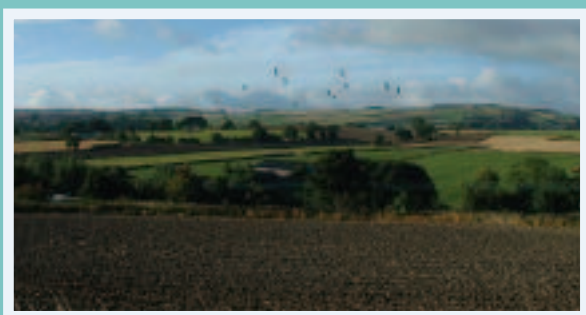


Single Payment Scheme

Cross Compliance

Guidance for Soil Management

2006 edition



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Other existing SPS publications:

Title	Defra publication no.
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<i>Cross Compliance Handbook for England (2006 edition)</i>	PB 11305
<i>Cross Compliance Soil Protection Review (2006 edition)</i>	PB 11160
<i>Cross Compliance Guidance for the Management of Habitats and Landscape Features (2005 edition)</i>	PB 10222C
<i>SPS Information for farmers and growers in England (October update)</i>	PB 11163

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Single Payment Scheme

Cross Compliance Guidance for Soil Management

2006 edition

Preface

The Single Payment Scheme (SPS) increases farmers' freedom to innovate and to respond to changing consumer demand. As such, it is a key part of Defra's Strategy for Sustainable Farming and Food. At the same time, all claimants have to meet a new baseline standard for agriculture and will be contributing to a higher degree of environmental protection.

Cross Compliance Guidance for Soil Management 2006 edition is an update of last year's publication and incorporates a number of key amendments after feedback from farmers and representative organisations, and some additions. The most important of these are highlighted below:

- the inclusion of the *Soil Protection Review*;
- maintaining soil organic matter;
- managing soils under set-aside; and
- managing soils not in agricultural production (Good Agricultural and Environmental Condition (GAEC) 12) or used for non-agricultural activities.

This guidance will help you to understand the rationale behind GAEC, provide good practice hints and tips to help you better understand the requirements of cross compliance, and signpost you to sources of additional information. The *Soil Protection Review* will need to be completed by September 2006 as part of the cross compliance requirements.

To help you with the introduction of cross compliance, Defra has set up a cross compliance advice programme. Further information on this service is provided in this guidance or by phoning the cross compliance advice line on 0845 345 1302.

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A Introduction

Background

1. The Single Payment Scheme (SPS) replaced most existing crop and livestock payments from 1 January 2005. The new scheme breaks the link between production and support. Instead, you are asked to demonstrate that you are:
 - keeping your land in Good Agricultural and Environmental Condition (GAEC); and
 - complying with a number of specified legal requirements relating to the environment, public health, plant health, animal health and welfare, and livestock identification and tracing (Statutory Management Requirements).
2. Meeting these requirements is described in the Common Agricultural Policy legislation as 'cross compliance'. The farmer requirements for cross compliance are set out in the *Cross Compliance Handbook for England 2006 edition* (referred to as 'the Handbook' in this Guidance). The Handbook may be updated from time to time.

Purpose

3. The guidance in the *Soil Protection Review* forms part of this soil management guidance and explains how to prepare a Soil Protection Review (SPR). The SPR provides a template for you to use which will make this task simpler. You should use that template with this Guidance to help you understand the rationale behind GAEC. Together, they provide good practice hints and tips to:
 - help you better understand the requirements of cross compliance; and
 - signpost sources of additional information and advice (see Appendix 3).
4. This Guidance should help you to manage your soils to improve their agricultural potential while at the same time reducing the scope for negative impacts on the environment. It will help you understand other soil-related problems you may find on your farm and what good practice measures you can put in place to minimise these problems. It will also help you meet the soils standards. You must read this guidance and are encouraged to read the *Cross Compliance Guidance on the Management of Habitats and Landscape Features*, distributed to all farmers last year.
5. This Guidance on soil management applies from 2006. It has been updated in the light of feedback from farmers and growers.

6. Neither this Guidance nor the Handbook takes the place of the law. You should refer to the legislation (SI 2004/3196) as amended, which is due to be further amended for 2006, for an explanation of your legal obligations.
7. You are required to retain and take account of this Guidance and the Handbook. The Handbook summarises your requirements for each GAEC and SMR standard.

What is GAEC for soils?

8. Good soil management means better productivity as well as improved environmental standards; it is vital to achieving good agricultural practice on your farm. Preventing soil eroding from fields and maintaining soil organic matter and a good soil structure are central to your responsibility for meeting the soil standards of GAEC.
9. During 2006, you should familiarise yourself with the relevant recommendations in this Guidance and continue to apply the three basic soil protection standards.
10. Before 1 September 2006, prepare a simple risk-based soil management plan, which we have called the Soil Protection Review, selecting measures that will help avoid any problems you have observed on your farm, and, for future years, the actions you will take to help remedy the problems if your measures do not work. This Guidance will help in drawing up your Soil Protection Review.
11. The Soil Protection Review must be put into practice on your land from 1 January 2007 onwards and reviewed annually.

Summary of GAEC requirements for soils

12. During 2006:
 - GAEC 1 – you must retain and take account of this Guidance booklet. Also, by 1 September 2006 you must draw up a SPR in accordance with this soils guidance booklet and the guidance in the SPR template.
 - GAEC 2–4 – you must comply with the three simple soil protection standards set out in the handbook and listed below.
13. The standards relate to:
 - GAEC 2 – post-harvest management of land after combinable crops (from harvest to 1 March);
 - GAEC 3 – waterlogged soil; and
 - GAEC 4 – burning of crop residues.
14. Although the impact of these standards may be greatest in the arable sector, they are relevant to all agricultural land. You should bear in mind that there are also requirements under the GAEC standards to protect soils for the maintenance of habitats and

landscape features. For example, farmers with livestock must comply with the overgrazing and unsuitable supplementary feeding requirement (GAEC 9).

15. During 2007 and in subsequent years:
 - you must continue to comply with the three simple standards (GAEC 2–4); and
 - you must implement the actions you have identified and update your SPR each year according to your experiences on the farm. It will only be necessary to produce a new review if the measures you have chosen to implement are not working, or you have changed land use or cropping.

Acknowledgements

16. The text and illustrations in this guidance are based on a number of sources, including discussions with stakeholders and specialists, which we are pleased to acknowledge. In particular, we are grateful for the substantial contribution made by the Environment Agency to the text. Images were provided by the Environment Agency unless stated otherwise.

Cross compliance advice

17. There is a practical advice service on the land management aspects of cross compliance. From January 2006, farm walks and workshops will be organised to provide guidance on how to complete and implement the Soil Protection Review. For further information please contact:

Helpline 0845 345 1302

Website www.crosscompliance.org.uk

B Managing soils on your farm

18. Well-managed soils are an important element of sustainable farming practice. Poor soil structure leads to patchy crops from uneven germination, poor growth and greater susceptibility to disease. It can also result in poor drainage and lead to ponding, runoff and soil erosion. Managing soils to reduce the risk of compaction and erosion will help increase yields and the quality of crops and pastures, as well as reducing the risk of damage to the environment. This section explains the soil-related problems (particularly erosion, poor structure and low organic matter) that you may encounter and sets out principles of good practice to help you manage your soils.

