

2013

# Plan Topics

Aggregates And Quarry Industry





The construction of infrastructure and development within urban and rural areas of New Zealand depends on the ability to access, extract, process and transport aggregate (being crushed rock, gravel and sand) from quarries (collectively referred to as 'quarrying' in this guidance note). Therefore, it is important aggregate resources are understood and effectively managed, including managing the effects of quarrying on the environment.

The potential effects of quarrying and gravel extraction vary according to the type, scale, location, receiving environment and distance from the market. The effects produced by quarrying can often be mitigated or remedied but not always avoided. This creates the potential for quarrying to both adversely affect, and be affected by, surrounding land uses.

Regional councils and territorial authorities both play a key role in integrated planning for aggregate resources and managing any adverse environmental effects of quarrying through district and regional plans and the resource consent process. However, councils do not manage the allocation of mineral resources – this is done by the Crown.

This guidance note outlines the key matters in planning for quarrying, describes the key effects of quarrying and gravel extraction and the methods available to manage these effects under the Resource Management Act 1991 (RMA), including examples of methods in practice.

The focus of this guidance note is on the planning and management of medium and large scale quarrying of aggregate from the ground, including river beds and beaches. It does not address small-scale quarrying, dredging, extraction from the coastal marine area below the mean low water springs or the extraction of other mineral resources such as coal, gold or oil. However, many of the resource management issues and associated management methods for quarrying and gravel extraction are generally relevant to other forms of mineral extraction and smaller-scale quarrying activities.

This guidance note was initiated by the [Aggregate and Quarry Association of New Zealand](#) (AQANZ), in partnership with the Ministry for the Environment and Local Government New Zealand, as a way of promoting best practice to deal with the complex range and scale of resource management issues associated with the aggregate and quarry industry.

The development of this guidance note was initiated with the development of a background paper identifying key resource management issues with quarrying. The main issues included:

- strategic planning for provision of aggregate to meet current and future infrastructure and development
- management of on-site and off-site environmental effects of quarrying, which vary depending on the type of activity, scale of operation, location, receiving environment and distance to market

- reverse managing the of existing establishment of new quarries, in areas where there are conflicts or constraints with adjacent land uses



sensitivity pressures on operation and expansion quarries or the

These issues and others were discussed with local government and industry participants at the 'Planning for the Aggregate and Quarry Industry Conference' held in June 2009 and are addressed throughout this guidance note.

## Guidance note

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### **Integrated management approach to planning for quarrying and gravel extraction**

#### **Planning steps and timeframes for aggregate resources**

#### **Quarry and gravel extraction resource management issues and effects**

#### **Developing objectives and policies to avoid, remedy or mitigate quarrying and gravel extraction effects**

#### **Management methods**

#### **Best practice examples, RMA provisions and key terms, definitions and concepts** **Integrated management approach to planning for quarrying and gravel extraction**

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Both regional councils (s30 of the RMA) and territorial authorities (s31 of the RMA) play a key role under the RMA in planning for aggregate resources and managing the effects of quarrying.

Aggregate resources are limited in quantity, location and availability, with demand and supply of aggregate often crossing regional and territorial council boundaries. Regional councils and territorial authorities should work together to strategically identify the future need for aggregates, their availability, and methods to provide for future access to aggregate resources, while avoiding remedying or mitigating the effects of quarrying and gravel extraction.

Councils should be aware of the [linkages between RMA documents](#) and [between non-RMA plans and strategies](#) when developing an integrated approach to managing quarrying and gravel extraction. General methods that can be used to integrate and strategically plan

for aggregate resources  
quarrying and gravel  
district levels include:



and manage the effects of  
extraction at regional and

### RMA related

- Regional Policy Statements (RPS) identify objectives, policies and methods to achieve integrated management of natural and physical resources and infrastructure, that regional and district plans must “[give effect to](#)”. This includes aggregate resources and their role in the development and maintenance of infrastructure.
- Regional Plans identify objectives, policies and rules to achieve the RPS objectives, including those on providing for quarrying and gravel extraction and the management of its effects on land, air and water. The regional coastal plan achieves this function for coastal marine areas.
- District Plans identify objectives, policies, rules and may contain other methods to provide protection, when appropriate, to aggregate resources and avoid, remedy or mitigate any adverse effects of quarrying and gravel extraction, through controls on subdivision and land-use activities.
- A combined plan can be prepared to address access to aggregate if it is a significant issue across regional council/ territorial authority boundaries.
- Rules, including performance standards, can be used or expressed through zones, buffers or setbacks in plans to identify areas where quarrying or gravel extraction activities may be provided for and identify conditions or considerations to manage adverse effects.
- Resource consents address site-specific environmental effects of quarrying or gravel extraction activities through the assessment and use of conditions.
- Iwi planning documents (including iwi management plans) identify areas which might be sensitive to quarrying or gravel extraction activities or associated effects of quarrying or gravel extraction, along with expectations for engagement and participation in RMA processes (refer to the [Facilitating consultation with tāngata whenua](#) guidance note).
- Monitoring informs and tracks the performance of policy statements, plans and consent conditions relating to quarrying or gravel extraction. This includes identifying the performance of plan provisions or consent conditions and any need

for review as a consequence of changes in the demand and supply of aggregate or effects of quarrying on the receiving environment.

### Non-RMA related

- Growth strategies integrate planning for growth within a region/district with the management of aggregate resources, including the management of quarrying and gravel extraction effects.
- Long Term Plans (LTP) prepared under the Local Government Act 2002 could indicate future aggregate needs by listing future infrastructure projects.
- Regional Land Transport Plans (RLTP) could identify future aggregate need by listing key roading infrastructure projects and also sources of aggregates in close proximity to roads for haulage, some of which should reflect consistently across LTP’s and regional policy statements (see other similar strategies in projecting demand).



- Quarry Management Plans provide a comprehensive and adaptive plan to manage the environmental effects associated with a specific quarry, including the complaints procedures, community consultation, communications protocols, rehabilitation and site completion standards.
- Guidelines or protocols produced with, or for, the industry to improve the management and processes around quarrying.
- Land information memorandums (LIMs) can be used to provide clear information on any restrictions applying to a property, such as if it is within a quarry buffer zone or where a no complaint covenant applies to a site and is registered on the title.

Generally, a combination of these methods can be used by councils to achieve integrated management of quarrying or gravel extraction.

## **Planning steps and timeframes for aggregate resources**

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A number of factors make planning for quarrying or gravel extraction challenging, these include:

- aggregate is a fixed and finite resource, often found in locations where extraction conflicts with other values (eg, river beds used for recreational purposes, or uplifted rock with high visual and ecological values)
- an incomplete knowledge of the location, scale and nature of aggregate resources and the high costs to obtain this information
- the benefits of locating aggregate resources close to the source of demand (ie, urban areas) due to the high costs of transporting aggregates and associated road damage

- the negative and their effects opposition to quarries
  - there is also no certainty as to where future quarry operations could actually take place.
- perceptions of quarries and the high potential for established and new

Without effective planning for aggregate resources there is the potential for incompatible activities to limit or prevent access to aggregate resources in the future. However, the need to access aggregate needs to be balanced with the effects of quarrying or gravel extraction on the environment and any restrictions imposed on private property rights. This is a key resource allocation issue for councils to consider when reviewing plans and processing resource consents.

How quarrying and gravel extraction is planned for will vary depending on the needs, pressures and availability of aggregate in an area. Given the finite nature and strategic reliance on aggregate it is important these factors are adequately considered against any likely short-term, intermediate and longer-term changes in demand and supply both within, and adjoining, an area.

A 30 to 50-year planning horizon reflects consistently with other strategic planning processes including LTPs, RLTPs and growth strategies, however, in [Road Metals Company v Christchurch City Council and Canterbury Regional Council](#), a lead-in time of 50 to 100 years was considered a more appropriate timeframe given the constraints on availability of aggregate within the area and the need for certainty for future infrastructural development.

Effective planning for aggregate resources is an ongoing process and requires a number of basic interrelated components:

- projecting the demand
- identifying aggregate resources
- assessing and providing appropriate access.

Councils should work closely with the aggregate and quarry industry, tāngata whenua and affected landowners to develop a robust approach to manage access to aggregate resources and the effects of quarrying and gravel extraction.

## Projecting demand for aggregate resources

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Understanding future demand for aggregate in a location will help inform how it is appropriately identified and managed in plans. The scale and detail of this exercise should be fit for purpose.

The need and location of future demand for aggregate can be identified through a range of methods including:

- Statistics New Zealand's [population](#) and [household](#) projections for regions and districts

- [National Land](#) (NLTP) which and future road region (available from regional councils and the [New Zealand Transport Agency](#) (NZTA))
- LTPs, RLTPs and the NLTP which provide details of planned and future infrastructure projects
- economic strategies which provide details of projected industrial and commercial growth
- growth strategies and asset management plans which identify infrastructure and areas for future development. These are often supported with more detailed studies which may provide general information about the potential future demand for aggregate resources in the area
- demand studies which project future demand based on a number of indicators and their relationship with past aggregate supply. Environment Canterbury prepared a [Regional Gravel Management Report](#) to help with future management of fluvial gravel extraction in the region. The report provides projections of supply of the fluvial gravels in Canterbury and investigates future demand for aggregate in the region based on a number of related drivers. It takes into account forecasts of expenditure on state highways, building consent numbers, economic growth, population changes and industry projections to estimate the annual gravel demands for the region to 2015.
- monitoring data from quarry operators which is either provided voluntarily (through surveys) or through resource consent conditions or by [New Zealand Petroleum and Minerals](#). This data can show current and past demand for aggregates which can help predict future trends
- aggregate consumption rates which can help approximate quantities eg, it takes approximately 4000 tonnes of aggregate for each kilometre of sealed road and 250 tonnes to build a new house.

[Transport Programme](#) provide details of planned construction within each

In considering future demand, councils should also take into account the need for, and impact of, the supply and demand of aggregate from adjoining areas.

## Identifying aggregate resources

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Identifying aggregate resources requires understanding of the location, scale, type, accessibility of the resource and the economics of quarrying and gravel extraction. Approaches used to identify aggregate resources vary in their level of detail and scale depending on the needs, pressures and availability of aggregate in an area. A common approach is to identify the aggregate resource in terms of its geological components and scale.

Identification of strategic aggregate resources should also identify other key factors that may affect access to, and viability of, an aggregate resource in relation to its location and surrounding land uses. The use of criteria provides transparency when considering the value and viability of aggregate resources and any subsequent level of protection provided to them and from quarrying or extracting them. It is also important to acknowledge that conditions will change over time (ie, new roads, urban growth) and this can also change the viability of the resource.

Information to help aggregate resources gained from:



identify strategic and constraints can be

- geological surveys and extractive viability studies, which can be used as a basis for more detailed exercises
- preliminary ecological monitoring for river-bed gravel extraction to identify any presence of nesting bird or freshwater fish species
- hydrological information for river-bed gravel extraction to ascertain which areas require extraction for flood protection purposes
- collecting monitoring data from quarries that estimates how much aggregate remains (including consented sites not yet in operation)
- council planning maps, overlays and schedules
- transport management plans
- community consultation exercises
- relevant studies into cultural and heritage values (including iwi management plans).

Approaches used to help identify aggregate resources include:

- aggregate assessments and strategies □ policies to identify aggregate resources.

Where appropriate, councils should also identify the use of recycled aggregate that is, or is likely to be, available to meet future demand. The use of recycled aggregate is increasing with a number of councils promoting its uses through objectives and policies in plans. Recycled aggregate can help meet future aggregate demand and reduce the need for new aggregate through re-using material that would otherwise be cleanfilled or dumped.

## Regional aggregate resource overview

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The [Tasman Resource Management Plan](#) provides management methods based on an overview of the aggregate resources in the region. The provisions in the plan relating to aggregate were informed by a strategy consisting of key studies and findings of past aggregate and soils studies. This includes identifying three environments in the district where there is high quality hard rock suitable for aggregate production. These environments are in the eastern ranges, the alluvial plains of particular catchments, and in the beds of two key rivers in the area. Based on the overview of aggregate from the strategy, the plan seeks to increase the uptake of opportunities to extract aggregate from the ranges and limit the future extraction in the fluvial and river-bed environments due to the ecological and physical issues associated with extraction in these environments.

Northland Regional Council, Far North District Council, Whangarei District Council, Ministry of Business, Innovation and Employment (New Zealand Petroleum & Minerals) and [GNS Science](#) have taken a collaborative approach to providing a detailed overview of the mineral resources at the regional level and the potential contribution of these resources to the viability of the region. This exercise produced a mineral resource assessment of the region, including rock and sand aggregate and the potential value and economic impact of those resources. The results were reported in two reports, the

## Policies to identify the regional aggregate resources

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Policy 5.4.1 of the [Proposed Northland Regional Policy Statement](#) states that mineral resources will be considered regionally significant, based on

- a. Relative scarcity;
- b. Potential contribution to the regional economy from the extraction;
- c. Current and potential demand, and location with respect to demand;
- d. Constraints on extraction including existing or planned settlement and access to the site;
- e. Constraints on other development and land use as a result of extraction;
- f. Quality and size of deposit; and
- g. Importance to infrastructure development.

Policy 5.1.3(d) deals with avoiding the adverse effects of new use(s) and development, particularly residential development on the use and development of regionally significant minerals.

The [Auckland Council Regional Policy Statement](#) states that one of the key methods to implement the mineral objectives and policies (chapter 13) is for the Auckland Council to prepare an evaluation of the location of actual and known potential mineral resources available and the foreseeable demand for mineral resources in the region. The RPS requires that on completion of this evaluation, the Auckland Council will review policies and methods to determine the most appropriate mechanism to implement the information from the process. While the Auckland Council Regional Policy Statement will be superseded by the [Auckland Unitary Plan](#) (notified September 2013) the Regional Policy Statement will remain relevant until the Unitary Plan becomes operative.

Method 51 of the [Operative Wellington Regional Policy Statement](#) identifies the Wellington Regional Council as the lead agency to identify the location of significant resources in the region.

Also see the [FutureProof](#) and [SmartGrowth](#) growth strategies which include actions to identify aggregate resources to be implemented through RPS and district plans. **Assessing and providing appropriate access to aggregate resources**

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Once the demand for, and location of, aggregate resources is understood, then objectives, policies and methods can be developed in plans to provide the appropriate access to them. Appropriate access to both existing and potential areas for future quarrying should be weighed up with Part 2 matters of the RMA, in particular, the adverse effects of quarrying and methods available to manage them.

A [s32](#) evaluation is a  
throughout the plan-  
Resource Management

provides greater guidance and specificity about what is required in section 32 reporting, particularly for the assessment of costs and benefits. These changes come into force on 3 December 2013 and require s32 evaluations to now:

key requirement  
making process and the  
Amendment Act 2013

- specifically assess the benefits and costs of the environmental, economic, social and cultural effects
- assess the opportunities for providing or reducing economic growth and employment
  - quantify the costs and benefits of provisions, where practicable.

The s32 evaluation process will help identify the degree and nature of issues and the effects around quarrying or gravel extraction in an area and provide a framework from which to consider and test appropriate objectives, policies, and methods in plans.

The findings of an evaluation will vary by location and circumstances. However, a number of points that councils should consider in evaluating appropriate objectives, and the effectiveness and efficiency of policies and methods may include:

- the extent to which the aggregate resource is known/identified
- the strategic value of the resource in relation to the demand for aggregate within/outside the region including:
  - the amounts of aggregate needed
  - the timeframe for expected demand
  - the scarcity of the resource and alternative locations
- the positive benefits of quarrying or gravel extraction
- the opportunities for economic growth that are anticipated to be provided or reduced
- the opportunities for employment that are anticipated to be provided or reduced
- how well existing quarries fulfil current and future needs versus the need for new sites
- the nature and density of surrounding land uses
- the different scale and nature of aggregate resources, the quarrying or gravel extraction activity and its potential effects
- any particularly sensitive land uses (i.e. schools), areas of significant landscape value or areas of importance to iwi and waterways
- costs of restricting the rights of landowners
- competing values for a location (refer *Winstone Aggregates v Rodney District Council* [2009](A054/09))
- potential loss of high valued land for other activities □ the proximity of a site or resource to transport networks.

In assessing the appropriate level of access to aggregate resources, councils need to have regard to any sites with existing use rights. It is important to establish baselines for effects as existing quarries can continue with their activities provided the level of effect does not change. Existing use rights need to be considered in developing plan provisions for quarrying and gravel extraction and in developing appropriate mechanisms to manage the effects of quarrying and gravel extraction.



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A range of methods that may inform, develop and deliver a policy framework to provide appropriate access to aggregate resources includes:

- growth strategies
- objectives and policies recognising the importance and management of aggregate resources
- methods such as zoning (including buffer areas and potential aggregate extraction areas), setbacks and no complaints covenants.

