



# ***A Manual for Forest Landscape Management***

## ***Chapter 6***

*(Republished 24-10-2006 — Forest Practice Board, Tasmania)*

*A roadside oldgrowth scenic reserve is part of the overall forest design along this major tourist road.*



# LANDSCAPE DESIGN OF FOREST OPERATIONS

6

People's perceptions of their surroundings are based mainly on what they see, and only marginally on what they hear or smell. It is through their eyes that they gauge the aesthetic and environmental values of the forest. This is especially so in largely natural areas. Management activities taking place in the forest -such as roading and harvesting -can have strong visual effects on the landscape. This is where skillful and detailed design is required if activities are to fit harmoniously into the landscape and achieve the Landscape Management Objectives for each area.

*The sensitive roadside wet sclerophyll forest shown here has been cut in three stages to limit the visual impact. The rear skyline forest was cut and regenerated first, followed by the sloping area now seen as regrowth forest. Finally the immediate foreground area was recently harvested to expose the visually acceptable regeneration behind. Note that this sequence of cutting effectively minimised the impact of the first two clearings until the forest was re-established.*



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The aim of this chapter is to illustrate treatments for forest operations that successfully integrate landscape concepts with operational factors. The examples cover all forms of operations commonly encountered, and offer a range of guidelines for each. These can be used in designing field solutions to achieve the management objective. Visual alternatives are provided for foreground, middleground and background harvests, including roadside screening and coupe treatment, skyline management, coupe shape and edges and cutting sequence.

## Desired Character

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The desired character is the appearance of the landscape that is to be retained or to be created over time. It should be defined for each stage of the proposed forest operations, taking into account visual changes due to regrowth and greening of the forest.

The first step in determining the desired character is to look at the existing visual character of the landscape. The design concepts present in the landscape are identified so that forestry operations can be consciously designed to fit harmoniously into a scene.

The design concepts have been discussed in detail in Chapter 1  
They describe the:

- *.dominance elements* inherent in the landscape
- *.design principles* that determine the composition of each landscape scene
- *.variable factors* affecting viewing conditions

The desired character for the landscape is best defined in terms of the design concepts, as these give the basis for visualising how the operations will appear in the landscape. As well, they provide a means for deciding on and describing the best landscape design solutions for forest operations.

First prepare a statement of the desired character for the landscape of the area being considered for forestry operations. This should incorporate details of the objectives for the area and the effects of these on forestry activities. The aim of this stage is to generate a general framework for determining the types of operations suited to the area. It is then possible to move on to consider which of the harvest treatments described in this chapter would satisfy both the visual and operational requirements.

# Harvest types

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The example treatments discussed here are concerned mainly with clearfell harvesting because clearfelling generally has a much stronger visual impact than partial harvesting. Clearfelling results in extreme contrasts of colour and texture between the harvested area and the surrounding forest canopy; as well the introduced form and line of a coupe boundary can conflict with elements in the surrounding landscape. It also exposes internal roads and snig tracks to full view (see also Chapter 4).

Partial harvests, on the other hand, retain at least part of the forest canopy and some textural and colour consistency with nearby uncut forests. Shelterwood techniques, retention of potential sawlog trees and advanced regrowth retention are partial harvesting practices that can be used with great visual success, producing low levels of visual impact.

These harvest techniques can also be used in combination with clearfelling operations to soften coupe edges and reduce overall visual contrasts; however, this is only possible where practical burning boundaries can be found. In cases where a partial harvest is preliminary to eventual clearfelling, the actual shape or size of the initial entry may set the die for clearfelling operations in the future. Thus a long-term perspective must be taken from the beginning.





# Landscape Design Aspects

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The main aspects that can be manipulated to control the impact of operations are:

- coupe edge configuration and treatment
- apparent shape of the coupe in the landscape .scale of the coupe
- distribution of coupes in time and space <sup>2</sup>

Every point from which operations can be seen should be considered. When the views of a single clearfell are from different directions, select and consider the most sensitive viewpoint first, followed by the less sensitive. In such cases the design must sometimes be a compromise between all viewing opportunities. However, if the existing dominance elements found in the landscape are successfully integrated into a harvest design, especially in the coupe shape and edge configuration, the visual results will be satisfactory from most viewpoints.

## Edge

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Efforts should be made to give a "natural" appearance to the coupe edge wherever possible. This usually means that coupe boundaries should be curvilinear to relate to existing lines seen in the landscape. Edges can also be softened visually by thinning or feathering in the zone of forest along the burning edge of the coupe. Where natural vegetative boundaries have varied patterns, irregular scalloping of coupe edges may be effective.

## Shape

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This refers to the way a harvest area appears in the landscape when seen from a particular viewpoint. Existing natural patterns or shapes resulting from changes in vegetation communities or from areas of rock scree or outcropping are valuable indicators to acceptable shapes for introduced changes. Coupe shapes can also be guided by dominant ridgelines, skylines and drainage gullies, and the dominant visual direction due to landform patterns.

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## Scale

The scale of a landscape is defined by the size and character of landforms and the patterns or variations within the landscape. Where little or no pattern exists naturally (as with the texture of an even-aged forest canopy), clearfell operations can be related to the scale and character of the landform. Thus, in broad, flat panoramas there is often scope for large clearfell coupes, whereas in small, enclosed landscapes and undulating topography, smaller clearfell coupes are more appropriate.

Scale can be seen in patterns in the landscape resulting from changes in vegetation and soils or the presence of minor drainages. Essentially, introduced changes should be of a similar size to these existing patterns.

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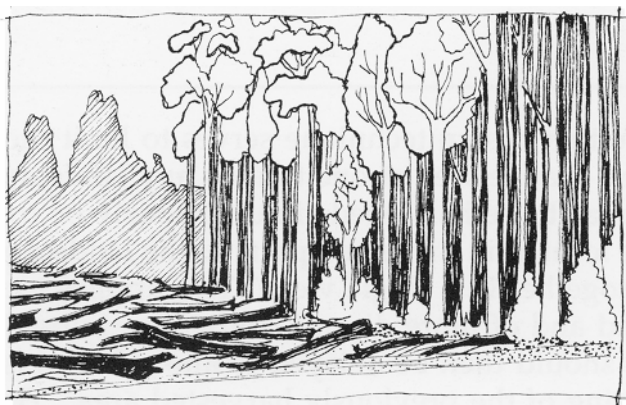
## Dispersal

In essence this design technique serves to limit the amount of introduced change seen at one time in any landscape scene. For best results, areas to be harvested simultaneously or consecutively should be located in dispersed parts of the landscape so that they are not seen together in a single view. This applies to views both of the foreground and of more distant landscape. Subsequent harvests in any view should then be delayed to allow for initial regeneration and greening of the previously harvested area. This will ensure that introduced changes in a scene remain subordinate to the existing natural character. By following this technique, the existing visual character will be maintained in each landscape scene throughout the full harvest period.

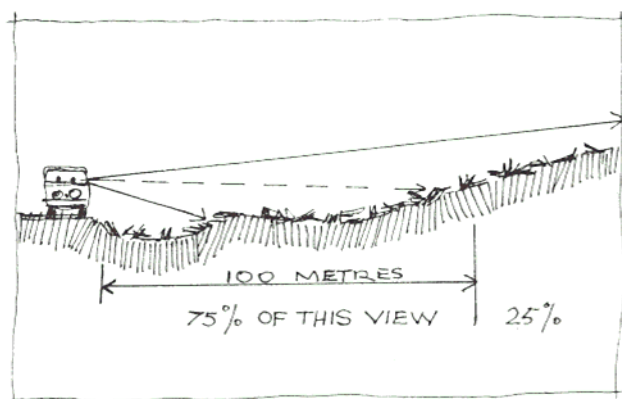
# Foreground Views

The distance from which a landscape is viewed affects the scale and visual contrast of changes in the landscape.

Colour and detail are clearly discernible in foreground views of up to 1 km distance. From forest roads, viewing attention is drawn to the forest edge or the roadway/forest transition, where such aspects as patterns on tree trunks, understorey vegetation, road earthworks and soil colour are visually prominent. As well, foreground vegetation may provide a visual barrier to what lies beyond in the middleground.



*Trees along the edge of a coupe near a road can be positive and attractive elements in the landscape if they are not damaged during the harvest.*

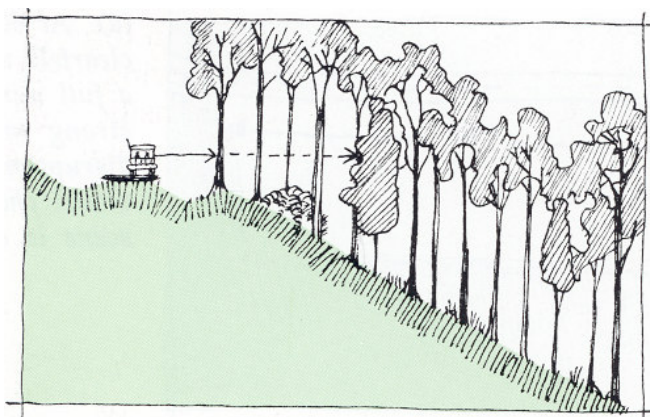


*The immediate roadside area is extremely visible, due to the extent of the vertical viewing arc.*

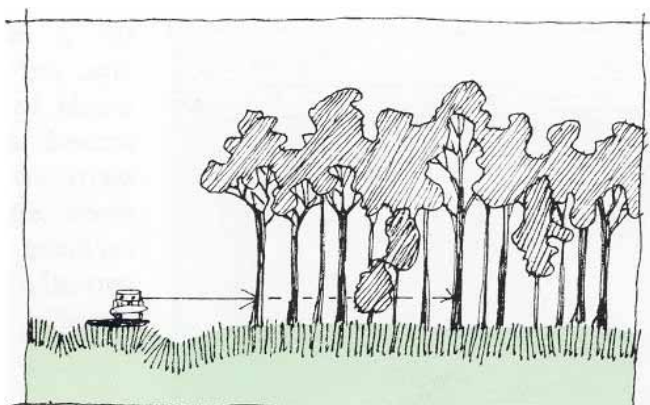
When designing to minimise the visual impact of changes in this zone, attention should be given to such details as the treatment of roadside slash and stumps, retention of vegetative screening zones, tidying of coupe edges close to the roadside, location of landings and design of spur roads to the cutting area.

## Observer position

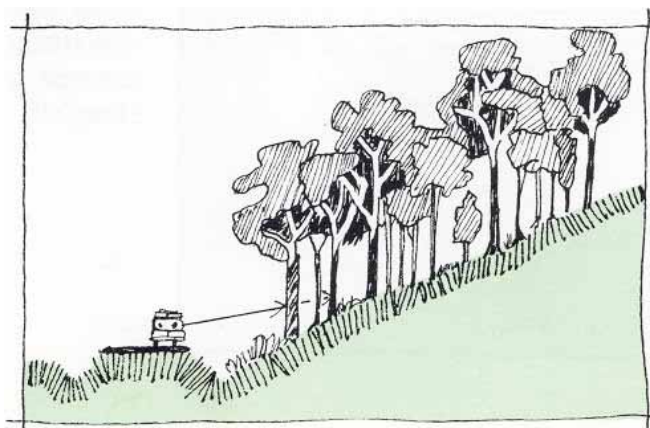
In foreground viewing, the position of the observer is an important consideration. The landscape may be *above*, *level* with, or *below* the moving viewer; each situation provides both opportunities and constraints.



