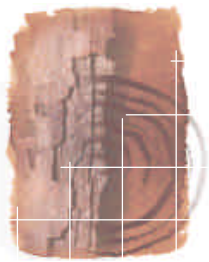




# CONTENTS

Introduction	1
Harvesting	3
Roading	10
Machine Servicing	14
Monitor Performance	16





## INTRODUCTION

As Ireland's forest estate continues to expand and mature, the amount of timber harvesting will increase. Forest harvesting and forest road construction and usage have the potential to impact adversely upon the environment. The adoption of sound planning procedures, operating techniques and control measures will considerably reduce any potential adverse effects.

The FOREST HARVESTING AND THE ENVIRONMENT GUIDELINES address issues relating to:

- soil conservation;
- the protection of water quality, archaeological sites, biodiversity and the visual landscape;
- the maintenance of forest health and productivity.

The guidelines are presented in the context of timber harvesting and forest road construction and maintenance. They recognise the commercial nature of forestry in Ireland and the need for cost-effectiveness in harvesting operations.

Comprehensive planning combined with sound operating techniques will protect and enhance important environmental resources. This document gives guidelines for:

- harvest planning;
- harvest operation;
- harvest site restoration;
- road planning;
- road construction;
- machine servicing.

The FOREST HARVESTING AND THE ENVIRONMENT GUIDELINES have been developed through extensive consultation with a wide range of relevant parties. They set out sound and practical measures based on the principles of Sustainable Forest Management (SFM), and are firmly rooted in the best available scientific information. The guidelines will be kept under review to facilitate amendment in the light of new research findings.

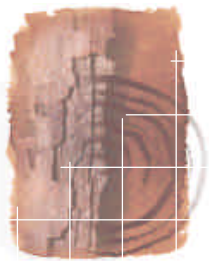
To ensure the successful implementation of SFM in Ireland, it is important that forest owners adhere to the guidelines and undertake all work in a way which is compatible with the protection of the environment.

The guidelines describe a range of measures intended to cover all situations relating to forest harvesting and the environment. Not all of the measures outlined will be applicable to every site. However, it is the responsibility of forest owners to identify and apply those measures which are appropriate to their particular forest.

The FOREST HARVESTING AND THE ENVIRONMENT GUIDELINES apply to all grant-aided projects and to all activities associated with a Felling Licence. Any breach may result in the forfeit of grant aid and premium payment or the withdrawal of a Felling Licence.

It is essential that all forest workers and machine operators involved in any forest operation are made aware of and understand the guidelines, all relevant environmental issues relating to the site, and working practices which minimise environmental disturbance. All operators should have contact telephone numbers onsite for all relevant agencies (Local Authorities, Regional Fisheries Boards, Dúchas The Heritage Service, National Museum of Ireland, Garda Síochána, etc.) in case of accidental damage to aquatic zones, archaeological sites, important wildlife habitats and other environmental features.





## HARVESTING

The principal forms of harvesting undertaken in Irish forests are thinning and clearfelling. Thinning takes place to improve the quality of the remaining trees, to enhance growing conditions and to provide intermediate yields of timber in the form of small roundwood. Clearfelling involves the harvesting of all marketable trees in a stand at the end of the rotation, with reforestation subsequently undertaken to replace the harvested trees. Silvicultural systems which incorporate continuous forest cover may provide alternatives to clearfelling in particular situations.

## HARVEST PLANNING GUIDELINES

The following outlines procedures for developing a harvest plan to minimise environmental disturbance. The plan is best represented and recorded on a map accompanied by a short written description.

### Environmental issues

Identify all relevant environmental issues. Establish if the area to be harvested lies within or contains:

- an area identified as being environmentally sensitive in a County Development Plan;
- a part or whole of a Special Area of Conservation (SAC), Special Protection Area (SPA) or proposed Natural Heritage Area (pNHA);
- aquatic zones (see FORESTRY AND WATER QUALITY GUIDELINES);
- archaeological sites and monuments (see FORESTRY AND ARCHAEOLOGY GUIDELINES);
- important habitats retained for biodiversity purposes (see FOREST BIODIVERSITY GUIDELINES).

