Clarion Housing Group

Richmond upon Thames College – Residential Zone

Dust Management Plan

MLM. Group

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1 Limitations and Exceptions

This report and its findings should be considered in relation to the terms and conditions proposed and scope of works agreed between MLM and the client.

This report provides available factual data for the site and the surrounding area at the time of the study and as obtained by the means described in the text. The data is related to the site on the basis of the site location information provided by the Client.

It should be appreciated that the information that has been made available to date, is not necessarily exhaustive and that further information relevant to the proposed site usage may be provided which could change the overall findings.

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2 Introduction

2.1 General

MLM Consulting Engineers Ltd (MLM) was commissioned by Clarion Housing Group (the Client) to prepare a Dust Management Plan (DMP) in connection with a proposed development at Richmond upon Thames College – Residential Zone.

This report will focus on the Residential Zone of the proposals which comprises "*a new residential development of up to 180 units together with associated parking for up to 190 vehicles, open space and landscaping.*" ('Proposed Development').

The Site falls within the planning jurisdiction of the London Borough of Richmond-upon-Thames (LBRuT).

2.2 Report Structure

The structure of the report is summarised below:

- A brief description of the site and proposed development;
- A brief description of the legislation governing air quality in England;
- Details of the methodology used for the dust impact assessment; and,
- Mitigation measures to manage dust emissions.

2.3 Objectives

The objectives of this report are:

- To assess the present levels of dust (ie PM_{10} – particles which are less than 10µm in diameter concentrations) around the Proposed Development site based upon the Local Authority data and the background atmospheric concentrations, as available in the public domain ; and,
- Assess the potential dust impacts during the construction phase of the development and develop the appropriate dust mitigation measures.

3 The Site

3.1 Location and Description

The 'Residential Zone' forms part of the wider Richmond upon Thames College development area. The site is bordered to the north by the school and college zones of the development ending at the A316 Chertsey Road, to the east by Egerton Road, to the south by existing dwellings on Craneford Way and to the east by parkland, with Langhorn Drive and the Twickenham Stoop stadium beyond.

The existing site is comprised of the existing Richmond upon Thames College and associated buildings. The surrounding area is predominantly residential and open space, with two stadiums in close proximity.

The location of the site is shown in Figure 1.

The approximate coordinates of the centre of the site are 515418 (Easting), 173719 (Northing).

3.2 The Proposed Development

The site is part of an outline planning consent gained on the 16th August 2016 (Planning Reference: 15/3038/OUT) for the demolition of existing college buildings, removal of hard surfacing, site clearance and groundworks together with the redevelopment of the site to provide a mixed-use development split into 9 separate developments.

This report will focus on the Residential Zone of the proposals which comprises *"a new residential development of up to 180 units together with associated parking for up to 190 vehicles, open space and landscaping."*

4 Air Quality Standards

4.1 International Legislation and Policy

The European Directive (2008/50/EC)[1] sets legally binding limits for concentrations of outdoor air of major air pollutants that impact public health such as particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2). The European Directive is implemented in the UK under the Air Quality Standards Regulations 2010[2]. The obligations under the Air Quality Standards Regulations 2010 are separate from those of the 2000 and 2002 UK Regulations because local authorities in the UK will only have powers to manage some of the pollutants in the Air Quality Standards Regulations 2010 as most of the source pollutants will be managed by the Environment Agency under the Environmental Permitting Regime[3]. Therefore, the obligation to meet the Air Quality Standards Regulations 2010 rests with the Secretary of State for Environment.

4.2 National Legislation and Policy

4.2.1 Local Air Quality Management

Part IV of the Environment Act 1995[4], requires the UK Government to publish an Air Quality Strategy and local authorities to review, assess and manage air quality within their areas. This is known as Local Air Quality Management (LAQM). The 2007 Air Quality Strategy[5] establishes the policy for ambient air quality in the UK. It includes the National Air Quality Objectives (NAQOs) for the protection of human health and vegetation for 11 pollutants. Those NAQOs included as part of LAQM are prescribed in the Air Quality (England) Regulations 2000 and the Air Quality (Amendment) (England) Regulations 2002. Table 4.1 presents the NAQOs for Nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of 10 µg or less (PM_{10}), the key pollutants of concern in relation to vehicle emissions.

Table 4.1 Relevant Objectives set out in the Air Quality Strategy

Pollutant	Concentrations	Measured As
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times per year	1 hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3 not to be exceeded more than 35 times per year	24 hour mean
	40 µg/m^3	Annual mean
Particulate Matter ($PM_{2.5}$)	25 µg/m^3	Annual Mean

The Air Quality Strategy also introduced a new policy framework for tackling fine particles ($PM_{2.5}$) including an exposure reduction target. However, although EU Directive 2008/50/EC includes a new regulatory framework for $PM_{2.5}$ this pollutant is not included within LAQM, therefore, there is no requirement to assess this pollutant unless as part of an Environmental Impact Assessment (EIA).

However, to ensure a robust assessment $PM_{2.5}$ has been considered in this assessment. The objective for this pollutant has been included in Table 4.1.

[1] Directive 2008/50/EC Of The European Parliament And Of The Council, 21st May 2008.
[2] Air Quality Regulations 2010 – Statutory Instrument 2010 No. 1001
[3] The Environmental Permitting (England and Wales) Regulations 2016, as amended.
[4] Environment Act 1995, 1995, The Stationery Office.
[5] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, March 2011.

The NAQOs apply to external air where there is relevant exposure to the public over the associated averaging periods within each objective. Guidance is provided within Local Air Quality Management Technical Guidance 2016[6] (LAQM.TG (16)) issued by Defra for Local Authorities, on where the NAQOs apply as detailed in Table 4.2. The objectives do not apply in workplace locations, to internal air or where people are unlikely to be regularly exposed (ie centre of roadways).

Table 4.2 Locations Where Air Quality objectives Apply

Averaging Period	Objectives Should Apply at:	Objectives Should Generally Not Apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24-hour mean and eight-hour mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties*	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
One-hour mean	All locations where the annual mean and: 24 and eight-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-min mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes.	

* – Such locations should represent parts of the garden where relevant public exposure to pollutants is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure to pollutants would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.

[6] Local Air Quality Management, Technical Guidance (TG16), Department of Environment Food and Rural Affairs (Feb 2018).

