THE CONTROL OF DUST AND EMISSIONS DURING CONSTRUCTION AND DEMOLITION

SUPPLEMENTARY PLANNING GUIDANCE

JULY 2014

LONDON PLAN 2011
IMPLEMENTATION FRAMEWORK

MAYOR OF LONDON

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GREATER LONDON AUTHORITY
July 2014

Published by
Greater London Authority
City Hall
The Queen's Walk
More London
London SE1 2AA
www.london.gov.uk
enquiries 020 7983 4100
minicom 020 7983 4458

ISBN

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The Mayor would like to thank those who contributed to this document by sharing case studies and photographs.

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THE CONTROL OF DUST AND EMISSIONS DURING CONSTRUCTION AND DEMOLITION

JULY 2014

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FOREWORD

London's air quality has vastly improved since the killer smogs of the 1950s, and even in the last four years London has seen significant reductions in emissions of both NOx and PM10/PM2.5 – the especially nasty particulates. Since 2008 the numbers of Londoners living in areas in areas where NO2 levels are above EU limits have halved, but given the health impacts of air pollution we must plainly do far better.

It is for this reason I have set out an ambitious package of measures to improve air quality that are to be implemented in my second term, including retrofitting more homes with energy efficiency measures, accelerating the roll-out of cleaner hybrid buses into the London bus fleet and setting out my vision for a central London Ultra Low Emission Zone from 2020. Cleaning up construction sites is also a key component of my plan. The latest evidence suggests that construction and demolition activity, and the machinery used for this purpose, may be responsible for up to 15 per cent of air pollutant emissions in the capital. Having made great leaps in reducing emissions from the transport sector, we must now tackle emissions from other sources.
This Supplementary Planning Guidance builds on the voluntary guidance published in 2006. It incorporates more detailed guidance and best practice and, for the first time, seeks to address emissions from construction machinery through a "low emission zone" for non-road mobile machinery which is to be introduced in 2015.

This guidance has been developed in partnership with industry, ensuring it is robust but deliverable. By working together we can reduce emissions at construction sites and improve air quality for all Londoners.

Boris Johnson
Mayor of London


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CHAPTER 1

INTRODUCTION

SUMMARY

This Supplementary Planning Guidance (SPG) seeks to reduce emissions of dust, PM_{10} and $PM_{2.5}$ from construction and demolition activities in London. It also aims to manage emissions of nitrogen oxides (NOx) from construction and demolition machinery by means of a new non-road mobile machinery ultra low emissions zone (ULEZ).

1.1 Air quality matters to Londoners. Air pollution not only harms the environment but also our health and wellbeing. Poor air quality can cause serious health problems (respiratory and cardio-vascular conditions) and reduces the quality of life for all.

1.2 In 2010 the Mayor published a study which estimated that the equivalent of 4,300 deaths per year in London are attributable to long-term exposure to PM2.5 (which is widely acknowledged as being the pollutant which has the greatest effect on health)[1]. Its impacts are most severely felt by vulnerable people such as children, older people and those with existing heart and lung conditions. In June 2012 the World Health Organisation (WHO) confirmed that fumes from diesel engines are carcinogenic. Its research determines that exposure can cause lung cancer and possibly tumours to the bladder.

1.3 While significant improvements have been made to London's air quality, particularly since the infamous pollution of the 1950s, air pollution remains a real challenge for all cities, especially large conurbations, where the sources of pollutants are more geographically concentrated, coupled with far greater populations exposed to them.

1.4 Construction and demolition activities can result in the following air quality impacts:
- Visible dust plumes;
- Dust deposition;
- Elevated PM10 and PM2.5 concentrations; and
- Increased concentrations of nitrogen dioxide.

1.5 The air pollutants result from dust generating activities on-site such as the breaking-up of materials and the movement of soil, as well as from the exhaust of diesel powered machinery and vehicles, both static and non-road mobile machinery (NRMM)[2]. Vehicles and people accessing and travelling across the site can also generate dust.

1.6 Please refer to the Institute of Air Quality Management's Guidance on the Assessment of Dust from Demolition and Construction for further information on the potential impacts upon air quality.

1.7 This Supplementary Planning Guidance (SPG) replaces The Control of Dust and Emissions from Demolition and Construction Best Practice Guidance published jointly by London Council's and the Mayor in 2006.

1.8 This SPG:
- Provides more detailed guidance on the implementation of all relevant policies in the London Plan and the Mayor's Air Quality Strategy to neighbourhoods, boroughs, developers, architects, consultants and any other parties involved in any aspect of the demolition and construction process;
- Sets out the methodology for assessing the air quality impacts of construction and demolition in London; and

- Identifies good practice for mitigating and managing air quality impacts that is relevant and achievable, with the over-arching aim of protecting public health and the environment.

BOX 1: POLLUTANTS OF CONCERN CAUSED BY CONSTRUCTION AND DE-MOLITION IN LONDON

Dust: Refers to all airborne particulate matter (PM) - that is, solid particles that are suspended in air, or have settled out onto a surface after having been suspended in air. In this guidance as the term 'dust' covers all airborne particulates it includes the particulates that give rise to soiling, poor health and environmental damage

Particulate matter (PM10 and PM2.5): Particulate matter (PM) is a complex assemblage of non-gaseous material of varied chemical composition. It is categorised by the size of the particle (for example PM10 is particles with a diameter of less than 10 microns (mm)). Most PM emissions in London are caused by road traffic, with engine emission and tyre and brake wear being the main sources. Construction sites, with high volumes of dust and emissions from machinery are also major sources of local PM pollution, along with fires, including the burning of waste.

Nitrogen dioxide (NO2): All combustion processes produce oxides of nitrogen (NOx). In London, road transport and heating systems are the main sources of these NOx emissions. NOx is primarily made up of two pollutants - nitric oxide (NO) and nitrogen dioxide (NO2). NO2 is of most concern due to its impact on health. However NO easily converts to NO2 in the air - so to reduce concentrations of NO2 it is essential to control emissions of NOx.

1.9 The principles of the SPG should apply to all developments in London as their associated construction and demolition activity may all contribute to poor air quality unless properly managed and mitigated. However, this SPG recognises that the air quality impacts will vary from site to site depending on its scale, location and the type of construction/demolition activity taking place. Accordingly, some aspects, namely Chapters 3 (Planning Application Process) and Chapters 4 (Air Quality (Dust) Risk Assessment) of this SPG only apply to major developments. There are separate arrangements for "Cleaner Construction Machinery for London", which are set out in chapter 7.

1.10 It is difficult to quantify for any specific period the contribution the measures to reduce emissions from construction and demolition set out in this guidance will have on overall air quality in London, as the number of development sites within London fluctuates, as do their size and nature. However, the latest version of the London Atmospheric Emissions Inventory estimates that construction and non-road mobile machinery account for around 15% of particulate matter (PM10) and 12% of nitrogen oxide (NOx) emissions. Consequently, reducing emissions from development sites across London will significantly reduce emissions of dust, including PM10 and PM2.5 and NOx, which is critical in and around areas with particularly high levels of air pollution.

1.11 Given the importance of improving air quality across London, this SPG provides detailed guidance and best practice for developers to implement on their development sites in London. Since a legal judgement[3] in 2011most demolition

requires planning permission (gained as part of an approval for a replacement scheme) or prior approval (where no replacement building is proposed). Consideration will also need to be given to whether the demolition requires an Environmental Impact Assessment or, as a minimum, a screening opinion from the local planning authority. Where planning permission is not required, developers are strongly encouraged to implement the relevant elements of this guidance[4]. Prior notification is required under the Building Act 1984, where a building is proposed to be demolished (see Appendix 2 for further details).

1.12 This SPG brings together best practice so that developers can meet wider legalisation, including both nuisance and environmental legislation, and contribute to London meeting its overall EU air quality emission limits.

1.13 Most of the measures outlined in this SPG are specific to the demolition and construction activities occurring on- site. However, not all measures are enforceable through a planning condition. Therefore, the planning authority will need to negotiate with the developer to secure appropriate demolition and construction practices to control dust and other air quality emissions through a s106 agreement. The appropriate off-site measures recommended will also need to be secured through a s106 agreement.

1.14 The relevant construction details requested, such as the start date and timings (both important for seasonal considerations), are unlikely to be fixed at application stage and, therefore, these details and any relevant mitigation measures will need to be secured by way of conditions on the planning permission or through a s106 agreement. Given the recommended level of detail sought from developers regarding dust and emissions control measures, it is likely planning officers will need to work closely with the borough's air quality experts.

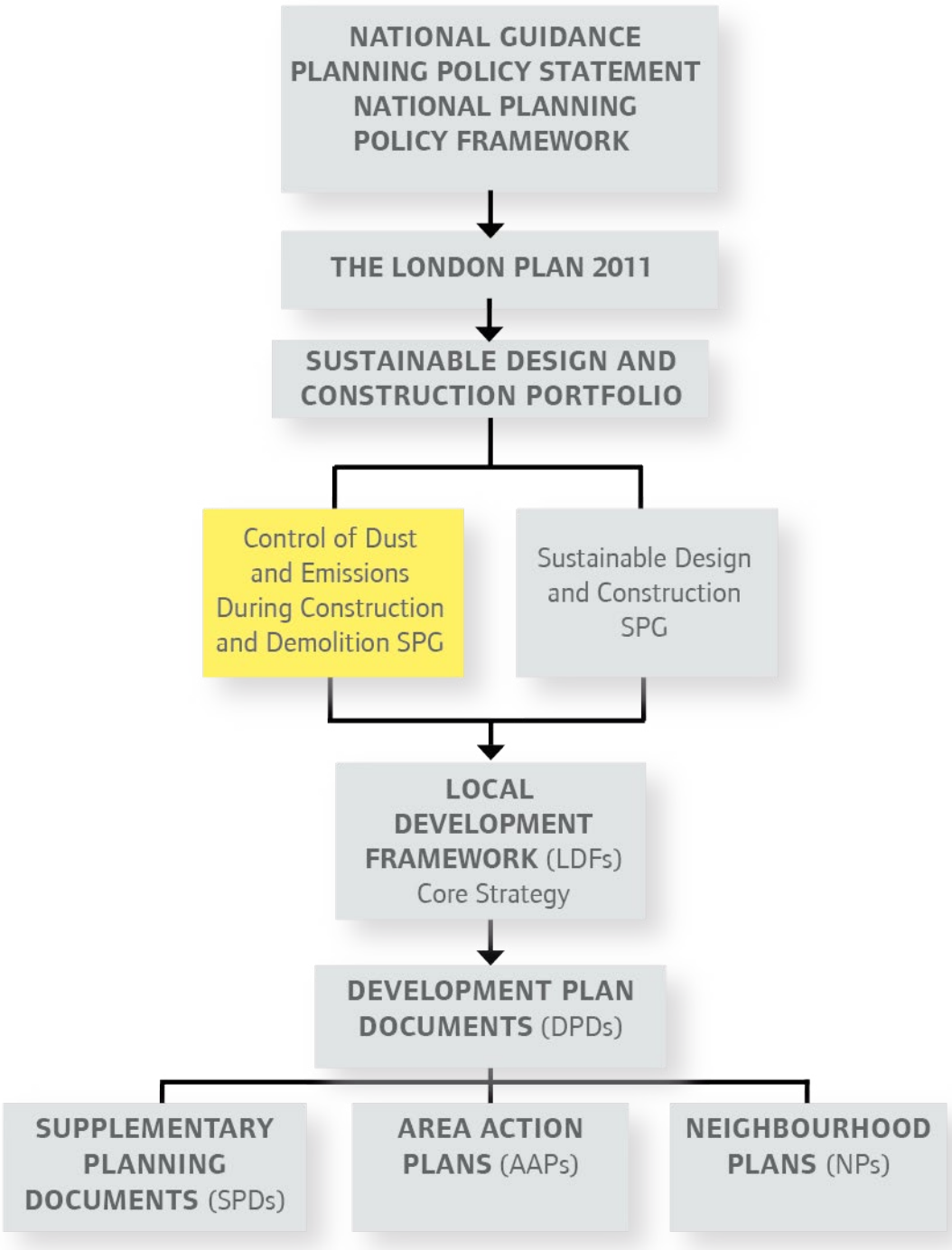
STATUS OF THIS SPG

1.15 This document sets out guidance supplementary to London Plan policies and forms part of the Implementation Framework to the London Plan. As a SPG, this document does not set new policy, but explains how policies in the London Plan should be carried through into action. It will assist boroughs when preparing their Local Plans and will also be a material planning consideration when determining planning applications. It replaces The Control of Dust and Emission from Demolition and Construction Best Practice Guidance published jointly by London Council's and the Mayor in 2006.

1.16 Where the London Plan and this SPG refer to Local Plans it is advice to boroughs in preparing their Local Development Frameworks (what the Government's National Planning Framework terms 'local plans') and to those preparing neighbourhood plans. See Figure 1.1 for the relationship between this SPG and other planning documents.

1.17 This SPG also provides guidance for neighbourhood forums and local communities in shaping their neighbourhood plans.

FIGURE 1.1 PLANNING POLICY FRAMEWORK



1.18 While this SPG does not have formal development plan status, after its consultation period and when it has been formally adopted by the Mayor as supplementary planning guidance under his powers under the Greater London Authority Act 1999 (as amended), it will be a material consideration in drawing up local and neighbourhood plans and in taking planning decisions. Boroughs should also be mindful of their statutory obligations under the local air quality management provisions of the Environment Act 1995. The Mayor may choose to implement aspects of this guidance using his power of direction under section 85 of the Environment Act 1995.

1.19 A draft SPG was consulted on over a 12 week period in late 2013. A number of pertinent and helpful comments were received from Consultees and the draft SPG has been modified to accommodate these comments, following a review. The changes made in response to these comments are set out in the accompanying consultation report.

STRUCTURE OF THIS SPG

1.20 This SPG is in line with the different parts of the construction and demolition process and sets out the steps necessary to assess air quality impacts, measures to mitigate and manage the impacts and approaches to site monitoring:

- Chapter 3 – Planning Application Process
- Chapter 4 – Air Quality (Dust) Risk Assessment
- Chapter 5 – Dust and Air Pollutant Emission Control Measures
- Chapter 6 – Site Monitoring
- Chapter 7 – Cleaner Construction Machinery for London

1.21 The Air Quality and Dust Management Plan (AQDMP) requested is aimed at minimising all emissions from construction and demolitions sites that contribute to poor air quality in London. The Air Quality (Dust) Risk Assessment (AQDRA) generally covers all the physical activities occurring on-site that result mainly in the generation of dust which results in soiling and impacts health (especially through the generation of PM10 and PM2.5). The recommendations for cleaner construction machinery tackles both PM and NOx emissions from machinery related to demolition and construction. Further information is set out in Chapters 3 and 4.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405
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100% recycled
Most litter that ends up
Waste minimalisation training is


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CHAPTER 2

POLICY CONTEXT

EUROPEAN UNION

2.1 Most air quality legislation in Europe and the UK is derived from health-based evidence provided by the World Health Organization (WHO). The WHO has published various guidelines for both global and European air quality. These guidelines are neither standards nor legally binding criteria. They are designed to offer guidance in reducing the health impacts of air pollution based on expert evaluation of current scientific evidence. However, many administrations use these guidelines as the basis for their own air quality standards.

2.2 The European Union has adopted an Air Quality Directive (2008/50/EC – the "Air Quality Directive") that sets standards for a variety of pollutants that are considered harmful to health and the environment. These standards, which are based on WHO guidelines, include limit values for various air pollutants, which are legally binding and must not be exceeded. These limit values comprise a concentration value for the pollutant, an averaging period over which it is measured, the date by which the limit values are to be achieved and in some cases, for shorter-term averaging periods, an allowable number of exceedences of the value per year. The Directive also includes target values, which are set out in the same manner as limit values, but which are to be attained, where possible, by taking all measures that do not entail disproportionate costs.

NATIONAL

2.3 The EU Air Quality Directive, the concentration limit values, has been transposed into English law by the Air Quality Standards Regulations 2010 ("the 2010 Regulations"). These Regulations includes criteria for determining how achievement of the limit values should be assessed, including consideration of the locations and length of exposure in relation to the averaging period of the limit values. It also requires that the sampling points installed to inform the compliance are sited to provide data on areas where the highest concentrations occur. This based on where the population is likely to be exposed to poor air quality for a period which is significant in relation to the averaging period of any limit value.

2.4 The Government's National Air Quality Strategy provides the national policy framework for air quality management and assessment in the UK. It sets out air quality standards and objectives for key air pollutants which are designed to protect health and the environment (see Appendix 1 for more details). It also sets out how different sectors (industry, transport and local government) can contribute to achieving the air quality objectives. The strategy includes little direct guidance on policy, nor does it constitute an action plan.

2.5 Since 2010 the Government has introduced a substantial number of measures which have contributed to improving air quality. Many of these measures have taken advantage of the synergies with carbon dioxide reduction. The Government will continue to investigate opportunities to reduce pollutants emitted into the air. Transport related measures introduced include:

- A £560m Local Sustainable Transport Fund for local authorities, funding local projects from 2011 to 2015. Bids are focusing on local authorities with poor air quality and those that providing strong

evidence that they will improve air quality will score higher in assessment;

- Support for the development and introduction of new vehicle and fuel technologies such as electric and other Ultra-Low Emission Vehicles. This includes a Plug-In Car Grant, which gives buyers 25% of the vehicle price up to a value of £5,000 (launched on 1 January 2011) and support for the 'Plugged-In Places' programme offering match-funding to local consortia to support the installation of a critical mass of electric vehicle recharging infrastructure;
- As announced in the 2011 Budget, the availability of Reduced Pollution Certificates (RPCs) for Euro VI standard vehicles from 1 January 2012 until 31 December 2016, applying to vehicles purchased before the standard becomes mandatory (1st January 2014); and
- The Government's current work to support sustainable travel choices and alternatives to travel, and to promote sustainable distribution of goods and sustainable low carbon approaches to other forms of transport, including rail, aviation and shipping.

2.6 All these measures, together with those of local authorities, help to hasten progress towards meeting the NO2 limit value and further reduce PM emissions.

