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Plan Topics - Land

Managing earthworks under the Resource Management Act

Managing Earthworks

Earthworks can generate a variety of adverse effects on land, air and water bodies, with the significance of these effects varying depending on their scale and the environment within which they occur.

Regional councils and territorial authorities are jointly responsible for managing the effects of earthworks under the Resource Management Act (RMA).

To help practitioners understand the effects of earthworks and to better equip them to manage these effects, this guidance note aims to:

- outline the issues and effects arising from earthworks
- clarify the functions of regional councils and territorial authorities in managing earthworks, including managing the potential overlap of jurisdictional responsibilities
- identify methods to manage the effects of earthworks.

Issues and effects

Introduction

Earthworks are undertaken to create areas of level land that can be used for living, business and recreation, and the required gradients for paths and roads that enable people to get from place to place. Earthworks are integral to the construction of foundations and buildings. Earthworks are part of most development projects undertaken at the small and large scale, including small scale projects by individuals.

Managing earthworks is a complex issue. This is due in part to the wide range of activities covered by the term 'earthworks', as well as the wide range of effects generated. It is also further complicated by:

- the overlap in jurisdictional responsibility between regional and territorial authorities under ss 30 and 31 of the RMA
- the role of the Building Act 2004 in controlling site works (including sedimentation) and stability of earthworks and structures through the issue of building consents
- the considerable technical/engineering component in determining the effects of proposed earthwork activities and appropriate management methods.

Earthworks: issues and effects

Earthworks involve revealing, disturbing, removing or depositing soil/earth which results in the creation of exposed surfaces. These surfaces are created by activities such as land contouring for urban development and roading, quarrying, filling operations (including cleanfills), clearing vegetation, forestry, agriculture and horticulture.

If not managed well, earthworks have the potential to cause significant adverse effects on the environment.

Effects on water quality and the ecosystems of water bodies

Erosion is a process by which the surface of land is gradually eroded by water or wind. The erosion process produces sediment runoff or air borne dust.

Sediment runoff is a natural occurrence. All land areas have a natural sediment runoff or discharge load that varies primarily with rainfall, geology and land use. Sediment runoff will also vary with factors such as storm intensity and duration, soil type, slope length and angle, and surface cover.

Exposing land surfaces through earthwork activities can increase sediment loads that are discharged to water bodies and the coastal marine area above normal levels. This can result in significant adverse effects on receiving environments and their habitats. In particular, an increased sediment load discharged to watercourses can affect water quality and the ability of aquatic organisms to survive and/or migrate.

The effect of increased loads of sediment discharged to waterbodies will vary as different waterbodies and habitat types have differing capacities to cope with elevated levels of sediment.

Aside from the immediate effects associated with single sites, one of the most significant impacts of accelerated sediment discharge is the cumulative effect of discharges from multiple sites over an extended time period. Without appropriate management, there is likely to be significant and long-term adverse effects on the streams, estuaries and harbours into which the catchment discharges. A broader catchment based analysis and management approach is needed in these situations.

Effects on local amenity

Earthworks can have adverse effects on amenity values, including -

- Visual Impacts - earthworks involving cut and fill have the potential to affect the visual qualities in the immediate area, including natural landscapes and views. Large areas of fill have the potential to block views, while large cuts can create a 'scar' or a visually dominant face.
- Dust from earthwork activities can have a potential effect on amenity values at a local scale. The level of dust generated by earthworks is dependent on a number of matters including soil characteristics, rainfall, wind and method of excavation.

- Noise is an indirect effect associated with earthworks (e.g. operation of heavy machinery) and the degree of management is dependent on local conditions. For example, machinery operating near a residential area may require more stringent controls to be applied than a similar operation in an isolated rural environment.
- Soil deposited as a nuisance - where earthworks result in the movement of vehicles to and from a site there is potential for soil to be deposited in an indiscriminate and uncontrolled manner in transit (e.g. soil falling off tyres, soil being blown off uncovered loads).

For the most part, adverse effects on amenity values will be temporary and generally restricted to the time required to complete the earthworks. The closer the proximity of earthworks to sensitive activities (i.e. residential), the greater the potential for adverse effects on local amenity values.

