LAYDE CONSULTING
AIR NOISE ODOUR

Air Quality Impact Assessment

Proposed new accommodation & dance studio block, theatre block and associated infrastructure, Bird College, Alma Road, Sidcup, DA14 4ED

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P481/1

Specialists in Air, Noise, Acoustics & Odour

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1.0 INTRODUCTION

1.1 Report Brief

This air quality impact assessment has been prepared by Layde Consulting in support of a planning application for a site at Bird College, Alma Road, Sidcup DA14 4ED. The college has identified the need for student living accommodation, more dance studios and teaching spaces, an updated wellbeing block and an additional theatre/performance space. Subsequently the proposed development includes the construction of a new accommodation and dance studio block, a new theatre block and associated infrastructure. It should be noted that the principles and layout of the new build will not increase Student numbers or alter the existing primary circulation or teaching facilities of the College, but rather the proposals aim to address the college needs as outlined above.

The purpose of this report is to assess the existing air quality conditions in the vicinity of the site and the likely air quality impacts resulting from the proposed development. The effects have been assessed in the context of relevant national, regional and local air quality policies and guidance. In addition, an Air Quality Neutral assessment has also been undertaken as required by the Greater London Authority Sustainable Design and Construction Supplementary Planning Guidance (2014).

Mitigation measures are proposed where necessary, which would be implemented in order to reduce the impact of the proposed development on air quality, as far as practicable.

1.2 Site Overview

The College is located approximately 0.4m from Sidcup Train Station at the junction between Alma Road - Lansdown Road, and is situated between Waring Park and Birkbeck Primary School (see Figure 1).

The College is made up of several buildings located around a central courtyard. The main College building to the south forms the main entrance and reception to the College and provides a series of teaching spaces, support services, library and refectory. The Theatre block forms the east wing and is accessible from the main College building via the central corridor. The Theatre also has an independent entrance which is accessible during out-of-hours and is located at the front of the College site along Alma Road. The north block forms the dance studios and the Wellbeing block provides further dance studios and gym.

The college has two car parks with one located to the east of the main building and the second to the back of the site, providing a combined total number of parking spaces of 94 regular spaces and 4 disabled spaces.

Figure 1. Site overview and location context, Bird College.

1.3 Description of Development

The college has identified the need for student living accommodation, more dance studios and teaching spaces, an updated wellbeing block and an additional theatre/performance space. The new modern building will accommodate needed teaching spaces and will help to support the College's ongoing requirements.

The proposed development is for the removal of the existing one-story North Block, wardrobe block and wellbeing block. It includes the construction of a new three-story Accommodation and Studio Block to the north of the existing courtyard, a three-story theatre to the west of the site and two-story EB3 Block to the back of the site. The proposal includes the remodelling of the existing courtyard, providing an outdoor performance space with an amphitheatre area and tiered auditorium step/seating. The proposal also seeks approval for the installation of a new pathway and sheltered walkway with steps creating a second courtyard towards the back of the site and allowing easy access to the EB3 and EB1 Buildings.

In terms of car parking spaces, the total number of existing parking spaces is 98 (94 regular spaces, 4 disabled), and it is intended to increase the proposed number of parking spaces to 123 (114 regular spaces, 9 disabled). Although this is a marginal increase, nevertheless the potential air quality impacts have been assessed within this report.

Key components of the detailed proposals are outlined as follows:

Proposed Accommodation and Studio Block:

- 5x Dance Studio (retractable wall included in 2 locations (between Studio 1 and 2, and Studio 4 and 5) allowing 2 dance studios to be combined to 1 larger dance studio when required)
- 2x Warden Bedrooms
- 1x Shared Warden Living/Kitchen
- 1x Disabled Access Studio
- 2x Launderette
- 5x Gender Neutral WC's
- 1x Accessible Gender-Neutral WC
- Changing Facilities
  - 6x Showers
  - 4x Changing Cubicles
  - 55x Locker Units (2x Lockers per unit therefore 110 lockers)
- 1x Scenery Storage
- 1x Scenery Studio
- 1x Wardrobe
- 4x 9 Student Room Blocks (with shared kitchen/living)
- 4x 10 Student Room Blocks (with shared kitchen/living)
- 2x 11 Student Room Blocks (with shared kitchen/living)

Proposed Theatre Block:

- 1x Black Box
- 1x Box Office
- 1x Coffee Dock
- 1x Green Room (with 1x WC)
- 1x Academic Room
- 1x Changing Places
- 1x Accessible Gender-Neutral WC
- 12x Gender Neutral WC's
- 1x Lighting Studio
- Female Changing
  - 5x Showers
  - 18x Locker Units (2x Lockers per unit therefore 36 lockers)
  - Accessible WC and Shower
- Male Changing
  - Shower Area (5x shower heads)
  - 8x Locker Units (2x Lockers per unit therefore 16 lockers)
  - Accessible WC and Shower
- 1x Band Room
- 1x Black Box Studio
- 3x Music Room

EB3:

- 1x Gym
- 1x Counselling
- 1x Physio
- 3x Dance Studio
- 1x Storage

2.0 AIR QUALITY LEGISLATION

2.1 European Air Quality

In 1996 the European Commission published the Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC)[1]. This Directive defined the policy framework for 12 air pollutants known to have harmful effects on human health and the environment. Limit values (pollutant concentrations not to be exceeded by a certain date) for each specified pollutant were set through a series of Daughter Directives, including Directive 1999/30/EC (the 1st Daughter Directive)[2] which sets limit values for sulphur dioxide (SO_2), nitrogen dioxide (NO_2) and oxides of nitrogen (NO_x), particulate matter (PM_{10}) and lead in ambient air.

In May 2008 the Directive 2008/50/EC[3] on ambient air quality and cleaner air for Europe came into force. This Directive consolidates the previous Directives (apart from the 4th Daughter Directive) and provides a new regulatory framework for $PM_{2.5}$ and makes provision for extended compliance deadlines for NO_2 and PM_{10}.

The Directives were transposed into national legislation in England by the Air Quality Standards Regulations 2010[4] and Air Quality Standards (amendment) Regulations 2016[5]. The Secretary of State for the Environment has the duty of ensuring compliance within the air quality limit values.

2.2 England Air Quality Legislation

2.2.1 Environment Act 1995

Part IV of the Environment Act 1995 places a duty on the Secretary of State for the Environment to develop, implement and maintain an Air Quality Strategy with the aim of reducing atmospheric emissions and improving air quality[6]. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland[7] provides the framework for ensuring compliance with the air quality limit values based on a combination of international, national and local measures to reduce emissions and improve air quality. This includes the statutory duty, also under Part IV of the Environment Act 1995, for local authorities to undergo a process of local air quality management and declare Air Quality Management Areas (AQMA) where necessary.