### Growth strategies

- Growth strategies are non-statutory documents generally developed at the regional or sub-regional level. They can strongly influence future land use and development, should be informed by infrastructure planning and be linked to the future demand and provision of aggregate resources.
- Growth strategies can identify the importance of aggregate resources as part of future growth and help project [future aggregate demand](#) by identifying the future location and pattern of development within an area. Although strategies are useful to provide a collaborative approach to planning for aggregate resources, their influence can be limited in RMA decision-making as they are largely non-statutory. Strategies can, however, identify implementation measures that can subsequently be incorporated into regional policy statements and plans to give them more statutory weight. See the [key linkages between non-RMA plans and strategies](#) for more information.
- Strategies are best developed collaboratively with councils, relevant agencies and key stakeholders such as the aggregate industry (local quarry operators), development representatives, affected landowners, and iwi and community groups. Strategies developed in consultation with the wider community and industry will help to achieve buy-in to the 'vision' and the methods proposed to implement and deliver that vision.
- An example of a collaborative strategy developed in consultation with the community is [Sustainable Futures 30/50](#) led by Whangarei District Council. This strategy involved a series of public consultation exercises with the community and iwi groups in developing a strategic planning programme to assess and plan for infrastructure requirements over a 30 to 50-year timeframe.
- The [FutureProof Growth Strategy and Implementation Plan](#) developed by the Hamilton City, Waikato District and Waipa District Councils, Environment Waikato and tāngata whenua provides a good example of a collaborative framework for the management of growth and the provision of infrastructure. The strategy has a 20 to 50-year planning horizon and includes a specific section on mineral resources (8.31). This recognises the need to plan for existing and new sources of aggregate to meet future growth needs while managing conflict with sensitive land uses, and the adverse effects of quarrying.
- The strategy contains two actions to address this issue. The first is for Environment Waikato to investigate mineral demand and resource potential in the area, and, if necessary, map it and develop management strategies. The second action is to "ensure rural-residential and urban development avoids mineral resource areas and that conflict between extraction of mineral resources and associated activities has been reduced by ensuring that any sensitive activities are not located adjacent to



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where mineral resources are being extracted”. Both actions are identified for implementation through the RPS and district plans.

- The [SmartGrowth 50-Year Strategy and Implementation Plan](#) is a strategy that was revised and adopted by Environment Bay of Plenty, Western Bay of Plenty District Council and Tauranga City Council in 2007 following consultation with the community and tāngata whenua. SmartGrowth is a cooperative approach to manage growth in the sub-region that sets out future settlement patterns, densities and transport networks that could be used to forecast the location and scale of aggregate demand. The strategy includes an aggregate and other mineral resources section (7.2.7) that recognises similar issues and objectives as the [FutureProof](#) example above.

### Objectives and policies

Objectives and policies are developed in RPS's or plans to help address key resource management issues including those relating to access to aggregate resources. Plans must give effect to the policies and objectives of a RPS. Methods, including rules and performance standards, are identified and developed to enable objectives and policies to be achieved. In order for the methods to be used effectively in plans a clear set of objectives and policies is a prerequisite.

For example, the [Auckland Council Regional Policy Statement](#), contains objectives to ensure mineral extraction activities and mineral deposits valuable for development in the region are not unnecessarily compromised, and that the region's need for rock material continues to be met. This objective recognises the high economic cost and environmental impact of transporting aggregate resources from outside the region. Policy 13.4.1(2) of the RPS aims to protect existing mineral extraction sites from activities which would unduly limit their operations to the detriment of the regional environment, including its economy. The policy also aims to protect areas of minerals which have the potential to provide cost effectively for the region's future needs from activities that may compromise them. While the Auckland Council Regional Policy Statement will be superseded by the [Auckland Unitary Plan](#) (notified September 2013) the Regional Policy Statement will remain relevant until the Unitary Plan becomes operative.

The [Waikato Regional Policy Statement](#) recognises the importance of mineral resources to the economy and infrastructure of the region. An objective of the RPS is that the extraction of mineral resources is not unnecessarily restricted by sensitive activities, extraction is neither prevented nor protected by unnecessary plan provisions, and adverse environmental effects are managed in an integrated and effects-based way. Policy 3.14.2 looks to address these issues when managing mineral resources by recognising the incompatible nature of activities and only imposing controls necessary to address adverse environmental effects and likely conflicts with incompatible activities. Policy 3.14.3 also recognises the extraction of mineral resources in some areas may be unsuitable. The policy provides for the regional council and district councils to consider both the beneficial and adverse effects of conflicting activities prior to decisions about the use and development of natural and physical resources. The RPS also recognises that in the implementation of the policy, decision-makers may need to differentiate between existing sites and prospective sites.



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Policy 60 of the [Operative Wellington RPS](#) directs that particular regard be given to the social, economic, and environmental benefits of using mineral resources within the region. It also requires that particular regard be given to protecting significant mineral resources from incompatible and inappropriate land use alongside. Examples of methods to protect significant mineral resources include the use of buffer areas in which sensitive activities may be restricted, and the use of noise reduction measures and visual screening.

Chapter 14 Disturbance, Deposition and Extraction of the [Environment Bay of Plenty's Regional Coastal Plan](#) provides for sand, shell, shingle and/or mineral extraction within the coastal marine area but only in appropriate locations while avoiding, remedying or mitigating any associated adverse environmental effects. Under policies 14.2.3(h)–(j) this allows for a precautionary approach to sand extraction in the coastal marine area. The policies recognise extraction activities as generally inappropriate in the Habitat Preservation Zone and encourage future extraction to occur in less sensitive areas, such as inactive beach areas.

Objective 18.3.1 of the [Whangarei District Plan](#) is to achieve exploration, extraction and processing of minerals in a manner that avoids, remedies or mitigates any adverse effects on the environment and community, and on the relationship of tāngata whenua with their ancestral lands, sites, water, wāhi tapu and other taonga. Objective 18.3.2 and Policy 18.4.2 seek to achieve this through managing conflict with incompatible activities around existing quarries and limit development through subdivision that may compromise or unduly constrain access to existing operations or to potential significant mineral resources.

### Zoning

Zoning is a well-established planning tool to divide areas of land into areas to manage particular effects, activities or uses within the area through the application of rules, including performance standards. This includes identifying the different types of activities that may be included in an area under sections 77A and 87A of the RMA, ie, whether it is a permitted, controlled, restricted discretionary, discretionary, non-complying or prohibited activity and the subsequent standards or conditions it must meet.

Zoning can be used to help regional councils carry out their functions, for example, through identifying areas with high ecological or landscape value, but is primarily used by territorial authorities to identify rules that apply to activities within a defined area in district plans.

The development of zones, appropriate activities, rules and standards should take into account those matters discussed in assessing and providing appropriate access to aggregate resources and the effects likely to be generated from quarrying. This requires consultation with key stakeholders such as affected landowners, industry, tāngata whenua, community groups and the relevant council in the district or region. This may result in different provisions for different quarrying activities in different areas.

Zoning can be used to identify potential aggregate extraction sites and to protect established sites from incompatible or sensitive activities that may lead to reverse



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sensitivity pressures. Zoning can also be effective to discourage quarries in areas valued for other reasons such as ecology, natural character or amenity.

For example, chapter 18 of Part II of the [Tasman Resource Management Plan](#) provides a zone (Residential Activity Restriction Area) around established quarries where residential dwellings are a restricted discretionary activity, and amongst other matters, the Council will consider the extent to which the dwelling may compromise the efficient operation of the quarry.

In some instances, it may be necessary to develop a hierarchy of zones or policy areas to provide for the appropriate level of protection of access to aggregate resources, such as:

- a quarry zone where quarries are an established activity, with plan objectives, policies and rules allowing and encouraging quarry development and/or discouraging other activities from establishing in that zone
- a buffer zone around a quarry site where activities are more tightly restrained to avoid reverse sensitivity pressures and to serve as a reminder of the potential for adverse effects from the quarry within that zone
- a potential aggregate extraction zone where a combination of factors indicates that aggregate extraction could be appropriate in the future. In some areas it may be appropriate for sensitive development in close proximity to the zone to be constrained by using quarry or buffer zones.

Refer to the guidance on the [plan development](#) process for more detailed information on the key steps to plan development.

### **Buffer areas on quarry zones**

Buffers establish an area around existing quarries or activity zones that prevent activities sensitive to quarrying locating there. Case law provides clear guidance on the use of buffers and that they should only be considered where an activity has taken all reasonable steps to internalise adverse effects. This can involve a quarry purchasing surrounding land to provide a buffer. However, all reasonably practical mitigation measures intended to internalise the effects may still fail to stop those effects from being experienced outside the boundary of the property. Such effects could include traffic noise, dust, noise, vibration and visual effects.

The use of buffers will require the consideration of the significance of the operation and other matters outlined in assessing and providing appropriate access to aggregate resources, including the effects likely to be generated from quarrying and reasonable measures taken to internalise them.

In considering the use of a buffer, councils must be satisfied the effects from the activity are internalised as far as is reasonable and consider the appropriate distance to mitigate the effects in question against the significance of the quarrying activity. Compliance with buffers means that effects are measured from the notional boundary of the buffer rather than the site. This can raise issues over access to private land to undertake monitoring of effects and compliance.



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An example of this approach is in the Special Rules Section of the [Tasman Resource Management Plan](#). The Plan identifies Quarry Areas by Residential Activity Restriction Areas. The combined effect of the rules for these two areas is to mitigate the effects of quarrying in two ways: by regulating quarry activities and by reducing incompatible land uses in the vicinity. In Quarry Areas, quarries are a discretionary activity provided they comply with a number of terms and conditions, whereas the construction of a new dwelling or a residential activity is non-complying. In the Residential Activity Restriction Area, a new residential dwelling is a restricted discretionary activity and must be set back 500 metres from a working quarry. The council also restricts its discretion to a number of conditions including the extent to which the dwelling may individually or cumulatively compromise the efficient use of a Quarry Area or an existing quarry.

### Potential aggregate extraction zone

The [Waikato District Plan 2011](#) contains an 'Aggregate Resource Policy Area' (ARPA) as a policy overlay on the planning maps and has an associated objective, policies and a subdivision rule that imposes restrictions on allotment size, location and layout. This policy area was incorporated into the plan by way of a consent order following the resolution of an appeal and currently only applies to one specific site in the Rural Zone.

It is intended that Council will carry out a future plan change where areas of rural zoned land, that meet the criteria for an ARPA set out in Chapter 4 of the District Plan. The areas of land identified as meeting the criteria will be identified on the planning maps by the ARPA policy area and will then be subject to the existing objective, policies framework and subdivision restrictions.

The plan change will result in there being two approaches to identifying aggregate extraction areas. The first (and existing) approach involves identifying areas of existing or consented aggregate extraction as 'Aggregate Extraction Protection Policy Areas' in the plan and providing an external buffer around these areas through restrictions on subdivision and housing development (200 metres for sand and 500 metres for hard rock).

The second (and new) approach will involve identifying areas where a combination of factors indicates that aggregate extraction could be appropriate in the future. These areas will be subject to the ARPA overlay on the planning maps and associated planning provisions. Chapter 4 of the District Plan identifies five criteria that must be met before an area is considered an ARPA, including:

- there is a substantial volume of high-grade aggregate resources, particularly where the resource is in close proximity to a significant market
- the transport network provides a convenient and direct route from the resource area to a major market
- large land holdings predominate
- current development does not unduly constrain access to or transportation of aggregate
- aggregate extraction would not compromise the matters identified as being of national importance under section 6 of the RMA.



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The ARPA policy area does not imply approval in principle for extraction, and aggregate extraction remains a discretionary activity requiring resource consent. However, the ARPA seeks to retain access opportunities to aggregate resources by managing the subdivision process. In this instance, subdivision of properties within the Rural Zone and the ARPA, becomes a restricted discretionary activity instead of controlled activity, allowing particular attention to be paid to the size, location and layout of new lots, for example, to ensure additional lots are away from haulage routes and that a sufficient buffer is retained between the aggregate extraction and residential activities.

The identification and management of subdivision in rural/ARPA will help retain access to resources but also help internalise the effects of any future quarrying within a site. This will occur by only applying the ARPA to large lots and then managing subdivision to ensure they do not change significantly in size (eg, a small additional lot may be created but the large lot will not be cut in half). The size of any internal buffers will differ between hard rock and sand, and this should be reflected in the size of land holdings to which this policy applies. Whereas this approach is easier for hard rock resources given their location on hilly areas where existing lots are large and there is little subdivision pressure, it will be more challenging for sand resources some of which are located in more populated areas where smaller titles predominate and subdivision pressures are greater.

Please contact the Waikato District Council if you would like to discuss this approach further.

### **Setback policies and rules**

This approach is similar to a buffer zone but differs in that it uses policies and rules that require minimum setback distances for new activities from established quarries, or consented quarries. This can be a useful method to protect quarries from conflicting activities such as residential development, while also providing appropriate levels of amenity for new activities.

For example, rule 2.4.6(g) of the [Waipa District Plan](#) requires that new dwellings should not be constructed closer than 500 metres to a site used for mineral extraction or where a consent has been granted for mineral extraction.

### **No complaint covenants**

These are an optional mechanism that can be included on a title by a landowner at the time that a property is subdivided or developed. No complaints covenants are used to prevent persons moving into an area from complaining about the adverse effects of a nearby established activity. Such instruments will often include a prohibition on the owner or occupier from:

- suing for nuisance
- taking any type of enforcement action under the RMA (in relation to specified activities)



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- making opposing submissions against an application by the effects-producing landowner to obtain new resource consents (in respect of specified activities) or renew existing ones
- funding or being otherwise involved in any of the above activities.

A resource consent applicant will often propose such a covenant to respond to the concerns of existing operators about their potential to complain about the operator's effects. A covenant may be either agreed as a condition of the consent under s108 RMA, or by private agreement, and can be registered on the title of the receiving site under s109 of the RMA. If a no complaints covenant is imposed as a condition of consent under s108 of the RMA, it needs to meet the 'Newbury' test for validity.

To be effective, no complaints covenants need the consent of all parties and cannot be imposed without the applicant's consent. No complaint covenants also generally need to be used in combination with other methods that mitigate the effects of vibration, such as acoustic insulation and setback distances.

No complaints covenants have been successfully used in a variety of situations where incompatible activities are proposed. For example, the [City of Napier District Plan](#) lists the use of no complaints covenants as a non-regulatory method to avoid reverse sensitivity issues in the city's Rural Environment (Objective 33.2).

## Quarry and gravel extraction resource management issues and effects

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### Quarry resource management issues and effects

Quarrying can generate a number of on-site and off-site environmental effects through the blasting, excavation, crushing, screening, stockpiling and transport of aggregate.

The degree and nature of effects caused by quarrying varies according to the type of quarry, the scale of operation, methods used to excavate aggregate, the geology of the area, the receiving environment and the surrounding land uses. The effects of quarries also vary by their nature (rock or sand) and whether they are in short- or long-term use, in continuous use or used irregularly or seasonally.

Quarrying involves the excavation of rock, gravel or sand from the ground (including river beds and beaches). Rock-won aggregate is typically produced through drilling and blasting it from suitable rock deposits, and crushing and screening it to the desired size.

Gravels and sand are normally sourced from river beds (both current and old) and from beaches. Excavation typically involves machinery, without the need for blasting. Crushing of gravel is usually limited to larger gravels while screening is used to separate out smaller sizes for specific uses. Aggregate products requiring further refinement can often involve additional washing, crushing and screening processes.

The uses of rock aggregate range from road preparation and finishing (base and surface) to composite for concrete. Gravel and sand aggregates are similarly used for road and construction products but also have a range of specialty landscaping uses.

Effects are either on site, on neighbouring properties or completely off site, such as the transportation of aggregate. The environmental effects of quarrying primarily include:

- the disturbance of land and vegetation
- the disturbance of river beds or coastal marine areas
- dust
- vibration

- noise
- traffic
- visual effects
- impact on cultural and historic heritage values
- the discharge of contaminants into air, water, land and the coastal marine area.

The effects of quarrying need to be considered when developing appropriate objectives, policies and methods in plans to manage quarrying. Although the effects of quarrying can often be mitigated, they cannot always be avoided.

When establishing parameters around objectives, policies and methods to control the effects of quarrying, it is important to encourage effects to be internalised on site as much as possible. The need to internalise effects also applies to resource consents, where the onus is on applicants to demonstrate they have internalised the effects of their activities as far as is reasonably practicable (see s17 of the RMA and case law on *Winstone Aggregates Limited v Papakura District Council (A096/98)*). Only where the internalisation of effects cannot be achieved, and protection is warranted, should off-site mitigation or reverse sensitivity measures be considered (refer to the discussion on buffer zones).

Existing use rights should also be considered when identifying effects and developing appropriate methods to manage them. See more on existing uses in the [RMA Enforcement Manual](#).

The positive benefits of quarrying should be considered alongside any adverse effects. Positive effects include:

- the contribution to the economic and social development of an area through the provision of raw materials to maintain and enhance community facilities, services and infrastructure such as water treatment plants, hospitals, schools, airports, new roads, bridges, motorways and new buildings
- the provision of direct and indirect employment opportunities
- diversification of the local economy and support of ancillary services such as engineering, mechanic and construction businesses
- the reduced social and economic costs of having aggregate resources closer to demand
- opportunity for the end use of quarries, for example, recreational or habitat opportunities
- other flow-on regional benefits, including complementary businesses or services.

### **Gravel extraction resource management issues and effects**

Gravel extraction can generate a number of on-site and off-site environmental effects through the excavation of material from riverbeds (or banks of rivers) and the associated, crushing, screening, stockpiling and transport of aggregate.

The degree and nature of effects caused by gravel extraction varies according to the scale of the operation, the methods used to extract the gravel, the surrounding land uses and the ecological and hydrological characteristics of the river environment.