4.2.2 National Planning Policy Framework

The latest guidance published in July 2018, the National Planning Policy Framework (NPPF)[7] sets out the Government's planning policies for England and how these are expected to be applied. It replaces Planning Policy Statement 23[8]: Planning and Pollution Control and NPPF 2012 which provided planning guidance for local authorities with regards to air quality.

At the heart of the NPPF is a presumption in favour of sustainable development.

It provides a framework within which locally-prepared plans for housing and other development can be produced. It requires Local Plans to be consistent with the principles and policies set out in the Framework with the objective of contributing to the achievement of sustainable development.

Current planning law requires that application for planning permissions must be determined in accordance with the relevant development plan (ie Local Plan or Neighbourhood Plan). The NPPF should be taken into account in the preparation of development plans and therefore the policies set out within the Framework are a material consideration in planning decisions.

Under paragraph 103, it states that:

> *"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."*

Under paragraph 170(e), it states that:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by 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."*

Under paragraph 181, it states that:

> *"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."*

4.3 Control of Dust and Particulates Associated with Construction

Section 79 of the Environmental Protection Act (1990)[9] states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Statutory nuisance is defined as:

[7] National Planning Policy Framework. July 2018. Ministry of Housing, Communities and Local Government
[8] Planning Policy Statement 23 (PPS 23): Planning and Pollution Control (ODPM).
[9] Environmental Protection Act 1990, 1990, The Stationery Office.

- 'Any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance'
- 'Any accumulation or deposition which is prejudicial to health or a nuisance'

Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

In the context of the proposed development, the main potential for nuisance of this nature will arise during the construction phase - potential sources being the clearance, earthworks, construction and landscaping processes.

There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist - 'nuisance' is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred. However, research has been undertaken by a number of parties to determine community responses to such impacts and correlate these to dust deposition rates. However, impacts remain subjective and statutory limits have yet to be derived.

4.4 Local Planning Policy

4.4.1 Cleaning the Air – The Major's Air Quality Strategy, 2010

The Mayor of London's Air Quality Strategy[10] sets out a series of policies and proposals for implementation of the UK AQS and for the achievement of the air quality standards and objectives within Greater London. With regards new developments the following policies are of relevance:

- Policy '7 - Using the planning process to improve air quality - new developments in London as a minimum shall be 'air quality neutral': The Mayor will encourage boroughs to require emissions assessments to be carried out alongside conventional air quality assessments. Where air quality impacts are predicted to arise from developments these will have to be offset by developer contributions and mitigation measures secured through planning conditions, section 106 agreements or the Community Infrastructure Levy.
- Policy '8 - Maximising the air quality benefits of low to zero carbon energy supply': The Mayor will apply emission limits for both PM and NO_x for new biomass boilers and NO_x emission limits for Combined Heat and Power Plant (CHPP). Air quality assessments will be required for all developments proposing biomass boilers or CHPPs and operators will be required to provide evidence yearly to demonstrate compliance with the emission limits.
- Policy '9 - Energy efficient buildings': The Mayor will set CO_2 reduction targets for new developments which will be achieved using the Mayor's Energy Hierarchy. These measures will result in reductions of NO_x emissions.
- Policy '10 - Improved air quality in the public realm': The Mayor will encourage the improvement of air quality in the public realm by planting vegetation to trap particulate matter. Through the planning system the Mayor will increase the number of green roofs and living walls across London. Additionally, he will encourage the planting of trees in areas of poor air quality.

4.4.2 The London Plan 2016

The London Plan[11] was first published in March 2015 and consolidated the London Plan 2011 with the Revised Early Minor Alterations to the London Plan[12] and the Further Alterations to the London Plan also published in March 2015. Further Minor Alterations to the London Plan were made in March 2016[13]. The Plan is the overall strategic plan for London setting out an integrated economic, environmental, transport

[10] Available at https://www.london.gov.uk/sites/default/files/Air_Quality_Strategy_v3.pdf
[11] Available at https://www.london.gov.uk/file/22780/download?token=a-BvX_IN
[12] Available at https://www.london.gov.uk/what-we-do/planning/london-plan/past-versions-and-alterations-london-plan
[13] Available at https://www.london.gov.uk/sites/default/files/the_london_plan_malp_final_for_web_0606_0.pdf

and social framework for the development of London over the next 20-25 years. It specifically addresses how development can help support the implementation of the Mayor's Air Quality Strategy and achieve a reduction in pollutant emissions and public exposure to pollution.

Policy 5.7 deals with renewable energy and states that 'all renewable energy systems should be located and designed to avoid any adverse impacts on air quality'.

'Policy 7.14 - Improving Air Quality' requires all development proposals to:

- Minimise increased exposure to existing poor air quality, make provision to address local problems of air quality (particularly within Air Quality Management Areas or AQMAs) and promote greater use of sustainable transport modes through travel plans.
- Promote sustainable design and construction to reduce emissions from demolition and construction of buildings including following current best practice guidance.
- Be at least 'air quality neutral' and therefore not leading to further deterioration of existing poor air quality.
- Look, in the first instance, to implement measures on-site to reduce emissions from a development. If inappropriate or impractical, other measures should be considered and where found to provide equivalent air quality benefits, planning obligations or planning conditions should be used to ensure their implementation.

The policy also states that 'permission will only be granted where a detailed assessment of biomass boilers shows no adverse impact from emissions'.

4.4.3 The Draft New London Plan 2018

The draft 'New London Plan' was originally published for consultation in December 2017, with the most recent version, including minor changes and clarifications following the consultation period, published in August 2018. Much of the policy with regards to Air Quality has remained consistent with notable introductions of:

'Policy SI1 – Improving Air Quality' requiring all development proposals to also:

- demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone standards and reduce the emissions from the demolition and construction of buildings following best practice; and
- Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should propose methods of achieving an Air Quality Positive approach through the new development.

'Policy SI2 – Energy Infrastructure' states that major development proposals within Heat Network Priority Areas should:

- Use zero emissions or secondary heat sources;
- Use low emission combined heat and power (CHP), only where there is a case for CHP to enable the delivery of an area-wide heat network;
- Use ultra-low NO_x gas boilers; and,
- CHP and ultra-low gas boiler communal or district heating systems should be designed to meet the requirements of policy SI1 (previously 7.14).

