BexleyCo Limited

Proposed Residential Development in replacement of Sidcup Library, Hadlow Road, Bexley DA14 4AQ

Air Quality Assessment

Project No: 444554-01 (00)

OCTOBER 2021

RSK GENERAL NOTES

Project No.: 444554-01(00)

Title: Proposed Residential Development in replacement of Sidcup Library at Hadlow Road Bexley - Air Quality Assessment

Client: BexleyCo Limited

Date: 13th October 2021

Office: Hemel Hempstead

Status: FINAL

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Date:	13th October 2021	Date:	13th October 2021

Abbreviations

AADT	Annual Average Daily Traffic
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQN	Air Quality Neutral
AQS	Air Quality Standard
ASR	Annual Status Report
BEB	Building Emissions Benchmark
CHP	Combined Heat and Power
CO_2	Carbon Dioxide
CO	Carbon Monoxide
DEFRA	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
EC	European Commission
EPUK	Environmental Protection UK
EU	European Union
GLA	Greater London Authority
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LLAQM TG.16	London Local Air Quality Management Technical Guidance (2016)
LBB	London Borough of Bexley
LDV	Light Duty Vehicle
NAQS	National Air Quality Strategy
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPPF	National Planning Policy Framework
$PM_{2.5}$	Particulate matter of size fraction approximating to <2.5mm diameter
PM_{10}	Particulate matter of size fraction approximating to <10mm diameter
RSK	RSK Environment Limited
TEB	Transport Emissions Benchmark
TfL	Transport of London
VOC	Volatile Organic Compounds

CONTENTS

1 INTRODUCTION

1.1 Background

RSK were commissioned by BexleyCo Limited to undertake an air quality assessment of the potential air quality impacts associated with a proposed residential development at Hadlow Road, Bexley. Figure 1-1 shows the proposed site location.

The proposed development comprises the demolition of existing Sidcup Library and erection of 32 residual units (Class C3). The approximate centre of the site is 546457, 171753. The site is within the jurisdiction of London Borough of Bexley (LBB).

This report presents the findings of an assessment of existing/baseline air quality conditions, potential air quality impacts during the construction phase of the proposed development and anticipated impacts on local air quality resulting from traffic emissions generated by the development once it is fully operational.

Figure 1-1: Proposed Development Site Location

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2 LEGISLATION, PLANNING POLICY & GUIDANCE

2.1 Key Legislation

2.1.1 Air Quality Strategy

UK air quality policy is published under the umbrella of the Environment Act 1995, Part IV and specifically Section 80, the National Air Quality Strategy. The latest *Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Working Together for Clean Air*, published in July 2007 sets air quality standards and objectives for ten key air pollutants to be achieved between 2003 and 2020.

The EU (European Unit) Air Quality Framework Directive (1996) established a framework under which the EU could set limit or target values for specified pollutants. The directive identified several pollutants for which limit or target values have been, or will be set in subsequent 'daughter directives'. The framework and daughter directives were consolidated by Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe, which retains the existing air quality standards and introduces new objectives for fine particulates ($PM_{2.5}$).

2.1.2 Air Quality Standards

The air quality standards (AQSs) in the United Kingdom are derived from European Commission (EC) directives and are adopted into English law via the Air Quality (England) Regulations 2000 and Air Quality (England) Amendment Regulations 2002. The Air Quality Limit Values Regulations 2003 and subsequent amendments implement the Air Quality Framework Directive into English Law. Directive 2008/50/EC was translated into UK law in 2010 via the Air Quality Standards Regulations 2010.

The relevant[1] AQS to England and Wales to protect human health are summarised in Table 2.1.

Table 2.1: Air Quality Objectives Relevant to the Proposed Development

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit ($\mu g/m^3$)
Nitrogen dioxide (NO_2)	1 calendar year	-	40
	1 hour	18	200
Fine particles (PM_{10})	1 calendar year	-	40
	24 hours	35	50
Fine particles ($PM_{2.5}$)	1 year	-	25

[1] Relevance, in this case, is defined by the scope of the assessment.

2.1.3 The Environment Act

These objectives are to be used in the review and assessment of air quality by local authorities under Section 82 of the Environment Act (1995). If exceedances are measured or predicted through the review and assessment process, the local authority must declare an Air Quality Management Area (AQMA) under Section 83 of the Act, and produce an Air Quality Action Plan (AQAP) to outline how air quality is to be improved.

2.2 Planning Policy

The land use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality concern that relates to land use and its development can, depending on the details of the proposed development, be a material consideration in the determination of planning applications.

2.2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was revised and published on July 2021, superseding the previous NPPF with immediate effect. The NPPF includes a presumption in favour of sustainable development.

Section 15 of the NPPF deals with Conserving and Enhancing the Natural Environment, and states that the intention is that the planning system should prevent '*development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability*' and goes on to state that '*new development* [should be] *appropriate for its location' and 'the effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account*.'

With specific regard to air quality, the NPPF 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."*

2.2.2 Regional Planning Policy

In March 2021 the latest version of the London Plan was published. Policy **SI 1 Improving air quality** states:

"A Development Plans, through relevant strategic, site-specific and area-based policies, should seek opportunities to identify and deliver further improvements to

air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.

B To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

1) Development proposals should not:

a) lead to further deterioration of existing poor air quality

b) 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

c) create unacceptable risk of high levels of exposure to poor air quality.

2) In order to meet the requirements in Part 1, as a minimum:

a) development proposals must be at least Air Quality Neutral

b) 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 in preference to post-design or retro-fitted mitigation measures

c) major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1

d) development proposals 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 should demonstrate that design measures have been used to minimise exposure.

C Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:

1) how proposals have considered ways to maximise benefits to local air quality, and

2) what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.

D In order to reduce the impact on air quality during the construction and demolition phase 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.

E Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development."

2.2.3 Local Planning Policy

Unitary Development Plan 2004 / Core Strategy 2012

Bexley's Local Plan includes the Core strategy, current policies in the Unitary Development Plan (UDP) and the Technical Documents. The Unitary Development Plan preceded the Core strategy and was adopted in 2004. Some UDP policies expired in 2007, following the adoption of the Core Strategy in 2012, some policies were replaced. LBB policies for managing developments are laid out in the London Borough of Bexley Unitary Development Plan for London Borough of Bexley and not replaced by the Core Strategy which include LBB policies relating to air quality. Policy ENV41 states the following:

"*The Council will have regard to national and local Air Quality Strategies in seeking to ensure that proposals for development do not compromise air quality objectives. The Council will require an applicant to prepare an Air Quality Assessment where proposals:*

1. *include industrial activities with potentially significant air borne emissions;*
2. *have the potential to increase significantly the volume of traffic flows or the ratio of heavy goods vehicles, or the level congestion so as to place air quality objectives at risk;*
3. *have the potential to increase the personal exposure of individuals at non-occupational locations to levels of air pollution which are likely to exceed objectives set in either national or local Air Quality Strategies; and/or*
4. *are located in (or are likely to effect) an Air Quality Management Area, which would significantly change the pattern of traffic flows or could lead to emissions of one or more of the pollutants specified in the national Air Quality Strategy.*

The Council may resist or impose conditions on applications where an air quality assessment shows that the proposed development will have an adverse effect on the achievement of national or local air quality objectives."

2.3 Best Practice Guidance

2.3.1 Guidance on the Assessment of Dust from Demolition and Construction

The Institute of Air Quality Management (IAQM) published a guidance document (Holman *et al*., 2014) on the assessment of construction phase impacts (herein the 'IAQM construction dust guidance'). The guidance was produced to provide advice to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM_{10} impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measure appropriate to the level of risk identified.

2.3.2 The Control of Dust and Emissions During Construction and Demolition (Mayor of London, 2014)

The Control of Dust and Emissions during Construction and Demolition is Supplementary Planning Guidance (Mayor of London, 2014) ('the MOL SPG') and replaces previous guidance published jointly by London Council's and the Mayor in 2006. The MOL SPG aims to provide more detailed guidance on the implementation of relevant air quality policies in London. It sets out a methodology for assessing air quality impacts of the construction phase of development and identifies good practice for

mitigating and managing any identified impacts, which are aligned to the IAQM 2014 guidance detailed above.

