The UK Forestry Standard

The governments' approach to sustainable forestry

Forestry Commission

Scottish Forestry
Coilltearachd na h-Alba

Cyfoeth Naturiol Cymru
Natural Resources Wales

FOREST SERVICE

2. General Forestry Practice

This section sets out aspects of forestry practice that apply to most forest situations, and that are common to the elements of sustainable forest management within the UKFS.

The importance of forest planning

Compliance with the law is fundamental to the UKFS, and this is reflected throughout. Any environmental impact arising from forestry practice must be considered, and this can apply at any stage of forest planning, from woodland creation plans to felling and restocking (or regeneration) proposals, and the construction of forest roads and quarries. Regulations are in place to help ensure that forestry operations do not cause significant negative effects on the environment, and various mechanisms and practices seek to encourage complementary action between forestry and wider land-use objectives (see Box 2.1). Local, national or international conservation or heritage designations may also apply to a site.

A key reference document supporting the planning, delivery and monitoring of sustainable forestry practice is a forest management plan that is compliant with the UKFS. In some cases, a forest management plan is also used to support the delivery of incentives by government bodies and others, as it demonstrates an understanding of the principles of the UKFS.

Forests need to be healthy and resilient to environmental change if they are to maintain and enhance their capability to produce timber products and provide other benefits to society and a high-quality habitat for wildlife. A forest's resilience is a function of its extent, condition, diversity, connectivity and adaptability, and therefore its resilience affects its cover, productivity and resistance to disease. Controlling damage by mammals, especially deer and grey squirrel, is essential, as is managing plant health and biosecurity. Given the rising number and severity of tree pests and diseases in recent decades, forestry practitioners should actively monitor the health of existing forests and be alert to the importance of biosecurity in their planning and management activities. The source of planting material for afforestation is important, especially in terms of biosecurity, benefitting productivity and biodiversity by reducing the risk of pathogens.

Box 2.1 Complementary action between forestry and catchment management

The concept of integrated catchment management looks to apply the principles of sustainable forest management at a water catchment scale rather than in a piecemeal approach that artificially separates land management from water management. It provides a framework to safeguard the natural functioning of freshwater ecosystems by trying to reconcile the various demands on the catchment, such as water supply, power generation, flood storage, navigation and fisheries, without jeopardising the natural characteristics of the water environment and heritage features on water courses. Connectivity is understood to be increasingly important, with forested areas planned and managed to allow links within the catchment and across the landscape.

UKFS Requirements for General Forestry Practice

General compliance

All occupiers of land and parties engaged in forest management activities are subject to a range of laws and regulations. Some are relevant to land-based activities in general and others are more specific to forestry.

Forestry activities and businesses must comply with all relevant laws and regulations.

Operations must be authorised by the legal owner.

Reasonable measures should be taken to ensure no illegal or unauthorised activity takes place within the forest.

Forestry activities and businesses should comply with relevant codes of practice and industry guidelines.

Forest protection

Forestry legislation across the UK conveys wide powers to promote sustainable forestry, support woodland creation and timber supply, and control felling and deforestation. Country guidance on forest protection legislation in England, Scotland, Wales and Northern Ireland should be referred to.

In addition to softwood and hardwood timber, UK forests deliver a wide range of social and environmental (or 'non-market') benefits and services. These benefits and services, in particular recreation, biodiversity, carbon sequestration, landscape, water quality and flood risk management, need to be maintained and enhanced as part of forest protection measures.

Deer management measures will need to take account of factors such as the scale and structure of the woodland, differing management objectives of neighbours, fragmented land ownership patterns and the contrasting ecological characteristics of different deer species, including the distinction between territorial and herding behaviour, which can have significant implications for deer management.

When required by country legislation, proposals for felling or thinning must be submitted to the appropriate forestry authority for approval. Following felling, restocking or regeneration will normally be required.

Before felling and pruning trees, a check must be made to ensure there are no Tree Preservation Orders or Conservation Area designations. Permission must be obtained from the relevant authority to fell or prune trees subject to Tree Preservation Orders or notification made where Conservation Areas have been applied.

