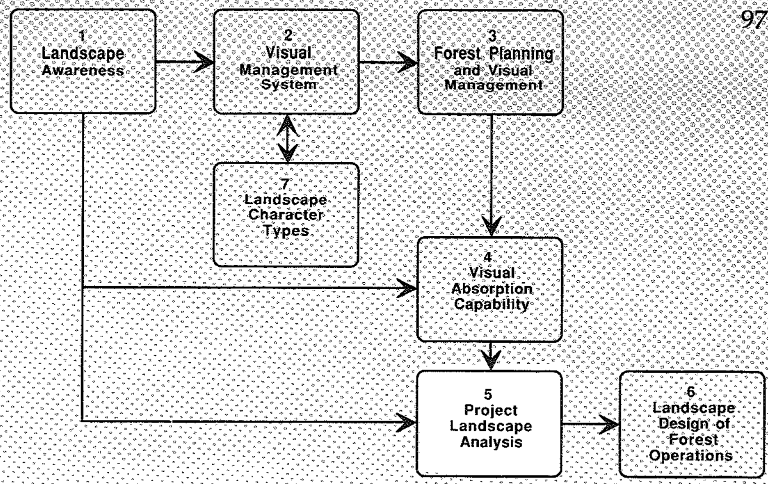
1
Landscape
Awareness
2
Visual
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3
Forest Planning
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Landscape
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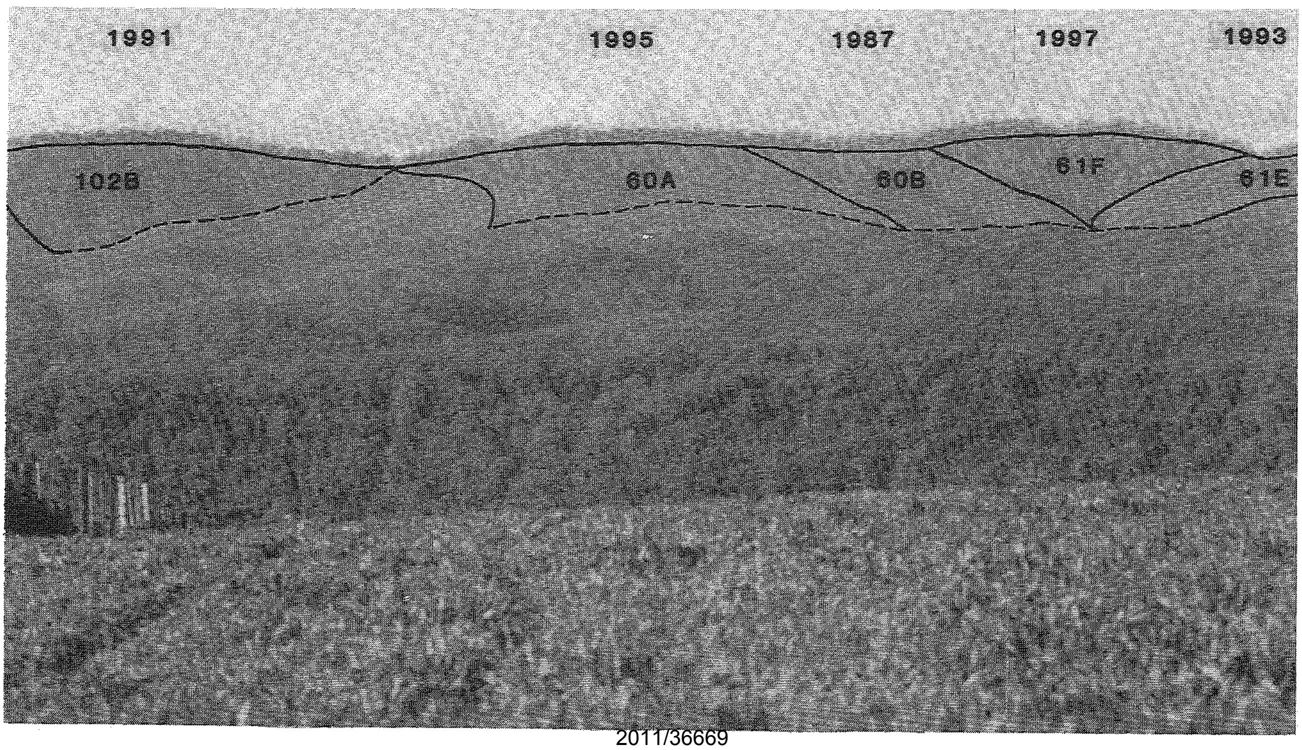
Absorption
Capability
5
Project
Landscape
Analysis
6
Landscape
Design of
Forest
Operations

Project landscape analysis for a distant range of hills (shown in this telephoto shot) determined the shapes and sizes of proposed harves coupes, which were related closely to the natural visual units of this landscape. The chosen sequence of cutting, over ten years, ensured that a green cover of regeneration was established on a coupe before the adjacent coupe was logged.



