



GOVERNMENT
OF GIBRALTAR

DUST - BEST PRACTICE GUIDE

The control of dust emissions from demolition and construction

Department of the Environment

In pursuance to Regulation 9 of the Control of Dust Regulations 2010 the Minister for the Environment & Tourism being satisfied that this document promotes the prevention or reduction of dust emissions has approved this document as a code of practice and it is issued for the purpose of providing practical guidance with respect to the technical requirements of the Control of Dust Regulations 2010.

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1. Introduction

Gibraltar, like other densely populated cities in the world, suffers from air pollution. This originates from a number of different sources including traffic, electricity generation and construction work. Although in general, levels of pollutants meet the necessary EU requirements, particulate matter has exceeded the limit values set. Dust emissions from demolition and construction work can adversely affect air quality but these impacts can be reduced through careful planning and good management.

This document is intended to provide best practice guidance to reduce emissions from construction and demolition sites around Gibraltar.

1.1 Impacts of air pollution from construction and demolition sites on the environment

Airborne dust emissions from construction sites, and construction-related activities, can cause a number of problems. For the purposes of this guide dust is defined as all particulate matter up to 75 µm in diameter and comprising both suspended and deposited matter.

Particulate matter (PM₁₀) is defined as a mass fraction of airborne particles with an aerodynamic diameter of 10 microns or less. It is comprised of coarse particles (2.5 – 10 µm in diameter) which are primarily from non-combustion processes and fine particles (less than 2.5 µm), which include combustion processes or are formed in the atmosphere through the chemical reaction of primary emissions of gases.

1.1.1 Health Impacts

Particulate matter contains microscopic solids or liquid droplets that are so small that they can travel deep within the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:

- increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing, for example;
- decreased lung function;
- aggravated asthma;
- development of chronic bronchitis;
- irregular heartbeat;
- nonfatal heart attacks; and
- premature death in people with heart or lung disease.

People with heart or lung diseases, children and older adults are the most likely to be affected by particle pollution exposure. However, even someone with no underlying health problems may experience temporary symptoms from exposure to elevated levels of particle pollution.

1.1.2 Environmental Effects

Particulate matter also causes significant environmental problems including reduced visibility and the pollution of air and water. This pollution can result in the acidification of nearby water bodies; changes in nutrient concentrations in coastal waters and large river basins; the depletion of nutrients in soil and can affect the diversity of ecosystems.

Particle pollution can also cause aesthetic damage, staining and damaging stone and other building materials, spoiling property and other belongings.

Dust can become airborne during construction, demolition or when soil and building materials such as aggregates are exposed or left uncovered. Wind then picks up dust particles and carries it off-site. Depending on the size these dust particles can be transported over great distances.

The most common sources of dust include:

- Demolition activities
- Site preparation activities
- Construction activities
- Vehicle movement
- Uncovered stockpiles
 - Construction associated activities

Effective dust control can help to mitigate some of these effects and result in numerous benefits:

To the Contractor.

- Enhanced business reputation
- Better working conditions for staff
- Better working relationships with clients and the community
- Improvements in relations with regulatory authorities

To the neighbours & community

- Fewer disruptions to everyday living
- Reduction of health risks resulting from air pollution
- Reduced risk of damage to property & belongings

To the environment

- Reduction in air pollution
- Reduction in water pollution
- Fewer disturbances to existing flora and fauna

2. How this guidance should be used

This guidance has been designed to be used by developers, architects, environmental consultants and any other parties involved in any aspect of the construction process (including demolition and other associated activities).

The guide establishes best practice that is relevant and achievable with a view to protecting the health of the public and the environment. It also aims to provide an overall mechanism to deal with the cumulative impacts of the many individual construction sites within Gibraltar.

The guidance follows a hierarchy to control emissions of dust and other pollutants from construction activities:

1. Prevention
2. Suppression
3. Containment

These three principles are embedded in this guidance and are used in a way that is appropriate to the scale of the development and the potential exposure of site workers, residential neighbours and other susceptible receptors.

In this guidance, the term “Construction Activities” includes any other associated activity.

The following chapter outlines how to assess a particular development for its potential risk and what controls and measures should be put in place as a result.