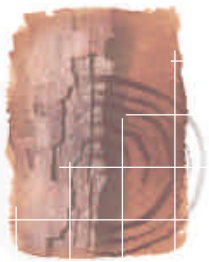
Liaise with the following for practical advice where important environmental issues are involved:

- the relevant Regional Fisheries Board;
- the relevant Local Authority;
- National Parks and Wildlife of Dúchas The Heritage Service;
- the National Monuments and Historic Properties Service of Dúchas The Heritage Service;
- other relevant bodies and non-government organisations.

### Terrain inspection

Inspect the area and prepare a map (Ordnance Survey 6 inch scale is usually appropriate) which includes the following:

- The boundaries of the harvest area.
- The environmental features of the area, including all aquatic zones, archaeological sites and monuments, and important habitats.
- Additional features which may present difficulties or require particular attention when harvesting, e.g. landscape considerations, dwellings and associated buildings, overhead and underground utility lines (electricity, gas, telephone and water), public and private water supplies, rights-of-way.
- The location of buffer and exclusion zones within the felling coupe (as stipulated by FORESTRY AND WATER QUALITY GUIDELINES and FORESTRY AND ARCHAEOLOGY GUIDELINES), within which operations will be prohibited or restricted.
- The existing and planned road network and associated structures such as landings, turntables and bridges.
- The location of areas of potentially high erosion risk.
- The location of machine maintenance, refuelling and repair areas and storage areas for fuel, motor oils, lubricants and chemicals. These must be on dry, elevated sites at least 50 m from the nearest aquatic zone. See FORESTRY AND WATER QUALITY GUIDELINES.
- Machine routes and particularly ground haul extraction routes. Plan these so that they avoid all buffer and exclusion zones and, where possible, difficult terrain conditions. The length of extraction routes should be minimised, particularly on steep slopes.



The careful selection of felling coupe size and shape will minimise landscape impact and create opportunities to introduce age structure diversity within the forest.

### Management regime

Select the management regime, including the harvesting system, to be adopted. The harvesting system will be determined primarily by the intended markets for the timber, the stand characteristics (including environmental issues), soil, topography, exposure and machine availability and cost.

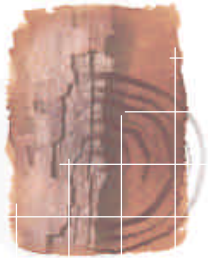
### Size of the felling coupe

The size of felling coupes for both thinning and final harvesting is determined by many competing factors. These include the stability of the forest crop and surrounding forest crops, environmental issues such as water quality and landscape, social issues such as public road usage, and various commercial and silvicultural constraints. The following factors should inform the decision regarding the appropriate size of felling coupes:

- Smaller sized felling coupes tend to promote water quality, with greater care and planning needed as the coupe size increases (see FORESTRY AND WATER QUALITY GUIDELINES).
- Smaller felling coupes tend to promote biodiversity (see FOREST BIODIVERSITY GUIDELINES).
- Select coupe sizes which reflect the scale of the landscape (see FORESTRY AND THE LANDSCAPE GUIDELINES). Skylines in particular need to be treated on a large scale, with the forest either left standing or cleared fully to reveal the shape of the underlying landform.

### The shape of the felling coupe

Water quality and archaeological sites demand buffer zones or exclusion zones (normally 10 m and 15 m respectively or as specified by the appropriate statutory authority - see FORESTRY AND WATER QUALITY GUIDELINES and FORESTRY AND ARCHAEOLOGY GUIDELINES) within which machine work is prohibited or, if unavoidable, carried out with extreme care. Biodiversity is enhanced through the retention of overmature trees, ideally scattered throughout the forest (see FOREST BIODIVERSITY



GUIDELINES). Landscape issues favour asymmetric and irregularly shaped coupes which follow landform, with edges diagonal to the contour, rising in hollows and descending on spurs (see FORESTRY AND THE LANDSCAPE GUIDELINES). As part of contingency planning, include non-sensitive areas within the felling coupe where harvesting may continue if it has to be postponed in sensitive areas.

### **Felling sequence**

Adjoining felling coupes harvested in a short time scale are likely to have a cumulative impact on the environment. In large, even-aged stands, phased felling will minimise this cumulative effect and will ensure that succeeding rotations do not have the same undesirable structure. Staggered felling/reforestation also benefits biodiversity and the landscape (see FOREST BIODIVERSITY GUIDELINES and FORESTRY AND THE LANDSCAPE GUIDELINES).