PROJECT LANDSCAPE ANALYSIS

5

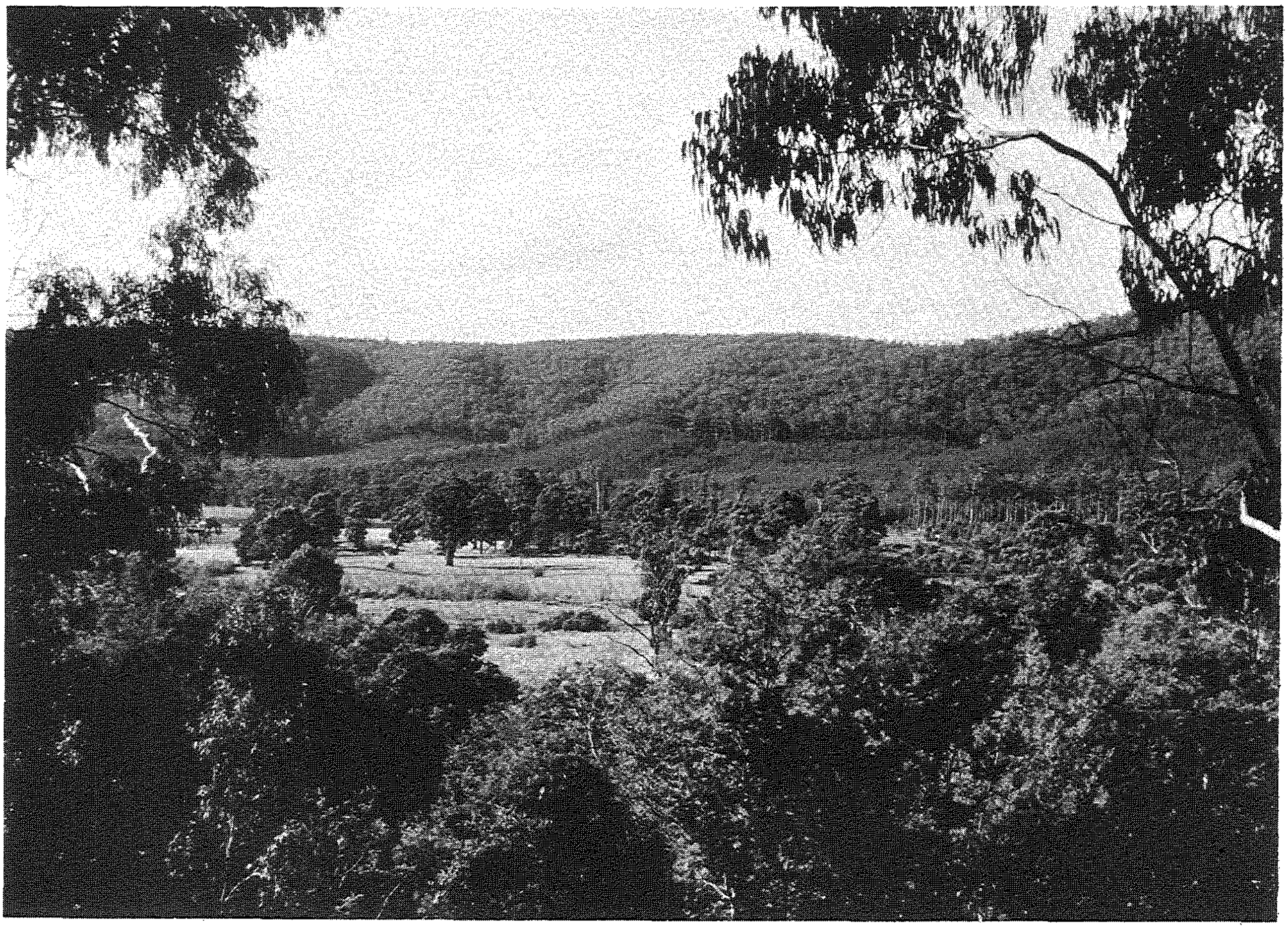
During the operational and harvest planning stages, specific proposals for harvesting and roading must be developed within the constraints imposed by operational, engineering, silvicultural and landscape requirements. The values of the landscape are inventoried in the Visual Management System as Landscape Priority Zones (LPZs) with accompanying Landscape Management Objectives (see Chapter 2). However, these objectives provide only general standards for visual management. They must now be translated into practical proposals and guidelines for management activities at the project landscape analysis stage. Figure 1 Chapter 3 shows the project analysis in the context of the broad landscape planning process.

Detailed project-level analysis is usually required where much of an operational area has the Inevident Alteration objective (indicating a high level of visual concern); for areas of landscape considered to be publicly prominent; and for areas where it may be difficult to design operations to satisfy the visual objectives. Visually sensitive areas can be identified by considering:

- the scale of the project area
- the proposed cutting rate
- the viewing sensitivity and general visibility
- the type of harvest proposed (clearfelling, selective, shelterwood)
- the slope of the land

The major purpose of the project analysis is to predict the expected visual impact of proposed operations, and then if greater than that allowed by the landscape objective, to develop visually acceptable alternatives. Such alternatives must of course take into account opportunities and constraints acting on an area (e.g. harvest types and limitations, production targets and silviculture).

A plantation forest is seen here behind the foreground paddocks. A "project landscape analysis" identified the need for the plantation to have a flowing rear boundary line, echoing the skyline behind, and the need to retain native forest along the creek (centre left of the plantation). Together, these aspects contribute visual variety to the scene.



Techniques for project analysis

The field planner needs to be able to predict the visual effects of proposed forest operations and provide this information for review by all staff responsible for forest planning. As well, there is a need to review harvest proposals to make recommendations as to their relative visual merit. This is the function of the visual analysis. It can take two forms:

either ...

- as a single viewpoint, where mainly the middle- and background are important, such as a panoramic overview from a high point to scenery below, or from a level area to a mountain or hill rising from a flat landscape

or ...

- as seen or experienced by a traveller along a road through a forest, where viewing is primarily a sequence of foreground and occasional middleground views, making up a "visual corridor". The emphasis here is on how the operations appear when seen in the sequence of visual features along the road.

In practice the two forms of viewing often overlap, as when a major distant view is seen from a single point along a road. For clarity, however, the two forms will be discussed separately.

Use of Visual Management System inventory

At the earlier Visual Management System stage, a range of basic information was recorded on maps and stored at the district office. These maps give a framework for the project analysis. "Public Sensitivity Levels" provide a statement of the viewing importance of travel routes and use areas and are useful for identifying where a visual corridor analysis might be required. Viewpoints and "seen-area" plots show areas visible to the public. These have been recorded on the base maps, and can be used directly in the project analysis.

Project Analysis for Single Viewpoints

The method of analysis described here is useful where proposed operations are viewed in the middleground and background distance (i.e. from 1 km to 16 km). By combining information on the landscape, including viewing points, plots of seen-areas, panoramic photography and landscape sketches, field planners can determine which operational alternative is visually most harmonious in a particular landscape.

The goals for the single-viewpoint analysis are:
- to identify operational proposals that most closely integrate with the characteristics of the landscape
- to show, with photomontages or sketches, how proposed changes will appear in the landscape.

The following procedure* is recommended for a single viewpoint:

Step 1
- Select a network of key viewpoints that give almost continuous views or representative views to the study area. Consult existing LPZ maps for viewpoints, and use these where suitable.
- Mark the selected viewpoints on a 1:25 000 base map.

Step 2
- Using 1:25 000 topographical base maps (or equivalent), plot the seen-areas, from viewpoints chosen solely from contours. Consult existing seen-area maps held in field offices.

Step 3
- Photograph a panoramic view of the study area from each viewpoint, making several overlapping photographs. Use a standard focal length lens.†
- Photograph the operational area, using a telephoto lens to enlarge site details.

Step 4
- Sketch operational areas, using the telephoto shots.
- Make field sketches. If possible, identify any details not apparent in the photographs.

* Adapted from R. Burton Litton, 1973[1].

† See Appendix B of this chapter for notes on techniques of photography.

