

Plan implementation review of

**The Land and Vegetation
Management Regional Plans
Part I and Part II**

**Prepared under Section 35 of the
Resource Management Act 1991**

Report No. U07/92

ISBN: 978-1-86937-746-5

58 Kilmore Street
P O Box 345
CHRISTCHURCH
Phone: (03) 365 3828
Fax: (03) 365 3194



75 Church Street
P O Box 550
TIMARU
Phone: (03) 684 0500
Fax: (03) 684 0505

Website: www.ecan.govt.nz
Customer Services Phone 0800 324 636

The Land and Vegetation Management Regional Plan Part I and Part II

Table of Contents

1	Overview	1
2	Introduction	2
3	Plan implementation review	4
	3.1 Objectives.....	4
	3.2 Policies and methods	5
	3.3 Environmental results.....	6
	3.4 Monitoring.....	9
4	Feedback	11
5	Section 35 analysis	11
	5.1 Effectiveness	11
	5.2 Efficiency	12
6	Conclusions and recommendations	13
7	References.....	15

Tables

Table 1: Policy implementation	5
Table 2: Monitoring undertaken to measure progress towards achieving environmental results.....	7
Table 3: State of the environment monitoring.....	9
Table 4: Compliance monitoring of consents issued 2005-07	9

Plan implementation review of the Land and Vegetation Management Regional Plans Part I and Part II

Comprising

The Land and Vegetation Management Regional Plan Part I Earthworks and Vegetation clearance, Kaikoura East Coast (1997)

and

The Land and Vegetation Management Regional Plan Part II Earthworks and Vegetation clearance, Port Hills (1997)

1 Overview

This report reviews the efficiency and effectiveness of two plans prepared under the Resource Management Act (RMA) 1991: the Land and Vegetation Management Regional Plan (1997) Part I (Earthworks and Vegetation clearance, Kaikoura East Coast), and the Land and Vegetation Regional Management Plan (1997) Part II (Earthworks and Vegetation clearance, Port Hills).

A plan implementation review as required under Section 35 of the RMA shows:

- The Canterbury region has experienced a relatively benign climate over the past 10 years and this may have been a significant factor in achieving anticipated environmental results. The effectiveness of rules in the LVMRP is yet to be tested over periods of when climatic variables are less benign.
- Land protection and/or maintenance of healthy indigenous vegetation cover appear to be effective methods in achieving anticipated environmental results on a large scale. The effectiveness of rules in the LVMRP is yet to be tested in areas where land protection for biodiversity or recreational purposes is low.
- Environmental monitoring of water quality at a regional scale showed that sedimentation rates increased during periods of vegetation clearance and infilling, and that sparsely vegetated catchments resulted in higher rates of sedimentation than heavily vegetated catchments.
- Environmental monitoring at a local scale within the Lyttelton harbour showed that mean sedimentation rates from 1849-1976 were $3.74 \times 10^6 \text{ m}^3$, and from 1976-1985 were $< 0.6 \times 10^6 \text{ m}^3$. More recent data to determine any changes since the plans have become operative has yet to be analysed.
- Aerial photograph analysis of a sample of sites on land at a local scale within areas where resource consents were issued over a short time period showed no visible impact of erosion induced by earthworks or vegetation clearance.
- Based on limited information, compliance monitoring and enforcement indicated that the effectiveness of District plan conditions on consents that implemented provisions in the LVMRP is variable.
- Recommendations have been made to alter the Christchurch City Council district plan zoning areas (which include the Port Hills and Banks Peninsula), to mitigate the effects of vegetation clearance and earthworks. Current rates of upper harbour sedimentation are expected to persist as long as the catchment remains in grassland.

