

Does the NES-PF adequately regulate forestry on orange (high) ESC land? An opinion

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Abstract

The National Environmental Standards for Plantation Forestry (NES-PF) has largely achieved its goal of nationally consistent Resource Management Act 1991 (RMA) planning and compliance requirements. However, no system is perfect and it has become clear that the NES-PF has three shortcomings. First, the NES-PF allows clearfell harvesting, and in some cases earthworks, to be a permitted activity on land zoned as high (orange) in its Erosion Susceptibility Classification (ESC). Controlled activity status should be the default minimum for earthworks and clearfell harvesting on orange ESC land, as these activities may not meet the threshold for permitted activity status on land highly susceptible to erosion. Secondly, the NES-PF and guidance documents do not adequately address problems with the scale and accuracy of mapping for the ESC and the need for landslide hazard mapping by qualified geoscience professionals. Finally, the NES-PF lacks a formal landslide and erosion risk management framework. The NES-PF and published guidelines conflate erosion susceptibility, landslide hazard and landslide risk, which are distinctly different concepts.

Introduction

The National Environmental Standards for Plantation Forestry (NES-PF) is a set of regulations under the RMA. The NES-PF was developed by Te Uru Rākau-New Zealand Forest Service (TUR) in partnership with the Ministry for the Environment. The NES-PF is implemented at the local level by territorial and regional councils. It is intended to provide certainty for commercial plantation forestry by setting nationally consistent RMA planning and compliance requirements for specified activities (Fowler, 2017). The focus of this paper is on the ability of the NES-PF to control significant adverse environmental effects arising from landslides and slash and/or sediment discharges on orange ESC land.

The NES-PF regulations use several science-based tools to help council staff and foresters plan and manage forestry operations. For landslides and erosion, the Erosion Susceptibility Classification (ESC) tool

spatially depicts a landscape’s susceptibility to erosion and landslides, with coverage of both the North and South Islands. The ESC classifies land according to a four-colour ‘traffic-light’ system, where green=low, yellow=moderate, orange=high and red=very high ESC.

