CONTROL OF DUST

From Construction And Demolition Activities

24 Jupps Lane



Introduction

1.1 BACKGROUND

Nuisance dust emissions from construction and other civil engineering activities are a common and well-recognised problem. Fine particles (less than 10 μm in diameter, known as PM_{10}) from these sources are now recognised as significant causes of pollution. Owing to their small size, they can be carried from sites even in light winds and may therefore have an adverse effect on the local environment and on the health of local residents, as well as on those working on the site.

This document describes the control measures Seaview Building Company will follow during this project as well as guidance for all activities that could result in pollution of the neighboring properties.

1.2 HEALTH EFFECTS

Dusts from construction processes contain a wide range of particle sizes and material types (eg silica) and can cause both minor and serious health problems. They can also cause discomfort to the eyes, nose, mouth, respiratory tract and skin.

The larger particles, tend to settle out of the air quickly and are mostly a health hazard to the operators of plant and equipment and those in the immediate area. They enter the nose and mouth during breathing and settle in the upper airways. The smaller particles, known as PM_{10} are usually invisible and may not seem to be an obvious hazard. However, they can be carried much further in the air and can cause health hazards both to workers on the site and to people living and working outside the site boundary in the local neighbourhood. They penetrate much further into the airways, down to the alveoli in the deep lung areas.

Health effects from particles and fibres from certain materials are immediate while those from other types of materials may take many years to develop. It is therefore essential that exposure to all forms and sizes of particle pollution is kept to a minimum, both for workers on site and for other people living and working outside the site boundary.



Potential effects of particles on people and the environment

People/resources affected	Potential effects
People	
People at home, workplaces, community facilities, schools, hospitals etc	• Health effects from particles of dust getting into eyes and mouth, falling onto the skin, hair and lips and smaller particles getting into the respiratory tract. • Nuisance through surface soiling.
Environmental resources	
Landscape	• Loss of visual amenity through deposition.
Nature conservation	• Covering of the leaf surface, resulting in shading and consequently reduction in net photosynthesis, altered pigment levels and/or reduced productivity. • Blocking of stomatal pores to prevent them from fully functioning. • Alteration of leaf surface chemistry that may affect disease resistance. • Addition of nutrients from the dust that may lead to increased growth and/or deficiencies. • Changes in pH levels over time if the dust has different pH conditions to surrounding soils.
Water environment	• Soil pollution via deposition from the air or water run-off. • Creation of a surface film on still water bodies. • Increase in suspended and dissolved material in water courses with knock-on effects on aquatic ecology.
Air quality	• Increased atmospheric particle concentrations.
Cultural heritage	• Surface soiling and damage during cleaning.

1.3 ENVIRONMENTAL AND NUISANCE EFFECTS

Dust emissions arising from construction activities can cause nuisance both within the site and outside the site boundary. Within the site, dust can cause mechanical or electrical faults to equipment and will increase abrasion of moving parts in plant and clogging of filters. In the surrounding environment, it can cause annoyance to neighbors by the soiling of property, in particular, windows, cars and also of washed clothes that have been hung out to dry.

Even very low concentrations of dust can affect plant and fruit growth. Plant growth is especially susceptible to dusts that are highly alkaline, for example, limestone and cement dusts.

Tables 1.2 and 1.3 give the Maximum Exposure Limits (MEL) and Occupational Exposure Standards (OES) currently in place for particle materials likely to be commonly produced during construction processes.

Table 1.2 Construction materials with a Maximum Exposure Limit (MEL)

Material	Long-term exposure limit (8 hr TWA) mg m^{-3}	Notes
Hardwood dust	5.0	Sensitiser*
Softwood dust	5.0	Sensitiser*
Silica (respirable crystalline)	0.3	
Man-made mineral fibre (MMF)**	5.0	

*Substances capable of causing respiratory sensitisation.
**Also has a MEL of 2 fibres per ml of air (8 hr TWA).