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Effects are either on site, on neighbouring properties or completely off site, such as the transportation of aggregate, or where fine sediments are transported downstream in the water column. The environmental effects of gravel extraction primarily include:

- the disturbance of land and vegetation
- the disturbance of river beds or coastal marine areas
- disruption of habitats for birds, freshwater and wildlife species
- dust
- vibration
- noise
- traffic
- visual effects
- impact on cultural and historic heritage values
- the discharge of contaminants into air, water, land and the coastal marine area.

The effects of gravel extraction need to be considered when developing appropriate objectives, policies and methods in District and Regional Plans. Although the effects of gravel extraction can often be mitigated, they cannot always be avoided.

When establishing parameters around objectives, policies and methods to control the effects of gravel extraction, it is important to encourage effects to be internalised on site as much as possible. The need to internalise effects in developing objectives, policies and other methods also applies to resource consents, where the onus is on applicants to demonstrate they have internalised the effects of their activities as far as is reasonably practicable (see s17 of the RMA). Only where the internalisation of effects cannot be achieved, and protection is warranted, should off-site mitigation or reverse sensitivity measures be considered (refer to the discussion on buffer zones).

The positive benefits of gravel extraction should be considered alongside any adverse effects. Positive effects include:

- enhanced flood protection through the removal of excess aggregate from the riverbed
- creation of habitats for birds where gravel extraction is well managed
- the contribution to the economic and social development of an area through the provision of raw materials to maintain and enhance community facilities, services and infrastructure such as water treatment plants, hospitals, schools, airports, new roads, bridges, motorways and new buildings
- the provision of direct and indirect employment opportunities
- diversification of the local economy and support of ancillary services such as engineering, mechanic and construction businesses
- the reduced social and economic costs of having aggregate resources closer to demand
- other flow-on regional benefits, including complementary businesses or services.

## **Developing objectives and policies to avoid, remedy or mitigate quarrying and gravel extraction effects**

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Councils should assess a variety of matters in developing appropriate objectives, policies and methods to avoid, remedy or mitigate the effects of quarrying and gravel extraction.

The approach to managing the effects of quarrying and gravel extraction is fairly common across plans, and many have objectives and policies that aim to avoid, remedy or mitigate the effects of these activities. The objectives and policies can be general in nature or tailored specifically to quarrying and/or gravel extraction activities. For example, general objectives and policies could be developed to manage all noise effects, and reference to quarrying and gravel extraction may not be explicitly stated. Alternatively, specific objectives and policies particular to quarrying activities could be developed.

A number of plans have objectives and policies that highlight a range of considerations to reflect specific pressures and values within an area. These may include such considerations as the impact on sensitive and incompatible activities, sites of significance to tāngata whenua, natural hazards, amenity values and the end use of a quarry. Objectives and policies are typically achieved through rules that have one or more activity classes (ie, whether it is a permitted, controlled, restricted or discretionary activity). Rules generally include performance standards which establish the appropriate level of effects and matters for consideration when assessing quarrying and gravel extraction activities. These might apply to quarrying and gravel extraction within a particular zone or area (i.e. specific areas of individual rivers), or across the entire region and/or district.

### **Objectives and policies to avoid, remedy or mitigate adverse effects**

Policies 13.4.1(1) and (3) of the [Auckland Council Regional Policy Statement](#) identify areas where quarries would:



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- have significant adverse effects on:
  - natural and cultural values
  - the character of coastal wetland lakes and rivers
  - elite land
- or would exacerbate the effects of natural hazards.

These policies highlight the planning of remedial measures and long-term management of sites help to avoid, remedy, and mitigate the adverse effects of quarrying and gravel extraction.

Chapter 14 Disturbance, Deposition and Extraction of the [Bay of Plenty Regional Council's Regional Coastal Plan](#) provides for sand, shell, shingle and/or mineral extraction within the coastal marine area but only in appropriate locations while avoiding, remedying or mitigating any associated adverse environmental effects. Policies 14.2.3(h)--(j) allow for a precautionary approach to sand extraction in the coastal marine area. The policies recognise extraction activities as generally inappropriate in the Habitat Preservation Zone and encourage future extraction to occur in less sensitive areas, such as inactive beach.

Objective 18.3.1 and Policy 18.4.1 of the [Whangarei District Plan](#) identify the need to avoid, remedy or mitigate to the extent practical, the adverse effects of mineral extraction including noise, dust and air emissions, natural hazards, land subsidence, erosion and sedimentation, traffic, visual impact and hazardous substance storage. The intention is to manage the impact of quarrying on receiving environments vulnerable to such effects. The policy notes that conflicts with other land uses can be minimised by managing the effects of mineral extraction (for example, setting standards for noise and dust). Policy 18.4.3 also addresses the rehabilitation of sites used for mineral exploration and extraction. Rehabilitation of a site following exploration and mining activity helps to minimise potential adverse effects upon the environment (including ongoing visual effects) and to make the land available for other uses.

Objective 1 of the [Hurunui District Plan](#) addresses the use of non-renewable resources by maintaining those physical and biological characteristics of the soils of the district that enable them to retain their life-supporting capacity and to sustain plant growth. Policy 1.7 provides for the extraction of land resources in a manner that avoids or mitigates any adverse environmental effects.

## Management methods

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### Methods relating to particular effects

The following table outlines the issues/effects associated with quarrying and gravel extraction and a number of methods that can be used to avoid, remedy or mitigate them.

Methods relate to the control of the effects of quarrying and gravel extraction operations both on and off site. The choice of appropriate method/s will vary depending on circumstances, and include those listed in assessing and providing appropriate access to aggregate resources.

<b>ISSUE / EFFECT AND METHODS TO MANAGE</b>	<b>METHODS AND EXAMPLES TO ADDRESS EFFECTS</b>	<b>REVERSE SENSITIVITY METHODS AND EXAMPLES</b>
Noise	General noise emission standards Noise standards associated with particular types of activities Standards associated with buffer zones Timing restrictions on operations Quarry management plans Use of noise barriers such as earth bunds or acoustic fences Equipment type and insulation	Acoustic insulation of residential dwellings near noise-generating activities No complaints covenants Setback requirements  Restrictions on land use, and building design construction standards



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Vibration	General vibration standards Timing restrictions on operations Quarry management plans	Applying lower vibration limits to vibration-sensitive receiving structures in adjacent areas No complaints covenants Setback requirements
Dust and air quality effects	Performance standards for particulate matter Assessment criteria to determine dust effects Permitted activity rule with management methods Best practicable option Quarry management plan	Land-use controls to avoid reverse sensitivity effects from dust
Earthworks, stockpiling and overburden	Quarry management plan (which often includes an earthworks management plan) Assigning council responsibility  Screening and landscaping	
Traffic	General traffic movement	Identification of heavy traffic
	standards Quarry management plan (which often includes a traffic management plan)	routes from quarries Acoustic insulation of new residential dwellings located along high noise routes
Water quality and use	Guidelines Activity performance standards Quarry management plan	



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<p>Extraction from river beds and the coastal marine area</p>	<p>Integrated gravel extraction studies and reports Policies on extraction in fluvial areas or coastal environment Linking extraction with flood management and beach nourishment Activity performance standards Assessment criteria Resource consent conditions and duration Guidelines</p> <p>Seasonal limits on activity eg avoid fish spawning</p>	
<p>Vegetation removal and ecological effects</p>	<p>Activity performance standards Offsetting Quarry and landscape management plan</p>	
<p>Visual effects</p>	<p>General bulk and location standards Quarry management plan Progressive restoration and rehabilitation Use of visual barriers such as earth bunds or solid fences</p>	
<p>Cultural and historic heritage values</p>	<p>Policies relating to archaeological and wāhi tapu sites Consultation policies and agreements Cultural impact assessments and cultural value reports Quarry management plan</p> <p>Avoid specific sites, e.g. mihi maunga</p>	
<p>Rehabilitation</p>	<p>Quarry management plan Rehabilitation plan Bonds</p>	

**Resource consents**

Quarrying and gravel extraction proposals generally trigger the need for resource consents from both regional councils and territorial authorities. It is good practice for



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councils to work together as appropriate to consider the effects of a proposal in an integrated manner. This approach can be established through pre-application meetings with the relevant councils and then subsequent joint application meeting(s), joint hearings (when notified) and the circulation of draft conditions to relevant parties. Councils can also determine not to proceed to notify or hold a hearing of an application under s91 of the RMA if they consider on reasonable grounds that other resource consents are required and need to be made before proceeding, for the purpose of better understanding the nature of the proposal.

When assessing the effects of a quarry or gravel extraction application it is often necessary to seek specialised information on the measurement and quantification of effects. When this is the case, useful guidance may be contained in other plan topic guidance notes.

Refer to [resource consent steps](#) for more information on the resource consent process and examples of resource consent conditions relating to quarrying and gravel extraction, a number of which have been developed to address specific effects from the above table.

### Noise issues and effects

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Noise is often generated by quarrying and gravel extraction through blasting, hydraulic rock breaking, crushing and vehicle movements. This noise has the potential to affect the amenity of surrounding areas. Noise is one of the primary issues leading to reverse sensitivity pressures, where quarries are vulnerable to complaints from nearby residents which may lead to constraints on quarrying activities such as reduced operating hours and blasting event times.

The effects from noise can be managed at either the source or where noise is received. Section 16 of the RMA places a general duty to avoid unreasonable noise, and requires all noise generators to adopt the best practicable option to ensure reasonable levels are not exceeded. This is in addition to the duty to comply with any noise standards in a district plan.

Even when adopting these practices, it may not be possible for quarries to comply with the permitted activity standards for noise. To determine appropriate noise standards for quarrying or gravel extraction activities it may be necessary for specialist acoustic reports to be commissioned that identify (potential) adverse effects on neighbouring properties and the surrounding environment.

### Methods to manage noise

Methods to manage other noise-generating activities could also be used in relation to the quarry industry: for example, those relating to traffic noise. Refer to the [noise management in mixed-use urban environments](#) guidance note for more information.

The examples provided below do not use the recently issued [New Zealand Standard for Environmental Noise \(NZ6802:2008\)](#) which provides guidelines on appropriate noise levels for environmental noise. The standard introduces a new standard for measuring

noise effects, notably introducing dBLAeq(15) and dBALeq (max) measures which are more stringent than the previous dBA(L10) measure.

### **General noise emission standards**

These may be imposed as an activity performance standard in a district plan zone or as a condition of consent. Noise standards apply to the site from which the noise is being emitted, but are measured at or beyond the boundary of the site, or at the notional boundary of neighbouring dwellings or other noise-sensitive activities. Generally, applying the noise standard at the notional boundary will be the most practical option for monitoring purposes as measuring from neighbouring dwellings will require the consent of third parties, which can cause an issue.

For example, rule 2.4.23 of the [Waipa District Plan](#) specifies that all activities within the rural zone shall be conducted so that the noise at the notional boundary of any dwelling does not exceed 50dBA(L10) between the hours of 7am and 8pm and 40dBA(L10) between 8pm to 7am. Mineral extraction activities are given a higher performance standard for noise in the plan during the day of 55dBA(L10). In addition to the general noise standard, the plan states that no single noise level shall exceed 65dBA at night.

The [Quarry Zone of the Auckland Council District Plan-Operative Papakura Section](#) (Section 3 Part 6 rule 6.13.8.1.1(e)) specifies the maximum permitted noise level in L10 as measured at or within 30 metres from any dwelling. However, rules like these can be difficult to monitor on an ongoing basis as they require the consent of third parties and are generally activated in response to a complaint.

### **Noise standards associated with particular types of activities**

These also apply to the site from which the noise is being emitted, but relate to a particular activity such as blasting or traffic movements. The noise levels are also measured at or beyond the boundary of the site, or at the notional boundary of neighbouring dwellings or other noise-sensitive activities.

For example, within the [Aggregate Extraction Zone of the Auckland Council District Plan – Operative Franklin Section](#) rule 35.5.8(ii) requires that the noise created by the use of explosives measured at a notional boundary of 20 metres from occupied dwellings shall not exceed a peak overall sound pressure of 128dB. However, controls like these can be difficult to cost-effectively monitor on an ongoing basis, with remedial action largely arising as a response to complaints.

### **Standards associated with buffer zones**

This approach uses buffer zones to set different noise standards around a quarry site. This is a useful approach to take into account background noise levels and the sensitivity of the receiving environment to noise emissions.

For example, within the [Mineral Extraction Zone of the Whangarei District Plan](#) (chapter 64) the permitted activity standards for operating noise differ between low noise areas and high noise areas, as measured at the notional boundary of any residential unit not

owned or controlled by the quarry owner. The noise areas are determined by the background sound levels.

[The Pokeno Structure Plan and Zoning Provisions](#) to the Waikato District Plan – Franklin Section also identifies a high background noise area (Map 107) along a major traffic route where the permitted noise level is higher (rule 27A.6.1).

### **Timing restrictions on operations**

Timing restrictions may be imposed on typical quarry operations such as blasting, vehicle movements and crushing as a condition of consent, and are reasonably easy to monitor. Although time restrictions may be appropriate in many circumstances, it is important to consider the impact this may have on the quarry operation. Often, it will be appropriate to set different time restrictions for quarry operations based on the particular activity and the noise it generates. For example, the timing restrictions on traffic movements may need to be different than restrictions on blasting times.

An example of different time restrictions for quarry activities is within the [Aggregate Extraction Zone of the Auckland Council District Plan Franklin Section](#). Rule 35.5.8(iii) states all blasting is restricted to between 10:00 and 16:00 hours, Monday to Saturday, except where blasting is necessary for safety reasons. The performance standard for other noise from quarry activities (55dBA at a notional boundary of 20 metres from the site) has a more flexible period of 0700 to 2200, Monday to Saturday. At all other times and on public holidays the noise standard is lower (40dBa).

### **Quarry management plans – noise**

A quarry management plan (QMP) may outline the number of times per calendar year the quarry may exceed the normal permitted hours of operation, the timing and noise levels of events that occur on the site, and detailed management procedures to help the quarry operator and neighbours deal with excessive noise.

For example, within the [Quarry Zone of the Auckland Council District Plan - Operative Papakura Section](#) (Section 3 Part 6 rule 6.13.8.1(1)(d) and (dd)), the operators and owners of each quarry are required to provide a QMP to the council. The quarry management plan submitted to the council must include a description of methods to be employed to comply with the noise and vibration provisions of the district plan.

Winstone Aggregates' [Hunua Quarry Management Plan](#) provides an example of a QMP to ensure operations and environmental risks are managed appropriately and within conditions of consent.

The [Waingaro Road Quarry – Operational Compliance Plan](#) prepared by Perry Resources provides an example of a QMP for a hard rock quarry to ensure operations and environmental risks are managed appropriately and within conditions of consent. It details the site operations, projects and monitoring and contains procedures to manage noise effects from the site, such as fitting machinery with silencing equipment, limiting the hours of operation and notifying neighbours in advance of blasting events.



### **Use of noise barriers such as earth bunds or solid fences**

The use of noise barriers can be applied as a condition of consent or as a standard in a particular zone within a district plan. The effectiveness of noise barriers will depend on what they are constructed of, how they are constructed, and the nature of the noise generated.

The use of natural noise barriers such as earth bunds to reduce noise levels beyond the site can sometimes be better determined and controlled by the quarry operator. In these instances, the council can condition a certain level of noise and allow barriers of a certain height to be constructed on site. These conditions leave meeting the condition and determining the best location for barriers to the operator. This approach is useful as stockpiles and overburden can be used to construct earth bunds to reduce noise levels beyond the site, which is a cost-effective method of construction. This approach also allows earth bunds to be constructed or moved in response to the orientation of the working face of the quarry.

For example, Fulton Hogan have retained an existing hill on the side of their Wairoa quarry to provide a natural visual and noise barrier to the surrounding rural-residential area.

The other option to using stockpiles and overburden from the site is to construct earth bunds or artificial barriers (such as high-walled fences). These can be easier to monitor but can cause other adverse effects, such as visual effects, and may be more costly to construct and maintain.

### **Equipment type and insulation**

There have been, and will continue to be, changes in technology that allow quarry operators to greatly reduce the level of noise emitted from the site. For example, fitting machinery with effective mufflers to lower noise emissions. Industry can be encouraged to use such technology to mitigate effects.

### **Acoustic insulation of residential dwellings near noise-generating activities**

This approach can be used to protect existing quarry operations by requiring new sensitive activities to mitigate the effects from noise. This could be applied either as a consent condition or a standard in a plan where the new residential activities are proposed to be established near an active quarry zone.

For example, the [Hastings District Plan](#) requires residential buildings within any industrial or commercial zone to be acoustically insulated to mitigate the potential noise effects of high background noise levels (rule 14.2.9.4). This could similarly be applied to areas near established quarries.

Rule [18.5.3\(h\) of the Operative Western Bay District Plan](#) identifies that in regard to the front yards adjoining Old Coach Road (between the entrance to Cameron's Quarry and State Highway 2) councils should have regard to whether any potential for conflict between activities and the use of the road for heavy vehicles can be avoided through the

design and construction of buildings to restrict noise levels within any habitable room to a reasonable level.

The [Waikato District Plan – Franklin Section](#) identifies a high background noise area (Map 107) along a major traffic route where the permitted noise level is higher. To avoid reverse sensitivity pressures and adverse effects on residential activity, all new residential dwellings must be designed and constructed so that noise levels at night in bedrooms do not exceed 35dBA<sub>Leq</sub> (1hour) (rule 27A.6.1 and rule 29.5.13). These rules require an acoustic report to be provided by an applicant to demonstrate the ability to comply with the standard.

