

Forest Audit Program

2012-13 AUDIT OF COUPE REGENERATION AND FINALISATION

VW06982 | 26 July 2013



Forest Audit Program: 2012-13 Audit of coupe regeneration and finalisation

Document title: 2012-13 Audit of coupe regeneration and finalisation

Version: Final

Date: 26 July 2013

Prepared by: Craig Clifton, Mark Poynter, Doris Pallozzi and Alicia Michael

Approved by: Doris Pallozzi

File name: C:\Users\ccclifton\skm\vwes\projects\vw06982\report\final\vw06982 regeneration-finalisation audit final 2.2 26072013.docx

Sinclair Knight Merz
ABN 37 001 024 095
PO Box 952 Bendigo VIC 3552
80A Mitchell St Bendigo VIC 3550

Tel: +61 (0) 3 5444 1861
Fax: +61 (0) 3 5444 1862
Web: www.globalskm.com

COPYRIGHT: The concepts and information contained in this document are the property of the Department of Sustainability and Environment (DSE). Use or copying of this document in whole or in part without the written permission of DSE constitutes an infringement of copyright.

LIMITATION: This report has been prepared on behalf of and for the exclusive use of SKM's client, and is subject to and issued in connection with the provisions of the agreement between SKM and its client. SKM accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

Executive summary

Audit scope

The former Department of Sustainability and Environment (DSE; now Department of Environment and Primary Industries, DEPI) commissioned Sinclair Knight Merz (SKM) to conduct an audit of coupe regeneration and finalisation as part of its Forest Audit Program (FAP) for the 2012-13 financial year. The audit was conducted as a statutory environmental audit under the auspices of the *Environment Protection Act 1970* and considered the risk of harm to the environment resulting from coupe rehabilitation and finalisation activities conducted by VicForests in State forests in eastern Victoria.

The specific focus of the audit was on compliance with prescriptions from the *Code of Practice for Timber Production 2007* (the Code) in relation to:

- > Rehabilitation and regeneration of coupe infrastructure, such as landings and snig tracks ;
- > Regeneration of harvested coupes;
- > Protection of soils, water quality, unharvested areas and any cultural heritage assets from unintended impacts of fire or mechanical disturbance during coupe regeneration;
- > Tending and maintaining the health of thinned forest stands.

The audit directly considered the vegetation and land or soils of harvested coupes and the multiple beneficial uses of State forests, including: timber production; biodiversity or nature conservation; recreation; provision of visual amenity; protection of cultural heritage values; maintenance of carbon cycles; and, generation of water for environmental and consumptive uses.

The audit considered 28 regeneration coupes and seven thinning coupes, each of which were selected at random from a list of 281 regeneration coupes and 31 thinning coupes proposed by VicForests for finalisation and handback to DSE in the 2012-13 financial year. The audited coupes were all located in the Central Gippsland, East Gippsland and Tambo Forest Management Areas (FMAs). All were the subject of a desk-top audit of compliance with the Code. Twenty-two of the regeneration coupes and four of the thinning coupes (approximately 10% of coupes of each kind) also underwent a field-based audit.

Audit methodology

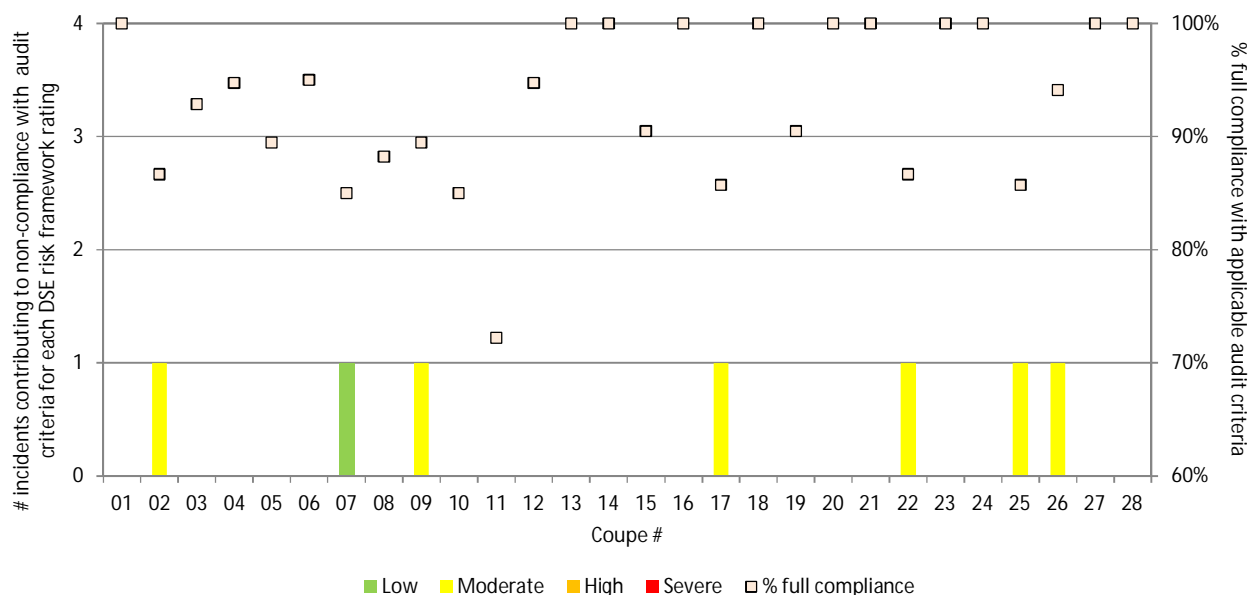
The audit was conducted against 31 criteria derived from relevant, mandatory Code prescriptions. The criteria (Appendix A) were specified in workbooks prepared for the FAP's Toolbox Module 7 for coupe regeneration and finalisation. Separate workbooks were used for regeneration and thinning coupes.

Compliance with audit criteria was assessed using information contained in coupe files and other records, discussions with VicForests' staff and field observations (for 26 of the 35 coupes included in the audit). Field assessments were made using sampling protocols developed for the FAP Toolbox's Module 7.

Where relevant, an Environmental Impact Assessment (EIA) rating was applied to instances of non-compliance with audit criteria. The rating tool provided an indication of the risk of harm to the environment of those non-compliances. The former DSE's Risk Management Framework was also used to provide an alternative assessment of the risk of harm to the environment from the underlying incidents contributing to non-compliance with Code prescriptions.

Audit findings for regeneration coupes

Overall, the audit found that regeneration coupes fully complied with 93% of applicable criteria (Figure 1). Eleven of the audited coupes complied with all of the applicable criteria. One coupe (coupe 11) complied with less than 80% of applicable criteria.



Note: No non-compliances received the high or severe risk rating. Some non-compliances were not associated with direct environmental risk.

Figure 1 Summary of results from audited regeneration coupes: % full compliance with audit criteria (right vertical axis) and the number of risk ratings (using DSE Risk Management Framework) for incidents leading to non-compliance with audit criteria (left vertical axis).

Incidents resulting in non-compliance with audit criteria on six coupes were considered to pose a material risk of environmental harm using the FAP's EIA rating tool and/or the former DSE's Risk Management Framework. These incidents were all assessed to have a moderate risk rating¹ and included:

- > Incomplete rehabilitation of landings so that they provide suitable conditions for regeneration, as required by the Code: this was detected on four regeneration coupes (02, 17, 22 and 25). Regrowth on at least parts of these landings was observed to be poor.
- > A windrow with soil and logging debris was pushed into the head of a drainage line on coupe 09 during rough heaping operations.
- > A regeneration burn on coupe 26 scorched the canopy of some trees in a nearby unharvested area.

Repeated non-compliance issues that were not associated with direct environmental risk included instances where:

- > Coupe files did not hold evidence of the regeneration procedures that were planned for use.
- > Site preparation plans were not held in the files of coupes that had been rough heaped. This meant that it could not be demonstrated that mechanical disturbance to encourage regeneration had considered erosion risk potential or the proximity of waterways.
- > There was no record that unintended environmental impacts of mechanical disturbance or burning treatments used in coupe regeneration had been assessed.
- > There was no record to indicate that the success of measures used to rehabilitate coupe infrastructure had been assessed.

All of the audited coupes were found to be acceptably stocked. Four of the 253 remaining unaudited regeneration coupes VicForests proposed for handback to DEPI do not meet the Native Forest Silviculture Guideline (NFSG) standards for acceptable stocking. In all cases, this was due to unstocked areas slightly greater than 1 ha being present in the coupes. VicForests recommended that these be accepted for handback

¹ Risk ratings of moderate or higher (i.e. moderate, high and severe) are considered to be material and require some form of response by DEPI. No high or severe risk incidents were identified during this audit using DSE's Risk Management Framework.

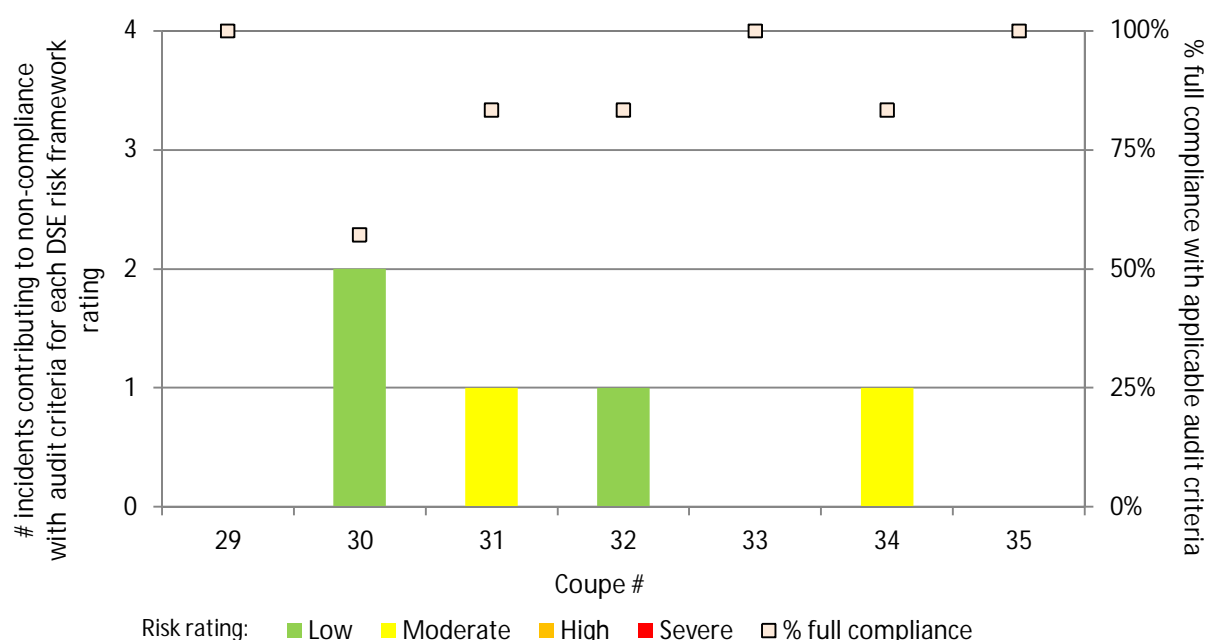
due to the relatively small size of the unstocked areas and the damage that would be caused to existing regrowth if further steps were taken to rehabilitate these areas.

Audit findings for thinning coupes

Thinning coupes included in the audit were found to fully comply with 86% of applicable criteria (Figure 2). Three of the audit coupes were found to be fully compliant with all applicable criteria.

Environmental risk resulting from non-compliance with audit criteria was assessed using the FAP's EIA rating tool and DSE's Risk Management Framework. Incidents on four coupes were assessed to pose a material risk of environmental harm, as follows:

- > Excessive levels of damage to retained trees posed a risk to stand health and productivity on three of the audited coupes.
- > Post-thinning windthrow damage was sustained at two East Gippsland FMA coupes, resulting in significantly reduced stocking and a risk to stand health and productive capacity.



Note: No non-compliances received the high or severe risk rating

Figure 2 Summary of results from audited thinning coupes: % full compliance with audit criteria (right vertical axis) and the number of risk ratings (using DSE Risk Management Framework) for incidents leading to non-compliance with audit criteria (left vertical axis).

Post-thinning windthrow incidents in East Gippsland FMA occurred despite VicForests' thinning operations largely complying with the Code and satisfying NFSG residual stocking requirements. They resulted from the unfortunate coincidence of the period of high vulnerability to windthrow in the thinned stands and a severe weather event that produced intense rainfall and strong winds. These coupes were considered to be non-compliant on the basis of their condition at the time of the audit and not as the result of inappropriate management by VicForests.

VicForests' post-thinning assessments found that seven of the 30 thinning coupes in its finalisation list, including two coupes that were the subject of this audit, sustained thinning damage that exceeded the acceptable level prescribed by NFSG 13 and 14. This may pose a risk to on-going stand health and productive capacity.

Finalisation and handback of coupes to DSE

All of the regeneration coupes included in the audit were stocked to an acceptable level and confirmed as retaining key commercial tree species that were present prior to harvest. In most cases, stocking surveys also confirmed that uncommon species originally found on the coupe were also present in the regenerating stand. It is therefore recommended that these coupes be accepted for hand back to DEPI for on-going management.

It is also recommended that the 253 regeneration coupes that were nominated for handback, but which were not included in the audit, are accepted for handback and on-going management by DEPI. This includes four coupes (R153, R159, R203 and R206) that were reported by VicForests to have unstocked areas that exceeded 1 ha. The auditor accepts VicForests' assertion that remedial works to improve stocking in these coupes could not be undertaken without posing undue risk to existing regrowth.

It is recommended that all 30 thinning coupes that were nominated for handback are accepted by DEPI. Excessive damage sustained in seven of these coupes during thinning operations cannot be rectified and hence there is nothing to be gained from not accepting them for handback. Residual stocking on two of the audited East Gippsland thinning coupes was significantly reduced by windthrow following a severe storm in June 2012. The widespread nature of the storm suggests that residual stocking in other coupes that were thinned at about the same time may also have been affected. However, since such damage was not the result of non-compliance by VicForests with the Code or NFSG thinning specifications, these coupes should be accepted for handback.

Recommendations

#	Recommendation
3.1	That site preparation monitoring records be completed for all rough heaping operations and that the records are retained in coupe files to demonstrate that the effectiveness of measures used to manage the risk of sediment transport to waterways has been assessed.
3.2	That coupe monitoring records be extended to specifically include the assessment and reporting of the effectiveness of coupe infrastructure rehabilitation. This assessment should be conducted by VicForests between one and three years after harvesting has been completed and during coupe finalisation rather than at coupe closure.
5.1	That DEPI commission an assessment of the impacts of windthrow on the productivity and environment of thinned stands and the economic viability of thinning. The investigation should also consider how windthrow impacts may be reduced.
5.2	That DEPI accept all of the regeneration coupes nominated by VicForests for handback.
5.3	That DEPI accept all of the thinning coupes nominated by VicForests for handback.
5.4	That VicForests' regeneration burn planning and reporting processes be amended to ensure that the impacts of the burn on unharvested areas is assessed and reported, even where the burn did not escape containment lines.

Audit summary for EPA

EPA File reference	68515-8
Auditor	Craig Clifton
Auditor term of appointment	02/10/2008-25/07/2014
Name of person requesting audit	Duncan Pendrigh Director, Operational Support and Compliance (former) Department of Sustainability and Environment (DSE; now Department of Environment and Primary Industry, DEPI)
Relationship to premises/location	DEPI is the management authority for State forests in Victoria and State government regulator of timber production operations in State forests.
Date of request	14 January 2013
Date EPA notified of audit	17 January 2013
Completion date of the audit	26 July 2013
Reason for audit	The audit forms part of the former DSE's annual Forest Audit Program to assess compliance with Code of Practice for Timber Production and related regulations.
Description of activity	Coupe regeneration and finalisation
Current land use zoning	State forest
EPA region	Gippsland
Municipality	Baw Baw, East Gippsland, Mansfield and Wellington Shires
Lot and site details	Not applicable, 35 regeneration or thinning coupes in State forests in eastern Victoria
GIS coordinates of site centroid	Not applicable, various sites
Site area (ha)	Not applicable, various sites
Members and categories of support team utilised	None required
Outcome of the audit	Audit report with recommendations
Further work or requirements	Six recommendations were made concerning monitoring of coupe regeneration and infrastructure rehabilitation operations conducted by VicForests and on the acceptance of thinning and regeneration coupes for handback.

Contents

Executive summary.....	ii
Audit summary for EPA.....	vi
1. Introduction.....	3
2. Audit approach.....	4
2.1 Audit scope.....	4
2.2 Audit methodology.....	5
2.3 Risk assessment approach.....	8
2.4 Audit team.....	9
3. Regeneration coupes.....	10
3.1 Coupe selection and coupe characteristics.....	10
3.2 Compliance with audit criteria	11
3.3 Environmental risk resulting from non-compliance with audit criteria	12
3.4 Coupe stocking	14
3.5 Repeated non-compliances without direct risk of harm to the environment	14
4. Thinning coupes.....	17
4.1 Coupe selection and coupe characteristics.....	17
4.2 Compliance with audit criteria	17
4.3 Environmental risk resulting from non-compliance with audit criteria	18
4.4 Damage to retained trees from thinning.....	19
4.5 Positive observations of VicForests' thinning operations	20
5. Discussion.....	21
5.1 Windthrow observed at thinning coupes.....	21
5.2 Audit findings	22
5.3 Findings of the previous Module 7 audit of coupe regeneration and finalisation	24
6. Conclusions and recommendations.....	28
6.1 Audit scope.....	28
6.2 Compliance with audit criteria in regeneration coupes.....	28
6.3 Compliance with audit criteria in thinning coupes.....	28
6.4 Finalisation and handback of coupes to DSE.....	29
6.5 Recommendations	29
7. References	31

Appendix A. Revised FAP Module 7 workbooks

Appendix B. Risk assessment methods

Appendix C. Detailed comments on instances of non-compliance with audit criteria

Glossary

Audit criteria	Criteria used to assess whether coupe regeneration and thinning activities are consistent with mandatory and guidance prescriptions of the Code and NFSGs.
Code	The <i>Code of Practice for Timber Production 2007</i> , which outlines mandatory prescriptions and guidelines for how timber production activities in native forests and plantations should be conducted.
Compliance	Compliance with audit criteria. Operations or planning on a coupe were either assessed to comply (or fully comply), not comply or partly comply with audit criteria. Part compliance was determined where the coupe satisfied some, but not all elements of the audit criterion. EIA ratings were applied to instances of part compliance, where this was appropriate to the criterion.
Coupe	An individual management unit within forests and plantations where timber harvesting or thinning activities are planned and conducted. Under the <i>Sustainable Forests (Timber) Act 2004</i> , a coupe is a specific area of State forest identified for the purposes of timber harvesting and regeneration in a Timber Release Plan.
DPI	Department of Primary Industries: machinery of government changes in 2012 resulted in responsibility for management of timber harvesting activities in State forest in western Victoria being transferred from the former DSE to DPI. DPI is now part of the Department of Environment and Primary Industries (DEPI).
DSE	Department of Sustainability and Environment: At the time of the audit, DSE had responsibility for environmental regulation of timber production activities in State forest. DSE is now part of the Department of Environment and Primary Industries (DEPI).
EIA rating tool	A tool developed for the Forest Audit Program (FAP) to provide a consistent basis for assessing the potential environmental implications of non-compliance with audit criteria.
EPA	Environment Protection Authority: environmental audits under the auspices of the <i>Environment Protection Act 1970</i> (EP Act) are conducted through EPA's environmental audit system (http://www.epa.vic.gov.au/our-work/environmental-auditing).
Exclusion areas	Areas within a gross or Timber Release Plan (TRP) coupe boundary that are unavailable for harvesting due to either Code prescriptions (e.g.) that maintain buffers around waterways or rainforest or the presence of Special Protection Zones (SPZ). In some cases the term is also used to refer to adjacent areas that are outside the TRP coupe boundary.
FAP	Forest Audit Program – an annual program of statutory environmental audits coordinated by DSE to ensure that timber production operations in State forests provide for sustainable forest management.
Finalisation	The process of ensuring regeneration and thinning coupes are successfully regenerated and otherwise in a suitable condition for hand back to DSE.
Forest coupe plan (FCP)	A plan that is prepared for each coupe that describes the biophysical character of the coupe and the nature of planned harvesting operations. Minimum content requirements of a FCP are specified by the Code. The FCP is contained within a coupe file that includes various other information, including coupe monitoring records, traffic management provisions and silvicultural operations. The coupe file may also refer to information about the coupe and its operations that is held within a VicForests or DSE information management system.
Forest Management Area (FMA)	The basic unit for forest planning used in Victoria. These forest planning units are not administrative units.
Gross coupe area or TRP coupe	The coupe area or boundary originally defined in the TRP. This area is used as the starting point for harvest planning. The actual harvested area is generally less than this due to the application of forest management zoning rules or Code or other prescriptions on harvesting buffers or exclusions relating to the protection of sensitive environmental features.
Hand back	The process whereby VicForests returns successfully regenerated harvest coupes to DSE for on-going management.