Recognising soil structural problems

19. Soil structure is a term used to describe the arrangement of particles into aggregates in the soil. You can see these aggregates if you dig a hole and carefully break the soil apart by hand or using a spade. Organic matter and clay (and, in some soils, calcium and iron) help to bind soil particles together. However, soil is very weak when it is wet and is vulnerable when pressure is applied to it.
20. The state of the aggregates in the soil determines how air and water move in the soil and how well crops and grass can grow. The structure can easily be damaged if the aggregates are broken down by poor soil management.
21. Problems with soils are not always easy to identify.

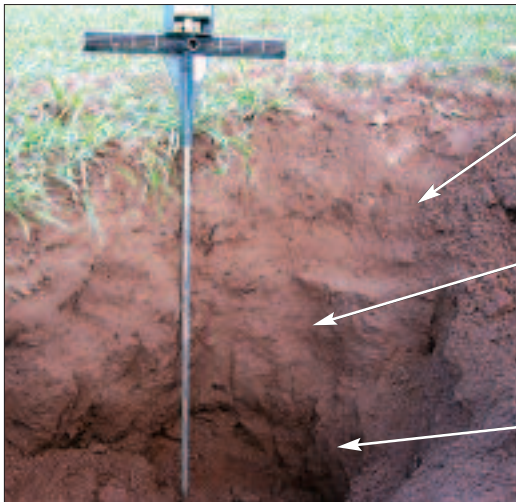
A well-structured soil



A well-structured soil has lots of pores, and aggregates can easily be broken between the thumb and finger when moist.

The subsoil usually has larger blocks than the topsoil, with many vertical cracks and channels. Well-structured subsoil can easily be broken apart when it is moist.

A poorly-structured soil

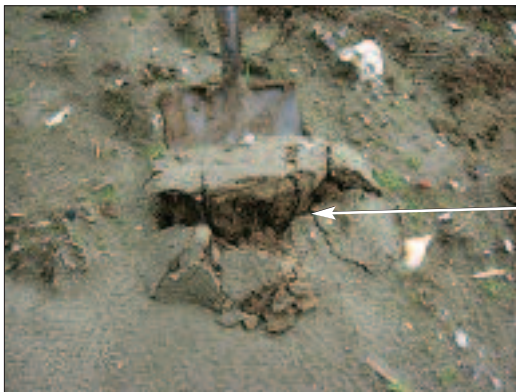


A poorly-structured topsoil has dense aggregates of soil with few pores and is difficult to break apart even when it is moist.

A subsoil with poor structure is dense and can often be seen as a distinct hard pan with platy structures. There are few pores or cracks in the soil.

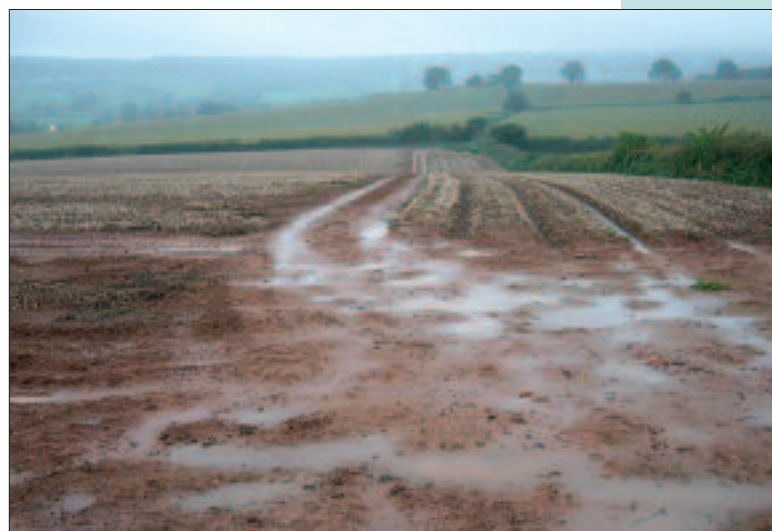
Soil beneath the pan may not be dense, or the compaction may extend deeper into the subsoil.

Surface capping



A surface cap is a compacted layer of soil particles often found on bare soils that have been exposed to rain. This cap can restrict crop emergence and lead to runoff and erosion.

22. Looking at the soil during or soon after rain will let you see the stability of the soil surface, how well water is getting into the soil, and where any runoff and erosion may be occurring.



Surface capping, compacted headlands and wheelings all reduce the porosity of the soil and may lead to runoff and erosion.

Maintaining soil organic matter

23. Soil organic matter improves the workability and fertility of soils, helps to maintain good structure and reduces the risk of capping, slumping and erosion. Continuous arable cropping reduces soil organic matter and positive action may be needed on some soils to maintain or increase current contents. Organic matter is added to soil by:
 - returning crop residues;
 - introducing cover crops, grass leys or longer periods of grass into the rotation; or
 - applying bulky organic manures.
24. These practices also recycle nutrients, in particular nitrogen, to the land. These nutrients should be taken into account when deciding on a fertiliser policy for the farm. By drawing up a nutrient management plan, which includes all sources of nutrients, farmers can save money on inorganic fertilisers. It will also help to protect the environment from excess nutrients getting into ground or surface water or into other sensitive habitats.
25. It is particularly important to account for all nitrogen additions to land in Nitrate Vulnerable Zones (NVZs). In these areas, farmers must not apply more nitrogen than the crop requires and there are limits on the total quantity of nitrogen that can be applied in organic manures. There are also restrictions on when certain types of manure can be applied. For full details of these and other restrictions in NVZs, you should refer to the Defra booklets *Guidelines for Farmers in NVZs England* and *Manure Planning in NVZs England*. Copies are available free of charge from Defra Publications (quote reference: PB 5505/5504). They can also be viewed and printed from www.defra.gov.uk/corporate/regulat/forms/agri_env/nvz/nvz4.pdf and www.defra.gov.uk/corporate/regulat/forms/agri/nvz/nvz5.htm
26. Further details of the help and advice available to comply with the NVZ Action Programme measures are provided on the Defra NVZ web pages at www.defra.gov.uk/environment/water/quality/nitrate/default.htm
27. Remember: the application of organic manures or nitrogen fertilisers on uncultivated land or semi-natural areas may constitute a project under the EIA (Uncultivated Land) Regulations 2001. You may need to obtain a screening decision. See GAEC 6 for further details.

General principles of good soil husbandry

- b1. Prepare and follow a soil management plan and, for cross compliance, complete a Soil Protection Review.
- b2. Prepare and follow a nutrient management plan.
- b3. Wet soils are more easily damaged by cultivation, harvesting, trafficking and livestock. Timeliness of activities and not overworking soils are critical to maintaining soils in good condition.
- b4. Drainage extends the season for field operations and grazing, especially in autumn and spring periods.
- b5. Soil organic matter improves soil stability and increases workability.
- b6. Look at soils during and after rain to identify areas of poor drainage and surface soil stability.
- b7. If you have to travel on or work wet soils, reduce the load with low ground-pressure set-ups, or set tyre pressures at the lowest pressure that is compatible with the load and tyre type.
- b8. Regular use of a spade to look for any compaction in the topsoil or subsoil helps you make decisions on cultivations, loosening and subsoiling. Deeper cultivation is often needed on tramlines, headlands and gateways to remove soil compaction.
- b9. Grow crops that match the capability of the land. When growing crops that require late harvesting, be prepared to correct any compaction or structural problems if they occur. Out-wintering of stock should be carried out on land that has good drainage. Stocking rates should be adjusted to minimise compaction and any runoff to watercourses caused by poaching.
- b10. Operating machines on sloping ground increases the possibility of overturn and likely injury. When carrying out your soil management planning, it is good practice to consider the limitations of the equipment you have available and avoid unnecessary risks to your safety.
- b11. Consider the risks of runoff and erosion when planning what to grow or your stocking on sloping land and which management practices to adopt.
- b12. Where severe erosion occurs, earth banks or other physical barriers may be used as a last resort to check the flow of water and reduce off-site impacts. They must be carefully designed and installed.