Table 1.3. Construction materials with an Occupational Exposure Standard (OES)

Material	Fraction (Total Inhalable or Respirable)	Long Term Exposure Limit (8 hr TWA), (mg m^{-3})
Calcium Carbonate	Total Inhalable	10
	Respirable	
Calcium Silicate	Total Inhalable	10
	Respirable	
Coal Dust	Respirable	2
Emery	Total Inhalable	10
	Respirable	
Gypsum	Total Inhalable	10
	Respirable	
Limestone	Total Inhalable	10
	Respirable	
Marble	Total Inhalable	10
	Respirable	
Mica	Total Inhalable	10
	Respirable	
Plaster of Paris	Total Inhalable	10
	Respirable	
Portland Cement	Total Inhalable	10
	Respirable	
Ground Granulated	Total Inhalable	10
Blastfurnace Slag (GGBS)	Respirable	4
Pulverised Fuel Ash (PFA)	Total Inhalable	10
	Respirable	
Silica (crystalline)	Total Inhalable	6
	Respirable	2.4
Silica (fused)	Respirable	0.8
Silicon Carbide	Total Inhalable	10
	Respirable	

Dust control measures

2.1 BACKGROUND

Dust and fine particle generation from construction and demolition activities can be substantially reduced through carefully selected mitigation techniques and effective management. Once particles are airborne, it is very difficult to prevent them from dispersing into the surrounding area. The most effective technique is to control dust at source and prevent it from becoming airborne, since suppression is virtually impossible once it has become airborne.

The control measures given in the following sections sets out techniques and methods we will use on this project , with many of the methods applicable to a variety of dust and particle problems.

2.2 HAULAGE ROUTES, VEHICLES AND CONSTRUCTION PLANT

2.2.1 Roads, surfaces and public highways

During dry and windy weather conditions, dust and mud from roads and haulage routes can become airborne through movement of vehicles, both on and outside the site Relevant control measures will be taken to minimise this problem

Since many of the techniques rely on washing and damping down, it is important that the run-off water does not itself become a source of water pollution.

Dust control for roads, surfaces and highways

Potential dust source	Dust control guidance
Construction and maintenance of unsurfaced roads and verges	• Grade fine materials from unsurfaced haul roads. • Keep in compacted condition using static sprinklers, bowsers, commercially available additives and binders
Public roads	• Clean regularly subject to Local Authority or Highway Authority approval.
Edges of roads and footpaths	• Clean by using hand broom with damping, as necessary.
High level walkways and surfaces (scaffold planking and other surfaces)	• Clean regularly using wet methods and not dry sweeping.
Vehicle waiting areas and hard standings	• Regularly inspect and keep clean by brushing or vacuum sweeping. • Spray regularly with water to maintain surface moisture if needed.

Vehicle and wheel washing		• Washing facilities, such as hose-pipes and ample water supply should be provided at site exits, including mechanical wheel spinners where practicable. • If necessary, all vehicles should be washed down before exiting the site.
Site traffic	Ð management	• Restrict general site traffic to watered or treated haul roads. • Keep vehicle movements to a minimum.
	Ð speed control	• Limit vehicle speeds Ð the slower the vehicle speeds, the lower the dust generation. Typical recommendations are: Ð 20 mph or less for surfaced roads Ð 5 mph for unmade surfaces.
Road cleaning		• Approved mechanical road sweeper should be readily available, with circular brush commonly fitted to side for cleaning kerbs, removed. • Frequency of cleaning will depend on site size, location and operation. However, cleaning should be carried out on a daily basis

Tarmac laying, bitumen surfacing and coating

It is difficult to avoid the production of black smoke particles with the types of hot bitumen processes commonly used in construction, although it can be minimised

Dust control for emissions from tarmac laying, bitumen surfacing and coating

Potential dust source	Dust control guidance
Bitumen over-heating	• Do not overheat bitumen, but use minimum acceptable temperature. • Measure temperature directly, especially on large heating plant. • Avoid if possible, heating with open flame burners.
Fume production	• Cover pots or tanks containing hot bitumen.
Small accidental fires	• Extinguish immediately.
Spillage	• Minimise spillages, especially any likely to contact open flames.
Direct application of open flames (ÔtorchingÕ)	• Use great care. • Avoid overheating the surface.

2.3 MATERIALS HANDLING, STORAGE, STOCKPILING, SPILLAGE, AND DISPOSAL

2.3.1 Handling, storage, stockpiling and spillage of dusty materials

Previously settled dust has the potential to become airborne during windy weather conditions. Solid fencing or hoarding will provide shelter from the wind and reduce the possibility of dust suspension from the ground. However, any improvement will occur only in the region of the fence.