2.3.3 Mayor of London's Sustainable Design and Construction Supplementary Planning Guidance 2014

The Sustainable Design and Construction (SDC) SPG, published in 2014 as part of the London Plan 2011 Implementation Framework, provides guidance on the requirements of air quality and air quality neutral assessments, and mitigation measures which can be used to improve air quality. This guidance was designed to assist in meeting the air quality policies specified in the London Plan.

2.3.4 Air Quality Neutral Planning Support ('the GLA AQN guidance')

The GLA AQN guidance, published in 2014, provides a description of the 'air quality neutral' concept, including methods to calculate building and transport-related emissions associated with the development to building and transport emissions benchmarks. The guidance has been designed to enable assessment of air quality neutrality as is required in the SDC SPG.

2.3.5 Local Air Quality Management Review and Assessment Technical Guidance

The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their air quality review and assessment work. This guidance, referred to in this document as the Local Air Quality Management Technical Guidance (Defra, 2016) ('LAQM TG.16').

2.3.6 London Local Air Quality Management Technical Guidance

The GLA has published technical guidance for use by London's 32 boroughs (and the City of London) in their air quality review and assessment work. This guidance, referred to in this document as LLAQM, has been used where appropriate. Where appropriate, additional guidance has been taken from the Defra LAQM.TG.16 guidance document.

2.3.7 Land-Use Planning & Development Control: Planning for Air Quality

Environmental Protection UK's (EPUK) and the IAQM jointly published a revised version of the guidance note 'Land-Use Planning & Development Control: Planning for Air Quality' in 2017 (herein the 'EPUK-IAQM guidance') to facilitate consideration of air quality within local development control processes. It provides a framework for air quality considerations, promoting a consistent approach to the treatment of air quality issues within development control decisions.

The guidance includes methods for undertaken an air quality assessment and an approach for assessing the significance of effects. The guidance note is widely accepted as an appropriate reference method for this purpose.

2.3.8 London Borough of Bexley Sustainable Design and Construction Guide Supplementary Planning Document

The Sustainable Design and Construction Guide Supplementary Planning Document (SPD) has been adopted by LBB in 2007 to provide further guidance and highlights the importance of design and construction in creating a mor environmentally friendly and

sustainable development. In the chapter of Minimising the Adverse Effects of the Construction On Site and Surroundings, Guidance 36 states the following:

"*Developers will be expected to identify potential sources of dust and other air pollution as early as possible and implement the following dust control measures.*

- *Activities that may affect air quality or generate dust should be located away from sensitive human receptors (e.g. hospitals, schools, housing) and ecological resources whenever possible.*
- *Completed earthworks should be sealed or replanted as early as practicable.*
- *Where practicable, stockpiled materials should be located to take account of the prevailing wind and any sensitive receptors. Stockpiles should be dampened.*
- *Dust sources such as skips should be covered.*
- *Roadways (including haul roads), construction sites and dust generating activities such as stone cutting should be dampened and swept when required.*
- *Sites should be designed to accommodate wheel washer facilities as appropriate.*
- *Low emission vehicles and plant equipment should be used particularly for on-site generators.*
- *Controls also need to be in place during demolition. Dampening down during demolition activities can assist with preventing dust pollution.*
- *Use energy efficient and low emission equipment, including the vehicles that transport materials and personal to and from the site.*
- *Minimise construction noise and disruption through the specification of techniques such as the use of framed construction and pre-fabricated components.*
- *Limit both the level and duration of noise.*
- *Consult with Bexley Environmental Health Officers at an early stage.*
- *Compost organic waste on site to supplement topsoil for landscaping.*
- *Conserve topsoil on site with as little disturbance as possible.*
- *Access surrounding new development should be safeguarded to protect the amenities of nearby residents and users of local facilities and businesses.*
- *New development should have appropriate fencing and site hoarding to protect local amenities and deter anti social behaviour such as vandalism, fly posting and graffiti.*

…."

3 ASSESSMENT SCOPE

3.1 Overall Approach

An air quality assessment has been undertaken, and the approach taken for assessing the potential air quality impacts of the proposed development may be summarised as follows:

- Baseline characterisation of local air quality;
- Qualitative impact assessment of the construction and operational phase of the development;
- Air quality neutral assessment; and
- Recommendation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

3.2 Baseline Characterisation

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources.

A desk-based study has been undertaken including a review of monitoring data available from LBB and estimated background data from the LAQM Support website maintained by Defra and from the London Atmospheric Emissions Inventory (LAEI) website maintained by the Greater London Authority. Consideration has also been given to potential sources of air pollution and the presence of AQMA.

3.3 Construction Phase Assessment

3.3.1 Construction Dust and Particulate Matter

Construction works for the proposed development have the potential to lead to the release of fugitive dust and particulate matter. An assessment of the likely significant effects of construction phase dust and particulate matter at sensitive receptors has therefore been undertaken following the IAQM's construction dust guidance.

Three separate dust impacts were considered:

- Annoyance to dust soiling;
- The risk of health effects due to an increase in exposure to PM_{10}; and
- Harm to ecological receptors.

In order to assess the potential impacts of construction, activities are divided into four types:

- Demolition;
- Earthworks;

- Construction; and
- Trackout[2].

The risk of dust and PM_{10} arising to cause disamenity and/or health or ecological impacts was based on an assessment of likely emissions magnitude and the sensitivity of the surrounding environment. The risk category may be different for each of the four 'construction' activities.

Appendix A sets out the construction dust assessment methodology in detail as per IAQM construction dust guidance. Once the level of risk has been determined, then site specific mitigation proportionate to the level of risk can be identified (as detailed in Appendix B).

The Magic Map application available online by Defra was used to identify statutory ecological receptors near the proposed development site area.

3.3.2 Emissions to Air from Construction Traffic and Plant

Exhaust emissions from construction phase vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the proposed development site and in the vicinity of the proposed development site itself. Detailed information on the number of vehicles and plant associated with the construction phase is not available at this stage (and would not be until after appointment of the main construction contractors). Therefore, a qualitative impact assessment has been undertaken based on professional judgement and considering the following factors:

- The likely duration of the construction phase;
- The potential number and type of construction traffic and plant that could be required; and
- The number and proximity of sensitive receptors to the proposed development site and along the likely construction vehicle routes.

3.4 Operational Phase Impact Assessment

3.4.1 Emissions to Air from Operational Phase Traffic

The EPUK-IAQM guidance provides indicative criteria for when an air quality assessment is required, if none of the criteria are exceeded, it is considered unlikely that there will be any significant impacts on air quality during the operational phase. A screening level assessment against these criteria has been undertaken in Section 5 of this report.

3.4.2 Exposure of Future Occupants to Air Pollution

The potential exposure of future users of the proposed development has been considered by reviewing the baseline conditions (Section 4) and the locations of

[2] Trackout is defined as the transport of dust and dirt from the construction / demolition sites onto public road network, where it may be deposited and then re-suspended by vehicles using the network.

sensitive receptors within the proposed development, as well as considering the EPUK-IAQM guidance.

It is understood that no significant combustion sources such as combined heat and power (CHP) plant or biomass boilers are proposed as part of the scheme. Therefore, this report has not considered emissions related to energy generation any further.

3.5 Air Quality Neutral Assessment

An air quality neutral assessment has been undertaken with reference to the SDC SPG (2014) and further guidance from the '*Air Quality Neutral Planning Support*' guidance (the GLA AQN guidance). The approach taken for the air quality neutral assessment for the proposed development may be summarised as follows:

- Estimation of transport emissions of NOx and PM_{10} associated with the proposed development and comparison against a site-specific transport emissions benchmarks (TEB) (calculated based on the size, type and location of the proposed development); and,
- Recommendations of measures to reduce the transport emissions, where appropriate, for the development to be classified as 'air quality neutral' as per the definitions in the guidance documents.

Further details of the air quality neutral assessment methodology have been provided in Appendix C.

4 BASELINE AIR QUALITY CHARACTERISATION

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources. Baseline air quality data employed in this study have been obtained from monitoring stations maintained by LBB, the LAQM Support website operated by the Department for Environment, Food and Rural Affairs (Defra) and the London Atmospheric Emissions Inventory (LAEI) website maintained by the Greater London Authority.

