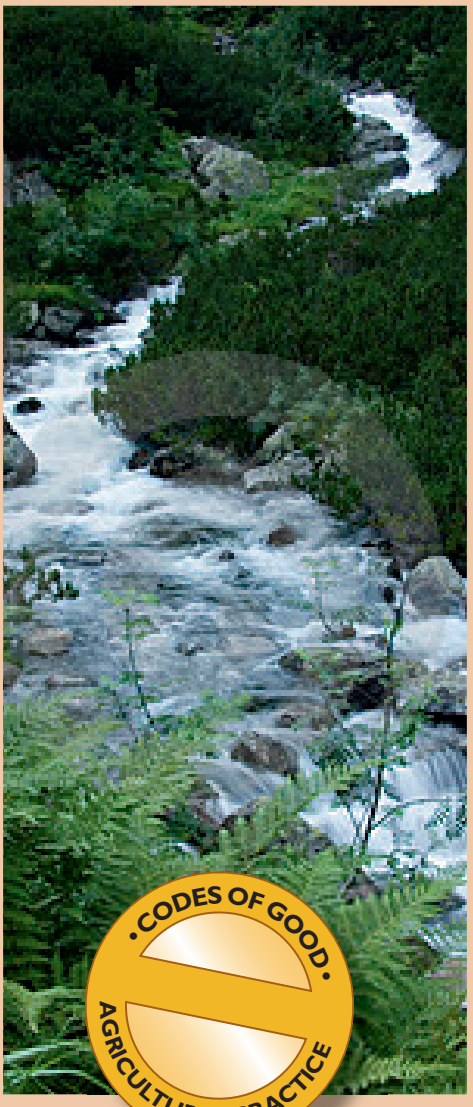
Protecting our Water, Soil and Air

A Code of Good Agricultural Practice for farmers, growers and land managers







defra
Department for Environment
Food and Rural Affairs

defra
Department for Environment
Food and Rural Affairs

Protecting our Water, Soil and Air

A Code of Good Agricultural Practice for farmers, growers and land managers

This code has been written by technical specialists from Defra and Natural England, and been produced in association with the Environment Agency





Published by TSO (The Stationery Office) and available from:

Online
www.tsoshop.co.uk

Mail, Telephone, Fax & E-mail
TSO
PO Box 29, Norwich, NR3 1GN
Telephone orders/General enquiries: 0870 600 5522
Fax orders: 0870 600 5533
E-mail: customer.services@tso.co.uk
Textphone: 0870 240 3701

TSO Shops
16 Arthur Street, Belfast BT1 4GD
028 9023 8451 Fax 028 9023 5401
71 Lothian Road, Edinburgh EH3 9AZ
0870 606 5566 Fax 0870 606 5588

TSO@Blackwell and other Accredited Agents

Published with the permission of the Department for Environment, Food and Rural Affairs on behalf of the Controller of Her Majesty's Stationery Office

© Crown Copyright 2009

Copyright in the typographical arrangement and design is vested in the Crown. Applications for reproduction should be made in writing to the Office of Public Sector Information, Information Policy Team, Kew, Richmond, Surrey, TW9 4DU.

First published 2009

ISBN 978 0 11 243284 5

Printed in the United Kingdom for The Stationery Office.
N6012544 12/08 19585 416992

Contents

		Paragraphs
About this Code		1 – 14
Section		
1	**Introduction**	
1.1	Pollution sources & impacts	15 – 35
1.2	Protecting the wider environment	36 – 42
1.3	Environmental regulation, cross compliance obligations and agri-environment schemes	43 – 49
1.4	Responsibilities of farmers, farm staff and contractors	50 – 52
1.5	Accident and emergency plan	53 – 54
2	**Soil fertility and plant nutrients**	
2.1	Introduction	55
2.2	Maintaining soil fertility	56 – 62
2.3	Managing nitrogen	63 – 97
2.4	Managing phosphorus	98 – 104
2.5	Soil contamination	105 – 131
3	**Management plans**	
3.1	Introduction	132 – 136
3.2	Manure management plan	137 – 146
3.3	Nutrient management plan	147 – 153
3.4	Soil management plan	154 – 161
3.5	Crop protection management plan	162 – 171
4	**Farm buildings & structures**	
4.1	Introduction	172 – 178
4.2	Silage stores and effluent handling	179 – 190
4.3	Livestock manure and dirty water collection, storage and treatment	191 – 234
4.4	Sheep dips and dipping	235 – 255
4.5	Pesticide storage and handling	256 – 271
4.6	Fertiliser storage and handling	272 – 286
4.7	Fuel oil storage	287 – 300
4.8	Livestock buildings and their management	301 – 331

5 Field work

5.1	Introduction	332 – 343
5.2	Soil management and cultivations	344 – 374
5.3	Management of peat soils	375 – 379
5.4	Application of livestock manures and dirty water	380 – 409
5.5	Application of organic wastes	410 – 426
5.6	Application of lime and manufactured fertilisers	427 – 435
5.7	Application of pesticides	436 – 447
5.8	Managing livestock	448 – 472
5.9	Soil handling	473 – 479
5.10	Turf production	480 – 486

6 Specialised horticulture

6.1	Introduction	487 – 488
6.2	Protected crops, nursery stock, mushrooms	489 – 506
6.3	Watercress	507 – 512

7 Wastes

7.1	Introduction	513 – 523
7.2	Waste minimisation	524 – 530
7.3	Waste storage, recovery and disposal	531 – 536
7.4	Waste exemptions	537 – 540
7.5	Disposal of dilute liquid wastes and waste oil	541 – 544
7.6	Disposal of animal carcases	545 – 551

8 Water supplies on the farm

8.1	Introduction	552 – 557
8.2	Water for crops and livestock	558 – 579

9 References

10 Glossary of terms

11 Index

12 Contacts

About this Code

1. This Code of Good Agricultural Practice is a practical guide to help farmers, growers and land managers protect the environment in which they operate.

- The Code describes key actions you can take to protect and enhance the quality of water, soil and air.
- In some cases you may also achieve cost savings for your business.
- It will help you to meet your legal obligations including those relating to cross compliance.

2. The Code is not a manual on how to manage your farm or holding. It is to help you select the appropriate actions for your individual situation. Many farms and holdings are already delivering a good standard of environmental protection, but there are some where it can be improved. Most can do something better.

3. Advice in this Code is appropriate for all farming systems. However, the advice does not override the legal requirement for certified organic producers to comply with the Compendium of UK Organic Standards (reference 1) and any extra requirements of their chosen Certification Body.

4. By 2015, the Water Framework Directive (reference 2) will require an integrated approach to managing water quality and quantity across whole catchments. If you follow the legal requirements and good practices in this Code it will help achieve the standards which will be set.

5. There are international obligations, under the National Emission Ceilings Directive (reference 3) and the UNECE Gothenburg Protocol (reference 4), to meet targets for limiting ammonia emissions. If you follow good practice in this Code, you will contribute to meeting these targets.

6. The Code replaces the separate Water, Air and Soil Codes published by the Ministry of Agriculture, Fisheries and Food and the Welsh Office Agriculture Department (last revised in 1998). It applies in England.

7. The Water Resources Act 1991 contains provisions which are designed to prevent water pollution. Under Section 85 of the Act it is an offence to cause or knowingly permit a discharge of poisonous, noxious or polluting matter or any waste matter into controlled waters. Defences to this offence are set out in Section 88 of the Act and include consents and permits from the Environment Agency. Controlled waters include groundwater and all coastal and inland waters, including lakes, ponds, rivers, streams, canals and field ditches.

8. Parts of this Code of Good Agricultural Practice form a Statutory Code under Section 97 of the Water Resources Act 1991. This means if you do not follow the advice on avoiding water pollution in Sections 1.4, 1.5, 2 (all), 3 (all), 4 (all sections, but only paragraph 313 in Section 4.8), 5 (all sections except 5.3 and 5.10), 6 (all sections), and 7.5, you will not be prosecuted or face civil proceedings, but the Environment Agency will take this into account when issuing discharge prohibition notices under Section 86 of the Act and when exercising powers conferred on them by regulations under Section

92 of the Act. Following the Code is not a defence to the offence of polluting controlled waters but it could be taken into account in deciding on enforcement action, penalties and mitigation.

9. Parts of this Code that relate to reducing nitrate loss form a Code under the Nitrates Directive. The advice can be found at Section 2.3, paragraphs 69 to 83 inclusive. But farmers in Nitrate Vulnerable Zones must also comply with the provisions set out in regulations (see paragraph 68).

10. Section 1 provides general information on how farm activities can pollute the environment, and basic precautions you should consider. It advises you how to prepare a plan to help cope with an environmental accident or emergency. Section 2 covers soil fertility issues, the loss of plant nutrients to water and the release of harmful gases to help you understand the practical measures in the rest of the Code. Problems can be avoided by considering the management of your holding, and Section 3 describes how you can do this by assessing risks and drawing up management plans for manures, plant nutrients, soils and crop protection.

11. To help you find more detailed information on specific topics, advice is provided in sections that relate to operations you undertake on your farm or holding. Section 4 covers activities related to farm buildings and structures and what goes on in and around them. Section 5 is about field-based operations. Section 6 provides basic comments on specialist horticultural production, Section 7 covers waste management, and Section 8 covers water supply issues.

12. There are references at Section 9 that will provide more information either on your legal obligations or on technical details to enable you to follow the recommendations. A Glossary at Section 10 provides definitions of some of the key terms used in the Code.

13. If you carry out any practices that are not covered in the Code you should protect the environment by following the general principles that are outlined in it.

14. Each of the sections 2 to 8 are set out in a similar way to help you understand the relative importance of the various messages. Section 4.2 ‘Silage stores and effluent’ is given opposite as an example:

4.2 Silage stores and effluent handling

- **Even small amounts of silage effluent from crops in an enclosed pit or silo, or from baled silage, will kill fish and other water life for a long way downstream if it gets into surface waters.**

Silage effluent should be contained and stored safely until it can be applied to land to make use of its nutrient content, or it can be used for animal feed.

If possible, recycle clean silage wraps, bags and sheets.



The construction of facilities for making and storing silage and storing effluent are controlled by law (Reference 51).

Seek advice from the Environment Agency if:

- you intend to construct a new silo or substantially enlarge or reconstruct an existing silo.
- you want to make field silage (field heaps or non-baled bagged silage). Sites must be notified to the Environment Agency.

You must notify the Environment Agency before you use new or substantially altered facilities for the first time.

See 'Regulations' below.

Good practice

179. Every year before using silos, you should inspect effluent tanks from the outside (as much as you can see) for leaks and corrosion – **do not go into them**. Also check channels, drains, silo floors, walls and wall/floor joints. Carry out repairs well before the silage making season.

Information Box

Where it appears, this box will provide some further information.

Explains why this section is important to you.

Key advisory messages that you should follow on your farm where they are relevant.

Actions you must take where they are relevant in order to meet your legal obligations. More details may be given elsewhere.

Actions you should consider taking, where they are relevant, to minimise harmful environmental effects and improve your overall management. These actions may also include more detail on things you have to do.

1 Introduction

1.1 Pollution sources and impacts

15. Protecting our natural resources of water, soil and air is essential for a sustainable environment. The advice in this Code recognises that things you do can affect water, soil and air all at the same time.

Examples of good practice which can benefit water, soil and air

- **Careful management of livestock manures can:**
  - **reduce losses of ammonia and other gases to the atmosphere;**
  - **limit nitrate leaching to groundwater;**
  - **avoid excessive build up of nutrients and contaminants in soil; and**
  - **stop micro-organisms such as salmonellae, *Escherichia coli*, campylobacters and *Cryptosporidium parvum* being washed into surface waters and reaching bathing-waters.**
- **Changing what is in animal feed will change the manures you have to deal with. This can:**
  - **reduce surplus nitrogen being lost to the environment;**
  - **limit the unnecessary accumulation of phosphorus in the soil which will reduce impact on the water environment; and**
  - **reduce the risk of contaminating soils with feed supplements, such as copper and zinc.**
- **Following a nutrient management plan will ensure efficient use of fertilisers (and organic manures) and can:**
  - **limit nitrate leaching to surface and groundwaters;**
  - **prevent the unnecessary accumulation of phosphorus in the soil which will also reduce impact on the water environment; and**
  - **reduce the risk of nitrous oxide (a greenhouse gas) being lost to the atmosphere.**

16. Pollution which originates from a single identifiable source such as a building, store or field, or from a particular event or action, for example, overflow or leakage from a manure store is called "point source pollution".

17. By contrast "diffuse pollution" comes from fields or many sources within a catchment which need to be identified and managed.

18. You should understand the relative risks to the environment that exist on your farm. Make sure you and your staff are aware of sensitive areas such as Groundwater Source Protection Zones, surface waters, water abstraction points (including on your neighbours land) and natural habitats, especially designated sites (see Section 1.2).

19. Some practical ways to save money by minimising both point source and diffuse pollution across a range of farming activities have been identified by the Environment Agency (reference 5).

Water pollution



© Natural England

20. Even though a single pollution incident may seem insignificant, the cumulative effect of a number of such incidents (either from point or diffuse sources) will become increasingly important. This may mean that Environmental Quality Standards or Water Framework Directive objectives are not met, particularly in sensitive river and groundwater catchments. For example, water abstracted from rivers, groundwater or reservoirs may not meet the required standards, may not be suitable for stock to drink downstream or may become eutrophic.

Eutrophication

Eutrophication is the enrichment of ecosystems by nitrogen or phosphorus. In water it causes algae and higher forms of plant life to grow too fast. This disturbs the balance of organisms present in the water and the quality of the water concerned. On land, it can stimulate the growth of certain plants which then become dominant so that the natural diversity is lost.

21. Livestock manures and organic wastes including sewage sludge and green waste compost are referred to collectively in this Code as organic manures. They are a particular hazard if they get into water. The ammonia they contain can kill wildlife in the water. Also, micro-organisms breaking down organic matter take oxygen out of the water. This is known as the Biochemical Oxygen Demand (BOD), and in severe cases can kill all river life. Many essential farm materials such as fuel oil, sheep dip, pesticides and fertilisers can also cause water pollution.

Livestock Manure and Dirty Water

In this Code, livestock manure includes slurries and solid manures (including farmyard manure). Dilute washings from dairy and milking parlours and run-off from lightly contaminated yard areas to which animals have regular access are referred to as dirty water.

Biochemical Oxygen Demand

Biochemical Oxygen Demand (BOD) is used to show the polluting strength of livestock manures and organic wastes. It is a measure (in mg/litre) of the amount of oxygen needed by micro-organisms to break down organic material. Crude sewage which only has a BOD of 200-300mg/litre can severely damage surface waters while milk (140,000 mg/litre), silage effluent (30,000 to 80,000 mg/litre), pig slurry (20,000 to 30,000 mg/litre) and cattle slurry (10,000 to 20,000 mg/ litre) are extremely polluting. Even dirty water (1,000 to 5,000 mg/litre) is a very high risk material.

22. Nitrogen, and in some circumstances also phosphorus, may be lost from the soil into groundwater and surface waters. These plant nutrients are also present in run-off from fields in soluble form, as well as in soil organic matter, organic manures and, and in the case of phosphorus, attached to soil particles from where they can be released into the water. The nitrate problem in England is so widespread that about 70% of the country drains to waters identified as nitrate-polluted under the EC Nitrates Directive (see paragraph 68). About 60% of the nitrate in English rivers comes from agriculture.

23. Eroded soil may remain suspended in the water and reduce the quality of drinking water. Larger particles may settle (sedimentation) in river gravels, causing serious damage to fisheries by smothering spawning grounds and reducing food supply. Such sediment can also support large growths of aquatic vegetation, which may increase the risk of flooding.

Groundwater

Groundwater is the water held underground in rock formations. Where these formations support wells, boreholes, watercourses, wetland habitats etc, they are called aquifers.

Surface water

Surface water includes coastal waters, estuaries, canals, lakes, ponds, rivers, streams, and ditches which contain free water and also temporarily dry ditches and blind ditches.

24. Agro-chemicals (pesticides, disinfectants, sheep dip and other veterinary medicines) and fuel oil are potential pollutants of water, and must be managed accordingly. Sheep dip chemicals in particular can have a huge impact on the ecology of a river. Also there is a maximum permissible concentration of any one pesticide in drinking water of only 0.1µg/l which can easily be exceeded.

Atmospheric Pollution and Climate Change

25. Ammonia and gases which cause unpleasant odours are released from organic manures and wastes during handling, storage and both during and after application to land. This Code includes advice on avoiding such odours. The local authority Environmental Health Department is responsible for enforcing legislation on odour nuisance (reference 6). Local authorities have a duty to inspect their areas to detect any statutory nuisances and to take reasonably practical steps to investigate complaints of statutory nuisances which are made to them. Where a statutory nuisance exists, or is likely to occur or recur, they have a duty to serve an abatement notice.

26. Ammonia in the air can cause human health problems. When it is re-deposited, it can acidify soils, natural habitats and fresh waters. By increasing the supply of nitrogen, it can reduce bio-diversity particularly in upland surface waters and natural and semi-natural habitats. Agriculture produces more than 85 per cent of ammonia emissions in the United Kingdom, so it is important to consider ways of reducing them (reference 7). This Code includes advice on reducing ammonia emissions, particularly from the land application of livestock manures, and also from their storage and from livestock housing.

27. Agriculture and forestry contribute 7 per cent of all the emissions of greenhouse gases in the United Kingdom. Carbon dioxide is one of these gases which cause global warming. It is produced by the burning of fossil fuels such as coal and oil, by the breakdown of organic manures and by the loss of soil organic matter.

28. Using fossil fuel to produce manufactured nitrogen fertilisers is one of the largest sources of carbon dioxide associated with agriculture. This Code includes advice on energy efficiency on the farm (reference 8, 9) and how to manage fertiliser inputs efficiently. An assessment of the carbon balance of your farm can help identify cost savings and contribute to combating global warming. There are a number of Carbon Calculators to help you prepare such a balance (reference 10, 11).

29. Any loss of soil organic matter contributes to carbon dioxide emissions as well as making soils more difficult to manage. Protecting lowland and upland peat soils from degradation and anything that locks up carbon such as grassland or trees or that produces a bio-fuel is beneficial.

30. Nitrous oxide and methane are other greenhouse gases. Nitrous oxide is produced by micro-organisms after the application of fertilisers and organic manures, especially if the soil is poorly aerated. Agriculture is estimated to be the source of two thirds of all the nitrous oxide produced in this country. The efficient use of fertilisers and organic manures as detailed in this Code will help to reduce these losses and provide a financial benefit to farmers.

31. Methane is produced directly by cattle and sheep and a smaller amount is also released from livestock manures. Agriculture is responsible for about a third of all emissions of methane. It is possible to reduce methane emissions by optimising livestock diets. The amount of methane emitted from livestock manures depends on the handling, storage and field spreading system, but avoiding anaerobic conditions will reduce such emissions. It is possible to collect and use methane from livestock manures in a controlled process called anaerobic digestion (see paragraph 234).

32. Dark smoke or smoke nuisance has been significantly reduced by regulations that restrict what may be burnt in the open. All farms generate waste materials which, if they are not recycled or disposed of correctly, pose a risk to the environment (see Section 7).

33. Poultry and pig housing can generate large amounts of dust which may adversely affect the health of people living nearby.

Protecting soils

34. Most farmers recognise the importance of their soils for the sustainability of their business. However, small quantities of run-off and erosion, which may seem insignificant, can cause pollution and nuisance. Well managed soils with adequate organic matter can result in lower costs and pose less risk of erosion and run-off.

35. When organic matter is added to soils in organic manures, care should be taken to prevent heavy metals and persistent organic pollutants reducing the fertility of the soil in the long term or contaminating food crops so that they fail to meet legal standards.

1.2 Protecting the wider environment

36. Farmers, growers and land managers have a responsibility to protect the wider environment, especially designated areas such as Sites of Special Scientific Interest (SSSIs) and Natura 2000 sites (Special Areas of Conservation, and Special Protection Areas) (reference 12, 13, 14). Some of these areas are particularly sensitive to nitrogen deposition from ammonia released by agriculture. The previous Section described how reducing and avoiding pollution can improve the quality of life in surface waters and in other sensitive ecosystems. The advice in this Code will also deliver other important benefits. You can obtain support for many of these by joining an agri-environment scheme.

37. You should ensure that you are aware of any SSSIs or other protected areas on, or adjacent to, your land. You must follow the provisions of the law (reference 12, 15), so that you do not harm SSSIs, and seek the necessary permission for activities such as cultivating soils and applying fertilisers and agro-chemicals. Specific mention is made of SSSIs in key sections of this Code, but care should be taken with all operations that could damage these and other habitats.

38. Hedges, surface waters and field margins are key habitats on farms. How they are cut, cleared or otherwise managed has a big effect on their value for wildlife. You should keep soil, organic manures, dirty water, fertilisers and pesticides out of these habitats and away from in-field trees during field operations. Leaving buffer strips or part of the headland untreated will provide additional benefits for ground nesting birds and natural predators of crop pests.

39. By careful management of permanent pasture, including possibly reducing stocking density and overall nutrient input, run-off and erosion can be reduced, nitrogen and phosphorus losses will decrease and in time the botanical composition of the sward will diversify with knock on benefits for insects and birds.

40. Fencing off surface waters prevents livestock fouling the water, damaging the banks, and getting soil into the water. It also allows a natural habitat to develop, which will in turn provide additional protection from run-off and soil erosion.

41. To conserve our historic heritage you should protect archaeological remains that appear on or above the soil surface or are buried beneath it. Take care not to cause damage by sub-soiling, ploughing or other deep cultivation, by uprooting trees or by allowing pigs to disturb the ground. In the case of Scheduled Monuments, such actions may be illegal. Seek advice from the Archaeological Officer of your local Authority if you are unsure about the status of an historic site.

42. The public's appreciation of the countryside is a very important part of sustainable use of land. Wherever possible you should select and apply pollution control measures that improve or maintain the landscape in which you farm. Consider the visual effects and the historical landscape before you plant new hedges for wildlife or to break slopes to stop run-off, also before you select your crops or grass down strips to help control run-off and erosion. Advice on historical matters is available from your County Archaeology Service.

1.3 Environmental regulation, cross compliance obligations and agri-environment schemes

Regulation

43. This Code includes details of legal requirements which you must follow if they apply to your farm. These are clearly identified in each section, and references are provided to enable you to obtain more detailed information if you need it. The Environment Agency web site provides further guidance that will help you comply with environmental legislation and protect the environment (see also, reference 16).

44. If you do not comply with legal requirements you may become liable for works notices, prosecutions or reductions in payments.

Cross compliance obligations

45. Since 1 January 2005 some farmers' direct payments, including the Single Payment, have been conditional on meeting "cross compliance" provisions – baseline standards for agriculture that all Single Payment applicants must meet. From 2007, cross compliance also applied to new land-based Rural Development schemes. There are two key elements of cross compliance that farmers must meet:

- Standards of good agricultural and environmental condition (GAEC). These have been in place since January 2005 and set requirements for farmers to protect soils and maintain a range of habitat and landscape features characteristic of the English countryside. Many of these were existing law and some reflect good practice; and
- Statutory Management Requirements (SMRs). These are set by the European Union, apply to all Member States and were phased in over a three year period from January 2005. They cover a range of issues dealing with the environment; public, plant and animal health; and animal welfare.

Failure to meet the GAEC or SMRs requirements could mean that part or all of the Single Payment may be withheld by the payment agency.

46. While a number of cross compliance standards are directly related to the scope of this Code, all of the standards are kept under review as part of a monitoring and evaluation project and may be subject to change. If you are unsure you should refer to the guidance (reference 17) and the Rural Payments Agency web site.

47. Some of the good practice outlined in this Code will help you to meet your cross compliance requirements. However, the Code does not replace any specific guidance issued for cross compliance purposes including that for soil management (reference 18).

Environmental Stewardship

48. Protection of soil and water is a primary objective of the Environmental Stewardship Scheme (reference 19). Farmers who wish to participate in the Entry Level Stewardship (ELS) and Organic Entry Level Stewardship (OELS) can gain points for their qualifying total by following some of the good practices outlined in this Code. This does not include any actions that are covered by law or by cross compliance obligations (reference 17).

49. In the Higher Level Stewardship (HLS), there are options specifically relating to land and fertiliser use and grazing management. Payments may also be available for capital items which contribute to increased protection of the environment, for example, hedgerow planting, fencing, ditch restoration, grip blocking in the uplands, cross drains under farm tracks, and moving gateways.



© *Natural England*

1.4 Responsibilities of farmers, farm staff and contractors

50. All farm staff and any contractors you employ should know their responsibilities, and be familiar with the causes and effects of pollution. They should:

- receive appropriate training for what they have to do;
- know how to operate and maintain the equipment they use;
- know what to do in an emergency;
- be able to follow any emergency plan you have for your farm;
- comply with any risk assessments you have made, for example, in manure, nutrient, soil or crop protection management plans; and
- be aware of the presence of areas which they might damage in the course of their work, such as:–
  - Source Protection Zones, and near springs, wells and boreholes;
  - Sites of Special Scientific Interest;
  - other protected areas;
  - land under agri-environment or other management agreements; and
  - sensitive archaeological sites.

51. You should consider having a written agreement with any contractors, so it is clear who is responsible for the task in hand. This will help to avoid problems. If it is not clear who is responsible, you could both be held liable for any problems or pollution incidents that happen.

52. You should check all surface waters frequently to make sure that they are not polluted. Particularly check at times of high risk such as when slurry, silage effluent or dirty water is being applied or shortly after heavy rain. Look for signs of soil erosion and run-off which is sometimes referred to as soil wash, including damage to the banks by livestock, poaching of ground by livestock, ponded water in fields, gullying and run-off along 'tramlines'. Use the advice in this Code to help you take appropriate action.

1.5 Accident and emergency plan

If any surface water or groundwater is at risk of becoming polluted or becomes polluted, tell the Environment Agency at once and take immediate steps to stop any further pollution.

The EA 24 hour incident helpline is FREEPHONE 0800 80 70 60

53. Many farms already have an emergency plan, and the larger pig and poultry farms are required to have them to comply with the Integrated Pollution Prevention and Control Directive (reference 20). It is good practice to produce one for the activities on your farm to prevent pollution, and to help you deal with incidents if they happen. Make sure everyone knows where the plan and emergency equipment is located, what they have to do, and how to do it.

54. Your plan should include:

a) ***A contact list***

This should contain the telephone numbers (including out-of-hours numbers) for the emergency services, regulators (e.g. Environment Agency and local Authority), water supplier, sewer provider, Health and Safety Executive, downstream water abstractors and landowners, and specialist clean-up contractors. Also include any key holders and staff to be contacted in the event of a significant incident.

b) ***A site plan***

Your site plan should show clearly the layout and access arrangements for:-

- all relevant buildings and structures;
- all drains, inspection manholes and gullies – both for clean and foul drainage systems;
- location of sewer; discharge points, soakaways; and ditches, surface waters, springs, wells and boreholes near the site; and
- location of buildings that can be used during an emergency.

c) ***The location of equipment***

Identify the location of any equipment and materials that can be used to plug drains, block ditches or contain spillages.

d) ***A regular test***

You should carry out an emergency response exercise regularly. This way you will know whether the plan will work in a real emergency. Review your plan after an incident, or at least every 3 years. Further guidance and example plans are available (reference 21, 22). Remember to update the plan if there are changes affecting the site such as new buildings, materials being stored in a different place or the layout of the drains.

