

## 29 Earthworks

### 29.1 Introduction

Earthworks are essential to the development of the City. They create the areas of level land used for living, business and recreation, and the even gradients for paths and roads that enable people to get from place to place. They are integral to the construction of foundations and buildings. For all these reasons, and more, earthworks are part of many development projects in the City.

Earthworks can have adverse effects on the environment, which have the potential to extend well beyond the site of the earthworks. These effects may be short-lived or they can last for many years. Poorly engineered excavations or areas of earthworks fill can cause landslips, on the site, on neighbouring properties and on publicly owned legal road.

Sediment from the construction phase of projects, or from later erosion of exposed ground, can cause problems with stormwater infrastructure, and affect water quality and the biological health of streams, wetlands and the sea. Council's focus is on the cumulative effect of many small projects on the sediment levels in natural waters.

Earthworks, landslips and the structures associated with earthworks, can cause changes to the appearance and character of the neighbourhoods in which they are located. In areas along coastal roads, poorly designed and executed earthworks and structures can impact on people's experience of the suburban coastal environment.

Modification of landforms and vegetation, piping of streams and the addition of new structures all have the potential to cause changes to landscapes and natural systems. The loss of sections of stream affects not only the landscape but the stream's ability to support indigenous biodiversity.

Wellington City contains many archaeological sites relating to Maori occupation and use as well as sites from early European settlement. Earthworks have the potential to destroy, damage or modify unidentified archaeological sites within the City. Archaeological sites associated with human activity that occurred before 1900 are protected by the Historic Places Act 1993. Should an archaeological site be discovered as a result of earthworks (either as a permitted activity or requiring a resource consent) an archaeological authority will be required from the New Zealand Historic Places Trust.

The objectives, policies and rules have been developed to achieve the sustainable management of earthworks. They concentrate on both, the type of earthworks that are environmentally acceptable, and the detail of how the adverse effects of earthworks and associated structures can be acceptably avoided, remedied or mitigated.

### Earthworks Objectives and Policies

#### OBJECTIVE

**29.2.1** To provide for the use, development and protection of land and physical resources while avoiding, remedying or mitigating any adverse effects of earthworks and associated structures on the environment.

#### POLICIES

**29.2.1.1** Ensure that the design and assessment of earthworks and associated structures is coordinated with future land development and subdivision.

#### METHODS

- Rules
- Design Guide (Subdivision, Residential, Rural Area)
- Section 91 RMA (where appropriate) to require further information on Resource Consent Applications
- Structure Plans

*Earthworks are a component of most development of land. They are necessary for the construction of roads, driveways, building foundations, the preparation of land for greenfield subdivisions and the maintenance and upgrading of infrastructure such as the National Grid.*

*On occasions applications are made for earthworks in advance of infill or greenfield subdivisions. The appropriateness of earthworks needs to be considered in conjunction with and at the same time as the appropriateness of the proposed future use of the land, enabling a co-ordinated and integrated approach to earthworks and the proposed future subdivision and development of land.*

*The environmental result will be the coordinated design and assessment of earthworks and associated structures, land development and subdivision.*

**29.2.1.2** Provide for minor earthworks to allow the use and development of land where the risk of instability is minimal.

#### METHODS

- Rules
- Advocacy

*Earthworks are an integral part of the use and development of land. They are associated with the design of subdivisions, the construction of buildings, landscaping, the maintenance and upgrading of utilities, and are necessary for maintenance and construction of farm tracks in the rural environment.*

*The permitted activity conditions provide for minor earthworks that have a low risk of instability, minimal effect on visual amenity and where adverse effects on the environment such as dust and sediment can be managed effectively.*

*In addition, the permitted activity conditions do not seek to control stability in cases where the stability is addressed by other legislation. In some cases,*

retaining and stabilising structures associated with earthworks will require a building consent under the Building Act 2004. For minor earthworks where a structure to retain the earthworks has been authorised by a Building Consent the District Plan does not seek to address the issue of stability. In these cases stability will be addressed through the Building Consent process for the retaining structure.

The environmental result will be the ability to undertake minor earthworks for the use, development and protection of land.

