

## CHAPTER 12: LAND DISTURBANCE EFFECTS

### 12.0 INTRODUCTION

This chapter addresses the adverse environmental effects of a range of land use activities that involve disturbance of the land by either vegetation removal or by physical ground disturbance, such as cultivation, intensive stocking, excavation, mining or track construction. The effects of land disturbance may include damage to soil, induced or accelerated erosion or slope instability, sediment generation and deposition in surface and subsurface water bodies. Other effects may include changes to river channels following deposition of sediment, water contamination and adverse effects on aquatic habitats, or cave habitats, adverse visual appearance of disturbed land, and damage or destruction of natural habitats, karst features, or sites or areas of cultural heritage significance.

### 12.1 LAND DISTURBANCE EFFECTS

#### 12.1.1 Issues

Land disturbances for a range of purposes may result in soil loss or damage, instability, sediment deposition and contamination of water, river channel and cave system changes and adverse visual, natural habitat and archaeological site effects.

Land disturbances include:

- (a) destruction or removal of vegetation which may expose bare ground, for example, by logging of forests or clearance of scrub by spraying, burning or mechanical means;
- (b) disturbance of soil but without significant removal of soil or modification of the ground's surface, for example, by cultivation of soil, compaction by intensive stocking, or deep ripping of subsoil;
- (c) earthworks, for example, by excavation or filling of ground in the construction of roads, tracks, building sites, pits or quarries.

Land disturbances may be carried out for a variety of practical or economic purposes, typically access tracks, harvesting of plantations, mineral extraction or building site establishment, or may result from land use practices, for example, pugging from intensive stocking. There is a range of potential adverse environmental effects from land disturbances. These effects include:

- (a) induced or accelerated soil loss through mechanical removal, erosion or slope instability;
- (b) damage to soil such as compaction;
- (c) sedimentation in surface water bodies, with contamination of water and damage to aquatic habitats;
- (d) sedimentation in subsurface water bodies or cave systems, and damage to karst systems and features;
- (e) river or stream channel modifications, induced channel erosion, and aggravated flood risk;
- (f) adverse effects on surface and subsurface drainage;
- (g) visual changes in disturbed areas;
- (h) destruction or damage to remnant indigenous plant or animal habitats;
- (i) adverse effects on intrinsic values of ecosystems;
- (j) destruction or damage to sites of cultural or archaeological significance.

Different terrains in the District vary in their susceptibility to erosion and sediment generation upon disturbance. Generally, flat or low angle slopes are at least risk from these effects. Steep weathered slopes on the Separation Point Granite formation yielding coarse sandy sediment are naturally high risk areas. Karst terrain includes marble and limestone formations in the western uplands and in the Takaka and Aorere catchments and the north-west coast. More than half of the karst terrain is conservation lands managed by the Department of Conservation, and is generally at higher altitudes than the privately-owned karst lands. The indigenous vegetation and animal communities on karst are often distinctive and change at different altitudes. Sediment from land disturbance activities on karst terrain and on adjacent catchments draining into karst, may adversely affect karst water bodies, particularly subsurface streams and springs, and cave systems. Sedimentation may damage caves, destroy cave habitats, bone and mineral deposits, and reduce the quality of water in or from karst drainage systems.

Rivers and streams may be particularly sensitive to accelerated sedimentation or to debris deposition, when freshwater fish, other wildlife and the biological communities they depend on, have significant value. Land disturbance can be successive or cumulative in its soil and water effects, whether on site or off site. Riparian vegetation may be a significant means of mitigating sediment movement and maintaining channel stability. Maintaining and enhancing vegetation within and near sinkholes is one way of reducing sediment movement into karst water bodies.

Visual effects of disturbances may be significant in certain locations or where certain disturbance practices are carried out. Clearance of indigenous vegetation may destroy significant plant and animal habitats. Sites of archaeological or cultural significance can be destroyed in land disturbance operations. Mineral extraction operations also have the potential to damage the soil resource when the soil is removed prior to the extraction of minerals.

Adequate knowledge and understanding of land disturbance effects is essential in their management, and ongoing monitoring and investigations support this need. Knowledge among land users of the adverse effects of land disturbance and of sustainable practices to avoid or mitigate such effects is variable. Advocacy and education concerning sustainable practices in a variety of terrains and situations is necessary.