Acoustic insulation can be a condition of a resource consent application or otherwise achieved through a side agreement. Refer to [resource consent conditions](#).

### **No complaints covenants – noise**

See the discussion on no complaint covenants in Assessing and providing appropriate access to aggregate resources.

### **Setback requirements – noise**

Noise effects can also be effectively managed through land-use planning that separates noise-generating and noise-sensitive activities.

This could be applied as a standard relating to particular zones in close proximity to aggregate extraction areas. For example, in the [Waikato District Plan](#) (chapter 27.51), the construction of a dwelling is permitted if it is located at least 200 metres from the boundary of an Aggregate Extraction Policy Area containing a sand resource, and 500 metres from the boundary of an Aggregate Extraction Policy Area containing a rock resource.

Separation by distance could also be included as a general rule requiring minimum setback requirements from established quarries to mitigate the effects from noise. For example, rule 2.4.6(g) of the [Waipa District Plan](#) requires that new dwellings should not be constructed closer than 500 metres to a site used for mineral extraction or where consent has been granted for mineral extraction.

If setback requirements are included in plans, it is important there is flexibility for these to be reduced where good on-site acoustic attenuation is proposed to be installed. In these situations, it may be appropriate to reduce the setback distances if compliance with indoor noise standards can be demonstrated.

### **Vibration issues and effects**

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There is often a significant amount of vibration generated by standard quarry operations, notably from vehicle movements, blasting and operational machinery. These have the potential to affect the amenity of nearby residents and may result in damage to property. However, there is significant variation in the need to undertake activities that may cause



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vibration such as blasting. For example, aggregates can be excavated from sand and gravel quarries by digging the relatively loose material, but material from hard rock quarries often requires blasting to loosen the rock so it can be excavated. The effects from vibration will therefore vary with the type and scale of quarry.

As vibration is a potential adverse effect of quarrying, information should be provided to those likely to be affected, regarding blasting methods, controls and practices used by quarry operators to ensure safety. Quarry operators can generally control the effects of vibration from blasting through efficient practices. It is also in the industry's best interest to undertake limited and targeted blasting due to the cost of explosives and the need to satisfy industry health and safety requirements.

The effects from vibration can be controlled either at the source or where the effects are received. Section 17 of the RMA places a general duty to avoid, remedy or mitigate any adverse effect of the environment from an activity, which includes vibration effects from quarries. This is additional to the duty to comply with the vibration standards included in a plan.

### **Methods to manage vibration**

Methods to manage vibration should take into account the specific type of quarry, industry practices to mitigate the vibration effects from blasting and New Zealand standards for vibration. It may also be useful to set up a protocol with the quarry operator and nearby properties to ensure the timing and nature of blasting events provides least disturbance to residents while also being workable for the industry. This may include providing advice to nearby property occupants in advance of when blasting will take place (eg, via a letterbox drop). Any conditions to limit traffic movements to reduce vibration should also consider the operational requirements of the quarries. The identification of preferred traffic routes (to and from if applicable) may also be used to mitigate noise effects.

### **General vibration standards**

These apply to the site from where the vibration is being emitted but should be based on the actual effect measured at, or beyond, the boundary of the site, or at the notional boundary of neighbouring dwellings. Plans and resource consent conditions should also be specific about how the level of vibration will be measured.

For example, within the [Aggregate Extraction Zone of the Franklin District Plan](#) (rule 35.5.8), the plan specifies the measurement of blast noise and ground vibration from blasting is to be carried out in accordance with Appendix J of Part 2 of Australian Standard AS 2187.2:1993. The plan also states noise created by the use of explosives measured at a notional boundary of 20 metres from occupied dwellings shall not exceed a peak overall sound pressure of 128dB. However, standards such as these can be difficult to monitor on an ongoing basis and are generally activated in response to a complaint.

### **Timing restrictions on operations – vibrations**

Timing restrictions on vibration-generating activities such as blasting and traffic movements may be imposed as a condition of consent and are reasonably easy to monitor. For example, within the [Aggregate Extraction Zone of the Franklin District Plan](#) (rule 35.5.8(iii)), all blasting is restricted to between 1000 and 1600 hours, Monday to Saturday, except where blasting is necessary because of safety reasons. The [Wellington City District Plan](#) (rule 7.1.3.3.2) restricts blasting in the Kiwipoint quarry from quarry faces for crushed rock production to only take place between 10am and 2pm, Monday to Friday.

It is important the timing restrictions seek to avoid and appropriately mitigate the effects of vibration on sensitive activities but are also not too restrictive on industry. It may be appropriate, for example, to specify the maximum number of blasts per week rather than per day, albeit times when blasting can occur may also need to be specified. Determining the appropriate timing restrictions to mitigate the adverse effects from vibration may therefore benefit from a formalised agreement between the quarry operator and nearby residents during the consent determination process, but also following complaints while the quarry is operational.

### **Quarry management plans – vibrations**

Quarry management plans (QMPs) can be used to specify a range of controls relevant to vibration, such as the number of blasting events per month, the timing and noise levels of blasting events, and detailed management procedures to help the applicant and neighbours to deal with vibration effects.

For example, within the [Quarry Zone of the Auckland Council District Plan – Operative Papakura Section](#) (Section 3 Part 6 6.13.8.1(d) and (dd)), the operators and owners of each quarry are required to provide a QMP to the council for its retention. The QMP must include a description of methods to be employed to comply with the noise and vibration provisions of the district plan.

QMPs can also detail how and when neighbours will be advised of blasting and the procedures to monitor and measure the vibration from blasting. For example, the [Waingaro Road Quarry – Operational Compliance Plan](#) prepared by Perry Resources is a QMP for a hard rock quarry to ensure operations and environmental risks are managed appropriately and within conditions of consent. It details the site operations, projects and monitoring and contains procedures for contacting neighbours before blasting events.

The [Three Kings Quarry – Quarry Management Plan](#) was prepared by Winstone Aggregates in consultation with Auckland City Council and the local community. The plan outlines the site operations, methods to manage a range of environmental effects and the objectives for rehabilitation and end use. The QMP contains an objective to mitigate adverse effects from blasting on the surrounding area with related blasting performance standards. The objective is supported by implementation measures which include time restrictions, a warning siren, signage, monitoring and blast design considerations.



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QMPs provide a useful tool for consulting with neighbours and can provide a useful point of contact. QMPs also have the benefit of being monitored reasonably easily, can be tailored to specific circumstances, and have the potential to be self-monitored by the consent holder in accordance with a consent condition.

### **Applying lower vibration limits to vibration-sensitive receiving structures in adjacent areas**

This involves setting a maximum vibration limit on quarrying activities measured at, or within, the boundary of any adjacent areas or structures. For example, the [Mineral Extraction Zone of the Whangarei District Plan](#) (rule 64.3.3 – Appendix 10) specifies the short-term vibration limits from any activity, as measured on any foundation or uppermost full storey of any building on any other site. The limits are as set out in Table 1 of DIN 4150:1986 Part 3, Structural Vibration in Buildings, and the district plan includes environmental performance criteria in accordance with this standard. The criteria vary depending on the use of the particular structure and the vibration frequency (Appendix 10, Table A10.4).

### **No complaints covenants – vibrations**

See the discussion on no complaint covenants in Assessing and providing appropriate access to aggregate resources.

### **Setback requirements – vibration**

This could be applied as a standard in a particular zone located in close proximity to an established quarry. For example, in the [Country Living Zone of the Proposed Waikato District Plan](#) (item 27.51), the construction of a dwelling is permitted if it is located at least 200 metres from the boundary of an Aggregate Extraction Policy Area containing a sand resource, and 500 metres from the boundary of an Aggregate Extraction Policy Area containing a rock resource. This approach could be used to reduce a range of potential reverse sensitivity effects that often arise as a result of the proximity of dwellings to quarries, such as visual effects and vibration effects.

Setback requirements could also be included as a general rule requiring minimum setback requirements from established quarries. For example, rule 2.4.6(g) of the [Waipa District Plan](#) requires that new dwellings should not be constructed closer than 500 metres to a site used for mineral extraction or where a consent has been granted for mineral extraction.

## **Dust and air quality issues and effects**

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Quarries have the potential to create dust through on-site and off-site activities such as the blasting of rock, the crushing and screening of aggregate and machinery movement around the site, and to and from the site. This dust has the potential to cause adverse effects on neighbouring properties, such as the soiling of clean surfaces and outdoor living areas, roofs providing tank water, reduced visual quality and can also cause respiratory problems.



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The nuisance effects from dust and impacts on amenity can be difficult to assess and can sometimes be subjective. Whether the effects from dust are offensive and objectionable will be dependent on the nature of the source, the sensitivity of the receiving environment, the weather and on individual perceptions. Case law has determined that the judgment of whether something is offensive or objectionable has to be linked to whether it is of such an extent that it is likely to have an adverse effect on the environment.

### Methods to manage dust and air quality effects

The management approach for dust and air quality effects should be based on environmental standards at the boundary of the site and include effective mitigation measures implemented on site. Quarry operators can implement a number of procedural measures (eg, water spraying of stockpiles) and structural measures (eg, vegetation bunds) to mitigate the effects of dust beyond the boundary of the site.

The adverse effects from dust can be exacerbated by the sensitivity of the receiving environment. Land-use planning therefore plays an important role in helping to manage the adverse effects from dust, by controlling the location of quarries and activities sensitive to dust.

Some local authorities have taken the approach to equate the production volume or output from the quarry with the scale and significance of the dust effects. This can be problematic as there is not necessarily a direct relationship between output and effects. Rather, the effects will be determined by the nature of the operations, the effectiveness of mitigation measures employed and the sensitivity of the surrounding environment.

### Performance standards for particulate matter

This approach involves specifying environmental guidelines in plans in relation to dust that can be used as permitted activity standards or as a guide for consent applications. For example, policy 69 of the [Hawke's Bay Regional Resource Management Plan](#) provides environmental guidelines for activities that have the potential for adverse effects on air quality. These guidelines state that any dust deposition beyond the boundary of the site shall not be more than 4 grams per square metre over 30 days, and that there should be no objectionable deposition of particulate matter beyond the subject property.

The [Waikato Regional Plan](#) (section 6.4.2) provides guideline values for activities that are of a scale or nature to discharge significant levels of particulate matter. The guidelines state the particulate deposition rate beyond the boundary of the subject property should not exceed 4g/m<sup>2</sup> over 30 days and the particulate deposition rate beyond the boundary of the subject property should not exceed 130mg/m<sup>2</sup> averaged over 24 hours. The plan also outlines the preferred methods for measuring the discharge of particulate matter at source, namely isokinetic methods such as the USEPA method 5 or equivalent.

Performance standards for permitted activities are a useful method to provide guidance on acceptable environmental limits and avoid the need for resource consent when quarries can meet the standards. This approach involves developing permitted activity standards with which quarries must comply, including the use of appropriate



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management methods. For example, the [Waikato Regional Plan](#) contains a permitted activity rule for the discharge of contaminants into air from mineral extraction, screening and storage, providing it meets a number of conditions (rule 6.1.16.1). One of the conditions relates to the use of water sprays to suppress dust from crushing and screening plants, stockpiles, load out areas and access roads.

See the [general methods – activity performance standards](#) section for more information.

### **Assessment criteria to determine dust effects**

This method involves developing assessment criteria in plans which can be used to determine the adverse effects from dust generation and whether the discharge is objectionable or offensive. For example, section 6.4.2.2 of the [Waikato Regional Plan](#) provides guidelines for assessing the effects of particulate matter. The Waikato Regional Council will take these into account to determine whether the discharge is objectionable to the extent that it has caused or is causing an adverse effect. The criteria include the frequency, intensity, duration, nature and location of the particulate matter discharge and any previous validated complaints relating to the same site. The guidelines also outlines the approach that the Waikato Regional Council will take when receiving complaints regarding particulate matter discharges from permitted activities and consented activities.

Policy AQL6 of Chapter 3 of the Proposed [Canterbury Natural Resource Regional Plan](#) states that any discharge of dust shall not cause an objectionable or offensive dispersal or deposition of particles beyond the boundary of the site. The proposed plan also provides assessment criteria to determine whether the discharge of dust will cause or is causing an objectionable or offensive effect. These criteria are to be used for the purposes of assessing compliance with permitted activity standards, permitted activity conditions, and whether to take enforcement action under the RMA.

The Auckland Council has produced a draft technical publication 152 '[Assessing Discharge of Contaminants into Air](#)'. Section 3.3 of the publication provides guidance on dust effects and how they are assessed. The publication explains the modelling of dust discharge is generally not suitable for large sources such as quarries and that, rather than spend considerable time and effort predicting off-site effects, the preference is for appropriate dust control measures in line with the best practicable option and best practice technologies.

The Ministry for the Environment has produced a [Good Practice Guide for Assessing Discharges to Air from Industry](#) that provides general information on how to assess the effects of air discharges from industry on air quality.

### **Permitted activity rule with management methods**

This approach involves developing permitted activity standards that quarries must comply with to be permitted, including the use of appropriate management methods. For example, the [Waikato Regional Plan](#) contains a permitted activity rule for the discharge of contaminants into air from mineral extraction, screening and storage, providing it meets a number of conditions (rule 6.1.16.1). One of the conditions relates to the use of water

sprays to suppress dust from crushing and screening plants, stockpiles, load out areas and access roads.

### **Best practicable option – dust**

As it is often not possible to avoid all the adverse effects from quarries, it is useful to adopt the best practicable option to mitigate effects. This can be useful to ensure the costs of a particular management option and any uncertainty about its effectiveness are taken into account when determining the best method to use. Refer to the discussion on [best practicable option](#) for more information on how this applies to quarries.

For example, rule 6.1.16.1 of the [Waikato Regional Plan](#) includes requirements that constitute the best practicable option for extraction, size reduction, screening and storage of minerals. The rule is supported by policy 6.1.3.4, which promotes using the best practicable option approach under appropriate circumstances. The circumstances extend to when numeric guidelines or standards are not available, where there is uncertainty over existing air quality, and the costs and benefits adopting the best practicable option are small in comparison to investigating the effects on air quality. The plan includes thorough explanation and principal reasons to support this policy.

### **Land-use controls to avoid reverse sensitivity effects from dust**

The effects of dust are to a large extent determined by the sensitivity of the surrounding environment. Land-use planning that aims to separate dust-emitting activities from dustsensitive activities can therefore be an effective method to manage the adverse effects from dust and conflict between incompatible activities.

For example, the [Wellington Regional Policy Statement](#) identifies district plans as the most appropriate regulatory tool to manage reverse sensitivity effects associated with dust through the separation of dust-emitting activities and sensitive activities. Policy 1 of the proposed regional policy statement states that district plans shall discourage sensitive activities locating near dust-emitting activities, and vice versa. Quarries, vegetation disturbance and earthworks are all identified as dust-emitting activities in the statement.

Chapter 4 (Air Quality) of the [Auckland Council Regional Plan: Air, Land and Water](#) recognises the adverse effects on air quality can be exacerbated by land use and that population growth in the region is intensifying pressure on competing and incompatible land uses. The regional plan identifies Air Quality Management Areas to help address this issue, and notes that integrated management between the regional and district councils is necessary to ensure the effects from competing and incompatible land uses is adequately considered in the decision-making process.

The [Proposed Canterbury Natural Resource Regional Plan](#) identifies that land-use planning has an important role in avoiding dust nuisance. Method AQL(6) of chapter 3 on Air Quality states that territorial authorities should provide for appropriate dust-emitting activities and make provision to protect established dust-emitting activities from encroachment by sensitive activities.

## Quarry management plans – dust

Quarry operators can implement a number of operational measures (eg, water spraying of stockpiles) and structural measures (eg, vegetation bunds) to mitigate the effects of dust beyond the boundary of the site. These measures are generally best outlined and implemented through a site-specific quarry management plan (QMP).

The [Three Kings Quarry – Quarry Management Plan](#) is a QMP prepared by Winstone Aggregates in consultation with Auckland Council and the local community. It outlines the site operations, methods to manage a range of environmental effects and the objectives for rehabilitation and end use. The QMP contains an objective to mitigate adverse effects from dust beyond the boundary of the site with related performance standards. The objective is supported by implementation measures such as vegetated earth bunds, sprinkler system, vehicle speed limits, wheel washing, and cleaning and maintenance of roads.

Also see the general methods section on quarry management plans for guidance on how these plans can be used to address a wide range of environmental effects through plans and resource consent conditions.

For more general information on approaches to manage the effects of dust on air quality and the Ministry for the Environment's [Good Practice Guide for Assessing and Managing the Effects of Dust Emissions](#).

## Issues and effects of earthworks, stockpiling and overburden

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Quarries, by their very nature, generally involve earthworks of significant scale through the extraction of rock from land-based resources, gravel from river beds and sand from the coastal marine area. Although a large amount of aggregate is removed from the quarry for use elsewhere, there is also a large amount of material that typically will remain on site. The by-product from quarrying not used for aggregate is generally referred to as 'overburden' ie, the material overlying a rock formation that cannot be used for aggregate.