2.7 Further relevant national legislation and guidance are identified in Appendix 2.

THE LONDON PLAN

2.8 Addressing quality of life[5], inequality of health, protecting the environment and the reduction of pollution in order to improve air quality are key priorities for the Mayor and are included in the overall objectives for London and Londoners within the London Plan.

1. A city that meets the challenges of economic and population growth in ways that ensure a sustainable, good and improving quality of life and sufficient high quality homes and neighbourhoods for all Londoners, and help tackle the huge issue of deprivation and inequality among Londoners, including inequality in health outcomes.

5. A city that becomes a world leader in improving the environment locally and globally, taking the lead in tackling climate change, reducing pollution, developing a low carbon economy, consuming fewer resources and using them efficiently.

2.9 These objectives are set out in London Plan policy 1.1. Other key London Plan policies include policy 3.2 Improving Health and Improving Health Inequalities and policy 5.3 Sustainable Design and Construction. See Appendix 3 for the full policies.

2.10 In addition, London Plan Policy 7.14 specifically relates to improving air quality.

POLICY 7.14 IMPROVING AIR QUALITY

STRATEGIC

A The Mayor recognises the importance of tackling air pollution and improving air quality to London's development and the health and well-being of its people. He will work with strategic partners to ensure that the spatial, climate change, transport and design policies of this plan support implementation of his Air Quality and Transport strategies to achieve reductions in pollutant emissions and minimise public exposure to pollution.

PLANNING DECISIONS

B Development proposals should:

a minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see policy 6.3)

b promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition'

c be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs)

d ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches

e where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permission should only be granted if no adverse air quality impacts from the biomass boiler are identified.

LDF PREPARATION

C Boroughs should have policies that:

a seek reductions in levels of pollutants referred to in the Government's National Air Quality Strategy having regarded to the Mayor's Air Quality Strategy

b take account of the findings of their Air Quality Review and Assessments and Action Plans, in particular where Air Quality Management Areas have been designated.

2.11 Paragraph 7.49 of the London Plan notes that the existing joint GLA and London Council's Best Practice Guidance on The Control of Dust and emissions from Demolition and Construction will be reviewed with the view to it being consulted on and published as supplementary guidance to the London Plan.

THE MAYOR'S AIR QUALITY STRATEGY AND OTHER STRATEGIES

2.12 In addition to the London Plan policies, the Mayor also has an Air Quality Strategy, Cleaning the Air, which was published in 2010. The Air Quality Strategy sets out actions to improve London's air quality and includes measures aimed at reducing emissions from transport, homes, workplaces and new developments. There is a commitment to updating the best practice guidance on reducing dust emissions from construction sites and publishing Supplementary Planning Guidance to encourage its implementation across London. This guidance document fulfils that commitment.

2.13 The Mayor wants London to be one of the cleanest, greenest cities in the world to ensure that people living here enjoy a great quality of life. This is supported by the Mayor's Climate Change Mitigation and Energy Strategy Delivering London's energy future. Together the Mayor's strategies aims to reduce harmful air quality emissions, mitigate climate change and improve Londoners' health and quality of life.

POLICY 6 REDUCING EMISSIONS FROM CONSTRUCTION AND DEMOLITION SITES

VISION

Responsibly managed construction and demolition sites that pose no health risk to people working or living nearby.

POLICY

The Mayor will work with London boroughs, the GLA group and the construction industry to encourage implementation of the Best Practice Guidance for construction and demolition sites across London.

PROPOSALS

The Mayor will work with London Councils to review and update the Best Practice Guidance (BPG) for construction and demolition sites and then create Supplementary Planning Guidance to assist implementation.

The Mayor will ensure that strategic planning applications include BPG implementation.

The Mayor will require the GLA Group to include full implementation of the BPG in its procurement policy (including through the supply chain).

2.14 Over the last few years, a number of measures have been taken to improve London's air quality and reduce carbon emissions including new hybrid and zero- emission buses on London's streets, adapting buses to make them cleaner, implementing a taxi emissions strategy, introducing the world's first city-wide Low Emission Zone (LEZ), initiatives to encourage cycling and walking, smoothing traffic flow to reduce pollution and promoting zero-emitting electric vehicles.

2.15 Despite this, pollution is still affecting Londoners' health and quality of life. This is why the Mayor has initiated a robust range of short and long-term sustainable measures to reduce pollution in the capital and to achieve European Union air quality limit values for pollution as soon as possible.

2.16 These measures include:

- New and tighter standards for the London Low Emission Zone (the largest zone of its type in the world);
- The first ever age limit for black cabs (15 years) and private hire vehicles (10 years). This has retired more than 3,000 taxis since it was introduced in 2012;
- Improving energy efficiency in over 90,000 homes and 400 public buildings, saving tonnes of oxides of nitrogen and carbon dioxide emissions;
- Cleaner hybrid and hydrogen buses with 1,700 hybrids on the road by 2016, including 600 of the New Bus for London, which emits over 50% less oxides of nitrogen than a standard diesel bus;
- Retrofitting 1,000 older buses to reduce their emissions of oxides of nitrogen;
- Retiring 900 of the oldest buses and replacing them with low emission Euro VI buses;
- Using the planning system to reduce emissions from developments;
- Record investment in cycling; and
- The Mayor's first Clean Air Fund, with £5m of funding from DfT, which has targeted innovative pollution reduction measures, such as dust suppressants, green walls and other green infrastructure and a no engine idling campaign, across central London where particulate matter concentrations are highest.


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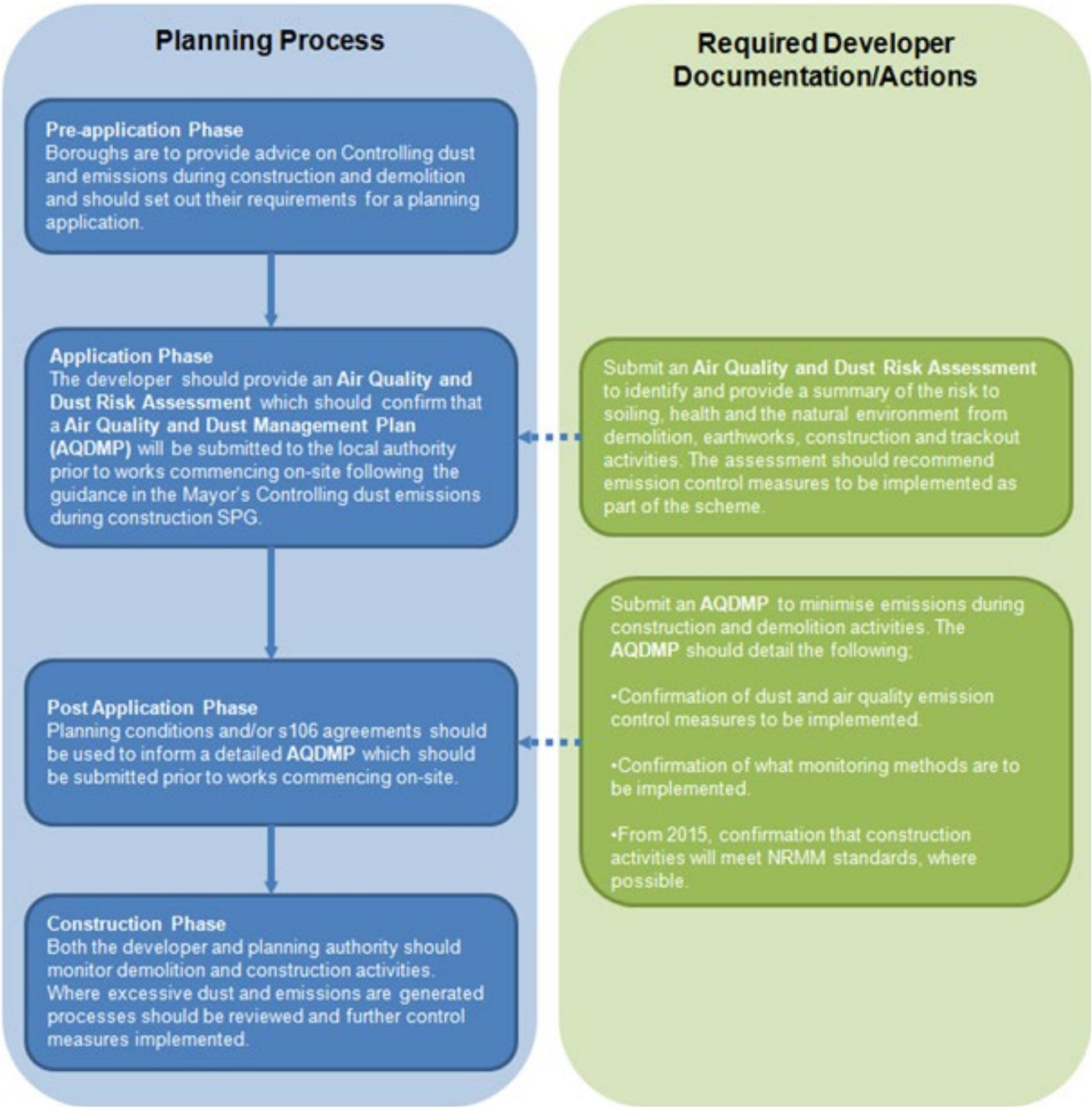
CHAPTER 3

PLANNING APPLICATION PROCESS

3.1 The flow chart below shows developers where in the planning process document submissions are required in order to comply with this SPG.

FIGURE 3.1 DUST AND EMISSIONS CONTROL FLOW CHART THROUGH THE PLANNING PROCESS



3.2 With the application submission, developers will be expected to produce an Air Quality Assessment. This should include an Air Quality (Dust) Risk Assessment (as set out in Chapter 4).

3.3 The risk category of the site calculated in the Dust Risk Assessment should be used to give an indication of likely required dust emission and control measures (as set out in Chapter 5). A list of control measures likely to be required should be included in Air Quality (Dust) Risk Assessment.

3.4 Local authorities have planning powers which allow them to decide whether a condition or s106 legal agreement is necessary to secure measures to safeguard health and prevent nuisance and, if necessary, what level of enforcement is needed. Examples of standard conditions can be found in Appendix 4.

3.5 In addition to planning enforcement powers, local authorities also have various regulatory powers which apply to certain activities, for example for mobile crushing. These activities are regulated as Part B process (under The Environmental Protection Act 1990 - see Appendix 2). Local authorities, as regulators of Part B processes, are responsible for controlling emissions from these activities and can set conditions in the permits they issue to achieve this. Conditions are based on best available techniques, which require that the cost of applying a technique is not excessive in relation to the environmental protection it provides. The Department for the Environment, Food and Rural Affairs (DEFRA) has produced Process Guidance Notes, which form the statutory guidance on what constitutes best available techniques (see Appendix 5 for details) for each regulated process. Local authorities can take enforcement action if they believe that an operator has contravened, or is likely to contravene any permit conditions

3.6 Guided by the Air Quality Assessment, local authorities would make use of these powers during the application phase. Should the application be successful, local authorities will work with developers prior to demolition or construction to ensure appropriate solutions to minimise air quality emissions will be implemented using the powers detailed above.

3.7 Developments outside the formal local planning process (e.g. for permitted developments or those with Parliamentary approval) should consider providing the information as set out below as part of the normal dialogue with the relevant local planning authority.

3.8 An Air Quality and Dust Management Plan (AQDMP) should be produced prior to any construction or demolition works after the planning application phase. The AQDMP can therefore be informed by any planning conditions or s106 agreements following the developments application.

3.9 The AQDMP should give specific instructions on how to manage impacts from dust and air pollutant emissions on the development site. It should cover all phases of the construction process and take account of all contractors or sub-contractors. The production of an AQDMP will assist developers to comply with The Environmental Protection Act 1990 which makes it an offence to cause a nuisance to nearby inhabitants by generating dust.

3.10 The specific content of an AQDMP will be determined through the site evaluation processes. These should be set out for each relevant phase of work (demolition, earthworks, construction and trackout[6]). Typical aspects of an AQDMP will include:

- 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 (wherever possible from dewatering or extraction), drainage and enclosed areas to prevent contaminated water leaving the site;
- Inventory and timetable of all dust and NOx air pollutant generating activities;
- Results of an Air Quality (Dust) Risk Assessment (see Chapter 4);
- List of all dust and emission control methods to be employed (see Chapter 5);
- Details of any fuel stored on-site;
- Identification of a trained and responsible person on-site for air quality. This person needs to have knowledge of pollution monitoring and control methods and vehicle emissions;
- Summary of monitoring protocols and agreed procedure of notification to the local authority nominated person(s); and
- A site log book to record details and action taken in response to incidents or dust-causing episodes and the mitigation measure taken to remedy any harm caused and measures employed to prevent a similar incident reoccurring. It should also be used to record the results of routine site inspections.

3.11 All staff should have some training of on-site pollution policy, perhaps as part of induction training. For major developments, at least one named individual or post should be given the responsibility for implementing dust monitoring and control measures across the site and implementing any required remediation measures.

3.12 The AQDMP may be complemented by a site-specific method statement. A method statement is an industry term used to plan in detail demolition and construction activities and processes.

3.13 Depending on the developer, one or more method statements may be prepared to plan the various demolition / construction activities to occur.

3.14 For sites with potentially asbestos-containing materials, a separate management plan will need to be produced by a specialist asbestos treatment contractor.

3.15 The AQDMP should be kept under review to address any changes in the demolition / construction timetable or associated dust and NOx emitting activities.


citigroup
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Waitrose
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CHAPTER 4

AIR QUALITY (DUST) RISK ASSESSMENT

4.1 As part of the Air Quality Assessment to be submitted to the local planning authority, the developer or their air quality consultant should produce a Dust Risk Assessment (DRA). This should submitted to the local planning authority and the GLA (for referable schemes – see Appendix 7) as part of the Air Quality Statement, with the planning application. The AQDRA should include:

- A risk assessment for each phase of works (demolition, earthworks, construction, trackout), which incorporates the risk evaluation process set out below, and identifies suitable mitigation measures (see Chapter 5) for the relevant level of risk.
- Identification of whether each phase of activity on-site represents a low, medium or high risk by following the guidance below.

4.2 As part of the Air Quality Assessment, the AQDRA will be reviewed by the local planning authority and dust (and emissions) control measures should be secured by planning condition or through a s106 agreement, as appropriate.

4.3 As outlined in Chapter 1, of this SPG, dust refers to all airborne particulate matter, which generally result in soiling, poor health and environmental damage, as well as PM_{10} and $PM_{2.5}$ which have specific impacts on health. This section sets out what is to be considered and addressed by the AQDRA and how the assessment should be developed. As a minimum the assessment will have to:

- describe the site and receptors on both health and environmental grounds;
- outline the potential activities to take place within the four identified stages of development (demolition, earthworks, construction and trackout);
- the potential scale of dust emissions for each development stage; and
- the level of risk due to the scale of dust emissions on health, soiling (dirt deposited on surrounding structures) and the natural environment, with a quantitative and qualitative explanation.

4.4 To effectively control dust from demolition and construction activity, it is important to evaluate the risk caused by the pollutants emitted. The risk of dust from a demolition/ construction site to have detrimental effects on amenity, health and the natural environment is related to:

- the activities being undertaken (demolition, earthworks, construction, trackout – including the number of vehicles and plant etc.);
- the duration of these activities;
- the size of the site;
- the prevailing meteorological conditions (wind speed, direction and rainfall);
- the proximity of receptors to the activity; at the site;
- the topography of the location (whether there is a canyon effect);
- existing levels of background pollution and the adequacy of the mitigation measures applied to reduce or eliminate dust; and
- the sensitivity of the receptors to dust.

4.5 The variables above mean that any risk assessment process will, be qualitative, and the methodology below sets out a risk evaluation process based on set parameters.

RISK EVALUATION CONSIDERATIONS

4.6 The approach outlined below is based on the site evaluation process set out in the

Institute of Air Quality Management's (IAQM) 2014 Guidance on the Assessment of dust from demolition and construction[7]. This guidance is periodically updated and, therefore, the latest version of the IAQM Guidance should be used. The issues below must be considered in the preparation of the AQDRA.

4.7 To reflect their different potential impacts, this guidance breaks down activities on demolition / construction sites into the following four categories[8].

- demolition;
- earthworks;
- construction; and
- trackout.

4.8 The potential for dust emissions[9] is to be assessed for each activity that is likely to take place.

4.9 The risk category assigned to the site can be different for each of the four potential activities (demolition, earthworks, construction and trackout). More than one of these activities may occur on a site at any one time. It is important to consider cumulative effects when defining the risk category. If more than one activity occurs at any one time, the level of risk automatically moves to the higher category.

4.10 The assessment procedure assumes no mitigation measures are applied, except those required by legislation. The level of risk is based on the scale and nature of the works and the sensitivity of the area.

4.11 If the site falls between two risk categories, the higher risk category should be applied. For example, if the site is assessed as low/ medium, then mitigation appropriate to a medium site classification should be applied.

4.12 Where appropriate (perhaps if the site is over a certain size), the site can be divided into 'zones' for the risk assessment. This may result in different level of control measures being applied to each zone. This could be where activities across a large site are varying distances from the nearest receptors, or where development activities move away from a receptor through time. However, on complex sites where activities are not easily segregated, the control measures appropriate for the highest risk category for that activity should be applied. This is to ensure appropriate mitigation is implemented and to make auditing simpler.

4.13 The Committee on the Medical Effects of Air Pollutants (COMEAP) have advised, in its report "The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom", that there is no threshold below which health effects associated with small particles do not occur. Therefore the risk categories shown below represent a sliding scale of additional risk and do not consider background levels of PM_{10}. Where background levels are high and additional PM_{10} may contribute to, or cause, an exceedence of the air quality objective[10] (daily and yearly limit values), such as in the situations below, a higher level of mitigation should be applied.

- Sites within an air quality management area (AQMA) declared for PM_{10}; or
- Sites in areas where the current concentration of PM_{10} / $PM_{2.5}$ are>90% of the relevant objectives (both the annual mean and daily PM_{10} objectives need to be considered).

4.14 Air quality objectives[11] for $PM_{2.5}$ (limit value and exposure reduction target) and NO_2 (hourly and yearly annual limit values) should also be considered when determining the level of mitigation to be applied.

4.15 Please contact your local authority to find out about the local air quality status of the area in which you may be operating.

