Isle of Man Government

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Protecting our Water and Soil

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

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This code has been prepared by a Working Party consisting of professional and technical officers of the Department of Environment, Food and Agriculture and Manx Utilities Authority.

Contents

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.

2. The Code describes key actions you can take to protect and enhance the quality of water, soil and air.

3. In some cases you may also achieve cost savings for your business.

4. It will help you to meet your legal obligations including those relating to cross compliance.

5. 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.

6. The Code replaces the Code of Good Agricultural Practice for the Protection of Water issued by the Department of Agriculture, Fisheries and Forestry, the Department of Local Government and Environment and the Isle of Man Water Authority in December 2003.

7. The Water Pollution Act 1991 contains provisions which are designed to prevent water pollution. Under Section 3 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. Controlled waters include groundwater and all coastal and inland waters, including lakes, ponds, rivers, streams, canals and field ditches.

8. In addition, it is intended that this Code be approved as a code of practice under section 11(1) of the Water Pollution Act 1993, which relates to the pollution of coastal and inland waters generally ('controlled waters'). A contravention of this Code does not itself give rise to any criminal or civil liability, but it may be taken into account in any legal proceedings instituted by the Department of Environment, Food and Agriculture under Part 1 of that Act, involving pollution of controlled waters.

9. Controlled waters include all rivers, streams, ditches, drains, cuts, culverts, dykes, sluices, sewers and passages through which water flows. They also include the waters of a lake or pond or of any river or watercourse includes the bottom, channel or bed of a lake, pond, river or watercourse which is for the time being dry.

1. Introduction

1.1 Pollution sources and impacts

10. Protecting our natural resources of water and soil and is essential for a sustainable environment. The advice in this Code recognises that things you do can affect water and soil 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 ground waters;
    - 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.

11. 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".

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

13. 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

14. Some practical ways to save money by minimising both point source and diffuse pollution across a range of farming activities have been identified by DEFA

Water pollution

15. 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 are not met, particularly in sensitive river and groundwater catchments. For example, 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.

16. 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.

17. 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. About 60% of the nitrate in Manx rivers comes from agriculture.

18. 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.

19. 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.

Protecting soils

20. 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.

21. 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

22. Farmers, growers and land managers have a responsibility to protect the wider environment, especially designated areas such as Areas of Special Scientific Interest (ASSIs). 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.

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

24. 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.

25. 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.

26. 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.

27. 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 if you are unsure about the status of an historic site.

28. 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.

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

Regulation

29. 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.

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

Cross compliance obligations

31. Since April 2009 most farmers' Agricultural Support Payments, have been conditional on meeting "cross compliance" provisions – baseline standards for agriculture that all Agricultural Development Scheme (ADS) applicants must meet. 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 April 2009 and set requirements for farmers to protect soils and maintain a range of habitat and landscape features characteristic of the Manx countryside. Many of these were existing law and some reflect good practice; and
    - Statutory Management Requirements (SMRs). These cover a range of issues dealing with the environment; public, plant and animal health; and animal welfare and have also been in place since from April 2009.

    Failure to meet the GAEC or SMRs requirements could mean that part or all of the ADS may be withheld.

32. 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 Farmers' Handbook (reference 1) and/or the DEFA web site.

33. 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 1).

1.4 Responsibilities of farmers, farm staff and contractors

34. 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;
    - Areas of Special Scientific Interest;
    - other protected areas;
    - land under agri-environment or other management agreements; and
    - sensitive archaeological sites.

35. 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.

36. 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 DEFA Environmental Protection Unit (tel 685885) at once and take immediate steps to stop any further pollution.

37. It is good practice to produce an emergency plan 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.

38. 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. DEFA and local Authority), MUA, DoI, Health and Safety Executive, 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. 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

39. 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.

Good practice

Soil pH and liming

40. 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 3, 4).

Maintaining soil organic matter

41. 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

42. 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).

