

# Managing forest operations to protect the water environment

Operator cab card



## Applying buffer zones

- Buffer areas are designed to protect the water environment from forestry activities and their use is central to this guidance.
- Most forest operations should not take place in buffer areas; the limited activities that are permitted for the different operations in this Guide are given in the table below.
- The specified widths extend the legally required buffer zones of 1-2 m and 5 m for operations around watercourses and water supplies, respectively.
- This guidance applies equally to new planting and forest restocking.
- For more information on the design and management of buffer areas see the UK Forestry Standard (UKFS) Guidelines on Forests and Water and the supporting Practice Guide on Managing forest operations to protect the water environment.\*

\*To view and download the UKFS (PDF or ePub format) or order printed copies of the Practice Guide (stock code FCPG025) or this cab card (FCPG025c), go to www.forestresearch.gov.uk/publications.

## Permitted activities within extended buffer areas around watercourses and water supplies for different forest operations.

Forest operation	Watercourse		Water cumply <sup>2</sup>	
	<2 m wide	>2 m wide <sup>1</sup>	water supply-	
Buffer width	2-10 m	2–20 m	5-50 m	
Cultivation	Mechanised cultivation limited to hinge or inverted mounding			
Drainage	Not permitted			
Fertilisers	Only hand applications of inorganic fertiliser. Organic fertiliser not permitted			
Pesticides	Only the dry planting of pretreated trees, unless the product is approved for use in or near water <sup>3</sup>			
Roads/quarries	No quarrying. Roads should be kept out of buffer areas unless there is a need for a crossing			
Harvesting	No trafficking (except for watercourse crossings). Brash should be minimised			
Vehicle/machine maintenance	Not permitted (including the storage and handling of fuel oils, lubricants and chemicals)			

<sup>1</sup> The 20 m buffer width also applies to lakes, reservoirs, large ponds and wetlands, and should be measured from the edge of the standing water.

<sup>2</sup> Concentric buffers for wells and boreholes but focus on the upslope/upstream area of springs and intakes.

<sup>3</sup> Note that the use of such products may require consent from the relevant water authority and users must adhere to the specific guidance on their use.

## **Cultivation operations**



- 1. Consider the weather and aim to carry out cultivation operations during dry periods.
- 2. Do not cultivate ground within 2 m of a watercourse or 5 m of a spring, well or borehole.
- 3. Limit cultivation to hinge or inverted mounding within buffer areas.
- 4. Leave 2-5 m breaks in plough lines (and any associated subsoiling) at regular intervals (e.g. every 40 m on moderate slopes and every 70 m on gentle slopes).
- 5. Only use discontinuous forms of cultivation on steep slopes.
- 6. Restrict the depth of ploughing (e.g. to 30 cm) to reduce soil disturbance.
- 7. Avoid fording streams and rivers, unless there is an existing purpose-built ford.
- 8. Do not dig spoil trenches that can discharge directly into watercourses.
- 9. Orientate spoil trenches so that they cannot intercept or carry large volumes of water; turn out the bottom 2 m length of each trench to alternate sides to dissipate flows.
- 10. Do not fill trenches created for mounding with fresh brash.
- 11. Restrict the length of trenches to less than 30 m; if this is not possible, fully integrate trenches into the drainage system do not exceed 2° gradient limit.
- 12. Install drains at the same time or immediately after cultivation operations.

## **Drainage operations**



- 1. Consider the weather and aim to carry out drainage works (including drain maintenance and silt trap cleaning) during dry periods.
- 2. Cut drains to run at a even gradient of 2° (3.5%) or less leading towards the head of the valley; ensure water does not discharge into lower cultivation channels.
- 3. End drains in a shallow turnout.
- 4. Space drains so the volume of run-off does not exceed the capacity of the drainage system.
- 5. Provide 'cut-off' drains so that plough furrows do not carry significant volumes of water from wet areas above.
- 6. Stop drains at the edge of buffer areas, preferably on flat ground where water can fan out.
- 7. Ensure drains do not discharge to the edges of steep gully sides or unstable slopes.
- 8. Avoid drains diverting water to adjacent catchments.
- 9. Do not end drains in natural channels, ephemeral streams or old agricultural drains.
- 10. Redesign existing drainage systems to meet current standards and correct any erosion problems; ensure restock drains discharge to a minimum 10 m wide buffer area.
- 11. Where an existing drain has become a sizable and stable watercourse, treat as a natural watercourse and establish buffer areas along its length; if in doubt, seek advice.
- 12. Avoid fording streams and rivers, unless there is an existing purpose-built ford.

