



Managing forest
operations to
protect the water
environment

Operator cab card

Applying buffer areas

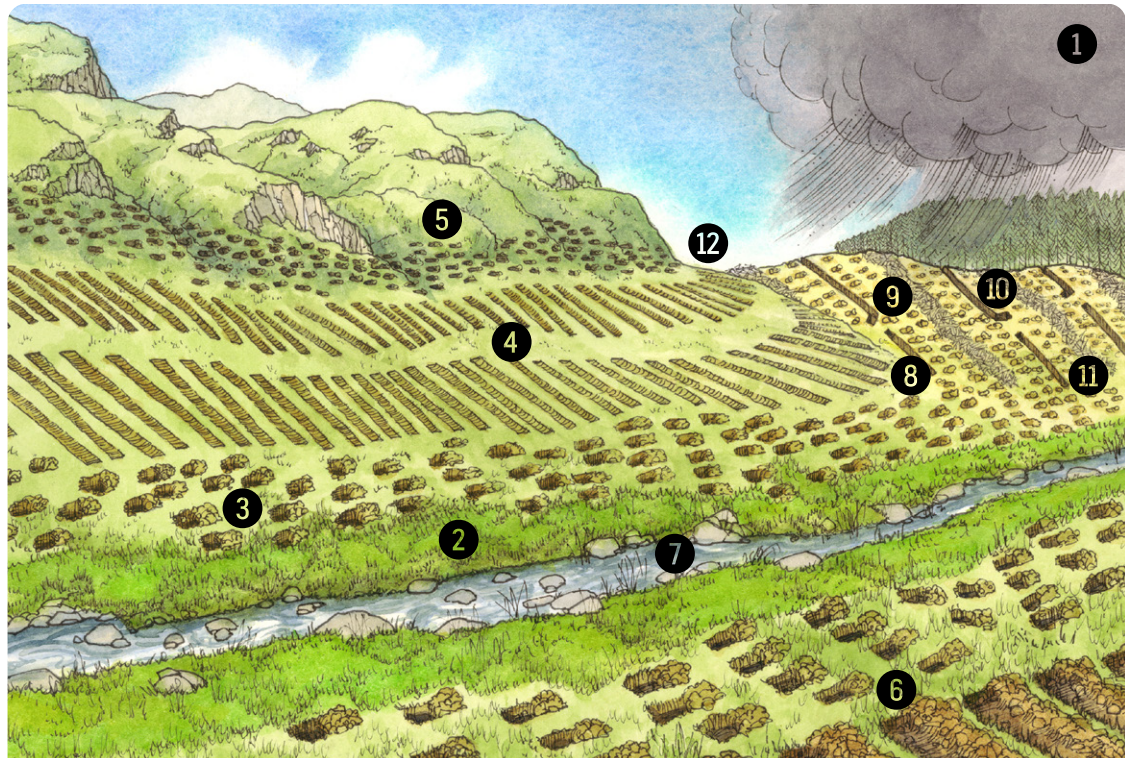
- Buffer areas are designed to protect the water environment from forestry activities. The use of buffer areas is a UK Forestry Standard Good Practice Requirement and is central to this guidance.
- Forest operations within buffer areas should be limited to hinge or inverted mounding and the direct planting of native trees and shrubs and other ecologically appropriate broadleaved trees to create riparian woodland. However, mounding should stop within 2 m of watercourses and within 5 m of abstraction points for water supply; note that this is a legal requirement in Scotland.
- This guidance applies to both sides of the watercourse, around the whole perimeter of the waterbody, and to all waterbodies, including connected ditches and drains, wetlands, large ponds, lakes, and reservoirs. Ditches and drains that are disconnected from a watercourse and so do not carry water into them do not require a buffer area.
- For more information on the design and management of buffer areas see the [UK Forestry Standard \(UKFS\) Requirements and Guidelines on Forests and Water](#) and the supporting Practice Guide on [Managing forest operations to protect the water environment](#).*
- Wider buffer areas might be required by a regulatory body as a condition of consent or permit (and this might be to address other interests such as a nearby priority habitat, private water supply, designated site or historic environment feature).
- Narrower widths of buffer area might be appropriate along minor watercourses with a channel less than 1 m wide, especially on steep ground. The UKFS takes this pragmatic approach for minor watercourses to accommodate situations where, on the one hand, they could be valuable habitats such as spawning streams, but in other situations they may be ephemeral drains leading to a watercourse.

