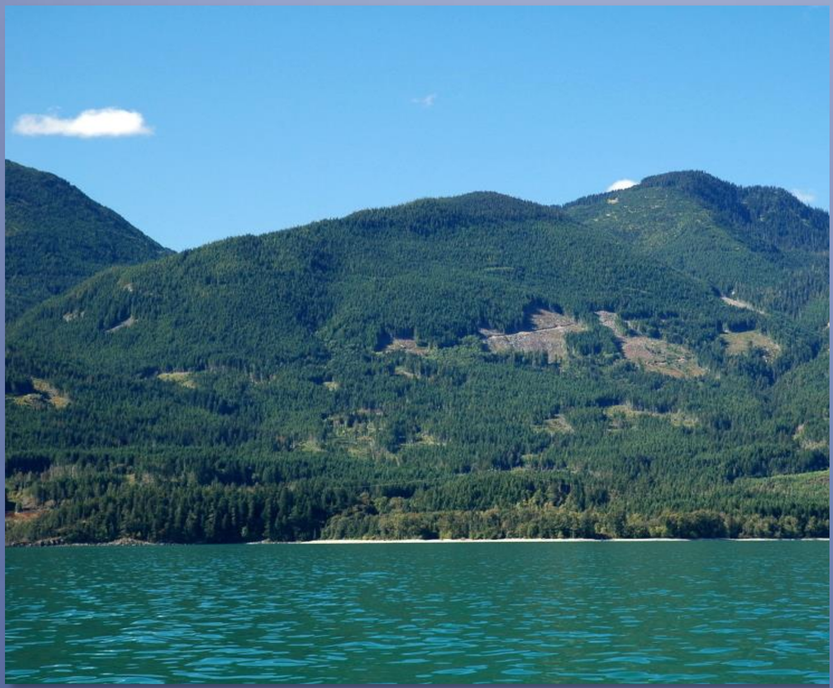


Visual Impact Assessment Guidebook

Province of British Columbia

Authority: Forest Practices Code of British Columbia Act; Operational Planning Regulation, Section 37 (1) (a); Range Road Regulation, Section 4 (7)

Canadian Cataloguing in Publication Data

Main entry under title:
Visual impact assessment guidebook. –- 2nd ed.

(Forest practices code of British Columbia)
Includes bibliographical references: p.
ISBN 0-7726-4405-5

1. Forest landscape management – British Columbia – Planning.
2. Forest landscape design – British Columbia – Planning.
I. British Columbia. Ministry of Forests. II. Series.

SD387.L35V57 2000 719.33'09711 C00-960359-X

Citation: Ministry of Forests, Forest Practices Branch. 2001. Visual Impact Assessment Guidebook. 2nd ed. For. Prac. Br., Min. For., Victoria, B.C.

For copies of this or any guidebook, contact: Government Publications PO Box 9452 Stn. Prov. Govt. Victoria BC V8W 9V7

Telephone: 1-800-663-6105 (outside Victoria) (250) 387-6409 (within Victoria)
Fax: (250) 387-1120
Internet: http://www.publications.gov.bc.ca/

Preface

This guidebook has been prepared to help forest resource managers plan, prescribe, and implement sound forest practices that comply with the Forest Practices Code.

Guidebooks are one of the four components of the Forest Practices Code. The others are the *Forest Practices Code of British Columbia Act*, the regulations, and the standards. The *Forest Practices Code of British Columbia Act* is the legislative umbrella authorizing the Code's other components. The Code establishes mandatory requirements for planning and forest practices, sets enforcement and penalty provisions, and specifies administrative arrangements. The regulations lay out the forest practices that apply province-wide. The chief forester may establish standards, where required, to expand on a regulation. Both regulations and standards are mandatory requirements under the Code.

Forest Practices Code guidebooks have been developed to support the regulations, but they are not part of the legislation. The recommendations in the guidebooks are not mandatory requirements, but once a recommended practice is included in a plan, prescription, or contract, it becomes legally enforceable. Guidebooks are not intended to provide a legal interpretation of the *Act* or regulations. In general, they describe procedures, practices, and results that are consistent with the legislated requirements of the Code.

The information provided in each guidebook is intended to help users exercise their professional judgement in developing site-specific management strategies and prescriptions designed to accommodate resource management objectives. Some guidebook recommendations provide a range of options or outcomes considered acceptable under varying circumstances.

Where ranges are not specified, flexibility in the application of guidebook recommendations may be required to adequately achieve land use and resource management objectives specified in higher-level plans. A recommended practice may also be modified when an alternative could provide better results for forest resource stewardship. The examples provided in many guidebooks are not intended to be definitive and should not be interpreted as the only acceptable options.

Contents

Abbreviations used in this guidebook

DTM – Digital Terrain Model

EVC – Existing Visual Condition

FDP – Forest Development Plan

RLD – Road Layout and Design

RP – Road Permit

SP – Silviculture Prescription

VAC – Visual Absorption Capability

VEG – Visually Effective Green-up

VIA – Visual Impact Assessment

VLI – Visual Landscape Inventory

VLU – Visual Landscape Unit (Old Standard)

VQC – Visual Quality Class

rVQC – Recommended Visual Quality Class

VQO – Visual Quality Objective

VRM – Visual Resource Management

VSC – Visual Sensitivity Class (New Standard)

VSR – Visual Sensitivity Rating (Old Standard)

VSU – Visual Sensitivity Unit (New Standard)

Introduction

The world-renowned landscapes of British Columbia are a source of everyday enjoyment for residents, as well as a foundation for our tourism industry. Accordingly, the *Forest Practices Code of British Columbia Act* (referred to as the *Act*) recognizes scenic landscapes as an integral component of the forest resource base. The Operational Planning Regulation provides two tools for managing visual resources: scenic areas and visual quality objectives.

A **scenic area** is any visually sensitive area or scenic landscape that is identified through a visual landscape inventory or planning process carried out or approved by the district manager. The procedures for managing visual or scenic values in these areas will depend on whether formally established visual quality objectives exist or not.

A **visual quality objective (VQO)** is a resource management objective that reflects the desired level of visual quality based on the physical characteristics and social concern for the area. These objectives are established by the district manager, or are contained in a higher-level plan.

The Operational Planning Regulation Section 37(1)(a) requires that a visual impact assessment (VIA) be completed before a silviculture prescription is approved in known scenic areas with established VQOs. The Forest Road Regulation Section 4(7) requires that a visual impact assessment (VIA) be completed before road construction or modification operations are carried out in known scenic areas with established VQOs.

A visual impact assessment simulates, in perspective view, the visual effects of proposed timber harvesting and road construction or modification operations on the scenic landscape. This simulation is used to assess whether or not the VQOs would be achieved.

The intent of this guidebook is to provide managers, planners, and field staff with planning and design tools for assessing the visual impact of forest practices in scenic areas at both the landscape and stand level and within targeted social and economic constraints. These tools have been developed from a combination of scientific research and informed professional judgement. As scientific understanding and social values change over time, the assessment techniques presented in this guidebook will be revised accordingly.

In summary, this guidebook provides direction on:

- explaining where visual impact assessment fits in the operational planning process;
- documenting the recommended procedures for completing an assessment;
- identifying the evaluation criteria that are used to assess whether or not proposed timber harvesting and road construction/modifications would meet the VQOs;
- managing visual values in known scenic areas without established VQOs.

Visual impact assessment in the context of visual resource management

This section explains how visual impact assessment fits into the Ministry of Forests visual resource management process. The visual resource management process was developed by the Forest Service to establish a framework for taking visual values into account in resource management planning, forest operations, and timber supply analyses. This process has evolved and changed over time. There are currently five recognized steps to this process:

1. Visual Landscape Inventory

2. Analysis and Establishment of Visual Quality Objectives

3. Planning and Visual Design

4. Implementation of Forest Practices

5. Monitoring

A summary of the visual resource management process

Visual landscape inventories are carried out to delineate, classify, and record areas in the province that are considered "visually sensitive." District managers and or those undertaking planning processes consider this information and may identify scenic areas and establish visual quality objectives under the Forest Practices Code. Where district managers or those undertaking planning processes have chosen to manage visual values, the effects of these decisions on timber supply are analyzed. Once visual quality objectives (VQOs) have been established, on-the-ground forest practices are designed and carried out to achieve stated visual objectives. When harvesting or road construction/modification operations are completed, monitoring is conducted to determine whether these operations achieved the visual objective.

Visual impact assessments (VIAs) are an integral part of step 3 (Planning and Visual Design) of the visual resource management process. These assessments must be completed by licensees for operations proposed in scenic areas with established VQOs before the development and submission of a silviculture prescription or a road layout and design for approval. They are used to estimate the potential visual impact of proposed operations on scenic resources and to assess whether the VQOs would be achieved. Although many methods exist to carry out visual impact assessments, this guidebook presents a set of proven tools that can be used to facilitate the assessment and approval processes.

Appendix 1 provides more detailed information on the visual resource management process, as well as other state-of-the-art techniques and practices as they are currently carried out in British Columbia.

Planning and visual design

"Visual design" is a term that appears throughout this guidebook. Visual design is a creative process that involves working with the visual patterns and forces of nature to guide changes to the resource in ways that meet the needs of society, both aesthetically and economically. In the context of the visual resource management process, visual design principles are used in the development of landscape- and stand-level cutblock designs to achieve VQOs and visual resource guidelines.

Proposed forest operations should be designed to consider all resource values; they should not simply meet visual resource management guidelines and mitigate negative visual impacts, but should also work with economic, biophysical, ecological, and social values while achieving VQOs. The choice of silviculture system, road layout, and logging practices will all affect the visual resource and should be considered during the initial stages of road and cutblock layout and design. It is the responsibility of all licensees, including those involved with the Small Business Forest Enterprise Program, to carry out visual resource design when operating in scenic areas with or without VQOs.

Visual resource design solutions developed at the landscape level are subsequently refined at the stand level where specific forest practices may be chosen or modified to further reduce adverse visual impact (skid trail and landing locations, slash disposal techniques, etc.).

Visual resource management: legal and planning context

This section summarizes the legal and planning context for managing visual resources in three key operational plans: forest development plan, road layout and design, and silviculture prescription.

Forest development planning

A Forest Development Plan (FDP) is a document that describes and illustrates how harvesting and road development in a specific area will be managed (OPR Part 3). This plan provides the linkage between the objectives for forest resources approved in higher-level plans, or established by the district manager before submission of the plan, and on-the-ground operations. Further details about requirements related to forest development planning are laid out in the Operational Planning Regulation. Concerning visual resources, an FDP must include the following.

- Information about known scenic area in the planning area (OPR Sect. 18(1)(e)(viii)).
- Location of cutblocks proposed to achieve category A status if the FDP is approved (OPR Sect. 18(1)(q)).
- Location of category A cutblocks that were previously approved in an FDP and whether or not the visual impact assessment has been completed (OPR Sect. 18(1)(r) and Sect. 37 (1)(a)).
- Approximate location of proposed road construction and modification and the location of a road that has been included on the most recently approved FDP (OPR Sect. 18(1)(h) and (i)).
- Location of harvested cutblocks that have not yet greened up and that are adjacent to proposed, or previously approved, category A blocks (OPR Sect. 18(1)(s)).

- Measures that will be carried out to protect forest resources, which include known scenic areas (FPC Act Sect. 10(1)(c)(ii)).

Before approving a plan or amendment, the district manager may require the licence holder to submit additional information to determine whether the plan or amendment will adequately manage and conserve the forest resources of the area (FPC Act Sect. 41(1)(b)). Green-up requirements may be varied through a higher-level plan or at the discretion of the district manager, and this information should also be reflected in the FDP (OPR Sect. 68(4) and (8) and THPR Sect. 9(2)(e). Category I cutblocks and Category I roads, while not part of the FDP, are useful tools for identifying the location of cutblocks and roads proposed for known scenic areas within the development plan area (OPR Sect. 19(1) and (2)). Referral agencies or the public may wish to provide comment(s) regarding block suitability at this stage.

Road layout and design

The primary purpose of a road layout and design is to provide the best road geometry and clearing widths to accommodate the vehicle sizes and traffic volume contemplated under operational plans and permits. Optimal road design should minimize the cost of construction, transportation, maintenance, and deactivation, as well as the impacts on other resources, such as visual resources. When any road layout and design occurs in a known scenic area, visual values must be considered. The following provisions are applicable in a road layout and design.

- When scenic area information is made known to licensees, they must list the actions (if any) required to adequately manage and conserve the visual resource, as these resources may affect or may be affected by the road location (FRR Sect. 6(1)(k)).
- Road locations must be selected and located in such a way as to accomplish the objectives of declared higher-level plans (FRR Sect. 4(1)(a)), including scenic area and/or Visual Quality Objectives.
- In known scenic areas with established visual quality objectives, a VIA must be completed to ensure proposed road construction or modification will achieve the established VQO (FRR Sect. 4(7)).
- The road layout and design must be consistent with the results and recommendations of the VIA, and a statement to that effect must be signed and sealed by a professional forester (FRR Sect. 6(4)).
- When requested in writing by the district manager, the VIA must be made available to other resource agencies before the road layout and design is approved. Where applicable, this could include the B.C. Ministry of Small Business, Tourism and Culture (FRR Sect. 3(1)).

Silviculture prescription

A silviculture prescription (SP) is a site-specific plan that describes the forest management objectives for an area. Silviculture prescriptions must be consistent with the management objectives set out in a forest development plan or, in the absence of an FDP, in a higher-level plan (*FPC Act* 12(a)(i)). The purpose of the SP is to show how management activities will be carried out to accommodate identified resource values. The following provisions are applicable when preparing silviculture prescriptions.

- If the cutblock is in a known scenic area that has established visual quality objectives, a visual impact assessment must be completed to demonstrate that the timber harvesting operations are consistent with those objectives (OPR Sect. 37(1)(a)).
- If a VIA is required, a SP must contain a statement that:
    - the procedures required by the OPR for the VIA have been followed; and
    - the SP is consistent with the results or recommendations of the VIA (OPR Sect. 38).
- If requested by the district manager, the VIA must be made available to the district manager before the SP may be approved (OPR VIA Sect. 37(1)(a)).
- The district manager may require by a notice in writing that a silviculture prescription or amendment submitted for approval be made available for review and comment in accordance with the notice (OPR Sect. 47(1)).
- If requested, a completed must be made available to the person conducting a review of the SP to assist that person in their review of the SP (OPR Sect. 47(3)).

Recommended timing for visual impact assessments

A visual impact assessment is typically undertaken after a cutblock or road is approved in the forest development plan and before a silviculture prescription or road layout and design is submitted for approval. It should be conducted as early as possible in the planning process before too much fieldwork is completed. All proposals within the same general planning area and any existing alterations that have not yet achieved a visually effective green-up (VEG) condition should be part of the same VIA package. (See the public perception study *A First Look at Visually Effective Green-up in British Columbia* (1994) for more information on VEG.)

VRM in known scenic areas with established visual quality objectives

This section identifies the specific visual resource management requirements in forest development plans for proposed new cutblocks and roads. It suggests an approach that ensures that visual resources are adequately managed and conserved. This section also specifies the licensee's obligations regarding visual resources for approved cutblocks or roads.

New cutblock and road proposals

Licensees must identify and describe, in their forest development plans, the location of known scenic areas. They must also specify any protective measures they plan to take to protect forest resources, including known scenic areas. These requirements may be considered as fulfilled if the licensee completes a visual impact assessment for each cutblock and road that falls within a scenic area with an established visual quality objective.