4.1 Emissions Sources and Key Air Pollutants

The proposed development is surrounded by residential areas to the north, east and west and by commercial areas to the south. The site is located approximately 0.05km to the north east of A211 and bounded by Hadlow Road and St John's Road to the west and to the east respectively.

There is an installation permit within 0.7km of the site for the SRCL Ltd. for the incineration of hazardous waste in Queen Marys Hospital (Permit ref: JP3133XP). Thus the principal pollutants relevant to this assessment are considered to be NO_2, SO_2, CO, PM_{10} and $PM_{2.5}$, generally regarded as the most significant air pollutants released by incineration and vehicular combustion processes, or subsequently generated by vehicle emissions in the atmosphere through chemical reactions.

4.2 Presence of AQMAs

LBB currently has declared the whole borough as an Air Quality Management Area (AQMA), due to the exceedance of annual mean NO_2, 24-hour and annual mean PM_{10} Air Quality Standards. The proposed development is within an AQMA.

4.3 Baseline Monitoring Data

According to the LBB's 2020 Air Quality Annual Status Report (ASR), there were four automatic monitoring locations in 2019. NO_2 and particular matter monitoring data are not available in the vicinity (within 3km) of the proposed development site. Furthermore, the proposed development site is located close to Royal Borough of Greenwich (RBG). According to the RBG's Air Quality Annual Status Report 2020, there were 10 automatic monitoring stations and a network of 42 diffusion tube monitoring locations in 2019. The closet monitoring location to the proposed site is a diffusion tube on Foots Cray Road (RBG ref: GW26) approximately 2.8km from the site. The monitoring data from sites within 3km from the proposed development site are reproduced in Table 4.1 below.

The data from these tubes show that there were exceedances of the annual mean NO_2 AQS during 2015 - 2019 at one monitoring location close to main road (A-road), however these may not be representative of conditions at the site.

Table 4.2 presents available monitoring results for NO_2 and PM_{10} at one automatic monitoring location for years 2015 - 2019. Although the data from the monitor show that there were exceedances of the annual mean NO_2 AQS during 2015 - 2019, the monitoring location is also located close to main road (A-road) and is therefore not representative. Figure 4-1 shows all three monitoring locations within 3km of the development site.

Table 4.1: Annual Mean Measured NO_2 Concentrations at the Diffusion Tube Locations within 3km of the Proposed Development Site

Site ID	Location	Site type	Approximate Distance from Site (km)	Annual Mean NO_2 Concentrations ($\mu g/m^3$)				
				2015	2016	2017	2018	2019
GW26	Foots Cray Rd	Roadside	2.8	28.6	28.26	28.4	23.8	26.5
GW56	Sidcup Rd	Roadside	2.9	**51.0**	**51.31**	**47.5**	**40.6**	39.1

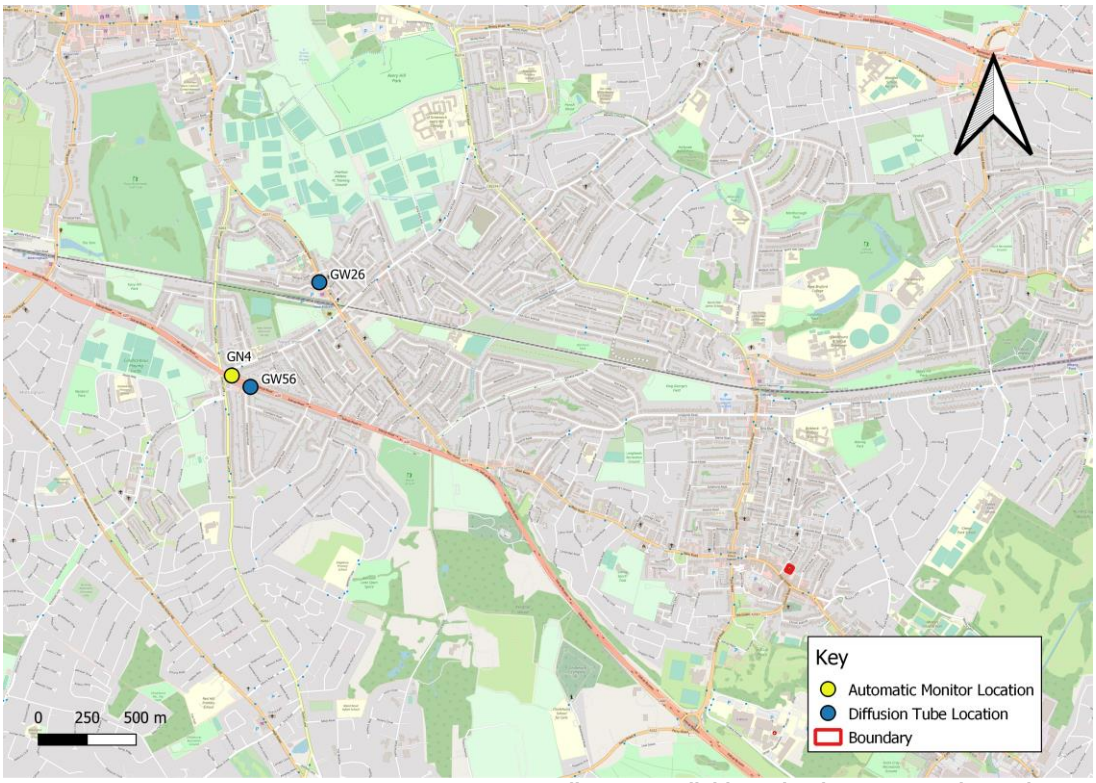
Note: Results shown in **bold** exceed the air quality objective.

Table 4.2: Monitoring Results at the Automatic Monitoring Location within 3km of the Proposed Development Site

Site ID	Location	Result Type	Site Description	Approximate Distance from Site (km)	Monitoring Results				
					2015	2016	2017	2018	2019
GN4 (previ-ously GR14)	Fiveways Sidcup Rd	Annual Mean NO_2 Concentration ($\mu g/m^3$)	Roadside	3.0	**44**	**46**	**41**	40	37
		Number of Hours NO_2 >200$\mu g/m^3$			1	0	0	0	0
		Annual Mean PM_{10} Concentration ($\mu g/m^3$)			23	23	21	25	25
		Number of Days PM_{10} >50$\mu g/m^3$			3	2	1	10	17

Note: Results shown in **bold** exceed the air quality objective.

Figure 4.1 Monitoring Locations within 3km of the Proposed Development Site



@OpenStreetMap contributors, available under the Open Database Licence

4.4 LAQM Background Data

In addition to the local monitoring data, estimated background air quality data available from the Local Air Quality Management (LAQM) website operated by Defra, may also be used to establish likely background air quality conditions at the proposed development site.

This website provides estimated annual average background concentrations of NO_2, PM_{10} and $PM_{2.5}$ on a 1km^2 grid basis. Table 4.3 identifies estimated annual average background concentrations for the grid square containing the proposed development site for years from 2021 to 2023. No exceedances of the NO_2, PM_{10} or $PM_{2.5}$ AQSs are predicted. As background concentrations are predicted to fall with time, background concentrations in future years would not be expected to exceed their respective annual mean standards. It should also be noted that the Defra website states that '*The projections in the 2018 background maps are based on assumptions which were current before the Covid-19 outbreak in the UK. In consequence these maps do not reflect short or longer term impacts on emissions in 2020 and beyond resulting from behavioural change during national or local lockdowns*'.

Table 4.3: Estimated Background Annual Average NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Proposed Development Site (from 2018 base map)

Assessment Year	Estimated Annual Average Pollutant Concentrations Derived from the LAQM Website (µg/m^3)		
	Annual Average NO_2	Annual Average PM_{10}	Annual Average $PM_{2.5}$
2021	17.7	15.7	10.5
2022	17.0	15.5	10.4
2023	16.5	15.3	10.2
Air Quality Objective	**40**	**40**	**25**

Note: Presented concentrations for 1 km^2 grid centred on 546500,171500; approximate centre of development site is 546457, 171753.