*(a) Observer above:* Where the ground slopes moderately to steeply downwards (more than 30%), the viewer sees only the immediate roadside area. To minimise foreground impact, it is only the latter area that requires careful treatment.



*(b) Observer level:* If the land ranges from flat to gently sloping (up to 30% upwards or downwards), the viewer sees further into a forested stand. Ground disturbance, slash and retained vegetation must be handled sensitively for 50 m to 150 m, depending on the screening density of the forest.

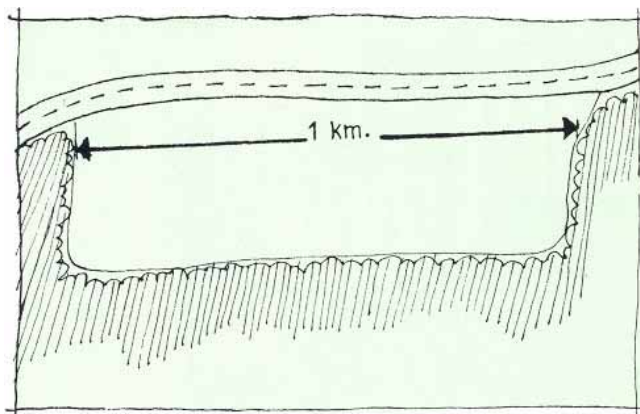


*(c) Observer below:* When the foreground slopes steeply upwards from the viewer (greater than 30%), viewing is centred on the roadside zone. Retaining a vegetation island of at least 50 m along the roadway can provide effective screening. Minimum ground disturbance and careful treatment of slash in this zone are also worthwhile.

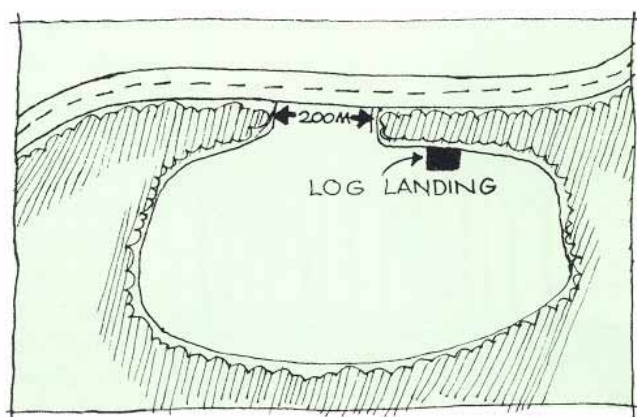


## Exposure of roadside harvests

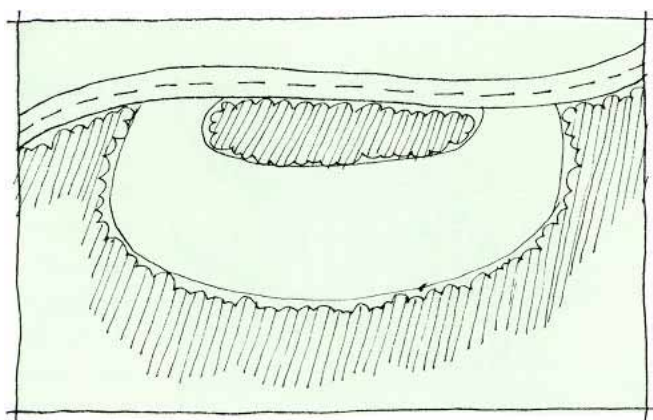
Operations along a major highway should, wherever possible, be seen only as views framed by retained roadside vegetation. Avoid harsh, disruptive, open viewing to harvest areas for long lengths along a roadway.



*(a) At 60 km/h, this clearfell would be seen for a full minute, and give a strong impression of visual disruption. The natural visual character of the scene is completely lost.*

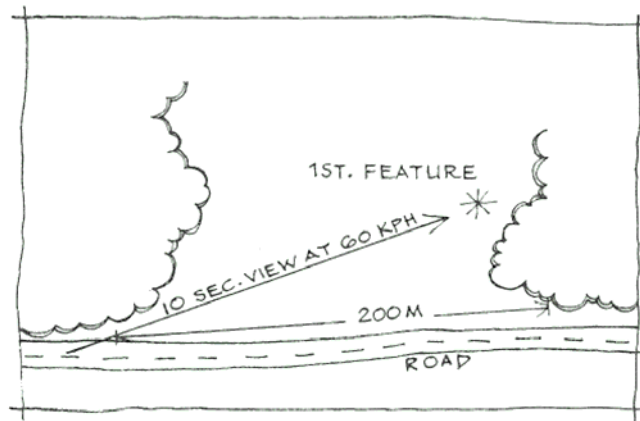


*(b) A coupe of the same size, but shaped differently, would be seen for only 12 seconds along the 200 metre stretch. Roadside forest zones may be either excluded from logging, or partially logged if this is visually acceptable.*

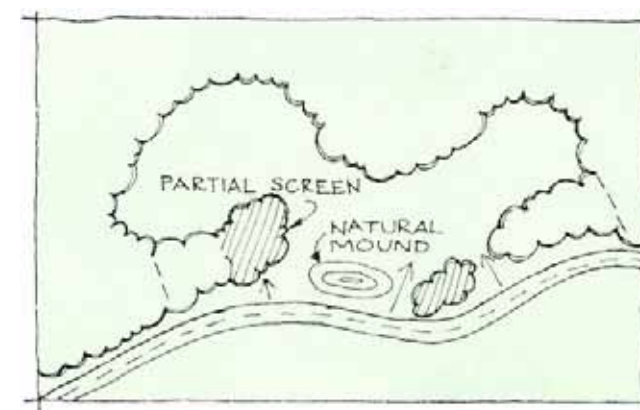
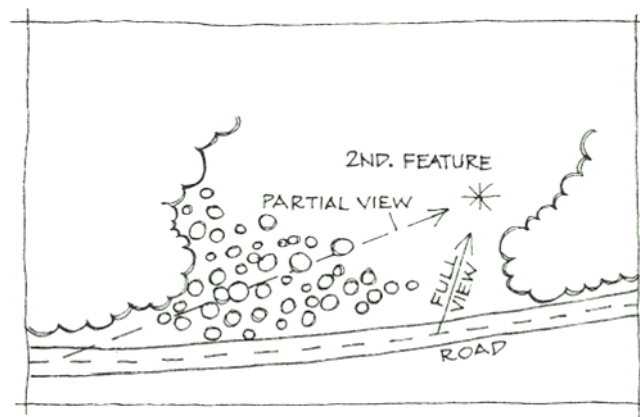


*(c) Vegetative or topographic islands can effectively break up the exposed length of a clearfell.*

## Exposure of roadside harvests (continued)



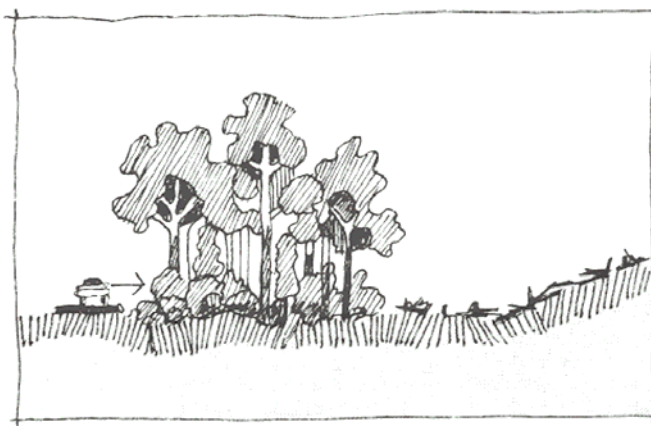
(d) By varying harvest techniques and the sizes of successive openings along a road, greater viewing variety is provided for the motorist, as shown below.



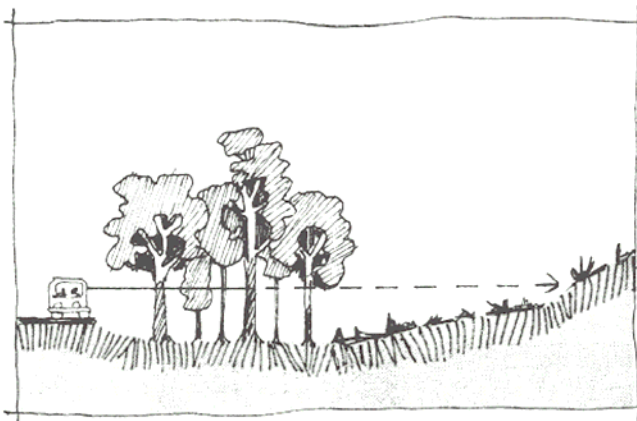
An example of a combination of vegetative screens, topographic screens and openings can provide varied views from the roadway.

## Screening

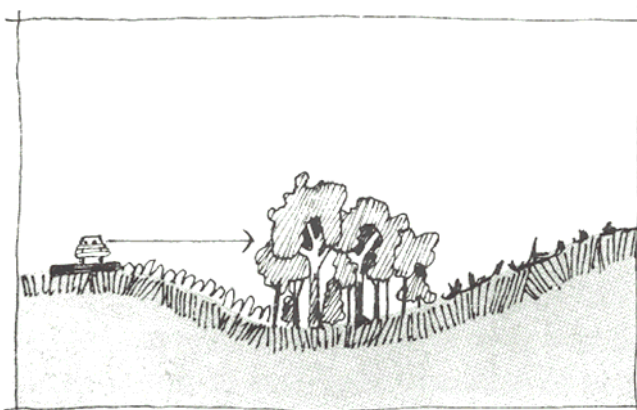
Vegetative and topographic screening are invaluable in reducing the visual impact of logging roads and harvest operations. There are several types of screens.



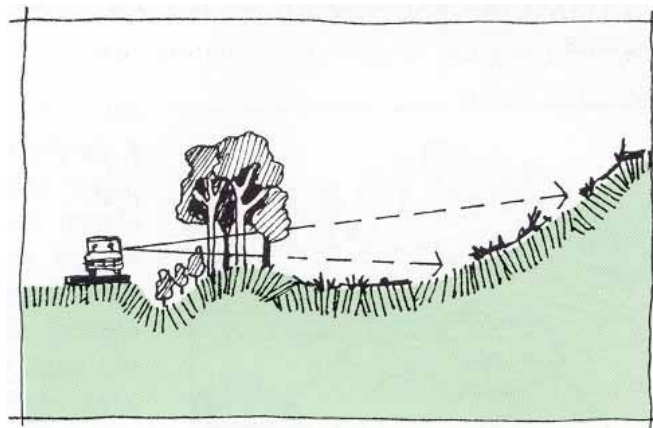
*(a) A full vegetative screen completely blocks the view of clearfelling operations.*



*(b) Thin vegetative screens partly block the view of clearfelling operations. From a moving car, most details behind the screen would be obscured.*



*(c) The vegetative screen need not be right next to a road.*



*(d) Topographic and vegetation screening can be used together to great advantage.*

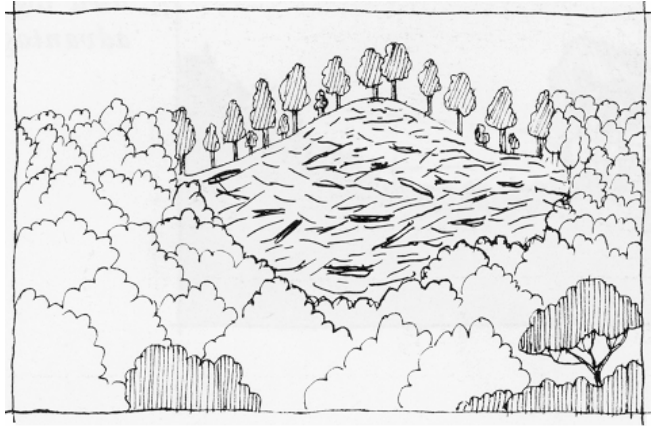
*This mature forest, set back 75m from the roadside, was retained to give screening to a clearfell area behind (as shown in (c) opposite). The forest can be harvested once foreground regrowth reaches screening height.*