### **Contingency planning**

A contingency plan should be in place to cover harvesting. This should identify areas of the felling coupe where harvesting operations may continue, even if they have been halted in more sensitive areas of the coupe due to particularly adverse weather conditions, soils with high erosion risk or low bearing capacity, or accidents involving environmental damage. Consider imposing seasonal restrictions and scheduling operations to avoid wet weather and waterlogged soils or to minimise disturbance to important wildlife species.

### **Method of harvesting and the harvesting equipment**

Select the method of harvesting and the harvesting equipment to be employed in each felling coupe. The choice of machinery will mainly depend upon the harvesting system, the nature of the terrain, environmental considerations, the forest road network, and machine availability and cost. Attach conditions on the machine type, permitted load size and the possible use of flotation and traction aids.

### **Buffer and exclusion zones**

Identify the appropriate width of buffer and exclusion zones for aquatic and archaeological features within or adjoining the coupe. The minimum buffer zone for aquatic zones is usually 10 m; the minimum exclusion zone for archaeological sites is usually 15 m. These may need to be increased following discussion with the Regional Fisheries Board, Local Authority or the National Monuments and Historic Properties Service of Dúchas The Heritage Service, depending on the sensitivity involved. In general, all forestry operations are prohibited from these areas. Trees, if present (due to the absence of guidelines at the time of planting), should be removed from these areas at thinning and final harvesting. This operation must be carried out with extreme care.

### **Ancillary structures**

Anticipate the need and detail the specifications and locations for ancillary structures such as:

- temporary bridges where machine routes cross aquatic zones;
- sediment traps in drains where considerable sediment flow is expected;
- corduroy rafts to reinforce short sections of soft ground subject to high traffic usage;
- log steps on steep routes to prevent the flow of sediment-laden surface water along machine paths, especially where wheel ruts may form.

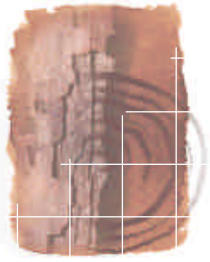
### **Site restoration procedures**

Outline site restoration procedures to be undertaken at the completion of operations. These should include requirements regarding roads, replacing damaged culverts, clearing and repairing drains, cleaning sediment traps, correctly disposing of hazardous materials, and removing log bridges and other temporary structures.









## HARVESTING OPERATION GUIDELINES

This section contains detailed information on low impact harvesting techniques which can be used to reduce the potential for adverse environmental effects.

Ensure that all personnel, particularly machine operators, are aware of:

- the harvest plan (including the contingency plan);
- environmental issues relating to the site;
- the outer perimeter of all buffer and exclusion zones.

### Ancillary structures

Install all necessary ancillary structures (e.g. additional drainage, sediment traps, log steps, aquatic zone crossings, corduroy strips) before harvesting commences or, where appropriate, as harvesting progresses. Maintain these features throughout the operation.

### Safety signage

Where harvesting operations adjoin public roads, appropriate warning signs should be in place to alert the public. Warning signs should also be placed within the forest, particularly if it is used for recreation.

### Brash mats

Create and maintain dense, fresh brash mats on all machine routes, to avoid soil damage, erosion and sedimentation. Concentrate brash mats on primary routes. The junction of extraction paths and landing sites should also be supplied with a protective brash cover. Where the bearing capacity of the soil is low, specify prompt extraction to ensure that fresh brash is available for extraction machinery. In all cases, brash mats should be renewed when they become heavily used and worn.

### Machine passage on forest roads

The passage of ground haul extraction on forest roads should be confined to unladen traffic gaining access to or exiting from the harvesting site. No forwarding or ground haulage operations should take place on either forest or public road surfaces. There should be no carrying over of soil or debris onto public roads. Keep roadside drains and culverts free of logs, debris and obstructions.

### Buffer and exclusion zones

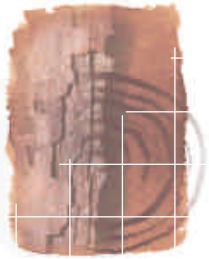
- The outer perimeter of all buffer and exclusion zones (see FORESTRY AND WATER QUALITY GUIDELINES and FORESTRY AND ARCHAEOLOGY GUIDELINES) should be marked clearly with a perimeter fence, brightly coloured paint marks on trees, or brightly coloured tape.
- Machines should not enter these zones during harvesting operations, except where it is unavoidable.
- Fell trees away from these zones.
- Ensure logs are presented in a way which avoids the entry of extraction machinery into these zones.
- Do not pile logs within these zones.