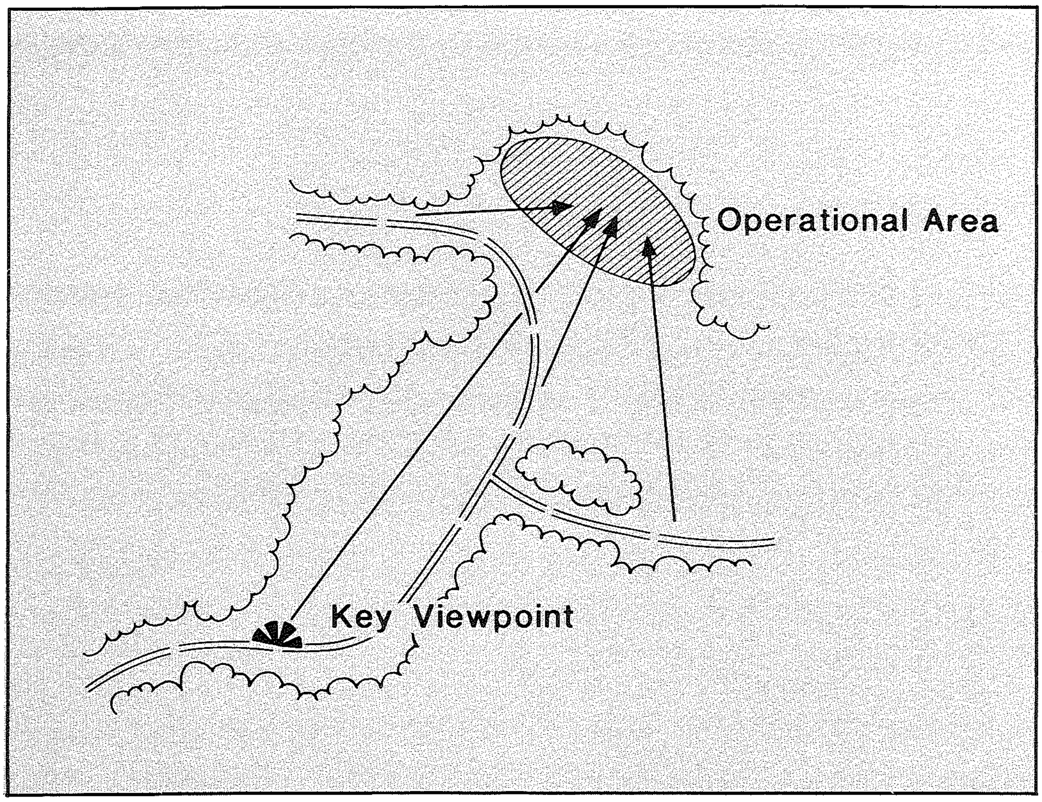
Step 5

- For each viewpoint, draw a projection of the proposed operation onto sketches or overlays to show its location, size and shape in the landscape.
- Assess the success of the proposed operation in satisfying required landscape objectives. Consider the graphic or sketch projection of the operation, together with the dominance elements and the design principles present in the particular landscape*, and the Visual Absorption Capability (VAC)† factors relevant to the area. (e.g. site recoverability, soil colour, coupe shape, site aspect to the viewpoint and viewing distance).

Applying the single-viewpoint analysis

In selecting the viewpoints for step 1, choose ones that give the most representative or extensive view of each operational area. Central or axial viewpoints are usually suitable (see Figure 1).

Figure 1. Selection of viewpoints



* See Chapter 1 "Landscape Awareness"

† See Chapter 4 "Visual Absorption Capability"

In Step 2, the aim is to determine as accurately as possible the area of land that is visible from a viewpoint, ignoring any possible screening effects of vegetation. The visible areas or "seen-areas" from a viewpoint may be determined in any of three ways‡:

- draw viewing rays on a plan, construct topographical cross-sections to determine visible limits, transfer back on the plan and interpret seen-areas between individual rays
- apply computer mapping techniques to plot visible areas automatically
- record field observation of visual boundaries directly onto a topographical base map

Photographs and sketches gathered in Steps 3 and 4 represent the three-dimensional aspect of the landscape. The photographs in particular give a precise record of the view at that time and are useful as a base for preparing sketch overlays. By joining neighbouring photographs, panoramas can be constructed to show a project area in the broader context of the surrounding landscape. As well, closer details of the project area can be recorded with a telephoto lens.

Sketches, on the other hand, can simplify a scene by emphasising only the major compositional aspects of the "characteristic landscape"*. They can be prepared by overlaying acetate on the photographs or by field sketching. The latter can record such details as distant ridgelines and boundaries of vegetation communities that are visible to the field observer.

At the analysis stage, Step 5, all of the information collected, together with aerial photographs and vegetation maps, is used to project operational alternatives onto sketches or overlays on photographs. This provides a graphic prediction of the alternatives, which can be readily understood by all forest planners. At the same time, it is sometimes worthwhile to generate a visually ideal alternative based on the "dominance elements" and "design principles" present in the "characteristic landscape"*.

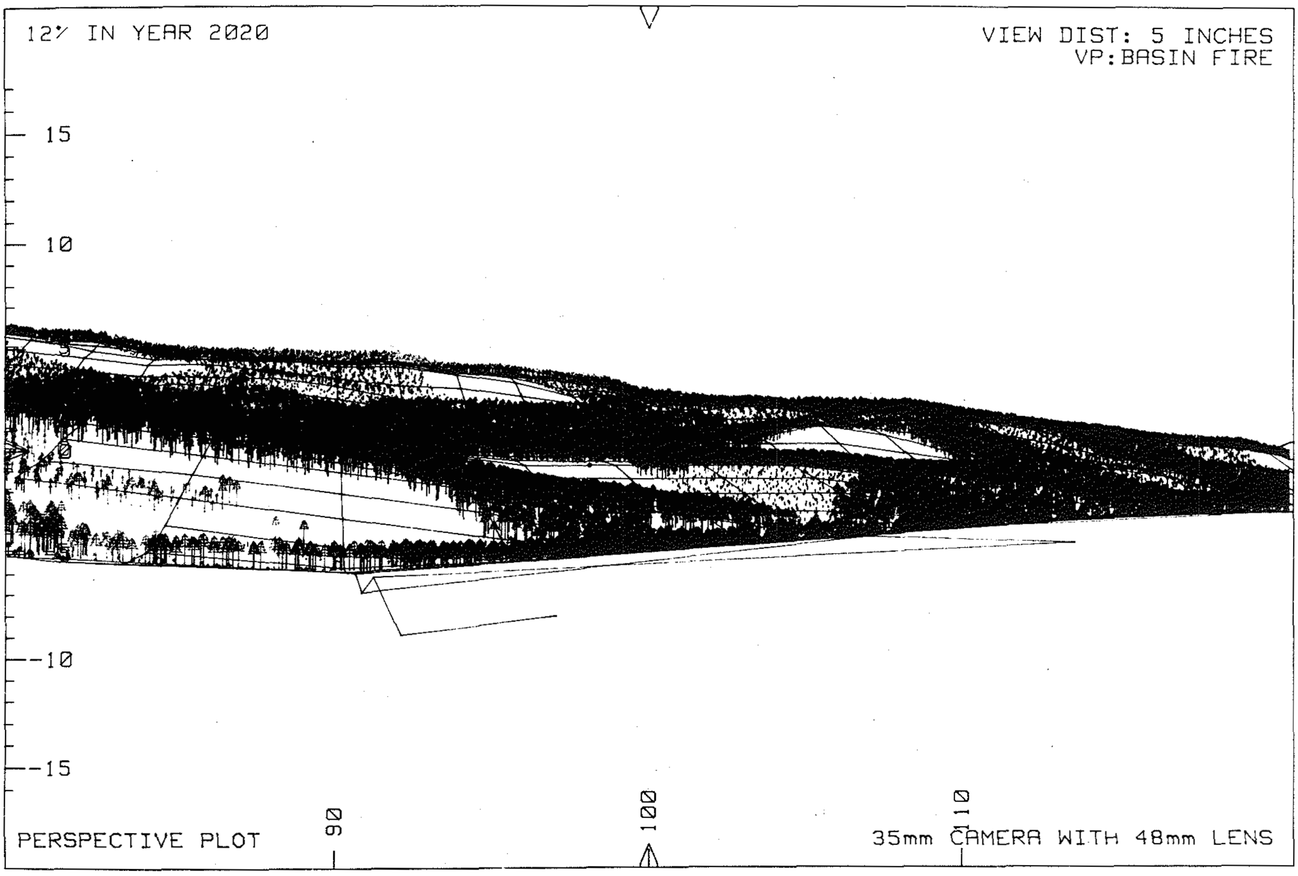
Normally, graphic projections are made manually, using estimates of the location, shape and scale of alternatives. The accuracy of this procedure depends entirely on the experience of the planner in transferring coupe and road information from maps to sketches and photographs. Computer-derived perspectives using such software as "Perspective Plot" [2,3] (see Fig. 2), or "Quick Look" [4] can provide accurate projections of proposed landscape changes. These projections can be used to supplement photographs and sketches,