AIR QUALITY (DUST) RISK ASSESSMENT REQUIREMENTS

STEP 1: Screen the Need for a Detailed Assessment

4.16 The developer will normally be required to undertake a detailed assessment where there is a 'human receptor' within:

- 50 m of the boundary of the site; or
- 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

4.17 A detailed assessment of effects on 'ecological receptors' will be required where an 'ecological receptor' is within:

- 50 m of the boundary of the site; or
- 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

4.18 If the development cannot be screened out, the developer is to provide a clear description of the proposed demolition and construction activities, their location and duration, and any phasing of the development, as far as it is known at the time of the evaluation. This information should be updated as the development progresses, to take into account any changes in timing and any seasonable implications of this as well as any changes in the proposed construction / demolition activities to be carried out on-site.

4.19 Other factors that need to be included in the description of the site and its surroundings that define the sensitivity of the area include:

- the proximity and number of receptors;
- the specific sensitivity of the receptor(s), for example a primary school or hospital;
- the duration for which the sources of dust emissions may be close to the sensitive receptors; and
- in the case of PM_{10}, the local background concentration.

STEP 2: Assess the Risk of Dust Impacts

4.20 The Air Quality (Dust) Risk Assessment should be set out using the following four phases of development:

- Demolition
- Earthworks
- Construction
- Trackout

4.21 The risk assessment should consider the potential effects of each development phase on the nearest receptors including:

- the risk of health effects from an increase in exposure to PM_{10} and $PM_{2.5}$,
- annoyance due to the deposition of dust; and
- harm to the natural environment.

4.22 The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based on two factors:

- The scale and nature of the works, which determines the potential dust emission magnitude as small, medium or large

(STEP2A); and
- The sensitivity of the area to dust impacts (STEP 2B), which is defined as low, medium or high sensitivity.

4.23 These two factors are combined in STEP 2C to determine the risk of dust impacts with no mitigation applied. The risk category assigned to the site can be different for each of the four potential activities demolition, earthworks, construction and trackout). More than one of these activities may occur on a site at any one time.

4.24 The following risk assessment procedure requires professional judgement. Those who are responsible for making this judgement must be able to demonstrate technical competency in the assessment of dust impacts. It is difficult to define precisely who has sufficient experience and expertise to make reasonable judgements, but, a person with full Membership of IAQM and experience of assessing dust impacts for a minimum of 10 diverse projects, including some complex multi-phase projects and similar projects to that being assessed, is likely to be technically competent.

4.25 A map must be provided to identify the receptors included in the assessment.

STEP 2A: Define the Potential Dust Emission Magnitude

4.26 The dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium, or Large.

i Demolition phase

4.27 The scale of potential dust emissions from this phase should be determined using the following criteria. Developers should use the highest category their development falls within.

Large

- total volume of building to be demolished >50,000m^3, or
- potentially dusty construction material
- (e.g. concrete), or
- on-site crushing and screening, or
- demolition activities >20m above ground level;

Medium

- total volume of building to be demolished 20,000m^3 – 50,000m^3, or
- potentially dusty construction material, or
- demolition activities 10-20m above ground level;

Small

- total volume of building to be demolished <20,000m^3, or
- construction material with low potential for dust release (e.g. metal cladding or timber), or
- demolition activities <10m above ground demolition during wetter months.

ii Earthworks phase

4.28 Earthworks primarily cover excavation, haulage, tipping and stockpiling of soil type materials. This includes levelling the site and landscaping.

4.29 The scale of potential dust emissions from this phase should be determined using the following criteria.

Large

- total site area >10,000m^2,
- potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), or
- >10 heavy earth moving vehicles active at any one time on site, or
- Formation of stockpile enclosures
- >8m in height;
- total material moved >100,000 tonne (where known).

Medium

- total site area 2,500m^2 – 10,000m^2,
- moderately dusty soil type (eg. silt), or
- 5-10 heavy earth moving vehicles active at any one time, or
- formation of stockpile enclosures 4m – 8m in height, or
- total material moved 20,000 tonnes – 100,000 tonnes (where known).

Small

- total site area <2,500m^2, or
- soil type with large grain size (e.g. sand), or
- <5 heavy earth moving vehicles active at any one time, formation of stockpile enclosures <4m in height, or
- total material moved <10,000 tonnes (where known), or earthworks during wetter months.

iii Construction phase

4.30 The key issues when determining the potential scale of dust emission during the construction phase include the size of the building(s)/infrastructure, method of construction, construction materials, and the duration of build.

4.31 The criteria below should be used to determine the potential scale of dust emission for the construction phase.

Large

- total building volume >100,000m^3, or
- piling, or
- on site concrete batching; or
- sandblasting

Medium

- total building volume 25,000m^3 – 100,000m^3, or
- potentially dusty construction material (e.g. concrete), or
- on-site concrete batching;

Small

- total building volume <25,000m^3, or
- construction material with low potential for dust release (e.g. metal cladding or timber).

iv Trackout phase

4.32 Factors which determine the risk of dust emissions from trackout are vehicle size, vehicle speed, vehicle numbers, geology and duration.

4.33 Only receptors within 50 m of the route(s) used by vehicles on the public highway and up to 500 m from the site entrance(s) are considered to be at risk from the effects of dust.

Large

- >50 HDV (>3.5t) outward movements in any one day,
- potentially dusty surface material (e.g. high clay/silt content),
- unpaved road length >100 m;

Medium

- 10-50 HDV (>3.5t) outward movements in any one day,

- moderately dusty surface material (e.g. high clay content),
- unpaved road length 50 m – 100 m (high clay content);

Small

- <10 HDV (>3.5t) trips in any one day,
- surface material with low potential for dust release,
- unpaved road length <50 m.

4.34 These numbers are for vehicles that leave the site after moving over unpaved ground, where they accumulate mud and dirt that can be tracked out onto the public highway.

4.35 It may be useful to set out the dust emission magnitude for each activity as shown in the example in Table 4.1.

STEP 2B: Define the Sensitivity of the Area

4.36 The sensitivity of the area takes account of a number of factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and
- Site-specific factors, such as whether there are natural shelters, such as trees or other vegetation, to reduce the risk of wind-blown dust.

4.37 The type of receptors at different distances from the site boundary or, if known, from the dust generating activities, should be included. Consideration also should be given to the number of `human receptors'. Exact counting of the number of `human receptors', is not required. Instead it is recommended that judgement is used to determine the receptors (a residential unit is one receptor) within each distance band.

4.38 For receptors which are not dwellings professional judgement should be used to determine the number of human receptors for use in the tables, for example a school is likely to be treated as being in the >100 receptor category.

4.39 The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. Trackout may occur along the public highway up to 500 m from large sites (as defined in STEP 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

4.40 A number of attempts have been made to categorise receptors into high, medium and low sensitivity categories; however, there is no unified sensitivity classification scheme that covers the quite different potential effects on property, human health and ecological receptors.

4.41 However, guidance follows on the sensitivity of different types of receptors.

i Sensitivity of People to Dust Soiling Effects

4.42 For the sensitivity of people and their property to soiling, the IAQM recommends that the air quality practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the following general principles:

High sensitivity receptor

- Users can reasonably expect an enjoyment of a high level of amenity; or

- the appearance, aesthetics or value of their property would be diminished by soiling **and** the people or property would reasonably be expected to be present continuously, or at **le**ast regularly for extended periods as part of the normal pattern of use of the land.
- Indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.

Medium sensitivity receptor

- Users would expect to enjoy a reasonable level of amenity but would not reasonably expect to enjoy the same level of amenity as in their home; or
- The appearance, aesthetic or value of their property could be diminished by soiling; or
- The people or property would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land;
- Indicative examples include parks and places of work.

Low sensitivity receptor

- The enjoyment of amenity would not reasonably be expected; or
- Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or
- There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.
- Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short-term car parks and roads.

ii Sensitivities of People to the Health Effects of PM_{10}

4.43 For the sensitivity of people to the health effects of PM_{10}, the IAQM recommends that the air quality practitioner assumes that there are three sensitivities based on whether or not the receptor is likely to be exposed to elevated concentrations over a 24-hour period, consistent with the Defra's advice for local air quality management (Defra, 2009, LAQM Technical Guidance LAQM.TG(09)).

TABLE 4.1 EXAMPLE OF HOW THE DUST EMISSION MAGNITUDE FOR A SITE COULD BE PRESENTED

ACTIVITY	DUST EMISSION MAGNITUDE
Demolition	Large
Earthworks	Large
Construction	Medium
Trackout	Small

High sensitivity receptor

- Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).
- Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.

Medium sensitivity receptor

- Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).
- Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.

Low sensitivity receptor

- Locations where human exposure is transient.
- Indicative examples include public footpaths, playing fields, parks and shopping streets

iii Sensitivities of Receptors to Ecological Effects

4.44 Dust can have two types of effect on vegetation: physical and chemical. Direct physical effects include reduced photosynthesis, respiration and transpiration through smothering. Chemical changes to soils or watercourses may lead to a loss of plants or animals for example via changes in acidity. Indirect effects can include increased susceptibility to stressors such as pathogens and air pollution.

4.45 These changes are likely to occur only as a result of long-term demolition and construction works adjacent to a sensitive habitat. Often impacts will be reversible once the works are completed, and dust emissions cease.

4.46 The advice of an ecologist should be sought to determine the need for an assessment of dust impacts on sensitive habitats and plants. Professional judgement is required to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the likely effect and the value of the ecological asset. A habitat may be highly valuable but not sensitive, alternatively it may be less valuable but more sensitive to dust deposition.

4.47 Consequently, specialist ecological advice should also be sought to determine the sensitivity of the ecological receptors to dust impacts. In general, most receptors will either be of high sensitivity or low sensitivity i.e. either sensitive or not to dust deposition. The following provides an example of possible sensitivities.

High sensitivity receptor

- Locations with an international or national designation *and* the designated features may be affected by dust soiling; or
- Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red

Data List for Great Britain.

- Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.

Medium sensitivity receptor

- Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or
- Locations with a national designation where the features may be affected by dust deposition.
- Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.

Low sensitivity receptor

- Locations with a local designation where the features may be affected by dust deposition.
- Indicative example is a local Nature Reserve with dust sensitive features.

4.48 Table 4.2, 4.3 and 4.4 show how the sensitivity of the area may be determined for dust soiling, human health and ecosystem impacts respectively. These tables take account of a number of factors which may influence the sensitivity of the area.

TABLE 4.2 SENSITIVITY OF THE AREA TO DUST AND SOILING EFFECTS ON PEOPLE AND PROPERTY [A B]

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)[c]			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

[A] The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout. See STEP 2B.

[B] Estimate the total number of receptors within the stated distance. Only the *highest level* of area sensitivity from the table needs to be considered. For example, if there are 7 high sensitivity receptors < 20 m of the source and 95 high sensitivity receptors between 20 and 50 m, then the total of number of receptors < 50 m is 102. The sensitivity of the area in this case would be high.

[c] For trackout, the distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

TABLE 4.3 SENSITIVITY OF THE AREA TO HUMAN HEALTH IMPACTS [A B]

Receptor Sensitivity	Annual Mean PM_{10} concentration [C]	Number of Receptors [D]	Distance from the Source (m)[E]				
			<20	<50	<100	<200	<350
High	>32 µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m³	>100	High	High	Medium	low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	24-28 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	1-10	Low	Low	Low	Low	Low

[A] The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout. See STEP 2B.

[B] Estimate the total within the stated distance (e.g. the total within 350m and not the number between 200 and 350m), noting that only the highest level of area sensitivity from the table needs to be considered. For example, if there are 7 high sensitivity receptors < 20m of the source and 95 high sensitivity receptors between 20 and 50 m, then the total of number of receptors < 50 m is 102. If the annual mean PM10 concentration is 29µg/m ^{3}, the sensitivity of the area would be high

[C] Most straightforwardly taken from the national background maps, but should also take account of local sources. The values are based on 32 µg/m ^{3} being the annual mean concentration at which an exceedence of the 24-hour objective is likely in England, Wales and Northern Ireland. In Scotland there is an annual mean objective of 18µg/m^3.

[D] In the case of high sensitivity receptors with high occupancy (such as schools or hospitals) approximate the number of people likely to be present. In the case of residential dwellings, just include the number of properties.

[E] For trackout, the distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessaryto consider trackout impacts up to 50 m from the edge of the road.

TABLE 4.4 SENSITIVITY OF THE AREA TO ECOLOGICAL IMPACTS [A B]

Receptor Sensitivity	Distance from the Source (m)[c]	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

[A] The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout. See STEP 2B.

[B] Only the highest level of area sensitivity from the table needs to be considered.

[C] For trackout, the distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site.

TABLE 4.5 EXAMPLE OF THE OUTCOME OF DEFINING THE SENSITIVITY OF THE AREA

Receptor Sensitivity	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	Medium
Human Health	High	High	High	High
Ecological	Medium	Medium	Low	Low

4.49 When using these tables, it should be noted that distances are to the dust source and so a different area may be affected by trackout than by on-site works. The highest level of sensitivity from each table should be recorded. It is not necessary to work through the whole of each table once it is clear that the highest level of sensitivity has been determined.

4.50 While these tables are necessarily prescriptive, professional judgement may be used to determine alternative sensitivity categories. The following additional factors should be considered when determining the sensitivity of the area.

- any history of dust generating activities in the area;
- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between the source and the receptors;
- any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant
- the season during which the works will take place;
- any conclusions drawn from local topography;
- duration of the potential impact, as a receptor may become more sensitive over time; and
- any known specific receptor sensitivities which go beyond the classifications given in this document.

4.51 Any judgements made should be fully documented. Whatever approach to determining sensitivity of the area is taken, it is important that the basis of the decision is documented and Table 4.5 presents an example of how the sensitivity of the area may be presented.

Step 2C: Define the Risk of Impacts

4.52 The dust emission magnitude determined in STEP 2A should be combined with the sensitivity of the area determined in STEP 2B to determine the risk of impacts with no mitigation applied.

4.53 The matrices in Tables 4.6, 4.7, 4.8 and Table 4.9 provide a method of assigning the level of risk for each activity. These should be used to determinie the level of site-specific mitigation that must be applied.

4.54 Mitigation is discussed in chapter 5 of this document. For those cases where the risk category is 'negligible', no mitigation measures beyond those required by accepted best practice will be required.

4.55 The risk of dust impacts for the four activities can usefully be summarised in a table. An example of a completed risk table is provided in Table 4.10.The local authority should review the AQDRA report for each demolition / construction activity and make an assessment of the effects and risks identified.

4.56 The primary aim of the AQDRA is to identify the appropriate site-specific mitigation measures that must be adopted to ensure there will be no significant effect on local amenty, public health or ecological sites. These mitigation measures should be identified in the AQDRA and included in an air quality and dust management plan (AQDMP), which should be submitted to the local authority for approval, prior to work commencing.
Figure 4.1 summarises the steps required during an air quality risk assessment.

TABLE 4.6 RISK OF DUST IMPACTS – DEMOLITION

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

TABLE 4.7 RISK OF DUST IMPACTS – EARTHWORKS

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

TABLE 4.8 RISK OF DUST IMPACTS – CONSTRUCTION

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

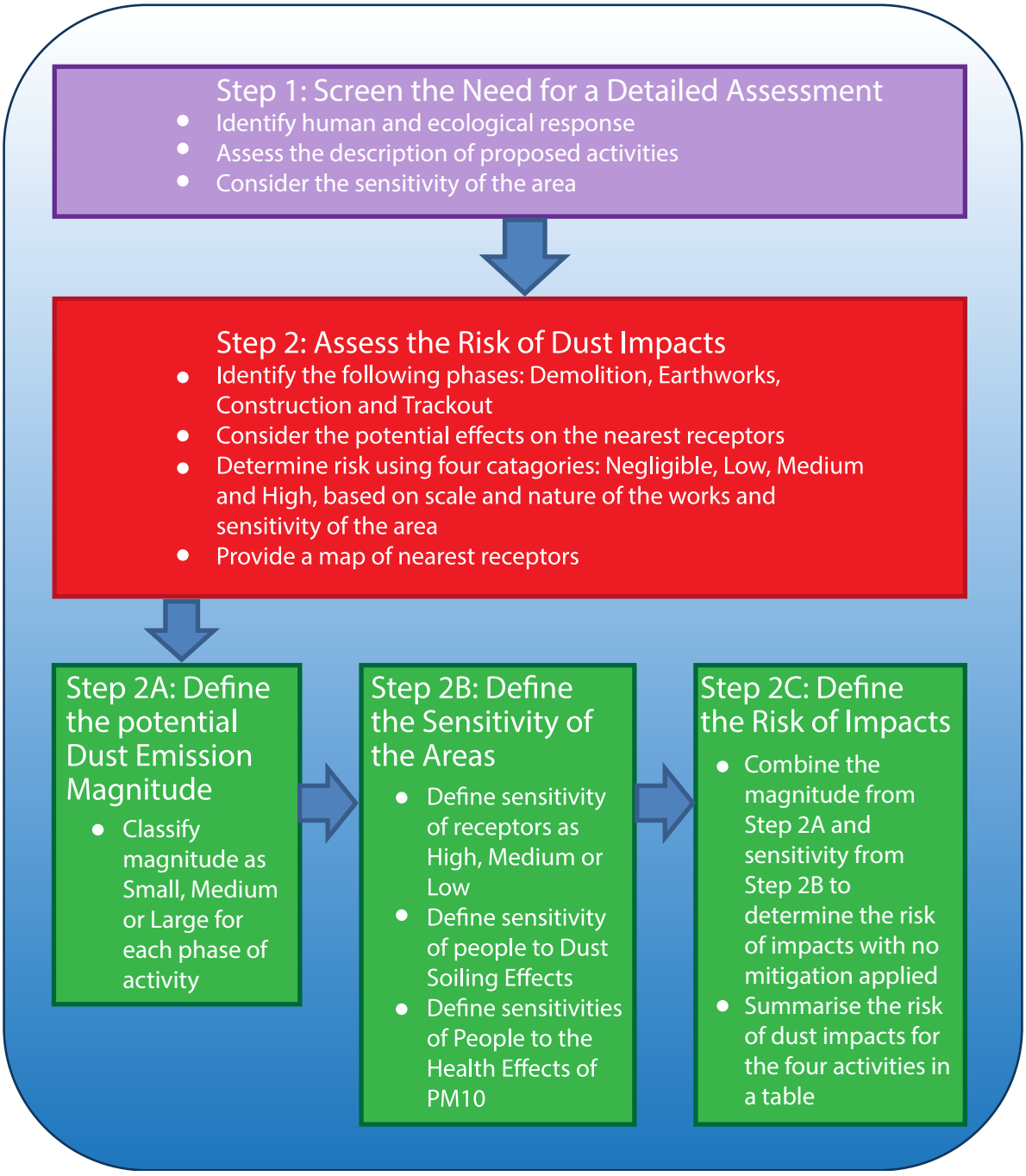
TABLE 4.9 RISK OF DUST IMPACTS – TRACKOUT

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

TABLE 4.10 EXAMPLE OF A SUMMARY DUST RISK TABLE TO DEFINE SITE-SPECIFIC

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High Risk	High Risk	Low Risk	Medium Risk
Human Health	High Risk	Medium Risk	Low Risk	Medium Risk
Ecological	Negligible	Negligible	Negligible	Negligible

Figure 4.1 Summary of Air quality (Dust) Risk Assessment Requirements

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CHAPTER 5

DUST AND EMISSIONS CONTROL MEASURES

5.1 For all sites, developers should implement the appropriate dust and pollution control measures set out below to ensure the air quality impacts of construction and demolition are minimised and any mitigation measures employed are effective. The proposed measures should be set out in draft form in the developer's AQDRA with a final version in the AQDMP.