It is in the quarry operator's interest to keep the amount of overburden to a minimum to maximise the commercial efficiency of the quarry. This overburden can be used effectively to create earth bunds to mitigate other effects such as noise and visual impacts and also to rehabilitate the site. Quarry efficiency and the desire to avoid the unnecessary truck movements from the site mean that overburden may need to be placed on the quarry site or in close proximity. Thus, quarry operators may, as part of their applications, be seeking to create new land forms, normally through the filling of valleys but also through creating mounds or hills. Overburden can normally be considered and handled as a 'cleanfill' material.

Stockpiles of the aggregate or sand material produced by the quarry will generally be stored on the site for a short time before being removed by truck. Where a quarry crushes the rock, aggregate of various grades may result and stockpiles for each grade being produced. These stockpiles may be replenished as the material is sold and trucked

from the site with the result that aggregate stockpiling becomes an ongoing activity on the site.

The [National Environmental Standards \(NES\) for Managing Contaminants in Soil](#) set standards for identifying and assessing contaminants in soil that may have an effect on human health. As earthworks are one of the triggers for consent requirements in the NES, it is likely that quarries may require consent under this legislation. The exact implications of this legislation will depend on a range of factors, including the previous use of the site, proximity to sensitive land-use and what the end use of the quarry is likely to be.

### **Methods to manage earthworks, stockpiling and overburden**

Most councils have general policies on earthworks and/or cleanfill and there can be a degree of overlap in the requirements of regional councils and territorial authorities. Regional councils generally have provisions to manage the impact of earthworks on erosion and water quality. Territorial authorities are generally more concerned with the disturbance of land and the deposition of materials. It is helpful if the effects from earthworks are considered by councils in an integrated manner without unnecessary duplication.

In addition to general earthwork provisions, some plans recognise that earthworks, stockpiling and overburden are activities closely associated with quarrying, and manage these collectively. This is a useful approach as stockpiling is standard practice and overburden can often be used effectively on site to mitigate adverse effects such as noise. Overburden can also contribute to the rehabilitation of the site. The management of stockpiling and overburden can often be managed effectively through a site quarry management plan that details the operations on the site, including the deposition of material. This approach allows operators to adapt over the life of the quarry in response to any concerns. Councils must take care that any adjustment/changes to the location or placement of overburden or stockpiles do not extend beyond the scope of the original consent. Where overburden is proposed to be permanently placed on site then councils should seek for those areas to be rehabilitated in a phased manner so as to minimise visual, dust and sedimentation effects.

Issues to consider in the management of overburden deposits and stockpiles include location within the site, visual effects, dust, silt and sediment control, erosion, stormwater, site stability and geotechnical issues including groundwater infiltration and drainage through and around 'cleanfilled' areas and any rehabilitation activities such as ground contour and landscaping.

For further information on managing earthworks refer to the [Earthworks](#) guidance note and [A Guide to the Management of Cleanfills](#), Ministry for the Environment, 2002.

### **Quarry management plans – earthworks, stockpiling and overburden**

Quarry management plans (QMPs) may include detailed operational procedures to help manage earthworks, stockpiling and overburden throughout the life of the quarry.



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For example, within the [Quarry Zone of the Auckland Council District Plan – Operative Papakura Section](#) (Section 3 Part 6 rule 6.13.8.1(1)(d) and (dd)), the operators and owners of each quarry are required to provide a QMP to the council. The QMP must show and explain provisions for the disposal and/or stockpiling of overburden, waste and quarried material, including the area to be used for stockpiling.

### **Assigning council responsibility**

Assigning a particular council with sole responsibility for earthworks controls may be done for the entire district or region, or for a particular zone within a plan. For example, the [Whangarei District Plan](#) contains limited rules relating to earthworks, as it was agreed that the Northland Regional Council should be the primary agency assessing the effects

of earthworks in the district and wider region. This avoids duplication of responsibilities between councils in respect of earthworks.

### **Traffic issues and effects**

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A core activity associated with quarries is the transportation of aggregate from the (quarry) site to the location of demand. The transport of aggregate requires heavy haulage, and quarries have the potential to significantly increase heavy traffic movements around the site and the key transport corridors providing access to the site. There is the potential for these heavy trucks to damage the roads. Managing traffic from quarries therefore requires consideration of the effects of traffic on the surrounding area and the roading network.

Effects of quarry traffic include dust, vibration, congestion, safety and noise, and these are mainly determined by the sensitivity of the surrounding environment. For example, noise from vehicles associated with quarry operations may be accentuated if located in, or adjacent to, rural areas where the background noise levels are generally low. Vehicle noise is also an issue in urban areas where increased traffic congestion makes it increasingly necessary for quarry transport to take place outside of peak traffic hours when traffic volumes are lower. Background noise levels at night are also lower, accentuating potential noise issues associated with the distribution of quarry resources.

Because there are adverse effects associated with aggregate transport, it can be useful for provision to be made for heavy haulage along key transport routes. This approach should be discussed with the regional council, adjacent councils and NZTA.

Some councils require a roading contribution to offset the damage on the road network. This is a complex issue as councils need to determine the likely road damage associated with the quarry and to what extent roading maintenance should be funded through general rates or targeted contributions. .

### **Methods to manage traffic**

Many of the adverse effects from quarry traffic can be managed through on-site management practices, such as regular maintenance of trucks and wheel washes to



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reduce tracking of mud onto local roads. Traffic movements and the days and hours of transportation in and out of quarry sites can also be limited and/or controlled to reduce effects such as noise and vibration when this may cause greatest disturbance (ie, at night). Any constraints imposed should be clearly necessary to reduce adverse effects on surrounding properties and the wider environment, and take into consideration the quarry's operation.

Also refer to the [Managing Land Transport Noise under the RMA](#) guidance note for specific information on managing the effects of noise from traffic.

### **General traffic movement standards**

These may be imposed as a permitted activity standard or as a condition of consent to provide a maximum permitted number of traffic movements associated with a quarry.

For example, within the [Mineral Extraction Area of the Whangarei District Plan](#) (rule 64.3.4), mineral extraction is a permitted activity if it does not cause the total traffic generation from the site to be more than a specified number of traffic movements within any 24-hour period. The number of traffic movements is dependent on whether the activity connects to a public road with a sealed carriageway and whether all vehicle manoeuvring can be undertaken on site.

When imposing limits on traffic movements or operating hours, it is important these are not too restrictive or inflexible for the quarry operator. For example, it may be more appropriate to limit the number of traffic movements per week rather than per day.

### **Quarry management plans – traffic**

Quarry management plans (QMPs) may include detailed management procedures to help the applicant and neighbours to deal with traffic-related effects. QMPs can be used to specify on-site management practices to address a number of other potential effects, such as wheel washing and vehicle maintenance practices.

For example, within the [Quarry Zone of the Auckland Council District Plan – Operative Papakura Section](#) (Section 3 Part 6 rule 6.13.8.1(1)(d) and (dd)), the operators and owners of each quarry are required to provide a QMP to the council. The QMP must include an indication of the route by which quarried material is to be removed from the site, as well as a description of methods to be used to avoid, remedy or mitigate any adverse effects of quarrying operations on identified significant places and areas.

The [Three Kings Quarry – Quarry Management Plan](#) prepared by Winstone Aggregates in consultation with Auckland City Council and the local community outlines the site operations, methods to manage a range of environmental effects and the objectives for rehabilitation and end use. The QMP contains an objective to mitigate adverse effects from traffic on the environment, as practicable. The objective is supported by implementation measures which include time restrictions, vehicle maintenance, wheel washing, a warning siren and vehicle entrances design.

## Identification of heavy traffic routes

Suitable heavy traffic routes may be identified through regional policy statements and plans to protect existing or future potential quarry sites. The identification, funding and protection of these routes for heavy traffic should ideally be linked to growth strategies and asset management plans.

An example of a plan that identifies the adverse effects on amenity associated with heavy vehicle traffic and the potential for residential activity to affect the efficient operation of roading assets is the [Pokeno Structure Plan and zoning provisions](#) to the Waikato District Plan – Operative Franklin Section. One objective of this plan change is to avoid operational inefficiencies that can arise from locating residential activity in close proximity to the main transport corridor routes. To achieve this objective, the plan change identifies a high background noise area (Map 107) where the permitted noise level is higher and new residential dwellings must be designed and constructed to not exceed 35dBa Leq (1 hour) at night (rule 27A.6.1).

The Auckland Council District Plan – Operative [Waitakere Section](#) identifies high noise routes, which are defined as any strategic arterial road, regional arterial road, or district arterial road as shown on the roading hierarchy map. It contains rules in relation to dwellings constructed adjacent to existing high noise routes, and also future high noise routes (general noise standards chapter). The explanation for policy 10.15 (policy section) notes that there are some areas of the city, particularly around the airbases, where noise levels exceed those compatible with human health. The district plan has adopted a policy that seeks to avoid further urban development in areas near the airbases where a number of high noise routes have been identified, as a precaution against further harm. However, district plan recognises this should be balanced against the possibility that design solutions may offset this effect. This approach could similarly be applied to future potential quarries, to protect the primary traffic routes for the aggregate.

## Acoustic insulation of new residential dwellings located along high noise routes

This approach can be used as a consent condition or be included as a specific standard for zones along heavy haulage or high noise routes. This can effectively protect existing access to significant aggregate resources, where the resource consent or zoning is proposing to establish new residential activities along a primary traffic route.

For example, [the Pokeno Structure Plan and Zoning Provisions](#) to the Franklin District Plan seeks to avoid operational inefficiencies that can arise from locating residential activity in close proximity to the main transport corridor routes. To achieve this objective, the plan change identifies a high background noise area (Map 107) where new residential dwellings must be designed and constructed to not exceed 35DBa Leq (1 hour) at night in bedrooms (rules 27A.6.1 and 29.5.13). These rules require an acoustic report to be provided by the applicant to demonstrate compliance with the standard.

The Auckland Council District Plan – Operative [Waitakere Section](#) is another example of a plan where the habitable rooms of dwellings on sites adjoining identified current and future high noise routes must be constructed to achieve stated performance standards.



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Rule 1.3(b) of the general noise standards chapter states any new dwelling or building containing residential activities on a front site adjoining a future high noise route, shall be a permitted activity, where any habitable rooms of the dwelling or residential activity meet the permitted internal acoustic standards. This approach could similarly be applied to future potential quarries, to protect the primary traffic routes for the aggregate.

### Water quality, use issues and effects

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Gravel extraction, processing and transportation of aggregate involves processes which generate suspended sediment with the potential to be entrained in water and eventually discharged into stormwater, surface water or groundwater. Quarries can also interrupt natural groundwater processes through changes or concentration of areas of recharge.

In addition to the potential effects on water quality, quarries will often use water for cleaning and washing aggregate and to control dust. The actual demand for water varies and many quarries use little or no water as most is used and then returned to groundwater. However, large quarries use significant amounts of water for dust suppression, particularly during drier times of the year.

Entrained sediment can have adverse effects on water quality through an increase in suspended sediment and loss of water clarity, which may impact on aquatic flora and fauna species. This is a particular issue during runoff events, and the effects on water quality can be site specific, on site and off site, short and long term and cumulative.

In addition to sediment, there may be other contaminants on it (eg, diesel tanks and oil from machinery) with the potential to contaminate stormwater run-off.

Avoiding water being contaminated by via storage on quarry sites and sedimentation will require site-specific measures, which could include cut-off drains, sedimentation ponds and/or wetlands, bunding and spill procedures.

### Methods to manage water quality and quantity

The management approach for water quality should be based on the quality of the water at the point of discharge, and the adverse environmental effects beyond the boundary of the site. This allows for the environmental controls, assessment of effects on water quality and appropriate mitigation methods to be based on the values of the receiving water body.

To provide guidance on the environmental objectives for water bodies, it is good practice to have performance standards or environmental guidelines for water quality (eg, suspended sediment levels). The effects from the discharge will vary depending on the existing quality of the water body and the type of water body being discharged into (eg, surface water, groundwater or coastal marine area). The nature and type of water body should be considered when setting the performance standards from discharges into these water bodies, and to also consider the council's objectives and policies and specifically any clear goals or action plans to clean up a waterway.



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When identifying appropriate management methods, it can be useful to adopt the best practicable option (BPO) as it factors in costs and the receiving environment. Determining the BPO is often best done through discussions with industry taking into account site-specific factors associated with the proposal. Refer to the discussion on [best practicable option](#) for further information.

It can also be useful for RMA plans to provide guidance on appropriate methods to mitigate adverse effects on water quality. Plans need to be flexible enough to allow for new management methods to be implemented as technology improves. A good approach to achieve this is by requiring a quarry management plan which contains methods to mitigate effects on water quality, related to site-specific standards. These management plans should specify general methods to reduce sedimentation and more specific methods to reduce and respond to spills from other contaminants on site.

Water is likely to need cleaning before discharging back to any waterway. Some quarries use large quantities of water for dust suppression, which may be an issue where the water resource is limited. It is important water spraying for dust suppression is only undertaken when necessary and not as a standard daily procedure to reduce water contamination effects.

In addition to water quality, the amount of water used by a quarry and its disruption to natural groundwater flow should be considered, particularly in areas where neighbouring uses rely on groundwater (the use of bores). Further assessment may be needed to identify how much a proposed quarry will impact on groundwater. This process may be supported where groundwater management strategies are in place.

### **Guidelines – water quality and quantity**

This approach involves setting environmental guidelines in plans for water quality or setting minimum water flows for particular rivers. For example, the [Hawke's Bay Regional Resource Management Plan](#) has environmental guidelines for surface water quality that include suspended solid levels in different catchment areas within the region. To guide decisions on resource consents, policy 72 of the plan states the activity should no more than double the suspended solids concentration or turbidity of the receiving water body (where the specified concentration is less than the guideline for the particular water body), or should not cause the concentration of suspended solids to increase by more than 10 per cent, as determined on a case-by-case basis (when the suspended solid concentration is equal or higher than the environmental guideline for the water body).

Section 5.5 of the [Hawke's Bay Regional Resource Management Plan](#) also provides environmental guidelines for surface water quantity for specific rivers. The objective is to sustain aquatic species and natural character, while making the water resource available for a number of purposes. To achieve this objective, the plan sets minimum flows for specific sites on rivers and the maximum volume for allocation.

This approach involves developing guidelines to provide information on appropriate methods and technologies which can be used to mitigate effects on water quality. However, it is not necessarily appropriate for guidelines to be used as standards or rules



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(that must be complied with), as technologies and on-site procedures change and there may be new methods that achieve greater levels of compliance and treatment.

An example of a guideline for stormwater treatment is the [Technical Publication 10: Design Guideline for Manual Stormwater Treatment Devices](#) produced by the Auckland Council. This guideline outlines a range of approaches to manage the effects of stormwater from sites, and chapter 5 provides information on stormwater pond design, construction and maintenance.

### **Activity performance standards – water**

This approach involves setting performance standards for water quality or use with which activities must comply to be permitted; otherwise a resource consent is required.

For example, section 3.2.4.6 of the water module of the [Waikato Regional Plan](#) has suspended solid standards for the discharge of stormwater into surface water. The suspended solid standards state an activity or discharge shall not increase the concentration of suspended solids in the receiving water by more than 10 per cent and that the suspended solids concentration of the discharge shall not exceed 25, 80 or 100 grams per cubic metre depending on the receiving environment. For the discharge of stormwater from quarries to be permitted, quarries must have an interceptor in place, and comply with the suspended sediment standard and other conditions in section 3.5.11.4 of the plan.

Chapter 33 of the [Tasman Resource Management Plan](#) includes permitted activity conditions for the discharge of sediment or debris from land disturbance activities into fresh or coastal water. These conditions include that the discharge of sediment does not cause a discernible change to any habitat, or cause the visual clarity of the receiving water to change by more than 40 per cent. In addition to these permitted activity standards, there is a quarry area in Section 18 of the plan (Special Area Rules). This states that no excavation or processing of aggregate should be undertaken within 10 metres of a river or stream.

The [Auckland Council Regional Plan – Operative: Air, Land and Water](#) has rules on water take that determine the type of resource consent required based on the combination of volume of take, the season, and the water use management area within which the activity is located. Under rule 6.5.8, the taking and use of no more than 5 cubic metres per day from a river, stream or spring is a permitted activity subject to conditions. The taking and use of no more than 100 cubic metres per day from a river, stream or spring during the six-month period from 1 May to 31 October is a controlled activity, becoming discretionary outside of this time period. The proposed plan also provides a number of assessment criteria for when resource consent is required, including the efficient use of water resources and adverse effects on water quality. While the Auckland Council Regional Plan – Operative: Air, Land and Water will be superseded by the [Auckland Unitary Plan](#) (notified September 2013) the Regional Plan will remain relevant until the Unitary Plan becomes operative.



## Quarry management plans – water quality and quantity

The Auckland Council District Plan – Operative [Waitakere Section](#) identifies a quarry special area for Waitakere Quarry, similar to a zone, where quarries need to meet the standards of a quarry management plan (QMP) to be a permitted activity. A QMP is attached as an appendix to [Rule 13 of the Special Area Rules](#). This includes a condition relating to water quality; that a silt trap shall be formed and maintained on the quarry floor and any crusher shall be bunded. It also requires quarry operations to ensure silt and any hazardous substances from the quarry do not enter the stream.