‡ See Appendix A for methods of plotting seen-areas.

* See Chapter 1, "Landscape Awareness", for definitions of these terms.

especially in an important study area where the expense of establishing the necessary digitised topographical data base is warranted.

Fig. 2. Computer-derived perspectives. *[Reproduced courtesy of* Landscape Journal, *University of Wisconsin Press 2]*



Graphic predictions, when considered in combination with the VAC checklist, can give a good idea of expected visual changes. Again, the "dominance elements" and "design principles" can be used, this time to gauge the impact of the changes on the characteristic landscape. At this final stage, the predicted visual impact of the changes can be compared with the landscape objectives for the project area. Here again, the experience of the planner will be crucial in deciding whether the predicted impact will satisfy the Landscape Management Objective.

Project Analysis for Visual Corridors

The view from highways that run along river valleys in hilly country or through areas of dense forest is predominantly of the foreground, with an occasional view to the middleground (out to 5 km). These "visual corridors", where the view is contained or restricted, should be analysed separately from areas beyond the corridor that may be seen from only lookouts or key viewpoints. The visual corridor should be recognised as being only part of the overall landscape. The remainder should be analysed from individual single viewpoints[5].

The general goals for the visual corridor analysis and planning are:

- to identify the visual character of the corridor or linear segments along it
- to limit at any time the visual impact of operations along the highway
- to enhance or maintain the visual variety of each segment of the highway in harmony with its identified visual character
- to determine forest management strategy and accompanying guidelines to maintain, rehabilitate and, where possible, enhance the visual character of each segment of the corridor

Procedures for visual corridor analysis

The characteristics of the views along a roadway can be analysed in several ways. A common method is suggested here; it can be adjusted to suit particular visual corridors. There are five steps in the analysis.

Step 1

- Travel along the roadway and select road features such as bends, river culverts and embankments that can be located on a topographic base map (1:25000 where available). Number them on the map. They provide a useful framework for field orientation on subsequent visits (see Figure 4).
- Select viewpoints for plotting potential seen-areas. These may be available from initial visual management system maps held in field offices.
- Mark the selected viewpoints on the 1:25 000 base map.
- Plot the potential seen-area from the roadway, ignoring vegetative screening. Then connect between individual seen-areas to give the visual corridor boundary.

Step 2

- Draw the boundary of the potential seen-area on the overlay.
- Plot the actual field view (i.e., viewpoints, arcs of view and current limit of the area seen).
- Note additional roadside features of scenic importance (distinctive vegetation, rock outcrops and creeks) and visible impacts (disturbed vegetation, existing harvest coupes and exposed embankments).
- Define the compositional viewing type — panoramic, focal, enclosed etc., as described in Chapter 1.
- Determine visual segments along the road with common viewing characteristics (see Figure 4).

Step 3

- Photograph roadside scenic features, elevated views, framed distant views, and existing man-made changes.
- Sketch or photograph key examples to show viewing characteristics of each segment (see Figure 4).

Step 4

- Mark up proposed harvest coupes on the base map.
- Determine which coupes are seen or unseen, actually and potentially.

Step 5

- Decide which are the most important views along the road and identify where these views can be seen from the road.
- Determine the most important roadside feature areas and decide how to protect them.
- Determine the best sequence of cutting to meet the required landscape objective and satisfy the wood resource requirements.
- Decide on how the roadside vegetation should be managed to meet landscape objectives (e.g., retention of total screens and feature areas, filter vegetation, clumps or sequenced cutting of roadside vegetation).
- Decide what is required to reduce the impact of previous alterations.

