

Technical Note

Project title	St Giles Quarter Air Quality Monitoring
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File reference	
cc	
Prepared by	Arup – Air Quality
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Subject	Air Quality Monitoring Methodology for Construction Dust

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1. Introduction

Ove Arup and Partners Ltd (Arup) has been commissioned by Lab Selkirk House Ltd and Sollidon Ltd to provide air quality monitoring in support of the discharge of a planning condition for the consented development at St Giles Quarter (Formerly known as the Museum Street and West Central Street scheme, planning reference: 2023/2510/P) in the London Borough of Camden (the Council).

Following the award of planning consent, the Council has requested planning condition 45 to be discharged prior to any works commencing, as follows:

Construction related impacts - monitoring

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

- 1. prior to installing monitors, full details of the air quality monitors have been submitted to and approved by the local planning authority in writing. Such details shall include the location, number and specification of the monitors, including evidence of the fact that they will be installed in line with guidance outlined in the GLA's Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance;*
- 2. a confirmation email should be sent to airquality@camden.gov.uk no later than one day after the monitors have been installed with photographic evidence in line with the approved details.*
- 3. prior to commencement, a baseline monitoring report including evidence that the monitors have been in place and recording valid air quality data for at least 3 months prior to the proposed implementation date shall be submitted to the Local Planning Authority and approved in writing. The monitors shall be retained and maintained on site in the locations agreed with the local planning authority for the duration of the development works, monthly summary reports and automatic notification of any exceedances provided in accordance with the details thus approved. Any changes to*

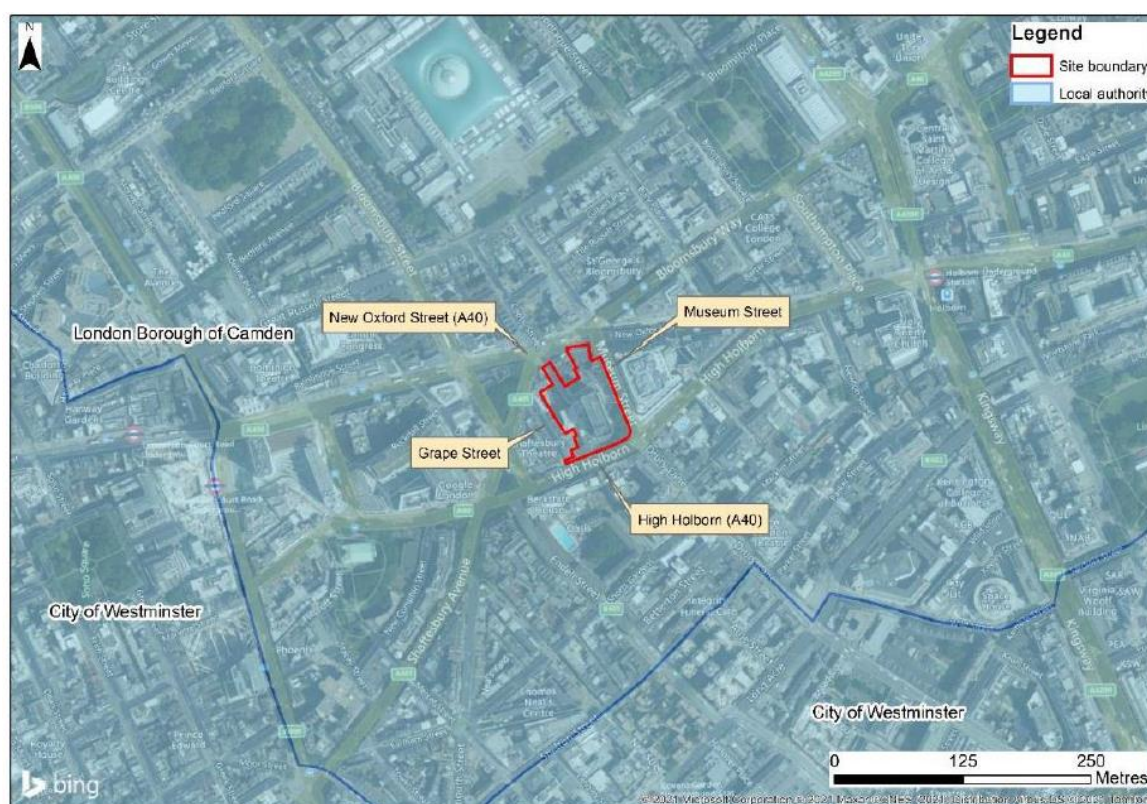
the monitoring arrangements must be submitted to the Local Planning Authority and approved in writing.