[1] Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management.
[2] Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air.
[3] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.
[4] The Air Quality Standards Regulations 2010, SI 2010/1001.
[5] Statutory Instrument (2016) The Air Quality Standards (Amendment) Regulations, No. 1184.
[6] Environment Act 1995, Chapter 25, Part IV Air Quality.
[7] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Volume 1, July 2007.

2.2.2 Statutory Nuisance

Section 79(1)(d) of the Environmental Protection Act 1990[8] defines one type of 'statutory nuisance' as "any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance". Where a local authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply with an abatement notice is an offence. However, it is a defence if an operator employs the best practicable means to prevent or to counteract the effects of the nuisance.

2.3 UK Air Quality Strategy

The UK Air Quality Strategy for England, Scotland, Wales and Northern Ireland was published and implemented in January 2000 and revised in 2007. The UK Air Quality Strategy provided a prescribed list of air quality limiting thresholds and objectives for a selected range of pollutants, along with implementation dates for each pollutant. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 has since been superseded as of the 14th January 2019 with the Clean Air Strategy 2019 (CAS)[9].

In contrast to the previous Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007, the CAS does not set legally binding objectives, rather the CAS has instead targets for reducing total UK emissions of nitrogen oxides (NO_x) and fine particulate matter ($PM_{2.5}$) from sectors such as road transport, domestic sources and construction plant (non-road mobile machinery or NRMM).

2.4 Air Quality Objectives and Limit Values

Air quality limit values and objectives are quality standards for clean air. Some pollutants have standards expressed as annual average concentrations (long-term) effects which occur after a prolonged period of exposure to elevated concentrations) and others have standards expressed as 24-hour, 1-hour or 15-minute average concentrations (short-term) due to the acute way in which they affect health or the natural environment (i.e. after a relatively short period of exposure).

Most pollutants have standards expressed in terms of both long-term and short-term concentrations. Table 1 sets out these EU air quality limit values and national air quality objectives for the pollutants relevant to this study (NO_2 and particulate matter PM_{10}).

[8] Parliament of the United Kingdom. (1990), 'Environmental Protection Act', Chapter 43. Queen's Printer of Acts of Parliament
[9] Department for Environment Food and Rural Affairs. (January 2019), 'The Clean Air Strategy'

Table 1: UK Air Quality Objectives

Pollutant	Air Quality Objective		To be achieved by
	Concentration	Measured as	
Nitrogen Dioxide	200 µg m^{-3} not to be exceeded more than 18 times a year	1-hour mean	31 December 2005
	40 µg m^{-3}	Annual mean	31 December 2005 1 January 2010*
Particles (PM10) (gravimetric)			
All authorities	50 µg m^{-3}, not to be exceeded more than 35 times a year	24 hour mean	31 December 2004
	40 µg m^{-3}	Annual mean	31 December 2004
Particles (PM2.5) (gravimetric) *	25 µg m^{-3} (target)	Annual mean	2020 1 January 2010*
All authorities	15% cut in urban background exposure	Annual mean	2010 - 2020

* EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe and The Air Quality Standards Regulations 2010. Derogations (time extensions) have been agreed by the EU for meeting the NO2 limit values in some zones/agglomerations

2.5 Dust Nuisance

Dust is the generic term used in the British Standard document BS 6069 (Part Two) to describe particulate matter in the size range 1–75µm in diameter. Dust nuisance is the perception of the surface soiling by excessive rates of dust deposition. Under provisions in the Environmental Protection Act 19907, dust nuisance is defined as a statutory nuisance.

There are currently no standards or guidelines for dust nuisance in the UK, nor are formal dust deposition standards specified. This reflects the uncertainties in dust monitoring technology and the highly subjective relationship between deposition events, surface soiling and the perception of such events as a nuisance. In law, complaints about excessive dust deposition would have to be investigated by the local authority and any complaint upheld for a statutory nuisance to occur. However, dust deposition is generally managed by suitable on-site practices and mitigation rather than by the determination of statutory nuisance and/or prosecution or enforcement notice(s).

3.0 PLANNING POLICY & GUIDANCE

3.1 National Planning Policy Framework (2012)

The National Planning Policy Framework (NPPF)[10] was published in March 2012 with the purpose of planning to achieve sustainable development. Paragraph 124 of the NPPF on air quality states that:

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

3.2 Planning Practice Guidance (2014)

As part of the NPPF, planning practice guidance on various topics was published in 2014[11]. In relation to air quality, the guidance refers to the significance of air quality assessments to determine the impacts of proposed developments in the area and describes the role of local and neighbourhood plans with regard to air quality.

3.3 Regional Air Quality & Planning Policy

In addition to national air quality strategies and legislation, local authorities have developed and implemented air quality action plans and objectives in order to improve or negate local air quality impacts associated with pollutants to include, but not limited to, nitrogen oxides (NO_x), nitrogen dioxide (NO_2), fine particulate matter (PM_{10} & $PM_{2.5}$) and construction related dust deposition.

3.4 The London Plan

The London Plan, consolidated with alterations in 2016[12] forms part of the development strategy for the Greater London area until 2036 and integrates all economic, environmental, transport and social frameworks. This has been amended to be consistent with the NPPF. Specifically, for new development proposals, the London Plan, consolidated with alterations, 2016, looks at air quality by proposing the following measures:

[10] Department for communities and local government (2012) National Planning Policy Framework
[11] Department for communities and local government (2014) Planning Practice Guidance: Air Quality

a) minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3);
b) promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition';
c) be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs);
d) ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches; and
e) where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permission should only be granted if no adverse air quality impacts from the biomass boiler are identified.

3.5 SPG on Sustainable Design and Construction

The Supplementary Planning Guidance (SPG) for Sustainable Design and Construction[13] was published in April 2014 by the Greater London Authority (GLA). Section 4.3 of the SPG focuses on air pollution, and provides guidance for new developments in London which are 'air quality neutral'. The air quality neutral policy sets benchmarks against which the annual emissions of NO_x and PM_{10} from traffic and combustion plant of a proposed development should be assessed.

Emission standards for combustion plant are outlined in the SPG for solid biomass and combined heat and power (CHP) plants in London. For individual and communal gas boilers in commercial and domestic buildings, a NO_x rating of less than 40mg NO_x/kWh should be achieved.

