

Title: Wellington Regional Council policy approaches for managing sediment in the Ruamāhanga catchment

Purpose: To provide information to the Ruamāhanga Whaitua Committee on current approaches that Wellington Regional Council (WRC) uses to manage sediment.

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1. Background

This report has been prepared for the Ruamāhanga Whaitua Committee (the Committee) to assist them in identifying sediment management issues to be addressed by the Whaitua Implementation Programme and therefore what management options to recommend.

The report briefly details the problems associated with sediment discharges, then outlines the current regulatory and non-regulatory approaches to managing sediment in the whaitua. This information provides the basis for the Committee to consider sediment issues that need to be addressed by management approaches in the Whaitua Implementation Programme.

The terms of reference for the Committee direct the management of nutrients as a key task, and specifically include developing:

- water quality limits, including nutrient load and contaminant limits for freshwater and coastal waters if appropriate
- programmes or activities that will support or contribute to the achievement of the established objectives and targets for water quality and quantity outcomes, including such tools as environmental accords and post-settlement arrangements.

1.1 What's the problem?

Both natural processes and land use activities can cause soil erosion. Eroded soil becomes mobile in rainfall and can adversely impact the environment where it enters water bodies such as rivers, lakes and wetlands (Sorenson, 2012). Erosion debris of silts and gravels entering rivers via surface runoff, increases the risk of flooding, and contributes to loss of aquatic habitat and increased sediment loads (Ministry for the Environment, 2007).

Soil erosion can also have significant economic and social impacts. Erosion can damage roads, buildings and other infrastructure, and in large landslide events can lead to social upheaval, reduced revenue and added cost associated with reinstating infrastructure.

Managing vegetation coverage is an important mitigation technique to control erosion and consequently the impacts of sedimentation on water quality. Soil conservation management strategies such as planting of woody vegetation, space-planted trees and forestry are used to reduce the occurrence of mass movement erosion on pastoral hill country.

One of the major issues in managing sediment discharge is the scale of the problem in the Ruamāhanga whaitua and the rate at which land can be treated. There are an estimated 63,000 hectares of hill country (LUC class 5+) in the Ruamāhanga whaitua. Eighteen thousand hectares are estimated to be high priority LUC classes with no vegetative cover. At an average cost of \$2000/ha to establish vegetative cover, it would cost \$36 million to treat this land.

There are limitations in assessing sediment loss at the farm scale, and hence limitations in the ability to track reductions in sediment loss from a farm over time. At a regional scale it is reasonably well accepted that afforestation can reduce sediment loss by 90% and space planting can reduce sediment loss by 70% compared to non-vegetated land.

Sediment loss is also closely linked to managing phosphorus in waterways. Historically, phosphorus has accumulated in waterways where land has been cleared, with the highest rates occurring where rainfall is high, slopes are steep and soils are prone to erosion. Phosphorus occurs naturally in soil, but the use of superphosphate fertiliser on hill country, which began in the 1950s, increases phosphorus in soil and thus the losses into water (Parliamentary Commissioner for the Environment, 2013).

Sewage and animal effluent contain phosphorus. Wastewater discharges from towns are the main point sources of phosphorus. Point source discharges are a small proportion of total phosphorus loads in the catchment; most of the phosphorus load comes from phosphorus attached to soils particles. However wastewater discharges increase dissolved reactive phosphorus (DRP) concentrations in localised stretches of the Ruamāhanga even when the discharge occurs at median or greater than median flows. Policy options may need to consider addressing both total catchment loads, as well as concentrations of phosphorus at different flows.

2. What's in the proposed Plan?

The Proposed Natural Resources Plan (the proposed Plan) was publicly notified in July 2015. The proposed Plan has region-wide objectives, policies and rules for the management of water quality. WRC's programme for implementation of the NPS-FM establishes that whaitua committees will be responsible for recommending water quality limits that will be included in the regional plan. However, the proposed Plan does provide some direction on managing sedimentation and this is discussed below.

2.1 Objectives

The proposed Plan includes a number of objectives relating generally to soil, land use, water quality and contaminant discharges (objectives O23 to O30). Specific objectives relating to soil and sediment getting into water are:

- O42: Soils are healthy and productive and accelerated erosion is reduced P33 states that the effects of nutrient discharges from agricultural activities should be minimised
- O44: The adverse effects on soil and water from land use activities are minimised
- O46: Discharges to land are managed to reduce the runoff or leaching of contaminants
- O47: the amount of sediment-laden runoff entering water is reduced

2.2 Policies

Policies in the proposed Plan identify matters that are relevant when resource consent applications are considered. The proposed Plan also includes a number of policies relating generally to water quality and contaminant discharges to water (P62 to P105). A number of these policies more specifically relate to sediment discharges. These more specific policies are P33, P74, P97 to P99, P101 and P103. They are shown in Appendix 1.