### 29.2.1.3 Ensure that earthworks are designed to minimise the risk of instability.

#### METHODS

- Rules
- Advocacy

Poorly constructed earthworks are a threat to people, property and infrastructure. Instability may affect both the site of the development work and neighbouring properties. The District Plan controls earthworks to minimise the risk of instability.

When assessing applications that do not comply with the permitted activity conditions the following matters will be taken into consideration:

- Whether the earthworks have been designed by an appropriately qualified and experienced person, for example, a chartered engineer practicing in the field of civil / geotechnical engineering. Whether this person will supervise the work and certify it upon completion.
- Whether the nature of the proposal requires a geotechnical assessment of the geology of the site and the surrounding land.
- Whether a retaining or stabilising structure or building will be used to support or stabilise the earthworks: whether its design can be assessed at a later date under the building consent process. This decision will depend on the nature of the proposal, the site and the surrounding land, and the extent and risk of instability.
- Whether the earthworks are designed in accordance with "NZS 4404:2004 Land Development and Subdivision Engineering" and "NZS 4431: 1989 Code of Practice for Residential Earthworks".

The environmental result will be earthworks that are designed to minimise the risk of instability.

### 29.2.1.4 Require earthworks to be designed and managed to minimise erosion, and the movement of dust and sediment beyond the area of the work, particularly to streams, rivers, wetlands and the coastal marine area.

#### METHODS

- Rules
- Design Guide (Subdivision, Residential, Rural Area)
- Technical Guides (*Erosion and sediment control guidelines for the Wellington Region 2003*, *Erosion and sediment control for small sites 2006*)
- Code of Practice for Land Development
- Advocacy by disseminating information on best practice e.g *Erosion Dust and Sediment Control for Small Sites 2006* and *Mind the Stream – A guide to looking after urban streams in the Wellington Region 2004* by Greater Wellington Regional Council

Erosion can take place on exposed or excavated soils. Dust and dirt carried by wind or water or vehicles from an area of earthworks can cause a nuisance to neighbouring properties, on roads and footpaths, in drainage channels and sumps, and in the stormwater system. Sediment carried into rivers, streams, wetlands the harbour and the coastal marine area can adversely impact on water quality while multiple earthworks projects can have a cumulative effect on suspended and bedload sediment levels within a river or stream system, the harbour or the coastal marine area.

The potential effects of dust and sediment can be minimised by requiring those undertaking earthworks for subdivision, construction or other activities, to use the best practical options as recognised by the Council and the Greater Wellington Regional Council. These options include, minimising the area of disturbance preventing water running onto the site, the control of erosion, managing dust, and installing sediment control structures and maintaining these structures to ensure their ongoing effectiveness.

Earthworks are restricted close to rivers and streams, wetlands and the coastal marine area to prevent direct contamination and to protect vegetation cover. Vegetation has an important role in capturing sediment and associated nutrients, which are carried across the ground by rainwater. The effectiveness of vegetated riparian areas is dependant on a range of factors including the width of the riparian strip and type of vegetation beside the river or stream, the slope of surrounding land and amount of pasture or disturbed ground draining to the river or stream.

Erosion, dust and sediment control in relation to rivers, streams, wetlands and the coastal marine area is controlled by rules in both the District Plan and the regional plans administered by Greater Wellington Regional Council. The issue is addressed in the District Plan because erosion, dust and sediment are all matters that are a direct effect of earthworks that the District Plan controls.

In situations where resource consents are required from both authorities for activities involving earthworks, the Council will work with the Regional Council to ensure a coordinated approach to consent issues.

