal rainwater collection. • Moderate to high cost, and in some instances can be easily extended if necessary. • Monitoring and periodic maintenance of joints and panels required to reduce the risk of failure. • Can deal with a range of materials, whole slurry to dirty water, but is not suitable for sand bedding. • Option where there is shallow groundwater, making below/part-below ground storage unsuitable.
Blockwork store	• Moderate to high cost. However, costs can be reduced by using farm labour to construct the store. • Extremely versatile and can deal with all materials. • Limited surface area, but there is flexibility in the shape of the store.
Concrete panel store	• Moderate to high cost. • Less easy to extend. • Durable, suitable for liquids and solids and quick to erect.

Detailed information on slurry and storage infrastructure from can be downloaded from https://www.ciria.org/.

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 making a financial commitment/building.

If you require further advice on slurry management or have specific queries, please contact the Farming Advice Service technical advice line on 0845 345 1301 or advice@farmingadviceservice.org.uk.