4.4.4 London Borough of Richmond upon Thames Local Plan

The LBRuT local plan, adopted 3rd July 2018, supersedes the Core Strategy and Local Development Plans, and sets out the policies and guidance for development within the borough until 2030. With regards to air quality the local plan includes the strategic objective:

"A sustainable future – 4. Reduce or mitigate environmental impacts and pollution levels (such as air, noise, light, odour, fumes, water and soil) and encourage improvements in air quality, particularly along major roads and areas that already exceed acceptable air quality standards".

With regards to specific policy, Policy LP10.B Air Quality states that:

"The council promotes good air quality design and new technologies. Developers should secure at least 'Emissions Neutral' development. To consider the impact of introducing new developments in areas already subject to poor air quality, the following would be required:

- *An air quality impact assessment, including where necessary, modelled data;*
- *Mitigation measures to reduce the development's impact upon air quality, including the type of equipment installed, thermal insulation and ducting abatement technology;*
- *Measures to protect the occupiers of new developments from existing sources;*
- *strict mitigation for developments to be used by sensitive receptors such as schools, hospitals and care homes in areas of existing poor air quality; this also applies to proposals close to developments used by sensitive receptors".*

5 Local Baseline Air Quality

5.1 Local Air Quality Management

LBRuT declared a borough wide AQMA in 2000 for exceedances of the annual mean NO_2 and daily and annual mean PM_{10} National Air Quality Objectives (NAQO), with the latest Annual Status Report (ASR) stating that the AQMA should be maintained. The main impacts on air quality in the LBRuT are from road transport, with the principal routes including the A305, A306, A307, A308 and A316, with Heathrow Airport located approximately 5km to the west of the borough.

5.2 Automatic Monitoring

LBRuT undertook automatic (continuous) monitoring of NO_2 at four stations and of PM_{10} at three stations sites during 2017. Of the four sites, two were roadside monitors and the other two suburban monitors. One site, a mobile air unit located on Chertsey Road, is located adjacent to the northeast corner of the wider Site boundary.

Tables 5.1 and 5.2 below detail the annual mean NO_2 and PM_{10} concentrations from automatic monitoring sites taken from LBRuT's Air Quality ASR 2018 within 3km of the proposed development site.

Table 5.1 Summary of the monitored annual mean NO_2 concentrations from 2014 to 2017 from Automatic Sites.

Site ID (Site Name)	Site Type	Distance from the Site(in kms)	Annual Mean (µg/m3)			
			2014	2015	2016	2017
RHG (Mobile Site)	Roadside	0.65	42	N/A	N/A	37
TD0 (Teddington AURN)	Suburban	2.93	27	19	22	N/A

Table 5.2 Summary of the monitored annual mean PM_{10} concentrations from 2014 to 2017 from Automatic Sites.

Site ID (Site Name)	Site Type	Distance from the Site(in kms)	Annual Mean (µg/m3)			
			2014	2015	2016	2017
RHG (Mobile Site)	Roadside	0.65	N/A	N/A	N/A	18

Tables 5.1 and 5.2 show that at these monitoring locations, the annual mean NO_2 and PM_{10} concentrations in the latest monitoring years were below the relevant annual mean NAQOs. Furthermore, the hourly NO_2 and daily mean PM_{10} NAQOs were not exceeded at either location.

5.3 Defra Background Maps

Additional information on estimated background pollutant concentrations has been obtained from the Defra background maps provided on UK-AIR, the Air Quality Information Resource[14]. The background data are available in 1km x 1km grid squares and provide an estimate of concentrations between 2017 and 2020 for the grid covering the Site. The background concentrations of pollutants have been taken for the closest

14 Available at https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015

grid square (515500; 173500) of the development site. 2015-based background data for NO_2, PM_{10} and $PM_{2.5}$ for years 2018-2021 are presented in Table 5.3.

Table 5.3 Annual Mean Background Concentrations for pollutants NO_2, PM_{10} and $PM_{2.5}$ from Defra based on 2015 Background Maps.

Pollutant	Background Concentrations (µg/m^3)			
	2018	2019	2020	2021
NO_2	21.9	20.9	19.9	19.1
PM_{10}	15.6	15.5	15.3	15.3
$PM_{2.5}$	10.0	9.9	9.8	9.7

Based on the information in the Table.5.3 above, there is a clear decreasing trend in the background concentrations of particulate matter from 2018 through to 2021. The data also indicates that background concentrations close to the Proposed Development site are well below the relevant NAQOs.

6 Construction Phase Impacts

6.1 Methodology

It is inevitable that with any development, demolition and construction activities would cause some disturbance to those nearby. Dust arising from most construction activities tends to be of a coarse nature, which through dispersion by the wind, can lead to soiling of property including windows, cars, external paintwork and laundry.

The ability of dust particles to remain suspended in the air depends on its shape, size and density. Coarse particles (>30µm) tend to be deposited within 100m of source. Finer particles, between 10-30µm, are generally deposited within 200 to 500m of source, while very fine particles (<10 µm), which remain suspended for longer, can travel up to 1km from source. The greatest proportion of construction dust is made up of coarse particles, thus the majority of dust emissions are deposited within 100m of source.

As well as giving rise to annoyance due to soiling of surfaces from dust emissions, there is evidence of major construction activities causing increases in long term PM_{10} concentrations and in the number of days exceeding the short term PM_{10} objective of 50 µg/m3. The potential for impacts to occur during the construction of a proposed development must therefore be considered, to ensure appropriate mitigation measures are applied to reduce potential impacts at adjacent receptors. However, it should be noted that disruption due to demolition and construction is a localised phenomenon and is temporary in nature.

During the construction of the Proposed Development, lorries would require access to the site to deliver and remove materials; earthmoving plant and other mobile machinery will work on site and generators and cranes will also be in operation. These machines produce exhaust emissions; of particular concern are emissions of NO_2 and PM_{10}.

The assessment of construction impacts has followed the methodology set out within guidance produced by the Greater London Authority (GLA) and the Institute of Air Quality Management (IAQM) on assessing impacts from construction activities and is set out below.

6.1.1 Prediction Method and Approach

In order to assess the potential impacts, the activities on construction sites are divided into four categories. These are:

- Demolition (removal of existing structures);
- Earthworks (soil-stripping, ground-levelling, excavation and landscaping);
- Construction (activities involved in the provision of a new structure); and
- Trackout (the transport of dust and dirt from the construction site onto the public road network where it may be deposited and then re-suspended by vehicles using the network).