3. Site Evaluation

It is essential to have effective dust and emission control measures in place for every dust generating activity carried out on site, not only to protect the health and safety of the on-site work force but also to protect the health of the wider public and to prevent unnecessary environmental pollution. The site evaluation process therefore applies to all proposed construction activities, including site clearing, demolition and construction phases. The site evaluation must be conducted prior to the commencement of any works.

In order to successfully control demolition and construction activity, it is important to first evaluate the risk from pollutants emitted from the site. This process will bring additional benefits such as a reduction in the number or nuisance complaints, the majority of which relate to dust and noise emitted from construction activities. At the pre-planning stage the site manager or developer should:

1. Identify whether the demolition/construction site represents a medium or high risk by following the guidance provided in the following section;
2. Determine the risks and best practice measures that could be required for mitigation
3. Undertake an air quality risk assessment and outline how each risk will be mitigated on site
4. Submit the risk assessment to the Environmental Agency and the Department of the Environment for assessment and to inform pre-planning discussions

3.1 Site Evaluation

A site manager's need and ability to deploy effective control measures will be largely dependent on the size and scale of the works. This guidance uses three criteria to determine the potential impact of construction activities and demolitions, namely:

- The area taken up by the site
- The number of properties being developed
- The potential impact of the development, or works, on sensitive receptors such as housing, schools, hospitals and other building uses which would be affected by high levels of air pollution or dust.

The potential for a site to impact upon sensitive receptors is dependant on a number of factors including the following:

- Location of the site
- Proximity of sensitive receptors
- Whether demolition will take place
- Extent of intended excavation
- Nature, location and size of stockpiles and the length of time they are to be on-site

- Occurrence and scale of dust generating activities – including cutting, grinding and sawing
- Necessity for on-site concrete crusher or cement batcher
- Number and type of vehicles and plant required on-site
- Potential for dirt or mud to be made airborne through vehicle movements and
- Weather conditions

Site Evaluation Guidelines

Given Gibraltar's small size it is felt that all development will have some level of impact upon the surrounding environment therefore there will be no low risk development sites on the rock.



Medium Risk Sites

- Development of up to 2500 square metres of land
- Development of between one and 150 properties
- Potential for emissions and dust to have an intermittent or likely impact on sensitive receptors



High Risk Sites

- Development of over 2500 square meters of land
- Development of over 150 properties
- Potential for emissions and dust to have a significant impact on sensitive receptors

Mitigation measures for medium risk sites

Medium Risk

Site Planning

- Erect solid barriers to site boundary
- No bonfires
- Plan site layout - machinery and dust causing activities should be located away from sensitive receptors
- Identify responsible person in charge
- Hard surface site haul routes

Construction Traffic

- All vehicles to switch off engines - no idling
- All loads entering and leaving site to be covered
- No site runoff of water or mud
- Hard surfacing and effective cleaning of haul routes and appropriate speed limit around site

Demolition works

- Use water as dust suppressant
- Cutting equipment to use water as suppressant or suitable local exhaust ventilation systems
- Securely cover skips and minimise drop heights
- Wrap buildings to be demolished

Site Activities

- Minimise dust generating activities
- Use water as dust suppressant where applicable
- Enclose stockpiles or keep them securely sheeted
- If applicable, ensure concrete crusher/batcher has permit to operate

Mitigation measures for high risk sites

High Risk

Site Planning

- Erect solid barriers to site boundary
- No bonfires
- Plan site layout - machinery and dust causing activities should be located away from sensitive receptors
- All site personnel to be fully trained
- Trained and responsible manager on site during working hours to maintain log book and carry out site inspections
- Hard surface site haul routes
- Put in place real time dust monitors across site

Construction Traffic

- All vehicles to switch off engines - no idling
- Effective vehicle cleaning and specific wheel washing on leaving site & damping down of haul routes
- All loads entering and leaving site to be covered
- No site runoff of water or mud
- Minimise movement of construction traffic around site
- Hard surfacing and effective cleaning of haul routes and appropriate speed limit around site