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

Minimum buffer widths for forestry activities (except those listed above in text) from forest edge to watercourse, waterbody, or abstraction point.

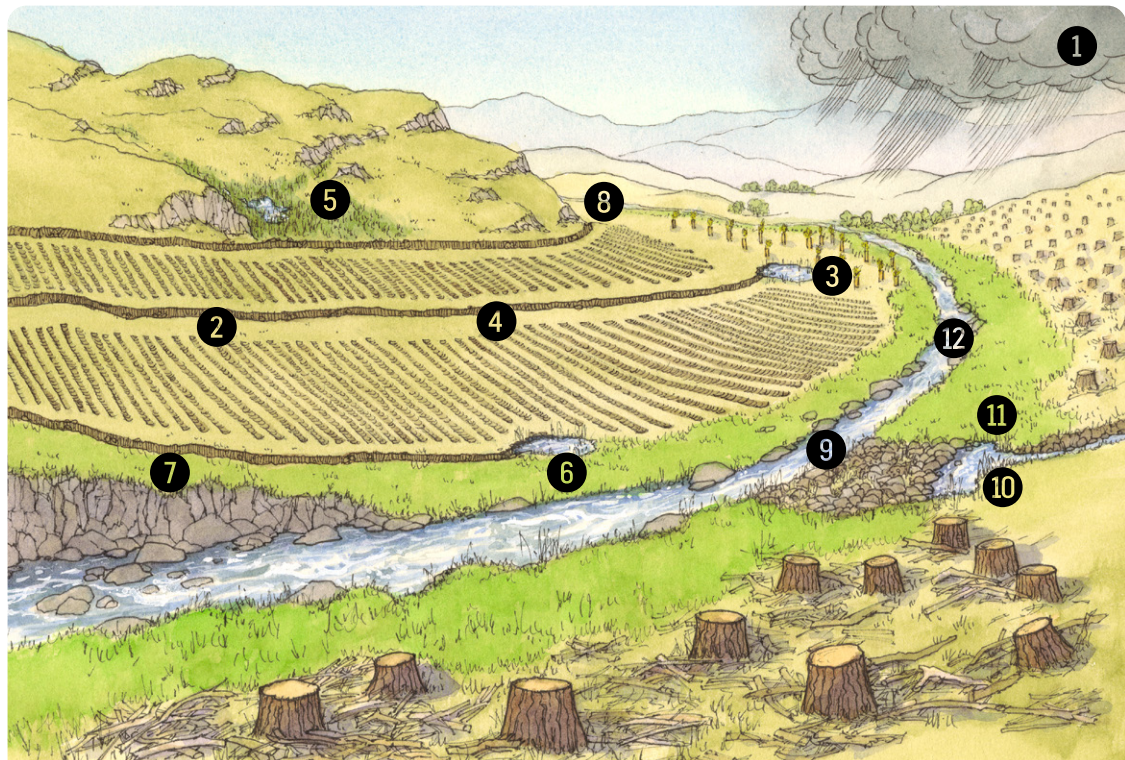
Buffer width	Situation
10 m	Along permanent watercourses with a channel less than 2 m wide.
20 m	Along watercourses with a channel more than 2 m wide and along the edge of lakes, reservoirs, large ponds, and wetlands.
50 m	Around abstraction points for public or private water supply, such as springs, wells, boreholes, and surface water intakes.