The effectiveness of on-site mitigation measures will be a key factor in determining the significance of effects on local amenity value and managing the adverse effects on these values.

Hazards - land instability and flooding

Earthworks can create or worsen hazard potential (i.e. flooding and land instability) and careful management is required to avoid this. For example, filling parts of a known overland flow path is likely to impede runoff and worsen flooding upstream, potentially enlarging the area affected by inundation. Instances of land instability may be created where excavations under cut a hillside, or where excavations result in un-retained or bare hillsides.

Earthworks are also often a part of physical works undertaken to manage the effects of hazards. The cumulative effects of earthworks on hazards may be significant.

Effects on significant natural land forms

A majority of earthworks involve permanent removal of soil from one area and relocation to another. Consequently, earthworks have the potential to change the underlying landform of an area, depending on their scale. Some landforms are valued for their natural character or landscape qualities, and earthworks can potentially compromise these values.

Earthworks that result in the modification of landform patterns can have an adverse impact on the visual coherence of an area through the degradation or, in some cases, removal of a natural landform. For example, levelling coastal dunes can give them an unnatural appearance (and interfere with their function), or cutting a track across a hillslope can create a highly visible 'scar' and can lead to other effects, such as erosion and those related to land instability.

Earthworks involving significant natural landforms can have an irreversible impact on their visual and cultural qualities. In some circumstances mitigation measures may not

be sufficient to manage the adverse effects, with avoidance being a more appropriate option.

Effects on vegetation

The effects of earthwork activities on vegetation will depend on the type, extent and values of the vegetation cover being removed or modified. The removal of vegetation, particularly indigenous vegetation, can result in the loss of habitat and visual amenity. In addition, exposed soil can cause other effects such as erosion, increased surface water and sediment runoff and dust nuisances.

When vegetation cover is removed, the ongoing and long-term effects will depend on the replacement cover and how quickly the exposed ground is stabilised. While hard surfaces (e.g. roads or buildings) can help to avoid effects such as dust and stability, replanting areas subject to earthwork activities is a key mitigation measure to manage both the short and long term effects of earthworks.

Effects on archaeological and heritage sites

Earthwork activities have the potential to alter, disturb, modify or destroy heritage or archaeological sites, regardless of whether they are scheduled in regional or district plans or identified on the New Zeeland Archaeological Association database.

The Historic Places Act 1993 (HPA) is the primary statutory framework for protecting known and probable archaeological sites (refer s10 HPA). RMA implementation (i.e. plan provisions and resource consents) should complement HPA requirements (e.g. by reference to protocols, etc).

Earthworks on contaminated land

Earthwork definitions in regional and district plans usually refer to soil disturbance of clean soils. Undertaking earthworks on contaminated land has the potential to give rise to a number of adverse environmental effects, including contaminated sediment and air discharges and may require/lead to the need to dispose of any excavated contaminated material. Specialist expert advice should always be obtained in respect of contaminated sites prior to any works taking place.

The disturbance of contaminated land may require consent to discharge contaminants under s15 of the RMA. It is also covered by the National Environmental Standard on Assessing and Managing Contaminants in Soil that affect Human Health. A thorough and robust assessment must be carried out where earthworks are proposed on a contaminated site. In particular, care is required when exposing contaminated soil to different environmental conditions and when contaminated material is disposed. Chemical and biological solutions may be available to either neutralise or make contaminants inert.

Earthworks may be temporary activities but effects can be permanent

Earthworks are often temporary activities associated with the construction phase of the urban development process or another land development activity (i.e. primary production land use conversion). There are a range of practical techniques that can be employed to manage the effects of the activity. In certain circumstances (e.g. fill areas for the disposal of soil or other uncontaminated material, unstable ground) or cuts there may be permanent effects such as instability, visual and flooding. In these situations, careful consideration of mitigation and the appropriateness of the earthworks is required. In particular, consider whether the earthworks are needed, or whether the proposed development can be designed so as to minimise the earthworks proposed.

Effects of earthworks can be time and seasonally dependent

The time of year, seasonal weather conditions, and duration of earthworks influence the magnitude of the effects generated. These environmental characteristics vary greatly around the country and should be considered when assessing the effects of earthwork activities. In particular, plan provisions and resource consent conditions should recognise local seasonal conditions. For example, erosion rates and related potential sediment runoff loads will be greater during months of higher rainfall.