Proposals for access onto a public highway by a forest road must be notified to the planning authority and appropriate permission obtained.

There is a presumption that forest land should not be converted into other land uses; guidance on the exceptional situations where woodland removal may be possible is available from country forestry authorities.

The capability of forests to produce a range of wood and non-wood forest products and services on a sustainable basis should be maintained and enhanced where possible.

Forests should be protected from the time of planting or restocking (or regeneration) of trees to ensure their successful establishment and long-term viability.

In areas where deer are present, deer management measures should be developed and implemented as part of a management plan, with the aim that deer browsing does not prevent regeneration of trees or the development of resilient forests; ideally this will be in co-operation with neighbours or as part of a Deer Management Group.

Environmental impact

There is legislation in each country of the UK requiring that the positive and negative impacts of forestry on biodiversity and the wider environment are addressed at both the planning and the operation stage. Any negative environmental impact of forestry operations should be minimised.

The potential for environmental impact is regulated under the various Environmental Impact Assessment (EIA) Regulations that apply to forestry, including activities relating to short rotation coppice, Christmas trees, deforestation, and the construction of forest roads and quarries. The regulations require a forestry authority to determine whether a proposal may have a significant effect on the environment. Where this is the case, the proposer is required to present an EIA report or Environmental Statement that has been prepared by a competent expert.

Manufactured products such as fencing, plastic packaging and bags, and tree guards and shelters, should be managed appropriately when they stop having a functional value in the forest environment. They should be collected and disposed of, and the costs and likely timeframe for recovery from the site will need to be addressed in the forest management plan. Care will need to be taken that any items left on site are not at risk of being lost during flood and storm events and subsequently causing damage or posing a hazard to people or wildlife.

The environmental impact from using chemicals (including fuels, oils and lubricants) in forests would mostly arise from spillages or incorrect storage. Chemicals can move quickly through soil, with soil and water contamination leading to water pollution. Small quantities are enough to pollute drinking water supplies and have a toxic effect on land-based and freshwater life by preventing the transfer of oxygen through the water surface and causing aquatic animals to suffocate. Bio-fuels and oils are less persistent in the environment, but still pose a risk of pollution and can emulsify more easily, making it difficult to recover them.

The synthetic detergents and foams in fire-fighting chemicals have a high oxygen demand, which can kill fish in receiving watercourses. There is an increasing risk of their spillage or careless disposal – and a subsequent greater threat to the water environment – as climate change increases the incidence of forest fires.

The impacts of forestry on the environment must be taken into account in the submission of forestry proposals.

Environmental Impact Assessment (EIA) Regulations must be complied with; where an EIA is required, all the relevant environmental impacts must be considered by the proposers and the requirements for public consultation must be met.

Manufactured products associated with forestry should be appropriately managed when they stop having functional value to minimise their impact on the environment.

Only the minimum of oil and fuel should be stored on site.

Plant health and biosecurity

Legislation is in place in each UK country to protect trees and timber from notifiable forestry pests and diseases, and guidance is available from each country's forestry authority. Trees and timber products subject to a Plant Health Order cannot be landed into, or moved within, the UK unless accompanied by a phytosanitary certificate/plant passport.

As well as being vigilant towards pest and disease outbreaks on their trees, forest owners and managers should take a systematic approach to biosecurity to reduce the risk of pests and diseases entering, spreading and leaving their land. Measures could be, for example, to install hard-standing parking places for vehicles, and provide cleaning equipment for walkers, cyclists and pets. Removing stressed and dead host tree species can help limit the spread of insect pests by reducing the amount of suitable habitat in the environment.

Statutory orders made under the Plant Health Acts to prevent the introduction and spread of forest pests and diseases must be complied with; suspected pests and diseases must be reported to the forestry authority if they are notifiable, access must be given to Plant Health Inspectors and their instructions must be followed.

Managers should take a systematic approach to planning and implementing biosecurity measures on all their land to reduce the risk of pests and diseases being introduced or spread.

Managers should be aware of the risks posed by pests and diseases, be vigilant in checking the condition of their forests and take appropriate measures to combat threats to tree health.