- P33 states that the effects of nutrient discharges from agricultural activities should be minimised
- P74 is for stormwater network discharges authorised by a controlled activity consent to monitor water quality and sediment quality in the receiving environment and the benthic habitat of low energy receiving environments
- P97 is to minimise the discharge of sediment to surface water bodies and coastal water from earthworks activities using a source control approach
- P98 targets activities relating to earthworks, vegetation clearance and plantation forestry harvesting activities that have the potential to result in significant accelerated soil erosion, or to lead to off-site discharges of silt and sediment to surface water bodies.
- P99 identifies matters to be managed in response to sedimentation and the direct discharges of contaminants as a result of livestock access
- P101 states that the impacts of sediment and nutrients on water should be managed in accordance with good management principles, including in regards to riparian margins, livestock exclusion and the management of pest plants and animals
- P103 identifies how gravel extraction shall be managed so that erosion is not increased.

2.3 Rules

Discharge and land use rules in the proposed Plan identified below have the potential to result in sediment entering rivers, lakes and groundwater (in small quantities in some cases). Discharge rules in the proposed Plan permit or prohibit activities. Activities not permitted or prohibited will require resource consent. Table 1 sets out the rules most relevant to sediment discharges to land and/or water.

Table 1: Regulation of activities relevant to sediment management in the proposed Plan

*Unless the activity does not meet the conditions of the relevant rule, in which case it requires consent

‡ But may be consented if less than minor effects or is supported by policies in the proposed Plan

Does not require consent*	Requires consent
Minor discharges to water and land (R42 and R69) Stormwater to water or land from an individual property (R48) Existing pump drainage schemes to water (R59) Cultivation or tilling of land (R94) Breakfeeding (R95) Stock access to water bodies (R96) Earthworks (R99) Vegetation clearance on erosion prone land (R100) Plantation forestry harvesting on erosion prone land (R102)	Discharge of treated wastewater to land (R79) Discharges of collected animal effluent (e.g. effluent ponds) (R83 or R84) Discharges that do not meet permitted activity conditions (R67 or R93) Stock access to water bodies (R97) Earthworks and vegetation clearance (R101) Plantation forestry (R103) Cultivation and break-feeding that does not meet permitted activity conditions for these activities (R151)

Permitted activity land use rules in the proposed Plan (R94, R95, R96, R99, R100 and R102 include conditions that relates to sediment getting into rivers and lakes. If these conditions are not meet, resource consent is required according to land use rules for the specific activities (R97, R101, R103 and R151).

2.4 Summary of proposed Plan provisions

Objectives and policies in the proposed Plan are directed at minimising and reducing sediment discharges. The Plan manages point source and diffuse source discharges. Point source discharges require resource consents and conditions are able to be put on these discharges that control them. Diffuse source discharges are generally permitted activities and the approach to managing them in the proposed Plan relies on landowners carrying out good practice.

The objectives, policies and rules in the proposed plan are region-wide. WRC's intention expressed through its programme for implementing the NPS FM (WRC, 2014), is that they will be complemented and improved by catchment specific provisions recommended by the Ruamāhanga Whaitua Committee that incorporate freshwater objectives, values, attributes and limits relevant to the Ruamāhanga catchment (including sub-catchments).

3. Non regulatory initiatives

The current non regulatory approach for managing sediment is the Hill Country erosion programme, managed by the Land Management Department. This programme works with farmers to identify and treat erosion prone land on their farms.

The programme is voluntary and involves completing a farm plan for a property and providing grant assistance to subsidise the cost of erosion control works. This approach has been used in the Wairarapa since 1953.

Farm plans typically include a summary of the farm system, resource information using Land Use Capability (LUC) mapping at a 1:10,000 scale, farm maps and a ten year works programme. There is currently a move to simplify and standardise farm plans in this format. This is driven by the fact that most farms determine their planting programme during annual discussions with a Land Management Advisor, rather than rigidly adhering to a written plan produced five to ten years earlier. The simplified plan aims to provide sufficient information to aid those discussions rather than spending time and money producing a comprehensive written document that is not often used.

