Construction Dust Risk Assessment
Air Quality Monitoring Plan

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1. Introduction

Hilson Moran has been commissioned by Wates Construction London Residential to undertake an assessment that satisfies the requirements of Condition 6 of planning permission reference 2020/2486/P, for the development at Abbey Road Phase 2, London, hereafter referred to as the 'Approved Development' or the 'Site'.

1.1. Approved Development

The Site lies within the London Borough of Camden (LBC) and is illustrated in **Figure 1**.

Planning Condition 6 of the Approved Development (reference 2020/2486/P) states:

Construction related impacts – Monitoring

Air quality monitoring should be implemented on site. No development shall take place until:

a. *prior to installing monitors, full details of the air quality monitors have been submitted to and approved by the local planning authority in writing. Such details shall include the location, number and specification of the monitors, including evidence of the fact that they have been installed in line with guidance outlined in the GLA's Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance;*

b. *prior to commencement, evidence has been submitted demonstrating that the monitors have been in place for at least 3 months prior to the proposed implementation date.*

The monitors shall be retained and maintained on site for the duration of the development in accordance with the details thus approved.

Reason: To safeguard the amenity of adjoining premises and the area generally in accordance with the requirements of policies A1 and CC4 of the London Borough of Camden Local Plan Policies

1.2. Potential Impacts

This report presents the findings of the construction dust risk assessment. During the construction phase, activities on the Site could give rise to dust, which, if transported beyond the site boundary, could have an adverse effect on local air quality. The report determines the risk to existing receptors during the construction phase, outlines the required mitigation and provides an air quality monitoring plan.

A glossary of terms is provided in **Appendix A**.

2. Legislation, Policy and Guidance

2.1. Legislation

A summary of the relevant air quality legislation is provided below.

2.1.1. Air Quality Strategy for England, Scotland, Wales and Northern Ireland

The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland[i], most recently updated in July 2007. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that the European Union and International agreements are met in the UK.

The AQS covers the following air pollutants: ammonia (NH_3), benzene (C_6H_6), 1,3 butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), oxides of nitrogen (NO_X) (including nitrogen dioxide NO_2), particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3), and polycyclic aromatic hydrocarbons (PAHs).

The AQS sets standards and objectives for the listed pollutants for the protection of human health, vegetation and ecosystems. The standards are based on recommendations by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO) based on current understanding and scientific knowledge about the effects of air pollution on health and the environment. The air quality objectives are policy based targets set by the UK Government that are often expressed as maximum concentrations not to be exceeded either without exception or with a limited number of exceedances within a specified timescale.

For the pollutants considered in this assessment, there are both a long-term (*e.g*. annual mean) and short-term standards (*e.g*. one hour mean). In the case of NO_2, the short term standard is for a 1-hour averaging period (no more than 18 exceedances of 200 µg/m^3 per year), whereas for PM_{10} it is a 24-hour averaging period (no more than 35 exceedances of 50 µg/m^3 per year). The variation in time periods reflects the varying impacts on health of differing exposures to pollutants.

2.1.2. Air Quality Standards Regulations

The air quality objectives in the AQS are statutory in England with the Air Quality (England) Regulations 2000[ii] and the Air Quality (England) (Amendment) Regulations 2002[iii] for the purpose of Local Air Quality Management (LAQM).

The regulations require likely exceedances of the AQS objectives to be assessed in relation to:

> *"…the quality of air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present…"*

The Air Quality Standards (Amendment) Regulations 2016[iv] transpose the European Union Ambient Air Quality Directive (2008/50/EC) into law in England, with the Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 ensuring continuation of the transposition of the Directive. This Directive sets legally binding limit values for concentrations in outdoor air of major air pollutants that impact public health such as NO_2, PM_{10} and $PM_{2.5}$. The limit values for NO_2 and PM_{10} are the same concentration levels as the relevant AQS objectives and the limit value for $PM_{2.5}$ is a concentration of 20µg/m^3. The relevant air quality objectives are presented in Table 2.1.

Table 2.1 Air Quality Objectives for Relevant Pollutants

Pollutant	Concentration	Measured as
NO_2	200 µg/m^3	1-hour mean, not to be exceeded more than 18 times a year (99.79%ile)
	40 µg/m^3	Annual mean
PM_{10}	50 µg/m^3	24-hour mean, not to be exceeded more than 35 times a year (90.41%ile)
	40 µg/m^3	Annual mean
$PM_{2.5}$	25 µg/m^3	Annual mean

2.1.3. Environment Act 1995

Part IV of the Environment Act 1995[v] requires local authorities to periodically review and assess the quality of air within their administrative area. The reviews have to consider both the air quality at the time of review and likely future air quality during the 'relevant period' and whether any air quality objectives prescribed in regulations are being achieved or are likely to be achieved in the future. Where the objectives are not likely to be achieved, an authority is required to designate an AQMA. For each designated AQMA the local authority is required to produce an Air Quality Action Plan (AQAP) that works to ensure compliance with the objectives by implementing a number of air quality improvement measures.

2.1.4. Environmental Protection Act 1990

Section 79 of the Environmental Protection Act 1990 (as amended)[vi] makes provision for the identification and control of statutory nuisances. The Act identifies statutory nuisance, in relation to air quality, as:

- *"Any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance"; and*
- *"Any accumulation or deposit which is prejudicial to health or a nuisance".*

As a result, the level at which a nuisance occurs is highly variable and dependent on perception, with effects influenced by existing conditions and the degree of change that has occurred.

Where a statutory nuisance has been demonstrated the local authority must serve an abatement notice, non-compliance with which would constitute a legal offence. The abatement notice may prevent or restrict occurrence or re-occurrence of the nuisance or the local authority may, itself, undertake action to abate the nuisance and recover any associated expenses.

2.2. Planning Policy

A summary of the national, regional and local planning policy relevant to air quality and the Development is detailed below.

2.2.1. National Planning Policy

2.2.1.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) 2019[vii] sets out policies, which will apply to the preparation of local plans, and to development management decisions. This framework sets out the Government's economic, environmental and social planning policies for England. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

The NPPF sets out the Government's planning policies on the conservation and enhancement of the natural environment, with the following paragraphs relating to air quality:

- Paragraph 8c, which states "*to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy*";
- Paragraph 54, which states "*Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition*";
- Paragraph 103, which states "*the planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making*";
- Paragraph 170e, which states *"preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans"*;
- Paragraph 181, which states "*Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan*";

- Paragraph 183, which states *"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities";* and,
- Paragraph 205c, which states "*ensure that any unavoidable noise, dust and particle emissions and any blasting vibrations are controlled, mitigated or removed at source, and establish appropriate noise limits for extraction in proximity to noise sensitive properties*".

2.2.2. Regional Planning Policy

2.2.2.1. Clearing the Air: The Mayor's Air Quality Strategy 2010

The Mayor's Air Quality Strategy[viii] is focused on delivering improvements to London's air quality and identifies road traffic as the largest contributor to air pollution. The strategy sets out a framework for improving air quality and details a number of measures to reduce emissions in London, these include:

- Development of electric vehicle infrastructure;
- Congestion charging and the London Low Emission Zone (LEZ);
- Smarter travel initiatives to encourage a shift to greener modes of transport;
- Funding and supporting car clubs (especially hybrid and electric cars);
- Maintaining roads in good repair to reduce the contribution of particulate matter from road surface wear;
- Smoothing traffic;
- Bus emissions programme, so that older buses have been fitted with particulate traps and diesel-electric hybrid buses are introduced as quickly as possible; and
- Publication and implementation of the London Best Practice Guidance for controlling dust and emissions from construction.