Incident	An event, action or lack of action on a coupe that gives rise to an assessment of non or partial compliance with an audit criterion. The nature of the audit criteria and various prescriptions mean that a single incident may result in multiple non-compliances.
Instance	Used here to refer to an individual example or <i>instance</i> of non-compliance.
NFSG	Native Forest Silviculture Guidelines. (Former) DSE guideline documents for silvicultural operations in native forests. NFSG 10 applies to regeneration in harvested coupes and includes standards for acceptable eucalypt stocking. NFSG 13 and 14 apply to thinning in ash and mixed species forests, respectively. They include (among other things) specifications for acceptable levels of damage to retained trees and retained basal area for thinned stands.
Regeneration coupe	Regenerated even-aged and uneven-aged harvest coupes proposed by VicForests for finalisation and hand back to DEPI.
Risk management framework	A structured process for assessing the effect of uncertainty on objectives. Risk frameworks define a process for identifying, assessing and managing or treating risk. The process follows AS/NZS ISO 31000: 2009.
Rough heaping	A form of mechanical disturbance often used to encourage regeneration in coupes where regeneration has initially been unsuccessful (particularly after a regeneration burn or wildfire). Soils are disturbed and their receptiveness as seedbeds improved as any understorey and logging debris are pushed into heaps and windrows. Rough heaped areas are subsequently artificially seeded from the air or ground.
Silvicultural system	A system for managing harvesting and regeneration in forests used for timber production.
SMZ	Special Management Zone: land within State forest that is managed to conserve specific features, while catering for timber production and other uses under specific management conditions
SPZ	Special Protection Zone: land within State forest that is managed for particular conservation values, forming a network designed to complement the formal conservation reserve system (e.g. National Parks). Timber harvesting and most other human disturbances are excluded from this zone.
Statutory environmental audit	An environmental audit conducted under the <i>Environment Protection Act 1970</i> .
State forest	Part of the publicly-owned and managed forest estate. Victoria has 3.4 million ha of State forest. State forest is managed for various beneficial uses including conserving flora and fauna, protecting water catchments and water supply, providing timber for sustainable forestry, protecting landscape, archaeological and historic values, and providing recreational and educational opportunities (http://www.dse.vic.gov.au/forests).
Stocking	Relates to measures of the density and species composition of regrowth and thinned forests. Regeneration coupe stocking relates specifically to the percentage of sampling points in which an “acceptable seedling” (according to NFSG 10) has been identified. For thinning coupes, stocking considers the retained basal area and width of bays and harvested outrows.
Thinning coupes	Coupes that have undergone commercial thinning operations and have been proposed by VicForests for hand back to DEPI.
Timber Release Plan (TRP)	<p>Timber resources in State forests in eastern Victoria are allocated to VicForests for the purposes of harvesting and/or selling through the Allocation Order to VicForests 2004 (as amended). The Allocation Order specifies the extent and location of the forest stands to which VicForests has access under this Order. VicForests must periodically prepare a Timber Release Plan for allocated areas.</p> <p>Timber Release Plans (TRPs) are publicly available documents that must include: a schedule of coupes selected for timber harvesting and associated access road requirements; details of the location and approximate timing of timber harvesting in the proposed coupes; and details of the location of any associated access roads. They are prepared by VicForests in accordance with Part 5 of the <i>Sustainable Forests (Timber) Act 2004</i>, and may be reviewed and changed in accordance with section 43.</p>

1. Introduction

Sinclair Knight Merz (SKM) was commissioned by the former Department of Sustainability and Environment (DSE; now Department of Environment and Primary Industries, DEPI) to conduct an audit of coupe regeneration and finalisation as part of its Forest Audit Program (FAP). The FAP's overall objective is to assess the risk of harm to the environment resulting from timber production activities in State forests. This particular audit considers the risk of harm to the environment resulting from coupe regeneration and finalisation activities that take place in regeneration and thinning coupes in State forests that are managed by VicForests. It applies audit tools from the FAP's Module 7.

The objective of the audit was to assess whether coupe regeneration and finalisation activities were appropriately conducted to achieve sustainable forest management and managed in accordance with relevant legislation, regulations, policies, regional Forest Management Plans and practice guidance. The latter is provided by the *Code of Practice for Timber Production 2007* (the Code [1]).

The audit was conducted as a statutory environmental audit under the auspices of the *Environment Protection Act 1970* (EP Act). The *Sustainable Forests (Timber) Act 2004* allows the Minister for Forests to commission an audit of compliance with any relevant Code of Practice relating to timber harvesting.

This is the final audit report. It was prepared following the receipt of comments from VicForests and DEPI on a draft version. The contents of this report include:

- > Section 2 Audit approach: outlines the formal scope of the statutory audit and its methods.
- > Section 3 Regeneration coupes: a description of the outcomes of the audit of VicForests' regeneration coupes.
- > Section 4 Thinning coupes: a description of the outcomes of the audit of VicForests' thinning coupes.
- > Section 5 Discussion: an analysis of some of the issues raised by the audit, including its main findings and a comparison with the main findings and recommendations of the 2011-12 FAP audit of coupe regeneration and finalisation.
- > Section 6 Conclusions and recommendations: the audit's conclusions are presented, with a collation of recommendations from previous sections.

The analysis and discussion in this report refers, at times, to specific harvest coupes. To maintain confidentiality regarding the status of individual coupes, an alternative coupe numbering scheme has been used for public reporting. The translation between this alternative numbering scheme and standard coupe identifiers has been provided to VicForests and DEPI.

2. Audit approach

2.1 Audit scope

The scope of the statutory environment audit was documented in a work plan which was provided to the Environment Protection Authority (EPA) on 17th January 2013. The following text updates this scope to reflect the actual work undertaken.

2.1.1 Activity undertaken

The audit concerned aspects of timber harvesting operations that are conducted by VicForests in State forest areas located in eastern Victoria, specifically:

- > Rehabilitation and regeneration of coupe infrastructure, such as landings and snig tracks ;
- > Regeneration of harvest coupes;
- > Protection of soils, water quality, unharvested areas within and adjacent to harvest coupes and any cultural heritage assets from unintended impacts of fire and/or mechanical disturbance during the coupe regeneration process;
- > Tending and maintaining the health of thinned forest stands.

2.1.2 Segments of the environment

The segments of the environment that were included in the audit comprised 28 even-aged regeneration coupes and seven thinning coupes located in Central Gippsland, East Gippsland and Tambo Forest Management Areas (FMAs). These coupes were selected for audit from the set of 281 even-aged regeneration coupes and 30 thinning coupes VicForests proposed for finalisation and handback to DEPI in 2012-13².



Examples of the segments of the environment included in this audit: a) an even-aged regeneration coupe; b) thinning coupe

2.1.3 Elements of the environment

The audit directly considered the vegetation, soils, cultural heritage and native fauna of regeneration and thinning coupes, the waterways that drain them and the water these waterways carry.

2.1.4 Beneficial uses

The *Sustainability Charter for Victoria's State forests* [2] identifies the objectives for management of Victoria's State forests. The beneficial uses of these areas which are implicit in these objectives include:

- > Maintenance and conservation of biodiversity;

² VicForests' finalisation list for 2012-13 also included 4 uneven-aged harvest coupes.

- > Production of wood and non-wood forest products;
- > Generation of clean water for environmental and consumptive uses;
- > Provision of recreational and tourism opportunities;
- > Protection and maintenance of cultural heritage values;
- > Maintenance of global carbon cycles.

2.1.5 Audit criteria

Criteria for the audit were established from mandatory prescriptions³ contained in the Code. A manual for conducting coupe regeneration and finalisation audits was developed for the FAP (FAP Module 7; [3]). The manual includes workbooks which specify the relevant prescriptions and audit criteria for regeneration and thinning coupes. The workbooks consider the following themes:

Regeneration coupes

- Planned regeneration procedures^d
- Source of seed used for regeneration^d
- Stocking and species composition of regenerated stands^{d,f}
- Planned measures to protect soils, water quality, any cultural heritage assets and areas excluded from harvesting from fire and mechanical disturbance when used to assist regeneration^d
- Use of chemicals to protect regenerating stands from insect damage and browsing^d
- Rehabilitation of coupe infrastructure (landings, snig tracks, boundary tracks)^{d,f}

Thinning coupes

- Maintenance of stand health following thinning^{d,f}
- Protection of areas excluded from harvesting from damage during thinning operations^f
- Rehabilitation of coupe infrastructure (where it has been developed)^{d,f}

Note:

d: Desk top assessment: audit theme at least partly assessed by means of desk-top assessment of information held in coupe file and other records.

f: Field assessment: audit theme at least partly assessed on the basis of field observations and measurements,

2.1.6 Stakeholder participation

Stakeholder engagement in the audit included the former DSE's Timber Harvesting Compliance Unit and VicForests' staff involved in environmental systems management and silvicultural operations in the FMAs in which the audit was conducted.

2.1.7 Timing of audit

The audit commenced in January 2013. The data collection component of the audit, including its field assessments, was undertaken between January and March 2013. Data analysis and reporting followed the completion of field work in March 2013. The field component of the audit was interrupted by the large Aberfeldy and Harrietville bushfires. Although neither fire affected coupes that were to be included in the audit, they did delay and, in one case, prevent access to coupes that were to be included in the field assessments.

2.2 Audit methodology

The audit included four main components, which are described below.

³ The Code also includes "guidance" on forest management practices. Since they are not mandatory requirements of timber harvesting activities in State forests, they have not been considered in this audit.

2.2.1 Review and revision of FAP Module 7 and its workbooks

Module 7 of the FAP Toolbox [3] was developed to guide audits of coupe regeneration and finalisation. It comprises an overview document and workbooks to guide the auditing of regeneration and thinning coupes.

Machinery of government changes that transferred some of the former DSE's management responsibilities for timber production activities in State forests to the former Department of Primary Industries (DPI; now part of DEPI) meant that the scope of coupe regeneration and finalisation audits commissioned by the former DSE differed from the previous Module 7 audit (undertaken in 2011-12; [4]). The workbooks that were developed during that first audit were subsequently revised by the former DSE so that their scope was consistent with the Department's (then) current management responsibilities. These workbooks (7A for regeneration coupes and 7B for thinning coupes) were then reviewed by the auditor and modified slightly prior to the commencement of data collection activities. The revised workbooks, as used in this audit, are included in Appendix A.

The audit target selection process and field assessment procedures (from the Module 7 overview document and workbooks [3]) were not substantively modified.

2.2.2 Audit target selection

FAP Module 7 [3] specifies that the coupes to be audited are selected from the list of coupes nominated by VicForests for finalisation and handback to DSE (now DEPI). Approximately 10% of the coupes in selected FMAs are to be audited. It recommends that the FMA with the largest number of coupes nominated for finalisation be selected and that one or two other FMAs also be included in the audit, depending on the resources available.

A summary of VicForests' finalisation list is given in Table 1. SKM was commissioned by the former DSE to conduct the audit in the two FMAs with the largest number of coupes nominated for handback (East Gippsland and Central Gippsland) and the adjacent Tambo FMA. Approximately 10% of regeneration and thinning coupes located in each FMA were selected, at random, for audit⁴. Several reserve coupes were also selected by the auditor, in case some of the core group in each FMA were found to be inaccessible or otherwise unsuitable for the field component of the audit. All of the selected reserve and core coupes were subject to the desk-top elements of the audit.

Table 1 Intended and actual distribution of coupes between FMAs and risk groups. Harvesting operations in the FMA are managed by VicForests, unless otherwise indicated.

FMA	Regeneration coupes				Thinning coupes	
	Even aged		Uneven aged		Total	Audit
	Total	Audit	Total	Audit		
Benalla-Mansfield	2	0	0	0	0	0
Central	62	0	0	0	1	0
Central Gippsland	86	9 (+2 reserve)	2	0	0	0
Dandenong	14	0	1	0	0	0
East Gippsland	96	10 (+3 reserve)	1	0	26	3 (+2 reserve)
Tambo	21	3 (+1 reserve)	0	0	3	1 (+1 reserve)
Total	281	22 (+6 reserve)	4	0	30	4 (+ 2 reserve)

⁴ The number of coupes selected for field assessment was 10% of the relevant coupe type in the FMA rounded up to the nearest whole number. Hence nine of the 86 regeneration coupes in Central Gippsland FMA were selected for audit. File or desk-top audits that were conducted on reserve coupes are reported here, increasing the percentage of coupes included in the audit.

2.2.3 Review of coupe files and other evidence of auditee harvesting and coupe closure practice

Compliance with most of the audit criteria was assessed from information that is held in coupe files and VicForests' information systems. That information included: the forest coupe plans (FCPs), silvicultural decision support systems (DSS), planning for any regeneration burns or mechanical disturbance and coupe monitoring records. Results from VicForests' established seedling surveys (ESS) and post-thinning surveys were also reviewed. Evidence was sought for both the core and reserve coupes prior to field audits being undertaken.

Audit criteria were only applied when they were relevant to the particular coupe setting. Coupes were assessed to comply, partly comply or not comply with each relevant audit criterion. Partial compliance was recorded where it could be demonstrated that coupe activities satisfied some, but not all elements of the individual audit criterion or that the criterion was satisfied for only part of the relevant coupe feature.

Notes on the reasons for partial or non-compliance assessment were included in the comments section of the workbook. When applicable, an assessment was made of the risk of harm to the environment resulting from instances of non or partial compliance using the methods outlined in Appendix B.

2.2.4 Field assessment of coupes

Compliance with some audit criteria were at least partly assessed by field observation, as documented in the respective audit workbooks. The observations included the following:

Regeneration coupes

- Coupe stocking: either the reconnaissance or detailed survey methodologies described in workbook 7A were used to assess whether the coupe was adequately stocked, and if the species originally present on the coupe had been retained.
- Infrastructure rehabilitation: *ad hoc* observations were made of the extent to which landings, snig tracks and boundary tracks had been stabilised or rehabilitated and were being recolonised by vegetation⁵.
- Unplanned impact of regeneration activities: *ad hoc* observations were made of any unplanned impacts of fire or mechanical disturbance on areas excluded from harvesting or soils and water quality, respectively.

Thinning coupes

- Thinning damage: an assessment was made of the damage to retained trees caused by harvesting and log extraction (following the methods described in *Native Forest Silviculture Guidelines* (NFSG) 13 and 14 [5,6]).
- Dominance of retained trees: the canopy dominance of retained trees was observed.
- On-going stand health: other *ad hoc* observations were made of the likely impact of thinning on the health of the stand (e.g. level of post-harvest windthrow).
- Infrastructure rehabilitation: *ad hoc* observations were made of the extent to which extraction tracks, log handling areas and other infrastructure required rehabilitation or had been rehabilitated.
- Unplanned impacts of harvesting: *ad hoc* observations were made of the extent to which thinning activities encroached on exclusion areas⁶.

⁵ Infrastructure rehabilitation is assessed in greater detail in Module 5 audits of coupe harvesting and closure [7,8]. Field sampling protocols require detailed measurement of landing rehabilitation and cross drainage of snig and boundary tracks. Such measurements are not normally possible at the time of regeneration and finalisation audits due to the level of regrowth. These assessments are therefore confined to *ad hoc* observations of the state of landings, snig tracks and other coupe infrastructure. This applies to regeneration and thinning coupes.

⁶ Unplanned impacts of harvesting are dealt with in greater detail in Module 5 of the FAP [7], as is infrastructure rehabilitation (see note above). The field sampling protocols for Module 5 audits require detailed observations of the location, size and integrity of exclusion areas. Such assessments may not be possible at the time of the coupe regeneration and finalisation audit due to access issues and difficulties in distinguishing exclusion area boundaries. These assessments in Module 7 audits are confined to general observations of the integrity of what appear to have been exclusion areas. This applies to regeneration and thinning coupes.

Twenty-two regeneration coupes and four thinning coupes were included in the field component of the audit. Field assessments were conducted in two of the reserve regeneration coupes because road closures associated with bushfires prevented access to two coupes in the core set.

Stocking was assessed using reconnaissance methods on regeneration coupes with reported stocking (from VicForests' ESS) of 75% or more⁷. These surveys included sampling points located at 50 m intervals on at least 1 km length of in-coupe road, snig track or boundary track. Detailed surveys were conducted on coupes with reported stocking of less than 75% or where coupe conditions meant that this sampling technique was more efficient than the reconnaissance approach (coupes 15 and 22).

Thinning damage and the canopy dominance of retained trees were assessed on six, 6x60 m sampling transects distributed across each of the thinning coupes. This method follows the post-thinning survey method described in NFSG 13 and 14 [5,6]. Residual basal area, outrow width and bay width, which are measured as part of standard post-thinning surveys, were not required for the purposes of this audit and were not measured.

2.2.5 Preliminary reporting of audit results

Audit workbooks were completed in draft form following the coupe file review and field assessment. These draft workbooks included assessments against all applicable criteria and provided a summary of the main instances of non-compliance with audit criteria and areas where further information would assist in clarifying potential instances of non-compliance. An accompanying spreadsheet provided the results of assessments of the risk of harm to the environment resulting from any non-compliance issues.

Draft workbooks were provided to VicForests to allow them to confirm or challenge the audit results, including the risk assessments for instances of non-compliance. Where available, the additional information requested of VicForests was provided at this time.

VicForests' responses and the additional information they provided were considered in finalising the workbooks.