### **12.1.2 Objective**

The avoidance, remedying, or mitigation of adverse effects of land disturbance, including:

- (a) damage to soil;
- (b) acceleration of the loss of soil;
- (c) sediment contamination of water and deposition of debris into rivers, streams, lakes, wetlands, karst systems, and the coast;
- (d) damage to river beds, karst features, land, fisheries or wildlife habitats, or structures through deposition, erosion or inundation;
- (e) adverse visual effects;
- (f) damage or destruction of indigenous animal, plant, and trout and salmon habitats, including cave habitats, or of sites or areas of cultural heritage significance;
- (g) adverse effects on indigenous biodiversity or other intrinsic values of ecosystems.

### **12.1.3 Policies**

*Refer to Policy sets 7.2, 9.1, 10.1, 10.2, 13.1, 33.1, 35.1.*

*Refer to Rule sections 16.10, 16.13, 17.5 - 17.11, 18.1, 18.2, 18.5, 18.6, 18.12, 36.2.*

- 12.1.3.1** To promote land use practices that avoid, remedy, or mitigate the adverse effects of land disturbance on the environment, including avoidance of sediment movement through sinkholes into karst systems.

**12.1.3.2** To avoid, remedy, or mitigate the actual or potential soil erosion or damage, sedimentation, and other adverse effects of land disturbance activities consistent with their risks on different terrains in the District, including consideration of:

- (a) natural erosion risk, and erosion risk upon disturbance;
- (b) scale, type, and likelihood of land disturbance;
- (c) sensitivity and significance of water bodies and other natural features in relation to sedimentation or movement of debris;
- (d) Coastal Risk Area. C22 2/11 Op 1/15

**12.1.3.3** To investigate and monitor the actual or potential adverse effects of soil erosion, other soil damage, sedimentation and damage to river beds, subsurface water bodies and caves in karst, aquatic and other natural habitats, arising from land disturbances.

**12.1.3.4** To avoid, remedy, or mitigate the adverse effects of earthworks for the purpose of mineral extraction, on the actual or potential productive values of soil, particularly on land of high productive value.

**12.1.3.5** To avoid the loss of extent of natural inland wetlands, to protect their values, and promote their restoration, except where: NPS-FM  
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- (a) the loss of extent or values arises from any of the following:
  - (i) the customary harvest of food or resources undertaken in accordance with tikanga Māori;
  - (ii) restoration activities;
  - (iii) scientific research;
  - (iv) the sustainable harvest of sphagnum moss;
  - (v) the construction or maintenance of wetland utility structures (as defined in the Resource Management (National Environmental Standards for Freshwater) Regulations 2020);
  - (vi) the maintenance or operation of specified infrastructure, or other infrastructure (as defined in the Resource Management (National Environmental Standards for Freshwater) Regulations 2020);
  - (vii) natural hazard works (as defined in the Resource Management (National Environmental Standards for Freshwater) Regulations 2020); or
- (b) the regional council is satisfied that:
  - (i) the activity is necessary for the construction or upgrade of specified infrastructure; and
  - (ii) the specified infrastructure will provide significant national or regional benefits; and
  - (iii) there is a functional need for the specified infrastructure in that location; and
  - (iv) the effects of the activity are managed through applying the effects management hierarchy.

## **12.1.20 Methods of Implementation**

### **12.1.20.1 Regulatory**

- (a) Rules that allow or regulate the adverse effects of land disturbances in the District.

**12.1.20.2 Investigations and Monitoring**

- (a) Annual provision for defined programmes of investigations and monitoring.
- (b) Identification and monitoring of representative and indicator sites to assess impacts on soil, water and river resources, including subsurface water bodies in karst, with periodic reporting.
- (c) Investigation of karst features and values, and risks of specific activities in specific areas, in consultation with landowners and land managers.
- (d) Reassessment of land disturbance effects, methods of management and appropriateness of other resource management methods following investigations and monitoring results.
- (e) Assessment of soil movement and stream sedimentation in response to major storm events, and comparison between disturbed and undisturbed sites.