When assessing applications that do not comply with the permitted activity standards the following matters will be taken into account:

- The extent that vegetation, natural soil structure and natural drainage patterns are retained, to intercept dust or precipitation, filter sediment and to reduce the volume and speed of runoff from the site. Particular consideration will be given to the protection or restoration of suitable vegetation, soils and drainage patterns, adjacent to rivers, streams, wetlands and the seashore
- The extent that the work will be designed and managed to address the principles and methods in Greater Wellington Regional Council's "Erosion and sediment control guidelines for the Wellington Region" 2003, or it's "Erosion and sediment control for small sites" 2006
- Whether any special measures are necessary to prevent dust and sediment entering and clogging street channels (gutters), drainage sumps or stormwater pipes

- The extent that the work or subsequent erosion will cumulatively add to existing or expected sediment levels in the relevant stream system, the harbour or the coastal marine area.
- The extent that the proposal uses 'soft engineering' practices to control erosion, dust and sediment, to prevent short term and long term effects beyond the area of the work, particularly to rivers and, streams, wetlands and coastal waters.
- The extent that dust or sediment will be a nuisance to residents of other properties or affect the amenities of streets or public places
- The need for an earthworks and construction plan to define acceptable performance standards for environmental and amenity protection and public safety during the construction process.

The environmental result will be earthworks that are designed and managed to minimise the effects of erosion, and the movement of dust and sediment beyond the area of the work, particularly to rivers, streams, wetlands .the coastal marine area.

#### **29.2.1.5 Ensure that earthworks and associated structures do not exacerbate flood events in Flood Hazard Areas.**

##### **METHODS**

- Rules
- Code of Practice for Land Development

Developments involving earthworks will be controlled to ensure that they do not increase the risk of flooding by blocking flood water flow paths and culverts, and diverting flood water to other sites. Situations such as a structure filling in an existing channel or overflow path must be carefully managed to avoid the risk of flooding. The extent and scale of the earthworks may necessitate the creation of an adequate 'secondary flow path' in the event that a primary flow path/channel is blocked. Any control measures used to address this issue must be effective in avoiding significant impacts.

Matters to consider in assessing applications include:

- Whether the earthworks and any associated structures will change the flow of flood waters
- Whether the earthworks and any associated structures will accelerate, worsen or result in the erosion or inundation of the site, or any other site or buildings
- The extent that the proposed earthworks and associated structures will be designed to use 'soft engineering' practices, which are visually unobtrusive and minimise or enhance the ecology of the stream and the flood-prone area.
- Whether the earthworks will reduce the risk or effects of flooding.
- Whether the potential threat to the health and safety of people, property or the environment from flooding is avoided, remedied or mitigated.

The environmental result will be earthworks and associated structures that are designed to minimise the hazard risks on flood plains or other flood-prone areas.

#### **29.2.1.6 Ensure earthworks and associated structure are designed and managed in a way that protects and enhances the character and amenity of streams and wetlands through measures such as:**

- minimising changes to the flow of water in streams or wetlands;
- encouraging appropriate riparian management to ensure that rivers and wetlands stay healthy.

##### **METHODS**

- Design Guide (Subdivision, Residential, Rural Area)
- Code of Practice for Land Development
- Advocacy by disseminating information e.g 'Mind the Stream – A guide to looking after urban streams in the Wellington Region 2004' by Greater Wellington Regional Council

Many streams that survive in urban areas are in Council parks and reserves. Others, especially smaller streams, flow through private property. While they may not be visible to the general public (or even neighbours) and they are not associated with walking tracks, they are still of value because they are part of a larger stream system and affect the qualities of that system.

Earthworks that change the flow of water in streams can adversely affect the character and amenity of streams. Changes to flows may increase flooding, lower dry-weather flows, change the stream substrate, cause bank erosion (with the release of sediments into the stream) and cause channel widening. These changes can lead to a loss of streamside vegetation and increase the need for engineering structures to protect the banks and to control flooding.

Earthworks proposals can minimise changes to the flow of streams through measures such as conserving natural soils and mature vegetation, increasing soil permeability and minimising hard surfaced areas. 'Soft engineering' practices to capture and slow stormwater runoff from a site, are another approach and they will be viewed as a mitigation of adverse effects of a development proposal.

Proposals can minimise the effects of earthworks by restoring streams or wetlands to a more natural state using measures such as planting riparian margins or 'day-lighting' previously piped sections of stream. Effective riparian management is a solution that works over the long term to reduce bank erosion and maintain and enhance the amenity and character of streams. The District Plan addresses the effects that earthworks can have on streams, wetlands and the coastal marine area. The loss or modification of streams and wetlands and their flow characteristics is regulated by regional plans administered by Greater Wellington Regional Council. In situations where resource consents are required from both authorities for activities involving earthworks, the Council will work with the Regional Council to ensure a coordinated approach to consent issues.