Ministry staff will review proposed category A cutblocks and proposed roads in scenic areas to determine whether or not to recommend to the district manager that they be moved to an approved category A stage for cutblocks and approved roads in the forest development plan. An important aspect of this review is to compare the existing visual condition of the landscape to the established VQO. The amount of existing visible alteration in non-visually effective green-up condition in a given scenic area will determine whether additional visible alteration can be added to this landscape without causing an overall visual impact beyond the target objective (i.e., established VQO). For example, if the existing visual condition is already beyond (i.e., exceeds) the VQO for the area (e.g., EVC = M [Modified] and VQO = PR [Partial Retention]), then a cutblock proposed for clearcutting may not be approved. However, some dialogue may be necessary between the licensee and Ministry staff if a preliminary analysis shows that the new clearcut proposal would not significantly add to the existing visual impact or if a partial cutting silvicultural system is planned. If the existing visual condition is more conservative than the VQO (e.g., EVC = P [Preserved] and VQO = PR [Partial Retention]), then the district manager would most likely approve the cutblock, as long as the VQO is not exceeded. The visual impact assessment will refine the shape, size, and position of the cutblock on the landscape. At this stage in the process, district managers may identify the impact assessments that they wish to review before approving silviculture prescriptions and road layout and designs. Existing visual condition ratings are available from the detailed visual landscape inventory (VLI) mapping at 1:50 000 scale. If the VLI mapping is more than 5 years old, the current visual condition of past cutblocks/roads may have changed since the completion of the inventory due to green-up. A field trip to confirm the EVC may be required if no recent photographs are made available for an office review.

Approved category A cutblocks and approved roads

Licensees must identify in their forest development plans those approved category A cutblocks and approved roads that require a visual impact assessment (OPR Sect. 18(1)(i) and (r)). They must also complete the assessment to demonstrate that a proposed cutblock or road would be consistent with the established VQO(s) and do this before the development and submission of a silviculture prescription or road layout and design. Licensees must develop and submit a silviculture prescription or road layout and design that is consistent with visual impact assessment results or recommendations.

The assessment must be submitted to Ministry of Forests' staff for review, when requested. If satisfied that the VQO will be met, the district manager approves the silviculture prescription or road layout and design.

Field monitoring is carried out to determine whether the established VQO is met and to determine consistency with the approved plan, prescription, and the visual impact assessment results or recommendations.

Licensees are encouraged to complete visual impact assessments as early as possible in the planning process after cutblocks and roads are approved in the forest development plan. This ensures that potential problems are dealt with quickly and that unnecessary costs associated with revising block layout and design or road construction are avoided.

Before completing the impact assessment, licensees may wish to confirm the viewpoints to be used for the visual simulations with Ministry of Forests staff. In addition, staff from the Ministry of Small Business, Tourism and Culture should be consulted about important viewpoints in scenic areas containing identified tourism features. Regional or district guidelines have been issued in certain locations of the province to help define the content and clarify the development of a visual impact assessment.

For known scenic areas with established visual quality objectives, Figures 1 and 2 outline specific visual resource management requirements in forest development plans, silviculture prescriptions, and road layout and designs.

Figure 1 Specific visual resource management requirements for known scenic areas with established visual quality objectives: forest development plans and silviculture prescriptions.

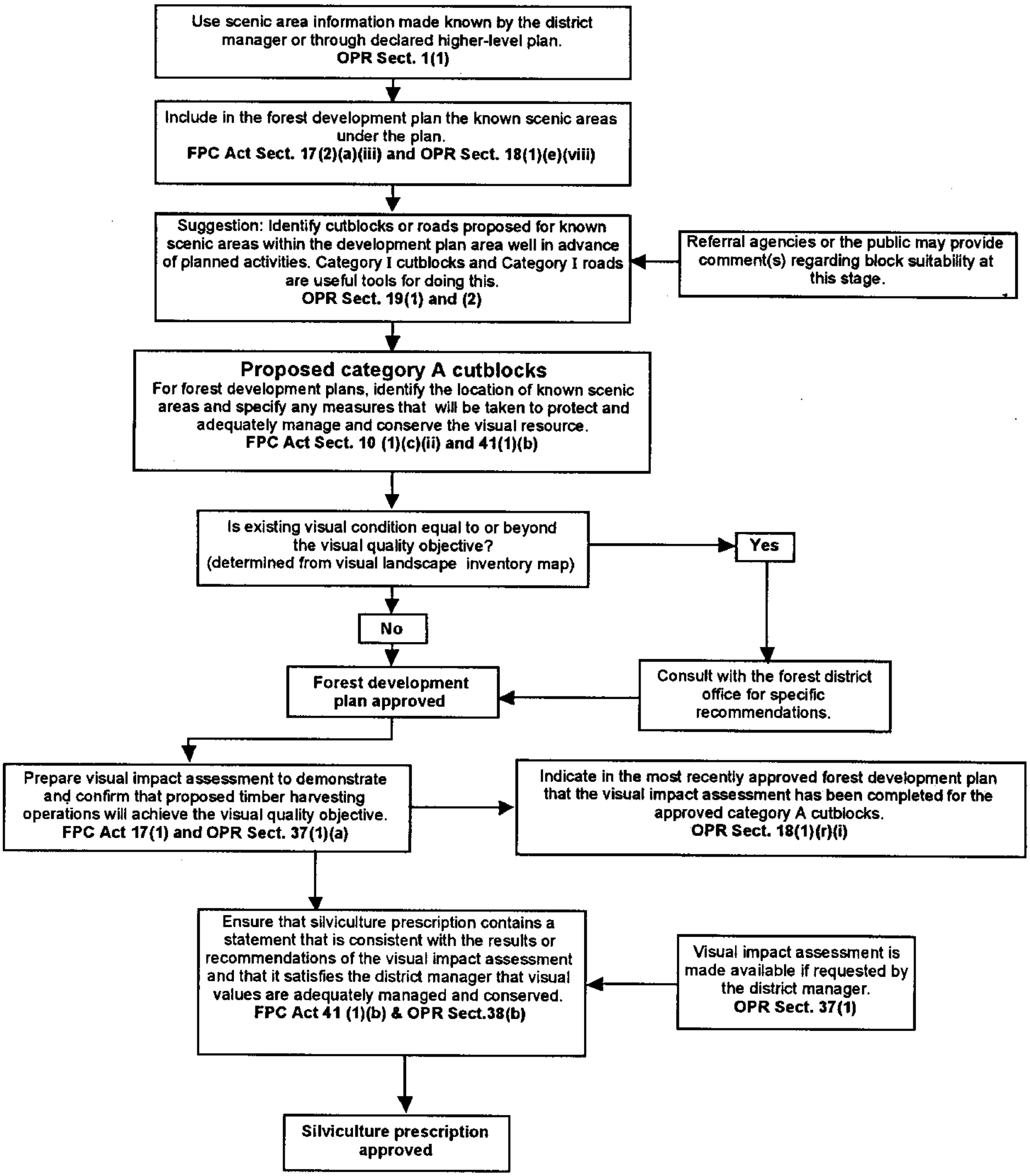
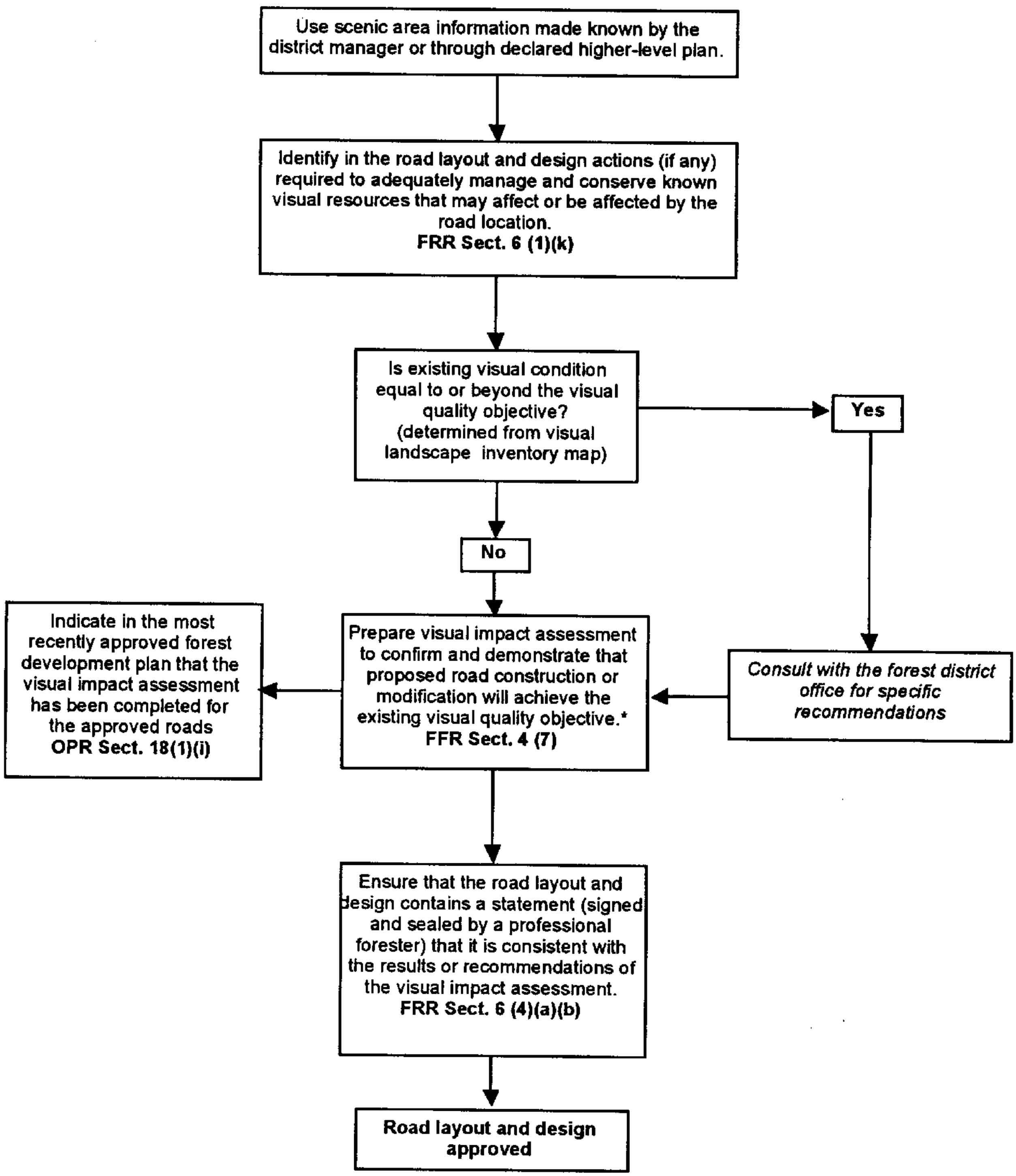


Figure 2 Specific visual resource management requirements for known scenic areas with established visual quality objectives: road layout and design.



VRM in known scenic areas without established visual quality objectives

The primary purpose of this guidebook is to document the recommended procedures for completing visual impact assessments. However, it would be remiss if it did not provide some direction on how to manage visual resources in scenic areas without visual quality objectives.

Current Forest Practices Code regulations do not require the preparation of visual impact assessments in scenic areas without established VQOs. In these circumstances, forest development plan requirements prevail. These plans must include information about known scenic areas included in the area under the plan (OPR Sect. 18(1)(e)(viii)). They must also specify the measures that will be carried out to protect forest resources (which include scenic feature or setting) (*FPC Act* Sect. 10(1)(c)(ii)). In addition, before approving a plan or amendment, a district manager may require that the proponent submits supporting information to ensure that the plan adequately manages and conserves the visual resource (*FPC Act* Sect. 41(2)). The road layout and design must also include the actions that will be taken to adequately manage and conserve known non-timber forest resources (including visual resources) that may affect or be affected by the road location (FRR Sect. 6(1)(k)).

For those known scenic areas without established visual quality objectives, recommended visual quality classes can provide an indication of the level of activity that would appropriate for managing and conserving visual values. Recommended visual quality classes are a specialist’s recommendation describing the level of visible alteration that would be appropriate for a specific landscape.

The best way to ensure that the visual values of a scenic area are being adequately managed and conserved is to plan the practices by using proven visual design techniques. These techniques, in conjunction with perspective view simulations, will help to demonstrate how the design will affect the landscape from important viewpoints. Visual landscape design concepts, techniques, and procedures are described in the *Visual Landscape Design Training Manual.* If visual simulations are requested, they would normally be submitted to the district manager before the approval of the silviculture prescription. However, in some circumstances (e.g., where the existing visual condition of the landscape is beyond the recom-mended visual quality class) the district manager may require this supporting information before FDP approval.

The district manager should supply the licensee with information about what level of management is appropriate in a scenic area without visual quality objectives, and what is generally expected in a visual simulation package. The content of this package will vary depending on the area’s visual sensitivity class (VSR of old) and recommended visual quality class (rVQO of old). ["Old" refers to the terminology used before 1997. After the release of the new visual landscape inventory standards in 1997, some of the old terminology was dropped and new terminology was used to clarify inventory and planning processes.] To help clarify the development of visual simulation packages, some forest regions and districts have issued standard operating procedures and guidelines.For known scenic areas without established visual quality objectives, Figures 3 and 4 outline visual resource management requirements in forest development plans, silviculture prescriptions, and road layout and designs.

Figure 3 Visual resource management requirements for known scenic areas without established visual quality objectives: forest development plans and silviculture prescriptions.