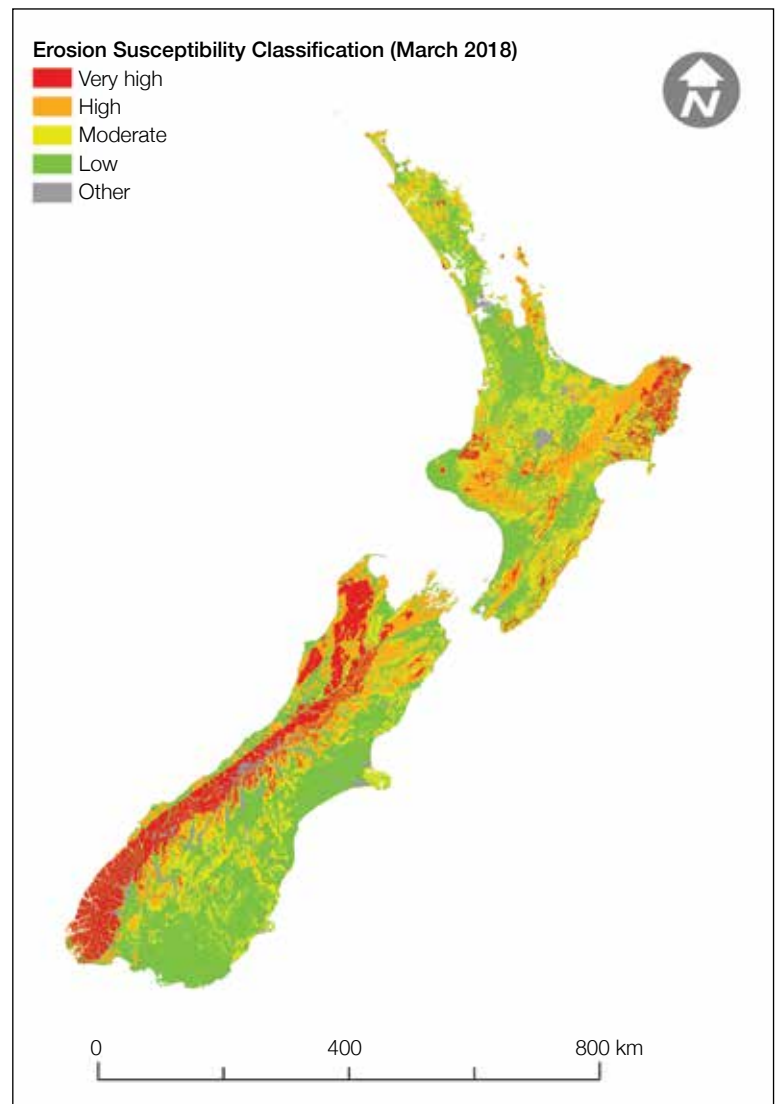


Figure 1: Erosion Susceptibility Classification for North and South Islands. Source: David Palmer (Scion) and Te Uru Rākau

Most steep and very steep (>25 degrees) landforms are classified as high (orange) or moderate (yellow) in the ESC. However, there are also significant areas of steep land classified as low (green) ESC, mainly in the South Island. Very high (red) ESC is largely restricted to highly erodible soft-rock terrains in the North Island or mountainous areas where commercial plantation forestry is not feasible (Figure 1).

The NES-PF has largely achieved its goal of nationally consistent RMA planning and compliance requirements, in contrast to the fragmented rules and policies that applied to forestry earthworks and harvesting before the NES-PF (Pendly et al., 2015; Strang et al., 2015). However, no system is perfect, and since coming into force in 2018 it has become clear that the NES-PF has three important shortcomings:

1. The provision for clearfell harvesting, and in some cases earthworks, to be a permitted activity on land zoned orange ESC. In my opinion, this is inappropriate since these activities may not meet the threshold for permitted activity status on land highly susceptible to erosion.
2. The NES-PF and guidance documents do not adequately address problems with the scale and accuracy of mapping for the ESC and the need for landslide hazard mapping by qualified geoscience professionals.
3. The NES-PF lacks a formal landslide and erosion risk management framework. The NES-PF, as currently written, conflates erosion susceptibility, landslide hazard and landslide risk, which are distinctly different concepts.

Permitted activity status inappropriate on orange ESC land

On orange ESC land, earthworks and clearfell harvesting may be a permitted activity subject to conditions including:

1. Restriction on the size of the earthworks (volume and batter height).
2. Earthworks must be on slopes <25 degrees.
3. Sediment originating from harvesting must be managed to ensure that after reasonable mixing it does not give rise to any of the following effects in the receiving waters:
 - any conspicuous change in colour or visual clarity
 - the rendering of fresh water unsuitable for consumption by farm animals
 - any significant adverse effect on aquatic life.

There are also conditions relating to the effects of sediment and slash in terms of damage to downstream infrastructure and properties.

These permitted activity conditions may not be met because clearfell harvesting on steep land can temporarily increase landsliding and sediment discharge rates. This increase in landsliding is thoroughly researched, both here in New Zealand (e.g. Phillips et al., 2018) and overseas (see Bathurst and Iroumé (2014) for a global review of research on this topic).

The clearfelling of a forest is a 'preparatory factor' (Saunders & Glassey 2007), making landscapes more susceptible to slope failure and higher landslide densities than would occur under a forest cover. Of course, during landslide-triggering rainfalls, slope failures can occur even under mature forests. However, during the 'window of vulnerability' after clearfell harvesting, the new replanted tree crop has not completely occupied the soil with its roots, nor does its canopy completely cover the ground. Therefore, its capacity to mitigate slope failures during landslide-triggering storms is reduced, resulting in an increased rate of slope failures, landslides and discharges of sediment and slash. The window of vulnerability generally lasts about six years after clearfell harvesting (Phillips et al., 2018).

Clearfell harvesting on orange ESC lands may not meet permitted activity standards

Section 43A of the RMA states you cannot give permitted activity status to something with significant adverse effects. If there is a good chance that a clearfell harvest may give rise to or exacerbate significant sediment discharges, you should therefore not make it a permitted activity. Therefore, the key question is what do we call a 'good chance'?