Demolition works

- Use water as dust suppressant
- Cutting equipment to use water as suppressant or suitable local exhaust ventilation systems
- Use enclosed chutes and covered skips
- Wrap buildings to be demolished

Site Activities

- Minimise dust generating activities
- Use water as dust suppressant where applicable
- Cover, seed or fence stockpiles to prevent wind whipping
- Re-vegetate earthworks and exposed areas
- If applicable, ensure concrete crusher/batcher has permit to operate

4. Dust Control Plan

A Dust Control plan should cover all phases of the development, or works, and take account of all contractors or sub-contractors. It should be submitted to the Environmental Agency and the Department of the Environment prior to any works being carried out and should include a site evaluation (see previous section) and a timetable of dust generating activities accompanied by the proposed dust control measures.

The exact content of the dust control plan will be determined by the site evaluation but typical features to include are:

For all sites:

- Summary of work to be carried out
- Description of site layout and access – including proposed haul routes, location of site equipment including supply of water for damping down, source of water, drainage and enclosed areas
- Inventory and timetable of all dust generating activities
- List of all dust and emission control methods to be used
- Details of any fuel stored on site
- Identification of an authorized responsible person on-site for air quality. Ideally this person should have knowledge of pollution control and vehicle emissions
- Summary of monitoring protocols and agreed procedure of notification to the Environmental Agency and the Department of the Environment
- A site log book to record details and action taken in response to exceptional incidents or dust causing episodes. It should also be used to record the results of routine site inspections.

Additional information for high risk sites

Details of the contractor's workforce training in areas such as health and safety, best practice methods, site housekeeping, reporting procedures and communication must be made available. All staff should have some training of on-site pollution policy, perhaps as part of site induction training.

Specific site issues

The following issues should also be included within the Dust Control plan:

Asbestos

For sites with potentially asbestos-containing materials, a separate method statement will need to be produced by a specialist asbestos treatment contractor. This should be approved independently to ensure that no person at work not member of the public is exposed to a harmful release of asbestos during works.

Contaminated Land

It may be appropriate for the site manager to consider the following in relation to the Dust Control plan:

- Inclusion of contaminated land issues in the context of identifying potential emissions to air and protecting human health
- Providing details of specific control measures for sites with potential contaminated land issues
- Site Managers should refer to the appropriate departmental guidance:
 - o Piling into Contaminated Sites
 - o Development on potentially contaminated land
 - o Land affected by Contamination – Technical guidance for applicants and developers

5. Dust and emissions control measures

Site managers must ensure that all on-site contractors employ Best Practicable Means (BPM) at all times to minimize dust and emissions. The following sub-sections identify the activities that are most likely to produce dust and outlines BPM. These measures are intended to be stringent but achievable in line with BPM to deal with the specific pollution problems facing Gibraltar. All appropriate measures should be included in the site management plan.

5.1 Pre-site preparation

For all sites with areas of open ground that are close to sensitive receptors, site managers should follow best practice to prevent dust and other pollutant emissions from being carried outside the boundary.

●● Medium risk and High risk

- Machinery, fuel and chemical storage and dust generating activities should not be located close to site boundaries and sensitive receptors if at all possible
- Erect solid barriers to site boundary

5.2 Haul Routes

5.2.1 *Surface of roads*

Unpaved haul routes can account for a significant proportion of fugitive dust emissions, especially in dry or windy conditions, when the generation of dust through the movement of vehicles is exacerbated. It is recommended that to comply with good practice, site managers should ensure that hard surfaces or paving are used for all haul routes, even if routes are temporary.

● Medium Risk

- Use consolidated surfaces on roads near to residential areas
- Hard surface all major haul routes through the site (e.g. use concrete blocks or tarmac)
- Regularly inspect haul routes for integrity and repair when required
- When haul route changes, re-use surface where possible.

● High Risk

- As for medium risk sites. In addition, lay roads to a camber to prevent puddles

5.2.2 *Damping down*

Site managers must ensure that haul routes, both within and outside the site, are regularly washed or damped down. This is particularly important for sites close to residential properties or other sensitive receptors.

