

6. Soil and Minerals

6.1 Introduction

The Regional Policy Statement **distinguishes between soil and land**. The former refers to the soil cover, that is, the inorganic and organic materials overlaying and including the parent material from which it is derived. Soil is but one aspect of land. Land includes water, vegetation, the built environment and landform.

This distinction assists in identifying the effects of various activities and events on the different aspects of land. It is not intended to obscure the interdependence of these aspects. The intimate relationship that exists between soil, water, vegetation, and air is fully recognised.

A further distinction is made among the **components of soil**. Soil is not homogeneous, but comprises parent material overlaid by inorganic and organic components which may in turn be divided into subsoil and topsoil. Soil includes mineral deposits. The process of soil formation involves complex chemical, biological and physical processes which take place continuously over long periods of time.

Soils perform a range of important **functions**. They absorb, retain and channel water; they support and sustain vegetation and economically important crops; they store and dispose of natural, domestic and industrial waste; they provide support for buildings and other structures; and they are a source of economically valuable minerals and construction materials.

By virtue of their wide ranging functions, the Region's soils are a primary source of its economic wealth. Soil resources provide the physical setting in which production and other activities take place, as well as the "natural capital" on which people draw.

The different uses to which soils can be put give rise to competing demands. These occur most often at the fringe of urban areas, but also in rural areas. For example, demands for residential use compete with demands for primary productive use (agriculture, horticulture, forestry), mineral extraction, recreational use (parks, sports grounds), industrial use (manufacturing, processing), commercial use (retailing, offices), transport use (roads, rail,

airports, shipping), and utilities (water, gas, electricity distribution networks).

The different uses of soil give rise to **effects** which vary in terms of their severity, extent, timing, and consequences for other associated resources (water, vegetation, air). Soils can be damaged, degraded, contaminated, and destroyed, and thus lose their ability to perform the functions required of them.

Soil degradation occurs when soil fertility is depleted, soil structure is lost, soil or soil forming materials are lost or removed, and when soil is contaminated. There are a number of areas in the Region where soil is being degraded or where the risk of degradation is high. The process of deterioration may become irreversible if remedial action is not taken and the resource may be lost or only be suitable for a restricted range of uses — by both current and future users. The costs of rehabilitation and of lost production can be very high.

The Wellington Regional Council has a responsibility to ensure that the Region's soils are managed so as to maintain their ability to meet human needs, both now and in the future. The Act imposes some constraints on the use of soils. In giving effect to these the Council has a primary role in controlling the use of land for the following purposes: soil conservation; maintaining and enhancing the quality of water; maintaining the quantity of water; avoiding or mitigating natural hazards; preventing or mitigating any adverse effects of the storage, use and disposal or transport of hazardous substances.

The soil issues discussed in this Statement relate primarily to the maintenance of soil cover and the soil forming process, the maintenance of sustainable interactions between soil, water, and vegetation, and the maintenance of soil fertility to meet the primary productive needs of people in the Region.

Minerals are a component of soil. Minerals are used extensively throughout the Region, largely for construction purposes, but also in agriculture. The only mineral deposits of economic significance in the Region are those which consist of rock material. Sand, rock, gravel and lime are mined from rivers, beaches, coastal cliffs and inland quarries. The Region has no known metallic minerals or oil or gas deposits of economic significance.

S. 5 of the Act excludes minerals from the requirement to sustain their potential to meet the reasonably foreseeable needs of future

generations. This recognises the finite nature of most mineral resources. It means that sustainable management of deposits of rock material, and their efficient use and development, are constrained only by the requirement to sustain the life supporting capacity of air, water, soil and ecosystems, and the need to avoid, remedy or mitigate adverse effects of extraction activities on the environment.

6.2 Issues

Issue 1

Erosion due to natural processes is inevitable, but the effects of this can be avoided, remedied or mitigated. Susceptibility to erosion is determined primarily by soil and rock type rather than by location, although faultlines are particularly susceptible.

Almost 42 percent of the Region is made up of young sedimentary rocks — mudstones, siltstones and sandstones. These rocks are poorly structured and are further weakened by tectonic processes, such as earthquake faulting and crushing. The associated landscape is widely susceptible to soil erosion.

The Rimutaka, Tararua and Aorangi Ranges comprise 24 percent of the Region's land area and provide the catchments for all urban water supplies. The combination of high rainfall and active forces, such as earthquake uplift, contributes to rapid rates of erosion in these ranges. This causes gravel to build up in river courses, which, in turn, poses a flood risk. Vegetation needs to be retained in a pristine condition if erosion is to be minimised, water supplies maintained, and downstream flooding not increased.

The loss of vegetation is often the cause or trigger for erosion. Protective vegetation is removed by a variety of events such as land clearance, accidents (e.g., fire), pests, and extreme climatic events (e.g., storm induced slips). Poor land management practices (e.g., overgrazing, overcultivation) or inappropriate land use can also trigger erosion. Individually, these events may not cause erosion but, when two or more of them occur together, severe damage can result. The preconditions for damage can exist and develop for a considerable time before noticeable damage occurs.

Soil
Objectives 1-
4.