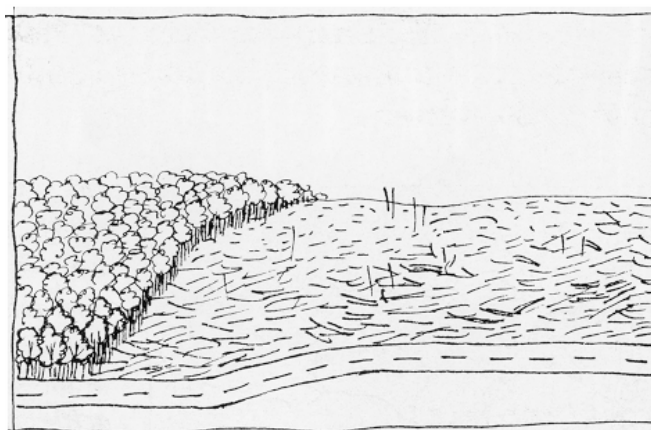
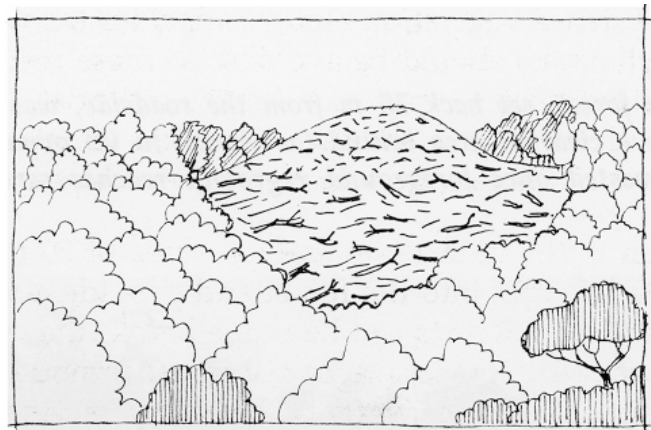


## Skylines

Skylines and ridgelines exposed by harvesting become points of visual emphasis.

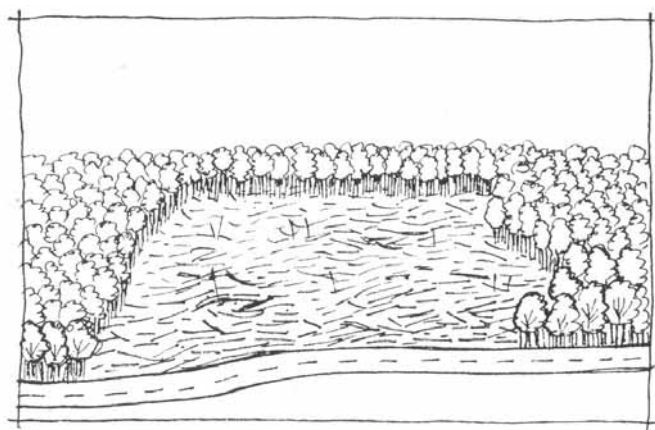


*(a) A small landform with a partly cleared skyline (older trees retained) is shown on the left. This ragged skyline has a longer- term impact than the fully cleared skyline shown in the next picture. The rear edge of the coupe has been retained in view.*



*(b) Avoid cutting across skylines, as this suggests that the harvest continues over the hill and on forever. In the next picture, the trees limit the apparent size of the harvest. (See next graphic on following page).*



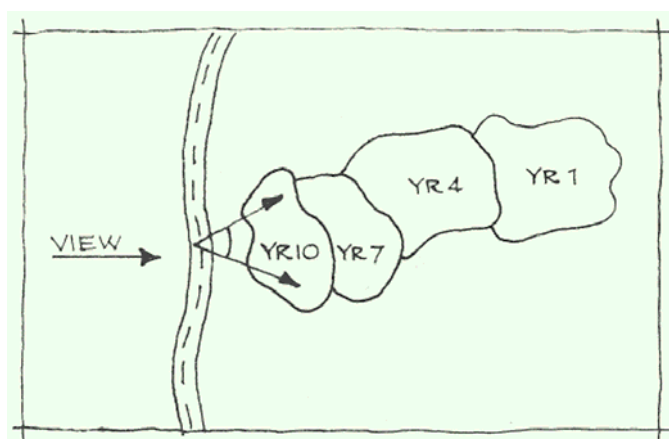


## Design diversity/ sequencing

Pleasing visual effects can be created in a roadside foreground by diversifying the harvest design to give forest stands of different ages and by using different silvicultural treatments. Uninterrupted lengths of dense vegetation along both sides (as with roading in wet sclerophyll areas) should be avoided, as these result in an uninteresting visual experience for the motorist. Instead, this sensitive viewing zone should offer wide variations in light penetration. This can be achieved in several ways.

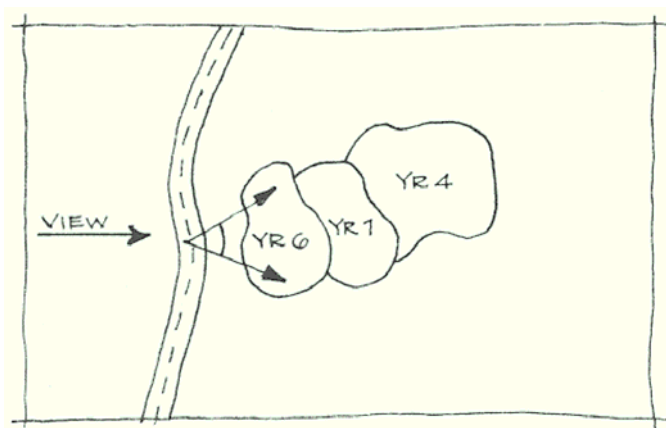
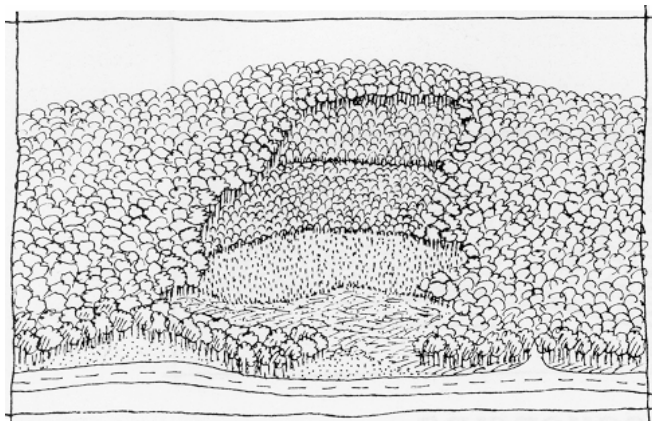
Vegetation in the immediate roadside area of 20 to 30 metres can be thinned to let light into the forest and provide a view from the road. Small roadside harvests can be made before the main harvesting so that subsequent vigorous regrowth forest provides a screen for the areas behind. These harvests will initially be visual openings, but if the stumps are cut low down and slash removed, they will soon look natural when they regenerate.

Existing dense roadside vegetation can be useful for screening the raw impact of new clearfell harvests behind. However, such screening can be monotonous; it should be combined with other techniques to create variety.

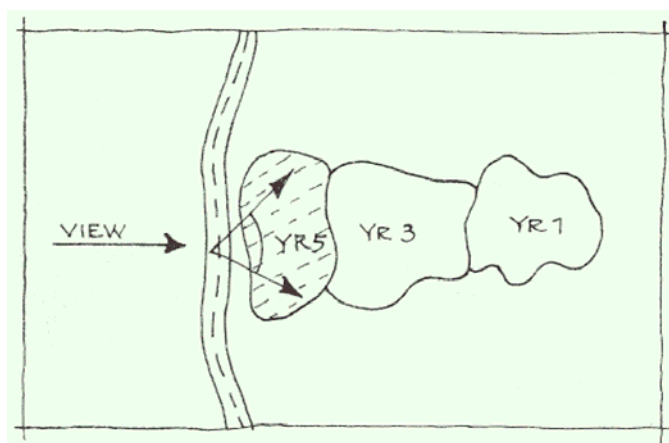


*(a) Intervals of three or more years\* between coupes can make the operations seem smaller and demonstrate regeneration successes. This can be achieved by scheduling cutting from the rear. The results are shown in the next picture.*

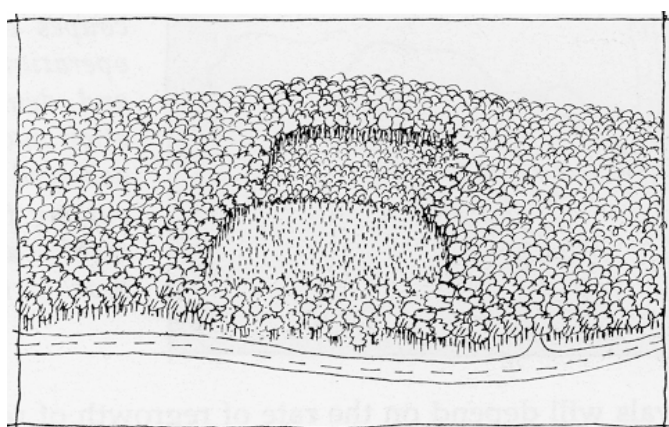
\*The intervals will depend on the rate of regrowth of regenerated vegetation.

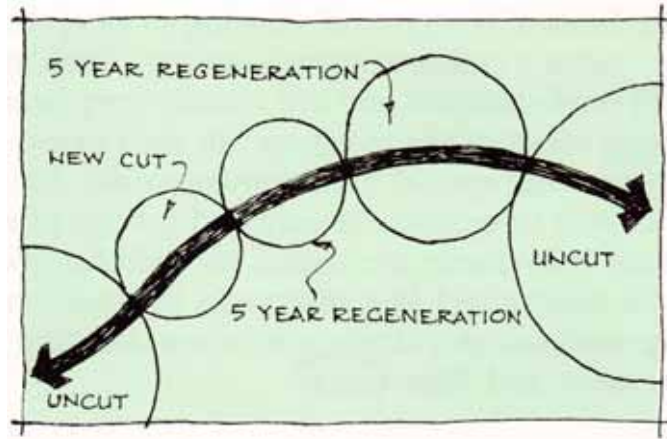


*Cutting can also be scheduled from middle to rear to front to expose the advanced growth of earlier regeneration.*

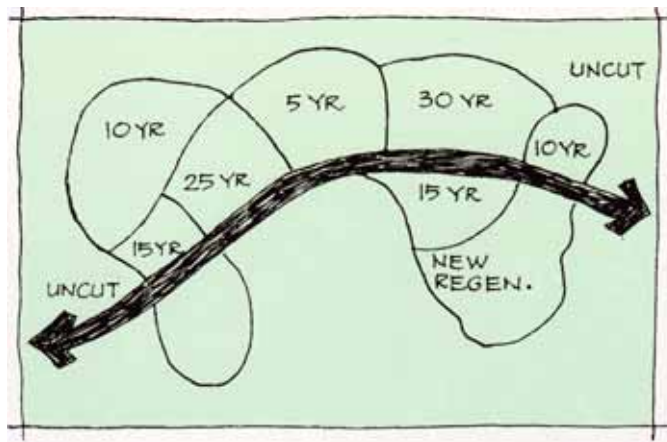


*(b) Use of more than one silvicultural practice within a harvest sequence can significantly improve the visual result. In this case, the harvest is only partially cut along the road in the fifth year. Subsequent removal of the shelterwood trees (after, say, 5-10 years) will expose established regeneration.*