For each activity, the risk of dust annoyance, health and ecological impact is determined using three risk categories: low, medium and high risk. The risk category may be different for each of the four activities. The risk magnitude identified for each of the construction activities is then compared to the number of sensitive receptors in the near vicinity of the site in order to determine the risks posed by the construction activities to these receptors.

Step 1: Screen the Need for an Assessment

The first step is to screen the requirement for a more detailed assessment. An assessment is required where there is:

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

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

Step 2A: Define the Potential Dust Emission Magnitude

This is based on the scale of the anticipated works and the proximity of nearby receptors. The risk is classified as small, medium or large for each of the four categories.

Demolition: The potential dust emission classes for demolition are:

- Large: Total building volume >50,000m^3, potentially dusty construction material (eg Concrete), on site crushing and screening, demolition activities >20m above ground level;
- Medium: total building volume 20,000m^3 - 50,000m^3, potentially dusty construction material, demolition activities 10-20m above ground level; and
- Small: total building volume <20,000m^3, construction material with low potential for dust release (eg metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

Earthworks: This involves excavating material, haulage, tipping and stockpiling. The potential dust emission classes for earthworks are:

- Large: Total site area >10,000m^2, potentially dusty soil type (eg clay, which would be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100,000 tonnes;
- Medium: Total site area 2,500m^2 - 10,000m^2, moderately dusty soil (eg silt), five - ten heavy earth moving vehicles active at any one time, formation of bunds 4m - 8m in height, total material moved 20,000 tonnes- 100,000 tonnes; and
- Small: Total site area <2,500m^2, soil type with large grain size (eg sand), <five 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.

Construction: The important issues here when determining the potential dust emission magnitude include the size of the building(s)/infrastructure, method of construction, construction materials, and duration of build. The categories are:

- Large: Total building volume >100,000m^3, on site concrete batching, sandblasting;
- Medium: Total building volume 25,000m^3 - 100,000m^3, potentially dusty construction material (eg concrete), on site concrete batching; and
- Small: Total building volume <25,000m^3, construction material with low potential for dust release (eg metal cladding or timber).

Trackout: The risk of impacts occurring during trackout is predominantly dependent on the number of vehicles accessing the Site on a daily basis. However, vehicle size and speed, the duration of activities and local geology are also factors which are used to determine the emission class of the Site as a result of the trackout.

The categories are:

- Large: >50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (eg high clay content), unpaved road length > 100m;
- Medium: 10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (eg high clay content, unpaved road length 50-100m; and

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

Step 2B: Defining the Sensitivity of the Area

The sensitivity of the area is defined for dust soiling, human health (PM_{10}) and ecological receptors. The sensitivity of the area takes into account the following factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of 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, to reduce the risk of wind-blown dust.

Table 6.1 is used to define the sensitivity of different types of receptors to dust soiling, health effects and ecological effects.

Table 6.1 Examples of Factors Defining Sensitivity of an Area

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
High	Users can reasonably expect enjoyment of a high level of amenity. The appearance, aesthetics or value of their property would be diminished by soiling. The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. eg dwellings, museums and other important collections, medium and long-term car parks and car showrooms.	10 – 100 dwellings within 20m of site. Local PM_{10} concentrations close to the objective (eg annual mean 36 -40 µg/m^3), eg residential properties, hospitals, schools and residential care homes.	Locations with an international or national designation and the designated features may be affected by dust soiling. Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red List for Great Britain. eg A Special Area of Conservation (SAC).
Medium	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. The appearance, aesthetics or value of their property could be diminished by soiling. The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. eg parks and places of work.	Less than 10 receptors within 20m. Local PM_{10} concentrations below the objective (eg annual mean 30-36 µg/m^3). eg office and shop workers but would generally not include workers occupationally exposed to PM_{10} as protection is covered by the Health and Safety at Work legislation	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 eg A Site of Special Scientific Interest (SSSI) with dust sensitive features.

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
Low	The enjoyment of amenity would not reasonably be expected. Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling. 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. eg playing fields, farmland unless commercially sensitive horticultural, footpaths, short lived car parks and roads.	Locations where human exposure is transient. No receptors within 20m. Local PM_{10} concentrations well below the objectives (less than 75%). eg public footpaths, playing fields, parks and shopping streets.	Locations with a local designation where the features may be affected by dust deposition. eg Local Nature Reserve with dust sensitive features.

Based on the sensitivities assigned to the different receptors surrounding the site and numbers of receptors within certain distances of the site, a sensitivity classification can be defined for each. Tables 6.2 to 6.4 indicate the criteria used to determine the sensitivity of the area to dust soiling, human health and ecological impacts.

Table 6.2 Sensitivity of the Area to Dust Soiling on People and Property

Pollutant	Concentrations	Distance from the Source (m)			
		<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

Table 6.3 Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentrations	Number of Receptors	Distance from the Source (m)				
			<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 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low		≥1	Low	Low	Low	Low	Low

Table 6.4 Sensitivity of the Area to Ecological Impacts

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

Step 2C: Define the Risk of Impacts

The final step is to combine the dust emission magnitude determined in step 2A with the sensitivity of the area determined in step 2B to determine the risk of impacts with no mitigation applied. Tables 6.5 to 6.7 indicate the method used to assign the level of risk for each construction activity.

The identified risk of impact is then used to identify appropriate mitigation measures for inclusion within a Dust Management Plan (DMP).

Table 6.5 Risk of Dust Impacts from Demolition

Sensitivity of Area	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 6.6 Risk of Dust Impacts from Earthworks/Construction

Sensitivity of Area	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 6.7 Risk of Dust Impacts from Trackout

Sensitivity of Area	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

6.1.2 Significance Criteria of Construction Phase Impacts

As detailed in the assessment methodology, each activity during construction is assessed and the dust emission magnitude defined. The sensitivity of the surrounding area to potential impacts is then considered. The risk of dust effects is then identified based on the dust magnitude and sensitivity of surrounding area. This is then used to identify appropriate mitigation.

6.2 Dust Impacts during the Construction Phase of the Proposed Development

The Proposed Development site and the surrounding area is currently mixed-use in character as mentioned in Section 3.

Dust emissions from demolition/construction activities can result in significant impacts on ecologically sensitive receptors within 50m of a construction site. A review of data held on the Defra's MAGIC website[15] shows no sites designated as important within 50m of the Site. Therefore, the construction phase dust impacts on this receptor have not been considered within this assessment.