Figure 3. Analysis Overlay showing aspects described in Step 2

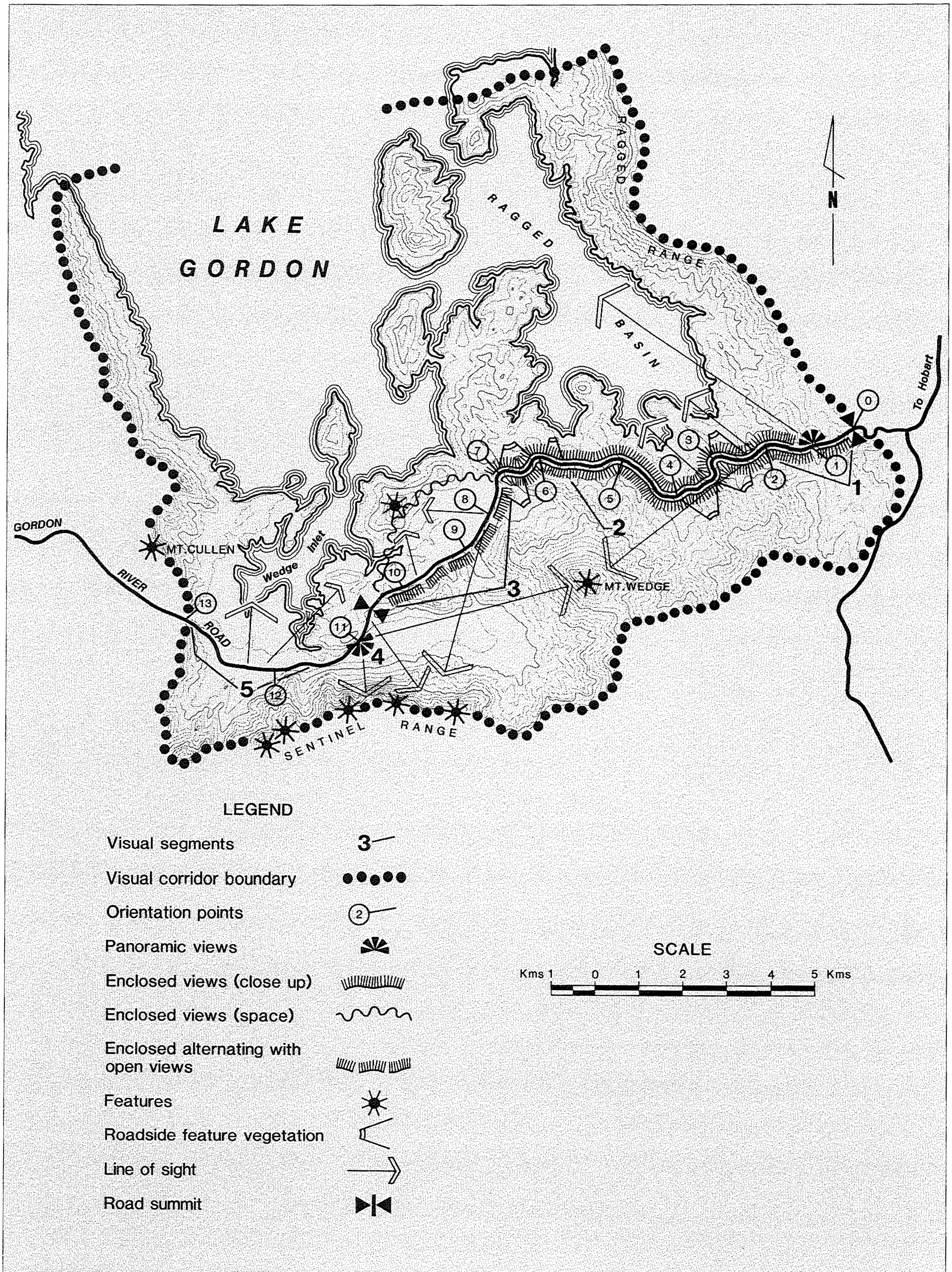
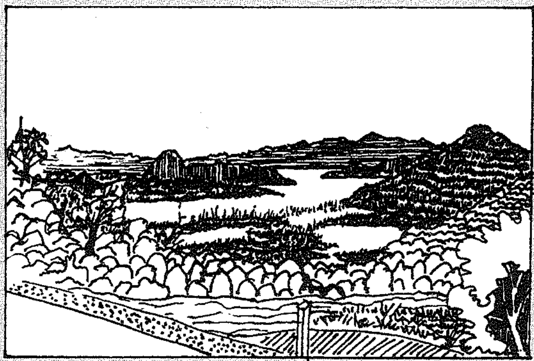
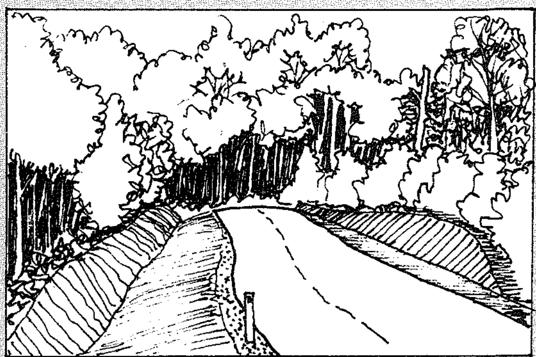


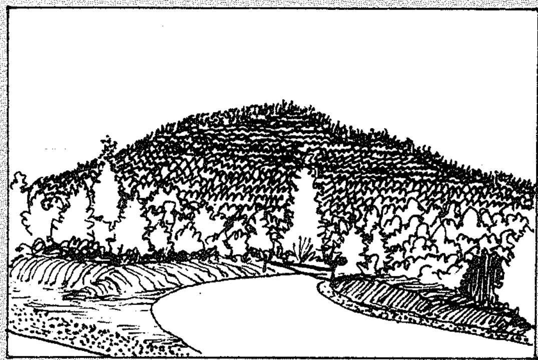
Figure 4. Sketches of visual segments showing their viewing characteristics



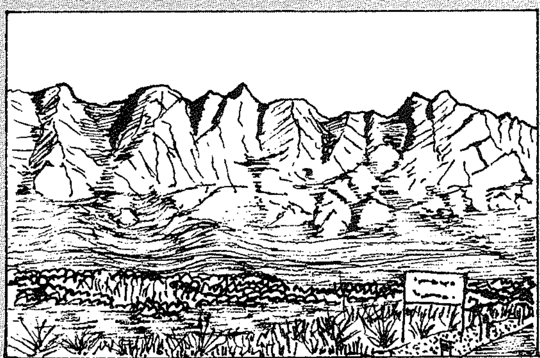
SEGMENT 1 (1.5 km long)
Panoramic views of Lake Gordon



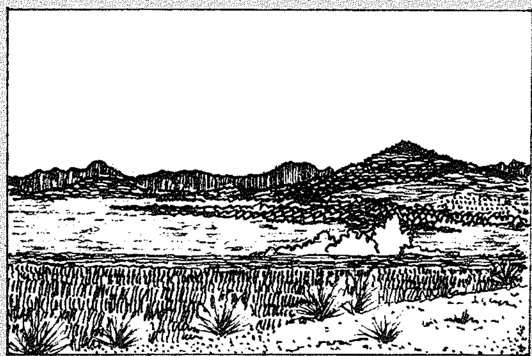
SEGMENT 2 (8 km long)
Close-up enclosed views of forest with limited visual variety



SEGMENT 3 (4.5 km long)
Alternating close-up views of forest and open views to more distant forest and Mt Wedge



SEGMENT 4 (1.5 km long)
Feature views to the Sentinels and panoramic views to Wedge River valley



SEGMENT 5 (4.5 km long)
Open plains with 360° panoramic views, and views back to forest land

Steps 1 and 2 allow the potential and actual views from the highway to be compared. When the overlay of proposed coupes (Step 4) is added, it will give a guide as to whether existing vegetation can screen proposed logging operations. At the same time, opportunities can be identified to open up nearby and distant views.

Roadside areas with special features such as distinctive vegetation (form, height and species) or rock outcrops should be noted as being worthy of protection to maintain the long-term visual diversity of the viewing corridor.

A series of photographs should be taken (for both directions of travel) for later analysis in the office (Step 3). These record the existing visual sequence along the road and also assist in defining the compositional viewing types. When used in combination with the cutting area overlay (Step 4), they provide a useful guide to the probable visual impact of proposed operations as they are introduced progressively over the full harvest rotation along the road corridor.