4.5 LAEI Mapped Pollutant Concentrations

Estimated ambient pollutant concentrations for annual mean NO_2, PM_{10} and $PM_{2.5}$ are available from the LAEI website operated by the GLA and Transport for London (TfL).

Figure 4-2 to **4.4** presents the annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations for 2016, based on models undertaken with a 2016 base year. The figures show that the annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations for 2016 are predicted to be below the relevant air quality objectives at the application site.

Figure 4-2: LAEI 2016 Predicted Annual Mean NO_2 Concentrations

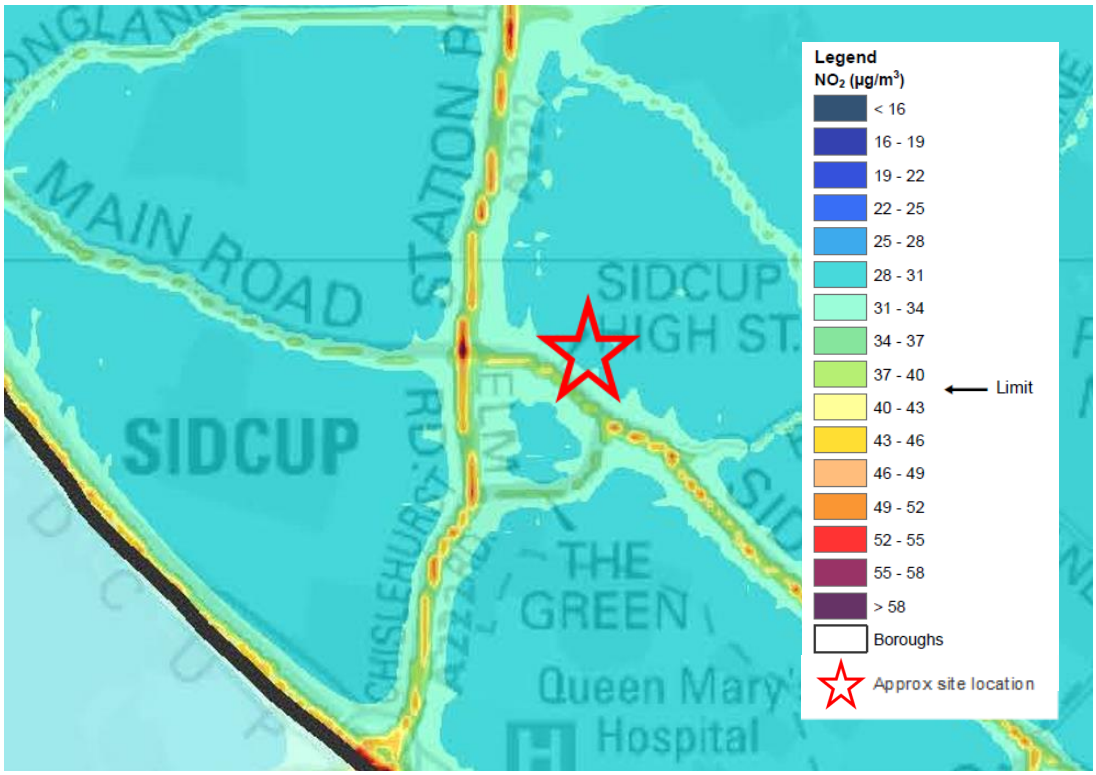


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Figure 4-3: LAEI 2016 Predicted Annual Mean PM_{10} Concentrations

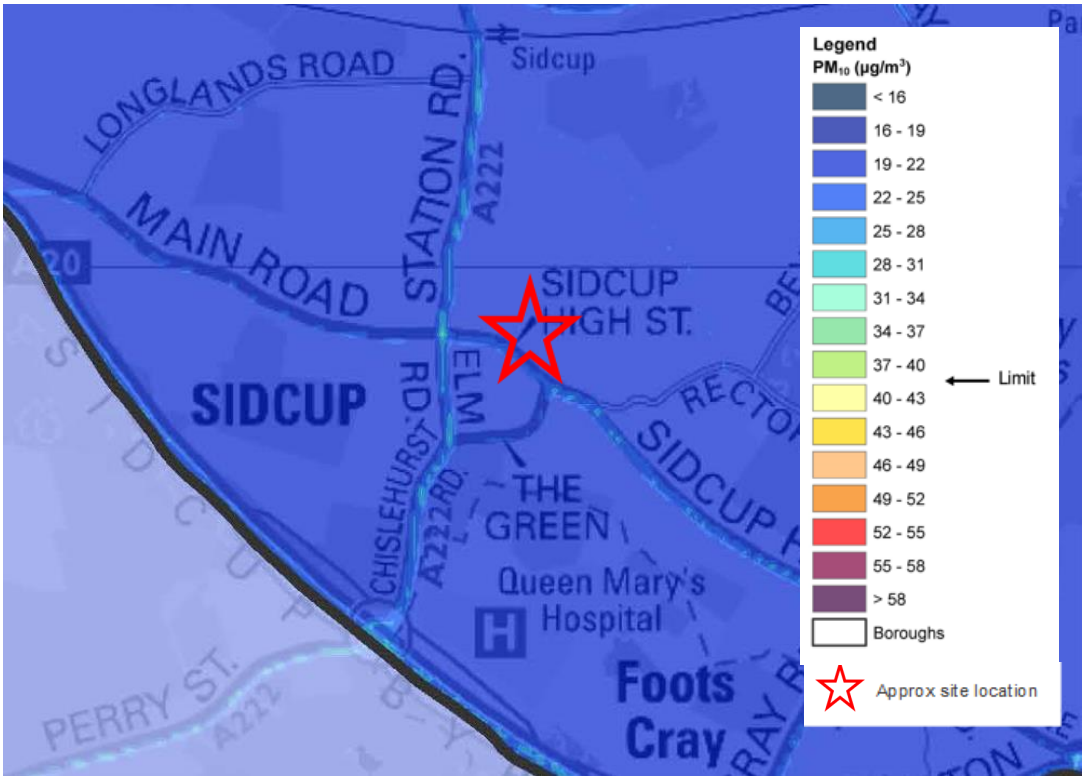

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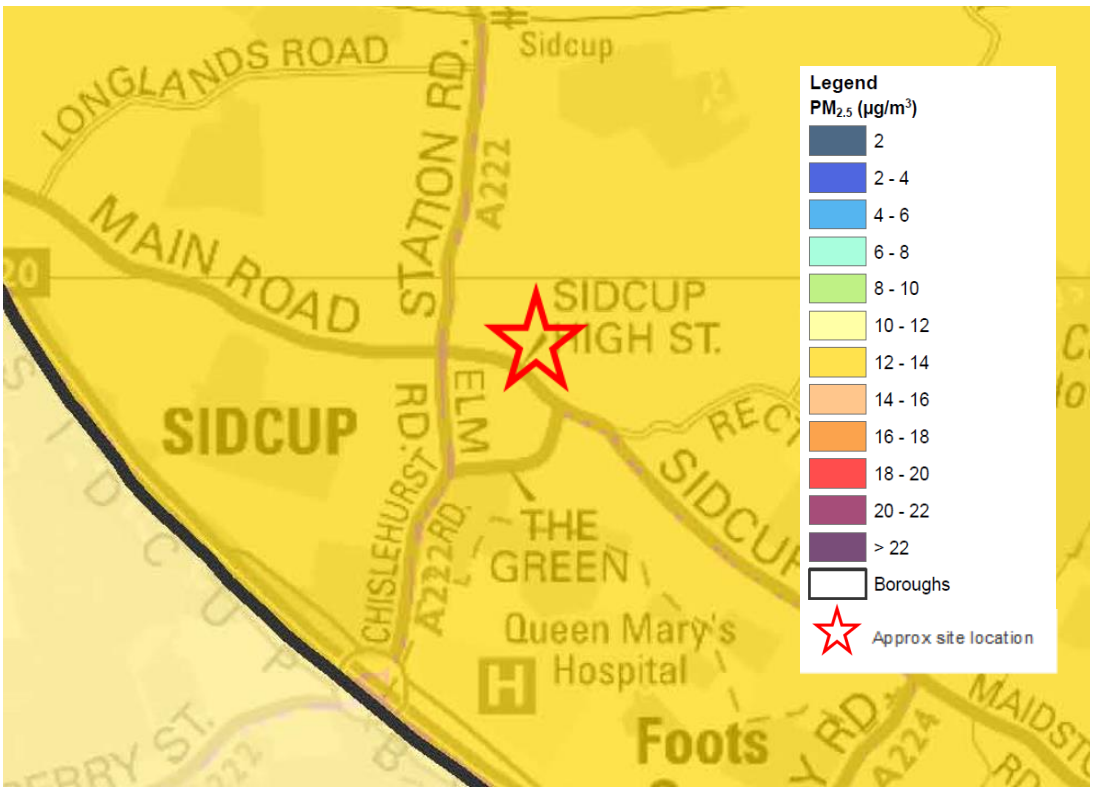
Figure 4-4: LAEI 2016 Predicted Annual Mean $PM_{2.5}$ Concentrations



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4.6 Background Air Quality at the proposed site

Based on the local monitoring data, estimated background concentrations from Defra and predicted ground level concentrations from LAEI, the annual mean NO_2, PM_{10} and $PM_{2.5}$ air quality objectives are considered unlikely to be exceeded at the site.