[12] Greater London Authority (2016) The London Plan: The Spatial Development Strategy for London Consolidated With Alterations Since 2011
[13] Greater London Authority (2014) Sustainable Design and Construction Supplementary Planning Guidance, April 2014.

3.6 SPG on Construction Dust

Supplementary Planning Guidance (SPG) for The Control of Dust and Emissions during Construction and Demolition[14] was published in July 2014 by the Greater London Authority (GLA), which sets out measures to reduce emissions of dust, PM_{10} and $PM_{2.5}$ associated with construction and demolition activities in London. It also aims to control NO_x from these same activities by introducing an Ultra Low Emissions Zone (ULEZ) for non-road mobile machinery as state below:

"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 NOx and PM. These standards will be based upon engine emissions standards set in EU Directive 97/68/EC and its subsequent amendments.

- *NRMM used on the site of any major development within Greater London will be required to meet Stage IIIA of the Directive as a minimum; and*
- *NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IIIB of the Directive as a minimum.*
- *From 1 September 2020 the following will apply:*
- *NRMM used on any site within Greater London will be required to meet Stage IIIB of the Directive as a minimum.*
- *NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IV of the Directive as a minimum."*

3.7 LLAQM.TG(16) Technical Guidance

The London Local Air Quality Management technical guidance (LLAQM.TG(16))[15] applies only to London's 32 boroughs (and the City of London), whilst LAQM.TG(16) applies to all other UK local authorities. Although the LLAQM.TG(16) technical guidance is largely based on the updated national guidance LAQM.TG(16), it does incorporate London-specific elements of the LAQM system. This guidance is designed to support London authorities in carrying out their duties to review and assess air quality in their area. Wherever relevant this guidance has been taken into account.

[14] Greater London Authority (2014) The Control of Dust and Emissions during Construction and Demolition, Supplementary Planning Guidance, July 2014

[15] Greater London Authority (2016) London Local Air Quality Management Technical Guidance TG (16)

3.8 Local Policy and Guidance

3.8.1 Air Quality in Bexley – A Guide for Public Health Professionals

The guidance document "Air Quality in Bexley – A Guide for Public Health Professionals" was prepared by the Greater London Authority in partnership with the Health Protection Agency. The document aims to provide an overview of the air quality issues and objectives for Bexley Borough Council, along with relevant air quality improvement action plans. The document also reiterates the national and regional policies towards air quality objectives.

3.9 London Borough of Bexley Air Quality Annual Status Report 2016

The annual air quality status report for 2016 outlines the monitoring objectives for the London Borough of Bexley, along with a revised Air Quality Action Plan for the borough. The document outlines the emission policies adopted by the Borough, and reiterates the AQ neutral policies which should adhere to the London Plan Policy 7.14 requirements and GLA Supplementary Planning Guidance. The document also places conditions on non-road mechanical machinery for NOx and PM10 between 37kW and 560kW.

3.10 Other Relevant Policy & Guidance

3.10.1 Institute of Air Quality Management (IAQM)

The Institute of Air Quality Management (IAQM) provides guidance[16] to development consultants and environmental health officers on how to assess air quality impacts from construction. The IAQM guidance provides a method for classifying the significance of effect from construction activities based on the 'dust magnitude' (high, medium or low) and proximity of the site to the closest receptors. The guidance recommends that once the significance of effect from construction is identified, the appropriate mitigation measures are implemented. It is noted that the method outlined for dust assessment is the same as in the GLA Control of Dust and Emissions during Construction and Demolition.

[16] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction

4.0 AIR QUALITY IMPACT ASSESSMENT

This section provides an overview of the methodology used to assess air quality impacts as a result of the development on local residential receptors, both during the construction and operational phases of the development.

4.1 Significance of Effect Criteria

The criteria used to describe the significance of impact has been adopted from the IAQM 2017 guidance document[17], which demonstrates the significance of effects using a simplified matrix approach, as presented below in Table 2.

Table 2. Impact Descriptors based on calculated AQAL

Long term average Concentration at receptor in assessment year	**% Change in concentration relative to Air Quality Assessment Level (AQAL)**			
	1	2-5	6-10	>10
75% of less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of less of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of less of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of less of AQAL	Moderate	Moderate	Substantial	Substantial
110% Or more of AQAL	Moderate	Substantial	Substantial	Substantial

In terms of specific modelling scenarios, the difference between the 'without' scenario and completed year of operation scenario is assessed for changes in concentration relative to the Air Quality Assessment Level (AQAL), and the significance determined thereafter.

4.2 Construction Phase

Construction activities often generate temporal emissions of dust during the construction phase of the development. Dust is the generic term used in the British Standard document BS 6069 (Part Two) to describe particulate matter in the size range 1–75µm in diameter, and is often perceived as a nuisance due to the perception of the soiling of surfaces by excessive rates of dust deposition. Under provisions in the Environmental Protection Act 1990, dust nuisance is defined as a statutory nuisance.

Although there are currently no standards or guidelines for dust nuisance in the UK, nor are formal dust deposition standards specified, the SPG on Construction Dust recommends splitting the construction activities into four separate source categories and determining the dust risk associated with each of these individually.

[17] Institute of Air Quality Management (2017) Land-Use for Planning & Development Control: Planning for Air Quality

This assessment has determined the risk of each of the following source categories: Demolition; Earthworks; Construction; and Trackout (the transport of dust and dirt onto the public road network). The risk of each source for dust effects is described as 'negligible', 'low risk', 'medium risk' or 'high risk' depending on the nature and scale of the construction activities and the proximity of sensitive receptors to the construction activities or site boundary. The assessment is used to identify appropriate mitigation measures proportional to the level of risk, to reduce the effects such that they are not significant.

4.3 Construction Plant Equipment

All construction plant has an energy demand with some direct emissions to air from exhausts. Guidance from the Institute of Air Quality Management (IAQM) notes that effects from exhausts will likely not be significant. Given the nature of the site plant, effects of plant emissions on local air quality are considered to be of negligible significance relative to the surrounding road traffic contributions on the local road network. It has also been assumed that site plant would comply with the emissions standards stated in the SPG on Construction Dust. Construction plant emissions have therefore not been assessed further within this report.

4.4 Construction Road Traffic Emissions

Environment Protection UK (EPUK) and IAQM guidance indicates that an assessment of traffic emissions is only likely to be required for large, long term construction sites that will generate an additional annual average flow of greater than 25 Heavy Duty Vehicles (HDVs) per day or greater than 100 Light Duty Vehicles (LDVs) per day within an AQMA.