5.2 Boroughs should secure the appropriate dust and emission control measures by condition or s106 agreement, as appropriate.

5.3 Developers will need to ensure that all contractors follow best practice at all times to control and limit emissions of gaseous and particulate pollutants into the atmosphere from construction and demolition activities, including from vehicles and plant. The following sections identify the activities that are most likely to produce dust, particulate matter and gaseous pollutant emissions and outlines best practice to prevent or minimise emissions. These measures are summarised in Appendix 7, and they are divided according to key construction and demolition stages, site risk and whether they are compulsory or discretionary. These measures are intended to be effective and deliverable and in-line with best practice to deal with the specific air quality problems facing London. All measures to be implemented should be identified in the Air Quality Statement (Chapter 3). This may form part of a wider environmental management plan or a plan to protect the amenity of nearby receptors.

5.4 The focus of the dust and pollution control measures to be outlined in the AQDRA and AQDMP should be to reduce health and dust annoyance impacts on existing local receptors. Potential health impacts from dust emissions to site personnel should be addressed (e.g. through the use of face masks where appropriate) in the sites health and safety documentation.

SITE MANAGEMENT

5.5 Developers should follow the site management practices set out below, to ensure that the site is responsibly managed during the demolition and construction phases of the development.

Stakeholder engagement

5.6 It is important to ensure that those sensitive to the impacts (based on guidance from COMEAP[12]) are notified and consulted before work commences and that they have an easy and effective mechanism for informing the developer of their concerns and issues. For particularly large schemes boroughs may request that a working group, with representatives of the local authority, the local community and the developer, is set up to monitor and discuss any issues arising from the demolition and construction phase of a development. To support the working group, or as an independent control measure, a hotline can be set up to take complaints from the demolition / construction site.

5.7 Contact details for the person responsible for dust and emissions generated from the site should be displayed on the site boundary so that local residents and businesses are able to contact the developer and/or contractor to raise any issues that they may have and report complaints. For major developments a

person should be responsible for the monitoring and implementation of dust and emissions control measures. Developers and contractors should keep a record of all such complaints and respond to them as soon as possible (timescales to be stipulated by the Local Authority through a planning condition or s106 agreement). The log of complaints and action taken should be made available to the local authority on request.

5.8 The potential cumulative effects of emissions from several development sites should be considered and managed between the sites. For high risk sites, liaison meetings should be held with site managers of other high risk construction sites within 200 m of the site boundary to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.

Site inspections

5.9 The developer and contractor are to actively monitor the site to ensure the control of dust and emissions. Dry and windy conditions increase the likelihood of dust and emissions being produced and dispersed, so extra site monitoring should take place during these times.

PREPARING AND MAINTAINING THE SITE

5.10 The way in which a site is prepared and maintained can have a significant impact on the control of dust and emissions. Below are some measures that can be used to minimise emissions from a development site.

Site layout

5.11 When planning their construction works developers should aim to:

- Locate machinery and dust generating activities away from receptors;
- Create a physical distance and/or barrier between dust/emission generating activities and receptors;
- Install solid screens or barriers around dust generating activities. These should be at least as high as any stockpiles on-site;
- Cover or seed stockpiles to prevent wind whipping; and
- Remove loose materials as soon as possible.

Green infrastructure

5.12 The benefit of vegetation in reducing the impacts of air pollutants is still being researched. However, several studies show a positive impact[13]. Site operators are encouraged to install green walls, screens and other vegetation to minimise the impact of dust and pollution and also to improve the local environment during construction. See the case study set out in Box 2, below.

Site maintenance

5.13 Developers should keep their construction sites in good order. Measures to consider include:

- The site or construction area should be bunded to prevent runoff. Runoff and mud should be avoided as it can lead to dust once dry as well as polluting local waterways and sewers[14]
- Hoardings, fencing, barriers and scaffolding should be regularly cleaned using wet methods, where possible to prevent re-suspension of particulate

matter. Developers should collect used water and maximise the use of recycled and non-potable water;
- Regular checks of buildings within 100 m of the site boundary should be carried out to check for soiling due to dust with cleaning carried out where necessary; and
- Require a change of shoes and clothes by staff and visitors before going off-site to reduce the transport of dust or provide cleaning facilities such as showers or boot cleaners.

Dealing with spillages

5.14 Spillages can occur with a wide range of liquid and materials, including those which are hazardous. For all sites the following measures will address this issue:
- 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, which has spilled on the site and is designated as waste that is no longer
- fit for use - this should be dealt with in accordance with the Waste Management Licensing Regulations (WMLR), 1994. See Appendix 2 for more information; and
- Inform the Environment Agency, London Fire and Emergency Planning Authority (LFEPA) or the Health Protection Agency (HPA) if harmful substances are spilled.

5.15 More information is provided by the Environment Agency in Pollution Prevention Guideline 6. (https://www.gov.uk/government/organisations/environment-agency)

REDUCING EMISSIONS FROM VEHICLES

5.16 Emissions from vehicles associated with construction sites can significantly add to levels of local air pollution, so it is important that best practice is employed to reduce these.

London Low Emission Zone

5.17 All mobile vehicles associated with the demolition / construction should comply with the standards of the London Low Emission Zone. For HGVs, the standard is Euro IV for PM and for heavier vans and mini buses it is Euro 3. Local authorities may introduce tighter emission standards for particular sites should local circumstances require these. More information can be found at www.tfl.gov.uk/lez.

Reducing vehicle idling

5.18 The site should be managed so that vehicles do not have to wait to park safely. However, should vehicles have to wait they should not idle. Generally, if a vehicle is stationary for more than a minute, turning off the engine will reduce emissions and fuel costs.

Construction Logistics Plans

5.19 Deliveries to construction sites can contribute greatly to congestion and emissions at and around sites. Larger sites should develop and implement Construction Logistics Plans (CLPs) / Construction Traffic Management Plans as part of wider transport assessments. A CLP is a framework that allows deliveries and removals to be managed so that they are made when they are most needed, at times when they will contribute less to

BOX 2 CASE STUDY – GREEN SCREENS ON BOROUGH HIGH STREET

Better Bankside Business Improvement District (BID) aims to improve the quality of the local environment for businesses, residents and visitors to the area. One of its key areas of work is Bankside Urban Forest – a partnership initiative to improve the streets and public spaces between the riverside and Elephant and Castle. The BID was keen to install vertical greening (tall plants and green walls), to raise awareness of the value of this type of planting in a densely built up neighbourhood like Bankside.

The hoarding on Southwark Street was selected for a number of reasons. It surrounded the marshalling yard used by Skanska, the main contractors of the Thameslink Borough Market viaduct project, and so was used by many heavy construction vehicles. It was close to the busy road junction of Borough High Street and Southwark Street – a known air pollution hot spot. The site also benefited from being in a prominent location close to the entrance to Borough Market – it was important that the greening be visible to raise awareness of the project.
The green screen was funded by Better Bankside, which in turn is funded by local businesses through an annual levy on their business rates, which gets pooled for improving Bankside as a place to do business. Network Rail and Skanska provided logistical support with access to the site during the implementation for the planting. On going maintenance was factored into the contract, with Skanska providing additional on-site support in terms of keeping the planting irrigated.

While no formal air quality monitoring was undertaken in the immediate vicinity of the green screen, the planting has made a big impact visually and has had plenty of positive feedback from passers-by. An unanticipated benefit was that with the green screens in place there has been no graffiti on these hoardings and the plants have not been vandalised.

Green Wall, Southwark St - Elliot Treharne

congestion and at locations where loading and unloading can take place safely. CLPs can help site managers to:

- Cut congestion in the local area, reducing the environmental impact of deliveries and inconvenience to local road users;
- Save time and money;
- Improve the safety of deliveries; and
- Improve delivery reliability.

5.20 Every CLP needs to be tailored to a site's requirements and its local context, including the location of sensitive receptors. Things to consider include:

- Looking at where legal loading can take place;
- Using freight operators who can demonstrate their commitment to best practice - for example, members of TfL's Freight Operator Recognition Scheme (FORS) www.tfl.gov.uk/fors;
- Consolidating deliveries so fewer journeys are needed; and
- Using sustainable delivery methods, such as via a canal or railway.

5.21 TfL provides advice on developing CLPs at: http://www.tfl.gov.uk/microsites/freight/construction_logistics_plans.aspx

5.22 Many boroughs also have their own requirements for CLPs/Construction management plans. Where required, these should be secured through a s106 agreement.

Use of railways and waterways

5.23 Where construction sites are located close to waterways or railways, developers are strongly encouraged to assess the viability and feasibility for construction materials to be delivered or removed by these means, rather than by road. The benefit of this is the reduction in the number of trips made by HGVs on local roads, reducing local emissions. TfL provides advice on the use of waterways and railways for freight at: http://www.tfl.gov.uk/microsites/freight/information_and_advice.aspx

Travel Plans

5.24 Sites that will be employing large numbers of workers for long periods may require the development of workplace travel plans which aim to reduce the emissions from workers and visitors travelling to and from the site. Measures set out in travel plans include schemes that encourage workers not to use single-occupancy cars to travel to and from work but instead to cycle, walk, use public transport or car share. Reducing car miles not only reduces emissions but can produce financial benefits and productivity improvements, saving both the business and its staff money and time. DfT has produced guidance on Workplace Travel Plans at: www.dft.gov.uk/pgr/sustainable/travelplans/work/essentialguide.pdf

Diesel or petrol generators

5.25 Even modern diesel or petrol powered plant items emit higher levels of PM and NOx than electric equivalents. Therefore, wherever possible, renewable, mains or battery powered plant items should be used.

OPERATIONS

Cutting, grinding and sawing

5.26 Ideally, cutting, grinding and sawing should not be conducted on-site and pre-fabricated material and modules should

be brought in where possible. In cases where such work must take place, spraying water, preferably from a water efficient spray pump, over the material as it is being cut greatly reduces the amount of dust generated.

5.27 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 best practice:
- Pre-wash work surfaces;
- Screen off work areas; and
- sweeping away.

Mobile crushing plant

5.28 This is an inherently dusty activity and will often take place on the sites normally classed as medium or high risk dust emission sites. Developers should:
- Notify the local authority if a crusher is to be used. Mobile crushing plants are authorised as Part B processes under the Environmental Protection Act (see Appendix 2 for more details), by the authority where they are registered (rather than the authority in whose area they are used), even if they are only temporary;
- Keep a copy of the permit on-site and adhere to the conditions of their use at all times, and
- Use best available techniques in accordance with the Process Guidance note PG 3/16 (04)12 at all times (see Appendix 5 for more information).

Concrete batching

5.29 As for mobile crushing plants, construction sites with concrete batching plants will often be categorised as medium or high risk. Developers should treat such plant as authorised Part B processes (see Appendix 6 for more details) even if temporary, and employ the following best practice:
- Notify the local authority a concrete batcher is to be used on site:
- Use best available techniques identified in the Process Guidance note PG 3/1 (04)12 (See Appendix 6 for more details); and
- Carry out these processes in an enclosure, wherever possible.

Chutes, conveyors and skips

5.30 Skips, chutes and conveyors should be completely covered and, if necessary, completely enclosed to ensure that dust does not escape. Similarly, drop heights should be minimised to control the fall of materials.

WASTE MANAGEMENT

Bonfires

5.31 Across London local authorities set conditions that prevent bonfires on-site. Taking into account the Clean Air Act 1993 and nuisance legislation (Environmental Protection Act 1990), it is recommended that:
- No burning of any material is permitted on-site; and
- Any excess material should be reused or recycled on or off-site in accordance with appropriate legislation.

Waste and/or recycling plans

5.32 For larger development sites, developers should produce a waste and/or recycling plan. The Environment Agency[15] suggests that a waste plan includes 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. The Waste and Resources Action programme (WRAP- www.wrap.org.uk) provides a list of ten quick wins for reducing and re-using waste;
- Control access to storage areas to minimise 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 areas 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). The BRE Smart Waste management tool (www. smartwaste.co.uk) is an on line template contractors can use to input data on the amount and type of waste and it will be sorted by the tool. CIRIA provides lists of recycled materials that companies will accept. Any materials re-used, however, should be suitable for purpose, for example any suspected contaminated soil should not be re-used until it has been tested first; and
- If practicable, remove materials for recycling from buildings prior to demolition or from demolition spoil.

5.33 For further details on reducing and managing waste, including the waste hierarchy and the reuse and recycling of waste see the Mayor's SPG on Sustainable Design and Construction.

MITIGATION MEASURES SPECIFIC TO DEMOLITION

5.34 Demolition activities can generate significant dust and also cause resuspension of dust currently within the building. Soft stripping is an effective way of screening dust and preventing dispersion. Water suppression should be used to damp down dust and other debris that could generate dust, and, where practical, manual or mechanical demolition techniques should be used. Blasting should be avoided in order to control dust.

MEASURES SPECIFIC TO EARTHWORKS

5.35 Following earthwork activities it is important to reduce the generation and resuspension of dust through re-vegetating exposed areas and soil stockpiles to stabilise surfaces. Where this is not possible, use hessian and/or mulches to re-vegetate or cover with topsoil.

MEASURES SPECIFIC TO CONSTRUCTION

5.36 It is important that cement, sand, fine aggregates and other fine powders are sealed after use and if necessary stored in enclosed or bunded containers or silos. Some materials should be kept damp to reduce the risk of drying out.

MEASURES SPECIFIC TO TRACKOUT

Haul routes

5.37 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, developers should as far as possible ensure that hard surfaces or paving are used for all haul routes, even if routes are temporary.

5.38 It is important that haul routes and local access roads are kept free of dust as far as possible and are swept regularly. Where possible, this should be water-assisted to increase damping down. However, care should be taken to not to contaminate sewers or local waterways.

Wheel washing

5.39 Vehicles – in particular wheels – should be washed or cleaned before leaving the site. At low risk sites, this might be by means of hosing, but at most sites wheel wash facilities should be installed, preferably with the application of rumble grids to dislodge accumulated dust and mud. Ideally the route from the wheel wash to the public road should be a paved. Where layout permits, the site access gates should be located at least 10m from receptors.

Covering vehicles

5.40 All vehicles carrying dusty materials should be securely covered before leaving the site, to prevent dust spilling on the road and being swept away by the wind.

Dust suppressants

5.41 Transport for London (TfL) has delivered a programme trialling the use of dust suppressants (Calcium Magnesium Acetate) at road sides and along roads close to and within construction and industrial waste sites with high levels of local PM10 pollution.

5.42 Dust suppressants have also been trialled by TfL in conjunction with the Environment Agency and four waste operators at three locations: Neasden Lane, Horn Lane and Manor Road. At these locations the dust suppressant Calcium Magnesium Acetate (CMA) was applied to yard areas on-site and off-site.

5.43 It was found by Kings College[16] that there were beneficial impacts of CMA application on the roads adjacent to the monitoring sites and/or on the process yard at three waste operator's sites. The most robust findings were at Horn Lane. A clear drop in local PM10 concentrations occurred in the hour following on-site CMA application of between 31% and 59% relative to the control. A lesser decrease was associated with the off-site applications. Analysis at Manor Road was restricted due to a lack of pre-trial period, but a similar decrease in local PM10 (41%) was associated with on-site CMA application.

5.44 Whilst this latter trial occurred on operating waste sites, the benefits can be extended to construction / demolition sites. Appendix 9 provides guidance on the use of dust suppressants.

5.45 Appendix 7 summarises the dust and emissions control measures and what type of risk it should apply to by demolition / construction activity.

TWO CONSTRUCTION EXAMPLE TRIAL SITES WERE:

i Pudding Mill Lane Site: This is a large Crossrail construction site next to the 2012 Olympic Park. It has a large internal haul road (500m) for transferring of materials thought the site.

ii Limmo Site: This Crossrail site will cater for the construction of two shafts. It is a large site comprising 2 hectares and the majority of the site is open aggregate. As part of the programme TfL also worked with Crossrail to install vegetated screens on a number of construction site hoardings to help trap particulate matter and offer visual and other local environmental and amenity benefits.

The programme was carefully monitored and evaluated by King's College London. The conclusions of this study suggest that the application of dust suppressants at construction sites could be beneficial. As a result site operators may wish to give consideration to the localised use of dust suppressant technology at locations where a large volume of vehicles enter and exit the site, to help prevent resuspension.


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CHAPTER 6

SITE MONITORING

KEY INFORMATION

All demolition and construction sites should be monitored for the generation of air pollution. It is essential to monitor for dust generation, including PM10. For smaller sites this can be simply visual monitoring. The need to monitor PM2.5 and NO2 will be determined on a case by case basis by the local planning authority. The need for monitoring will generally depend on existing air quality, air pollution risks from the evelopment, the technical practicalities and financial implications of such monitoring.