Ultimately, the landscape information generated in the visual corridor analysis is integrated into forest planning along with operational and silvicultural requirements (see Chapter 6 for practical ideas for visual management in the foreground zone).

Appendix A —Seen-area Analysis

(Plotting the Visible Landscape*)

As part of the landscape inventory to establish Landscape Management Objectives, areas of landscape visible from viewpoints and travel routes must be plotted. The initial stage in this process is to establish a network of viewpoints that give a viewing coverage of the landscape from a roadway or walking track.

Choose only enough viewpoints to give a representative coverage of all areas seen from locations used by the public. The views should overlap slightly to give a continuous visual coverage. Viewpoints should be chosen initially from topographic maps, and then verified in the field. Any photographic panoramas required for specific landscape management projects should be taken from these viewpoints so that plots of seen-area may be compared directly with the photographic record.

The seen-area is recorded on a topographical base map by ...

- drawing topographical cross-sections for a series of viewing lines radiating from each viewpoint, transferring the points of viewing limit to topographical plans, and then connecting the points from each cross-section to give viewing limit lines and, thus, seen-areas

or ...

- direct observation in the field and reference to topographic maps

or ...

- using a computer to calculate the seen-area from one or a number of viewpoints

Each of these methods has advantages and disadvantages, such as the amount of effort and time required and the degree of accuracy. The manual methods are described below. They have been extremely useful in making the initial inventory for the Visual Management System and also for specific landscape projects.

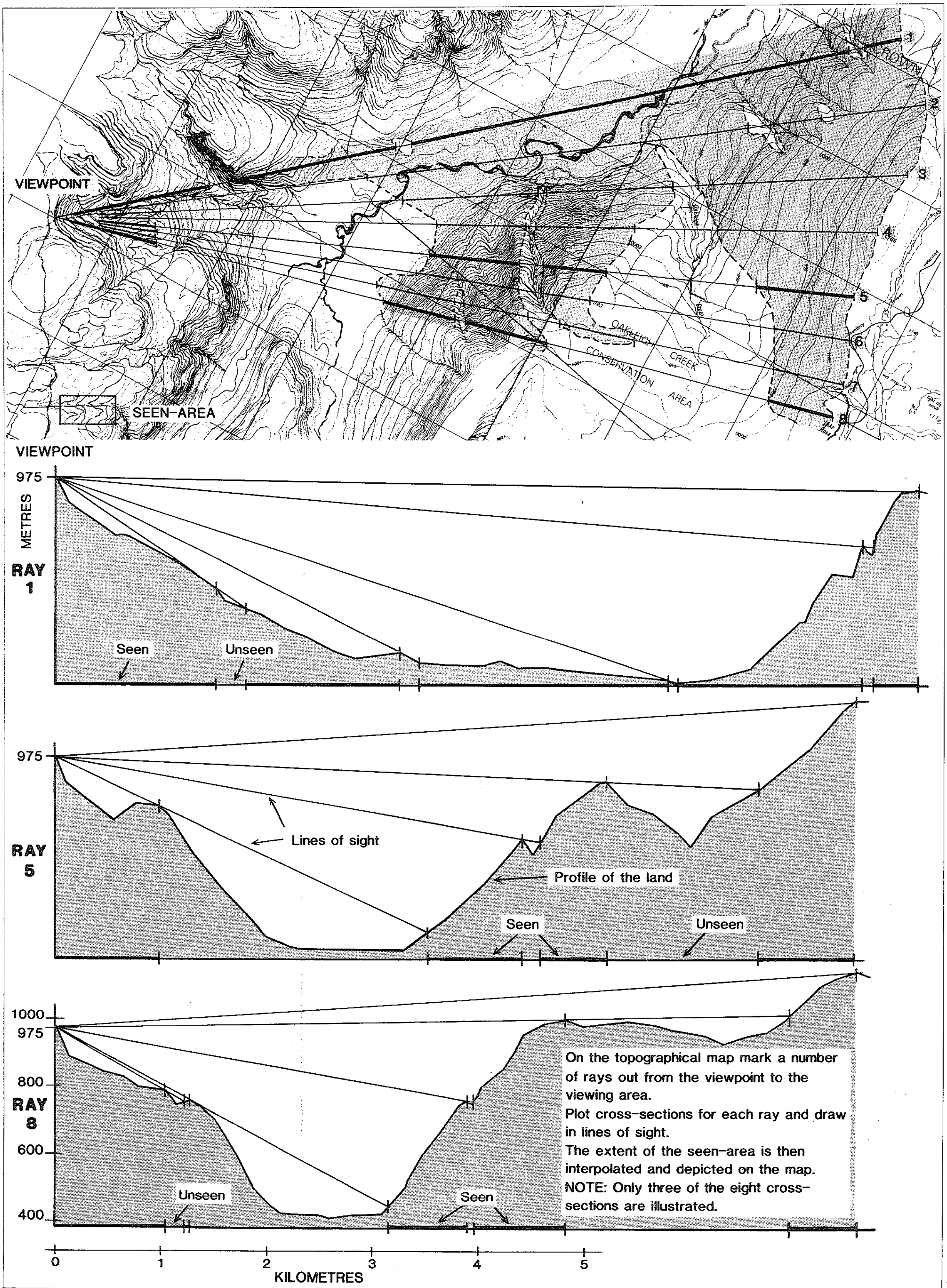
Plotting with cross-sections

This is the traditional approach for determining which parts of the landscape are visible from any selected point. Its potential accuracy is very high, being limited only by the quality of the topographical mapping available and the skill of the planner. With the 1:25 000 series maps (in the areas where these are available) there are no real limitations with this method. The steps for plotting seen-areas by cross-sections are listed below:

- On a topographical base map, mark the viewpoint and draw an arc to cover the study area.
- Then, within the arc, draw a series of rays* out from the viewpoint (see Figure 6). (To determine the number and location of the rays on the plan, the topography, or at least the contour representation of it, must be examined carefully. Use peaks, saddles, low points and changes in steepness of slope to guide the placement of rays on ridgelines. This will improve the accuracy of the unseen or "shadow" boundary on the landscape directly behind. The complexity of the landform and the length of the ray must also be considered: as both of these increase, the number and density of viewing rays must be increased.)
- Plot a cross-sectional profile of the topography cut by each ray.
- On each profile draw lines from the viewpoint to prominent points to determine which parts of the land are seen and unseen. This is done for each ray to give the viewing limits.

* The basic principles of this section are derived from Litton, R. Burton Jr. (1).

Appendix A Figure 1. Plotting with cross-sections



- Transfer the extent of the seen and unseen areas from the profiles onto the viewing rays on the map.
- Still on the map, determine the areas of landscape that are seen and unseen from the viewpoint by interpolating contour information between neighbouring rays. In other words, join viewing limit points from neighbouring rays by estimating from contours the screening effects of ridges and other landforms.