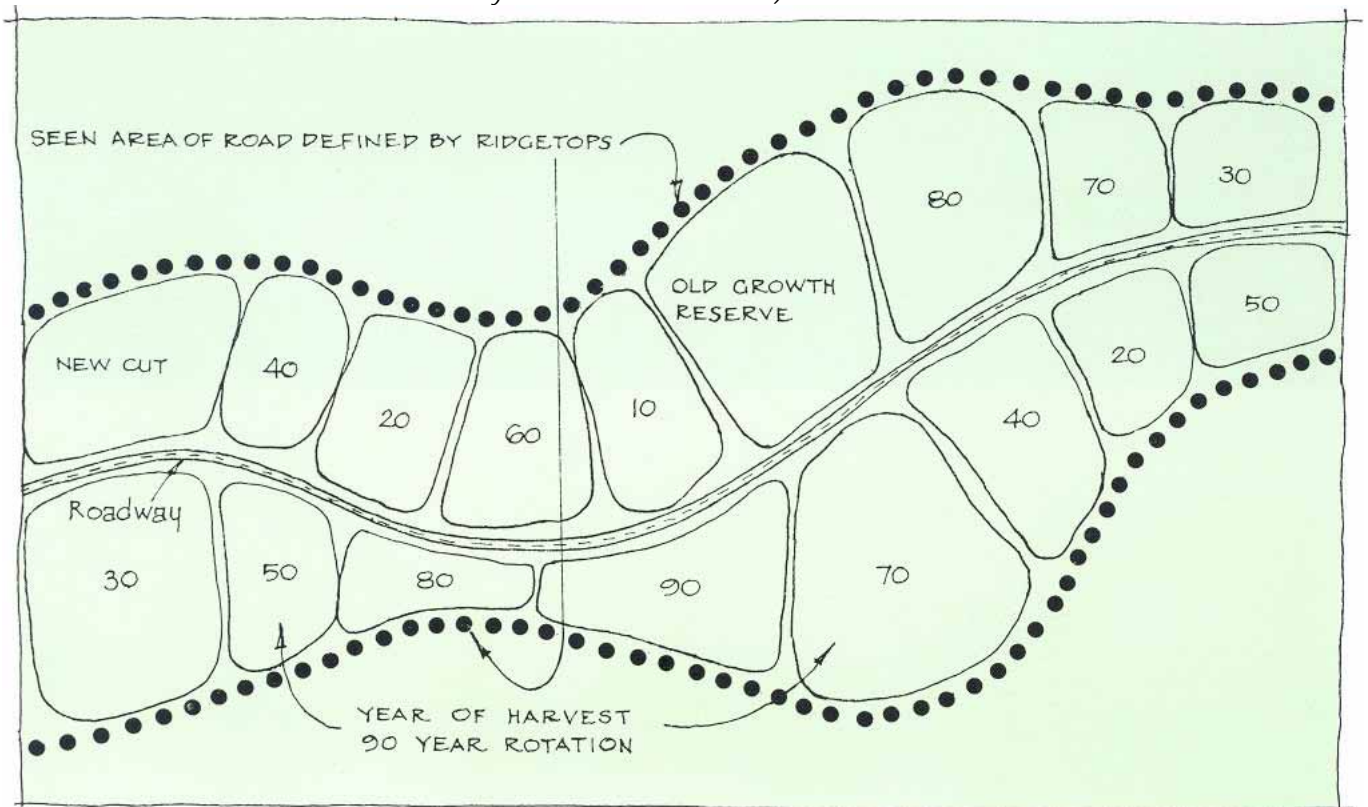


(c) Operations along a road can be sequenced to achieve a balance between young regeneration at various stages, and older forest stands. Variety is aesthetically pleasing, and also gives the motorist an opportunity to appreciate the different stages of regeneration.



(d) The visual sequence can be improved by varying the timing of the harvest on either side at any point along the road.

(e) Ideally, the sequence of visual experiences and harvest ages should be coordinated over a whole forest rotation period. This level of planning is appropriate for major tourist roads. The example shows a forest with a 90 year rotation. (See Chapter 5 for a method of visual analysis of roadside corridors.)





## Distant foreground

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Towards the limit of foreground viewing in steep terrain, forested hillsides appear as a coarse-textured canopy. Such views often occur at the end of road straights and are usually very prominent because of the focusing effect of the roadway. In such cases, retain the visual character by creating special management areas. Look especially for examples of good tree-crown texture and groups of attractive trunks. Natural visual boundaries are useful for defining such an area, which can be maintained as a reserve in the medium-term. It should be considered as a single unit when deciding such aspects as fire management and thinning.

*An oldgrowth reserve seen in the foreground from a major highway.*



## Middleground and Background Views

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Broad views of landscape cover both the middleground and background distance zones. These share a range of design concepts that can be used to explain how harvest activities appear in the landscape. In these zones, the whole or most of a harvest area will often be seen at a time, opening harvest management to a high degree of public scrutiny.

Middleground (1 km to 5 km) is generally the more critical zone. The observer sees not only parts of the landscape, linked by valleys or a range of hills, but also the finer detail in the landscape. Aspects of coupe design relevant to this zone are edges, shape, scale and sequencing. It is important to know how these relate to the existing natural visual character of a landscape.

Background (5 km to 1-6 km) begins at the point where the landscape becomes visually simplified and the basic shape or outline of landforms replaces surface texture or detail as the dominant elements<sup>2p.5</sup>. Forestry operations will generally have less impact in this zone. However, they should still harmonise with the natural patterns and form in the landscape.

Background is usually seen as part of an overview, so the whole land area should be considered when planning the harvesting. Avoid straight-line boundaries and geometric shapes; instead, "borrow" the shapes from nearby skylines and ridgelines.

Note that *skylines* in the background zone are especially sensitive.

## Observer position

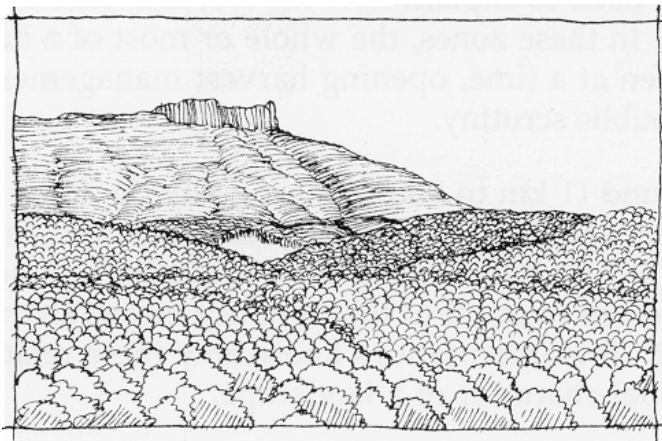
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Background looks much the same when viewed from the top of a hill or from the plains below. However, the middle ground looks very different to a viewer in a high position than it does to one in a low position. This is because of the difference in the angle of incidence between the two lines of sight. Where the same harvest area will be seen from different heights, design firstly to satisfy the higher observer position, as this will normally be effective for both (see Chapter 1).

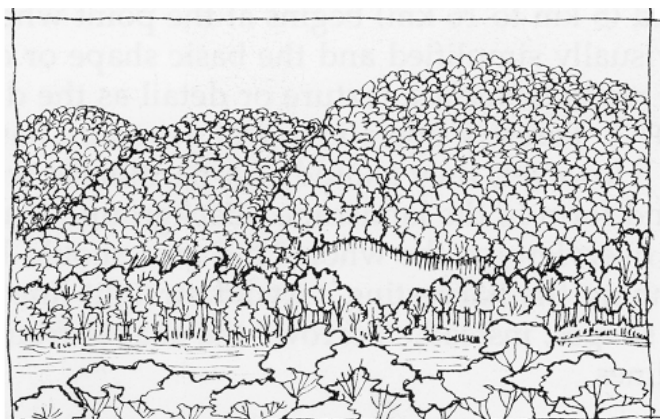


## Scale

The actual size of a coupe seen in the middleground or background can be larger than a coupe that is closer to the observer and still be visually successful. However, it should be designed to seem smaller to the viewer than the closer coupe, as the observer's "sense of scale" expects alterations to appear smaller at a distance.



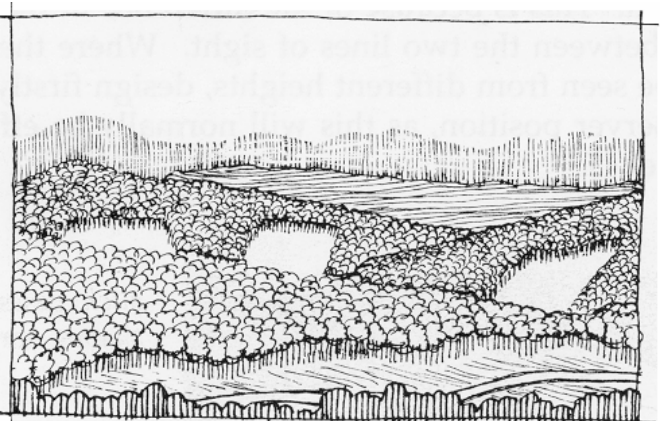
*A 50 hectare opening  
seen in the background*



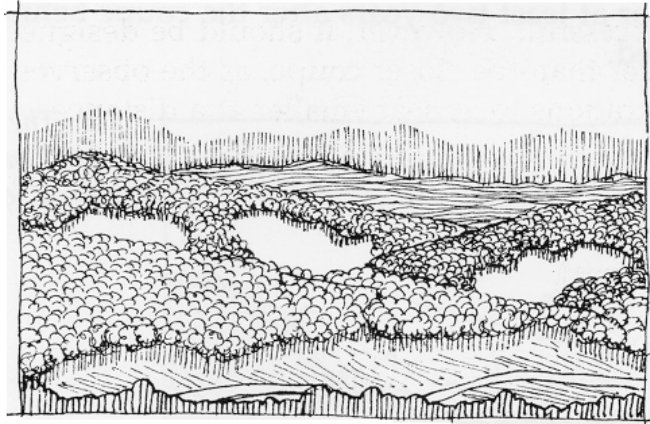
*A 10 hectare opening  
seen close to the viewer*

## Shape

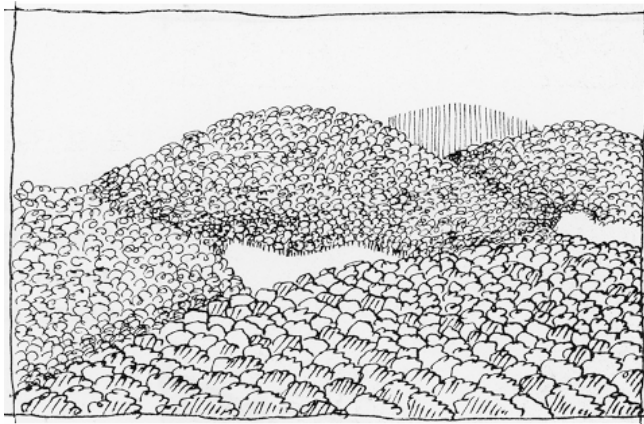
When clearfell areas are readily visible, attention should be given to their overall pattern in the landscape and to how their shapes relate to the surrounding landforms. This is equally relevant to middleground and background viewing.