As the total additional flows of LDVs and HDVs during the construction phase are anticipated to be lower than these values, and the construction phase will be relatively short term in nature, then no further consideration has been given to the effects of construction road traffic on ambient air quality.

4.5 Operational Phase

The operational phase of the development will result in a minor increase in traffic accessing the site, although this increase takes the form of 25 additional car parking spaces which represents a minimal increment of potential traffic volumes. Nevertheless, the increase in emissions of NO2 and PM10 has been assessed using air dispersion modelling to determine the significance of effect on local receptors.

No atmospheric dispersion modelling was undertaken for the proposed CHP gas boiler due to the proposed size being less than 220kW, therefore the contribution of the boiler to pollutant concentrations at nearby sensitive receptors will be minimal. Instead, the impact of the boilers has been considered within the air quality neutral assessment in later sections of this report.

4.6 Advanced Dispersion Modelling System (ADMS ROADS)

Air dispersion modelling was undertaken using the UK developed Cambridge Environmental Research Consultants (CERC) ADMS Roads V5. This model is widely used in the UK, including by Local Authorities for Review and Assessment purposes and to support planning application assessments. The parameterisation and model rationale are outlined in further detail below.

4.7 Meteorological Data

Meteorological data (Met Data 2017 - 2019, London Inner meteorological station epsg 27700: 543591 / 180407) was used in the ADMS model, with the wind rose diagrams presented below. The Met Year 2019 was used as the calibration year based on the most recent diffusion tube monitoring results published by Bexley for pre-Covid 19 conditions. The Met Year 2019 was used for prediction models as the base year (most recent year of meteorological data). Each data file comprises of hourly sequential data collected over a 1 year period, and each year contains ~8760 lines of meteorological data. This type of data is useful for representations of actual meteorological conditions, and can be used for long-term concentration and percentile calculations for comparison with regulatory standards. The meteorological parameters entered into the model are shown in Table 3.

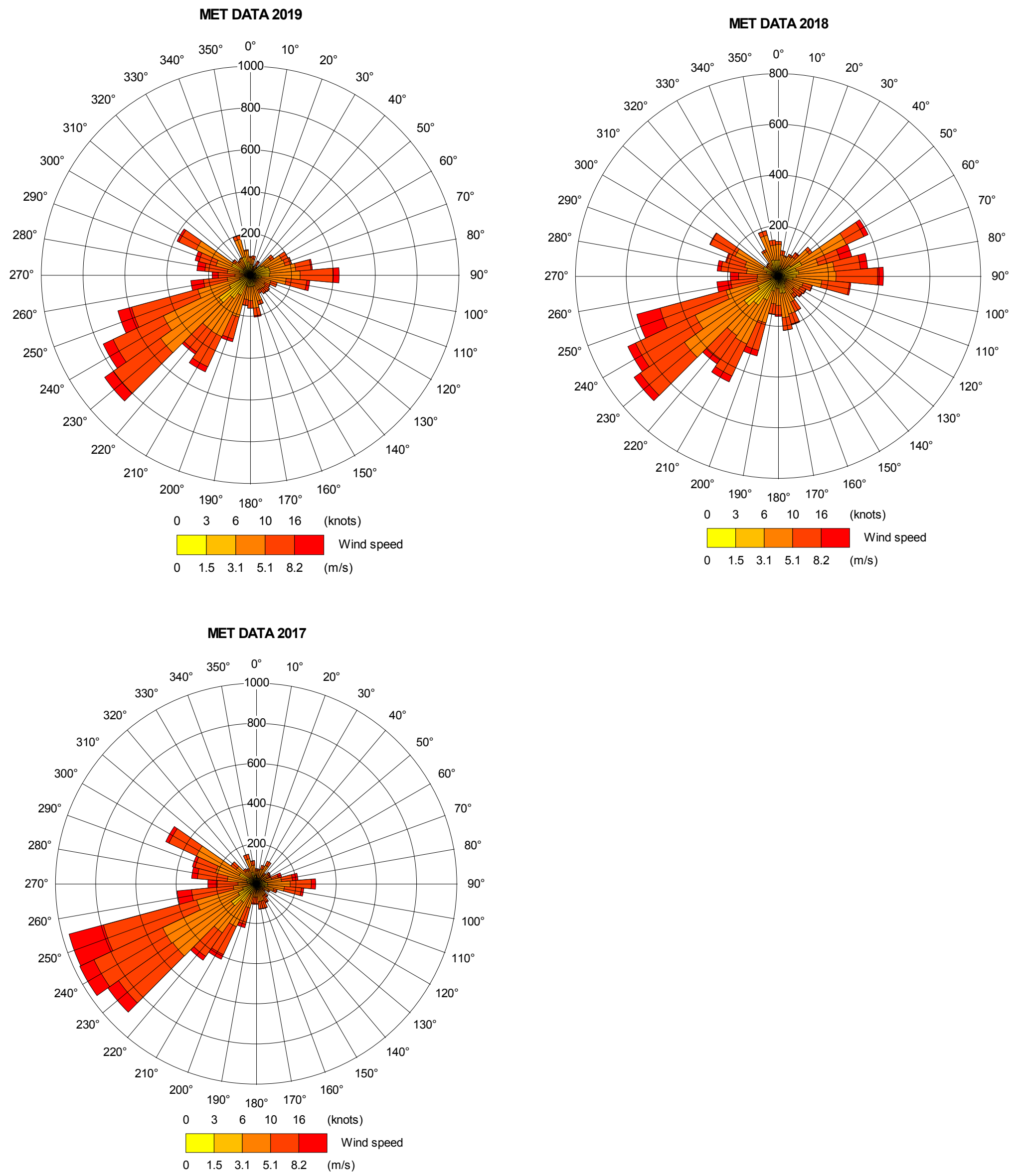
Table 3. Meteorological parameters adopted within the ADMS model.

Parameter	Modelled Receptors (including Cartesian Grids)	Meteorological Site
Surface Roughness	1 m	1 m
Minimum MO Length	30 m	30 m
Surface Albedo	0.23*	0.23
Priestly-Taylor Parameter	1*	1**

*Model default value

Wind roses have been generated for each of the three years of meteorological data used in this assessment, as shown in Figures 2 below. The wind roses illustrate that in all three meteorological years, there is a dominance of strong winds from the west/south west.