When drawing up the cross-sections:

- exaggerate the vertical scale of the cross-section by 4 or 5 times the horizontal scale, so that lines of sight cut the profile at a more obtuse angle
- overlay a sheet of transparent graph paper onto the topographical base map (to give a vertical measuring scale) and then place tracing paper over these and plot the profile in a single step
- use a light table so you can read contour information more easily through the overlay sheets
- use dyelines of 1:25 000 series Tasmaps (with unscreened contours), as these are easier to read than the colour versions of the maps

Complete seen-area plots may be made in the office, using cross-sections; however it is often better to use these in conjunction with field visits, so that the real viewing conditions in the field can be compared for accuracy with the cross-sectional plot. Although plotting with cross-sections is fairly tedious, it does not involve travel and can be done in the office on rainy or overcast days.

In field plotting and office cross-section plotting, foreground vegetation screening is to be ignored at the Strategic Planning level (for the Visual Management System), because vegetation could be harvested or lost to fire at any time in the future. The final plot is therefore the potential seen-area based exclusively on topography. However, at the Project Landscape Analysis stage, vegetative screening is very important in determining what is seen for it affects the subsequent planning of forest operations or roads in the forest landscape.

This is the scene plotted in the seen-area analysis

Direct Field Plotting

As a general rule, this method should not be used alone, If used together with plots done by cross-section and with panoramic photography, it can give a clearer picture of the actual landscape. The method is straightforward and easy to apply in ideal conditions with fine weather, suitable lighting, and minimum foreground screening.

Simply take a topographic map to the chosen viewpoint in the field and plot the observed visual limits directly onto the map. The procedure should be familiar to everyone who has used topographic maps for locating themselves in the field. The next step is to estimate the visual boundaries relative to landforms and other landscape elements and then mark these down as lines on the map.

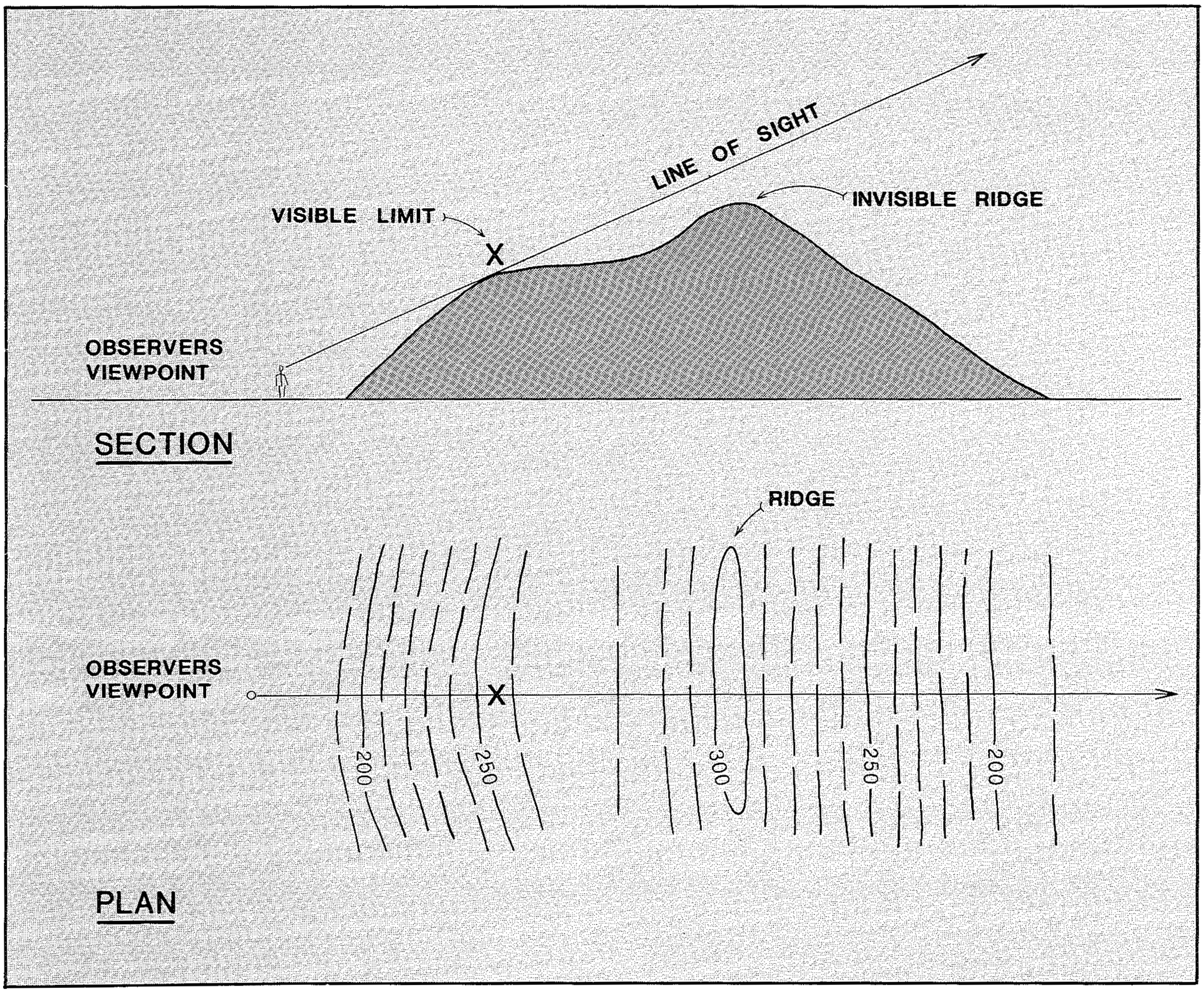
Where more than one map is available for any area, use the one with the smallest contour interval, as it will give the clearest indication of landform details seen in the field. The obvious choice is the 1:25 000 series map with 10 metre contour interval, while 1:50 000 and 1:100 000 maps will be of less value because of the larger intervals.

Several factors will affect the accuracy of field plotting. For any viewpoint, side-lighting to the main direction of viewing is the most useful for this analysis. Front lighting merges landforms into one another, making the landscape seem flat, while back-lighting obscures visual detail and contrast in the landscape. The time of the day is also important: the best hours are 9-11 am and 2-4 pm, when there is generally sufficient light and a low sun angle to accentuate the three-dimensional aspect of the landscape.

Weather conditions also limit field plotting. Mist, fog and cloud obscure land features, severely affecting the accuracy, and therefore the value, of field plotting. Seasonal weather variations should be considered when selecting the best times for plotting. Field plotting can be a problem where foreground forest makes viewing difficult or where viewpoints are too remote to be visited easily, such as on some bushwalking tracks.