- The scale, extent and intensity of monitoring carried out in relation to these plans over the last 10 years has not been sufficient to establish the effectiveness of policies and methods in achieving the anticipated environmental outcomes.
- Aerial photograph analysis of land at a regional scale taken at regular intervals (e.g. within a 5 year period) are required to establish baseline monitoring of environmental indicators for landslip and flood damage, and the health of vegetation as a context for interpreting data more specific data collected on the Port Hills and Kaikoura East coast.
- In high risk areas (areas prone to erosion due to vegetation clearance or earthworks), it is likely that land protection, healthy vegetation cover and rules will be the most effective and efficient means of achieving environmental outcomes. In moderate risk areas, it is likely that rules will be more efficient and effective in areas that are subject to high rates of vegetation clearance and earthworks e.g. due to subdivision.
- It is recommended that the review of earthworks and vegetation clearance activities that is signalled in the Proposed Canterbury Natural Resources Regional Plan (2007) be undertaken in conjunction with the full review of the Land and Vegetation Management Regional Plan Parts I and II, under section 79 of the RMA.

The following acronyms are used:

LVMRP	Land and Vegetation Management Regional Plan Part I and Part II
Part I	Land and Vegetation Management Regional Plan 1997 Kaikoura East Coast
Part II	Land and Vegetation Management Regional Plan 1997 Port Hills
TRP	Transitional Regional Plan
ECan	Environment Canterbury
RMA	Resource Management Act 1991
PCNRRP	Proposed Canterbury Natural Resources Regional Plan (2007)
CRPS	Canterbury Regional Policy Statement

2 Introduction

The Land and Vegetation Management Regional Plan (1997) Part I (Earthworks and Vegetation clearance, Kaikoura East Coast), and The Land and Vegetation Management Regional Plan (1997) Part II (Earthworks and Vegetation clearance, Port Hills) were prepared under Section 63 of the Resource Management Act 1991 (RMA), to ensure continuity of controls for earthworks and vegetation clearance when rules under the Transitional Regional Plan (TRP) Section 34 notices expired in 1993. Both plans were made operative in September 1997.

The two plans are part of a series of four Land and Vegetation Management Regional Plans that independently address various aspects of land and vegetation management throughout the Canterbury region. The Proposed Canterbury Natural Resources Regional Plan (PCNRRP) subsumed the Land and Vegetation Regional Management Plan Part III. The Land and Vegetation Regional Management (2005) Part IV, Land Management, Fires, Canterbury Hill and High Country was made operative in 2005. A Section 35 report for Part IV will be required for this before 2010.

The relevant Resource Management Act (1991) section 35 requirements (introduced in 2003) are:

Section 35

(2) Every local authority shall monitor —

*(b) the efficiency and effectiveness of policies, rules, or other methods in... its plan;
and*

(c) the exercise of any functions, power, or duties delegated or transferred by it.

(2A) Every local authority must, at intervals of not more than 5 years, compile and make available to the public a review of the results of its monitoring under subsection (2)(b).

As part of Section 35 requirements, this report reviews the efficiency and effectiveness of implementing the LVMRP Part I and Part II. As the LVRMP was operative for six years prior to the section 35 requirement of a 5 yearly review, this report monitors the efficiency and effectiveness of policies, rules or other methods over the past 10 years from 1997-2007. The information collected provides the basis for commencement of the 10 year review of the plans, as required under section 79.

The relevant RMA section 79(1) states

- 1) every regional council shall commence a full review of its regional policy statement and each of its regional plans not later than 10 years after the statement of plan became operative
- 2) if, after reviewing a policy statement or plan under this section, a regional council or territorial authority considers –
 - a) that the statement or plan requires change or replacement, it shall change or replace the statement or plan in the manner set out in the Schedule 1 of this part

that the statement or plan can remain without change or replacement, it shall publicly notify that statement or plan as if it were a proposed policy statement or plan in the manner set out in the Schedule 1 of this Part.

3 Plan implementation review

This review of the implementation of the LVMRP summarises what has happened over the past 10 years since the plans became operative in 1997, and assesses how effective and efficient its policies, rules or other methods have been. The review outlines the objectives, outputs (referred to as methods of implementation), and outcomes (referred to as “Anticipated Environmental Results”).