Cultivation operations



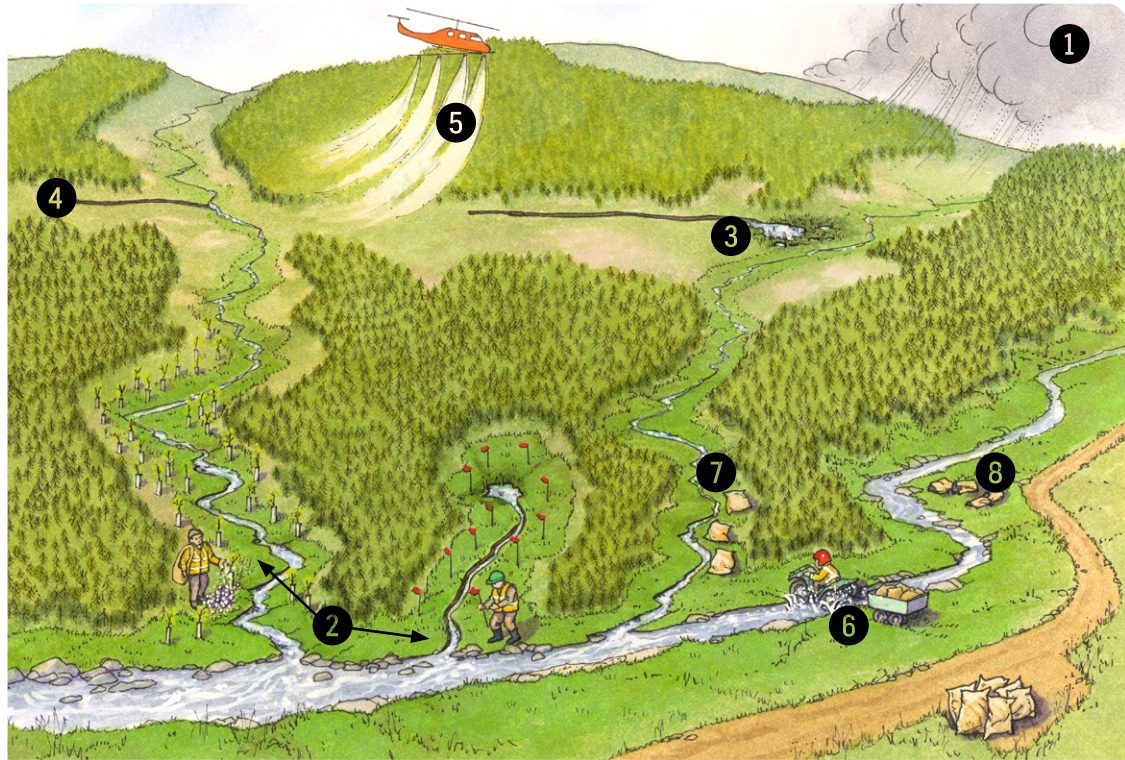
1. Consider the weather and aim to carry out cultivation operations during dry periods.
2. Do not cultivate ground within 2 m of a watercourse or 5 m of abstraction points for water supply, such as springs, wells, boreholes and surface water intakes.
3. Limit cultivation to hinge or inverted mounding 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