In the past, more detailed farm plans (Sustainability Plans and the original Wellington Regional Erosion Control Initiative - WRECI Plans) have also included some or all of the following; information on pasture production, stocking rates, projected changes in these if the farm plan is implemented, carbon sequestration, potential sediment reduction once the farm plan is implemented and the location of waterways on the property.

3.1 Farm plans

A total of 527 Farm Plans have been prepared across the Wellington region since the 1950's; 99% of these are located in the Wairarapa. Over this time a significant number of properties have been converted to forestry, amalgamated with neighboring properties or subdivided into lifestyle blocks. Today it is estimated that there are 380 hill country properties in the Wairarapa that contain erosion prone land, and 324 (or 85%) currently have a Farm Plan. 265 of these farm plans are considered active. Erosion control work is completed on approximately 130 to 150 properties each year. New farm plans are being prepared where farmers show an active interest in joining the programme. Existing plans are reviewed approximately every 10 years.

Table 2: History of farm plan preparation

	1950 to 1959	1960 to 1969	1970 to 1979	1980 to 1989	1990 to 1999	2000 to 2009	2010 to now
Farm Plans prepared	78	118	156	104	34	12	25

3.2 Grant rates

Grant assistance is provided for approved works, primarily poplar and willow planting, or afforestation or reversion projects. Works are approved at a broad scale when a farm plan is produced. Annual work programmes are approved by Land Management Advisors. The recent increase in grant rates has increased the interest in afforestation work. This means that afforestation works are now prioritised based on the LUC class of land treated, proximity to water and cost effectiveness of the project in order to treat the highest priority areas within the available budget.

Grant rates to support this work have varied over the years. Prior to 1990, when the Government provided grant assistance, grant rates were between 66% and 75%. In 1987, when the government withdrew grant assistance, the Regional Council continued with Regional grants of 40%.

In 1996, Sustainability Plans (targeting farms with the most severe erosion) provided grant rates of 50%. In 1998, Regional grants were reduced to 35% and 45%, and then in 2001 Regional grant rates were reduced again to 30% and 40%. In 2010, the Upper Taueru catchment was included in the WRECI programme, which provided grant rates of 60% (30% from Regional Council and 30% from MPI). In 2015, all of the Ruamāhanga whaitua was included in the WRECI programme.

The current grant rate available in the Ruamāhanga whaitua is 60% for poplar and willow planting, and either 60% or 75% for afforestation projects. The different grant rates for afforestation projects are determined by LUC class of land and the connectivity to waterways of the area planted.

Expansion of the WRECI programme in 2015 to include all of the Ruamāhanga whaitua was accompanied by a shift in policy to target erosion control works at high priority LUC classes of land that generate higher loads of sediment. Works on erosion prone land that generates lower amounts of sediment are still supported by a 30% grant rate. In the 2015/2016 year just over 80% of plantings were carried out on high priority LUC classes.

Table 3: High priority targeted LUC classes

Moderate Landslide	Moderate Earthflow	Severe Landslide	Severe Earthflow and unproductive land
6e1, 6e4, 6e5, 6e7, 6e8, 6e9, 6e13, 6e15, 7e3, 7e10, 7e11, 7s3	6e10, 6e12, 6e12b	7e1, 7e2, 7e4,	7e6, 7e6b, 7e8, 7e12, 8e1, 8e3

Grant rates also support other erosion control methods including de-watering slumps, sediment traps, and debris dams. The amount of work using these methods is considerably less than vegetation planting. A small amount of funding is also available to support stream bank erosion control.

Table 4: History of non-regulatory methods used in the Ruamāhanga whaitua

1941 Soil Conservation and Rivers Control Act → Catchment Boards National Soil and Water Conservation Authority (NWASCA) established
1947 Wairarapa Catchment Board formed
1953 First Farm Plan prepared in the Wairarapa
1960 National subsidies as high as 75% provided to support erosion control work
1987 Removal of central government subsidies. Grants were gradually removed over a 5 year period
1989 Wairarapa Catchment Board becomes part of Greater Wellington Regional Council NWASCA abolished
1990s Regional Council grants made available to continue soil conservation work – 40%
1996 First Sustainability Plan prepared – Regional grant rate of 50%
1998 Regional Council grants reduced to 35% and 45%
2000 Baseline Soil quality and soil intactness monitoring begun
2001 Regional Council grants reduced to 30% and 40%
2007 Government re-enters as a partner in erosion control through the Hill Country Erosion Fund
2010 The Wellington Regional Erosion Control Initiative (WRECI) started. Covers the Upper Taueru part of the Ruamāhanga whaitua
2015 WRECI programme expanded to cover all of the Ruamāhanga whaitua