C Understanding the management requirements of different soils

28. This section divides soils into five broad groups and describes the characteristics and management requirements of each group. Choose the soil type or types that most closely match the soil(s) on your farm. The broad groups are:
- sandy and light silty soils;
 - medium soils;
 - heavy soils;
 - chalk and limestone soils; and
 - peaty soils.
29. The soil textural triangle (Appendix 1) and flow diagram of how to texture your soils (Appendix 2) can be helpful in clarifying the soil types on your farm.



Know the soils on your farm.

Sandy and light silty soils

30. When in good condition, these soils are naturally free-draining and do not lie wet for long periods (unless there is a high water table in the subsoil). There are usually long periods in the year when these soils may be worked without damaging them.
31. However, their structure is often weak because of the low clay and organic matter content. The soil surface is easily broken up by rain and forms a cap when it dries. The topsoil may fall apart, causing the soil to slump. The soil may then set solid when it dries out.
32. Water gets into soils more slowly if they are capped, slumped or have poor soil structure. This leads to runoff and erosion during rainfall.
33. Although sandy and light silty soils are usually well drained and present good opportunities for land-work, they can suffer from compaction – particularly when used to grow vegetable crops. Compaction can be caused by harvesting in wet conditions or by deep cultivation in a wet spring.

34. When they are dry and have little or no vegetation to protect them, these light soils are also prone to wind erosion.



Overworked sandy and light soils can slump following rainfall.



A fine smooth seedbed is vulnerable to capping.



Capping and slumping of the soil increases runoff and soil erosion.



Deep cultivation in spring can compact soft, wet subsoils.



Wind blow on fine dry sandy soil.



Out-wintered stock may cause compaction and runoff.

Broom's Barn Research Station



Earlier drilling of winter wheat on the right-hand side allows better surface cover, which helps to protect the soil.



A coarse seedbed on light soils can help prevent capping. A furrow-pressed coarse seedbed can help prevent wind erosion.

Summary of the main problems associated with sandy and light silty soils

- Low organic matter.
- Capping, surface sealing and slumping.
- Runoff and soil wash.
- Soil erosion by water and wind.

Principles of good soil husbandry for sandy and light silty soils

- c1. For winter cereals in particular, avoid a very fine, smooth seedbed. A coarse seedbed is less likely to form a cap that will lead to runoff.
- c2. Crop cover protects the soil from the battering action of the rain, and a good root structure holds the soil together. Therefore, sow winter cereals early enough to achieve a good crop cover before winter.
- c3. Correct any deep compaction problems caused by harvesting of potatoes, vegetables and forage crops by subsoiling when conditions are suitable.
- c4. Where it is safe and practical, sow crops and establish tramlines across the slope.
- c5. Sandy and light soils are not well suited to direct drilling because they tend to slump and will need regular loosening.
- c6. Aim to increase the organic matter content and improve the stability of the topsoil by retaining crop residues, by applying manures or by using grass breaks or green manures.
- c7. Avoid growing potatoes, vegetables, maize and other forage crops on slopes if runoff problems are likely to cause soil erosion.
- c8. Avoid out-wintering stock on slopes if runoff problems are likely to cause soil erosion.
- c9. Sow nurse crops such as barley to prevent wind erosion, particularly in vegetable crops or sugar beet grown on unsheltered land that is exposed to strong winds.

Medium soils

35. 'Medium' refers to a range of soils that are widespread across the country. Some of the most productive soils are in this category. Medium soils tend not to lie as wet as heavy soils and in general are at lower risk of structural damage. However, compaction can occur because, although conditions in the topsoil may be suitable, the subsoil may stay wet for longer, particularly where the water table is high or the subsoil is heavier than the topsoil. Timeliness of operations is essential to prevent damage to soil structure.
36. Medium soils contain enough clay to make them stick together, so they are at less risk of capping or slumping after rain. However, those with a high content of silt or fine sand are not as stable, particularly where organic matter content is low, and they may cap.
37. Even on medium soils, capping, compaction or poor drainage can cause excessive runoff leading to erosion, particularly on sloping land in wetter areas of the country.



Landline PR Ltd

Ploughing a wet soil can damage soil structure.



Ploughing at optimum soil moisture levels does not damage soil structure.



A compact subsoil reduces permeability, leading to soil erosion.



Using machinery on wet soil can damage soil structure, causing excessive runoff.

Summary of the main problems associated with medium soils

- Compaction, particularly in the subsoil, from traffic and tillage damage.
- Capping of medium soils that have a high proportion of silt or fine sand.
- Runoff and erosion.

Principles of good soil husbandry for medium soils

- c10. Medium soils are suited to a wide range of crops and grassland. Various management techniques can be appropriate, but timeliness is still needed to avoid compaction – particularly in the subsoil.
- c11. Using a plough and press combination can reduce the number of passes.
- c12. Examine soils for structural damage, especially after late harvesting of crops, as part of your soil management plan under Environmental Stewardship or *Cross Compliance Soil Protection Review*. Plan remedial measures for when conditions are suitable.
- c13. Where it is safe and practical, sow crops and establish tramlines across the slope.
- c14. Where tramlines cause runoff due to reduced infiltration of water, loosen with a tine when conditions allow.
- c15. Medium soils containing a high proportion of silt or fine sand are liable to cap. Avoid this by drilling winter cereals early and ensure seedbeds are left as coarse as possible to encourage infiltration.
- c16. Livestock should be managed to avoid poaching of pasture.
- c17. Avoid out-wintering stock on slopes, particularly where poached soil is likely to cause runoff and erosion.

Heavy soils

- 38. Many heavy soils have a low permeability and are prone to waterlogging and the ponding of water on the surface. They can lie wet for long periods and are susceptible to compaction. Chalky clay soils, which are common in eastern England, are more permeable, easier to work and generally more suited to arable cropping.
- 39. All operations have to be carefully timed to ensure that soil structure is not damaged by wheelings, tillage implements or trampling and poaching by livestock.
- 40. The combination of low permeability and compaction can result in surface runoff carrying pollutants (such as fertilisers, manures and slurries, sediment and pesticides) into watercourses. However, this runoff does not usually cause erosion because the clay holds the soil together.



A compacted subsoil can lead to slow drainage.



Compaction and slow drainage can cause runoff on sloping land.



Compaction and slow drainage can cause ponding of water following harvesting.



Land drainage on heavy soils increases the opportunities for timely land-work.

Summary of the main problems associated with heavy soils

- Poor drainage and waterlogging.
- Compaction from traffic and tillage.
- Ponding, runoff and soil wash.