### Drains and aquatic zones

Prevent the accumulation of brash, logs and debris in drains and aquatic zones. The installation of heavy duty plastic culverts with a protective brash cover is preferable for drain crossings. If logs are used for this purpose, they should be examined regularly and removed, if necessary, to avoid blockages and localised flooding. Remove temporary bridges and crossings as harvesting progresses.

Selecting the right machine for the operation and site conditions is a key element in protecting the environment during harvesting.





### Urea application

Urea should be applied immediately after felling to all conifer stumps. Prepare and securely store urea under shelter on a dry, elevated site at least 50 m from the nearest aquatic zone.

### Load sizes

Load sizes specified in the harvest plan or recommended by manufacturers should not be exceeded. Overloading will damage extraction machinery and will increase the risk and severity of soil compaction and rutting.

### Establish new buffer and exclusion zones and other open spaces

If absent and where tree stability and site conditions allow, use the opportunity afforded by harvesting to impose buffer and exclusion zones and other open spaces in relation to public roads, dwelling, habitats, etc. Refer to FORESTRY AND WATER QUALITY GUIDELINES, FORESTRY AND ARCHAEOLOGY GUIDELINES, FORESTRY AND THE LANDSCAPE GUIDELINES and FOREST BIODIVERSITY GUIDELINES for details.

### Wildlife habitats and biodiversity

Ensure that important wildlife habitats retained for biodiversity purposes are protected during harvesting. Plan operations with due regard to the breeding and nesting seasons of important species, and associated features such as badger setts and heronries. Important species to consider include birds of prey (buzzard, eagle, falcon, harrier, hawk, kite, osprey and owl) and mammals badger, bat species, red deer, hare, hedgehog, otter, pine marten and red squirrel. If possible and where wind firmness and landscape considerations apply, retain some stems to grow on to old age, ideally scattered throughout the forest. Some deadwood should also be left *in situ* after both thinning and harvesting, in the form of standing dead stems or naturally fallen trunks, or as logs deliberately left behind on the forest floor. See FOREST BIODIVERSITY GUIDELINES.

### Perimeter trees

Narrow belts of perimeter trees on the skyline tend to accentuate the negative visual impact of harvesting operations and should not be retained unless for biodiversity purposes. See FORESTRY AND THE LANDSCAPE GUIDELINES.

### Unrecorded archaeological sites

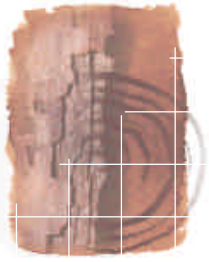
Any unrecorded archaeological site or artefact discovered during the course of the harvesting operations must be left undisturbed and the relevant authorities (the National Monuments and Historic Properties Service, the National Museum of Ireland and the Garda Síochána) notified immediately. A minimum exclusion zone of 20 m must be created until the site of the find has been investigated. Also, it is advisable to switch operations to some other part of the property until the investigation is complete. See FORESTRY AND ARCHAEOLOGY GUIDELINES.

### Suspending operations

On sites which have a high risk of soil erosion or with soils of low bearing capacity, consider suspending mechanised operations during and immediately after periods of particularly heavy rainfall.

## HARVEST SITE RESTORATION GUIDELINES

Harvesting operations can impact upon the forest infrastructure. Although the adoption of sensitive working practices will minimise any adverse effects, some disturbance is inevitable.



### **Road repairs**

Road surfaces should be restored and reshaped as necessary to prevent erosion and sedimentation.

### **Drain repairs**

Harvesting debris and sediment should be removed from drains, sediment traps and culverts. Drains damaged during the course of operations should also be repaired.

### **Temporary structures**

All temporary structures, such as log bridges and corduroy rafts, should be removed immediately after use.

### **Hazardous compounds and refuse**

Ensure that all hazardous compounds are removed from the site for correct disposal. All containers, machine parts and refuse generated by the operation should also be removed.

### **Water management on extraction routes**

Immediately after operations, implement water control and soil ameliorating treatments on major extraction routes. These may include the creation of diversion channels across wheel ruts where there is a risk of erosion, or ripping in heavily compacted areas.