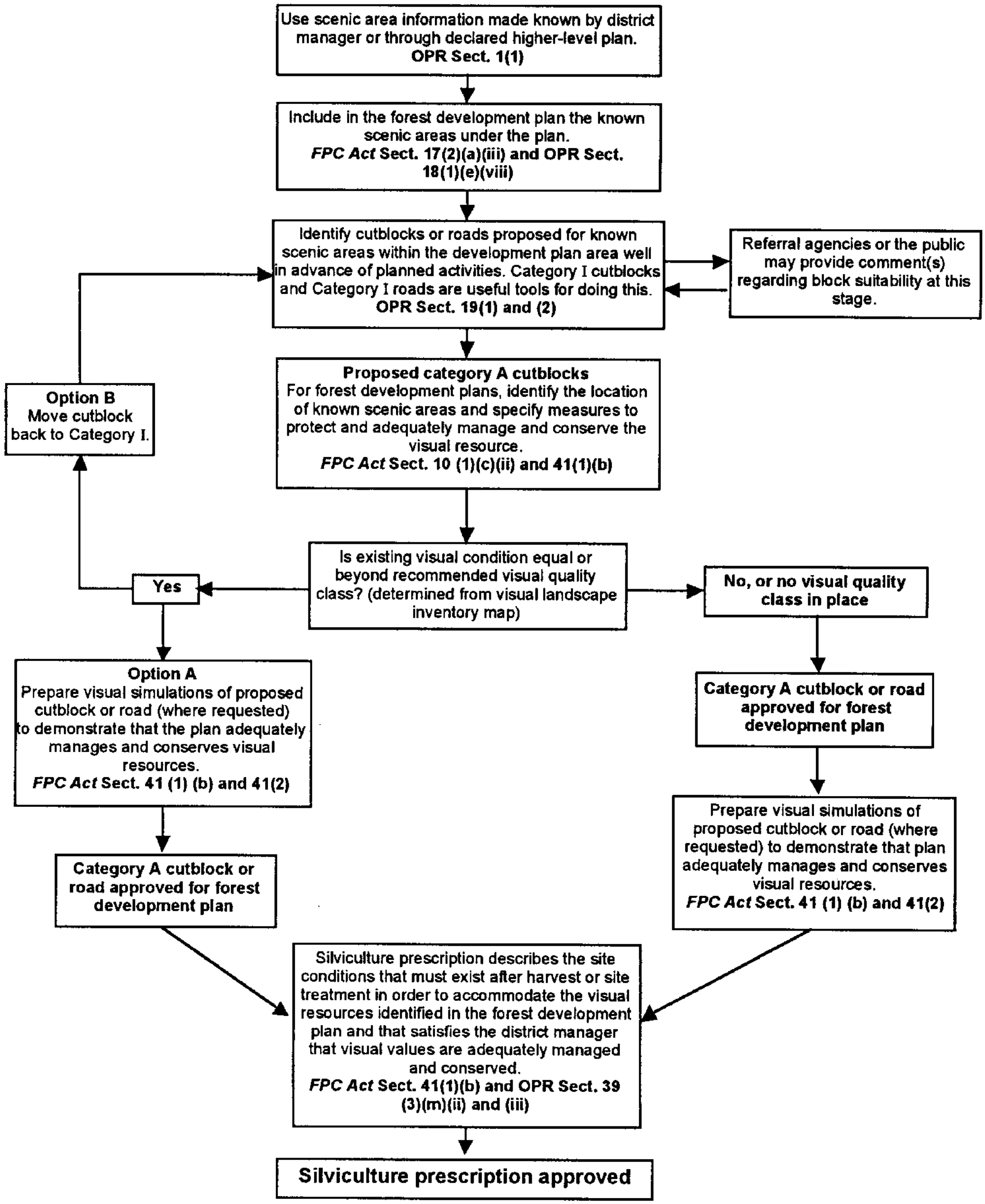
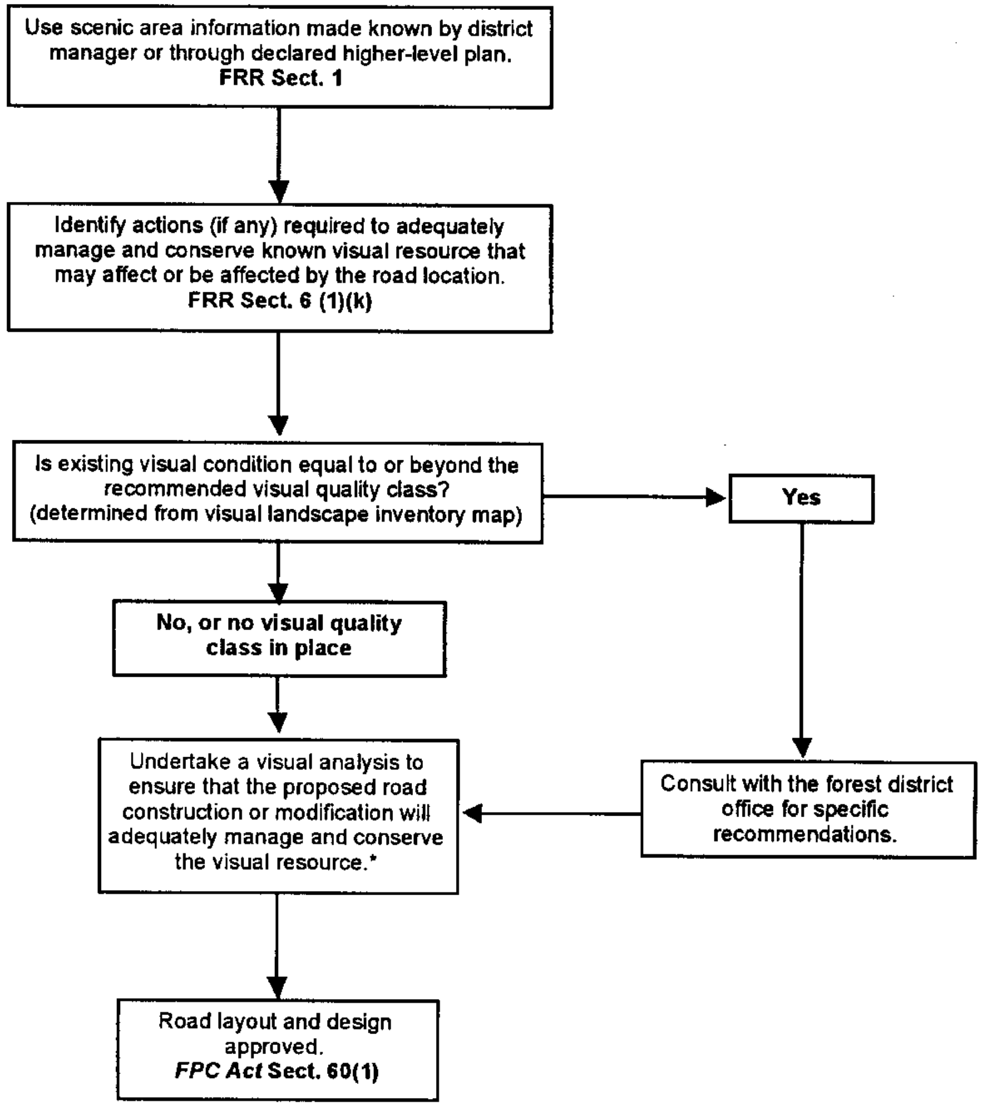


Figure 4 Visual resource management requirements for known scenic areas without established visual quality objectives: road layout and design.

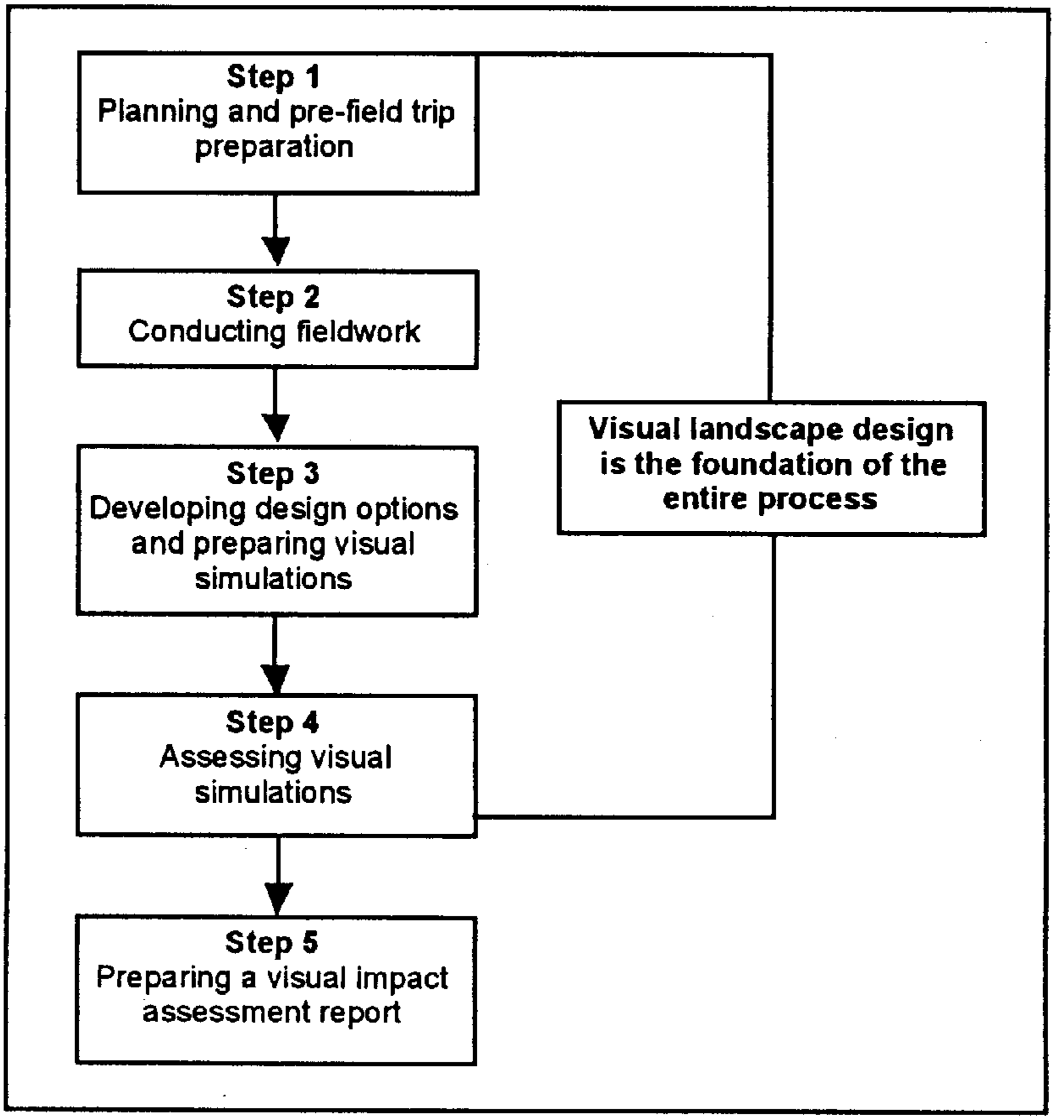


* A visual analysis could entail: (a) a field trip to view the site; (b) some airphoto interpretation work; (c) a visual simulation of proposed road; and/or (d) an evaluation of topographical sections to determine effects of cuts and fills.

Visual impact assessment procedures

Visual impact assessments estimate, in perspective view, the potential visual effect of proposed operations on the scenic landscape. These assessments are used to confirm whether visual quality objectives for these sites will be achieved. This section describes a five-step process for completing a visual impact assessment and identifies the various products that are required as part of the VIA report.

Figure 5 The five-step visual impact assessment process.



In practice, the VIA process may not be carried out in such a straightforward sequence of steps as shown in Figure 5. Many aspects of steps 1 and 2 may have already been completed in developing the forest development plan. In addition, a certain amount of interactive work may be required to develop visual design options and test, through visual simulations, their ability to meet visual quality objectives. Refer to the *Visual Landscape Design Training Manual* to assist in designing various options for proposed operations.

The following pages describe in more detail the typical procedures and sequence of events for each step of the visual impact assessment process.

Step 1: Planning and pre-field trip preparation

The purpose of this step is to gather and transfer onto maps all of the information that is known prior to carrying out the fieldwork. It is also a good time to contact district staff to discuss any assessment uncertainties and confirm viewpoint selection.

- Consult the visual landscape database and mapping for the area of proposed operations. For each visual sensitivity unit where activities are proposed, record the attribute data (i.e., EVC [existing visual condition], VAC [visual absorption capability], VSC [visual sensitivity class or equivalent], and VQO [visual quality objective]) on the assessment summary form (Appendix 2).
- Contact the forest district office to discuss specific assessment requirements if a cutting system other than clearcutting or seed tree is proposed. Further information can be found in *Visual Impacts of Partial Cutting* (1997).
- Make a preliminary list of the locations from which the proposed operation may be visible (e.g., highway rest areas, recreation sites, and communities) and transfer them onto the map prepared for the assessment package. Complete the assessment from the viewpoint(s) that provide the best view of the land-form or unit on which the proposed operation is to occur. These viewpoints may or may not correspond to those shown on the visual landscape inventory map. Confirm the viewpoint(s) selection with the district office.
- Transfer information about the visual sensitivity unit boundary and existing landscape alterations, such as cutblocks and roads, to a 1:20 000 or larger- scale (e.g., 1:10 000 or 1:5000) topographic base map. This information will help to position and sketch the proposed operation on perspective photographic overlays. Identify the location of the proposed operation on the topographic base map.

Step 2: Conducting fieldwork

The purpose of the fieldwork is to gain an on-the-ground familiarity with the planning area from a visual perspective, to locate the pre-selected viewpoints, and to gather data. This step is also necessary to confirm whether these pre-selected viewpoints require updating on the basis of the actual viewing conditions.

- Conduct the assessment using the means of travel most often used by the average forest visitor or traveller (e.g., vehicle on roads, boat on water, or on foot).
- Locate the viewpoints identified in the office and select the one(s) that provides the best view of the proposed operation being assessed. Identify and number these viewpoints on the topographic base map (1:20 000 scale or larger). Familiarize yourself with the landscape and the proposed operation by travelling throughout the study area as much as possible, taking note of special features, road stops, viewpoints, traffic pull-offs, and traffic conditions.
- At each viewpoint:
    - Take a photograph, or a set of overlapping photographs, of the landscape to capture the entire landform where the operation is proposed. By off-setting the photo point by a few metres, a second shot of the same scene can provide a stereographic pair which, when viewed through a stereoscope, will provide a three-dimensional image that can be useful for landform analysis. Refer to Appendix 3 for photography and presentation criteria.

- Complete the photography data section of the visual impact assessment summary form in Appendix 2.
- Estimate the visible portion of the proposed operation on the topographic base map.
- Back at the office, splice photographs together and label them (see Appendix 3).
- Estimate and transpose the visible area of the proposed cutblock/road to the spliced photographs using the natural and human-made landmarks or features.

Step 3: Developing design options and preparing visual simulations

- Complete a visual force analysis on the sketch, photograph overlay, or digital terrain model (perspective view) and on the topographic base map (plan view). Refer to Appendix 4 for more in-depth information about this technique.
- Complete a land feature analysis on a photograph and on the topographic base map (plan view). Refer to Appendix 4 for more in-depth information about this technique.
- Using the results of the visual force and land feature analyses, develop one or more design options in perspective view exhibiting elements of good visual design. Development of more than one design option for each proposed operation may make the design and assessment process more efficient and cost-effective. Refer to the *Visual Landscape Design Training Manual* for more in-depth information about design techniques.
- Select the most appropriate technique (e.g. sketch, photographic manipulation, or computer model [see Appendix 5 for information about digital terrain models]) and prepare a visual simulation for each design option. This simulation will demonstrate what the proposed operation will look like from each of the viewpoints. Not every visual simulation technique is required for every assessment report (see Appendix 6 to choose an appropriate simulation technique). If any doubt exists as to the technique necessary for a given situation, consult the forest district office.
- In cases where hand simulations are produced, complete sight lines from major viewpoints to confirm how much of the proposed operation will be visible. Appendix 7 outlines procedures for plotting and presenting sight lines.
- Using the sight lines and field information, indicate on a 1:5000 or smaller- scale (e.g., 1:10 000, 1:20 000) topographic map that portion of the opening that would become visible following operations.

Step 4: Assessing visual simulations

The purpose of this step is to evaluate whether a proposed operation will achieve the established visual quality objective.

The evaluation is conducted at all important viewpoints. In addition, the existing non-visually effective green-up alterations within, and immediately adjacent to, the unit must be considered in this evaluation. Three variables are used to assess the visual simulation(s).

1. **Basic VQO definition:** Does a proposed operation meet the basic visual quality objective definition?

2. **Visual design:** Does a proposed operation exhibit elements of good visual design?
3. **Numerical assessment**: In perspective view, what proportions of the landform or unit are represented by existing non-visually effective green-up alterations and a proposed operation? What percent volume or stems will be left in the block? What level of site disturbance will be present?

In order to receive approval, it is imperative that all existing and proposed operations meet the basic VQO definition and exhibit elements of good visual design. The numerical assessment should be used only as a yardstick to help determine into which class the cumulative alterations on a landscape fall.

More detailed information about each of these variables is presented in the following subsections.

1. Visual quality objective definition

This is a measure of the ability of proposed operations, in combination with non-visually effective green-up alterations, to achieve the basic VQO definition. Table 1 presents an outline of these definitions.