**12.1.20.3 Education and Advocacy**

- (a) Provision of guideline information and advice for appropriate land disturbance practices, particularly in relation to high risk terrains including karst and riparian areas.
- (b) Promotion of the development of codes of practice for land disturbance operations in consultation with landowners and land managers, with commitment to achieve agreed codes of practice, including a code for land disturbance (and other activities such as contaminant discharges) on karst terrain and adjacent catchments, operating within one year following the operative status of this provision. *Refer to Method 33.1.20.2(c).*
- (c) Investigation of the value and practicability of recognising approved operators in achieving and maintaining high standards of land disturbance practices under self-management systems.

**12.1.20.4 Financial Incentives**

- (a) Funding to support plantings and other works for erosion prevention and control in accordance with the following criteria:
  - (i) the erosion risk is resulting from natural erosion risk or from past (discontinued) land use practices that have increased that risk; or
  - (ii) the works provide or assist in providing benefits to off-site (downstream) resources, including river channels.

**12.1.30 Principal Reasons and Explanation**

There are a number of adverse effects on soil, water, aquatic ecosystems, river channels, cave and karst systems, natural habitats, visual appearance of land and archaeological or systems, natural habitats, visual appearance of land, land subject to hazards and archaeological or cultural heritage sites that may be caused by land disturbances, including vegetation removal, disturbance of soil and earthworks.

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Council wishes to ensure that these actual or potential effects are avoided or limited.

There are several methods of managing adverse effects of land disturbances, including education and advocacy concerning sustainable land disturbance methods and practices; financial incentives; regulation of land disturbance consistent with risks; and research into effects and means of managing these effects, and monitoring of land disturbances.

Advocacy of sustainable practices, including self-regulatory systems such as codes of practice or environmental management systems, may over time reduce risks and assist in reducing regulation that might otherwise be necessary.

Incentives may help innocent landowners to reduce natural erosion and related risks, particularly where there are public benefits to downstream resources.

Regulation of land disturbances is based on the degree of erosion and sedimentation risk and risk of damage to soil upon disturbance to soil and water resources and associated natural resources, whether on site or off site, and the nature of the disturbance operation in relation to these risks. Council seeks to manage risks following land disturbance by regulating in a manner consistent with those risks across the District. Areas of least risk of erosion and sedimentation include flat plains, terraces, valley floors and stable hill country. Most land disturbances are allowed in these areas subject to compliance with specified conditions. In steeper sites or where the risk to off-site resources is significant, greater regulation of the type or scale of operation and specification of the performance standards is necessary to ensure risks are limited.

A variety of terrains and types of land disturbance can be regulated under a common set of requirements, including provisions for specific site situations. Land Disturbance Area 1 rules cover most of the District in this way. A naturally high risk terrain in Area 1 in the District is karst terrain. Careful management of vegetation, soils, pavement surfaces and streams is required. These can be important sources of sediment in water entering subsurface streams. Water bodies and cave systems in karst are vulnerable to sedimentation and other forms of contamination, and adverse effects on cave systems and water quality. The Separation Point Granite terrain also poses special risks from weathered dispersive sandy material, both on site and off site, and needs a special set of requirements to limit these risks. Land Disturbance Area 2 covers this terrain.

There is a significant risk of damage to soils resulting from earthworks for mineral extraction operations, particularly to recent alluvial soils. Soils in the Waimea and Motueka Plains have high productive value, and the risk of damage arising from their disturbance for gravel extraction needs to be limited.

There are gaps in information and understanding of land disturbance effects, particularly on soil and water resources in specific catchment or terrain situations, or in relation to types of land disturbance operations. Investigations into processes and effects of land disturbances and continuing monitoring of activities and their effects is necessary to help refine Council policy for effective management.

#### **12.1.40 Performance Monitoring Indicators**

- 12.1.40.1 Depth of soil at key representative sites.
- 12.1.40.2 Bedload and suspended sediment measurement in selected catchments.
- 12.1.40.3 Surveyed awareness of land users of good practice techniques for land disturbance operations.

#### **12.50 ANTICIPATED ENVIRONMENTAL RESULTS**

- 12.50.1 Reduced risk or incidence of damage or loss of soil, sedimentation and contamination of water bodies, damage to aquatic and other natural habitats, river channels, structures or cultural heritage sites as a result of land disturbance.
- 12.50.2 Increased community awareness of and support for appropriate land disturbance practices.
- 12.50.3 Progressively reduced requirement for resource consents for land disturbances.
- 12.50.4 Improved understanding of the nature and significance of land disturbance effects and of appropriate methods of management.