Resource Management Act 1991

Regional council responsibilities

Section 30 of the RMA sets out the statutory responsibilities of regional councils. These include controlling the use of land for soil conservation purposes, maintenance and enhancement of water quality and ecosystems, and controlling discharges of contaminants.

Accelerated loads of sediment have the ability to change the physical, chemical, or biological condition of water and, therefore, fall within the definition of 'contaminant' under the RMA.

The two primary approaches available to regional councils to manage the effects of earthworks are:

- control of the use of land
- control of the discharge of contaminants.

Territorial authority responsibilities

Section 31(1) of the RMA sets out the statutory responsibilities for territorial authorities. Controlling the use, development or subdivision of land covers a wide range of issues, including vegetation cover, amenity values, infrastructure, roading, and natural hazards. As earthworks can have adverse effects on all these matters, territorial authorities will need to evaluate how these matters are to be appropriately managed.

Section 106 of the RMA amongst other things requires territorial authorities to consider land stability issues (erosion, falling debris, subsidence, slippage and inundation) and access when determining subdivision applications.

Managing potential overlap between regional councils and territorial authorities

Regional councils and territorial authorities are responsible for controlling different aspects of earthwork activities. Consequently, councils need to direct specific attention towards the mechanisms they use to manage areas of potential overlap and to ensure that unnecessary duplication of consent processes in relation to earthwork activities is avoided.

Typically regional councils focus on the effects of earthworks on water quality and ecosystems, and territorial authorities tend to focus on land-use effects such as amenity. However, overlapping of these functions does occur and can result in duplication, particularly in relation to activities requiring resource consent.

To address this situation, more effective use of regional policy statements can be made by regional councils to help clarify respective functional responsibilities. In particular, policies and methods should be included that clearly identify how the effects of

earthworks activities are to be managed across the region and by whom. This is particularly relevant as district plans are required to give effect to regional policy statements under s75(3) of the RMA.

Particular steps that local authority practitioners should consider concerning overlapping functional responsibilities include:

- clear allocation of responsibility. Clear identification in regional policy statements and/or regional and district plans of relevant issues and effects concerning earthworks, including the particular issues and effects that each council will assume responsibility for. Consideration should also be given to applying a single consent process to minor earthwork activities.
- local authority collaboration on policy development. Active collaboration between regional councils and territorial authorities in preparing and developing plan provisions to manage the effects of earthworks, particularly prior to notification.
- inclusion of references in district and regional plans to respective earthworks management regimes.
- local authority liaison on earthworks management and monitoring. Regular liaison group meetings between regional council and territorial authority staff involved in managing and monitoring earthworks
- joint hearings. Convening joint hearings where resource consents are required from the regional council and the relevant territorial authority (s102 of the RMA).

Definition of 'earthworks' in regional and district plans

The term 'earthworks ' is used in a wide range of situations. It is not exclusively referred to in plans and other related terms such as 'soil disturbance', 'land modification' and 'excavations' are also commonly used.

As a variety of definitions apply to these terms a range of differing interpretations of 'earthworks' can result. Some definitions also include a range of exclusions, such as cleanfilling, quarrying, normal household gardening practices, and horticultural and pastoral farming activities.

The Environment Court has been asked to determine the meaning of 'earthworks' on a number of occasions. Based on these determinations, a definition of earthworks can include details on what physical activities constitute earthworks, such as:

- blading
- contouring
- ripping
- moving
- removing
- placing
- replacing
- excavation
- cutting
- filling.

Any list which forms part of a definition should describe the common physical works and methods of earthwork activities. The definition should not include minimum/maximum thresholds (e.g. excavations in excess of 1.0m in depth), as these should form part of the associated rules (performance standards and terms).