Information should be reported to the forestry authority that might assist in preventing the introduction or spread of forest pests and diseases.

Suspected pests and diseases should be investigated and reported to the forestry authority, and biosecurity control measures recommended by the forestry authority carried out.

Forest reproductive material

A legislative framework of Forest Reproductive Material Regulations is in place in each UK country for controlling plant materials used in forest establishment, with specific country policies applicable to species not included in the Regulations.

For species covered by Forest Reproductive Material Regulations, only certified material must be used for forestry purposes.

Forest planning

Forest planning takes place at several levels. The highest level is the strategic plan, which defines the broad objectives of the owner and how these can be met across the forest estate or holding (which may comprise several forest areas). Beneath this are the three levels at which UKFS Requirements should be met:

1. Forest planning applies to a convenient management unit, called the forest management unit (FMU). The resulting **forest management plan** will vary with the scale of the forest and the size and nature of the holding.
2. An **operational (or site) plan** is concerned with the operational detail of how proposals will be implemented at site level.
3. A **contingency plan** ensures that procedures are in place and can be enacted should unforeseen events occur, for example, forest fires, catastrophic wind damage and accidental spillages.

Forest management plans may sometimes include the site operational plan and a contingency plan.

Forest management plan

The forest management plan is the reference document for the monitoring and assessment of forest holdings and forest practice. It allows for the positive impacts of forestry on the environment, economy and society to be proactively planned for, and for detrimental impacts to be minimised through direct measures and greater complementarity between forestry and wider land-use objectives. The importance of having forests managed in a way that helps them to be resilient to the impacts of climate change is becoming increasingly clear, with adaptation now understood as a fundamental part of long-term climate change mitigation.

The forest planning process starts with the owner's objectives and by identifying the opportunities and constraints offered by a site. This usually involves gathering and analysing a wide range of information about the site and its potential. Even for relatively small sites, planning will involve a range of professionals dealing with different aspects of the forest environment. The social dimension of forest planning is an important consideration from the outset. For forests that will be regularly used for recreation or are prominent in the landscape, community involvement in the planning process is a vital part of developing proposals.

A forest management plan is also used for communicating proposals and engaging with interested parties. Effective communication requires an awareness of the expectations of the intended audience, and when done well it can lead to positive outcomes for everyone with an interest in the forest management plan. The plan itself should be proportionate to the scale, sensitivity and complexity of the FMU.

13 Forest management plans should state the objectives of management, and set out how the appropriate balance between social, environmental and economic objectives will be achieved.

14 Early consultation with relevant authorities should be carried out to determine site sensitivity and inform forest management plans and operations.

15 Forest management plans should address the forest's context and potential and demonstrate how relevant interests and issues have been considered and addressed.

16 In designated areas, particular account should be taken of landscape and other sensitivities in the design of forests and forest infrastructure.

17 Consultation on proposals should be carried out with interested parties as forest management plans are developed.

18 Forests should be designed to provide a range of habitats, using a variety of site-adapted species and species mixtures to produce a diversity of stand structures appropriate to the scale, context and ecological potential of the site.

19 Forests characterised by a lack of age diversity due to extensive areas of even-aged trees should be managed to increase the range of tree ages and sizes.

20 Forests should be planned and managed to enhance their resilience and mitigate the risks posed to their sustainability by the effects of climate change or attack by pests or diseases.

21 Maintain or establish a diverse composition across the forest management unit so that no more than 65% of the area is allocated to a single species. Enhance resilience and seek to mitigate the risks from climate change and pests and diseases by selecting species appropriate to the site using Ecological Site Classification or a similar tool.

In all cases, incorporate a minimum of:

- 5% native broadleaved trees or shrubs;
- 10% of other tree species;
- 10% open ground, or ground managed for biodiversity as the primary objective.

Notes:

- The percentages using minimums do not add up to 100%. When deciding which of the above minor components to increase, consider the opportunities for further species diversification within the landscape context and scale of the forest, as well as the site conditions.