SITE MONITORING PROTOCOLS

6.1 If the best practice methods identified in Chapter 5 are implemented correctly, then formation of dust and harmful emissions from construction sites will be minimised. However, continuous site monitoring is still an important way for developers to manage the generation of dust including PM10 and PM2.5 and NOx emissions during construction and demolition. In London construction and demolition activities could result in even poorer air quality within an existing air quality management area (AQMA) or could result in local air quality being degraded to the extent that an AQMA needs to be declared by the local authority.

6.2 Monitoring will vary from visual assessments for low risk sites to the installation of real time automatic monitors for PM10 for high risk sites. On certain sites it may be appropriate to determine the existing (baseline) pollution levels before construction begins. The local planning authority will provide advice on the appropriate air quality monitoring procedure and timescale on a case by case basis. Two frequently used procedures for automatic real-time air quality monitoring are:

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

6.3 Best practice monitoring methods that may be required by local planning authorities are set out in Appendix 8. These will not be applicable to all sites in these dust and emission risk categories (as per risk categories identified in Chapter 4).

Low Risk Sites

- Take into account the impact of air quality and dust on occupational exposure standards to minimise worker exposure and breaches of air quality objectives that may occur outside the site boundary, such as by visual assessment; and
- Keep an accurate log of complaints from the public, and the measures taken to address any complaints, where they were required;

Medium Risk Sites

- As for low risk sites;
- Determine the prevailing wind direction across the site using data from a nearby weather station[17];
- If measuring air quality along a line;
  - ◊ Set up a line across the site according to the direction of the prevailing wind; and

- ◊ Operate a minimum of two automatic particulate monitors to measure PM10 levels at either end of the line - either inside or outside the site boundary. These instruments should provide data that can be downloaded in real-time by the local authority; and
- If monitoring air quality 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 by the local authority;
  - ◊ If required, supplement monitoring with hand held monitors to get on-the-spot readings at selected points, such as close to sensitive receptors; and
  - ◊ Consider also monitoring dust deposition and soiling rates as these can be used to indicate nuisance.

High Risk Sites

- As for medium risk sites;
- Determine prevailing wind direction, as for medium risk sites, or by setting up a weather station on site to measure local wind direction and speed;
- If measuring along a line:
  - ◊ Set up a line across the site according to the direction of the prevailing wind; and
  - ◊ 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 by the local authority; and
- The LPA may also require monitoring at sensitive receptors, if this is the case:
  - ◊ 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 by the local authority;
  - ◊ If applicable, supplement with automatic monitors or hand-held monitors, particularly focusing on any sensitive locations such as schools;
  - ◊ 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 dust log;
  - ◊ Identify a responsible trained person on- site for dust monitoring who can access real-time PM10 data from automatic monitors (e.g., at hourly or 15 minute intervals). Ensure that adequate quality assurance/quality control is in place; and
  - ◊ Agree a procedure to notify the local authority, so that immediate and appropriate measures can be put in place to rectify any problem. Alert mechanisms could include email, texts or alarm systems.

Site threshold for the concentration of PM10

6.4 It is recommended a trigger level of 250 ug m-3 is set as a 15-minute mean for concentrations of PM10 close to construction sites. This trigger level was devised from measurement near a

construction site in London using TEOM[18] measurements with a multiplier of 1.3 (Fuller and Green, 2004). The multiplier of 1.3 was designed to allow for the loss of volatile PM from the TEOM which would not be an issue with construction dust. An updated correction method is now available (www.volatile-correction-model.info). The trigger level of 250 ug m-3 would approximate to 200 ug m-3 as a 15 minute mean without the multiplier. However some PM10 reference instruments cannot measure a 15 minute mean. As an alternative 50 ug m-3 is suggested as a 1-hour mean having subtracted background concentrations (to account for regional pollution episodes etc). A 1-hour mean of 50 ugm-3 from local sources is equivalent to a 15 min mean of 200 ug m-3 and would be a compromise, taking into account the longer averaging period. The one hour limit is designed to prevent any complaints from people living or working close to the site.

6.5 Where the site threshold for PM10 is being significantly breached developers should stop work immediately and ensure best practice measures are in place before restarting. Where there are breaches of the PM10 threshold local authorities can use their powers to prevent the statutory nuisance.


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CHAPTER 7

CLEANER CONSTRUCTION MACHINERY FOR LONDON: A LOW EMISSION ZONE FOR NON-ROAD MOBILE MACHINERY

7.1 Since 2008, heavy duty diesel road vehicles have had to meet emissions standards for PM to avoid being charged for travelling within the London Low Emission Zone (LEZ).The Mayor has recently announced his intention to introduce an ultra low emission zone in central London from 2020. This will require all vehicles to be either zero or ultra low emission.

7.2 It is also important to take action to reduce emissions from non-road mobile machinery (NRMM) to protect and improve Londoners' health. The latest version of the London Atmospheric Emissions Inventory estimates that in 2010 the NRMM used on construction sites was responsible for 12% of NO_x emissions and 15% of PM_{10} emissions in Greater London.

73 To address this significant contribution by non-road mobile machinery to London's poor air quality the GLA will seek to control the emissions from this equipment from 2015 by establishing emissions standards for London. This will apply to development from 1st September 2015 and is included to give developers notice so that they can develop their supply chain and so the boroughs can develop procedures to secure, monitor and enforce these standards through the planning system.

7.4 Officers from the Greater London Authority have been liaising with the London Boroughs, construction industry representatives, manufacturers, the retrofit industry and the construction plant hire association to agree robust standards

7.5 for NRMM operating in London. This approach is the outcome of these discussions. The approach is summarized by Figure 7.1.

2015 EMISSION STANDARDS

7.6 From 1 September 2015 NRMM of net power between 37kW and 560kW used

- in London will be required to meet the standards set out below. This will apply to both variable and constant speed engines for both NO_x and PM. These standards will be based upon engine emissions standards set in EU Directive 97/68/EC and its subsequent amendments.
- NRMM used on the site of any major development within Greater London will be required to meet Stage IIIA of the Directive as a minimum; and
- NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IIIB of the Directive as a minimum.

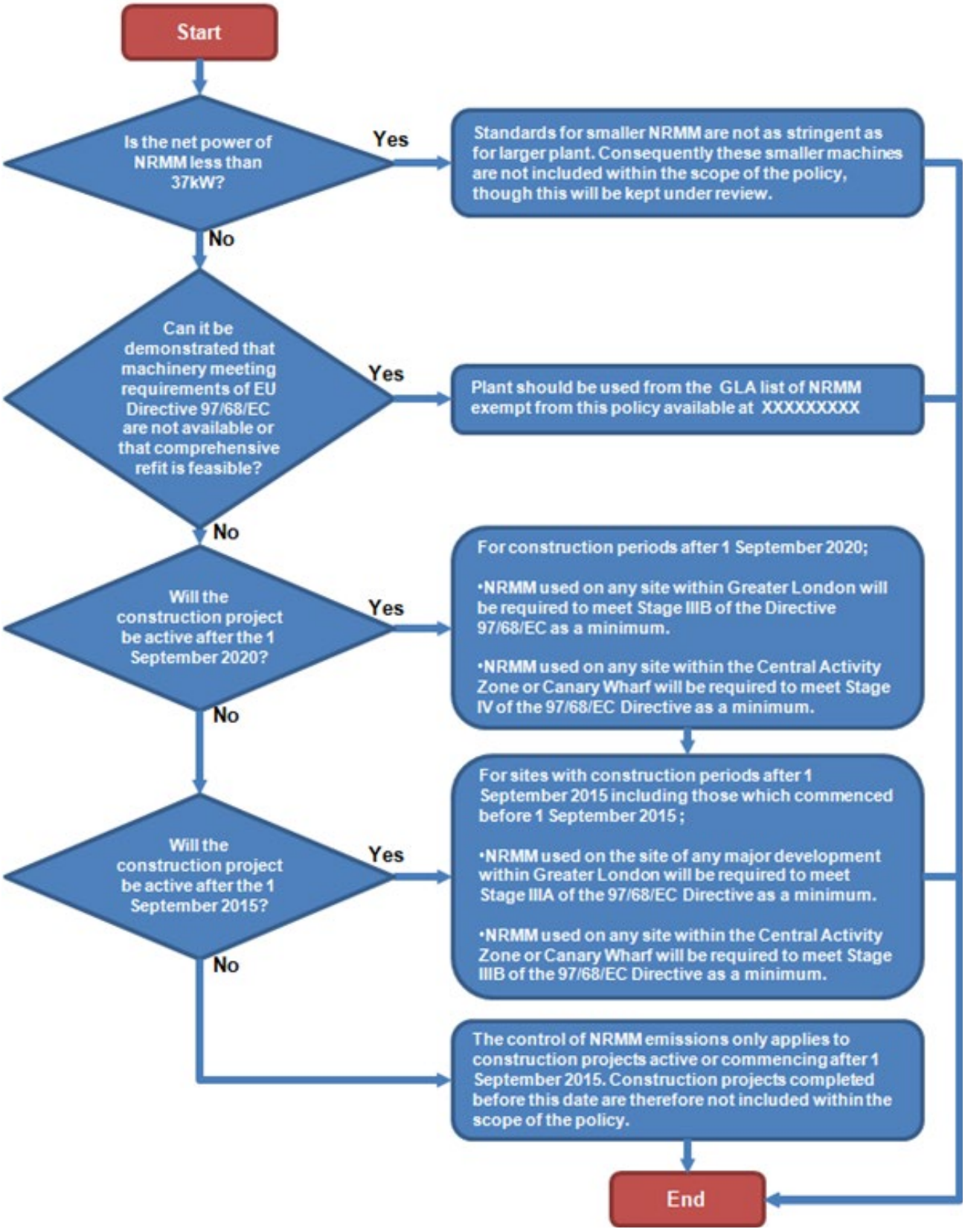
7.7 From 1 September 2020 the following will apply:

- NRMM used on any site within Greater London will be required to meet Stage IIIB of the Directive as a minimum.
- NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IV of the Directive as a minimum.

7.8 The requirements set out in paragraphs 7.6 and 7.7 may be met using the following techniques;

- Reorganisation of NRMM fleet
- Replacing equipment (with new or second hand equipment which meets the policy)
- Retrofit abatement technologies
- Re-engining

FIGURE 7.1 SUMMARY OF NRMM EMISSIONS REQUIREMENTS FROM 2015



7.9 In developing this approach there has been an appreciation of the potential impact on small businesses and the associated potential equalities impact. In recognition of this, the 2015 standards for the Non-Road Mobile Machinery Low Emission Zone will only apply to major developments in outer London, thus removing small operators from the scope of the proposals until 2020. It is expected that this additional compliance time will significantly reduce costs imposed on small operators.

7.10 All eligible NRMM should meet the standards above unless it can be demonstrated that the machinery is not available or that a comprehensive retrofit to meet both PM and NO_x emission standards is not feasible. In this situation every effort should be made to use the least polluting equipment available including retrofitting technologies to reduce particulate matter emissions.

7.11 It is recognised that some NRMM plant is not yet widely available in the numbers required to meet the above standards and that the options for retrofitting or re-engining are currently cost prohibitive. As such the GLA will publish a list of NRMM that is exempt from this policy. This list will be reviewed regularly.

7.12 At present, the standards for smaller NRMM (19kW to 37Kw) are not as stringent as for larger plant. Consequently these smaller machines are not included within the scope of the policy, though this will be kept under review.

7.13 These NRMM emissions standards will apply to all construction projects which are active from September 2015 including those which commenced before this date. Developers should begin to put processes in place to ensure their supply chain can meet these standards, where possible.

Compliance with the Non-Road Mobile Machinery (NRMM) policy

7.14 The LPAs will be responsible for the application and enforcement of this policy through the planning process.

- The compliance with the NRMM standards should be secured by the local authorities as a planning condition or s106 agreement. An example condition has been included in Appendix 2.
- It is acknowledged that developers may not know what equipment will be
- required during construction at planning application stage, therefore as part of their Air Quality Dust Risk Assessment (AQDRA) developers will be required to provide a written statement of their commitment and ability to meet these standards. This statement will be used by the local authority for the purposes of monitoring and enforcement.
- An inventory of all NRMM should be kept on-site stating the emission limits for all equipment. All machinery should be regularly serviced and service logs kept on-site for inspection. This documentation should be made available to local authority officers as required.
- The Considerate Constructors Scheme will play a role in reviewing the levels of compliance with this policy across London as part of their audit activities at the construction sites of their members. Given the importance of this policy boroughs are strongly encouraged to ensure developers sign up to the Considerate Constructors Scheme to assist with monitoring compliance.

ENDNOTES

[1] Institute of Occupational Medicine, Report on estimation of mortality impacts of particulate air pollution in London, 2010.

[2] In the UK the maximum permitted sulphur content of fuels used in road and off-road applications is 10ppm, and therefore sulphur dioxide is no longer a significant pollutant from these sources.

[3] Save Britain's Heritage v Secretary of State for Communities and Local Government [2011] EWCA Civ 334.

[4] Approval under the Buildings Act 1984 is required for demolition.

[5] This objective is supported by paragraphs 1.56 and 1.57 of the London Plan.

[6] The transportation of dust and materials on the wheels of vehicles

[7] http://www.iaqm.co.uk/text/guidance/construction_guidance_2014.pdf

[8] The glossary provides definitions of these activities.

[9] NO_x is mainly generating by the operation of equipment and vehicles and is address in Chapter 7 Cleaner Construction Machinery for London

[10] The EU air quality limits

[11] The EU air quality limits

[12] Committee on the Medical Impacts of Air Quality www.comeap.org.uk

[13] http://pubs.acs.org/doi/abs/10.1021/es300826w

[14] This could prevent London meeting its requirements under the Water Quality Directive.

[15] www.environment-agency.gov.uk

[16] http://www.tfl.gov.uk/assets/downloads/corporate/evaluation-dust-suppressants-pmconcentrations.pdf

[17] Permanent weather stations are only operated at few locations in and around London. Ideally a minimum of 12 months data should be used.

[18] Tapered Element Oscillating Monitor

GLOSSARY

ALG	Association of London Government
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
BRE	Building Research Establishment
CIRIA	Construction Industry Research and Information Association
CIWM	Chartered Institute of Waste Management
COMEAP	Committee of Medical Effects of Air Pollution
CNG	Compressed Natural Gas
COSHH	Control of Substances Hazardous to Health
CTRL	Channel Tunnel Rail Link
DEFRA	Department of Environment, Food and Rural Affairs
DPF	Diesel Particulate Filter
Dust	All airborne particle matter
EA	Environment Agency
EPA 1990	Environmental Protection Act (1990)
EST	Energy Saving Trust
GLA	Greater London Authority
HGV	Heavy Goods Vehicle
HSE	Health and Safety Executive
HPA	Health Protection Agency
ICE	Institution of Civil Engineering
AQM	Local Air Quality Management
LAPC	Local Air Pollution Control
LAPPC	Local Air Pollution and Prevention Control
LEV	local exhaust ventilation
LEZ	Low Emission Zone
LFEPA	London Fire and Emergency Planning Authority
LPG	Liquefied Petroleum Gas
NO2	Nitrogen Dioxide
NOX	Oxides of Nitrogen Oxides
NRMM	Non-Road Mobile Machinery
PG	Process Guidance
PM2.5	Fine particles with a diameter less than 2.5 micro-metres
PM10	Particles with a diameter less than 10 micro-metres
QA/QC	Quality Assurance/Quality Control
RPC	Reduced Pollution Certificate
SAC	Special Area of Conservation (EU Habitats Directive)

SPA	Special Protection Area (EU Birds Directive)
SPG	Supplementary Planning Guidance
SSSI	Site of Special Scientific Interest
TEOM	Tapered Element Oscillating Monitor
TfL	Transport for London
Track out	The transportation of dust and materials on the wheels of vehicles
TSP	Total Suspended Particles
ULSD	Ultra Low Sulphur Diesel (present UK specification is EN590:2004)
VOC	Volatile Organic Compounds

APPENDICES

APPENDIX 1 UK AIR QUALITY OBJECTIVES IN THE NATIONAL AIR QUALITY STRATEGY

AIR QUALITY STRATEGY OBJECTIVES IN AIR QUALITY REGULATIONS

Pollutant	Air quality objective	Concentration measured as	Date
Fine particles (PM10)	No more than 35 days above 50 µg/m3	Daily mean	31st Dec 04
	40 µg/m¬3	Annual mean	31st Dec 04
	No more than 10 days above 50 µg/m3	Daily mean	31st Dec 10*
	23 µg/m3	Daily mean	31st Dec 10*
Nitrogen dioxide	No more than 18 hours above 200 µg/m3	Annual mean	31st Dec 05
	40 µg/m3	Hourly mean	31st Dec 05
Sulphur dioxide	No more than 24 hours above 350 µg/m3	Hourly mean	31st Dec 04
	No more than 3 days above 125 µg/m3	Daily mean	31st Dec 04
	No more than 35 times above 266 µg/m3	15 minute mean	31st Dec 05
Carbon monoxide	Maximum 10 mg/m3	Running 8 hour mean	31st Dec 03*
Benzene	5 µg/m3	Annual mean	31st Dec 10
1,3 butadiene	2.25 µg/m3	Running annual mean	31st Dec 03
Lead	0.5 µg/m3	Annual mean	31st Dec 04
	0.25 µg/m3		31st Dec 08

MAXIMUM EXPOSURE LIMITS (MEL) USED TO ENFORCE THE HEALTH AND SAFETY AT WORK ACT 1974

Substances that may cause most serious health effects for which "no adverse effect level" can be determined

Material	Long term MEL (8h TWA) mg/m3
Hardwood dust	5
Softwood dust	5
Silica (Respirable crystalline)	0.3
Man-made mineral fibre	5

OCCUPATIONAL HEALTH STANDARDS

MATERIAL	FRACTION	LONG TERM MEL (8H TWA) MG/M3
Calcium carbonate	Inhalable	10
	Respirable	4
Calcium silicate	Inhalable	10
	Respirable	4
Coal Dust	Respirable	2
Emery	Inhalable	10
	Respirable	4
Gypsum	Inhalable	10
	Respirable	4
Limestone	Inhalable	10
	Respirable	4
Marble	Inhalable	10
	Respirable	4
Mica	Inhalable	10
	Respirable	4
Plaster of Paris	Inhalable	10
	Respirable	4
Portland Cement	Inhalable	10
	Respirable	4

MATERIAL	FRACTION	LONG TERM MEL (8H TWA) MG/M3
Ground granulated blast furnace slag	Inhalable	10
	Respirable	4
Pulverised Fuel Ash	Inhalable	10
	Respirable	4
Silica (amorphous)	Inhalable	6
	Respirable	2.4
Silica (fused)	Respirable	0.08
Silica Carbide	Inhalable	10
	Respirable	4

APPENDIX 2 RELEVANT NATIONAL LEGISLATION AND GUIDANCE

AIR QUALITY STRATEGY OBJECTIVES IN AIR QUALITY REGULATIONS

1. UK ACTS OF PARLIAMENT

This section provides a summary of some of the legislation and guidance that local authorities can use to control dust and emissions from construction and demolition sites. These are provided for information purposes and are not an authoritative statement of the law.