2 Soil fertility and plant nutrients

2.1 Introduction

55. You should read this section to help you understand the importance of following the practical measures in the rest of the Code. It deals with:

- Plant nutrients in soil and their loss from agriculture, which can pollute water and air and damage natural and semi-natural habitats; and
- Guidance on managing soil contamination which can affect the fertility of soil, the health of livestock, the safety of the human food chain, and the quality of surface water and groundwater.

2.2 Maintaining soil fertility

- **Maintaining an appropriate level of soil fertility by the careful use of fertilisers, organic manures and lime will help to maximise the profitability of your farming system.**

Apply fertilisers, organic manures and lime to provide optimum conditions for crop growth, taking account of regular soil analyses.

Use soil and crop or grass analysis to confirm sulphur and trace element deficiencies, and to help identify any that may be affecting your crops or livestock.

The application of fertiliser, organic manure or lime to a Site of Special Scientific Interest without consent may be in breach of a management agreement or a notice under the Wildlife and Countryside Act 1981.

Restrictions also apply if you are in a Nitrate Vulnerable Zone (reference 23, 24).

Good practice

Soil pH and liming

56. Soil pH is a measure of acidity or alkalinity. Lime is lost from the soil as a result of cropping, leaching, pollution and the application of certain nitrogenous fertilisers making the soil more acid. Excessive soil acidity can cause large yield losses and reduce the effectiveness of other fertilisers. You should apply lime as necessary to maintain optimum pH. Do not over apply lime, as an unnecessarily high pH can increase trace element deficiencies. It will take a long time for an over-limed soil to return to normal . Optimum pH varies according to soil type and crop rotation (reference 25, 26).

Maintaining soil organic matter

57. The organic matter content of soil is an important part of its fertility. It plays a key role in the physical, chemical and biological processes which control plant growth and soil management. You should seek to enhance soil organic matter by reducing losses, minimising cultivations and adding organic carbon. Carbon is added to soil by roots and other crop residues and by recycling organic manures.

Nutrient management

58. You should have soil analysed regularly. Ideally this should be done every 3 to 5 years to set and maintain a correct fertiliser policy, or whenever a major change of land use is proposed. This can be done as part of a nutrient management plan (see Section 3.3).

59. Provide crops with a balanced supply of the major nutrients: nitrogen, phosphorus, potassium, magnesium, calcium and sulphur. Sodium is also required by some crops. Also ensure adequate availability of trace elements such as iron, manganese, boron, copper, zinc, molybdenum and chlorine. Trace elements are generally supplied by the soil, but you may need to supplement with fertilisers or organic manures.

60. Use a recognised fertiliser recommendation system (e.g. reference 27, 28). If you receive professional advice on nutrient management and fertiliser use, make sure the person giving the advice is a current FACTS Qualified Adviser who has the FACTS (Fertiliser Advisers Certification and Training Scheme) qualification and is either a member of the BASIS professional Register (Fertilisers) or a member of the FACTS Annual Scheme (reference 29).

61. You may need to analyse grass and other crops, in addition to soil, to identify any mineral imbalance which may be affecting growth. You should seek veterinary advice for livestock problems as it is usually, but not always, more effective to treat the stock than apply anything to the soil.

62. When applying fertilisers and organic manures, take care not to harm natural and semi-natural habitats, including surface waters, either by accidentally spreading directly into them, or from run-off getting into them afterwards (see Section 5.4, 5.5 and 5.6).

2.3 Managing nitrogen

- **Manage nitrogen efficiently by using the correct quantity which will reduce losses, increase profitability and protect the environment.**
- **Following the advice given here can reduce nitrate and ammonium losses into water, and ammonia and nitrous oxide emissions to air.**

Pay particular attention to how, when and the amount of nitrogen fertiliser and organic manure you apply to meet crop requirement.

Maintain green cover on the land for as much of the year as possible.

Match the nitrogen content of livestock feed to the particular requirements of the stock.

To reduce both run-off risk and ammonia loss, when you apply livestock manures to bare land or stubble:

- **you should incorporate into the soil any slurry that has been surface broadcast (spread by splash plate). You should do this immediately and at the latest within 6 hours.**
- **you should incorporate solid manures into the soil as soon as possible and at the latest within 24 hours.**

Note: Soil incorporation is not required where solid manure (farmyard manure) is used as a mulch to control wind erosion on susceptible soils.

If you farm in a Nitrate Vulnerable Zone you must follow the mandatory rules on the quantity and timing of applying manufactured nitrogen fertilisers and organic manures (references 23, 24).

Ploughing permanent grass may breach Environmental Impact Regulations (references 17, 30).

Concentrations of ammonium nitrogen in surface water have to comply with Regulations (reference 31).

Nitrogen fertiliser and manufactured nitrogen fertiliser

In this Code these terms have been used to mean the same as in the guidance for farmers in Nitrate Vulnerable Zones (reference 24).

Nitrogen fertiliser includes:

- **Manufactured nitrogen fertiliser ~ any nitrogen fertiliser (other than organic manure) which is manufactured in an industrial process;**
- **Other nitrogen-containing materials ~ any substance containing nitrogen that is neither a manufactured nitrogen fertiliser nor an organic manure e.g. dredgings; and**
- **Organic manure ~ any nitrogen fertiliser derived from animal, human or plant sources, including livestock manure.**

The environmental impacts of nitrogen

63. Losses of nitrogen from agriculture have significant impacts upon the quality of water, soil and air. You should use nitrogen as efficiently as possible and minimise losses.

64. Leaching of nitrate from soil to ground and surface waters reduces drinking water quality, often so badly it can no longer be used as a source drinking water. It can cause eutrophication, particularly in canals, estuarine and marine waters. High concentrations of ammonium in surface water can exceed threshold limits (reference 31), and kill fish.

Leaching

Leaching is the process by which soluble materials are removed from the soil by drainage water passing through it.

65. Nitrogen escapes to the air as ammonia particularly from livestock manures (reference 7) and as nitrogen gas and nitrous oxide through natural soil processes.

66. Ammonia has significant impacts on the environment and human health. It can lead to damage of land and water ecosystems by depositing excess nitrogen and through soil acidification. Nitrogen gas is harmless to the environment but nitrous oxide is an important greenhouse gas which contributes to climate change.

67. When you reduce one form of loss, you may increase another. For example, reducing ammonia loss to air will mean more nitrogen gets into the soil. This can increase the risk of nitrate leaching or emissions of nitrous oxide. The following paragraphs outline the approaches to reducing losses of some particular pollutants. This Code also provides advice on integrated approaches which aims to achieve the best, overall practical environmental outcome.

Good practice

Minimising nitrate loss to water

Regulations

68. The EC Nitrates Directive (91/676/EEC) requires Member States to introduce a Code of Good Agricultural Practice to control nitrate loss and to protect against nitrate pollution, which all farmers should follow on a voluntary basis. In Nitrate Vulnerable Zones (NVZs) designated under domestic legislation which implements the Nitrates Directive, farmers must comply with mandatory measures or rules (references 23, 24). These rules are similar to, although in some cases more strict than, the good practice guidance that follows in paragraphs 69 to 83 inclusive. If you are not sure if you are in an NVZ you should consult the maps available on the Defra web-site (reference 24).

Controlling nitrogen application

69. You should carefully work out the amount of nitrogen fertiliser needed for each crop in each field (the crop nitrogen requirement). You should not exceed the crop nitrogen requirement, as this increases the amount of nitrate lost by leaching so harming the environment as well as being a waste of money. You should take into account the amount of nitrogen supplied by the soil (the soil nitrogen supply). This will depend on the type of soil, previous cropping, rainfall and any organic manure you have applied. There are various recommendation systems available to help you (e.g. reference 27). Where the soil nitrogen supply is high, soil analysis for mineral nitrogen can provide a more precise guide to fertiliser requirement.

70. You should keep accurate records of the amounts and dates of applications of manufactured nitrogen fertilisers, organic manures and other nitrogen containing materials that are used as nitrogen fertilisers (e.g. dredgings and soil from the processing of sugar beet) to help work out how much nitrogen fertiliser is needed for future crops.

Organic manures

71. You should not apply more than 250 kg of total nitrogen in organic manures to any given hectare in any 12 month period. Also, you should ensure that the amount of crop available nitrogen does not exceed the crop nitrogen requirement, which may mean applying less than this maximum amount. There are simple on-farm kits which can measure the nitrogen in animal slurries that is readily available to crops (reference 34), or you can use look up tables (references 27, 28).

Certified organic farms

All organic farmers certified according to Council Regulation (EC) No 834/2007 must be within an overall farm limit of 170 kg N per ha per year from livestock manures including nitrogen deposited during grazing (reference 32). Currently Certification Bodies also require organic farmers to observe a limit of 250 kg/ha of total nitrogen in livestock manures that can be applied to any area of land in a year. All farms in a Nitrate Vulnerable Zone, whether organic or not, must comply with the mandatory measures or rules.

Readily available nitrogen

Nitrogen that is present in livestock and other organic manures either as ammonium or nitrate, or in poultry manure as uric-acid nitrogen, is known as the readily available fraction as it will be taken up more quickly by plants than nitrogen that is bound in organic compounds.

72. Livestock manures, such as cattle and pig slurries and poultry manure, and liquid digested sewage sludge contain a relatively high proportion of readily available nitrogen (i.e. greater than 30% of total nitrogen is present in a readily available form). You should apply these in late winter or spring when crops can use the nitrogen efficiently. Where practically possible you should not apply them in the autumn and early winter months. This is particularly important on sandy and shallow soils where the risk of nitrate leaching is greatest.

73. You may need additional storage for livestock manures. You should provide sufficient storage capacity to allow optimum timing and use of manure nutrients which will allow you to reduce the amount of fertiliser you buy (see Section 4.3). All constructed stores should be impermeable and not allow liquids to escape.

74. You can spread organic manures that do not contain much readily available nitrogen (i.e. less than 30% of total N is readily available) such as farmyard manure, sewage sludge cake and compost made from green waste at any time, if field conditions are suitable to avoid causing run-off.

75. You should not apply organic manures when:

- the soil is waterlogged, flooded, frozen hard or snow-covered; or
- there is a significant risk of nitrogen getting into surface water via run-off, taking into account in particular the slope of the land, weather conditions, ground cover, proximity to surface waters, soil conditions and the presence of land drains.

76. You should not apply organic manures within:

- 10 metres of surface waters, including field ditches; or
- 50 metres of a spring, well or borehole.

77. You should be particularly careful when applying organic manures to steeply sloping land close to surface waters.

78. You should spread organic manures as accurately as practically possible. You should use spreading equipment with a low spreading trajectory when spreading slurries to avoid causing atomisation (small droplets) and subsequent drift (see Sections 5.4 and 5.5).

Manufactured nitrogen fertilisers

79. It is important to apply manufactured nitrogen fertiliser only at times when the crop can use the nitrogen. You should not apply it to grass between 15 September and 15 January and to other crops between 1 September and 15 January unless there is a specific crop requirement at this time.

80. You should spread manufactured nitrogen fertiliser as accurately as possible and at the right rate. You should not apply it directly to surface waters (including ditches).

Advice note

The current cross compliance requirement is that you must not apply any fertilisers or organic manures within 2 metres of the centre of hedges, a watercourse or field ditch if you receive the Single Payment. This also applies to land within 1 metre of the top of the bank of a watercourse (reference 17).

81. You should consider not spreading manufactured fertiliser within 2 metres of surface water. Establishing managed buffer strips will help you protect surface water (as well as hedges and other sensitive habitats) from fertilisers; you may do this as part of an Entry Level Stewardship agreement.

82. You should take special care when applying any manufactured nitrogen fertiliser to fields where there is a significant risk of run-off to surface water, taking into account in particular the slope of the land, weather conditions, ground cover, proximity to surface water, soil conditions and the presence of land drains.

83. You should not apply manufactured nitrogen fertiliser when the soil is waterlogged, flooded, frozen hard or snow-covered.

Crop cover in arable rotations

84. On suitable soils, you should sow a temporary cover or catch crop in early autumn when an early harvested crop is to be followed by a spring-sown crop. This will take up nitrogen and reduce leaching losses. Winter green cover is particularly important on one-year set-aside land. Where it is not practical to establish a cover or catch crop, you should leave uncultivated stubble for as long as possible (also see paragraph 86 below).

85. Plan to sow autumn-sown crops as early as possible having regard to the needs of the crop such as the risks from pests and diseases. Crops sown in early September will take up more nitrate than later sown crops, and will also reduce the risk of run-off and soil erosion. This is particularly important when cattle slurry, pig slurry and poultry manures, which have a lot of readily available N, are applied to sandy and shallow soils.

Autumn cultivations and crop residues

86. In autumn you should cultivate the land as close to sowing the next crop as possible. This will reduce the build up of nitrate in the soil and can be especially beneficial after a crop, such as vining peas or oilseed rape, which leave residues containing a lot of nitrogen. You can often leave residues of late harvested crops, such as root crops, undisturbed until the following spring, unless the soil is compacted and there is a risk of run-off or soil erosion.

Cereal straw residues

Incorporating crop residues that do not contain much nitrogen, such as cereal straw, into the soil in autumn will help to reduce the amount of nitrate leached and to maintain or increase soil organic matter.

Advice Note

The current cross compliance requirement for land that has carried a crop of oil-seeds, grain legumes (e.g. peas or beans) or cereals (other than maize) which have been harvested using either a combine harvester or a mower:

- **you must ensure that, from the day after harvest until the last day of February (dates inclusive) in the following year, the land is not left in a state where run-off is likely (reference 17).**

Environmental Stewardship

Leaving uncultivated stubbles over winter can encourage wildlife. There are options in Environmental Stewardship to encourage such management but you should consider the risk of run-off and erosion before deciding to do this (reference 19).

Managing grassland

87. There is a risk of losing large quantities of nitrate from intensively grazed grassland. Reducing nitrogen applications and the intensity of grazing during the late summer and autumn months will reduce the amount of nitrate leached.

88. If at all possible, avoid ploughing old permanent grassland for arable cropping. Large quantities of nitrate can be leached over several years, organic matter will be lost and carbon released to the atmosphere. Ploughing permanent pasture may breach cross compliance requirements. Wherever practical, cultivate grassland in spring rather than autumn. If the grassland needs reseeding, you should do it with a minimum of soil disturbance and establish grass cover quickly and, if in the autumn, by early October. If arable crops are to follow grass in a rotation, you should sow the crops as soon as possible after ploughing or cultivating the grass.

89. To reduce the amount of nitrate released, you should not apply organic manures in the 6 months prior to cultivation of grassland.

Minimising ammonium nitrogen loss to water

90. Ammonium nitrogen from organic manures can pollute ground and surface waters. For livestock manures this can happen from:

- uncontrolled run-off from buildings, yards and farm tracks used by livestock;
- direct application of manure and dirty water, especially to drained land;
- run-off after applying manure and dirty water to land; and
- run-off caused by rain falling onto solid manure heaps.

You can reduce the risk of causing water pollution by following the advice in the relevant parts of this Code (see Sections 4.3, 4.8, 5.4, 5.5 and 5.8).

91. On bare land or stubble, you should reduce the risk of surface run-off getting into surface water from ***adjacent slopes*** by incorporating organic manures into the soil:

- For cattle slurry, pig slurry and liquid digested sludge applied by broadcast (splash plate) methods, you should incorporate them into the soil as quickly as possible and at the latest within 24 hours of application. But you should do this immediately and at the latest within 6 hours to reduce ammonia losses to air as well (see paragraph 93).
- For poultry manures, you should incorporate them into the soil within 24 hours of application.
- For farmyard manure, sewage sludge cake and compost made from green waste, you should incorporate them into the soil within 24 hours of application unless they are being applied to protect susceptible soils from wind erosion.

Minimising ammonia loss to air

Gothenburg Protocol and National Emission Ceilings Directive

Under these international obligations there are targets to reduce ammonia emissions and limits for the concentration of particles in the air which are increased by the presence of ammonia (Reference 10).

92. Ammonia gas released from livestock manures in animal housing, manure stores and when manures are applied to land, is by far the largest source of ammonia emissions in the United Kingdom. It is also released from excreta deposited directly to land by grazing livestock or outdoor pig and poultry units. Follow the advice in sections 4.3, 4.8, 5.4, and 5.8 to minimise ammonia loss.

93. Take particular care when applying livestock manures to land because the benefits of reducing ammonia emissions from housing or stores will be lost if you do not. On bare land and stubble:

- If you broadcast slurry (by splash plate), you should incorporate it into the soil immediately and at the latest within 6 hours.
- If you apply solid manure, you should incorporate it into the soil as soon as possible and at the latest within 24 hours, unless it is being applied to protect susceptible soils from wind erosion.

94. When you reduce ammonia loss, more nitrogen is potentially available for grass or crop uptake. You should make allowance for any savings in your nutrient management plan (see Section 3.3, and reference 7, 27).

Livestock diets

95. You should match the nitrogen content of diets to the expected level of production and the particular growth stage of the stock. This will save you money and, by reducing the amount of nitrogen excreted, reduce the amount of ammonia being released. It may also make it easier for you to meet any restrictions on the quantity of livestock manure that you can apply to your land. You may wish to seek advice from a consultant or your feed supplier to help achieve this.

Use of urea fertiliser

96. Ammonia can be lost from manufactured nitrogen fertilisers, especially when no rain falls soon after spreading any that contain urea. Up to 20% of the nitrogen content of urea may be lost to air. Such losses are more closely related to soil moisture and weather conditions than to soil type, and may be minimised if urea is applied shortly before light rain is expected (Reference 27).

Minimising nitrous oxide loss to air

97. The natural processes in the soil that produce nitrous oxide under wet and warm conditions are increased by the addition of nitrogen fertilisers and organic manures. You should adopt measures in this Code to help you use nitrogen efficiently, and keep soils in good structural condition. This will reduce nitrate loss as well as nitrous oxide emissions and contribute to farm profitability.

2.4 Managing phosphorus

- **Phosphorus lost from agricultural land is an important contributory cause of poor quality in surface waters. Losses must be reduced to meet Water Framework Directive[1] targets. You can reduce the risk by not over applying phosphorus in fertilisers and organic manures.**
- **You can reduce costs by only applying the fertilisers you need and taking account of phosphorus in all the organic manures that you apply.**

Follow a nutrient management plan to ensure efficient use of fertilisers and organic manures.

Do not spread organic manures in conditions that are likely to lead to run-off.

Control soil erosion and run-off.

Match the phosphorus content of feed to the needs of the livestock.

[1] See reference 2.



© *Environment Agency*

The environmental impacts of phosphorus

98. Phosphorus contributes to eutrophication of freshwaters. Agricultural land is the source of about 25% of the phosphorus entering rivers. Phosphorus from agriculture can reach surface water in various forms and by various routes, which will depend on the particular river catchment. The main ways phosphorus is lost from land are:–

- by soil erosion, where phosphorus is attached to soil particles;
- by surface run-off, particularly along farm tracks and where residues of recently spread organic manures or phosphorus fertilisers remain on the soil surface;
- by organic manures running down cracks and getting into land drains; and
- when it is either dissolved in, or attached to very fine particles in drain flow. The latter can be important on silty soils, especially when there is a lot of phosphorus in the soil e.g. above Index 2 (reference 27).

Good practice

Animal feeds

99. Livestock diets should be formulated so that the phosphorus content of the feed closely matches the needs of the livestock. This minimises the amount of phosphorus in manures that are returned to land, which in turn reduces the risk of subsequent losses to the water environment. You may wish to seek advice from a consultant or your feed supplier to help achieve this.

Organic manures and fertilisers

100. The amount of phosphorus lost by erosion and run-off, or in drain flow will depend on the quantity of phosphorus in the soil. To reduce losses, you should not apply inorganic fertiliser or organic manures that contain more than the recommended amounts of phosphorus. For most crops, none is recommended at soil phosphorus Index 4 or above (reference 27).

101. When the soil phosphorus Index is already 3 or above and you wish to utilise the nitrogen and other nutrients in organic manures, you should not apply more total phosphorus than will be removed by the crops in the rotation. This will avoid raising soil reserves above those necessary for crop production.

102. Soils should be sampled and analysed every three to five years in accordance with a nutrient management plan (see Section 3.3).

Surface run-off

103. Minimise the risk of phosphorus from organic manures reaching surface water by following the advice in a manure management plan (Section 3.2). Minimise losses following fertiliser application by following advice in a nutrient management plan (Section 3.3). On bare land or stubble you can reduce the risk of run-off reaching surface water by incorporating surface applied organic manure or fertiliser into the soil soon after application, and within 24 hours.

104. Follow a soil management plan (see Section 3.4) to reduce the amount of soil erosion, and the amount of particulate phosphorus reaching surface waters.

2.5 Soil contamination

- **Soils may be, or may become, contaminated by heavy metals or persistent organic chemicals. You should consider the possibility of this and manage the land to protect its long-term fertility. This will safeguard groundwater and surface water and the health of plants, livestock and consumers.**

If there is any reason to suspect soil is contaminated, the situation should be investigated and checks made on the quality of food sold.

Monitor the metal content of the soil whenever organic manures, waste materials, or metal containing pesticides are applied regularly.



There are maximum legal limits for the heavy metal content in foods offered for sale (reference 33).

If sewage sludge is applied to agricultural land, there are legal obligations that you and the sludge provider must follow (reference 34, 35). Complying with this legislation is currently a cross compliance requirement.

Compost and anaerobic digestate made from approved bio-degradable wastes may be used without specific permission if the relevant Quality Protocols are followed (reference 36, 37).

Other waste materials, including dredgings, should only be applied to land if the relevant regulations have been followed (see Section 7).

© *Environment Agency*

Sources and impacts of contamination

105. The contaminants of major concern are heavy metals such as lead, cadmium, copper and zinc, and persistent organic compounds such as dioxins and polychlorinated biphenyls. Some metals and compounds may harm soil organisms and reduce soil fertility, before they affect the quality of crops or the health of livestock.

106. Some soils contain contaminants from natural sources and old mine workings. This background contamination can be very variable. However, soil is usually contaminated by people's activities, either directly by things applied to the land or indirectly by atmospheric deposition. It is usually a slow process, taking place over many years. But accidental spillages of oil, or flooding with seawater or contaminated water (such as from old mine workings), may need urgent action. More information is available (reference 38). If the contamination is so serious that there are effects on crops or livestock there are legal powers that require action or remediation (reference 39). Removing the affected land from production may be the only cost effective way to meet such a requirement.

Good practice

Dealing with existing contamination

107. If you suspect any of your soils are contaminated you should get professional advice based on analysis of the soil and of crops or livestock as appropriate. There are legal limits for the maximum content of lead, cadmium, arsenic, mercury and some persistent organic compounds in certain foods offered for sale (reference 33). Remember that crops that are growing satisfactorily and apparently healthy animals may contain contaminants that exceed these legal limits. If necessary, you should seek advice from your local Authority or the Food Standards Agency.

108. The risk of poisoning livestock from contaminated soil depends almost entirely on how much soil they eat rather than the amount of contaminants in the grass. You should limit the amount of soil they ingest by controlling grazing and making sure that you do not get soil into silage and hay during harvesting. Seek veterinary advice if you suspect contamination is affecting the health of your stock. Advice on grazing sites contaminated by mine spoil is available (reference 40).

109. Although there are ways of treating soils to remove contaminants, these are usually too expensive to be justified for agricultural land. You may be able to reduce their availability by simple management actions such as liming the soil. You may need to consider alternative use of the land, such as growing bio-mass crops or crops for industrial use, planting trees, or establishing a habitat for wildlife, possibly through an agri-environment scheme. You should seek appropriate advice.

Preventing further contamination

110. Following the regulations, and observing good practice will prevent soil contamination by materials such as industrial wastes, dredgings from canals and rivers, sewage sludge, livestock manures, composted wastes, pesticides, or irrigation water.

Industrial wastes and dredgings

111. You will require an exemption under the Environmental Permitting Regulations (reference 35) before industrial wastes or dredgings from inland waters are applied to your land. This will only be granted when a qualified person has made an application to the Environment Agency confirming that it will provide ecological improvement or agricultural benefit to the land, and that it will be safe to apply the proposed quantity. You should check that only the permitted quantities are actually applied. Dredgings from farm ditches can be applied to land under an agricultural waste exemption (see Section 7).

Sewage Sludge

112. It is beneficial to recycle the organic matter and plant nutrients contained in sewage sludge (sometimes called bio-solids). Applying sludge to agricultural land growing food and fodder crops is controlled by the Sludge (Use in Agriculture) Regulations (as amended) (reference 34) and by the voluntary application of the Safe Sludge Matrix (reference 41). Further guidance is given in a supporting Code of Practice (reference 42). Complying with this Regulation is currently a cross compliance requirement.

113. In practice, sludge producers will be responsible for meeting the legal limits on metals in the sludge, and in the soil to which it is applied. However, farmers should not accept sludge if they have doubts about whether these rules will be complied with. Farmers also have responsibilities to ensure the land is managed according to the regulations after sludge is applied. In particular stock must not be grazed or certain crops must not be harvested until a safe period of time has passed. This period will vary according to the type of sludge applied. You should ensure the pH of the soil is maintained at a satisfactory level during sludge application and in the years after sludge has been applied, as most metals become more available to plants in acid soils.

114. Sewage sludge can also be spread on land used to grow crops other than food, such as for industrial cropping (reference 42). This requires an Environmental Permitting exemption from the Environment Agency.

115. The metal content of sludge has decreased greatly in recent years as a result of controls on discharges to sewers. As a result it will usually be the nutrient content of the sludge which determines the rates at which it can be applied. See also Sections 2.2, 3.2, and 3.3 on making best use of the nutrients in sludge.

116. If you store liquid sludge, you must comply with regulations (reference 35). This provides for secure temporary storage for up to 12 months, that no more than 1250 m^3 is stored at any one time, restrictions on location of the store, and that a freeboard of 300 mm is maintained (750 mm for an earth-banked lagoon).

Livestock manures

117. The main potential contaminants in livestock manures are copper and zinc. They are added to livestock feed as growth promoters, to increase the supply of trace elements or for medicinal purposes. You should minimise the amount of metal added to feed consistent with the health and welfare of your stock, after considering alternative husbandry practices. If you are mixing rations on the farm, you must not exceed the statutory limits for metal additions to feedingstuffs (reference 44). If you are administering medicines, you must follow instructions from your veterinary surgeon.

118. More metal will be applied to soil when you spread some kinds of livestock manure than from regular applications of sewage sludge. On fields which receive regular applications of pig and poultry manure, you should monitor the copper and zinc in the manure and in the soil. If concentrations in the soil approach those given in Table 2 you should seek professional advice before you apply more manure to this land.

Table 2: Trigger values for copper and zinc for seeking advice when applying manures or pesticides (reference 42)

	Table 2: Trigger value for seeking advice – total concentration (mg/kg)	
	pH 5.0 to 5.5	pH above 5.5
Zinc	200	200
Copper	80	100

119. Some veterinary medicines contain compounds that leave potentially harmful residues in manures and slurries. You must therefore follow instructions provided on the packaging of all veterinary medicines and where appropriate take advice from the Environment Agency on disposal options.