The EPUK-IAQM 2017 guidance indicates that the annual mean PM_{10} concentrations tend to be greater than ~31µg/m^3 for an exceedance of the daily mean PM_{10} AQS to be likely. LAQM TG.16 indicates that the annual mean NO_2 concentrations tend to be greater than 60µg/m^3 for an exceedance of the hourly mean NO_2 AQS to be likely. Based on the monitoring data available, the estimated background concentrations and the predicted ground level concentrations of NO_2 and PM_{10}, it is considered unlikely that short-term NO_2 and PM_{10} AQSs would be exceeded at or in close proximity to the proposed development site.

Overall, exceedances of any of the relevant AQSs are not anticipated at the site; therefore, no significant air quality impacts are considered to be likely at the proposed development site.

5 ASSESSMENT OF IMPACTS

5.1 Construction Phase

Atmospheric emissions from construction activities will depend on a combination of the potential for emissions (the type of activity and prevailing conditions) and the effectiveness of control measures. In general terms, there are two sources of emissions that will need to be controlled to minimise the potential for adverse environmental effects:

- exhaust emissions from site plant, equipment and vehicles; and
- fugitive dust emissions from site activities.

5.1.1 Exhaust Emissions from Plant and Vehicles

The operation of vehicles and equipment powered by internal combustion engines results in the emission of exhaust gases containing the pollutants NO_x, PM_{10}, volatile organic compounds (VOCs) and carbon monoxide (CO). The quantities emitted depend on factors such as engine type, service history, pattern of usage and fuel composition. The operation of site equipment, vehicles and machinery will result in emissions to atmosphere of exhaust gases, but such emissions are unlikely to be significant, particularly in comparison to levels of similar emission components from vehicle movements on the local road network surrounding the development site.

Construction traffic will comprise haulage/construction vehicles and vehicles used for workers' trips to and from the site.

5.1.2 Fugitive Dust Emissions

Fugitive dust emissions arising from construction activities are likely to be variable in nature and will depend upon the type and extent of the activity, soil type and moisture content, road surface conditions and weather conditions. Periods of dry weather combined with higher than average wind speeds have the potential to generate more dust.

Fugitive dust arising from construction and demolition activities is mainly of a particle size greater than the PM_{10} fraction (that which can potentially impact upon human health). However, it is noted that demolition and construction activities may contribute to local PM_{10} concentrations. Appropriate dust control measures can be highly effective for controlling emissions from potentially dust generating activities identified above, and adverse effects can be greatly reduced or eliminated.

See Appendix A for further explanation of the tendency of dust to remain airborne.

5.1.3 Potential Dust Emission Magnitude

With reference to the IAQM guidance criteria outlined in Appendix A, the dust emissions magnitude for demolition, earthworks, construction and trackout activities are

summarised in Tables 5.1, 5.2, 5.3 and 5.4. Risk categories for the four construction activities are summarised in Table 5.5.

Worst-case assumptions have been made, where information is not currently available, for a conservative assessment.

Table 5.1: Summary of Dust Emissions Magnitude of Demolition Activities (Before mitigation)

Demolition Criteria	Dust Emissions Class	Evaluation of the Effects
Total volume of buildings to be demolished	Small	<20,000 m^3
On-site crushing and screening	Small	No
Height of demolition activities above ground	Medium	10-20 m
Dust potential of demolition materials	Medium	Yes
Times at which activities undertaken	Small	Demolition will be undertaken in winter/spring
Overall Rating	**Medium**	Conservative Rating based on professional judgement

Table 5.2: Summary of Dust Emissions Magnitude of Earthworks Activities (Before mitigation)

Earthworks Criteria	Dust Emissions Class	Evaluation of the Effects
Total site area	Small	<2,500 m^2
Soil type	Medium	Silty/sandy Clay
Earth moving vehicles at any one time	Small	<5 vehicles
Height of bunds	Small	None
Total material moved	Small	<20,000 tonnes
Work times	Medium	Throughout the year
Overall Rating	**Medium**	Conservative rating based on professional judgement

Table 5.3: Summary of Dust Emissions Magnitude of Construction Activities (Before mitigation)

Construction Criteria	Dust Emissions Class	Evaluation of the Effects
Total building volume	Small	<25,000m^3
On-site concrete batching or sandblasting proposed	Small	No
Dust potential of construction materials	Medium	Yes
Overall Rating	**Medium**	Conservative rating based on professional judgement

Table 5.4: Summary of Dust Emissions Magnitude of Trackout Activities (Before mitigation)

Trackout Criteria	Dust Emissions Class	Evaluation of the Effects
Number of HDV>3.5t per day	Small	<10
Surface type of the site	Large	Potentially dusty surface
Length of unpaved road	Small	<50m
Overall Rating	**Medium**	Conservative rating based on professional judgement

Table 5.5: Summary of Dust Emission Magnitude of the Site (Before mitigation)

Construction Activities	Dust Emissions Class
Demolition	Medium
Earthworks	Medium
Construction	Medium
Trackout	Medium

5.1.4 Sensitivity of the Area

As per the IAQM Guidance, the sensitivity of the area takes into account a number of factors, including:

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

Consideration is given to human and ecological receptors from the impact of the development, distances are calculated from the construction site boundary and the trackout route proposed. Where necessary, for example, the trackout route is not yet known, a conservative view on the likely route has been taken.

Construction and trackout 'buffers' were used to identify the sensitivity of the area (refer to Figure 5.1 and Figure 5.2).

Table 5.6 presents the determined significance of the area. Construction activities are relevant up to 350m from the proposed development site boundary whereas trackout activities are only considered relevant up to 200m from the edge of the road, as per the IAQM guidance. Only 20m, 50m, 100m and 200m buffers have been included for trackout for this reason. Figures 5.1 and 5.2 show maps indicating the demolition/earthworks/construction and trackout buffers, respectively, for identifying the sensitivity of the area.

There are no ecological statutory sites within 350m of the site boundary.