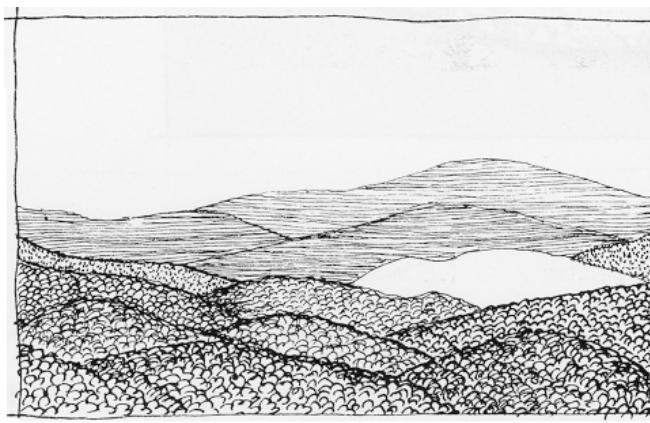
*(a) Here rectilinear clearfells are  
not responsive to landscape  
forms and patterns. (See also  
graphic on following page.)*



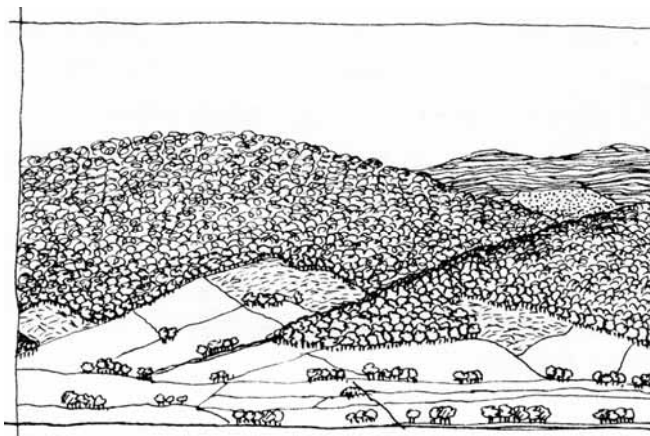
*Clearfells should have a natural shape which is responsive to landform, folds in hills, skylines and the natural patterns and shapes of the landforms.*



*(b) Location of the initial clearfell is very important. One approach is to locate it in a low position in the landscape, behind a hill if possible, to make it appear small. Subsequent clearfells should be dispersed in space and time*



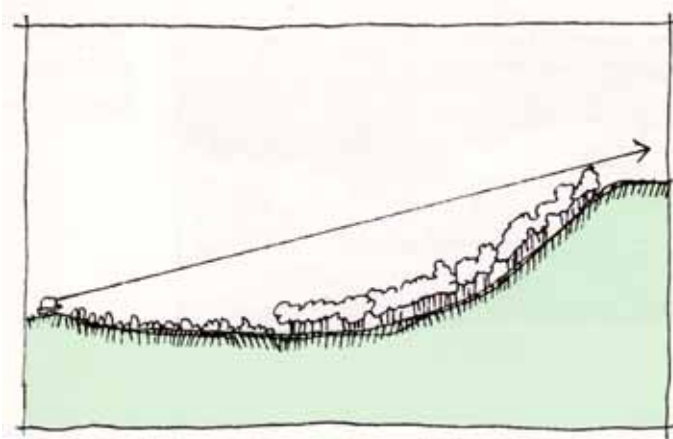
*(c) The shapes and edges seen in the middleground, in landscape with multiple, small-scale landforms, can be given a natural appearance by treating the whole of one of the landforms at a time. Use this concept with care and with small areas only.*



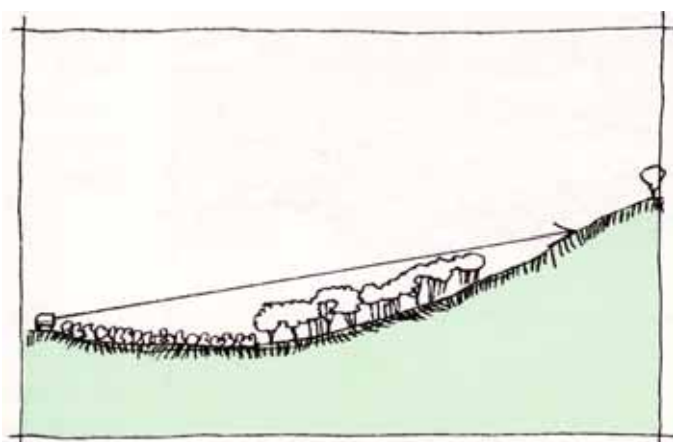
*(d) The shapes and sizes of adjacent agricultural openings can be a guide along the interface of rural and forest landscapes. In such cases more rectilinear shapes may be suitable.*

## Screening

This is most effective where tall trees in the middle ground can be retained for at least two years after the coupe behind them has regenerated.



*(a) The forest can sometimes hide an entire operation.*



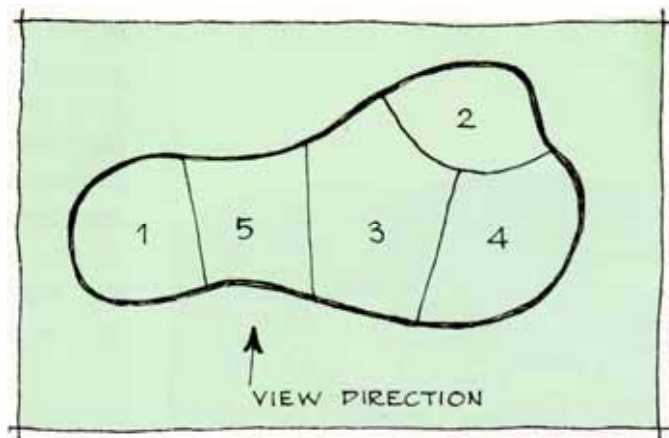
*(b) In this case the retained trees effectively halve the apparent size of the operation.*

## Sequence of harvests

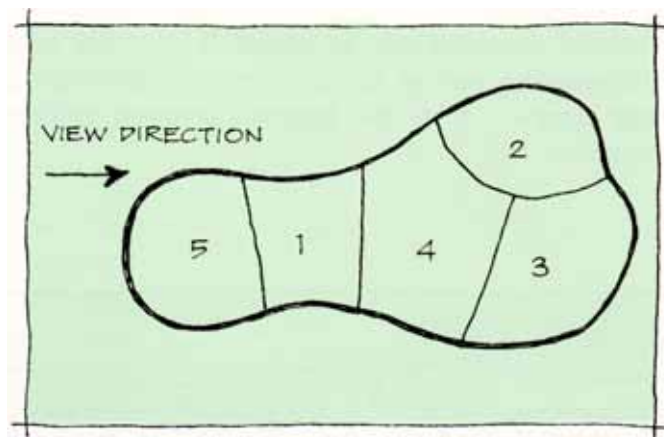
An effective way of reducing visual impact in middleground or background is to carefully plan a sequence of harvesting so that only one newly cleared coupe is visible at any time throughout the rotation. There should be a time delay between cutting adjacent coupes, or coupes can be separated spatially. The length of this delay will depend on the rate of revegetation after the burn, which in turn depends on the fertility of the soil, regeneration success, climate and so on. Even in the best growing conditions it takes at least two years to achieve worthwhile greening of the cutover area. However, a longer delay will make the sequencing more effective.

Consequently, only the order of successive coupes is shown in the examples that follow.

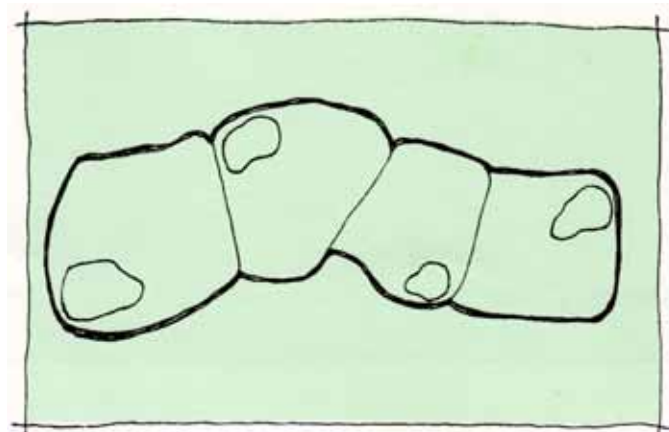




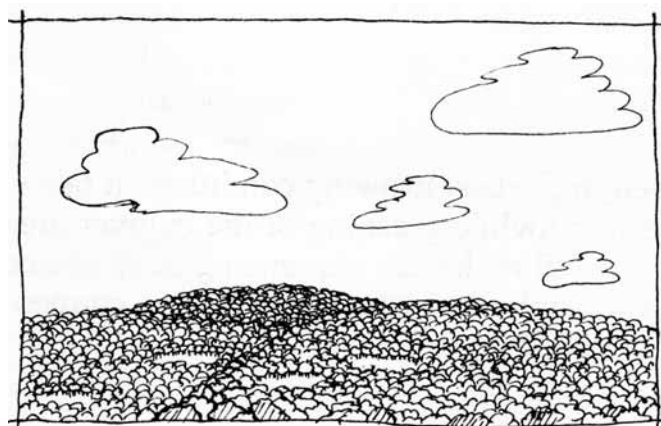
(a) Staggering the cutting of adjacent coupes stops them appearing as a single large coupe and varies the pattern



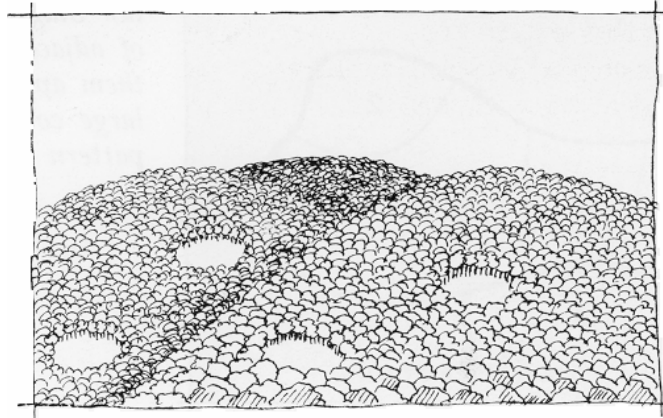
(b) On land tilting gently towards the viewer, schedule cutting to take advantage of vegetative screening so that the operation is not visible until the last unit is cut.



(c) Cutting coupes in any year should be spaced out throughout several compartments. This will visually disperse the coupes and reduce the overall impact, thus maintaining the visual character of the landscape.