43. 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.

44. Use a recognised fertiliser recommendation system (e.g. reference 4, 5). 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 6).

45. 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.

46. 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.

Nitrogen fertiliser and manufactured nitrogen fertiliser

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

47. 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.

48. 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, and kill fish.

Leaching

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

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

50. 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.

51. 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

Controlling nitrogen application

52. 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 4). Where the soil nitrogen supply is high, soil analysis for mineral nitrogen can provide a more precise guide to fertiliser requirement.

53. 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

54. You should not apply more than 100 kg of total nitrogen in organic manures to any given acre 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 8), or you can use look up tables (reference 4, 5).

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.

55. 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.

56. 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.

57. 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.

58. 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.

59. You should not apply organic manures within:

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

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

61. 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

62. 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.

63. 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, organic manures or Pesticides within 1 metres of the centre of a hedge, a watercourse or a field ditch if you receive an ADS payment. This also applies to land within 1 metre of the top of the bank of a watercourse (reference 1).

64. 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.

65. 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.

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

Crop cover in arable rotations

67. 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. 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 69 below).

68. 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

69. 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 peas, beans 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.

Leaving uncultivated stubbles over winter can encourage wildlife, but you should consider the risk of run-off and erosion before deciding to do this.

Managing grassland

70. 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.

71. 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. 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.

72. 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

73. 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).

74. 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

75. 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 Isle of Man. 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.

76. 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:

77. If you broadcast slurry (by splash plate), you should incorporate it into the soil immediately and at the latest within 6 hours.

78. 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.

79. 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 4).

Livestock diets

80. 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

81. 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 4).

Minimising nitrous oxide loss to air

82. 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. 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.

The environmental impacts of phosphorus

83. 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 4).

Good practice

Animal feeds

84. 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

85. 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 4).

86. 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.

87. 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

88. 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.

89. 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 regulated in the IoM under the Food Act 1996 through EC legislation as in the UK (reference 52).

If sewage sludge is applied to agricultural land, there are obligations that you and the sludge provider must follow (reference 1, 13, 45). Complying with this is currently a cross compliance requirement.

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

Sources and impacts of contamination

90. 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.

91. 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 from DEFA. If the contamination is so serious that there are effects on crops or livestock there are legal powers within Public Health Act 1990 and The Water Pollution Act 1993 which can be enforced by DEFA. Removing the affected land from production may be the only cost effective way to meet such a requirement.

Good practice

Dealing with existing contamination

92. 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 55). 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.

93. 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 9).

94. 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

95. 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

96. You will require a Waste Disposal Licence under the Public Health Act 1990 (reference 54) 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 DEFA 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.

Sewage Sludge

97. 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 8) and by the voluntary application of the Safe Sludge Matrix (reference 10). Further guidance is given in a supporting Code of Practice (reference 11). Complying with this Regulation is currently a cross compliance requirement.

98. 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.

99. Sewage sludge can also be spread on land used to grow crops other than food, such as for industrial cropping (reference 11). This requires a Waste Disposal Licence exemption from DEFA.

100. 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.

Livestock manures

101. 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 administering medicines, you must follow instructions from your veterinary surgeon.

102. 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 1 Trigger values for copper and zinc for seeking advice when applying manures or pesticides (reference 11)

	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

103. 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 DEFA on disposal options.

Composts and other wastes

104. Composts made from bio-degradable wastes may be applied to agricultural land under the Waste Disposal Licencing Regulations. Other wastes and composts may only be applied to land if Waste Disposal Licencing Regulations are followed. These require prior notification to, or permitting by, DEFA. Following the Regulations will ensure that soil does not become contaminated.

105. For land application of other organic wastes, composts and digestates– you must apply for a Waste Disposal Licence 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).

106. 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 53). You should consult Animal Health for advice.

Pesticides

107. 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).