Composts and other wastes

120. Provided the Quality Compost Protocol is followed (reference 36), composts made from bio-degradable wastes may be applied to agricultural land outside of Environmental Permitting Regulations. The Protocol assures the quality of the compost by compliance with BSI PAS 100 (reference 45), and requires the land to be analysed for metals before applications are made and a record to be kept of where the compost has been spread. Other wastes and composts not produced according to the Quality Protocol may only be applied to land if Environmental Permitting Regulations are followed. These require prior notification to, or permitting by, the Environment Agency. Following the Regulations will ensure that soil does not become contaminated.

121. A Quality Protocol is also being developed for digestate from anaerobic digesters (reference 37). This protocol assures quality by compliance with BSI PAS 110 (reference 46) and will also require similar sampling and record keeping.

122. For land application of other organic wastes, composts and digestates not produced according to Quality Protocols – you must comply with an environmental permit or an exemption (see Section 5.5), and you must not cause harm to human health, or cause pollution of the environment (see Section 7).

123. You must also comply with the relevant provisions of the law on animal by-products if these are applied to pasture land, except for manure and digestive tract contents (reference 47). You should consult Animal Health for advice.

Pesticides

124. If you apply pesticides, you must do so in accordance with label recommendations so that they will have no unacceptable long-term effect on the environment (see Section 5.7).

125. Most pesticides are organic compounds which break down in the soil. Some pesticides contain copper and, although not widely used, repeated applications will increase the copper content of the soil. In such situations you should have the soil analysed, and compare the content with Table 2 to decide if you should continue to use the pesticide.

Lead shot

126. Lead shot can accumulate in soil. If land regularly used for clay pigeon shooting continues to be farmed, you should take professional advice to ensure that crop and livestock products meet food safety standards. Alternatively consider using shot that is not lead based.

Cleaning up accidental contamination

127. If your land is accidentally flooded by seawater, drain it off as soon as possible to minimise the amount of salt remaining in the soil. Normal winter rainfall will remove this salt in one or two winters. Seek professional advice. Be prepared to leave the land fallow, grow tolerant crops such as barley or ryegrass, take extra care with cultivations, and if necessary apply extra calcium as gypsum to stabilise soil structure. If you use waste gypsum, you will need to register an exemption with the Environment Agency under the Environmental Permitting Regulations (reference 35).

128. If there is a significant oil spillage, put your emergency plan into operation (see Section 1.5). Do not try to absorb petrol spillages as these are highly flammable. Create a bund to hold the spillage and arrange for the excess to be taken away. This is good practice for any spillage, as it reduces the amount of absorbent material generated. Any material contaminated with oil is classed as hazardous waste and must be disposed of accordingly (see Section 7).

129. Cultivate and fertilise the soil to encourage microbial activity, which will help to break down the oil. If you are in a Nitrate Vulnerable Zone, and you need to apply some nitrogen fertiliser to help this process, you must seek advice and prior permission from the Environment Agency. The lighter the oil the sooner the soil will recover. Detailed guidance is available (reference 48).

130. If floodwater containing spoil from mine workings contaminates pasture in the growing season, seek veterinary advice before cutting or grazing. Investigate the degree of metal contamination before deciding on future management of the land. You may need to cultivate the soil if a contaminant has accumulated in the surface.

131. Floodwater from urban or industrial areas, including from sewers, are other potential sources of contamination. Seek professional advice on the actions that should be taken, including veterinary advice if livestock are involved.

3 Management plans

3.1 Introduction

132. Preparing management plans for your farm will help to improve the efficiency of your business. They could save you money, and will help you to meet the standards of environmental management set out in this Code.

133. You may find it most effective to prepare all the relevant plans for your farm at the same time because some information will be needed in more than one plan. It can be helpful to combine the plans into one document to provide a better overview of your system.

134. The following sections describe the key steps you should take to prepare a satisfactory plan. The information in the plans should be available so it can be consulted regularly and shared with everybody who has an input to the business, including consultants, farm staff and contractors. Everyone who uses them should be asked to contribute when they are reviewed. See also Section 1.5.

135. You may wish to get help to prepare your plans, including from a suitably qualified independent consultant. In addition to references given in the following sections you may wish to consider information in the Defra Whole Farm Approach (reference 49) and the LEAF Audit (reference 50).

136. Management plans should be reviewed regularly and updated when circumstances change.

3.2 Manure management plan

- **The most economic and environmentally friendly way of dealing with livestock manures (slurry and solid manure) and dirty water will usually be to apply them to agricultural land at appropriate rates for the benefit of soil and the crop.**
- **When combined with a nutrient management plan, a manure management plan will help you to make the most of your livestock manures to reduce your fertiliser bill and reduce the risk of water pollution.**

The following guidance will help you to decide when and where to safely spread slurry, solid manure, dirty water, silage effluent and other organic materials.

It will reduce the risk of transfer of nutrients, organic matter and pathogens from livestock manures and dirty water to surface water.

The plan can be used to work out the amount of slurry and dirty water storage you need, although you may need to take specialist advice.

In Nitrate Vulnerable Zones you must comply with the rules that restrict the quantity of livestock manure and organic manures you can apply and times of the year when certain types may not be applied, and set minimum storage requirements for some livestock manures (reference 24).

New or substantially altered slurry stores must comply with regulations that lay down minimum construction standards (reference 51,52). The regulations also include minimum storage periods that you may have to provide (see also Section 4.3).

Good practice

137. Management plans should be reviewed regularly and updated when circumstances change.

138. If you have already produced a manure management plan you may wish to check it includes the following steps. It should include a field-by-field risk map (See Figure 1 at the foot of the reference list in Section 9) and an assessment of the need for any extra slurry or dirty water storage (see Section 4.3). You can draw up your own plan (reference 53) or obtain professional advice from a consultant (reference 54). Your plan should be clearly set out and include the steps identified in the following paragraphs.

139. By considering slope, soil type and the position of surface waters and water supplies, you should identify fields or parts of fields where livestock manures and dirty water should never be spread. These non-spreading areas should be marked on a farm map (in red).

140. Identify where livestock manures and dirty water should not be spread under certain conditions or where application rates should be restricted. These very high risk areas (orange) and high-risk areas (yellow) should be marked on the farm map. The remaining areas should be marked as lower risk (green). Identify on the map any areas in Nitrate Vulnerable Zones affected by the closed (non-spreading) periods.

141. Calculate the minimum area of land needed for spreading livestock manures by using a maximum field application rate of 250 kg total nitrogen per hectare per year. You can use standard tables or an analysis of your manures for this. But you must check that you comply with legal requirements in Nitrate Vulnerable Zones and with other management agreements where lower spreading rates may apply (e.g. organic standards and agri-environment schemes).

142. Assess if you have sufficient land available to spread your livestock manures and dirty water within the relevant restrictions. If you do not, you should consider reducing stocking levels or make arrangements to transfer manure elsewhere, e.g. for use as a fertiliser on another farm. Surplus manure from a certified organic farm can only be sent to another organic production unit. There may be other opportunities, for example sending poultry litter to a power station but this would be subject to environmental permitting (see Section 7).

143. If you wish to spread sewage sludge, green waste compost or other organic materials you should identify how much land is available after you have spread livestock manures and dirty water produced on your farm. You should not accept such materials on to your land if it will make it difficult to spread livestock manures and dirty water safely or to meet any restrictions (see also Sections 2 and 5.4).

144. Assess whether extra storage is needed for slurry or dirty water. Use the risk map (coloured map), and your experience of spreading over the winter period, to help you decide how much, if any, you can safely apply at this time. If you farm in a Nitrate Vulnerable Zone, you must comply with the minimum storage capacity requirements (reference 24). All new or substantially altered slurry stores must comply with standards of construction (reference 51, 52).

145. Update the risk map if you take on extra land.

146. Update the manure management plan if livestock numbers increase, the dirty yard area gets bigger, or other changes affect the volume of slurry or dirty water produced.

3.3 Nutrient management plan

- **A nutrient management plan will help you to make the most efficient use of inorganic fertilisers and maximise the use of nutrients contained in any organic manures that you apply.**
- **If you use organic manures, you should combine this plan with a manure management plan.**

A nutrient management plan will help you decide upon lime and fertiliser use, taking account of all sources of nutrient supply, as well as soil nutrient status, and the influence of soil type and rainfall.

Following the plan will minimise the risk of pollution resulting from the over-application of nutrients.



© Environment Agency

In Nitrate Vulnerable Zones you must comply with the mandatory rules, and only apply manufactured nitrogen fertilisers and organic manures according to crop requirement and at certain times. You must keep records that enable the Environment Agency to check what you have applied (reference 24). This is currently a cross compliance requirement.

Good practice

147. If you have already produced a nutrient management plan you may wish to check it is clearly set out and includes the steps in the following paragraphs. The "Tried and Tested" plan will meet all the advice and criteria set out below (reference 55).

148. Soils should be analysed for pH, P, K, and Mg every three to five years, depending on the cropping system. Use the results to adjust inputs of lime and phosphate, potash and magnesium nutrients.

149. Assess the nutrient requirement of the crop using a recognised fertilizer recommendation system (e.g. references 27, 28). If you receive professional advice on your plan, ensure that you use a current FACTS (Fertiliser Advisers Certification and Training Scheme) qualified person (reference 56).

150. Assess the nutrient supply from organic manure. Consider if a laboratory or on-farm analysis is necessary (references 27, 28, 57 and 32). Make sure you obtain representative samples of manure for analysis. You may need to thoroughly mix the contents of slurry stores.

151. Calculate the need for fertiliser nutrients by deducting the contribution from organic manures from the crop nutrient requirement.

152. Keep clear and accurate field records of your cropping and of all applications of fertilisers, livestock manures and organic manures. This will help future decisions on nutrient management and demonstrate the practical outcome of the plan.

153. Update the plan at the start of each cropping year.

3.4 Soil management plan

- **A soil management plan will help you to provide optimum conditions for the growth of crops and grass, while minimising the risk of run-off and erosion.**
- **It will help you protect the long term productivity of your land.**

Match crops and rotations to the capability of soils on the farm.

Inspect the structure of soils regularly. Record what you find and draw up a soil management plan for managing your land. You should review this plan annually and where necessary make changes based on what has happened during the year.



© *Environment Agency*

If you prepare a soil management plan it will be in addition to the 'Soil Protection Review' (reference 58). This is currently a cross compliance requirement.

Good practice

154. A soil management plan can help land managers to improve the way they treat soils. If you have already produced a soil management plan you may wish to check it includes a risk map for run-off and erosion, and a field-by-field assessment of the condition of the soil and how you will manage it. You can either draw up your own plan or obtain professional advice from a consultant. Your plan should be clearly set out and include the steps identified in the following paragraphs.

155. When developing a soil management plan the protection of archaeological sites should be taken into account.

156. Read relevant publications on controlling run-off and erosion and good practices for managing soils (reference 18, 59).

157. Using published guidance (reference 60) or advice from a consultant, prepare an assessment of the risks of run-off and erosion for your whole farm. It can help to look at soil during and after rain to identify areas of poor drainage and where run-off or erosion may be occurring including gateways, roads and tracks. When you have done this, you should prepare a map showing the risk class for each field or part field.

158. Match the intended use of each field with the capability of the land so as to minimise the risks of harming the environment.

159. Use a spade to look at soil structure in each field, or part field, to decide what you will need to do to maintain or improve its condition. Consider if you need to take any additional actions to improve the organic matter content of the soil.

160. Record on a field-by-field basis the steps you will take during the coming year to minimise run-off and erosion and to ensure good structure and maintain the infiltration of rainfall (see Section 5.2).

161. During the year you should record any problems such as ponding, patches of poor growth, or run-off or erosion events. This will remind you what has happened, and where you need to consider changing your management when you come to review the plan. You should review the plan each year, and include another assessment of soil structure, paying particular attention to any areas where you noticed problems.

3.5 Crop protection management plan

- **A crop protection management plan will help you to maximise the efficiency of any pesticides you use and to minimise effects on the environment.**

A crop protection management plan will minimise the risk of affecting human health, harming bio-diversity or polluting water.

Adopt alternative methods of control wherever possible and select pesticides with the least risk of causing adverse effects.

Inspect crops regularly and apply pesticides relevant to any problems that occur.

Good practice

162. A crop protection management plan will provide a checklist of what you should consider when planning the use of pesticides. Either complete a plan using an established format such as for the Voluntary Initiative or LEAF or prepare one of your own (reference 61, 50). See also Sections 4.5 and 5.7 for the measures you should take when storing and applying pesticides. You should read the code of practice for using plant protection products (reference 62) before producing a plan.

163. If you have already produced a crop protection management plan, you may wish to check it is clearly set out and includes the steps in the following paragraphs.

164. If neither you or a member of your staff are BASIS qualified, you should produce your plan with a BASIS qualified agronomist (reference 56).

165. Consider farm location, soil type, previous cropping, rotations and pesticide resistance issues. This can help you anticipate and predict potential problems.

166. Adopt non-chemical options wherever economic and practical. Include the use of rotations, cultivations and resistant varieties and encourage natural predators by incorporating beetle banks and field margins. You should consider the environmental impact of alternative control options such as flame and mechanical weeding, including the fuel used.

167. Inspect crops regularly to identify weeds, pests and diseases accurately. Evaluate the need for a pesticide by use of thresholds and diagnostic kits.

168. Select an effective pesticide that will minimise impacts on:- crop pest predators, non-target organisms, neighbouring crops, wildlife habitats, and the quality of surface water and groundwater.

169. If you want to reduce the statutory no-spray buffer zone adjacent to surface waters you must undertake a Local Environment Risk Assessment for Pesticides (LERAPS) (reference 63).

170. Keep accurate records. They are a key management tool to help identify where improvements can be made and should include the justification for a particular course of action. Record keeping is a requirement under EC law when you grow food or feed crops (reference 64).

171. Complete an annual review so as to incorporate any new priorities.

4 Farm buildings and structures

4.1 Introduction

172. The following sections deal with some of the buildings and structures on farms that could cause pollution of water, air or soil. They also contain advice on the handling and management of both solids and liquids in and around the farmyard to avoid pollution, and how to deal with wastes that arise. More information on wastes is provided in Section 7.

173. You should consider whether you need to make any changes, including how you manage buildings and structures, to protect the environment. Some changes will be inexpensive but deliver significant benefits. Run-off of contaminated water and rainfall from yards and tracks can cause pollution of water and may damage habitats. Remember to consider if this happens from field tracks and gateways. New buildings and structures, or significant changes, may require planning permission (reference 65). You should always seek advice from your local planning Authority; they will also tell you if an environmental impact assessment is needed for new or extended livestock buildings.

174. To conserve our historic heritage you should protect archaeological remains that appear on or above the soil surface or are buried beneath it. Seek advice from the Archaeological Officer of your local Authority if you are unsure about the status of an historic site.

175. Keeping buildings and structures in good repair is key to good practice and may reduce your insurance premiums. Regular checks on all structures, such as fuel stores and slurry stores containing potentially polluting liquids will alert you to problems before they occur and can prevent serious pollution incidents.

176. Make regular checks:

- of liquid levels;
- for signs of corrosion, damage and leaks in containers, pipework and stores; and
- of all buildings, roofs, gutters, downpipes, clean water drains, foul drains, yard areas, and any clean water outfalls to ditches, surface waters and soakaways.

Greenhouse gases

177. You can reduce emissions of carbon dioxide (a greenhouse gas) by maintaining fixed equipment such as grain driers, refrigerated stores and bulk milk tanks in good condition, and by operating them efficiently. You can reduce heat loss from buildings by using effective insulation and ventilation systems. Insulation will also reduce heat gains which can reduce the need for subsequent ventilation. Consider opportunities for using alternative energy sources which are not fossil fuels. You should monitor energy use and identify ways to save costs by making energy reductions (reference 66).

178. Apart from their effect as greenhouse gases, chlorofluorocarbons (CFCs) and halons also damage the ozone layer. CFCs are used in refrigeration equipment and halons are often used in fire extinguishers for use on electrical fires. Refrigeration

equipment needs specialist servicing to avoid loss of refrigerant. Dispose of old refrigeration equipment and old or partly used fire extinguishers through specialist contractors (see Section 7).

4.2 Silage stores and effluent handling

- **Even small amounts of silage effluent from crops in an enclosed pit or silo, or from baled silage, will kill fish and other water life for a long way downstream if it gets into surface waters.**

Silage effluent should be contained and stored safely until it can be applied to land to make use of its nutrient content, or it can be used for animal feed.

If possible, recycle clean silage wraps, bags and sheets.



© *Environment Agency*

The construction of facilities for making and storing silage and storing effluent are controlled by law (Reference 51).

Seek advice from the Environment Agency if:

- you intend to construct a new silo or substantially enlarge or reconstruct an existing silo.
- you want to make field silage (field heaps or non-baled bagged silage). Sites must be notified to the Environment Agency.

You must notify the Environment Agency before you use new or substantially altered facilities for the first time.

See 'Regulations' below.

Good practice

179. Every year before using silos, you should inspect effluent tanks from the outside (as much as you can see) for leaks and corrosion – **do not go into them**. Also check channels, drains, silo floors, walls and wall/floor joints. Carry out repairs well before the silage making season.

180. During silage making:

- check around the silo and effluent tank for leaks and blockages daily. Put right any problems immediately;
- check effluent tank levels frequently and empty as necessary; and
- check ditches, surface waters and clean water drains for signs of pollution. If any are found, put your accident and emergency plan into action.

181. You can minimise the amount of effluent produced by wilting grass to at least 25% dry matter before it is ensiled. Harvest other crops (such as whole crop cereals and maize) at the correct stage of maturity.

182. Apply effluent to land in accordance with your manure management plan (see Section 3.2). To avoid scorch when applying to a growing crop – dilute the effluent in a slurry tanker with the same amount of water, dirty water or slurry, and do not apply more than 50 m3/ha. Note: adding effluent to slurry or dirty water will increase the risk of causing an odour nuisance.

183. For baled silage:

- you must store bales at least 10 metres away from field drains, ditches and surface waters. Do not remove plastic wrap within this 10-metre zone as effluent may be released. If bales are stored directly on the ground (i.e. not on a specially constructed base), you must ensure they do not leak effluent. Bales should be located well away from any ruts or tracks that could provide a pathway for effluent to get into ditches, surface waters or damage habitats; and
- when crop dry matter is below 25%, using a 750 mm wide bale wrap (rather than 500 mm) will reduce the quantity of effluent released during storage. This applies for both 4 and 6 wrap systems.

184. For field silage – field heaps or large bags (non-baled):

- choose a level site and make a careful assessment of pollution risk to groundwater and surface water. Discuss your proposals with the Environment Agency well in advance of silage making;
- sites must be at least 10 metres away from field drains, ditches and surface waters; and at least 50 metres away from springs, wells and boreholes where water is used for human consumption or in farm dairies; and
- make sure bags are closed and sealed at each end. If there is any effluent inside the bag you must use it or dispose of it safely.

Regulations

185. There are legal obligations that control how you make and store silage in a silo; or in wrapped and sealed or bagged bales; or in a tower silo; or as field silage (field heaps or non-baled bagged silage). The requirements (reference 52) for silos include having impermeable floor and walls (they must not leak), being corrosion resistant, the base must extend beyond the walls and have channels on all sides to collect effluent, it must have an effluent tank of appropriate size, and no part may be within 10 metres of any field drains or surface waters. Effluent tanks must have a design life of 20 years without maintenance.

186. If you intend to remove silage from where it was originally made and put it into another store – **either** that store must comply with the regulations, **or** you must get prior approval from the Environment Agency.

Designing new silos

187. The base and wall of the silo should be **professionally** designed to suit the conditions of the site. There are a number of British Standards or other equivalent

standards involved. Building work should be supervised to make sure the silo is structurally sound and effluent cannot escape. Further guidance is available (reference 67, 68). The use of hot-rolled asphalt (HRA) surfacing is an activity that should be carried out by a specialist (Reference 69).

Feeding effluent to livestock

188. Silage effluent contains only a small quantity of dry matter but it does have some feed value. You may be able to use some of the effluent in this way – but take advice particularly on how to feed it to dairy cows. Any new storage facilities for feeding purposes must meet the regulations (reference 51).

Silage additives

189. Most additives are extremely polluting. They should be stored safely and handled at least 10 metres from a field drain or surface water. Do not leave undiluted product out on site or allow additives or used containers to get into surface waters (see Section-7).

Disposal of silage plastics and tyres

190. Silage wraps, bags and sheets will require disposal. Ideally they should be recycled off-farm using specialist collectors but make sure such wastes are as clean and free from soil as possible. Tyres used for holding down silage sheeting will eventually require disposal. Do not burn plastics or tyres in the open. For disposal options – see Section 7.

Safety Note

Effluent tanks can contain lethal gases. Do NOT go into them at any time. Lock tank covers. Display a clear warning notice.

4.3 Livestock manure and dirty water collection, storage and treatment

- **Livestock manures and dirty water can cause serious water pollution if they get into surface water or groundwater. Storage systems that are properly designed, built and maintained will reduce these risks.**

Adequate storage will allow better timing and use of manure nutrients, and allow you to reduce the amount of fertiliser you buy.

Minimise the amount of slurry and dirty water by keeping rainwater out, unless it is specifically required for dilution. This will reduce storage and field application costs.

Consider using floating covers or roofs on slurry stores to reduce odour and ammonia emissions, as well as keeping direct rainfall out. Natural surface crusts on stored slurry will reduce odour and ammonia emissions. Consider roofing over solid manure stores and outside soiled yard areas to keep rainfall out of slurry and dirty water systems.



The construction of **slurry storage systems** is controlled by law (reference 51, 52). This includes stores for dilute effluent such as dirty water, run-off from solid manure stores in yards, washings from buildings or yards used by livestock, reception pits and associated pipes and channels.

Seek advice from the Environment Agency if you intend to construct a new system or substantially enlarge or alter an existing system. You must tell the Environment Agency in writing before you use such facilities for the first time.

In Nitrate Vulnerable Zones you must comply with the rules that set minimum standards for manure storage (reference 24).

See 'Regulations' below.

© *Environment Agency*

Livestock manures and dirty water

Livestock manures are either slurries or solid manures. Slurries can be pumped or discharged by gravity. Solid manures, including farmyard manure, can generally be stacked. Dirty water is a term commonly used to describe rainfall run-off from yard areas to which animals have regular access, and washings from the dairy and milking parlour (reference 32, 27).

Good practice

General

191. All solid manure, slurry and dirty water should be properly contained and directed into a well designed and constructed store, although solid manures can be stored temporarily in the field if the site is suitable (see paragraph 228). Some of the store types that are commonly used are described below, but others will be suitable if they meet the requirements of the regulations. It is good practice to keep at least a 750 mm freeboard[2] in earth-banked lagoons and 300 mm in other slurry and dirty water stores (Note: the 750 mm freeboard is a legal requirement for new or substantially altered earth-banked lagoons).

192. You can minimise the amounts collected by providing separate drainage for clean roof water and clean yard water. Consider whether you can collect and re-use clean water (see Section 8). Careful re-organisation of yards and drains can dramatically reduce the volume of foul drainage (reference 70). Where applicable, you should

[2] The distance between the level (surface) of the liquid in the store to the point at which it would overflow.

consider roofing over stores and outside soiled yard areas to keep rainfall out. Avoid over-use of wash water by checking volumes occasionally (see Section 8.2).

193. Check all foul drains, channels, pipes, valves and sluices frequently to ensure they are operating well. Remember to check clean drains, including roof gutters and downpipes, to ensure they are not adding unwanted dilution to foul drainage. Carry out repairs as soon as possible.

194. Check storage tanks and structures frequently for signs of corrosion or leakage. Once a year, when the store is empty, check the walls and floor for signs of corrosion or degradation of mastic sealant (concrete and steel structures), and damage and leakage (all structures). With steel stores, you should check for corrosion around bolt holes and at the edges of panels as this can lead to the collapse of the store. Use binoculars for inaccessible areas. Get professional help to carry out repairs.

195. Make sure you have an accident and emergency plan in place and everyone knows how to respond to run-off, leaks or other failures (see Section 1.5).

Safety Note

- **Mixing or re-circulating slurry can give off dangerous gases that are lethal to both humans and livestock.**
- **Never put silage effluent into under-floor slurry stores, as similar problems can occur.**
- **Cover or fence-off below ground tanks and reception pits; fence off earth-banked stores. Clearly display warning signs.**

Under-floor storage and transfer channels

196. The base and walls of channels or pits should be impermeable to stop polluted liquids getting out, or to prevent water getting in if they are built below ground.

197. If slurry is emptied from channels to a reception pit through a sluice, the pit should be big enough to hold all the slurry that might be released.

Below-ground tanks and reception pits

198. Below-ground tanks should be big enough to suit the circumstances and emptying method. Reception pits should be built to hold at least two days' slurry and dirty water taking into account likely rainfall. Consult the Environment Agency about specific requirements as the risk of causing water pollution depends on site conditions.

199. Make sure you provide adequate access arrangements if tanks and pits are to be emptied by tractor-drawn slurry tankers.

Above-ground circular stores

200. These are suitable for storing slurry that is easy to pump. They are not suitable for slurries with a lot of long straw bedding, sand bedding or waste feed.

201. Keep long bedding and long feedstuffs out of the store by scraping to one side, so that you can deal with it separately after liquids have drained into the reception pit.

202. Use the transfer pump to mix the slurry thoroughly in the reception pit, before putting it into the store.

203. If you allow a surface crust (from floating solids) to develop in unroofed stores it will reduce odour and ammonia emissions. This is particularly effective with cattle slurry. You will need to be able to break up such crusts later to avoid problems when you empty the store.

204. Mix the store contents to break up any crust and stir up sediment before you empty the store. To avoid the risk of overflow, do not leave the pump running unattended with the valves open between the store and reception pit.

205. You should fit two valves in-line between the store and the reception pit to control the outflow of slurry (reference 71). The valves should be located far enough apart to reduce the chance of a blockage keeping both valves from being shut properly (e.g. from pieces of wood or long sticks). Keep them locked shut when they are not being used.

Weeping-wall stores

206. These are normally filled by tractor scrapers and/or automatic scrapers and are particularly suitable for cattle slurry with a lot of straw bedding in it.

207. The store is not usually emptied during the winter housing period because access panels cannot be opened safely until the contents have dried out – typically from early summer onwards. When conditions are right – remove access panels carefully, section by section, and check that the store contents will not flow out.

208. Rain that falls into the store, and about 10% of slurry going into it, will drain out through the gaps or slots in the walls. This liquid should be collected in a drainage channel outside the store and directed into a suitable tank. The size of the liquid storage tank should be large enough to avoid having to spread its contents when conditions are unsuitable. Remember that this liquid is much more polluting, and contains more plant nutrients, than dirty water.

209. You should prevent excess liquid from entering a weeping-wall store, as this may cause "spurting" through the slots which is difficult to contain. Any excess liquids should be directed into the associated storage tank or other containment, depending on the design of the system.

Earth-banked stores

210. These can be used for all types of slurry or dirty water. Depending on the consistency of its contents, they can operate as a liquid store which is emptied by pump or vacuum tanker, or by taking some liquids away first and removing the remaining solids with a mechanical digger.