Issue 2	<p>Surface erosion during the development phase of urban subdivisions, such as those surrounding the Pauatahanui Inlet, can cause deposition of soil and debris in watercourses and estuaries. This may destroy natural habitats and ecosystems and increase the risk of surface flooding, water pollution and disruption of services. Although topsoil retention may not be an issue when earthworks are carried out, the control of subsequent erosion and of water pollution are issues to be addressed.</p>	<p>Soil Objectives 1, 2 and 5. See also Fresh Water Issue 1.</p>
Issue 3	<p>River and stream bank erosion is an ongoing problem in most waterways and, if not correctly managed, can lead to a loss of productive and conservation land, degrade stream habitats and pose a threat to residential and commercial areas. These problems are apparent in river catchments such as the Waiohine, Otaki and Hutt. The use of bankside management techniques, such as tree planting and rock placement, can avoid or alleviate erosion problems.</p>	<p>Soil Objectives 3 and 4.</p>
Issue 4	<p>Light textured topsoils are prone to wind erosion which reduces soil fertility and primary production capability. Some soil types on the Wairarapa Plains are subject to wind erosion under particular land management practices (e.g., intensive cropping). In coastal areas (e.g., Kapiti) recreation and subdivision activities can trigger dune erosion.</p>	<p>Soil Objectives 1, 2 and 4.</p>
Issue 5	<p>Erosion may also be induced by gravity on slopes that are susceptible to slumping and slips. Land clearance on hill country carries the risk of slope failure before new vegetation cover becomes established. The Tawhero syncline at Tinui is subject to extensive mass movement and associated gully erosion.</p>	<p>Soil Objectives 1, 2 and 4.</p>
Issue 6	<p>Erosion can also occur through overdrying of soils as a result of land drainage. Overdrying increases the risk of wind erosion and, when combined with cultivation, destroys soil structure and creates soil instability. This can cause problems for developers wishing to build and for farmers and horticulturalists. Sensitive soils include those which are high in organic matter, such as peat. Peat soils are present throughout the Region, with areas of particular importance being Whitemans Valley and the dune/lowland/foothill complex along the Kapiti Coast.</p> <p>Erosion can have severe environmental and economic effects, including reduction of productive capacity, reduction of the flood carrying capacity of waterways through sediment deposits, and damage to ecosystems and property.</p>	<p>Soil Objective 1.</p>

Issue 7

Vegetation clearance and soil disturbance can occur when roads and tracks are constructed for the purposes of agriculture, forestry, other primary production activities and mineral extraction. Soil is exposed to more rapid weathering and sediment and nutrient loads in surface run-off are increased. After vegetation removal even minor accelerations in erosion and sedimentation rates can destroy fish spawning beds, affect the behaviour of some fish and filter feeding animals, disturb stream ecosystems and contaminate water supplies. Logging operations in adjacent areas have previously caused silt contamination of trout spawning grounds in the Mangatarere and Akatarawa Rivers. Burning and uncontrolled grazing of native vegetation in areas such as the Rimutaka foothills have reduced vegetation cover and accelerated erosion. This has led to increased run-off which contaminates water with sediment and nutrients and aggrades river and stream beds.

Soil
Objective 5.
See also
Fresh Water
Issue 1.

Issue 8

Commercial extraction of gravel and sand can assist river management, including flood and erosion mitigation, in rivers such as the Hutt, Waikanae, Ruamahanga, Waiohine, Waingawa and Otaki.

Overextraction or uncontrolled extraction of gravel in these rivers can cause erosion by altering the river channel's development. Poorly controlled disturbance of riverbeds can cause significant siltation, with consequent adverse effects on aquatic habitats if extraction occurs in flowing water. Overextraction can also affect bridge stability and the effectiveness of flood protection works.

Sand and gravel extraction operations on beaches have the potential to create erosion in three ways: firstly, at the point where material is removed; secondly, by breaching the beach ridge; and thirdly, by restricting or removing the supply of sand and gravel to downdrift beaches. The risk of flooding behind the beach and on land adjacent to river mouths may be increased because the supply of sand and gravel is cut off.

Soil
Objectives 1,
2
and 4. See
also
Fresh Water
Issue 6.

Issue 9

Activities associated with **hard rock extraction** can cause land instability when vegetation is removed, when mine faces, benches and access tracks are not designed correctly, and when overburden waste and fines from washings are not properly disposed of. Water can be contaminated with sediment when aggregate is washed and when soil is disturbed with machinery. Extraction activities, particularly on hard rock sites, create noise, dust, vibration and visual impacts which can create a nuisance or disamenity for the community.

Soil
Objectives 1,
2
and 5. See
also
Fresh Water
Issue 1.

Issue 10

Extraction of topsoil exposes the subsoil, leaving it open for erosion by wind and water. As a consequence, loss of sediment and nutrients into waterways may occur. Topsoil removal can also compromise the versatility of the soil by restricting the range of alternative uses.

Soil
Objectives 1,
2
and 5.

Studies have determined that in Wellington the most suitable soils for topsoil removal are those in the Belmont series.¹¹ Turf farming has effects which can be similar to those of topsoil removal, although the loss of topsoil can be minimal with good management practices.

Issue 11

Contamination of soil by agrichemicals, and by industrial waste and contaminants, can damage soil microorganisms, as well as insects, worms and other invertebrates which play a vital role in maintaining the soil's ability to support plant and animal life. There can also be adverse off-site effects when non-target organisms are affected and when groundwater is polluted. In addition, there are concerns about the impact of chemical residues on public health and on wildlife and ecosystems. When persistent agrichemicals are applied they can be carried in run-off from the soil into waterways and affect ecosystems far removed from their point of application. Damage can also occur when persistent chemicals that have been stored in the soil are released, perhaps years later, by earthworks or other disturbances. Discharges of waste or chemical pollutants onto land may reduce the life supporting capacity of soil, be visually offensive, create unpleasant odour and have potentially serious consequences for water quality and aquatic ecosystems.