108. 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

109. 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

110. 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 DEFA under Schedule 5 of The Collection and Disposal of Waste Regulations 2000 by completing a Waste Disposal Licence (reference 54).
111. 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).

112. Cultivate and fertilise the soil to encourage microbial activity, which will help to break down the oil. The lighter the oil the sooner the soil will recover. Detailed guidance is available (reference 12).

113. 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.

114. 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.

115. Do not allow spillages of any oils or contaminated liquids to discharge into the public sewer. Should such an incident occur contact the MUA immediately on 686687 with details of where the discharge has occurred, and what it is that has entered the public sewer.

3. Management plans

3.1 Introduction

116. 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.

117. 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.

118. 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.

119. You may wish to get help to prepare your plans, including from a suitably qualified independent consultant. (reference 13).

120. 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.

New or substantially altered slurry stores must comply with the guidance laid down as minimum construction standards in the CoGAP (reference 13). The code also includes minimum storage periods that you may have to provide (see also Section 4.3).

Good practice

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

122. 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 13); your plan should be clearly set out and include the steps identified in the following paragraphs.

123. 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 dirt water should never be spread. These non-spreading areas should be marked on a farm map (in red).

124. 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).

125. Calculate the minimum area of land needed for spreading livestock manures by using a maximum field application rate of 100kg total nitrogen per acre per year. You can use standard tables or an analysis of your manures for this.

126. 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 Waste Disposal Licencing (see Section 7).

127. 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).

128. 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. All new or substantially altered slurry stores should comply with standards of construction (reference 13).

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

130. 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.

Good practice

131. 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 15).

132. 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.

133. Assess the nutrient requirement of the crop using a recognised fertilizer recommendation system (e.g. references 4, 5). If you receive professional advice on your plan, ensure that you use a current FACTS (Fertiliser Advisers Certification and Training Scheme) qualified person (reference 16).

134. Assess the nutrient supply from organic manure. Consider if a laboratory or on-farm analysis is necessary (references 4, 5). Make sure you obtain representative samples of manure for analysis. You may need to thoroughly mix the contents of slurry stores.

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

Good practice

136. 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.

137. When developing a soil management plan the protection of archaeological sites should be taken into account. Read relevant publications on controlling run-off and erosion and good practices for managing soils (reference 1, 17). Using published guidance (reference 17) 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.

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

139. 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.

140. 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).

141. 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

142. 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 18, 19). 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 20) before producing a plan.

143. 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.

144. If neither you nor a member of your staff is BASIS qualified, you should produce your plan with a BASIS qualified agronomist (reference 16).

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

146. 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.

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

148. 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.

149. 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 21, 22).

150. 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.

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

4. Farm buildings and structures

4.1 Introduction

152. 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.

153. 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.

154. 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.

155. 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 Manx National Heritage if you are unsure about the status of an historic site.

156. 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 store and slurry stores containing potentially polluting liquids will alert you to problems before they occur and can prevent serious pollution incidents.

157. 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.

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.

Good practice

158. 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.

159. 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.

160. 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.

161. 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 $20m^3$/ac. Note: adding effluent to slurry or dirty water will increase the risk of causing an odour nuisance.

162. 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.

163. 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 DEFA 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

164. There are no legal obligations on the Isle of Man 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). However the requirements (reference 23) from the UK are exemplars of good practice for silos these 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.

Designing new silos

165. 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 24).

Feeding effluent to livestock

166. 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.

Silage additives

167. 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

168. 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.

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 25).

Good practice

General

169. 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 204). 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, in earth-banked lagoons and 300 mm in other slurry and dirty water stores

170. 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 26). Where applicable, you should 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).

171. 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.

172. 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.

173. 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

174. 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. 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

175. 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 DEFA about specific requirements as the risk of causing water pollution depends on site conditions.

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

Above-ground circular stores

177. 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.

178. 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.

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

180. 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.

181. 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.