- In forests of less than 10 hectares and in native woods, the above proportions may be relaxed, as long as the adjacent land provides landscape and habitat diversity.

Management of the forest should conform to the plan, and the plan should be updated to ensure it is current and relevant.

New forests should be located and designed to maintain or enhance the visual, cultural and ecological value and character of the landscape.

Forest management should contribute towards achieving the objectives of River Basin Management Plans and ensure that forestry pressures on the water environment are addressed.

When planning woodland creation, the sensitivity of downstream water supplies, water bodies and wetlands (including Ground- and Surface Water Dependent Terrestrial Ecosystems) to a reduction in water quantity should be considered; where this is an issue, advice should be sought from the relevant authorities.

Forest management should not have a negative impact on flood risk to vulnerable downstream locations.

Operational and contingency plans

Operational plans aim to make forestry practice more efficient and to ensure that important site features are identified and protected in advance. Expansion of forest cover is generally encouraged across the UK, by planting or by promoting natural colonisation. Woodland creation should be undertaken according to an operational plan, and be appropriate to the site, support owner objectives and promote forest resilience.

Contingency plans address potential threats to the forest environment such as fire and pest and disease outbreaks or accidental events such as pesticide and fuel spillages into watercourses, and identify actions to help remedy any environmental damage that occurs. These plans may, in practice, be combined with the forest management plan.

Operational plans should be in place before major operations such as cultivation, harvesting and engineering works take place.

Where appropriate, contingency plans should be in place for dealing with actual and potential threats to the forest and environment.

UKFS Guidelines on General Forestry Practice

Forest planning process

Forest management plans

The process of producing a forest management plan falls into seven stages (Table 2.1).

1 Produce a clear forest management plan to demonstrate that all relevant aspects of sustainable forest management have been considered and to provide a basis for implementation and monitoring. The plan should:

- state the objectives of management, and how sustainable forest management is to be achieved;
- provide a means to communicate forest proposals and engage interested parties;
- serve as an agreed statement of intent against which implementation can be checked and monitored.

Table 2.1 The process of producing a forest management plan.

Stage	Objective	Activities and/or sources of information
Scoping	To develop management objectives	Draw on the owner's objectives, the potential of the site, UKFS Requirements and Guidelines, forestry strategies, policies and plans at country, regional and local level, and forestry frameworks.
	To analyse stakeholder interests	Consider of all potential interests, including those of specialist interest groups and the local community.
Survey	To collect information	Collect and map information about the site and its location, including any statutory constraints. Hold early-stage meetings with stakeholders and those with specialist knowledge including the forestry authority, to help identify all the factors to take into account and alert interested parties to the proposal.
Analysis	To assess information from the survey stage	Assess the survey information in light of the project's objectives, allowing the potential of the site to be determined.
Synthesis	To develop a design concept	Use the information that has been collected and analysed, including the visual aspects, to formulate a broad concept for the forest's design.
	To develop a draft management plan	Refine and develop the forest design concept into a draft management plan. This will be the basis of consultation with interested parties. Several drafts may be required in an iterative process.
	To finalise the plan and submit it for approval	Amend, refine and firm up the draft into a final forest management plan.
Implementation	To develop and implement work programmes	Use the forest management plan to develop operational plans and implement work programmes.
Monitoring	To evaluate progress	Check indicators of progress at regular intervals. Collect and record data to evaluate management.
Review	To make periodic updates of the forest management plan	Record work done on the plan and update it at regular intervals to keep it current. The plan is thoroughly reviewed and updated periodically (usually at five-year intervals).

Operational plans

Operational or site planning helps to ensure safe and efficient working practice on site and the protection of the forest environment. The starting point is a thorough assessment that identifies important features to be protected and options as to how the work could be undertaken. From this, a detailed operational plan can be developed that sets out the working arrangements for the site, protected areas and other site constraints. It is particularly important that the operational plan is communicated and understood by all those involved.