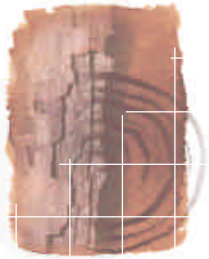
## **ROADING**

Roading involves the construction and maintenance of forest roads, tracks and ancillary structures such as landings, turntables, bridges and culverts.

Forest roads and tracks provide access to the forest for management, recreation, harvesting and transport. They have the potential to adversely impact upon the environment. Therefore, during their construction, in the course of harvesting and immediately after the completion of operations, measures should be taken to minimise disturbance and the threat of sedimentation.



During harvesting and roading, ensure that all relevant measures are taken to avoid sedimentation and damage to aquatic zones.



## ROAD PLANNING GUIDELINES

The following guidelines outline planning procedures for developing a forest road network with minimal environmental disturbance.

Environmental features are usually more readily identifiable before canopy closure. Road planning at an early stage of the forest rotation would therefore be desirable, but this may conflict with the need to await technological or market developments.

### Environmental issues

Identify all relevant environmental issues. Establish if the area to be roaded lies within or contains:

- an area identified as being environmentally sensitive in a County Development Plan;
- a part or whole of a Special Area of Conservation (SAC), Special Protection Area (SPA) or proposed Natural Heritage Area (pNHA);
- aquatic zones (see FORESTRY AND WATER QUALITY GUIDELINES);
- archaeological sites and monuments (see FORESTRY AND ARCHAEOLOGY GUIDELINES);
- important habitats retained for biodiversity purposes (see FOREST BIODIVERSITY GUIDELINES).

Liaise with the following for practical advice where important environmental issues are involved:

- the relevant Regional Fisheries Board;
- the relevant Local Authority;
- National Parks and Wildlife of Dúchas The Heritage Service;
- the National Monuments and Historic Properties Service of Dúchas The Heritage Service;
- other relevant bodies and non-government organisations.

### Terrain inspection

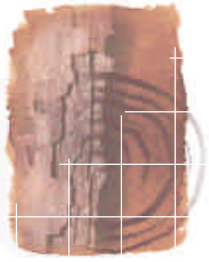
Inspect the area and prepare a map (Ordnance Survey 6 inch scale is usually appropriate) which includes the following:

- The boundaries of the forest to be roaded.
- Main public access route(s) and any existing forest road and track network, including associated structures such as landings, turntables and bridges.
- The environmental features of the area, including all aquatic zones, archaeological sites and monuments, and important habitats.
- Additional features which may present difficulties or require particular attention when developing a road network, e.g. awkward bends and restricted bridges, landscape considerations, dwellings and associated buildings, overhead and underground utility lines (electricity, gas, telephone and water), public and private water supplies, rights-of-way.
- The location of buffer and exclusion zones within the area (as stipulated by FORESTRY AND WATER QUALITY GUIDELINES and FORESTRY AND ARCHAEOLOGY GUIDELINES), within which operations will be prohibited or restricted.
- Areas unsuitable for roading, due to potentially high erosion risk, topography, etc.
- The location of machine maintenance, refuelling and repair areas and storage areas for fuel, motor oils, lubricants and chemicals. These must be on dry, elevated sites at least 50 m from the nearest aquatic zone. See FORESTRY AND WATER QUALITY GUIDELINES.
- The location of any gravel source within the forest which is intended to be used for road construction.

### Spacing and density

Determine the appropriate spacing and density for the road and track network. The extent of forest roads and tracks will depend on factors such as the size and shape of the forest, expected volume, current and potential value of the crop, the harvesting systems and machinery to be used, and the nature of the terrain.





Brash mats and suitable wheel attachments, such as tracks, will protect against soil damage and sedimentation during extraction operations.



### Road design standards

Road design standards should be based on:

- the bearing capacity of the public road access routes;
- anticipated axle loads;
- traffic intensities;
- environmental considerations.

Subjecting a forest road to axle loads greater than those for which it was designed can lead to severe damage, greatly reducing the life of the road and creating the potential for serious environmental disturbance and community upset.

### Plan the routes

Plan the routes of forest roads and tracks and the location of landings and turntables to minimise the potential for environmental disturbance.