Principles of good soil husbandry for heavy soils

- c18. Heavy soils that lie wet for long periods are not suited to crops that are harvested in late autumn/winter, crops grazed late in the season or crops for over-winter grazing, so careful crop selection is needed.
- c19. Using a plough and press combination can reduce the number of passes.
- c20. Heavy soils that are regularly cultivated or intensively stocked often require land drainage to increase the opportunities for working the land or grazing without damaging the soil. Note: natural wetlands should not be drained unless consent has been given under the Environmental Impact Regulations (see the *Cross Compliance Handbook for England 2006 edition* and *Cross Compliance Guidance for the Maintenance of Habitats and Landscape Features* (GAEC 5) for further information).
- c21. Effective drainage systems often combine moling or subsoiling as secondary treatments over pipe drains that have a permeable backfill.
- c22. Regular maintenance of field drains is essential to ensure that they are working effectively.
- c23. Ditches should be kept clear to help the flow of drainage water. To encourage wildlife, clean the ditches and cut their banks in rotation, and only in the autumn or early winter.
- c24. You should only subsoil when the subsoil is dry enough to shatter and the surface is firm enough for good traction. This will usually be in the autumn. However, poor structure and compaction is easiest to see in the spring, and this is the time that plans should be made for autumn subsoiling.
- c25. Heavy soils are generally not suited to ploughing or other primary cultivation in the spring because subsoils remain wet.
- c26. Stock should be managed to avoid poaching of pasture.
- c27. If a pasture has been poached, it may be necessary to reseed the pasture or otherwise loosen the compact topsoil. When reseeding permanent pastures, avoid bringing soil with low organic matter to the surface.
- c28. Avoid spreading manure and slurry when the soil is wet, especially if there is a risk of runoff and pollution.

Chalk and limestone soils

- 41. Soils over chalk and limestone are often shallow and are mostly free-draining. These soils are usually strong and stable so they do not tend to suffer from capping or slumping. This means there are good opportunities for working the land without causing soil damage.
- 42. However, runoff and erosion can occur, particularly along compacted tramlines and headlands on steep slopes.
- 43. Where the topsoil is shallow, it is very easy to dilute it by ploughing or cultivating into the rock beneath. The gradual movement of soil down slopes caused by cultivation (known as tillage creep) can also expose the underlying rock, reducing water retention capacity and yields.



Landline PR Ltd

Calcareous soils are naturally well structured, stable soils.



Runoff can occur on chalk soils from compacted headlands and from tramlines running down slopes.



Landline PR Ltd

Cultivation of thin chalk soils can expose the parent rock material.



Work across the slope and turn soil uphill to counter tillage creep.

Summary of the main problems associated with chalk and limestone soils

- Erosion of thin soils due to tillage creep.
- Runoff and erosion on steep slopes, particularly from tramlines and headlands.

Principles of good soil husbandry for chalk and limestone soils

- c29. Avoid deeper ploughing or cultivation into the rock beneath to prevent dilution of the topsoil.
- c30. Working and sowing crops across the slope, where it is safe and practical to do so, can prevent tillage creep, especially if the soil is turned up the slope when ploughing.
- c31. Loosen tramlines to increase infiltration of water when conditions allow.
- c32. When gateways and headlands become compacted, they should be subsoiled when conditions are suitable to achieve good shattering.
- c33. Thin chalk and limestone soils may be suited to minimum cultivation.

Peaty soils

44. This group includes peat and organic soils that may be found both in lowland and upland situations. Peat topsoils contain more than 50% organic matter, while organic soils have more than 12%. These soils are widespread in the uplands and are also found in lowland bogs and river valleys. They are intensively farmed in the Fens of eastern England and the Lancashire Mosses.
45. In the Fens and Mosses these soils are very important for arable and vegetable production. They are vulnerable to soil loss by wind erosion because they are light and loose. When drained and cultivated, these soils are vulnerable to 'wastage' by oxidation of the peat.
46. Upland peats are extremely prone to erosion once the vegetation cover is broken and the peat is exposed. This may be caused by overstocking, supplementary feeding, heather burning, vehicle access, drainage or recreational activities.



Broom's Barn Research Station

Barley nurse crops can be sown to protect peat soils from wind erosion.



Sugar beet growing within a sprayed-off barley nurse crop.



Trampling and overgrazing can cause the erosion of peat soils in uplands.



Dense vegetation can protect sensitive upland soils.

Summary of the main problems associated with peaty soils

- Erosion by water and wind.
- Wastage.

Principles of good soil husbandry for peaty soils

- c34. To avoid wind erosion of fenland soils, sow a nurse crop such as barley, winter rye or mustard, or 'plant' straw to provide shelter. Kill off nurse crops by cultivation or spraying before drilling spring crops.
- c35. Reduce wind blow by planting and maintaining shelterbelts.
- c36. Undrained lowland and upland peat bogs have become increasingly rare and you will need consent under the Environmental Impact Assessment Regulations if you want to bring them into intensive agricultural production (see *Cross Compliance Guidance for the Maintenance of Habitats and Landscape Features* (GAEC 5) for further information).
- c37. Minimise the damage to plant cover on upland peats. Damage can occur through trafficking, overgrazing, supplementary feeding, uncontrolled burning, and putting in grips and drainage channels.

D Managing soils when growing cereals and other combinable crops

47. Cereals can have a beneficial effect on soil structure. They can provide a high input of organic matter from deep-growing roots, stubble and chopped straw. Harvesting is normally carried out in dry conditions and crop residues can protect the soil from erosion. They are good at drying out the soil, allowing subsoiling after harvest.
48. On suitable soils, shallow ploughing and cultivation, and non-inversion tillage, retain crop residues near the soil surface, helping to improve organic matter and soil stability.
49. The main risks to soil are:
 - cultivation in wet conditions (either in autumn or spring) potentially damaging structure and leading to erosion;
 - fine smooth seedbeds on soils that are susceptible to capping and slumping;
 - an increased risk of erosion to bare soils following late autumn drilling; and
 - runoff and erosion along tramlines or on compacted headlands.
50. Heavy soils are susceptible to damage from ploughing and cultivating during the spring, when subsoils are generally still wet.



Shallow cultivation in wet conditions can create a tillage pan near the soil surface.



Harrowed sandy soil left over winter without crop cover on steep slopes is vulnerable to capping and erosion.



Stubble and shallow cultivation can protect the soil surface.



Sandy soil under stubble on the left-hand side has slumped. Loosened soil on the right has better drainage.

Principles of good soil husbandry for cereals and combinable crops

- d1. On soils vulnerable to capping and slumping, drill autumn-sown cereals early to ensure a good crop cover and avoid very fine seedbeds.
- d2. Ensure timeliness of cultivations to avoid damage to soil structure.
- d3. Where it is safe and practical, sow crops and establish tramlines across the slope. If possible, do not use the tramlines until the spring.
- d4. Where tramlines cause runoff due to reduced infiltration of water, they should be loosened with a tine when conditions allow.
- d5. Before establishing the next crop, remove compaction by loosening the topsoil or subsoiling where necessary, particularly along old tramlines and on headlands.
- d6. Where shallow cultivation is carried out, care is needed to prevent soil compaction near the soil surface. Sandy and silty soils benefit from regular loosening.
- d7. Heavy soils and some medium soils that are regularly cultivated often require land drainage to increase the opportunities for working the land without damage.
- d8. Where there is little organic matter, apply bulky organic manures or introduce grass leys or green manure crops into the rotation. If you spread organic manure in Nitrate Vulnerable Zones (NVZs), you must follow the rules on rate and timing.