Regarding new developments, the Strategy plans to make use of the existing planning system to ensure that any new development does not have a negative impact on air quality in London by stating '*new developments in London shall as a minimum be 'air quality neutral' through the adoption of best practice in the management and mitigation of emissions*'. It also aims to implement the Construction Best Practice Guidance on all construction sites across London.

2.2.2.2. The London Plan: Spatial Development Strategy for Greater London 2016

Planning policy in respect of development planning and air quality management is also presented in the London Plan[ix]. Policy 7.14 on improving air quality states that development proposals should:

- Minimise exposure to existing poor air quality, make provision for addressing air quality problems and where development is likely to be used by large numbers of people particularly vulnerable to poor air quality, set up design solutions, buffer zones and travel plans for promoting a greater use of sustainable transport modes;

- Promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance;
- Be at minimum 'air quality neutral' and not lead to further deterioration of existing poor air quality;
- Ensure that where provision needs to be made to reduce emissions from a development, this is generally made on-site; and
- Where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations.

2.2.2.3. The London Plan (Intend to Publish): Spatial Development Strategy for Greater London 2019

Planning policy in respect of development planning and air quality management is also presented in the 'Intend to Publish' version of the London Plan[x], which is being taken by the Mayor of London as adopted policy. Policy SI1 on improving air quality states:

- *Development proposals should not:*
  - *i. Lead to further deterioration of existing poor air quality;*
  - *ii. Create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits;*
  - *iii. Reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality;*
  - *iv. Create unacceptable risk of high levels of exposure to poor air quality.*
- *Development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality. Particular care should be taken with developments that are in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people;*
- *The development of large-scale redevelopment areas, such as Opportunity Areas and those subject to an Environmental Impact Assessment should propose methods of achieving an Air Quality Positive approach through the new development. All other developments should be at least Air Quality Neutral;*
- *Development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance;*
- *Air Quality Assessments (AQAs) should be submitted with all major developments, unless they can demonstrate that transport and building emissions will be less than the previous or existing use;*
- *Development proposals should ensure that where emissions need to be reduced, this is done on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated.*

2.2.3. Local Planning Policy

2.2.3.1. London Borough of Camden Local Plan

The Camden Local Plan 2017[xi] sets out the Council's planning policies. It ensures that Camden continues to have robust, effective and up to-date planning policies that respond to changing circumstances and the borough's unique characteristics and contribute to delivering the Camden Plan and other local priorities. The Local Plan will cover the period from 2016-2031.

The policies of interest within the local plan include: Policy CC4 – Air Quality, which states:

"The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.

The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan.

Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact.

Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan".

In addition to Policy CC4, this Plan also actively supports the improvement of air quality in Camden by:

- Requiring all new development in the borough to be 'car-free' (see Policy T2 Parking and car-free development);
- Maintaining and increasing green infrastructure (see Policy A2 Open space);
- Reducing emissions associated with new development (see Policy CC1 Climate change mitigation); and,
- Supporting and encouraging sensitive energy efficiency improvements to existing buildings (see Policy CC1 Climate change mitigation).

2.2.3.2. Camden's Draft Clean Air Action Plan

The Camden Draft Clean Air Action Plan[xii] has been produced as part of the borough's duty to London Local Air Quality Management. It outlines the action they will take to improve air quality in Camden between 2019 and 2022. The Clean Air Action Plan (CAAP) is split across seven themes:

- Building Emissions;
- Construction Emissions;
- Transport Emissions;
- Communities and Schools;

- Delivery, Servicing and Freight;
- Public Health and Awareness; and,
- Lobbying.

The CAAP has been developed in recognition of the role local authorities have under the Environment Act to meet the air quality obligations. Camden's role in this includes:

- Working to reduce emissions from their own estate and operations;
- Helping residents and visitors to reduce emissions and exposure;
- Using planning policy and regulation to reduce air pollution;
- Implementing innovative projects across the borough to improve air quality;
- Using their influence to lobby for increased financial and regulatory support for the mitigation of air pollution;
- Maintaining a monitoring network and ensuring the data is freely accessible; and,
- Raising awareness on how to reduce emissions and exposure.

The CAAP is support by a number of other plans and strategies (including Camden 2025, Our Camden Plan, Green Action for Change 2010 – 2020, Camden's Parking and Enforcement Plan, Camden's Transport Strategy 2019 – 2022 and the Joint Strategic Needs Assessment) with the overarching aim if improving air quality in the borough of Camden.

2.2.4. Guidance

A summary of the publications referred to in undertaking the air quality assessment is provided below.

2.2.4.1. Guidance on the Assessment of Dust from Demolition and Construction

This document[xiii], published by the IAQM, provides guidance on how to assess the impact of construction activities on air quality associated with new developments. The methodology prescribed within the document allows the impacts to be categorised based on risk (with particular reference to dust and PM_{10} on sensitive human and ecological receptors) and, where applicable, identify mitigation measures associated to the risk classification determined.

2.2.4.2. Mayor of London's Supplementary Planning Guidance for the Control of Dust and Emissions during Construction and Demolition

The Supplementary Planning Guidance (SPG)[xiv] builds on the London Councils guidance to establish best practice when mitigating impacts on air quality during construction and demolition. The SPG, offers further detail and seeks to address emissions from Non-Road Mobile Machinery (NRMM) through the use of a Low Emission Zone, which was introduced in 2015.

The SPG provides a methodology for assessment the impacts on air quality of the construction and activities following the same procedure set out in the IAQM guidance. It identifies the potential impacts and risks to sensitive receptors and details the relevant control measures required to mitigate any adverse impacts.

2.2.4.3. Greater London Authority: Sustainable Design and Construction Supplementary Planning Guidance

Section 4.3 of this SPG[xv] provides guidance on when an air quality assessment is required, looks at how transport measures can minimise emissions to air and sets out emissions standards/limits for combustion plant.

The SPG also contains guidance on assessing the air quality neutrality of a new development. Emission benchmarks for transport and buildings for NO_X and PM_{10} are detailed in the SPG.

Developments that do not exceed the calculated emission benchmarks are considered 'air quality neutral', however when the emission benchmarks are exceeded the development is not 'air quality neutral'. Where a development exceeds the benchmarks, additional mitigation or off-setting is required. This can be achieved by providing appropriate abatement including: green planting, upgrade or additional abatement to on-site combustion plant, retro-fitting of abatement technology for vehicles or flues, exposure reduction. Such measures can be achieved by condition or S106 contribution. The SPG states that air quality monitoring is not an eligible method for off-setting air quality impacts as this does not contribute to actual air quality improvements.

3. Methodology

3.1. Scope of the Assessment

The scope of the assessment has been determined in the following way:

- Consultation with the Environmental Health Officer (EHO) at LBC to agree the scope of the construction dust assessment and the methodology to be applied.