2.3 Risk assessment approach

Two forms of risk assessment were undertaken for instances where audit criteria were not fully satisfied. The first assessment used the FAP's environmental impact assessment (EIA) rating tool [9]. The second form of risk assessment applied the former DSE's Risk Management Framework [10], which is based on the Australian and International Standard for risk management (AS/NZS ISO 31000: 2009 [11]).

2.3.1 Environmental impact assessment tool

The EIA tool [9] considers three factors:

- > Extent of impact or disturbance – based on the percentage of the sampled area or length over which the impact is detected or if the impact results in offsite effects;
- > Duration of impact – the period over which the affected area is expected to recover to pre-impact levels;
- > Environmental asset value – which is defined by the relative environmental value or resilience to impact of the affected area.

The EIA tool scales risk of harm to the environment between *negligible* (short duration impacts within marked harvest area) and *severe* (long term impact in buffers, reserves or off the harvested site). The EIA tool could not be applied to instances where non-compliance with an audit criterion does not directly translate to a risk of environmental harm. Such instances may include non-compliance with criteria relating to planning, monitoring or reporting provisions of the Code or where non-compliance results in reputational or other non-environmental risks. Details of the EIA tool are provided in Appendix B.1.

⁷ Coupe 13, with VicForests' ESS stocking of 74% was assessed using the reconnaissance method due to an oversight by the audit team. The coupe was found to have been satisfactorily regenerated.

This method is recommended for Module 5 audits of harvesting and coupe closure, but has not previously been used in Module 7 audits of coupe regeneration and finalisation. Its use here provides insights into the relative risks of harm to the environment associated with the activities considered in both types of audit.

2.3.2 DSE Risk management framework

The former DSE's Risk Management Framework (Appendix B.2; [10]) is based on the relevant Australian and International Standard (AS/NZS ISO 31000: 2009; [11]). It may be used to assess risks associated with all instances of non-compliance with audit criteria, including those not directly leading to environmental risks or impacts (e.g. those having financial, legal, reputational or safety/wellbeing implications). Use of this framework enables risks associated with non-compliance with the regulatory framework for timber production operations to be evaluated in the same way as other risks faced across the organisation. This provides a basis for risks associated with non-compliance with audit criteria to attract the same level of management attention as other similarly-rated risks faced across the Department.

The former DSE's Risk Management Framework was, with the EIA rating tool, applied to all instances of non-compliance with audit criteria where there was direct potential for risk of harm to the environment. Since the focus of this audit is on risks of harm to the environment, only environmental consequence criteria (and not social, governance or economic criteria; Appendix B.2) were considered during the risk assessment. Non-compliances that did not have direct environmental implications were therefore not assessed.

2.4 Audit team

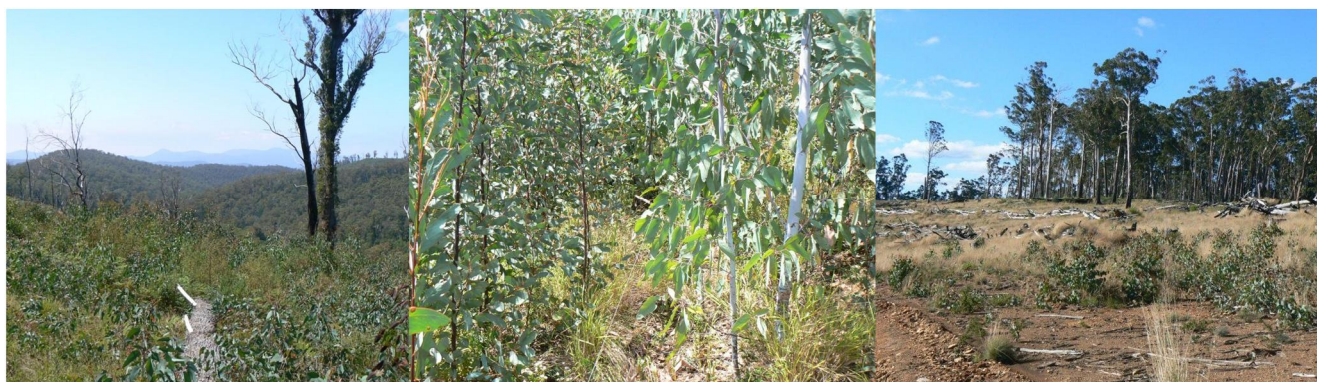
The audit team was led by Craig Clifton, an Environmental Auditor (Natural Resources) appointed pursuant to the *Environment Protection Act 1970*. The support team included:

- > Doris Pallozzi: Project Director and EPA-appointed Environmental Auditor in Industrial Facilities (SKM);
- > Mark Poynter: Forest management specialist (Treepoynt Pty Ltd);
- > Alicia Michael: Terrestrial ecologist (SKM).

3. Regeneration coupes

3.1 Coupe selection and coupe characteristics

Twenty-eight regeneration coupes were selected from the 203 coupes included in VicForests' finalisation list for Central Gippsland, East Gippsland and Tambo FMAs (Table 2). The selected coupes were drawn from five of the six forest types present in coupes on the finalisation list and all of the main forest types. They also included the three main silvicultural systems practiced (clearfell, fire salvage clearfell and clearfell with seed trees retained). The proportion of coupes of each forest type and silvicultural system for the set of audited coupes was broadly representative of the respective FMAs as whole.



Examples of the characteristics of some regeneration coupes included in this audit

The average (eucalypt) stocking reported by VicForests was about 80% for the audited coupes and for each of the three FMAs (Table 2). Only four coupes (in Central Gippsland FMA) were reported in VicForests' finalisation list to have unstocked areas exceeding 1 ha. None of these were included in this audit.

Table 2 Characteristics of core and reserve coupes included in regeneration coupe audits and VicForests' finalisation list for the three FMAs in which the audit was conducted.

	Forest Management Area					
	Central Gippsland		East Gippsland		Tambo	
	Finalisation	Audit	Finalisation	Audit	Finalisation	Audit
# coupes in each forest type						
Alpine Ash predominant	68	8	3		13	4
Coastal mixed species			27	4		
Foothill mixed species	4	1	43	5	2	
Mountain mixed species	2	1	23	4	2	
Mountain Ash predominant	10	1			4	
Shining Gum predominant	2					
Total	86	11	96	13	21	4
# coupes in each silvicultural system						
Clearfell	28	4	2		13	3
Clearfell-fire salvage	57	6	17	3	6	1
Seed trees retained	1	1	77	10	2	
Average coupe area (ha)	16.9	21.7	22.7	22.1	22.8	20.8
Average stocking %	81%	81%	79%	80%	82%	77%
# coupes with unstocked area >1 ha	4	0	0	0	0	0

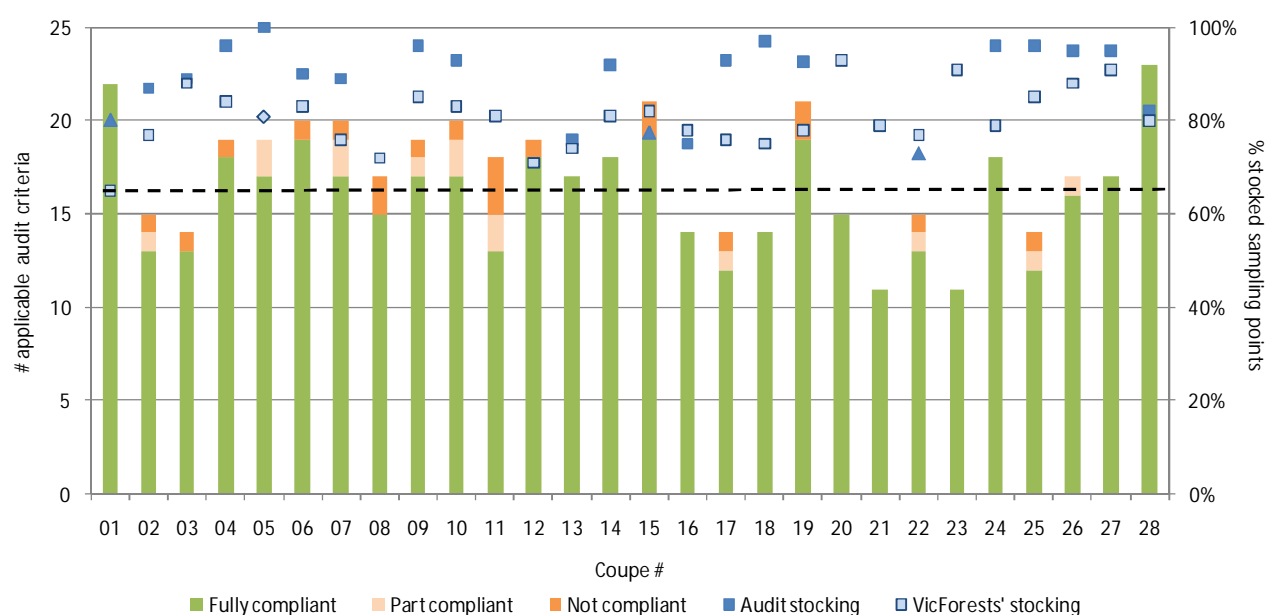
Coupe files and other relevant documentary evidence were reviewed for all of the selected coupes, including the nominated reserve coupes. Reserve coupes were only assessed in the field if the originally selected coupes could not be audited. Two of the initial core set of coupes could not be accessed at the time of the audit. This was due to either road closures associated with the Harrietville bushfire [coupe 11] or the removal or culverts to prevent general public access to the area of forest in which the coupe was located [coupe 12]). They were replaced in the core set of coupes by reserve coupes 08 and 13, which were from within the same FMAs.

3.2 Compliance with audit criteria

Regeneration coupes were audited against 31 criteria that are based on relevant Code prescriptions (Appendix A). No more than 23 audit criteria were applicable to an individual coupe (Figure 3) and only 25 of the 31 audit criteria were applicable to the coupes selected for this audit.

Audited coupes were found to fully comply with 93% of applicable criteria and partly comply with a further 3% of applicable criteria. All of the audited coupes fully complied with seven of the criteria (2, 3, 4, 5, 8, 24 and 25; Appendix A). A further seven criteria were fully satisfied by all of the coupes for which they were applicable.

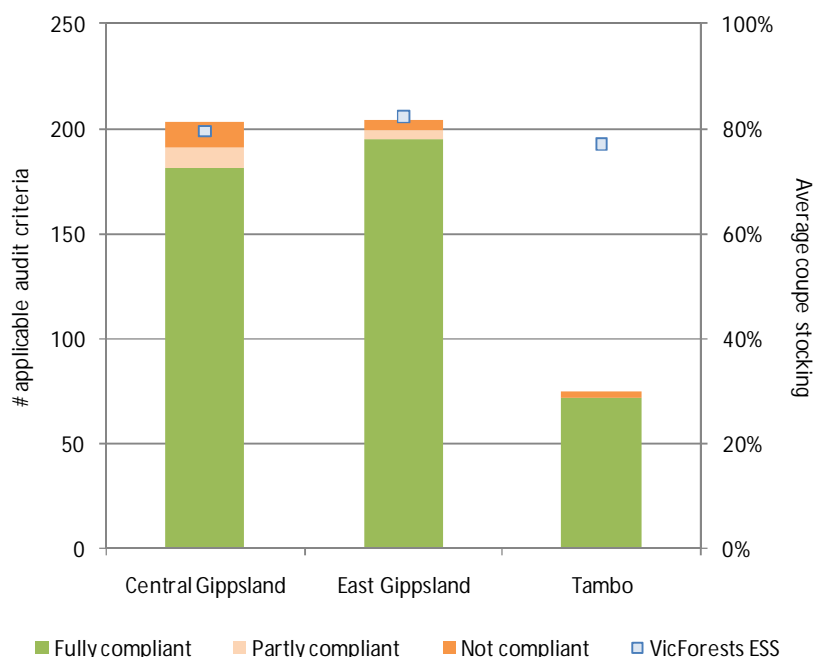
Compliance with applicable audit criteria varied between coupes (Figure 3). At the extremes, 11 coupes were found to fully comply with all applicable criteria and one coupe complied with less than 80% of applicable criteria (coupe 11). An analysis of criteria for which non or partial compliance was detected is provided in Appendix C.1.



Note: Solid blue triangles flag the audit coupes for which stocking was assessed using a detailed, rather than reconnaissance survey. Reserve and inaccessible coupes in which field assessments were not carried out only have results for VicForests' ESS. All VicForests' ESS results are based on a standard survey (80x20 m grid), with the exception of coupe 05 (diamond symbol). The stocking result for this coupe is based on the results of an intensive ESS (40x20 m grid). The black dashed line represents the minimum acceptable stocking for a regeneration coupe, based on a standard (80x20 m) ESS [11]

Figure 3 Compliance with audit criteria in regeneration coupes and results from audit and VicForests' stocking surveys.

Compliance with audit criteria varied slightly between FMAs. Audited coupes in Central Gippsland FMA fully complied with 89% of applicable audit criteria and those in East Gippsland and Tambo FMAs fully complied with 96% of applicable criteria (Figure 4). Differences between FMAs in the level of full compliance were not statistically significant.



Note: Coupe stocking is based on VicForests' ESS results. With the exception of one coupe (in Central Gippsland FMA), the results are based on standard sampling grids (80x20 m). Since the sampling methods differed among audited coupes, an average stocking for each FMA could not be calculated.

Figure 4 Compliance with audit criteria in regeneration coupes and average stocking rate from audited coupes in FMA from VicForests' established seedling surveys (ESS).

3.3 Environmental risk resulting from non-compliance with audit criteria

Where possible, risk of harm to the environment was assessed for all instances of non or partial compliance (Figure 5), using both the FAP's EIA rating tool (Appendix B.1) and the former DSE's Risk Management Framework (Appendix B.2). Environmental impact or risk assessments were not applicable to many of the instances of non-compliance as they did or could not directly lead to an environmental risk or impact.

Seven incidents (sometimes comprising multiple instances of non-compliance with audit criteria) were identified where an EIA rating was applicable. Three of these (each associated with a different coupe) were found to pose a material environmental risk.⁸

- > Coupe 09: where rough heaping in one part of the coupe led to a windrow with soil and logging debris being pushed into the head of a drainage line. The coupe was assessed to only partly comply with criterion 15 and be inconsistent with the Code requirement (section 2.3.1) to undertake mechanical disturbance to assist in coupe regeneration "*with due consideration of erosion risk potential and proximity to waterways*". A site preparation plan had been developed to guide rough heaping operations on this coupe. A major EIA rating was given because of the potential for off-site impact on water quality values. This is considered to overstate the environmental significance of the incident.
- > Coupe 17: where an attempt was made to rehabilitate the landing, but was not considered to provide suitable conditions for regeneration and regrowth (as required by section 2.5.3 of the Code). While the coupe as a whole has been successfully regenerated, the whole of the landing has not been. A moderate EIA rating was assessed for this incident.
- > Coupe 26: where the regeneration burn caused crown scorch in vegetation along a ridge line that was excluded from harvesting. The affected trees had epicormic shoots and were recovering from the effects of scorch at the time of the field audit. A burn plan was prepared for the coupe, approved by DSE and executed and hence the requirements of the Code (section 2.3.1; that "*all practicable measures must be*

⁸ Following the practice of the 2012-13 Module 5 audit of harvesting and coupe closure [7], a material environmental risk was considered to occur where the EIA rating was moderate, major or severe.

taken to protect all areas excluded from harvesting from the impacts of fire”) were presumably met. However, the intent of the Code that exclusion areas are protected from impacts of regeneration burning has not been satisfied. The major EIA rating for this non-compliance is consistent with the way similar issues were dealt with in the 2012-13 Audit of harvesting and coupe closure [8].



Examples of non-compliance with audit criteria that were assessed to pose material environmental risk: a) placement of a rough heap in the head of a drainage line on coupe 09; b) crown scorch to an unharvested area adjacent to coupe 26 that resulted from planned regeneration burning.

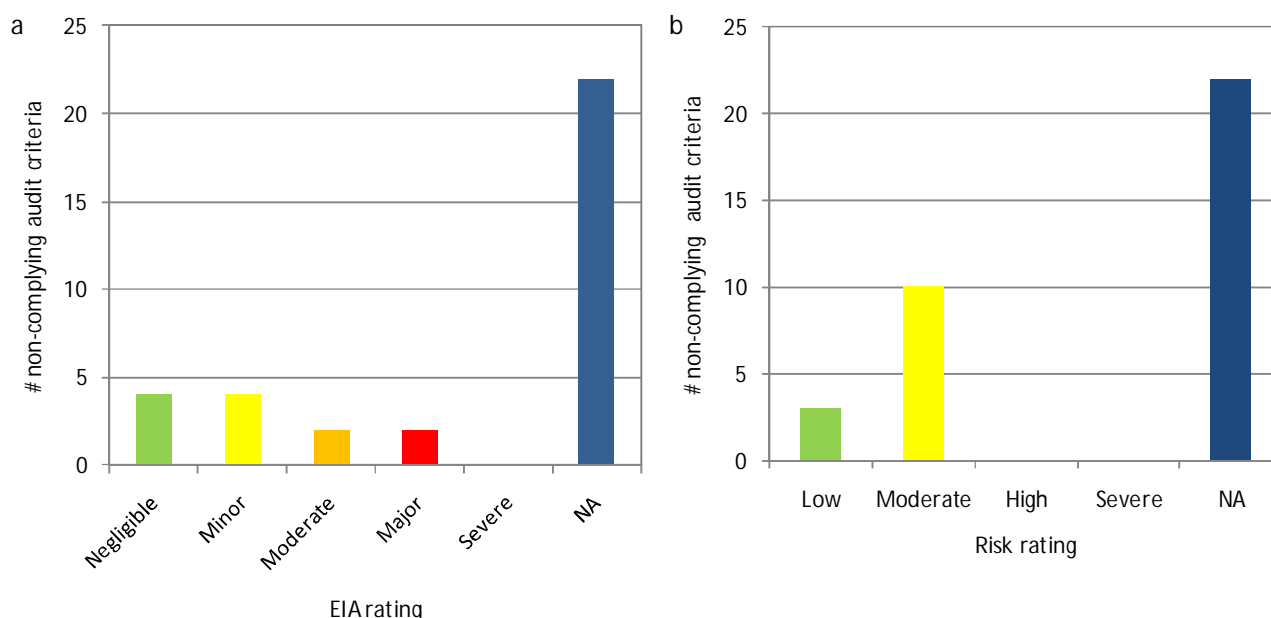


Figure 5 Assessments of environmental risk resulting from non-compliance with audit criteria for regeneration coupes, using a) EIA rating tool and b) DSE's risk management framework.

DSE's Risk Management Framework was also used to assess risk associated with each applicable instance of non-compliance with audit criteria⁹. Six of the nine non-compliances to which DSE's Risk Management

⁹ There were 15 such instances, three more than for the EIA rating tool. The EIA rating tool was not considered to be suitable for assessing environmental risk arising from non or partial compliance with criterion 7, "All tree species originally present on coupe have been successfully regenerated to the composition and spatial distribution of canopy species common to the coupe prior to harvesting", because the extent of impact could not be unambiguously determined (see Appendix B.1). The former DSE's Risk Management Framework was considered to be suitable for non-compliance with this audit criterion.