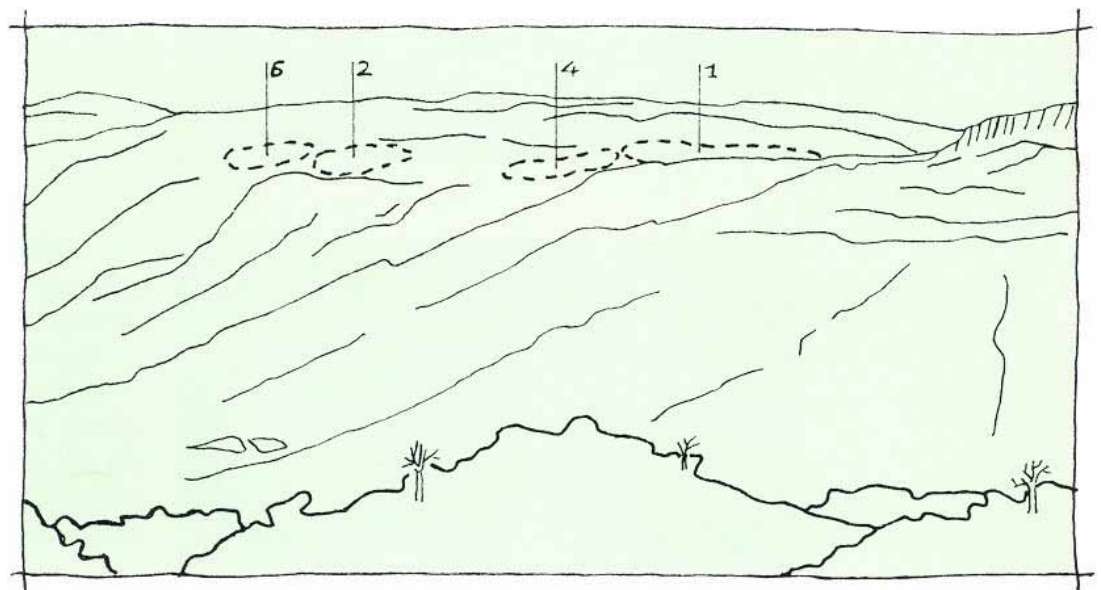


(d) Depending on their size and shape, coupes can be dispersed very successfully, and be barely visible in flattish landscapes.



(e) In steeper country much greater attention must be paid to the shape and sequence. Try to limit cutting to one or possibly two visually separate areas at anyone time to avoid the pockmark effect shown in this picture.

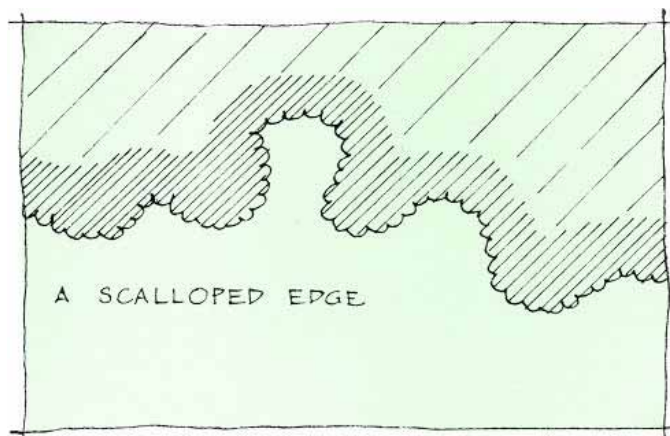
(f) A directional sequence can be useful to give the impression that the coupes are progressing out of the landform. The order in which the coupes are logged are shown. Note the interval between adjacent coupes and successive coupes.



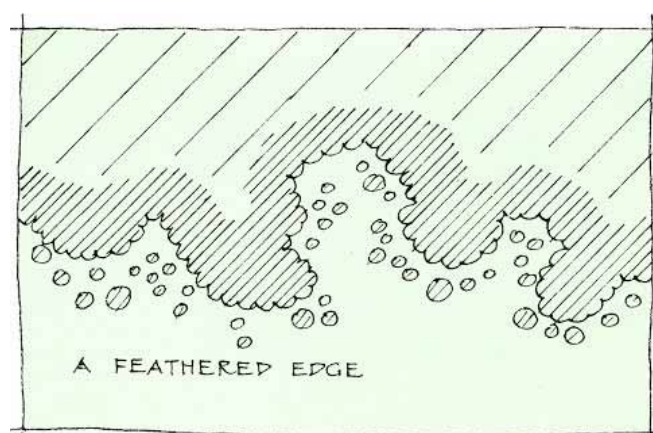
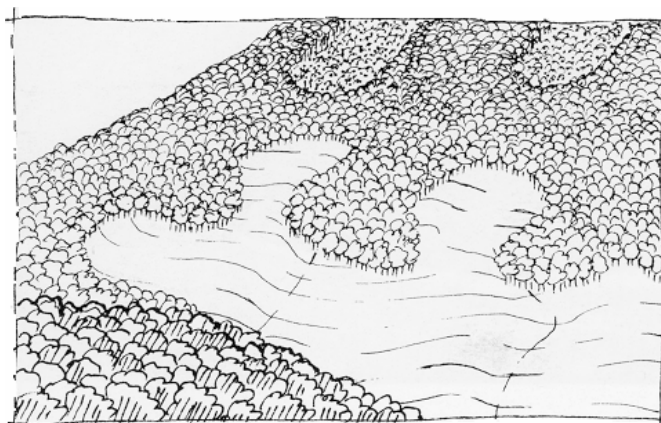


## Edge treatment

The edges of clearfells should blend into the surrounding landscape, especially in the middleground. Generally, linear, irregular and abrupt edges create zones of high contrast, due to the strong changes in colour and texture. Where possible, this contrast should be reduced.

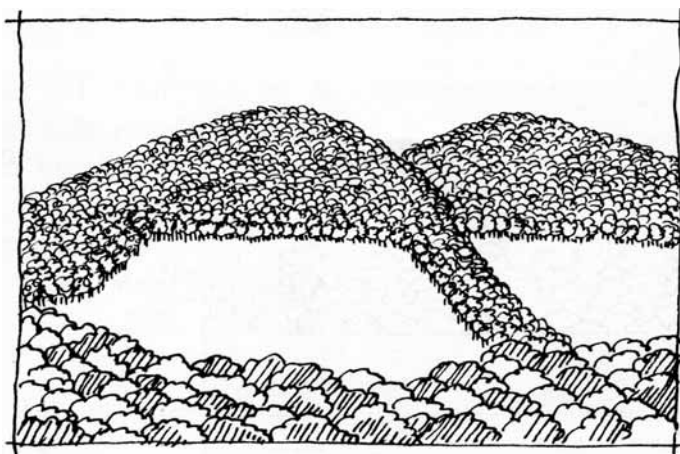


*(a) Edges should undulate and flow with existing contrasts, such as rock screes, found in the natural landscape. Note that this should be applied only where suitable burning boundaries are available.*



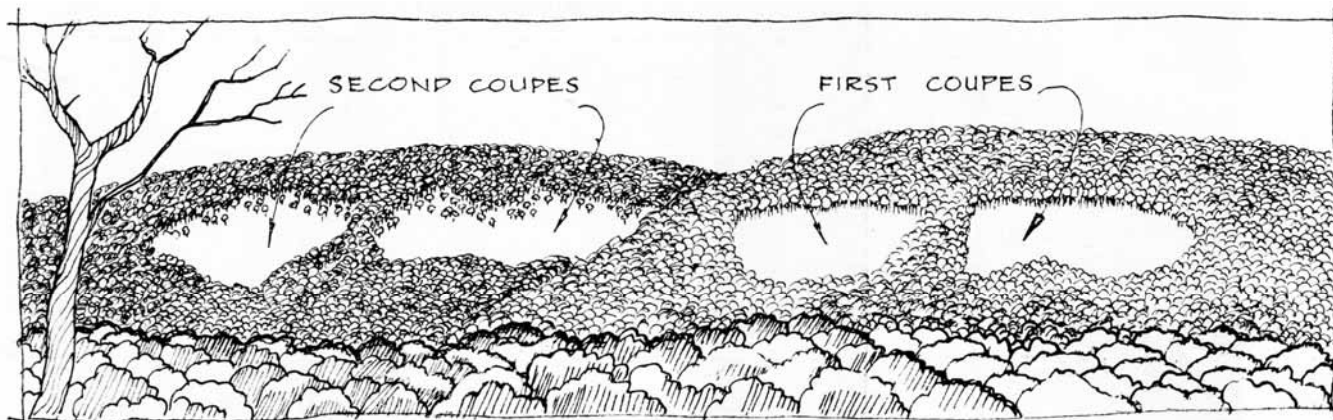
*(b) The edges of clearfells can also be feathered and scalloped to create a near- natural appearance. This is the same scene as above (see photo on next page).*

*The irregular top edge of this coupe has been feathered and scalloped to reduce visual contrast.*



*(c) Avoid straight edges in native forest settings. Straight edges highlight contrasts between mature trees and felled coupes.*

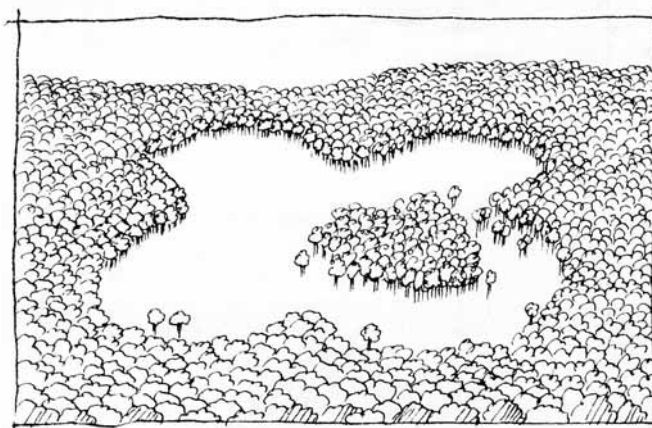




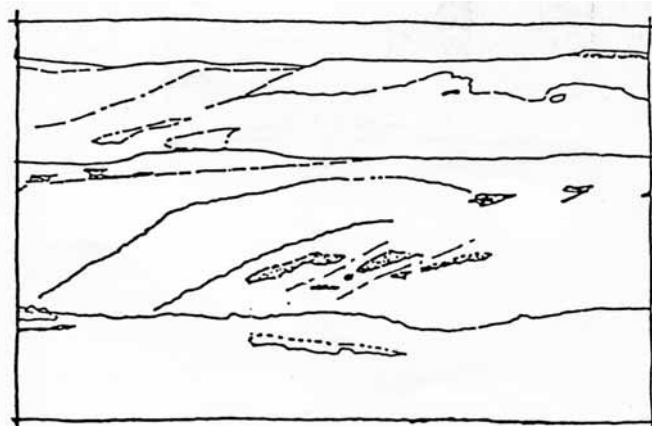
(d) Treatment of the uphill edge is important. Compare the two examples below. In the coupes on the left, contractors were allowed to pull sawlogs from above the top edge of the coupe beyond the normal operational limits defined by steepness and rockiness. Although there is some increased risk of fires escaping, it produces a more natural and irregular upper boundary (i.e., feathered and scalloped). The boundaries of the coupes on the right were marked with tape in the field, resulting in a regular edge and stronger visual impact.

## Vegetation islands and streamside reserves

Islands of trees retained in a clearfelled area can reduce the overall apparent size and contrast of clearfelling operations. This approach is suitable for both middle ground and background views.



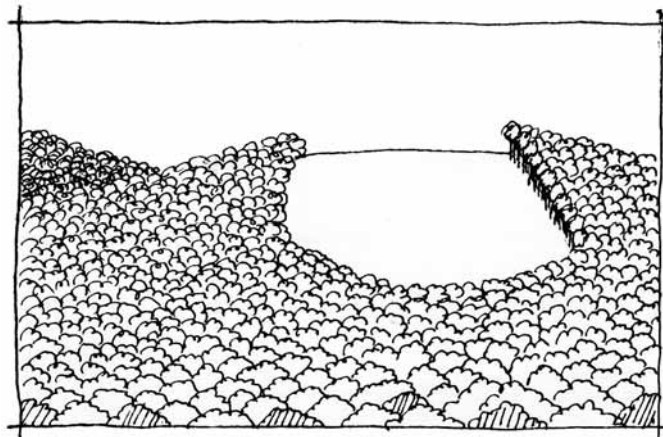
(a) Islands of future sawlogs retained here add to the complexity of the clearfell shape and reduce both the overall size and the contrast. Burning, if required, can be done over several stages (see later).