Produce a clear operational plan that is understood by all those working on the site. For major operations, the plan should include:

- A description of the site, including any relevant designations, consents, licences or agreements.
- A statement of the purpose of the operations and an outline description of activities, which explains how:
  - operations will be modified in case of bad weather;
  - potential hazards to workers will be mitigated;
  - potential hazards to forest users will be mitigated;
  - machine access, refuelling and timber stacking will be handled;
  - sensitive or easily damaged parts of the site will be safeguarded;
  - to ensure only the intended trees and shrubs are felled;
  - biosecurity will be addressed;
  - the site will be left on completion of operations.
- A site map showing constraints, hazards and other key information.

Contingency plans

Contingency plans cover what happens in the event of an unexpected or unplanned event. For site operations this may include dealing with accidents and mitigation measures in response to spillages, major soil disturbance, or other problems that could pose a serious risk to public health and the environment. Contingency plans can also address other threats to the forest, for example, fire, extreme weather events, or outbreaks of pests and diseases.

Have appropriate contingency plans in place to deal with risks to the forest, including spillages, major soil disturbance, fire, extreme weather events, and pest and disease outbreaks.

Forest planning considerations

This section sets out the key forest management issues that should be considered when producing a forest management plan.

Woodland creation

Expansion of forest cover in appropriate locations is encouraged across the UK. Woodland creation, whether expanding existing forests or creating new ones, should take account of impacts on the site and surrounding area. Planning and design should address all aspects of sustainable forest management in order to deliver a range of benefits for the future.

Well-planned, appropriately sited and well-designed woodland creation can help protect the quality of drinking water supplies, reduce flood risk, guard against erosion, landslides and the loss of soils, improve connectivity within and between habitats, support mitigation and adaptation to climate change, support the sustainable supply of timber and other economic activities and provide opportunities for access to support physical and mental health and well-being. On the other hand, poor planning can lead to significant negative environmental impacts.

4 When considering opportunities for woodland creation, ensure that planning, design and implementation support sustainable forest management to deliver a range of ecosystem services and benefits.

Forest productivity

The maintenance of the productive potential of forests includes both timber production, which supports the development of forest industries and economic well-being, and ecosystem services and wider non-market benefits. The essential consideration for the landowner or manager is to ensure that the forest thrives and is not degraded. This includes protecting young trees to help them become successfully established, and protecting the health of the forest, for example, by ensuring it has the necessary resilience to cope with emerging threats and changing conditions, especially in light of climate change. It also involves maintaining levels of fertility and site potential for future rotations.

5 Retain or expand the forest area and, where required, undertake compensatory planting where forest area is lost through land-use change.

6 Ensure new woodland and restocking (or regeneration) becomes established by ensuring adequate protection from pests and competing vegetation.

Forest composition and silviculture

Ensuring a forest has a varied composition in terms of age, species, origin or provenance and open space will help forests develop the resilience necessary to cope with emerging threats and changing climatic conditions, and will therefore allow for flexibility in management options. Being able to modify forest practice by, for example, moving to a low impact silvicultural system (LISS), will help improve the resilience of the forest and may limit the damage caused by extreme events such as gales or pest invasions.

Diversity can be increased by incorporating open areas and through phased felling and restocking (or regeneration) to ensure that, over time, a diverse forest develops. As part of this, some trees can be left as long-term forest cover to produce standing and fallen deadwood. Open space is a key element of diversity within a forest and can be used to develop permanent internal edges, structural diversity and flexibility for operational management. Wildlife habitat can be enhanced by developing non-wooded elements, such as streams, ponds, roads, utility wayleaves and rides. Open space is also important for the provision and development of access and recreation.

7 Plan to maximise forest resilience using a variety of silvicultural systems to foster a diversity of ages with a range of species, species mixtures and provenances, and create variation in stand structures; consider the risks to the forest from wind, fire, increased temperature, drought, waterlogging, and pest and disease outbreaks.

8 When selecting trees and shrubs for new woodland and restocking, ensure the risks and opportunities of climate change, biodiversity loss, and the vulnerability of particular species to pests and diseases are taken into account. Choose alternative species, or an increased diversity of species and genetic material, to improve resilience.

9 Develop a long-term forest structure of linked permanent habitats, such as riparian woodland, open space and mature broadleaves.