3.1 Objectives

The objectives of the LVMRP Part I are:

1. Ensure earthworks and vegetation clearance do not increase the risk of slope instability, induce soil erosion, concentrate runoff, cause degradation of water quality, or damage water courses, property, road or rail transport links.
2. Ensure earthworks and vegetation clearance do not adversely affect areas of natural character, outstanding natural features or landscapes, areas of significant indigenous vegetation and significant habitats of indigenous fauna, mahinga kai areas or sites of importance to Tangata whenua.

The objectives of the LVMRP Part II are:

1. Ensure earthworks and vegetation clearance do not increase the risk of slope instability, induce soil erosion, concentrate runoff, cause degradation of water quality, or damage water courses or property.
2. Ensure earthworks and vegetation clearance do not adversely affect the outstanding natural features or landscapes, areas of significant indigenous vegetation and significant habitats of indigenous fauna, mahinga kai areas or sites of importance to Tangata whenua.

The objectives of both plans are essentially identical, apart from reference to road and rail transport links in Part I.

3.2 Policies and methods

Policies describe how the objectives will be met. Methods are the ways in which policies are carried out. Progress towards achieving the objectives through policies and methods is outlined in Table 1. As the policies and methods of the LVMRP Parts I and II are very similar, they have been grouped together.

Table 1: Policy implementation

Policies	Methods
<p>LVMRP Parts I and II 1. Promote land use management that avoids undue soil disturbance or vegetation removal</p>	<p>Information on sustainable land management practices has been prepared and disseminated e.g. pamphlets, flyers, ECan website, sediment control guidelines for developers.</p> <p>No user groups have prepared environmental codes of practice.</p> <p>Environmental Enhancement fund have promoted environmental codes of practice, and provided incentives for planting and fencing of some areas to mitigate the effects of vegetation clearance and earthworks. An erosion and sediment guideline has been produced (ECan 2007).</p> <p>LandCare programmes support volunteer community groups that undertake planting and stream monitoring. Sites fenced and planted within the Port Hills or Kaikoura East coast have been few or small scale.</p>
<p>LVMRP Part I 2. Control earthworks and vegetation clearance so as to avoid, remedy or mitigate induced erosion and slope instability</p> <p>LVMRP Part 2 2. Control earthworks and vegetation clearance on the Port Hills so as to avoid induced erosion and slope instability, and remedy or mitigate only if prevention is not possible</p>	<p>Regional rules for vegetation clearance and earthworks have been enforced (Table 2).</p>
<p>LVMRP Parts I and II 3. Pursue, in conjunction with other agencies and individuals, the identification of areas of natural character, outstanding natural features and landscapes, areas of significant indigenous vegetation and significant habitats of indigenous fauna, mahinga kai areas or sites of importance to Tangata whenua; and protect them from the adverse effects</p>	<p>The Land Cover Data Base (LCDB II) established a national baseline for the protection and enhancement of natural values, especially vegetation cover</p> <p>Historical rates of vegetation clearance in Canterbury, in general are not slowing (Walker <i>et al.</i> 2006). While this information is not specific to the Port Hills, or Kaikoura East coast, or to earthworks, this information provides a regional context for more specific information collected from</p>

<p>of earthworks and vegetation clearance</p>	<p>these areas.</p> <p>A Landscape study undertaken for ECan in 1993 remains a potentially useful starting point for considering regional landscape issues, but has not yet been used to provide an integrated policy framework for the region.</p> <p>In the Port Hills and Kaikoura East coast, land owned and managed by the Crown and District land and managed as to protect biodiversity and recreational values is, to a large extent, protected from the adverse effects of earthworks and vegetation clearance.</p> <p>There has been no increase in signs of erosion or vegetation clearance in areas where resource consents were issued on the Port Hills and Kaikoura East coast (Pompei, 2005, 2007).</p> <p>ECan works closely with Tangata whenua to identify areas and sites of significance to iwi such a mahinga kai. Other agencies such as the Historic Places Trust collate some cultural information. The Historic Places Trust has identified and registered about 850 heritage items since 1998. All historic sites are protected from uncontrolled earthworks under the Historic Places Act.</p> <p>Conditions on consents through District plan provisions relating to earthworks and water quality afford some protection to urban land in the Kaikoura East coast and Port Hills area. The Kaikoura and Christchurch City District Plans identify sites of significance.</p>
---	---