3.3 Other approaches to manage sediment

In the past the Regional Council has purchased and afforested farm scale blocks of severely erodible land. Essentially this provides 100% grant rate to treat the erosion in these severely eroded areas. In the Ruamāhanga whaitua two areas, Tauanui and Hiwinui were purchased and afforested. Cutting rights to these forests have recently been sold, and land ownership has been retained by the Regional Council.

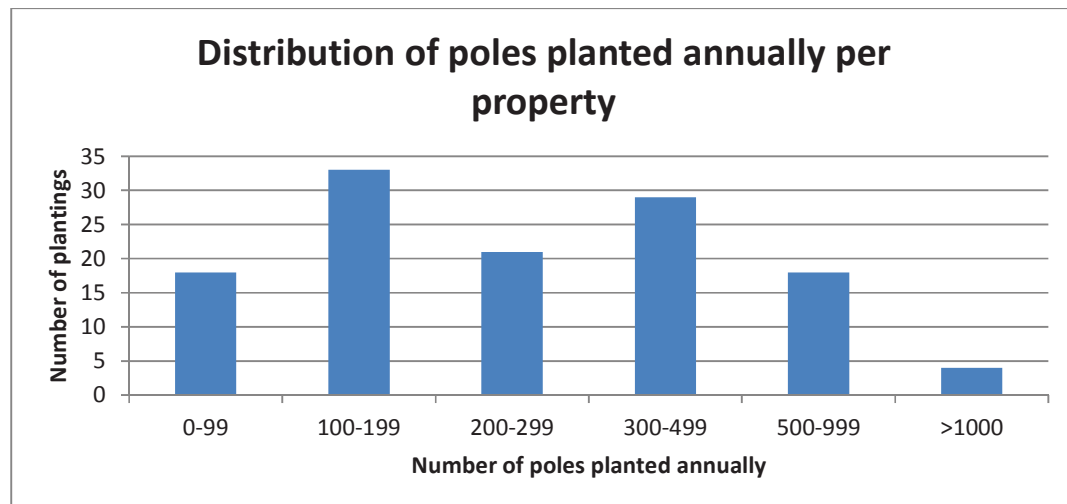
3.4 Discussion on the current programme

In the 2015/2016 year an estimated 170 hectares of erosion prone land was treated in the Ruamāhanga whaitua. This is 0.9% of the estimated 18,200 hectares of targeted LUC classes (Table 3) that have no woody or protective vegetation cover. At the current rate of work it will take approximately 100 years to treat the high priority erosion prone land in the Ruamāhanga whaitua. This does not include treating erosion prone land on non-target LUC classes.

There are still some properties that no work is being undertaken on because landowners do not want to work with the Council. An estimated 21% of high erosion prone land is not covered by a farm plan.

There is a large range in the amount of work undertaken on individual farms. The distribution of poles planted per property per year in the first four years of the WRECI programme (2010-2013) is shown in Figure 1. 15% of plantings were of fewer than 100 poles. Approximately 40% of plantings were of fewer than 200 poles per property (approximately 3 ha treated). 18% of plantings were more than 500 per property per year.

Figure 1: Distribution of poles planted per property per year between 2010 and 2013



This indicates that some properties are treating between seven and ten hectares per year of erosion prone land. Other properties are only protecting between one and two hectares per year, and will therefore take significant time to achieve any major reduction in sediment loss from the farm.

There are also benefits from providing erosion control other than sediment reduction e.g. maintaining and improving pasture productivity, and infrastructure protection at farm and district scale. Where erosion control work is used to address these issues, reduction in sediment will be lower than if the work was targeted at the highest sediment generating areas. Any decisions around policy and allocation of resources to manage sediment reduction would need to incorporate this consideration.

There are large variations in sediment loss from different classes of land. It is however difficult to provide accurate data on sediment loss from different land classes at a farm scale. At the moment there aren't any good methods to assess sediment loss accurately at farm scale.

The hill country erosion programme has traditionally focused on preventing erosion on hill slopes. Establishment of vegetative cover on hill slopes is effective in reducing sediment loss to waterways over a long period of time. There has been less work done on managing sediment that has already eroded from hill slopes and is being transported through the river system. Consideration of the relative importance of managing sediment already lost from the hills, yet not delivered to river systems, should be incorporated into any policy approach aimed at reducing sediment load to rivers.