- Routes should avoid archaeological sites and important habitats. Their encroachment in or near wet or unstable areas or within 50 m of aquatic zones should be minimised.
- Maintenance costs and erosion problems tend to increase greatly with steeper inclines. The gradient of roads should therefore be kept to a minimum, restricted where possible to short stretches of steep road which are considered necessary to reduce overall impacts.
- The layout of the road network should be designed with appropriate variation in curves and gradient to reflect landform. Routes should be unobtrusive and cross skylines at the lowest practical point. See FORESTRY AND THE LANDSCAPE GUIDELINES.
- Landings and turntables should be located on stable, well-drained sites at least 20 m from the nearest aquatic zone. Avoid locating them on prominent spurs or ridges.
- Road layout should aim to direct off-road traffic away from aquatic zones, and should follow the natural contours of the terrain.



Suitably located landing areas and well-presented timber will facilitate efficient haulage of material from the forest.



## ROAD CONSTRUCTION GUIDELINES

This section contains detailed information on low impact road construction techniques which can be used to reduce the potential for adverse environmental disturbance from road and track construction.

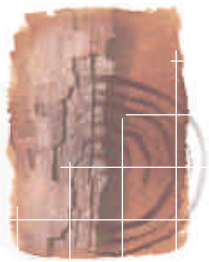
Minimise the total area of disturbance which results from road construction. The total length and average width of the road network should be the minimum required for efficient and safe transportation.

### Timing of formation and construction

- Wherever possible, carry out formation and construction from April to October - the period when ground conditions tend to be drier.
- Where there is a risk of severe erosion occurring, construction should be suspended during periods of high rainfall.

### Prior drainage and roadside drains

- Where the intended route of a road must pass through waterlogged or impervious soils, these areas should be drained before construction commences. This will stabilise the road bed and reduce the danger of failure during construction and use.
- Ensure that roadside drains do not intercept large volumes of run-off from higher ground.
- Cut-off drains should be constructed to a flat gradient at least 5 m back from the upper edge of the road formation, to avoid erosion.
- Roadside drains must never discharge directly into aquatic zones. As with all drainage channels, they must taper out before entering the buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within the zone. If deemed necessary, install sediment traps at the end of the drainage channels.
- Adhere to drainage measures set out in FORESTRY AND WATER QUALITY GUIDELINES.



### Buffer and exclusion zones

- The outer perimeter of all buffer and exclusion zones (see FORESTRY AND WATER QUALITY GUIDELINES and FORESTRY AND ARCHAEOLOGY GUIDELINES) should be marked clearly with a perimeter fence, brightly coloured paint marks on trees or brightly coloured tape.
- Machines should not enter these zones during roading operations, except where it is unavoidable.
- Fuel storage, maintenance, refuelling and repair work must not take place within 50 m of the nearest aquatic zone.

### Culverts, bridges and fords

- Any work in an aquatic zone should be limited to the period May to September (inclusive).
- Crossings should be designed so that:
  - the number of crossings over a given aquatic zone is minimised;
  - disruption to the bank, bed and adjacent buffer zone is minimised;
  - the water flow is crossed at a right angle;
  - cement or uncured concrete is kept out of the aquatic zone, with cast-in-place concrete isolated from any water which might enter the aquatic zone, until the concrete is cured;
  - local stone is used for bridge kerbs and end treatments for culverts;
  - all timber treatment is carried out off-site.
- Consult with the Regional Fisheries Board at least six weeks prior to constructing any crossing over a fisheries aquatic zone.
- Bridge construction is necessary where culverts may restrict fish migration.
  - All supports and buttresses should be completely out of the stream.
  - Do not create shallow or shooting flow at the bridge aprons, to ensure that water velocities do not impede fish movement.
- Fords are not desirable and should only be used when the design is approved by the Regional Fisheries Board.
- All culverts should be well-bedded and of sufficient size to carry normal flow and to accommodate 25-year storm events, and to avoid blockages and washouts. Ends should be tapered to match the embankment slope. If greater than 1.0 m in diameter, they should be buried to a depth of 30 cm or 20% of their height (whichever is greater) below the streambed, and the original bed material as well as boulder-sized rocks placed in the culvert.

### Embankments and cuttings

Maintain all roadside embankments and cuttings and encourage their revegetation (e.g. grass, willow), in order to improve stability and to prevent erosion. Divert drainage water from these to more stable vegetated ground.