Framework was applied were assessed to pose a moderate risk to the environment. None of the non-compliances were assessed to have a high or severe risk rating. Moderate environmental risk was assessed for six incidents, as follows:

- > Coupes 02, 17, 22 and 25: where at least one of the landings on the coupe appear not to have been rehabilitated to the extent that they provide suitable conditions for regeneration. As noted above, this is not consistent with section 2.5.3 of the Code. Regrowth on at least parts of these landings was observed to be poor and further rehabilitation works were considered to be necessary if the landings were to satisfy the requirements of the Code. In each case, the stocking of the coupe as a whole was found to be acceptable.
- > Coupe 09: where (as described above) a windrow with soil and logging debris appeared to have been pushed into the head of a drainage line during rough heaping operations. The operation was subject to a site preparation plan, however the coupe was assessed to not fully comply with criterion 15. The risk to off-site water quality values added to the risk rating.
- > Coupe 26: where (as described above) the regeneration burn has scorched the canopy of some trees in an exclusion area along a ridge line that sits above the coupe. Although a burn plan was prepared and executed, the requirement of the Code - to protect areas excluded from harvesting from the effects of fire – has not been fully satisfied.

The moderate risk ratings applying to the non-compliances observed on coupes 09 and 26 are considered to more accurately reflect risk of harm to the environment than the major EIA ratings.

The incidents discussed in this section pose or have potentially posed risks to the beneficial uses which are implicit in the objectives of the *Sustainability Charter for Victoria's State Forests* [2], including the maintenance and conservation of biodiversity, production of wood and the generation of clean water. They are therefore relevant to the scope of this audit.

3.4 Coupe stocking

Stocking was assessed by VicForests prior to the coupes being nominated for finalisation. The assessed stocking on all of the audited coupes was greater than 65%, which is the lower limit specified in the NFSG for satisfactory stocking from standard (i.e. 80x20 m sampling grid) ESS ([12]; Figure 3). The average assessed stocking was 80%.

None of the audited coupes were identified as having unstocked areas greater than 1 ha, although lightly stocked areas of this size or greater were observed at several coupes. The ESS for three of the audited coupes (05, 20 and 25) did not locate seedlings of all of the species identified on the coupe prior to harvest, although it was noted that the “missing” species were uncommon on the coupe prior to harvest. VicForests did not record trees of the missing species being harvested on coupes 20 and 25, suggesting that they were most likely not present within the harvested areas and so were not required to be regenerated.

Coupe stocking assessments were included in the field assessment component of the audit. Reconnaissance or detailed sampling methods were used (Appendix A), depending on VicForests' stocking assessments and the configuration of the coupe. These assessments confirmed that all of the audited coupes were adequately stocked (Figure 3). No unstocked areas of 1 ha or more were identified. The species not detected in the ESS for coupe 05 and 25 were also not detected in the field assessment¹⁰.

3.5 Repeated non-compliances without direct risk of harm to the environment

Non or partial compliance was consistently recorded for several audit criteria for which there were no direct environmental risk implications. In some cases these represented a direct procedural breach of Code requirements and in other cases insufficient evidence was available to confirm compliance with Code requirements.

¹⁰ Coupe 20 was a reserve coupe and not included in the field assessment component of the audit. It was therefore not possible to confirm the presence of the species not detected in VicForests' ESS.

Criteria for which there were repeated instances of non-compliance included:

- > *Criterion 1. FCP describes regeneration procedures applied to coupe and identifies requirements for the rehabilitation of infrastructure:* copies of the silvicultural decision support system (DSS) that provides a decision tree for coupe regeneration were either not present or incomplete for four of the audited coupes. While experienced silvicultural foresters have most likely memorised the regeneration decision trees for the forest types in which they work, the Code requires that the FCP describe the regeneration procedures that are to be applied (section 2.1.3) and that the silvicultural methods for regeneration be appropriate for the forest type (section 2.3.1). Coupe files lacking completed versions of the DSS did not satisfy these Code requirements.
- > *Criterion 13. Measures were undertaken to manage erosion risk and potential sediment movement to waterways in coupes with mechanical disturbance:* site plans for rough heaping operations are taken to demonstrate that appropriate planning is in place to avoid risks of erosion and sediment transport to waterways. Three of the 15 coupes on which rough heaping was used to encourage regeneration did not have site preparation plans. These coupes therefore could not demonstrate, as required by the Code (section 3.2.1), that due consideration had been given to the risk of erosion and proximity of waterways during mechanical disturbance for regeneration.
- > *Criterion 14. Effectiveness of erosion control measures was assessed:* coupe files for eight of the 15 coupes in which rough heaping operations were carried out did not have adequate evidence that the implementation and effectiveness of the site preparation plan in mitigating risks to soils and water quality had been assessed. In conjunction with the site preparation plan, monitoring and reporting on the effectiveness of erosion control measures used to manage risks from mechanical disturbance potentially form an important evidence base to demonstrate that the Code requirement to “give due consideration ... to the risk of erosion and proximity of waterways during mechanical disturbance” (section 2.3.1) has been satisfied.

Recommendation 3.1

It is recommended that site preparation monitoring records be completed for all rough heaping operations and that the records are retained in coupe files to demonstrate that the effectiveness of measures used to manage the risk of sediment transport to waterways has been assessed.

- > *Criterion 30. Rehabilitation of coupe infrastructure has been assessed within three years of initial treatment:* this criterion was considered to be satisfied where the final clearance coupe monitoring record confirmed that landings and snig tracks had been appropriately rehabilitated. For four coupes with landings, the entry for rehabilitation of landings was “n/a” and hence they were assessed to not comply with this criterion, as there was no evidence to assess compliance with the Code requirement (section 2.5.2) to assess the rehabilitation of coupe infrastructure within three years of initial treatment.

It is the auditor's view that confirming that coupe infrastructure has been treated in coupe monitoring records does not strictly comply with the requirements of the Code or this audit criterion. The Code (section 2.5.2) requires that rehabilitation be assessed and, where it is inadequate, that remedial action is taken. This is interpreted to require that rehabilitation is attempted and that its success is assessed and reported.

Recommendation 3.2

It is recommended that coupe monitoring records be extended to specifically include the assessment and reporting of the effectiveness of coupe infrastructure rehabilitation. This assessment should be conducted by VicForests between one and three years after harvesting has been completed and during coupe finalisation rather than at coupe closure.

The recommended monitoring could be undertaken as part of each regeneration coupe's ESS.

3.5.1 Positive observations of VicForests' regeneration operations

VicForests' regeneration coupes included in this audit complied with 93% of applicable audit criteria. Less than one third of the 34 instances of non-compliance were assessed to have the potential to directly lead to environmental harm.

All of the audited coupes were successfully regenerated and the infrastructure stabilised so that there was no movement of sediment to nearby watercourses. On only one of the 28 audited coupes was there evidence that regeneration operations (in this case, regeneration burning) had actually adversely affected areas outside the harvested coupe boundary.

4. Thinning coupes

4.1 Coupe selection and coupe characteristics

Seven thinning coupes (including three reserve coupes) were selected from the 29 thinning coupes in VicForests' finalisation list that were located in East Gippsland and Tambo FMAs¹¹ (Table 3). The selected coupes were located in East Gippsland and Tambo FMAs and were managed under the thinning from below silvicultural system. Thinning coupes in East Gippsland FMA were located in four forest types, including Alpine Ash predominant and coastal, foothill and mountain mixed species. Thinning coupes in Tambo FMA were all located in the Alpine Ash predominant forest type. The coupes that were selected for audit were located in all of these forest types except coastal mixed species. The distribution between forest types approximated that of coupes in the handback list (Table 3).

Table 3 Characteristics of core and reserve coupes included in thinning coupe audits and VicForests' finalisation list for the two FMAs in which audits of thinning operations were conducted.

	Forest Management Area			
	East Gippsland		Tambo	
	Finalisation	Audit	Finalisation	Audit
# coupes in each forest type				
Alpine Ash predominant	4 ¹	1	3	2
Coastal mixed species	3			
Foothill mixed species	13	3		
Mountain mixed species	6	1		
Total	26	5	3	2
Average coupe area (ha)	32.7	35.4	18.6	15.0
Average % trees with thinning damage	12.2%	15.4%	12.0%	12.3%

1. One of the coupes included Alpine Ash predominant and mountain mixed species forest types.

The average size of thinning coupes in VicForests' finalisation list was 32.7 ha in East Gippsland FMA and 18.6 ha in Tambo. The average size of audited coupes was greater than the finalisation list average for East Gippsland and smaller than the average for Tambo FMA (Table 3). Average damage levels to retained trees was about 12% in both FMAs, with the average in audited coupes, particularly those in East Gippsland FMA, being a little greater. The average level of thinning damage to retained stems in audited coupes located in East Gippsland FMA coupes (15.4%; Table 3) exceeds the acceptable level of 15% specified in the NFSGs for thinning native forests [4, 5].

Coupe files and other relevant documentary evidence were reviewed for all of the selected coupes, including the three nominated reserve coupes. None of the reserve coupes were required for the field component of the audit.

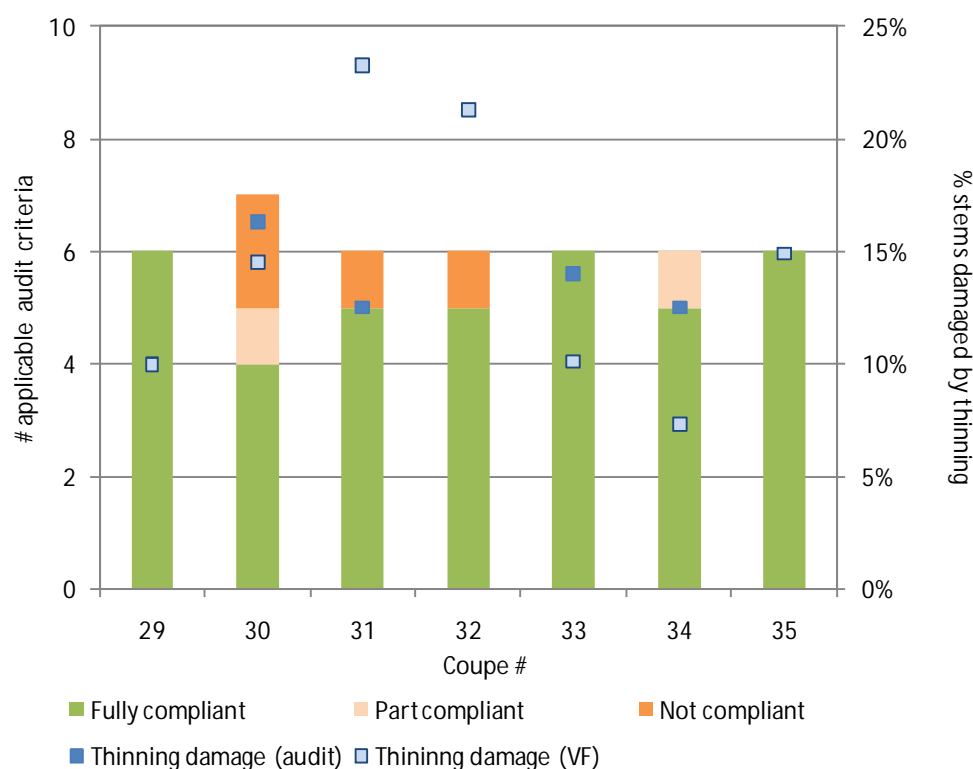
4.2 Compliance with audit criteria

Thinning coupes were audited against just eight criteria based on relevant Code requirements. It was not possible to apply all criteria to each coupe. All of the thinning coupe criteria were able to be assessed for one or more of the audited coupes. No more than seven of the eight audit criteria were applicable to any individual coupe (Figure 6).

Audited coupes were found to fully comply with 86% of applicable criteria and partly comply with a further 5% of applicable criteria. All of the audited coupes fully complied with five of the eight criteria (1, 2, 4, 5 and 7; Appendix A). Compliance with the applicable audit criteria varied between coupes (Figure 6). Three coupes

¹¹ There were no thinning coupes nominated for finalisation and handback in Central Gippsland FMA in 2012-13.

were found to fully comply with all applicable criteria. Coupe 30 fully complied with only four of the seven applicable criteria. An analysis of criteria for which non or partial compliance was detected is provided in Appendix C.2.



Note: Coupes 29, 32 and 35 were reserve coupes. No audit assessments of thinning damage were undertaken on these coupes.

Figure 6 Compliance with audit criteria in thinning coupes and results from audit and VicForests' surveys of damage from thinning operations sustained by retained trees.

4.3 Environmental risk resulting from non-compliance with audit criteria

Risk of harm to the environment was assessed for all instances of non or partial compliance with audit criteria (Figure 7), using both the FAP's EIA rating tool (Appendix B.1) and the former DSE's Risk Management Framework (Appendix B.2). Environmental impact or risk assessments were applicable to all six instances of non or partial compliance with audit criteria. Four such instances were assessed, using the FAP's EIA tool, to pose a material environmental risk¹². Each instance related to individual incidents on four coupes:

- > Coupe 30: the audit found that thinning damage to retained stems was 16.3% and exceeded the acceptable limit of 15% prescribed by NFSG 14 [5]. This was slightly higher than the level of damage detected in VicForests' post-thinning surveys (14.5%), although the difference is within sampling uncertainties.
- > Coupe 31: the coupe was found to have experienced excessive damage as a result of the thinning operation (criterion 3). This included damage sustained by retained trees due to the thinning operations, as well as post-thinning windthrow of retained trees. VicForests' post-thinning survey found that 23.3% of retained stems had been damaged by thinning operations. The rate of damage identified during the audit was less (12.5%) and within the prescribed level. However, much of the coupe could not be sampled during the field assessment due to the extensive windthrow of retained trees.

This coupe was severely affected by windthrow following completion of the thinning operation. At least half of the retained trees were affected in the parts of the coupe that were most exposed to the storm event.

¹² As for regeneration coupes and following the practice of the 2012-13 Module 5 audit of harvesting and coupe closure [7], a material environmental risk was considered to occur where the EIA rating was moderate or higher.

While windthrow was the result of a natural phenomenon, its extent appears to have been significantly exacerbated by the instability caused by thinning. Windthrow damage occurred despite VicForests' thinning operation appearing to have been conducted to achieve residual stocking levels which were consistent with the relevant NFSG (i.e. in terms of the retained basal area and widths of bay and harvested outcrops).

- > Coupe 32: VicForests' post-thinning survey found that average thinning damage was 21% on this coupe, which is outside the acceptable range prescribed by the NFSG for thinning in mixed species forest. As this was a reserve coupe, thinning damage was not verified during the audit.
- > Coupe 34: This coupe also sustained significant damage from windthrow, presumably during the same storm event that affected coupe 31. Windthrow reduced the retained basal area of the stand and its overall productive capacity, although its impact was considerably less than on coupe 31. Again, the windthrow occurred despite the thinning operation having achieved residual stocking levels which were consistent with the relevant NFSG.

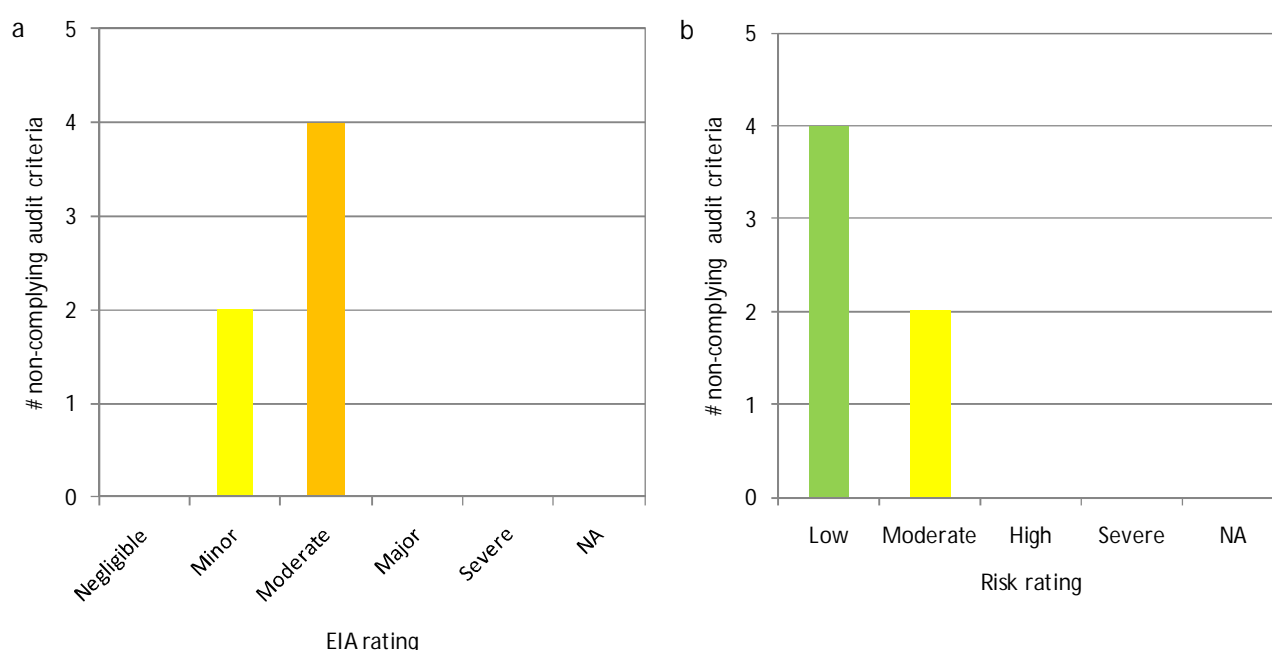


Figure 7 Assessments of environmental risk resulting from non-compliance with audit criteria for thinning coupes, using a) EIA rating tool and b) DSE's risk management framework.

The former DSE's Risk Management Framework found that only two of the six non-compliances posed a material (in this case moderate) risk of harm to the environment. These related to the incidents referred to (above) on coupes 31 and 34.

The four incidents referred to above pose risks to beneficial uses which are implicit in the objectives of the *Sustainability Charter for Victoria's State Forests* [2], including the production of wood and maintenance of global carbon cycles (section 2.1.4) and are therefore relevant to the scope of this audit.

4.4 Damage to retained trees from thinning

Damage sustained by retained trees during thinning and various other attributes of the thinned coupes were assessed by VicForests prior to their being nominated for finalisation. The assessed level of damage exceeded the acceptable limit (of 15%) specified in NFSG 13 and 14 (for Ash and mixed species forests, respectively) in two of the seven audited coupes and was between 14 and 15% for two other coupes (Figure 6). The audit found that more than 15% of retained trees were damaged on only one coupe (30). VicForests assessed damage to be 14.5% on this coupe.

According to VicForests' post-thinning surveys, seven of the 30 thinning coupes nominated for handback recorded thinning damage rates of 15% of retained trees or more.

4.5 Positive observations of VicForests' thinning operations

Thinning operations in the audited coupes fully complied with 86% of applicable criteria. The operations were conducted in ways that minimised soil disturbance during harvesting (including the use of cording on outrows and some extraction tracks). There was no evidence that the operations had infringed on or otherwise affected areas that were excluded from harvesting.