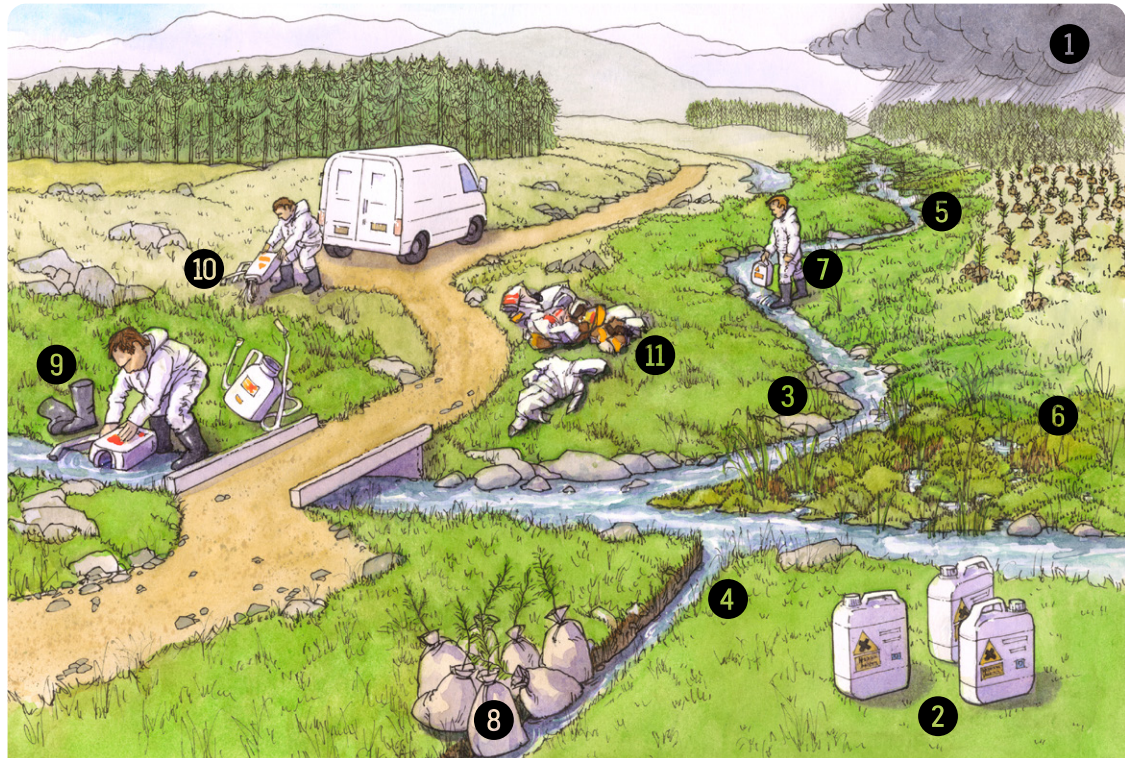
1. Consider the weather and aim to carry out drainage works (including drain maintenance and silt trap cleaning) during dry periods.
2. Cut drains to run at an even gradient of 2° (3.5%) or less leading towards the head of the valley; ensure water does not discharge into lower cultivation channels.
3. 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 drains discharge to a minimum 10 m wide buffer area for permanent watercourses with channels <2 m wide, and to a minimum 20 m wide buffer area for channels >2 m wide. Note that narrower buffer widths (minimum 5 m) might apply along channels <1 m wide, especially ephemeral watercourses on steep ground.
11. Where an existing drain has become a sizeable 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