As discussed in Section 5.2, the PM_{10} concentrations from monitoring undertaken by LBRuT (Table 5.2) and taken from the Defra background maps in the vicinity of the Site are expected to be below the relevant

15 Available at http://magic.defra.gov.uk/MagicMap.aspx?

objective limits (Table 5.3). The data indicates background PM_{10} concentrations are in the range of 15 – 18 $\mu g/m^3$.

The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

A wind rose from Heathrow Airport meteorological station for the year 2017 is shown in Figure 3. We consider this station as a representative of the Site. Figure 3 shows that the prevailing wind direction during 2017 was predominantly south-westerly. Areas most consistently affected by pollutants are influenced by prevailing winds that are generally located downwind of an emission source, and therefore these are likely to be to the north-east of the site.

6.3 Potential Dust Emission Magnitude

The dust emission magnitude is based on the scale of anticipated works at the site and has been classified as small, medium or large for each of the four activities; demolition, earthworks, construction and trackout.

Based on the information available from the IAQM guidance on the assessment of dust from demolition and construction activities, we have qualitatively assessed the magnitude of dust emissions during of each activity and summarised in Table 6.8.

Demolition

Demolition is described as any activity involved with the removal of an existing structure. This may also be referred to as de-construction, specifically when a building is to be removed a small part at a time.

The site is currently a mixed-use unit. Based on the information form the Client, the total area of buildings to be demolished is ~20,000 m^3 with the height of demolition activities 10-20m above ground with 'no' on-site crushing and screening. The demolition activity is scheduled during dryer periods of the year.

Based on this information, the dust emission magnitude is considered to be 'Large'.

Earthworks

Earthworks are those activities involved in preparing the site for construction such as excavation of material, haulage, tipping, stockpiling and levelling.

Based on the information from Client, the total site area is suggested to be > 20,000m^2. However minimum amounts of excavation and only localised topsoil will be removed and replaced. As such very few earthmoving vehicles are predicted to be operating on site. The amount of material, and approximate height of stockpiles is unknown at this stage.

Based on this information, it is considered that the potential dust emission magnitude for earthwork activities would conservatively be 'Medium'.

Construction

There are a number of factors that can have an impact on the magnitude of dust emission during construction activities, which include the size of the building, materials used for construction, the method of construction and the duration of the build.

The total area of buildings to be built is 18,000m^2, with on-site piling, no on-site sand blasting or concrete batching but potential dusty construction materials involved.

Based on this, and given the height of the buildings to be constructed the dust emission magnitude from construction is considered to be 'Large'.

Trackout

The risk of impacts occurring during trackout is predominantly dependent on the number of vehicles accessing the site on a daily basis. However, vehicle size and speed, the duration of activities and local geology are also factors which are used to determine the emission class of the site as a result of trackout.

The site is currently served by a number of paved routes, as such the extent of the unpaved surfaces is expected to be limited to areas that have been excavated. The number of HDVs accessing the site for the residential stage is unknown at this stage, however the ES Chapter for the entire development suggests that a maximum of 24 HDV movements per day would be generated. Access to the site would be via Langhorn Drive.

The resulting magnitude of emissions from trackout activities are therefore considered conservatively to be 'Medium'.

Table 6.8 Summary of Dust Emission Magnitude for Each Activity

Source	Magnitude
Demolition	Large
Earthworks	Medium
Construction	Large
Trackout	Medium

6.4 Sensitivity of the Surrounding Area

The sensitivity of the surrounding area takes into account the following 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 concentrations; and,
- Site-specific factors ie whether there are natural shelters such as trees, to reduce the risk of wind-blown dust.

Based on the IAQM guidance residential dwellings and school are considered as 'High' sensitivity receptors while commercial areas or places of work are 'Medium' sensitivity receptors in relation to both dust soiling and health effects of PM_{10}.

The Proposed Development and the surrounding area is predominantly residential in nature, with the Richmond upon Thames College buildings and school in close proximity to the Site boundary. Therefore, it is considered that the receptors are high sensitive.

As seen in Figure 4, there are >10 high sensitive receptors within the 20m buffer of the development site and more high sensitive receptors within the 50m buffer and downwind of the site. As a result, given the distance and number of these receptors, the sensitivity of the surrounding area is considered to be 'High' in relation to dust soiling effects on people and property from the earthworks and construction activities. The resulting sensitivity of receptors in the surround areas is summarised in Table 6.9 below.

Table 6.9 Sensitivity of Receptors

Potential Impact		Sensitivity at Site
Dust Soiling	Receptor sensitivity	High

Potential Impact		Sensitivity at Site
	Number of receptors	10-100 within 20m
	Sensitivity of the area	**High**
Human Health	Receptor sensitivity	High
	Annual mean PM_{10} concentration	<24 µg/m^3
	Number of receptors	10-100 within 20m
	Sensitivity of the area	**Low**

Trackout may occur from the side of the roads used by the construction traffic and up to 50m from the site access point from a small site. Based on the road layout it is understood that the construction traffic will have direct access to the Proposed Development site from Langhorn Drive.

As can be seen from Figure 5, there are very few receptors within 50m of the trackout boundary. As such the sensitivity of the with regards to trackout and respect to dust soiling is considered to be 'Low'.

Table 6.10 Summary of Sensitivity of Surrounding Area

Potential Impact	Sensitivity of Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	Low
Human Health	Low	Low	Low	Low

6.5 Defining the Risk of Impacts

The dust emission magnitude (as set out in Table 6.8) is combined with the sensitivity of the area (Table 6.10) to determine the risk of both dust soiling and human health impacts, assuming no mitigation measures applied at site.

The risk of impacts associated with each activity are provided in Table 6.11 below and have been used to identify site-specific mitigation measures, which are set out in Section 7 of this report.

Table.6.11 Summary of Risk Effects to Define Site Specific Mitigation

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

7 Measures to Control Dust and Emissions during Construction and Demolition Phase

Appropriate measures set out below have been adopted from GLA's supplementary planning guidance and will be implemented by developers to ensure that air quality impacts of construction and demolition activities are minimised and any mitigation measures employed are effective.

7.1 Site Management

Developers will follow the site management practises set out below, to ensure that the Site is responsibly managed during the demolition and construction phases of the development.

7.1.1 Stakeholder engagement

- It is important to ensure that those sensitive to the impacts (ie residential receptors) 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;
- Contact details for the person responsible for dust and emissions generated from the site will 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;
- A log book recording any complaints received should be kept and made available to the Local Authority should this be requested; and,
- The potential cumulative effects of emissions from several development sites will be considered and managed between the sites, where appropriate.