Figure 2 – Wind rose diagrams for London City MET Station 2017 - 2019



4.8 EFT Emission Factors

The Emission Factor Toolkit (EFT) (Version 9.0 2VC), has been used to provide emission factors for use within the modelling based on road traffic flows, HDV percentage and vehicle speeds for each of the road links included in the model. Traffic emissions for the base year 2021 (without scenario) has been modelled, along with the anticipated year of operation (2022). The road types have been selected as London (inner).

4.9 NO_X to NO_2 Relationship

Traffic emissions have been modelled for NO_x outputs under both assessment scenarios. The incremental increases in NO_2 contributions from the development have been determined using the Defra NO_x to NO_2 conversion spreadsheet, based on Bexley local authority area and for the relevant year of assessment using a traffic mix representing all London traffic.

4.10 Modelled Scenarios

The following scenarios have been modelled for traffic flows associated with the development:

- 2021 – without development, using MET data and most recent published traffic data
- 2022 – with development - anticipated year of completion and operation

It is assumed that the 2022 is the earliest year of completion for all phases of the development, and represents the operational year for assessing 'with' impacts.

4.11 Traffic Data

Traffic data was obtained from the Department of Transport road traffic statistics datasets for 2000 – 2019 for the borough of Bexley. The datasets include the count points, traffic AADF values and raw count data for all directions of flow. The adopted traffic flow values are presented in Table 4 below.

Table 4. Summary of modelled traffic data used within ADMS-ROADS 5.

Link / Road	Point ID	Year of Count	X (m)	Y (m)	AADF HGV	AADF CAR	Speed (kmph)
Birkbeck Road	811215	2019	546351	172239	10	2728	32
Faraday Ave	990714	2019	547280	172681	61	9194	32
Hatherley Road	811215	2019	546351	172239	10	2728	32
Lansdown Road	802955	2018	546628	172311	15	3915	32
Station Road	26806	2019	546180	172000	138	14303	32

4.12 Receptors

All receptors have been selected as the closest residential dwellings to the site such that all other receptors are located at a greater distance from the site and would thus be impacted upon to a lesser degree. A summary of the modelled residential receptors is presented below in Table 5.

Table 5. Summary of residential receptors.

ID	ADDRESS	Coordinates		
		X (m)	Y (m)	Z (m)
R1	18 Hemmings Close	546660	172517	1.5
R2	19 Hemmings Close	546657	172529	1.5
R3	20 Hemmings Close	546655	172541	1.5
R4	24 Hemmings Close	546646	172566	1.5
R5	7 Sydney Court	546612	172358	1.5
R6	2 Heron House	546571	172327	1.5
R7	100 Birkbeck Road	546521	172355	1.5
R8	163 Alma Road	546490	172376	1.5
R9	5 Faraday Avenue	546488	172554	1.5
R10	23 Faraday Avenue	546570	172579	1.5
R11	37 Faraday Avenue	546632	172603	1.5
R12	Proposed Residential Block	546595	172430	1.5

Given that there are no ecologically sensitive designations within close proximity to the site, these are therefore not a consideration within this assessment.

5.0 BASELINE AIR QUALITY CONDITIONS

5.1 Local Air Quality Management Areas (AQMA's)

An Air Quality Management Area (AQMA) was declared by London Borough of Bexley on the 1st March 2007. The AQMA incorporates the whole borough of Bexley and was declared on the basis of Nitrogen dioxide (NO_2) and Particulate Matter PM_{10}.

5.2 Local Authority Monitoring

NO_2 and PM_{10} concentrations are monitored by the London Borough of Bexley at a number of locations. The closest monitoring station to the site is Bexley Slade Green, which is approximately 5 miles from the site. Although the setback distance is significant, nevertheless this position represents the closest suburban monitoring network position to the site, which is also suburban in nature. The alternative to this location is Greenwich, Falconwood, however this monitoring station represents a kerbside road network position, and is considered to be unrepresentative of the proposed development site conditions. The Bexley Slade Green monitoring site forms part of Defra's Automatic Urban and Rural Network, and also forms part of the London Air Quality Network. QA/QC is carried out by King's College London for the LAQN, and QA/QC is carried out by the Environment Agency's QA/QC unit for the AURN.

The most recent monitoring data for Bexley Slade Green monitoring site is presented below in Tables 6 & 7, and the results demonstrate no exceedances in NO_2 or PM10 objectives. Data ranges were obtained for 2017 – 2019, with 2019 being the most recent pre-covid 19 year.

Table 6. Summary of NO_2 monitoring results, Slade Green.

Site Name	NO2 concentrations (ug/m^3)					
	Annual Mean			Occurrences of hourly mean >200ug/m^3		
	2017	2018	2019	2017	2018	2019
Slade Green	25	23	22	0	0	0

Table 7. Summary of PM_{10} monitoring results, Slade Green.

Site Name	PM10 concentrations (ug/m^3)					
	Annual Mean			Days where daily mean >50ug/m^3		
	2017	2018	2019	2017	2018	2019
Slade Green	17	18	17	3	1	8

5.3 London Atmospheric Emissions Inventory

GIS datasets were obtained from the London Atmospheric Emissions Inventory (LAEI) web portal for the base year 2016, as this is the latest version of the Emissions Inventory and replaces previous versions of the inventory. The LAEI provides emission estimates of key pollutants (NOx, PM10, PM2.5 and CO2), and provides data coverage over Greater London (the 32 London boroughs and the City of London), as well as areas outside Greater London up to the M25 motorway.

These emissions have been used to estimate ground level concentrations of key pollutants NOx, NO2, PM10 and PM2.5 across Greater London for year 2016, using an atmospheric dispersion model. The detailed GIS datasets for 20m resolution mapping were reviewed, and the baseline concentrations at the site were obtained thereafter. A summary of the LAEI data is presented below in Table 8.

Table 8. Summary of LAEI predicted concentrations for 2016 base year, British National Grid.

LAEI Base Year	X (m)	Y (m)	NO_2	NO_x	PM_{10}	$PM_{2.5}$
2016	546547	172434	29.9 ug/m^3	47.8 ug/m^3	20.2 ug/m^3	12.4 ug/m^3

It is noted that none of the predicted parameters exceeded the mean objective concentrations at the site, therefore it is anticipated that the site will continue to meet the current air quality objectives.

5.4 Defra Background Concentration Maps

Background mapping data is provided by Defra for concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ using 2018 base maps and predicting future concentrations of these parameters up to 2030. Concentration values for each parameter have been modelled using a 1km grid interval, and are available on a local authority or council region. Predicted background concentrations for the 1km grid square (British National Grid 546500, 172500) containing the proposed development for the 2021 'without' scenario, and the 2022 operational year are summarised below in Table 9.