E Managing soils when growing potatoes, vegetables and salad crops

51. The main damage to soil from growing potatoes, vegetables and salad crops is likely to be caused during harvest in wet conditions. Loaded trailers and heavy harvesting equipment can cause rutting and deep compaction. In wet springs, soil may also be damaged by intensive cultivation when preparing beds and rows.
52. De-stoning soils can damage soil structure, increasing the risk of runoff and erosion. In the longer term, it will encourage the loss of organic matter.
53. Fine, clod-free tilths on sandy and light silty soils, particularly with rows or beds that run up and down the slope, are vulnerable to soil erosion, especially from early summer thunderstorms.
54. Over-application of irrigation water and the use of large water droplets can cap the soil and lead to runoff and erosion, as well as wasting water.
55. Soil structure on headlands, tracks, tramlines and wheelings can be damaged in wet conditions.



Ridges up and down steep slopes and a fine tilth exacerbate soil erosion.



High-rate irrigation with large water droplets can damage soil structure.



Wheel tracks from harvesting brassicas on wet soil can cause deep compaction.



Tined wheel tracks can remove compaction between onion beds.

Principles of good soil husbandry for potatoes, vegetables and salad crops

- e1. Land selected for potatoes, vegetables and salad crops should be naturally free-draining or have effective field drainage. Consider the risks of runoff and erosion when planning in which field to grow potatoes, vegetables and salad crops (options are provided under the Entry Level Stewardship scheme to help you reduce the risks of erosion).
- e2. Avoid planting on slopes in a way that channels runoff and erosion and/or divide long slopes into smaller units by planting some ridges and headlands across the slope (where it is safe and practical to do so).
- e3. Bed systems reduce the area that is wheeled, but take care to maintain infiltration in these areas.
- e4. Cultivate headlands and gateways to remove compaction following planting.
- e5. Following harvest, cultivate the soil as early as possible to break up compaction.
- e6. To prevent sealing and runoff, ensure that irrigation is uniform, application rates are not too high and droplet size is not too big.
- e7. Where possible, use tied ridges and dykes in furrow bottoms to improve infiltration and reduce runoff.
- e8. Cultivate wheelings to loosen compaction, particularly if water is likely to be channelled to the bottom of the slope, causing further problems during harvest.
- e9. Rough plough sandy and silty soils following harvest to produce a cloddy, coarse surface that is less likely to cap and slump.
- e10. On intensively cropped soils where there is little organic matter, apply bulky organic manures or introduce grass leys or green manure crops into the rotation. You may be able to utilise set-aside for this.
- e11. Where land is fumigated, it should be cultivated to leave a rough surface as soon as possible after treatment.

F Managing soils when growing sugar beet, maize and other forage crops, fruit and bulbs, and when keeping outdoor pigs

Sugar beet

56. Sugar beet is deep rooting and can dry the soil to some depth, which improves soil structure. Most damage to soil structure occurs from harvesting in wet conditions.
57. Fine seedbeds on peaty soils and sandy soils are at risk from wind erosion in dry conditions. Fine sandy soils are also at risk from capping, soil wash and erosion, especially during early summer thunderstorms.



Damaged soil showing ponding of water following harvest of sugar beet.



Sugar beet drilled into a furrow-pressed coarse seedbed can prevent wind erosion on sandy soil.

Principles of good soil husbandry for sugar beet

- f1. Land selected for sugar beet should be naturally free-draining or have efficient field drainage. Consider the relevant risks of runoff and erosion when planning in which field to grow sugar beet (options are provided under the Entry Level Stewardship scheme to help you reduce the risks of erosion).
- f2. On light soils, leave the seedbed as coarse as possible (for example by drilling directly into furrow pressed land or into loosened cereal stubble).
- f3. Use nurse crops or planted straw to prevent wind blow on sandy and peaty soils.
- f4. Plant across the slope where it is safe and practical to do so.
- f5. To prevent capping of the soil and runoff, ensure that irrigation is uniform, application rates are not too high and droplet size is not too big.
- f6. Cultivate wheelings to increase infiltration if water is likely to be channelled to the bottom of the slope, causing further problems during harvest.
- f7. Cultivate the soil as soon as conditions are suitable after harvest, to remove wheelings and compaction.
- f8. Where there is little organic matter, apply bulky organic manures or introduce grass leys or green manure crops into the rotation. You may wish to utilise set-aside for this.

Maize and other forage crops, including grazed crop residues

- 58. The risk of damaging soils when growing maize, kale, rape, turnips and fodder beet depends mainly on whether harvesting or grazing is carried out in wet conditions. Maize harvesting in wet autumns can cause deep and severe compaction. Similarly, where root crops are lifted throughout the winter, severe damage from harvesters and loaded trailers can occur.
- 59. Grazing forage crops and crop residues such as sugar beet tops and brassicas in the autumn or over the winter can lead to poaching, runoff and erosion. Although sheep tend to cause only shallow damage, runoff can be severe.



Soil compaction can occur following late harvesting of maize.



Surface pan can be caused by out-wintering of cattle on stubble turnips.

Principles of good soil husbandry for maize and other forage crops

- f9. Avoid growing maize and other forage crops on land where the chances of runoff and erosion are high (options are provided under the Entry Level Stewardship scheme to help you reduce the risks of erosion on such land).
- f10. On fields that are vulnerable to compaction, runoff and soil erosion, choose early-maturing maize varieties to allow an early harvest.
- f11. Where necessary, cultivate as soon as conditions are suitable after harvest or grazing to remove wheelings and compaction.
- f12. Manage the grazing of forage crops and crop residues to minimise poaching and runoff. This can be achieved by:
 - limiting periods of access;
 - providing run-back areas;
 - starting at the bottom of sloping fields and back-fencing;
 - cultivating strips across the slope to reduce runoff where it is practical to do so; and
 - avoiding slopes vulnerable to erosion and runoff.



Paul Holmes-Ling FWAG

Soil compaction between rows of strawberries and on the headlands can cause runoff and soil erosion.



Paul Holmes-Ling FWAG

Natural regeneration of vegetation and loosening of soil to remove compaction between rows can reduce soil erosion.

Fruit crops

- 60. The main risks to soil from fruit crops occur during planting and harvesting in wet conditions. Wheel ruts can cause deep compaction, runoff and soil erosion. Even repeated foot traffic of fruit pickers can puddle the soil in wet conditions.
- 61. Wheelings between polythene tunnels or mulches can damage soil structure and, together with the tunnels or mulches, can greatly increase runoff and erosion. Over-application of irrigation water on fruit crops can cap the soil and cause erosion.

Principles of good soil husbandry for fruit crops

- f13. Land selected for fruit crops should be naturally free-draining or have efficient field drainage.
- f14. Avoid planting in wet conditions.
- f15. Plant across the slope where it is safe and practical to do so.
- f16. Use a mulch of straw to protect the soil between rows.
- f17. Allow natural regeneration of vegetation or establish grass between rows of perennial crops to prevent erosion.
- f18. Tine between rows with a single-leg subsoiler to remove compaction and to prevent channelling of water.
- f19. To prevent capping of the soil and runoff, ensure that irrigation is uniform, application rates are not too high and droplet size is not too big.
- f20. Avoid grubbing out plants and trees when the soil is wet.
- f21. Cultivate headlands and gateways to remove compaction when necessary.
- f22. Where land is fumigated, it should be cultivated to leave a rough surface as soon as possible after treatment.

Bulbs

- 62. Bulb fields suffer heavy foot traffic and consequent compaction when flowers are picked in winter and early spring. Daily tractor traffic collecting flowers along headlands in wet conditions causes deep wheel ruts, soil compaction, channelling of water, runoff, soil wash and erosion.



