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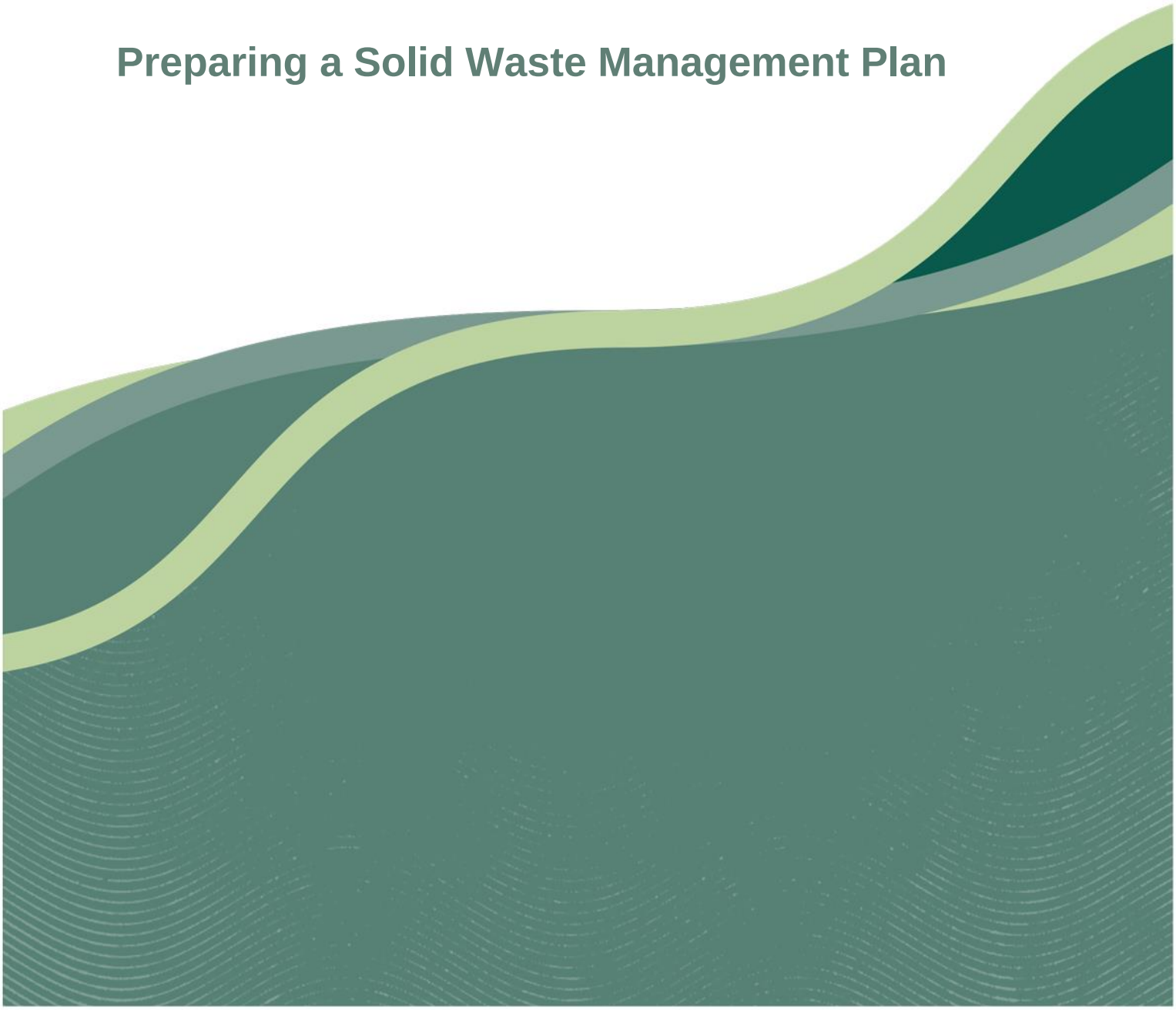
Agribusiness Development Guidelines

Preparing a Solid Waste Management Plan



Preparing a Solid Waste Management Plan

Operating intensive agribusiness facilities often results in solid animal waste.

Spreading this waste to agricultural land is a common method of re-use, which if not done appropriately may pose a risk to the environment and/or cause nuisance to the surrounding community.

This document provides guidance if you are planning to dispose of solid animal waste via on-site storage and/or spreading to agricultural land.

The guidelines may be helpful in preparing a Works Approval and/or Development Application for regulators; but are not intended as a definitive list of requirements.

Solid animal waste describes the by-products from intensive animal husbandry and production including manure, paunch, spent bedding and composted residual materials (such as animal carcasses and components) that is intended to be disposed of on the property of origin.

Scope

Applying solid animal waste to the property of origin should be carried out in accordance with a Solid Waste Management Plan (SWMP). This Guideline outlines what is required in a SWMP.

The Department of Primary Industries and Regional Development's (DPIRD) Land Application of Solid Animal By-Products should also be considered.