5. Discussion

5.1 Windthrow observed at thinning coupes

Two of the East Gippsland thinning coupes (31 and 34) that were included in the field audit were found to have sustained significant losses of retained trees due to windthrow. The damage was most likely due to a storm in early June 2012 which produced very strong winds and over 90 mm of rain in a single day¹³ (measured at Orbost).

The damage caused by this disturbance was particularly severe at coupe 31, with at least half of the retained trees being uprooted or otherwise damaged in the most exposed sections of the coupe. The extent of damage to coupe 31 and parts of coupe 34 were such that their health and (particularly) future productive capacity are likely to have been significantly diminished. The current stocking on coupe 31 may limit its future viability as a harvest coupe under the proposed rotation length. This coupe also had a large volume of fallen timber that may be suitable for salvage.

Coupes 31 and 34 were considered not to comply with criterion 3 of workbook 7B, that “*excessive damage from thinning does not detract from the health of retained trees or pose a risk to the stand*”. While the damage experienced by the coupes was the result of the storm, it appears to have been exacerbated by the thinning operations. Adjacent unharvested stands sustained much less windthrow damage during these events than thinned coupes. The auditor notes that this damage occurred despite thinning operations being conducted to standards that were consistent with the relevant NFSG¹⁴.

While the coupes were assessed to not comply with the audit criterion and underpinning Code definition, it was not as the result of direct action by VicForests or their contractors. Regardless of responsibility, the effects of this disturbance event should be addressed to ensure the on-going health, timber production and carbon sequestration capacity of the affected stands.

The June 2012 storm event was widespread and was observed to have also contributed to windthrow of retained seed and habitat trees in clearfell harvest coupes included in the FAP Module 5 audit of harvesting and coupe closure [7]. The widespread nature of the storm means that it may also have affected other thinning coupes in the East Gippsland region, particularly those including exposed ridgelines and having only been thinned in the 12 months preceding the storm.

The damage sustained by these and, potentially, other thinning coupes during the June 2012 storm poses a risk of harm to the beneficial uses of State forest environments. The relevant beneficial uses of State forest include the production of wood and maintenance of global carbon cycles (section 2.1.4). While risks to wood production and carbon cycles at the scale of the East Gippsland FMA or State of Victoria are small, they are relevant to this audit.

The extent of windthrow damage on coupes that complied with NFSG standards for retained stocking raises questions about both the appropriateness of those standards and of the suitability of thinning operations on highly exposed ridges (such as coupe 31). Thinned stands are inherently unstable for some time after harvesting. Windthrow events and the associated reduction in productive capacity and disruption in harvest cycles are likely to be relatively common occurrences where storms that combine heavy rainfall and high winds are regular features of the local or regional climate.

Thinning, at least to NFSG standards for retained basal area, may not be economically or silviculturally viable in highly exposed locations due to the high risk of windthrow during a severe storm. It is recommended that DEPI commission an investigation into windthrow impacts on thinned stands and how they may be reduced. The

¹³ Bureau of Meteorology data for Orbost meteorological station: <http://www.bom.gov.au/climate/dwo/201206/html/IDCJDW3062.201206.shtml> Accessed 21/3/2013. Other stations in the East Gippsland region (Mt Nowa Nowa, Gelantipy, Combienbar, Mallacoota) recorded similar and in some cases more extreme wind gusts (>70 km/h) and daily rainfalls for 4-6th June 2012.

¹⁴ Removed and retained basal area, bay and outrow width for coupes 31 and 34 that were reported by VicForests in their post-thinning assessments were within the range specified by NFSG 14 for mixed species forests.

investigations should assess the suitability of current NFSG thinning standards and of thinning operations for highly exposed locations and include an economic analysis of thinning that considers productivity and other risks resulting from windthrow events. The assessment should also consider the risk of harm to the environment and beneficial uses of State forest that may be posed by post-thinning windthrow events.

Recommendation 5.1

It is recommended that DEPI commission an assessment of the impacts of windthrow on the productivity and environment of thinned stands and the economic viability of thinning. The investigation should also consider how windthrow impacts may be reduced.

5.2 Audit findings

5.2.1 Risk of harm to the environment

Risk of harm to the environment from non-compliance with audit criteria was assessed using DSE's Risk Management Framework and the FAP's EIA rating tool. Non-compliances assessed through this audit that pose a material risk of harm¹⁵ to the environment comprised just 1% of all applicable audit criteria for regeneration coupes and either 5% or 9% of applicable criteria for thinning coupes (for EIA rating and DSE Risk Management Framework, respectively).

The issues that contributed to material environmental risk included:

- > A single incident where a part of windrow was pushed into the head of a drainage line during rough heaping operations. In the immediate aftermath of rough heaping, this would have posed a risk to off-site water quality from the mobilisation of sediment incorporated into the windrow. This risk has diminished to negligible levels currently, as the coupe has regenerated and soil in the windrow has been stabilised by vegetation regrowth.
- > Six clearfell coupes and one thinning coupe where landings or log handling areas were not rehabilitated effectively following the completion of harvesting and did not provide suitable conditions for regrowth of at least the understorey vegetation, as is required by the Code.
- > A single incident where the crowns of trees in an unharvested area adjoining a coupe were scorched during regeneration burning. While measures were taken by VicForests to avoid this outcome, as required by the Code, the objective to protect such areas from fire used in regeneration was not fully achieved.
- > Several coupes where the damage sustained by retained trees during thinning exceeded acceptable levels and posed a risk to the on-going health and productive capacity of the stand.
- > Two instances where post-thinning windthrow reduced retained stocking in coupes to the extent that their health and productive capacity are likely to have been significantly diminished. These incidents were the unfortunate result of extreme weather conditions coinciding with the period during which thinned stands are highly vulnerable to windthrow rather than harvesting practice that did not comply with the Code.

Only two of these incidents, the formation of a windrow in a drainage line during rough heaping and scorching the crowns of trees in exclusion areas during regeneration burning, were the result of actions directly relating to coupe regeneration and finalisation. Risks or impacts associated with both non-compliance issues were relatively confined in both time and space. With these exceptions, non-compliances posing environmental risk reflected management of the harvesting and coupe closure process rather than regeneration and finalisation¹⁶.

On this basis, it is considered that coupe regeneration and finalisation activities do not pose an unacceptable risk of harm to the environment.

¹⁵ As previously noted, material risk of harm is indicated from moderate or higher risk rating under DSE's Risk Management Framework and moderate or higher EIA rating.

¹⁶ As these are comprehensively assessed in Module 5 audits conducted under the FAP, no comment is made here on whether timber harvesting and coupe closure pose unacceptable risks of harm to the environment.

The windthrow damage identified on two of the audited thinning coupes and other observations suggests that thinning poses localised risks to some beneficial uses of State forests, even where thinning operations comply with the Code and NFSGs. Until a more comprehensive assessment of windthrow damage on thinning coupes is undertaken (see Recommendation 5.1), it is not possible to provide a definitive comment on whether these risks are acceptable.

5.2.2 Handback of regeneration coupes to DSE

The audit included 28 of the 281 regeneration coupes nominated by VicForests for handback to DEPI. All of the regeneration coupes included in the audit were stocked to an acceptable level and confirmed as retaining all main tree species that were present prior to harvest. In most cases, stocking surveys also confirmed that uncommon species originally found on the coupe were also present in the regenerating stand.

VicForests' finalisation report to DEPI identified five coupes among the remaining 253 coupes whose stocking does not appear to comply with the standards prescribed in NFSG 10:

- > Coupe R193: whose reported stocking from an "extensive" ESS is 57% and hence unsatisfactory. Additional information provided by VicForests indicates that the reference to an "extensive" survey was incorrect. The survey was actually "intensive" (40x20 m or closer) and satisfied the prescribed standard.
- > Coupes R153, R159, R203 and R206, which were reported to have unstocked areas of between 1 and 2 ha in area. VicForests' ESS reports for these coupes assert that remedial works to improve stocking in these areas could not be undertaken without posing undue risk to adjacent regrowth. The auditor agrees with this conclusion and does not consider that further effort be undertaken to improve stocking in these coupes.

Parts of the landings of six of the audited coupes were found not to have been successfully rehabilitated at the time of the audit. The affected areas were less than 1 ha and so pose little threat to the productive capacity of the regenerating stand. It was considered that they were likely to be slowly recolonised by understorey and overstorey species as the stand redevelops. Despite not providing suitable conditions for regeneration (as required by the Code), it is not considered that further work to rehabilitate the landing is required.

On the basis of the above discussion, it is recommended that all regeneration coupes nominated by VicForests for handback be accepted.

Recommendation 5.2

It is recommended that DEPI accept all of the regeneration coupes nominated by VicForests for handback.

5.2.3 Handback of thinning coupes to DSE

The level of damage to retained trees during thinning is high, with VicForests reporting that 23% of thinning coupes proposed for handback exceeded the prescribed standard (NFSG 13 and 14) of no more than 15% of trees damaged. However, since such damage cannot be remediated, it should not prevent the finalisation and handback of such coupes.

As previously discussed, two of the three East Gippsland thinning coupes included in the field component of this audit were found to have sustained significant windthrow damage. This appears to have been due to the unfortunate coincidence of a severe storm in June 2012 with the period of vulnerability to windthrow of recently thinned stands. The third coupe had been thinned earlier than the other two coupes and it is assumed that as a result, the retained trees were more stable at the time of the storm and sustained little damage. It is considered to be likely that at least some of the other East Gippsland thinning coupes nominated for handback to DEPI would also have sustained some damage from the June 2012 storm.

However, as there is no suggestion that the windthrow damage resulted from the thinning operations not complying with the Code or NFSG standards, it should not prevent these coupes from being finalised. The only coupes that would not be accepted for handback would be any East Gippsland thinning coupes on which salvage harvesting operations were to be conducted. At this stage, VicForests is understood to have no plans to undertake salvage harvesting on any of the East Gippsland thinning coupes proposed for handback to DEPI.

Coupe 30 was found to have an unrehabilitated log handling area that is not compliant with the Code (section 4.2). However this affects only a relatively small area, which should progressively revegetate as the bark decomposes. This non-compliance also need not delay hand back.

It is proposed that all thinning coupes be accepted for handback.

Recommendation 5.3

It is recommended that DEPI accept all of the thinning coupes nominated by VicForests for handback.

5.3 Findings of the previous Module 7 audit of coupe regeneration and finalisation

Machinery of government changes in 2012 reduced the scope of the former DSE's policy interests and responsibilities in relation to coupe regeneration and finalisation. As a result, the scope of the current audit is significantly reduced from the previous FAP Module 7 audit of coupe regeneration and finalisation [4] and not all of its findings are relevant here.

Relevant non-compliance issues, audit findings and recommendations from the 2011-12 FAP audit of coupe regeneration and finalisation are given in Table 4. These are accompanied by brief discussions that are based on reflections from the current audit.

Table 4 Summary of key findings from 2011-12 FAP Module 7 audit of coupe regeneration and finalisation and their relevance to the current audit.

2011-12 Module 7 audit findings	Reflections from 2012-13 Module 7 audit
Non-compliance issues with material environmental risk in 2011-12 audit (medium or higher risk rating)	
Regeneration burns escaping control lines and affecting unharvested areas	<p>Regeneration burns in three of the coupes included in the 2011-12 audit were reported to have escaped control lines.</p> <p>While none of the regeneration burns carried out in coupes included in the current audit were reported to have escaped control lines, the regeneration burn on coupe 26 scorched the crown of trees in an exclusion area along a ridge above the coupe. In all cases, regeneration burns were subject to Burn Plans, as required by the Code (section 2.3.1). However the problematic burns (in coupe 26 and those highlighted above from the 2011-12 audit) still posed threat to areas outside the harvest boundary, an outcome that is not consistent with the relevant section of the Code.</p>
Non-compliance issues with low environmental risk rating in 2011-12 audit	
Coupes not being regenerated to a standard consistent with NFSG 10	<p>A single coupe was found in the 2011-12 audit to have an understocked area greater than 1 ha. The location of this area and the advanced state of regeneration on the remainder of the coupe mean that it was not appropriate to attempt to encourage further eucalypt regeneration.</p> <p>All of the coupes included in the 2012-13 audit were found to have been successfully regenerated. Four of the (281) coupes nominated for finalisation are reported by VicForests to have areas greater than 1 ha that are unstocked. As was the case with the 2011-12 example, it is considered that further disturbance to promote regeneration on these coupes is not warranted, given the risk of damage to regrowth in adjacent areas.</p>
Remedial work undertaken to achieve acceptable stocking in regeneration coupes	<p>This non-compliance refers to the coupe discussed above (with an understocked area > 1ha). Remedial action was (justifiably) not undertaken in this coupe to improve stocking in this area.</p> <p>Remedial work was undertaken on several audited coupes following poor results from preliminary, reconnaissance or established seedling surveys. This work was successful on all of the audited coupes and no further action was required.</p>

2011-12 Module 7 audit findings	Reflections from 2012-13 Module 7 audit
Retention of original species following thinning	<p>Discrepancies in the species composition of some of the audited thinning coupes were observed in the 2011-12 audit. In two cases, species that were originally present in the coupe were uncommon following thinning.</p> <p>ESS for three of the 2012-13 audited coupes did not located individuals of all eucalypt species identified on the coupe prior to harvest. However each of the species was uncommon prior to harvest and may not have been located within the harvested area.</p> <p>No discrepancies in the species present in thinning coupes were observed in the current audit.</p>
Thinning operations do not meet the standards required by NFSG 13 and 14.	<p>The 2011-12 audit found that four of the five audited thinning coupes did not fully comply with thinning standards from the NFSG in terms of the extent of damage to retained trees, basal area retained and removed and outrow and bay width.</p> <p>Only the extent of thinning damage to retained trees was considered in the current audit. It was found to be excessive (in either VicForests' survey or the field assessment undertaken for this audit) in three of the five audited (core and reserve) coupes and in seven of the 30 coupes proposed for handback.</p>
Procedural and other non-compliance issues with no direct environmental risk	
Assessment of impact of regeneration burning on areas excluded from harvesting	<p>On one of the coupes audited in 2011-12 there was no evidence that the impact of an escaped regeneration burn had been assessed.</p> <p>The regeneration burn on coupe 26 (in this audit) was not reported as having escaped and so there was no assessment of the impact of regeneration burning on areas excluded from harvest. This occurred despite the regeneration burn scorching the crown of trees in one unharvested areas outside the coupe.</p> <p>VicForests does not routinely report on regeneration burning activities in ways that provide conclusive evidence to an auditor that the burn has or has not affected areas excluded from harvesting nor of the severity of any such impacts. Auditors typically have to assume that there have been no observable impacts on areas excluded from harvesting unless this is specifically recorded in the burn plan or coupe file.</p>
Protection of Indigenous cultural heritage sites and places located within the harvested area during regeneration	<p>The 2011-12 non-compliance was due to there being no record in the coupe file that the presence of indigenous cultural heritage sites had been assessed rather than such sites had not been adequately protected.</p> <p>Indigenous heritage checks were carried out for all of the coupes included in the current audit. The absence of indigenous sites meant that no specific protective measures were required on any of the audited coupes.</p>
Assessment of coupe regeneration within 3 years of treatment	<p>The 2011-12 audit identified five coupes for which the earliest recorded ESS was not conducted within 3 years of regeneration treatment.</p> <p>Initial ESS on all of the 2012-13 audited coupes were undertaken within three years of regeneration treatment.</p>
Assessment of rehabilitation of coupe infrastructure within three years of initial treatment	<p>The file for one coupe included in the 2011-12 audit did not have any record of an assessment being made of the rehabilitation of its landings.</p> <p>A similar non-compliance was observed for several of the 2012-13 audit coupes. The final clearance coupe monitoring record recorded "n/a" against landing rehabilitation.</p> <p>The auditor's view is that the rehabilitation of coupe infrastructure is not adequately assessed by VicForests' coupe monitoring process. Current monitoring arrangements assess whether rehabilitation actions have been undertaken and not whether they have been successful, as is required to fully satisfy the relevant Code prescription (section 2.3.1). This point is addressed by recommendation 3.2.</p>

2011-12 Module 7 audit findings	Reflections from 2012-13 Module 7 audit
Timing of post-thinning surveys	<p>The post thinning survey for one 2011-12 audit coupe was undertaken 5 years after the coupe was thinned.</p> <p>This audit criterion was not relevant to the current audit.</p>
Audit findings relevant to the scope of the 2012-13 audit	
Non-compliances with audit criteria based on the Code and NFSG generally posed low or at most moderate risk of harm to the environment, based on DSE's Risk Management Framework.	A similar level of risk of harm to the environment was assessed to result from non-compliance with audit criteria in the current audit.
It was recommended that all 315 regeneration coupes and 40 thinning coupes proposed for finalisation and handback to DSE be accepted.	<p>Discussion on acceptance for handback of coupes on VicForests' finalisation list is given in sections 5.2.2 and 5.2.3.</p> <p>It is recommended that all regeneration and thinning coupes nominated in VicForests' 2012-13 finalisation list be accepted for handback (see Recommendations 5.2. and 5.3).</p>
Harvest coupe regeneration and finalisation activities generally comply with audit criteria and relevant Code and NFSG requirements.	<p>Differences in audit criteria mean that statistics on the level of compliance with audit criteria for the 2011-12 and 2012-13 audits are not directly comparable.</p> <p>The current audit found that coupes complied with 93% of applicable criteria based on the Code.</p>
<p>While coupe files provided a useful evidence base for the audit, several procedural shortcomings were identified, as follows:</p> <ul style="list-style-type: none"> • Inconsistent coupe labelling in FireWeb • Implementation of the silvicultural DSS • Notation of obsolete records • Assessment of impacts of regeneration burns or mechanical disturbance 	<p>Similar procedural shortcomings were observed in the 2011-12 audit:</p> <ul style="list-style-type: none"> • FireWeb – there was no need to refer to Fire Web as burn plans were included in all of the coupe files. • Silvicultural DSS – these were missing from two coupe files and incomplete in two other files. While it is assumed that the decision trees for the relevant forest types were followed for these coupes, the files do not comply with Code requirements sections 2.1.3 and 2.3.1. • Notation of obsolete records – various forms of obsolete information are retained in some coupe files, which results in the coupe files presenting conflicting records of the activities actually undertaken. <p>The most common forms of obsolete record were burn plans or preliminary burn plans that were not implemented and instances where alternative silvicultural decisions were made to those flagged on the DSS.</p> <ul style="list-style-type: none"> • Assessment of impacts of regeneration burns or mechanical disturbance – VicForests' burn plans are not structured to require information on the impacts of regeneration burns on areas outside the coupe boundary to be recorded. It is therefore difficult to determine whether regeneration burns have or have not affected unharvested areas or whether they comply with relevant audit criteria and Code prescriptions. <p>The site plan monitoring record provides a suitable record of monitoring of the impacts of mechanical disturbance. Evidence from the current audit suggests this form was not used on all coupes undergoing mechanical disturbance to promote regeneration. This issue is addressed by Recommendation 3.1.</p>
Recommendation 5.4	
It is recommended that VicForests' regeneration burn planning and reporting processes be amended to ensure that the impacts of the burn on unharvested areas is assessed and reported. This should include coupes where the fire does not escape containment lines and where there was no observable impact.	
Thinning coupe operations sometimes did not fully meet NFSG standards for retained or removed basal area, thinning damage and bay and outrow width. Coupes typically complied with other audit criteria	<p>The current audit of thinning coupes has a much narrower scope than the previous audit and did not consider NFSG requirements other than the level of acceptable thinning damage. Seven of the 30 thinning coupes proposed for finalisation were reported by VicForests to have damage levels exceeding the acceptable levels specified in NFSG 13 and 14.</p> <p>Audited thinning coupes were found to comply with 86% of applicable criteria.</p>

2011-12 Module 7 audit findings	Reflections from 2012-13 Module 7 audit
Recommendations relevant to the scope of the 2012-13 audit	
6.7 Various recommendations on methods for assessing stocking in field components of the audit of regeneration coupes.	These recommendations were incorporated into the method for the current audit.
6.10 It is recommended that DPI work with VicForests to strengthen the planning and implementation of forest thinning operations to achieve better compliance with relevant NFSGs	Thinning damage, because of its potential implications for stand health, is the only NFSG compliance criterion considered in this audit. As with the previous audit, this audit found that thinning damage frequently exceeded acceptable levels. This recommendation still needs to be addressed by VicForests and DEPI.
6.11 It is recommended that protocols be developed for the reporting of coupe stocking in instances where multiple surveys, potentially of differing intensities, have been undertaken to assess coupe stocking.	No action has been taken. For some of the audited coupes the stocking rate reported by VicForests in the finalisation list is the result of an intensive survey or just part of the coupe and is not representative of the entire coupe. This recommendation still needs to be addressed by VicForests and DEPI.
6.12 Relatively poor compliance with the requirement to assess regeneration coupe stocking within 3 years of coupe treatment may reflect VicForests' reporting of the latest rather than earliest established seedling survey. In future finalisation reporting, VicForests should ensure that the earliest such survey date be reported. VicForests should also ensure it complies with the Code requirement to conduct stocking surveys within 3 years of coupe treatment for regeneration.	Stocking surveys for all of the audited coupes were undertaken within three years of treatment as required by the Code.