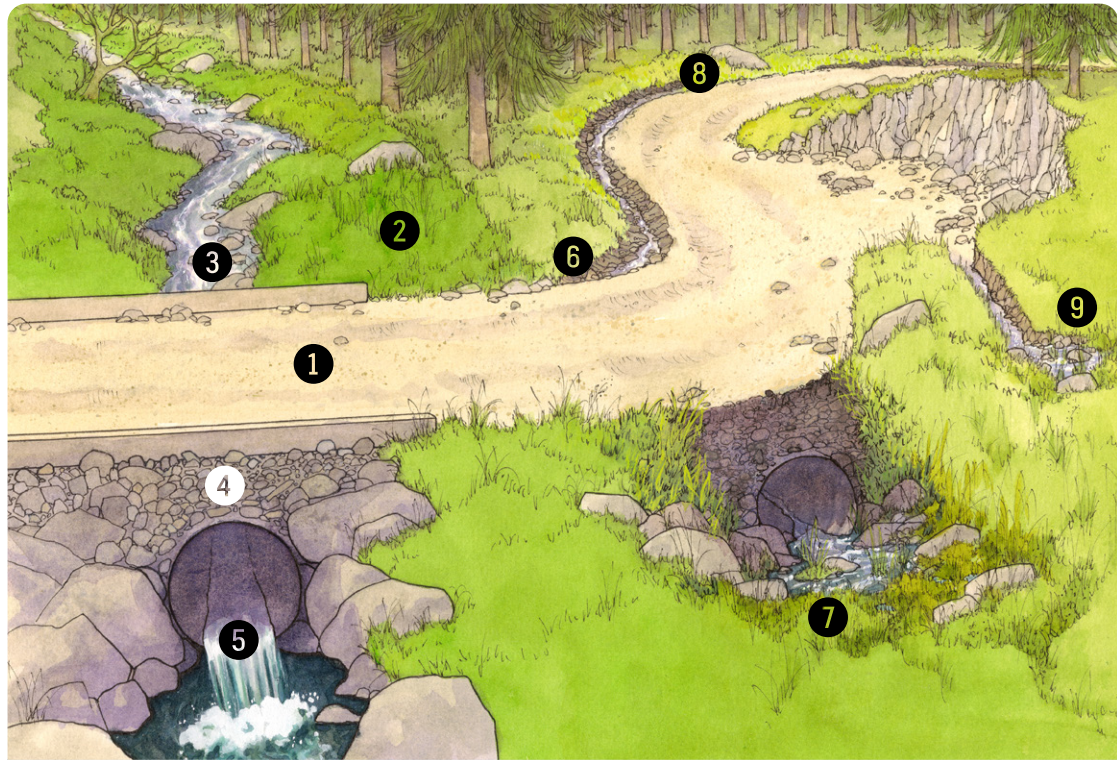
1. Do not apply fertiliser during wet weather (or if heavy rain is forecast within 48 hours), if wind conditions are inappropriate, or if the ground is waterlogged, frozen, or snow-covered.
2. Do not apply inorganic or organic fertiliser within buffer areas, regardless of method or form of fertiliser; make sure the buffer area is clearly marked.
3. Do not apply fertiliser when run-off from drains is sufficient to produce visible surface flow across buffer areas.
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. Double minimum buffer widths for aerial fertiliser applications to land draining to nutrient-sensitive waters.
6. Do not ford streams with loaded quads or other vehicles when distributing fertiliser bags or other materials around a site.
7. Do not store fertiliser within buffer areas.
8. Do not bury or leave empty fertiliser bags on site.