The scope of the assessment includes consideration of the potential impacts on local air quality resulting from:

- Dust and particulate matter generated by on-site activities during the construction phase.

3.2. Construction Phase

Assessment of the risk of impact associated with the generation of dust during the construction phase of the Approved Development and determination of subsequent mitigation measures necessary has been undertaken following IAQM guidelines.

The assessment is based on a series of steps: screening the requirement for a detailed assessment, classification of the likely magnitude of dust emissions; characterisation of the area of influence and establishment of its sensitivity to dust; and establishment of the overall risk of impact. The risk of impact from dust emissions from the Approved Development considers effects on human health, nuisance as a result of dust soiling and ecological receptors from four main activities: demolition; earthworks; construction; and trackout. The potential for dust emissions from each activity should be considered, unless any of them are not relevant to the Approved Development.

The guidelines identify appropriate screening criteria for the identification of potential receptors, based on a conservative approach and in consideration of the exponential decline in both airborne concentrations and the rate of deposition with distance. A detailed assessment of the impact of dust from construction sites will be required where:

- A 'human receptor' is located within 350m of the boundary of the site or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance;
- An 'ecological receptor' is located within 50m of the boundary of the site or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance.

The magnitude of dust emissions for each activity is classified as small, medium or large depending upon the scale of the works proposed, materials involved and level of activity required. The IAQM guidelines provide examples of how the magnitude of emission can be defined, which are identified in Table 3.1. The Approved Development is unlikely to satisfy all criteria within the examples, therefore professional judgement and site specific information are used to identify appropriate emission magnitude.

Table 3.1 Dust Emission Magnitude *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Activity	Small	Medium	Large
Demolition	• Total building volume <20,000m^3 • Construction material with low potential for dust release (*e.g.* metal cladding or timber) • Demolition activities <10m above ground level • Demolition during wetter months	• Total building volume 20,000 - 50,000m^3 • Potentially dusty construction material • Demolition activities 10-20m above ground level	• Total building volume >50,000m^3 • Potentially dusty construction material (*e.g.* concrete) • On-site crushing and screening • Demolition activities >20m above ground
Earthworks	• Total site area <2,500m^2 • Soil type with large grain size (*e.g.* sand) • <5 heavy earth moving vehicles active at any one time • Formation of bunds <4m in height • Total material moved <20,000 tonnes • Earthworks during wetter months	• Total site area 2,500 - 10,000m^2 • Moderately dusty soil type (*e.g.* silt) • 5 - 10 heavy earth moving vehicles active at any one time • Formation of bunds 4 - 8m in height • Total material moved 20,000 - 100,00 tonnes	• Total site area >10,000 m^2 • Potentially dusty soil type (*e.g.* clay) • >10 heavy earth moving vehicles active at any one time • Formation of bunds >8m in height • Total material moved >100,000 tonnes
Construction	• Total building volume <25,000 m^3 • Construction material with low potential for dust (*e.g.* metal cladding or timber).	• Total building volume 25,000 - 100,000 m^3 • Potentially dusty construction material (*e.g.* concrete) • On-site concrete batching	• Total building volume >100,000 m^3 • On-site concrete batching, sandblasting
Trackout	• <10 HDV (>3.5t) outward movements* in any one day# • Surface material with low potential for dust release • Unpaved road length <50m	• 10 - 50 HDV (>3.5t) outward movements* in any one day# • Moderately dusty surface material (*e.g.* high clay content) • Unpaved road length 50 - 100m	• >50 HDV (>3.5t) outward movements* in any one day# • Potentially dusty surface material (*e.g.* high clay content) • Unpaved road length >100 m

* A vehicle movement is a one way journey, *i.e.* from A to B, and excludes the return journey.

\# HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.

Consideration is given to the likely sensitivity of the area to the impacts of dust, establishing a sensitivity of low, medium or high for dust soiling, human health and ecological receptors. The sensitivity of the area considers a number of factors, including the specific sensitivities of receptors in the area, the proximity and number of those receptors, local baseline conditions such as background concentrations and site specific factors.

The first step in identifying the sensitivity of the area is to establish the sensitivity of the receptor, based on the presence or level of activity associated with the area influenced by the Approved Development. Professional judgement and site specific information are used to assign an appropriate level of receptor sensitivity using the principles outlined in Table 3.2. Following this, the sensitivity of the area can be established from Tables 3.3 to 3.5 based on the sensitivity of the receptor, number of receptors (in the case of human health and dust soiling) and the distance from source.

Table 3.2 Receptor Sensitivity Definitions *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Activity	Small	Medium	Large
Dust Soiling	• Enjoyment of amenity would not reasonably be expected; • There is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; • Transient exposure, where people or property is only expected to be present for limited periods of time as part of the normal pattern of use; • Indicative examples include playing fields, farmland, footpaths, short-term car parks and roads.	• Users would expect to enjoy a reasonable level of amenity, but not reasonably at same level as in their home; • The appearance, aesthetics or value of property could be diminished by soiling; • Indicative examples include parks and places of work.	• Users can reasonably expect enjoyment of a high level of amenity; • The appearance, aesthetics or value of property would be diminished by soiling, and continuous or regularly extended periods of presence expected during normal pattern of land use; • Indicative examples include dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms.
Human Health	• Locations where human exposure is transient; • Indicative examples include public footpaths, playing fields, parks and shopping streets.	• Locations where the people exposed are workers#, and exposure is over a time period relevant to the air quality objective for PM_{10}*; • Indicative examples include office and shop workers, but not those occupationally exposed to dust.	• Locations where members of the public are exposed over a period of time relevant to the air quality objective for PM_{10}*; • Indicative examples include residential properties, hospitals, schools and residential care homes.
Ecological	• Locations with a local designations where the features may be affected by dust deposition, *e.g*. Local Nature Reserve.	• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; • Locations with a national designation where the features may be affected by dust deposition, *e.g.* Site of Special Scientific Interest.	• Locations with an international or national designation and the designated features may be affected by dust soiling, *e.g*. Special Area of Conservation with acid heathland; • Location where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain.

* 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, following Defra Guidance.

Workers are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children, are not normally workers.

Table 3.3 ***Sensitivity of the Area to Dust Soiling Effects on People and Property*** *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Receptor Sensitivity	Number of Receptors	Distance from Source			
		<20m	*<50m*	*<100m*	*<350m*
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

Table 3.4 ***Sensitivity of the Area to Human Health Impacts*** *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Receptor Sensitivity	Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Number of Receptors	Distance from Source				
			<20m	*<50m*	*<100m*	*<200m*	*<350m*
High	>32	>100	High	High	High	Medium	Low
		10 – 100	High	High	Medium	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	28 - 32	>100	High	High	Medium	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	24 - 28	>100	High	Medium	Low	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10 – 100	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Number of Receptors	Distance from Source				
			<20m	*<50m*	*<100m*	*<200m*	*<350m*
Medium	>32	>10	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	28 - 32	>10	Medium	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	24 - 28	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	<24	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 3.5 ***Sensitivity of the Area to Ecological Impacts*** *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Receptor Sensitivity	Distance from Source	
	<20m	*<50m*
High	High	Medium
Medium	Medium	Low
Low	Low	Low

3.2.1. Establishing Significance

The risk of dust related impacts from the Approved Development is established from the sensitivity of the area and the likely dust emission magnitude. The risk should be established, on the worst-case area sensitivity and in the absence of mitigation, for each of the construction related activities (demolition, earthworks, construction and trackout) following the matrix in Table 3.6.