3.3 Environmental results

If environmental results listed in Table 3 are achieved, it can be assumed that the objectives of the plans have been met. As there are similarities in the methods used to measure progress towards achieving policies and environmental results, there are similarities between Tables 1 and 2. As the policies and methods of the LVMRP Parts I and II are very similar, they have been grouped together.

Environmental results are determined from long term trends. The scale, extent and intensity of monitoring carried out in relation to these plans over the last 10 years has not been sufficient to establish the effectiveness of policies and methods in achieving environmental results. However, analysis of satellite imagery produced between 1990 and 1999 and between 1999 and 2007 has the potential to provide some data “before” and “after” the LVMRP parts I and II became operative. This may improve understanding of changes in risk or occurrence of erosion required to address environmental results.

Table 2: Monitoring undertaken to measure progress towards achieving environmental results

LVMRP	Environmental results	Progress
Parts I and II	1. A reduction in erosion induced by human activities	<p>ECan has undertaken a wide range of investigations of soil quality and quantity, primarily focussed on establishing baseline information to measure the past extent and rates of erosion. This work includes soil quality, soil depth and vegetation cover. Baseline soil erosion maps have been prepared (Lynn, 1999a). This information provides a regional context for more specific information collected from the Port Hills and Kaikoura East coast.</p> <p>Environmental monitoring of a sample of sites on land at a local scale within areas where resource consents were issued over a short time period showed no visible impact of erosion induced by earthworks or vegetation clearance. (Pompei 2005, 2007). However, aerial photographs show recent landscape scars outside of the sampling area. As these scars are recent, whether or not effects may be mitigated in the near future is uncertain.</p>
Parts I and II	2. Reduced risk of slope instability	There is no information within ECan to be able to determine whether or not the risk of slope instability (due to earthworks and vegetation clearance) has been reduced.
Part I	3. Reduced risk of degradation of the natural character of the environment, outstanding natural features or landscapes, areas of significant indigenous vegetation and significant habitats of indigenous fauna, mahinga kai areas or sites of significance to Tangata Whenua	<p>There is no information within ECan on the risk of degradation of the environment as a result of vegetation clearance and earthworks. However, it can be assumed that if there is no erosion due to earthworks or vegetation clearance, there will be no risk to the environment.</p> <p>Progress towards achieving the anticipated environmental result of “reduced risk” is essentially the same as achieving the environmental result of “a reduction in erosion induced by human activities” as outlined above.</p>
Part II	5. Reduced risk of degradation of outstanding natural features of landscapes, areas of significant indigenous vegetation and significant habitats of indigenous fauna, mahinga kai areas or sites of importance to Tangata Whenua	There is no indication that any areas of earthworks and vegetation clearance activities have been sited in or affected areas of regional value.
Part I	4. Reduced risk of degradation of water quality in streams, lakes and coastal waters	Baseline standards for water quality are collected by ECan. Trends show that catchments that are sparsely vegetated have higher rates of siltation than catchments that are heavily vegetated.