The accuracy of field plotting is variable, depending upon the observer's experience in plotting, the height of the forest in the landscape, and the ruggedness of the landform. As well, observers tend to overestimate the visible area, especially where the viewing limit at the shoulder line of a ridge or mountain is interpreted as the ridge line or mountain top proper. Pockets and gullies may also be missed, as these are not always readily apparent (see Fig. 2).

Appendix A Fig. 2. Field Plotting: *The visible shoulder here is easily mistaken for the invisible ridge behind because of the difficulty in estimating distance by eye.*



Appendix B—Photographic Records of Landscapes

Photography is an essential tool for assessing the success of landscape management practices. It provides a method of recording the same scene throughout a cutting period and during the years of rehabilitation. Photographs must, therefore, be stored systematically for easy retrieval in future years. An ordinary 35 mm camera produces satisfactory photographs, and is easy to use. The procedure for taking photographs of middleground or background forest landscapes from a viewpoint is summarised below.

The conditions best suited to photographic recording are not the same as for "artistic" photography. The most suitable days are clear, haze-free and cloud-free or with high, thin cloud and little shadow. These conditions are most common in Tasmania during late summer and early autumn. The time of the day is also important. The scene should be side-lit to give greatest depth (although front lighting may sometimes be suitable). Normally 9-11 am and 2-4 pm are the best times, though south-facing slopes are best photographed in early morning and late afternoon in summer.

The photographs should be taken from the key viewpoints chosen previously so that the seen-area plots can be compared directly with the photographic record. The viewpoint should be located precisely in the field and on the 1:25 000 base maps by taking bearings and distances to nearby ground features (e.g. stumps, boulders and trees). Metal stakes driven flush with the soil surface and slashes and paint marks on trees can be used to mark the point for easy relocation in the future.

Photographic records may take the form of a "panorama" (from 2 to 7 photos joined) showing the project area and surroundings, or a specific "project area" photo (sometimes 2 photos). Recommended techniques for taking these photos are listed below.

Panoramic Photographs

- use a 35 mm camera with a 50 or 80 mm lens
- use film of low ASA rating to give fine grain / high detail photos (i.e. 25—64 ASA)
- use a tripod and set the pan axis vertical (by level bulb if available)
- overlap each photo in a panorama series by 1/4 of the image
- take exposure from a well-lit area of the panorama and use the same exposure for all photographs in the panorama
- print as "Elite"-sized photos; request that one enlarger exposure be used throughout (this may only be available from a professional laboratory)
- join photos by cutting half of the overlap off one neighbouring photo only, then overlay and tape on the back with masking tape, cut together from the back using a straight-edge and knife to give a clean butt finish. Retape on the back with "magic mending" tape after removing all masking tape
- mount on display cardboard or hot-laminate both surfaces

Project Area Photographs

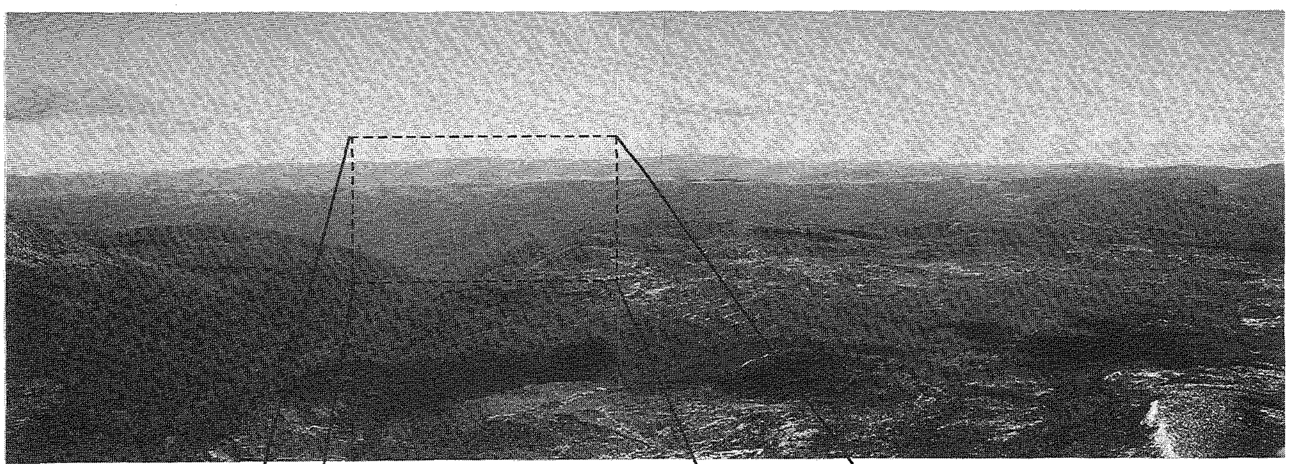
- as for panoramic photographs
- except use a 35 mm camera with a 150 or 200 mm lens
- enlarge to a print size of 25 x 20 cm (10 x 8 inches) or more.

Other considerations

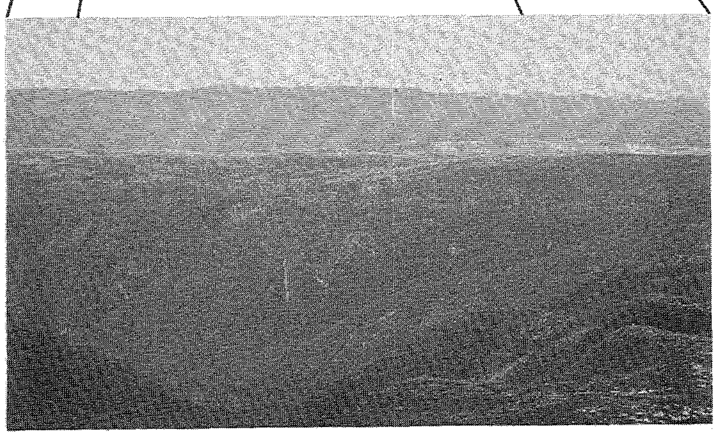
Two types of film are suitable for print records: colour negative and slide film. Prints from negatives are cheaper than prints from slides (i.e. Cibachromes) and are well suited to panoramas. Slides, on the other hand, give much finer grained prints and therefore give good enlargements for project area photographs. Use low ASA film for better resolution of detail.

It takes time and effort to make a good photographic record, but photographs provide a valuable visual statement with long-term importance for landscape management. Some time after the initial records have been made, at least one additional series of photographs should be taken to record changes. The new series should, if possible, be taken at the same time of the year and day to ensure ready comparability with the originals. Several such series of photographs are valuable for monitoring visual changes in the landscape over the full harvest rotation.

Information on the technical aspects of the camera, lens, film and exposure, as well as the exact location of the chosen viewpoint, must be stored with the photographic record in a form that can be easily accessed. A "Photo-Card" record system, which references each negative and print or slide against a file number, is recommended.



Panoramic Photographs – 50 mm lens



Project Area Photograph – 200 mm lens

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