Methods for managing the effects of earthworks in RMA plans

Research and background investigations

The following should be used as a guide when preparing plan provisions to manage earthworks:

- **issue identification (optional):** identify local issues and special characteristics which will influence the approach to earthworks management. For example, earthwork effects vary depending on variables such as soil type, sensitivity of receiving environment, climate, land stability (soil type and location of faults) and topography. Where possible, rely on state of the environment data and reports and plan effectiveness monitoring reports to help inform this process. Equally, liaise with council staff with relevant local or technical knowledge. Topography (gradient), soil type (if available) and locations of faults can also be mapped to identify potential issues by areas.
- **environmental outcomes (optional):** identify the measurable outcomes which you are aiming to achieve; this will help define the objectives, policies and methods required to achieve these outcomes.
- **Building Act 2004:** overlap with the role of the Building Act should be minimised when considering land stability issues. The Building Act controls stability issues (including slippage and inundation) in respect of new buildings and structures. Any structure 1.5 metres in height or more, that supports any load including soil (such as a retaining wall) requires building consent.
- **consultation:** should be based on commissioned technical reports and focus on parties directly associated with earthwork activities, such as contractors, engineers, forestry companies and developers. Where appropriate, it may be beneficial to involve the Earthquake Commission as well as professional organisations like the Institute of Professional Engineers New Zealand (IPENZ) and the New Zealand Institute of Surveyors (NZIS).
- **definitions:** to avoid confusion and misunderstanding include clear definitions of terms in plans.

Technical expertise

It is important to obtain technical advice to determine both the effects of earthwork activities and appropriate methods to manage their effects. This might include geotechnical, structural engineering, landscape and ecological advice.

Rules and methods to manage the effects of earthworks for resource consent or policy/plan purposes should consider issues such as soil type/characteristics, topography, faults and sensitivity of the receiving waters to any sediment run-off. Technical expertise should be used to assist in understanding different interactions and natural processes.

Experts with an understanding of earthwork processes, operations and environmental impacts will help identify methods to manage the effects of earthworks in a manner that is effective, efficient and workable.

Translating the science around the effects of earthworks into specific policy guidance can be challenging. To help manage this issue, the development of a process to reconcile conflicting advice should be considered.

Evaluation and assessment

An assessment of the characteristics of the region/district and the risks posed by earthworks is a first step in any evaluation. The costs and benefits of the available methods to manage earthwork activities will also need to be carefully considered.

A number of the effects from earthworks are interrelated. Methods should be evaluated and adapted to reflect the local environmental conditions (i.e. soil characteristics, topography, climate, and sensitivity of receiving waters to sediment run-off). Successful methods used in other regions/districts should be evaluated in terms of their suitability for local environmental conditions before being applied.

It may be appropriate to avoid subdivision and development in certain locations due to the sensitivity of the receiving environment or to require provision of specific mitigation for subdivision applications in order to overcome s106 land stability concerns.

Objectives and policies in regional/district plans

Objectives establish the overall aim in relation to the resource management issues identified. These could include region-wide objectives as well as area-specific ones.

Policies provide guidance as to how earthworks will be managed in the area. The policies need to specifically identify which particular effects are being managed, and who is responsible for their management, and how. The policy should direct the broad actions to be taken to achieve the objectives, and will assist in the development of methods and determining relevant resource consent applications.

Regulatory methods

Rules in regional/district plans

Rules are the primary method used by councils to manage the effects of earthworks. Regional councils generally have a regional plan relating to “Land and Water”, "Sediment Control" or "Land Disturbance" to regulate earthworks and sediment discharges. An effects-based approach to sediment control could include rules relating to activities in sensitive environments (such as riparian areas), soil types and topography. Rules can be developed where they apply to a whole region/city/district or on a catchment basis, and can establish varying activity status and thresholds.

Region/city/district wide versus catchment wide

There are two broad regulatory approaches used to manage earthworks:

- **general rules:** apply to all earthwork activities throughout the whole region/city/district. This approach is commonly used in district plans.
- **catchment or defined area rules:** apply on a catchment or area level. The catchment or area approach is normally based on identifying the underlying environmental or heritage-related characteristics, or sensitivity of these areas, and managing the potential impact that earthworks may have on them. For example, this may involve stricter thresholds in outstanding landscapes, areas where a known or probable concentration of archaeological or wahi tapu sites exists, sensitive coastal receiving environments, steeply sloping land, and areas adjacent to waterbodies.

In some situations, both approaches might be used with general rules applying to the region/city/district complemented with targeted provisions applying to more sensitive areas.