10 On suitable sites, consider continuous cover forestry as an alternative to clearfelling where this less intensive approach would be compatible with management objectives.

11 On suitable sites, consider the use of thinning to improve stem quality and enhance structural and species diversity.

12 Maintain or work towards creating a range of stand structures and silvicultural approaches across the forest as a whole, including veteran trees, open-crowned trees, occasional windthrow, understorey layers, open space and areas of natural regeneration.

Felling and restocking

When felling and restocking (or regenerating), take the earliest opportunity to review and realign plans to reflect the UKFS because it presents the opportunity to restructure age classes and improve diversity, thus improving forest resilience. In even-aged forests, particularly those established in the 20th century, this may involve delaying or bringing forward felling or, where windthrow is very likely to occur, delaying restocking. Following initial restructuring, further age class diversity can be introduced in subsequent rotations, especially where the nature of the forest site limited the initial scope.

Rotational felling also presents a major opportunity to reassess the forest through the forest planning process. Future felling coupes can be identified within a long-term forest structure, defined by open ground, watercourses, semi-natural habitats and areas managed by a LISS such as continuous cover forestry.

13 In forests characterised by a lack of diversity due to extensive areas of even-aged trees, retain stands adjoining felled areas until the restocking or regeneration of the first coupe has reached a minimum height of 2 m; for planning purposes this is likely to be between 5 and 15 years depending on establishment success and growth rates.

14 In upland forests, identify future felling boundaries as part of the long-term forest structure, manage compartment edges to increase stability and make use of permanent features such as watercourses and open space.

15 In semi-natural woodland, limit felling to 10% of the area in any five-year period and no more than 20% in any 20-year period unless there are overriding biodiversity or social advantages.

Mammal damage

Forests may be subject to damage or degradation from grazing or browsing mammals, particularly when trees are at the establishment stage. Mammals likely to cause damage are deer, grey squirrel, hare, rabbit, vole, goats, bison and wild boar. The forest manager's role is to monitor damage and decide whether intervention is necessary.

In areas where deer are present in the forest and wider environment, deer control is essential. A deer management plan – incorporating culling and habitat (or herbivore) impact assessments – allows a strategic approach to be taken. Keeping records of deer culled and levels of damage will help inform plans so that they can be refined to give more effective levels of control. Participation and consultation with local deer management groups (where they exist) will help to achieve effective deer management on the appropriate landscape scale. In Scotland, NatureScot advises on the sustainable management of wild deer. In England, Forestry Commission Deer Officers provide advice on the management of deer. In Wales, Natural Resources Wales supports provision of advice through partnership working. Responsibility for wild deer in Northern Ireland lies with the Northern Ireland Environment Agency of the Department of Agriculture, Environment and Rural Affairs.

16 Monitor forests for damage and intervene to protect vulnerable trees and habitats from domestic livestock and wild mammals.

17 In areas where mammals pose a threat, develop management plans to reduce environmental and economic damage, including by completing habitat (or herbivore) impact assessments. Collaboration at the landscape scale is most effective.

Pests and diseases

There has been a significant increase in the incidence of pest and disease outbreaks in forests in recent years, and climate change is likely to exacerbate these threats in the future. It is vital that all those involved in forest management take a proactive role in minimising risks, monitoring tree health, keeping abreast of emerging threats and deciding when intervention is needed.

18 Identify appropriate biosecurity measures by assessing the risks as part of a Risk Assessment; as a minimum there should be simple measures taken, such as cleaning equipment and clothing and avoiding moving materials from contaminated sites to clean sites.

19 Consider the susceptibility of new and existing forests to pests and diseases, taking specialist advice where appropriate, and use the assessment to inform planning and practices that promote resilience.

20 Be vigilant for pests and diseases in forests, including those in urban areas where the risk of new introductions can be high.

Use of chemicals and fuels

The use of artificial pesticides and fertilisers is generally a last resort in sustainable forest management, although they can have more of a role in energy crops such as short rotation coppice. Pesticides and fertilisers are expensive and should only be deployed in a reactive way to protect trees when a problem has been identified or is highly likely – and only then used at the minimum amount to satisfy crop need. Their use on special sites such as ancient woodland is particularly discouraged.