Table 1 Visual quality objectives: five levels of landscape alteration

Preservation	(P)	No visible activities
Retention	(R)	Activities are not visually evident
Partial Retention	(PR)	Activities are visible, but remain subordinate
Modification	(M)	Activities are visually dominant, but have characteristics that appear natural
Maximum Modification	(MM)	Activities are dominant and out of scale, but appear natural in the background

The assessment summary form in Appendix 2 outlines a process to evaluate and report on whether proposed operations will meet the visual quality objectives. This summarization will become an integral part of the assessment report.

2. Visual design of proposed operations

This is the measure of the ability of proposed operations to achieve the visual design concepts and principles as set out in the *Visual Landscape Design Training Manual*. Answering the following questions will help to guide the assessment.

- Have the major visual force lines been identified and used to develop the size and shape of the proposed operation?
- Has the proposed operation borrowed from the natural character of the landscape?
- Have edge treatments been incorporated into the design of the proposed operation (feathered edges, irregular cutblock design, etc.)?
- Have "islands," or patches of trees, been maintained to mitigate visual impacts and meet other resource management objectives?

- Have enough stems been left in the proposed partial cutblock to meet the established visual quality objective?

Key visual design concepts and principles

Incorporating the following important design concepts and principles into the planning of landscape- and stand-level forest development proposals will lead to better visual design. Refer to the *Visual Landscape Design Training Manual* for visual representations and more in-depth explanations of the principles presented below. The manual also provides additional concepts and principles.

Landscape-level cutblock design The following guidelines provide some clues for designing cutblocks at the landscape level based on internationally recognized design concepts and principles.

- Start in the less sensitive hollows and work up the hillside, when designing the first harvesting pass on a landscape.
- Locate larger openings on lower slopes and decrease the size of openings as the slope increases.
- Ensure that opening boundaries follow visual force lines by extending up hollows and descending down ridge lines.
- Design the shape of harvest units to reflect the quality of those shapes found in the natural landscape (i.e., rounded curvilinear shapes in rounded landforms; spiky jagged shapes in more rugged terrain).
- Use the visual cues presented by the landform, vegetation (timber types), and natural openings to determine the type of shape that is most appropriate for the particular landscape.
- Make sure that the general shape, scale, and position of the proposed operations fit the landscape. Organic shapes are generally more compatible with the natural landscape than geometric shapes.
- Design proposed operations with future passes or entries in mind to ensure that both visual quality objectives and wood removal can be maintained over the long term.
- Use curved lines rather than horizontal and vertical lines.
- Avoid jagged edges, right angles, and straight lines when designing opening boundaries. Where necessary use diagonal lines.
- Vary opening sizes and spacing between openings to achieve irregular appearance.
- Vary the texture on the landscape by introducing small cutblocks or by using partial cutting techniques.
- Protect *Genius Loci,* or the spirit of place.
- Make use of interlocking shapes like pieces of a jigsaw puzzle to improve the blending of proposed operations into the surrounding forest.
- Reduce contrasts in colour and shape of proposed operations to minimize their visual impact on the landscape.
- Design asymmetric cutblock shapes rather than symmetric ones (i.e., a large cutblock and a small one are better than two blocks of equal size and shape for a given landscape).
- Avoid creating notches or abrupt changes in tree canopy for openings proposed along skylines and ridge lines. If openings must cross a skyline, then they should cross in saddles or on breaks in ridge lines.
- Distribute openings between visible and non-visible areas, and between steeper and gentler slopes within visual sensitivity units.

- Use Table 2 as a broad guide for judging appropriate opening sizes in the landscape.

Table 2 A guide to determine appropriate opening size in perspective view at the landscape level

Factor	Appropriate opening size
	Smaller <--> Larger
VQO	Preservation ------------------------------------Maximum modification
Viewing distance	Foreground --------------- Middle ground ----------------- Background
Landform scale	Small, continuous -- Large, broken
Slope	Steep -- Gentle
Viewing angle	Direct, focal -- Oblique
Natural openings	Small, discontinuous, or none ------------------------- Large, connected
Vegetation patterns	Subtle, distinct --- Large, mixed
Non-timber values	High -- Low

Stand-level cutblock design The following guidelines provide some clues for designing cutblocks at the stand level based on internationally recognized design concepts and principles. More information on these and additional concepts and principles can be found in the *Visual Landscape Design Training Manual*.

- Feather clearcut opening edges to reduce the sharp contrasting line between opening boundary and forest edge.
- Leave healthy, undamaged conifer and deciduous trees standing in well-designed clumps or in sufficient densities to break up an opening, reduce its apparent size, and avoid blowdown.
- Remove damaged, leaning, or poor-quality, residual trees in foreground views to avoid a scruffy appearance.
- Avoid leaving individual trees standing on ridge lines when these trees are viewed against the sky.

Road design The following guidelines provide some clues for designing roads on the landscape based on internationally recognized design concepts and principles. More information on these and additional concepts and principles can be found in the *Visual Landscape Design Training Manual*.

- Design road lines to curve gently and blend with the landform by climbing in hollows and dropping on ridge lines.
- Design road locations to make as much use of landform as possible and take advantage of non-visible areas, benches, and vegetative screening wherever possible to reduce visual effects.

- Align roads diagonally to slopes in those situations where mid-slope roads cannot be avoided; vary alignment in response to landform.
- Reduce the visual effects where roads cross skylines by locating them in hollows.
- Curve road lines gently to blend with natural landforms, dropping on convex slopes and rising in hollows.
- Locate roads away from skylines.
- Locate switchback roads on benches or in hollows, where possible, to minimize road cuts.
- Avoid locating roads that follow the viewers' line of sight on gentle foreground slopes; roads should curve away or cross at another angle.
- Reduce the size of cut-and-fill slopes to decrease contrast between a road and the landscape.
- Use techniques such as end-hauling and controlled blasting to mitigate the visual effects of road construction on steep, visually sensitive slopes.
- Hydro-seed exposed mineral soil created by road construction or modification to reduce visual impacts.

3. Numerical assessment

The numerical assessment provides a measure of the ability of a proposed operation to achieve the numerical standards that predict a VQO. Percent alteration is used to assess the impact of clearcutting, volume or number of stems removed is used to assess partial cutting, and the level of site disturbance within a cutblock is used to assess the impact of roads.

Clearcutting: Percent alteration

Percent landform (unit) alteration is a reasonable predictor of achieved visual condition. To achieve a specific visual quality objective, this measure should fall within the ranges presented in Table 3 for those units harvested using a clear-cutting or seed-tree system. Factors that can influence the appropriate position within each alteration range include: visual absorption capability, slope, viewer position, viewing distance, quality of design, and number of residual trees.

If the other two variables are dealt with satisfactorily, an acceptable rationale can be submitted to support alterations beyond this range. Larger cutblocks may be accepted and approved if appropriate design principles and techniques are employed and these cutblocks meet the basic definition for the visual quality objective.

The following describes the general steps for making a numerical assessment of a clearcut. Refer to Appendix 8 for a more detailed account of the calculation procedures for percent alteration.

Use a planimeter or computer digitizer to measure (in perspective view) the visible landform unit that contains the proposed clearcut or seed-tree operation and to determine the size and scale of the operation itself. Include all previous operations that have not yet achieved visually effective green-up.

- Use the visual simulation product produced (i.e., sketch, photographic overlay, digital terrain model, or digital photo retouch) to perform the calculation. Do not use dot grids as these produce extremely unreliable results.
- Calculate, with this information, the percentage of the visible area being altered and compare this with the percentages of alteration allowed by the visual quality objective in the Table 3.

Perform this calculation for each of the viewpoints selected for design and simulation and enter the results on the assessment form (Appendix 2).

Table 3 Predicting visual quality **objectives** based on percent alteration only (for clearcut and seed-tree silvicultural systems). Shaded areas indicate the most probable range for predictions based on percent alteration in perspective view only.

Visual quality objective (VQO)	Percent alteration per VQO	Percent of visual landscape or landform permitted to be in non-vegetated state[a]
		0------------10--------------------20 ----------------------30
Preservation	0	
Retention	0–1.5	
Partial Retention	1.6–7.0	
Modification	7.1–18.0	
Maximum Modification	18.1–30.0	

[a] These percentages apply to the visible green portion of the landscape in perspective view. Rock and ice patches are excluded from the calculation.

Partial cutting: Volume or stems removed

Partial-cutting silvicultural systems must also be designed and carried out to meet established visual quality objectives. Partial-cutting systems always result in the retention of some volume or basal area on a cutblock. The net result is a change in the forest canopy texture. On cutblocks where a very low volume or basal area is removed, the change in texture is minimal. On cutblocks with a high level of removal, the texture becomes coarser. In situations where the removal rate is such that the ground becomes readily visible (e.g., seed-tree operations), the public no longer see a partial cut; they perceive a clearcut with only a few trees left.

Table 4 shows the likelihood of achieving a VQO for various combinations of volume or stems removed by tree height. Within the 10–40 m tree height range, a 90% confidence of achieving the VQO is shown. For example, if 50% of the volume is removed for a tree height of 30 m, Table 4 shows that 90% of the time you will achieve partial retention. In some circumstances, the number of stems or volumes proposed for removal will fall outside of the data presented in this table, but will still achieve the visual quality objective.

Table 4 Predicting visual quality objectives using even-distribution, leave-tree, partial-cutting silvicultural systems[a].

Column values across top = mean height (m) of residual trees.

Row values down left = volume (stems) removed (%).

	5	10	15	20	25	30	35	40	45	50
10	R[b]	R	R	R	R	R	R	R	PR	PR
20	R	R	R	R	R	R	PR	PR	PR	PR
30	R	R	R	R	PR	PR	PR	PR	PR	PR
40	R	R	PR	PR	PR	PR	PR	PR	PR	M
50	PR	PR	PR	PR	PR	PR	PR	M	M	M
60	PR	PR	PR	PR	PR	M	M	M	M	M
70	PR	PR	PR	M	M	M	M	M	M	M
80	PR	PR	M	M	M	M	M	M	M	M
90	M	M	M	M	M	M	M	M	M	M

[a] To use this table: First determine what percent of the stand you wish to remove, either in volume or by stems, along

Y-axis. Then determine the mean tree height of your stand along X-axis. Follow volume (Y) axis across and the tree height (X) down; their intersection point will yield the VQO you will most likely achieve.

[b] R = retention; PR = partial retention; M = modification. See Table 1 for definitions of visual quality objectives.

Table 4 is based on the assumption that each stem proportionately contributes an equal volume to the stand. The data presented here were derived from forest stands with the following characteristics:

- slope: 3–47%;
- dbh: 17.5–86.3 cm;
- tree height: 11–39 m;
- pre-harvest volume: 70–844 m^3/ha;
- pre-harvest basal area: 21–68 m^2 per ha; and
- pre-harvest stems: 136–1150 per ha.

Note: Use caution when extrapolating beyond these parameters.

Table 6 in the report *Visual Impacts of Partial Cutting* provides a much more detailed breakdown on both volume and stems removed. In addition, the report provides some guidance (see its Table 5) on use of basal area for achieving visual quality objectives. As long as a sufficient number and distribution of overstorey trees are retained to meet the visual quality objective, no maximum opening size is specified for partial-cut areas.

Observing the following guidelines will help to achieve the visual quality objective.

- Leave more volume and stems as the size of a partial-cut area increases.
- Leave more stems or volume as the slope increases.
- Leave more stems or volume in foreground views.
- Leave more stems or volume as visual absorption capability decreases.
- Maintain the integrity of ridge lines; ensure that an adequate number of stems, basal area, and volume are left on ridges to avoid a ragged appearance.
- Leave more volume and stems where windthrow is a problem.
- Design partial cuts so that a natural-appearing boundary remains. This is particularly important for even-aged stands, for openings that lie in snowbelt areas, and for areas where a high percentage of overstorey trees has been removed.
- Use low ground pressure, cable or aerial yarding systems on steep visible slopes.

Note: Observer position (i.e., above, level, or below the unit being viewed) can influence the number of stems or volume that must be left.

Appendix 9 contains a set of photo sheets that provide visual resource management practitioners with examples of the range of impacts acceptable for and within each visual quality class/objective category.

Roads and other site disturbances

Roads and other site disturbances can create some of the most severe and longest-lasting visual impacts on the landscape, unless carefully designed, constructed, and maintained.

Guidelines for designing roads on the landscape are presented earlier in this guidebook (see Step 4: "Visual Design of Proposed Operations" in the "Visual Impact Assessment Procedures" section). Table 5 identifies the amount of site disturbance found to be socially acceptable within a cutblock.

Table 5 Acceptable amount of visible roads and other site disturbances within a cutblock by visual quality objective

VQO	Amount of visible roads and other site disturbances[a]
Preservation	• No visible roads or other site disturbances.
Retention	• Roads or other site disturbances, if visible, will be difficult to perceive.
Partial Retention	• Roads and other site disturbances may be visible, but will not dominate. • The visible impact should have disappeared by the time visually effective green-up is achieved. • In instances where logging activities have created site disturbance within a cutblock, the total area of visible site disturbance should be less than 5% of the logged opening.
Modification	• Roads and other site disturbance will be visible and may initially dominate. • The visible impact should have disappeared by the time visually effective

	green-up is achieved. • Where logging activities have created site disturbance within a cutblock, the total area of visible site disturbance should be less than 10% of the logged opening.
Maximum Modification	• Roads and other site disturbance may dominate. • The visible impact may not have disappeared by the time visually effective green-up is achieved. • Where logging activities have created site disturbance within a cutblock, the total area of visible site disturbance should be less than 20% of the logged opening.

[a] The allowable percent disturbance figures presented here are based on very preliminary research done in this subject area. These data will be refined with public perception research in the near future.

Important considerations related to Table 5:

- A cutblock that meets a visual quality objective from a definition and design standpoint could create a visual impact beyond the target VQO because of excessive roads and other visible disturbances.
- Factors that may affect visually acceptable levels of site disturbance include:
  - depth of disturbance in the ground,
  - composition of subsurface material,
  - soil colour, and
  - susceptibility to erosion or mass wasting.
- For scenic areas without VQOs, consideration is required to minimize the contrast created by roads and site disturbance.

Step 5: Preparing a visual impact assessment report

A recommended visual impact assessment report format and content is described below. Following this format will ensure consistency and may accelerate the review and approval process where the district manager has requested to see an assessment or the assessment is to be presented publicly. The assessment report or package should be self-contained and must be completed before the silviculture prescription is approved or before a road layout and design is submitted for approval. Where districts have standard operating procedures for visual resource management, district managers may wish to provide specific direction as to their requirements.

While there are many factors influencing the type and amount of information needed in a visual impact assessment report, the following basic information is considered essential to any report.

Basic content

1. Topographic map (1:50 000 or larger scale) showing:

- Visual sensitivity unit boundaries from visual landscape inventory.
- Visual sensitivity class (old VSR), visual absorption capability, existing visual condition, and established visual quality objective ratings for each unit.
- Viewpoint / photo point locations and number.
- Visible areas as seen from viewpoints.
- Existing blocks and roads in and around the area proposed for development and the year logged.
- Proposed blocks and roads and year to be harvested.

2. Pre-operations colour photograph(s) from important viewpoints (minimum size: 4 x 6").
3. Visual simulation product (sketch, photo, digital terrain model, or hybrid) showing proposed operations.
4. Completed visual impact assessment summary form (Appendix 2).

Note: The form has enough space for four viewpoints only. If an assessment involves more than four viewpoints, use additional copies of this summary form to capture all data.

Additional content

Depending on the visual sensitivity class, visual quality objective, number of viewpoints, complexity of the proposed operations, and/or silvicultural system proposed, additional supporting information may be required to accompany the assessment report (see Table 6).