Frequent tractor traffic in wet conditions during flower picking causes soil compaction.



Foot traffic from flower pickers puddles the soil, damaging soil structure.

- f23. Land selected for bulbs should be naturally free-draining or have efficient field drainage.
- f24. Sloping fields should be avoided if they cause runoff and erosion.
- f25. Ridges should be planted across the slope and should follow the contour where possible and where it is safe to do so.
- f26. Cultivate headlands to remove compaction following planting.
- f27. After harvest, cultivate soils to remove any wheelings and compaction as soon as conditions are suitable.
- f.28 Where land is fumigated, it should be cultivated to leave a rough surface as soon as possible after treatment.

Outdoor pigs

63. Pigs can cause severe trampling and compaction of the topsoil, and trackways used by vehicles can become deeply rutted. Where pigs are kept on slopes, problems of runoff and erosion can occur. Problems will increase the longer pigs are kept on the same area of land.



Outdoor pigs can damage soil structure, causing excessive runoff and soil erosion on slopes.



Keeping outdoor pigs on grass can reduce soil erosion.

Principles of good soil husbandry for outdoor pigs

- f29. Avoid keeping pigs on slopes and on slow-draining soils that lead to runoff.
- f30. Plan and manage paddocks and tracks to avoid channelling of water.
- f31. Develop a rotation and a system of management so that pigs can be moved on to grass and the sward can be maintained.
- f32. It is good practice to establish grass buffers to intercept runoff, but these should be in addition to the points above and must not be relied on to prevent off-site impacts.
- f33. If problems of runoff and erosion occur, move pigs from problem areas to other paddocks, and loosen ground or cultivate as soon as possible.
- f34. When pigs have been moved to another paddock, loosen the compacted soil or cultivate as soon as conditions allow.

G Energy crops – short rotation coppice and *Miscanthus*

64. Short rotation coppice (SRC) and *Miscanthus* can benefit the soil by adding organic matter, resisting erosion through the binding effect of the dense root system, and providing a good cover of the soil surface.
65. The main risks to soil from these crops are structural damage during harvest (including that of *Miscanthus* rhizomes) in wet conditions and subsequent erosion.



Harvesting *Miscanthus* rhizomes during winter can damage soil structure.



Harvesting *Miscanthus* canes late in the season during dry conditions prevents damage to soil structure.

Bical

Principles of good soil husbandry for SRC and *Miscanthus*

- g1. Land selected for SRC/*Miscanthus* should be naturally free-draining or have efficient field drainage. Any compaction should be removed prior to planting.
- g2. Avoid sloping fields that are prone to runoff and erosion.
- g3. Harvesting, which will normally be from October to March, should be carried out in dry conditions to avoid soil compaction. Care should be taken not to disturb nesting birds. If necessary, raise the cutter bar above the new growth.
- g4. Avoid harvesting *Miscanthus* before it is mature (early in the season) if this would damage wet soil.
- g5. Use *Miscanthus* cane as a mulch in gateways if required during harvest.
- g6. Use well-established tracks when travelling across adjacent fields during harvest.
- g7. Following harvest, cultivate or loosen the soil to remove compaction, paying particular attention to tracks, headlands and gateways.

H Managing soils under grass

Improved grassland

66. Grass can improve soil structure due to its dense network of fine roots and high input of organic matter. Nevertheless, grassland soils are prone to damage from working the land and grazing when the soil is too wet. High-risk activities are:
- silage-making with heavy loaded trailers;
 - spreading manure and slurry in wet conditions;
 - grazing when the soil is too wet, particularly when using a strip system;
 - out-wintering of stock;
 - reseeding grassland; and
 - not moving supplementary feeders often enough.
67. Structural damage may cause runoff and erosion may follow, depending on the circumstances.



Compacted grassland can suffer from ponding and runoff.



Slurry spreading on wet soil can damage soil structure.

Principles of good soil husbandry for improved grassland

- h1. Remove grazing livestock from grassland when the soil is too wet and poaching occurs. Ensure that there is suitable housing for stock in areas where the soil is wet for long periods.
- h2. Avoid spreading manure and slurry when the soil is wet if there is a risk of runoff and pollution. Ensure that there is sufficient manure and slurry storage of a suitable standard.
- h3. Maintain land drainage systems to reduce the risk of damaging soil structure under wet conditions (for example when cutting silage).
- h4. Use well-drained tracks for vehicles and livestock.
- h5. When reseeding grassland or loosening compacted soil, preserve botanically rich swards and do not dilute the organic matter content of the topsoil.

Principles of good soil husbandry for improved grassland (*continued*)

- h6. If it is necessary to out-winter stock, locate any supplementary feeding sites on freely-drained soils and not on slopes, which will lead to erosion, and avoid areas of semi-natural vegetation. Cultivate in the spring to remove any compaction.
- h7. When reseeding grass in the autumn, sow early enough to achieve a good cover before winter.
- h8. Minimise damage to riverbanks by providing managed access to water for livestock.

Natural and semi-natural grazing

68. Damaging the ground cover provided by natural and semi-natural grassland can lead to runoff and soil erosion in both the uplands and lowlands. When vegetation cover is lost on upland peat soils, rapid and damaging erosion can occur. Manage vegetation and livestock, vehicle and human access to maintain the ground cover.



Sheep 'scar' caused by trampling and scraping by sheep.



Sheep 'scars' joining together to cause accelerated upland sheet erosion.

Principles of good soil husbandry for natural and semi-natural grazing

- h9. Adjust stocking rates to ensure that overgrazing does not result in a loss of vegetation cover.
- h10. Shepherd the stock to prevent overgrazing in localised areas.
- h11. Undertake all supplementary feeding on level ground away from sensitive vegetation and move the feeding sites as necessary to avoid breaking the soil cover. Keep supplementary feeding away from watercourses. See also the cross compliance requirements that relate to overgrazing (GAEC 9).
- h12. Minimise the need for vehicle use and use low ground pressure machinery when conditions require, keeping to established tracks and paths as far as possible.
- h13. Where possible, install and maintain tracks so as to minimise runoff.
- h14. Maintain gates, stiles and waymark paths to help restrict damage caused by walkers.
- h15. Avoid burning on blanket bog and deep peat, where subsequent erosion can be rapid and serious. You must also meet the requirements relating to heather and grass burning (GAEC 11), and if your land lies within a Site of Special Scientific Interest you must also take account of GAEC 6.
- h16. Avoid leaving bare soil during bracken management on sites with a risk of erosion.
- h17. Block existing grips and surface drains where erosion is occurring and do not dig new ones.

I Managing soils under set-aside

69. This section must be read in conjunction with your *Set-aside Handbook and Guidance for England* (2006 edition, PB 11304), which has been sent to you by RPA. The handbook may be updated from time to time and must be followed, but as far as possible you should adopt the principles of good soil management given below and in other parts of this guidance.
70. Remember that the set-aside period runs from 15 January to 31 August, whereas cross compliance requirements for claimants under the Single Payment Scheme must be met for the full 12-month period. Care should be taken that any management activities undertaken do not prevent you meeting the necessary set-aside requirements. Soil management proposals and actions should be clearly recorded in your Soil Protection Review.
71. If you grow crops for permitted non-food uses, establish a green cover as soon as possible where land does not already have established cover or grass leys. When preparing the land for any other following crop, you should apply the principles given in the relevant section of this guidance.
72. Set-aside can provide significant benefits for soil management:
 - a well-grown green cover will improve the workability of the soil and provides an additional return of organic matter;
 - it provides the opportunity to take your least suitable land out of arable production, which may include land at high risk of erosion or heavy land subject to compaction and runoff; and
 - it can be placed strategically to provide buffers and grassed strips to reduce runoff and erosion.
73. The main soil-specific risks from set-aside are:
 - runoff and possible erosion from compacted soils left for natural regeneration, especially along tramlines or other wheelings;
 - runoff and erosion from land where green cover has not established satisfactorily; and
 - erosion, especially on high-risk sites, if heavy rain follows summer cultivation.