21 Minimise the use of pesticides and fertilisers.

22 If it is unavoidable to use static plant or equipment in a buffer area, position it on a suitably sized and maintained impervious drip tray with a capacity equal to 110% of the capacity of the fuel tank which is supplying the equipment.

Tree protection

In the UKFS, tree protection is taken to mean fences, tree shelters and tree guards.

The alignment and design of forest fences can have major impacts on access, wildlife, landscape and archaeology. Fencing needs to be considered in relation to public access because it is illegal to obstruct rights of way and, in other areas, public access can be an important consideration in fence alignment and the design of appropriate access points.

Fence lines themselves are not usually prominent but they can generate striking textural changes in the landscape through differences in grazing or land use. Fences can be invisible to birds such as black grouse, so using techniques to mark fences to improve their visibility, and to align them so that they avoid obvious flight paths, will help minimise collisions. Removing old fences from site when they become redundant or are replaced is a better option than leaving them there, as they can be a nuisance to livestock, wildlife and people.

Tree shelters and tree guards may provide an effective alternative to fencing, although the use of plastics, whether made from oil-based or bio-based polymers, should be avoided or reduced as much as possible. When redundant, tree shelters and tree guards should be removed and recycled to avoid the impacts of bio-accumulation in the forest soil.

23 Ensure the impacts of tree protection on biodiversity, landscape, archaeology and access are minimised.

24 Identify old and redundant tree protection and remove it as soon as possible for recycling or disposal.

Forest roads and quarries

Forest roads, quarries and associated infrastructure works can have a significant impact on the environment and landscape. They may therefore come within the scope of the EIA Regulations and be subject to planning controls rather than prior notification arrangements.

Considering important viewpoints and allowing road alignments to respond to the landform rather than taking the most direct route can ameliorate visual impacts and potentially reduce the amount of cut-and-fill needed for construction. The construction of forest roads and the extraction of material accounts for a high proportion of the total energy expended in a forest's life cycle, and so has a bearing on the sustainability of the timber grown.

Forest roads and access onto them can disrupt forest drainage systems and cause water and soil problems. It is important that road drainage is designed to function independently from the main forest drainage network. Where minor public roads and bridges are weak, consideration should be given to how the forest road network can be designed or upgraded to avoid using public roads for timber transport. In many areas there are timber transport groups that involve local authorities and advise the forestry industry on preferred routes and the options for using alternatives to road transport such as rail or sea. Sensitivities with timber transport should be addressed as part of the forest management planning process.

25 Minimise the adverse visual impacts of forest roads and quarries; blend road alignments with landform, and locate quarries, roads and bridges to respect landscape character, especially in designated landscapes.

26 Design road surfaces, drainage and access points for harvesting machines to avoid erosion and other adverse impacts on soils, watercourses and water quality.

27 Wherever possible, use forest road networks to minimise damage to public roads, and take advice from timber transport groups.

28 Liaise with the highway authority when felling near public highways or when lorries emerging onto the highway might pose a threat to road users.

Mechanised operations

Mechanised operations, such as cultivation and harvesting, are resource intensive and can be the cause of significant negative environmental impacts. Careful operational planning is required to combine good silviculture and cost-efficiency with care for people and the environment.

29 Plan operations by selecting the most appropriate method and machine for the site.

30 Ensure that risk assessments and pre-commencement planning and communication have been completed and everyone working on site understands their roles and responsibilities; ensure operations are monitored as needed.

31 Mark out buffer areas in advance of any operations taking place.

32 Plan felling and timber extraction to minimise the number of stream and drain crossings, except where alternatives create more difficult, dangerous or potentially damaging extraction routes; protect crossing points and riparian zones from damage by machinery.

33 Install culverts or log bridges to avoid crossing and blocking drains; restore the site and drains as extraction progresses.

34 Avoid burning brash and harvesting residues unless it can be demonstrated that it is a management necessity, all the impacts have been considered, and the necessary approvals obtained.