6. Conclusions and recommendations

6.1 Audit scope

The former DSE commissioned this 2012-13 Module 7 audit of coupe regeneration and finalisation as part of its Forest Audit Program. The audit concerned VicForests' timber harvesting operations in State forest areas in eastern Victoria. It considered 35 coupes located in Central Gippsland, East Gippsland and Tambo FMAs, 28 of which were regeneration coupes and seven of which were thinning coupes. The selected coupes represented a wide range of forest types, silvicultural systems and environmental risk contexts. Desk top and field assessments were undertaken for 28 of these coupes (22 regeneration coupes and four thinning coupes). The remaining coupes were only subject to the desk top elements of the audit.

The audit was conducted against criteria derived from the *Code of Practice for Timber Production* 2007 and used workbooks prepared for Module 7 of the FAP Toolbox.

6.2 Compliance with audit criteria in regeneration coupes

Overall, the audit found that regeneration coupes fully complied with 93% of applicable criteria. Eleven of the audited coupes complied with all of the applicable criteria. One coupe fully complied with less than 80% of applicable criteria.

Incidents on six coupes were considered to pose a material risk of environmental harm using the FAP's EIA rating tool or former DSE's Risk Management Framework, as follows:

- > Incomplete rehabilitation of landings so that they provide suitable conditions for regeneration, as required by the Code: this was detected on four regeneration coupes (02, 17, 22 and 25). Regrowth on at least parts of these landings was observed to be poor.
- > A windrow with soil and logging debris was pushed into the head of a drainage line on coupe 09 during rough heaping operations. In the immediate aftermath of the rough-heaping operation, this posed a risk that sediment from soil contained in the windrow might be washed into the drainage line and off-site.
- > A regeneration burn on coupe 26 scorched the canopy of some trees in an unharvested area adjacent to the coupe.

Other Code compliance issues that posed no direct environmental risk included:

- > Coupe files providing no written evidence of planned regeneration procedures.
- > The absence of site preparation plans in the files of coupes that had been rough heaped. This meant that it could not be demonstrated that mechanical disturbance to encourage regeneration had considered erosion risk potential or the proximity of waterways.
- > The assessment and recording of any unintended environmental impacts of mechanical disturbance or burning in coupe regeneration and the success of measures to rehabilitate coupe infrastructure.

All of the audited coupes were found to be acceptably stocked. Four of the 281 regeneration coupes proposed for handback to DEPI were reported by VicForests to not fully meet the NFSG standards for acceptable stocking. The stocking survey conducted in each coupe identified an unstocked area of between 1 and 2 ha. The auditor agrees with VicForests' assertion that the risk of damage to adjacent existing regrowth in these unstocked areas means that further disturbance to promote stocking is not warranted.

6.3 Compliance with audit criteria in thinning coupes

Thinning coupes included in the audit were found to fully comply with 86% of applicable criteria. Three of the audit coupes were found to be fully compliant with all applicable criteria.

Incidents on four coupes were assessed using the FAP's EIA rating tool or the former DSE's Risk Management Framework to pose a material risk of environmental harm, as follows:

- > Excessive levels of damage to retained trees posed a risk to stand health and productive capacity on three of the audited coupes.
- > Post-thinning windthrow damage sustained on two East Gippsland FMA coupes significantly reduced stocking and was considered to pose a risk to stand health and productive capacity.

Post-thinning windthrow incidents occurred despite VicForests' thinning operations largely complying with the Code and NFSG stocking requirements. They resulted from the unfortunate coincidence of the period of high vulnerability to windthrow in the thinned stands with a severe weather event that produced intense rainfall and very strong winds. These coupes were considered to be non-compliant on the basis of their condition at the time of the audit and not as the result of inappropriate management by VicForests.

Seven of the 30 thinning coupes in VicForests' finalisation list, including two coupes that were the subject of this audit, were reported to have sustained thinning damage levels that exceeded the acceptable level prescribed by NFSG 13 and 14 and pose a risk to on-going stand health and productive capacity.

6.4 Finalisation and handback of coupes to DSE

All regeneration and thinning coupes that VicForests proposes to finalise should be accepted for hand back to DEPI for on-going management.

6.5 Recommendations

Recommendations arising from this audit of coupe regeneration and finalisation and their rationale are given below.

#	Recommendation	Rationale
3.1	It is recommended that site preparation monitoring records be completed for all rough heaping operations and that the records are retained in coupe files to demonstrate that the effectiveness of measures used to manage the risk of sediment transport to waterways has been assessed.	VicForests' coupe monitoring system has a form for monitoring mechanical site preparation. If used, the form provides evidence that the effectiveness of erosion control measures described in site preparation plans have been assessed. Together with the site preparation plan, they provide evidence that the Code requirement (section 2.3.1) to consider <i>erosion risk potential and the proximity of waterways</i> has been met. They can also demonstrate that such considerations have been effective in mitigating the risk of sediment being mobilised into waterways.
3.2	It is recommended that coupe monitoring records be extended to specifically include the assessment and reporting of the effectiveness of coupe infrastructure rehabilitation. This assessment should be conducted by VicForests between one and three years after harvesting has been completed and during coupe finalisation rather than at coupe closure.	Current coupe monitoring records show that actions have been taken to rehabilitate infrastructure. There is no explicit monitoring and reporting of the success of such activities. The Code (section 2.5.2) requires that coupe infrastructure be rehabilitated so that suitable conditions for regeneration and growth of vegetation are provided. Current monitoring does not provide explicit evidence that the second element of that requirement has been met.
5.1	It is recommended that DEPI commission an assessment of the impacts of windthrow on the productivity and environment of thinned stands and the economic viability of thinning. The investigation should also consider how windthrow impacts may be reduced.	<p>Thinning temporarily destabilises forest stands and increases the risk of windthrow, particularly during wet and windy weather. Sites that are highly exposed to such conditions may not be suitable for thinning under current prescriptions due to an unacceptably high risk of lost productive capacity and disruption to harvest cycles.</p> <p>The level and severity of windthrow damage detected in this audit suggests that investigations are required to determine whether and under what circumstances the economic and environmental risks associated with thinning exceed the benefits. Such an assessment should also consider how risks associated with thinning might be mitigated.</p>

#	Recommendation	Rationale
5.2	It is recommended that DEPI accept all of the regeneration coupes nominated by VicForests for handback.	While some instances of non-compliance with audit criteria and Code prescriptions were identified, these should not delay the handback of coupes to DEPI.
5.3	It is recommended that DEPI accept all of the thinning coupes nominated by VicForests for handback.	While some instances of non-compliance with audit criteria and Code prescriptions were identified, these should not delay the handback of coupes to DEPI. As post-thinning windthrow damage appears to have occurred despite VicForests' thinning operations complying with NFSG post-thinning stocking prescriptions, this should not delay the handback of coupes.
5.4	It is recommended that VicForests' regeneration burn planning and reporting processes be amended to ensure that the impacts of the burn on unharvested areas is assessed and reported, even where the burn did not escape containment lines.	<p>VicForests' reporting on burn plans only record significant incidents where regeneration burns have escaped containment lines. Escapes of only a few metres or tens of meters are not typically recorded, nor are incidents where a fire that remains within containment lines scorches the crowns of trees in unharvested areas in exclusion areas or adjacent coupes.</p> <p>This means that there is little evidence in the coupe file by which an auditor can assess whether regeneration burning has achieved its objective to minimise impacts on unharvested areas.</p>

7. References

1. Department of Sustainability and Environment 2007. Code of practice for timber production.
2. Department of Sustainability and Environment 2006. Sustainability Charter for Victoria's State forests
3. Department of Sustainability and Environment 2010. Forest Audit Program Toolbox Module 7. Coupe regeneration and finalisation
4. Sinclair Knight Merz 2012. Forest Audit Program: 2011-12 reporting period. Module 7 audit of coupe regeneration and finalisation. Report to Department of Sustainability and Environment. Project VW06499. Final report.
5. Department of Sustainability and Environment 2006a. Native Forest Silviculture Guideline No. 13. Thinning of ash eucalypt regrowth.
6. Department of Sustainability and Environment 2006b. Native Forest Silviculture Guideline No. 14. Thinning of mixed species regrowth.
7. Department of Sustainability and Environment 2010. Forest Audit Program Toolbox Module 5. Harvesting and closure.
8. Sinclair Knight Merz 2013. Forest Audit Program. 2012-13 Audit of harvesting and coupe closure. Report to Department of Sustainability and Environment. Project VW06734. Draft.
9. Department of Sustainability and Environment 2010. Forest Audit Program Toolbox Module 2. Audit process.
10. Department of Sustainability and Environment 2012. Risk management guidelines.
11. Standards Australia 2009. AS/NZS ISO 31000:2009 Risk management: principles and guidelines. Standards Australia.
12. Department of Natural Resources and Environment 1997. Native Forest Silviculture Guideline No. 10. Eucalypt stocking surveys.

Appendix A. Revised FAP Module 7 workbooks

The following include the two workbooks used in the 2012-13 FAP audit of coupe regeneration and finalisation. Workbook 7A was used for regeneration coupes and workbook 7B was used for thinning coupes.

ENVIRONMENTAL AUDIT FOREST AUDIT PROGRAM TIMBER PRODUCTION IN STATE FORESTS

FMA

Module 7 Regeneration and Finalisation

Workbook 7A: Audit Criteria for Regeneration Coupes

Summary Page

Positive observations:	Non-compliances identified and acted on by the auditee in their supervisor capacity (include contractor penalties allocated)		
•	•		
Summary of non-compliance and/or potential risk of harm to the environment:			
•			
Areas for improvement:	Further evidence required:		
•	•		
Auditors:		Date of audit:	

Previous Key Audit Findings

What key findings were observed during any previous assessments?

The auditor will require an understanding of previous key findings in order to provide commentary on current practices and improvements over time.

Comments:

Audit Criteria

The audit criteria consider compliance with the Code of Practice for Timber Production 2007 (the Code). The information may be derived from: interviews with auditees; reviews of information from the FCPs, the Coupe databases or other relevant auditee records; and the field assessment. Table 1 lists the audit criteria for regeneration coupes. Details are reported on a coupe-by-coupe basis using the tables in this workbook where relevant.

Compliance with audit criteria is assessed as follows:

- yes - fully complies
- no - does not comply with or satisfy any component of the audit criterion
- partial – partly, but not fully satisfies the audit criterion
- not applicable - where the audit criterion is not relevant to the condition or management of the particular coupe
- unknown - where field assessment of the criterion is required, but has not been possible

If the coupe file or other relevant sources do not provide typically available evidence to enable an assessment of compliance, the assessment is to be “no”.

The auditor should enter comments in the field provided, particularly where the coupe was assessed to not or only partially comply with the audit criterion.

The process for selecting coupes to be included in the audit is described in Module 7 of the Forest Audit Program Toolbox.

Table 1 Audit criteria for regeneration coupe compliance with the Code of Practice for Timber Production 2007

FMA:		Coupe address:	
District:		Coupe area:	ha
Forest type:		Silvicultural system:	

Regeneration method:		Date sown/planted	
----------------------	--	-------------------	--

Audit details:					
Auditor and audit team		Auditees		Date of audit	

Source	Section	Prescription	Audit Criteria	Compliance (yes/no/partial/not applicable)	Assessment location	Auditor Comments
Mandatory actions and legal requirements						
<i>Code of Practice for Timber Production 2007</i>	2.1.3 Forest Coupe Plans	The Forest Coupe Plan must describe regeneration procedures to be applied and identify requirements for the rehabilitation of infrastructure.	1. Forest Coupe Plan describes regeneration procedures applied to coupe identifies requirements for the rehabilitation of infrastructure.		Forest Coupe Plan and field assessment	
<i>Code of Practice for Timber Production 2007</i>	2.3.1 Regeneration	State forest available for timber production must not be cleared to provide land for the establishment of plantations.	2. Coupe has not been regenerated with plants grown from non-indigenous or exotic forestry species.		Forest Coupe Plan and field	
			3. Coupe has not been replanted on a regular grid.		Field assessment	
<i>Code of Practice for Timber Production 2007</i>	2.3.1 Regeneration	Action must be taken to ensure the successful regeneration of a harvested coupe, except where: <ul style="list-style-type: none"> - the land is to be used for an authorised/ approved purpose for which native vegetation is not compatible; - timber has been harvested by thinning a stand; or 	4. Evidence can be provided of action taken to ensure successful regeneration or that regeneration has been acceptable without specific intervention.		Forest Coupe Plan	

Source	Section	Prescription	Audit Criteria	Compliance (yes/no/partial/not applicable)	Assessment location	Auditor Comments
		- the stocking of seedlings or regrowth is assessed as sufficient through natural regeneration processes				
<i>Code of Practice for Timber Production 2007</i>	2.3.1 Regeneration	Following timber harvesting, State forest must be regenerated with species native to the area, wherever possible using the same provenances, or if not available, from an ecologically similar locality. Regeneration operations must aim to approximate the composition and spatial distribution of canopy species common to the coupe prior to harvesting, where they can be determined	5. Original tree species found in coupe were recorded prior to harvesting, as was their approximate density and spatial distribution.		Coupe Finalisation List, Forest Coupe Plan and Coupe database	
			6. Local or similar provenance seed (only) was used in coupe regeneration.		Forest Coupe Plan and Coupe database	
			7. All tree species originally present on coupe have been successfully regenerated to the composition and spatial distribution of canopy species common to the coupe prior to harvesting.		Coupe Finalisation List and field assessment	
<i>Code of Practice for Timber Production 2007</i>	2.3.1 Regeneration	Silvicultural methods for regeneration must be appropriate to the forest type (including understorey species) and local conditions.	8. Evidence is available to demonstrate that the silvicultural system used is appropriate to the forest type, understorey and local conditions.		Forest Coupe Plan and field assessment	
<i>Code of Practice for Timber Production 2007</i>	2.3.1 Regeneration	Where fire is used in regeneration operations, all practicable measures must be taken to protect all areas excluded from harvesting from the impacts of fire. The use of fire must be in accordance with an approved Burn Plan under the <i>Code of Practice for Bushfire Management on Public Land</i> 2012	9. Measures were taken to protect areas excluded from harvesting from damage as a result of use of fire in regeneration.		Forest Coupe Plan and field assessment	
			10. Impact of regeneration burning on areas excluded from harvesting was assessed.		Forest Coupe Plan and field assessment	
			11. Measures taken to protect areas excluded from harvesting from damage as a result of use of fire in regeneration have been		Forest Coupe Plan and field assessment	

Source	Section	Prescription	Audit Criteria	Compliance (yes/no/partial/not applicable)	Assessment location	Auditor Comments
			effective.			
			12. Any use of fire in regeneration was subject to an approved Burn Plan under the <i>Code of Practice for Bushfire Management on Public Land</i> 2012.		Forest Coupe Plan	
<i>Code of Practice for Timber Production 2007</i>	2.3.1 Regeneration	Where mechanical disturbance is used, it must be undertaken with due consideration of erosion risk potential and proximity of waterways.	13. Measures were undertaken to manage erosion risk and potential sediment movement to waterways in coupes with mechanical disturbance.		Forest Coupe Plan and field assessment	
			14. Effectiveness of erosion control measures was assessed.		Forest Coupe Plan and field assessment	
			15. Measures undertaken to manage erosion risk and potential sediment movement to waterways in coupes with mechanical disturbance were effective		Forest Coupe Plan and field assessment	
<i>Code of Practice for Timber Production 2007</i>	2.3.1 Regeneration	Action must be taken to ensure that any Aboriginal cultural heritage places located within harvested coupe areas are appropriately protected and managed during regeneration activities.	16. Measures were taken to protect Indigenous cultural heritage sites or places located within harvested areas during regeneration.		Forest Coupe Plan and field assessment	
			17. Effectiveness of protection measures was assessed.		Forest Coupe Plan and field assessment	
			18. Measures taken to protect Indigenous cultural heritage sites or places located within harvested areas during regeneration were effective.		Forest Coupe Plan and field assessment	
<i>Code of Practice for Timber Production 2007</i>	2.3.1 Regeneration	The source of seed used must be recorded in a manner that allows for future reference	19. The source of any seed used for regeneration is recorded on the Forest Coupe Plan.		Forest Coupe Plan	
<i>Code of Practice for Timber Production 2007</i>	2.3.1 Regeneration	The use of poisons to control wildlife browsing is prohibited. The use of pesticides in site	20. A register of chemicals used in the management of the coupe exists and has been		Forest Coupe Plan	