Sheltering efficiency can be improved by using porous fences. Fence porosities (the fraction of the fence area that is open) up to 50% are best. The porosity can be achieved by vertical or horizontal slatting or by a mesh structure, as long as the element size is no more than about a fifth of the fence height. Hedges typically have the same properties. Areas of the site that are expected to be strong local sources of dust generation can be fenced in this way. In general, fences around for example stockpiles, need to be of the same approximate size as the object being protected or slightly larger, if they are to be effective.

Wet material is likely to dry out during periods of hot weather and more frequent damping will be required.

Dust control for emissions from handling of materials

Potential dust source	Dust control guidance
Material handling operations	• Always keep the number of handling operations to a minimum by ensuring that dusty material isnõt moved or handled unnecessarily.
Transport of fine powdery materials	• Use closed tankers.
Transport of dusty materials and aggregates	• Use enclosed or sheeted vehicles.
Handling areas	• Keep clean and free from dust.
Vehicle loading	• Use material handling methods that minimise the generation of airborne dust. • Damp down using water.
Loading materials onto vehicles and conveyors	• Drop heights must be kept to a minimum and enclosed wherever possible. • Damp down with water.
Chutes, skips and conveyor transfer points	• Drop heights must be kept to a minimum and enclosed wherever possible • Damp down with water.
Conveyor loads	• Damp down wherever possible.
Dust dispersing over the site boundary	• Use static sprinklers, bowsers, hand held hoses and other watering methods, as necessary.

Dust control for emissions from storage of powder material

Potential dust source	Dust control guidance
Bulk cement, bentonite and similar materials	• Delivered by tanker and stored in silos
Silos	• Ventilators should be fitted with particle filters.
Accidental spillages when filling or operating silos	• Methods and equipment for cleaning should be in place. If necessary, include the use of audible and visual alarm systems.
Fine, dry materials (less than ~3 mm in particle size)	• Store inside buildings or enclosures or with adequate protection from the wind eg by using sheeting.
Dry materials (greater than ~3 mm in particle size diameter)	• Store materials in bunded areas.
Storage location	• Store materials away from the site boundary and sensitive areas, wherever possible.

Dust control for emissions from stockpiles

Potential dust source	Dust control guidance
Stockpile location	• Stockpiles should be located away from sensitive receptors eg residential, commercial and educational buildings, places of public access or other features, such as watercourses.
Building stockpiles	• Ensure slopes of stockpiles, tips and mounds are at an angle not greater than the natural angle of repose of the material. • Avoid sharp changes of shape.
Small and short-term stockpiles Ð protecting from wind erosion	• Where possible, ensure stockpiles are kept enclosed or under sheeting. • Dusty materials can be damped down using suitable and sufficient water sprays. • Wind barriers (protective fences) of similar size and height to the stockpile may be used.
Larger and long-term stockpiles Ð protecting from wind erosion	• Shrouding, wind shielding using screens, watering and controlled spraying of the surface with chemical bonding agents, should be carried out (subject to necessary approval from the Environment Agency). • Wind barriers (protective fences) of similar size and height to the stockpile may be used. • Long-term stockpiles can be capped or grassed over.

Dust control for emissions from spillages

Potential dust source	Dust control guidance
Cleaning up	• Methods and equipment should be in place for immediate clean-up of spillages of dusty or potentially dusty materials.
Inspection	• Regularly inspect site for spillages.
Cement powder (and similar)	• Clean up spillages using wet handling methods.

2.4 SITE PREPARATION AND RESTORATION AFTER COMPLETION

Earthworks, excavation, soil stripping, earthmoving and landscaping can be significant sources of particle generation, especially during dry weather periods and, in particular, if followed by high winds. Surfaces will always be disturbed as little as possible, and stabilised as soon as possible afterwards.