211. New or substantially altered stores must be impermeable and therefore built in suitable soil – you can import clay or use a liner to make sure you contain the liquid material. Pre-fabricated liners are not suitable for mechanical emptying and therefore should only be used for liquid storage.

212. A strainer box placed at the deepest part of the store will allow gradual removal of some liquid slurry by pump.

213. The designer should check that the soil and the site are suitable and provide details on moving any land drains, removing growing plants and top soil, building the embankments and their consolidation, making allowance for settlement, and covering exposed surfaces with a layer of topsoil sown to grass to prevent erosion.

214. For stores without a cover, allowing a crust to develop will reduce odour and ammonia emissions from the store, particularly for cattle slurry. You will need to be able to break up such crusts to avoid problems when you empty the store.

215. If you use mechanical unloading methods, or agitate the contents with propeller mixers you should take care not to damage the earth banks or floor. The bank tops should be wide enough for safe operation of equipment. Take care not to damage any liners when mixing or emptying the store.

216. You should keep vegetation on embankments short to allow for inspection. Do not let trees grow on or next to them. If cracks appear or the banks settle, they should be repaired straight away. Examine embankments after heavy rain.

Systems for dirty water

217. You may decide to direct small amounts of dirty water into slurry stores, but for larger amounts you should consider a separate system for storage and subsequent application to land.

218. 'Low rate' irrigation systems use suitable tanks or earth-banked stores to collect liquids and let them settle. They use an electric pump, small bore piping and sprinklers (up to 5 millimetres per hour) or a small travelling irrigator (up to 50 m3/ha or 5-millimetres per run) to spread liquids onto the land. The storage period required will depend on the risks of causing pollution from run-off when spreading (see paragraph 31).

219. 'High rate' irrigation systems use large bore pipes to provide high flow and application rates. These systems are not normally used in winter because of the high risk of run-off, and therefore long-term storage is usually required. Applications in excess of 50 m3/ha are only acceptable on field sites when soil and slope conditions are optimum.

220. A manure management plan will help you to decide when and where to irrigate dirty water (see Section 3).

221. If you can apply dirty water to land on a regular basis, then the tank should have 2 to 4 compartments to remove solids (those that float and those that settle). These compartments should be joined by overflow H-pipes to reduce solids getting into the final compartment or pump chamber. The pump chamber should be big enough to avoid overflow when a lot of rain falls in a short time. The overall minimum buffer capacity in the tanks should be sufficient to contain a 25 mm rainfall on the area draining to the store – and should be available when the level of dirty water causes the pump to switch on. In some cases the buffer should be much greater, so you should agree details with the Environment Agency.

222. Use frost protection for the pumping system, and fit automatic devices to stop the pump when there is a very high pressure (caused by blockage) or a very low pressure (caused by leakage). Fit a warning device that you can see or hear easily, to warn you hat the system has shut down or failed. Travelling irrigators should have an automatic shut down at the end of a run.

223. Move sprinklers and irrigators regularly. Check land you are irrigating for any signs of run-off, ponding on the surface, or worms being killed. Move sprinklers or re-set travelling irrigators if there are any signs of these problems. On sloping land, set the travelling irrigator to run across slopes. Check surface waters (including all ditches) frequently during and after spreading, to make sure there is no pollution.

224. Remove sludge from settlement tanks as necessary. Check storage tanks, pumps, filters and control gear regularly. During use – check warning devices, sprinklers and mobile irrigator several times a day.

Solid manure stores

225. Permanent stores for solid manures should have bases that do not let liquids pass through. The base should slope so that liquids run-off into collection channels. Collection channels should be outside the store if the walls let liquids pass through them.

226. You should consider providing a roof to keep rainfall off the manure and minimise the volume of liquids produced. You can reduce odour and ammonia emissions from poultry manure by keeping it as dry as possible.

227. Collect liquids in a suitably sized tank, or direct them to a slurry store.

Field heaps

228. Only put solid manures into temporary field heaps if there is minimal risk of run-off polluting groundwater or surface water. Normally you should not put field heaps within 10 metres of field drains. If there is no alternative, you should only put heaps over field drains for a few days before application and then only if it does not cause pollution. You should not put any field heaps within 10 metres of surface waters or within 50 metres of a spring, well or borehole or in positions that would cause odour problems for nearby residents. Field heaps should be located well away from any ruts or tracks that could provide a pathway for effluent to get into ditches, surface waters or damage habitats.

229. Using narrow densely packed A-shaped heaps for poultry manure will shed rainwater more easily and prevent manure from becoming very wet. This will reduce odour and ammonia emissions.

Regulations

230. There are legal obligations for **new or substantially altered structures** that require you to store slurry, run-off from solid manure stores and dirty water safely. The requirements (references 51, 52) include impermeability (does not leak), corrosion resistance, structural integrity, a reception pit of appropriate size (at least 2 days slurry production), the use of 2 valves in-line on outlet pipes, and all not being with 10 metres of field drains or surface waters. You must provide at least 4 months' slurry storage, unless you can demonstrate to the Environment Agency that you have a safe year-round management and field application system; but you must comply with the minimum storage requirement if your farm is in a Nitrate Vulnerable Zone (reference 24). The size of the store and any reception pit must take into account rain that falls directly onto or drains into them. Earth-banked stores must have a 750 mm freeboard at all times, while other stores must include a 300 mm freeboard when the store size is calculated. All structures must have a 20-year design life with proper maintenance.

Design of the store

231. The store should be professionally designed to suit conditions of the site. There are a number of British Standards or other equivalent standards involved. Building work and earth works should be supervised to make sure the store is structurally sound and slurry cannot escape. Further guidance is available for a range of different storage options, including roofing (reference 68, 72, 73, 74, 75, 76). For operational reasons and to avoid pollution you may require at least 6 months storage, particularly on farms in very wet areas and with unsuitable land or cropping for winter spreading. Store size should be based on the number of animals or birds, the housing period, the area of open soiled concrete yards and any additional collection areas, the amount of wash water used, and the rainfall and comply with at least the minimum requirements set down in legislation. Estimates of excreta and solid manure production are provided in separate guidance (references 24, 32).

Manure treatment

232. The management and handling of livestock manures, particularly the length of time they are stored, are important factors in the survival of micro-organisms. On farms where *Cryptosporidium parvum* (a parasite that can make humans ill) has been diagnosed, reduce the risk of contaminating surface waters with viable oocysts (eggs) by storing:–

- slurry for as long as practically possible; and
- solid manures (farmyard manure) for at least 2 months before spreading to land.

233. If you plan to apply livestock manures before planting "ready-to-eat" crops, you should follow advice on how to reduce risks of food contamination by pathogens (reference 77).

234. The following techniques go beyond good agricultural practice, but may be appropriate or even required, in certain situations.

a. ***Composting*** solid manures reduces the quantity to be spread to land, and the odour that is released during and after spreading. Composting itself can give rise to site odours, and increase the loss of ammonia. The best results are obtained by using ingredients that are chopped and well mixed – usually manure and straw in the right proportions – and by controlling temperature and moisture content. Typical farmyard manure heaps that are not turned will not compost thoroughly.

b. ***Mechanical separation*** of slurry removes some solids and provides a liquid that can be pumped. The solid portion, typically 10 to 20% of the original slurry volume can be stacked and stored in a similar way to farmyard manure, although you must make provision to collect run-off (usually from beneath the separator). Simple wedge-wire run-down screens or vibrating screens for pig slurry, produce separated solids which will not stack but tend to slump. For pig and cattle slurries, separators which press and squeeze the slurry against a fabric belt or steel screen will produce separated solids of 18 to 30% dry matter that can be more easily stacked and composted.

c. If you wish to consider other ***biological or mechanical treatment*** of slurry or solid manure to reduce odour, polluting potential or for other reasons – you should obtain specialist advice.

   i. In some circumstances the ***anaerobic digestion*** of slurry, often with other organic bio-degradable materials, can produce sufficient biogas to be used for local heating schemes or for generating electricity (reference 78). Key factors for success include:

      - securing a regular and consistent supply of organic bio-degradable material;
      - receiving "gate fees" for organic bio-degradable material; and
      - matching the nutrients in the digested material (digestate) with land available for spreading nearby, and with crop nutrient requirements.

4.4 Sheep dips and dipping

- **All sheep dip compounds are very toxic and extremely small amounts will kill fish and other water life for a long way downstream if they get into surface waters. Small quantities can also be very damaging to groundwater and can affect drinking water supplies, including neighbours' private supplies.**

Site all dips (including mobile dips, jetters and showers) well away from surface waters, springs, boreholes and other vulnerable groundwater. Make sure that used dip is safely contained.

You must get an authorisation from the Environment Agency to dispose of used dip on land.

Everyone involved in sheep dipping must be properly trained and competent.



© *Environment Agency*

Read and follow the Groundwater Protection Code on the use and disposal of sheep dip compounds (reference 79).

Complying with this legislation is currently a cross compliance requirement.

Sheep dip compounds must be handled by, or their use supervised by, a competent person (reference 80).

You must comply with the law if you are jetting, spraying, showering or carrying out conventional dipping of sheep (reference 81).

See 'Regulations' below.

Good practice

Before you dip

235. Plan to carry out safe dipping of sheep (reference 82). Make sure everyone involved in sheep dipping has been trained in personal health and safety, animal welfare and environmental impacts (reference 83). After 31st December 2008, sheep dip products must be handled by, or their use supervised by, a person who holds a Certificate of Competence in the Safe Use of Sheep Dip (reference 80, 84).

236. Ensure dip baths and draining pens are properly sited, constructed and maintained, and equipment is in good working order. They must be at least 10 metres from ditches and surface waters, and 50 metres from springs, wells or boreholes.

237. Choose a flat site for mobile dips, showers and jetters. Do not let used dip run into clean water drains, ditches or surface waters, or soak into land. Use clean water to check that any overflow or spillage will not cause this to happen.

238. All dip and drainage from holding pens must be contained.

239. Store and transport dip concentrate safely.

240. Put procedures in place to deal with emergencies such as spillages of dip concentrate or used dip, or sheep escaping from draining pens and getting into wetlands or surface waters. These should be included in your accident and emergency plan for the farm (see Section 1.5).

241. Check weather forecasts and do not dip sheep if rain is likely within 24 hours.

When you dip

242. Only use dip concentrate that is authorised for use. Follow mixing instructions on the container label and be careful when washing out measuring jugs and containers not to spill any dip so it does not harm the environment.

243. Organise sheep handling to minimise splashing, and take care not to transfer dip from the dip pen area onto equipment or clothing.

244. Keep sheep in the drain pen until there is nothing dripping from their fleeces.

After you dip

245. Wherever possible keep sheep out of surface waters for at least 2 weeks.

246. Empty the dip bath as soon as possible. Wash equipment, including the drain pen, and contain all washings for disposal. Store used dip in impermeable containers suitable for toxic materials, if you cannot dispose of it immediately. Do not store used dip with slurry.

247. Cover the dip bath when not in use.

248. When applying used dip to land you must comply with the conditions set out in your authorisation (see paragraph 249). If you use contractors – make sure they comply as well.

Regulations

249. You must have a prior written authorisation from the Environment Agency to spread used dip onto land (reference 81). This will set conditions, but you should check that the land is in a suitable state to receive used dip. You must keep records of the disposal you make to the approved field site.

250. You may send the used dip off-farm, but you must use a licensed waste carrier (see Section 7), or check that your contractor has an appropriate authorisation to dispose of the used dip.

251. The Environment Agency can serve a Notice to restrict or improve unsafe sheep dipping practices.

Spreading used dip onto land

252. Guidance on preparing a manure management plan (see Section 3.2) includes making a field risk assessment to minimise water pollution. This will help you to decide when field conditions are suitable for spreading used dip.

253. You can mix used dip with controlled volumes of slurry or water in a slurry tanker to achieve the required application rate. One part used dip to 3 parts water or slurry is a typical dilution. Add water* to the tanker first, and make sure there are no leaks. Apply used dip to land in accordance with your groundwater authorisation (see paragraph 249).

**Do not take water direct from streams using potentially contaminated equipment and do not use a mains supply tap.*

Caution

Some sheep dip chemicals are poisonous to terrestrial invertebrates, birds (including domestic geese and hens) and mammals. Do not let birds and other livestock drink the dip. Do not let livestock graze on land for at least 1 month after used dip has been spread.

Containers and unwanted dip concentrate

254. Do not reuse empty containers for any purpose. Rinse empty dip containers three times with clean water, and empty contents into the dip bath. Store the rinsed containers under cover prior to disposing of them; store any surplus concentrate safely or, if unwanted, dispose of it (see Section 7 for disposal options).

Designing facilities

255. Dip baths must **not** have a drain hole. There should be "draining-off" pens of sufficient size to hold sheep after dipping, such that used dip drains back to the dip bath. Further guidance is available (reference 79, 85).

4.5 Pesticide storage and handling

- **Pesticides can harm water life, and affect drinking water sources. Good storage and handling procedures will minimise risks of causing water pollution.**

Very small amounts of pesticide can cause serious pollution problems, even just the amount of residue on a foil seal from a concentrate container. Mixing, filling and washing operations should be carried out carefully to avoid pollution.

Everyone who uses pesticides must be properly trained and competent.



© *Environment Agency*

The use of pesticides is controlled by law (reference 86).

Everyone who uses pesticides should know the rules set out in these laws and their practical implications. Read the Code of practice for using plant protection products (reference 87).

See 'Disposal of wastes' and 'Regulations' below.

Good practice

Storage

256. New pesticide stores should meet good standards of design and construction (reference 88, 89). You should not build stores where there is a risk of polluting surface waters or groundwater. Get advice from the Environment Agency, local planning and fire authorities, the crime prevention officer, and the Health and Safety Executive before you build or substantially alter a pesticide store.

257. You can store small amounts of pesticide in a suitable chest, bin, vault or cabinet. This container should be resistant to impact and fire and capable of retaining any pesticide leakage, and kept locked.

258. Stores should have an impermeable floor and be able to hold spillage from all the store contents plus at least an extra 10% (an extra 85% if you are near an environmentally sensitive site).

259. You should review existing stores and identify and carry out any necessary improvements.

Mixing pesticides, filling spray tanks and washing equipment

260. Mixing, filling and washing operations should be carried out in an area designated for the purpose such that spillages and washings cannot escape to contaminate soil, groundwater or surface water. All liquids should be directed to a suitable collection tank or system. These facilities should be well away from yard drains, ditches, field drains and other surface waters.

261. You must avoid back-siphoning when filling a sprayer by ensuring there are no direct connections between a sprayer and water supply.

Transport

262. You should transport pesticides safely. If you collect pesticides from a supplier, or move pesticides around or off the farm, you should check your legal obligations for the safe transport of dangerous goods. Consult the Code of practice for using plant protection products (reference 87) for more detail.

Training

263. Everyone who uses pesticides must be properly trained and competent to do their job. You may need a certificate of competence to use pesticides. Check the Code of practice for using plant protection products, for details of training and certification requirements (reference 87).

Spillage

264. If spillage occurs outside of the area designated for sprayer cleaning, you should follow your accident and emergency plan (see Section 1.5). Even small spills should be soaked up immediately with absorbent material e.g. sand or cat litter. For major spills, contact the Environment Agency emergency hotline on 0800 807060. Do not hose down, as this will increase the risk of causing water pollution. Spillages of any treated seed or slug pellets should be cleared up immediately to avoid the risk of poisoning wildlife.

Treatment

265. If you intend to install a waste treatment facility for dilute pesticide washings – such as a biobed, you should first consult the Environment Agency (see Section 7) (reference 90).

Disposal of wastes

You must dispose of the wastes described below by using recognised disposal options – for further details see Section 7.

266. You should minimise ***packaging waste*** by carefully considering how much product to buy and store. Do not burn packaging waste in the open. Recycle packaging off-farm or use another recognised disposal option.

267. You can minimise or eliminate sprayer tank ***washings*** by careful planning, use of rinsing equipment or direct-meter sprayers. You can cut down the amount of waste washings when you clean out equipment by using an efficient flushing system, instead of filling the sprayer tank with water and pumping it through the equipment. You may be able to use washings to make a further batch of the dilute pesticide, but if not you can:

- apply washings to the treated or untreated *crop* provided this is within the terms of the product approval;

- apply washings to *land* under conditions set out in a prior written groundwater authorisation from the Environment Agency – this is a legal requirement (reference 81); or
- use another recognised disposal option.

268. It is not economical to store ***pesticides*** that you cannot use in the near future; only order according to need. It is illegal to store them if the approval has been taken away. You may be able to return unwanted, unused containers to your supplier otherwise you must use a recognised disposal option.

269. Do not re-use pesticide ***containers*** except, if in good condition, to hold an identical pesticide from a container that is damaged or leaks. Triple rinse empty containers (reference 91) or use specialist rinsing equipment. If possible, clean the containers when you are preparing working strength spray dilution and use rinsing liquid to dilute the spray. Store the cleaned containers upright and under cover before recycling them or disposing of them off-farm.

Safety Note

Do not rinse or clean containers that have held hydrogen cyanide gassing powders or aluminium, magnesium or zinc phosphides. They give off dangerous gases if they get damp. These containers must be dealt with as hazardous waste (see Section 7).

270. You must dispose of other ***contaminated materials***, e.g. soiled protective clothing, material for soaking up spillages, used rodenticide, or other pesticide baits, using a recognised disposal route for hazardous waste.

Regulations

271. A number of regulations deal with the use of pesticides, so it is important that users understand their responsibilities. The Code of practice for using plant protection products gives detailed guidance on how to comply with the law when using pesticides (reference 87).

4.6 Fertiliser storage and handling

Good storage and handling procedures for fertilisers will minimise the risks of causing water pollution. If pollution incidents occur, they are likely to be very serious.

The risks of causing water pollution are low from storing and handling solid fertiliser, but you need to be especially careful with fluid fertilisers.

Recycle clean plastic fertiliser bags.



© Environment Agency



© Environment Agency

A number of regulations deal with storage and handling of dangerous substances such as ammonium nitrate fertilisers. General guidance is available (reference 92).

Good practice

General

272. You should consider the risk of polluting water from the storage and handling of fertilisers. Make sure you include how to deal with spillages in your accident and emergency plan (see Section 1.5).

Solid fertilisers

273. Do not store bags of fertiliser within 10 metres of a field drain, ditch or surface water. Return unused bags from temporary field sites to a permanent store as soon as possible.

274. You should handle bags carefully to avoid damage, and you should gather up any spilt material.

275. Provide secure storage on farm and carry out regular stock checks (reference 92, 93, 94, and 95 if you store over 150 tonnes of ammonium nitrate fertiliser). If possible keep fertiliser in a locked building.

276. Further guidance is provided in a Code of Practice (reference 96).

Fluid fertilisers

277. You should place storage facilities as far away as possible from any ditch, surface water or drainage system. Stores should be at least 10 metres from drains, ditches and surface waters, and at least 50 metres from springs, wells or boreholes. The Environment Agency strongly advises that suitably designed and constructed secondary containment is provided for fluid fertiliser storage tanks. You should check the suitability of sites with the Environment Agency.

278. The storage tank should be resistant to corrosion from fertiliser. Its base should be designed to take the weight of the full store. There should be a hard-standing so that large delivery vehicles can get to the store.

279. You can protect the outside of mild steel tanks by applying a suitable coating. If you are storing nitrogen fertiliser, you can prevent corrosion inside the tank by either using a phosphate-containing compound fertiliser or by adding a small amount of phosphate to the nitrogen fertiliser.

280. Inspect tanks, pipes and valves regularly for any sign of leaking or corrosion. Paint the outside of mild steel tanks regularly. Treat any damage to the surface of glass-fibre reinforced plastic (GRP) tanks with a coat of resin.

281. Consider using protective barriers to protect tanks, especially ones made of GRP, against collision damage.

282. You can use a flexible liner, which is supported and protected by a suitable structure, to store liquid fertiliser. Do not use unprotected or unsupported flexible containers for either temporary or permanent stores.

283. Pipes, valves and connectors should be made out of materials that do not corrode and should be placed where they will not be damaged. Lock shut any valves that might allow fertiliser to escape. All pipes, valves and connectors should be within a bund to provide secondary containment.

284. The hatches, lids and valves of tankers and bowsers holding fluid fertilisers should be securely closed during transport. All valves should be locked when unattended. Do not overfill tanks. Leave space for the contents to expand.

285. Further guidance is provided in a Code of Practice (Reference 97).

Disposal of fertiliser bags

286. Fertiliser bags can be re-used on the farm but eventually they will need to be disposed of or recycled. Such bags can be recycled off-farm using specialist collectors. Keep bulk bags separate from small fertiliser bags and make sure all are clean and free from soil. You should shake bags clean to remove fertiliser residues. Do not burn plastics in the open. For disposal options – see Section 7 on waste.

4.7 Fuel oil storage

- **Every year fuel oil spills on farms pollute water and damage wildlife. Oil spreads rapidly and widely over the surface of water and can also get into groundwater. The clean up costs are very expensive.**

Agricultural fuel oils should be contained and stored safely within bunds to provide secondary containment.

Take steps to minimise the risks from vandalism and from accidental damage by moving vehicles.

New or substantially enlarged or re-constructed above-ground agricultural fuel oil storage facilities that increase the total stored on farm to more than 1500 litres capacity are controlled by law (Reference 51). This requires, among other things, that such stores or areas for storing fuel oil drums must be bunded (to provide secondary containment) and not located within 10 metres of a ditch or surface water.

Consult the Environment Agency for advice.

See 'Regulations' below.

Good practice

287. All agricultural fuel oil stores should be bunded to provide secondary containment of possible leaks and spillage. Some installations must comply with permit conditions set by the Environment Agency (reference 98, 35).

288. Make sure you include how to deal with spillages in your accident and emergency plan (see Section 1.5). You should have sand or other absorbent material available to soak up any spillages. Ideally, spill kits should be available at all locations where oil is stored and used. Do not hose down a spillage or use detergent.

289. You should devise operational procedures for deliveries to and from the tank, to minimise the chances of having a spill. If possible, a member of farm staff should be present when fuel is delivered.

290. Keep all valves inside the bund closed and locked when you are not using them. Keep all valves on fuel lines to boilers, grain driers and other equipment closed and locked when not in use. Store flexible hoses for refuelling vehicles with the hose outlet in the bund and locked when not in use. Avoid overfilling vehicle tanks.

291. Check frequently for leaks and repair any leaks immediately. Take out any water or oil that accumulates in the bund and dispose of it safely. Large amounts of oil can be removed from water using a blanket that is specially made to absorb oil. Oily wastes are classified as hazardous (see Section 7).

292. Inspect tanks, pipes and equipment regularly for damage and corrosion. Carry out maintenance and repaint metal tanks on the outside to prevent corrosion. Inspect bunds and keep them in good condition.

293. Transport, site and use mobile tanks with care, especially when you are refuelling machines such as irrigation pumps next to surface waters. Check that the fuel systems and tanks of all tractors and diesel engines used in a fixed position are not leaking. Use a drip tray as a short-term measure.

Regulations

294. The requirements (reference 51, 52) for new or substantially altered agricultural fuel oil storage include the provision of bunding (secondary containment) and its size and impermeability (does not leak), the position of taps and valves, the use of an automatic fuel shut-off on flexible delivery pipes, and all not being with 10 metres of field drains or surface waters. Stores must have a 20-year design life with proper maintenance. These regulations do not apply to underground tanks and temporary mobile fuel tanks, or to domestic fuel oil that is stored separately. You should consult the Environment Agency if you want to consider installing underground fuel storage tanks. The Environment Agency can serve notices to prevent pollution of groundwater and surface waters with regard to any oil storage activities.

Design of storage facilities

295. Tanks are normally sited above ground and built from welded mild steel plate or plastic. Some prefabricated tanks are available where the outer tank provides an integral bund. These will not comply with the regulations if, for example, the bund is breached by an outlet pipe. You should check the suitability of such tanks with the Environment Agency.

296. You should place the tank away from any foul or surface-water drains, and where the delivery driver can see the filling gauge. The tank should be protected from being hit by vehicles. The bund must not have an outlet or drain, but there should be some way (for example, a hand pump) of removing water or fuel oil from a sump. Some installations may be suitably roofed or covered to avoid rainfall entering the bund. Further advice on bunds is available (references 99, 100, 101).

297. You should be able to lock any tank drain valve closed. There should be room for a container (for example a bucket) underneath it. The tank should have an anti-siphon device fitted to the filling pipe if its inlet is lower than the highest fuel level in the tank. Fuel lines to equipment such as grain driers should have hand valves fitted next to the tank.

298. Outlet valves should be marked to show when they are open and closed.

Safety Note

Take precautions to reduce the risk of fire. Ask your local Fire Service for advice.

Waste oils

299. Waste oils come from the servicing of agricultural machinery. The main types are used lubricating oil from engines and oil from hydraulic systems. These should be collected and stored in suitable leak-proof containers – preferably bunded and secure from vandals. Disposal or recycling of waste oil must be through registered carriers and licensed sites (see Section 7).

300. You can burn waste oils for heating on farms provided you obtain approval for the installation from the local Authority Environmental Health Department. You should also check with the Environment Agency whether you need to register an exemption from environmental permitting regulations (reference 102, 103).

4.8 Livestock buildings and their management

- **Good management and a high standard of hygiene and cleanliness will reduce emissions of odour and ammonia from livestock buildings and from fouled open concrete yards.**



© Natural England

Keep buildings and concrete yards in good repair.

Rainfall from roofs and clean yards should be kept separate from manure systems unless you need extra dilution for slurry handling and storage.

Good practice

All livestock buildings

301. If possible, you should collect and transfer slurry every day from buildings and concreted areas to a suitable store.

302. For bedded systems – use sufficient clean, dry bedding to keep animals clean. Dirty livestock increase emissions of odour and ammonia.

303. Clean and disinfect buildings regularly, for example, after each batch of stock is removed or as pens become empty. Remove thick deposits of dust from surfaces inside the building, especially from ledges, ventilation shafts and cowls. Clean out grit and sediment from slurry channels and collection systems. Do not allow any of these washings or deposits to get into clean water drains, surface waters or soakaways.

304. Remove and dispose of all dead animals, birds and foetal remains through recognised options as soon as possible (see Section 7).

305. You should maintain ventilation fans and check they are running at the correct airflow for the number and weight of animals or birds present. Poor ventilation can result in humid conditions that give rise to unpleasant odours, high concentrations of ammonia and poor conditions for animal health and welfare.

306. Keep areas of open concrete used by livestock to the minimum, as these areas will be fouled by manure. Pipe or channel foul run-off rather than letting it flow across clean concrete. Keep soiled concrete areas free from any build-up of slurry or manure. Where applicable, you should consider roofing over outside soiled yard areas to keep rainfall out of slurry and dirty water stores (see Section 4.3).

307. You should maintain drains and repair broken or badly laid concrete to prevent effluents from ponding – both inside buildings and on open concrete yards.

308. Rainfall from clean roofs and clean yards should be kept separate from livestock manure systems unless you need extra dilution for slurry handling and storage. Consider whether you can collect and re-use the clean water (see Section 8).

309. Store all chemicals, disinfectants and veterinary medicines in suitably designed and appropriate storage facilities. Make sure that your accident and emergency plan covers them (see Section 1.5).