Soil
Objectives 1
and 5. See
also
Air Issue 9.

Soil acts as a filter for water percolating through the soil profile. It removes contaminants or assists in their breakdown to less harmful forms. Soils vary, but all are limited in their capacity to perform this assimilative function. Rates of waste disposal in excess of this capacity, or disposal of forms of waste which persist in a harmful form, will result in the accumulation of contaminants and a consequent reduction in the ability of soil to support plant life and to purify water.

Issue 12

Loss of soil fertility can occur through overcultivation, overgrazing in drought prone areas, the removal of topsoil, and

Soil
Objectives 1
and 2.

¹¹ Hart P, August J, Watts H, 1990, *Topsoil Mining in the Wellington Region : Background Issues, Agronomic and Cost/Benefit Studies on an Upland Soil, and Rehabilitation Guidelines for the Region*. DSIR, Division of Land and Soil Sciences, Land Resources Department, Lower Hutt.

the removal of vegetation in sensitive areas. For example, intensive cropping practices, if poorly managed, will deplete fertility through the loss of organic matter, soil compaction and wind erosion. Soil fertility includes all soil characteristics which enhance plant growth. A decrease in soil fertility will reduce the ability of the soil to support a wide range of uses and may be irreversible.

Issue 13

The effects of the use and development of soils are often not limited to the site where the activity takes place but occur off-site as well.

Major **downstream effects** include further erosion, deposition of sediment and other material onto land, contamination of water with sediment, and contamination of water with chemicals leached from the soil. For example, land clearance for pasture establishment in the Dry River catchment has previously caused significant on-site erosion. This resulted in excessive downstream gravel and sediment deposition which closed the Martinborough water supply and covered prime dairy land. At its junction with the main Ruamahanga River, gravel blockages have resulted in higher flood levels and substantial river bank erosion.

Soil
Objectives 3
and 5. See
also
Fresh Water
Issue 1.

Issue 14

Areas with **high quality soils** in the Wellington Region are limited and the total available area, particularly in and around high population areas, is decreasing. The Land Use Capability Survey (1974)¹² shows Class I land as comprising less than 1 percent (5,200 hectares) of the total area of the Region and Class II land as comprising less than 4 percent. The adverse effects of a continued loss of high quality soils include loss of the potential to meet the needs of future generations, loss of life supporting capacity and greater pressure on soils of lesser quality.

High quality soils are often associated with intensive production of food and ornamental crops, but human settlement has resulted in fewer high quality soils being available for such uses. Urban development has an irreversible effect on soil. It often involves its physical removal and renders soils inaccessible for long periods of time (decades or centuries) through the construction of roads and buildings. For example, urban expansion in the Hutt Valley has rendered most of the high quality soils unavailable for alternative uses. Similarly, urban expansion in the future could

Soil
Objective 6.

¹² Ministry of Works, 1974, *Land Use Capability Survey Handbook*, Ministry of Works, Wellington

threaten the last remaining good quality soils in areas such as Otaki and the Wairarapa.

Issue 15

There is a risk that restrictions may be placed on the continued use or development of some sources of minerals because of the **effects of extraction activities** on neighbouring communities. Air pollution, noise, water contamination and visual impairment are effects which can occur and which may result in pressure to restrict activities on, or to close down, extraction sites. The problem is most likely to arise where hard rock quarry sites are adjacent to residential subdivisions or adjacent to areas which can be subdivided.

Soil
Objective 7.

6.3 Objectives

Soil
Policies 1, 2,
3, 6 and 8.

Objective 1

The soils of the Wellington Region maintain those desirable physical, chemical, and biological characteristics which enable them to retain their life supporting capacity and to sustain plant growth.

Soil degradation has been raised as an issue. The loss of soil structure or fertility, or the loss of the soil cover itself, reduces the potential of soil to meet the needs of land users, and may reduce the life supporting capacity of soil (s. 5). The intent of this objective is that the basic physical, chemical and biological properties of soils are maintained so as to meet the s. 5 requirements.

The incidence of erosion, eutrophication, and contamination of soil and waterways in the Region shows that the capacity of some soils to meet the life supporting and productive functions required of them is being undermined by inappropriate land use practices.

Objective 2

Land degradation is limited to that for which there is no feasible remedy.

Soil Policies
1,
2, 3, 6 and 8.

The intent of this objective is that, in the long-term and over the Region as a whole, the amount or extent of degraded land should only be that which results from natural processes which it is not feasible to control. By "feasible" is meant that a remedy is

technically possible and financially achievable. Where it is feasible to control or influence the causes of degradation — whether this results from natural processes or human activities or some combination of these — such degradation is either prevented or remedied. This allows for situations where, in spite of the best efforts, degradation might still occur, but requires that the damage be remedied.

Objective 3

Land uses within river catchments are consistent with downstream river management and water use requirements, and do not undermine catchment resilience to storm damage and other natural calamities.

Soil Policies
1,
3, 7 and 8.

The intent of this objective is that all catchments, and especially those which have multiple uses, are capable of sustaining these uses.