Dust control for emissions during site preparation and restoration

Potential dust source	**Dust control guidance**
Earthworks, excavation and digging	• Vegetation and cover should be removed in discrete sections and not all at once. • Earthworks, excavation and digging activities should be kept damp and, if possible, be avoided during exceptionally dry weather periods.
Completed earthworks	• Stabilise surfaces and/or re-vegetate as soon as possible.
Storage mounds	• Seal surfaces by seeding or surface with vegetation that has previously been removed from the site. For example, turfing which has been removed may be stored and reused. • Alternatively, cover with correctly secured tarpaulins.
Landscaping	• Soils may be landscaped into suitable shapes for secondary functions, such as visual screening.
Transitory soil mounds	• Soil mounds should be treated with surface binding agents to reduce wind erosion. • Consultation with the Environment Agency is necessary before employing any binding agent.
Processing aggregates, crushing and screening	• Crushers should be sited as far away as possible from sensitive receptors. • Mobile plant for crushing, screening and grading of materials may require authorisation (under the Environmental Protection Act, 1990) by the appropriate Local Authority in whose area the operating companyÕsregistered office is situated.

Dust control for emissions during demolition activities

Potential dust source	Dust control guidance
Blasting using explosives	• Blasting should be avoided and other methods used wherever possible.
Sheeting/screening	• Buildings should be screened with suitable debris screens and sheets.
Biological materials	• Bird droppings and other biological material should be removed prior to demolition. • Care must be taken that the material does not become airborne, but is sufficiently contained.
Asbestos	• Asbestos must be removed by a registered specialist contractor prior to demolition.
Water sprays	• Suitable and sufficient water sprays must be used. • Spraying should be carried out prior to and during demolition
Chutes for dropping demolition materials to ground level	• Enclose chutes and skips. Regular water spraying should be carried out. • Material drop heights should be minimised.
Burning of waste materials, foliage etc	• Burning should be avoided if possible. If unavoidable, use incinerators rather than bonfires
Removal of materials from site	• Materials should be removed from the site as soon as is practical. Prolonged storage of debris on site or exposure to wind should be avoided.
Transport of materials	• Vehicles removing demolition materials must have their loads effectively sheeted.
Vehicle routes	• As far as practical, routes should be located away from residential and commercial properties.
Crushing of material for reuse, transportation or disposal	• Crushers should be sited as far away as possible from sensitive receptors. • Mobile plant, eg crushing, screening and roadstone coating plant, will require authorisation by the Local Authority in whose area the operating companyÕs registered office is situated.

Dust control for emissions from cutting, grinding and drilling

Potential particle source	Control guidance
Cutting, grinding, drilling, sawing, trimming, planing, sanding	• Cutting on site should be avoided by using prefabrication whenever possible. • Avoid cutting out errors and re-bars. • Employ equipment and techniques that minimise dust emissions, using best available dust suppression measures. • Use water sprays to minimise dust from cutting equipment. • Local exhaust ventilation should be used where possible. • Fans and filters should be serviced and maintained to ensure correct operation. • Design to fill wherever feasible rather than cutting back oversized work.
Cutting roadways, pavements, blocks etc	• Use a diamond bladed floor saw with water pumped through to suppress dust. • Standard angle grinders and disk cutters with no dust control should not be used for this purpose.
Raking out mortar/pointing	• Standard angle grinders and disk cutters with no dust control should not be used. • A mortar raking kit, fitted on to a standard 5Óangle grinder can be used on soft mortar. For hard mortar, a super-saw with oscillating blades can be used.
Angle grinders and disk cutters	• Dust extraction/minimisation systems should always be used.

Dust control for emissions from mixing processes

Potential particle source	Control guidance
Mixing and granular materials	• The use of pre-mixed plasters and masonry compounds is recommended. • The mixing of concrete or bentonite slurries should take place in enclosed or shielded areas. • Fine materials should be palletised and shrink wrapped where possible.