Part II	3. Reduced siltation of rivers, streams and Lyttelton Harbour	<p>A preliminary study collected core sediment samples from the Lyttelton Harbour (Goff, 2005).</p> <p>In response to concerns from the Lyttelton Harbour Issues group, a more detailed study of Lyttelton Harbour Potential Contaminant Sources (in prep) was undertaken. More recent data has yet to be analysed.</p> <p>High risk areas were identified as subdivision, quarrying, roading and areas where historic erosion features are still active.</p> <p>Recommendations have been made to alter the Christchurch City Council district plan zoning areas(which include the Port Hills and Banks Peninsula) to mitigate the effects of vegetation clearance and earthworks. Current rates of upper harbour sedimentation are expected to persist as long as the catchment remains in grassland (Hart 2004).</p>
Part I	4. Reduced risk of damage to property	<p>There is no evidence of damage to property or the integrity of transport networks caused erosion as the result of vegetation clearance and earthworks. However, it can be assumed that if there is no erosion due to earthworks or vegetation clearance, there will be no damage to property or transport networks.</p>
Part II	6. Reduced damage to property	
Part I	5. Reduced risk to the integrity of transport networks	<p>Progress towards achieving the environmental result of “reduced risk of damage to property” and “reduced risk to the integrity of transport networks” is essentially the same as achieving the environmental result of “a reduction in erosion induced by human activities” as outlined above.</p>

3.4 Monitoring

Effectiveness and efficiency of the plans is determined through State of the Environment monitoring, compliance monitoring (consent monitoring and monitoring of permitted activities), and plan monitoring (this report). State of the Environment monitoring and compliance monitoring are summarised in Tables 3 and 4.

3.4.1 State of the Environment

Overall, as monitoring the State of the Environment gives long term trends at a large scale results from monitoring for the relatively small (to the region) areas of the Port Hills and Kaikoura East coast are inconclusive. The plans may or may not be effective.

Table 3: State of the environment monitoring

State of the Environment	Progress
<ul style="list-style-type: none">- Landslip and flood damage events- Health and diversity of vegetation	<p>ECan has access through the New Zealand meteorological service to detailed national records of storm events, and prevailing meteorological conditions.</p> <p>ECan keeps detailed records of catchment hydrological response, the type, extent and severity of soil erosion, records of resulting damage from landslip and flood events, as well as and any pre-disposing factors that escalate the scale of damage, to assist in the future management of natural hazards. While this information is not specific to the Port Hills, or Kaikoura East coast, or to earthworks and vegetation clearance, this information provides a regional context for more specific information collected from these areas.</p> <p>Ecological surveys have been undertaken to determine the health and diversity of vegetation, and whether or not vegetation cover is improving or declining. In the Port Hills and Kaikoura East coast, vegetation extent over the past 10 years, appears to be stable. Vegetation condition is improving in local areas where planting, fencing and pest control activities are undertaken.</p> <p>ECan has taken aerial photograph transects that cover 10% of the LVMRP area. Data from these photographs has yet to be analysed (see Environmental results above).</p>

3.4.2 Compliance monitoring

From 1992-2002, under the Conservation of Ground cover bylaw, of a total of 120 consents issued for earthworks and vegetation clearance, 15 were issued in the Port Hills and 47 in the Kaikoura East coast area. Compliance monitoring of consents issued from 2005-2007 is summarised in Table 4. Since 2005, 32 consents have been issued for the Kaikoura East coast (Part I) and 4 for the Port Hills (Part II) (Table 4). Over half of these had not been monitored. District councils monitor earthworks and vegetation clearance controls in urban areas, and areas in the urban/rural interface, as well as building and subdivision consents.

Table 4: Compliance monitoring of consents issued 2005-07

LVMRP Part I (Kaikoura East Coast)	Consents	Compliance
Rule 1: Permitted activity	N/A	N/A
Rule 2: Discretionary Activity	None	N/A
Rule 3: Permitted activity	N/A	N/A
Rule 4: Discretionary activity Area ii	32	4 compliant 5 minor non-compliance 1 enforcement order 17 not monitored 5 in progress
LVMRP Part II (Port Hills)		
Rule 1: Permitted activity Area i	N/A	N/A
Rule 2: Permitted activity Area ii	N/A	N/A
Rule 3: Discretionary activity Area i	1	In progress
Rule 4: Discretionary activity	3	In progress
Rule 5: Non complying activities – Area i	None	N/A
Rule 6: Non complying activities – Area ii	None	N/A

3.4.3 Compliance enforcement

A sample of 33 complaints from the Port Hill areas was selected from an area subject to high development. From 2000-2005, complaints were received from Cass Bay, Port Lyttelton and Lyttelton Harbour Catchments in relation to siltation resulting from earthworks/development, vegetation clearance and stormwater overflow. Of the 12 complaints relevant to the LVRMP, 8 were part of District Council responsibilities, two were minor, and two monitored.