An important aspect of soil stability is the maintenance of adequate vegetative cover.

Objective 4

The susceptibility of soils to natural hazards (flooding, land movement, subsidence, erosion, fire and wind) is such that the risk of damage is acceptable to the communities affected and the adverse effects of these events are reduced as far as is practicable.

Soil Policies
1,
3, 4, 5, 7 and
8. Natural
Hazards
Policy 3.

This objective recognises that soils cannot be completely protected against the effects of natural hazards. The level of protection for soils is consistent with the level of risk that the affected communities are willing to bear.

Objective 5

The off-site impacts of soil degradation on land, water, air, ecosystems and communities are avoided or mitigated.

Soil Policies
1,
2, 3 and 6.

The intent of this objective is to encourage land users to have regard to the wider context in which their land use activities take place. The strong interrelationship between soils, water, vegetation and air means that effects on one usually flow on to affect another. Some degradation will occur as a result of natural events or human actions, or some combination of both, but this should be controlled to the extent that damage is avoided or mitigated to a level that is acceptable to the communities affected. It is intended that resource users should first seek to avoid or mitigate off-site impacts, rather than allowing them to occur unabated before trying to remedy them.

Objective 6

The total stock and occurrence of Class I and Class II land is sufficient to meet the needs of existing and future users, and future uses are not limited by the irreversible effects of existing uses.

Soil Policies
1, 8
and 9.

There is a presumption that options on the use of the best quality land in the Region are kept open. The soils associated with Class I and II land are capable of a wider range of uses than soils of lesser quality and are also limited in total area within the Region. The loss of these may result in greater pressure on those of lesser quality.

All soils constitute a natural capital resource. However, high quality soils are capable of supporting uses that other soils of lesser quality cannot. Some uses of high quality soils result in depletion of the capital stock (e.g., through erosion, removal, construction of buildings and roads, etc.) or loss of the soil's ability to deliver the services required of it (e.g., through loss of fertility or structure). The principle of sustainability requires that these stocks are managed over time so as to be available for future use.

Objective 7

The Region's needs for rock material continue to be met and are not unnecessarily disadvantaged by restrictions on the availability of, or access to and operation of, extraction sites.

Soil Policy
10.

The intent of this objective is that the Region's mineral resources are developed and used efficiently. Unnecessary disadvantage may occur when costs are imposed that result in an inefficient outcome or which are unreasonable. For example, when residential land uses are sited in proximity to hard rock quarries, pressure may be brought to bear on operators to avoid, remedy or mitigate the effects. While this may be appropriate to address environmental concerns, in extreme cases it may result in operations being stopped or relocated. This should only occur if the benefits outweigh the costs. Decision making about new land use, development or subdivision should give consideration to potential conflicts with adjacent existing or planned mineral extraction activities.

6.4

Policies

The policies set out below have the overall aim of ensuring that the "natural capital stock" of soils and minerals in the Region is

maintained so as to achieve the purpose of the Act, recognising that s. 5(2)(a) specifically excludes minerals.

Policy 1

To avoid, remedy or mitigate erosion and other forms of soil degradation on susceptible sites and avoid off-site effects of erosion and other soil degradation, including the contamination of water, contamination of the beds of water bodies and the coastal marine area and contamination of air.

This policy is intended to deal with those situations where, because of the susceptible nature of the site, a proactive approach to soil conservation is necessary. Susceptible sites include areas of Class VII and Class VIII land and areas where topsoil has been removed or substantially disturbed.

Avoidance of a problem reduces the cost to the community. These costs include the loss of productive capacity due to soil loss, the costs of remedying a problem once it has occurred, and downstream or off-site costs, such as deposition of debris onto neighbouring areas and damage and disruption to services. Initiating soil conservation on land that may be prone to erosion under certain conditions or has been damaged by past use (or exceptional natural events) will avoid worsening the problem.

Off-site impacts often occur as a result of a failure to take a wider view of soil and water management. In focusing too narrowly on problems at particular sites, the opportunity is lost to see features in common with other sites. For example, a catchment approach, rather than a property approach, will allow management practices to be integrated so as to address on and off-site impacts.

Policy 2

To ensure that the adverse effects of commercial topsoil removal, mineral extraction and turf farming operations are avoided, remedied or mitigated, or do not exceed any relevant rules or standards set for soil, water, air, ecosystems or landscape in any regional or district plan.

This policy is intended to deal with those situations where disturbance of the land is likely to cause acute on-site and off-site effects. Relevant rules and standards will include national standards and those rules and standards set out in any regional plans and district plans.

Policy 3

To ensure that, where feasible, sites are rehabilitated in circumstances where, as a result of either natural processes or human activities, or some combination of both, soils are, or are

Soil Methods
1-
10.

See also
Fresh Water
Policies 4, 7
and
8.

Soil Methods
1,
4 and 11.

See also
Fresh Water
Policies 4-6.

Soil Methods
1,
12 and 13.

likely to be, eroded, removed, disturbed or otherwise rendered unable to sustain their life supporting capacity or to meet the needs of the local or regional community.

This policy is intended to deal with those situations where the severity of the modification to a site means that human assistance is needed to mitigate or remedy the damage.

Rehabilitation of a site refers to the restoration of a site to a state where it will continue to meet the needs of the local or regional community in a sustainable manner. By "feasible" is meant that rehabilitation is technically possible and financially achievable.

Policy 4

To manage rivers within approved design standards derived from floodplain management studies.