Figure 5.1: Demolition/Earthworks/Construction Activities Buffer Map

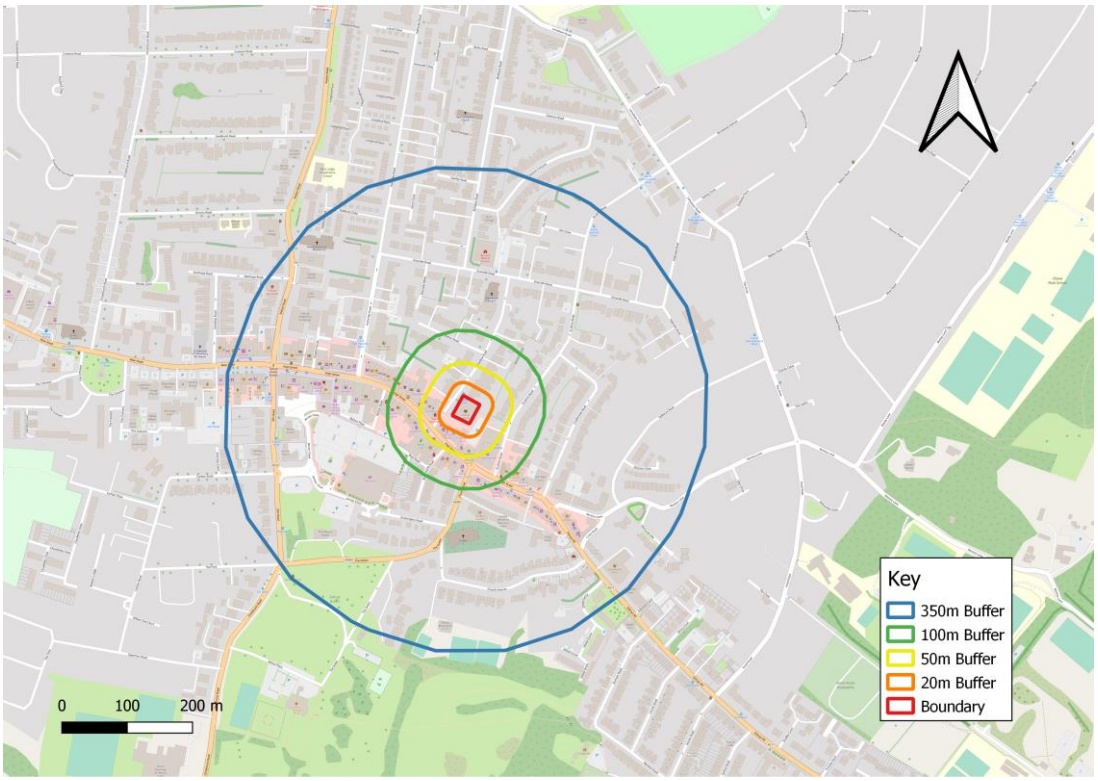

Figure 5.2: Trackout Activities Buffer Map

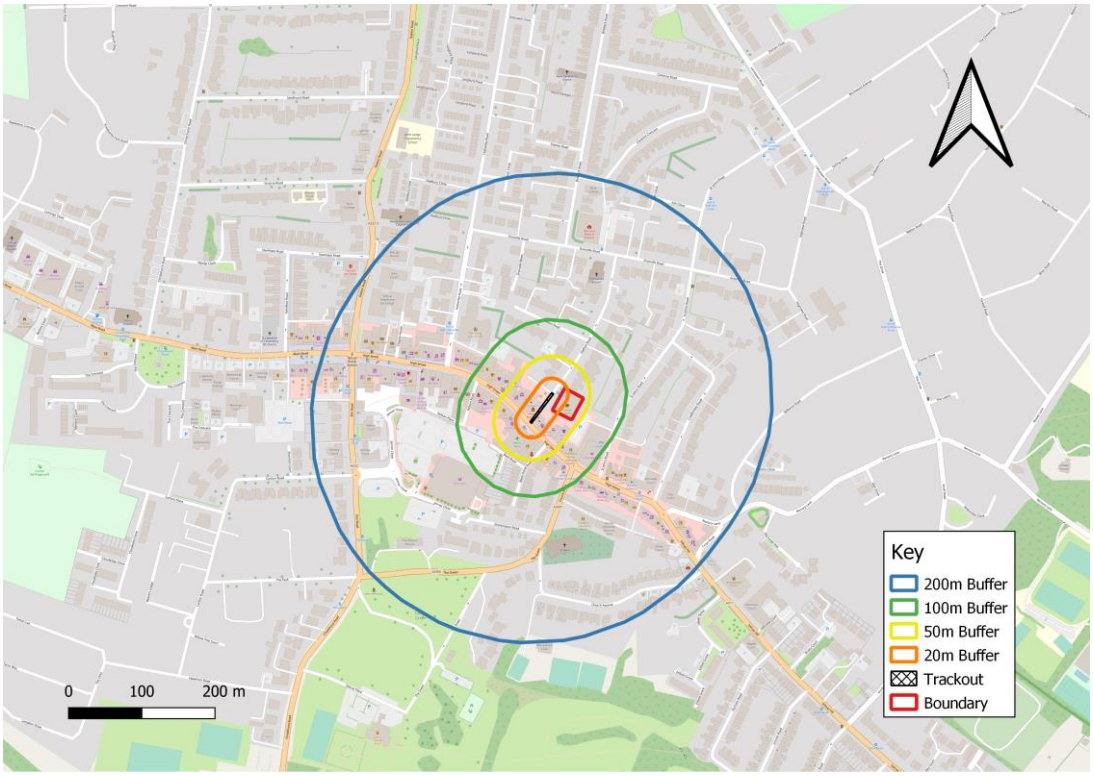

Table 5.6: Sensitivity of the area

Potential Impact		Sensitivity of the surrounding area			
		Demolition	Earthworks	Construction	Trackout
Dust soiling	Receptor sensitivity	High	High	High	High
	Number of receptors	1-10	1-10	1-10	1-10
	Distance from the source	<20m	<20m	<20m	<20m
	Sensitivity of the area	**Medium**	**Medium**	**Medium**	**Medium**
Human health	Receptor sensitivity	High	High	High	High
	Annual mean PM_{10} concentration	<24µg/m^3	<24µg/m^3	<24µg/m^3	<24µg/m^3
	Number of receptors	1-10	1-10	1-10	1-10
	Distance from the source	<20m	<20m	<20m	<20m
	Sensitivity of the area	**Low**	**Low**	**Low**	**Low**
Ecological	Receptor sensitivity	N/A			

5.1.5 Risk of Impacts

The dust emission magnitude is combined with the sensitivity of the area to determine the risk of impacts of construction activities before mitigation; these are evaluated based on risk categories of each activity in Appendix A. The risk of dust impacts from construction activities is identified in Table 5.7.

Site specific mitigation measures to reduce construction phase impacts are defined based on this assessment in Section 6 and Appendix B.

Table 5.7: Summary of the Dust Risk from Construction Activities

Potential Impact	Dust Risk Impact			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Medium Risk	Medium Risk	Medium Risk	Low Risk
Human health	Low Risk	Low Risk	Low Risk	Low Risk
Ecological	N/A			

5.2 Operational Phase

5.2.1 Emissions to Air from Operational Phase

Table 5-8 presents the EPUK-IAQM 2017 guidance screening criteria for when an air quality assessment might be required. Should the criteria within Table 5-8 be exceeded then it is likely that a detailed assessment of operational phase impacts will be required.

During the operational phase, air quality impacts are likely to be associated with traffic emissions as a result of any changes in traffic flows or flow composition the development may bring.

Road traffic data for the proposed development has been prepared by the Transport Consultants (EAS Transport Planning Ltd) for the scheme. It is concluded that the proposed development would generate 68 two-way movements, Heavy Duty Vehicles generated being 2.9%. These are lower than the road traffic generated from the exiting site use (i.e. 114 two-way movements). Therefore, we anticipate that the proposed development will unlikely to cause a significant impact on local air quality.

Table 5.8 presents a comparison of the relevant EPUK-IAQM screening criteria for the proposed development.

5.2.2 Emissions to Air from Operational Phase Energy Plant

At the time of writing, there are no significant combustion sources such as combined heat and power (CHP) plant or large boilers anticipated within the proposed development. Should any such sources be proposed, further assessment of potential air quality impacts may be required.

Table 5.8: Air Quality Screening Criteria from EPUK-IAQM 2017 Guidance

The Development will	Indicative Criteria to Proceed to an Air Quality Assessment	Is the Indicative Criteria Exceeded?
Cause a significant change in Light Duty Vehicle (LDV) traffic slows on local roads with relevant receptors.	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere.	**Criterion not exceeded.** The proposed development is not expected to generate significant LDV movements, therefore it is not anticipated that the development would lead to a change in LDVs of more than 100 AADT.
Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors.	A Change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100AADT elsewhere.	**Criterion not exceeded.** The proposed development is not expected to generate significant HDV movements, therefore it is not anticipated that the development would lead to a change in HDVs of more than 25 AADT.
Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA	**Criterion not exceeded.** Road realignment is not proposed.
Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.	**Criterion not exceeded.** New junction and new traffic system are not proposed.
Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100AADT elsewhere.	**Criterion not exceeded.** None proposed.
Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).	**Criterion not exceeded.** None proposed.
Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.	Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. - In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates. Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.	**Criterion not exceeded.** None proposed at the time of writing this report.