182. You should fit two valves in-line between the store and the reception pit to control the outflow of slurry. 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

183. 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.

184. 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.

185. 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.

186. 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

187. 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.

188. 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.

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

190. 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.

191. 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.

192. 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.

193. 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

194. 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.

195. '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 $20m^3$/ac 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.

196. '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 $20m^3$/ac are only acceptable on field sites when soil and slope conditions are optimum.

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

198. 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 DEFA.

199. 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 that the system has shut down or failed. Travelling irrigators should have an automatic shut down at the end of a run.

200. 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.

201. 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.

202. Dirty water should not be allowed to enter the public sewer without the authorisation of the MUA in the form of a Trade Effluent Consent.

Solid manure stores

203. 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.

204. 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.

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

Field heaps

206. 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.

207. 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.

208. You must provide at least 4 months' slurry storage, unless you can demonstrate to DEFA that you have a safe year-round management and field application system;

Design of the store

209. 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 27). 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 (reference 13, 25).

Manure treatment

210. 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.

211. 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 28).

212. 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. 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.

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

Good practice

Before you dip

213. Plan to carry out safe dipping of sheep (reference 29). Make sure everyone involved in sheep dipping has been trained in personal health and safety, animal welfare and environmental impacts (reference 29). Sheep dip products

should be handled by, or their use supervised by, a person who holds a Certificate of Competence in the Safe Use of Sheep Dip (reference 30).

214. 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.

215. 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.

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

217. Store and transport dip concentrate safely.

218. 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).

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

When you dip

220. 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.

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

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

After you dip

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

224. 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.

225. Cover the dip bath when not in use.

Spreading used dip onto land

226. 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.

227. 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.

**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

228. 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

229. 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 31).

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.

Good practice

Before you dip

230. New pesticide stores should meet good standards of design and construction (reference 32). You should not build stores where there is a risk of polluting surface waters or groundwater. Get advice from DEFA, local planning and fire authorities, the crime prevention officer, and the Health and Safety Executive before you build or substantially alter a pesticide store.

231. 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.

232. 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).

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

Mixing pesticides, filling spray tanks and washing equipment

234. 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.

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

Transport

236. 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 20) for more detail.

Training

237. 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 20).

Spillage

238. 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 DEFA 01624 685885 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

239. If you intend to install a waste treatment facility for dilute pesticide washings – such as a biobed, you should first consult the Voluntary Initiative web site (see Section 7) (reference 33).

Disposal of wastes

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

240. 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.

241. 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;

    - use a licenced waste disposal contractor, SUEZ (formally SITA)

242. 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.

243. 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 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).

244. 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.

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.

Good practice

General

245. 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

246. 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.

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

248. Provide secure storage on farm and carry out regular stock checks. If possible keep fertiliser in a locked building (reference 34)

Liquid fertilisers

249. 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. DEFA strongly advises that suitably designed and constructed secondary containment is provided for fluid fertiliser storage tanks. You should check the suitability of sites with DEFA.

250. 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.

251. 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.

252. 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.

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

254. 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.

255. 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.

256. 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.

257. Further guidance is provided in a Code of Practice (Reference 35).

Disposal of fertiliser bags

258. 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.

Good practice

259. All agricultural fuel oil stores should be bunded to provide secondary containment of possible leaks and spillage. Some installations must comply with licence conditions set by DEFA with their respective Waste Disposal Licence (reference 54).

260. 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.

261. 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. Keep all valves inside the bund closed and locked when you are not using them.

262. 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.

263. 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).

264. 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.

265. 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.

Design of storage facilities

266. 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 DEFA.

267. 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.

268. 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.

269. 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

270. 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 licensed sites (see Section 7).

271. You can burn waste oils for heating on farms.

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.**

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

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

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

274. 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.

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

276. 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.

277. 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).

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

279. 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).

280. 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

281. The space allowances and other provisions for cattle must meet the requirements of the Red Tractor Assurance (reference 36). You should follow advice in the Welfare Code (reference 37).