Soil Method
14-
16.

This policy is intended to ensure that erosion control and flood control measures are carried out in accordance with guidelines which derive from consideration of the whole catchment system and not on an ad hoc basis. Floodplain management studies have been carried out or are proposed for the major river systems of the Region (Otaki, Waikanae, Hutt, Waiohine, Waingawa, Ruamahanga) and river management plans designed as a result. Failure to manage rivers within the guidelines of these schemes increases the risk of damaging floods and erosion.

See also
Fresh Water
Policy 9 and
Natural
Hazards
Policies 3
and 4.

Policy 5

To manage river gravel extraction at sustainable levels so as to complement river management programmes.

Soil Methods
1
and 17-19.

This policy is intended to deal with those situations where gravel extraction may cause river bank erosion or endanger other works or structures.

Extraction of gravel from riverbeds must occur at or below the rate of replenishment otherwise channel form may be altered. This, in turn, can alter water flows and lead to erosion of the riverbed, river bank and foundations of structures such as bridges.

See also
Fresh Water
Policy 9.

Policy 6

To avoid, remedy or mitigate the adverse effects of harmful waste and contaminants on soil, and to dispose of these in ways which respect the assimilative capacity of the soil and which comply with relevant standards set for water quality and air quality.

Soil Methods
1
and 20-23.

Contamination of soils can arise from inappropriate application of

harmful chemicals, and from poor management of the disposal of waste to land. It is recognised that there are means of safe disposal to land for some waste products (e.g., treated dairy shed effluent) and that these should be allowed within set limits and conditions. These must have regard to the capacity of the soil to assimilate those components of the discharge which have the potential to reduce the productive or life supporting capacity of the soil, and to the requirements for water and air quality where there is a risk of flow-on effects from soil to water and/or air. Methods of waste disposal must also have regard to the concerns of tangata whenua regarding the use of soil for waste disposal.

Policy 7

To integrate soil conservation with other land management objectives on a planned whole catchment or subcatchment basis.

Soil Methods
1,
6-10 and 24-
25.

This policy is aimed at integrating soil conservation programmes with other land uses by addressing them on a scale which enables multiple use objectives to be met and which encourages efficient use of the available resources.

Land uses such as agriculture, forestry, recreation and conservation have differing objectives. In catchments with multiple land uses, conflict between these objectives can lead to land management practices which cause adverse effects. The accumulation of such effects, or the flow on impacts of such things as vegetation removal and soil disturbance, can combine to create large-scale problems.

In catchments where land uses are primarily productive (e.g., farming) and where land management practices differ between adjacent properties, soil conservation objectives are best achieved through planning on a scale which takes into account the whole catchment or the relevant subcatchment rather than just individual properties.

Policy 8

To manage soils in such a way that the risks of flooding, erosion, land movement and subsidence are reduced to a level which is acceptable to the affected community.

See also
Methods 1
and
26-31.

The intent of this policy is to ensure that land management activities which destroy vegetation and disturb soil do not lead to soil erosion and associated detrimental downstream impacts on assets, land and water quality. Communities throughout the Region differ in their exposure to natural hazards and may

See also
Natural
Hazards
Policy 3.

therefore be willing to accept different levels of risk in terms of measures taken to avoid or mitigate the effects of such hazards.

An "acceptable level of risk" will be one that balances the benefits and costs of various risk reduction measures, taking into account non-monetary costs, community aspirations and the statutory responsibilities of relevant authorities. Public input is required to determine this level.

Policy 9

To ensure, when planning for and making decisions on new subdivision, use and development on Class I and Class II land (as defined by the Land Use Capability Survey), that there is a net benefit to the local community which includes consideration of environmental standards, the needs of future generations, and any matters of significance for the Region.

Soil Methods
32-35.

Remaining areas of high quality soils are located primarily in the floodplains of the Otaki, Waiohine and Ruamahanga Rivers. These soils are very versatile because of the wide range of primary productive uses to which they can be put. They can be used intensively and are close to easily accessible supplies of water. However, they are in short supply.

This policy is intended to deal with those situations in which there is, or is likely to be, a significant or permanent loss of these soils. Decisions should include consideration of all costs and benefits and should proceed in favour of uses which may have irreversible effects only where the benefits clearly outweigh the costs. In situations where there is no net benefit from a change of land use, the presumption is that existing uses should remain. Matters of significance for the Region include, but are not limited to, the economic consequences of the loss of land which is highly suited to food production, and loss of land which has value in terms of its rural character.

The use of high quality soils for activities such as urban development (which would deny the option of alternative uses such as orcharding or market gardening) results in what is effectively a permanent loss. The irreversible nature of these changes creates a need to evaluate carefully further loss of the high quality soils that remain.

While it does not necessarily follow that protection of high quality soils is always desirable, neither does it follow that their use should be unconstrained. While it is desirable that the total stock

of the soil resource is not diminished, it is also necessary that there be flexibility in the way soils are used. There may be circumstances where the advantages of land development could outweigh the advantages of protecting the soils. However, there is a risk that in the long-term high quality soils may be lost entirely. Trade-offs may be made, but these should have regard to the full range of costs and benefits associated with the changes. These decisions require good information about the costs and benefits of the alternatives. There is often not enough information about these, so a cautious approach is advocated. Until better information about the effects of alternative uses is available, it is prudent not to foreclose on future options.