Pesticide applications



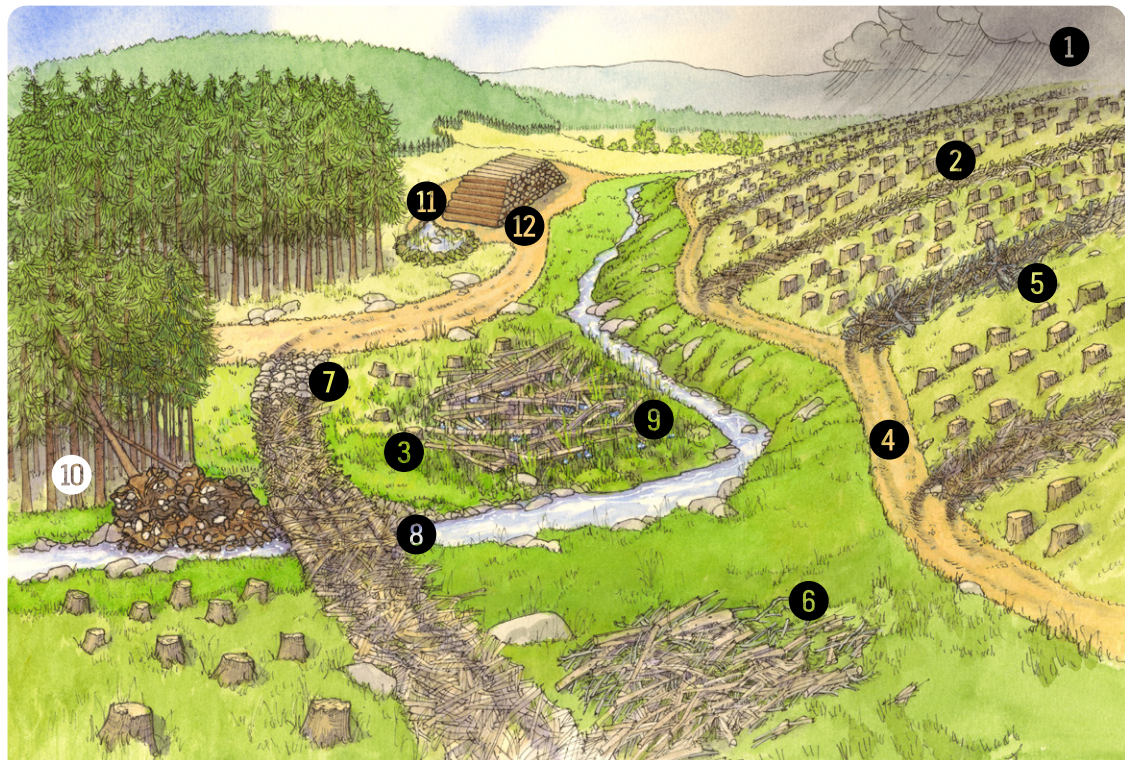
1. Do not apply pesticides during wet weather (or if heavy rain is forecast within 48 hours), windy conditions (more than a light breeze), or if the ground is frozen, waterlogged, or snow-covered.
2. Read and comply with the instructions on the product label.
3. Do not prepare, store, or apply pesticides or plant treated trees within buffer areas unless the product is approved for use in or near water and you have appropriate authorisation. The possibility of leaving narrower buffer areas along minor watercourses <math>< 1\text{ m}</math> wide does not apply to pesticide use.
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



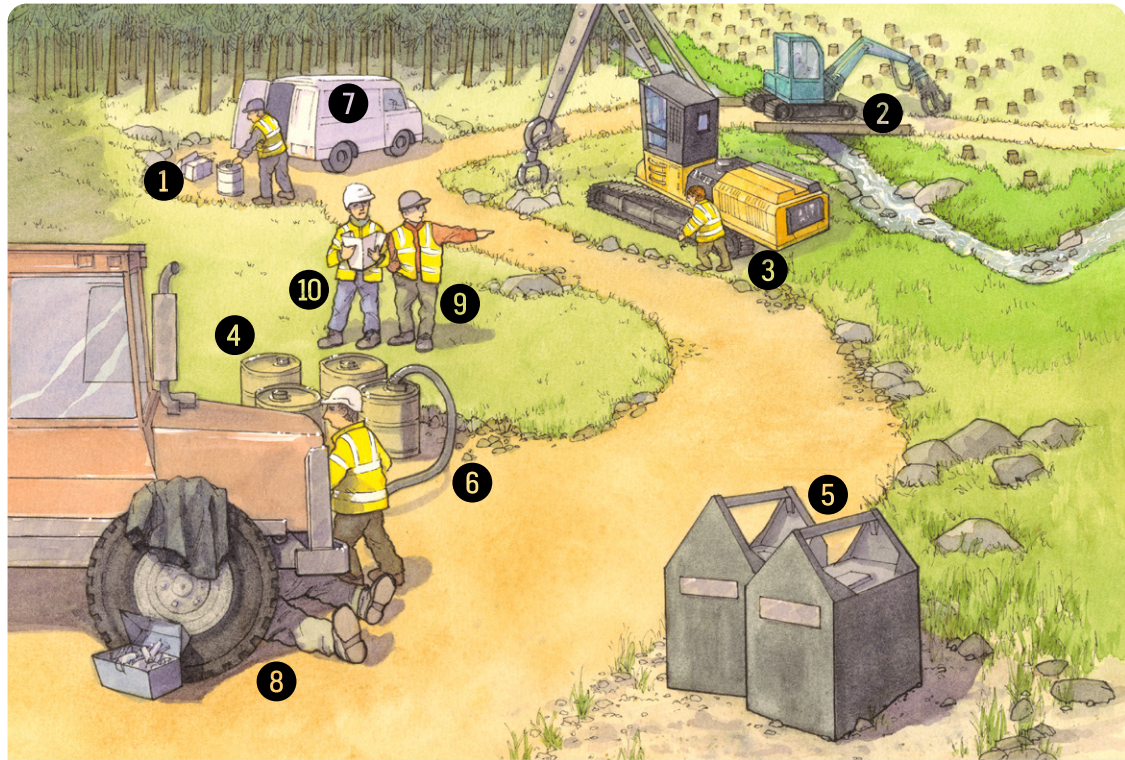
1. Avoid significant road construction work near watercourses in wet weather.
2. Minimise machine trafficking and working within buffer areas.
3. Any natural watercourse that is intercepted by a road should be culverted or bridged at that point.
4. Culverts should be installed on the same alignment as 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