Activity status and thresholds

Activity status and associated thresholds are a common method used by regional and territorial authorities to manage earthworks. Thresholds can be based on such factors as the area, volume, height/depth of a cut/fill or slope of an earthwork.

- **Territorial authority rules** typically focus on effects from earthworks on amenity values (e.g. dust, sediment, visual qualities and hazards) and on land stability issues associated with both subdivision and land use. Minor earthworks are generally permitted provided they meet performance standards relating to volume, area, gradient and heights of cut/fill. If these minimum permitted standards are exceeded, a resource consent of a certain type is generally required.
- **Regional rules** typically focus on the effects of earthworks on water quality and ecosystems. Minor soil disturbance is generally permitted, provided it meets performance standards relating to volume, area, slope, proximity to a water body, size of the catchment and manner in which the works are undertaken. Resource consent is generally required where these minimum performance standards are not met.
- **Activity status** usually varies depending on the location and scale of soil disturbance associated with earthworks. For example, large-scale earthworks and earthworks located in close proximity to sensitive receiving waters, should have a more restrictive activity status due to the greater potential to generate adverse effects from the discharge of sediment.
- **Volume versus area versus cut depth/fill height:** Earthworks' standards have historically been based on volume, as there is a direct correlation between volume and effects such as traffic movements and construction noise. In addition, the height and/or length of cut/fill has been commonly used to manage effects on natural hazards and the landscape, with area controls used for sediment run-off

management. Regardless of the choice of control, it is important that the standard specifically relates to the effects from earthworks being managed.

Resource consent applications

Resource consent applications should include erosion and sediment control plans when associated earthworks have the potential to cause significant adverse effects. This will ensure there is sufficient information available to assess the effects of the proposal, and the ability to avoid, remedy or mitigate these effects.

- **Erosion and sediment control plans** should not be applied generically across different areas, but be developed to manage the specific nature of the earthworks proposed, based on the characteristics of the local environment.
- **Erosion control methods:** It is more difficult to remove sediment from run-off than prevent it being entrained in the first place. Therefore, erosion control methods are the most effective means of limiting the sediment-related effects of earthworks. Applicants should place emphasis on erosion control measures. This includes minimising the overall area of disturbance and the area of soil exposed at any one time, track rolling, contour (or cut-off) drains, temporary stabilisation of areas not being worked by mulching or similar, and progressive stabilisation of completed areas (e.g. by hardfill or grassing/ hydro-seeding).
- **Sediment control methods** are those measures that capture sediment after it has been entrained in run-off. These include silt fences, decanting earth bunds and sediment retention ponds. There are also chemical sediment control measures available, such as flocculation. Flocculation dosing needs to be managed in order to maximise its effectiveness and to minimise (unused) chemical flocculants entering watercourses.
- **Subdivision consents** applicants will need to demonstrate compliance with the land stability requirements of s106 of the RMA. This might mean, for example, that building platforms/sites on lots proposed to be created are specified in order to avoid sensitive areas and/or to mitigate potential off-site effects. These can be enforced by means of a consent notice. These approaches can be used in conjunction with the introduction of esplanade reserves and QEII covenants.

Resource consent conditions

Resource consent conditions are the primary means by which the effects of earthwork activities are controlled and managed. Conditions can cover:

- detailed earthworks controls (e.g. preparation of an earthworks management plan)
- minimum performance requirements (e.g. percentage of suspended sediment entering water body)
- preparation and adherence to an erosion and sediment control plan
- a range of other conditions to manage specific environmental effects
- review conditions relating to earthworks, and erosion and sediment control.

When imposing conditions on resource consents, it is important to recognise that no sediment control techniques are 100 percent effective. These techniques minimise, but do not avoid, the sediment load discharged to the receiving environment.

To ensure compliance, a combination of active monitoring of consent conditions and consent holder self-monitoring is generally required. In addition, integrated monitoring of consent conditions between regional and territorial authorities can help manage the effects of earthworks.

Bylaws

Under ss 145 and 146 of the Local Government Act 2002 (LGA), territorial authorities can make bylaws for the purposes of protecting the public from nuisance, for public health and safety, and to protect infrastructure. Consequently, bylaws can be prepared to control and manage the effects of earthworks and the discharge of sediment for these purposes.