## Issues and effects of extraction from river beds and the coastal marine area

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Extracting aggregate from river beds and the coastal marine area often has a number of extra issues compared to land-based extraction that require special consideration. Extraction from these areas is generally required to obtain specific forms of aggregate (eg, sand, exposed fluvial rock). However, fluvial and coastal environments are often valued for a number of reasons such as amenity, natural character and ecology. Also, these areas are often culturally significant to local iwi (see Cultural and Heritage). This can lead to opposition to aggregate extraction in river beds and in the coastal marine area in particular, and means the potential adverse effects need to be carefully assessed and managed in these environments.

Extraction from river beds is an important source of aggregate and is more common than extraction from the coastal marine area. In lowland fluvial areas, such as Canterbury, Otago and Hawke’s Bay, fluvial gravel is a major source of aggregate. Gravel extraction from river beds can, in some instances, help manage flood risk and channel bed erosion, and many councils are involved in gravel extraction for flood risk management purposes.

Whereas there are a number of potential benefits from gravel extraction in river beds, there are also some additional issues that must be considered. These issues primarily relate to the potential adverse effects on avifauna and aquatic life, natural processes and character and amenity. For example, the [Tasman Resource Management Plan](#) identifies the following issues associated with extraction of rock and on-site processing of aggregate in river beds:

- extraction exacerbating a bed degradation trend, with site and downriver effects from lowered groundwater levels and exposure of river control structures
- adverse effects on some aquatic habitat values and risk of contaminant discharge where extraction is close to water level
- the potential to affect channel dynamics for stability and capacity and increase the flood risk.

Similarly, the [Canterbury Regional Gravel Management Strategy](#) outlines these same issues, and further discusses effects of this activity on bird nesting sites and the cultural value of waterbodies to local Iwi.

It is important the potential effects on aquatic ecosystems and sediment dynamics are considered when managing the effects of extraction of gravel and sand from river beds.



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Extraction from river beds should be assessed in terms of the wider effects on the sediment system, as there is often potential for gravel and sand extraction to limit the sediment cycles to the coast. It is also important to recognise and provide for the preservation of the natural character of rivers and their margins as a matter of national importance under section 6 of the RMA.

Although less common the extraction of sand from the coastal marine area is still undertaken in a number of sites around New Zealand. Sand extraction can also be used to rehabilitate beaches and provide a buffer against coastal erosion.

On-shore extraction from the coastal marine area can generate a number of issues that need to be considered to reduce the adverse effects on the coastal environment. These issues include:

- the high natural character values often attached to the coastal environment, which require preservation as a matter of national importance under section 6 of the RMA
- the potential impact on coastal marine ecosystems and the difficulties in assessing the impacts of extraction on these ecosystems
- the dynamics in the coastal environment to determine what effect sand extraction (and deposition) may have on shoreline erosion
- the impact of climate change and sea-level rise on rates of coastal erosion.

It is important these issues are considered in coastal extraction proposals, and this will often involve the input of technical specialists such as coastal scientists. It may be appropriate to avoid or constrain extraction in coastal areas with high natural character value, or vulnerable to erosion, or where the adverse effects cannot be effectively managed.

### **Methods to manage extraction in river beds and the coastal marine area**

Managing the effects of extraction in river beds and the coastal marine area requires additional considerations to land-based extraction. These relate to the potential adverse effects on aquatic habitats, sediment dynamics, amenity and the natural character of the coastal and river environments. Given there is a degree of uncertainty about the potential impact on these values, adaptive management will often be the most appropriate approach so the effects of the extraction can be monitored over time.

To manage flood risk through gravel extraction, it is good practice to work with industry to provide benefits to both parties and a number of councils are doing this. Working closely with industry also allows for more efficient measures of allocation to be implemented. The consent process allows for site-specific mitigation of effects through the implementation of appropriate management methods.

Determining the potential effects on sediment dynamics of extraction from both rivers and the coastal marine area will generally require technical input and guidance. Where there is uncertainty regarding the potential effects of extraction on the wider sediment supply system, it may be appropriate to take a precautionary approach. This is particularly important in coastal areas that are vulnerable to coastal erosion. A



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precautionary approach does not necessarily equate to prohibiting extraction completely, but may involve a more limited quantity and duration of extraction coupled with a monitoring strategy.

For more general information on methods to manage effects of land-based activities on the coastal environment see the [Coastal Land Development Guidance Note](#). The [Coastal Hazards and Climate Change: Guidance Manual for Local Authorities](#) also provides information on how to manage coastal erosion and the potential effects of climate change.

### **Integrated gravel extraction studies and reports**

This approach involves undertaking research on gravel extraction issues and effects, and future supply and demand for gravel. This can be used as a basis to develop a management framework. For example, the [Regional River Gravel Management Strategy](#) prepared by Environment Canterbury provides useful information to underpin the future management of fluvial gravel extraction.

This strategy acknowledges the importance of aggregate to the Canterbury Region but also outlines the physical effects of gravel extraction. This report was subject to community consultation and provides recommendations for a future management approach to gravel extraction in the region.

### **Policies on extraction within fluvial areas or coastal environment**

Many regional plans and policy statements contain specific policies and rules for extraction within river beds and the coastal marine area, in recognition of the special characteristics of these environments. For example, section 27 (Minerals) of the [Northland Regional Policy Statement](#) has specific policies to avoid the adverse effects of sand extraction from the coastal marine area, and gravel extraction from rivers, by encouraging the use of land-based alternatives where these are reasonably available. The policy statement also contains policies to ensure the rate of extraction from rivers and the coastal marine area does not exceed natural replenishment rates and result in significant geomorphic changes.

The [Auckland Council Regional Policy Statement](#), while recognising the importance of protecting aggregate resources, states that quarry activities will not be considered appropriate in areas of high natural value, such as the Hauraki Gulf Islands. Policy 13.4.1 states that mineral extraction and processing activities should be avoided in those areas where these activities would have an adverse effect on the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and their rivers and margins. While the Auckland Council Regional Policy Statement will be superseded by the [Auckland Unitary Plan](#) (notified September 2013) the Regional Policy Statement will remain relevant until the Unitary Plan becomes operative.

The [Bay of Plenty Regional River Gravel Management Plan](#) provides a comprehensive approach to managing the effects of gravel extraction in the region. Part III of the plan provides specific objectives, policies and methods relating to gravel extraction.



## Activity performance standards – extraction in river beds and the coastal marine area

The [Waikato Regional Plan](#) (chapter 4) manages the extraction of sand and gravel based on the amount being extracted and the location. Extraction is permitted in some river beds for up to 50 cubic metres per year of sand and gravel, subject to a number of conditions. Extraction between 50 and 200 cubic metres is controlled, and above this it is discretionary. The regional plan also has different rules for extraction in the Coromandel Peninsula Rivers. In these rivers, extraction is a restricted discretionary activity with the council reserving its control over a larger number of matters.

In the disturbance section of the [Waikato Regional Coastal Plan](#) there are a number of rules relating to disturbance (extraction) of sand, shell or shingle in the coastal area (section 16.6). These rules determine whether resource consent is required and, if it is, what type. Minor disturbances are permitted or controlled, whereas larger volumes of extraction are discretionary and/or restricted coastal activities. This is to enable removal of large quantities of sand from predominantly closed physical systems to be more closely managed. In areas identified as having significant conservation value, the extraction of quantities over 50,000 cubic metres is a prohibited activity. Decisionmaking criteria and considerations are also set out in Appendix II of the plan.

The Bay of Plenty [Regional River Gravel Management Plan](#) provides a comprehensive approach to managing the effects of gravel extraction in the region. Part III of the plan provides specific rules relating to gravel extraction that determine whether the activity is permitted, provided it can meet a number of performance standards.

The [Wellington Regional Coastal Plan](#) provides a number of rules on gravel or shingle extraction in the coastal marine area (section 7.3) that vary depending on the amount being extracted and the location. Extraction in the coastal marine area outside of areas of significant conservation value is a discretionary activity or a restricted coastal activity depending on the amount being extracted. Extraction of gravel or shingle within the identified areas of significant conservation value in the regional coastal plan is a noncomplying activity.

### Linking extraction with flood management

This approach involves developing specific objectives, policies and rules that recognise the potential benefits of extraction for flood risk mitigation and beach nourishment. This approach is most useful when supported by specific performance standards and controls, identifying circumstances under which extraction from the river bed and coastal marine areas is appropriate.

For example, section 3.11 of the [Hawke's Bay Regional Resource Management Plan](#) has specific objectives and policies for river bed gravel extraction that link extraction to the management of flood risk. Objective 29 is to facilitate gravel extraction from areas where it is desirable for river management purposes, while ensuring that any adverse effects of gravel extraction are avoided, remedied or mitigated. This objective recognises that in some areas there is a surplus of gravel which can cause problems for river flood management. Policy 54 of the plan seeks to integrate the management of gravel



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extraction with river control works by encouraging gravel extraction where there is potential to minimise flooding or the risk of damage to essential structures.

The Marlborough [Wairau/Awatere Resource Management Plan](#) has a specific section on mineral extraction (chapter 24) which recognises the importance of gravel extraction in the lower Wairau Plain as an integral component of floodplain management. The plan contains an objective to manage gravel and sand extraction to improve the efficient and effective performance of river channels and floodway systems, especially in the stockbanked floodways of the main Wairau floodplain.

The [Waikato Coastal Regional Plan](#) contains a number of provisions relating to extraction from the coastal marine area. This includes rule 16.6.5 which provides for deposition of sand for the purposes of beach nourishment as a controlled activity, providing it meets terms and conditions. The plan states the reason for this rule is that beach nourishment is one of the favoured options for remedying beach erosion. However, this does not by itself provide justification for extraction at any one given location.

While not specifically a plan made under the RMA, the Canterbury River Gravel Management Strategy has been developed to encourage gravel extraction for natural hazard purposes. This strategy aims for simplified compliance requirements where contractors are extracting gravel for flood protection works. In this instance, the 'Regional Engineer' would issue permits for extraction, which would have already been allowed for by a plan or resource consent. Any extraction that does not meet this requirement would trigger the need for resource consent. The strategy acknowledges that this approach would save rate payers money in flood protection works and remove some of the regulatory costs from contractors.

### **Assessment criteria – extraction in river beds and the coastal marine area**

This approach involves developing rules with supporting criteria to help determine which type of extraction is considered appropriate and the important considerations to avoid, remedy or mitigate adverse effects.

For example, the [Hawke's Bay Regional Resource Management Plan](#) provides assessment criteria when considering resource consent applications to help ensure the adverse effects of gravel extraction are avoided, remedied or mitigated (section 6.8.6). The criteria are comprehensive and include the avoidance of contaminants from machinery and sediments entering water bodies, the effect of extraction on the ecology of the river, and the extent to which natural processes will be capable of returning the river bed to a state of equilibrium following extractive activity.

The [Bay of Plenty Regional River Gravel Management Plan](#) provides a comprehensive approach to managing the effects of gravel extraction in the region. Chapter 16 provides assessment criteria to consider for consent applications for gravel extraction, which include the effects on erosion, water quality and ecology.



## **Resource consent conditions and duration – extraction in river beds and the coastal marine area**

The resource consent process can be used to limit the effects of extraction through setting consent conditions and limiting the duration of the consent. Limiting the duration and scope of the consent for extraction is a particularly useful approach where there is uncertainty regarding the effects of extraction, or where the allocation of extraction needs to be balanced between competing users. For example, phase 1 of an extraction activity might only be approved, or extraction could be phased so as to include rest periods during which waterways are allowed to recover. This again can be linked to water quality standards.

For example, the decision on the application by Perry Resources for Sand Extraction, clean filling and vegetation removal in property adjoining a rural river has conditions relating to the extraction of 300,000 cubic metres of sand per year on average from the Waikato River. This decision by Franklin District Council includes consent conditions covering a range of matters and it limits the amount and location of sand extraction to avoid adverse effects and distance extraction away from protected trees, sands and flood defence systems.

### **Guidelines – extraction in river beds and the coastal marine area**

As extraction from river beds and the coastal marine area often requires some technical input, it is useful to produce guidelines on how to assess and manage the effects from extraction.

For example, the Bay of Plenty Regional Council has produced [River Gravel Management Guidelines](#). These guidelines provide useful reference material on gravel management which are intended to be used for education, to complement the regulatory controls in the River Gravel Management Plan and to lead to environmental improvements. The guidelines include background information on gravel sources and process, principles to manage adverse effects from extraction and some operation guidelines for extraction and associated monitoring and reporting.

## **Ecological and vegetation removal issues and effects**

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The establishment or expansion of quarry sites will often require the disturbance of the natural environment and removal of vegetation. This may range from a small area of bush to a significant change in a natural habitat, including the loss of significant areas of native bush and the diversion of streams. Indeed, many significant aggregate resources are also areas of high ecological value due to the nature of the terrain (eg, uplifted rock) which means the native vegetation has not been removed for agricultural purposes. The Environment Court has confirmed that in such circumstances, it is appropriate to recognise the value of the area for both the ecological resource and the mineral resource (refer *Winstone Aggregates v Rodney District Council* [2009] (A054/09)).



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Extraction within river beds and the coastal marine area requires consideration of the potential impact on aquatic habitats and marine biodiversity. Often these effects are harder to assess and manage because there is much less information and knowledge about the potential impacts on marine and river ecologies. For more information on managing the effects of extraction on aquatic ecosystems see extraction from river beds and the coastal marine area.

In some cases, research and assessment will conclude that there is no way to avoid or remedy adverse effects, particularly on wildlife. In this case, ecological off-setting may be required.

### **Methods to manage ecological effects from quarries**

To help assess effects on ecology from vegetation removal, plans should identify areas of high ecological value or natural landscape value. Identifying these high value areas should be accompanied by objectives and policies that discourage activities that involve vegetation removal or disturbance in these areas. This provides certainty as to the intended use for the site but should not always equate to prohibition of other activities within the zone, as many of these areas also have significant value for the underlying aggregate resource. When there is both high ecological value and aggregate resource value an assessment would have to be carried out to decide how to balance these values.

To help manage ecology, plans can specify policies for revegetation that the quarry must carry out to mitigate or minimise ecological effects. Another approach is to require a quarry management plan to be prepared that includes provisions to mitigate the effects on ecology caused by vegetation removal if possible. This is a useful approach, as it allows the management approach to be adapted over time and tailored to the specific site. A quarry management plan may also be used to manage the effects on aquatic species and marine ecosystems from extraction from river beds and the coastal marine area.

### **Activity performance standards – ecological effects**

This approach involves developing rules and performance standards to provide guidance on the significance of the vegetation removal and the important effects to consider. For example, in the [Land and Soil Module of the Waikato Regional Plan](#) (chapter 5), there are a number of rules around vegetation clearance aimed at minimising potential erosion and adverse effects on water quality. The rules determine whether a consent is required and, if so, what type, based on the volume of vegetation clearance, the type of vegetation being cleared and the location of the clearance. For example, vegetation removal is generally permitted up to an area of 5 hectares and then it becomes a controlled activity. However, this rule excludes planted forests, where vegetation removal of over 5 hectares is still permitted.

In the [Mineral, Aggregate and Hydrocarbon Extraction District Wide Activity section of the Hastings District Plan](#) (section 13.2) there are specific performance standards and criteria for mineral extraction and processing, which include specific assessment criteria relating to land disturbance and vegetation clearance. The plan provides for land disturbance and vegetation clearance from quarry operations as a restricted discretionary activity,



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assessed for the effects on the life-supporting capacity of soils, soil erosion and stability, natural landforms and contours and flora and fauna.

This section of the plan also includes specific performance standards and terms with which quarry operators must comply, including site revegetation to minimise overall disturbance to vegetation. The standard states that where vegetation clearance occurs, disturbed areas should be re-pastured or revegetated as soon as possible within the next growing season.

Section 18 of the [Tasman Resource Management Plan](#) (Special Area Rules) relates to a quarry area where quarrying is a discretionary activity, providing it complies with standards and terms. One of the matters for the council's discretion is the extent to which the proposed quarry will detract from the landscape and conservation values of the site and locality, including effects on indigenous vegetation.

### **Offsetting**

This approach involves identifying offsetting as an appropriate method to mitigate the ecological effects from vegetation removal. This may be included as a general policy or method, but it is more useful when plans provide guidance on the type of offsetting considered appropriate.

The ecology section of [Auckland City District Plan – Operative Papakura District – Section Two: Rural Papakura](#) includes a number of general policies aimed at identifying and protecting areas of significant ecological resources, including provision of development incentives. Policies Part 6 the plan change provide for development potential as an incentive to protect and manage ecologically significant resources in perpetuity, and to encourage the restoration and enhancement of degraded ecologically significant resources.

The financial contributions section of [Horizons Proposed One Plan](#) contains policies identifying the use of a financial contribution to offset any adverse effects on biodiversity where such adverse effects will not be adequately avoided, remedied or mitigated. The purpose of the financial contribution would be to offset the adverse effects by providing for the protection, restoration or enhancement of biodiversity, in a location with similar biodiversity values.

Chapter 2 of the [Proposed Waikato District Plan](#) has a number of objectives, policies and methods to manage the effects of development on indigenous vegetation and habitats. These include policies 2.2.6 and 2.2.7 which state that regard should be had to replacing or restoring habitats when remedying or mitigating adverse effects on indigenous biodiversity. These policies recognise the use and development of indigenous habitats are not precluded, but where adverse effects occur they should be mitigated at that site or offset by conservation at another site of similar ecosystem type.