Table 9. Summary of Defra predicted background concentration (ug/m^3).

Year	NO_x	NO_2	PM_{10}	$PM_{2.5}$
2022	22.2	15.6	15.3	10.5
2021	23.3	16.3	15.4	10.6

5.5 Air Dispersion Modelling

The results of air dispersion modelling for concentrations of NO_2, PM_{10} and $PM_{2.5}$ are presented in the following sections, and the significance determined thereafter in the subsequent sections.

5.5.1 Nitrogen dioxide (NO_2)

The results of air dispersion modelling for NO_2 concentrations predicted for each of the identified local receptors is presented below in Table 10.

Table 10. Summary of predicted Annual mean NO_2 concentrations, ug/m^3

Receptor	Annual mean concentration (ug/m3)		Predicted change in NO2 concentrations (ug/m^3)	Effect of change
	2021 without development	2022 Operational Year		
18 Hemmings Close	30.35	30.31	-0.04	Negligible
19 Hemmings Close	30.42	30.37	-0.05	Negligible
20 Hemmings Close	30.53	30.47	-0.06	Negligible
24 Hemmings Close	31.15	31.03	-0.12	Negligible
7 Sydney Court	30.54	30.51	-0.03	Negligible
2 Heron House	30.78	30.74	-0.04	Negligible
100 Birkbeck Road	31.26	31.17	-0.09	Negligible
163 Alma Road	31.12	31.06	-0.06	Negligible
5 Faraday Avenue	32.29	32.07	-0.22	Negligible
23 Faraday Avenue	32.26	32.05	-0.21	Negligible
37 Faraday Avenue	31.74	31.57	-0.17	Negligible
Proposed Residential Block	30.33	30.3	-0.03	Negligible

The results of air dispersion modelling indicate no exceedances for the annual mean NO_2 objective of 40ug/m^3, with the maximum predicted NO_2 concentration for the operational year being 32.07ug/m^3. It is notable that the minimal increase (25 vehicles) in traffic volumes to the site during the operational year are offset by the forecasted decrease in overall NO_2 concentrations as a result of the implementation of air quality action plans and a predicted reduction in traffic NOx emissions for 2022.

5.6 Particulate Matter (PM_{10}) Concentrations

The results of air dispersion modelling for PM_{10} concentrations predicted for each of the identified local receptors is presented below in Table 11.

Table 11. Summary of predicted Annual mean PM_{10} concentrations, ug/m^3

Receptor	Annual mean concentration (ug/m3)		Predicted change in PM_{10} concentrations (ug/m^3)	Effect of change
	2021 without development	2022 Operational Year		
18 Hemmings Close	20.30	20.30	0.00	Negligible
19 Hemmings Close	20.32	20.32	0.00	Negligible
20 Hemmings Close	20.34	20.34	0.00	Negligible
24 Hemmings Close	20.48	20.48	0.00	Negligible
7 Sydney Court	20.35	20.35	0.00	Negligible
2 Heron House	20.40	20.41	0.01	Negligible
100 Birkbeck Road	20.51	20.52	0.01	Negligible
163 Alma Road	20.48	20.49	0.01	Negligible
5 Faraday Avenue	20.75	20.74	-0.01	Negligible
23 Faraday Avenue	20.74	20.74	0.00	Negligible
37 Faraday Avenue	20.62	20.62	0.00	Negligible
Proposed Residential Block	20.30	20.30	0.00	Negligible

The modelling results indicate that the greatest change in annual mean PM_{10} concentrations as a result of the proposed development is 0.01µg/m^3.

The predicted number of days where PM_{10} concentrations exceed the short-term objective of 50µg/m^3 are well below the allowance of 35 days, with 'imperceptible' changes between the 2021 'without development' scenario and the 2022 year of operation scenario. Short term PM_{10} impacts are therefore concluded to be 'negligible'.

5.7 Particulate Matter ($PM_{2.5}$) Concentrations

The results of air dispersion modelling for PM_{10} concentrations predicted for each of the identified local receptors is presented below in Table 12.

Table 12. Summary of predicted Annual mean $PM_{2.5}$ concentrations, ug/m^3

Receptor	Annual mean concentration (ug/m3)		Predicted change in $PM_{2.5}$ concentrations (ug/m^3)	Effect of change
	2021 without development	2022 Operational Year		
18 Hemmings Close	12.46	12.46	0.00	Negligible
19 Hemmings Close	12.47	12.47	0.00	Negligible
20 Hemmings Close	12.48	12.48	0.00	Negligible
24 Hemmings Close	12.57	12.56	0.00	Negligible
7 Sydney Court	12.49	12.49	0.00	Negligible
2 Heron House	12.52	12.52	0.00	Negligible
100 Birkbeck Road	12.58	12.58	0.00	Negligible
163 Alma Road	12.56	12.57	0.00	Negligible
5 Faraday Avenue	12.72	12.71	0.01	Negligible
23 Faraday Avenue	12.72	12.71	0.01	Negligible
37 Faraday Avenue	12.65	12.64	0.01	Negligible
Proposed Residential Block	12.46	12.46	0.00	Negligible

The modelling results indicate that the greatest change in annual mean $PM_{2.5}$ concentrations as a result of the proposed development is 0.01µg/m^3. $PM_{2.5}$ concentrations are predicted to be well below the annual mean air quality target at all modelled receptors. In accordance with the EPUK/IAQM guidance, it is concluded that the proposed development would result in 'negligible' impacts at all receptors and therefore is 'not significant'.

6.0 AIR QUALITY NEUTRAL ASSESSMENT

In harmony with the GLA Air Quality Neutral Planning Support document, London's air quality problems are primarily a result of a very large number of sources each contributing a small amount. In light of these issues, both the London Plan and the 2010 Mayor's Air Quality Strategy (MAQS) make reference to new developments being "air quality neutral". The London Plan states:

"Development proposals should be at least 'air quality neutral' and not lead to any further deterioration of existing poor air quality".

As such, an Air Quality Neutral Assessment has been undertaken for the proposed development in line with the Greater London Authority Sustainable Design and Construction SPG and the Air Quality Neutral Planning Support. The Air Quality Neutral Planning Support document details the methodology that should be adopted to assess whether a development is air quality neutral, which is based on comparing benchmarks for emissions from buildings and transport against the proposed development emissions. Benchmark and proposed development emissions are calculated based upon the development's floor space, land-use class, energy demand and transport movements.