Bylaws provide territorial authorities with a mechanism to control any effects of earthworks which are not related to "effects on the environment". For example, bylaws may be used to manage the potentially damaging effects of earthworks and associated sediment run-off on council stormwater drainage, wastewater and water supply infrastructure. The management of effects on local amenity including noise, traffic movements, and soil and sediment run-off deposited as nuisance can be controlled by both bylaws and the RMA.

Codes of practice/standards

Codes of practice/standards have been developed at both national and local levels. Some codes are directly referenced in plans, while others are administered outside of RMA processes. Prior to adopting any nationally based standards, local authorities should assess their suitability relative to their own individual circumstances.

- NZS 4404: 2010 `Land Development and Subdivision Infrastructure' This standard includes requirements for earthworks and geotechnical needs and supersedes the earlier version NZS 4404:2004.
- A large number of city/district councils have also developed their own codes of practice for land development or engineering. These codes commonly have a chapter that relates to the management of earthworks.

Non-regulatory methods

Guidelines/ practice notes

Erosion and sediment control guidelines are a common method used by regional councils to outline accepted/recommended principles and practices for the effects of earthworks.

Councils also often place emphasis on minimum earthworks strategies, through guidelines.

Subdivision/development guidelines produced by district/city councils often incorporate design principles and practices relating to roading and built development and advise how these should influence earthworks. Most guidelines encourage developers to limit earthworks in the first instance, but where they are necessary the guidelines provide practical advice on methods to manage their effects.

Education

Education programmes can be developed to advise landowners, developers, engineers, planners and surveyors about managing earthworks, including erosion and sediment control measures. Depending on the target audience, such programmes can be implemented through seminars, on-site meetings, field demonstrations, information booklets and guidelines.

Material can be prepared to inform landowners, developers, engineers, planners, surveyors and builders about managing earthworks, including erosion and sediment control measures This could include information about the techniques available and the different environments and circumstances where they are best suited. Aside from making this material available from council offices it can also be distributed at field days and training seminars, through contractors' associations and direct mail-outs to interested parties.

Integrated management techniques

Greater use of an integrated suite of management techniques has the potential to improve the administration and enforcement of regulatory methods. For example, land-use provisions in district plans can give effect to objectives and policies contained in regional plans and the management of small-scale earthworks in district plans may achieve regional council outcomes for water quality. However, achievement of effective integrated management also depends on such factors as educated contractors, good engineering standards and competent monitoring.

A further option is the transfer of powers between regional and district councils under s33. A clear mandate would need to be established for the basis of this transfer and how it is to be implemented.

Other legislative requirements

Other legislation also indirectly manages activities associated with earthworks.

- The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health may also apply. The National Environmental Standard came into effect in January 2012 and applies to the development of land that may be affected by contaminants.
- Building Act 2004: Earthworks are often a related aspect of any construction activity requiring a building consent (e.g. the formation of access and a building platform for a dwelling). Although the building consent process provides some ability to control earthworks, this is limited to the effects of sediment as a

nuisance to adjacent property or infrastructure and also to land stability issues. Thus the Building Act consent process can, amongst other things, require measures to ensure sites remain stable and limit the discharge of sediment to other properties or roads, or to council stormwater reticulation.

It is important to note that certain activities are exempt from building consent requirements, and building consent will only be required for structures over 1.5 metres high that support a surcharge or any additional load (for example a vehicle on a road). In all other instances, building consent is not required and while the provisions of the Building Act still apply, councils will only become involved retrospectively.

The Building Act is linked to regulation and control of buildings rather than to any wider environmental concerns. Therefore, it does not provide an effective means of controlling adverse environmental effects such as water quality, visual effects, traffic effects or noise effects.

- Historic Places Act 1993: Earthworks can result in the disturbance or destruction of archaeological or waahi tapu sites. Section 10 of the Historic Places Act requires an authorisation to be obtained from the New Zealand Historic Places Trust before any known or probable archaeological site can be destroyed, damaged or modified. Earthworks' consents can include an advice note to this effect. It may also be appropriate to ensure the discretion specified in the relevant rules of the district or regional plan allows these matters to be directly dealt with through the consent process, including the imposition of associated conditions.