Table 6 Additional supporting materials for visual impact assessment reports

Content	When required
Sight-line plots from key viewpoints and map showing viewpoint locations and lines of sight (1:20 000 scale or larger) to confirm visibility and visual impact.	In support of manual simulations, such as sketches, annotated (touched-up) photographs, or acetate overlay on photographs.
Digital terrain model presentation criteria as per Appendix 5.	When computer simulation used.
Visual force analysis on topographic map and photograph overlay.	For all areas with a medium or high VSR or areas with a VSC of 1,2 or 3. Usually not required for partial-cut systems with at least 50% of the basal area remaining.
Digitally retouched photographs.	Areas with high public concern and expectations and where public presentations are required.

References

Alberta Forestry, Lands and Wildlife Service, 1986. Forest Landscape Management Strategies for Alberta. Alberta Information Centre.

B.C. Ministry of Forests, 1981. Forest Landscape Handbook. Information Services Branch.

B.C. Ministry of Forests, 1994. A First Look at Visually Effective Green-up in British Columbia: A Public Perception Study. Recreation Branch.

B.C. Ministry of Forests, 1994. Visual Landscape Design Training Manual. Recreation Branch.

B.C. Ministry of Forests, 1995. Forest Road Engineering Guidebook. Resource Tenures and Engineering Branch.

B.C. Ministry of Forests, 1995. Visual Impact Assessment Guidebook. Recreation Branch.

B.C. Ministry of Forests, 1997. Visual Impacts of Partial Cutting. Forest Practices Branch.

B.C. Ministry of Forests, 1999. Scenic Area Management Guidelines. Prince George Forest Region.

B.C. Ministry of Forests, 2000. Silviculture Prescription Guidebook. Forest Practices Branch.

Canadian Forest Service and B.C. Ministry of Forests, 1996. Clear Cutting and Visual Quality: A Public Perception Study. Range, Recreation and Forest Practices Branch.

Enterprise, Scotland, 1992. Guidelines for Graphic Presentation of Forest Design Plans. Environment Section.

Jarvis, Karen. 1994. An Introduction to Graphic Communication for Visual Landscape Forestry. B.C. Ministry of Forests, Recreation Branch.

Lucas, Oliver W. 1991. Design of Forest Landscapes. British Forestry Commission, Oxford University Press, New York.

Glossary

Digital terrain models (DTMs) — are three-dimensional topographic models or simulations created by a computer using digital data such as TRIM.

Existing visual condition — is a component of the visual landscape inventory that represents the level of human-made landscape alteration caused by resource development activities in a visual sensitivity unit; expressed as visual quality classes.

Forest development plan — is a document that describes and illustrates how harvesting and road development for a specific area will be managed.

Genius loci — is the intangible quality or characteristic of a landscape that makes it unique and different from any other. It is a combination of elements in the landscape that evoke one's emotions (also called "spirit of place").

Recommended visual quality class — is a specialist's recommendation describing the level of alteration that would be appropriate for a visual sensitivity unit; this recommendation considers visual and other resource values.

Road layout and design — specifies the proposed centre-line location of a forest road and its drainage structures, together with the necessary design of the components of the road package; it is consistent with an approved forest development plan and contains information required by the Forest Road Regulation.

Road permit — gives a person the right to construct or modify a road on Crown land to access Crown timber that the person has a right to harvest (e.g., under a forest licence); if Crown timber must be harvested to construct or modify the road, the road permit may also grant the person the right to harvest the timber.

Scenic area — is any visually sensitive area or scenic landscape identified through a visual landscape inventory or planning process carried out or approved by the district manager.

Silviculture prescription — is a plan required under the operational planning regulation that states management objectives and specifies the standards for reforestation and site protection for the area to be harvested.

Visual absorption capability — is a component of the visual landscape inventory that rates the relative capacity of a landscape to absorb visual alterations and still maintain its visual integrity.

Visual force — is an illusion or sensation of movement created by a static image, object, or position of a number of elements in the landscape.

Visual force analysis — is an analysis of landform structure to identify primary, secondary, and tertiary ridge lines and hollows in the landscape for use in visual landscape design.

Visual impact assessment — is an assessment required under the Operational Planning Regulation or Forest Road Regulation that is carried out to demonstrate that timber harvesting operations or road work are consistent with the established visual quality objective for a scenic area. A visual impact assessment simulates, in perspective view, the visual effects on the landscape of proposed timber harvesting operations and road construction or modification operations.

Visual landscape inventory — is the identification, classification, and recording of the location and quality of visual resources; these non-forest resources may be problematic if not managed to the concepts, principles, and practices set out in the visual landscape management process.

Visual quality class (recommended) — is a specialist's recommendation describing the level of alteration that would be appropriate for a visual sensitivity unit; this recommendation considers visual and other values.

Visual quality objective — is a resource management objective established by the district manager or contained in a higher-level plan; these objectives reflect the desired level of visual quality based on the physical characteristics and social concern for the area.

Visual resource management — is a planning and management process for visual values and resources.

Visual sensitivity class — is a component of the visual landscape inventory that rates the sensitivity of the landscape to visual alteration based on biophysical characteristics, as well as viewing and viewer-related factors.

Visual sensitivity rating — is a component of the visual landscape inventory that estimates the sensitivity of the landscape based on biophysical characteristics and viewing factors; this was replaced by visual sensitivity class in 1997.

Visual sensitivity unit — is a distinct topographical unit as viewed from one or more viewpoints; its delineation is based on the homogeneity of the landform and of biophysical elements.

Visually effective green-up — is the stage at which regeneration on a cutblock is perceived by the public as a newly established forest; forest cover on the cutblock should be of sufficient height to block stumps, logging debris, and bare ground from view; once achieved, an adjacent stand of timber is available for harvest.

Appendix 1: Visual resource management concepts and principles

The purpose of this appendix is to explain, in general terms, how visual resources are managed by the Ministry of Forests in British Columbia.

The *Recreation Manual* and *Forest Landscape Handbook* provided guidance on visual resource management in the context of integrated resource management (IRM). However, the introduction of the Forest Practices Code in 1995 has seen changes made to many of those procedures and standards. This appendix summarizes the state of the art in the visual resource management approaches, procedures, techniques, and practices that are currently being developed or carried out in British Columbia to manage visual resources and maintain timber supply. For ease of use and understanding, these concepts and practices are presented using standard planning steps and terminology. When available, additional information or explanation is referenced for your convenience.

Step I: Inventory

- Visual landscape inventory is used to delineate, classify, and record areas in the province that are considered to be visually sensitive. This information is intended to assist land-use planners and resource managers in deciding appropriate land uses, resource development objectives, and management prescriptions.
- New visual landscape inventory standards and procedures were approved by the Director of the Forest Practices Branch in June 1997 and endorsed by the Resource Inventory Committee. These new standards incorporate a more systematic and comprehensive methodology, and all new inventories should be carried out to these standards to ensure consistency of application across the province (see the *Visual Landscape Inventory Procedures and Standards Manual*).
- All existing inventories will eventually be converted to the new inventory standards to remove the old recommended and approved visual quality objectives (VQOs) from the map label. This will eliminate the confusion with VQOs established under the *Forest Practices Code Act*.
- Twenty percent of a district’s visual landscape inventory should be updated each year. This will ensure that the inventory is brought up to date in 5 year’s time. It also rationalizes existing inventories, fills gaps, and improves the reliability and consistency of the inventory.

Step II: Planning

- Where strategic land-use planning is initiated or under way, Ministry of Forests visual landscape inventory mapping or Ministry of Small Business, Tourism and Culture tourism capability mapping can provide the necessary information to identify the location of sensitive landscapes and known scenic areas, as well as provide management direction.
- Where landscape unit planning is initiated or under way, scenic areas may be identified and made known and VQOs may be established through this planning process.
- In the absence of higher-level plans, or for higher-level plans not specifically addressing the management of scenic areas and visual quality, district managers can use their own statutory

authority to identify and make scenic areas known, and establish VQOs. (See *Forest Practices Code Bulletin* 16a for information on this subject.)

Step III: Analysis

- During the development of the new visual landscape inventory standards described above, recommended visual quality objectives (RVQOs) were removed from the inventory in order to keep the visual landscape inventory and analysis functions separate. Interim directions for carrying out visual landscape analyses are presented in a Forest Practices Branch memo dated August 25, 1997. Recommended visual quality classes (RVQCs) now replace the RVQOs of old. These classes are a specialist's recommendation describing the level of alteration that would be appropriate for a visual sensitivity unit.

Uses of RVQs include:

- input to planning processes;
- input to Timber Supply Reviews (TSRs) (where the RVQC reflects current management practice); and
- operational guidance for managing visual resources in lieu of established VQOs.

Recommended visual quality classes are recorded as administrative attributes on the inventory file, but do not appear on visual landscape inventory maps.

- In those circumstances where a district manager or those involved in a planning process choose to establish VQOs within scenic areas, the effects on timber supply should be assessed or the results of already completed TSRs or timber supply analyses should be used.
- In circumstances where strategic land-use plans develop visual quality objectives, the results should be modelled in TSRs.
- Where timber supply analyses are undertaken, it is imperative that what is modelled as current management in TSRs reflects visual resource management as it is practiced on the ground within the Timber Supply Area (TSA) (i.e., do not model inventory data for an entire district if VQOs have just been established and are being managed on 30% of the inventoried area).
  (See *Procedures for Factoring Recreation and Visual Resources into Timber Supply Analyses*.)
- With the adoption of the Forest Practices Code and subsequent timber supply analyses, it was found that some TSAs exhibit a short-term timber supply problem related to integrated resource management. It may be possible to make up some of this shortfall by managing visual resources differently. (See *Framework for Managing Visual Resources to Mitigate Impacts on Timber Supply*.)

Step IV: Implementation of Forest Practices

- In areas where an approved government strategic land-use plan (e.g., regional plan or LRMP) or a higher-level plan is in place, these should be examined for direction on managing visual resources (e.g., such a plan may identify known scenic areas, in which case the district manager must ensure that the resource is adequately managed and conserved).

- In areas where VQOs have been established through higher-level plans or by the district manager, the *Visual Landscape Design Training Manual* provides design strategies for minimizing the effects of various forest practices on visual quality and the *Visual Impact Assessment Guidebook* provides the standards that must be achieved and recommended procedures for assessing whether the visual impact of proposed practices will meet the established VQOs.
- When harvesting is proposed in a scenic area, or in a scenic area with established VQOs, it is important that TSR modelling reflects on-the-ground management practices. This will ensure an adequate and timely timber supply contribution from these visually sensitive areas.
- Visual landscape design, as described in the *Visual Landscape Design Training Manual*, is an effective tool to evaluate whether or not measures specified to protect the scenic resource (as required by Section 10(1)(c)(ii) of the *Forest Practices Code Act*) are adequate to manage and conserve the resource.
- Integrated visual design is an effective tool for addressing multiple resource objectives (e.g., biodiversity, riparian management, and visual quality for a given area). (See Chapter 6 of the *Visual Landscape Design Training Manual*.)
- Where it is necessary to increase wood supply from scenic areas, two strategies are available. One or both may be implemented.
    1. Increase wood supply without relaxing visual quality classes by:
        - improving visual landscape design;
        - encouraging alternative silvicultural systems;
        - using lower visually effective green-up tree heights; and
        - identifying visual rehabilitation opportunities not requiring changes to VQCs.
    2. Modify management practices to increase wood supply by:
        - reassessing visual quality classes;
        - using minimum visually effective green-up tree heights; and
        - identifying visual rehabilitation opportunities that may require changes to VQCs.

Visual quality objectives that have been established by higher-level plans cannot be relaxed using district manager authority. (See *Framework for Managing Visual Resources to Mitigate Impacts on Timber Supply*.)

Monitoring

- Effectiveness audits are used to determine if Code provisions, including regulations, policy, and guidebooks, are effective; they provide the necessary information to manage the visual resource. Forest Practices Branch will work with regions and districts to schedule effectiveness audits on visual resource management.
- Compliance and enforcement inspections are used to determine whether on-the-ground operations achieved the objectives approved in the FDP. Visual resource management should be incorporated in the ongoing monitoring and inspection of forest practices.

Training

- Training of Ministry and industry personnel is an ongoing necessity to ensure consistent application of Code provisions, and for undertaking inventory, analysis, planning, and design procedures relating to the visual resource. Key areas requiring training include: new visual resource management policies, visual landscape design, visual impact assessments, and visual landscape inventory.

Appendix 2: Visual Impact Assessment Summary Form

(To be completed for each individual cutblock or road proposed)

Licensee Name:_______________________________	Licence Number:_________________________________
CP# or RP#:_________________________________	Block No.:______________________________________
Proposed Year of Harvest:______________________	Proposed Silviculture System:______________________
Type of Proposed Operation:____________________	Net Block Size excl. WTPs (ha):__________________

Visual Resource Management LABEL (old)	VLU#:		VSR:		VAC:		EVC:		EVQO:	
Visual Resource Management LABEL (new)	VSU#:		VSC:		VAC:		EVC:		EVQO:	

Date Visual Landscape Inventory Completed:__________	DOES EVC EXCEED ESTABLISHED VQO?	Yes ___	No ___

VIEWPOINTS & PHOTOGRAPH INFORMATION

Number and name of viewpoints from which the proposal is visible and photos are taken	VPT #___ ________	VPT #___ ________	VPT #___ ________	VPT #___ _______
Viewpoint importance (Major/Minor/Potential)				

Viewpoint coordinates (Lat./Long. or UTM inc. elevation (m))				
Viewing distance (Foreground/Middleground/Background)				
Viewing duration (High/Moderate/Low) This factor is important when deciding the VQO achieved from all selected VPTs. (See Box 1)				
Focal length of camera lens (mm)				
Direction of view (degrees)				

1. ASSESSING BASIC VQO DEFINITION

Describe the level of impact that the proposed alteration, in combination with any existing non-VEG alterations, will have on the landscape from each viewpoint, using one of the following terms:***Not visible, Not visually evident, Subordinate, Dominant, Out of scale***	**VPT** #___	VPT #___	VPT #___	VPT #___
Which basic VQO definition would the proposed alteration, in combination with any existing non-VEG alterations, meet from all the selected viewpoints and taking into account viewpoint importance, viewing distance and viewing duration? P ___ R ___ PR ___ M ___ MM ___				
If applicable, state reasons why the proposed alteration(s) does not achieve the basic definition of the established VQO from any of the selected viewpoints. ____ ____				

2. ASSESSING VISUAL DESIGN

Have major lines of force been identified and used to develop the size and shape of the proposed operation? (If Yes, attach visual force analysis to this form.)	Yes ___ No ___
Has the proposed operation borrowed from the natural character of the landscape?	Yes ___ No ___
Have edge treatments been incorporated into the design of the proposed operation (feathered edges, irregular cutblock design, etc.)?	Yes ___ No ___
Have "islands," or patches of trees, been maintained to mitigate visual impacts and other resource management objectives?	Yes ___ No ___
Are there any existing human-made alterations visible in the unit that exhibit poor design? If **Yes**, describe design deficiencies below: ____	Yes ___ No ___
If applicable, list any additional design techniques used and/or state reasons why certain design	

techniques could not be employed. ____

3. ASSESSING NUMERICAL DATA

Complete either the clearcut or partial-cutting section below depending on the silviculture system used.