6.1 Building Emissions

The development proposals include the installation of a gas boiler / gas CHP plant and the construction of a new three-story Accommodation and Studio Block to the north of the existing courtyard, a three-story theatre to the west of the site and two-story EB3 Block to the back of the site. The ground floor of the residential block comprises of dance studios, wardrobes etc. The total benchmarked building emissions for the gas boilers have been calculated by multiplying the floor space for each land-use class by the default emissions factors for the land-use class as specified in the Air Quality Neutral Planning Support. In accordance with the GLA guidelines, the development comprises of the following classes and gross internal floorspace:

- Class C2 (residential institutions) – accommodation block
- Class D2 (a-d) (concert halls etc) – proposed theatre
- Class D2 (e) (gymnasium etc) – EB3 block & dance studios

In accordance with the GLA guidelines, the building emissions benchmark for each class used within the Air Quality Neutral Assessment is presented in Table 13 below.

Table 13. Building Emissions Benchmark BEB

Land Use Classes	NO_x (kg/m²/annum)	Internal Floor Space (m²)	Building Emissions Benchmark (kg NO_x/annum)
Class C2	0.0685	2700	184.9
Class D2 (a-d)	0.0903	1480	133.6
Class D2 (e)	0.0284	1500 + 1350	80.9
		Total	399.4

It is proposed to install a single ultra-low emission gas boiler / gas CHP plant as per the recommended GLA specifications, with emissions to be produced lower than 40mgNO_x/kWh. As the exact make / model and specifications are unknown at this stage, the emissions value of 40mgNO_x/kWh has been adopted for this assessment. The total building emissions for the gas plant are presented in Table 14, and the comparison of gas plant emissions are compared against the total benchmarked building emissions in Table 15.

Table 14. Building Emissions

Parameter	Gas CHP Plant Calculations
Required Capacity (kW)	220
NOx Emission Limit (kg/kWh)	0.00004
Operating Hours per Annum (kWh/annum)	51700
Total NOx Mass Emissions (kg/Annum)	2.07

Table 15. Comparison of Total Building Emissions and Benchmarked Emissions for gas CHP plant

Parameter	NOx Emissions (kgNO$_x$/Annum)
Total Benchmarked Building Emissions	399.40
Total Building Emissions	2.07
Difference	-397.33

The comparison of results demonstrates a negative score, therefore the proposed energy plant is considered to be air quality neutral in accordance with the GLA criteria and Mayor's SPG on Sustainable Design and Construction.

6.2 Transport Emissions

The GLA Air Quality Neutral Planning Support document indicates that the Transport Emissions Benchmark (TEB) cannot be derived for land-use classes of C2 or D2, as the land uses are too diverse to calculate a specific TEB value, either for trip length or for number of trips.

However, as indicated within the preceding sections of this report, air dispersion modelling of traffic flow has been undertaken in order to determine the significance of change and impact on local air quality as a result of the development. In summary, the results demonstrated insignificant differences between the 'without' scenario and the year of completion / operation. As such, transport emissions are expected to be neutral given the negligible increase (25 car parking spaces) in potential traffic flow to the site.

6.3 Results of Air Quality Neutral Assessment

In summary, the Building Emissions Assessment and Transport Emissions Assessment indicate that the proposed development will be air quality neutral, even without taking into account that a significant portion of the building land use already exists and is to be upgraded.

7.0 CONSTRUCTION & DEMOLITION DUST IMPACT

An assessment of the potential impacts of dust associated with the demolition, construction and operational phases of the development have been undertaken in accordance with the Institute of Air Quality Management 2014 guidance document[18]. The guidance document outlines a series of steps to assess the risk of dust impacts arising from the development, and to determine the order of magnitude of effects and develop suitable mitigation measures thereafter. The risk of dust emissions from a demolition/construction site causing loss of amenity and/or health or ecological impacts is related to:

- the activities being undertaken (demolition, number of vehicles and plant etc.);
- the duration of these activities;
- the size of the site;
- the meteorological conditions (wind speed, direction and rainfall);
- the proximity of receptors to the activities;
- the adequacy of the mitigation measures applied to reduce or eliminate dust; and
- the sensitivity of the receptors to dust.

Given that there are no designated areas of ecological sensitivity located within close proximity to the site, then impacts on ecology have been screened out and are not considered further within this report. As human receptors are located within 350m of the boundary of the site, then the Step 1 screening assessment as recommended by the IAQM 2014 guidance document has identified the need for a more detailed assessment. As such, the impacts of dust on local residential receptors has been considered to be the most significant risk of impact, and are discussed within the following sections. Reference tables which related to the IAQM 2014 guidance are presented in Appendix 1 of this report, and the assessment results should be read in conjunction with the relevant reference tables.

Using the assessment criteria outlined within the Tables A1–A8 in Appendix 1 of this report, the following information presents the potential dust related impacts of the development during the demolition phase. Table 16 presents a summary of the dust emission magnitude assigned to each demolition activity based on these descriptors.

Table 16. Dust Emission Magnitude

Activity	Dust emission magnitude	Description
Demolition	Small	Total building volume 20,000m^3 – 50,000m^3, potentially dusty construction material, demolition activities 10-20 m above ground level
Earthworks	Medium	Although total site area greater than 10,000m^2, proposals are to develop in smaller phases. Limited total material to be moved likely to be less than 20,000 tonnes – 100,000 tonnes
Construction	Medium	Total building volume 25,000m3 – 100,000m3, potentially dusty construction material (e.g. concrete). Although site to be developed in smaller phases of construction
Trackout	Small	10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

The sensitivity of the local area to the effects of dust deposition (soiling) is summarised below in Table 17, and the effects of PM10 are summarised in Table 18.

Table 17. Sensitivity Effects on Local Area

Activity	Dust emission magnitude	Description
Demolition	Low	Number of receptors 1-100 at a distance of <50m, although most are in excess of 100m
Earthworks	Low	
Construction	Low	
Trackout	Low	Number of receptors 1-10 at a distance of <50m

Table 18. Effects of PM10 on local receptors

Activity	Dust emission magnitude	Description
Demolition	Low	Background annual PM10 concentrations calculated to be less than 21ug/m3 for year of works and operational year. Number of receptors 1-100 at a distance of <50m, although most are in excess of 100m
Earthworks	Low	
Construction	Low	
Trackout	Low	

The overall summary of dust impacts is presented below in Table 19.