The IAQM guidelines identify a range of mitigation measures intended to reduce the emission and effects of dust from construction sites, and identify their likely applicability to a development based on the level of impact risk attributed. Consideration is given to these in the development of mitigation measures, with the significance of the residual effect based on professional judgement.

Table 3.6 ***Risk of Dust Impacts from Each Activity*** *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Sensitivity of Area	Activity	Dust Emission Magnitude		
		Large	*Medium*	*Small*
High	Demolition	High Risk	Medium Risk	Medium Risk
	Earthworks	High Risk	Medium Risk	Low Risk
	Construction	High Risk	Medium Risk	Low Risk
	Trackout	High Risk	Medium Risk	Low Risk
Medium	Demolition	High Risk	Medium Risk	Low Risk
	Earthworks	Medium Risk	Medium Risk	Low Risk
	Construction	Medium Risk	Medium Risk	Low Risk
	Trackout	Medium Risk	Low Risk	Negligible
Low	Demolition	Medium Risk	Low Risk	Negligible
	Earthworks	Low Risk	Low Risk	Negligible
	Construction	Low Risk	Low Risk	Negligible
	Trackout	Low Risk	Low Risk	Negligible

4. Effects Appraisal and Site Suitability

4.1. Construction

4.1.1. Assessment of Potential Dust Emission Magnitude

The likely magnitude of dust emissions from the Approved Development for the four main activities has been assessed, as identified in Table 4.1.

Table 4.1 Predicted Magnitude of Dust Emissions from Approved Development

Activity	Magnitude	Justification
Demolition	Small	There is a small amount of demolition activity proposed, this includes a pedestrian footbridge (35m^3) and two ramps (10m^3 each). The total volume of material to be demolished is 55m^3, which is well below the small threshold of 20,000m^3 set out in the IAQM guidance. The material to be demolished is concrete and therefore has the potential for dust releases. The height of the bridge does not exceed 10m, therefore all demolition works will occur below this threshold. Based on this information, it is reasonable to categorise the dust emission magnitude as small.
Earthworks	Medium	Although the site area is 10,860 m^2, however the area in which the development is taking place is much smaller, at 935.6m^2. The soil type is potentially dusty, no bunds are proposed. Earthworks will be limited to site levelling and for the establishment of foundations, therefore excavated material is estimated at 600m^3, which equates to approximately 212 tonnes (well below 20,000 tonnes set out for the small threshold). A maximum of two excavators and two earth moving vehicles will be used during this stage i.e. less than five as set out in the IAQM threshold for small. However, due to the site area it has been classified as Medium.
Construction	Small	The total building volume is 20,045m^2 (below 25,000m^2 as set out in the IAQW Guidance small threshold). The material to be used in the construction stage includes steel, brick and timber cladding, composite floor decking and plasterboard partitions – the dust release potential is low.
Trackout	Medium	Considering the size of the Proposed Development, the outward movements of vehicles is as follows: • 32t Tipper: 20 muck away deliveries per day during first 8 weeks • Skip loader: 2 deliveries per week during first 10 weeks • Articulated vehicles: 1 delivery per day • 18t flatbed: 1 deliveries per day for duration of project • 3.5t van: 6 deliveries per day for duration of project Based on the above information the maximum number of outward HDV movements is 30, which is below the threshold of 50. The proposed haul roads are expected to be kept to a minimum (*i.e.* <50 m) but will be concrete to minimise dust resuspension.

4.1.2. Sensitivity of the Area

Wind roses for London City Airport for 2018 and 2019, provided in **Appendix B**, indicate that the prevailing wind direction is predominantly from the south and south west. Therefore, existing receptors that are located to the north and north east are most likely to fall within the area of influence from dust emissions generated by the construction phase at the site.

The majority of dust generated by the construction stage is likely to be deposited in close proximity to the source (within 350m) – **Figure 2** indicates the construction zone of influence. The majority of existing buildings are residential in nature, with terrace houses lining both sides of Belsize Road and various apartment buildings present both within and in the vicinity of the Site. The wider masterplan *i.e.* beyond Phase 2 incorporates two apartment blocks overlooking Abbey Road where more than 100 receptors within 20 m of the Site would be present. For human health, considering the buildings on site as falling within 20 m of the works represents a worst case scenario.

There are no ecological receptors located within 50 m of the Application Site, or within 50 m of the likely construction traffic route for 500 m from the site boundary, and therefore consideration of these receptors has been scoped out.

The 2018 to 2020 PM_{10} background concentrations have been taken from Defra and are presented in Table 4.2.

Table 4.2 Defra PM_{10} Concentrations (µg/m^3)

Grid Square	Pollutant	Pollutant Concentration (µg/m^3)		
		2018	2019	2020
525500 184500	PM_{10}	17.23	16.94	16.65
526500 184500	PM_{10}	18.31	18.02	17.72
526500 183500	PM_{10}	17.91	17.62	17.33
525500 183500	PM_{10}	18.36	18.06	17.76

The maximum PM_{10} concentration for the Site between 2018 and 2020 ranges from 18.36µg/m^3. The background PM_{10} concentration within the Application Site is less than 24 µg/m^3, which is well below the annual mean air quality objective.

The sensitivity of the area to each of the previously identified impact types associated with the Approved Development are identified in Table 4.3.

Table 4.3 Sensitivity of Receptors to Dust Emission Effects

Impact Type	Sensitivity of Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	Medium	Medium	Medium	Medium
Ecological	N/A	N/A	N/A	N/A

The sensitivity of the surrounding area for dust soiling is classified as high, and for human health the sensitivity is classified as medium.

4.1.3. Risk of Impact

To determine the risk of impacts prior to the implementation of mitigation the dust emission magnitude and the sensitivity of the area have been combined and professional judgement applied. Table 4.4 below summaries the potential risk of impacts during the construction phase.

Table 4.4 Risk of Dust Related Impacts from the Approved Development

Impact Type	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium Risk	Medium Risk	Low Risk	Medium Risk
Human Health	Low Risk	Medium Risk	Low Risk	Low Risk
Ecological	N/A	N/A	N/A	N/A

The risk of dust related impacts from the Approved Development on existing receptors in the vicinity of the Site is Medium to Low Risk without the implementation of mitigation. The risk of dust related impacts on human health during the construction phase is Medium to Low Risk.

4.1.4. Construction Road Traffic & Non-Road Mobile Machinery (NRMM)

The greatest impact on air quality due to construction traffic and NRMM is likely to be along roads in the vicinity of the Application Site. It is likely that construction traffic will enter the Application Site via Belsize Road, but the volume of construction traffic will be low compared to the existing traffic flows.

Based on the current local air quality in the area, the proximity of sensitive receptors to the roads likely to be used by construction vehicles, the impacts are therefore considered to be slight adverse without the implementation of mitigation.

5. Mitigation

As dust risk has been undertaken and identified that the risk ranges from Medium Risk to Negligible.