Cattle buildings

310. The space allowances and other provisions for cattle must meet legal requirements (reference 104). You should follow advice in the Welfare Code (reference 105).

311. Scrape cubicle passages and other heavily soiled areas regularly, typically twice daily.

312. Dairy and parlour buildings need to be washed and cleaned frequently (reference 106).

Woodchip corrals

313. These have become increasingly popular for out-wintering cattle. Good design, construction and management are crucial to avoid polluting groundwater and surface water (reference 107). You should provide a liner and effluent collection facilities, and seek advice from the Environment Agency about suitable sites. You must not discharge effluent into ditches or surface waters, or to soakaways.

Pig buildings

314. The space allowances and other provisions for pigs must meet legal requirements (reference 108). You should follow advice in the Welfare Code (reference 109).

315. Emissions are minimised if pens are kept clean. Dirty pens can result from poor management, poor ventilation and inadequate floor surfaces, as well as incorrect pen design and construction, and badly sited feeding and watering facilities.

316. Whenever possible you should clean non-bedded, concreted dunging areas every day.

317. You should consider ways to reduce energy use in buildings that are mechanically ventilated or heated (reference 110).

318. Larger pig units must comply with permit conditions set by the Environment Agency (reference 98, 35).These conditions are based on the Best Available Techniques (BAT) for avoiding or minimising all types of emissions, including from pig buildings. Guidance is available on BAT from the Environment Agency (reference 111). You should consider these techniques for smaller pig units when refurbishing or constructing new buildings.

Poultry buildings

319. The space allowances and other provisions for poultry must meet legal requirements (reference 112).You should follow advice in the Welfare Codes (references 113, 114).

320. You can reduce emissions from housing by keeping poultry manure in a dry condition.

321. You should consider ways to reduce energy use in buildings that are mechanically ventilated or heated.

322. Larger poultry units must comply with permit conditions set by the Environment Agency (references 98, 35). These conditions are based on the Best Available Techniques (BAT) for avoiding or minimising all types of emissions, including from poultry buildings. Guidance is available on BAT from the Environment Agency (reference 111). You should consider these techniques for smaller poultry units when refurbishing or constructing new buildings.

Caged laying birds

323. Remove manure frequently from poultry houses with manure belt systems. Consider rapid air-drying of manure on the belts by using the warm air from the house ventilation system. For deep pit systems – consider rapid air-drying of manure below the cages. Keeping manure as dry as possible will reduce ammonia emissions.

324. Prevent drinkers leaking and spilling water onto manure belts or into manure stores.

Deep litter systems

325. Buildings with deep litter systems should be adequately ventilated and also insulated with suitable materials which have a vapour barrier to prevent deterioration of the insulation material.

326. Direct-fired gas or oil heaters put extra moisture into the house. Indirect heaters avoid this problem.

327. Drinkers should be designed to minimise spillage. If suitable for the type of stock – nipple and drip cups (or similar system) are preferable to hanging bowl drinkers. Maintain drinkers at the correct height by frequently adjusting them to bird eye level to avoid spillage and wet litter.

328. Feeds containing certain oils and animal fats which are poorly absorbed by the birds can result in the manure becoming greasy causing capping of the litter and odour production. You may need to adjust feed rations if this problem occurs.

Odours from feeding and food stores on farms

329. Odours can be absorbed by dust particles which are then carried in the air. Finely ground feeds and long feed drops (into bins or onto floors) increase the amount of dust. Using liquid feeds or pelleted feeds can reduce dust and may help to reduce odours.

330. Keep foods such as whey, skimmed milk, yeasts and molasses which can produce strong odours in properly constructed covered tanks or silos. The delivery area should be concreted and any spillage directed into the foul drainage system.

331. Do not allow effluent from any food storage, including silage, to flow across open concrete; it should be collected in a channel or drain and directed to a suitable storage tank.

5 Field work

5.1 Introduction

- **The advice in this section will help to protect soils and maintain yields while reducing the risks of causing water pollution by run-off and erosion. It will also reduce air pollution and protect sensitive habitats and historical features.**



© Natural England



© Environment Agency

332. Good soil management is difficult to achieve unless you make a realistic assessment of the capability of your land. Certain crops can only be grown, and particular management practices can only be carried out, under appropriate conditions. If you exceed the limitations of your land it can lead to poor production and may cause unacceptable damage to the environment.

333. All field operations should take into account any management plans you have produced for your farm (see Section 3), and should be consistent with your cross compliance obligations.

334. You must comply with the Environmental Impact Assessment Regulations (reference 30) which control the agricultural intensification of uncultivated land and semi-natural areas. Complying with this Regulation is currently a cross compliance requirement.

335. To conserve our historic heritage you should protect archaeological remains that appear on or above the soil surface or are buried beneath it. Take care not to cause damage by sub-soiling, ploughing or other deep cultivation, or by uprooting trees. Actions you take now may mean that irreplaceable archaeological sites are lost to present and future generations. This is true whether the sites are legally protected or not. Seek advice from the Archaeological Officer of your local Authority if you are unsure about the status of an historic site or for advice on management.

336. Ensure that all staff and contractors are aware of, and follow, the requirements of cross compliance and of any agri-environment scheme and are familiar with any relevant management plans for the holding.

337. Unnecessary or badly planned fieldwork is a cost to your business and a pollution risk. It will use extra fuel which will contribute to greenhouse gas emissions.

338. Consider both soil and weather conditions and the short-term weather forecast. Be prepared to suspend work, including that of contractors, until conditions improve.

339. If you have to travel on wet soils, reduce the loading with low ground pressure set-ups, or set tyre pressures at the lowest that is compatible with the load and tyre type. This is currently a cross compliance requirement (reference 17).

340. Maintain and calibrate all equipment regularly and use it according to manufacturers' instructions. Pay attention to weights and tyre pressure.

341. Regular inspection of your soils will show when you need to maintain or replace existing field drainage schemes or carry out secondary treatments (moling or sub-soiling). This will reduce the risk of run-off and increase the time available for working on the land or for grazing livestock.

342. Operating across the slope can reduce the risk of run-off and erosion. Make sure your equipment can operate properly and that it is safe to travel whenever you decide to work in this way.

343. Minimise the quantity of soil taken from the field on equipment or on crops. Soil left on the road is a traffic hazard and if washed into surface water it is a source of pollution. You will also reduce the risk of spreading soil borne diseases.

5.2 Soil management and cultivations

- **Good soil management is essential to maintain a productive and sustainable farming system.**
- **Poor soil structure leads to poor crop growth, poor drainage and can be a key factor in run-off and erosion which can cause serious harm to surface waters and other sensitive habitats.**

Preparing a soil management plan will help you to manage and protect soils on a field-by-field basis. It can also help identify any areas where special action may be needed.

Take soil conditions into account whenever travelling over or cultivating the soil.

Select management systems and approaches that will enable you to protect the structure of the soil and manage it to minimise run-off and erosion from both water and wind.



© Natural England

If you claim the Single Payment (reference 17), you must follow the standards of Good Agricultural and Environmental Conditions for soil, including preparing a Soil Protection Review (reference 58).

You may be prosecuted if soil eroding from your land pollutes surface water (reference 115), or a protected wildlife site (reference 12), or is deposited on a highway (reference 116). You may face a civil claim if it damages a neighbours' property.

This section is based on published guidance for managing soils under cross compliance in England, and other advisory publications (reference 18, 117).

Good practice

General

344. A soil management plan (see Section 3.4) will help to identify fields or parts of fields where you may need to change your management to improve crop performance and protect the environment.

345. Timeliness is critical to maintaining soils in good condition. Wet soils are more easily damaged by field operations. Use a spade to look for signs of compaction, and to help make decisions on appropriate cultivations and the need for soil loosening or sub-soiling. Look at your land during and after rain to identify areas of poor drainage and where run-off or erosion may be occurring from fields or other parts of the farm such as roads and tracks.

346. Well drained and well structured soils allow water to enter more quickly and therefore reduce the risk of run-off and erosion. Under-drainage systems should be maintained and replaced in whole or part where necessary to achieve this.

347. When deciding where to grow a particular crop, consider what soil conditions will be like at harvest time in both a normal season and one where the weather is adverse. This includes grassland where you need access for silage equipment, and biomass crops which may have to be harvested in winter or early spring (reference 118, 119).

Controlling run-off and erosion

348. Consider the risks of run-off and erosion when planning what to grow or how to manage livestock, especially on sloping land, and modify your management accordingly. On arable land be prepared to introduce grass strips, or larger areas, to intercept flow on slopes or in valley features. It may help if you establish buffer strips alongside surface waters which are at the bottom of slopes. However, you should not rely on such areas at the expense of good soil management in the rest of the field. (Note: Buffers alongside surface waters may be ineffective in river catchments where the water flows below the land surface). If necessary, consider permanent grass, woodland, or similar land cover. You should not plough permanent grass for arable production in places where the risk of erosion is high, such as on slopes or in river valleys that flood.

349. If run-off is channelled along farm tracks you should maintain and improve the surface to reduce the flow and consider providing cross-drains to reduce and interrupt any that develops. Polluted run-off must not be allowed to get into field drains, ditches or surface waters.

350. Run-off is often channelled through gateways at the bottom of sloping land. You may be able to reduce the risk by constructing a hardcore area. In many cases it will be better to relocate the gateway. If you relocate a gateway onto a highway, always check with your Local Authority as you may need planning permission.

351. Where erosion occurs (despite your best endeavours), earth banks, other physical barriers or ponding sites may be used as a last resort to check the flow of water to reduce off-site impacts. They should be carefully designed and installed to achieve the

required effect. You may need consent from the Environment Agency if, for example, they are within 9 metres of a main river, or if the material used to make them is a 'waste'. Note this could include soil or spoil moved from another part of the holding.

352. In upland areas, fence off areas of eroding soil to help the vegetation to re-establish. Blocking grips and surface drains can also reduce erosion but you should consult the Environment Agency to ensure these practices work correctly and do not lead to more serious flooding downstream. Do not leave bare soil during bracken management or burn vegetation if it will leave a bare surface which will be at risk of erosion. See also Section 5.3, paragraph 378.

Organic matter

353. Take positive action to maintain or increase soil organic matter which will improve soil stability and increase workability. Consider if you can reduce the number of passes, including introducing integrated systems of management, returning crop residues, applying bulky organic manures and introducing grass or green manures into the rotation. Remember to adjust your fertiliser use accordingly.

Primary cultivations

354. Where the soil is compacted, undertake any soil loosening or sub-soiling that is needed when soils are dry (but not hard) to depth. Deeper cultivation may be needed on tramlines, headlands and gateways than in the rest of the field. During the operation check to see whether it is being successful and adjust the implement accordingly.

355. Do not cultivate more deeply than is necessary. It will slow down overall work rates, increase fuel use and therefore costs and may damage field drainage, archaeological features and bring up poorly structured or low organic matter soil.

356. Soil moving down the slope by erosion or tillage operations can reduce the depth of soil and restrict crop growth, especially on the crest of a hill. To counteract this, plough or cultivate across the slope throwing the soil upslope if it is safe to do so.

357. Where any harvesting takes place or if forage crops (e.g. kale, stubble turnips) are grazed, in winter or under wet conditions, undertake a primary cultivation as soon as conditions are suitable to create a rough surface that will reduce the risk of run-off and erosion.

358. To increase work rates and reduce fuel consumption, select a cultivation system which uses the minimum number of passes consistent with creating soil conditions suitable for the crop to be grown. Consider direct drilling or reduced tillage systems and using a furrow-press if ploughing.

359. To minimise run-off and erosion before spring sown crops, establish temporary green cover or leave the land in stubble or roughly cultivated over winter. Complying with this will ensure you meet current cross compliance requirements.

Crop establishment

360. A coarse seedbed will reduce the risk of the soil slumping or capping which can reduce emergence and lead to run-off and erosion. Prepare as coarse a seed bed as you can that will still produce a good germination and ensure the effectiveness of any pre-emergence herbicides.

361. Plan your program of autumn cultivations so that, after combinable crops, you do not leave a fine seedbed unplanted or you may be in breach of current cross compliance requirements.

362. On any soil liable to capping or which may suffer from run-off, drill autumn-sown cereals early to ensure a good crop cover to reduce the risk of this happening.

363. To reduce the risk of run-off, consider if you can delay establishing tramlines until after winter or if you can avoid using them until the spring. Pulling a tine along a compacted tramline can reduce run-off.

364. To limit the effects of wind erosion on light or other blowing soils, you should:

- avoid high risk crops, such as sugar beet and some vegetables, on the most exposed fields;
- establish windbreaks;
- direct drill or drill in to a 'ploughed and pressed' surface;
- plant straw to protect emerging seedlings;
- apply a surface mulch such as farmyard manure but remember to account for its fertiliser value in your nutrient management plan or in a Nitrate Vulnerable Zone; and
- sow nurse crops such as barley to stabilise the soil and protect seedlings.

365. De-stoning soils before planting can cause long-term damage to soil structure and increase the loss of organic matter. Only do it where it is essential to ensure the quality of the harvested crop.

366. Where possible, drill across the slope and establish any tramlines in the same direction. But always take safety considerations into account including when you have to subsequently apply fertilisers or pesticides.

367. Where it is not possible to plant row crops such as potatoes and vegetables across the slope, divide long slopes with grass strips or unplanted cultivated headlands within the field. Use tied ridges or dykes in furrow bottoms to improve water infiltration.

Managing the crop

368. Cultivate wheelings (in row crops or bed systems) and tramlines (in combinable crops) to loosen any compaction if it is causing run-off and erosion.

369. To prevent sealing or capping of the soil surface and to reduce run-off, ensure irrigation is applied evenly and that droplet size is not too big.

370. Use a tined weeder or similar implement within the crop to break up capped soils that are causing run-off.

371. When using plastic covers on a field scale, take precautions to limit run-off and erosion from the site.

Harvesting

372. Wherever possible you should avoid harvesting in conditions where equipment leaves ruts in the field. Even before ruts are formed, repeated trafficking across the same

area can cause significant compaction deep into the soil which will increase run-off. Also avoid this wherever possible, but if it does happen you should cultivate afterwards to remove compaction as soon as conditions are suitable.

373. Distribute chopped straw and crop residues evenly across the field to aid subsequent incorporation.

374. You must not burn crop residues (other than linseed residues) unless certain restricted conditions apply (reference 120). This is currently a cross compliance requirement.

5.3 Management of peat soils

- **Peat soils that have not been drained and improved for agriculture are rare and increasingly important habitats for bio-diversity and have a part to play in flood control.**
- **All peat soils hold large reserves of carbon and should be managed to minimise losses.**



© *Environment Agency*

Many areas of unimproved peat soils are protected as Sites of Special Scientific Interest (SSSI). You must not carry out any "operations likely to damage" a SSSI and you should consult Natural England before starting any work that may impact on one. This is currently a cross compliance requirement.

You must comply with the The Heather and Grass Burning Regulations (reference 121).

You must not overgraze natural or semi-natural vegetation on peat soils if in receipt of the Single Payment.

Good practice

375. All undrained, or virtually unaltered sites with peat or peaty soils should be left as natural or semi-natural areas, or as traditionally managed pasture.

376. When managing land adjacent to such sites, protect the peat habitat by not lowering the water-table, by preventing spray drift, and by preventing nutrient and sediment rich run-off entering the site.

377. On upland sites, protect the peat from erosion. If you find signs of erosion, you should take measures to stabilise the surface. Control stocking rates to avoid serious poaching, especially around supplementary feeders. Blocking grips and surface drains can also reduce erosion but you should consult the Environment Agency to ensure these practices work correctly and do not lead to more serious flooding downstream. Wherever possible, control public access to prevent damage to the surface of the peat by walkers and vehicles.

378. Do not start fires on peat soils if this will leave an exposed surface vulnerable to erosion. The regulations (reference 121) set permitted dates for burning, and prohibit various types of burning which may create a high risk of soil exposure and erosion (unless under licence from Natural England). The Heather and Grass Burning Code (reference 122) provides further guidance on the law and good practice and is currently a cross compliance requirement.

379. Large areas of lowland peat have been improved for agriculture. You should take steps to minimise the oxidation (shrinkage) of the peat by keeping the water-table as close to the surface for as long as possible consistent with the need to manage such land for food production. If the opportunity arises, consider reinstating natural peat mire conditions.

5.4 Application of livestock manures and dirty water

- **Livestock manures are valuable sources of nutrients and organic matter. Correct application of manures will reduce your fertiliser costs, improve soil structure, and reduce the risk of causing pollution.**

Use your manure management plan together with a field inspection to identify whether it is safe to spread livestock manures and dirty water – and avoid causing water pollution. You should not spread if heavy rain is forecast within the following 48 hours.

Use both your manure and nutrient management plans to work out an application rate. Avoid applying more than 50 m^3 of slurry or dirty water per hectare at any one time to reduce the risk of run-off.

If possible, to reduce odour and ammonia loss:

- **use a band spreader or injector to apply slurry.**
- **otherwise, use broadcast equipment with a low trajectory and large droplets.**

On bare land and stubble, to reduce odour, ammonia loss and run-off risk:

- **if you broadcast slurry (by splash plate), you should incorporate it immediately, and at the latest within 6 hours.**
- **if you apply solid manure, you should incorporate it as soon as possible, and at the latest within 24 hours.**

Note: Soil incorporation is not required where solid manure (farmyard manure) is used as a mulch to control wind erosion on susceptible soils.

Check that all equipment is in good working order and calibrated to give a known application rate and uniform spread pattern. If you use contractors, make sure they are aware of all pollution risks and safe application rates.



© Environment Agency



© Environment Agency



© Environment Agency

The application of livestock manures in Nitrate Vulnerable Zones is controlled by law (reference 23). You must comply with the nitrogen loading limits, restrictions (times of the year) when spreading slurry and poultry manure is not allowed, and other controls and record keeping (reference 24).

Good practice

General

380. Use your manure management plan to help you decide when and where to apply solid manure, slurry and dirty water. Use your nutrient management plan to work out an application rate to supply the nutrients needed to meet crop requirements, taking into account other sources of fertility (see Section 3).

381. The method and timing of livestock manure and dirty water applications to land can affect the length of time that micro-organisms survive on herbage or in the soil:

- spreading manures onto grazing land can play a role in transferring disease to healthy livestock. Risks are reduced by storage, using low application rates and leaving the land for as long as possible before grazing (reference 32).
- if you plan to apply these before planting ready-to-eat crops, you should follow advice on how to reduce risks of food contamination by pathogens (reference 77).

382. If you use contractors – ensure they are aware of pollution risks on your farm and that they use safe application rates.

383. Check field drain outfalls and surface waters frequently during and after spreading slurry, solid manure, and dirty water to make sure there is no pollution.

Timing of applications

384. You should apply livestock manures when grass and crops can make efficient use of nitrogen. Spring applications on all soil types make best use of nitrogen in the manures (see Section 2).

385. You should not apply livestock manures and dirty water when:

- the soil is waterlogged; or
- the soil is frozen hard; or
- the field is snow covered; or
- the soil is cracked down to field drains or backfill; or
- the field has been pipe or mole drained or subsoiled over drains in the last 12 months; or
- heavy rain is forecast within the next 48 hours.

386. Use a weather forecast to help choose suitable conditions for spreading. The best conditions are where air mixes to a great height above the ground, which are typically sunny, windy days, followed by cloudy, windy nights. These conditions cause odours to be diluted quickly. Check wind direction in relation to nearby housing before spreading.

387. Avoid spreading at weekends, bank holidays, or in the evening unless it is solid manure that has been well composted, or slurry that is to be band spread, or injected or has been treated to reduce odour.

388. If you have any land in a Nitrate Vulnerable Zone, you must not spread slurry or poultry manures (materials that have a high readily available nitrogen content) during the closed periods (reference 24).

Restrictions on certain areas

389. You should not apply livestock manures and dirty water:

- within 10 metres of any ditch, pond or surface water; or
- within 50 metres of any spring, well, borehole or reservoir that supplies water for human consumption or for farm dairies; or
- on very steep slopes where run-off is a high risk throughout the year; or
- on any areas where you are not allowed to because of specific management agreements.

390. You should only broadcast slurry and solid manures to bare land or stubble if soil conditions are suitable for incorporation within a few hours (see paragraphs 398 to 400).

391. Avoid spreading solid manure, slurry or dirty water in fields close to and upwind of houses.

392. If there is an outbreak of a notifiable disease, you must comply with any conditions for livestock manures set by the Secretary of State. Contact Animal Health for advice.

393. Some veterinary products contain highly polluting compounds, and manures from treated livestock should only be applied to land according to advice from the Environment Agency. You must follow any instructions provided with the products.

Application rates

394. You should limit applications to no more than 250 kg of 'total nitrogen' per hectare in any 12 month period; this figure does not include manure deposited from grazing animals. You should not apply more available nitrogen than the crop needs, which may mean applying less than this maximum amount. If you apply both livestock manures and organic wastes you should keep within this overall limit (see also Section 5.5). You must comply with the Livestock Manure N Farm Limit, the Organic Manure N Field Limit and other controls if you are applying these materials in a Nitrate Vulnerable Zone (reference 24).

395. Avoid applying more than 50 m^3 of slurry or dirty water per hectare (4,500 gallons per acre) in a single application to reduce run-off risk. Pay careful attention on all sites to make sure that spreading does not cause ponding or run-off. Leave at least 3 weeks between each application to reduce surface sealing and to let the soil recover.

396. Keep within any application rates specified in any management agreements that you have made.

Application techniques

397. Consider applying slurry with a band spreader or injector to reduce odour and ammonia loss. Otherwise, use broadcast techniques (splash plate) with a low trajectory and large droplets. If you broadcast slurry or solid manure to bare land or stubble, you should only do so if soil conditions allow such manures to be incorporated into the soil soon afterwards (see paragraphs 398 to 400).

398. If you apply slurry to bare land or stubble by a broadcast method – use equipment with a low trajectory and large droplets. You should incorporate the slurry as soon as possible to reduce odour, ammonia loss and the risk of run-off. Best results are achieved by incorporating slurry immediately after it has been spread with the aim of completing work within 6 hours.

399. If you apply solid manure to bare land or stubble, you should incorporate it as soon as possible and aim to complete the work within 24 hours to reduce odour, ammonia loss and the risk of run-off.

400. Ploughing bare land or stubble to incorporate slurry and solid manure is more effective at reducing odour and ammonia emissions compared to other techniques such as discs or tined equipment. You should consider the most appropriate technique for the circumstances.

401. Check all equipment is in good working order well before field activity starts. Carry out repairs as necessary. Set up spreaders according to manufacturers' instructions, and adjust to an appropriate application rate and uniformity of spread for the type of manure (reference 32). Keep to an appropriate bout width. Avoid spilling slurry while you are filling and moving equipment around the farm; spillages on the road may be an offence, and run-off can enter surface waters via highway drainage (reference 116).

402. You should carry out some spot checks on load weights, application rates and uniformity of spread; and adjust as necessary.

Band spreaders

403. These machines place slurry on the ground in strips or bands by using a series of hoses, or hoses with shoes attached (reference 32). The shoe attachment allows slurry to be placed under the crop canopy directly onto the soil. Band spreaders reduce grass and crop contamination and will increase the number of work days available (especially on grassland) compared to broadcast (splash plate) techniques. After cutting grass for silage, you should allow for some grass re-growth before applying slurry by band spreader as this will reduce ammonia and odour emissions.

Injectors

404. These are usually open slot shallow injectors (up to 50 millimetres deep), or deep injectors (over 150 millimetres deep) (reference 32). The times and places where slurry can be injected successfully are limited by the soil and the crop, but will avoid grass and crop contamination. To reduce the risk of causing water pollution:

- inject across slopes (where it is safe to do so), rather than up and down;
- do not inject into porous backfill over field drains; and
- do not inject below the crop's active roots.

Umbilical systems

405. Pumping slurry from store through an "umbilical pipe system" directly to tractor-mounted applicators in the field can be an effective way of increasing the area treated per day and reducing the risk of causing soil compaction compared to tanker operations (reference 32). Take care to match pumping rate to field application rate. Use safety cut-offs to stop delivery if there is a leak or if the pressure builds too high. Avoid repeated dosing on field headlands by shutting off the supply while turning. If you have to apply slurry up and down slopes – leave a large headland area at the bottom of slope and, after careful inspection to check that no run-off has occurred, treat this area last, but not within at least 10 metres of any ditch or surface water.

406. Take care when repositioning supply pipes that slurry does not escape and run off into ditches and surface waters.

Irrigation

407. Use equipment with a low trajectory (low spread pattern) and large droplets to reduce odour and ammonia emissions (reference 32). Move sprinklers and irrigators regularly. Check land you are irrigating for any signs of run-off, ponding on the surface, or worms being killed. Move sprinklers and re-set travelling irrigators if there are any signs of these problems. On sloping land, set the travelling irrigator to run across slopes. Travelling irrigators should have an automatic shut down at the end of each run. If the amount of liquid that can be stored is limited, you should start the irrigator on a new run as soon as possible.

408. Check storage tanks, pumps, filters and control gear regularly. During use – check warning devices, sprinklers and mobile irrigator several times a day.

409. Take care when repositioning slurry supply pipes so that slurry or dirty water does not escape and run off into ditches and surface waters.

5.5 Application of organic wastes and treated materials

- **Organic wastes and certain treated materials[3] are valuable sources of nutrients and organic matter.**
- **Correct application of such materials will reduce your fertiliser costs, improve soil structure, and reduce the risk of causing pollution.**

The risks of causing pollution from applying these organic materials to land are similar to those when applying livestock manures.

Use your manure management plan, together with a field inspection to identify whether it is safe to spread such organic materials – and avoid causing water pollution. You should not spread if heavy rain is forecast within the next 48 hours.

Use both your manure and nutrient management plans to work out an appropriate application rate. Avoid applying more than 50 m^3 of liquid waste per hectare in a single application, to reduce run-off risk.

Use the same techniques as when spreading livestock manures to reduce odour, ammonia loss and the risk of run-off.

Check all equipment is in good working order and calibrated to give a known application rate and uniform spread pattern. If you use contractors – make sure they are aware of pollution risks and safe application rates.

[3] Some treated wastes that comply with an approved Quality Protocol may be defined as products and are no longer wastes.

The application of sewage sludge and other organic wastes to land is controlled by law (reference 34, 35). The activity must provide agricultural benefit or ecological improvement (reference 123). You must also comply with the law on animal by-products if these are applied to pasture land (reference 47). Complying with this legislation is currently a cross compliance requirement.

Further guidance on sludge application is available (reference 42, 41, 43). Also, see Sections 2.4 and 7.

Compost and anaerobic digestate made from approved bio-degradable wastes may be used without specific permission from the Environment Agency if the relevant Quality Protocols are followed (reference 36, 37).

The application of all organic materials in Nitrate Vulnerable Zones is controlled by law (reference 23). You must comply with the Organic Manure N Field Limit for nitrogen, restrictions (times of the year) when spreading liquid digested sludge or other organic wastes with a high readily available nitrogen content is not allowed, and other controls and record keeping (reference 24).

See 'Regulations' below for more detail on sludge, protocols and organic wastes.