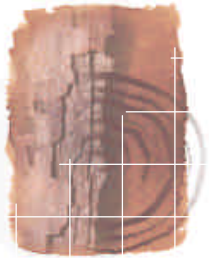
#### Metalliferous or sulphide-rich material

Metalliferous or sulphide-rich material for road construction must not be used within 50 m of an aquatic zone. Any water flowing off such a surface should be directed onto vegetated soil and not allowed to flow directly into an aquatic zone.

### Gravel removal

Gravel must not be removed from aquatic zones. Gravel should be removed from an aquatic buffer zone only after consultation with the Regional Fisheries Board and fishery owner. Any water discharging from a quarry or gravel source must pass through a sediment trap before entering the buffer zone.





### **Unrecorded archaeological sites**

Any unrecorded archaeological site or artefact discovered during roading operations must be left undisturbed and the relevant authorities (the National Museum of Ireland, the Garda Síochána and National Monuments and Historic Properties Service) notified immediately. A minimum exclusion zone of 20 m must be created until the site of the find has been investigated. See FORESTRY AND ARCHAEOLOGY GUIDELINES.

### **Consolidation**

All roads should be allowed to consolidate, dry out and settle before use, so that they do not become rutted from traffic.

### **Drain maintenance**

Harvesting debris and sediment should be regularly removed from roadside drains, sediment traps and culverts to avoid blockages and washouts, particularly after extended periods of heavy rainfall.

### **Condition of roads**

The condition of roads, drains and culverts should be assessed prior to and immediately after harvesting and transport operations. Photographic evidence gathered at this time may assist in any subsequent disputes.

### **Sediment traps**

Sediment traps should be routinely inspected and cleared of sediment, preferably during May to September to avoid the sensitive salmonid spawning period.

### **Forest road entrances**

Forest entrances off public roads should be sensitively designed and constructed, and well maintained.

## **MACHINE SERVICING**

Machine maintenance and breakdowns require servicing and repair work to be performed during the course of harvesting and roadwork. It is vital that such operations, which can involve the spillage of potentially polluting materials, are undertaken at appropriate locations, and that the following procedures designed to limit potential environmental damage are adopted.

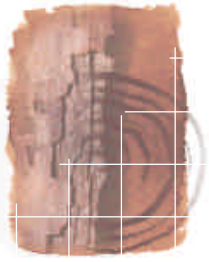
### **MACHINE SERVICING GUIDELINES**

#### **Hazardous compounds**

Prepare and store all fuels and machine oils under shelter on a dry, elevated site at least 50 m from the nearest aquatic zone. See FORESTRY AND WATER QUALITY GUIDELINES.

#### **Maintenance and refuelling**

All maintenance and refuelling operations and machine repairs (where possible) should be carried out at least 50 m from the nearest aquatic zone.



Ensure that all machine servicing is carried out at least 50 m from the nearest aquatic zone.

### Spent compounds

Spent oils must be collected and retained for correct off-site disposal. Remove all containers from the site and dispose of carefully.

### Accidental spillage

The relevant Local Authority and Regional Fisheries Board must be informed promptly of an accidental spillage of fuel or machine oil which threatens an aquatic zone. Do not, under any circumstances, discharge chemicals, fuels or machine oils into an aquatic zone.

## MONITOR PERFORMANCE

The forest owner/agent should undertake inspections during the course of operations to allow for immediate corrective action to be taken in the event of deviations from the plan or unforeseen problems. An assessment should involve an evaluation of the location and condition of roads, landings and machine routes, particularly in relation to drainage, compaction and rutting. Sites should be visited in the aftermath of an extended period of heavy rainfall to ensure that, if merited, operations are suspended. An assessment should be undertaken to determine whether protected areas are undamaged, and that fuel, lubricants, anti-freeze, urea and other hazardous compounds are stored correctly and are removed from the site on the completion of operations.



The final product - quality timber harvested and extracted using environmentally sustainable techniques and operations.



The Forest Service gratefully acknowledges the contribution of Purser Tarleton Russell Ltd., Forest Industry Consultancy & Research, to the development of the FOREST HARVESTING AND THE ENVIRONMENT GUIDELINES, made through the preparation of a commissioned report. Copies of this report can be obtained from the Forest Service, Department of the Marine and Natural Resources, Leeson Lane, Dublin 2.

Photos: Forest Service.