The [Assessing Applications Involving Native Vegetation Removal](#) practice note by the Department of Sustainability and Environment, Victoria, Australia provides guidance on assessing planning permits involving vegetation removal, including appropriate offset options and calculations. Although this guidance relates to planning permits in Australia it

still provides a useful framework for offset calculations based on the conservation significance of the vegetation being removed.

### **Quarry and landscape management plans – ecological**

This approach can be imposed as a condition of a consent or identified as a requirement in plans for a quarry management plan (QMP) to be prepared that includes specific provisions relating to vegetation removal, replanting or enhancement. For example, the [Waitakere City District Plan](#) identifies a quarry special area for the Waitakere Quarry (special areas section), where an activity meeting the standards of the QMP is a permitted activity. The QMP includes a condition to retain certain areas of native vegetation identified in a plan, which shows the areas to be quarried and where the existing areas of vegetation cover should be retained.

The [Aggregate Extraction and Processing Zone of the Auckland Council District Plan - Franklin Section](#) (Part 35) requires a management plan to accompany any resource consent application for aggregate extraction activities, for approval and inclusion as a condition of consent. The plan states these management plans shall include, as appropriate, a landscape plan, and an ongoing or staged rehabilitation programme including objectives and revegetation techniques.

The [Waingaro Road Quarry – Operational Compliance Plan](#) prepared by Perry Resources provides an example of a QMP for a hard rock quarry to ensure operations and environmental risks are managed appropriately and within conditions of consent. It details the site operations, projects and monitoring and contains procedures to manage and mitigate the adverse effects on ecology. This includes procedures for vegetation removal and re-planting which are planned annually based on a set of criteria. Planting projects on site include planting of a visual bund, wetland and stream diversions.

Also see the general methods section on quarry management plans for guidance on how these plans can be used to address a wide range of environmental effects through plans and resource consent conditions.

### **Visual issues and effects**

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Quarrying typically involves large-scale excavation that can have a significant visual impact on the landscape. Often quarries are located in a rural setting, but there are also a number of quarries in close proximity to, or within, urban areas. Quarries in both rural and urban locations may be visually inconsistent with the surrounding areas or visually dominant where the operations are large scale. Rehabilitation of quarries and related overburden deposits may also impact on visual effects in the long term.

The visual impact will also be dependent on site-specific factors such as the direction of the working face, buildings and other structures associated with on-site crushing and processing, and the screening around the site. It is in the industry's interest to minimise the visual effects from quarries to help avoid complaints and potential reverse sensitivity pressures. Screening (eg, earth bunds, vegetation) has the potential to significantly mitigate the visual effects throughout the life of a quarry, as does the orientation and



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direction of extraction. For example, the Fulton Hogan York Quarry sits adjacent to an urban area, therefore the quarry has undertaken development so that the cut face is facing away from Nelson City to reduce visual effects. In the Fulton Hogan Wairoa Quarry, which is a rural quarry, a berm has been used to obscure the view of the cut face from nearby rural-residential properties.

Quarries often operate at night and require permanent and/or temporary lighting to be installed on the site. Lighting plans may be required with details relating to angle and type of lights to ensure glare is adequately controlled and mitigated.

### **General bulk and location standards**

These may be imposed as a condition of consent or an activity standard within a plan. For example, within the [Aggregate Extraction Zone of the Auckland Council District Plan – Operative Franklin Section](#) (Part 35) permitted activity conditions include the requirement for a 5-metre front yard to be landscaped with planting which, at maturity, will achieve a significant visual screening effect. Plantings are required to be maintained at all times.

### **Quarry management plans – visual issues and effects**

Quarry management plans (QMPs) may be imposed as a condition of consent or as a standard in a plan, and include detailed management procedures to help the applicant and neighbours to deal with visual effects.

For example, within the [Quarry Zone of the Auckland Council District Plan – Operative Papakura Section](#) (Section 3 Part 6 rule 6.13.8.1(1)(d) and (dd)), the operators and owners of each quarry are required to provide a QMP to the council. The QMP must include provision for screening visually intrusive features from public view and provision for the progressive restoration of the site.

The [Three Kings Quarry – Quarry Management Plan](#) was prepared by Winstone Aggregates in consultation with Auckland City Council and the local community. It outlines the site operations, methods to manage a range of environmental effects and the objectives for rehabilitation and end use. The QMP contains a landscape and visual objective to minimise adverse effects on the surrounding community. This objective is supported by performance standards and implementation measures such as landscaping and revegetation of completed areas.

It may also be appropriate in certain circumstances, to require a landscape management plan for quarries that outlines methods to reduce visual effects. This may be included as part of the quarry landscape management plan or as a separate document. The landscape management plan would generally outline any planting requirements, site maintenance at the boundary and the construction of any visual barriers to reduce visual effects. Section 7.6 (Landscape and Visual) of Winstone Aggregates [Hunua Quarry – Management Plan](#) provides an example of measures that are undertaken on site to minimise adverse landscape and visual effects on the surrounding community.

### **Progressive restoration and rehabilitation (also see [rehabilitation](#))**

This may be imposed as a condition of consent or a plan may require consideration of the ability to progressively restore and rehabilitate the quarry. The progressive restoration or rehabilitation of the site can be an effective means of minimising the visual effects from a quarry, both on a temporary and long-term basis.

For example, the [Wellington City District Plan](#) requires Kiwipoint Quarry to progressively rehabilitate all land encompassed within the quarry boundary, except where used for other permitted or consented activities (rule 7.1.3.6.1).

### **Use of visual barriers such as earth bunds or solid fences**

This could be applied as a condition of consent or as a standard for quarries within a plan. If applied as a standard in a plan this should be a flexible provision, as the effectiveness of visual barriers will depend on what they are constructed of, how they are constructed, and the nature of the visual effect generated.

Natural visual barriers such as earth bunds are generally best developed in conjunction with the quarry operator when they are establishing the direction of working in the quarry. For example, Fulton Hogan have retained an existing hill on the side of their Wairoa quarry to provide a natural visual and noise barrier to the surrounding rural residential area.

### **Rehabilitation issues and effects**

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Quarry sites can often be effectively rehabilitated for other purposes at the end of their productive life. Rehabilitation can avoid some of the adverse effects associated with quarries. Often there is some requirement for proposed quarry operations to detail rehabilitation plans for the end of the quarry's life. This can be a useful method to mitigate adverse effects, but it can be difficult for quarry operators, who are often looking at a significant long-term timeframe for the project. There are also other expectations from the community of how a quarry site should be rehabilitated.

One of the best approaches for quarries with a long working life is to stipulate the requirement for a rehabilitation plan to be submitted to council for approval at a set date before the quarry closes. Such a plan may need to include staged rehabilitation and, as such, conditions should be drafted as appropriate. This allows for the rehabilitation plan to be linked to the objectives for the site at the time, although any changes to the end use of the site, or staging that goes beyond the scope of the original consent, will attract the need for additional consents.

It is important to note that different quarries have different effects and can be rehabilitated in different ways. For example, a sand or gravel quarry can rehabilitate over time as the work moves across a site, whereas it may be more difficult for hard rock quarries to rehabilitate as work progresses. Rehabilitation may also be carried out over stages to mitigate other effects such as visual impacts and noise while the final rehabilitation plans are not known.

## Methods to manage the rehabilitation of quarries

### Quarry management plans – rehabilitation

These may be imposed as a condition of consent or a permitted activity standard, and include detailed procedures for progressive rehabilitation to help the applicant and neighbours to deal with effects. Quarry Management Plans (QMPs) in the context of rehabilitation have the benefit of being adaptive over the working life of the quarry and with respect to the site-specific circumstances. For example, the [Wellington City District Plan](#) requires the Kiwipoint Quarry to produce an annual report which outlines what rehabilitation has been carried out, what rehabilitation is planned in the next year and what has been learnt from the previous year's rehabilitation works (policy 6.2.3.3A).

The Auckland Council District Plan – Operative Papakura Section (Section 3 Part 6 rule 6.13.8.1(1)(d) and (dd)) also requires a QMP, which must include provision for the progressive restoration of the site, such that the land will be left in such condition as the council considers suitable for the establishment of those uses to which that land may be subsequently put.

The [Three Kings Quarry – Quarry Management Plan](#) was prepared by Winstone Aggregates in consultation with Auckland City Council and the local community. It outlines the site operations, methods to manage a range of environmental effects and the objectives for rehabilitation and end use. The QMP acknowledges there are many options available for rehabilitation and sets out a guiding principle for the selection of the suitable end use and rehabilitation options. The plan provides five basic rehabilitation options and potential uses which will be considered further in consultation with Auckland City Council and the local community.

When the quarry has reached its end life, a QMP may then be developed to rehabilitate the site. For example, the [Haswell Quarry Park Management Plan](#) in Christchurch is a council-owned project to progressively rehabilitate the quarry into the wider park area.

### Rehabilitation plan

A requirement to submit a rehabilitation plan to the council for approval within a particular timeframe before the closure of the quarry may be imposed as a condition of consent. This can provide the council with greater certainty on the proposed end use of the quarry (eg, requiring a rehabilitation plan to be submitted and approved a minimum of one year prior to the anticipated closure of a quarry), rather than if a rehabilitation plan was required at the time of lodgement, when it may be more difficult to determine the appropriate end use.

The [Wellington City District Plan](#) (policy 6.2.3.3A) also requires that a rehabilitation implementation plan be prepared annually for Kiwipoint Quarry, in accordance with the QMP. This requirement is included because successful rehabilitation of any disturbed area requires constant monitoring as site conditions vary considerably and evolve over time.

Regular observation and recording of results is seen as an essential part of managing the process.

## Bonds

Bonds may be imposed as a condition of consent under ss108 and 108A of the RMA. These may be imposed as a rate per tonne of aggregate produced over the life of a quarry or a fixed price. Bonds are generally acceptable to the industry, but can create time and cost issues for councils in their administration. However, it is often the specific wording of the consent condition that will determine the complexity of the administration.

For example, conditions 53–56 of conditions imposed by Hutt City Council on Winstone Aggregates – Cottle Overburden Disposal Area provides for a bond to be entered into. The purpose of the bond is to satisfy conditions 46 and 47 of the consent which relate to a requirement for a rehabilitation plan for the progressive rehabilitation of the site.

Refer to the [resource consent](#) conditions guidance note for further discussion on bond conditions.

## Cultural and historic heritage values

Under the RMA, local authorities are required to recognise and provide for the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taonga (s6(e)), and to have particular regard to recognition and protection of the heritage values of sites, buildings, places or areas (s7(e)). In addition Part II requires councils to make provision in relation to the protection of natural, physical, and cultural heritage sites and values, including landscape, land forms, historic places and wāhi tapu.

Quarrying typically involves large-scale excavation which has the potential to affect cultural and historic heritage values. As quarries are often associated with rivers, coastal areas or identifiable rock formations, the potential effects on cultural values is quite a common issue. These values may be known or unknown at the time a quarrying activity is proposed in a particular location. The challenge is identifying all cultural and historic heritage values associated with the area to be quarried, and ensuring these values are protected from inappropriate use or development. This may include archaeological sites and sites or areas of cultural significance to iwi.

It is generally not quarrying itself that is of particular concern to tāngata whenua, but how quarrying has the potential to impact on things that are valued by them. Such impacts can include earthworks or developments near ancestral sites (including an urupa – burial ground), discharges to water potentially compromising the mauri (spirit / life force) or compromising the integrity of, or access to, food resources (mahinga kai).

The relationship of tāngata whenua with the coastal environment is explained further in the [coastal development](#) guidance note and a wider list of activities of concern to tāngata whenua is available in the [consultation for resource consents](#) guidance note.



## Methods to manage the effects on cultural and historic heritage values

There are a number of methods that can be used to manage the effects on cultural and historic heritage values. These range from the identification of cultural and historic sites through to the use and inclusion of consultation mechanisms and resource consent conditions.

### Policies relating to archaeological and wāhi tapu sites

Most plans address the management of archaeological and wāhi tapu sites through policies managing activities and potential effects on known archaeological and wāhi tapu sites. Sites and areas are typically identified on maps or schedules and restrictions or specific considerations are given to the potential for activities to have an impact on identified sites.

[Section 15.8 of the Kaikoura District Plan](#) provides an example where conditions are provided to manage the effect of both permitted earthwork activities where they are not immediately adjoining a known site of significance and greater consideration of activities and conditions where they are within or in close proximity to known sites. The policies include two protocols, one recognising the input role and advice of local tāngata whenua when operating within a known wāhi tapu site and the second provides for the procedure to follow when there is an accidental uncovering of unidentified archaeological sites, archaeological areas, historic areas or wāhi tapu.

[Waikato Regional Council's Regional Plan rule 4.3.7.1](#) identifies the extraction of up to 50 cubic metres per year of sand and gravel within selected river beds within the region as a permitted activity subject to the activity not disturbing any identified archaeological site or wāhi tapu except where Historic Places Trust approval has been obtained. Where an unidentified wāhi tapu is disturbed, the activity shall cease insofar as it may affect the wāhi tapu and the Waikato Regional Council shall be notified as soon as practicable. The activity shall not be recommenced without the approval of the Waikato Regional Council. Under section 2.3.4.22, the Waikato Regional Council has a number of criteria it must consider, including ascertaining tāngata whenua interests and values (including metaphysical values), after appropriate consultation with tāngata whenua who are kaitiaki for that site, or any archaeological, historical or scientific evidence before providing approval to continue.

Refer to the [Historic Heritage](#) guidance note for further information on the duties and considerations for cultural and historic values in plans.

### Consultation policies and agreements

A number of plans recognise the role and relationship with tāngata whenua through specific consultation policies or agreements. These can be associated with general policies on wāhi tapu sites such as policy 6.6.7 of the Manakau District Plan which requires active consultation with tāngata whenua where activities have the potential to adversely affect taonga or tāngata whenua's relationship with taonga. This policy is achieved through the resource consent process, contracted services and an agreement of understanding with tāngata whenua authorities.



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The [Kaikoura District Plan](#) also provides an example where the council has clearly set out situations where tāngata whenua must be involved in the RMA process. Section 15.2.2 includes policies that require the council to:

- forward summaries of any resource consent applications for any activity within, adjacent to, or impacting directly on Mt Uwerau or Lake Rotorua to Te Runanga o Ngai Tahu
- have due regard to the statutory acknowledgments of Mt Uwerau or Lake Rotorua in deciding whether Te Runanga o Ngai Tahu is an affected party in respect of any resource consent applications for activities within, adjacent to, or impacting directly on Mt Uwerau or Lake Rotorua
- develop in conjunction with Te Runanga o Ngai Tahu, a protocol for consultation in respect of resource consent applications

See [consultation on resource consents](#) and [consultation with tāngata whenua](#) for further details on consultation with tāngata whenua in plan and resource consent processes and details on statutory acknowledgments and other similar agreements between councils and tāngata whenua.

### **Cultural impact assessments and cultural value reports**

Cultural impact assessments (CIA) can be used to provide information to applicants and councils on the potential effects of a proposed quarry on cultural values. Although not always a statutory requirement, a CIA can help identify issues early on in the development of a proposal and provide information to councils in considering how Part 2 RMA matters have been addressed. CIAs are typically paid for by the applicant as part of the information forming their application.

Cultural value reports are slightly different as they generally do not directly consider quarrying or its impacts but rather identify and describe values pertaining to an area or resource. Cultural value reports may address broad level impacts of development in the area and can help identify what the relevant issues may be and how these should best be addressed.

See the [FAQs on cultural impact assessments](#) for further information and an example of a CIA relating to a [cultural values report prepared for Environment Canterbury relating to the Wairau River](#).

### **Quarry management plans – cultural and historic heritage values**

Quarry management plans (QMPs) may be imposed as a condition of consent or as a standard in a plan, and include detailed management procedures to help the applicant, council, tāngata whenua and the Historic Places Trust (where relevant) to deal with cultural effects of quarrying, in particular the disturbance of wāhi tapu. Both the [Friedlander Road Quarry – Operational Compliance Plan](#) and [Waingarō Road Quarry – Operational Compliance Plan](#) outline procedures to follow on the discovery of archaeological or skeletal remains.



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A QMP may also be beneficial in establishing an ongoing relationship with tāngata whenua over the operation of quarrying activities and effects. The [Three Kings Quarry – Quarry Management Plan](#) provides an example where a consultation protocol is established to enable a site liaisons group, comprising representatives from Auckland City Council and the local community, to discuss issues with a quarry.

Also see the general methods section on quarry management plans for guidance on how these plans can be used to address a wide range of environmental effects through regional and/or district plans and resource consent conditions.

### Some matters to consider for roading contributions

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The transport of aggregate requires heavy truck movements from the site to the source of demand. In many instances, the main transport routes will be known and the number of traffic movements can be estimated over the life of the quarry. For larger quarries, these traffic movements can be significant and have the potential to cause additional road damage along access routes.

To compensate for potential damage to the roading network and any impact on road safety, many councils now require targeted roading contributions for proposed quarries. However, determining whether roading contributions should be required and the appropriate level of contribution is a complex issue dependent on a range of factors.

Although many roading authorities have particular methodologies, there is no standard or accepted methodology to calculate roading contributions. However, there are some general matters that should be considered. These matters will generally require the technical input of traffic/roading engineers, asset managers and planners. These matters include the following.