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

283. Dairy and parlour buildings need to be washed and cleaned frequently (reference 38).

Woodchip corrals

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

Pig buildings

285. The space allowances and other provisions for pigs must meet the requirements of the Red tractor assurance (reference 39). You should follow advice in the Welfare Code (reference 40).

286. 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.

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

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

Poultry buildings

289. The space allowances and other provisions for poultry must meet the requirements of the Red tractor assurance (reference 41). You should follow advice in the Welfare Code (reference 42).

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

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

Deep litter systems

292. 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.

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

294. 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.

295. 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

296. 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.

297. 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.

298. 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.

299. 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.

300. 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.

301. 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.

302. 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.

303. 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.

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

305. If you have to travel on wet soils, reduce the loading with low ground pressure setups, or set tyre pressures at the lowest that is compatible with the load and tyre type.

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

307. 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 subsoiling). This will reduce the risk of run-off and increase the time available for working on the land or for grazing livestock.

308. 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.

309. 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.

Good practice

General

310. 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.

311. 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 subsoiling. 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.

312. 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.

313. 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.

Controlling run-off and erosion

314. 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.

315. 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.

316. 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 DEFA as you will need planning permission.

317. 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 DEFA 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.

318. 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 DEFA 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 342.

Organic matter

319. 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

320. 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.

321. 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.

322. 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.

323. 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.

324. 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.

325. 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

326. 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.

327. 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.

328. 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.

329. 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.

330. 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; and
- sow nurse crops such as barley to stabilise the soil and protect seedlings.

331. 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.

332. 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.

333. 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

334. 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.

335. 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.

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

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

Harvesting

338. 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.

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

340. You must not burn crop residues unless certain restricted conditions apply (reference 1). 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.**

Good practice

341. 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.

342. 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.

343. 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 DEFA 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.

344. Do not start fires on peat soils if this will leave an exposed surface vulnerable to erosion. The Act (reference 43) sets 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 DEFA). The Heath Burning Code (reference 44) provides further guidance on the law and good practice and is currently a cross compliance requirement.

345. 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 20m3 of slurry or dirty water per acre 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 where practical at the latest within 6 hours.*
- *if you apply solid manure, you should incorporate it as soon as possible, and where practical 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.

Good practice

General

346. 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).

347. 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 25).
    - 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 28).

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

349. 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

350. 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).

351. 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.

352. 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.

353. 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.

Restrictions on certain areas

354. 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.

355. 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 362 to 365)

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

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

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

Application rates

359. You should limit applications to no more than 100 kg of 'total nitrogen' per acre 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).

360. Avoid applying more than 50m^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.

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

Application techniques

362. 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 363 to 365).

363. 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.

364. 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.

365. 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.

366. 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 25). 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.

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

Band spreaders

368. These machines place slurry on the ground in strips or bands by using a series of hoses, or hoses with shoes attached (reference 25). 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

369. These are usually open slot shallow injectors (up to 50 millimetres deep), or deep injectors (over 150 millimetres deep) (reference 25). 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

370. 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 25). 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.

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

Irrigation

372. Use equipment with a low trajectory (low spread pattern) and large droplets to reduce odour and ammonia emissions (reference 25). 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 shutdown 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.

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

374. 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 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 20m^2 of liquid waste per acre 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.

The application of sewage sludge and other organic wastes to land is controlled by The Collection and Disposal of Waste Regulations 2000 (reference 54). The activity must provide agricultural benefit or ecological improvement as defined by the 2000 Regulations. You must also comply with the law on animal by-products if these are applied to pasture land (reference 53). Complying with this is currently a cross compliance requirement.

Further guidance on sludge application is available (reference 45). Also, see Sections 2.4 and 7.

Compost and anaerobic digestate made from approved bio-degradable wastes will require an exemption under the Collection and Disposal of Waste Regulations 2000 (reference 54).