Note that storing animal by-products should only take place within a fit-for-purpose facility.

Summary

A SWMP should include a nutrient balance using one of two approaches:

1. **Desktop nutrient balance**, which is less complex and makes use of generic information. However, this approach is limited in the volume and types of by-products that can be analysed; or
2. **Detailed nutrient balance** including analysis of soil storage and information on the site to be collected and monitored. This depth of analysis will allow the nutrient balance to be applied for longer periods (two years or longer). For more information refer to the 'Detailed Nutrient Balance' section.

1. Desktop Nutrient Balance

A desktop nutrient balance is based on the guiding concept of:

Nutrient Balance = Nutrients in – Nutrients out

A nutrient balance can be positive or negative, with a positive nutrient balance often called a surplus, and negative balance a deficit.

The nutrient balance is an indication of the quantity of nutrients retained in the soil (thereby reducing the threat of contamination) or lost to the environment.

This desktop nutrient balance does not consider soil storage.

a) Nutrients in

To determine 'nutrients in' you need to consider and provide the following for each waste stream:

- **Quantity produced** – how much solid waste will be produced over a certain timeframe and how often it is collected (noting that some forms of removal are not 100 per cent effective and this needs to be accounted for).
- **Nutrient content** – nutrient content can be determined by sending samples to an accredited laboratory for analysis or via credible industry data. This could include nutrients (at least nitrogen and phosphorous), salts, pH and heavy metals. It is important to test the product at its end point (just prior to application) as the nutrient content can change following storage and treatment. Storage and treatment should be detailed in the SWMP.

b) Nutrients out

The following information is needed to determine 'nutrients out':

- **Method of removal:**
  - **Off-site** – how the waste will be transported.
  - **On-site via a crop**[1] (nutrient off-take) – the type and yield of the crop grown on the disposal area determines the amount of nutrients removed at harvest. Information required includes:
    - crop type and method of removal:
    - expected dry matter yield; and
    - nutrient content (in the absence of long-term average yields for the farm, use average district crop yields).
- **Losses:** expected gaseous nitrogen losses during storage and after spreading.

[1] Grazing removes only low levels of nutrients from reuse areas since most nutrients are recycled in manure. Accordingly, grazing alone is not a recommended land use for reuse areas.

2. Detailed Nutrient Balance

A desktop nutrient balance does not consider soil storage. However, some soils have greater capacity to store nutrients and/or inherent nutrient deficits, which allows more nutrients to be applied. At a minimum, a detailed nutrient balance would include testing of waste products, soil testing and seeking agronomic advice on the true storage capacity of the soils.

If soil storage of nutrients is to be considered, then the nutrient balance becomes:

Nutrient Balance = Nutrients in – (Nutrients out + soil storage[2])

3. Determining spreading rate

The spreading rate will depend on the most limiting nutrient within the solid waste, which in most cases will be phosphorous or occasionally nitrogen. It is recommended that spreading rate calculations for any likely limiting nutrient should be undertaken to confirm which nutrient is most restrictive.

a) Determining the spreading rate for Phosphorous

The following formula can be used to determine the spreading rate for Phosphorus:

Spreading rate of P (ton/ha)
= crop requirement (kg/ha) / (by-product nutrient content (%) x 10)

b) Determining the spreading rate for Nitrogen

Nitrogen can be lost to the atmosphere during spreading (estimated at 20 per cent). This formula can be used to determine the spreading rate for Nitrogen:

Spreading rate of N (ton/ha)
= crop requirement (kg/ha) / (by-product nutrient content (%) x 10 x 0.8)

c) The lowest calculated spreading rate (limiting factor) is the maximum spreading rate that can be employed.

[2] Once 95% of maximum P soil storage in the plant root zone has been attained, no further accumulation of phosphorus can occur.

4. Determining minimum area

Once a sustainable spreading rate is known, the land area required for disposal can be determined:

Minimum area required (ha) **= total by-product produced (ton/year) / spreading rate (ton/ha/year)**

The nutrient requiring the largest area (ha) is the limiting factor and determines the minimum land area (ha) needed for disposal. Once the minimum land area needed for disposal is known, contingency plans for solid animal waste over and above that which can be spread on-site need to be made. This could include off-site re-use or transport to a licensed facility.

Records

Accurate records should be kept supporting the validation of the nutrient balance in the SWMP. Records for a desktop nutrient balance should include:

- Paddocks where solid animal waste have been applied.
- Application rates.
- Crop type and yield.
- A map showing where the solid waste can be spread, with acceptable buffers to sensitive areas.

Records for a detailed nutrient balance should include the above plus:

- Soil test information.
- Application rate recommendation based on soil testing.

Related factsheets

ABD Guideline: Land Application of Solid Animal By-Products

Contact

If you require additional information, contact the Agribusiness Development team at DPIRD at agribusiness@dpird.wa.gov.au

Important disclaimer