- Medium Risk
 - Use agreed wet cleaning methods or mechanical road sweepers on all roads at least once a day
 - Clean road edges and pavements using agreed wet cleaning methods
 - Provide hard standing areas for vehicles and regularly inspect and clean these areas.
- High Risk
 - As for medium risk sites
 - Use fixed or mobile sprinkler systems to clean roads at least once a day
 - Remove any dust or debris deposited on public highways

5.2.3 Vehicles

All site managers should carry out the following controls to reduce dust and particulates associated with vehicles such exhaust emissions, the contact of tyres on the road surface or dust blowing from the materials carried:

- Medium Risk
 - All vehicles should switch off engines – no idling
 - Wash all vehicles effectively before they leave a site if there is a risk of affecting nearby sensitive receptors
 - All loads entering and leaving site to be covered
 - Wheel wash all vehicles before the leave site
 - Hard surface haul routes and clean them effectively
 - Impose an appropriate speed limit around the site
- High Risk
 - As for medium risk sites
 - Fixed wheel and/or vehicle washing at site exit
 - Use fixed or mobile sprinkler systems to clean internal and external roads at least once a day

5.3 Site entrances/exits

Site Managers should employ the following control measures to help prevent dust being spread outside the site boundary by site vehicles at entrances and exits.

- Medium Risk
 - Provide a control zone around the site boundary to protect sensitive receptors (this could include an area of hard standing)
 - Provide effective vehicle cleaning and specific wheel washing facilities at all exits; with hose pipes, adequate water supply and pressure and mechanical wheel spinners or brushes.

- High Risk
 - As for medium risk sites
 - Put in place fixed wheel washing at all exits as well as procedures for effective cleaning and inspection of vehicles, which should include total vehicle washing and ticketing of vehicles
 - Vehicles carrying dusty materials should be securely covered before leaving the site
 - All information relating to vehicles entering/leaving the site should be entered into a log book

5.4 Excavation and earthworks

Excavation and earthwork activities can be a potential source of dust outside the site if they are not properly controlled. If these activities are essential then site managers need to act to minimize dust disturbance.

- Medium risk and High risk
 - All dusty activities should be damped down, especially during dry weather
 - Re-vegetate earthworks and other exposed areas to stabilize surfaces
 - Only remove secure covers in small areas during work and not all at once
 - Use hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil
 - Minimise drop heights to control the fall of materials

5.5 Stockpiles & Storage Mounds

Site managers should avoid the use of long-term stockpiles on-site wherever possible unless it performs the function of visual or noise screening. If necessary, the following measures should be put in place:

- Medium Risk
 - Make sure that stockpiles exist for the shortest possible time
 - Do not build steep sided stockpiles or mounds or ones which have sharp changes in shape
 - Keep stockpiles away from the site boundary, sensitive receptors, water courses and surface drains
 - Enclose stockpiles or keep them securely sheeted
- High Risk
 - As for medium risk sites
 - Take into account the prominent wind direction when siting stockpiles to reduce the likelihood of affecting sensitive receptors
 - Seed, re-vegetate or turf long-term stockpiles to stabilize surfaces or use surface binding agents that have been approved by the Department of the Environment
 - Re-use hard core material where possible to avoid unnecessary vehicle trips

- Erect fences or use windbreaks such as trees, hedges and earth banks of similar height and size to the stockpile to act as wind barriers and keep these clean using agreed wet methods
- Store fine or powdery material (under 3mm in size) inside buildings or enclosures
- Contact the Environmental Agency if you need to stockpile waste material offsite, whose disposal is subject to the Part VA of the Public Health Act (waste regulation)

5.6 Cutting, grinding and sawing

Ideally these activities should not be conducted on site and pre-fabricated material should be brought in wherever possible. In cases where such work is necessary, then the following techniques should be employed:

- ● Medium risk and High risk
 - Use dust extraction techniques where available
 - All other equipment should be fitted with water suppressant systems
 - Use local exhaust ventilation
 - Service all fans and filters regularly to ensure they are properly maintained

A simple method to reduce dust emissions when cutting or grinding

This method is suitable for all sizes of demolition or construction sites. When materials such as concrete slab or bricks are cut with a power tool without extraction or suppression, a second worker can pour water from a plastic bottle over the material as it is being cut. This greatly reduces the amount of dust generated and can stop the occurrence of a statutory nuisance.