One serious concern was raised in 2001 over excessive rainwater run off and storm water overflow being a likely consequence of a residential development that exceeded the maximum number of houses permitted (30). Following an investigation by Environmental Protection Officers, a consent application was received.

4 Feedback

ECan Environmental Protection Officers monitor consents compliance. Feedback from staff supported the use of rules as an effective means of controlling earthworks and vegetation removal in high risk areas of the region.

5 Section 35 analysis

As the issues, objectives, policies, methods, environmental results and monitoring of the LVMRP Parts I and II are very similar, this Section 35 analysis of efficiency and effectiveness will apply to both plans.

5.1 Effectiveness

Plan effectiveness is measured by whether or not the policies and methods have achieved the environmental results. Aerial photograph monitoring of 10% of the area of each plan was used to compare areas where resource consents were issued for earthworks and vegetation clearance to areas where no consents were issued (Pompei 2005, 2007). As there was no direct evidence of slips caused by these activities within the sample area, it is assumed that implementation of existing policies is effective. However, this assumption needs to be tested as monitoring was small scale and over short time frames.

Long term State of the Environment reporting through the Land Cover data base has shown that overall, on a regional and national scale, where land protection does not occur, the rate of indigenous vegetation loss due to a range of activities, including vegetation clearance and earthworks has not slowed (Walker *et. al.* 2006).

Department of Conservation estate and City Council reserves protect the upper catchments as well as the health of existing indigenous vegetation, reducing the risk of erosion due to earthworks and vegetation clearance. Land protection and/or maintenance of healthy indigenous vegetation cover in areas of high risk of erosion appear to be effective methods in achieving anticipated environmental results. The effectiveness of rules in preventing erosion due to vegetation clearance and earthworks may therefore, in part, be clouded by the extent of Crown (Department of Conservation) and District Council land ownership within the Kaikoura East coast and Port Hills areas.

Rule effectiveness must also be interpreted in a wider ecological context. Records collected by the Meteorological Service have shown that the last decade has been characterised more by drought conditions and less by torrential rain, and has been relatively benign in terms of climatic triggers resulting in soil erosion and water quality degradation. It is therefore more likely that low rates of erosion are due to past relatively benign climatic conditions.

With predicted climate change, and a forecasted pattern of El Nina rather than the current El Nino conditions, the next 10 years may be characterised by more storm and torrential rain events. In this context, any earthworks or vegetation clearance due to human induced activities may trigger moderate to large flow-on effects. The effectiveness of rules may therefore be tested in the long term by relatively unstable environmental conditions.

State of Environment monitoring is undertaken outside the scope of the LVMRP, and is a long-term, indirect method of measuring the effectiveness of the plans. To complement this, short term, direct methods of monitoring plan effectiveness and efficiency are required. As

rules appear to be effective in preventing vegetation clearance and earthworks in the short term, this can be tested by monitoring areas of similar risk (and regional value) where earthworks and vegetation clearance in the absence and presence of consents.

At a larger scale, rule effectiveness could be determined by comparing areas of similar risk in the Port Hills and Kaikoura East coast (high land protection and/or healthy vegetation and/or high biodiversity value) to other areas where land protection and/or healthy vegetation and/or high biodiversity is low, in the absence and presence of consents.

In addition, aerial photographs of the entire region taken within a 10 year period are required to establish baseline monitoring of environmental indicators for landslip and flood damage, and the health of vegetation as a context for interpreting data more specific data collected on the Port Hills and Kaikoura East coast.