7.1.2 Site Inspections

The developer and contractor will 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 precautions will take place during these times.

7.2 Preparing and Maintaining the Site

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 will be used to minimise emissions from the Proposed Development.

7.2.1 Site layout

When planning their construction works developers will 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 onsite;
- Stockpiles will be covered/seeded to prevent wind whipping; and,
- Loose materials will be removed as soon as possible.

7.2.2 Green Infrastructure

The benefit of vegetation in reducing the impacts of air pollutants is still being researched. However, several studies show a positive impact. 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.

7.2.3 Site maintenance

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

- The site or construction area would be bunded to prevent runoff. Runoff and mud would be avoided as it can lead to dust once dry as well as polluting local waterways and sewers;
- Hoardings, fencing, barriers and scaffolding would be regularly cleaned using wet methods, where possible to prevent re-suspension of particulate matter. Developers will collect used water and maximise the use of recycled and non-potable water;
- Regular checks of buildings within 100m of the site boundary would 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, where appropriate.

7.2.4 Dealing with Spillages

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;
- Inform the Environment Agency, Fire and Emergency Planning Authority or the Health Protection Agency (HPA) if harmful substances are spilled; and,
- More information is provided by the Environment Agency in Pollution Prevention Guideline 6. (https://www. gov.uk/government/organisations/environment-agency)

7.3 Reducing Emissions from Vehicles

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.

7.3.1 Reduce Vehicle Idling

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

7.3.2 Construction Logistics Plan

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 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.

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

- Looking at where legal loading can take place;
- Using freight operators who can demonstrate their commitment to best practice;
- Consolidating deliveries so fewer journeys are needed; and,
- Using sustainable delivery methods, such as via a canal or railway (if possible).

7.3.3 Travel Plans

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. Guidance produced by DfT on Workplace Travel Plans will be used. This guidance is available at: www.dft.gov.uk/pgr/sustainable/travelplans/work/essentialguide.pdf

7.3.4 Diesel or Petrol Generators

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

7.4 Operations

7.4.1 Cutting Grinding and Sawing

Ideally, cutting, grinding and sawing would not be conducted on-site and prefabricated material and modules would 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.

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.

7.4.2 Mobile Crushing Plant

This is an inherently dusty activity and will often take place on the sites normally classed as medium or high risk dust emission sites. Based on the information from the Client, there is no on-site crushing'. Therefore, no measures recommended.

7.4.3 Concrete Batching

As for mobile crushing plants, construction sites with concrete batching plants will often be categorised as medium or high risk. Based on the information from Client, there is 'no' onsite concrete batching proposed. Therefore, no measures recommended. However, if onsite concrete crushing and screening is undertaken, the conditions within the relevant Environmental Permit should be complied with.

7.4.4 Chutes, Conveyors and Skips

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

7.5 Waste Management

7.5.1 Bonfires

Taking into account the Clean Air Act 1993 and nuisance legislation (Environmental Protection Act 1990), it is recommended that:

- Bonfires are prohibited;
- 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.

7.5.2 Waste and Recycling Plans

For larger development sites, developers should produce a waste and/or recycling plan. The Environment Agency suggests that a waste plan includes the following best practise 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.

7.6 Mitigation Measures Specific to Demolition

Demolition activities can generate significant dust and also cause resuspension of dust currently within the building. The following measures should be put in place to reduce the dust emission impact:

- Soft stripping is an effective way of screening dust and preventing dispersion, outer walls should be retained to act as screens;

- 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.

7.7 Measures Specific to Earthworks

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, hessian and/or mulches to re-vegetate or cover with topsoil will be used.

7.8 Measures Specific to Construction

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

7.9 Measures Specific to Trackout

7.9.1 Haul Routes

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

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 would be water-assisted to increase damping down. However, care would be taken to not to contaminate sewers or local waterways.

7.9.2 Wheel Washing

Vehicles, in particular wheels, would 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.

7.9.3 Covering Vehicles

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

7.9.4 Dust Suppressants

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 PM_{10} pollution would be considered, if appropriate.

8 Monitoring Residual Impacts

8.1 General

Environmental monitoring during construction projects can be beneficial and can be used to:

- Demonstrate the efficacy of mitigation measures;
- Reduce costs by effective targeting of mitigation measures;
- Demonstrate compliance with regulatory or other standards;
- Demonstrate a commitment to reduce environmental impacts;
- Reduce complaints from site staff and the public;
- Reduce potential for conflict with regulators; and,
- Speed up dispute resolution.

Sites for which monitoring is particularly likely to be beneficial include large or long-term sites in sensitive areas (eg residential), contaminated sites, and sites in sensitive air quality areas, such as AQMAs.

Monitoring regimes can range from real-time, continuous monitoring to the visual assessment of dust generation, depending on the risks identified for the respective construction activities.

Given the high risks of the proposed construction works (ie demolition and construction activities in this case), site specific monitoring is required to demonstrate the efficacy of mitigation measures.

For the duration of demolition and construction activities, monitoring will be undertaken as detailed below:

- Determine prevailing wind direction, by setting up a weather station on site to measure local wind direction and speed or obtaining locally sourced meteorological data;
- If measuring along a line, set up a line across the site according to the direction of the prevailing wind;
- Operate a minimum of two automatic particulate monitors to measure PM_{10} 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, if required;
- If applicable, supplement with automatic monitors or hand-held monitors, particularly focusing on any sensitive locations such as identified houses or 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 PM_{10} data from automatic monitors (eg, 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.

8.2 Site threshold for the concentration of PM10

It is recommended a trigger level of 250 $ug.m^{-3}$ is set as a 15-minute mean for concentrations of PM_{10} close to construction sites. Where the site threshold for PM_{10} 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 PM_{10} threshold local authorities can use their powers to prevent the statutory nuisance.

9 Non-Road Mobile Machinery (NRMM)

It is 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.

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.

9.1 2015 Emission Standards

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

9.2 2020 Emission Standards

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.

The requirements set out above 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; and
- Re-engining.

10 Implementation and Management

A specified person shall be responsible for the control of environmental impacts of construction activities. It is anticipated that the nominated person will be the Site Manager. The responsible person shall be briefed and trained appropriately. A deputy will be appointed as the responsible person in his/her absence.

As part of the air quality management regime, the responsible person will keep a site logbook documenting the maintenance of effective emissions control methods and details of any complaints or incidents, and actions taken.