Good practice

General

375. 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.

376. 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).

377. You should not apply more than 100 kg of 'total nitrogen' per acre 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 200 kg per acre of 'total nitrogen' in one application every 2 years.

378. 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 mulch and left on the surface of soils. In such cases you will need a Waste Disposal Licence exemption from DEFA (reference 54).

379. Guidance is available on the application of paper sludge to agricultural land (reference 56).

Regulations

380. The treatment of land by the application of organic wastes to provide agricultural benefit or ecological improvement is controlled under The Collection and Disposal of Waste Regulations 2000 (reference 54). Consult DEFA for further advice.

Sewage sludge

381. 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 guidance (reference 45) is 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 45). Applications of sewage sludge must take into account the metal content of the soil and of the sludge that is applied.

382. When sewage sludge is applied you must comply with industry best practice before and after applications to ensure food safety and to reduce the risk of disease transmission to animals (reference 45).

Quality Protocols

383. Composts made from approved bio-degradable wastes may be applied to agricultural land provided a waste disposal exemption licence under the Disposal of Waste Regulations 2000 is obtained (reference 58).

384. For other organic wastes – you must comply with a Waste Disposal Licence or an exemption (reference 54), and you must not cause harm to human health, or cause pollution of the environment (see Section 7).

385. 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 53). You should consult the Animal Health Directorate for advice.

386. Land spreading of industrial wastes (including some agricultural wastes, and those organic wastes and composts) is controlled by the Waste Disposal Licencing system and a duty of care to protect the environment and public health (see Section 7).

387. A lighter regulatory approach ('exemptions' from the need to obtain a Waste Disposal Licence) is taken for land spreading some wastes that present a lower risk. Such exemptions (reference 54) contain conditions that you must comply with, and where wastes are brought onto and applied to the land you must confirm to DEFA 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.

388. All exemptions must be registered with DEFA. You should consult DEFA for advice because exemptions are subject to change, including the provision of new ones (reference 54).

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.

Good practice

389. 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.

390. 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. Particular care is needed when using solid urea. You should only use fertiliser of a quality that you can spread accurately and evenly.

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

392. 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.

393. 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.

394. 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.

395. 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 ADS 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 1). 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.

396. 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.

397. 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 they must work under the direct supervision of someone with the correct certificate (reference 20).

You must always comply with the conditions of use. These are either on the label or are part of an Extension of Authorisation for Minor Use (EAMU) previously known as a Specific Off-Label Approval (SOLA) (reference 46).

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 DEFA.

You must keep records of all pesticides used when you grow food or feed crops (reference 1); this is a cross compliance requirement.

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

398. 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 20, 46). Keeping records of all pesticides is not only good practice but is a cross compliance requirement.

399. 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 47).

400. 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.

401. 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 (LERAP) (reference 22).

402. Ensure you take adequate precautions to protect bees and other beneficial insects (reference 20).

Field application

403. 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.

404. Consider having trailed, mounted or self-propelled sprayers tested annually under the National Sprayer Testing Scheme (NSTS) (reference 48).

405. 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.

406. 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.

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

408. 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.

409. 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.

410. 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 DEFA. You may also have to let water abstractors know.

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 ADS Payment, you must comply with the principles of good husbandry. You will be in breach of cross compliance rules if you overgraze, or carry out unsuitable supplementary feeding on natural and semi-natural vegetation (reference 1).

You must not burn heather, rough grass, bracken, gorse or Vaccinium in breach of regulations (reference 43).

You must not allow stock to damage important features on Areas of Special Scientific Interest (ASSIs), or on other designated areas (reference 1).

Good practice

General

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

412. 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.

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

414. 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.

415. 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

416. 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.

417. 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.

418. You should not overgraze natural or semi-natural vegetation.

419. 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 cross compliance requirement.

420. 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.