Policy 10

To ensure, when planning for and making decisions on new use, development and subdivision of land, that consideration is given to the consequences for access to and the location of existing or proposed mineral extraction sites on nearby land.

Soil Method
36.

This policy is intended to ensure that when planning residential and other types of development which may be sited adjacent to mineral extraction sites, such as hard rock quarries, full consideration is given to the impacts that each type of land use will have on the other. Consideration should be given to the effects of extraction activities on nearby residents and to the consequences of possible objections to those effects on mineral extraction operations. Minerals are fixed in location and, even where alternative sites exist, extraction operations cannot be easily relocated. Changes in land use adjacent to existing extraction sites, which may have implications for those sites, should only be made when the full range of economic, social and environmental costs and benefits has been taken into account. Forced closure or relocation can result in higher costs for operators and may result in an economic disbenefit for the Region when supplies are unavailable or must be sought from more distant sources.

6.5

Methods

The Act has highlighted the concept of sustainability as the cornerstone of soil conservation, while acknowledging the need to avoid, remedy or mitigate erosion and to rehabilitate eroded land. It specifies that it is a function of regional councils to minimise and prevent damage by floods and erosion and to control the use of land for the purpose of soil conservation. The majority of soil conservation problems in the Wellington Region occur on private

land. The emphasis given in the methods to Regional Council initiatives derives from the wider powers that the Regional Council has to operate on private land and its ability to enter into co-operative projects with landowners and territorial authorities for soil conservation purposes.

The Wellington Regional Council will:

Method 1

- *Prepare a Regional Soil Plan to guide and/or regulate activities which can cause adverse effects through the destruction of vegetation and disturbance of soils.*

A Regional Soil Plan is proposed as the means by which any rules that might be required will be specified. Rules can only be made through a Plan. The contents of the Plan will be determined through discussions with territorial authorities and other relevant interest groups.

The use of regulation is retained to address severe, intractable and inappropriate use and management of the Region's soil resources. Some form of regulatory control over activities that cause or contribute to erosion is necessary in circumstances where the actions of one or more persons create effects which are borne by others.

Methods for Avoiding, Remedying or Mitigating Erosion and Soil Degradation

The Wellington Regional Council will:

Method 2

- *Identify priorities for soil conservation on a regional scale, based on land use capability, frequency of damaging events, and downstream impacts of erosion.*

Method 3

- *Provide information to landowners on land use capability, soil conservation principles and practice and soil rehabilitation.*

Method 4

- *In consultation with territorial authorities and industrial and professional groups, develop (where appropriate) and encourage adherence to relevant guidelines and codes of practice for routine activities such as mineral extraction (gravel, sand, hard rock, etc.), topsoil removal, turf farming, river management, forestry operations, and urban and rural earthworks, in order to avoid or mitigate adverse environmental effects.*

Soil Policies
1-3
and 5-8.

Soil Policies
1
and 7.

See also
Fresh Water
Method 35.

Method 5 • *Provide advice on establishing and managing soil conservation plantings used in revegetation programmes to ensure long-term stability is maximised.*

Method 6 • *Inspect Wellington Regional Council plantings and other works put in for soil conservation purposes, particularly after storm events, to ensure that they are adequately maintained and to assess their effectiveness.*

Method 7 • *Encourage and promote the retirement, legal safeguarding and reforestation of areas affecting targeted waterways to diminish and prevent excessive sediment in run-off entering such waterways and to avoid and mitigate erosion risk.*

See also
Fresh Water
Methods 31-
33.

Method 8 • *Encourage and facilitate the afforestation of areas of Class VI and Class VII land identified as being increasingly susceptible to erosion and where it is shown to be ultimately unsustainable for pastoral use.*

Method 9 • *Investigate the use of other policy mechanisms, including economic instruments, as a means of avoiding, remedying or mitigating soil erosion and degradation, and other adverse effects of land use.*

Method 10 *District plans would be an appropriate means of implementing Soil and Minerals Policy 1 by providing for the susceptibility of sites to soil erosion, soil degradation and other adverse effects caused by existing land uses and potentially caused by new land use, development and subdivision.*

Past attempts, and the existence of some major problems, show that regulation alone has not been adequate in preventing soil erosion. There are enforcement problems, particularly on private land. It is important that landowners take responsibility for their own soil conservation problems. Subsidies and grants have been successful, but unless it can be shown that the benefits accrue primarily to the community rather than to individuals, other methods may be more effective and efficient.

Methods 2-8 provide an information/education/facilitation mechanism which fits well with the results required. These methods are community targeted and funded. They are flexible enough to encourage the avoidance of soil erosion, preserve or protect the soil and control actions which contribute to erosion.

They can be designed to give direction to communities and allow for community involvement. This encourages community ownership of soil erosion problems and community solutions.

The use of information, education and facilitation, together with any necessary regulation, is the most effective means of implementing policies for controlling off-site impacts on soil and water. The permissive nature of the Act is given effect to through a whole catchment approach to planning and implementation. This is a community based approach which presumes a high level of co-operation among those affected. It requires information to be fully and freely available and that both on-site and off-site users of soil and water resources understand the issues and problems involved.

By identifying priorities for soil conservation, preventative and rehabilitative measures can be targeted and carried out efficiently. Such information is essential for the preparation of the proposed Regional Soil Plan and in the preparation of codes of practice.