Good practice

General

410. The risks of causing pollution from applying organic wastes to land are similar to those when applying livestock manures. Check through the general recommendations in Section 5.4, and those on timing of applications, restrictions on certain areas, application rates and application techniques.

411. Soil metal contents should also be monitored for the Quality Protocols and when other organic materials are applied regularly (see Section 2.5 on soil contamination).

412. You should not apply more than 250 kg of 'total nitrogen' per hectare in any 12 month period (taking into account any livestock manures). You should not apply more available nitrogen than the crop needs, which may mean applying less than this maximum amount. In river catchments less sensitive to nitrate leaching, some wastes such as sewage sludge cake or composted organic waste that contain very little plant available nitrogen may be applied at rates supplying up to 500 kg per hectare of 'total nitrogen' in one application every 2 years. You must comply with the Organic Manure N Field Limit and other controls if you are applying organic wastes in a Nitrate Vulnerable Zone (reference 24).

413. Organic wastes may be spread and left on the surface of susceptible soils to reduce the risk of wind erosion. They may also be applied to a growing crop as a mulch and left on the surface of soils. In such cases you will need an environmental permit or an exemption from the Environment Agency.

414. Guidance is available on the application of paper sludge to agricultural land (reference 124).

Regulations

415. The treatment of land by the application of organic wastes to provide agricultural benefit or ecological improvement is controlled (reference 35). Consult the Environment Agency for further advice.

Sewage sludge

416. Sewage sludges (sometimes known as bio-solids) contain significant proportions of nitrogen, phosphorus, trace elements and organic matter. But they can also contain potentially harmful substances including pathogens and heavy metals. The regulations and guidance (reference 34, 42, 41, 43) are designed to protect the environment, human and animal health, and the soil. If sludge is used on your land, you should make sure that you know about your responsibilities (reference 42); information packs are available from many of the sludge producers. Separate guidance deals with the use of sludge and composts in forestry (reference 125).

417. Applications of sewage sludge must take into account the metal content of the soil and of the sludge that is applied.

418. When sewage sludge is applied you must comply with controls before and after applications to ensure food safety and to reduce the risk of disease transmission to animals (reference 34, 41, 43).

Quality Protocols

419. Composts made from approved bio-degradable wastes may be applied to agricultural land outside of waste regulations provided the Quality Compost Protocol is followed (reference 36). The Protocol assures the quality of the compost by compliance with BSI PAS 100 (reference 45), and requires the land to be analysed for metals before applications are made and a record to be kept of where the compost has been spread.

420. A Quality Protocol is also being developed for digestate from anaerobic digesters (reference 37). This protocol assures quality by compliance with BSI PAS 110 (reference 46) and will also require similar sampling and record keeping.

Other organic wastes

421. For other organic wastes – you must comply with an environmental permit or an exemption (reference 35), and you must not cause harm to human health, or cause pollution of the environment (see Section 7).

422. You must also comply with the relevant provisions of the law on animal by-products if these are applied to pasture land, except for manure and digestive tract contents (reference 47). You should consult the Animal Health Agency for advice.

423. Land spreading of industrial wastes (including some agricultural wastes, and those organic wastes and composts that do not comply with the Quality Compost Protocol) is controlled by the environmental permitting system and a duty of care to protect the environment and public health (see Section 7).

424. A lighter regulatory approach ('exemptions' from the need to obtain an environmental permit) is taken for land spreading some wastes that present a lower risk. Such exemptions (reference 126) contain conditions that you must comply with, and

where wastes are brought onto and applied to the land you farm you must confirm to the Environment Agency that the activity, results in agricultural or ecological benefit. You will need to provide evidence from a person who can demonstrate that they have the appropriate qualifications or vocational expertise (or a combination of the two) to make the necessary assessments (reference 123).

425. There are some exemptions for land spreading agricultural waste e.g. waste milk, ash from on-farm incineration of pigs and poultry, and dredgings from farm ditches (see Section 7.4).

426. All exemptions must be registered with the Environment Agency. You should consult the Environment Agency for advice because exemptions are subject to change, including the provision of new ones (reference 126).

5.6 Application of lime and manufactured fertilisers

- **Lime and manufactured fertilisers are important inputs to a farm system. Using them inefficiently is a cost to your business and increases the risk of causing pollution.**

All applications should be based on a nutrient management plan and take into account your soil management plan.

Machinery should be regularly maintained and calibrated.

Keep all plant nutrients away from sensitive habitats in the landscape.



© *Environment Agency*

The application of manufactured nitrogen fertiliser in Nitrate Vulnerable Zones is controlled by law (reference 23). You must comply with the restrictions (times of the year) when spreading is not allowed, other controls and record keeping (reference 24).

If you receive the Single Payment you must not spread any fertiliser within the designated buffer zones of the centre of hedges or watercourses. This also applies to land in the proximity of the top of the bank of a watercourse (reference 17).

Good practice

427. All applications of lime and manufactured fertiliser should be based on your nutrient and soil management plans (see Sections 3.3 and 3.4). If soil conditions are unsuitable for travelling on the land, there is a high risk that nitrogen will not be used efficiently and the risk of causing pollution by run-off, leaching or gaseous loss will increase.

428. Ensure all equipment, including that used by contractors, is checked, maintained and calibrated at least once a year. Remember different materials have different

spreading properties, and machinery may need re-adjusting, and the spread pattern checked, during the season (reference 127). Particular care is needed when using solid urea. You should only use fertiliser of a quality that you can spread accurately and evenly.

429. Match up bout widths and spread patterns carefully to ensure an even spread, taking into account the width of any tramlines.

430. It is important to apply manufactured nitrogen fertiliser only at times when the crop can use the nitrogen. You should not apply it to grass between 15 September and 15 January and to other crops between 1 September and 15 January unless there is a specific crop requirement at this time.

431. You should take special care when applying lime and manufactured fertiliser to fields where there is a risk of run-off to surface water, especially on steeply sloping land.

432. You should not apply lime and manufactured fertiliser when:-

- the soil is waterlogged, flooded, frozen hard or snow-covered; or
- heavy rain is forecast to fall within the next 48 hours.

433. You should not spread directly into ditches (even if dry), surface waters, hedge bottoms, uncropped areas or other habitats where lime or nutrients may harm the natural flora and fauna. You must not spread any fertiliser within the designated buffer zone of the centre of hedges and surface waters if you receive the Single Payment. This also applies to land within the proximity of the top of the bank of a watercourse. You should refer to the published guidance for the specific margins (reference 17). Wider buffers are advisable and conservation headlands and buffer strips in excess of any cross compliance obligation may be eligible for payment under an agri-environment agreement. On some fertiliser distributors you can use headland discs, tilt the tractor linkage, or make some other adjustments to limit the throw. Otherwise, you should accept leaving an area where the application rate is lower.

434. You should not spread manufactured fertilisers in very windy conditions when spread patterns will be disrupted, unless you use a pneumatic spreader. Uneven application may affect crop growth and increase the risk of nitrate leaching if overlap occurs or the fertiliser may get blown into sensitive habitats.

435. Take particular care when spreading very fine materials such as lime, not to cause a nuisance to neighbours or contaminate sensitive habitats.

5.7 Application of pesticides

- **Applying pesticides effectively will maximise their benefit and reduce the risk of harming people and livestock and polluting the environment.**

A crop protection management plan will help you determine the best way to use pesticides on your farm.

Consult the National Sprayer Testing Scheme for guidance on maintaining and testing machinery.

Apply pesticides so that they only affect their intended target.



Everyone who uses pesticides must have the appropriate training so that they have the relevant certificate of competence, or have "grandfather" rights, or they must work under the supervision of someone with the correct certificate (reference 62).

You must always comply with the conditions of use. These are either on the label or are part of a Specific Off-Label Approval (SOLA) (reference 128).

You have a legal obligation to keep all pesticides on the sites of intended application.

Before you use any product in or near water, e.g. on the bank of a watercourse, you should first contact the Environment Agency.

You must keep records of all pesticides used when you grow food or feed crops (reference 129).

This section should be read together with advice on preparing a crop protection management plan (see Section 3.5) and on the storage and handling of pesticides (see Section 4.5).

Good practice

General

436. Advice on applying pesticides is published in the Code of Practice for using plant protection products. Everybody involved should follow the code and other helpful guidance (reference 62, 128). Keeping records of all pesticides is not only good practice but is a requirement under EC law when you grow food or feed crops (reference 129).

437. Anybody who applies pesticides must have appropriate training, and may need a certificate of competence to do so. Managers and advisers should be appropriately trained and knowledgeable before giving advice. You should check if advisers have qualifications like those from BASIS. Encourage those who use sprayers to join the National Register of Sprayer Operators (NRoSO) (reference 130).

438. A crop protection management plan will help you determine the best way to use pesticides on your farm (see Section 3.5). You should identify and protect all surface waters and groundwater protection zones, wildlife habitats and enhance conservation areas on the farm including all hedgerows and other boundary areas and prevent spray drift affecting them. To achieve this consider leaving unsprayed strips or having conservation headlands. Conservation headlands and buffer strips in excess of any cross compliance obligation may be eligible for payment under an agri-environment agreement.

439. If you want to reduce the statutory no-spray buffer zone adjacent to surface waters you must undertake a Local Environment Risk Assessment for Pesticides (LERAPS) (reference 63).

440. Ensure you take adequate precautions to protect bees and other beneficial insects (reference 62).

Field application

441. You should maintain your sprayer properly to prevent all leaks and drips and ensure that it sprays evenly, and does not leave untreated patches, or over-treated areas. Consider having trailed, mounted or self-propelled sprayers tested annually under the National Sprayer Testing Scheme (NSTS) (reference 131).

442. Make sure conditions are suitable so that the soil is not compacted or rutted in a way that might lead to run-off and erosion.

443. Check local weather conditions, and take the direction and strength of the wind into account when deciding if it is safe to spray. Be prepared to stop work if conditions deteriorate. Conditions are often better early in the morning or in the evening.

444. Minimise spray-drift at all times by using the appropriate equipment and sprayer controls. Use low drift and other types of nozzles where efficacy is not compromised and adopt the correct forward speed and boom height.

445. Match up bout-widths carefully, taking particular care in fields without tramlines. Where no tramlines or sprayer wheelings are present, use foam markers or marker pegs.

446. In each field, consider the pattern of working, so you avoid overlap, particularly when turning on headlands. You may need to leave an area unsprayed in order subsequently to dispose of tank washings safely within label recommendations.

447. If you decide that you need to use a pesticide in or near any water, not just rivers and streams, you must only use a specifically approved material. Before you use any product approved for use in or near water i.e. on the bank of a watercourse, you should first contact the Environment Agency. You may also have to let water abstractors know. Further guidance is available (reference 132, 133).

5.8 Managing livestock

- **Managing livestock in a way that protects grassland and soils will maintain productivity, and reduce the risk of causing damage to the surrounding environment.**

You should include the impact of all your livestock systems when preparing a soil management plan, and follow the principles of good husbandry.

Minimise the impact of stock and of all management operations on the soil and the sward to reduce the risk of run-off and erosion.

Be prepared to remove livestock from fields if problems occur.

Whenever practical, keep livestock out of watercourses.



If you receive the Single Payment, you must comply with the principles of good husbandry (reference 17). You will be in breach of cross compliance rules if you overgraze, or carry out unsuitable supplementary feeding on natural and semi-natural vegetation (references 17, 134).

You must not burn heather, rough grass, bracken, gorse or *Vaccinium* in breach of regulations (reference 121).

You must not allow stock to damage important features on Sites of Special Scientific Interest (SSSIs), or on other designated areas (reference 12).

Good practice

General

448. Do not exceed the livestock carrying capacity of your land. You should take into account available feed, soil and climate.

449. Adopt systems that are appropriate for your soil, climate and infra-structure (such as farm tracks). Extending the grazing season can save on the cost of housing and manure storage, but should only be considered on suitable sites where the risk of poaching, erosion and run-off and of nitrate leaching can be managed to maintain the productivity of the sward and prevent water pollution.

450. Make allowance in your nutrient management plan (see Section 3.3) for the fertility left behind by all types of livestock.

451. Be prepared to relieve compaction in grassland soils to improve infiltration and drainage. Consider spiking, sub-soiling or lifting the soil according to the prevailing conditions.

452. Remove and dispose of all dead animals, birds and foetal remains through recognised options as soon as possible (see Section 7).

Grazing stock

Control poaching of soil by livestock and avoid run-off

453. Remove stock from the land when the soil is too wet and poaching becomes a risk to subsequent production or if run-off or erosion will pollute surface waters or other sensitive habitats. Take particular care when out-wintering stock or when grazing forage crops or crop residues.

454. You should consider providing hard standing around permanent feeders, water troughs and in gateways to reduce poaching and run-off into field drains, ditches and surface waters.

455. You must follow the Environmental Impact Assessment Regulations (reference 30). You should not overgraze natural or semi-natural vegetation.

456. You should move supplementary feeders to avoid poaching the soil in all situations where it will lead to run-off and erosion. On natural or semi-natural vegetation, this is a legal requirement, and currently a cross compliance requirement.

457. If you need to out-winter stock, choose sites that will not result in run-off or erosion polluting surface waters or damaging other sensitive habitats. Allow the site time to recover in the spring. Cultivate and re-seed, as necessary, to re-establish green cover.

458. Unlined woodchip corrals should not be used for over wintering cattle due to the high risk of pollution to surface waters or groundwater (see Section 4.8).

Protect surface waters

459. Use well drained tracks for vehicles and livestock. Where necessary, provide cross-drains to prevent run-off channelling along impervious surfaces.

460. Where livestock tracks cross surface water, consider options to reduce the impact on water quality, including putting in a bridge. This will generally require land drainage consent from the Environment Agency.

461. Do not allow polluted run-off from livestock handling facilities to enter surface water. You may need to move existing facilities or build new ones to achieve this.

462. Wherever possible, keep livestock out of surface waters. If the water quality is suitable and it is necessary for them to drink direct from a watercourse, limit the area to which they have access such as by putting in a drinking bay. This will reduce erosion of the banks and direct fouling of the river by the stock. Ideally, put in alternative watering facilities such as pasture pumps.

Outdoor pigs

463. Sites for outdoor pigs should be chosen with due regard to possible environmental and general nuisance problems. You should consider the possible impact of odours, wind erosion (soil blow) and run-off on neighbouring properties.

464. You should choose sites that will minimise the risk of run-off to surface water, and that will not have an impact on groundwater. You should manage them so that they do not cause pollution or other damage to the environment. Further advice is available (reference 135). See also Section 3.4 for producing a site risk assessment.

465. Sites should be free draining without obvious risks of run-off and erosion. Sandy and silty soils on sloping sites in high rainfall areas should be avoided.

466. You should take account of slopes when planning and managing paddocks and all tracks to avoid channelling run-off. Minimise machinery movements on tracks in wet weather.

467. Try to develop a system where grass cover is maintained on the site. Adjust stocking rates and the length of time pigs are in a paddock to achieve this. You should provide and maintain grass-buffers to intercept any run-off that does arise, but do not rely on these to provide protection for sensitive off-site locations including roads and neighbouring property.

468. You should move pigs to other paddocks when problems of run-off and erosion occur, then cultivate the area as soon as conditions allow to reduce run-off. Establish a following crop or green cover as soon as possible to reduce nitrate loss.

469. You should provide wallows for the pigs in hot weather. Take measures to reinstate the soil in such areas after the pigs have left the site.

Outdoor poultry

470. Sites for outdoor poultry should be chosen with due regard to possible environmental and general nuisance problems. You should consider the possible impact of odours, wind erosion (soil blow) and run-off on neighbouring properties.

471. You should maintain grass cover in poultry runs by using a mobile housing system or rotating the roaming areas so they have time to recover. Provide hard standing around static sheds to reduce puddling of the soil in wet weather.

472. Take occasional cuts of grass from permanent systems to reduce nitrate leaching and limit the build up of other nutrients.

5.9 Soil handling

- **Soils are an important resource and their long-term function should be protected when they are disturbed for mineral extraction, pipeline laying, landfilling, land reclamation and other operations on the farm.**

Many activities will involve soil handling which has the potential to damage the soil. Ensure that plans are in place to protect soil before work starts.

If soils have to be removed, this should be done with care. They should be:

- **stored properly to preserve their integrity;**
- **re-instated under good conditions; and**
- **subsequently managed to help them return to good condition.**

Work involving moving soil for minerals, waste disposal and pipelines may require consent from a regulator. If in doubt check:

- For minerals proposals – Mineral Planning Authority or District Council.
- For landfilling, waste recovery or waste disposal – Environment Agency.
- For a pipeline proposal – District Council plus other regulator depending on the material being transferred.

See references 136, 137, 138, 139, 140.

Good practice

Planning the work

473. Ensure that any operation on your land that involves moving soil includes detailed proposals that will protect its long-term use and function. Where necessary seek specialist advice to ensure these are appropriate for the work that will be carried out. As well as best practice (reference 141, 142, 143), you should be aware of anything that might be a legal obligation on you, or a contractual issue outside of any planning condition or environmental permit.

474. Good planning is essential and should include any implications for the surrounding land and the locality. You should consider the risk of run off and erosion causing flooding and pollution in surrounding areas and ensure there are provisions to prevent this happening.

475. You may need to provide storage facilities, as well as access or haulage roads to allow for the movement and re-use of soils, and possibly also the recovery or removal of surplus materials. These may require separate consents. Contact the Environment Agency for details of any environmental permitting requirements or exemptions which may be required for the work.

476. You should be aware of the roles and responsibilities of everybody involved in the project. Where permitting and planning are involved this will include legally binding conditions, monitoring and ongoing commitments. If a site operator fails to meet their commitments, enforcement action may be pursued against the landowner.

Moving the soil

477. Different soils occurring on the site should be handled and stored separately, especially top soils and sub soils. Take care to minimise contamination of soils with chemicals such as oil, or other materials such as stone, brick and wood.

478. Contractors often have detailed practical instructions for site working which have been developed from the formal planning or permitting process. The success or quality of work will depend upon following this best practice. If you believe that they are not being followed, notify your agent or the relevant enforcement authority.

479. The long term potential of the land will depend on how the site is worked and managed. Avoid working or trafficking on wet soils. Although soils will recover in the long term, careful planning and good practice will reduce the need for expensive engineering operations. Restored soils are fragile, and are easily damaged by inappropriate use. Treat the soil with great care, no matter what the immediate after-use might be.

5.10 Turf production

- **Although turf production can be a profitable operation it should be done in such a way that it does not affect the sustainable use of the land.**

It may be necessary to obtain a range of consents before turf cutting begins.

Ensure turf cutting does not destroy any habitats, or cause damage to archaeological and historical sites.

The long term potential of land will be reduced if substantial amounts of soil are removed with the turf or through repeated turf crops.

Turf cutting may require consents before work commences (references 136, 138).

Seek advice from your Local Planning Authority where there is any doubt whether the proposed activity could be regarded as commercial and not reasonably necessary for agriculture.

Proposals may also require an application under the Environmental Impact Assessment Regulation (Reference 30), and consent from English Heritage where the site is on, or close to, a scheduled monument (Reference 144).

Good practice

480. You must ensure that any permissions and consents have been obtained before turf cutting begins (references 136, 138). For tenants, or where the land is held through an agreement or contract, you will need the consent of the landlord.

481. You should not use sites with a high risk of soil erosion (see Section 3.4 on soil management planning) especially if operating a system that involves re-seeding where fine rolled seedbeds are necessary.

482. Turf cutting is normally a specialist activity often undertaken by contractors or tenants. Ensure that the extent, method of working and any remedial works are agreed prior to the work commencing.

483. Only a minimum amount of soil consistent with producing a viable turf should be removed from the site. It is normally not necessary to remove more than 15 mm of soil.

484. The work should be carried out when the weather and ground conditions are dry to avoid damaging the soil through compaction or loss of soil by erosion. Ensure that access for machinery and lorries is considered well in advance of cutting. You may need to provide short-term storage of turfs.

485. You should take into account the management of the land for turf production when planning future land use. Include it in any soil management plan (see Section 3.4), and in your Soil Protection Review if you claim single Payment (reference 58).

486. If turf is to be produced from permanent pasture, choose sites that do not have historic, ecological or landscape importance and are not protected by Environmental Impact Regulations (reference 30). Old grassland and sites that have historic remnants such as ridge and furrow should not be used. Seek advice from the Archaeological Officer of your local Authority if you are unsure about the status of an historic site.

6 Specialised horticulture

6.1 Introduction

487. This section covers pollution risks associated with specialised horticultural crops grown under cover or in contained facilities. Field grown horticultural crops are covered by advice in other parts of this Code.

488. You should refer to other sections in this Code for guidance on storage of fuel oil, pesticides, and fertilisers, and for guidance on nutrient loss, waste management and water supplies.

6.2 Protected crops, nursery stock, mushrooms

- **These specialised horticultural crops are often grown in high input systems. This section offers advice to help minimise these inputs and to reduce harmful environmental effects.**





Use energy efficiently to reduce costs and limit carbon dioxide emissions.

Minimise the loss of nutrients, pesticides, sediments and organic material to the water environment.

Use the minimum quantity of water and nutrients consistent with optimum crop performance.

Recycle or dispose of liquid and solid wastes according to the regulations.

Good practice

Energy Use

489. You should minimise carbon dioxide emissions by using energy efficiently and exploiting non-fossil fuel sources. Where appropriate, insulate walls, roofs and heating pipes. Maintain boilers and burners, and ensure precise control of correct temperature regimes, and consider using thermal screens to reduce heat loss. You may wish to compare your energy use with published standards (reference 145).

Protected crops

490. You should not use more liquid feed than soil-grown crops need, as any excess nutrients will have to be flushed out of the soil before the following crop. This will mean extra work and may affect ground or surface water.

491. Where possible, install recirculation systems for hydroponic crops. When the system has to be emptied, run it down as much as possible first to reduce the volume that has to be disposed of.

492. For non-recirculating systems, including 'table systems' for crops such as strawberries, you should control and monitor water use to avoid excessive run-off. Design, install and maintain the system to ensure that the variability in the amount of water delivered by each nozzle or dripper is as low as possible. For rock-wool systems, you should aim to reduce run-off to less than 30% of the water applied.

493. You should match the nutrients added to the water to the requirements of the crop, the stage of growth and time of the year. Monitoring the electrical conductivity of the feed and of the run-off can help to ensure the correct quantity of feed is being used.

494. Recycle used nutrient solutions by spraying on to growing crops on the holding. You should take account of such re-use in your nutrient management plan, take care to avoid polluting groundwater or surface water and if you are in a Nitrate Vulnerable Zone follow any restrictions.

495. Provided there are no risks from pests and diseases, compost waste plant material for re-use on the holding. If such actions are not possible, dispose of liquid and solid wastes according to the regulations. Site any waste storage facilities for organic wastes away from surface waters so they do not cause pollution. For disposal options see Section 7 on waste.

496. You should collect water from roofs for use in washing down and as an emergency supply for the holding. Do not use for crop production if there is a risk of contaminated water damaging the crop. If roof water is not collected it should have a separate drainage system from dirty water and be directed into a ditch, surface water or soakaway. See Section 8 on water harvesting.

Container grown nursery stock

497. You should minimise run-off from all systems by careful management. Consider sub-irrigated bed systems and water recycling to help with this.

498. You should match watering to the rainfall, species, growing medium, stage of growth, container size and time of year. Design the system so the irrigation system matches the cropped area and maintain nozzles to ensure even application.

499. To reduce the risk of nutrient-rich run-off, use controlled release fertilisers in the growing media, and supplement with the minimum quantity of nutrients in the irrigation water. You should match the total nutrient supply to the production system. If you monitor nutrients in compost and run-off, you can minimise costs and run-off loss.

500. Only use the minimum amount of pesticide needed to produce marketable crops. Where possible incorporate pesticides in the growing media, rather than using drenches. If it is necessary to use a drench, make sure you follow the code of practice for using plant protection products to reduce possible environmental problems.

Mushrooms

501. Producers can compost up to 10,000 cubic metres of biodegradable waste from agricultural premises for cultivating mushrooms by registering an exemption with the Environment Agency. Extra details will be required by the Environment Agency if the operation is within 250 metres of a building or location occupied by people. Larger quantities will require an environmental permit (reference 35).

502. You should keep dirty yard areas to a minimum. When producing compost, apply water evenly to minimise run-off and collect it and recycle it wherever possible.

503. If you keep spent compost and other organic debris on site, ensure that any run-off is collected. See Section 4.3 for advice on dealing with solid manures and dirty water.

504. When cleaning trays and equipment, you can reduce water usage by dry brushing, followed by careful choice of nozzle size and water pressure.

505. You should contain all surplus dirty water on the site for disposal. It must not be discharged to a ditch or surface water. Soakaways should not be used if the dirty water contains residues of pesticides or disinfectants. See Section 4.3 for advice on dealing with dirty water, and Section 5.4 for advice on application to land.

506. You should provide a separate drainage system for clean water from roofs and yards. Consider collecting this water for use as washing water, or direct it to a ditch, surface water or soakaway. See Section 8.1 on water harvesting.

6.3 Watercress

- **The quality of water entering rivers after watercress production can have serious effects upon aquatic habitats. You must manage the unit to meet your consent conditions.**

By adopting good husbandry practice you can minimise water use and the discharge of potential pollutants and so keep within the consents set for the unit.

Both water abstraction and discharges to groundwater and watercourses require permits from the Environment Agency (reference 115).

Production units may also affect protected habitats such as Sites of Special Scientific Interest (reference 12). You should consult Natural England for advice.

Disposal of settled solids cleaned out from lagoons and beds are subject to control (reference 35).

Good practice

Water abstraction

507. You should minimise water use by considering all uses on the unit to help you keep within your abstraction licence. See also Section 8.2 (Water for crops and livestock).

Suspended solids

508. To reduce the quantity of sediment released downstream, you should minimise disturbance of the beds consistent with planting and growing the crop.

509. You can use lagoons or settlement beds to control the discharge of solid material. Obtain advice on their design and operation. If solids are passing through the settlement bed to the watercourse, you should reduce flow rates through the beds to allow silt to settle out.

510. The settled material will be subject to environmental permitting controls when you clean out any of these facilities (reference 35).

511. You should only supply the minimum quantity of fertiliser needed by the crop. Take account of the concentration already in the water supply. Consider if you need to install a reed-bed or wetland plot downstream to strip out any surplus nutrients.

512. Minimise the use of insecticides and zinc to reduce concentrations in the outflow.

7 Wastes

7.1 Introduction

513. Waste is any substance or object which the holder discards, or intends to or is required to discard (reference 146). Wastes produced from agricultural and horticultural premises, often referred to as "agricultural wastes", are controlled to protect the environment and public health; you must comply with the law (reference 35). The disposal of animal carcases is controlled by Animal By-Products legislation (see Section 7.6).

514. There is no definitive list of agricultural waste but examples (when you need to get rid of them) are vehicle and machinery waste, non-packaging plastics, plastic packaging, animal health products, building waste, cardboard and paper, metal, wood, glass, rubber, ash, and some hazardous wastes such as unused agro-chemical concentrates, oils, brake fluids, antifreeze, asbestos, lead-acid batteries, and fluorescent light tubes.

515. Livestock manures are not waste if they are used to fertilise soil for agricultural or ecological benefit on agricultural land – whether on the farm where they are produced, or on another farm.