Percent Alteration Worksheet for Clearcutting

Use photograph or computer simulation output from each viewpoint for calculations. See Appendix 8 for example of calculation.	VPT #____	VPT #____	VPT #____	VPT #____

1. Total area of landform/VSU in perspective view as seen from each viewpoint (measured in cm^2)				

2. Visible ground area of *proposed*alteration(s) in perspective view as seen from each viewpoint (measured in cm^2)				

3. Visible ground area of all *existing*alterations in non-VEG state in perspective view as seen from each viewpoint (measured in cm^2)				

4. Total % alteration of the viewshed in perspective view as seen from each viewpoint [(#2+#3)¸#1]´100=#4				

Identify for each viewpoint which VQO will be achieved based on % alteration. See Table 3 in VIA Guidebook for % alteration guidelines.				

Which VQO would the proposed alteration, in combination with any existing non-VEG alterations, meet from all the selected viewpoints based on percent alteration only? P ___ R ___ PR ___ M ___ MM ___ or Other ____________________

Partial-cutting Evaluation

What percent volume or stems retention is proposed?	%Volume Remaining	% Stems Remaining

Which VQO would the proposed alteration, in combination with any existing non-VEG alterations, meet from all the selected viewpoints based on volume or stems remaining? See Table 4 in VIA Guidebook for partial-cutting guidelines. P ___ R ___ PR ___ M ___ MM ___

VIA SUMMARY

Does the proposal, in combination with any existing non-VEG alterations, achieve the basic definition for the established VQO?	Yes ___ No ___
Have visual design concepts and principles been incorporated into block/road design?	Yes ___ No ___
Does the proposal, in combination with any existing non-VEG alterations, fall within the numerical ranges for the established VQO?	Yes ___ No ___

Given the three criteria listed above, does the proposal meet the established VQO from all the selected viewpoint(s)?	Yes ___ No ___

Completed By: ______________________ Date Completed: _______________

NOTES:

1. It is strongly recommended that the district office be consulted before carrying out an assessment to confirm viewpoint locations and content recommendations.

2. Proposed alterations are assessed using three criteria (the first two being the most critical ones): (1) meeting basic definition and intent of VQO, (2) quality of design, and (3) scale of alteration.
3. Silvicultural systems leaving significant tree cover will be assessed using volume or stems remaining rather than by scale of alteration as outlined in *Visual Impacts of Partial Cutting* (1997).
4. Visual quality objectives must be achieved from all selected viewpoints.

ADDITIONAL CONSIDERATIONS

Has this visual impact assessment incorporated all known alterations proposed in the scenic area for the next 5 years (i.e., all operations proposed by the same or different licensees)? [In scenic areas where operating areas are shared among licensees, there should be co-ordination between licensees in preparing VIAs (i.e., existing and proposed cutblocks/roads, if visible from the same viewpoints, must be shown for all licensees). Potential benefits are that one VIA may satisfy the requirements of several licensees, and/or digital data may be shared between licensees when preparing the VIAs.] **Yes ___ No ___** Comments: ____ ____ ____ ____

Appendix 3: Photography & photograph presentation criteria in perspective view

Taking photographs

- Take photographs that provide the best view of the proposed operation.
- Take photographs on clear days and with sun behind or perpendicular to you for best detail rendering.
- Use a 50 or 55 mm lens to maintain the same proportions on photographs as the ones seen in the field. Avoid wide-angle or telephoto lens. A wide-angle lens (e.g., 28 or 35 mm) provides a wider angle of vision, but "pushes" landforms away from the viewer; a telephoto lens (e.g., 200 mm) "pulls" landforms closer to the viewer.
- Take enough photographs to capture entire landforms on file (i.e., panoramic shots), even if no proposals are planned for adjacent landforms. Once juxtaposed and mounted, these photomontages provide the visual context necessary to assess the overall visual impact of specific proposals.
- Mark photo locations(s) on map (i.e., identify photo point on the topographic map to within 50 m on road or water).
- If producing visual simulations on a computer, use a Global Positioning System (GPS) to more accurately determine the x, y, and z UTM co-ordinates of each viewpoint. Use the same co-ordinates to produce models for comparison to the photographs taken from the same viewpoints. Also record the horizontal view direction (using a compass) and vertical angle of view (using a clinometer) for each photograph or set of photographs for panoramic views.

- Produce a stereographic pair by offsetting the viewpoint; an approximate offset of 100 m per km of distance from the target provides an easy-to-view, three-dimensional image. Several offsets may be necessary to produce the desired image.

Presenting photographs

- Minimum print size for presentation is 4 x 6 inches, preferably 5 x 7 inches or larger. A large print size helps to overcome the illusion of compression created by small print sizes and is easier to work with.
- Splice together overlapping photographs to present broad panoramas.
- If the photomontages will be used for public meetings or for displays, mount them on a rigid backing such as foam core boards.

For each individual photograph or set of photographs making up a panorama, print on the backing material the photo location (e.g., "Viewpoint #1 or name"), the date photographs were taken, and the lens used (e.g., 50 mm). Photocopy the relevant portion of the topographic map to show the photo point, direction of view, and the immediate landforms seen; cut and paste this adjacent to the photographs for easy reference.

Appendix 4: Completing visual force and land feature analyses

The purpose of this appendix is to explain how visual force and land feature analyses are carried out (see the *Visual Landscape Design Training Manual*, 1994).

Visual force analysis

The visual force concept is based on the premise that, as we observe the landscape, our eyes are drawn up hollows and down ridge lines. Learning how to map this concept is critical to developing cutblock designs that better fit the natural landscape. Lines of force are mapped in plan and perspective view using different colours and weights of arrows: red arrows are drawn down ridges and green arrows up hollows.

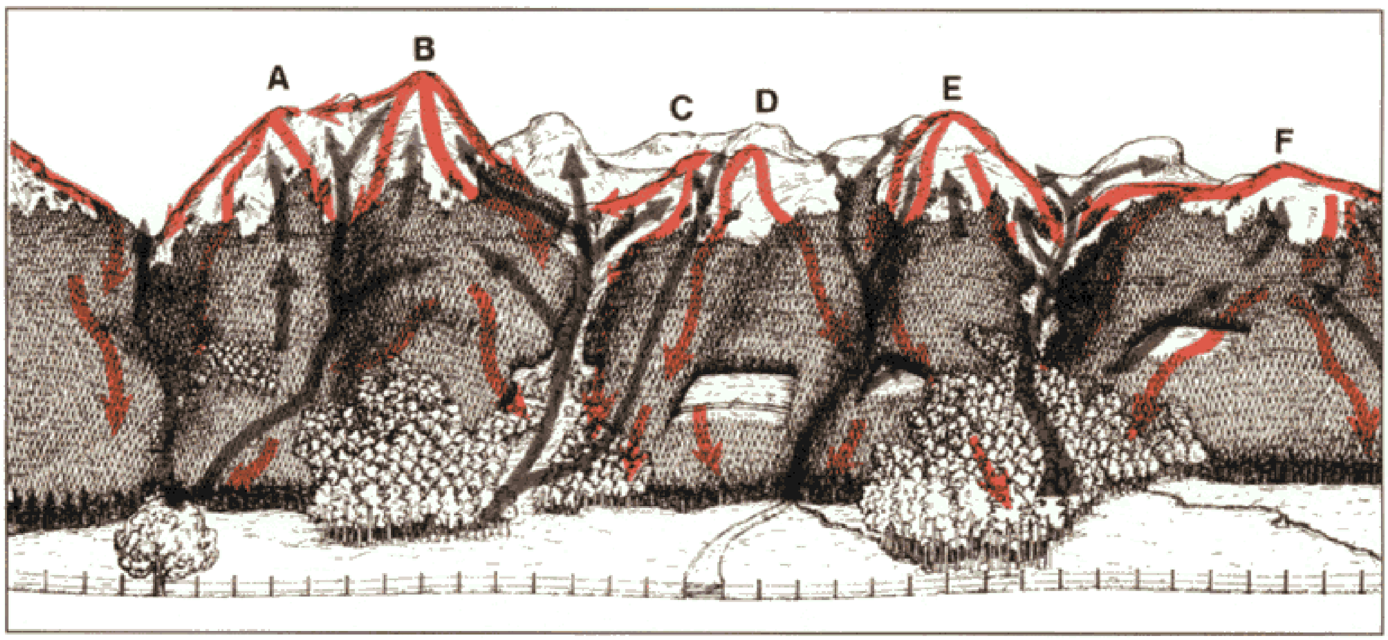
Mapping procedures

1. Identify and label all major peaks, summits, ridges, and saddles on both the photograph(s) and topographic maps. These landmarks will help make the transition between plan and perspective easier.
2. Starting on the photograph pick out either the convexities or the concavities and complete each set before working on the other. Often it is easiest to start with the convexities. Using a red felt-tip pen identify the major convexities and ridges. Try to ensure that the lines follow the apexes

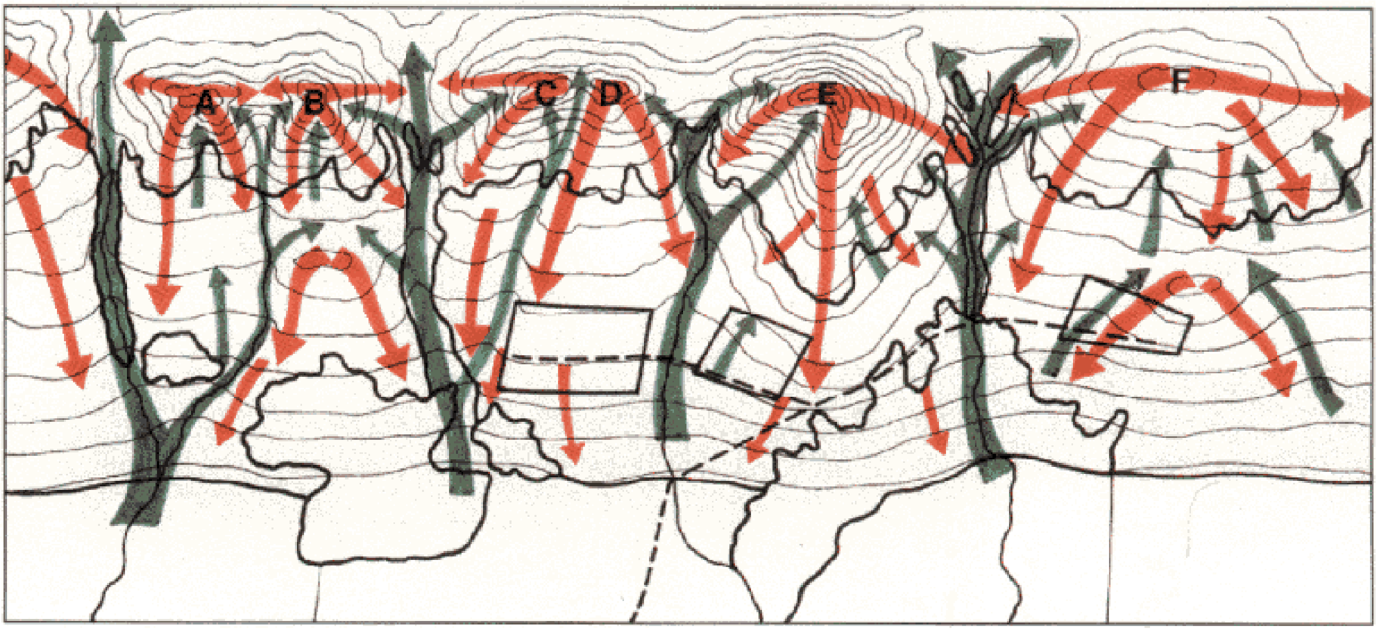
of the ridges as far as they can be traced. Transpose the lines identified on the photo to the contour map as you go.

3. Identify secondary-strength ridges, which will tend to spring from the primary ones. A branching pattern may well emerge. It is usual to find that the number and structure of arrows relates closely to the structure of the landform. There are naturally going to be more force lines in a broken, jagged landform than in a smooth, flowing one. There may be three or four levels in the hierarchy of forces, shown by different thicknesses of arrows.
4. When the mapping of the convexities is completed, repeat the process with a green felt-tip pen on the concavities. Some of the major hollows will coincide with streams or rivers, while others may be dry. Occasionally, stream features are not associated with readily identifiable hollows; in that case, they should be ignored. A connected, dendritic system of green arrows is usual.

Figure A4.1 Visual force analysis in perspective and plan view. Red arrows show major peaks, summits, ridges, and saddles; green arrows show major valleys and gullies (from the *Visual Landscape Design Training Manual*, 1994).



A landform analysis in perspective view



The same analysis on a plan view of the landscape

Notes:

- In no circumstances should a red arrow cross a green arrow, or vice versa.
- If either the hollows or convexities are generally more dominant, then the primary arrows should be thicker to emphasize this; this may have an impact on the later design.
- It is possible that the contour maps, by reason of their resolution and the spacing of the contour lines, do not show all the visible features of the landform. In this case, additional arrows can be added from analysis of the photograph.
- Conversely, working from a photograph can be misleading when mature forest hides the topography and smooths over subtleties in the landform. It is important to try to look beneath the canopy because if logging takes place, the topography will be revealed.
- On completion, the structure of the topography should have become very clear. The very action of drawing the arrows will help to get the feel of the landform.
- Three-dimensional computer simulations of the views help to show what lies beneath the trees, or can be used to produce different viewpoints with the visual forces in place. This can help to show how the relative strengths of different parts of the landform vary depending on the viewer position.

Using visual force lines

After mapping the visual force lines in perspective and plan view, they are used to guide cutblock design. When cutblocks are being designed, they should respond to visual force analysis mapping in plan view, by pushing up in gullies (green arrows) and dropping down on ridge lines (red arrows). The weight of the arrow will dictate the amount of response. The thicker the arrow, the stronger the response; the thinner the arrow, the weaker the response.

Land feature analysis

This analysis builds on the visual landscape inventory and identifies all the various features in the landscape that make up its character and diversity, its visual absorption capability (VAC), and its existing visual condition (EVC). However, it is not just a process of identifying the features, such as rock outcrops, vegetation, water features, and so on; you should also try to discern a pattern in the occurrence of these features and their distribution. Some underlying logic generally exists as to why some features occur where they do—rock outcrops are related to geology, erosion, and landform; vegetation to drainage, soil, and exposure; and water features to landform structures and geology. Historic events, such as wildfires, insect attacks, or blowdowns, may have left their mark; and landscape alterations from human activities may be present.

The basic materials required to carry out a landform analysis are panoramic photos, topographic maps, aerial photos, vegetation or forest cover maps, and terrain stability maps. The objective of the landform analysis is to guide cutblock design by identifying visible landscape features in photographs and transferring them to plan-view maps.