421. 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

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

423. 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 DEFA.

424. 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.

425. 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

426. 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.

427. 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. See also Section 3.4 for producing a site risk assessment.

428. 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.

429. 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.

430. 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.

431. 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.

432. 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

433. 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.

434. 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.

435. 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 – DEFA Mineral Planning.*
- *For landfilling, waste recovery or waste disposal –Environmental Protection Unit.*
- *For a pipeline proposal –Manx Utilities plus other regulator depending on the material being transferred.*

See reference 57

Good practice

Planning the work

436. 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.

437. 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.

438. 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 DEFA for details of any Waste Disposal Licencing requirements or exemptions which may be required for the work.

439. 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

440. 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.

441. 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.

442. 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.

Turf cutting may require consents before work commences.

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 consent from Manx National Heritage (MNH) where the site is on, or close to, a scheduled monument.

Good practice

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

444. 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.

445. 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.

446. 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.

447. 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.

448. 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).

449. If turf is to be produced from permanent pasture, choose sites that do not have historic, ecological or landscape importance. Old grassland and sites that have historic remnants such as ridge and furrow should not be used. Seek advice from the Archaeological Officer of MNH if you are unsure about the status of an historic site.

6. Specialised horticulture

6.1 Introduction

450. 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.

451. 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

452. 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.

Protected crops

453. 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.

454. 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.

455. 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.

456. 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.

457. 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.

458. 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.

459. 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

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

461. 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.

462. 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.

463. 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

464. 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.

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

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

467. 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.

468. 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.

7. Wastes

7.1 Introduction

469. Waste is any substance or object which the holder discards, or intends to or is required to discard (reference 57, section 77). To protect the environment and public health; you must dispose of any waste generated through agricultural and horticultural practices responsibly and in accordance with Cross-compliance Standard 13 - Landscape, litter, waste and scrap. The disposal of animal carcases is controlled by Animal By-Products Regulations 2007 (see Section 7.6).

470. Non-farm generated waste should not be stored on claimant's holdings. If non-farm generated waste is found on any part of the agricultural unit, a medium severity breach of the cross-compliance scheme will be deemed to have occurred. If this breach is rectifiable a deduction of 20% from the claimants CCS payment will be made; if the breach were to be deemed permanent then a deduction of 30% will be made. If two instances of this breach were to be found than the deductions would be greater.

471. There is no definitive list of agricultural waste but examples (when you need to dispose 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.

472. Livestock manures are not waste if they are used to fertilise soil for agricultural or ecological benefit on agricultural land (reference 4, 15 & 25) – whether on the farm where they are produced, or on another farm.

473. The burning of wastes creates cancer causing chemical compounds called Dioxins and is not an acceptable, safe or sustainable way of waste disposal. The Public Health Act 1990 (reference 57) places a Duty of Care on waste producers to ensure that all waste is disposed of correctly at registered licenced facilities. It is your Duty of Care to manage your waste responsibly in order to protect the environment and human health.

474. 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 licenced recovery or disposal facility;
- give the waste to an authorised person;
- apply for a Waste Disposal Licence; and
- register permitting 'exemptions' and comply with conditions for recovery or disposal of that waste.

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

Special (Hazardous) waste

"special waste" means waste of a kind to which regulations under section 71(1) of the public health act 1990 (reference 57) that the Department considers that controlled waste of any kind is or may be so dangerous or difficult to dispose of that special provision is required for its disposal

Examples of farm wastes that are classified as hazardous include waste oil, asbestos, lead acid batteries and agro-chemicals containing dangerous substances. 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 by persons authorised to do so.

476. It is the duty of any person who produces, carries, keeps, deals in a prescribed manner with or disposes of controlled waste to take all such measures as are reasonable in the circumstances —

    (a) to prevent any contravention by any other person of section 57 or regulations under section 71 or 71A in relation to the waste; and

    (b) to prevent the escape of the waste from his control or that of any other person.