The environmental result will be avoiding the adverse effects of earthworks on the character and amenity of streams and wetlands.

#### **29.2.1.7 Ensure that earthworks and associated structures are designed and landscaped (where appropriate) to reflect natural landforms and to reduce and soften their visual impact having regard to the character and visual amenity**

of the local area.

## METHODS

- Rules
- Design Guide (Subdivision, Residential, Rural Area)

*Earthworks and associated structures can be visually prominent and sometimes visually intrusive. Large scale earthworks should be engineered to reflect natural landforms. The Subdivision and Rural Area design guides provide guidelines. On a smaller scale, careful consideration is needed of how visible earthworks and any associated structures will be once a building is constructed on a site. The policy is concerned with measures that can be used to soften and reduce the visual impact, which include the design of retaining and stabilising structures and landscaping. Earthworks are typically associated with or facilitate another activity or use which can provide social and economic wellbeing. The policies of the underlying zone may be relevant and can be used to recognise the potential benefits of earthworks and other activities.*

*When assessing applications that do not comply with the permitted activity conditions the following matters should be taken into account:*

- *Where the earthworks are associated with an application for subdivision, the extent that the proposed earthworks and any associated structures meet the relevant guidelines of the Residential, Subdivision or Rural Area design guides*
- *The extent that the proposed earthworks and any associated structures meet the relevant guidelines of the Residential or Rural Area design guides*
- *The extent that the earthworks are designed and engineered to reflect natural landforms and natural features such as cliffs, escarpments, streams and wetlands and avoid unnatural scar faces that detract from the amenity of the area. In situations where bare rock is common, untreated cut faces may be favoured over artificial finishes. In more urban settings well designed retaining walls, which reflect existing older structures, may be an appropriate model for design*
- *The extent that existing vegetation can be retained above, below and at the sides of the earthworks and any associated structures*
- *The extent that proposed buildings will conceal the view of the earthworks and any associated structures from the street, other public places and other properties*
- *The extent that the design and finishing of any retaining or stabilising structure reflects the building or buildings it is associated with*
- *Whether the design of any retaining or stabilising structure reduces its apparent size, by using features that break up the surface area of the structure and create patterns of light and shadow*
- *Whether the placement of pipes above the surface of the earthworks or structures will visually detract from the appearance of the overall development. Pipes should be buried underground or integrated into the design of a structure as a deliberate and positive part of the design*
- *Whether the use of sprayed concrete can be avoided by the use of alternative methods, such as anchored netting*
- *Whether landscaping can be used to hide or soften the earthworks or associated structure taking into consideration purpose and the growing conditions of the site. Proposals for landscaping must be supported with a professionally prepared planting plan and specifications at the time of application.*

*The environmental result will be earthworks and associated structures that reflect the visual character of the local area.*

### **29.2.1.8 Manage earthworks in Open Space and Conservation Site Areas in accordance with the different purpose and use that these recreation and conservation areas have for the City.**

## METHODS

- Rules
- Reserve Management Plans

*The District Plan identifies a number of different types of Open Space Areas and Conservation Site where each has a different purpose. The areas are managed under the Reserves Act and the District Plan provisions according to that purpose. Active and passive recreation areas have different needs and requirements and therefore different requirements for earthworks. The earthworks provisions that apply have been developed having consideration for the underlying purpose of each of the different types of Open Space Areas and Conservation Sites. When assessing whether earthworks are appropriate within Open Space Areas or Conservation Sites consideration should also be given to the objectives and policies of the different Areas.*

### **29.2.1.9 Control earthworks in the Urban Coastal Edge, areas within the Ridgelines and Hilltops Overlay, Open Space B Areas Conservation Sites, Heritage Areas and on sites containing listed Heritage Items to protect the character, visual amenity or heritage value these areas provide to their immediate surrounds and the City.**