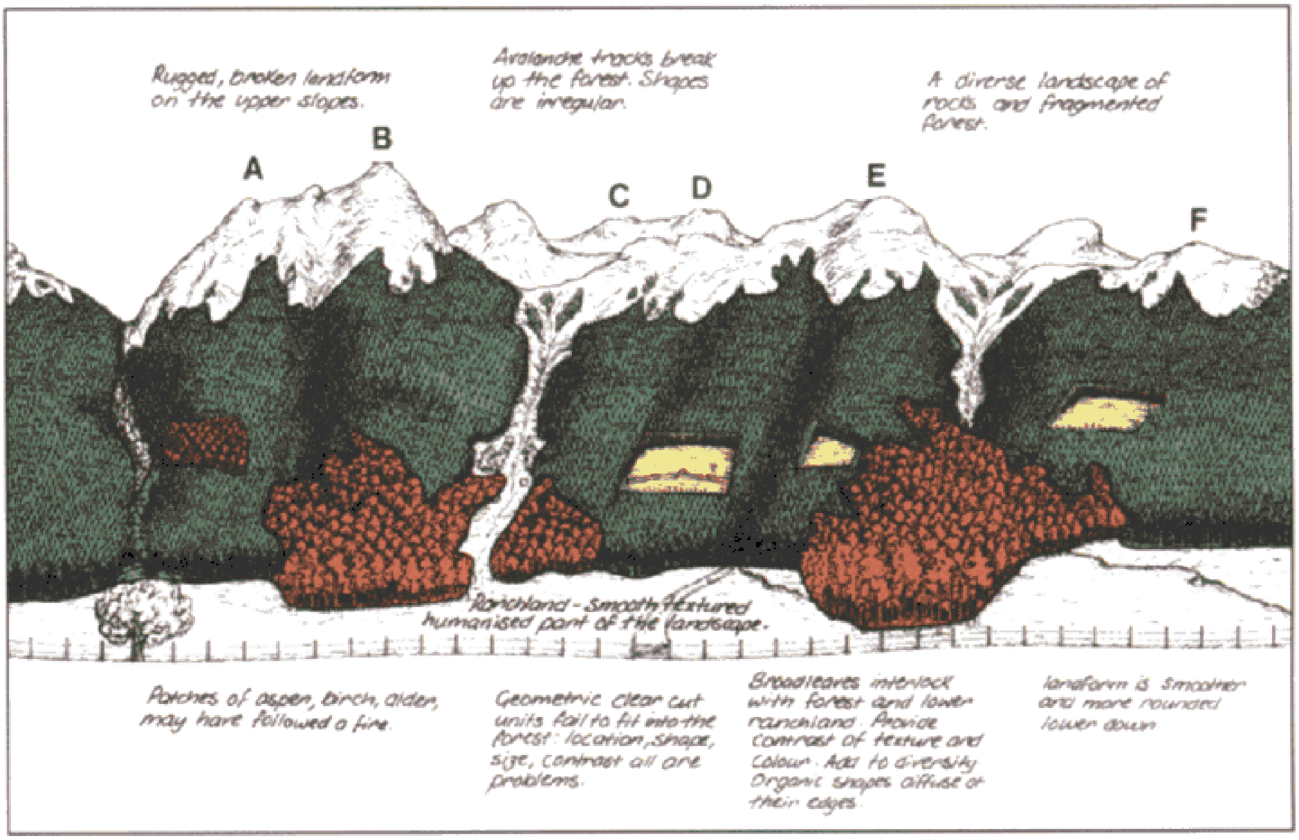
For example, identifying the size, shape, and distribution of natural openings on the photograph and on the map can **give a designer some insight about the size, shape, and distribution of cutblocks that would work best on the landscape.** Describing the type of landforms present (e.g., sharp, rugged peaks), can indicate that sharper, more rugged shapes would best fit the landscape.

Notes:

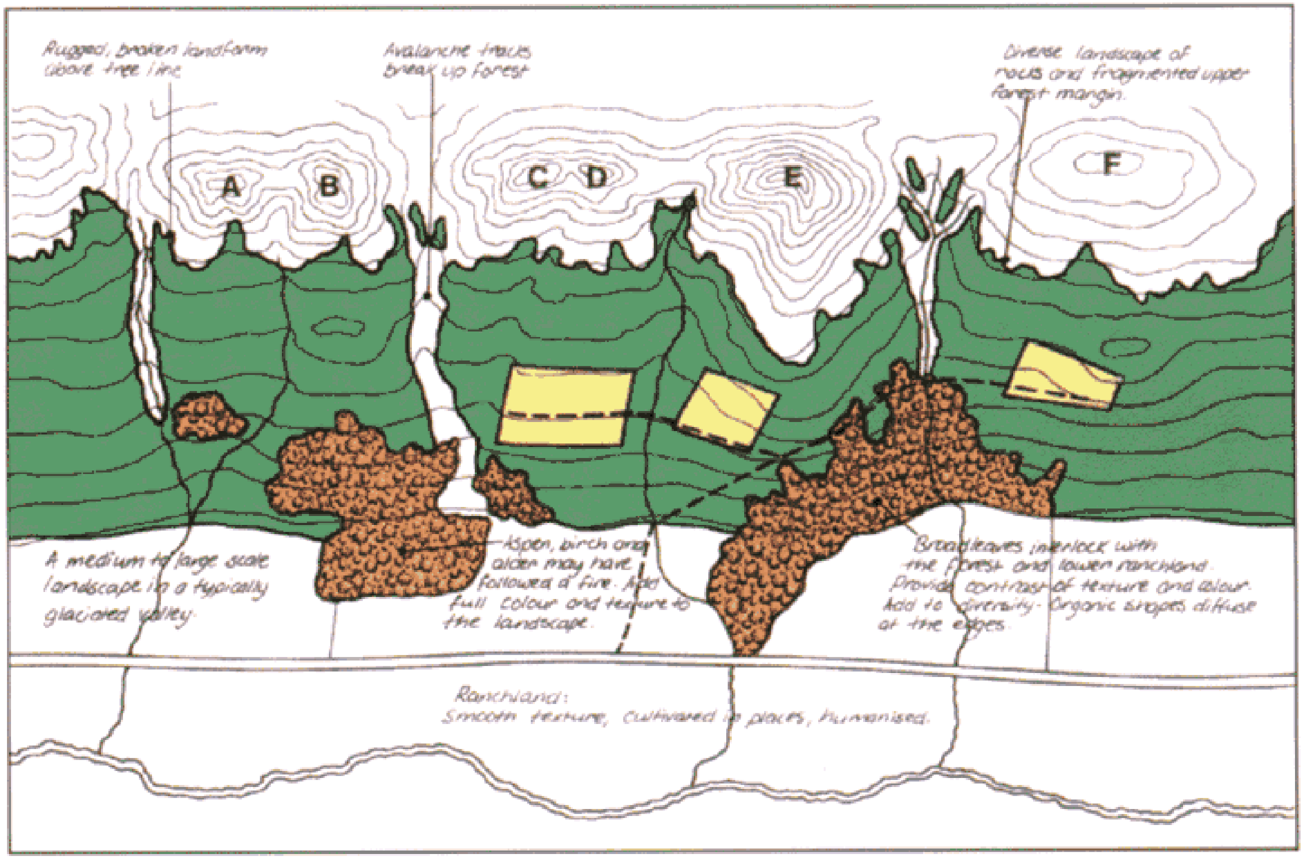
- Much of the detail to be analyzed can be seen only in the photographs; it will not be obvious on maps.
- Other information can be transferred from the maps to overlays or photocopies of the photographs. Annotations and symbols are useful for this part of the analysis.
- Features beneath the canopy might be revealed after logging. Some of these might help the design, others may suggest places where forest cover needs to be maintained.
- The notes and comments recorded on the plan and perspective views should point out aspects of the pattern and the relationships between different parts of the landscape.

After the land feature analysis is complete, the annotated maps and photographs will provide useful guides to the shape, size, and distribution of cutblocks on the landscape. See step 4 of the "Visual Impact Assessment Procedures" section for information about specific visual design concepts and principles.

Figure A4.2 Landscape feature analysis in perspective and plan view (from the *Visual Landscape Design Training Manual*, 1994).



Rugged, broken landform on the upper slopes.
Avalanche tracks break up the forest. Shapes are irregular.
A diverse landscape of rocks and fragmented forest.
A
B
C
D
E
F
Ranchland - Smooth textured humanised part of the landscape.
Patches of aspen, birch, alder, may have followed a fire.
Geometric clear cut units fail to fit into the forest: location, shape, size, contrast all are problems.
Broadleaves interlock with forest and lower ranchland. Provide contrast of texture and colour. Add to diversity. Organic shapes diffuse at their edges.
landform is smoother and more rounded lower down



Appendix 5: Digital terrain model presentation criteria

The following information should be included with or shown on each digital terrain model plot:

- Title (e.g., "Digital Terrain Model of . . ." or "Perspective view of . . .")
- Geographic area name (e.g., Lake X, Highway XX)
- Name and/or number of viewpoint used to produce plot
- Viewpoint UTM co-ordinates
- Elevation of viewpoint above ground (normally 1.6 m)
- Licensee name
- Licensee and/or cutting permit number
- Existing cutblock or road (including numbers)
- Proposed cutblock or road (including number)
- Average tree height used for forest cover
- Lens size (Ministry of Forests recommends 50 mm)
- Direction of view angle in degrees (centreline of vision cone)

- Vertical viewing angle (degrees)
- Vertical exaggeration (Ministry of Forests requests none)
- Name and telephone number for person who produced DTM
- Date plotted

Notes:

- The recommended DTM plot size is 11 x 17 inches. Each DTM plot should be accompanied with a plan-view map.
- A photograph taken from the same viewpoint location as the DTM plot should also be attached to the plot, especially if used for public presentation.
- The plan-view map DTM plot and photograph(s) should all be oriented in the same way in relation to each other.
- If colour codes are used on the plot instead of labels, then a colour-coded legend should be used to differentiate between water features, existing and proposed roads, and existing and proposed blocks.

Basic features or data to show on the accompanying plan-view map:

- Number of topographic map
- Contour lines with roads and water features
- Scale of map; 1:50 000 or larger scale preferred (e.g., 1:20 000 or 1:10 000)
- Existing cutblocks or roads
- Proposed cutblocks or roads
- Viewpoint location used for the DTM (shown on the map with a symbol) with centre and cone of vision lines matching the perspective view.
- Visual landscape inventory data, such as visible area and visual sensitivity unit (VSU) boundaries, VSU label including number and ratings, and visual quality objective.

Appendix 6: Choosing an appropriate visual simulation presentation technique

Choose the appropriate presentation technique for the perspective view based on:

- complexity of the proposed operation(s);
- number of viewpoints and visual sensitivity class (previously visual sensitivity rating);
- level of public involvement;
- silvicultural system proposed; and
- number and location of landmarks easily identified on both topographic map and photographs.

1. Sketching

- Freehand sketching requires some practice and is generally used only in low-risk situations where accurate representation of the proposed operation is not critical. A more accurate and effective approach is a photo overlay.
- In the field or based on photographs, record on sketches the main forms and lines of the landscape and some of the variety, such as forest type change, rock outcrops, and existing openings.
- Estimate and draw the shape and position of the proposed operation.
- Develop sight lines from specific viewpoints to increase reliability and accuracy.
- Refer to the Ministry of Forests booklet *An Introduction to Graphic Communication* (1994) for details on how to sketch. This booklet is available from the Forest Practices Branch upon request.

2. Photographic overlay

Acetate overlay:

- Photographic overlay is relatively easy to apply, but requires backup maps and sight-line information to be reliable and accurate.
- Place an acetate overlay on top of photograph and locate the proposed operation on the landscape by matching landscape features, such as rock outcrops, meadows, and timber type boundaries, on photographs with the same features observed in the field.
- Refer to Appendix 3 for photographic presentation criteria.

DTM overlay:

- Take a photograph from the important viewpoint(s) used in the assessment.
- Develop a simple wire-frame DTM from the photo locations using the same parameters as for taking the photograph (i.e., same lens size and same horizontal and vertical viewing angles).
- Plot the DTM to match the size of photo used; alternately reduce the wire-frame DTM onto acetate overhead material using a photocopier.
- When the reduced DTM matches the photograph perspective, overlay DTM acetate on top of the photograph and colour the proposed operation to match as closely as possible the final appearance.

This simulation should provide an accurate representation of size, shape, and location of the proposed operation relative to the photo image.

3. Computer simulations

- Computer simulations are usually necessary in situations where: the terrain is complex or indistinct; a high public concern is evident; or multiple proposals are visible from one or more viewpoints, or one proposal is visible from more than two viewpoints.
- Computer simulations are also used to predict forest operations over several passes or over an entire rotation period.

Digital terrain models:

- Import TRIM data and digitized or scanned contour map data to generate a DTM for the area being evaluated.
- Digitize all existing and proposed cutblocks and roads.
- Produce simulations from the same viewpoint previously used in the field for taking photographs. A stereoscopic pair can be produced by offsetting the viewpoint. An approximate offset of 100 m per km of distance from the target will provide an easy-to-view, three-dimensional image. Several offsets may be necessary to produce the desired image.
- To simulate a cutblock, some software programs add trees to the model surface while others counter-sink the block into a rendered surface. Whichever process is used, it is necessary to specify the average height of the trees in the vicinity of the proposed block. This information can either be measured in the field or derived from forest cover inventory data. After a visual simulation has been completed, it should be labelled with information identified in Appendix 5 (i.e., digital terrain model presentation criteria).

Digital photo retouching:

- Digital retouching allows the merging of DTM output with scanned photographs. The final product realistically simulates the appearance of proposed operations.
- This technique may be required in high-sensitivity areas and when public presentations are required.

Note: Not all visual simulation techniques are required for all visual impact assessments.

Appendix 7: Sight line plotting instructions and presentation criteria

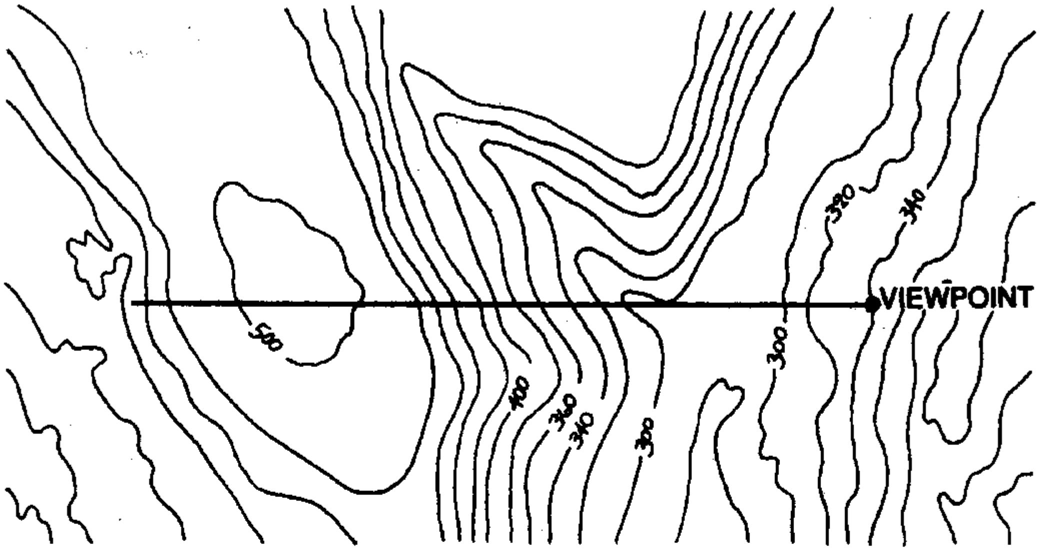
Sight lines

- Using the best topographic map scale available, plot sight lines to determine the areas visible from each viewpoint. Sight-line plots determine the extent of visible alteration(s) from viewpoints; the sight-line map (topographic map) shows the direction of lines of sight from the same viewpoints.
- Based on the sight-line plots, indicate on the topographic map the portion(s) of the proposal(s) that would be visible.
- Plot sight lines (also called "topographic sections or profiles") using the best scale available (preferably at 1:10 000 or larger) from each important viewpoint.
- Label each sight-line plot with the viewpoint number, opening number, sight line number, and scale of the topographic map used for the plotting.
- Provide an elevation bar on the upslope end of the profile and a distance scale on the horizontal bar (see the following example).