Nevertheless, the IAQM guidelines provide an indication of standard mitigation measures that would be appropriate for inclusion within the Approved Development, based on the risk of dust related impacts identified for each of the activities. Consequently, the following mitigation measures should be incorporated into the Approved Development, and delivered through the implementation of a Construction Environment Management Plan (CEMP).

Mitigation measures that are generic to each of the activities, and therefore should be implemented for the duration of the construction related works where applicable are identified in Table 5.1, whilst activity specific mitigation measures are identified in Table 5.2.

Table 5.1 Mitigation to be implemented during the Construction Phase

Development Element	Mitigation Measure
Communication	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. Display the head or regional office contact information.
Planning	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the measures recommended in this table. The DMP may include monitoring of dust deposition, dust flux, real time PM_{10} continuous monitoring and/or visual inspections
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. Make the complaints log available to the local authority when asked. Record any exceptional incidents that cause dust and/or emissions, either on- or off- site, and the action taken to resolve the situation in the log book.

Development Element	Mitigation Measure
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning provided if necessary. Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked. Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. Agree dust deposition, dust flux, or real time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
Preparing and Maintaining the Site	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period. Avoid site run-off of water or mud. Keep site fencing, barriers and scaffolding clean using wet methods. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below. Cover, seed or fence stockpiles to prevent wind whipping.

Development Element	Mitigation Measure
Operating Vehicle/ Vehicle Movements	Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable. Ensure all vehicles switch off engines when stationary – no idling vehicles. Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable. Impose and signpost a maximum speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads 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). Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
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. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. Use enclosed chutes and conveyors and covered skips. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fin water sprays on such equipment wherever appropriate. 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.
Waste Management	Avoid bonfires and burning of waste materials.

Table 5.2 Activity Specific Mitigation Measures to be implemented during the Construction Phase

Development Element	Mitigation Measure
Demolition	Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground. Avoid explosive blasting, using appropriate manual or mechanical alternatives. Bag and remove any biological debris or dam down such material before demolition.

Development Element	Mitigation Measure
Earthworks	Only remove the cover in small areas during work and not all at once.
Construction	Ensure sand and other aggregates are stored in bunds in areas that 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.
Trackout	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. Avoid dry sweeping of large areas. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. Record all inspections of haul routes and any subsequent action in a site log book. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). 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. Access gates to be located at least 10 m from receptors where possible.

6. Air Quality Monitoring Plan

6.1. Proposed Monitoring

In accordance with the Mayor of London's Guidance on The Control of Dust and Emissions during Construction and Demolition SPG, where sites are classified as a Medium Risk following the dust risk assessment there is a requirement to undertaken real-time particular monitoring at two locations within the Site.

Based on the prominent wind direction, as indicated by the wind roses included in **Appendix B**, the monitoring equipment will be located along a southwest to northeast axis. An initial site visit has been undertaken and we propose to locate the units in the SW and NE corners of the Site which represents the most suitable locations in terms of security, accessibility for a continuous power supply and exposure for existing sensitive residential receptors which are located in the direction of the prevailing wind (*i.e*. from the South West).

The onsite demolition works and construction traffic routing are confined to the south western corner of the Site, therefore monitoring has been proposed at Casters House which is located downwind of these works closest to existing sensitive receptors. We propose to affix the unit to the outward facing part of the brick column of the building (depicted by ML1 on **Figure 3**) where it will remain in-situ for the duration of works.

The majority of earthworks and construction related activities (also incorporating some construction traffic routing) are confined to the eastern part of the Site, within the area identified in brown in **Figure 4**. Therefore, during the baseline period (3 months) we propose to install the monitor on the very eastern boundary of the Site, immediately adjacent and upwind of the existing residential dwellings located along this boundary (depicted by ML2 on **Figure 3**).The unit will be affixed to a purpose built hoarding and remain in situ for duration of works. As the site has severe power constraints until formal commencement in late 2020 when the perimeter hoarding will be erected and site wide power supplies will be made available a purpose built trench from an existing lamp post at the eastern side of the car park will need to be dug and a formal power supply laid between the two points.

Upon installing the monitors we will ensure that there are no substantial structural obstructions (including any fixings) between the dust activities and the monitors, and we will insert them as far as possible into the 'line of sight' between the sensitive receptors and dust generating points. Based on the proposed demolition, construction traffic routing, earthworks and construction schedule we are confident that the monitoring locations proposed are between the main dust generating activities, shown in brown, and the sensitive receptors, shown in green, in **Figure 4**.

Any additional details regarding the micro-positioning of the monitors, including photographs can and will be provided following the installation.

We are proposing to utilise a real-time dust monitor at two locations within the Site, where data will be collected on a real time basis and uploaded to the 'cloud' for immediate visualisation and download. The real time monitoring equipment we are proposing to use is the Turnkey Osiris, which is MCERTS certified – see **Appendix C**.

We propose that real-time monitoring is undertaken for the duration of the demolition, earthworks and construction phases which is expected to last approximately 64 weeks.

Prior to any works commencing onsite there is a requirement to undertake baseline monitoring to capture the existing concentrations within the Site. As per the Mayor of London's SPG and following discussions with the EHO at the LBC this is proposed for a period of 12 weeks.

6.2. Particulate Matter Trigger Levels

As part of the data collection, and in accordance with Mayor of London's SPG, we are proposing to apply two trigger levels (or averaging periods) for PM_{10} which are taken over a 15-minute average, the first is 150µg/m^3 and the second is 250µg/m^3.

If the first trigger level (150µg/m^3) is exceeded in any given 15-minute time period a notification will be sent to the relevant persons (site manager, Hilson Moran and Camden if requested) to indicate that there is elevated particulate matter concentrations. Where the first trigger level is exceeded, investigations should be undertaken to review the possible cause and measures should be implemented to minimise potential elevated concentrations.

If the second trigger level (250µg/m^3) is exceeded in any given 15-minute time period a notification will be sent to the relevant persons (site manager, Hilson Moran and Camden if requested) to indicate that an exceedance has occurred. Where the second trigger level is exceeded, work should cease and an investigation should be undertaken to review the possible cause and measures should be implemented to minimise the possibility of any future exceedances. Operations should not continue until measures have been put in place and monitoring data indicates compliance with the identified trigger levels.

6.3. Reporting

As part of the air quality monitoring, there is a requirement to submit a report to the Local Planning Authority. We propose to submit a report on a monthly basis for the duration of monitoring. This report will present the monitoring data in an illustrative manner and identify any exceedances recorded and the measures imposed to minimise or limit future exceedances.

7. Summary

A construction dust risk assessment has been undertaken in accordance with the IAQM Guidance on the Assessment of Dust from Demolition and Construction and the Mayor of London's The Control of Dust and Emissions during Construction and Demolition SPG.

The construction dust risk assessment has identified a Medium to Low Risk of dust soiling and for fugitive PM_{10} emissions.