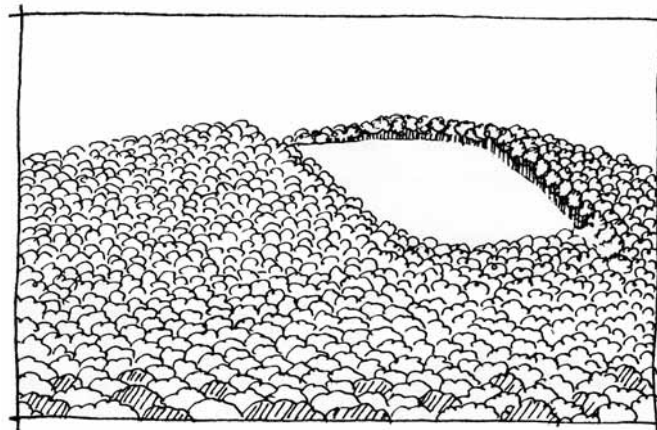
(b) Streamside vegetation retained in accordance with the Forest Practices Code can provide valuable "green belt" visual buffers, as shown in this example of streams running between the three operations in the centre of this view.

## Skylines

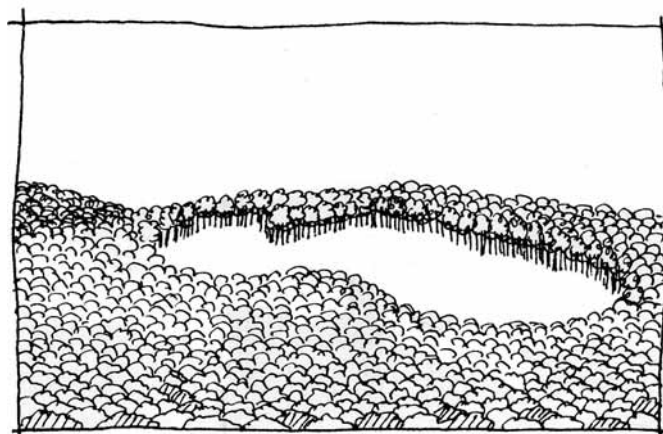
Skyline notches can have a strong visual impact even when seen in the distant background.



*(a) Skylines should not be cut directly across in the direction of the principal viewpoint, as the coupe edges will remain clearly visible for many years.*

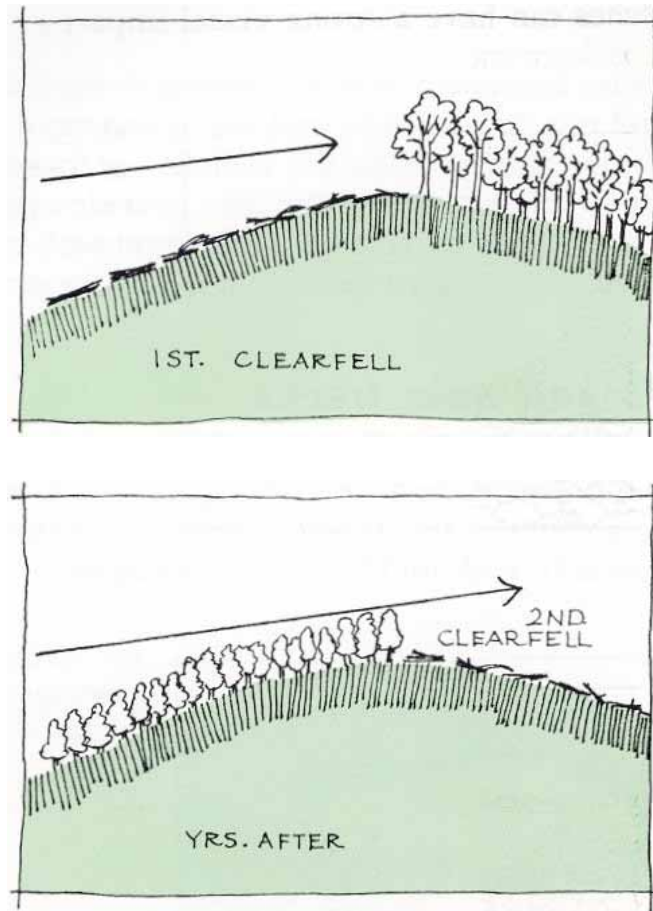


*(b) If skyline cutting is necessary, arrange the harvest at an angle to the main viewpoint.*



*(c) The impact is lessened if the harvest is along, instead of across, the skyline.*





*(d) Skyline harvests should, if possible, be made at least 10 years later to allow regenerated forest to create a vegetative screen.*

*(e) Skyline vegetation retained above this coupe helps to retain the visual character of the hill.*



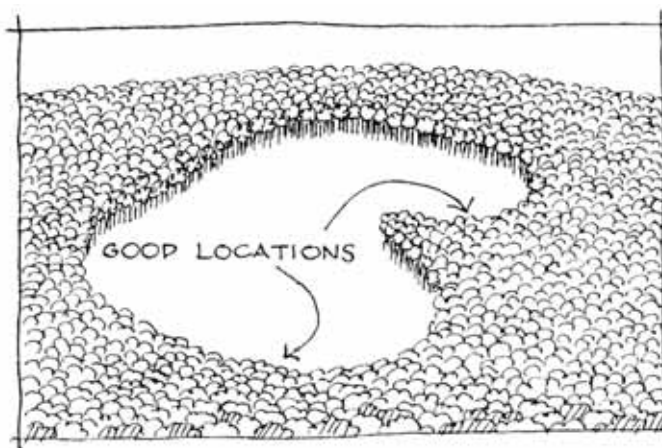


## Other Design Aspects

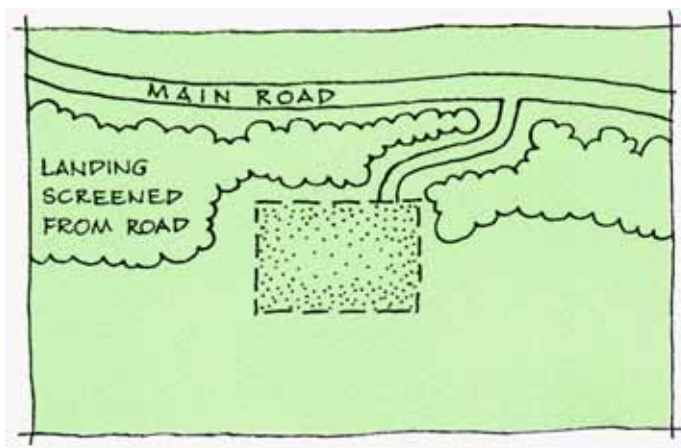
Other activities associated with harvesting - such as landings, snig tracks, gravel pits, forest roads, and the treatment of stags and regeneration burning - affect the visibility of forest operations in the landscape. These activities can also provide opportunities to enhance scenic values by creative initiatives, such as removal of screen trees or stags to give views to a mountain or river.

### Landings, spur roads and snig tracks

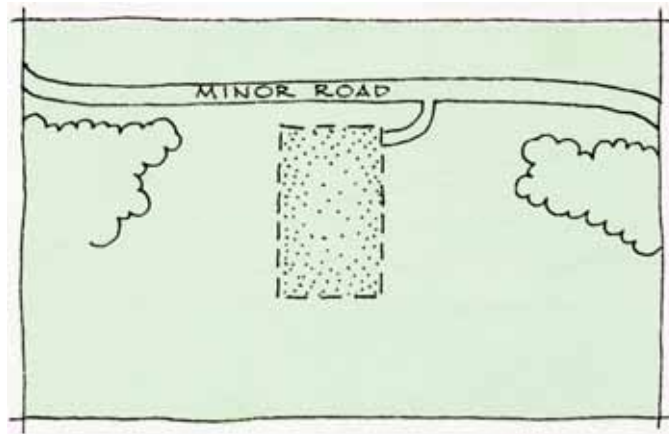
The alignment of roads and snig tracks, and the location of landings, should take account of the direction from which they will be viewed, especially with middleground examples.



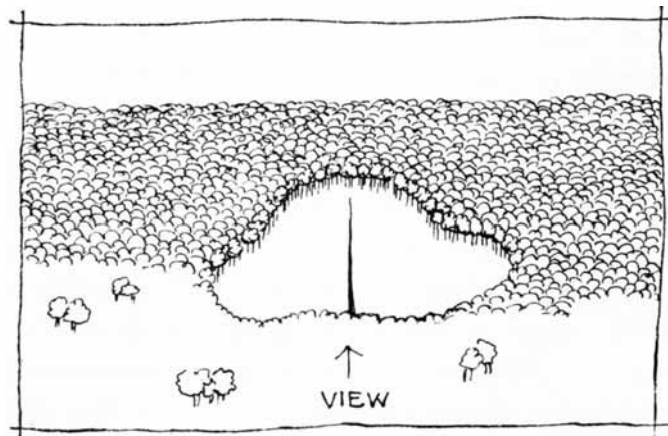
*(a) Locate landings behind existing vegetative screens, on flat sites or in hidden areas.*



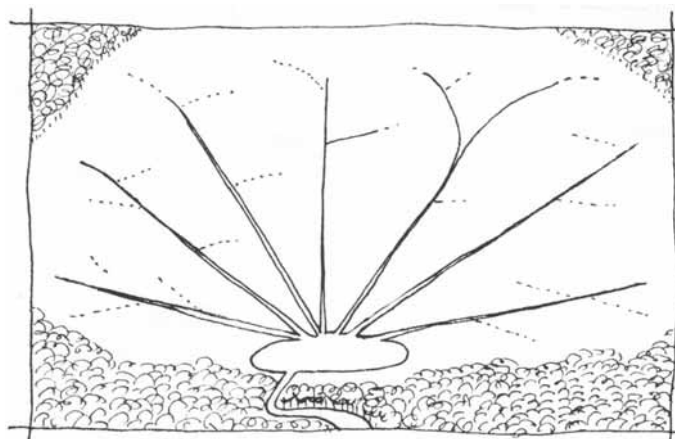
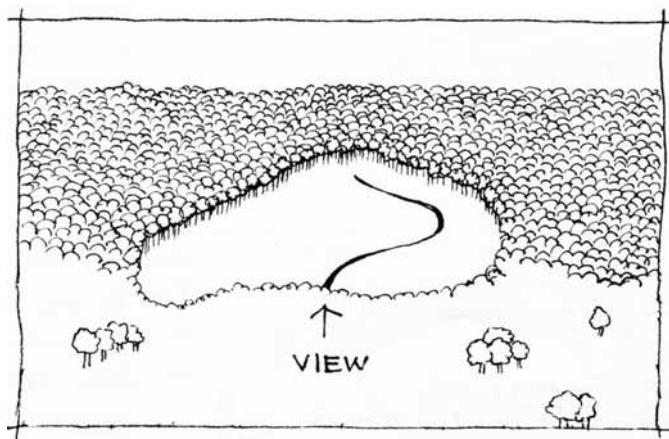
*(b) Landings should not be visible from major roads. The curved road prevents views down the access road in the foreground.*



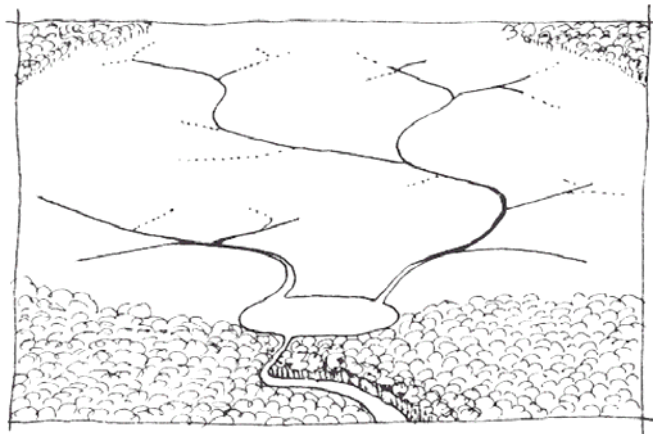
(c) When landings are close to the road, they should be as small as possible, with the shortest boundary the facing the road.