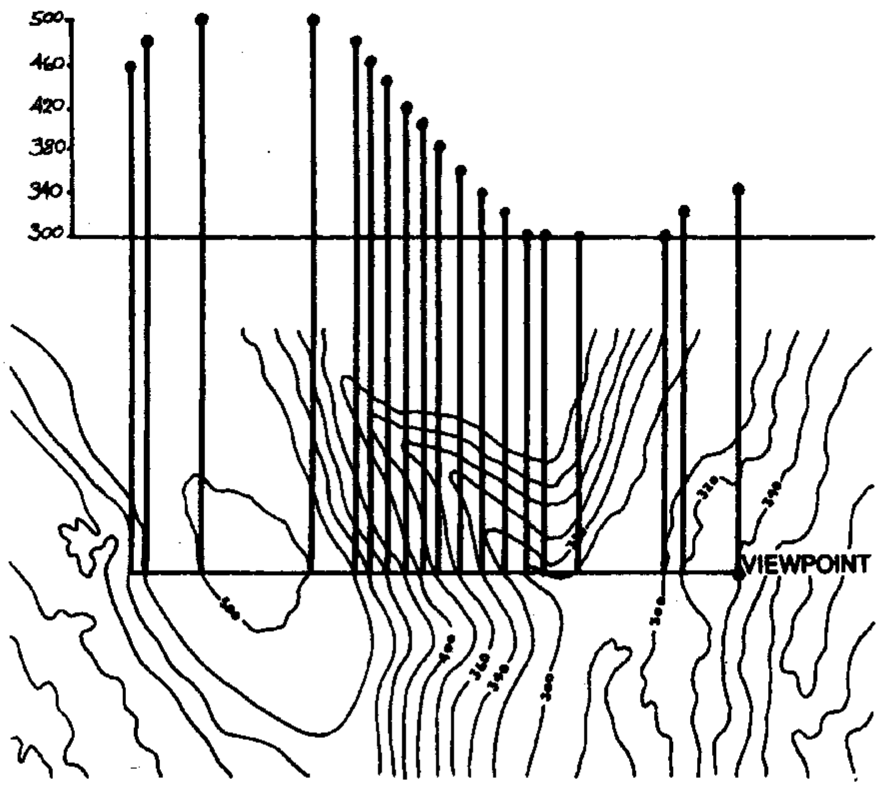
- Identify the start and end of the opening with a tree representative of stand height class (see Figure A7.1).
- Indicate road locations within the block.
- Shade in the visible area and transfer these data onto the topographic map.
- Minimize vertical exaggeration; the recommended vertical exaggeration is 1:1–1:1.5.

Figure A7.1 Plotting a sight line.

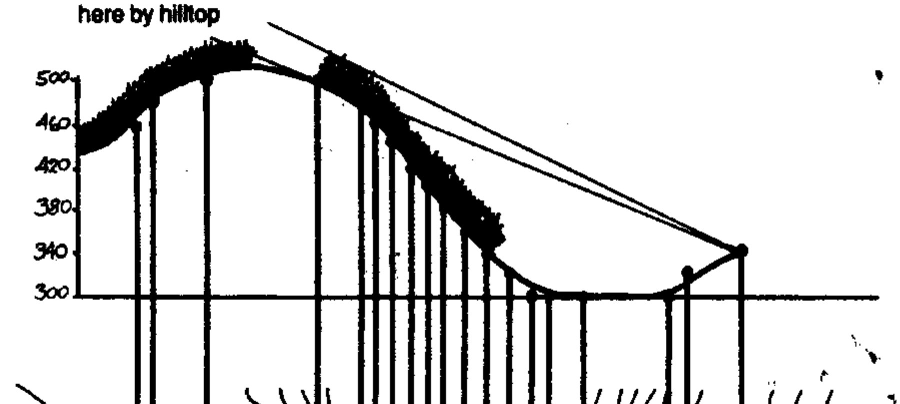
Making topographic sections from a contour map. (a) Draw line of section on map from viewpoint across the relevant part of the terrain. Project lines at right angles from where the line of section cuts the contour to the corresponding heights on the sectional drawing above. (b) Connect the points on the section and draw line(s) of sight from the viewpoint. (c) Illustrate tree heights at appropriate age intervals as required.


VIEWPOINT
500
400
360
340
300
300
320
340

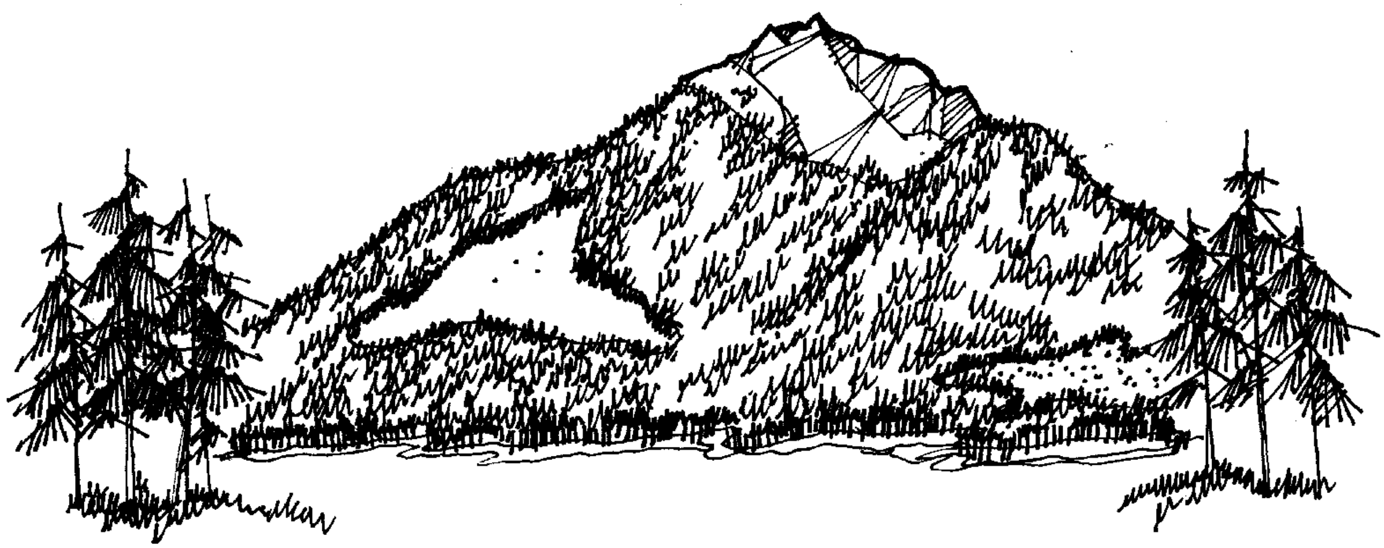
(a)


500
460
420
380
340
300
VIEWPOINT

(b)


20 m trees screened here by hilltop
20 m trees screen hill top
500
460
420
380
340
300

Appendix 8: Calculating percent alteration in perspective view

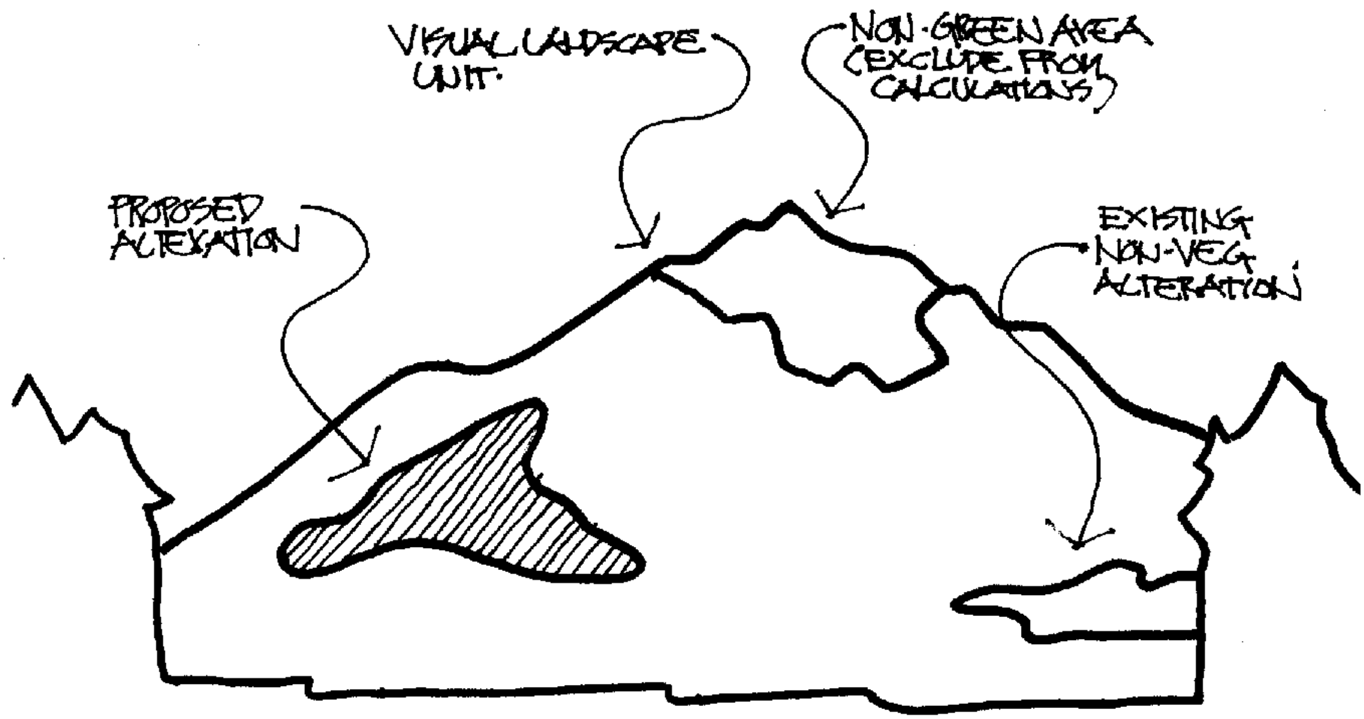


Proposed Alteration: Visual Simulation

Step 1. Using the visual simulation output produced, define and outline the visual unit or landform. Exclude those portions of the landform screened by vegetation and non-green areas, such as mountain tops, rock, snow, and ice.

Step 2. Measure the visible unit or landform (e.g., middle ground landscape unit = 37.5 cm^2).

Step 3. Measure visible ground area of existing alteration that has not yet achieved visually effective green-up (e.g., current alteration = 1.8 cm^2).



Step 4. Measure visible ground area of proposed alteration (e.g., = 4.7 cm^2).

Step 5. Add existing non-VEG alteration and proposed alteration figures together to get total area altered.

Divide this figure into visual landscape unit figure to get percentage of unit altered (e.g., [(1.8 + 4.7) ÷ 37.5] ´ 100 = 17.3%.)

Note: Repeat the above calculation for each of the viewpoints selected for design and simulation. Enter the percent alteration figure derived from each viewpoint on the visual impact assessment summary form (Appendix 2).

Appendix 9: Sample visual quality class photo sheets

The purpose of these sheets is to give the visual resource management practitioner examples of the range of impacts acceptable for and within each visual quality class.

- The photo sheets are arranged in order from the most restrictive visual quality class (Retention on Page 1) to the most liberal visual quality class (Maximum Modification on Page 6).

- There is a series of photos for each visual quality class. These photos are arranged vertically on each page and provide a gradation range from the most conservative to the most generous alteration possible within each visual quality class. Partial-cut and clearcut examples are provided for each visual quality class.
- Beneath each image:
    - a measure of alteration and level of design are provided for clearcuts, and
    - the volume/stems removed and tree height are provided for partial cuts.

Note: the term Visual Quality Class is used to describe the character or condition of a landscape. A Visual Quality Objective is a resource management objective that defines the level of alteration that would be appropriate on a landscape.

Photo Sheets

The following pages include these photo sheets:

- Clearcut units meeting a retention VQC
- Partial-cut stands meeting a retention VQC
- Clearcut units meeting a partial retention VQC
- Partial-cut stands meeting a partial retention VQC
- Clearcut units meeting a modification VQC
- Partial-cut stands meeting a modification VQC
- Clearcut and partial-cuts units meeting a maximum modification VQC

Clearcut units meeting a retention VQC

Design: Moderate; Percent alteration: 0.3%

Design: Moderate; Percent alteration: 1.0%

Design: Moderate; Percent alteration: 1.5%

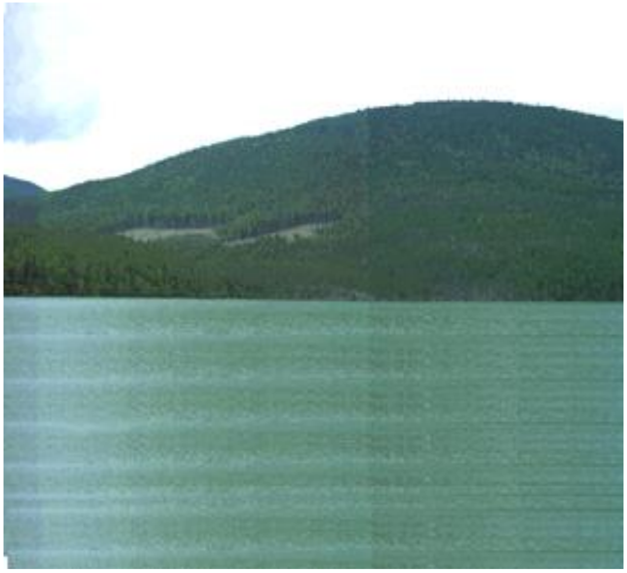
Partial-cut stands meeting a retention VQC

Volume removed: 58%; Average height: 13.5 m;
Stems removed: 43%

Volume removed: 46%; Average height: 29.8 m
Stems removed: 74%

Volume removed: 60%; Average height: 28m;
Stems removed: 80%

Clearcut units meeting a partial retention VQC



Design: Good; Percent alteration: 1.4%

Design: Moderate; Percent alteration: 5.3%

Design: Moderate; Percent alteration: 2.7%

Design: Moderate; Percent alteration: 5.5%

Design: Moderate; Percent alteration: 3%

Design: Poor; Percent alteration: 8.1%

Partial-cut stands meeting a partial retention VQC

Volume removed: 42%; Average height: 31.4 m; Stems removed: Not available

Volume removed: 75%; Average height: 31.1 m; Stems removed: 74%

Volume removed: 44%; Average height: 20.3 m; Stems removed: 55%

Volume removed: 81%; Average height: 21.2 m; Stems removed: 82%

Volume removed: 70%; Average height: 20.0 m; Stems removed: 75%

Volume removed: 89%; Average height: 22.8 m; Stems removed: 85%

Clearcut units meeting a modification VQC

Design: Poor; Percent alteration: 5.9%

Design: Poor; Percent alteration: 7.5%

Design: Poor; Percent alteration: 6.6%

Design: Good; Percent alteration: 14.8%

Design: Moderate; Percent alteration: 7.7%

Design: Good; Percent alteration: 21%

Partial-cut stands meeting a modification VQC

Volume removed: 72%; Average height: 23.4 m; Stems removed: 63%

Volume removed: 89%; Average height: 34.1 m; Stems removed: 95%

Volume removed: 86%; Average height: 38.9 m; Stems removed: 98%

Volume removed: 88%; Average height: 20.2 m; Stems removed: 97%

Volume removed: 88%; Average height: 29.4 m; Stems removed: 96%

Volume removed: 92%; Average height: 28.6 m; Stems removed: 92%

Clearcut and partial-cuts units meeting a maximum modification VQC

Design: Moderate; Percent alteration: 13%

Design: Poor; Percent alteration: 21%

Design: Poor; Percent alteration: 17.9%

Design: Moderate; Percent alteration: 35.6%

Volume removed: 83%; Average height: 31.3 m;
Stems removed: 72%