Reviewing the background air quality data available (Section 4) and considering the likely road pollutant contribution from the development, it is deemed unlikely that the development would have a significant impact on local air quality. In addition, it is considered that the development would not introduce additional sensitive receptors into an area of known poor air quality.

5.3 Air Quality Neutral

5.3.1 Building Emissions

It has been advised that there are no combustion sources associated with the proposed development. Heating and hot water will be provided by air source heat pumps together with PV panels. Therefore, emissions associated with the proposed building has not been assessed further and the development can be considered air quality neutral in respect to building emissions.

5.3.2 Road Transport Emissions

The Transport Emission Benchmarks (TEBs) are based on the number of trips generated by different-land use classes, together with the associated trip lengths and vehicle emission rates. The site is located in 'Outer London' and the factors for Outer London have therefore been used in the assessment.

The GLA AQN guidance recommends a comparison of the proposed development emissions to benchmark emissions based on the type and size of development, rather than comparison with the existing use. Therefore, for the purpose of calculating transport emissions for the proposed development, traffic flows generated by the proposed development have been considered irrespective of the current flows generated by existing site use. The transport consultants for the scheme, EAS, indicate that traffic flows generated as a result of the proposed 32 residential units will be between 68 movements per day.

The calculated TEB for the proposed development are presented in Table 5.9 and the estimated actual transport emissions for the proposed development are presented in Table 5.10.

Table 5.9: Calculation of Transport Emission Benchmarks for the Proposed Development

Type of area	No. of residential units	Transport Emission Benchmark (g/dwelling/annum)		Proposed Development Transport Emission Benchmark (kg per annum)	
		NO_x	PM_{10}	NO_x	PM_{10}
C3	32	1553	267	49.696	8.544

Table 5.10: Calculation of Transport Emissions for the Proposed Development

Type of Area	Daily trips	Trips per Annum	Emission Factor (g/vehicle-km)		Distance Travelled per vehicle-km	Proposed Development Transport Emission (kg per annum)	
			NO_x	PM_{10}		NO_x	PM_{10}
C3	68	24,820	0.353	0.0606	11.4	99.9	17.1

The transport emissions associated with the proposed development are predicted to be above the TEB and therefore, further mitigation would be required. Mitigation measures are defined based on this assessment in Section 6.

6 MITIGATION MEASURES

6.1 Construction Phase Mitigation

The dust emitting activities outlined in Section 5.1 can be effectively controlled by appropriate dust control measures and any adverse affects can be greatly reduced or eliminated.

Prior to commencement of construction activities, it is anticipated that an agreement on the scope of a DMP for the construction phase will be reached with the local authority to ensure that any potential for adverse environmental effects on local receptors is minimised. The DMP should include *inter alia*, measures for controlling dust and general pollution from site construction operations and include details of any monitoring scheme, if appropriate. Controls should be applied throughout the construction period to ensure that emissions are mitigated.

The dust risk categories identified have been used to define appropriate, site-specific mitigation methods. More detailed, site-specific mitigation measures are contained in Appendix B. There are no 'negligible' risks assigned to any activities, however a selection of mitigation measures are usually recommended as good practice.

The traffic effects of the proposed development during the construction phase will be limited to a relatively short period and will be along traffic routes employed by haulage/construction vehicles and workers. Any effects on air quality will be temporary i.e. during the construction and demolition period only, and can be suitably controlled by the employment of mitigation measures appropriate to the development project.

6.2 Operational Phase Mitigation

As identified in Section 5.2, no significant operational phase impacts are anticipated on local air quality. Ambient air quality is not expected to have significant adverse effects on future site users. The impact of exhaust emissions from traffic generated by the proposed development is not considered likely to be significant. Therefore, it is unlikely the proposed development will have a significant impact on the local air quality.

However, as the transport emissions associated with the proposed development has been predicted to be above the TEBs, mitigation measures such as provision of secure cycle storage and electric vehicle recharging points have been suggested to minimise the operational phase impacts.

7 CONCLUSIONS

An air quality assessment for the proposed development of 32 residential units in replacement of Sidcup Library at Hadlow Road, Bexley has been undertaken with reference to existing air quality in the area and relevant air quality legislation, policy and guidance.

The proposed development site is located within an air quality management area (AQMA), however, the estimated background air pollutant concentrations at the proposed development site are considered likely to be within relevant air quality standards. Therefore, air quality is not considered to be a concern to the development proposals.

Construction phase impacts of the proposed development on local air quality may potentially arise due to fugitive dust emissions during the period of construction. The risk of dust impacts (without mitigation) was assessed according to a widely used method published by the Institute of Air Quality Management (IAQM) and found to be 'medium risk'. Mitigation measures appropriate to the construction phase will be specified by a dust management plan (DMP) agreed with LBB; therefore, significant residual effects are not anticipated.

Road traffic data for the proposed development has been prepared by the Transport Consultants (EAS Transport Planning Ltd) for the scheme. It is concluded that the proposed development would generate 68 two-way movements, Heavy Duty Vehicles generated being 2.9%. These are lower than the road traffic generated from the exiting site use (i.e. 114 two-way movements). No significant change in existing road traffic, vehicle speed or the number of HGVs has been identified. Therefore, the impact from traffic generated by the proposed development is not considered to be significant and a quantitative air quality assessment is not considered to be required. A qualitative impact assessment has been undertaken for the operational phase as per the IAQM guidance - Land-Use Planning & Development Control: Planning for Air Quality' in 2017 (herein the 'EPUK-IAQM guidance'. No significant operational phase air quality impacts are anticipated.

An Air Quality Neutral Assessment has also been carried out for the proposed development. The assessment results indicate that the transport emissions associated with the proposed development are predicted to be above the TEB and therefore, further mitigation would be required. To minimise the operational phase impacts, mitigation measures have been identified which included provision of secure cycle storage and electric vehicle recharging points.

No significant stationary combustion sources such as combined heat and power (CHP) plants or biomass boilers are proposed within the development.

On the basis of this assessment, the proposed development is unlikely to be adversely affected by or have a significant impact on local air quality. Therefore, air quality is considered to be a low priority concern for the proposed development.

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APPENDIX A
CONSTRUCTION DUST ASSESSMENT METHODOLOGY

This appendix contains the construction dust assessment methodology used in the assessment.

To assess the potential impacts, construction activities are divided into demolition, earthworks, construction and trackout. The descriptors included in this section are based upon the IAQM construction dust guidance. The assessment follows the steps recommended in the guidance.

Step 1: Screen the requirement for assessment

The first step is to screen out the requirement for a construction dust assessment, this is usually a somewhat conservative level of screening. An assessment is usually required where there is:

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

Step 2A: Defining the Potential Dust Emission Magnitude

Demolition

The dust emission magnitude category for demolition is varied for each site in terms of timing, building type, duration and scale. Examples of the potential dust emission classes are provided in the guidance as follows:

- **Large**: Total building volume >50,000m^3, potentially dusty construction material (e.g. 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 10m – 20m above ground level; and
- **Small**: 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, demolition during wetter months.

Earthworks

The dust emission magnitude category for earthworks is varied for each site in terms of timing, geology, topography and duration. Examples of the potential dust emission classes are provided in the guidance as follows:

- **Large**: Total site area >10,000m^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;

- **Medium**: 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 – 100,000 tonnes; and
- **Small**: 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 <10,000 tonnes, earthworks during wetter months.

Construction

The dust emission magnitude category for construction is varied for each site in terms of timing, building type, duration, and scale. Examples of the potential dust emissions classes are provided in the guidance as follows:

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

Trackout

Factors which determine the dust emission magnitude class of trackout activities are vehicle size, vehicle speed, vehicle number, geology and duration. Examples of the potential dust emissions classes are provided in the guidance as follows:

- **Large**: >50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- **Medium**: 10 – 50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 – 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 and ecosystems. The sensitivity of the 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 concentration; and
- Site-specific factors, such as whether here are natural shelters such as trees, to reduce the risk of wind-blown dust.

Table A1 has been used to define the sensitivity of different types of receptors to dust soiling, health effects and ecological effects.