ENVIRONMENTAL PROTECTION ACT (EPA) 1990 AND POLLUTION PREVENTION AND CONTROL (ENGLAND AND WALES) REGULATIONS 2007

Part 1 of the EPA 1990 contains two methods of pollution control, Part A and Part B (below)

c Integrated Pollution Control (IPC) – regulation of the larger polluting processes (Part A) by the Environment Agency

d Local Authority Integrated Pollution Prevention and Control (LA-IPPC) - local authority regulation of industrial activities (Part A2), covers emissions to air, water (including discharge to sewers) and land

e Local Air Authority Pollution and Prevention Control (LAPPC) – regulation of smaller, less polluting processes (Part B) by the local authority

f From 1 August 2000, regulation of processes has been transferred to the Pollution Prevention and Control (England and Wales) Regulations 2000. These regulations were amended in 2007. Certain activities relevant to construction sites are regulated as Part B processes and have their own process guidance (PG) and/or additional guidance notes, including:

- Mobile Crushing and Screening Processes- PG 3/16 (04)
- Quarry Processes (Aggregates)- PG 3/8 (04)
- Blending, Packing, Loading and use of Bulk Cement- PG 3/1 (11) – revised draft 2004
- Asbestos- PG 3/13 (95) with additional guidance AQ15(04))
- Plaster Processes- PG 3/12 (04)
- Lime Processes – PG 3/14 (04)
- Cement Processes - AQ14 (92)
- Mobile Plant AQ 9(92)

Part II makes provisions for the management of waste duty of care for its proper disposal, for example Part 2 33(c) states that a person shall not treat, keep or dispose of controlled waste in a manner likely to cause pollution of the environment or harm to human health. Part III of the Act allows local authorities to take action to abate statutory nuisances such as dust, steam, smell, fumes from construction site that is deemed prejudicial to health or a nuisance. Dark smoke emissions are dealt with separately under the Clean Air Act 1993.

GREATER LONDON AUTHORITY ACT 1999 (AS AMENDED)

This Act set up the Greater London Authority and functional bodies (Transport for London, Metropolitan Police Authority, London Fire and Emergency Planning Authority and the London Development Agency). It is made up of a directly elected Mayor and a separately elected Assembly.

The Mayor has an executive role, making decisions on behalf of the GLA and must have regard to equality of opportunity, promoting health and sustainable development. The Mayor has published his statutory strategies on transport, spatial development, economic development and the environment. They contain policies to improve London's economy, infrastructure and environment and the most relevant to this Best Practice Guidance are the London Plan, Mayor's Transport Strategy and Mayor's Air Quality Strategy.

ENVIRONMENT ACT 1995 AND AIR QUALITY REGULATIONS 2010

The Air Quality Strategy set standards and objectives (see Appendix 1 for more details) for air pollutants under Part IV of the Environment Act 1995. Local authorities have a responsibility to carry out a process of Local Air Quality Management and work towards objectives set for seven pollutants in the Air Quality Regulations. Of these, the most relevant for construction sites is PM10, for which a short term (24 hour) and long term (annual average) objective have been set.

CLEAN AIR ACT 1993

Under the Clean Air Act 1993, the burning of infected timber and waste is exempt in cases where transportation may have cross- infected wooden backed vehicles. However, emitting dark smoke from bonfires is an offence under this act.

BUILDING ACT 1984

Applies to demolition of buildings and requires prior notification to the local authority and production of a method statement before work begins. Sections 80-82 concern procedures to be carried out by the person who intends to undertake demolition. Under Section 80, the developer must notify Building Control at least 6 weeks before work begins. Demolition may commence after 6 weeks has elapsed from the submission of the notification or after the local authority has issued a counter notice, which will require certain tasks to be carried out. The local authority will often issue a counter notice that requires certain tasks to be carried out first.

HEALTH AND SAFETY AT WORK ACT 1974

The purpose of this act is to secure the health, safety and welfare of person at work and to protect against risk to other persons from these activities. Under this act the Health and Safety Executive (HSE) issue sets of guidance notes, the most relevant to construction activities include:

- Working with asbestos cement and board- HSG189/1, HSG 189/2.
- Dust: general principles of protection-EH44.
- Respirable crystalline silica-EH59.
- Man-made mineral fibres-EH46.
- Ventilation of the workplace-EH22.
- Assessment of exposure to fumes from welding and allied processes-EH54
- The control of exposure to fumes from welding, brazing and similar processes-EH55.
- Occupational Exposure Limits-EH40.
- Asbestos: exposure limits and measurements of airborne dust concentrations -EH10.
- Asbestos 1988-HS13.
- BS 6187:1982 Code of Practice for Demolition.

2. NATIONAL REGULATIONS

The following regulations and guidance are also important to consider when dealing with dust and emissions from construction sites:

CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS (COSHH) 2002

These regulations apply to all "very toxic, toxic, harmful, corrosive or irritant" substances. This includes dust of any kind when present in the air. These regulations mean employers must protect their employees. This includes a requirement to comply with exposure limits in the HSE publication EH40, which is published annually5 (see Table 1 and 2 that relate to materials from construction).

CONTROL OF ASBESTOS REGULATIONS 2012

The control limit for asbestos is 0.1 asbestos fibres per cubic centimetre of air (0.1 f/cm3). The control limit is not a 'safe' level and exposure from work activities involving asbestos must be reduced to as far below the control limit as possible.

THE CONTROL OF POLLUTION (SPECIAL WASTE) REGULATIONS 1980 (AMENDED 1988)

These regulations define a system to trace special or special waste from the point of origin to final disposal, including transfer, subdivision, and any other change.

CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2007

These regulations are relevant to all stages and activities of construction and demolition work as they aim to improve the management and co-ordination of all health, safety and welfare aspects throughout construction projects to reduce the number of accidents.

WASTE MANAGEMENT LICENSING REGULATIONS (WMLR) 1994. SCHEDULE 3 AND SPECIAL WASTE REGULATIONS 1996.

Procedures to manage contaminated and un-contaminated waste and deal with waste licenses.

THE NON-ROAD MOBILE MACHINERY (EMISSIONS OF GASEOUS AND PARTICULATE POLLUTANTS) (AMENDMENT) REGULATIONS 2011

Transposes stringent requirements to reduce emissions from diesel engines of non-road mobile machinery in EU directives 97/68/EC, 2002/99/EC and 2004/26/EC. These regulations tighten the emission standards in two stages – Stage IIIA from 2006-8 and Stage IIIB from 2011-12 to reduce NOX, hydrocarbons (HCs) and particulate emissions.

THE TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) (ENGLAND AND WALES) REGULATIONS 2011

For major developments over certain thresholds (Schedule I and II applications), the developer must submit an environmental impact assessment (EIA) to the local authority before planning consent is granted. The EIA sets out the likely impacts on the environment of the proposed development (from all stages including demolition and construction)

and must include measures to mitigate any significant negative effects.

3. NATIONAL GUIDANCE

NATIONAL PLANNING POLICY FRAMEWORK

The NPPF states that planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan.

NSCA GUIDANCE 20064: DEVELOPMENT CONTROL: PLANNING FOR AIR QUALITY

This new guidance provides a framework for air quality considerations to be included in the development control process and provides a new approach to addressing air quality impacts. The document aims to improve communication between developers, planners and environmental health officers.

LONDON COUNCIL'S GUIDANCE

This guidance provides robust technical advice for developers (their consultants) and local authority air quality officers, on how to assess planning applications that could have an impact on air quality. The procedures aim to provide a consistent approach for dealing with air quality and planning in London.

4. ENVIRONMENT AGENCY GUIDANCE

MODEL PROCEDURES FOR THE MANAGEMENT OF LAND CONTAMINATION (CLR 11)

The Environment Agency developed the model to provide the technical framework for applying a risk management process when dealing with land affected by contamination. The process involves identifying, making decisions on, and taking appropriate action to deal with land contamination in a way that is consistent with government policies and legislation within the UK.

POLLUTION PREVENTION GUIDANCE NOTES (PPGS)

The Environment Agency, Scottish Environment Protection Agency (SEPA) and the Environment and Heritage Service in Northern Ireland have produced of a range of Pollution Prevention Guidance notes (PPGs), which are targeted at a particular industrial sector or activity and gives advice on the law and good environmental practice. They include advice on oil and fuel storage, preventing pollution of water courses and managing fire water and major spillages.

These PPGs are available from either of the agencies as hard copies or directly from their websites.

Pollution Prevention Guidelines 1: General Guide to the Prevention of Pollution.

Pollution Prevention Guidelines 6: Working at Construction and Demolition Sites.

Pollution Prevention Guidelines 5: Works in, near or liable to affect watercourses.

APPENDIX 3 RELEVANT LONDON PLAN POLICIES

POLICY 1.1 DELIVERING THE STRATEGIC VISION AND OBJECTIVES FOR LONDON

STRATEGIC

A Growth and change in London will be managed in order to realise the Mayor's vision for London's sustainable development to 2031 set out in paragraph 1.49 and his commitment to ensuring all Londoners enjoy a good, and improving quality of life sustainable over the life of this Plan and into the future.

B Growth will be supported and managed across all parts of London to ensure it takes place within the current boundaries of Greater London without:

- a encroaching on the Green Belt, or on London's protected open spaces
- b having unacceptable Impacts on the environment

The development of east London will be a particular priority to address existing need for development, regeneration and promotion of social and economic convergence with other parts of London and as the location of the largest opportunities for new homes and jobs.

C Other mayoral plans and strategies, decisions on development proposals and investment priorities, and borough DPDs and development decisions should aim to realise the objectives set out in paragraph 1.50 so that London should be:

- a city that meets the challenges of economic and population growth
- b an internationally competitive and successful city
- c a city of diverse, strong, secure and accessible neighbourhoods
- d a city that delights the senses
- e a city that becomes a world leader in improving the environment
- f a city where it is easy, safe and convenient for everyone to access jobs, opportunities and facilities.

POLICY 3.2 IMPROVING HEALTH AND ADDRESSING HEALTH INEQUALITIES

STRATEGIC

A The Mayor will take account of the potential impact of development proposals on health and health inequalities within London. The Mayor will work in partnership with the NHS in London, boroughs and the voluntary and community sector as appropriate to reduce health inequalities and improve the health of all Londoners, supporting the spatial implications of the Mayor's Health Inequalities Strategy.

B The Mayor will promote London as a healthy place for all – from homes to neighbourhoods and across the city as a whole – by:

- a coordinating investment in physical improvements in areas of London that are deprived, physically run-down, and not conducive to good health
- b coordinating planning and action on the environment, climate change and public health to maximise benefits and engage a wider range of partners in action
- c promoting a strong and diverse economy providing opportunities for all.

C The impacts of major development proposals on the health and wellbeing of communities should be considered through the use of Health Impact Assessments (HIA).

PLANNING DECISIONS

D New developments should be designed, constructed and managed in ways that improve health and promote healthy lifestyles to help to reduce health inequalities.

LDF PREPARATION

E Boroughs should:

- a work with key partners to identify and address significant health issues facing their area and monitor policies and interventions for their impact on reducing health inequalities
- b promote the effective management of places that are safe, accessible and encourage social cohesion
- c integrate planning, transport, housing, environmental and health policies to promote the health and wellbeing of communities
- d ensure that the health inequalities impact of development is taken into account in light of the Mayor's Best Practice Guidance on Health issues in Planning.

POLICY 5.3 SUSTAINABLE DESIGN AND CONSTRUCTION

STRATEGIC

A The highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments and to adapt to the effects of climate change over their lifetime.

PLANNING DECISIONS

B Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.

C Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:

- a minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems)
- b avoiding internal overheating and contributing to the urban heat island effect
- c efficient use of natural resources (including water), including making the most of natural systems both within and around buildings
- d minimising pollution (including noise, air and urban runoff)
- e minimising the generation of waste and maximising reuse or recycling
- f avoiding impacts from natural hazards (including flooding)
- g ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions
- h securing sustainable procurement of materials, using local supplies where feasible, and
- i promoting and protecting biodiversity and green infrastructure.

LDF PREPARATION

D Within LDFs boroughs should consider the need to develop more detailed policies and proposals based on the sustainable design principles outlined above and those which are outlined in the Mayor's supplementary planning guidance that are specific to their local circumstances.

APPENDIX 4 EXAMPLE CONDITIONS AND S106 CLAUSES

The following standard phrases are taken from legal agreements and section 106 agreements signed by London local planning authorities. These phrases are intended to show what conditions can be placed on developers, but it is by no means an exhaustive list. If you choose to use these examples, take care to ensure the correct wording is used to reflect current policies:

PROVISIONS FROM THE LEGAL AGREEMENT THAT APPLY TO THE THAMES GATEWAY BRIDGE

The legal agreement was signed by LB Barking and Dagenham, LB Greenwich, LB Newham, LB Redbridge and Transport for London. The following minimum provisions shall apply to vehicles used by contractors for the purposes of construction of the Thames Gateway Bridge, currently anticipated to be from 2008 to 2012:

i All HGVs shall have minimum emissions standards equivalent to Euro III plus exhaust after treatment (duty cycle permitting) from start of construction and Euro IV by 2010;

ii All Non Road Mobile Machinery (NRMM) shall use ultra low sulphur diesel (ULSD);

iii All Non Road Mobile Machinery (NRMM) shall comply with either the current or next previous EU Directive Staged Emission Standards (97/68/EC, 2002/88/EC, 2004/26/EC);

iv All Non Road Mobile Machinery (NRMM) shall be fitted with Diesel Particulate Filters (DPF) or other exhaust after-treatment conforming to a defined and demonstrated filtration efficiency (load/duty cycle permitting); and

v The ongoing conformity of plant retrofitted with exhaust after-treatment, to a defined performance standard, shall be ensured through a programme of on-site checks.

EXAMPLE OF A PLANNING CONDITION SET BY LB NEWHAM FOR THE CHANNEL TUNNEL RAIL LINK

All commercial road vehicles used on the construction project must meet the European Emission Standards (commonly known as Euro standards) of Euro 3 during any works that take place from the date of this consent and Euro 4 for any works that takes place from 1 January 2008. In the event of any new European Emission Standards being introduced after 2006, the standards shall be applied to all road vehicles serving the construction project within a period of 2 years from the date of introduction contained within the relevant EU Directive.

All non-road mobile vehicles with compression ignition engines used within the site must comply with emission standards set in EC directive 97/68/EC. Vehicles must meet Stage II limits from the start of contract and from I January 2012, meet Stage IIIa and b emission limits.

Exemptions to the above standards (for road and non-road vehicles) may be granted for specialist equipment or for equipment with alternative emission reduction equipment or run on alternative fuels. Such exemptions will be applied

for in writing to the LPA in advance of the use of such vehicles, detailing the reasons for the exemption being sought and clearly identifying the subject vehicles. Exemptions that are granted will be made in writing and such vehicles must not be used until written exemption has been received by the applicant.

No vehicles or plant to which the above emission standards apply shall be on site, at any time, whether in use or not, unless it complies with the above standards, without the prior written consent of the local planning authority.

Any diesel powered machines used on, or otherwise serving the site, must be run on ultra low sulphur diesel (also known as ULSD 'cleaner diesel' or 'green diesel'). "Ultra low sulphur diesel" means fuel meeting the specification within EN590:2004.

Reasons: To protect the amenity of future occupants and/or neighbours and with regard to policy EQ45 of the London Borough of Newham Unitary Development Plan (adopted June 2001).

EXAMPLES OF 106 AGREEMENT CLAUSES SET BY LB GREENWICH WITH REGARD TO THE GREENWICH PENINSULA DEVELOPMENT (PLANNING REF: 02/2903/O)

DEED OF PLANNING OBLIGATION

18. Low Emission Zone

18.1 The Developer covenants with the Council:

18.1.1 at the same time as it submits the first application for residential/ commercial development for approval of reserved matters to the Council in consultation with the GLA under condition number 53 of the Planning Permission to submit to the Council for approval details of the Low Emission Zone on the Land and of the Low Emission Zone Controls together with a programme for implementation of the Low Emission Zone and the Low Emission Zone Controls all within the terms set out in Schedule 6;

18.1.2 to implement the Low Emission Zone and the Low Emission Zone Controls on the respective parts of the Land in accordance with the details and the programme approved under Clause 18.1.1 to the reasonable satisfaction of the Council and thereafter keep implemented the Low Emission Zone and the Low Emission Zone Controls at all times until Completion of the Development to the reasonable satisfaction of the Council, subject to any variation of the Low Emission Zone and/or the Low Emission Zone Controls approved by the Council from time to time;

18.1.3 save for the heavy goods vehicles and construction vehicles referred to in Schedule 6 not later than 1 April 2010 (or such other date agreed by the Council) and thereafter at the dates for Periodic Review, to submit to the Council for approval a review of the operation of the Low Emission Zone, including the Low Emission Zone Controls over the preceding period and proposals for the following period and shall use all reasonable endeavours to obtain the Council's approval thereto.

The relevant schedule with regards to HGVs and the Greenwich Low Emission

Zone

12. Heavy Goods Vehicles / Construction Vehicles

12.1 Through the operation of the Integrated Management System, MDL will use reasonable endeavours to achieve emission levels for HGV/Construction vehicles in accordance with the item 11.2 below.