Source	Section	Prescription	Audit Criteria	Compliance (yes/no/partial/not applicable)	Assessment location	Auditor Comments
		preparation and/or seedling or advanced growth liberation must comply with Commonwealth and State legislation and regulations. Under the <i>Wildlife Act 1975</i> , browsing native animals may only be controlled under permits and in accordance with any associated conditions as issued by relevant authorities.	maintained; as has a record of how they were used.			
			21. Procedures to ensure any pesticide use on the coupe comply with Commonwealth and State regulations are documented. All personnel using pesticides on the coupe have been inducted into their use.		Forest Coupe Plan	
			22. Poisons have not been used to control wildlife browsing.		Forest Coupe Plan and field assessment	
			23. Any native animal control activities were conducted in accordance with permits issued by relevant authorities.		Forest Coupe Plan	
<i>Code of Practice for Timber Production 2007</i>	2.3.2 Stocking Assessment	Stocking on harvested coupes must be assessed within three years of treatment, to determine whether regeneration has been successfully achieved and to ensure that re-treatment occurs where necessary	24. Coupe regeneration was first assessed within three years of treatment.		Coupe Finalisation List, Forest Coupe Plan	
			25. The assessment correctly determined the success of regeneration and the need for re-treatment where necessary.		Coupe Finalisation List and field assessment	Check compliance against the Native Forest Silviculture Guideline #10 stocking standards summarised below
<i>Code of Practice for Timber Production 2007</i>	2.3.2 Stocking Assessment	The results of (coupe regeneration) assessment must be recorded for future reference.	26. The results of assessments and details of any further silvicultural treatments are recorded in a Coupe database.		Coupe Finalisation List and coupe database	
<i>Code of Practice for Timber Production 2007</i>	2.3.2 Stocking Assessment	Where stocking, health or early growth is inadequate, remedial work must be conducted as soon as practicable to obtain adequate regeneration. Further assessment must be undertaken following remedial treatment to ensure that it has been successfully regenerated.	27. Remedial work has been undertaken to achieve acceptable regeneration where stocking, spatial distribution, health or early growth was initially found to be below the applicable standard.		Coupe Finalisation List and coupe database	
			28. A second regeneration survey was undertaken following remedial work to improve		Coupe Finalisation List and coupe	

Source	Section	Prescription	Audit Criteria	Compliance (yes/no/partial/not applicable)	Assessment location	Auditor Comments
			stocking to an acceptable level.		database	
<i>Code of Practice for Timber Production 2007</i>	2.5.2 Coupe Infrastructure	Infrastructure must be rehabilitated on completion of operations, where not required for future operations, using rehabilitation techniques that provide suitable soil conditions for the regeneration and growth of vegetation existing on the site prior to harvesting. Rehabilitation of coupe infrastructure must be assessed within three years of initial treatment and, where found inadequate, remedial action must be taken.	29. Coupe infrastructure has been rehabilitated in ways that provided suitable soil conditions for the regeneration and growth of vegetation existing on the site prior to harvesting.		Field assessment	
			30. Rehabilitation of coupe infrastructure has been assessed within three years of initial treatment.		Coupe database and field assessment	
			31. Remedial action was taken where rehabilitation was inadequate.		Coupe database and field assessment	

Additional comments:

Native Forest Silviculture Guideline # 10 stocking standards

1. In even-aged stands:
 - 65% of plots on potentially productive area should be stocked (55% if a NFSG #10 intensive survey technique is used); and
 - no discrete area greater than 1 ha should be unstocked.
2. In uneven-aged stands:
 - 70% of plots on potentially productive area should be stocked (60% if a NFSG #10 intensive survey technique is used); and
 - no discrete area greater than 2 ha should be unstocked.
3. To be considered stocked a plot must contain at least one acceptable seedling (see NFSG #10 for details) or sapling defined as a species indigenous to the area in either a seedling, sapling, lignotuber, or coppice form. For coppice, the stem must be likely to remain attached to the stump and survive.
4. At least 10 acceptable seedlings of those eucalypt species present on the site, prior to harvesting or other disturbance must be present on the regenerated site.

Field assessment of stocking standards

Acceptable stocking is described in the Code in section 2.3.2 Stocking Assessment as, all tree species originally present on a coupe have been successfully regenerated to the composition and spatial distribution of canopy species common to the coupe prior to harvesting. The method described below aims to test this criteria, not to replicate the Native Forest Silviculture Guideline (NFSG) survey method used by the auditee.

Two reconnaissance survey options have been developed for use, depending on the auditees final assessment of coupe stocking. For coupes where the auditee has reported a stocking of >75% from standard or intensive NFSG surveys (>90% for extensive survey), option 1 applies. Option 2 applies to coupes where the auditee has reported <75% stocking from standard or intensive NFSG surveys (<90% for extensive surveys).

Option 1 – Stocking greater than 75%

A rapid assessment is undertaken to confirm that actual coupe stocking is similar to that reported by VicForests. Results of the assessment are recorded using **Table 2**. It is assumed that sampling will be undertaken by two auditors.

Procedure:

1. Each of the two auditors must walk at least 400 m of the coupe perimeter, snig tracks and/or access roads (200 m for any coupes smaller than 5 ha) and record stocking. At least half of that distance must be on internal tracks.
2. Observations of stocking must be made at 50 m intervals along the survey route. Where the height and density of regrowth limits visibility, the auditors will also assess stocking at a point 20 m into the coupe (roughly perpendicular to their route).
3. Auditors are to record the eucalypt species present on the coupe and record 'yes' or 'no' in the stocked column for each observation point. An observation point is acceptably stocked where acceptable seedlings are spaced at less than 5m intervals (which roughly corresponds to >400 regrowth trees per ha).
4. The auditors' routes will be marked on a map of the coupe.

If stocking appears to be low (acceptable seedlings spaced at more than 5 m intervals¹) at more than a third of observation points, the coupe should be surveyed using option 2.

Option 2 - Stocking less than 75%

Stocking assessment is recorded using **Table 3** and **Table 4** for even-aged coupes and **Table 5** and **Table 6** for uneven-aged coupes. It is assumed that sampling will be undertaken by two auditors.

Procedure:

1. Auditors will commence the survey at opposite ends of the coupe.
2. A random number table (Annex 1) will be used to locate the initial sampling point. The first number determines the distance to travel into the coupe (in a direction appropriate to the coupe layout and location of the starting point). The first stocking assessment will be conducted at this point.

¹ Which roughly corresponds with <400 regrowth trees per ha

- For uneven-aged coupes only, complete a basal area sweep at each plot centre for all trees (unlike the NSFGs, do not distinguish between merchantable and non-merchantable trees). If the total basal area is greater than 30% of the Reference Basal Area (RBA)², the plot is stocked. If the total basal area is less than 30% of the RBA continue with a sapling and seedling fixed plot search as per 4 below.
- For uneven-aged coupes only search each 3.57 m plot for acceptable saplings/coppice using a 3.57m staff centred on the plot centre.
- For uneven-aged and even-aged coupes search each 2.27m plot for acceptable seedlings using a 2.27 m staff centred on the plot centre.
- Random numbers will then be used to determine the distance to be walked to the second sampling point and so on. Auditors will alternate from walking in a N-S or E-W direction between each sampling point.
- When a coupe boundary is reached through this process, the auditor will use the opposite direction (e.g. south if they were previously heading north) to ensure sampling is conducted within the coupe. A schematic of the approach is given in Figure 1.

Each auditor will assess stocking on up to 25 points per coupe (up to 50 in total). On coupes smaller than 10 ha, the number of sampling points would be reduced to 15 per auditor or 30 overall.

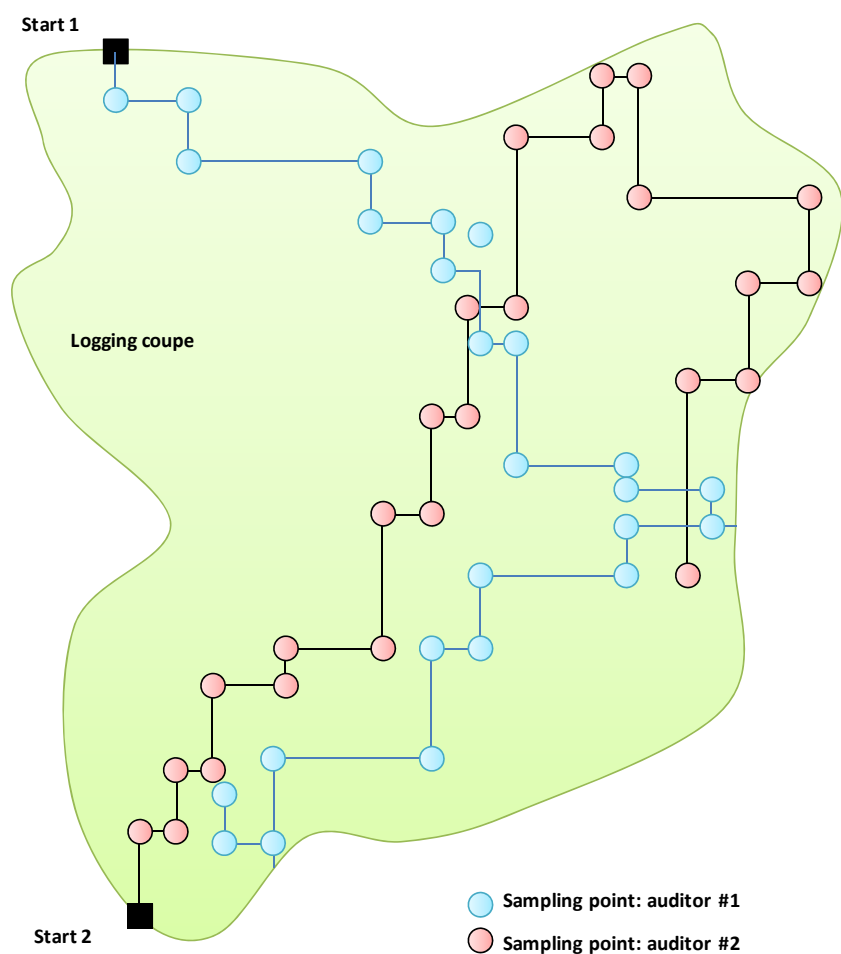


Figure 1 Schematic of random sampling design for field audit of regeneration coupes.

Following the assessment, the average stocking rate for the coupe is calculated, as is the 90% confidence interval (using **Equation 1**). Stocking will be considered to be acceptable if average stocking rate + the 90% confidence interval is equal to or greater than 65%. If stocking is less than 65% the coupe should be surveyed using the intensive survey technique from the NFSG #10.

Eq 1 90% confidence interval for mean stocking rate = $1.66 \sqrt{[A(1 - A) / B]}$ where:

A is the proportion of stocked plots (number of stocked plots / number of productive plots); and

B is the number of productive plots.

² The reference basal area of a coupe is the expected basal area for a fully stocked stand (this varies with forest type and site quality)

Table 2 Field survey sheet for regeneration coupe with > 75% stocking

					Page				Of			
Coupe address									Area		ha	
Auditor									Date			
Species required												
>10 present												
# unstocked area >1 ha observed?												

Observation point	Stocked (yes/no)	Comments
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
Overall assessment		
Comments:		

A sampling point is considered to be stocked if acceptable seedlings are located at approximately 5 m intervals or less.

Table 3 Field survey sheet for < 75% regeneration even-aged coupe

					Page		Of	
Coupe address						Area		ha
Auditor						Date		
Species required								
>10 present								
# unstocked area >1 ha observed?								

Coordinates of sampling point		Plot #	Stocking	Seed bed	Species	Comments
N-S	E-W					
		1				
		2				
		3				
		4				
		5				
		6				
		7				
		8				
		9				
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				
		21				
		22				
		23				
		24				
		25				

Stocking: Stocked with acceptable seedling – S; Unstocked or no acceptable seedling – N

Seedbed: Non-productive area (rock or understorey etc) – N; Soil damaged or compacted – D; Colonised by non-eucalypts – C; Slash, covered by litter or debris – L

Table 4 Summary sheet for <75% regeneration even-aged coupes

FMA							District			
Coupe address								Area		ha
Auditors								Date		
Species required										
>10 present										
# unstocked area >1 ha observed?										
Total # plots			Total # productive plots							
Total # stocked plots			% productive plots stocked				95% confidence interval			
Comments: 										

Table 5 Field survey sheet for <75% regeneration uneven-aged coupe

					Page		Of	
Coupe address					Area		ha	
Auditor					Date			
Species required								
>10 present								
# unstocked area >2 ha observed?		BAF		RBA		RBA×0.3		

Sampling point coordinates		Angle sweep		Fixed plots					
N-S	E-W	Plot #	Total BA	BA Stocking *	Sapling/ coppice	Seedling	Stocking status	Seedbed	Comments
		1							
		2							
		3							
		4							
		5							
		6							
		7							
		8							
		9							
		10							
		11							
		12							
		13							
		14							
		15							
		16							

FOREST AUDIT PROGRAM, AUDIT WORKBOOK 7A: AUDIT CRITERIA FOR REGENERATION COUPES

Sampling point coordinates		Plot #	Angle sweep		Fixed plots		Stocking status	Seedbed	Comments
N-S	E-W		Total BA	BA Stocking *	Sapling/ coppice	Seedling			
		17							
		18							
		19							
		20							
		21							
		22							
		23							
		24							
		25							

Stocking: Stocked with acceptable seedling – S; Unstocked or no acceptable seedling – N

Seedbed: Non-productive area (rock or understorey etc) – N; Soil damaged or compacted – D; Colonised by non-eucalypts – C; Slash, covered by litter or debris – L

BA – Basal area; RBA – the reference basal area of a coupe is the expected basal area for a fully stocked stand (this varies with forest type and site quality); BAF – Basal area factor of device used for angle sweep.

* If the total basal area is greater than 30% of the Reference Basal Area (RBA), the plot is stocked.

Table 6 Summary sheet for <75% regeneration uneven-aged coupes

FMA							District			
Coupe address								Area		ha
Auditors								Date		
Species required										
>10 present										
# unstocked area >2 ha observed?										
Total # plots			Total # productive plots							
Total # stocked plots			% productive plots stocked				95% confidence interval			
Comments: 										

Annex 1 Random number table

7	77	50	11	2	38	74	33	70	48	34	72
67	44	48	33	48	44	46	30	18	53	32	76
38	7	29	76	73	65	45	49	42	26	2	37
50	76	76	73	1	32	13	50	34	65	36	63
34	65	46	44	27	58	45	54	45	71	12	2
10	29	37	41	64	75	24	8	59	70	76	49
33	71	59	26	34	69	70	63	51	8	48	31
13	64	56	43	52	78	50	40	52	58	32	6
15	52	64	6	57	59	35	55	69	36	50	3
59	29	4	64	28	39	55	25	61	43	44	13
61	56	69	13	37	65	67	32	29	79	70	68
5	68	33	49	72	24	3	21	51	48	48	68
47	10	39	65	73	16	56	54	21	13	3	66
66	32	59	64	57	2	69	41	56	33	31	16
2	75	79	70	25	2	24	4	8	74	73	77
21	2	58	29	71	70	3	35	13	26	32	65
50	42	34	52	27	60	22	21	61	43	49	54
77	64	80	50	68	3	40	58	48	57	6	37
14	49	40	70	12	59	37	42	6	25	79	49
15	27	43	64	34	36	75	11	52	43	33	47
43	13	30	46	54	13	45	36	59	60	15	42
48	43	26	23	35	13	5	64	77	30	44	51
48	18	27	15	56	71	51	67	79	47	30	78
18	71	37	73	77	68	8	76	30	29	54	32
50	8	63	11	68	63	12	68	74	6	49	16
64	11	39	63	39	46	35	9	4	11	53	48
40	75	2	66	43	2	61	19	47	44	27	71
55	73	6	20	55	28	20	76	61	15	33	3
49	61	40	14	7	37	58	21	12	2	45	62
68	52	16	64	53	57	72	38	43	62	22	7
50	56	73	55	67	33	28	8	32	17	15	7
39	52	67	10	43	41	1	37	17	25	8	35
78	54	26	62	33	66	43	45	72	73	57	78
2	28	45	74	38	7	59	35	42	63	71	49
62	76	48	59	27	12	58	38	34	80	64	64
13	56	18	20	8	1	22	31	72	60	33	40
47	36	71	76	34	27	57	10	6	44	29	17
39	12	28	10	8	68	62	37	28	71	36	52
4	9	46	68	40	50	76	33	65	42	41	8
24	20	37	76	49	11	38	49	31	45	15	23
31	36	23	71	13	11	62	37	70	21	58	65
49	25	80	35	77	43	29	44	34	77	13	28
31	4	16	53	29	14	63	39	45	29	11	28
30	8	68	35	73	70	57	46	63	15	34	38
23	1	59	56	20	1	40	27	8	64	9	25
15	7	30	67	56	19	75	5	13	37	57	9
38	18	65	13	65	50	2	38	53	28	38	1
55	70	43	69	73	54	24	42	8	61	21	46
13	63	54	62	33	36	35	77	12	38	79	10
5	18	42	54	12	28	11	79	28	53	11	36
26	46	39	32	77	28	7	55	9	24	29	46
67	28	34	36	80	41	39	65	13	20	72	9
8	40	42	8	68	47	35	32	50	71	20	14
29	25	68	18	44	60	47	53	73	80	77	11
14	27	25	25	5	26	49	8	56	56	60	15
79	53	4	47	11	40	76	51	79	51	51	48
6	20	12	74	35	5	3	17	30	24	72	43
31	61	4	64	62	43	60	45	21	52	49	70
46	32	41	55	57	8	60	38	19	5	75	41
36	8	73	15	2	11	65	59	50	63	28	19

ENVIRONMENTAL AUDIT FOREST AUDIT PROGRAM TIMBER PRODUCTION IN STATE FORESTS

«FMA» FMA

Module 7 Regeneration and Finalisation
Workbook 7B: Audit Criteria for Thinning Coupes

Summary Page

Positive observations:	Non-compliances identified and acted on by the auditee in their supervisor capacity (include contractor penalties allocated)
•	•
Summary of non-compliance and/or potential risk of harm to the environment:	
•	
Areas for improvement:	Further evidence required:
•	•

Auditors:		Date of audit:	
-----------	--	----------------	--

Previous Key Audit Findings

What key findings were observed during any previous assessments?

The auditor will require an understanding of previous key findings in order to provide commentary on current practices and improvements over time.

Comments:

Audit Criteria

The audit criteria considers compliance with the Code of Practice for Timber Production 2007 (the Code). The information may be derived from: interviews with auditees; reviews of information from FCPs, Coupe databases or other relevant auditee records; and the field assessment. Table 1 lists the audit criteria for thinning coupes. Details are reported on a coupe-by-coupe basis using the tables in this workbook where relevant.

Compliance with audit criteria is assessed as follows:

- yes - fully complies
- no - does not comply with or satisfy any component of the audit criterion
- partial – partly, but not fully satisfies the audit criterion
- not applicable - where the audit criterion is not relevant to the condition or management of the particular coupe
- unknown - where field assessment of the criterion is required, but has not been possible

If the coupe file or other relevant sources do not provide typically available evidence to enable an assessment of compliance, the assessment is to be “no”.

The auditor should enter comments in the field provided, particularly where the coupe was assessed to not or only partially comply with the audit criterion. Thinning environmental standards have been developed on page 7 that relate directly to the audit criteria derived from the Code. They should be used in the field to assess compliance with the relevant audit criteria.

The process for selecting coupes to be included in the audit is described in Module 7 of the Forest Audit Program Toolbox.