516. You must not burn, bury, dump or tip waste unless you have a permit, or have registered an appropriate exemption with the Environment Agency (reference 35). Farm tips and dumps must not be used unless you have a permit.

517. You can use any of the 5 basic options (in combination) for dealing with agricultural waste:

- store waste securely on your holding for up to 12 months;
- take the waste to a recovery or disposal site;
- give the waste to an authorised person;
- register permitting 'exemptions' and comply with conditions for recovery or disposal of that waste; and
- get an environmental permit.

518. There are other methods for dealing with dilute liquid wastes, waste oil and animal carcases (see Sections 7.5 and 7.6).

Duty of Care

519. A duty of care applies to everyone who handles waste – from the person producing the waste to the person who finally disposes of or recovers it. This duty is based on common business sense and is a key method to combat fly-tipping. You must keep such waste secure so it does not leak, spill, or blow away and you can only give your waste to an authorised person – a registered waste carrier. It is your duty to ensure that the waste goes to a properly authorised site, and to give the person a transfer note describing the waste and signed by both of you. You must keep a copy of transfer notes for a minimum of 2 years. Guidance is available (reference 147).

Hazardous waste

520. Examples of farm wastes that are classified as hazardous include waste oil, asbestos, lead acid batteries and agro-chemicals containing dangerous substances (reference 148). You must not mix hazardous wastes or mix hazardous waste with non-hazardous waste or other substances and materials. Hazardous wastes must be collected and disposed of separately, and are subject to the requirements of the Hazardous Waste Regulations (reference 149). You must register with the Environment Agency if you produce more than 500 kg or 500 litres of hazardous waste in any 12-month period (reference 150).

521. All movements of hazardous waste must be accompanied by "consignment notes" when they are moved off your holding to provide an audit trail (reference 151). When you complete the consignment note, you must describe the waste and keep a copy of consignment notes for a minimum of 3 years. You must also keep a copy of any return from the waste management facility certifying receipt of the waste.

Exemptions (from environmental permitting)

522. These are a light form of regulatory control that allow you to recover or dispose of some wastes that present a low risk of causing pollution or damaging public health (see Section 7.4). You must comply with all the conditions that are set down in each exemption. If you are unable to do this you will need a permit.

Environmental permits

523. Obtaining a permit from the Environment Agency is only likely to be an option for those who want to provide professional waste management services to deposit, recover or dispose of waste. There is a significant charge (application fee and annual subsistence fee) for this and certain conditions apply – including whether the applicant is a "fit and proper person." And you may need planning permission for the proposed scheme.

Advice Note

For further advice on dealing with agricultural wastes, consult the Environment Agency by telephoning their National Customer Contact Centre on 08708 506 506.

7.2 Waste minimisation

- **Minimising the amount of waste you produce will reduce its potential impact on the environment.**

Creating less waste will save you time and money in managing, handling and disposing of waste. It will also mean you use raw materials more efficiently.

Good practice

524. Review current practices by considering the nature, quantity and full costs of dealing with wastes on your holding. Deal with the more significant issues first.

525. Identify whether you can avoid producing waste from the outset. Consider alternative materials, or the use of alternative techniques.

526. If you cannot avoid producing waste, consider how it might be reduced by making technical changes, by using a different management technique, and by improving staff training.

527. Some wastes may be re-used – identify whether this is possible.

528. Many waste materials can be recycled for a secondary purpose (reference 152).

529. Produce a shortlist of potential improvements, and prioritise them based on cost/benefit and how easy they are to put into practice. Make the changes when the opportunity arises.

530. Further guidance is available to help you carry out a waste audit, and to provide ideas for reducing the cost of dealing with waste (reference 66).

7.3 Waste storage, recovery and disposal

Poor arrangements for storing and dealing with waste can cause pollution and risk harming public health.

You can only store waste for up to 12 months. Wastes must be stored securely to avoid pollution.

You can take waste from your holding to a recovery or disposal site and/or you can give the waste to an authorised person – but you must comply with your "duty of care."

Wastes produced from agricultural and horticultural premises, often referred to as "agricultural wastes," are controlled to protect the environment and public health; you must comply with the law (reference 35).

Good practice

531. You must only store waste for up to 12 months. It must be stored securely. This means it must not become windblown or cause pollution and may mean you have to use suitable containers.

532. You should keep different types of waste separate to avoid contamination. Mixed wastes usually cost more to dispose of and contaminated wastes are more difficult to recycle. Some specific good practice guidance on the collection and recovery of agricultural waste plastics has been developed (reference 153).

533. If you intend to take your agricultural waste off your holding to a recovery or disposal site (reference 152), you should telephone the site first to check:–

- if you can take the waste in your vehicle;
- the cost and how payment is made;
- the paperwork you need to take ('duty of care' transfer notes);
- what wastes they can legally accept under their permit or exemption; and
- the best way of delivering waste (bales, loose, etc.).

You will not have to register as a waste carrier to transport your own agricultural waste.

534. If you give the waste to someone else, such as a waste carrier, you must make sure that they are authorised to take your waste. If a person cannot prove that they are authorised to take your waste, you should not give it to them. You will need to give the carrier a waste transfer note with a description of the waste, which is signed by you and the carrier (reference 147). Consignment notes are required for hazardous waste (reference 151). You must keep copies of waste transfer notes for 2 years, and copies of hazardous waste consignment notes for 3 years.

535. You can register exemptions (from environmental permitting) to recover or dispose of some wastes (see Section 7.4). You must comply with the conditions of each exemption.

536. You should consult the Environment Agency if you are considering business opportunities in waste management (reference 154).

7.4 Waste exemptions

Exemptions allow you to recover or dispose of wastes that have a low risk of causing pollution or harming human health.

Consider how you can benefit from the wide range of exemptions available for dealing with some wastes.

All farmers and growers must register the exemptions they need for their business.

Exemptions from the need to have an environmental permit are provided in law. But you must comply with all the conditions that are set down for each activity (reference 35, 155).

In addition, you must not cause harm to human health, or cause pollution of the environment.

Good practice

537. If you want to recover or dispose of certain agricultural wastes that arise on your holding by carrying out an exempt activity, you must register the exemptions with the Environment Agency (reference 155, 49).

538. You should consider the wide range of exemptions available. There are many that may be useful for agriculture, including the following:–

- burning waste plant tissue in the open e.g. hedge trimmings, logs, branches, untreated timber
- spreading of dredgings and plant material cleared from inland waters and farm ditches
- chipping, shredding, cutting or pulverising waste plant matter e.g. logs, branches, natural wood waste
- baling, compacting, shredding, pulverising waste at the place of production e.g. using a compactor bin to crush waste, baling plastic, crushing clean pesticide containers
- deposit of plant tissue at the place of production e.g. spoiled crops from store deposited on land to rot down
- beneficial use of waste e.g. waste paper as animal bedding, tyres on a silage clamp
- land treatment by spreading diluted waste milk on land for benefit to agriculture or for ecological improvement.
- burning waste as a fuel in appliances e.g. waste oil, wood and straw
- burning waste in an exempt incinerator
- land treatment by spreading ash from the on-farm incineration of pig and poultry carcases
- treatment of dilute pesticide washings in a biobed
- burning waste as a fuel in a local authority authorised process
- burying waste from a portable toilet e.g. as used by crop pickers or from public events on your farm
- composting biodegradable waste e.g. bracken, hedge trimmings, wood-chippings, spoiled straw, wood or paper based bedding.

- the storage and use of building waste from agricultural premises for construction on your farm; and
- land treatment by spreading waste for agricultural or ecological benefit e.g. spreading composted crop wastes and other plant material (hedge clippings etc) from agricultural premises, and ditch dredgings.

539. You must comply with the conditions that are set down for each of the exemptions, and ensure that you do not cause harm to human health or pollution of the environment. Consult the Environment Agency for advice or to check for any new or updated exemptions.

540. You must register the exemptions you need for your business. Most exemptions require registering once with the Environment Agency and remain active as long as you are carrying out the activity at the location specified. A few require re-notifying every year, but the Environment Agency will let you know. Consult the Environment Agency by telephoning their National Customer Contact Centre on 08708 506 506.

7.5 Disposal of dilute liquid wastes and waste oil

Using recognised disposal routes protects the environment from pollution.

Consider whether the options described for dealing with dilute liquid waste and waste oil are applicable to your holding.

Disposal of wastes in the way described in this section are controlled by different laws.

See below.

Good practice

Dilute liquid waste

541. A Water Service Company might allow dilute liquid discharges to a public sewer, if they are able to treat the extra pollution load (reference 156, 115). A trade effluent permit is required, and a charge is made on the volume and polluting load of the waste. You will also need to provide and maintain an agreed sampling point.

542. In some circumstances, you may be able to discharge a treated dilute liquid waste of very low polluting load to a surface water or to the ground (reference 115). You must get a discharge consent from the Environment Agency for this, and a charge is made. The standards required will vary depending on the receiving waters, but are generally stringent – it is unlikely that simple treatments will be good enough. You will need to provide and maintain an agreed sampling point.

543. The disposal of certain substances (List I and List II) onto or into land can be allowed, but you must obtain a groundwater authorisation from the Environment Agency. For example, you must have an authorisation for the disposal on land of used sheep dip and dilute pesticide washings (reference 81, 79). You must follow the conditions set down in the written authorisation. See also Sections 4.4 and 4.5.

Waste oil

544. You can burn waste oils for heating providing you obtain approval for the installation from the local authority Environmental Health Department. You should also check with the Environment Agency whether you need to register an exemption from environmental permitting requirements (reference 102, 35).

7.6 Disposal of animal carcases

Using recognised disposal routes protects the environment from pollution.

Animals and poultry that die on the farm must be disposed of through an authorised route.

Consult the Animal Health Agency for advice, for approval of low capacity carcase incinerators, and to report suspected notifiable disease.

Disposal of animal carcases is controlled by law (reference 47).

Good practice

545. Animals and poultry that die on the farm must be disposed of through an authorised incinerator or rendering plant or other approved outlet (reference 47). The removal, storage and disposal of carcases should be carried out as soon as possible to avoid causing odour problems. Collection services may be available (e.g. reference 157).

546. If you suspect animal ill-health or death is caused by a notifiable disease, you must report it to Animal Health. Any carcases should be made available for post-mortem examination. Subsequent disposal is subject to direction by Animal Health.

547. Carcases may be incinerated on-farm, but there are technical conditions and environmental controls that must be met. You must obtain approval for the incinerator from Animal Health (reference 158). You should incinerate carcases as soon as possible. Do not exceed the design loading rate.

548. If you intend to use an on-farm incinerator with a loading rate in excess of 50 kg/hour, you must also get approval from your local authority (reference 47, 159). High capacity incinerators can accept ruminant carcases and Specified Risk Material (SRM).

549. Small on-farm incinerators with a loading rate of less than 50 kg/hr must still comply with legislation (reference 47, 102(1), 160, 161). You can get a list of "type approved" low capacity incinerators (reference 162). These incinerators can also accept ruminant carcases and SRM provided they are suitably approved by the Animal Health (reference 47).

550. The ash from Specified Risk Material (SRM) must be sent to a permitted landfill site. The ash from the incineration of pig and poultry carcases may be applied to land for agricultural benefit, provided you have registered an exemption with the Environment Agency (see Section 7.4).

551. Consult Animal Health if you wish to consider mobile or shared incineration facilities (reference 158).

8 Water supplies on the farm

8.1 Introduction

552. The amount of water available for domestic, industrial, agricultural and horticultural use, and to support the needs of the environment, is limited. Its use should be planned and managed properly to avoid waste, which in turn will help to keep control of your costs.

553. An environmental impact assessment must be carried out for water management projects that could have significant environmental impacts (reference 164, 165). These include irrigation projects involving the taking of water, or storage of water, regardless of whether they need an abstraction licence from the Environment Agency (reference 166). Projects that require planning permission may also need an environmental impact assessment (reference 136).

554. If you want to take more than 20 m^3 per day from a river, stream or canal, or from an underground source, you will almost certainly need a licence. If you intend to impound water on a watercourse, you will need a licence. Consult the Environment Agency for further information, including the fees that apply.

555. The safe operation and management of reservoirs (above natural ground level) is very important in reducing flood risk. If you own or operate a reservoir of over 25,000 m^3 capacity, you must understand your legal responsibilities (reference 167). Consult the Environment Agency for advice.

556. Water is used for drinking by livestock, for washing and cleaning, for heating and cooling, for irrigating crops, and for protected crops and nursery stock. It may be taken from the mains supply or abstracted from a river or borehole. Using water efficiently is key to protecting the environment and you should consider whether it is practical to collect rainfall from roofed areas for use on your farm or holding – often called 'rainwater harvesting' (reference 168). You should know how much water you are using, keep records and make regular checks to monitor its use. If you have an abstraction licence, it will most likely be a condition of your licence to measure and record the quantity of water abstracted.

557. Anybody who installs or uses water fittings has a legal duty not to cause or allow waste, misuse, undue consumption or contamination of mains drinking water (reference 169). You must take steps to ensure mains water cannot be contaminated from back-siphonage or backflow.

8.2 Water for crops and livestock

Efficient use of water protects supplies, and benefits biodiversity and public enjoyment of the countryside.

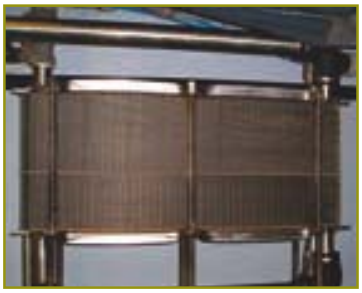
You should know how much water you are using and identify ways to optimise its use. This will not only protect water resources, but also help to control your costs.



© *Environment Agency*



© *Environment Agency*



© *Environment Agency*



© *Environment Agency*

Good practice

558. Identify overall how much water you are using and its cost. Include metered and non-metered sources, and take meter readings at least every month. Do not forget the real costs include the amount you are charged for your supply or abstraction licence, and your operational and maintenance costs.

559. Carry out an audit of water use by checking each separate activity. You may need to estimate water consumption for some of the activities by using a suitable container (of known volume) and stopwatch to check flow rates. The frequency of the activity will determine how much water is used per year. You may identify some improvements while doing the audit – for example by doing more dry brushing or scraping, or changing hose nozzles and water pressure.

560. Calculate from standard information (where available) how much water you might use and compare with your actual usage (reference 168, 66). This may indicate scope for savings.

561. Make regular checks for leaks. This includes visual checks for dripping taps, leaky pipes, hoses and nozzles, and for unusually wet areas around the pipe network. You should monitor water flows by regular recording of meter readings, and increase

frequency if a problem is suspected. Isolate and drain pipes that are not in use over winter to prevent freezing.

562. Put improvements into practice, review and check water usage.

563. Further guidance and suggestions for making optimum use of water and minimising costs are available (reference 168, 66).

Crop irrigation

564. Use 'irrigation scheduling', and good practice, to make efficient use of water (reference 170, 171, 172, 173).

565. Consider using boom irrigation to apply water more accurately than a gun. For some crops, trickle irrigation can be used to reduce water consumption.

566. Make regular checks of pumps, mains pipe, hydrants, supply hoses and irrigators and carry out necessary repairs.

567. Check that you are using the correct pump and pipe size to operate at the stated pressure. Make adjustments to avoid soil compaction from large droplets and to avoid run-off.

568. Avoid uneven application by not irrigating when it is windy. Irrigating at night, in the early morning or late evening will reduce loss (evaporation) of water, but be aware of potential noise nuisance when siting your pump.

569. Consider the need for winter storage of water and the potential for co-operating with neighbours (reference 174). There may be opportunities for recreational use and conservation management.

570. Keep up-to-date with developments for water use within your area. Experience has shown it is important to be involved and informed.

Vegetable washing

571. Consider recycling vegetable wash water for use in wash cycles that do not need such a high quality of water, or consider cleaning the wash water for re-use.

572. Wash water can be stored and used for irrigation. Check whether such water is of good enough quality for the specified crop. Vegetable wash water can also be re-used for other applications such as cleaning equipment.

573. You should seek advice from the Environment Agency if vegetable washings need disposal (see also Section 7 on waste).

Water for protected crops and nursery stock

574. You should control and monitor water applied to crops and container grown nursery stock (reference 175) to minimise run-off (see Section 8.1).

575. Consider collecting any water from clean roofs (rainwater harvesting) for use as washing water, irrigation water (if it meets the relevant quality standards) or for an emergency fire-fighting supply (see Section 8.1).

Water for livestock

576. Ensure that you provide sufficient water to meet the welfare requirements of livestock (reference 104).

577. **On dairy farms** – consider reusing plate-cooling water for drinking by livestock or for washing and cleaning purposes. Rainwater harvesting can provide a useful source of water, especially for cleaning purposes. You should check that water is suitable for livestock to drink and you must comply with milk hygiene standards (reference 176, 106).

578. Ensure water troughs for **cattle** do not overflow, by setting the ball valve at a low enough level, carrying out regular maintenance, and careful siting. Troughs should supply adequate water for the number of livestock expected. You may be able to install low-lift pasture pumps or, on sites with sufficient hydraulic head, ram pumps to make use of water from a nearby watercourse. You should check with the Environment Agency about the need for an abstraction licence.

579. **On pig and poultry farms** – check drinkers do not cause spillage. Consider changing to better designs to reduce water losses. Wet poultry litter increases the ammonia emitted, and can cause welfare problems for the birds.

9 References

Note:

Text of European laws and directives can be obtained from http://eur-lex.europa.eu/en/index.htm

Text of National laws and explanatory memoranda can be obtained from http://www.opsi.gov.uk/

♦ Available from www.defra.gov.uk

• Available from www.environment-agency.gov.uk

♣ Available from Defra Publications, Admail 6000, London, SW1A 2XX or e-mail defra@cambertown.com or Tel 0845 955 6000.

1. Compendium of UK Organic Standards made under The Organic Products Regulations 2004 ♦
2. The Water Framework Directive 2000/60/EC
3. National Emission Ceilings Directive 2001/81/EC implemented by The National Emission Ceilings Regulations 2002
4. Protocol to the 1979 Convention on long-range transboundary air pollution to abate acidification, eutrophication and ground-level ozone.
5. Best Farming Practices: Profiting from a good environment, Environment Agency, 2008 •
6. Environmental Protection Act 1990
7. Ammonia in the UK, PB6865, Defra, 2002 ♦♣
8. GIL139 Agriculture and horticulture factsheet www.carbontrust.co.uk
9. GPG323 Energy saving guide for agriculture and horticulture www.carbontrust.co.uk
10. The Carbon Trust www.carbontrust.co.uk
11. The Country Land and Business Association www.cla.org.uk
12. Wildlife and Countryside Act 1981 (as amended) www.jncc.gov.uk
13. Countryside and Rights of Way Act 2000 (Part III gives greater protection to Sites of Special Scientific Interest and strengthens wildlife protection) at www.jncc.gov.uk
14. Habitats Directive 92/43/EEC at www.jncc.gov.uk
15. Wild Birds Directive 79/409/EEC at www.jncc.gov.uk
16. NetRegs at www.netregs.gov.uk
17. The Guide to Cross Compliance in England (2008), PB 12904, available at www.rpa.gov.uk

18. Single Payment Scheme: Cross Compliance Guidance for Soil Management, PB 11162, Rural Payments Agency and Defra, 2006 available at www.rpa.gov.uk
19. Environmental Stewardship Handbooks, (ELS) ISBN 978-1-84754-080-5 (2008); (OELS) PB 10381 ♦♣ (HLS) ISBN 978-1-84754-082-1 (2008) available from www.naturalengland.org.uk
20. (1) Integrated Pollution Prevention and Control Directive 96/61/EC implemented by the Pollution Prevention and Control (England and Wales) Regulations 2000; (2) Environmental Permitting Guidance, The IPPC Directive, Defra, 2008 ♦
21. Pollution incident response planning, Pollution Prevention and Guidance notes (PPG 21), Environment Agency, February 2004 ●
22. Integrated Pollution Prevention and Control (IPPC) Factsheet No 4, Accident and emergency plan, Environment Agency, 2006 ●
23. (1) Nitrates Directive 91/676/EC (2) The Nitrate Pollution Prevention Regulations 2008, SI No 2349. ♦
24. Guidance for Farmers in Nitrate Vulnerable Zones, PB 12736, Defra and the Environment Agency, October 2008 ♦♣
25. Agricultural Lime – The Natural Solution. Agricultural Lime Association. www.aglime.org.uk
26. Lime calculator, Agricultural Lime Association. www.aglime.org.uk
27. Fertiliser recommendations for Agricultural and Horticultural Crops, RB209, MAFF, 7th edition, 2000 at The Stationery Office (£15) or free at www.defra.gov.uk Note: A revised version due in 2009.
28. The PLANET Nutrient Management software provides a computerised, interactive, version of the Defra Fertiliser Recommendations (RB209). To obtain a copy, either visit www.planet4farmers.co.uk or ring the PLANET Helpline on 0845 6023864.
29. Fertiliser Advisers Certification and Training Scheme (FACTS), BASIS Registration Ltd at http://www.basis-reg.com
30. Environmental Impact Assessment (Agriculture) (England) (No 2) Regulations 2006, SI No 2522 – Guidance document ♦
31. Freshwater Fish Directive 78/659/EEC.
32. Managing Livestock Manures Series, Booklets 1, 2, 3 and 4, Institute of Grassland and Environmental Research, ADAS and Silsoe Research Institute, 2001. Available from ADAS Gleadthorpe Tel: 01623 844331
33. The Food law Guide, Food Standards Agency www.food.gov.uk
34. The Sludge (Use in Agriculture) Regulations 1989, SI No 1263.
35. (1) The Environmental Permitting (England and Wales) Regulations 2007, SI No 3538; (2) Explanatory memorandum. Both at www.opsi.gov.uk (3) Environmental Permitting Overview Booklet – Simplifying regulation for waste management and pollution prevention and control, Defra, July 2007; (4) Environmental Permitting Core Guidance, Defra, 2008; (5) Environmental Permitting Guidance List, Defra, 2008. All references ♦

36. The quality protocol for the production and use of quality compost from source-segregated biodegradable waste, Waste & Resources Action Programme (WRAP) and the Environment Agency, 2007. www.compost.org.uk or ●
37. The quality protocol for the production and use of digestate from anaerobic digestion (for information see ●)
38. Contamination of agricultural land & Part IIA of The Environmental Protection Act 1990. CLAN 4/04. ♦
39. Defra Circular 01/2006 "Contaminated land" October 2006 ♦
40. Notes on the restoration and aftercare of metalliferous mining sites for pasture and grazing. ICRCL 70/90. http://www.eugris.info/envdocs/ICRCL70_90.pdf
41. Guidelines for the application of sewage sludge to agricultural land, The Safe Sludge Matrix, British Retail Consortium, Water UK and ADAS, April 2001. www.adas.co.uk
42. Code of Practice for Agricultural Use of Sewage Sludge 1996, Defra ♦
43. Guidelines for the application of sewage sludge to industrial crops, The Safe Sludge Matrix, British Retail Consortium, Water UK and ADAS, April 2001. www.adas.co.uk
44. Feeding stuffs regulations, SI No. 3281, 2005.
45. Specification for composted materials. BSI PAS 100. WRAP/Composting Association, 2005. www.wrap.org.uk or www.compost.org.uk
46. Draft specification for digestate BAS 110. www.compost.org.uk
47. Animal By-Products Regulation 1774/2002; and paragraph 2 of the guidance ♦
48. Code of practice for the investigation and mitigation of possible petroleum-based land contamination. The Institute of Petroleum, 1993. http://products.ihs.com/Ohsis-SEO/INSTITUTEOFPETROLEUM.html
49. Whole Farm Approach, Defra ♦
50. LEAF, The National Agricultural Centre, Stoneleigh Park, Warwickshire CV8 2LZ , and at www.leafuk.org and www.leafaudit.org
51. The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991 (SI No 324), and as amended 1997 (SI No 547).
52. Guidance Notes for Farmers on The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations, Department of the Environment/Welsh Office, April 1997. ♦
53. Manure Management Plan: a step-by-step guide for farmers, Defra, June 2003 ♦
54. National Farm Waste Register, Races Farm, Aston Tirrold, Didcot, Oxford OX11 9DJ (Tel: 01398 361326).
55. Tried and Tested nutrient management plan. www.agindustries.org.uk
56. BASIS Registration Ltd at www.basis-reg.com

57. Guidance on the assessment of the nutrient supply from organic manures is available from the above publication, or from the MANNER (**Man**ure **N**itrogen **E**valuation **R**outine) Decision Support System. This guidance is available free of charge from ADAS Gleadthorpe Research Centre (Tel: 01623 844331).

58. Single Payment Scheme: Cross Compliance Soil Protection Review, PB 11160, Rural Payments Agency and Defra, 2006 available at www.rpa.gov.uk

59. A guide to better soil structure, National Soil Resources Institute, Cranfield University, 2001. www.cranfield.ac.uk

60. (1) A manual for the assessment and management of agricultural land at risk from water erosion in lowland England, Revised 2005, Defra ♦
(2) Think Soils: soil assessment to avoid erosion and run-off, Environment Agency, 2008. Available from enquiries@environment-agency.gov.uk or Tel: 08708 506506.

61. The Voluntary Initiative – an industry led approach to reducing the impact of pesticides on the environment; see www.voluntaryinitiative.org.uk

62. Code of practice for using plant protection products, January 2006, PB 11090 and PB11909CD, Defra, Health & Safety Commission, NAW. Downloadable version available from PSD website at www.pesticides.gov.uk

63. LERAPs information is available on the Pesticides Safety Directorate's website at www.pesticides.gov.uk

64. EC Regulation 852/2004 on the hygiene of foodstuffs and EC Regulation 183/2005 on the hygiene of feed.

65. A Farmer's Guide to the Planning System, Defra, Office of the Deputy Prime Minister, July 2002. ♦

66. Saving money by reducing waste. Waste minimisation manual: a practical guide for farmers and growers, PB 11674, Defra and the BOC Foundation, April 2006. ♣

67. Silage clamps and effluent tanks, Guidance on Construction, Repair and Maintenance, CGN 005, ADAS, July 2000. ♦

68. CIRIA Report No 126: Farm waste storage – guidelines for construction, Construction Industry Research and Information Association, 1992. www.ciria.org

69. The use of hot-rolled asphalt (HRA) surfacing for agricultural forage silos, Guidance on Construction, Repair and Maintenance, CGN 012, ADAS, December 2002. ♦

70. Separation of clean and dirty water, dirty water storage, and yard area construction, Guidance on Construction, Repair and Maintenance, CGN 008, ADAS, July 2000. ♦

71. Sluice valves on steel and concrete circular above-ground slurry stores, Guidance on Construction, Repair and Maintenance, CGN 010, ADAS, March 2001. ♦

72. Above-ground circular concrete and rectangular weeping-wall slurry stores, Guidance on Construction, Repair and Maintenance, CGN 001, ADAS, July 2000. ♦

73. Earth-banked slurry stores, Guidance on Construction, Repair and Maintenance, CGN 002, ADAS, July 2000. ♦

74. In-situ concrete slurry stores, Guidance on Construction, Repair and Maintenance, CGN 003, ADAS, July 2000. ♦

75. Above-ground circular steel slurry stores, Guidance on Construction, Repair and Maintenance, CGN 004, ADAS, July 2000. ♦

76. The use of covers on circular steel and concrete slurry stores, Guidance on Construction, Repair and Maintenance, CGN 011, ADAS, May 2002. ♦

77. Managing Farm Manures for Food Safety: Guidelines for growers to reduce the risks of microbiological contamination of ready-to-eat crops (draft), Food Standards Agency, January 2005. www.food.gov.uk

78. (1) UK biomass Strategy 2007, Working paper 3, Anaerobic Digestion ♦ (2) Energy from Biomass, Volume 4, Anaerobic Digestion for Biogas (a summary of DTI funded research studies), www.biomassenergycentre.org.uk ; (3) e.g. General information, www.renewableseast.org.uk ; (4) EN 178 Anaerobic Digestion, www.envirowise.gov.uk; (5) The Renewable Energy Association, www.r-e-a.net

79. Groundwater Protection Code: Use and disposal of sheep dip compounds, PB 12010, Defra, August 2001 (reprinted June 2006). ♦♣

80. The Veterinary Medicines Regulations 2006, SI No 2407.

81. Groundwater Regulations 1998, SI No. 2746.

82. Sheep Dipping, AS29, Health and Safety Executive. www.hse.gov.uk

83. STOP every DROP leaflet: guidance on best practice for sheep producers and Contractors, available from industry sources.