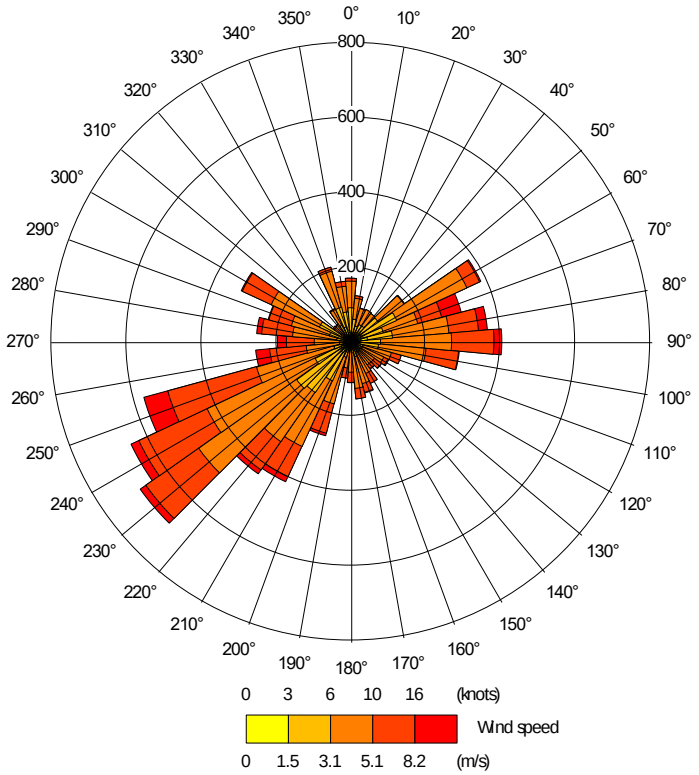
The Site has been identified as Medium Risk, therefore mitigation is required as per those detailed in Table 5.1 and 5.2. Through good site practice and the implementation of mitigation measures in line, the impact of dust and PM_{10} releases will be minimised.

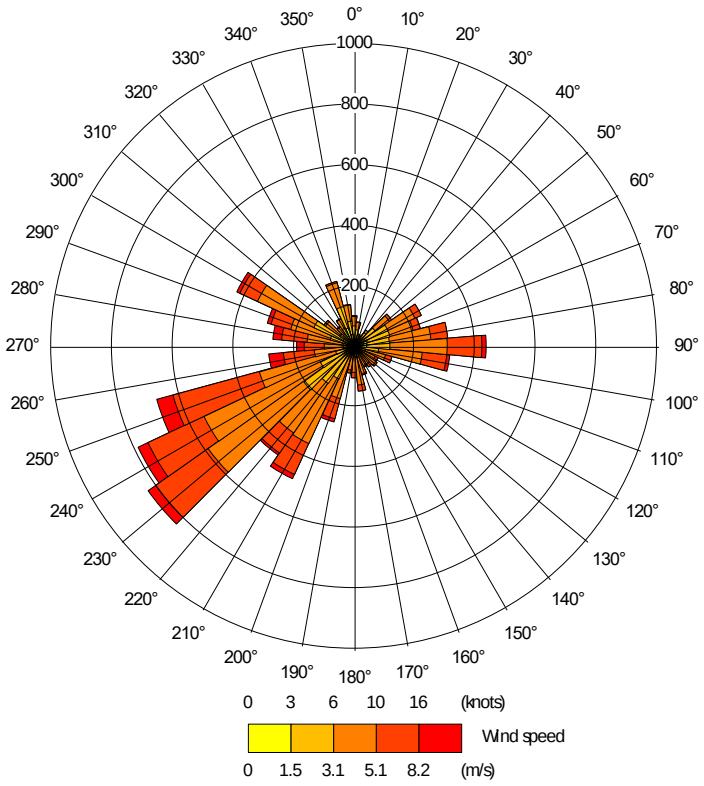
As part of the required mitigation measures, on-site real time monitoring should be implemented. The proposals include for the installation of two real time monitors for the duration of the demolition, earthworks and construction phases, and for a maximum of three months prior to any onsite works commencing – this is to capture the existing baseline PM_{10} concentrations on the Site. The data will be available in real time via an upload to the 'cloud', trigger levels will be applied in accordance with guidance and monthly reporting will be undertaken and submitted to LBC as required.

Appendix A - Glossary

Term	Definition
Air Quality Objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted umber of exceedances within a specific timescale (see also air quality standard).
Air Quality Standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year.
AQMA	Air Quality Management Area.
Defra	Department for Environment, Food and Rural Affairs.
Exceedance	A period of time where the concentrations of a pollutant is greater than the appropriate air quality standard.
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle
LAQM	Local Air Quality Management
NO_2	Nitrogen dioxide
NO_X	Nitrogen oxides
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
$\mu g/m^3$ (micrograms per cubic metre)	A measure of concentration in terms of mass per unit volume. A concentration of 1 $\mu g/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

Appendix B – Wind Rose for London City Airport (2018 & 2019)





Appendix C – Turnkey Osiris MCERTs

PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

Osiris Airborne Particle Monitor

Manufactured by:

Turnkey Instruments Ltd

1 & 2 Dalby Court
Gadbrook Business Centre
Northwich, Cheshire
CW9 7TN

has been assessed by Sira Certification Service
And for the conditions stated on this certificate complies with:

MCERTS Performance Standards for Indicative Ambient Particulate Monitors, Version 4 dated August 2017

Certification Ranges :

PM_{10} 0 to 100µg/m^3

Project No.:	674/0356A / 80007209
Certificate No:	Sira MC090157/06
Initial Certification:	30 September 2009
This Certificate issued:	29 September 2019
Renewal Date:	29 September 2024

Emily Alexander
Environmental Project Engineer

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service

Unit 6, Hawarden Industrial Park
Hawarden, Deeside, CH5 3US
Tel: +44 (0)1244 670 900

UKAS PRODUCT CERTIFICATION 0011

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Form 1335
Issue 8

Certificate Contents

Approved Site Application

Any potential user should ensure, in consultation with the manufacturer, that the monitoring system is suitable for the intended application. For general guidance on monitoring techniques refer to the Environment Agency Monitoring Technical Guidance Notes available at www.mcerts.net

The indicative dust monitoring analyser(s) can be operated in one of two ways:

For qualitative measurements: Providing qualitative measurement data for the analysis of particulate pollution trends, and source identification studies based for example on pollution roses etc. Such application can rely on instrument factory calibration only.

For quantitative measurements: Providing measurement data with the uncertainty defined for indicative instruments (+/- 50%). This can be achieved on condition that each instrument used for measurement has been calibrated on the specific site where monitoring is taking place against a standard reference method for a period of two weeks and the resulting slope and intercept have been used for instrument calibration. Using non-standard filters and procedures for this purpose is not acceptable. To maintain the validity of data this calibration has to be repeated at least every twelve months or when the instrument is moved to a different site.

They **cannot** be used as a substitute for continuous ambient air quality monitoring systems (CAMs) employed in national air quality monitoring networks for the EU Air Quality Directive.

Basis of Certification

This certification is based on the following Test Report(s) and on Sira's assessment and ongoing surveillance of the product and the manufacturing process:

Bureau Veritas Report No. BV/AQ/AGGX0849/DH/2610

Product Certified

The measuring system consists of the following parts:

- Osiris analyser
- Heated Inlet
- Flow controller
- Lampost Box

This certificate applies to all instruments fitted with software version 0400 (serial number TNO 2296 onwards).