Table 1 Detailed audit of thinning coupe compliance with the Code of Practice for Timber Production 2007

FMA:		Coupe address:			
District:		Coupe area:	ha	Slope	
Forest type:		Silvicultural system:			

Audit details:					
Auditor and audit team		Auditees		Date of audit	

Source	Section	Prescription	Audit Criteria	Compliance (yes/no/partial/not applicable)	Assessment location	Auditor Comments
Mandatory actions and legal requirements						
<i>Code of Practice for Timber Production 2007</i>	2.1.3 Forest Coupe Plans	The Forest Coupe Plan must identify the silvicultural systems to be employed.	1. Forest Coupe Plan identifies the silvicultural systems applied to coupe.		Forest Coupe Plan and field assessment	
<i>Code of Practice for Timber Production 2007</i>	Definitions	Thinning operations are consistent with their definition as operations that remove part of a forest stand or crop, with the aims of increasing the growth rate and/or health of retained trees and, in commercial thinning, obtaining timber from trees that would otherwise eventually die before final harvest	2. Thinning operations largely remove suppressed and other sub-dominant stems that are unlikely to survive to final harvest.		Field assessment	
			3. Excessive damage from thinning does not detract from the health of retained trees or pose a risk to the stand.		Field assessment	<i>Check compliance against the Native Forest Silviculture Guideline #13 (Ash forests) or #14 (Mixed species forests) maximum damage specifications for retained trees.</i>
<i>Code of Practice for Timber Production 2007</i>	2.3.3 Tending	Tending operations must be planned and conducted in a manner that minimises adverse impacts on areas that are excluded from harvesting	4. Coupe planning and operations sought to mitigate the risk of damage to exclusion areas.		Forest Coupe Plan	
			5. Exclusion areas have not been disturbed by thinning operations.		Field assessment	
<i>Code of Practice for Timber Production 2007</i>	2.5.2 Coupe Infrastructure	Infrastructure must be rehabilitated on completion of operations, where not required for future operations,	6. Coupe infrastructure, including outcrops and forwarding tracks, provides		Field assessment	

Source	Section	Prescription	Audit Criteria	Compliance (yes/no/partial/not applicable)	Assessment location	Auditor Comments
		using rehabilitation techniques that provide suitable soil conditions for the regeneration and growth of vegetation existing on the site prior to harvesting. Rehabilitation of coupe infrastructure must be assessed within three years of initial treatment and, where found inadequate, remedial action must be taken.	suitable soil conditions for the regeneration and growth of vegetation existing on the site prior to harvesting or has been rehabilitated to provide such conditions			
			7. Rehabilitation of coupe infrastructure has been assessed within three years of initial treatment.		Coupe database and field assessment	
			8. Remedial action was taken where rehabilitation was inadequate.		Coupe database and field assessment	

Additional comments:

Appendix B. Risk assessment methods

B.1 FAP Environmental impact assessment tool

The EIA tool is used to assess the environmental impact of instances of non-compliance with audit workbook criteria. The assessment is based on three factors:

- > Extent of impact or disturbance;
- > Duration of impact; and
- > Environmental asset value.

Extent of impact or disturbance (E)

The extent of the impact is measured as a relative percentage of the sampled area or length and defined as one of the following four categories:

- > 0 – 10%
- > 11 – 25%
- > 26 – 50%
- > >50%

A fifth category is used when the impact or disturbance results in a significant offsite effect where an area outside of the coupe boundary is adversely affected.

Duration of impact or expected time to recover (t)

The duration of the impact is defined as the period in which the area will recover to pre-impacted levels. The impact period is defined by three levels as follows:

- > Short term, 0 – 12 months;
- > Medium term, 12 – 36 months; and
- > Long term, > 3 years

The extent of impact (E) and duration of impact (t) form a risk matrix to determine an Et rating (Table 5).

Table 5 Determining the extent-duration rating for the impact

Extent (E)	Duration of impact		
	Short term (<1 year)	Medium term (1-3 years)	Long term (> 3years)
0-10%	A	C	F
11-25%	B	E	H
26-50%	C	F	I
>50%	D	G	J
Off-site	E	H	K

Environmental asset value (z)

The environmental asset value of the impacted area is defined by the relative resilience and resistance of the area affected, and the significance of the environmental value of the area, which may be characterised by its protection status within the Forest Management Zoning system or the Code of Forest Practice.

The environmental asset value is divided into four categories;

- > General environmental value
- > Filter or drainage line
- > Representative SMZ or SPZ, i.e. habitat corridors, landscape buffers and some linear buffers
- > Specific SMZ or SPZ, i.e. for specific flora and fauna, rainforest buffers and riparian or streamside reserve buffers.

The Et rating and environmental asset value (z) are applied in an additional risk matrix (Table 6) to determine an environmental impact assessment level for the non-compliance. The impact is categorised into five nominal levels as follows:

- > Negligible (including areas of no impact) – impacts typically within marked harvest areas with a short duration of impact.
- > Minor – impacts typically within marked harvest areas or filter strip with a short to medium duration of impact
- > Moderate – impacts typically within marked harvest areas with a medium to long term duration of impact or impacts within filter strips, buffers or reserves with a short to medium term impact
- > Major – impacts typically within marked harvest areas leading to a long term offsite impact or impacts within filter strips, buffers or reserves with a medium to long term on-site or off-site impact
- > Severe – impact within buffers or reserves with a long term on-site or off-site impact.

Table 6 Level of environmental impact

Et value	Environmental asset value			
	General	Filter	rSPZ/LR/LB	sSPZ/RB/RF
A	Negligible	Negligible	Minor	Minor
B	Negligible	Minor	Moderate	Moderate
C	Negligible	Minor	Moderate	Moderate
D	Negligible	Moderate	Moderate	Moderate
E	Minor	Moderate	Moderate	Major
F	Minor	Moderate	Major	Major
G	Moderate	Moderate	Major	Major
H	Moderate	Major	Major	Major
I	Moderate	Major	Major	Severe
J	Moderate	Major	Severe	Severe
K	Major	Major	Severe	Severe

Note:

LR – Linear reserve
RF – Rainforest buffer

LB – Landscape buffer
rSPZ – Representative SPZ

RB – Riparian buffer
sSPZ – Specific SPZ

B.2 DSE Risk Management Framework

The former DSE's Risk management framework is based on AS/NZS ISO 31000: 2009, the *Australian Standard for Risk Assessment and Management*. Risk is determined from an assessment of the consequence of an impact and its likelihood of occurrence. Consequence and likelihood descriptors are provided in Table 7 and Table 8. The risk table, which determines the overall level of risk from combinations of consequence and likelihood, is given in Table 9. The former DSE's risk framework does not specify specific interventions required for given risk levels.

Table 7 Consequence table for DSE risk framework

Consequence criteria	Level of harm				
	Negligible	Minor	Moderate	Major	Extreme
Environment: Impact on the surrounding environment, including habitats and species, as well as the broader landscape	No material effect on the environment, contained locally within a single site/area. Environment affected for days.	Limited effect on the environment, restricted to a singled township or locality. Environment affected for weeks.	Moderate effect on the environment, impacting on a municipality or multiple localities. Environment affected for months.	Major effect on the environment, impacting on a region or multiple municipalities. Environment affected for 1-3 years.	Very serious effect on the environment, impacting on the state or multiple regions. Environment affected for >3 years.
Business case: Cost to the State.	Cost impact of up to 2.5% of allocated operational budgets (including capital budget). OR a cost impact of up to \$2.5M.	Cost impact between 5 and 10% of allocated operational budgets (including capital budget). OR a cost impact of up to \$5M.	Cost impact between > 10% of allocated operational budgets (including capital budget). OR a cost impact of up to \$10M.	Cost impact of \$10-50M.	Cost impact of >\$50M.
People: workers, local communities and other stakeholders Safety and well-being	On-site first aid treatment only	Minor injuries/illness requiring medical attention	Significant injury/illness requiring in-patient hospitalisation	Extensive and/or permanent injury/illness	Death or permanent disability/illness
Political/reputational: How media, public and stakeholder perception of State is influenced	Minimal adverse local attention (1 day only).	Adverse localised public attention on a single issue over a short period (up to 1 week).	Adverse localised negative public attention on a single issue over a sustained period (up to 2 months).	Serious adverse public attention on more than one issue over a prolonged period (up to 2 years).	Very serious public outcry over a prolonged period (>2 years), or leading to a formal inquiry, serious investigation or other major political event.
Legal: Legal consequences	Non-compliance with legislation, identified internally and resulting in internal acknowledgment and process review.	Non-compliance with legislation or breach of duty of care, identified externally and either resolved without prosecution of civil action or resulting in prosecution or civil action involving low level of resourcing required to defend, exposure to low level remedies or damages and low level risk of negative precedent.	Non-compliance with legislation or breach of duty of care, resulting in prosecution or civil action with one of high level of resourcing required to defend, exposure to high level remedies or damages or high level risk of negative precedent.	Non-compliance with legislation or breach of duty of care, resulting in prosecution or civil action (with all of high level of resourcing required to defend, exposure to high level remedies or damages and high level risk of negative precedent) or public inquiry.	Non-compliance with legislation or breach of duty of care resulting in prosecution or civil action leading to imprisonment of an officer and/or an uninsured compensation payout.

Note: DSE risk framework consequence criteria that are not relevant to this audit have not been included in this table.

Table 8 Likelihood table for DSE risk framework

Likelihood	Rare	Unlikely	Possible	Likely	Almost certain
Description	Event may occur only in exceptional circumstances	The event could occur at some time	The event might occur	The event will probably occur in most circumstances	The event is expected to occur in most circumstances
Percentage	0-5%	5-20%	20-50%	50-80%	80-100%

Table 9 DSE risk framework, overall risk rating

Likelihood	Consequence				
	Negligible	Minor	Moderate	Major	Extreme
Almost certain	Low	Moderate	High	Extreme	Extreme
Likely	Low	Moderate	High	Extreme	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Low	Moderate	High	Extreme
Rare	Low	Low	Low	Moderate	High

Note: DSE's risk management framework labels the overall risk levels as A (highest) to D (lowest) and does not use the above terms

Appendix C. Detailed comments on instances of non-compliance with audit criteria

C.1 Regeneration coupes

Audit criteria	# coupes with EIA ratings					Comment on non-compliance
	Negligible	Minor	Moderate	Major	Severe	
<p>1. Forest Coupe Plan describes regeneration procedures applied to coupe and identifies requirements for the rehabilitation of infrastructure.</p> <p>Coupes with non-compliance: 4 of 28</p>						<p>EIA rating not applicable</p> <p>VicForests' coupe files typically include copies of silvicultural decision support systems (DSS) that provide a decision tree for regeneration that is relevant to the coupe's particular forest type. The decision pathway that is followed for the coupe is highlighted and any changes annotated. This provides the required evidence to satisfy this criterion.</p> <p>This DSS was missing from two of the coupe files (09, 12) and incomplete on two others (10, 11). For coupe 10, the DSS was generic for the whole group of fire salvage coupes in the location and provided no specific indication of what regeneration activities were actually planned or took place on that coupe.</p> <p>Since this criterion relates to the FCP containing a description of the regeneration procedures, there is no direct potential environmental impact from non-compliance and neither EIA nor risk ratings were applied</p>
<p>7. All tree species originally present on coupe have been successfully regenerated to the composition and spatial distribution of canopy species common to the coupe prior to harvesting.</p> <p>Coupes with non-compliance: 1 of 28</p> <p>DSE risk rating: low</p>						<p>EIA rating not applicable</p> <p>VicForests' ESS failed to identify all of the species originally present within the gross coupe area¹⁷ on coupe 05. The "missing" species were uncommon in the coupe prior to harvest and may have been uncommon in the regenerating stand and simply not observed. They may also have not been found within the planned harvest area and hence would not necessarily be detected in the stocking survey.</p> <p>The EIA rating tool was not considered to be applicable to this instance of non-compliance. However under DSE's Risk Management Framework, this non-compliance was considered to pose a low risk of harm to the environment.</p>

¹⁷ The gross coupe area is the area indicated on the Timber Release Plan. The actually harvested (our marked) coupe area is generally significantly smaller than this due to the presence of features (e.g. drainage lines, very steep slopes, rainforest, SPZs) that under the Code or Forest Management Plan must be excluded from harvesting.

Audit criteria	# coupes with EIA ratings					Comment on non-compliance
	Negligible	Minor	Moderate	Major	Severe	
<p>11. Measures taken to protect areas excluded from harvesting from damage as a result of use of fire in regeneration have been effective.</p> <p>Coupes with non-compliance: 1 of 28</p> <p>DSE risk rating: moderate</p>				1		<p>While regeneration burning for coupe 26 was planned and implemented under an approved burn plan, trees in an exclusion area along the top of a ridge adjoining the coupe were scorched. While this was unintended, the regeneration burn for that coupe did not comply with this criterion and did not satisfy the intent of the Code, that areas excluded from harvesting be protected from the use of fire during coupe regeneration.</p>
<p>13. Measures were undertaken to manage erosion risk and potential sediment movement to waterways in coupes with mechanical disturbance.</p> <p>Coupes with non-compliance: 4 of 28</p>						<p>EIA rating not applicable</p> <p>Rough-heaping is the main form of mechanical disturbance used to assist in regeneration on the audited coupes. Completed site preparation plans for rough heaping are taken to provide evidence that measures have been planned and undertaken to manage erosion risk and the potential for sediment movement in coupes with mechanical disturbance.</p> <p>Coupes 11, 15 and 19 were rough-heaped, although there was no evidence of a site preparation plan in the coupe file. The file for coupe 10 had a generic site plan for the group of coupes in its location, but did not provide any specific details of works undertaken on the coupe or of particular protective measures applied.</p> <p>Since this criterion is assessed on the basis of evidence of planning in the coupe file, the EIA tool is assessed not to apply.</p>
<p>14. Effectiveness of erosion control measures was assessed.</p> <p>Coupes with non-compliance: 9 of 28</p> <p>Coupes: 04, 05, 06, 08, 10, 11, 15, 19</p>						<p>EIA rating not applicable</p> <p>Many of the coupes included in the audit had been rough heaped to assist with regeneration. As noted above (criterion 13), four of these either did not have a site preparation plan or did not have one that was specific to the coupe. Coupe files for these and five other coupes did not have evidence indicating that the effectiveness of measures to mitigate erosion risks arising from rough heaping had been assessed.</p> <p>Since non-compliance with this criterion concerns assessment of the effectiveness of erosion control measures, rather than their actual effectiveness, the EIA tool was not considered to be applicable here.</p>

Audit criteria	# coupes with EIA ratings					Comment on non-compliance
	Negligible	Minor	Moderate	Major	Severe	
<p>15. Measures undertaken to manage erosion risk and potential sediment movement to waterways in coupes with mechanical disturbance were effective.</p> <p>Coupes with non-compliance: 1 of 28</p> <p>DSE risk rating: moderate</p>				1		<p>Part of one windrow from rough heaping operations on coupe 09 was found to have been pushed into the upper reaches of a drainage line. Since the windrow contains soil and woody debris, it was considered to pose a short-term risk to water quality in the drainage line downstream of the coupe. This potential for off-site impact contributed to the high EIA and risk ratings given.</p>
<p>29. Coupe infrastructure has been rehabilitated in ways that provided suitable soil conditions for the regeneration and growth of vegetation existing on the site prior to harvesting.</p> <p>Coupes with non-compliance: 6 of 28</p> <p>DSE risk rating: low (1 coupe), moderate (4 coupes)</p>	2	2	1			<p>Landings on four of the audited coupes were found not to have been fully rehabilitated to the put where they provided suitable conditions for regeneration and growth of vegetation existing on the site prior to harvesting. For three of the coupes (02, 07 and 25), it was only part of one of the landings that was affected. In one of these coupes (25), the landing was not suitable for regeneration due to the extent of bark retention. One landing on coupe 17 was found not to have been successfully regenerated.</p> <p>Coupe 22 was harvested using thinning machinery and thinning –type coupe infrastructure was established (with bays, outrows, log loading areas and snig tracks). The audit found that one section of extraction track on the coupe was significantly rutted and had not been rehabilitated.</p> <p>The final monitoring record for coupe 11 had “n/a” entered against rehabilitation of coupe infrastructure, suggesting that this had not been carried out. Since this coupe was inaccessible during the field assessment, there was no independent verification of the rehabilitation status of coupe infrastructure. The coupe was assess not to comply with this criterion, however as no field assessment was undertaken, no EIA or risk rating was given.</p>
<p>30. Rehabilitation of coupe infrastructure has been assessed within three years of initial treatment.</p> <p>Coupes with non-compliance: 4 of 28</p>			EIA rating not applicable			<p>This criterion was assessed to have been complied with if the final clearance coupe monitoring record noted that coupe infrastructure had been assessed to have been rehabilitated. For coupes 03, 07, 08 and 11, the final clearance entry in the coupe monitoring record landing rehabilitation was “n/a”. Since these coupes have landings, they were assessed to not comply with this criterion.</p> <p>As the criterion concerns the assessment of rehabilitation rather than its success, EIA and risk ratings were not applied.</p>

Audit criteria	# coupes with EIA ratings					Comment on non-compliance
	Negligible	Minor	Moderate	Major	Severe	
31. Remedial action was taken where rehabilitation was inadequate. Coupes with non-compliance: 5 of 28 coupes DSE risk rating: low (1 coupe); moderate (4 coupes)	2	2	1			Non-compliance with this criterion was assessed for all of the coupes that were assessed on the basis of the field audit not to comply with criterion 29 (02, 07, 17, 22, and 25; this excludes coupe 11 which was not included in the field audit). These coupes were found to not have fully rehabilitated landings or other coupe infrastructure. As such, they did not comply with criterion 31, as no effective remedial action had occurred. EIA and risk ratings were the same as for criterion 29.

C.2 Thinning coupes

Audit criteria	# coupes with EIA ratings					Comment on non-compliance
	Negligible	Minor	Moderate	Major	Severe	
<p>3. Excessive damage from thinning does not detract from the health of retained trees or pose a risk to the stand.</p> <p>Coupes with non-compliance: 4 of 7 coupes</p> <p>DSE risk rating: low (2 coupes), moderate (2 coupe)</p>			4			<p>Damage sustained by retained trees during thinning on three coupes (30, 31 and 32) was found to exceed the maximum acceptable level in the VicForests' post-thinning assessment or field component of this audit.</p> <p>In two coupes, 31 and 34, the residual stocking of the coupe was so affected by post-thinning windthrow that its future productive capacity has been significantly diminished. While the damage to these coupes was sustained during a severe storm that was outside VicForests' control, it appears to have been exacerbated by the instability experienced in the immediate aftermath of thinning.</p>
<p>6. Coupe infrastructure, including outrows and forwarding tracks, provides suitable soil conditions for the regeneration and growth of vegetation existing on the site prior to harvesting or has been rehabilitated to provide such conditions.</p> <p>Coupes with non-compliance: 1 of 7 coupes</p> <p>DSE risk rating: low</p>		1				<p>One of the log handling areas on coupe 30 was found to be covered in bark, not rehabilitated and not providing suitable conditions for understorey regeneration at the time of the field audit.</p>
<p>8. Remedial action was taken where rehabilitation was inadequate.</p> <p>Coupes with non-compliance: 1 of 7 coupes</p> <p>DSE risk rating: low</p>		1				<p>No remedial action to remove bark and provide suitable conditions for regeneration had been taken on a log handling area on coupe 30 (see criterion 6) at the time of the audit.</p>