## METHODS

- Rules
- Rural Area Design Guides (for areas within the Ridgelines and Hilltops Overlay)
- Reserve Management Plans (for Open Space B Areas and Conservation Sites)

*The earthworks provisions that apply have been developed having consideration for the visually sensitive nature of these different areas.*

*Suburban coastal roads and the residential and commercial properties and open space areas along suburban coastal roads, are a distinctive component of Wellington City's landscape character. Some of these areas are a "cultural landscape"; the character resulting from a combination of natural landforms and patterns of building and development. A strong and defining element is the coastal escarpments and headlands that provide a natural backdrop to the houses and other buildings on the coastal terraces. Earthworks have the potential to visually impact on these steep slopes and have an adverse effect on the character and visual amenity of these areas.*

*Wellington's Ridgelines and Hilltops are an important and sensitive feature of the landscape. Earthworks will be carefully assessed to ensure they are undertaken in a sensitive manner responsive to the local natural features. The Rural Area Design Guide will assist in the management and assessment of*

the effects of proposed earthworks within identified Ridgelines and Hilltops.

Open Space B Areas can often be enjoyed and experienced from a distance creating a visual distinction between built and unbuilt areas. Conservation Sites are significant areas of Wellington's natural heritage with high ecological values. Earthworks have the potential to impact on the visual and ecological values these areas provide to the city and therefore the earthworks in these areas will be controlled. However, earthworks are necessary to create tracks for public access within reserve areas and therefore earthworks for the purpose of providing walking and cycling tracks are provided for.

When assessing an application for resource consent, in addition to the matters outlined below it is also necessary to have regard to the objectives and policies of the relevant are or topic based chapter.

Matters to consider within the Urban Coastal Edge:

- Whether the proposed earthworks and any associated structures will have a negative visual impact on the appearance and character of areas along coastal roads
- The extent to which the natural characteristics of the site will be altered or modified by the earthworks.
- Whether mitigation will be effective in addressing the visual effects of the earthworks and associated structures
- The extent that indigenous or naturalised species are used in landscaping.
- All relevant matters listed for assessment under Policy 29.2.1.7.

Matters to consider within the Ridgeline and Hilltop Overlay:

- Whether the earthworks will detract from the character of the surrounding landscape
- The extent to which the earthworks are sited and designed to avoid being visually obtrusive
- Whether visual continuity of the upper slopes to the apex of the ridgeline or hilltop is maintained
- The extent to which any earthworks can be restored to resemble natural landforms
- Whether the visibility of earthworks can be minimised through design or planting in relation to district wide, community wide and neighbouring views
- Whether the earthworks will detract from the relatively unmodified character of the landscape
- The extent to which the proposal meets the relevant aspects of the Rural Area Design Guide

Matters to consider within Open Space B and Conservation Sites:

- Whether the proposed earthworks will have a negative visual impact on the appearance or character of the area
- Whether the earthworks will detract from the relatively unmodified character of the landscape
- The extent to which any earthworks can be restored to resemble natural landforms
- Whether the visibility of earthworks can be mitigated by appropriate planting and/ or screening.

Matters to consider within Heritage Areas or on sites containing Heritage Items:

- The extent to which the earthworks detract from the values for which Heritage Item or Area was listed.
- Whether the earthworks can be achieved without altering the significance of the building, object, item or area.
- The extent to which the earthworks maintain the relationship of the building, object, item or area with its setting.
- Whether the site has or is likely to have significant archaeological values, and whether the effects on those values by the proposal can be adequately avoided, remedied or mitigated.

The environmental result will be the protection of the character and visual amenity along suburban coastal roads, within the Ridgeline and Hilltop Overlay and in Open Space B Conservation Sites and within Heritage Areas and Sites containing Heritage Items.

**29.2.1.10 Ensure the design of structures used to retain or stabilise landslips, reflect the character and visual amenity of the local area.**

#### **METHODS**

- Rules
- Design Guide (Subdivision, Residential, Rural Area)

Landslips can be unexpected events, generally beyond human control, and cannot be considered as deliberate work or 'earthworks', unless earthworks are required to reshape or clean up the slip.