Table A1: Sensitivity of the Area Surrounding the Site

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. • Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.	• Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day) • Examples include residential properties, hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	• 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 Data List For Great Britain. • Examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	• 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. • Examples include parks and places of work.	• Locations where the people exposed are workers and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • Examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	• 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. • Example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
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. • Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	• Locations where human exposure is transient. • Indicative examples include public footpaths, playing fields, parks and shopping streets.	• Locations with a local designation where the features may be affected by dust deposition. • Example is a local Nature Reserve with dust sensitive features.

Based on the sensitivities assigned of the different types of receptors surrounding the site and numbers of receptors within certain distances of the site, a sensitivity classification for the area can be defined for each. Tables A2 to A4 indicate the method used to determine the sensitivity of the area for dust soiling, human health and ecological impacts, respectively.

For trackout, as per the IAQM construction dust guidance, it is only considered necessary to consider trackout impacts up to 200m from the edge of the road.

Table A2: Sensitivity of the area to dust soiling effects on people and property

Receptor Sensitivity	Number of Receptors	Distances 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 A3: Sensitivity of the area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Conc.	Number of Receptors	Distances from the Source (m)				
			<20	<50	<100	<200	<350
High	>32μg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32μg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28μg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 μg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32μg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32μg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28μg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 μg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table A4: Sensitivity of the area to Ecological Impacts

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

Step 2C: Defining the Risk of Impacts

The final step is to use both the dust emission magnitude classification with the sensitivity of the area, to determine a potential risk of impacts for each construction activity, before the application of mitigation. Tables A5 to A7 indicate the method used to assign the level of risk for each construction activity.

Table A5: Risk of Dust Impacts from Demolition

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

Table A6: Risk of Dust Impacts from Earthworks/Construction

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

Table A7: Risk of Dust Impacts from Trackout

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

APPENDIX B
SITE-SPECIFIC MITIGATION MEASURES

Site-specific mitigation measures are divided into general measures, applicable to all sites and measures specific to demolition, earthworks, construction and trackout. Depending on the level of risk assigned to each site, different mitigation is assigned. The method of assigning mitigation measures as detailed in the IAQM guidance has been used.

For those mitigation measures that are general, the highest risk has been applied. In this case, the 'medium risk' site mitigation measures have been applied, as determined by the dust risk assessment in Section 5. There are two categories of mitigation measure – 'highly recommended' and 'desirable', which are indicated according to the dust risk level identified in Table 5.7. Desirable measures are presented in *italics*.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of people 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.

Dust Management

- Develop and implement a 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 highly recommended measures. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. 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 air emissions, either on- or off-site and the action taken to resolve the situation in the log book.

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 site boundary, with cleaning to be provided if necessary.*

- Carry out regular site inspections to monitor compliance with the dust management plan, 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 east three months before work commences on site or, if it a large site, before work on a phase commences.

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 runoff 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.

Operating Vehicles/Machinery and Sustainable Travel

- 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 15mph on surfaced and 10mph on unsurfaced haul routes and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).*
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- *Implement a Travel plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).*

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 fine 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 or burning of waste material.

Specific to Demolition

- *Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).*
- 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 provide 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 damp down such material before demolition.

Specific to Earthworks

- *Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.*
- *Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.*
- *Only remove the cover in small areas during work and not all at once.*

Specific to Construction

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

Specific to 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 any dry sweeping of large areas.*
- *Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.*
- *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).*

APPENDIX C
AIR QUALITY NEUTRAL ASSESSMENT METHODOLOGY

Application of the Air Quality Neutral Policy

The GLA's Air Quality Neutral Planning Support Update document published in April 2014 provides guidance on the application of the 'air quality neutral' policy. The air quality neutral policy is said to be applicable to proposed developments with ten or more residential dwellings (or an area of more than 0.5ha) and for all other uses, where the floor space is 1,000m^2 or more (or when the site area is more than 1ha).

Emissions from buildings and transport are to be treated separately. The guidance has established a building emissions benchmark (BEB) and transport emissions benchmark (TEB) for different land use classes. The proposed development needs to demonstrate compliance with these benchmarks, or where this is not possible, offsetting measures need to be used to help achieve the benchmarks.

Building Emission Benchmark (BEB)

Building emission benchmarks (BEB) have been set for NO_x and PM_{10}, for a series of land-use classes. To calculate the emissions from the buildings, the following information is required for each land-use category:

- Gross floor area (m^2) of development;
- On-site emissions of NO_x associated with building use (kg/annum) calculated from energy use (kWh/annum) and default or site-specific emission factors (kg/kWh); and
- On-site emissions of PM_{10} associated with oil or solid fuel use (kg/annum) calculated from energy use (kWh/annum) and default or site-specific emission factors (kg/kWh).

On-site emissions are calculated either from the estimates of fossil fuel consumption per annum, using default emission factors provided by the GLA Air Quality Neutral Planning Support 2014 document, or from knowledge of the emission standards that apply to the combustion sources (CHP/boiler).

The BEB emissions for the development are also calculated (g/m^2), using the annual emission rates as provided by the Sustainable Design and Construction SPG (2014), reproduced in Table C1 and the proposed gross internal area/ number of residential units for each type of land use. Following this, a subtraction of the BEB from the total building emissions is undertaken and, should the outcome be negative, the building emissions are therefore within the benchmark however should the outcome be positive, on or off-site mitigation is required.

Table C1: 'Air Quality Neutral' Building Emission Benchmarks

Land Use Class	NO_x (g/m^2)	PM_{10} (g/m^2)
Class A1	22.6	1.29
Class A3 – A5	75.2	4.32
Class A2 – and Class B1	30.8	1.77
Class B2 – B7	36.6	2.95
Class B8	23.6	1.90
Class C1	70.9	4.07
Class C2	68.5	5.97
Class C3	26.2	2.28
D1 (a)	43.0	2.47
D1 (b)	75.0	4.30
Class D1 (c – h)	31.0	1.78
Class D2 (a - d)	90.3	5.18
Class D2 (e)	284	16.3

Source: Sustainable Design and Construction SPG (2014).

Transport Trip Rate Benchmark (TEB)

Transport emissions benchmarks have been set for NO_x and PM_{10} for a smaller range of land-use classes than for buildings, which are more specific. The following information is required for each land-use category:

- Gross floor area (m^2) of development (by type) and number of dwellings;
- Number of vehicle movements attributable to each proposed land use per annum;
- The average distance travelled per annum; and,
- NO_x and PM_{10} emissions factors (g/vehicle-km (see Table C2).

Table C2: Emission Factors

Pollutant	g/vehicle-km		
	CAZ	Inner	Outer
NO_x	0.4224	0.370	0.353
PM_{10}	0.0733	0.0665	0.0606

To compile the TEB for a development, the TEB provided in the AQN guidance is multiplied either by the gross floor area of each area of the development, or the number of dwellings (where applicable) and the average distance travelled (for the area of London in which the development is located), to achieve the NO_x and PM_{10} emissions in kg/annum. The benchmark was calculated within the AQN guidance based on the emissions factors shown in Table C2 which take into account the distance travelled at the proposed development and more site specific information. The benchmarks are dependent on location within London.

The transport emissions for the development are also calculated by multiplying the number of vehicle movements associated with each portion proposed development (per annum) by the emissions factors shown in Table C3.

The TEB is then compared to the calculated 'total transport emissions'. The TEB can be subtracted from the total transport emissions and if the outcome is negative, the transport emissions are said to below the benchmark and the site is better than air quality neutral. However, should the outcome be positive, on or off-site mitigation is required.

Table C3: 'Air Quality Neutral' Transport Emission Benchmarks

Land Use	CAZ*	Inner	Outer
NO_x (g/m²/annum)			
Retail (A1)	169	219	249
Office (B1)	1.27	11.4	68.5
NO_x (g/dwelling/annum)			
Residential (C3)	234	558	1553
PM_{10} (g/m²/annum)			
Retail (A1)	29.3	39.3	42.9
Office (B1)	0.22	2.05	11.8
PM_{10} (g/dwelling/annum)			
Residential (C3)	40.7	100	267

Note: *CAZ = Central Area Zone. Source: Sustainable Design and Construction SPG (2014).