Specific on-site information, combined with analysis of large scale of aerial photographs will enable interpretation and analysis of the effectiveness of the plans within a national context, and integration with longer term and broader scale data sets such as those forming the basis of the LCDB II (Land Cover data base).

In the future, rule effectiveness could be improved if they are used as an auditing tool for ensuring that RMA obligations under District Plan provisions are met. ECan could, for example, request access to earthworks and vegetation clearance consents issued by District Councils (e.g. under the Building Act 2004), and audit their effectiveness by monitoring areas of similar risk where earthworks and vegetation clearance occur in the absence of consents. The audit could include a qualitative assessment e.g. did the consent identify high risk activities? Did conditions mitigate or remove the effects of high risk activities?

Overall, the scale, extent and intensity of monitoring carried out in relation to these plans over the last 10 years has not been sufficient to establish the effectiveness of policies and methods in achieving the anticipated environmental outcomes.

5.2 Efficiency

Plan efficiency is determined by whether or not the policies and methods are the most cost effective way of achieving the outcomes. Compliance monitoring shows that rules may be an efficient method of implementing the plans over short time frames in localised areas. However, over the past 3 years, it is of concern that more than half of the consents issued had not been monitored. Method 1 (rules) appears to have been efficient and has the potential to be more efficient if well monitored. There is no evidence that shows whether or not Methods 2 and 3 are efficient. Overall, there is insufficient data to be able to assess the efficiency of the plans.

6 Conclusions and recommendations

This report reviews the implementation of two plans under Section 35 of the Resource Management Act 1991: The Land and Vegetation Regional Management (1997) Part I (Earthworks and Vegetation clearance, Kaikoura East coast), and The Land and Vegetation Regional Management Plan (1997) Part II (Earthworks and Vegetation clearance, Port Hills).

Plan efficiency can be determined by taking a risk management approach, as recommended by Landcare Research (2002). Under a risk management approach, plan efficiency can be assumed to be high if the risk of loss to property and transport networks from soil erosion and flooding is high, or perceived to be high by the community, as the Council would be justified in assisting in securing land protection and improving vegetation cover and/or taking a more regulatory approach to offset any potential losses.

Conversely, if the risk of loss to property and transport networks from soil erosion and flooding is low, then the Council would be justified in taking a general education and advocacy approach. If the risk is low to moderate, then emphasis on consultation or more targeted education and advocacy should be considered.

Under a risk management approach, the LVMRP Part I and Part II can be considered efficient as rules and land protection exist in two areas (Kaikoura East coast and the Port Hills) of high risk of soil loss and flooding (anticipated environmental result, or outcomes), that prevent potential losses to transport networks, property, and sites of regional significance (costs and benefits).

The targets for environmental results all refer to “reduced” risk. Overall, as climatic conditions were benign, the risk of erosion, siltation, loss to property etc was relatively low, but was perceived by the community (due to recent flood events) to be high. At a regional scale, “reduced” risk is a more appropriate target for land that is a moderate risk, as changes in land management practices are more likely to be detected.

More detailed monitoring programmes than those currently undertaken may be justified where there is a high level of vegetation clearance and earthworks (e.g. a regionally important new subdivision) and the area is of moderate-high risk of erosion. Otherwise it can be assumed to be more efficient and effective to mitigate effects e.g. through land protection, and improving vegetation health through ECan initiatives such as the Environment Enhancement Fund, Living Streams programme than to monitor them at those specific sites.

Overall, land protection and/or healthy vegetation cover appear to be effective methods that achieve anticipated environmental results on a large scale, while rules appear to be more efficient and effective on a smaller scale. The effectiveness of promoting land use management that avoids undue soil disturbance or vegetation removal or in identify sites of regional significance in achieving anticipated environmental outcomes is difficult to ascertain, but appears localised in effect.

The efficiency of policies and methods requires a more rigorous approach to monitoring consents and/or environmental outcomes. It is recommended that a data base of digitised and ortho-corrected aerial photographs of the entire region be taken every 10 years. This will enable baseline monitoring of environmental indicators for landslip and flood damage to be established.