5.7 Chutes & Skips

- Medium Risk
 - Securely cover skips
 - Minimise drop heights to control the fall of materials
 - Regularly damp down surfaces with water
- High Risk
 - As for medium risk sites
 - Completely enclose skips whenever possible
 - Hard surface areas where skips are to be stored
 - Reduce drop heights by using variable height conveyors or chutes

5.8 Scabbling

Scabbling is the process of grinding concrete using a machine tipped with steel or carbide material to rapidly pound it. The following measures should be in place at **all** sites to comply with BPM:

- Pre-wash work surfaces
- Screen off work areas
- Vacuum up all dusty residue rather than sweeping away

5.9 Waste Disposal & Burning

Taking into account air pollution objectives and nuisance legislation (Public Health Act) this guidance recommends that:

- No burning of any material is permitted on site
- All excess material should not be wasted but used or safely removed from site according to appropriate legislation



High Risk

- In addition to the above, the Site manager should produce a waste or recycling plan. This should include the following best practice procedures:
 - Identify the waste types that are likely to be produced and aim to reduce the amount of waste as much as possible through identifying routes to reuse or recycle materials
 - Control access to storage areas to minimize risk of theft or damage
 - Set up a dedicated store for timber, from which workers can re-use supplies
 - Store any materials away from sensitive locations in fenced off areas
 - Label all waste storage and skips, detailing the type of waste
 - Employ a just in time policy to deliver materials in order to reduce the storage time on site
 - Consider using recycled materials and recycle any materials used on site rather than disposing of them (including timber, aggregates, soil, tarmac, bricks, masonry, concrete and glass).
 - If practicable, remove materials for recycling from buildings prior to demolition or from demolition spoil.

5.10 Dealing with spillages

For all sites the following measures should be followed:

- Use bunded areas wherever practicable
- Regularly inspect the site area for spillages
- Have spillage kits readily available
- Clean spillages using agreed wet handling methods
- Vacuum or sweep regularly to prevent the build up of fine waste dust material
- Inform the Department of the Environment and Environmental Agency if harmful substances are spilled

5.11 Demolition activities

Examples of best practice in demolition include:

- Sheet and screen buildings with suitable material and where possible strip inside buildings before demolition begins
- Ensure that a specialist contractor removes any asbestos before demolition
- Materials should be removed from site as soon as possible. If stored, techniques covered in section 5.5 should be employed
- Avoid explosive blasting where possible and consider using appropriate manual or mechanical alternatives
- Bag and remove any biological debris or damp down before demolition

5.12 Hazardous or contaminated materials

Site Managers must ensure that they take into account risks to the workforce from exposure to any harmful substances generated by work activities. Construction sites are often associated with activities that emit volatile organic compounds (VOCs) such as use of paints, adhesives, bitumen products and concrete and timber treatments. Emphasis should be placed on preventing or reducing emissions at source and where this is not possible personal protective equipment may be required.

5.13 Vehicle controls

Vehicle exhausts emit various pollutants including nitrogen oxides, carbon dioxide and particulate matter. As such, controls should be put in place to limit these emissions.

- Medium Risk
 - No vehicles or plants will be left idling unnecessarily
 - Engines and exhaust systems should be regularly serviced according to manufacturer's recommendations
 - All vehicles should hold current MOT certificates
 - Vehicle exhausts should be directed away from the ground and positioned so they are not directed at site entrances
 - Reduce number of vehicle movements through better planning
 - Consider using consolidation centres to ensure that only the materials needed for the job access the site
 - Set an appropriate speed limit on haul routes
 - Clearly label all vehicles associated with the contract
- High Risk
 - As for medium risk sites
 - Where works on site occur close to residential or other sensitive receptors near the site boundary, non-essential vehicles and machinery should not enter these areas
 - Control queuing or parking of vehicles outside the site, both during and before the site opens

- Avoid use of diesel or petrol powered generators by using mains electricity or battery powered equipment where possible and health and safety permitting

5.14 Specific site activities

Other activities, specific to some demolition and construction sites, also have the potential to generate dust without proper control. Best practice for each activity is outlined below.