Soil erosion and degradation problems can arise through lack of knowledge on the part of land users. **Methods 3, 5, 6, 7 and 8** address this by raising awareness of, and encouraging a favourable attitude toward, soil conservation. **Method 8** will use the New Zealand Land Resource Inventory (NZLRI)¹³ as the basis for identifying land which is highly erosion prone. The NZLRI recognises that the majority of Class VI land can be sustainable for pastoral use with appropriate soil conservation measures.

Where codes of practice contain adequate provisions for avoiding or mitigating adverse effects, a consent authority may require adherence to these as a condition in resource consents. The consent authority may also require an assessment of off-site impacts in consideration of consent applications for land development proposals. **Method 4** makes provision for the preparation of codes of practice and for consultation with relevant codes and other sources of expertise.

Financial measures, such as economic instruments, offer a greater degree of flexibility than regulation and may be more cost effective. The use of these, whether alone or in combination with regulatory measures, may provide an effective means of implementing Soil Policy 1. **Method 9** makes provision for the investigation of such measures.

In seeking to avoid, remedy, or mitigate adverse effects where

they occur, consideration should be given to both existing and proposed land uses. The effects of all land uses on soil should be subject to scrutiny, not just from the point of view of existing land uses, but from a perspective which includes prospective land uses. **Method 10** seeks to give effect to this approach.

Methods to Avoid, Remedy or Mitigate the Adverse Effects of Extraction of Topsoil and Minerals

Soil Policy 2.

The Wellington Regional Council will:

¹³ Landcare Research New Zealand Ltd, *New Zealand Land Resource Inventory*, Lincoln (electronic database)

- Method 11**
- *Include objectives, policies and, where appropriate, rules and other methods in the Regional Soil Plan to contribute to the implementation of Soil Policy 2.*

Soil degradation, resulting from activities which remove, deplete or disturb soils, is an ongoing issue. A strategic approach has therefore been adopted in **Method 11**. The Regional Soil Plan will include policies to avoid or mitigate adverse on-site and off-site effects.

Methods for Rehabilitation of Soils

Soil Policy 3.

The Wellington Regional Council will:

- Method 12**
- *Make provision through the consent granting process for the rehabilitation of land used for mineral extraction and soil removal (e.g., require applications for consents to be accompanied by a site rehabilitation plan).*

- Method 13**
- *Investigate the use of performance bonds as an incentive for operators of mineral extraction, topsoil removal, and turf farming activities to undertake site rehabilitation or other remedial action. Bonds should cover a period long enough to adequately assess the long-term impacts of extraction activities and rehabilitation methods.*

See also Soil Method 4.

The Regional Soil Plan may include guidelines for the rehabilitation of soils. Where degradation of, and damage to, soils as a result of human activities causes significant adverse effects

on-site or off-site, the damage should be remedied by those who cause it. This may be given effect to through the resource consent process whereby a consent is issued conditional upon a plan for site rehabilitation being presented. Sometimes the effects do not appear until some time after the damaging activity occurs. This may be addressed through an economic instrument such as a performance bond. This would provide a financial incentive for operators to ensure that site rehabilitation covers long-term, as well as short-term, impacts.

Methods for Riverbed Management

Soil Policy 4.

The Wellington Regional Council will:

- Method 14** • *Undertake, as appropriate, floodplain management and hydrological studies as the basis for selecting river management policies for major rivers in the Region.*
- Method 15** • *Provide funding assistance, as appropriate, for river management activities in accordance with management policies for each river.*
- Method 16** • *Consult with those affected by river management schemes.*

Methods 14-16 provide for a comprehensive and integrated approach to riverbed management. Landowners, territorial authorities and other parties have both a financial and a personal interest in river management. The Council is best placed to provide appropriate information and funding assistance and will ensure that there is appropriate consultation with affected parties. The provision of part funding for capital works accounts for the public good aspect of erosion control. Consultation with affected parties is an appropriate means of providing information to land users and of ensuring the continuity of protective measures.

Methods for Managing River Sand and Gravel Extraction

Soil Policy 5.

The Wellington Regional Council will:

- Method 17** • *Maintain and modify stream beds and channels, when necessary, to improve the flow of flood water in accordance with the provisions of flood hazard management programmes in a regional plan or floodplain management plan.*

See also
Fresh Water
Methods 34-
37.

Method 18 • *Authorise, through resource consents or regional plans, the extraction of sand and gravel from targeted rivers.*

Method 19 • *Monitor riverbed levels and other relevant indicators to provide information for decisions on gravel extraction rates and sites.*

S. 13 of the Act restricts activities in the beds of lakes and rivers and permits these to occur only through rules in a regional plan or through resource consents. **Methods 17 and 18** provide for this. **Method 19** is needed in order to provide information for resource consents and to evaluate the effectiveness of rules in a regional plan.

Methods to Avoid, Remedy or Mitigate Soil Contamination

Soil Policy 6.