[18] Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction

Table 19. Risk of Dust Impacts

Activity	Dust Soiling Effects	PM10 Effects
Demolition	Low Risk	Low
Earthworks	Low Risk	Low
Construction	Low Risk	Low
Trackout	Negligible	Negligible

In summary, the overall dust soiling potential risks and impacts from PM10 are considered to be Negligible to Low Risk. That said, additional mitigation measures are outlined below in order to minimise any potential impact further. These measures should be incorporated into a Construction Environmental Management Plan (CEMP) and updated as the project progresses through the planning-tender-demolition-construction phases.

7.1 Dust Mitigation

7.1.1 Demolition & Construction Phases

Although the overall dust soiling potential risks and impacts from PM10 are considered to be Negligible to Low Risk, nevertheless in order to further reduce and minimise dust impact the following recommended mitigation measures have been proposed as per the IAQM 2014 guidelines. The dust mitigation and management recommendations are outlined in Table 20 - 23:

Table 20. Mitigation measures for the management of dust – all phases

Mitigation Measure	Recommendation
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager	Highly
Display the head or regional office contact information	Highly
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. 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, realtime PM10 continuous monitoring and/or visual inspections	Desirable
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	Highly
Make the complaints log available to the local authority when asked.	Highly
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	Highly
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	Desirable

Mitigation Measure	Recommendation
surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary	
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked	Highly
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.	Highly
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.	Highly
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	Highly
Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period	Desirable
Avoid site runoff of water or mud	Highly
Keep site fencing, barriers and scaffolding clean using wet methods	Desirable
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.	Desirable
Cover, seed or fence stockpiles to prevent wind whipping.	Desirable
Operating vehicle/machinery and sustainable travel	
Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable	Highly
Ensure all vehicles switch off engines when stationary - no idling vehicles	Highly
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable	Highly
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate	Desirable
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	Highly
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate	Highly
Use enclosed chutes and conveyors and covered skips.	Highly
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate	Highly
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.	Desirable
Waste management	
Avoid bonfires and burning of waste materials	Highly

Table 21. Mitigation measures specific to demolition phase

Mitigation Measure	Recommendation
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust)	Desirable
Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	Highly
Avoid explosive blasting, using appropriate manual or mechanical alternatives.	Highly
Bag and remove any biological debris or damp down such material before demolition	Highly

Table 22. Mitigation measures specific to construction phase

Mitigation Measure	Recommendation
Avoid scabbling (roughening of concrete surfaces) if possible	Desirable
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	Desirable

Table 23. Mitigation measures specific to trackout

Mitigation Measure	Recommendation
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	Desirable
Avoid dry sweeping of large areas	Desirable
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport	Desirable
Record all inspections of haul routes and any subsequent action in a site log book	Desirable
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable)	Desirable

7.1.2 Operational Phase

As the proposed development is expected to result in negligible changes in air quality and is considered air quality neutral, no additional mitigation is required.

8.0 REPORT SUMMARY

This air quality impact assessment has been prepared by Layde Consulting in support of a planning application for a site at Bird College, Alma Road, Sidcup DA14 4ED. The college has identified the need for student living accommodation, more dance studios and teaching spaces, an updated wellbeing block and an additional theatre/performance space. Subsequently the proposed development includes the construction of a new accommodation and dance studio block, a new theatre block and associated infrastructure. It should be noted that the principles and layout of the new build will not increase student numbers or alter the existing primary circulation or teaching facilities of the College, but rather the proposals aim to address the college needs as outlined above.

The Air Quality Assessment was carried out using detailed ADMS Roads air dispersion modelling to predict air quality NO_2 concentrations on future occupants of the site, under two separate scenarios: 'without' development; operational year 'with' development. A comparison between the modelled scenarios demonstrate that the operation phase will have negligible impacts on NO_2, PM_{10} and $PM_{2.5}$ concentrations at sensitive receptors in accordance with the EPUK/IAQM guidance adopted for this assessment.

An Air Quality Neutral Assessment was undertaken for the proposed development. The Building Emissions Assessment indicates that the proposed development will be air quality neutral, even without taking into account the fact that a significant portion of the building land use already exists and is to be upgraded.

An assessment of the potential impacts of dust associated with the demolition, construction and operational phases of the development was undertaken in accordance with the Institute of Air Quality Management 2014 guidance document, and the results demonstrated a negligible impact potential. That said, as per the IAQM 2014 guidelines a series of mitigation measures have been recommended in order to minimise / reduce any dust impact potential.

In summary it is concluded that provided the mitigation measures outlined within this report are implemented, then air quality impact on local receptors, existing air qualities and future occupants of the development is anticipated to be LOW.

Appendix 1

Table A1: Potential Dust Emission Magnitude

Phase	Dust Emission Magnitude	Description
Demolition	**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 10-20 m above ground level
	Small	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months
Earthworks	**Large**	Total site area >10,000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes
	Medium	Total site area 2,500m^2 – 10,000m^2, moderately dusty soil type (e.g. silt), 5-10 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
	Small	Total site area <2 ,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at anyone time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months
Construction	**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 (e.g. concrete), on site concrete batching
	Small	Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout	**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 anyone day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m–100m
	Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

Table A2: Sensitivities of People to Dust Soiling Effects

Sensitivity	Description
High	users can reasonably expect enjoyment of a high level of amenity; or
	the appearance, aesthetics or value of their property would be diminished by soiling; and
	the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land
	indicative examples include dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms
Medium	users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or
	the appearance, aesthetics or value of their property could be diminished by soiling; or
	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.
	indicative examples include parks and places of work
Low	the enjoyment of amenity would not reasonably be expected; or
	property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or
	there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.
	indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.

Table A3: Sensitivities of People to the Health Effects of PM_{10}

Sensitivity	Description
High	locations where members of the public are exposed over a time period relevant to the air quality objective for PM10 (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).
	Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment
Medium	locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM10 (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).
	indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM10, as protection is covered by Health and Safety at Work legislation.
Low	locations where human exposure is transient.
	indicative examples include public footpaths, playing fields, parks and shopping streets.

Table A4: Criteria for Sensitivities of People to Dust Soiling Effects

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20	<50	<200	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	High	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table A4: Criteria for Sensitivities of People to Dust Soiling Effects

Receptor Sensitivity	Annual Mean PM10 Conc.	No. of Receptors	Distance from Source (m)				
			<20	<50	<100	<200	<350
High	>32 ug/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 ug/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 ug/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 ug/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 ug/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 ug/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 ug/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 ug/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table A5: Risk of Dust Impacts - Demolition

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

Table A6: Risk of Dust Impacts - Earthworks

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

Table A7: Risk of Dust Impacts - Construction

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

Table A8: Risk of Dust Impacts - Trackout

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