84. Code of Practice on the Responsible Use of Animal Medicines on the Farm, Veterinary Medicines Directorate, updated October 2007. www.vmd.gov.uk

85. Sheep dip handling facilities and drainage yards, Guidance on Construction, Repair and Maintenance, CGN 006, ADAS, July 2000. ♦

86. Part III, Food and Environment Protection Act (FEPA) 1985; The Control of Pesticides Regulation (COPR) 1986 (as amended); and Control of Substances Hazardous to Health (COSHH) Regulations 1994 made under the Health and Safety at Work etc Act 1974. Council Directive 91/414/EEC on the marketing of plant protection products, the Plant Protection Products Regulations 2005 (PPPR) to implement it into British law, and the Plant Protection Products (Basic Conditions) Regulations 1997 (BCR) which applies FEPA to PPPR approved products.

87. Code of practice for using plant protection products, PB 11090, Defra, Health & Safety Commission, NAW, January 2006. ♣

88. Chemical and pesticide stores, Guidance on Construction, Repair and Maintenance, CGN 007, ADAS, July 2000. ♦

89. (1) Guidance on storing pesticides for farmers and other professional users, Information Sheet No 16, Health and Safety Executive www.hse.gov.uk; (2) Code of practice for design and construction of chemical stores, British Standard BS 5502, Part 81, 1989.

90. Design Manual: Pesticide Handling Areas and Biobeds, The Voluntary Initiative, April 2005. www.voluntaryinitiative.org.uk

91. Container cleaning (A practical guide), Crop Protection Association. www.cropprotection.org.uk or www.voluntaryinitiative.org.uk

92. Guidance concerning ammonium nitrate based fertilisers on farms, Agricultural Industries Confederation, August 2004. www.agindustries.org.uk

93. Secure storage on farm, Agricultural Industries Confederation. www.agindustries.org.uk

94. Guidance note – Storing and Handling Ammonium Nitrate – Health and Safety Executive. www.hse.gov.uk

95. Self Help Checklist for the Storage and Handling of Ammonium Nitrate fertiliser – Health and Safety Executive www.agindustries.org.uk

96. Code of Practice for the prevention of water pollution from the storage and handling of solid fertilisers, April 1998, Agricultural Industries Confederation. www.agindustries.org.uk

97. Code of Practice for the prevention of water pollution from the storage and handling of fluid fertilisers, Agricultural Industries Confederation, April 1998. www.agindustries.org.uk

98. Integrated Pollution Prevention and Control Directive, 96/61/EC.

99. Bunds for agricultural fuel oil tanks, Guidance on Construction, Repair and Maintenance, CGN 009, ADAS, July 2000. ♦

100. PPG 2 Above-ground Oil Storage, PPG 26 – drums, Environment Agency ●

101. CIRIA report 163; design of bunds for oil storage, Construction industry Research and Information Association (CIRIA)1992; and Guidance on masonry and concrete bund construction, CIRIA, Environment Agency CIRIA, 6 Storey's Gate, Westminster, London SW1P 3AU. www.ciria.org

102. (1) Part I, Environmental Protection Act 1990; (2) the Secretary of State's Guidance for Waste Oil and Recovered Oil Burners less than 0.4 MW; Process Guidance Note 1/1(04), Defra 2004. ♦♣

103. Environment Agency guidance on exemptions from permitting ●

104. The Welfare of Farmed Animals (England) Regulations 2007 (SI No. 2078). See Schedule 6, calves for rearing and fattening; and Schedule 7, cattle ♦

105. Code of Recommendations for the Welfare of Livestock: Cattle; Defra, PB 7949, March 2003. Note: awaiting revision to reflect 2007 regulations ♦♣

106. Milk hygiene on the dairy farm: a practical guide for milk producers to the Food Hygiene (England) Regulations 2006, Food Standards Agency (prepared by the Dairy Hygiene Inspectorate). www.defra.gov.uk/animalhealth

107. Woodchip corrals, Technical Note TN 595, Scottish Agricultural College, 2007. www.sac.ac.uk

108. The Welfare of Farmed Animals (England) Regulations 2007 (SI No. 2078). See Schedule 8, pigs ♦

109. Code of Recommendations for the Welfare of Livestock: Pigs; Defra, PB 7950, March 2003. Note: awaiting revision to reflect 2007 regulations ♦
110. Energy use in pig farming, ECG089, The Carbon Trust, January 2005 www.carbontrust.co.uk
111. How to comply: guidance for intensive pig and poultry farmers, Environment Agency, April 2006. ●
112. The Welfare of Farmed Animals (England) Regulations 2007 (SI No. 2078). See Schedule 2, laying hens in non-caged systems; Schedule 3, laying hens in conventional cages; Schedule 4, laying hens in enriched cages; and Schedule 5, additional conditions for laying hens. ♦
113. Code of Recommendations for the Welfare of Livestock: Laying Hens; Defra PB 7274, July 2002. Note: awaiting revision to reflect 2007 regulations ♦
114. Code of Recommendations for the Welfare of Livestock: Meat Chickens and Breeding Chickens, Defra, PB 7275, July 2002. Note: awaiting revision to reflect 2007 regulations. ♦
115. Water Resources Act 1991.
116. Highways Act 1980 (as amended by the Rights of Way Act 1990).
117. A guide to managing crop establishment; Soil Management Initiative 2006 www.smi.org.uk
118. Guidance on best practices for growing miscanthus ♦
119. Guidance on best practices for growing short rotation coppice ♦
120. Crop Residues (Burning) Regulations 1993, (Schedule 2).
121. The Heather and Grass etc. Burning (England) Regulations 2007, SI No 2003.
122. The Heather and Grass Burning Code 2007 www.naturalengland.org.uk
123. Draft Statutory Guidance to the Environment Agency on the exercise of its functions with regard to the Waste Management Licensing (England & Wales) (Amendments & Related provisions) Regulations 2005, Defra, December 2005. ♦
Note: waste management licensing is now called environmental permitting.
124. Code of Practice for Landspreading Paper Mill Sludge, The Paper Federation of Great Britain, September 1998. www.confedpaper.org.uk
125. Use of sewage sludge and composts in forestry, Information Note 79, Forestry Commission, January 2006. www.forestry.gov.uk
126. Environment Agency guidance on exemptions from waste management licensing ●
Note: waste management licensing is now called environmental permitting.
127. Fertiliser spreaders. Choosing, maintaining and using. Agricultural Industries Confederation http://www.agindustries.org.uk
128. Pesticide approvals – see www.pesticides.gov.uk
129. EC Regulation 852/2004 on the hygiene of foodstuffs and EC Regulation 183/2005 on the hygiene of feed.

130. National Register of Sprayer Operators at www.nroso.org.uk
131. National Sprayer Testing Scheme at www.aea.uk.com/sprayer/index.htm
132. Guidelines for the use of herbicides on weeds in or near watercourses and lakes, Defra, 1995. ♣
133. Use of herbicides to control weeds in or near water (Application form and guidance), Environment Agency. ●
134. Management of Habitats and Landscape Features: Guidance for Cross Compliance in England PB12903 (2007) available at www.rpa.gov.uk
135. Site suitability for outdoor pig farming, PB 4444, MAFF, 1999. ♣
136. Town and Country Planning Act 1990.
137. Planning and Compensation Act 1991.
138. Town and Country Planning (General Permitted Development) Order 1995.
139. Environment Protection Act 1990 (part II); and Environmental Permitting Regulations.
140. Series of acts giving the requirements for respective pipeline work: Pipeline Act 1962; Gas Act 1986; Water Industry Act 1991; Water Resources Act 1991.
141. Soils handling ♦
142. Good practice for restoration ♦
143. Mineral Planning Guidance Note 7 – the reclamation of Mineral workings http://www.communities.gov.uk/corporate/ and ●
144. Ancient Monuments and Archaeological Areas Act 1979.
145. ECG091 Energy benchmarks for protected greenhouse horticulture in the UK, The Carbon Trust www.carbontrust.co.uk
146. (1) Waste Framework Directive, 2006/12/EC; (2) Environmental Permitting Guidance, The Waste Framework Directive, Defra, 2008 ♦
147. (1) Duty of Care leaflet, "Waste – you can handle it" series of leaflets, Environment Agency, 2006. ● ; (2) Waste Management, The Duty of Care, A Code of Practice ISBN 0-11-753210-X from The Stationery Office or Tel: 0870 600 5522.
148. "Hazardous waste – you can handle it" leaflet, Your guide to Hazardous Agricultural Waste, Environment Agency, 2007. ●
149. The Hazardous Waste (England and Wales) Regulations 2005, SI No. 894.
150. A Guide to the Hazardous Waste Regulations, How to notify your premises, Environment Agency. ●
151. A Guide to Hazardous Waste Regulation, Consignment Notes, Version 2.0, Environment Agency, June 2006. ●
152. Waste Recycling Directory at www.recycling.org.uk or telephone the Environment Agency on 0845 603 3113 with your postcode and list of wastes to find sites near you.

153. Agricultural Waste Plastics Collection and Recovery Programme, Good Practice Information, Chartered Institute of Waste Management Environmental Body, 2007 see www.agwasteplastics.org.uk

154. Agricultural Waste – Opportunities for farmers and growers; farm collection and recycling schemes, Environment Agency, 2006. ●

155. Registration of agricultural exemptions pack, in the "Waste – you can handle it" series, Environment Agency (includes Form WMAW 01 and guidance), 2006. ●

156. Water Act 1989.

157. Groundwater Protection Code: Use and disposal of sheep dip compounds, PB 12010, Defra, August 2001 (reprinted June 2006). ♣

158. National Fallen Stock Company Tel: 0845 0548888.

159. Controls on high/low capacity animal carcase incineration plants, Version 2.1, Defra, January 2006. ♦

160. Secretary of State's Guidance for Animal Carcase Incineration: Process Guidance Note 5/3(04), Defra 2004. ♦♣

161. Clean Air Act 1993, which prohibits dark smoke.

162. Part III, Environmental Protection Act 1990, which relates to statutory nuisances.

163. List of "type-approved" low capacity incinerators ♦

164. The assessment of the effects of certain public and private projects on the environment Directive 85/337/EEC, as amended by 97/11/EC.

165. The Water Resources (Environmental Impact Assessment) (England and Wales) Regulations 2003, SI No. 164 (as amended by SI No. 3124, 2006).

166. Environmental Impact Assessment for water resources authorisations; guidance on the requirements and procedures, Environment Agency, 2003. ●

167. Reservoirs Act 1975.

168. Waterwise on the farm; Version 2, Linking Environment And Farming (LEAF), National Farmers Union, Defra and the Environment Agency, March 2007. Available from enquiries@environment-agency.gov.uk or Tel: 08708 506506, or ●

169. Water supply systems: prevention of contamination and waste of drinking water supplies – agricultural premises, Water Regulations Advisory Scheme, May 2001. www.wras.co.uk

170. Irrigation best practice: a water management toolkit for field crop growers, Defra/ ADAS July 2007. Available from ADAS Boxworth Tel: 01954 268214 or e-mail horticulture@adas.co.uk

171. Irrigation best practice: water management for potatoes, Defra/ADAS, December 2005. Available from ADAS Boxworth Tel: 01954 268214 or e-mail horticulture@ adas.co.uk

172. Irrigation best practice: water management of soil and substrate-grown crops (top and soft fruit), Defra/ADAS, February 2003. Available from ADAS Boxworth Tel: 01954 268214 or e-mail horticulture@adas.co.uk

173. Irrigation best practice: water management for field vegetables, Defra/ADAS, July 2003. Available from ADAS Boxworth Tel: 01954 268214 or e-mail horticulture@adas.co.uk

174. Thinking about an irrigation reservoir? A guide to planning, designing, constructing and commissioning a water storage reservoir, Environment Agency and Cranfield University, 2008. •

175. Irrigation best practice: container-grown ornamentals, Defra/ADAS, March 2002. Available from ADAS Boxworth Tel: 01954 268214 or e-mail horticulture@adas.co.uk

176. General Food Hygiene Regulations, Jan 2006.

Figure 1: Example of farm waste management plan.



Don't spread in the red areas.

Avoid orange areas in winter and in a dry summer when the soil cracks down to the drains, or when the soil is compacted.

You can use yellow areas throughout the year subject to ground conditions, but restrict application rates in the winter.

Green areas can be used throughout the year.

Bore hole.

10 Glossary of terms

Biochemical Oxygen Demand (BOD) ~ describes the polluting strength of livestock manures and organic wastes. It is a measure (in mg/litre) of the amount of oxygen needed by micro-organisms to break down organic material.

Cover crop ~ a crop sown primarily for the purpose of taking up nitrogen from the soil and which is not harvested.

Compost ~ produced by aerobic decomposition of biodegradable organic materials.

Digestate ~ produced by anaerobic digestion of biodegradable organic materials. They may include liquid or separated fibre after digestion.

Dirty water ~ lightly contaminated run-off from lightly fouled concrete yards or from the dairy/parlour that is collected separately from slurry. It does not include liquids from weeping-wall slurry stores, slurry strainer boxes, slurry separators, or silage effluent which are rich in nitrogen and regarded as slurries.

Eutrophication ~ the enrichment of ecosystems by nitrogen or phosphorus. In water it causes algae and higher forms of plant life to grow too fast. This disturbs the balance of organisms present in the water and the quality of the water concerned. On land, it can stimulate the growth of certain plants which then become dominant so that the natural diversity is lost.

Excreta ~ the materials directly deposited (excreted) by livestock, and includes dung and urine.

Farmyard manure (FYM) ~ livestock excreta that is mixed with straw bedding material, that can be stacked in a freestanding heap without slumping.

Frozen hard ~ a term used when the soil is frozen for more than 12 hours in the previous 24 hours. Days when soil is frozen overnight but thaws out during the day do not count.

Groundwater ~ the water held underground in rock formations. Where these formations support wells, boreholes, surface waters, wetland habitats etc, they are called aquifers.

High readily available nitrogen content ~ more than 30% of the total N content of the organic manure is present in molecular forms that can be immediately taken up by the plant, or is released in the year in which it is applied to land. Examples include cattle and pig slurry, most poultry manure, and liquid digested sludge.

Leaching ~ a process by which soluble materials are removed from the soil by drainage water passing through it.

Livestock manure N farm Limit ~ a limit to the annual average loading of the total amount of nitrogen (N) in livestock manure across the area of a holding in a Nitrate Vulnerable Zone.

Low readily available nitrogen content ~ less than 30% of the total N content of the organic manure is present in molecular forms that can be immediately taken up by the plant, or is released in the year in which it is applied to land. Examples include straw-based cattle and pig manure.

Manufactured fertiliser ~ any fertiliser (other than organic manure) which is manufactured in an industrial process.

Manufactured nitrogen fertiliser ~ any nitrogen fertiliser (other than organic manure) which is manufactured in an industrial process.

Nitrate Vulnerable Zone (NVZ) ~ an area of land designated in accordance with Article 3 of the Nitrates Directive as a vulnerable zone for the purposes of that Directive.

Nitrogen fertiliser ~ any substance containing one or more nitrogen compounds used on land to enhance the growth of vegetation and includes organic manures.

Organic manure ~ any nitrogen fertiliser derived from animal, human or plant sources. It includes livestock manure, sewage sludge and other organic materials.

Organic manure N field limit ~ an upper limit for the addition of nitrogen from all livestock manures and all other organic manures applied to each field in any 12 months in a Nitrate Vulnerable Zone. It does not include excreta and urine deposited directly to land by grazing animals.

Other nitrogen-containing materials ~ any substance containing nitrogen that is neither a manufactured nitrogen fertiliser nor an organic manure e.g. dredgings.

Quality Protocol ~ standards for the production and use of compost and digestate such that they are no longer waste materials.

Readily available nitrogen ~ nitrogen that is present in livestock and other organic manures either as ammonium or nitrate, or in poultry manure as uric-acid N, is known as the readily available fraction as it will be taken up more quickly by plants than nitrogen that is bound in organic compounds.

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 them to be pumped or discharged by gravity. The liquid fraction of separated slurry is also defined as slurry.

Soil nitrogen supply (SNS) ~ the amount of nitrogen (kg N/ha) in the soil that becomes available for uptake by the crop in the growing season, taking account of nitrogen losses.

Solid manure ~ organic manure which can be stacked in a freestanding heap without slumping.

Surface water ~ includes coastal waters, estuaries, canals, lakes, ponds, rivers, streams, ditches which contain free water and also temporarily dry ditches and blind ditches.

11 Index

Numbers refer to paragraphs in the text.

Above-ground circular stores 200–205
Accident and emergency 53–54, 127–128, 180, 195, 240, 264, 272, 288, 309
Acidity (see Soil acidity)
Agricultural fuel oil (see Fuel oil)
Agricultural waste 111, 423, 425, 513–518, 531–540
Air pollution 25–33
Ammonia 5, 21, 25–26, 36, 65–67, 91–95, 203, 214, 226, 229, 234, 302, 305, 323, 397–400, 403, 407, 579
Anaerobic digestion 31, 234
Animal carcases 513, 518, 538, 545–551
Animal feed 95, 99, 117, 170, 188, 328–331, 377, 436
Animal housing (see Livestock buildings)
Application rate 140–141, 219, 253, 380, 382, 394–409, 410, 433
Archaeological sites 41–42, 50, 155, 174, 335, 355, 486
Arsenic 107
Atmospheric deposition 106

Baled silage 183, 186
Bagged silage 185–186
Bio-solids 112, 416
Buffer strips 38, 81, 169, 348, 433, 438–439, 467
Burning 27, 378, 538

Cadmium 105, 107
Calcium 59, 127
Carcases (see Animal carcases)
Carbon 28–29, 57, 88, 375–379
Carbon dioxide 27–29, 117, 489
Cattle housing (see Livestock buildings)
Climate change 25–33
Compaction (see Soil compaction)
Compost 21, 74, 91, 110, 120–123, 143, 234, 387, 412, 416, 419, 423, 495, 499, 501–506, 538
Container grown nursery stock 497–500, 574
Contamination (see Soil contamination)
Copper 59, 105, 117–118, 125
Cover crops 84–85
Crop protection (see Management plans)
Crop residues 57, 86, 353, 373–374, 453
Cryptosporidium 232
Cultivations 41, 57, 86, 89, 127, 166, 335, 344–374

Dark smoke (see Smoke)
Diesel oil (see Fuel oil)
Diffuse pollution 17, 19
Dioxins 105
Dirty water 38, 52, 90, 137, 146, 182, 191–199, 208, 210–224, 230–231, 306, 380–409, 496, 502–506
Dredgings 70, 110, 111, 425, 538–540

Earth-banked stores 116, 191–195, 210–216, 218, 230–231
Emergency action (see Accident and emergency)
Empty containers 254, 269
Energy 28, 177, 317, 321, 489
Eutrophication 20, 64, 98

Farmyard manure 74–78, 91, 232, 234, 364
Feed (see Animal feed)
Fertilisers 21, 28, 30, 37–38, 49, 56, 58–62, 69–70, 79–83, 96–98, 100–104, 129, 142, 147–153, 272–286, 353, 364, 366, 427–435, 488, 499, 511
  fluid fertilisers 277–285
  solid fertilisers 273–276
Field heaps (manure) 228
Field silage 184–186
Flooding (see Sea water flooding)
Floodwater 130–131
Fuel oil 21, 24, 287–298

Grazing 49, 87, 92, 108, 130, 341, 394, 449, 453–462
Greenhouse gases 27, 30, 66, 177–178, 337
Groundwater 7, 20, 22, 53–54, 55, 168, 184, 228, 253, 256, 260, 267, 294, 313, 438, 458, 464, 494, 543

Harvesting 108, 357, 372–374
Heavy metals 35, 105, 416
Hedge trimmings 538
Hydroponic protected crops 491

Incinerators 538, 545–551
Inorganic fertiliser (see Fertilisers)
Irrigation (see Land irrigation)
Irrigation reservoirs 552–555

Lagoons (see Earth-banked stores)
Land application
band spreader 397, 403
dirty water 380–409
fertiliser 427–435
injector 397, 404
irrigator 217–224
lime 427–409
livestock manure 380–409
organic waste 410–426
risk assessment 137–146
sewage sludge 410–426
slurry 380–409
silage effluent 182
used sheep dip 249–253
Lead 105, 107, 126
Livestock buildings 2, 6, 33, 92–93, 301–328
cattle 310–312
pig 314–318
poultry 319–328, 471
Liquid fertilisers (see Fertilisers)
Liquid waste 518, 541–543
Livestock diets (see Animal feeds)
Low rate irrigation 218

Magnesium 59, 148
Management plans 132–171
crop protection 162–171
manure 137–146
nutrient 147–153
soil 154–161
Manganese 59
Mechanical separation 234
Mercury 107
Methane
Milk 330, 425, 538, 577
Mine workings 106, 130
Mulching 364, 413
Mushrooms 501–506

Natura 2000 sites 36
Nitrate 9, 22, 64, 67, 68–89, 97, 412, 449, 468, 472
Nitrogen 22, 26, 28, 36, 39, 56, 59, 63–67, 69–72, 74, 79–83, 86–87, 90–97, 101, 129, 141, 279, 384, 388, 394, 412, 416, 427, 430
Nursery stock 497–500, 556, 574–575
Nutrient management 58–62, 94, 102–103, 147–153, 364, 380, 450, 494

Odours 25, 182, 203, 214, 226, 228–229, 234, 302, 305, 328–331, 386–387, 397–404, 463, 470, 545
Oil spillage 106
Organic chemicals 105–131
Organic manure 21–22, 25, 27, 30, 35, 38, 57, 59, 62, 69–78, 89–91, 97–98, 100–103, 147–53, 353.
Organic matter 21–22, 27, 29, 34–35, 57, 88, 112, 159, 353, 355, 365, 416
Outdoor pigs 92, 463–469
Outdoor poultry 470–472

Peat 29, 375–379
Pesticides 21, 24, 38, 110, 118, 124–125, 162–171, 256–271, 366, 436–447, 500, 505, 538, 543
pH (see Soil acidity)
Phosphorus 22, 39, 59, 98–104, 416
Pig housing (see Livestock buildings)
Pipeline laying (see Restoring disturbed soils)
Point source pollution 16, 19
Polychlorinated biphenyls 105
Potassium 59
Poultry housing (see Livestock buildings)
Protected crops 490–496

Quality protocols 120–122, 411, 419–420

Rainwater harvesting 496, 506, 556, 575, 577
Reception pits 197–205, 230
Responsibilities 36, 50–52, 113, 271, 416, 476, 555

Seawater flooding 106, 127
Separation (see Mechanical separation)
Sewage sludge 21, 72, 74, 91, 110, 112–116, 118, 143, 412, 416–418
Sheep dip 21, 24, 235–255
Silage
    additives 189
    effluent 52, 179–188, 331
    stores 179–187
Sites of Special Scientific Interest (SSSI) 36, 50
Slurry 52, 85, 91, 93, 137–146, 175, 182, 191, 196–217, 227, 230–234, 246, 253, 301, 303, 306–308, 380, 383, 387–409.
Slurry storage 144, 175, 191–231
Smoke 32
Soil
    acidity 56
    compaction 345, 368, 372, 405, 451, 484, 567
    contamination 55, 105–131, 477
    disturbance 88
    erosion 34, 39–40, 42, 52, 85 -86, 91, 93, 98, 100, 104, 154, 161, 213, 342, 345 – 352, 356 – 359, 360 – 367, 368 – 372, 377 – 378, 413, 442, 449, 453 – 457, 462, 463 – 471, 474, 481, 484
    fertility 35, 55 – 62, 105, 380, 450
    incorporation 91, 93, 103, 373, 390, 397 – 400
    mixing (see Soil incorporation)
    reinstatement 469, 473 -479
    sampling and analysis 102
    storage 473 – 479
Sprinklers 218, 223 224, 407 – 408
Strainer box 212

Tin tanks (see Above-ground circular stores)
Travelling irrigator 218, 220 – 224, 407 – 408
Treatment
    manure 232 – 234
    pesticide 265
Turf 480 – 486

Ventilation 177, 303, 305, 315, 317, 321, 323, 325
Veterinary medicines 24, 119, 309

Waste 513 – 523
exemptions (from permitting) 537 – 540
minimisation 524 – 530
storage, recycling and disposal 531 – 536
Waste oil 299 – 300, 518, 520, 538, 544
Watercress 507 – 512
Water erosion (see Soil erosion)
Water pollution 20 – 24
Water usage 552 – 579
field crop irrigation 564 – 570
livestock drinking 576 – 579
protected crops and nursery stock 574 – 575
vegetable washings 571 – 573
Weeping wall slurry store 206 – 209
Wind erosion (see soil erosion)
Wrapped silage (see Baled silage)

Yard run-off (see Dirty water)

Zinc 59, 105, 117 – 118, 512

12 Contacts

Environment Agency Head Office, Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, BS32 4UD
www.environment-agency.gov.uk

Environment Agency General Enquiry Line 08708 506 506 or
e-mail enquiries@environment-agency.gov.uk
Environment Agency Incident Hotline 0800 80 70 60
Environment Agency Floodline 0845 988 1188

Natural England Head Office, 1 East Parade, Sheffield, S1 2ET
Tel: 0114 241 8920
Fax: 0114 241 8921
www.naturalengland.org.uk

Natural England General Enquiries 0845 600 3078, or Fax 01733 455103, or
e-mail enquiries@naturalengland.org.uk

Department for Environment, Food and Rural Affairs, Nobel House, 17 Smith Square, London, SW1P 3JR

Tel: 020 7238 6000 (switchboard)
Fax: 020 7238 2188
www.defra.gov.uk

Defra Helpline 08459 335 577 or e-mail helpline@defra.gsi.gov.uk

Animal Health (an Executive Agency of Defra)
Contact local Divisional Offices
http://www.defra.gov.uk/animalhealth/index.htm

Animal Health Information Line 0844 884 4600

ISBN 978-0-11-243284-5





www.tso.co.uk