Sand, grit and shot blasting

- Use agreed wet processes, sheet areas to contain dust and use silica-free material.

Planning and sanding

- Use fans and/or filters, dust suppression techniques and water sprays.

Fitting out

- Fit all machinery for activities such as plastering, sanding or rendering with dust suppression/collection equipment.
- Vacuum all waste material

Tarmac laying and use of bitumen

- Do not overheat bitumen and cover pots
- Use great care in all processes to prevent spillages and extinguish any accidental fires immediately

6. Site Monitoring

6.1 Site Monitoring Protocols

If the best practicable means identified in Section 5 are employed correctly then the formation of dust and harmful emissions from construction sites should be minimized significantly, however, continuous on-site monitoring is still important to help manage dust and PM₁₀ emissions from construction and demolition activities.

This section specifies air quality monitoring protocols that should be observed according to the identified risk of the site. Air pollution monitoring should be undertaken for all demolition and construction sites. The extent of this monitoring will vary from a visual assessment for low risk sites to the installation of real time automatic monitors for PM₁₀ for high risk sites. The Department of the Environment in conjunction with the Environmental Agency will provide advice on the appropriate air quality monitoring procedure and timescale – the requirements of which will be determined on a case by case basis.

When it is determined that a site requires automatic real time monitoring to be carried out by the site manager, two frequently used procedures are:

- Monitoring along a transect (straight line) across the construction site, set up in the direction of the prevailing wind. This will allow the site manager to take into account background levels to determine the relative contribution of air quality and dust emissions from the construction site. Prior monitoring if background air quality may not be needed in this case
- Monitoring to take place close to sensitive receptors to assess any impact at these locations



- Medium Risk
 - Employ best practice methods
 - Keep an accurate log of complaints from the public
 - Determine the prevailing wind direction across the site
 - If measuring along a transect:
 - set up a transect across the site according to the direction of the prevailing wind
 - Operate a minimum of two automatic particulate monitors to measure PM₁₀ levels at either end of the transect – either inside or outside the site boundary. These instruments should provide data that can be downloaded in real-time.
 - If monitoring at sensitive receptors:
 - identify which location(s) need to be monitored and set up an automatic particulate monitor at each of these to measure representative PM₁₀ levels. These instruments should provide data that can be downloaded in real-time.
 - If relevant, supplement monitoring with hand held monitors to get on the spot readings at selected points, such as close to sensitive receptors

- Consider monitoring dust deposition and soiling rates as these can be used to indicate nuisance



- High Risk
 - As for medium risk sites
 - Set a site action level (see section 6.2)
 - Carry out dust deposition and soiling rate assessments following recommended procedures
 - Carry out a visual inspection of site activities, dust controls and site conditions and record in a daily log
 - Identify a responsible person on-site for dust monitoring who can access real-time PM₁₀ data from automatic monitors (i.e. at hourly or 15 minute intervals). Ensure that adequate quality assurance/quality control is in place.
 - Agree a procedure to notify the Environmental Agency and Department of the Environment so that immediate and appropriate measures can be put in place to rectify any problem. Alert mechanisms could include e-mail, texts or alarm systems.
 - Set up 24 hour phone hotlines so that residents can complain about high dust or PM₁₀ levels directly to the developer and/or site manager. Consider circulating summaries of monitoring results to the local community.

6.2 Site action levels

It is common procedure in other countries to set a maximum action level for PM₁₀ levels at the boundary of a work site. Based on UK guidance on this matter, this document recommends that a site action limit should be set, based on the risk assessment and background PM₁₀ level and this limit should be agreed with the Department of the Environment and Environmental Agency before the commencement of works. A minimum site action is recommended to be 250 µg/m³ over 15 minutes, especially important for high risk sites. If this level is breached it may indicate that best practice is not being achieved.

Where the site level is at risk of being exceeded, site managers should check that best practice is in place. When a site action level is being significantly breached site managers should stop work whilst ensuring that best practice measures are in place before re-starting. It should be noted that the Environmental Agency may use breaches of site action levels as a basis for making site visits and will use all powers at their disposal to prevent a statutory nuisance.

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