The Wellington Regional Council will:

Method 20 • *Control the discharge of waste products, chemical contaminants and effluent onto or into soil through provisions in a regional plan dealing with the discharge of contaminants to land.*

Method 21 • *Advocate a strengthening of the educative and information provision role played by manufacturers and suppliers of agrichemicals to commercial contractors and consumers (e.g., farmers, urban residents) in terms of minimising the risks of and potential for contamination of soils.*

Method 22 • *Encourage the preparation of waste management codes of practice by industries that generate liquid and solid wastes which may be discharged to land (e.g., poultry, pig farms).*

Method 23 • *Investigate soils that are known to be, or may be, contaminated as a basis for identifying contaminated sites and for developing appropriate strategies for remedial action.*

See also
Waste
Method 20

S. 9 and 15 of the Act provide for controls on discharges of contaminants or any substance into or onto land. Such uses are prohibited unless provided for in a rule, resource consent or regulation. The potentially severe impacts of contaminant discharge are best dealt with through a combination of methods,

including risk reduction measures, guidelines or codes of practice, and regulatory measures. **Methods 20-23** provide for soils which are, or are at risk of being, contaminated to be identified, for guidelines to be prepared for situations where land users may wish to discharge wastes or other substances into or onto the soil, for information to be provided as a way of reducing the risk of contamination and for rules and other methods to be prepared in a regional plan.

Methods for Integrated Land Management

Soil Policy 7.

The Wellington Regional Council will:

- Method 24**
- *Produce and promote integrated land management plans for catchments and individual properties based on sustainable land use.*

See also Soil Methods 6, 7 and 8.

- Method 25**
- District plans would be an appropriate means of implementing Soil and Minerals Policy 7.*

It is a function of the Regional Council to develop objectives, policies and methods to achieve the integrated management of land (s. 30). This can be effectively achieved through a planning approach which is flexible in scope. Flexibility is important in soil conservation because the nature of the problem varies widely. In some cases, a preventive approach is possible, but in other cases a rehabilitative approach is necessary. Some problems occur at a property level but others are more widely based and occur across a number of properties. **Method 24** is intended to integrate soil conservation measures with other land uses at both a catchment and a property level.

Territorial authorities, through their responsibility for the control of subdivision of land, can make provision for controlling the adverse effects of land use in district plans. **Method 25** identifies district plans as being a useful additional means of achieving regional soil conservation objectives.

Methods to Avoid, Remedy or Mitigate the Effects of Natural Hazards on Soils

Soil Policy 8.

The Wellington Regional Council will:

- Method 26**
- *Advise on techniques of land management that reduce the*

See also Natural

risk of soil erosion, flooding, subsidence and landslip.

- Method 27**
- *When appropriate, develop conservation plans to identify any long-term soil conservation and land management practices required for sustainability.*
- Method 28**
- *Provide funding assistance, as appropriate, for soil conservation activities identified in conservation plans and in accordance with Regional Council policies.*
- Method 29**
- *Work with territorial authorities and landowners to ensure regional soil management objectives are met.*
- Method 30**
- *As part of a consent process, require developers to provide an assessment of environmental effects for land development proposals where there is a significant risk of soil erosion or degradation.*
- Method 31**
- District plans would be an appropriate means of implementing Soil and Minerals Policy 8.*

Reducing the adverse impacts of natural hazard events requires a combination of risk reduction and restoration measures. Prevention of damage is not always possible, but the damage can be reduced to an acceptable level. **Methods 26-31** combine information provision, service provision, and a regulatory approach to natural hazard mitigation.

Territorial authorities could, through rules in district plans and through the consent granting process, make provision for soil conservation measures. **Method 31** identifies this as being a useful additional means of mitigating the adverse effects of natural hazards on soils.

Methods to Assist Decision Making on Land Use

The Wellington Regional Council will:

- Method 32**
- *Identify areas of highly versatile soils that are viable for continued agricultural or horticultural use and promote the continued availability of these soils where the benefits of doing so outweigh the costs.*
- Method 33**
- *Identify situations in which urban expansion onto agricultural land is likely to cause effects which are of*

significance to the Region.

- Method 34**
- *Establish a methodology to evaluate the full range of economic, social and environmental costs and benefits of proposed land use changes on Class I and Class II land.*

Method 35 *District plans would be an appropriate means of implementing Soil and Minerals Policy 9.*

Decisions on alternative uses of land should have regard to the effects of proposed uses. In the case of resources which are limited in supply and where proposed uses may have irreversible effects, consideration should be given to the issue of sustainability. Unless the requirements of existing and future users can be met from the remaining resource stock or by augmenting the capacity of soils of lesser quality, the presumption is that the resource stock should not be diminished. **Methods 32-34** provide for "at risk" situations to be identified, an evaluative methodology to be developed, and strategies adopted to promote the continued availability of high quality soils. **Method 35** suggests that territorial authorities may also promote the policy through district plans.

Method 36 *District plans would be an appropriate means of implementing Soil and Minerals Policy 10.*

Where proposed new activities will be affected by existing activities, the consent authority could, through the consent granting process, require applicants to show how actual or potential adverse effects of activities occurring on neighbouring sites would be dealt with. Examples of methods by which adverse effects can be remedied or mitigated include buffer zones, establishing screening vegetation, landscaping and the use of provisions in building codes for noise reduction.

6.6 Anticipated Environmental Results

- (1) There is sustainable use of the remaining high quality soils throughout the Region.
- (2) The physical, chemical and biological characteristics of the Region's soils are maintained.

- (3) The rate of soil degradation is the natural rate resulting from processes beyond the control of landowners.
- (4) Damage to farmland, urban areas and other land from floods, erosion and subsidence is at levels acceptable to local communities and the regional community.
- (5) The life supporting capacity of the Region's soil resources is maintained or enhanced.
- (6) Catchments are stable and robust enough to withstand the effects of natural hazards and to accommodate human activities where required.