Ongoing management of established woody vegetation also needs to be considered in policy decisions, especially whether support is provided for this ongoing work.

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Appendix 1: Plan policies directly related to sedimentation

Policy P33: Protecting indigenous fish habitat



The more than minor adverse effects of activities on the species known to be present in any water body identified in Schedule F1 (rivers/lakes) as habitat for indigenous fish species, and Schedule F1b (inanga spawning habitats), particularly at the relevant spawning and migration times identified in Schedule F1a (fish spawning/migration) for those species, shall be avoided. These activities include the following:

- (a) discharges of contaminants, including sediment, and
- (b) disturbance of the bed or banks that would significantly affect spawning habitat at peak times of the year, and

damming, diversion or taking of water which leads to significant loss of flow or which makes the river impassable to migrating indigenous fish.

Policy P74: First-stage local authority network consents



The adverse effects of discharges from a local authority **stormwater network** during a controlled activity consent granted under Rule R50 shall be managed by:

- (c) managing the **stormwater network** on a comprehensive basis whereby discharges from local authority **stormwater** devices are aggregated on a catchment or **sub-catchment** basis and authorised via a single ‘global’ consent, and
- (d) undertaking monitoring to identify the adverse quality and quantity effects of discharges from the **stormwater network** on:
 - (i) **aquatic ecosystem health** and **mahinga kai**, and
 - (ii) contact recreation and **Māori customary use**, and
 - (iii) the values of areas with identified outstanding or significant values identified in Schedule A (outstanding water bodies), Schedule C (mana whenua), Schedule F (indigenous biodiversity), and
 - (iv) water and sediment quality in the receiving environment, and the benthic habitat of **low energy receiving environments**,

in order to develop a prioritised programme for improvement of areas within the **stormwater network** that will form the basis of a **stormwater management strategy**, and

Policy P97: Managing sediment discharges



The discharge of sediment to **surface water bodies** and coastal water from **earthworks** activities shall be minimised by using a source control approach.

Good management practices shall be used in site management, erosion and sediment control design operation and maintenance in order to minimise the adverse effects of sediment-laden **stormwater** discharges.

Effects that cannot be minimised may be appropriately **offset**.

Policy P98: Accelerated soil erosion



Earthworks, vegetation clearance and **plantation forestry harvesting** activities that have the potential to result in significant accelerated soil erosion, or to lead to off-site discharges of silt and sediment to **surface water bodies**, shall use measures, including **good management practice**, to:

- (e) minimise the risk of accelerated soil erosion, and
- (f) control silt and sediment runoff, and
- (g) ensure the site is **stabilised** and vegetation cover is restored.

Policy P99: Livestock access to surface water bodies



Sedimentation, the direct discharge of contaminants and the disturbance to the banks and beds (including plants and habitats in, on or under the bed) of **surface water bodies** and the coastal marine area resulting from **livestock** access shall be managed to:

- (h) protect aquatic habitat and water quality, and
- (i) protect the significant values of **Category 1 surface water bodies**.

Where **livestock** are not excluded from the bed (including the banks) of **surface water bodies**, the adverse effects of access are avoided, remedied or mitigated by methods, such as, but not limited to:

- (j) restricting the types of **livestock**, and
 - (k) restricting the numbers of animals, and
 - (l) limiting the density, frequency and duration of access, and
- providing sufficient alternative sources of drinking water, shade and grazing outside of the banks and beds.

Policy P101: Management of riparian margins



In order to maintain or restore **aquatic ecosystem health** and natural character, and reduce the amount of sediments and nutrients entering **surface water bodies**, good management of riparian margins shall be encouraged including:

- (m) the exclusion of **livestock**, and
- (n) the planting of appropriate riparian vegetation, and
- (o) the management of pest plants and animals.

Policy P103: Management of gravel extraction

The extraction of gravel, sand or rock from the beds of rivers shall be managed so that:

- (p) the extraction does not result in an increase in flooding or erosion either at the site of extraction or across the wider river catchment, including any erosion of existing structures, and
- (q) the flow of sediment and gravel to the coast is not reduced to the extent it would contribute to coastal erosion, and
- (r) the rate of gravel extraction does not exceed the natural rates of gravel deposition, unless this is required to manage aggradation.