The responsible person shall liaise regularly with LBRuT and other stakeholders, if required.

Emissions control procedures and equipment will only work satisfactorily if carried out or used appropriately. The responsible person shall maintain good housekeeping and ensure that all equipment is well maintained and used appropriately.

It is important that all site personnel are aware of the requirement for the control of environmental impacts, and appropriate training shall be given to all site personnel, covering:

- Health and environmental impacts of emissions to air;
- The benefits of controlling emissions to air;
- Emission control measures;
- Method statements; and,
- Importance of good communication.

Figures

LEGEND

SITE BOUNDARY

0 100 200 300 m

THIS DRAWING IS INDICATIVE ONLY

COORDINATE SYSTEM: BRITISH NATIONAL GRID
UNITS: METRE
SCALE: 1:4,539
BASEMAP SOURCE: GOOGLE EARTH

REV	DATE	DESCRIPTION	MADE	CKD

MLM. Group

DRAWING STATUS: FINAL

CLIENT: CLARION HOUSING GROUP

PROJECT: RICHMOND COLLEGE – RESIDENTIAL ZONE

DRAWING TITLE: SITE LOCATION

DRAWN/DESIGN:	KN	DATE:	15/11/2018	STATUS:	S2
CHECKED:	AC	APPROVED:	AC	REVISION:	C01

DRAWING NO: 777024-MLM-ZZ-XX-DR-J-FIGURE 1

LEGEND

SITE BOUNDARY

MONITORING LOCATIONS

AUTOMATIC MONITORING STATION

DIFFUSION TUBE

0 50 100 150 m

THIS DRAWING IS INDICATIVE ONLY

COORDINATE SYSTEM: BRITISH NATIONAL GRID
UNITS: METRE
SCALE: 1:4,500
BASEMAP SOURCE: GOOGLE SATELLITE

REV	DATE	DESCRIPTION	MADE	CKD

MLM. Group

DRAWING STATUS: FINAL

CLIENT: CLARION HOUSING GROUP

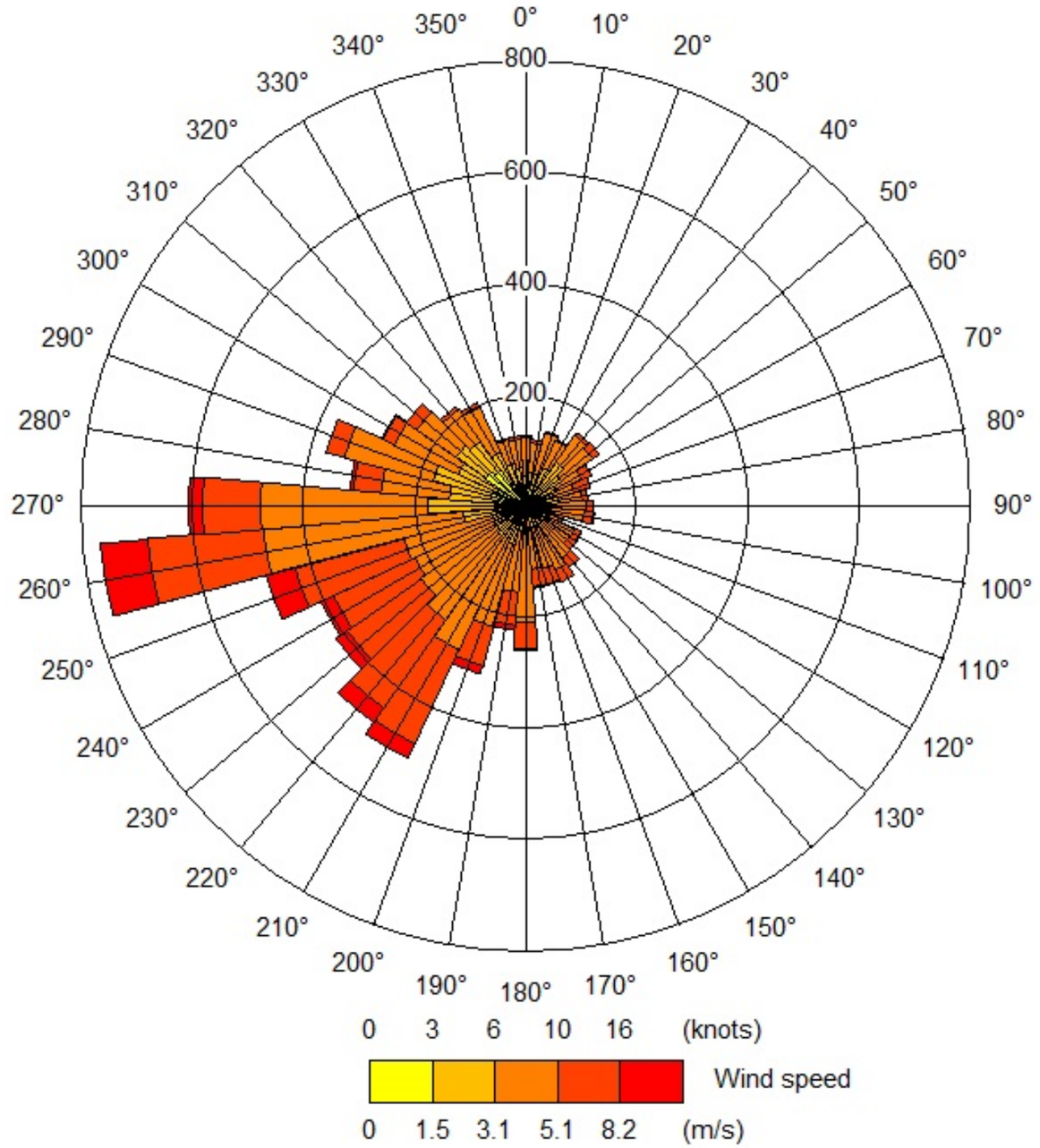
PROJECT: RICHMOND COLLEGE – RESIDENTIAL ZONE

DRAWING TITLE: LOCAL AUTHORITY MONITORING LOCATIONS