#### **Fertiliser applications**



- 1. Do not apply fertiliser during wet weather (or if heavy rain is forecast within 48 hours), if wind conditions are inappropriate, or if the ground is waterlogged, frozen or snow-covered.
- 2. Do not apply organic fertiliser within buffer areas.
- 3. Do not apply inorganic fertilisers within 2 m of any surface water, and within 5 m of any spring, well or borehole; make sure this area is clearly marked.
- 4. Restrict the use of inorganic fertiliser within buffer areas to hand applications.
- 5. Do not apply fertiliser when run-off from drains is sufficient to produce visible surface flow across buffer areas.
- 6. Treat drains that have become sizeable and stable watercourses and those that flow directly into streams (including road drains) as natural watercourses with their own buffer areas.
- 7. Double minimum buffer widths for aerial fertiliser applications to land draining to nutrientsensitive waters.
- 8. Do not ford streams with loaded quads or other vehicles when distributing fertiliser bags or other materials around a site.
- 9. Do not store fertiliser within buffer areas.
- 10. Do not bury or leave empty fertiliser bags on site.

## **Pesticide applications**

![](_page_5_Picture_1.jpeg)

- 1. Do not apply pesticides during wet weather (or if heavy rain is forecast within 48 hours), windy conditions (more than a light breeze), or if the ground is frozen, waterlogged or snow-covered.
- 2. Read and comply with the instructions on the product label.
- 3. Do not prepare or store pesticides within buffer areas or spray within 10 m of watercourses unless the product is approved for use in or near water and you have appropriate authorisation.
- 4. Treat drains that have become sizeable and stable watercourses and those that flow directly into streams (including road drains) as natural watercourses with their own buffer areas.
- 5. Ensure buffer areas around watercourses are extended to include adjacent boggy/wet ground.
- 6. Do not apply pesticides when run-off from drains is sufficient to produce visible surface flow across buffer areas.
- 7. Do not step into or walk along watercourses or drains while wearing contaminated spray suits or footwear.
- 8. Do not store or soak treated planting stock within a drain or watercourse prior to planting.
- 9. Do not fill sprayers directly from watercourses or wash sprayers, containers, clothing or footwear in or near a watercourse.
- 10. Avoid emptying washings to the same area of ground and do not empty in buffer areas.
- 11. Do not puncture, bury, burn or otherwise leave empty pesticide containers, packaging, planting bags or contaminated spray suits on site.

#### **Roads and quarries**

![](_page_6_Picture_1.jpeg)

- 1. Avoid significant road construction work near watercourses in wet weather.
- 2. Minimise machine trafficking and working within buffer areas.
- 3. Any natural watercourse that is intercepted by a road should be culverted or bridged at that point.
- 4. Culverts should be installed on the same alignment as the watercourse channel.
- 5. Do not install hanging culverts in fish-bearing watercourses.
- 6. Install culverts at regular intervals along roads to prevent a build-up of water (e.g. every 100 m).
- 7. Ensure roadside drains are disconnected from natural watercourses and discharge to a buffer area.
- 8. Avoid unnecessary disturbance of drain-side vegetation. Leave undisturbed sections or install silt traps when cleaning connected drains.
- 9. Discharge seepage waters or surface run-off from quarries or borrow pits to a buffer area of vegetated ground.

## Harvesting operations

![](_page_7_Picture_1.jpeg)

- 1. Monitor weather forecasts daily and amend work plans accordingly. Suspend operations during heavy rainfall but try to avoid long breaks in working.
- 2. Avoid long, straight extraction routes and ensure brash mats are maintained.
- 3. Avoid using skidders on soft ground.
- 4. Keep extraction routes outside buffer areas and valley bottoms wherever possible.
- 5. Use log steps where rutting occurs to split run-off and divert it to unbroken ground.
- 6. Locate brash heaps outside buffer areas and ensure run-off does not drain directly into watercourses.
- 7. Use stone ramps to protect main access routes.
- 8. Protect stream crossings from damage to stream banks and bed.
- 9. Consider felling crops but not extracting timber where this would cause major damage to very soft ground.
- 10. Avoid exposing conifer crops on the bank of a watercourse opposite the felling site, where these are vulnerable to windblow. Where practical, try to replace any upturned root plates to restore banksides.
- 11. Ensure run-off from roadside timber stacks and loading areas does not drain directly into watercourses; disconnect road drains.
- 12. Suspend operations if heavy rainfall leads to a build-up of mud on timber stacking and loading areas, especially where there is a risk of run-off reaching local watercourses.