Use the opportunity of set-aside to remove compaction by subsoiling in late summer, if conditions allow.



Ensure that land left for natural regeneration is not compacted and at risk of runoff.

Principles of good soil husbandry for set-aside

- i1. After harvest, loosen compacted areas such as tramlines, especially if the land is intended for natural regeneration. You may plough or deep cultivate to achieve this.
- i2. Where the soil has capped, carry out a shallow cultivation and leave a rough surface before natural regeneration.
- i3. Where soil organic matter is low, establish a green cover by seeding rather than relying on regeneration.
- i4. On land at high risk of runoff and/or erosion, establish a green cover by seeding and consider long-term set-aside.
- i5. Establish such cover by undersowing or by drilling early to ensure a good cover over winter. Leave as coarse a seedbed as possible.
- i6. Use set-aside to establish permanently grassed buffers or other areas in the landscape to help control runoff and erosion.
- i7. If any activity damages the soil by causing ruts or compaction that could lead to runoff or erosion, the land should be cultivated and green cover reinstated as soon as conditions allow.

J Managing soils of land not in agricultural production (GAEC 12) or used for non-agricultural activities

74. It is important that soils are protected on land that is not in agricultural production. A green cover must be maintained or established except where creating a one year fallow under GAEC 12. This may be done by natural regeneration, but seeding is preferable on sites at risk of runoff and erosion.
75. On sites where organic matter is low, a green cover established by seeding can help build up organic matter ahead of a possible return to production.
76. The main risks to soil are:
- runoff and erosion from land where green cover has not established satisfactorily;
 - reshaping of the land surface, for example for motor sports activities;
 - the soil becoming eroded, rutted or compacted by vehicles, including car parking or access, or being poached by animals, for example by equestrian activities;
 - erosion, especially on high-risk sites, if heavy rain follows summer cultivation; and
 - a failure to maintain drains and ditches leading to waterlogging and slow drainage.



Use temporary tracking to prevent rutting and compaction in car parking areas.



Failure to establish green cover can lead to serious run-off and erosion.

Principles of good soil husbandry for land not in agricultural production or used for non-agricultural activities

- j1. For land being taken out of production after the harvest of arable crops, loosen compacted areas such as tramlines, especially if the land is intended for natural regeneration.
- j2. Where the soil has capped, carry out a shallow cultivation and leave a rough surface before natural regeneration.
- j3. Where there is little organic matter, establish a green cover by seeding rather than by relying on regeneration.
- j4. On land at high risk of runoff and/or erosion, establish a green cover by seeding.
- j5. Establish such cover by undersowing or by drilling early to ensure a good cover over winter. Leave as coarse a seedbed as possible.
- j6. If any activity damages the soil by causing ruts, compaction or poaching, the land should be cultivated and green cover reinstated as soon as conditions allow.
- j7. Restrict activities that cause loss of soil, such as reshaping the land surface or the repeated passage of vehicles.
- j8. Maintain drains and ditches to ensure flexibility of land use, unless you wish to provide an environmental benefit such as encouraging biodiversity.

K Managing soils in the landscape

77. It is important to recognise the part that farm layout and slopes play in runoff and soil erosion. They can intensify the problems associated with inappropriate management or they may themselves cause the problem. For example:
- Slopes and valley features can promote and/or increase the effect of runoff.
 - Farm layout, such as tracks, and off-site features such as roads or neighbouring land, can channel water and cause excess runoff. They may also link eroding fields to watercourses.
 - Field access points and gateways, particularly at the bottom of sloping fields, can provide runoff pathways and links to other areas vulnerable to erosion.
 - Large, open fields with limited shelter from trees, hedgerows or other landscape features can leave peaty and sandy soils vulnerable to wind erosion.
 - Watercourses are vulnerable to bank erosion where livestock has access.
78. It is essential to consider these features when developing a soil management plan. The Environmental Stewardship scheme (Entry Level and Higher Level tiers) may allow you to improve your soil management. To access the soils options in these schemes you will need to develop a more detailed management plan than the SPR required for cross compliance, and you will receive financial assistance for producing a satisfactory plan. This will help ensure that you get the best results from the options in Environmental Stewardship, by putting the right option in the right place. This will also allow you to choose more demanding management options (see below) and be rewarded for these.
79. Expert advice can help, especially when developing an Entry Level soil management plan, but you can do much of the work without the need for specialist advisers. For example, BASIS offers a new training course for which funding may be available from the VTS (Vocational Training Scheme). You can also get help from organisations such as the Farming and Wildlife Advisory Group (FWAG) and Linking Environment and Farming (LEAF), and from your crop consultant. Such a plan will complement the Soil Protection Review that you are required to produce for cross compliance in 2006.

80. Options funded under Environmental Stewardship may include:

- using barriers such as grass buffers and strips, wooded areas and fencing;
- relocating features and activities such as gateways, tracks and feeding sites;
- changing land use from a high-risk activity – for example, not growing maize on high-risk fields, or undersowing the maize crop; and
- improving and maintaining existing features – for example, field drainage and field boundaries such as hedgerows.



A grass buffer strip at the bottom of slope helps reduce runoff.



Steep and awkward field corners are suited to arable reversion.

81. Both the Entry Level and Higher Level of Environmental Stewardship contain options that can be used to help protect soils. They are intended to reduce off-site impacts by protecting watercourses and natural habitats and by stopping soil washing on to roads and neighbouring properties. A summary of the options is shown below.

Environmental Stewardship support

The Entry Level options that have direct benefits for reducing soil erosion and runoff may include:

- producing a soil management plan;
- not growing certain high-risk crops;
- managing maize;
- creating buffer strips alongside watercourses;
- planting beetle banks; and
- managing hedgerows.

Higher Level Stewardship options that will help reduce or prevent soil erosion and maintain and/or increase organic matter may include:

- the reversion of arable land to grassland with no fertiliser or low fertiliser input; and
- in grassland systems:
 - managing improved grassland; and
 - a supplement for removing livestock in winter or summer.

Higher Level Stewardship is targeted at specific geographic areas.