The future stability of land affected by a landslip and the safety of existing buildings and structures are addressed by remedial and retaining work that is likely to require a building consent under the Building Act 2004. However, not all remedial work for landslips requires Building Consent. To ensure that the visual effects of any remedial work undertaken are taken into consideration a specific rule addresses this issue.

The environmental result will be that the structures used to retain or stabilise landslips will reflect the character and visual amenity of the local area.

**29.2.1.11 Ensure the transport of earth or construction fill material, to and from a site, is undertaken in a way that is safe and minimises adverse effects on surrounding amenity and the roading network.**

#### **METHODS**

- Rules

Larger earthworks projects can cause problems with transport on city streets. Taking material from a site, or bringing it to a site from elsewhere, can adversely affect safety on footpaths and roads and cause congestion. Noise from trucks can also affect the amenity of properties within the vicinity of the work being undertaken and along the route chosen to transport the material.

In some instances material will be removed from one site and transported as fill to another site. In these situations it may be necessary to assess the transport effects for both sites, either together or under separate resource consent applications. In order to minimise the adverse effects of moving material it may be necessary to place conditions which define the route, hours of trucking and any other matters that could mitigate the effects.

When assessing an application for resource consent the following matters should be taken into consideration:

- The extent to which the transport of material to or from the site will affect the amenity of surrounding areas having regard to:
  - the type of truck being used
  - the frequency, timing and duration of truck movements
  - the proposed route. The use of Collector, Principal and Arterial Roads and the Motorway, over local roads is preferred
  - the width, sightlines and other characteristics of the streets along the route
  - the presence of sensitive land uses along the route e.g. schools
  - whether the proposal requires the closure of any streets
- Whether the location of the access to the site under consideration can be sited safely. Measures may be necessary to allow traffic, cyclists and pedestrians to move safely past the site
- The need for a traffic management plan (as part of a wider earthworks and construction plan) detailing the above matters and how they will be managed, including any procedures for receiving and responding to complaints.

The environmental result will be that earthwork material is transported in a way that is safe and does not detract significantly from the amenity of an area.

**29.2.1.12 Protect koiwi (human remains), taonga, Maori and Non-Maori material and archaeological sites dated from before 1900, by advising applicants of their obligations under legislation and using enforcement powers where necessary.**

## METHODS

- Archaeological Authority process under the Historic Places Act 1993, administered by the New Zealand Historic Places Trust
- Chapter 20: Heritage Objectives and Policies
- Section 17 of the Resource Management Act 1991 - Abatement Notices, Enforcement Orders
- Advocacy – advising applicants of their obligations under legislation and using enforcement powers where appropriate

Earthworks have the potential to expose koiwi (human remains), taonga or Maori or Non-Maori archaeological material. Archaeological sites associated with human activity that occurred before 1900 are protected by the Historic Places Act 1993. An archaeological authority will be required from the New Zealand Historic Places Trust to destroy, damage or modify these sites. In the event that a site is discovered when undertaking earthworks owners, applicants or contractors should contact the New Zealand Historic Places Trust as they will be required to apply for an Archaeological Authority from the New Zealand Historic Places Trust.

The Council will work with the New Zealand Historic Places Trust, Wellington Tenth's Trust and Ngati Toa Rangatira, to make information available to ensure that property owners / applicants are aware of their statutory and cultural obligations.

Chapter 20, the Heritage Objectives and Policies, identifies the importance of archaeological values and sites and the requirement under the Resource Management Act to protect them from inappropriate subdivision, use and development. At this stage the District Plan does not identify particular archaeological sites to enable the implementation of rules to control the effects on such sites (similar to the heritage rules for buildings, objects and areas). This work will be undertaken in the future.

This does not mean that there is no RMA controls on the effects of earthworks on archaeological values. Every person undertaking earthworks has a general duty under Section 17 of the Resource Management Act 1991 to avoid, remedy or mitigate any adverse effects of activities. Where significant archaeological sites are known or discovered during earthworks Council can use its enforcement powers to protect them.

The environmental result will be greater protection of Maori and non-Maori archaeological values from inappropriate subdivision, use or development.