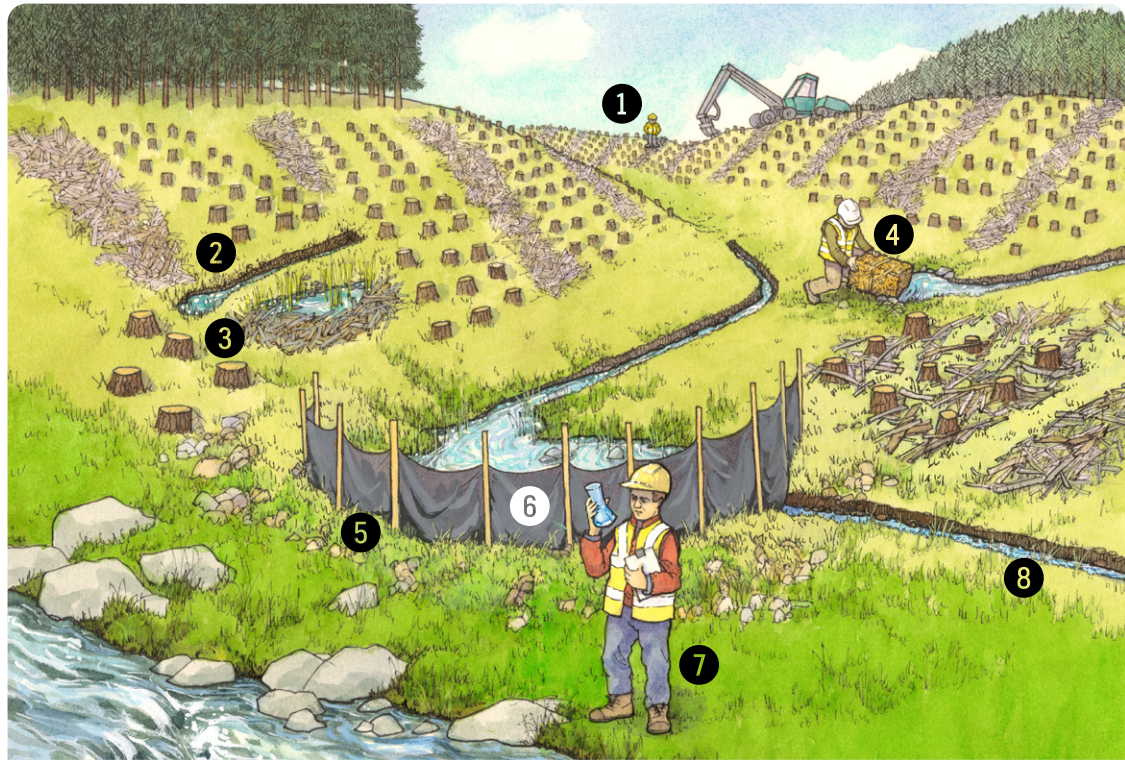
1. Monitor weather forecasts daily and amend work plans accordingly. Suspend operations during heavy rainfall but try to avoid long breaks in working.
2. Avoid long, straight extraction routes and ensure brush mats are maintained.
3. Avoid using skidders on soft ground.
4. Keep extraction routes outside 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 brush 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