More information is available from your local Rural Development Service (RDS) office. www.defra.gov.uk/corporate/rds/default.asp

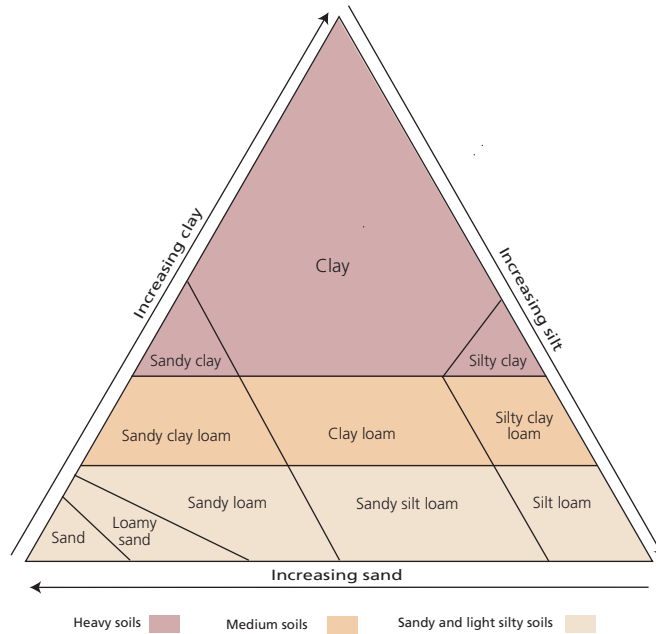
General principles for managing the landscape to protect soils

- Consider reversion to permanent grass or woodland or set-aside (*Set-aside Handbook and Guidance for England 2006 edition*) on slopes and valley features where runoff is likely or in areas prone to wind erosion. Explore alternatives under the Woodland Grant Scheme or Higher Level Stewardship (HLS).
- Permanent strips of grass, rough vegetation, beetle banks or hedgerows can slow runoff and trap sediment if installed at critical places on long slopes. Explore set-aside options in conjunction with Entry Level Stewardship (ELS) or HLS.
- Buffer strips, hedgerows and set-aside strips (see set-aside rules handbook) planted around the edge of fields can slow runoff and break links between neighbouring fields that are vulnerable to erosion (set-aside, ELS, HLS).
- New ditches or drains can be installed to intercept runoff and direct it away from areas vulnerable to runoff and erosion (HLS).
- Relocate tracks and gateways away from areas where they channel runoff (HLS).
- Improving the surface of tracks can increase water infiltration and stop them from channelling water (HLS).
- Planting rows of trees or hedgerows provides shelter and wind breaks around fields (HLS).
- Bank erosion can be prevented by providing a piped water supply to fields, using fencing to protect bank-side stock access points (HLS), or building bridges over watercourses at crossing areas (HLS).

For guidance on the set-aside rules see the *Set-aside Handbook and Guidance for England* (2006 edition, PB 11304). For copies of this publication contact Defra publications (see contact details inside the front cover). You can find further information on the Defra website at: www.defra.gov.uk/farm/capreform/index.htm

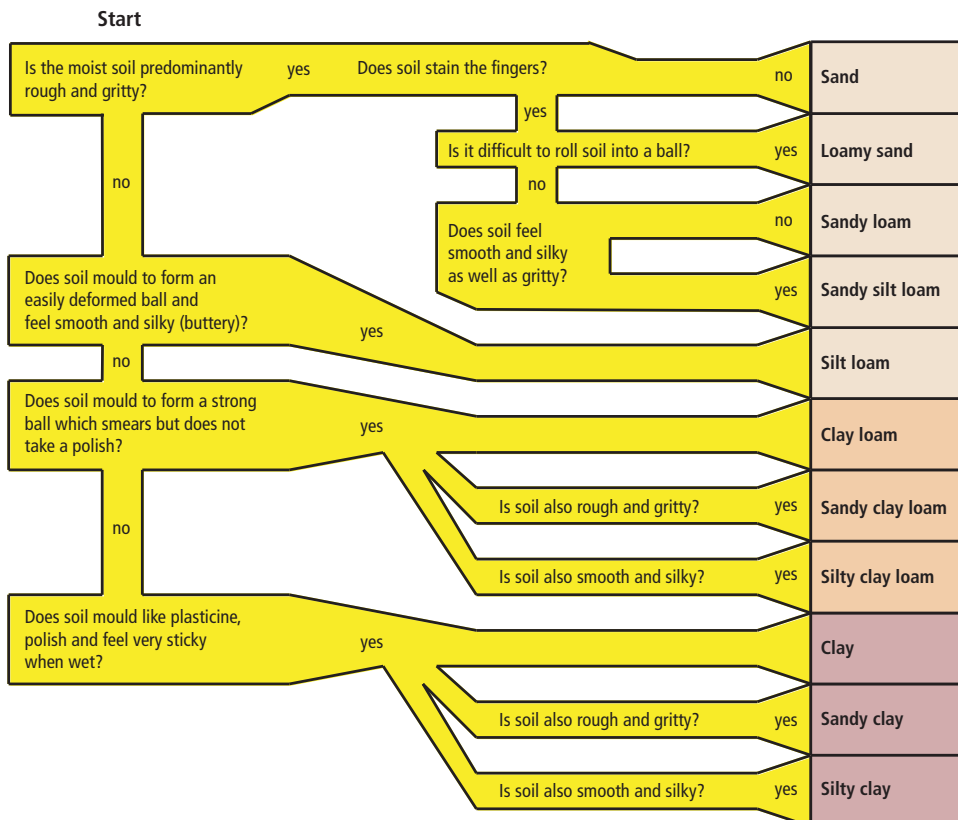
Appendix 1

Simplified soil triangle



Appendix 2

How to texture your soil



Appendix 3

Useful contacts and publications

Contacts

Cross compliance advice	A practical advice service on the land management aspects of cross compliance. From January 2006, farm walks and workshops will be organised to provide guidance on how to complete and implement the Soil Protection Review. Helpline: 0845 345 1302 Website: www.crosscompliance.org.uk See also the <i>Cross Compliance Handbook for England 2006 edition</i> .
Defra	For information on any aspect of Defra's work, including cross compliance, please contact the Defra Helpline by telephone on 08459 33 55 77 or by email at helpline@defra.gsi.gov.uk , or see www.defra.gov.uk
Environment Agency	Rio House Waterside Drive Aztec West Almondsbury Bristol BS32 4UD Tel: 0870 8506506 Email: enquiries@environment-agency.gov.uk Website: www.environment-agency.gov.uk
Rural Payments Agency	PO Box 1058 Lancaster House Hampshire Court Newcastle Business Park Newcastle upon Tyne NE99 4YQ Tel: 0845 603 7777 Email: csc@rpa.gsi.gov.uk Website: www.rpa.gov.uk
Linking Environment and Farming (LEAF)	National Agricultural Centre Stoneleigh Kenilworth Warwickshire CV8 2LZ Tel: 02476 413 911 Fax: 02476 413 636 Email: enquiries@leafuk.org Website: www.leafuk.org

Farming and Wildlife Advisory Group (FWAG)	National Agricultural Centre Stoneleigh Kenilworth Warwickshire CV8 2RX Website: www.fwag.org.uk Tel: 02476 696 699 Fax: 02476 696 760 Email: info@fwag.org.uk
UK Soil Management Initiative Ltd	1 The Paddocks Powey Lane Mollington Chester CH1 6LH Website: www.smi.org.uk

Environmental Stewardship

www.defra.gov.uk/erdp/schemes/es/default.htm

Contact: ES Team, Area 4D, Ergon House, Horseferry Road, London SW1P 2AL.

Soil erosion – Defra guidance

These guides are available online at

www.defra.gov.uk/environment/land/soil/information/publications.htm

- *Controlling soil erosion: a manual for the assessment and management of agricultural land at risk of water erosion in lowland England – revised 2005 (PB 4093)*
- *Controlling soil erosion: incorporating former advisory leaflets on grazing livestock, wind, outdoor pigs and the uplands, 2005.*

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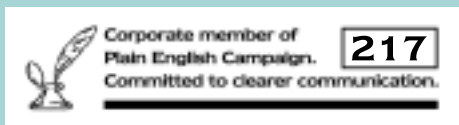
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