Certified Performance

Test	Results	MCERTS specification
Constancy of the sample volumetric flow	-2.7% See Note 1	Remain constant within ±3% of rated value
Tightness of the sampling system	<2%	Leakage not to exceed 2% of sampled volume
Maintenance Interval	Four weeks	Two weeks
Between sampler/instrument uncertainty for the complete data set	≤5µg/m^3	≤5µg/m^3
Between sampler/instrument uncertainty for two data sets obtained by splitting the full data set into values below and above 50% of the limit value	≤5µg/m^3	≤5µg/m^3
Highest resulting uncertainty estimate comparison against data quality objective (Measurement Uncertainty)	$W_{CM} \leq W_{dqo}$ 2007: W_{CM} = 46.20% 2003: W_{CM} = 50.10%	$W_{CM} \leq W_{dqo}$ Measurement uncertainty defined as 50% for indicative instruments

Note 1: The internal particulate filter is not used for calibration, therefore the constancy of sample volumetric flow is not treated as a pass/fail criterion of the instrument operation. The tests have been carried out for engineering assessment of the flow control system performance.

The OSIRIS and TOPAS instruments are fitted with an internal flow controller maintaining the flow rate at 600 cc/min as the flow resistance increases with the dust loading. The recommended filter is a circular Whatman GFA of 25 mm diameter.

Description

The Turnkey **Osiris, Topas** and **Dustmate** instruments give a continuous and simultaneous indication of the PM_1, $PM_{2.5}$, PM_{10} and TSP mass fractions. They use a light scattering technique to determine the concentration of airborne dust in the particle size range from about 0.3 microns (1 micron = 10^{-6} metre) to about 20 microns. The air sample is continuously drawn into the instrument by a pump with a flow rate set by the microprocessor. The incoming dusty air passes through a laser beam in a photometer and then through a filter to remove the particles before reaching the pump.

The light scattered by airborne particles can be thought of as consisting of three components. Light *reflected* from the surface of the particle, light *refracted* through the particle and light which is *diffracted* from its original path by the presence of the particle. The intensity of the light scattered by reflection or refraction strongly depends on the type of particle. Thus a white limestone particle will reflect much more light than a black diesel fume particle of the same size. On the other hand the diffracted component depends only on the size of the particle and is independent of its material composition.

For irregularly shaped particles, light which is reflected and refracted tends to be scattered over all possible directions. The diffracted component, however, tends to be scattered only through very small angles. For example, for a 5 micron diameter particle, 90% of the diffracted light is scattered by less than 10 degrees from the original direction of the light beam.

Turnkey's instruments analyse only the light scattered through 10 degrees or less. That is they respond only to the diffracted component and have a virtually constant response whether the particles are black or white. Other commercially available photometers detect light scattered through much wider angles or even at 90 degrees to the light beam.

In addition, all of Turnkey's instruments employ a sensitive scattering volume of less than 0.1 micro-litres. Therefore they can analyse the intensity of the light scattered by individual particles, even when there are many millions of them per litre. This allows the photometers to accurately count and size individual particles at concentrations of up to several mg/m^3. Having counted and sized the individual particles a dedicated microprocessor then continually determines the PM_1, $PM_{2.5}$, PM_{10} and TSP unit mass concentrations. These results are averaged and stored at chosen intervals and can be downloaded for analysis.

General Notes

1. This certificate is based upon the equipment tested. The Manufacturer is responsible for ensuring that on-going production complies with the standard(s) and performance criteria defined in this Certificate. The Manufacturer is required to maintain an approved quality management system controlling the manufacture of the certified product. Both the product and the quality management system shall be subject to regular surveillance according to 'Regulations Applicable to the Holders of Sira Certificates'.

2. The design of the product certified is defined in the Sira Design Schedule V03 for certificate No. Sira MC090157/05

3. If certified product is found not to comply, Sira Certification Service should be notified immediately at the address shown on this certificate.

3. The Certification Marks that can be applied to the product or used in publicity material are defined in 'Regulations Applicable to the Holders of Sira Certificates'.