(d) Do not align major snig tracks with important viewpoints. A curving snig track (see below) is less offensive to the viewer .picture.

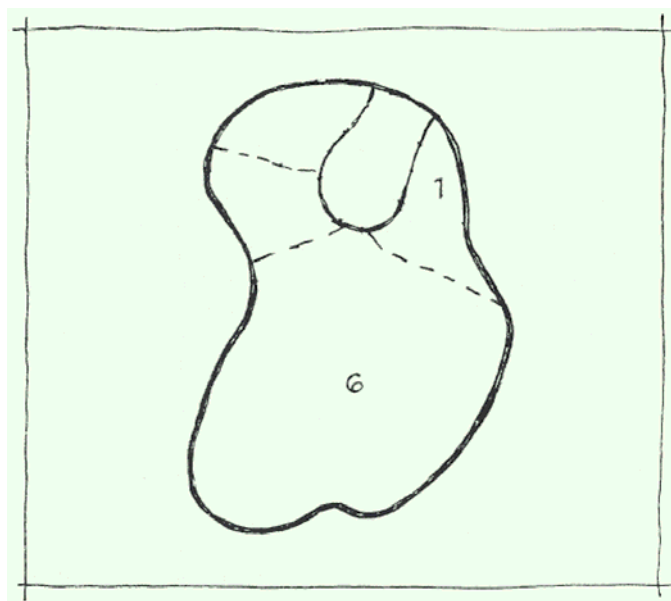


(e) Avoid building snig tracks direct to the landing. Instead, funnel them into two or three main branches, as in the next picture.



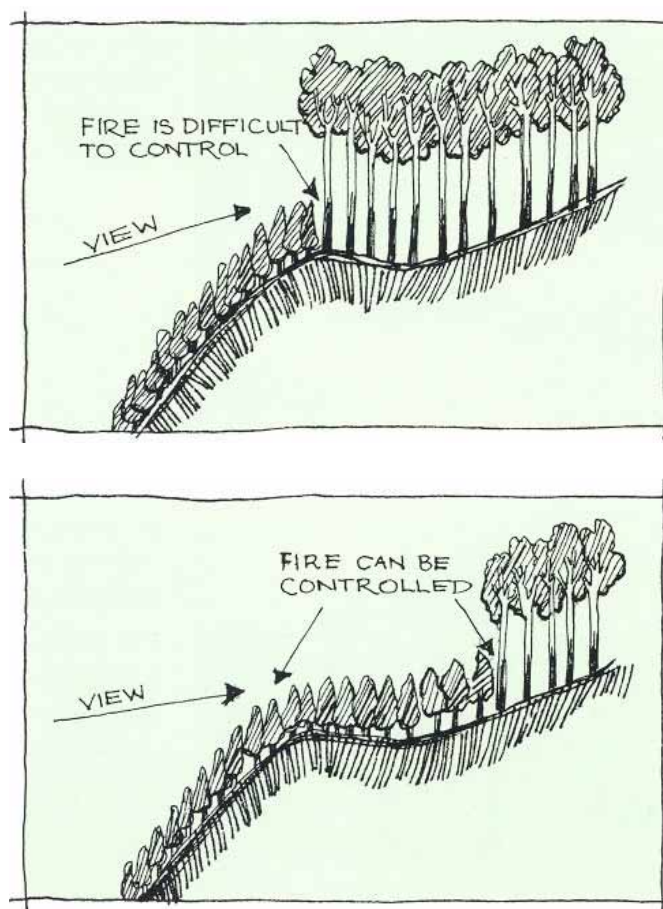
## Regeneration burns

When designing clearfelling areas, provision must be made for manageable regeneration burns to minimise visual impact. An unsuccessful slash burn can slow down regeneration, prolonging the visual impact of the clearfell, while an excessively vigorous burn can scorch tree-edges or escape to adjacent areas. In visually sensitive areas, special burning treatments may be warranted to complement other management steps taken to minimise the visual impact.



*(a) Where islands of uncut trees and stream reserves are retained, burning the perimeter of the clearcuts becomes more difficult. A special lighting sequence may be required as shown (1 to 4).*

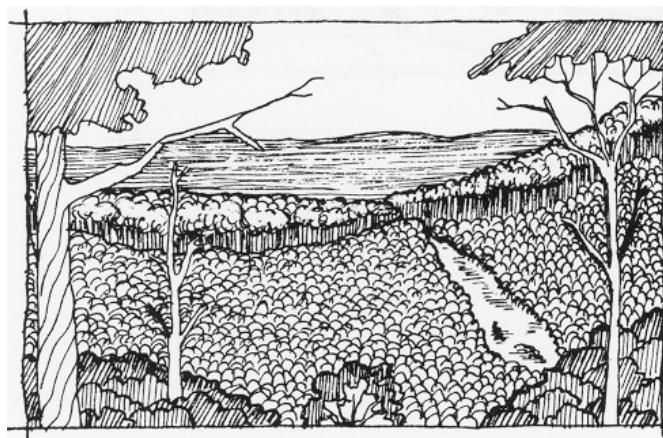
*In dry or high-altitude sclerophyll forests, fuel reduction burning before logging can be considered.*



(b) The top or upslope perimeter of a cutting unit should be carefully located to maximise visual benefits and safety during perimeter firing. If possible, upslope boundaries should be located back from the very top of a steep slope (as in the picture below). This gives a controllable burning boundary while still retaining skyline vegetation.

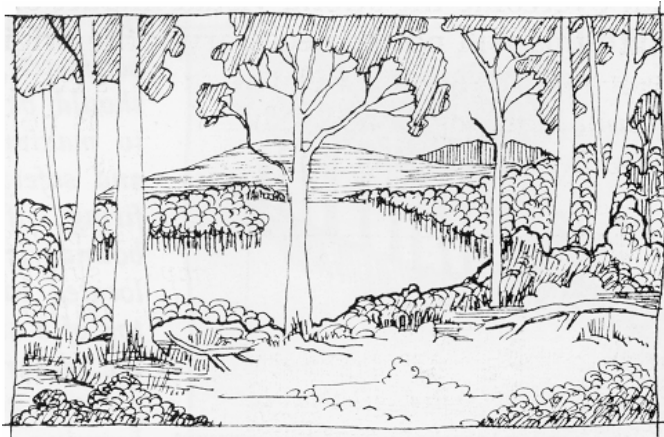
## Enhancement

Forest roads can open up new recreational and scenic opportunities. It is an important goal of forest management to take advantage of these opportunities.



(a) Vegetation along a forest road can be cleared to provide a vista showing a feature landform or river. This is especially valuable in road corridors in heavily screened wet-forest areas.

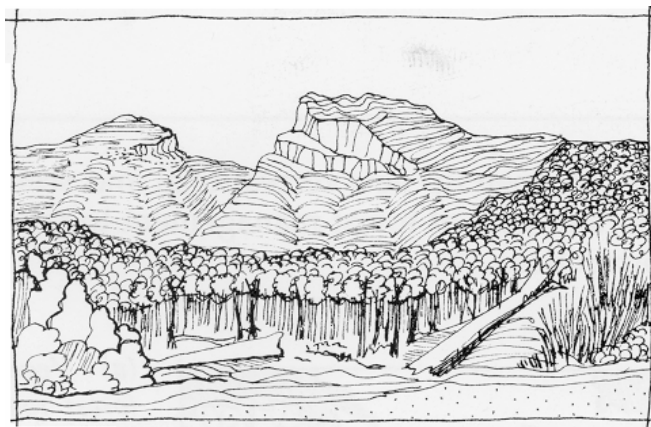




*(b) A foreground screen can be thinned or groups of trees can be kept along the roadway to frame the views.*

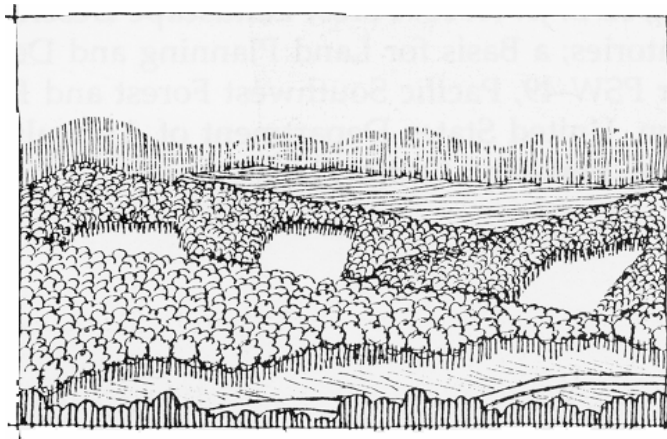


*(c) Stags in the immediate foreground can block and detract from a scenic vista. They can be removed (as in the picture below), but should not be if they provide nesting sites for wildlife or if the expense of their removal is not justified by the visual result.*

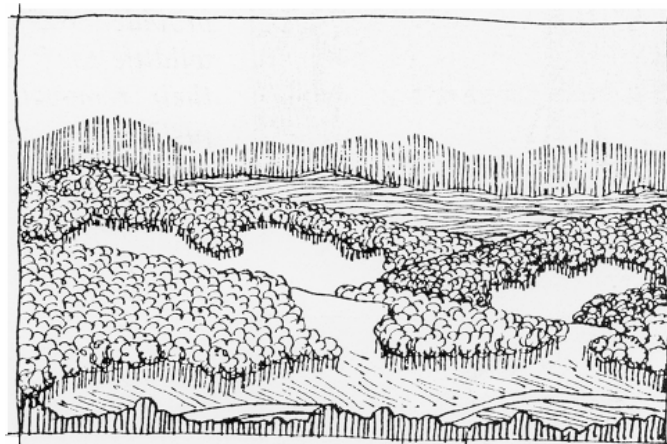


## Rehabilitation

Rehabilitation can overcome the strong visual impact of an existing operation, although this will not be necessary if the original operation has been well designed. Rehabilitation is costly because it requires an additional logging phase. Therefore it is normally only undertaken for the most critical viewing situations.



*An area of high visual impact suitable for rehabilitation.*



*The same area after second- stage logging. Geometric areas have been reshaped to tie in with surrounding ridgelines.*



## References

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- 1 United States Department of Agriculture, Forest Service (1980) *"Timber". National Forest Landscape Management*, Vol. 2, Chapter 5. Agriculture Handbook 559, Washington D.C.
- 2 Litton, R. B. Jr. (1968) *Forest Landscape Description and Inventories; a Basis for Land Planning and Design*. Research Paper PSW -49, Pacific Southwest Forest and Range Experiment Station, United States Department of Agriculture, Forest Service, Berkeley, California.