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. The possibility of leaving narrower buffer areas along minor watercourses <math>< 1\text{ m}</math> wide does not apply to these activities.
4. Keep containers of fuel oils or lubricants on flat ground and away from the immediate working area of machinery.
5. 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

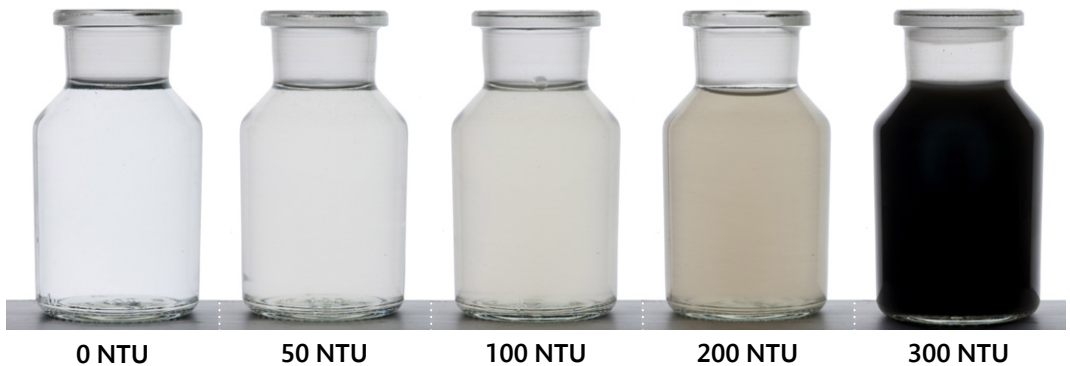


1. Suspend operations if a sediment problem is identified; walk the site to identify the source and the extent of the problem.
2. Install a cut-off ditch to reduce the flow of surface water draining to sediment sources where needed.
3. Locate barriers or traps as close to sediment sources as possible; use brush 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.



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

Assess

- Is anyone injured? ✓ Apply **first aid** and summon the **emergency services** if needed.
- Is the scene safe? ✓ Consider **flash points** and **toxic fumes**.
- Where is the site? ✓ Note the **Grid reference** or **GPS coordinates**.
- What is the spillage? ✓ Record the **type, source, and extent** of the spill.
- What action is required? ✓ **Act to contain spillage**. If it is not possible, notify the agreed contacts and anyone at risk (e.g. downstream users).

Communicate

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

Contain

- Locate the source of spill if unknown ✓ Take action to stop the leak/prevent further spillage at source.
- Stop the spill from spreading ✓ Use available materials and equipment to create a barrier. Wear personal protective equipment if the spill is hazardous.
- Deal with spillage ✓ Use available absorbent materials and equipment from spill kit.
- Organise back-up materials ✓ Send for extra pollutant absorbing materials from nearest store.
- Assess effectiveness of actions ✓ Monitor site and condition of water.

Clean up

- Bag contaminated materials and soil ✓ Remove contaminated materials from the site and dispose via a licensed waste disposal company.
- Check site/watercourse(s) are clean ✓ Discuss with site manager whether water sampling is needed.
- Reinstate site when confirmed clean ✓ Dismantle and remove equipment/any containment measures.