4. This document remains the property of Sira and shall be returned when requested by the company.

Figure 1 – Site Boundary

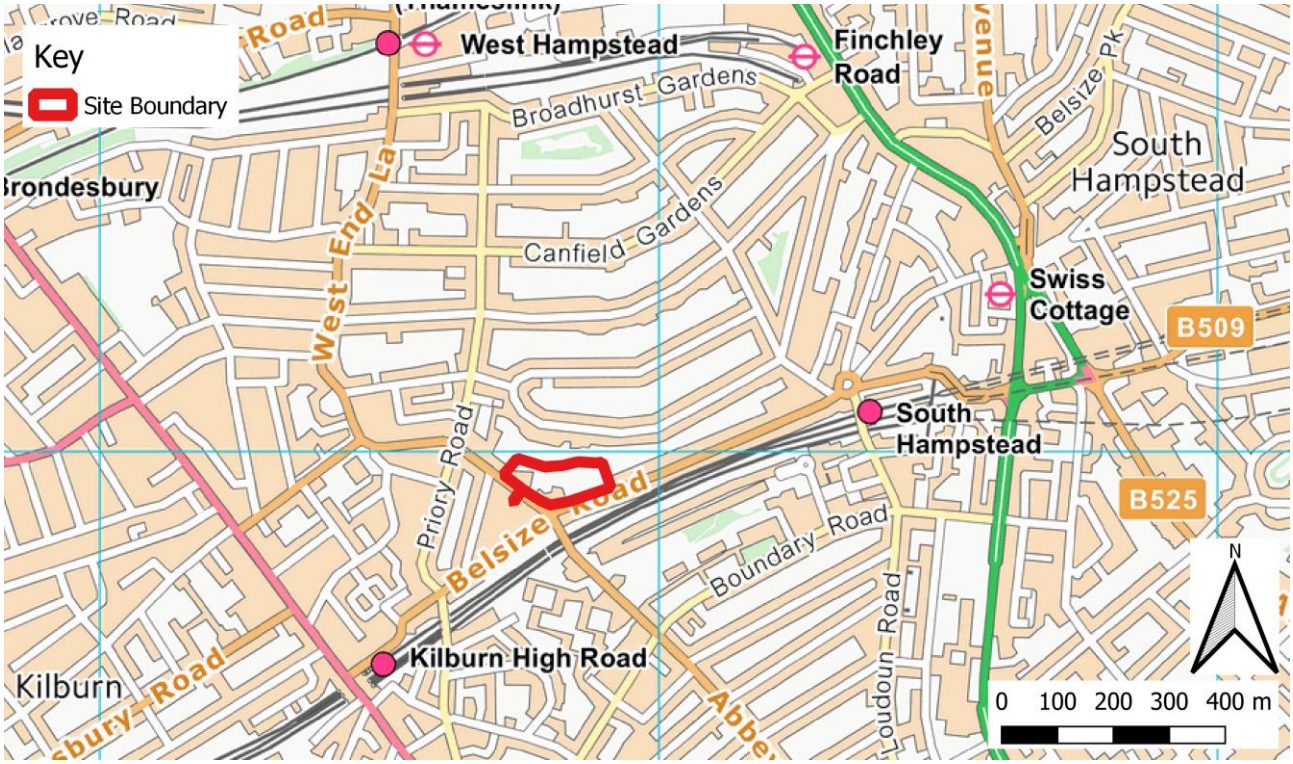

Figure 2 – Construction Zone of Influence

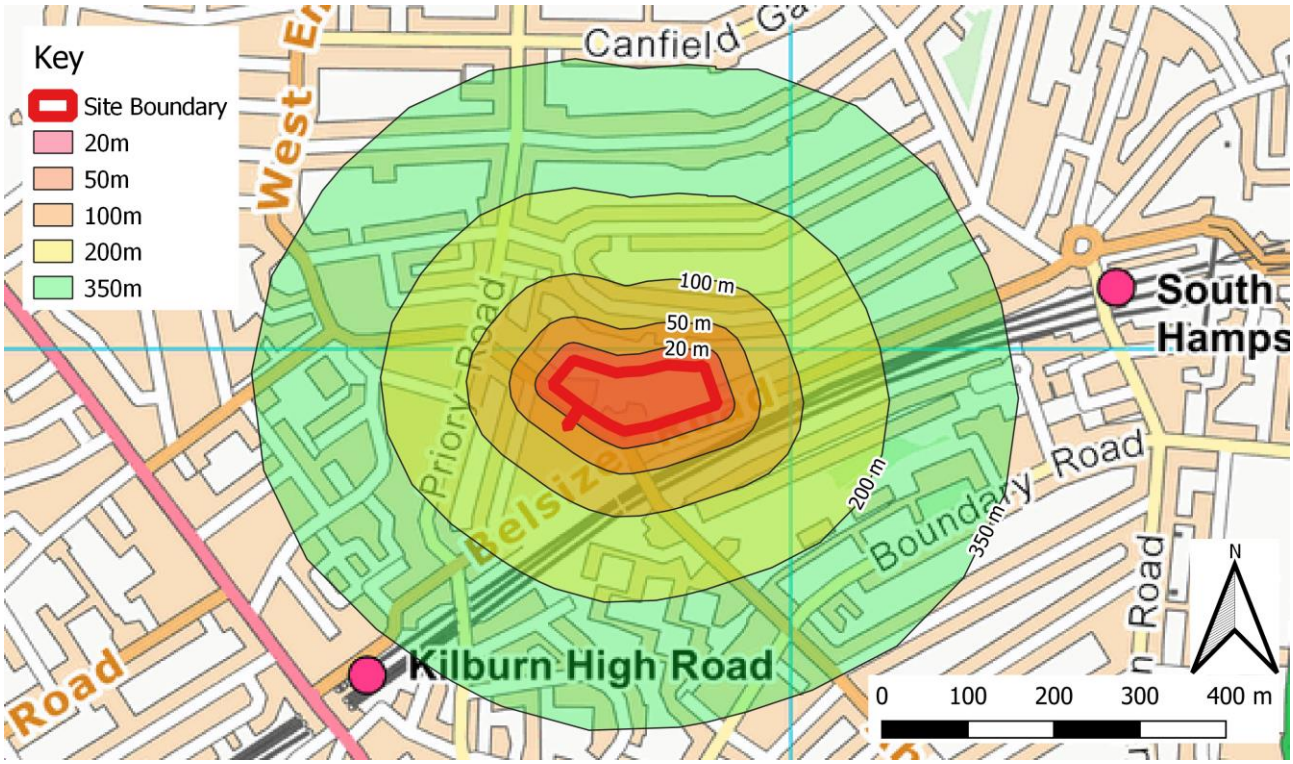

Figure 3 – Proposed Real Time Monitoring Locations

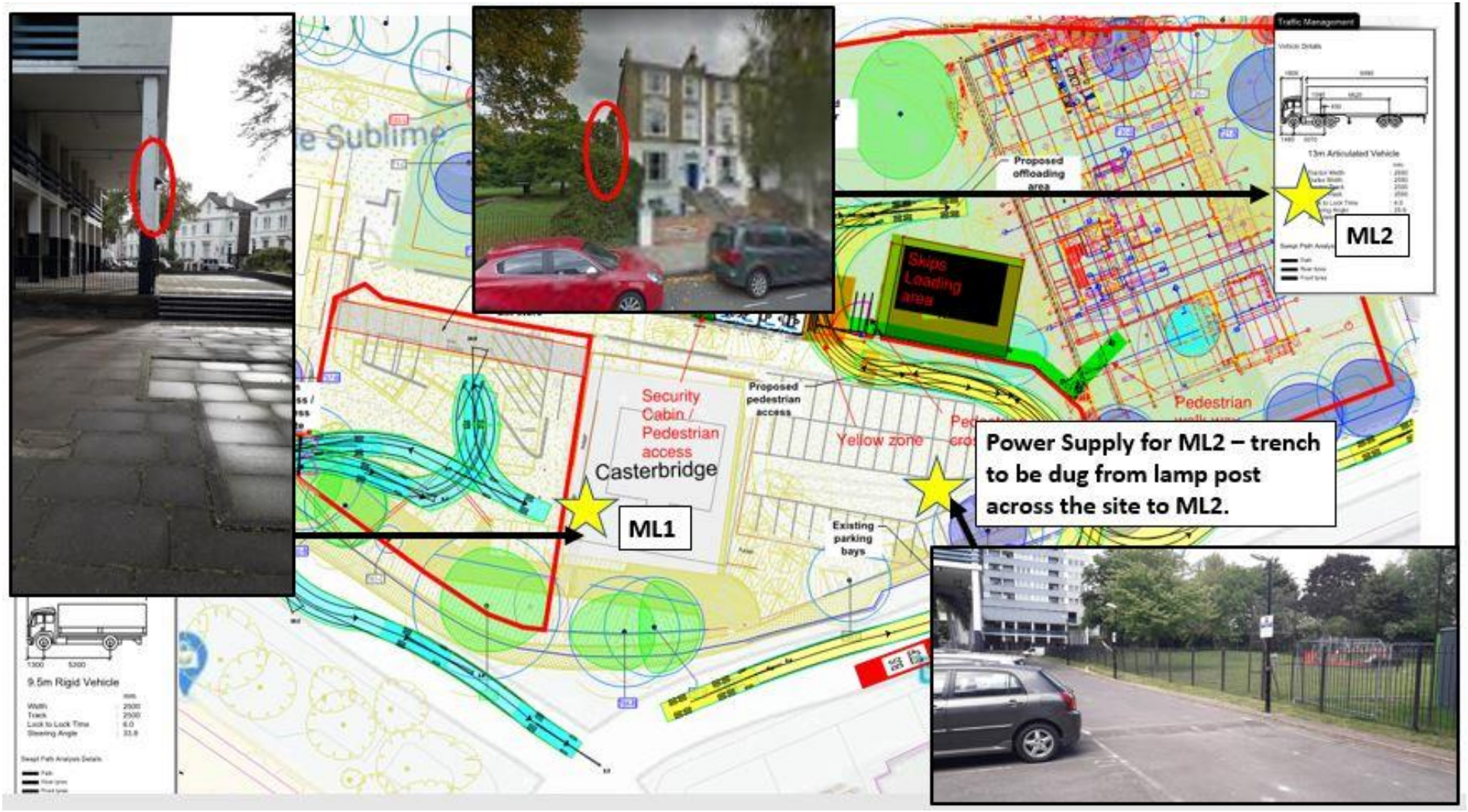

Figure 4 – Dust Generating Activities & Sensitive Receptors

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