12.2 MDL will use reasonable endeavours to achieve emission levels for HGV as follows:

12.3 80% vehicles achieving a minimum Euro 2 plus reduced pollution certificate up to 1 January 2007;

12.4 MDL will use the following measures:

(a) prior to MDL's approval of a principal Contractor to start on site at any of the development plots (and/ or infrastructure works), the principal Contractor will be required to submit his strategy to MDL for achieving the required Euro emission standards;

(b) the principal Contractor will be required to monitor progress against his strategy referred to in Paragraph 3.1;

MDL will carry out a review of the HGV/ Construction vehicle low emission zone measures and targets post Dome Arena opening with a view to achieving Euro 4 compliance by 1 January 2010.

DEED OF PLANNING OBLIGATION

35 Maximise use of the river Thames

35.1 The Developer covenants with the Council:

35.1.1 not later than the First Dwelling Implementation Date to submit to the Council for approval in consultation with TfL a strategy to maximise use of the River Thames where reasonably appropriate for the delivery of those construction materials to the Southern Land and removal of that construction waste from the Southern Land as listed in Schedule 3, during the construction of the Development;

35.1.2 before Implementation of any part of the Development on a Plot to submit to the Council for approval by the Council detailed measures to implement the strategy referred to in Clause 35.1.1 and to implement such measures in the carrying out of the part of the Development on the Plot.

35.2 The strategy shall be included in the Integrated Management System.

35.3 This Clause 35 is a Management Covenant except in relation to Clause 35.1.2 which is a Plot Covenant. similar facilities subject to the agreement of commercial terms. compliance by 1 January 2010.

The relevant schedule with regards to using the River Thames

RIVER USE/NON-ROAD USE

Any reference to MDL in this Schedule 2 shall, unless the context otherwise provides, mean the Developer in Clause 3 of this Agreement. Any reference to Ansco in this Schedule 2 shall, unless the context otherwise provides, mean the Developer in

Clause 4 of this Agreement.

1. Through the operation of the Integrated Management System, the Developer will use reasonable endeavours to reduce road based construction traffic from levels predicted in the Environmental Statement. Maximising use of the River Thames will play a key role in achieving this objective but the Developer shall be entitled to have regard to the cost differential between river and road use.

2. The Developer will use reasonable endeavours to reduce the amount of construction materials transported by road to/from the Land (measured by weight and as a percentage of the total weight of materials transported) as follows:

2.1 10% by the first Periodic Review (2 years);

2.2 15% by the second Periodic Review (5 years);

2.3 20% by the third Periodic Review (10 years);

2.4 25% by the fourth Periodic Review (15 years); and

2.5 30% by the fifth Periodic Review (20 years).

3. The Developer will use the following measures:

3.1 Prior to the Developer's approval of a principal Contractor to start on site at any of the Plots (and/or associated infrastructure works), the principal Contractor will be required to submit its strategy to the Developer for evaluation and implementation of non-road transportation of materials to/from its site. The principal Contractor's strategy shall include procedures for increasing the amount of non-road transportation of construction materials to/from his site during his contract period.

3.2 The principal Contractor will be required to monitor progress against the principal Contractor's strategy referred to in Paragraph 3.1. For example, at the Dates for Periodic Review referred to in Paragraph 2, the principal Contractor will be required by the Developer to confirm the proportion of materials (measured by weight and as a percentage of the total weight of materials) transported (or intended to be transported) to/from the Land by river transport.

4. Details of the Hanson concrete supply operation at VDWT and the London Concrete supply operation will be provided to all relevant Contractors by the Developer. Both operations utilise non-road transportation to import bulk aggregate materials to their facilities - and will qualify for designation as non-road imported material. All relevant Contractors will be encouraged by the Developer to utilise these or similar facilities subject to the agreement of commercial terms. compliance by 1 January 2010.

EXAMPLE PLANNING CONDITION FOR CLEANER ROAD MOBILE MACHINERY (2015 – 2019)

PLANNING CONDITION FOR GREATER LONDON (EXCLUDING THE CENTRAL

ACTIVITY ZONE AND CANARY WHARF)

All Non-Road Mobile Machinery (NRMM) used for major developments of net power between 37kW and 560 kW will be required to meet Stage IIIA of EU Directive 97/68/EC for both NOx and PM. If Stage IIIA equipment is not available the requirement may be met using the following techniques:

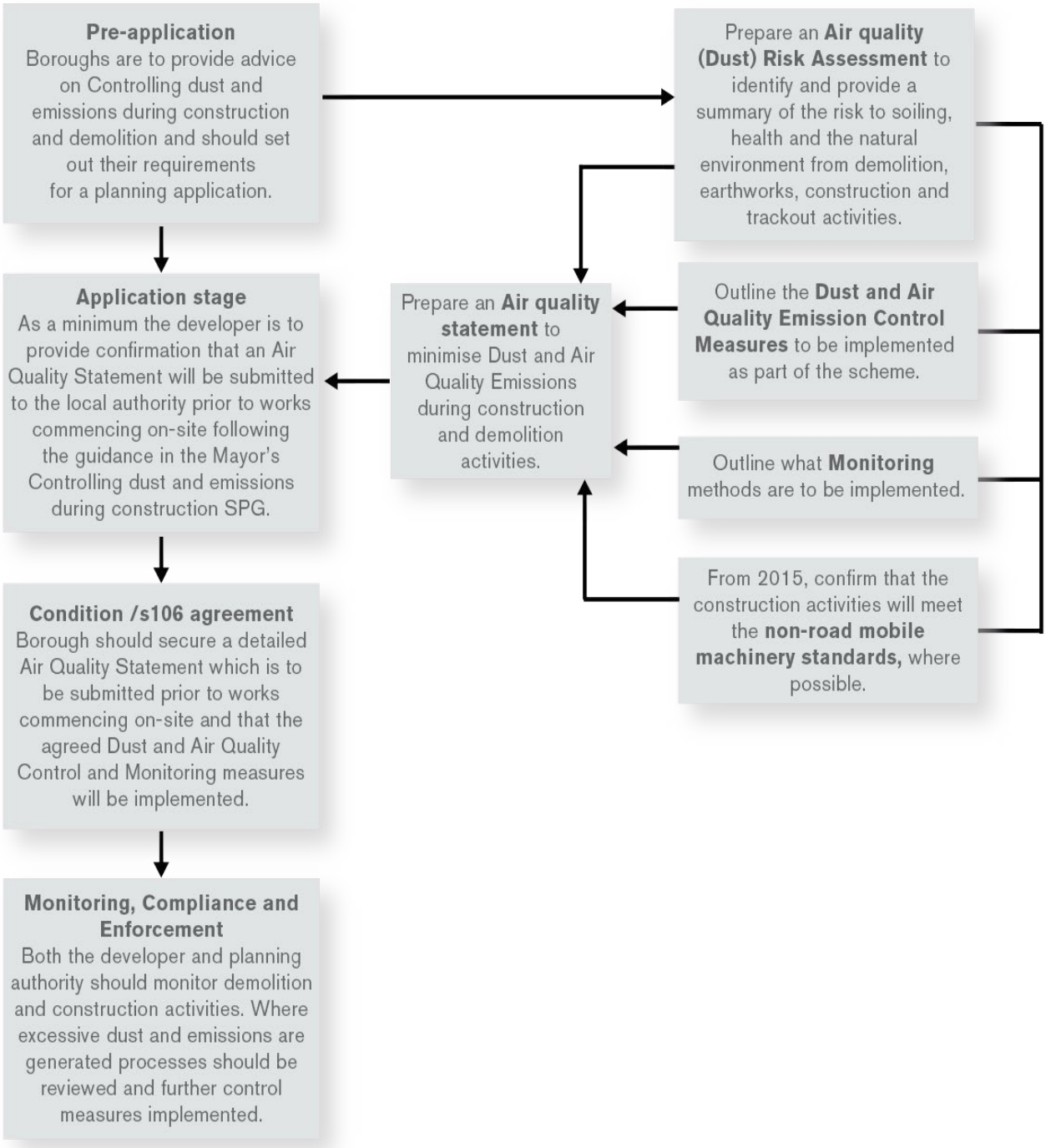
- Reorganisation of NRMM fleet
- Replacing equipment (with new or second hand equipment which meets the policy)
- Retrofit abatement technologies
- Re-engining

All eligible NRMM should meet the policy above unless it can be demonstrated that the machinery is not available or that a comprehensive retrofit for both PM and NOx is not feasible. In this situation every effort should be made to use the least polluting equipment available including retrofitting technologies to reduce particulate emissions.

Developers will be required to provide a written statement of their commitment and ability to meet the policy within their Construction and Demolition Air Quality Statement and Environment Management plans.

An inventory of all NRMM must be kept on site and all machinery should be regularly serviced and service logs kept on site for inspection. Records should be kept on site which details proof of emission limits for all equipment. This documentation should be made available to local authority officers as required.

DUST AND EMISSIONS CONTROL FLOW CHART THROUGH THE PLANNING PROCESS



APPENDIX 5 LOCAL AUTHORITY POLLUTION PREVENTION AND CONTROL

The tables below outline relevant best available techniques in accordance with DEFRA's Process Guidance Notes.

MOBILE CRUSHING PLANT

SOURCES OF DUST	CONTROL TECHNIQUE
Loading and unloading of materials	Cntainment Suppression Reduce drop heights (through variable height conveyors
Double handling transfer points	Site and process design
Stockpiles	Wind design management through fencing, bunding etc Suppression Covering
Crushing, grinding, screening	Containment Suppression Dust
Conveyors and transfer	Containment (wind boards) Appro
Blending and packing	Containment Reduce drop height Dust arrestment
External operations	Appropriate siting Wind design management
Vehicles	Wheel and under body washing

Taken from Defra Process Guidance Note 3/16 (04)

CEMENT CONCRETE BATCHING ACTIVITIES

SOURCES OF DUST	CONTROL TECHNIQUE
Loading and unloading of materials	Containment Suppression Reduce drop heights (through variable height conveyors conveyors or chutes) Dust arrestment (loading area) using bag or cartridge filters
Double handling transfer points	Site and process design
Delivery from road tanker to silo	Various techniques
Silos	Dust arrestment (bag or cartridge filters)
Aggregate stockpiles	Wind design management through fencing, bunding etc Suppression (water and/or suppressants, well positioned spray guns and sufficient coverage by sprays) Covering
Conveyors and transfer	Containment (wind boards) Reduce drop heights Appropriate siting away from receptors
Blending and packing	Containment Designated areas Reduce drop height Dust arrestment (bag or cartridge filters)
External operations	Appropriate siting Wind design management
Vehicles	Wheel and under body washing Exhausts that do not point vertically down

Taken from DEFRA Process Guidance Note 3/1 (04)

APPENDIX 6 DEVELOPMENTS REFERABLE TO THE MAYOR

In accordance with the Mayor of London Order 2008 local authorities in Greater London must refer to the Mayor any planning applications received on or after 6thApril 2008 which meet one or more of the following criteria.1

APPLICATION	CRITERIA
New Housing	Any development comprising or including over 150 units (houses or flats) Departure involving provision of residential units adjacent to waste site
Other New Uses (e.g. retail, industry, offices)	100,000 sq.m. in the City 20,000 sq.m. in the rest of central London 15,000 sq.m. outside of central London
(e.g. retail, industry, offices)	Various techniques
New Tall Buildings	25m adjacent to the River Thames 150m anywhere else in the City 30m elsewhere
Existing Tall Buildings	Increase of 15m, if then above the relevant threshold for new tall buildings
Mining	10 ha (winning and working of minerals in, on or under the ground)
Waste	Capacity more than 5,000 tonnes per annum of hazardous waste Capacity more than 50,000 tonnes per annum of other waste Waste development occupying more than one hectare / 10,000 sq.m Departure involving 5 ha / 5,000 sq.m Departure involving 2,000t (hazardous waste) or 20,000t (other waste)

APPLICATION	CRITERIA
Transport	Aircraft runway, Air passenger terminal at an airport or Heliport Existing air passenger terminal capacity increase of 500,000 passenger p.a. Railway station; Tramway; underground, surface or elevated railway; cable car Bus or coach station Storage or distribution (B8) occupying more than 4 ha River Thames crossing (over or under) Thames passenger pier Depot to store more than 70 buses/coaches or occupies more than 0.7 ha Departure involving loss of bus/coach depot as above
Existing housing2	Any development involving the loss of 200 units (houses or flats) (irrespective of any new units) or loss of 4 ha of land used for housing
Existing B1 Business, B2 General Industrial, B8 Storage or Distribution2	Any development involving the loss of 4 ha
Playing Fields2	Any development involving the loss of 2 ha
Green Belt/MOL	One or more buildings totalling 1,000 sq.m or more - new use or change of use
Departures from the relevant UDP/LDF/Local Plan	2,500 sq.m. of retail (A1), financial and professional (A2), food and drink (A3), drinking establishments (A4), hot food takeaways (A5), business (B1), general industrial (B2), storage and distribution (B8), hotels (C1), residential institutions (C2), non-residential institutions (D1), assembly and leisure (D2)
Parking	200 spaces (non-residential)
Article 10(3) direction	Any development subject to such a direction, or any development on a site subject to such a direction. (This includes safeguarded wharves and developments in a safeguarded strategic view; in the near future this will also include the safeguarded alignments for the East Thames river crossings)

2006 REVIEW OF THE MAYOR'S POWERS

After wide consultation the Government has decided to grant increased powers to the Mayor on a number of key areas, including planning. The legislation granting these powers is expected to receive Royal Assent in summer 2007 and will enable the Mayor to:

- Direct changes to boroughs' programmes for the local development plans they produce.
- Have a stronger say on whether draft local development plans are in general conformity to his London Plan.
- Use his discretion to determine planning applications of strategic importance.

APPENDIX 7 AIR QUALITY CONTROL

MEASURES RELEVANT FOR DEMOLITION, EARTHWORKS, CONSTRUCTION AND TRACK-OUT

MITIGATION MEASURE	LOW RISK	MEDIUM RISK	HIGH RISK
Site management			
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.		XX	XX
Develop a Dust Management Plan.		XX	XX
Display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary.	XX	XX	XX
Display the head or regional office contact information.	XX	XX	XX
Record and respond to all dust and air quality pollutant emissions complaints.	XX	XX	XX
Make a complaints log available to the local authority when asked.	XX	XX	XX
Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the local authority when asked.	XX	XX	XX
Increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions and dust are being carried out, and during prolonged dry or windy conditions.	XX	XX	XX
Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the log book.	XX	XX	XX

MITIGATION MEASURE	LOW RISK	MEDIUM RISK	HIGH RISK
Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.			XX
Preparing and maintaining the site			
Plan site layout: machinery and dust causing activities should be located away from receptors.	XX	XX	XX
Erect solid screens or barriers around dust activities or the site boundary that are, at least, as high as any stockpiles on site.	XX	XX	XX
Fully enclosure site or specific operations where there is a high potential for dust production and the site is active for an extensive period.	X	XX	XX
Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution.		X	X
Avoid site runoff of water or mud.	XX	XX	XX
Keep site fencing, barriers and scaffolding clean using wet methods.	X	XX	XX
Remove materials from site as soon as possible.	X	XX	XX
Cover, seed or fence stockpiles to prevent wind whipping.		XX	XX
Carry out regular dust soiling checks of buildings within 100m of site boundary and cleaning to be provided if necessary.		X	XX
Provide showers and ensure a change of shoes and clothes are required before going off-site to reduce transport of dust.			X
Agree monitoring locations with the Local Authority.		XX	XX
Where possible, commence baseline monitoring at least three months before phase begins.		XX	XX

MITIGATION MEASURE	LOW RISK	MEDIUM RISK	HIGH RISK
Put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly.		XX	XX
Operating vehicle/machinery and sustainable travel			
Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone.	XX	XX	XX
Ensure all non-road mobile machinery (NRMM) comply with the standards set within this guidance.	XX	XX	XX
Ensure all vehicles switch off engines when stationary – no idling vehicles.	XX	XX	XX
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where possible.	XX	XX	XX
Impose and signpost a maximum-speed-limit of 10mph on surfaced haul routes and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	X	X	XX
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.		XX	XX
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	XX	XX	XX
Operations			
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	XX	XX	XX

MITIGATION MEASURE	LOW RISK	MEDIUM RISK	HIGH RISK
Ensure an adequate water supply on the site for effective dust/particulate matter mitigation (using recycled water where possible).	XX	XX	XX
Use enclosed chutes, conveyors and covered skips.	XX	XX	XX
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	XX	XX	XX
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.		XX	XX
Waste management			
Reuse and recycle waste to reduce dust from waste materials	XX	XX	XX
Avoid bonfires and burning of waste materials.	XX	XX	XX

MEASURES SPECIFIC TO DEMOLITION

MITIGATION MEASURE	LOW RISK	MEDIUM RISK	HIGH RISK
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	X	X	XX
Ensure water suppression is used during demolition operations.	XX	XX	XX
Avoid explosive blasting, using appropriate manual or mechanical alternatives.	XX	XX	XX
Bag and remove any biological debris or damp down such material before demolition.	XX	XX	XX

MEASURES SPECIFIC TO EARTHWORKS

MITIGATION MEASURE	LOW RISK	MEDIUM RISK	HIGH RISK
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces.		X	XX
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil.		X	XX
Only remove secure covers in small areas during work and not all at once.		X	XX

MEASURES SPECIFIC TO CONSTRUCTION

MITIGATION MEASURE	LOW RISK	MEDIUM RISK	HIGH RISK
Avoid scabbling (roughening of concrete surfaces) if possible	X	X	XX
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place	X	X X	XX
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.		X	XX
For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.		X	X

MEASURES SPECIFIC TO TRACKOUT

MITIGATION MEASURE	LOW RISK	MEDIUM RISK	HIGH RISK
Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site.	X	XX	XX
Avoid dry sweeping of large areas.	X	XX	XX
Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport.	X	XX	XX
Record all inspections of haul routes and any subsequent action in a site log book.		XX	XX
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems and regularly cleaned.		XX	XX
Inspect haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;		XX	XX
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	X	XX	XX
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.		XX	XX
Access gates to be located at least 10m from receptors where possible.		XX	XX
Apply dust suppressants to locations where a large volume of vehicles enter and exit the construction site		X	XX

XX Highly Recommended X Desirable

APPENDIX 8 AIR QUALITY MONITORING TECHNIQUES

There are is a wide range of sampling and detection methods available. Some of the main techniques are indicated below:

1. Automatic real-time point analyser methods

Provide high-resolution measurements (typically hourly or shorter time periods). In order to ensure that data is accurate and reliable, there needs to be a high standard of maintenance, calibration and QA/QC procedures in place. These types of monitors can measure different particulate fractions such as PM10 and PM2.5 when fitted with designated inlet heads. Monitors such as TEOM or beta-attenuation analysers (with heated inlets) need to be corrected by a factor of 1.3, when comparing results with the AQS objectives, as these are based on a gravimetric standard.

