# Dust Control

*Water can be used as a dust suppresant.*

Dust is the product of wind erosion, much as sediment is the product of erosion by water. Dust can be generated when soil that is repeatedly disturbed and broken down into finer particle size is then subjected to windy conditions. On some susceptible soils (such as some volcanic ashes) the dust problems associated with earthworks can be severe, and difficult to control. Repeated tracking of soils with machinery not only breaks down the soil particles but also aerates the soils so that they become quite “fluffy” and suspended as particulate material in the air. The problem is directly related to particle size, and is similar in principle to sediment control where finer particles are more difficult to settle out.

Particle sizes of less than 0.15 mm (fine sand and smaller) are susceptible to saltation and suspension by wind, and capable of causing dust problems off site. As the strength of the wind increases, the potential for dust problems increases exponentially. (The rate of soil movement is proportional to the cube of the wind velocity).

On high-risk sites that have had no dust management, the fine soil on the ground can be very dry and aerated, and roll in waves as machines pass even when there is no wind to exacerbate the problem. Once the site is subject to any wind, the dust problem is very difficult to control.

Dust from problem sites can travel for kilometres and cause a range of problems to health and property. While most sites have a prevailing wind from a particular quarter, the wind can blow from any direction. In that respect, dust can be more difficult to control than soil erosion from stormwater.

## Dust Management Plan

Dust management should be considered early in the planning stages of any earthworks project. Forward planning and management to minimise dust problems provide the best options for control. If dust management is only addressed after it has become a problem on-site, it is almost impossible to bring under effective control.

A Dust Management Plan should be prepared prior to any works being undertaken. In the Bay of Plenty, where resource consents are required for some earthworks operations, a Dust Management Plan is a necessary part of the consent application.

The main practice used to control dust on earthworks sites is the application of water to keep soil moisture high enough to prevent dust generation.

A Dust Management Plan should include the following:

- The potential effects of dust problems if dust causes a nuisance off site.
- The soil characteristics of the site and whether the timing of operations will help or hinder dust control.

- Any considerations that have been given to operational methodology to reduce the dust problems e.g. restricting the amount of bare ground exposed, staging of works etc.

Type of controls to be used:

**Water**
The plan should detail the water source, source capacity and availability. If the source is marginal, then on-site storage may be necessary. If it is proposed to source water from municipal reticulated water supply then written confirmation from the territorial authority will be required for consent purposes.

Water should be applied as a dust suppressant at a rate of at least 5 mm/day (50 $m^3$/hectare) before soil moisture levels start to drop. This can vary with individual sites, and prevailing weather conditions, but consideration should be given to applying water after 7 days without rain during spring/summer periods on susceptible sites. This period can be reduced markedly in windy conditions, where on-site conditions should be assessed to commence treatment. Water should continue to be applied until the next rainfall event that results in surface runoff from the site.

**Dust Suppressants**
There is a range of different brands of dust suppressants available. They are normally a proprietary blend of naturally derived surfactants and acrylic polymers, provided in an aqueous emulsion form so that they dissolve readily in water for easy application. Upon application, they provide a protective surface that reduces dust emissions. Alternatively, some dust suppressants act as a binder. These include salts ($CaC_{l2}$, and $MgC_{l2}$), and lignin sulfonates. Chemical suppressants include salts, lignin sulfonate, wetting agents, latexes, plastics, vegetable oils and petroleum derivatives. Note that the use of petroleum derivatives may require specific resource consent.

**Other Methods**
Stabilisation of the ground surface by application of aggregate, tackifier (hydrosyeeding) or establishment of vegetation.

Other methods that may be used rely on surface protection, surface roughening or reducing wind velocity. Surface roughening is not commonly used in the Bay of Plenty, as the soils are generally not well suited to this method of control. Reducing wind velocity can be accomplished using small windbreaks (similar to silt fences), and may be appropriate for small areas.

A Dust Management Plan normally also provides for signs at an earthworks site giving a 24 hour contact number for dealing with dust complaints that may arise from the operations. The provision of this 24-hour contact number ensures that the contractor has a management plan in operation to deal with dust control.

The timing of works can be crucial for dust management. If the earthworks can be carried out during the wetter winter season with minimal erosion and sediment control problems, then dust control will be less of a problem. This may be an option if the works site can be isolated with little or no stormwater discharge off site, or if the works are on sand country with little off site erosion or sedimentation effects.

# Example Dust Management Plan

## Introduction

This Dust Management Plan shows how the consent holder will avoid or reduce the effects of dust from this site on other properties.

This plan relates to (name of activities).

## Potential Effects Area

This Plan considers:

- • the distance to the nearest potentially affected neighbour (~ XXX m) and
- • the ambient air quality. This is characterised by particulate matter generated by both rural and industrial land uses in the XXXX area.
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## Management Measures

The following steps will also be used as part of this dust management plan:
Water carts will be used regularly during dry weather to dampen unsealed roads and other exposed areas at the construction site. The need for using water carts will be assessed on a daily basis by the Site Manager. Because there are few commercial water cart operators in the locality, the consent holder has arranged for a water cart to be located on site .

In dry conditions, vehicle speeds along any unsealed site access road will be kept below 5 km/h (note: the ability to reach this speed within the site is limited, but this limit could be beneficial elsewhere in the area).

The main construction access areas will either be sealed or will be constructed with large roading aggregate to minimise dust.

Vegetation clearance will be avoided in excessively dry conditions, or vegetation removal areas will be dampened down with sprinklers.

The area of the site which is exposed at any one time will be staged. This will avoid exposing large areas before they are needed for construction. Areas not needed for any site development purpose will be grassed or secured as far as practicable.

There will be a water supply available on site which is enough to apply up to 1 litre/$m^2$/hour during dry periods (ie on a 5 hour per day basis, this is equivalent to 50 $m^3$/hectare). For staged earthworks, proposed permanent construction surfaces and sealed roads it is not expected that daily water demand would exceed XXX$m^3$/day.

Dust generation from stockpiles will be minimised by one of the following measures:

- covering with sheeting
- grass seeding/hydroseeding
- dust suppressant application
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The general principles of the Ministry for the Environment “Good practice guide for assessing and management the environmental effects of dust emissions” will also be followed.

## Complaints Management

A public notice will be posted at the site entrance and any other site boundary that the regional council (Environment Bay of Plenty) considers to be sensitive to dust emissions. This notice will outline site contacts for complaints, including an after hours complaints phone number.

Every complaint will be recorded in the environmental log, noting the time and nature of complaint, complainant details and the weather conditions at the time.

The Site Manager will investigate the cause of the complaint (within one hour of the complaint being made) and take appropriate action and advise the complainant of the action taken.

Complaints and any action taken will be advised to the Regional Council on a weekly basis.