- **The damage to the road network** - the extent to which the existing road network can carry the extra vehicle movements without causing damage to the road will depend on the designed pavement structure and capacity of the road. Major arterial routes should be able to absorb the traffic movements with little or no damage whereas other small rural roads may effectively need to be re-built. Determining the approximate level of road damage associated with a proposed quarry should involve specialist input and take into account a number of factors such as the pavement design-life assumptions, the existing condition of the road, council road-use data and the additional loading on the road.
- **The type of road** - the maintenance and provision of major arterial routes is the responsibility of councils and the New Zealand Transport Agency (NZTA). These routes should be designed to cater for all truck movements. It will generally not be appropriate to consider the effects of quarry movements on major arterial routes unless the proposed quarry will add significant loadings, or there are particular safety issues to address because of the additional quarry trucks. However, for local routes where quarry traffic will become the dominant road user, it will generally be appropriate to consider the potential road damage and whether contributions are required.



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- **The wider benefits of the contribution/roading upgrade** – in many situations the contribution and roading upgrade associated with a proposed quarry may have wider benefits to other road users (eg, through increased road life and improved safety). In these circumstances, it will often be appropriate for councils to contribute to the costs of the roading upgrade from its own sources of funding such as rates.
- **One-off payments versus per tonne levy** - whether the contribution should be made up front as a one-off payment or as a per tonne levy over the life of the quarry is a matter to consider. Quarries will generally prefer a one-off payment that provides certainty and helps in the immediate upgrade of the road. If a per tonne levy is used then it should take into account whether the upgrade has made the road to a standard where it can accommodate the additional vehicle movements (and therefore ongoing charges may not be appropriate). Discount factors may also be required to determine the appropriate ongoing cost.
- **Cross-boundary issues** - often the transport of aggregate will extend beyond one district and roading contributions may be required from more than one council. This can be a particular issue where the two councils have different methods to determine and administer roading contributions. In these situations, adjoining councils should work together to develop a consistent approach to calculate the appropriate level of road contributions.
- **General funding for roading works** - roading funding is sourced either locally through rates/contributions or at the national level through NZTA. The NZTA share of funding is typically around 50 per cent and this is sourced through the Government and road-user charges. Those transporting aggregate are subject to road charges so any roading contributions from council means they are essentially paying 'twice' if the contribution is made on the total cost of the work. Councils should consider whether it is appropriate for the contribution to be based and proportioned on the council's share of the cost or the total cost of upgrading.

Quarries are generally willing to undertake works or provide contributions to manage road safety associated with increased traffic activity around the site. The extent of the mitigation/contribution should, however, be determined according to the scale of the safety issue caused by the proposed quarry and whether there are existing safety issues. If the latter is the case and there are wider benefits of the works, it will generally be appropriate for a council to make a contribution. For example, Perry Resources and Franklin District Council both contributed to the costs of an intersection upgrade near a proposed quarry as the council acknowledged there were already safety issues. The council also paid for the upgrade of a section of road to be used by the quarry trucks as there were already capacity and pavement issues.

### General methods

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#### Performance standards

Managing the effects from quarries is generally based on the effects at the boundary of the site and nature of the receiving environment. Including rules with performance standards in plans relating to environmental effects, such as noise, suspended sediment, and dust deposition, is therefore a useful method to outline the acceptable level of effects



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within a particular area. Rules and performance standards often accompany zones recognising quarrying and its classification under s77A of the RMA (ie, permitted or a controlled, restricted discretionary, and so on). This determines how quarrying is provided for in an area or what effects will be considered in assessing and attaching controls to proposals.

Often there will be some performance standards that quarries cannot meet, such as noise limits of 50dBLAeq. In circumstances where compliance with permitted activity standards is not possible for a proposed quarry, the performance standards in the plans are normally used as a guide and the proposed activity is assessed as a resource consent application under the appropriate activity status in the plan. Another example is the [Mineral Extraction Area](#) of the Whangarei District Plan where the permitted activity standards for noise differ between areas identified as either high or low noise. These noise areas are determined by background noise levels.

See the [Writing Provisions in Regional and District Plans](#) for more guidance on developing appropriate performance standards for different types of activities in plans.

### Resource consent conditions

The type of activity under s77A of the RMA (permitted, controlled, restricted discretionary, and so on) will determine whether a resource consent is required, and the matters over which the consent authority has reserved discretion and/or may impose conditions.

Consent conditions can be an effective management tool because quarry proposals are site-specific and the effects will vary depending on the type and scale of quarry and the receiving environment. The application assessment process provides an opportunity to focus on the specific attributes of the proposed quarry and to tailor consent conditions accordingly to address adverse effects.

Generally, for both new and expanding quarries, resource consents will be required from both regional councils and territorial authorities. In these situations, each council should be aware of any related consent requirements and consider holding joint meetings and hearings (on notified applications) to ensure environmental effects arising from a proposal are addressed in an integrated manner. Councils should also work together to avoid duplication and conflict in consent conditions and monitoring requirements.

Refer to the [Consent processing resource](#) for general guidance on the resource consent process and [Resource consent conditions](#) for specific guidance on developing resource consents conditions.

Some examples of consent conditions for specific quarries are included below. Note, however, that consent conditions for quarries will need to be tailored to individual proposals to manage specific effects on the surrounding environment. It is not necessarily appropriate to adopt other examples of consent conditions, although they can clearly form the basis for developing conditions that avoid, remedy or mitigate adverse effects for any particular proposal.



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- [Perry Resources – sand extraction, cleanfilling and vegetation removal in property adjoining rural river](#). This decision by Franklin District Council for a sand quarry operation includes consent conditions covering a range of matters including agreement to contribute to an intersection upgrade, erosion and sediment control, hours of operation, dust management and site rehabilitation. There are also conditions relating to the covenanting of kahikatea tree stands and the establishment of a community liaison group.
- [Winstone Aggregates – extension of sand quarry](#). This decision by Waipa District Council includes a range of conditions relating to noise, traffic, dust and requirements for site rehabilitation and restoration. It also outlines procedures for the discovery of archaeological or culturally significant artefacts or features, including notifying the Historic Places Trust and/or the relevant iwi authority.
- [Winstone Aggregates – new sand extraction site](#). This decision by Environment Waikato on a sand extraction proposal includes consents for the discharge to land and water, groundwater take and disturbance to land (vegetation removal) and river bed. There are specific and general conditions associated with the consents which relate to matters such as dust, re-vegetation, erosion and sediment control, and a complaints register. There are also conditions for a rehabilitation plan to be submitted to the satisfaction of the council acting in a technical capacity, and which specify what the rehabilitation plan should address but not be limited to.
- [Fulton Hogan – Parkburn Quarry](#). This decision by Central Otago District Council on an application to extract sand and aggregate resources includes a number of conditions to mitigate adverse environmental effects. These include conditions relating to a landscape buffer area, progressive land restoration, operating hours and water spraying to suppress dust.

It is also important to ensure the conditions of a consent can be effectively monitored. Monitoring of consents can also provide information to councils to help them with the ongoing management of aggregate resources and the effects of quarrying. For example, the amount and frequency of gravel being removed from a river bed can help inform future demand levels alongside an assessment of reserves to meet demand, while ensuring the river ecology and system are not adversely effected. See [Resource consents, compliance and complaints](#) for further information on monitoring resource consents.

### Best practicable option

Often determining the appropriate consent condition is about determining the best practicable option for the quarry. Best practicable option (BPO) is defined in s2 of the RMA.

As it is often not possible to avoid all the adverse effects from quarries, it is often useful to adopt the BPO to mitigate effects. However, the use of BPO should only be limited to where there are unknowns and should be accompanied by a s128 review condition. See [Resource consent conditions](#) for more details.

## Quarry management plans

Quarry management plans (QMPs) are a key tool to address the site-specific environmental effects from a particular quarry in an integrated and adaptive manner. Quarry operators will generally have some form of QMP to help them in carrying out their day-to-day activities, but these can also be used to manage a range of on-site and offsite environment effects. As QMPs have the advantage of being able to be both adaptive and comprehensive to address environmental effects and achieve compliance, these plans are increasingly being required through RMA plans and as a condition of consent.

It can be useful for RMA plans to include the requirement for a QMP as a performance standard and outline the matters that the plan should contain. For example, Rule 6.13.1.8(d) of the [Papakura District Plan](#) requires a management plan as part of a permitted activity. Policy 6.2.3.3A of the [Wellington District Plan](#) for the development and site rehabilitation of the Kiwi Point Quarry identifies a QMP as a method and identifies a number of procedures and methods the management plan should contain to address environmental effects.

Some useful matters that a QMP could include are:

- site layout and plans that show the area to be quarried, site contours, the location of working faces, aggregate stockpiles, ancillary buildings, lighting and the internal and external transport paths
- provision for the disposal and stockpiling of overburden, including areas used
- an indication of the proposed development of the site, any staged areas, and the final contours of the site
- the drainage layout for the site, location of any water treatment devices, and procedures to reduce the contamination of runoff from the site
- procedures to minimise the discharge of contaminants into air from activities on site and entering and exiting the site
- procedures to reduce the noise vibration, glare (from lights) and dust levels on site and a procedure for any complaints
- provision for screening or to reduce visual impacts as required
- the location of any sites of natural significance, or cultural or heritage value
- existing and proposed landscaping
- progressive restoration and rehabilitation, including a programme for interim and final site form and re-vegetation.
- time period for quarrying operations including blasting
- staging of quarry development
- traffic routes (internal and external). (This may also be addressed in a traffic management plan. These are generally sought for such proposals as they address all traffic issues.)
- consultation or notification requirements with neighbours/local community □  
provision of monitoring information to regional council/territorial authority.

QMPs can also provide a useful tool for consulting with neighbours and a useful point of contact. The [Three Kings Quarry – Quarry Management Plan](#) was prepared by Winstone Aggregates in consultation with Auckland City Council and the local community. The plan outlines the site operations, methods to manage a range of environmental effects and



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the objectives for rehabilitation and end use. This process could help the development and agreement of suitable consent conditions across all parties.

QMPs also have the benefit of being monitored reasonably easily, can be tailored to specific circumstances, and have the potential to be self-monitored by the consent holder in accordance with a consent condition.

If the QMP is relied upon to provide details and ensure standards as part of a resource consent are met over time it should:

- only relate to operational matters and physical works required to manage environmental effects and demonstrate compliance with the relevant rules or consent conditions
- not be excessive in terms of the information required with the level of detail relating to the scale and significance of the operations on site
- not be used as a tool to reconsider or change the proposed quarry beyond that which was proposed and agreed with council. If approval was stipulated as a consent condition, it should be done in a technical certification capacity and needs to be:
  - submitted to council for acceptance and confirmation that meets agreed scope
  - include appropriate monitoring requirements (which can include self-monitoring and professionally commissioned independent monitoring reports)
  - enforceable
  - updated every few years as appropriate □ reviewable (using s128 as appropriate).

Examples of actual QMPs for quarries are included below. Please note that QMPs will need to be tailored to suit site-specific factors and the nature and scale of the quarry operations.

- [Friedlander Road Quarry – Operational Compliance Plan](#). This QMP prepared by Perry Resources for a sand quarry ensures operations and environmental risks are managed appropriately and within conditions of consent. The QMP describes the site operations for sand extraction and the procedures to manage the range of effects from the site (such as noise) which include speed restrictions, fitting silencing equipment on machinery and road maintenance.
- [Waingaro Road Quarry – Operational Compliance Plan](#). This QMP prepared by Perry Resources for a hard rock quarry ensures operations and environmental risks are managed appropriately and within conditions of consent. It provides a framework for site operations, projects and monitoring and prescribes procedures to manage effects from the site such as noise, stormwater, traffic and visual effects.
- [Three Kings Quarry – Quarry Management Plan](#). This QMP was prepared by Winstone Aggregates in consultation with Auckland City Council and the local community. The plan outlines the site operations, methods to manage a range of environmental effects and the objectives for rehabilitation and end use. The QMP also outlines the consultation protocol for a site liaisons group comprising representatives from Auckland City Council and the local community.
- [Whangaripo Quarry Management Plan](#). This QMP was prepared by Rodney Aggregate Supplies and provides an overview of the rock extraction and associated activities that will take place on site as the quarry expands. It includes methods to control



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effects such as noise and dust, and outlines procedures for managing hazardous substances spills and the process to report and deal with complaints. The QMP also includes a traffic safety plan and a driver's code of conduct to manage road safety, minimise nuisance effects on the local community and ensure compliance with consent conditions.

### **Best practice example, RMA provisions and key terms, definitions and concepts**

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Given the differing nature, pressures and effects of quarrying and gravel extraction around New Zealand, practices reflecting the planning and management of adverse effects vary. A number of examples of approaches and methods used by councils are highlighted in the assessing and providing appropriate access to aggregate resources, quarry resource management issues, effects and methods, and Gravel extraction resource management issues, effects and methods sections.

Other specific examples of best practice are included below.

#### **Integrated approach to identifying and managing quarrying**

The [Future Proof Growth Strategy and Implementation Plan](#), [Waikato Regional Policy Statement](#) (also see the [Waikato District Plan Operative in Part](#)), provide an example of integrated plans that all recognise and provide for quarrying and its effects, across regional and territorial authority plans.

The Auckland Spatial Plan, which is a 30 year vision document for the newly formed Auckland Council, recognises aggregate as an important construction and roading material required for a growing city. While this is a higher-level plan that discusses all aspects of city operation and growth, acknowledgement in this document should allow this to flow through into more specialised resource management plans and strategies as they are developed.

This approach identifies strategic issues and pressures in the region. Access to aggregate resources and the adverse effects of quarrying are considered alongside the provisions for growth including transport and infrastructure planning, which has been integrated into the district plan.

## Provision for potential future aggregate resources

A number of plans recognise the need to provide for access to significant aggregate resources in the future and the need to limit incompatible activities in these areas. This is generally achieved through the resource consent process and considerations. However, the [Waikato District Plan \(partially operative\)](#) example goes further in using a set of specific criteria to identify which resources require additional consideration as opposed to giving protection to all potential aggregate resources. Although this approach is relatively new and yet to be tested in operation, it provides more specific identification and consideration of certain aggregate resources. This, in turn, gives more certainty to landowners and quarry operators.

## Quarry management plans

Although not always a formal requirement (ie, through a policy or consent condition), Quarry Management Plans are a useful way to outline a range of operational details relating to the use and management of aspects of sites. In particular, the [Three Kings Quarry – Quarry Management Plan](#) provides for periodical meetings of a site liaison group consisting of the quarry operator, council and local community representatives. During these regular and ongoing meetings matters associated with the operation of the quarry which affect the community or of mutual interest are discussed.

## Application forms for mines, quarries and gravel extraction

The Waikato Regional Council provides a number of [consent application forms](#) for a range of activities, including one for small and large-scale mining and quarrying activities, and another for gravel extraction. Similarly, Environment Canterbury provide a specific form for gravel extraction.

The Waikato Regional Council form for mining and quarrying covers all the associated discharges to air, water and land from quarrying and provides useful guidance on what to include in an application at the outset. The form also requires information on water take and overburden placement and provides a comprehensive guideline of what to include in the assessment of environmental effects for applications relating to quarrying operations.

## Guidelines and education material for quarrying

An example of a strategy providing a framework for managing gravel extraction is the Canterbury Regional River Gravel Management Strategy produced by Environment Canterbury. The purpose of this strategy is to manage gravel extraction in a way that is environmentally sustainable, manages flood risk, and provides for aggregate needs of the wider Canterbury area.

[River Gravel Management Guidelines](#) produced by the Bay of Plenty Regional Council also provide useful reference material on gravel management. These are intended to be used for education, to complement the regulatory controls in the River Gravel Management Plan. The guidelines include background information on gravel sources, principles to manage adverse effects and operational guidelines for extraction and associated monitoring and reporting.



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The [Wellington Regional Council](#) has guidance on the extraction of gravel and shingle on its website. This provides information on the rules for extraction across coastal, river and inland environments.

### Key terms, definitions and concepts

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Definitions are provided in the context of aggregates and quarrying only.

- **Aggregate:** Particles of crushed rock, sand or gravel.
- **Best practicable option:** As defined in the s2 of the RMA.
- **Blasting:** The detonation of explosives to break rock.
- **Offsetting:** Undertaking actions to compensate for adverse environmental effects that cannot be avoided after appropriate mitigation measures have been taken.
- **Overburden:** Material, whether consolidated or not, that has to be removed before a mineral can be worked.
- **Recycled aggregate:** Aggregate resulting from the processing of inorganic material, previously used in construction.
- **Screening:** The separation of solid materials of different sizes by causing part to remain on a surface provided with apertures through which the remainder passes.
  
- **Quarry:** An open pit or excavation from which stone, sand, gravel or mineral is extracted.
- **Quarrying:** The land-based extraction of material, and typically this occurs in either an open pit (often referred to as a borrow pit) or along a hill-side. While in some situations the material may be loose (like a river bed), often it is solid rock which requires blasting or rock-breaking to initially dislodge the material before mechanically shifting to stock-pile areas or crushing areas. In most cases, quarrying occurs on privately owned land.
- **Gravel Extraction:** The extraction of loose material from the beds of watercourses, predominantly rivers. This material normally only requires mechanical extraction before stockpiling and crushing. Given gravel extraction involves the removal of gravel from waterbodies, they are often located in public areas where the public can access.



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