2. Gravimetric monitoring

This monitoring method is considered to be the most accurate and produces concentrations equivalent to the EU reference samplers, which are used to set EU limit values. Such systems have designated inlet heads to measure different particulate fractions and a typical measurement is taken over 24 hours. The measurement system is time-consuming as filters need to be individually weighed and accurate filter weighing and conditioning facilities are required. This method cannot be used as a trigger system as it does not produce instantaneous readings.

3. Remote optical/long path analysers

These are relatively low-cost automatic analysers that have been developed specifically for portable or personal exposure applications. These tend to be battery or mains powered and use the light scattering principle to measure PM10 and other particulate fractions.

4. Hand-held monitors

Although these types of monitors are not as accurate as automatic monitors and cannot be used for long term studies, they are ideal for walk-over surveys of construction sites as they provide real time or instantaneous dust readings (every second). These monitors can be set up to measure different particle sizes and can be used to assess short term peaks and breaches of set limits.

In techniques 3 and 4, a factor is used to convert the measured number of particles in each size range to an overall mass concentration – which may not be accurate without a gravimetric filter backup.

In addition to the individual monitors, other site infrastructure is often required, particularly to support automatic monitors and can include housing structures, cooling or heating systems, electrical systems, telephone lines or modems and air sample inlet systems.

Automatic monitoring equipment should have an independent verification of performance, such as the Environment Agency's MCERTS scheme. Further information on siting requirements and equipment suppliers is available on the National Air Quality Information Archive at

www.airquality.co.uk.

5. Dust assessment

Approaches to measure the amount of dust deposited on a surface tend to focus on either determining the soiling of a surface by a change in its properties or determining the quantity of dust deposited, by weight. These techniques are often used to determine nuisance and may be requested by a local authority in cases of complaint from sensitive receptors. Accepted methodologies include:

Deposit gauges: These are simple, but accurate methods to measure nuisance dust. Dust is collected onto a horizontally mounted capture container, or, in the case of a Directional Dust Gauge, into four vertical tubes aligned in different directions. The dust collected can also be analysed to determine its composition.

DEPOSITED DUST GUIDELINES FOR URBAN AREAS (BASED ON MONTHLY MEAN DUSTFALL)

TABLE 2. EXAMPLES OF DUST GUIDELINE LEVELS

BRITISH STANDARD GAUGE (MG/M2/D)		DRY FRISBEE GAUGE EQUIV (MG/M2/D)	
Complaints possible (90th percentile)	Complaints likely (95th percentile)	Complaints possible	Complaints likely
150	190	200	260

Soiling Rate Measurement: This is used to determine changes in the soiling rates of surface over a period of time. One method is the Sticky Pad system, which measures the soiling on a white adhesive surface over a known period. This provides a measurement of the deposition (as percentage Effective Area Coverage per day) using a reflectometer. Alternatively, glass slides can be used which are exposed for a week before returning to the laboratory to measure the changes in the gloss of the surface reflectance. Results are measured in soiling units (su) per week, whereby 20 su/week reflects a dusty activity.

Soiling rates

1) Sticky pads

Possible complaints: 0.5 per cent Effective Area Coverage (EAC)/day (34 g/m3). Serious complaints: 5 per cent EAC/day (280 g/m3)

2) Glass slides

A level of 20-25 su/week, averaged over 4 weeks appears to be the boundary between acceptable and unacceptable dust levels.

APPENDIX 9 SUMMARY GUIDANCE ON THE USE OF DUST SUPPRESSANTS

What's this document about?	This document provides guidance on the use of dust suppressants. The main focus of this document is on waste transfer sites, but many of the abatement techniques could be successfully applied to other types of waste facilities or other potentially dusty activities, such as construction and demolition sites or road works.
Who does this apply to?	Waste site operators, construction/demolition site managers, utility companies and contractors undertaking road works and site personnel carrying out dust suppressant applications.
What is in the document ?	The document includes the following information: • Guidance for Site Personnel; and • Guidance for Site Managers.
Guidance for Site Managers	
Site Manager Tasks	The site manager will need to get the site organised to deploy dust suppressants including: • Decide on and order a dust suppressant; • What equipment will be needed; • Who will be responsible for applications and equipment; • Identify a location to store the containers; • Decide how the containers are going to be accessed by the site operative; • How the dust suppressants are going to be applied by operatives; • How often will suppressants need to be applied; • How much suppressant to apply; • Using suppressants with other dust abatement measures; • How often will suppressants need to be ordered; and • Updating management systems with a standard operating procedure.

Decide on a dust suppressant;	There are a range of dust suppressants available. The trials undertaken by TfL and the EA have utilised Ice and Dust Away 25 a Calcium Magnesium Acetate (CMA) solution from Nordisk Aluminate A/S. Costs for dust suppressants will vary between manufacturers and the location solutions are shipped from. However, an indicative price for 1,000 litres before shipping for one brand is a few hundred pounds.
What equipment will be needed	The equipment required will be determined by following manufacturer's instructions and through risk assessment (e.g. site specific risk assessment, COSHH etc). However, it is anticipated that the following type of equipment will be needed by site operatives: • Personal Protective Equipment (PPE): e.g. safety glasses, gloves, high visibility vest etc; • A stirrer to make sure the suppressant solution is well mixed; • A basic hand held pump to extract the solution from the container; and • A backpack spray pack with volume measurements on the pack so the operator knows how much solution has been used (or other form of applicator e.g. bowser).
Identify who will be responsible for day to day applications	Identifying a site operative who will be responsible for dust suppressant applications and cover members of staff will help make applications part of routine site operations. This operative and any additional site operatives who may be required to cover absences should receive appropriate training on-site considering manufacturer's instructions and the sites standard operating procedure (see the Standard Template at the end of this Appendix) and this guidance as necessary.
Identify a location to store the containers	Dust suppressants should be stored in a safe location away from vehicles. The manufacturer's instructions provided with the suppressants will advise on storage (e.g. whether bunds are required or not), but no refrigeration or locked containers etc are generally needed.

Decide how the containers are going to be accessed by the site operative	Transferring a portion of the dust suppressant solution from storage containers can be done using a small hand held pump from the top of some containers or some have a tap at the base of the container. Some operators have raised containers off the ground to make taps and container tops more accessible for site operatives.
How the dust suppressants are going to be applied	Dust suppressants may be applied using dedicated vehicles with tanks and a rotating disk (as used in the trial on the TfL road network), using road sweepers as on roads near waste sites, using bowsers with small pumps on a construction site or using backpacks, as used on some waste transfer sites. The application method for dust suppressants depends on a number of factors including: the dust sources to be treated, the area to be treated and the equipment available. For example small areas could easily be treated using backpacks, but a large yard site may require a method that allows greater areas to be treated more quickly, if compliant with manufacturer's instructions. This could include a bowser with a small pump or a road sweeper.

How much suppressant to use	The amount of liquid to be spread will depend on how high a delivery rate is required (e.g. in particularly dusty locations higher rates my be required to abate dust). More dusty locations and locations with higher vehicle movements may require higher amounts of liquid. Information may be provided in manufacturer's instructions to enable delivery rates to be calculated. However, if not rates of coverage can be worked out by measuring how much liquid is used in a known area. Delivery rates can be calculated based on changes in volume at the start and end of spraying over a known area following the below formula: • Volume used (litres (l)) divided by area (meters square (m2)) to calculate a delivery rate (l/m2). • This is converted in to a delivery rate of ml/m2 by multiplying by 1000. • For Ice and Dust Away 25 the delivery rate in ml/m2 can be converted in to a delivery rate in grams per m2 by multiplying by 1. • This is calculated based on an approximate fluid density of 1:1 whereby 10ml is equivalent to 10g. Some examples are listed below: • When 5 litres of suppressant is applied over an area of 1,000m2 this is a delivery rate of 5 millilitres (ml) per m2 or a rate of coverage of 5 grams (g) per m2. • When 10 litres of suppressant is applied over an area of 1,000m2 this is a delivery rate of 10 millilitres (ml) per m2 or a rate of coverage of 10 grams (g) per m2. • When 10 litres of suppressant is applied over an area of 500m2 this is a delivery rate of 20 millilitres (ml) per m2 or a rate of coverage of 20 grams (g) per m2. These examples show that the greater the volume of suppressant applied in a given area, the higher the rate of suppressant delivery. The standard operating procedures for sites should note down how much suppressant and how long it should take to treat areas on-site. Initial tests could be done with water to establish how long different areas will take to treat.
Use with other dust abatement measures	After dust suppressants have been applied care should be taken not to wash away or dilute the layer of dust suppressants in cleaning operations, for example by using a bowser on a treated area as this would risk washing away the dust suppressants.

How often will suppressants need to be ordered	The amount of dust suppressant required by a site will vary depending on the areas to be treated, the frequency of applications and on the amount of liquid applied. However, using the example above ('How much suppressant to use' sub-section) a small treatment area of 1000 m2 (0.1 ha) treated on a daily basis, using a spray of 10ml/m2 (10g/m2), would last around 3 months and cost around £1,000 without shipping.
Updating management systems with a standard operating procedure	The management practices at the site will need to be updated to reflect the operating procedure for dust suppressant applications. A standard template is provided at the end of this Appendix.
Reporting and Feedback	As part of the application process records must be retained on-site detailing the applications of suppressants (e.g. site diaries). Record keeping is important as it enables site managers to evaluate the performance of suppressant applications against any monitoring data (either visual, ambient air quality monitoring or dust soiling/deposition data). This information can then be used to adjust programmes of applications to improve dust suppression, for example to increase the number of treatments, change the timing of treatments or the amounts of suppressant used. This information would also be useful to demonstrate how dust has been managed to third parties, such as the EA (waste sites) or Environmental Health Officers (construction sites) in the event of dust issues. Third parties, such as the EA, would also welcome feedback so that further practical knowledge on the application of dust suppressants can be disseminated to further improve dust management and to share knowledge with other site managers and operations.

GUIDANCE FOR SITE PERSONNEL

STEP BY STEP GUIDANCE	THIS SECTION PROVIDES STEP BY STEP GUIDANCE FOR SITE OPERATIVES UNDERTAKING THE DUST SUPPRESSANT APPLICATIONS. FURTHER INFORMATION ON WHEN TO APPLY SUPPRESSANTS IS PROVIDED IN THE GUIDANCE FOR SITE MANAGERS SECTION
Step 1	Collect PPE e.g. gloves, safety glasses and equipment e.g. backpack sprayer or bowser.
Step 2	Check the areas to be treated and how much solution is to be used at each area from the standard operating procedure (e.g. Area A: 10 litres)
Step 3	Stir and transfer the amount of suppressant solution required in to the backpack sprayer or bowser for the area to be treated (e.g. 10 litres).
Step 4	Check the amount of time it should take to treat the area about to be treated (e.g. Area A: 20 minutes).
Step 5	Take equipment to the area to be treated.
Step 6	Note the time and start treatment by walking at a steady rate to complete the treatment in the time identified for the area being treated.
Step 7	Check as treatment is underway that the treatment is on target to be completed in the correct time (e.g. 10 minutes around a half of the area has been treated).
Step 8	Check the amount of solution used at the end of the treatment is correct, if not change the pace of treatment on the next application.
Step 9	Return the equipment ready for the next treatment.
Step 10	Note down the dates, time, weather and amount of solution used and time its taken for the application at the treatment areas.

BENEFITS AND LIMITATIONS OF DUST SUPPRESSANTS

INTRODUCTION	DUST SUPPRESSANTS HAVE A RANGE OF BENEFITS WHICH CAN BE USEFUL AS PART OF A PACKAGE OF OTHER DUST ABATEMENT MEASURES. HOWEVER, THERE ARE SOME LIMITATIONS WHICH SHOULD BE CONSIDERED. THIS SECTION OUTLINES THE STRENGTHS AND LIMITATIONS OF DUST SUPPRESSANTS.
Benefits	The benefits of dust suppressants, integrated in to a package of dust abatement measures, are outlined below: Demonstrated effectiveness Demonstrated effectiveness in reducing dust re-suspension in locations with high dust levels, such as waste or construction sites. Low cost The use of dust suppressants is low cost in comparison to some dust suppression measures e.g. construction of enclosed facilities. Reduced water use Some operators have found that less water is required because dust suppressants have increased longevity relative to water suppression, to achieve the same levels of dust suppression. Easy to do The application of dusts suppressants is relatively straight forward and quick to do. Ice control Some dust suppressants have properties which assist in the control of ice formation, some are used at Airports for this purpose.

INTRODUCTION	DUST SUPPRESSANTS HAVE A RANGE OF BENEFITS WHICH CAN BE USEFUL AS PART OF A PACKAGE OF OTHER DUST ABATEMENT MEASURES. HOWEVER, THERE ARE SOME LIMITATIONS WHICH SHOULD BE CONSIDERED. THIS SECTION OUTLINES THE STRENGTHS AND LIMITATIONS OF DUST SUPPRESSANTS.
Limitations	The limitations of dust suppressants are outlined below: Some ongoing management and costs Whilst the application of dust suppressants is low cost and easy to do there are some on going costs associated with labour to prepare and apply solutions and also on going costs to purchase solutions and for fuel if bowsers are used to apply solutions. Interaction with sensitive materials In some circumstances, there may be adverse reactions between some dust suppressants and other materials. For example CMA, at certain concentrations may react with bentonite. Manufacturer's recommendations should be followed to identify and avoid any potentially sensitive interactions. Skid resistance At higher rates of delivery, some dust suppressants may cause a reduction in skid resistance. Manufacturer's recommendations should be followed to avoid applications at too high concentrations.

STANDARD OPERATING PROCEDURE TEMPLATE

The table opposite presents the type of information that would be useful in a sites standard operating procedure. A site standard operating procedure should be developed based on manufacturers instructions, site specific risk assessment and specific site requirements (e.g. areas requiring treatment). The text in blue is an example.

DUST SUPPRESSANT INFORMATION	SITE DETAILS
Dust Suppressant Name	Ice and Dust Away 25
Risk Assessment Information	Risk Assessment kept in site offices – safety files.
Storage Location	By storage cabin (with or without bunding as recommended by manufacturer's instructions)
Key Site Operative responsible for dust suppressant applications	P Jones
Cover Site Operatives responsible for dust suppressant applications when key site operative is absent	S Smith
Safety Equipment	Safety glasses, gloves, high visibility clothing
Application Equipment	Backpack sprayer.
Treatment Areas	Skip storage area
Treatment Frequencies	Skip unloading area
Treatment Amounts	Entrance area
Treatment Durations	Start of day and end of day
Application Procedure	And in response to elevated monitoring
Treatment Amounts	Skip storage area 10 litres undiluted
Skip unloading area 12 litres undiluted	Skip unloading area 12 litres undiluted
Entrance area 15 litres undiluted	Entrance area 15 litres undiluted
Treatment Durations	Skip storage area 15 minutes
Skip unloading area 20 minutes	Skip unloading area 20 minutes
Entrance area 25 minutes	Entrance area 25 minutes
Application Procedure	Laminated copy of 'Guidance for Site Personnel' kept in site diary and in storage cabin

Other formats and languages

For a large print, Braille, disc, sign language video or audio-tape version of this document, please contact us at the address below:

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Chinese

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Hindi

यदि आप इस दस्तावेज की प्रति अपनी भाषा में चाहते हैं, तो कृपया निम्नलिखित नंबर पर फोन करें अथवा नीचे दिये गये पते पर संपर्क करें

Vietnamese

Nếu bạn muốn có văn bản tài liệu này bằng ngôn ngữ của mình, hãy liên hệ theo số điện thoại hoặc địa chỉ dưới đây.

Bengali

আপনি যদি আপনার ভাষায় এই দলিলের প্রতিলিপি (কপি) চান, তা হলে নীচের ফোন্ নম্বরে বা ঠিকানায় অনুগ্রহ করে যোগাযোগ করুন।

Greek

Αν θέλετε να αποκτήσετε αντίγραφο του παρόντος εγγράφου στη δική σας γλώσσα, παρακαλείστε να επικοινωνήσετε τηλεφωνικά στον αριθμό αυτό ή ταχυδρομικά στην παρακάτω διεύθυνση.

Urdu

اگر آپ اِس دستاویز کی نقل اپنی زبان میں چاھتے ھیں، تو براہ کرم نیچے دئے گئے نمبر پر فون کریں یا دیئے گئے پتے پر رابطہ کریں

Turkish

Bu belgenin kendi dilinizde hazırlanmış bir nüshasını edinmek için, lütfen aşağıdaki telefon numarasını arayınız veya adrese başvurunuz.

Arabic

إذا أردت نسخة من هذه الوثيقة بلغتك، يرجى الاتصال برقم الهاتف أو مراسلة العنوان أدناه

Punjabi

ਜੇ ਤੁਹਾਨੂੰ ਇਸ ਦਸਤਾਵੇਜ਼ ਦੀ ਕਾਪੀ ਤੁਹਾਡੀ ਆਪਣੀ ਭਾਸ਼ਾ ਵਿਚ ਚਾਹੀਦੀ ਹੈ, ਤਾਂ ਹੇਠ ਲਿਖੇ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ ਹੇਠ ਲਿਖੇ ਪਤੇ 'ਤੇ ਰਾਬਤਾ ਕਰੋ:

Gujarati

જો તમને આ દસ્તાવેજની નકલ તમારી ભાષામાં જોઈતી હોય તો, કૃપા કરી આપેલ નંબર ઉપર ફોન કરો અથવા નીચેના સરનામે સંપર્ક સાધો.

MAYOR OF LONDON