It is recommended that ECan work with district councils to identify future areas of subdivision or major earthworks and vegetation clearance in moderate risk areas, with low to moderate public land protection. In these areas, it is recommended that ECan undertake monitoring of landslip and flood damage events, and the health and diversity of vegetation before and after

subdivision or major earthworks and vegetation clearance occur, and in a range of those sites where discretionary and permitted rules are in place, on a regional scale.

Consideration should be given to improving the efficiency and effectiveness of the LVMRP by considering all high risk land in the region under one plan. In high risk areas (areas prone to erosion due to vegetation clearance or earthworks), it is likely that land protection, healthy indigenous vegetation, and rules, will be the most effective means of achieving environmental outcomes.

The review of the Land and Vegetation Management Regional Plan Parts I and II under section 79 of the RMA will commence in 2007. To enable better integration of policies and methods, it is recommended that the review of earthworks and vegetation clearance activities that is signalled in the Proposed Canterbury Natural Resources Regional Plan (2007) be undertaken in conjunction with this review. .

7 References

- Canterbury Regional Council 2001: Proposed Canterbury Natural Resources Regional Plan.
- Canterbury Regional Council 1997a. Land and Vegetation Management Regional Plan 1997. Part I Earthworks and Vegetation Clearance, Kaikoura East Coast. Canterbury Regional Council, Christchurch. 64pp.
- Canterbury Regional Council 1997b. Land and Vegetation Management Regional Plan 1997. Part II Earthworks and Vegetation Clearance, Port Hills. Canterbury Regional Council, Christchurch. 50pp.
- Canterbury Regional Council 2004. Proposed Natural Resources Regional Plan Environment Canterbury, Christchurch.
- Canterbury Regional Council 2005. Land and Vegetation Management Regional Plan 1997. Part IV Land Management Fires, Canterbury Hill and High Country. Canterbury Regional Council, Christchurch. 41pp.
- Environment Canterbury 2007. Erosion and sediment control guideline. A better way of managing earthworks and the environment. Report R06/23. 22pp.
- Goff, J. 2005. Preliminary core study- upper Lyttelton Harbour. Unpublished Landcare Research contract report CHC2005-151. 15pp.
- Hart, D. E. 2004. Sedimentation in the Upper Lyttelton Harbour. A Report to Environment Canterbury. Unpublished internal report. Environment Canterbury. 18pp.
- Hunter, G. G., Lynn, I. H., Phillips, C. J. 1996. The susceptibility of land in Canterbury to soil erosion and water quality degradation associated with earthworks and vegetation clearance. Unpublished Landcare Research contract report LC9596/147.
- Hunter, G. G., Lynn, I. H., Phillips, C. J. 2002. Towards policy for controlling earthworks and vegetation clearance activities in Canterbury. Prepared by Landcare Research for Environment Canterbury. Report no. U02/50. 29pp.
- Lynn, I H. 1999a. Soil erosion mass movement maps for the Kaikoura East Coast and Port Hills. Unpublished Landcare Research contract report: LC9899/98. 49pp.
- Phillips, C. J. 1994. Rural land disturbance and vegetation removal controls. Unpublished Landcare Research contract report: LC9394/69. 40pp.
- Pompei, M. 2005. With Reference to the Land and Vegetation Management Regional Plan Part II: Earthworks and vegetation clearance. An assessment of the changes in erosion in sample areas of the Port Hills. Unpublished Internal report, Environment Canterbury.
- Pompei, M. 2007. With reference to the Land and Vegetation Management Regional Plan Part I: Earthworks and vegetation clearance. An assessment of the changes in erosion in sample areas of Kaikoura District's East coast. Unpublished Internal report, Environment Canterbury.
- Walker, S., Price, R., Rutledge, D., Stephens, R.T.T., Lee, W.G. 2006. Recent loss of indigenous cover in New Zealand. *New Zealand Journal of Ecology* 30(2):169-177.