Dust control for emissions from scabbling, sand and gritblasting and façade cleaning

Potential particle source	Control guidance
Scabbling	If possible, scabbling should be avoided altogether. Alternative strategies include: • designing tolerances for infilling rather than cutting back oversize work • increasing the size of concrete pours to reduce the need for scabbling • the use of bonding agents • designing the concrete components themselves to affect interfaces • the use of wet grit blasting for outside work. If scabbling cannot be avoided then the dust emission risk should be assessed, including the size of area to be scabbled, material used, amount of dust likely to be emitted etc If necessary, the following control procedures should be used: • fit tools with dust bags • pre-wash work surfaces • screen off areas to be scabbled to limit the spread of dust • vacuum up, rather than sweep away residual dust as this can generate more dust than the scabbling operation itself.
Sand, grit or shot blasting and façade cleaning	• Silica-free material should be used for abrasive cleaning, since the inhalation of silica dust is harmful. • Wet processes should be used wherever possible. These introduce water into the air/grit stream, greatly reducing the dust hazard to both building occupiers and the general public. • Ensure that slurries do not dry out. If dry grit blasting is unavoidable: • assess the emission of dust (especially respirable dust) • sheet all work areas before commencement of operations • seal all windows and openings in the structure with polyethylene sheeting • use local exhaust extraction and filtering, if possible.

2.7 INTERNAL AND EXTERNAL FINISHING AND REFURBISHMENT

Finishing processes such as painting, decorating, fitting out, grouting and cleaning all have a potential for generating dust and fine particles and the following control measures will be implemented

Dust control for emissions from internal and external finishing and refurbishment

Potential particle source	**Control guidance**
Painting and decorating	• Sanding and cutting machinery should be fitted with dust suppression or collection equipment. • Vacuum cleaning should be used wherever possible.
Fitting out Ð plastering, rendering, decorative finishing, furniture fitting	• Cutting and sanding machinery should be fitted with dust suppression/collection equipment. • Vacuum cleaning should be used whenever possible.
Installation of electrical systems and plumbing Ð chasing of walls, soffits and floors	• Cutting and sanding machinery should be be fitted with dust suppression/ collection equipment. • Vacuum cleaning should be used whenever possible.
Installation of fire proofing and insulation (usually from man-made mineral fibres, such as mineral wools, special purpose and continuous filament fibres)	• Dust suppressants should be used when blowing fibres into voids and spaces. • Local exhaust ventilation should be used when handling and cutting fibrous insulating materials.
Cleaning processes	• Dry sweeping should be avoided and only carried out with vacuum extraction methods attached. • Damp sweeping using fine mist should be used. • Washing and damping down should be carried out whenever necessary.

Managing site operations for dust minimisation

3.1 PRE-PROJECT PLANNING

3.1.1 Identifying dust generating activities

Before the start of a project, it is important to identify which construction activities are likely to generate dust and to draw up risk assessments and control measures to minimise their effects.

3.1.2 Environmental risk assessments

Environmental risk assessments should be prepared for all dust generating processes and activities. CDM Regulations impose upon the designer a duty to ensure that, so far as is reasonably practicable, any design will conform with the following hierarchy of risk control:

- to avoid altogether, if possible, risks to the health and safety of any person at work on building, maintaining, repairing or carrying out cleaning work on a structure
- to combat at source risks to such persons
- to give priority to measures which protect the whole workforce over those which protect only the individual.

We will work together with designers to evaluate the hazards and risks likely to occur for each activity taking place on the site and find ways of avoiding or reducing them within the design.

In assessing the risks associated with dust generation from construction and demolition activities and the need for dust control measures, the following issues are considered:

- the nature of the activities to be carried out
- any dangerous or toxic materials (eg asbestos) likely to be encountered during demolition or refurbishment
- the weather conditions that are likely to prevail during dust generating operations
- the proximity of dust-sensitive receptors such as nearby schools, hospitals and residential, commercial and industrial areas
- the effects on the general public and road users
- any restrictions placed on the site by the client or facility manager.

Dust emissions from construction sites will mainly be the sum of a large number of small activities. Therefore, attention to detail is a critical feature of effective management of the total site emissions.

3.1.3 Method statements

Methods of dust prevention and suppression will be prepared well in advance of works starting on site.

A comprehensive method statement detailing the methods to be used will be drawn up for all relevant personnel to use. It is also necessary to have a management procedure to ensure that the appropriate parts of the method statement are communicated to the people who will be required to apply them.

The method statement covers the following:

- methods and materials that should be used to ensure that dust generation is minimised
- the use of prefabricated materials wherever possible
- optimum site layout as follows:
  Ð dust generating activities to be located away from sensitive receptors Ð there must be an adequate supply of water for damping down dust with sufficient hoses to reach all parts of the site
  Ð water supply should be conveniently located if possible, for example, near dust generating activities and site exits
- good site housekeeping and management.