Advice Note

For further advice on dealing with agricultural wastes, consult DEFA Environmental Protection Unit by telephoning Neil Gray 01624 685535

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

477. 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.

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

479. 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.

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

481. Many waste materials can be recycled for a secondary purpose.

482. 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.

483. 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 49).

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 ensure that the waste carrier disposes of the waste at a registered waste facility

Good practice

484. 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.

485. 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.

486. If you intend to take your agricultural waste off your holding to a recovery or disposal site 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;
- what wastes they can legally accept under their Licence or exemption; and
- the best way of delivering waste (bales, loose, etc.).

You must ensure, that the recovery or disposal site is a licenced facility.

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 and have an Agricultural benefit as defined in (reference 58) Regulation 8 schedule 5

Consider how you can benefit from exemptions available for dealing with some wastes.

These are exemptions from waste regulations which can be applied for through DEFA to allow deposit in a secure lagoon and on land of sewage sludge where for the purpose of fertilising or otherwise beneficially conditioning that land. The person depositing the waste must furnish particulars of the deposit. *In addition, you must not cause harm to human health, or cause pollution of the environment.*

Good practice

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.

Good practice

Dilute liquid waste

487. The MUA may allow dilute liquid waste discharges to a public sewer. This would be subject to an analysis of the proposed liquid waste to determine its potential impact on the sewer network and sewage treatment process. A trade effluent consent is required, and a charge may be made dependant on the volume and biological load of the waste. You will also need to provide and maintain an agreed sampling point, and adhere to any requirements set out in the consents.

488. SUEZ (formally SITA) provide a collection service for waste oil and will provide appropriate containers in which the spent oil can be stored prior to collection (reference 60) tel 695262.

489. In some circumstances, you may be able to discharge a treated dilute liquid waste of very low polluting load to surface water or to the ground. You must get discharge consent from DEFA for this (ref 59). 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.

7.6 Disposal of animal carcases

Using the recognised disposal route (AWPP) protects the environment from pollution. Animals and poultry that die on the farm must be disposed of through an authorised route.

Good practice

490. Animals and poultry that die on the farm must be disposed of through the AWPP, the removal, storage and disposal of carcases should be carried out as soon as possible to avoid causing odour problems.

491. 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.

8. Water supplies on the farm

8.1 Introduction

492. 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.

493. An environmental impact assessment must be carried out for water management projects that could have significant environmental impacts. These include irrigation projects involving the taking of water, or storage of water, Projects that require planning permission may also need an environmental impact assessment. 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 61). Consult DEFA for advice.

494. 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 50). You should know how much water you are using, keep records and make regular checks to monitor its use.

495. 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 62). 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.

Good practice

496. 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 and your operational and maintenance costs.

497. 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.

498. Calculate from standard information (where available) how much water you might use and compare with your actual usage (reference 49). This may indicate scope for savings.

499. 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.

500. Put improvements into practice, review and check water usage.

Crop irrigation

501. Use 'irrigation scheduling', and good practice, to make efficient use of water (reference 51).

502. Consider using boom irrigation to apply water more accurately than a gun. For some crops, trickle irrigation can be used to reduce water consumption.

503. Make regular checks of pumps, mains pipe, hydrants, supply hoses and irrigators and carry out necessary repairs.

504. 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.

505. 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.

506. Consider the need for winter storage of water and the potential for co-operating with neighbours. There may be opportunities for recreational use and conservation management.

507. 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

508. 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.

509. 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.

510. You should seek advice from DEFA if vegetable washings need disposal (see also Section 7 on waste).

Water for protected crops and nursery stock

511. You should control and monitor water applied to crops and container grown nursery stock to minimise run-off (see Section 8.1).

512. 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

513. Ensure that you provide sufficient water to meet the welfare requirements of livestock (reference 37, 40).

514. 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 38).

515. 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.

516. 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.

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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.