By definition, orange ESC lands are susceptible to erosion and landsliding. However, landsliding will not occur until a landslide-triggering event, usually a high-intensity or long-duration rainfall. If the triggering event has a 10-year Average Recurrence Interval (ARI), then the cumulative probability that at least one such event will occur in the six-year window of vulnerability is 0.47. If the triggering event has a 30-year ARI, then the probability of at least one such event occurring in the six-year window of vulnerability is 0.18. Even with a 50-year ARI event, the six-year probability is 0.114. Therefore, while 10, 20 or 50-year ARIs can sound reasonable as a threshold for significant landslide-triggering rainfall events, the odds do not seem so good if you look at the cumulative likelihood of such events over six years.

For example, North Marlborough has experienced five major landslide-triggering rainfall events in the last 12 years, in 2010, 2018 (Cyclones Gita and Fehi), 2021 and, most recently, in August 2022 (Figure 2). There have also been several smaller events in North Marlborough since 2010, including two in 2016 and 2017, where forestry companies were convicted for slash and landslide debris discharges.

The landsliding shown in Figure 2 is not unusual in North Marlborough. Numerous other examples



Figure 2: Landslides from a harvested forest in North Marlborough in 2022. The landslides impacted the state highway (SH6) at the bottom of the slope. Source: Matt Oliver, Marlborough District Council

could have been depicted, on a range of ownerships ranging from small private ownerships to large corporate forests.

Although my experience with forestry landslides has largely been in Te Tau Ihu | Nelson-Marlborough, landslide events on harvested orange ESC land have occurred in other parts of New Zealand within the last 20 years (e.g. Bay of Plenty (Douglas et al., 2011), Taranaki (TRC, 2016), and the Coromandel Peninsula (Marden et al., (2006)).

In summary, there is a good chance that clearfell harvesting on orange ESC land will give rise to significant adverse effects, such as discharges into waterways, impacts on the built environment and threats to human safety. Therefore, clearfell harvesting may not meet the threshold for permitted activity status on land highly susceptible to erosion. A controlled activity consent should be the default minimum for earthworks and clearfell harvesting on orange ESC land. In particular, the consent should specify the right of the consent holder to discharge sediment, as such discharges are possible during the window of vulnerability and, in a landslide-triggering storm, difficult to avoid.

Admittedly, resource consent requirements will add cost and effort to planning harvest operations. However, much of the additional information required in support of consent applications ought to be gathered anyway, to conform with TUR guidelines on ESC mapping and correctly assess landslide risk. These requirements are described in the next two sections.

Limitations of the ESC map layer

TUR and the scientists who developed the ESC have recognised its limitations (Basher, 2016; Bloomberg, 2015; Marden, et al., 2015; Hendrickson, 2018). A key limitation is that the ESC maps are at a scale of 1:50,000. This is too coarse a resolution to identify smaller land units whose ESC may differ from a surrounding larger area of land. For example, a small steep hill face within an area of gentler topography may be highly susceptible to landsliding, but will not show in the 1:50,000 ESC map layer.

Therefore, Schedule 3 of the NES-PF requires the following:

- Management plans at a scale of 1:10,000, and
- An ESC (NES-PF overlay map).



Figure 3: The area between Belvue Bay Road and Moenui Road on Queen Charlotte Drive showing multiple landslide scars after the July 2021 rainfall event. The coloured shading shows slopes: <26 degrees (green), 26–35 degrees (pale) and >35 degrees (red). The ESC maps the entire area as green (low erosion susceptibility). Source: Google Earth and unpublished slope analysis by the author and David Palmer (Scion)

As noted in the Te Uru Rākau ‘Erosion Susceptibility Classification and Operational Scale Forestry Earthworks Management and Harvest Management Plans Guidance’ (TUR, 2022):

After consulting the ESC, an essential second step in risk assessment to guide decision is detailed planning at an operational scale. Additional site-specific information, such as the likely effects of topography, soils, drainage and risks of high intensity rainfall events provide for the ESC outputs to be refined to a larger scale. It is not credible to apply (e.g. simply blow up/expand to a larger scale) the ESC at this scale without interpretation and/or adjustment to the operational management plans scale. (The last sentence is underlined for emphasis)

However, there are two problems with this requirement:

1. Some New Zealand forestry companies have or are developing the inhouse skills to assess erosion susceptibility, hazard and risk at an operational (1:10,000 scale). But many companies, especially the smaller ones, will not have this capability.