## Vehicle and machine maintenance

![](_page_8_Picture_1.jpeg)

- 1. Remove waste or recovered oil from the site in an impermeable container and dispose of at a suitable licensed site; do not puncture, bury, burn or leave empty containers on site.
- 2. Do not park vehicles, machinery or bowsers or locate un-bunded tanks on bridges or near to watercourses or drains.
- 3. Do not store or handle oils and lubricants, or refuel, wash or repair machinery, within buffer areas.
- 4. Keep containers of fuel oils or lubricants on flat ground and away from the immediate working area of machinery.
- Use double-skinned or bunded, securely lockable tanks where there is a need to temporarily store fuel oils or lubricants on site; provide a cover to reduce the build-up of contaminated rainwater.
- 6. Always use a transfer hose when refuelling.
- 7. Use appropriate bowsers or drums for fuel transport and do not overfill; secure drums within vans, ensuring proper weight distribution.
- 8. Regularly check to ensure there is no leak of fuel or lubricants from machinery and equipment.
- 9. Consider potential threats posed to water from the handling of fuel oils and lubricants.
- 10. Review the contingency plan and ensure you know how to correctly use diesel-handling systems and what to do in the event of a spillage.

#### Pollution control measures for sediment release

![](_page_9_Picture_1.jpeg)

- 1. Suspend operations if a sediment problem is identified; walk the site to identify the source and the extent of the problem.
- 2. Install a cut-off ditch to reduce the flow of surface water draining to sediment sources where needed.
- 3. Locate barriers or traps as close to sediment sources as possible; use brash bunds to reduce the amount of sediment run-off from the land.
- 4. Use smaller silt traps formed from straw bales or other materials to try to retain sediment within drains; secure these traps in place to prevent movement or washout.
- 5. Use geotextile barriers for larger sediment problems; ensure these are well dug into the ground and wide enough to prevent water flowing underneath or around the barrier.
- 6. Match the type and design of any geotextile barrier to the nature of sediment issue.
- 7. Regularly check the quality of water discharging from barriers and traps to ensure sediment is being removed, especially after heavy rainfall; maintain and adjust as necessary.
- 8. Temporarily divert flows or install a downstream silt trap when removing barriers or traps from watercourses; excavate any significant sediment deposits and dump silt outside buffer areas.

#### Assessing water turbidity

- The turbidity of a water sample is a good indicator of the fine sediment content.
- Measuring turbidity can be used to assess the impact of forest management practices and the effectiveness of emergency measures.
- Measuring turbidity can also be used to trace the source of pollution when someone first notices a change in water clarity.
- Measure turbidity by filling a clear-sided and clean bottle from the watercourse taking care not to touch the bottom of the channel to avoid disturbing any deposits of sediment.
- Place the sample bottle against an appropriately coloured background and compare the clarity against the samples below.
- Take immediate action if there is a marked change in water clarity, e.g. by suspending operations, modifying operating procedures and/or constructing silt traps.

Water turbidity is measured in Nephelometric Turbidity Units (NTUs). This diagram shows five samples that range between 0 NTUs (clear) and 300 NTUs.

![](_page_10_Picture_8.jpeg)

The drinking water standard is 4 NTU so any visible water turbidity is an issue for water supplies. Freshwater life can be adversely affected by turbidity levels of between 10 and 50 NTU so surface waters cloudier than this require attention to check whether forest operations are the cause.

## Pollution control checklist for spillages

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#### Assess

- Is anyone injured?
- Is the scene safe?
- Where is the site?
- What is the spillage?
- What action is required?

#### Communicate

- Forestry site manager
- Local forestry office
- Out of hours contact
- Neighbours/landowners
- Downstream water users

#### Contain

- Locate the source of spill if unknown
- Stop the spill from spreading
- Deal with spillage
- Organise back-up materials
- Assess effectiveness of actions

#### Clean up

- Bag contaminated materials and soil
- Check site/watercourse(s) are clean
- Reinstate site when confirmed clean

- Apply first aid and summon the emergency services if needed.
- Consider flash points and toxic fumes.
- Note the **Grid reference** or **GPS co-ordinates**.
- Record the type, source and extent of the spill.
  - Act to contain spillage. If it is not possible, notify the agreed contacts and anyone at risk (e.g. downstream users).

Mobile:	
Mobile:	
Mobile:	
Mobile:	
Mobile:	

- Take action to stop the leak/prevent further spillage at source.
- Use available materials and equipment to create a barrier. Wear personal protective equipment if the spill is hazardous.
- Use available absorbent materials and equipment from spill kit.
- Send for extra pollutant absorbing materials from nearest store.
  - Monitor site and condition of water.
  - Remove contaminated materials from the site and dispose via a licensed waste disposal company.
- ✓ Discuss with site manager whether water sampling is needed.
  - Dismantle and remove equipment/any containment measures.

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