Dust control equipment will be readily available on site from the commencement of works. The choice of plant and equipment and the method of work will reflect the necessity to employ best practicable means in the control of dust. Generally, where alternative methods exist, intrinsically dusty operations, such as dry sweeping or dry sandblasting should not be used.

3.1.4 Action and reporting – allocating responsibilities

It is important that all operatives understand their responsibility for ensuring that the generation of particles is minimised. Responsibilities will be allocated to specified operatives to ensure that dust generation is effectively controlled.

3.1.5 Training

Training for operatives on how to control dust emissions from construction and demolition will be provided. Training in respect of dust control may form part of the site safety induction and is likely to include:

- the effect of dust on health and the environment
- benefits of reducing dust generation
- methods to minimise dust generation
- action plans on what should be done if dust emissions breach the guideline that has been set for the particular site content and requirements of method statements
- the importance of effective communication between relevant personnel.

3.2 IMPLEMENTATION AND ON-SITE MANAGEMENT

3.2.1 Handling public relations

Site hoarding displays the following information:

- site programme
- telephone contacts for receipt of complaints and enquiries
- the name of the site representative who should be contacted.

The specified phone will be attended at all operational hours by persons with the appropriate authority to act to resolve any problems that may occur. Specific activities with the potential of causing dust problems will be notified to the Environmental Health Officer (EHO) and the residents likely to be affected, so that appropriate safeguards can be adopted before any activity takes place. Details of all complaints will also be notified to the local EHO for verification purposes.

3.2.2 Controlling site traffic and setting up access routes

At the project planning stage it will be extremely important to consider the positioning of any site entrances, exits and haul roads in relation to the surrounding area. The possible positioning of exits will also consider the need and practicability of installing vehicle washing facilities where it is appropriate to do so.

3.2.3 Fine particle and nuisance dust emission monitoring

An assessment of the need for particle emission monitoring should consider the nature of the works that are undertaken, the duration of works, the size of the site and the locality. Discussions with the relevant Local Authority should take place at an early stage of the project to determine what, if any, monitoring is required to meet the aims of the UK Air Quality Strategy. It is possible that specialist advice on dust monitoring may also be required for complex sites.

Sites that are likely to require particle monitoring to be carried out include:

- large sites in proximity to sensitive receptors
- longer term sites in proximity to sensitive receptors
- sites containing any contaminated soils
- projects involving large scale demolition and/or earthworks
- sites situated within sensitive areas, ie within an existing or proposed Local Authority Air Quality Management Area (AQMA), in which air pollution levels are already high.

If implemented, ambient particle monitoring can serve a number of purposes, as follows:

- providing an objective measure of particle concentrations at the construction site
- providing information on the success of abatement strategies
- allowing attribution of particle concentrations to individual sources, processes or events which may be required in the case of disputes.

This site does not fall into these categories so particle monitoring is not required.

3.2.4 Managing housekeeping

Good housekeeping is essential in running a safe site. Site supervision of a high standard and a supportive attitude towards health and safety and the environment is also very important. Site management staff are responsible for ensuring that equipment is used appropriately, and maintained effectively. Plant that is used badly, or dust suppression equipment that is used inappropriately or poorly maintained will not be effective at controlling dust. Examples include:

- missing or corroded wind boards on conveyors
- missing or corroded sheeting enclosing crushing plant
- poorly maintained pumps or fans
- torn or missing fabric bag filters in dust control/filtration units
- blocked water sprays or water bowser jets
- infrequent watering of haul road surfaces
- failure to enforce site management practices, such as speed restrictions, use of wheel washers or sheeting of loads carried by road licensed vehicles
- lack of frost protection during winter months for water-based dust suppression systems.

Preventative measures will be taken to minimise the formation and spread of dust. Site managers need to ensure that dust suppression measures are applied promptly and effectively as required. For example, by ensuring that:

- an adequate supply of water is available with sufficient hoses to reach all parts of the site
- service and repair contracts are in place to deal with the maintenance and breakdown of pollution control equipment
- provision is made, before it is required, for the disposal of wastewater
- a site log book is provided as part of the dust management regime.

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