DRAWN/DESIGN:	KN	DATE:	16/11/2018	STATUS:	S2
CHECKED:	AC	APPROVED:	AC	REVISION:	C01

DRAWING NO: 777024-MLM-ZZ-XX-DR-J-FIGURE 2

HEATHROW AIRPORT 2017



REV	DATE	DESCRIPTION	MADE	CKD

MLM. Group

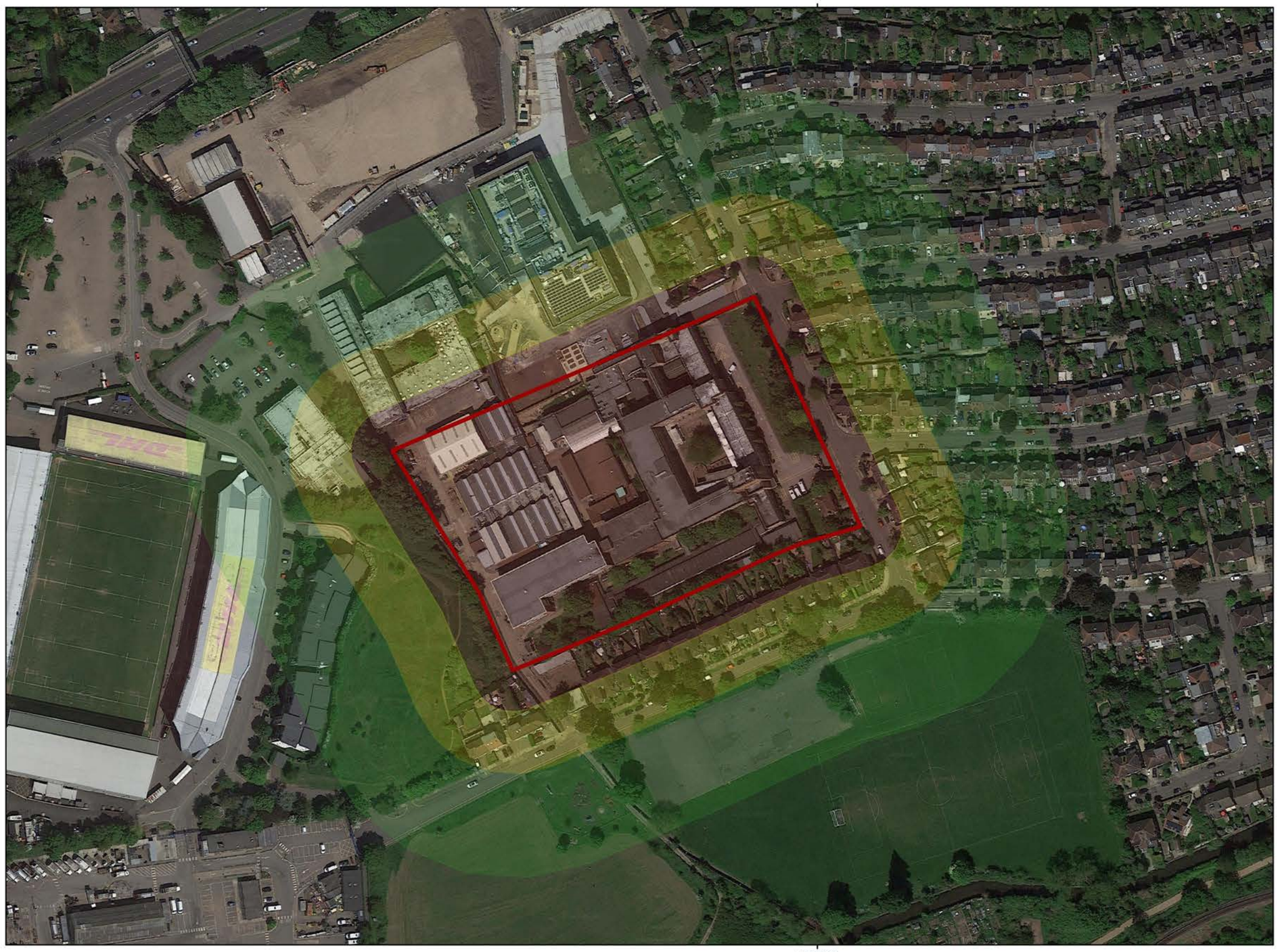
DRAWING STATUS: FINAL				DRAWING TITLE: 2017 MET DATA AT HEATHROW AIRPORT	
CLIENT: CLARION HOUSING GROUP	DRAWN/DESIGN: KN	DATE: 16/11/2018	STATUS: S2		
	CHECKED: AC	APPROVED: AC	REVISION: C01		
PROJECT: RICHMOND COLLEGE – RESIDENTIAL ZONE				DRAWING NO: 777024-MLM-ZZ-XX-DR-J-FIGURE 3	

LEGEND

SITE BOUNDARY

CONSTRUCTION BUFFERS

- 20M
- 50M
- 100M



515500

0 50 100 150 m

THIS DRAWING IS INDICATIVE ONLY

COORDINATE SYSTEM: BRITISH NATIONAL GRID
UNITS: METRE
SCALE: 1:2,000
BASEMAP SOURCE: GOOGLE SATELLITE

REV	DATE	DESCRIPTION	MADE	CKD

MLM. Group

DRAWING STATUS: FINAL

CLIENT: CLARION HOUSING GROUP

PROJECT: RICHMOND COLLEGE – RESIDENTIAL ZONE

DRAWING TITLE: DEMOLITION/CONSTRUCTION DUST BUFFERS

DRAWN/DESIGN:	KN	DATE:	16/11/2018	STATUS:	S2
CHECKED:	AC	APPROVED:	AC	REVISION:	C01

DRAWING NO: 777024-MLM-ZZ-XX-DR-J-FIGURE 4

LEGEND

SITE BOUNDARY

CONSTRUCTION BUFFERS

- 20M
- 50M
- 100M

0 50 100 150 m

THIS DRAWING IS INDICATIVE ONLY

COORDINATE SYSTEM: BRITISH NATIONAL GRID
UNITS: METRE
SCALE: 1:2,000
BASEMAP SOURCE: GOOGLE SATELLITE

REV	DATE	DESCRIPTION	MADE	CKD

MLM. Group

DRAWING STATUS: FINAL

DRAWING TITLE: TRACKOUT DUST BUFFERS

CLIENT: CLARION HOUSING GROUP

PROJECT: RICHMOND COLLEGE – RESIDENTIAL ZONE

DRAWN/DESIGN:	KN	DATE:	16/11/2018	STATUS:	S2
CHECKED:	AC	APPROVED:	AC	REVISION:	C01

DRAWING NO: 777024-MLM-ZZ-XX-DR-J-FIGURE 5

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