2. Discussions with regional council and forestry company staff in the northern and central South Island suggest that some companies do not properly re-map ESC at 1:10,000 when submitting management plans. If this is true for most regions in New Zealand, then at least in some cases the TUR guidelines are being ignored.

Possible misclassification of high erosion-susceptibility land as low or moderate ESC

There is a further consequence of the ESC’s inability to identify smaller land units whose ESC may vary from a surrounding larger area of land. Since NES-PF regulations (including permitted activity standards and consent status) are determined by ESC classification, land mapped as low or moderate ESC may include significant areas of orange or even red ESC. However, because these areas are not shown on the ESC map, applicants and consent authorities may mistakenly adjudge clearfell harvesting and earthworks activities to be permitted activities on land with high actual susceptibility to landslides and risk of significant adverse effects.

An extreme example was revealed at Moenui on Queen Charlotte Drive, Marlborough during the July 2021 rainfall event (Figure 3). Here, land mapped by the ESC as entirely low (green) ESC experienced multiple landslide failures, including debris flows which severely impacted downslope infrastructure and housing. A simple slope analysis revealed significant areas in the 26–35 and >35 degree slope classes. The landsliding originated in these steep areas, which clearly did not have a low erosion susceptibility.

Lack of formal risk management methods in the NES-PF

To properly assess landslide risk, mapping the erosion susceptibility of a landform is not enough. Landslide hazard mapping is also required, identifying downslope or downstream areas that could be affected by a damaging landslide. Hazard assessment also includes landslide probability within a specified time interval. Finally, the assets (e.g. housing, infrastructure, high conservation value areas) within the area affected by the landslide hazard need to be identified and located. This identification is needed to assess the consequences of landsliding to life, property or the natural environment.

The NES-PF does not have a formal system for assessing erosion or landslide risk. Note that there is an internationally accepted standard for assessing landslide risk (Fell et al., 2008). NES-PF guidance documents do not follow this international standard and frequently conflate erosion susceptibility, hazard and risk. For example, the 'Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2018 Consenting and Compliance Guide' (MPI, 2018) states:

Inherent site risk and/or exceeding a threshold – the NES-PF introduces a resource consent requirement for certain plantation forestry activities located in the orange or red zone because of the inherent erosion risk on this land.

This statement does not recognise the components of erosion or landslide risk. There is no inherent erosion risk with orange or red ESC land. Red and orange ESC lands have geomorphological characteristics that make them susceptible to landslides or erosion under triggering conditions. This susceptibility contributes to risk, but terming this susceptibility 'inherent risk' ignores the need to understand the other contributing factors. These factors include the downslope nature of the hazards created by the landslides and the impact of those hazards on human safety and the built and natural environments.

An understanding of landslide hazard and risk comes from a fuller assessment of landslide susceptibility than provided by the ESC, combined with an assessment of landslide hazard and downslope consequences viewed over a suitable timescale.

Recommendations

1. Controlled activity status should be the default minimum for all earthworks and clearfell harvesting on orange ESC land (aside from the routine maintenance of consented works), as these activities may not meet the conditions for permitted activity status on land highly susceptible to erosion.
2. The current ESC mapping at 1:50,000 scale is not accurate. Professional landslide susceptibility and hazard assessment should be compulsory for any steepland logging (>25 degree slope) wherever there are potential risks to human safety and built and natural environments.
3. The effort put into planning and regulating earthworks and clearfell harvesting on orange ESC land needs to increase, which includes improvements to landslide hazard mapping and formal landslide risk assessment. Landslide risk management on red ESC land is only discussed in passing in this paper, as rules in the NES-PF are generally more restrictive for this land. However, the recommendations in this paper for risk management apply to both red and orange ESC plantation forests.

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