Reason: To safeguard the amenity of adjoining premises and the area generally in accordance with the requirements of policies A1 and CC4 of the London Borough of Camden Local Plan 2017.

In addressing planning condition 45, this document has been drafted to share with the Council in order to set out and agree the method proposed for the site (shown in Figure 1).

Section 2 includes the real-time dust monitoring approach to inform the baseline air quality conditions around the site and continuation of real-time monitoring for the duration of the construction works to support the discharge of planning condition 45. Section 3 details the reporting processes.

Figure 1: Site Location



2. Monitoring methodology for construction dust

2.1 Proposed monitoring locations

A construction dust assessment was undertaken as part of the air quality assessment submitted for planning¹, in which classified the site as *High* risk to dust soiling and *Low* risk to human health impacts from the construction activities, based on conservative assumptions. As such, it is proposed to install four units of automatic air quality sensors to monitor PM₁₀. The locations are selected to assess impacts upwind and downwind of works based on the prevailing wind direction from the southwest. The monitoring locations have also considered the nearby sensitive receptors and have been placed to at the boundaries of the work areas

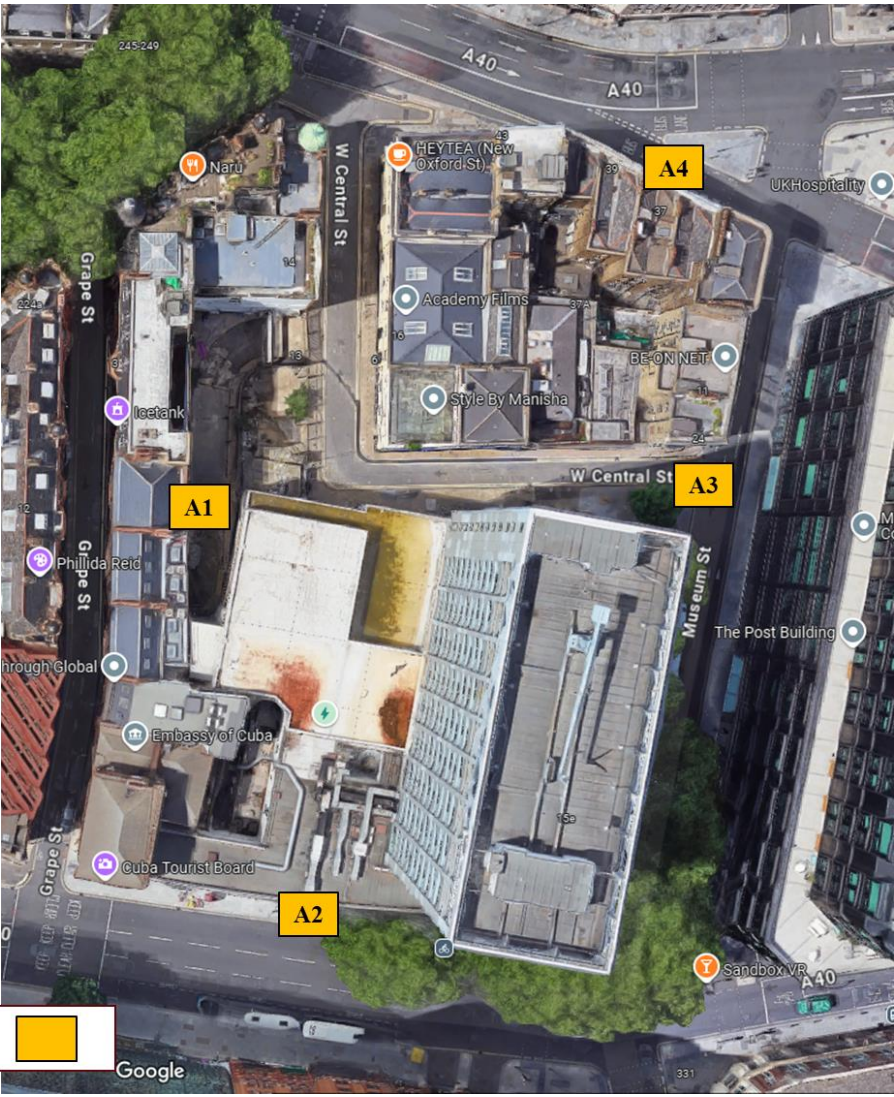
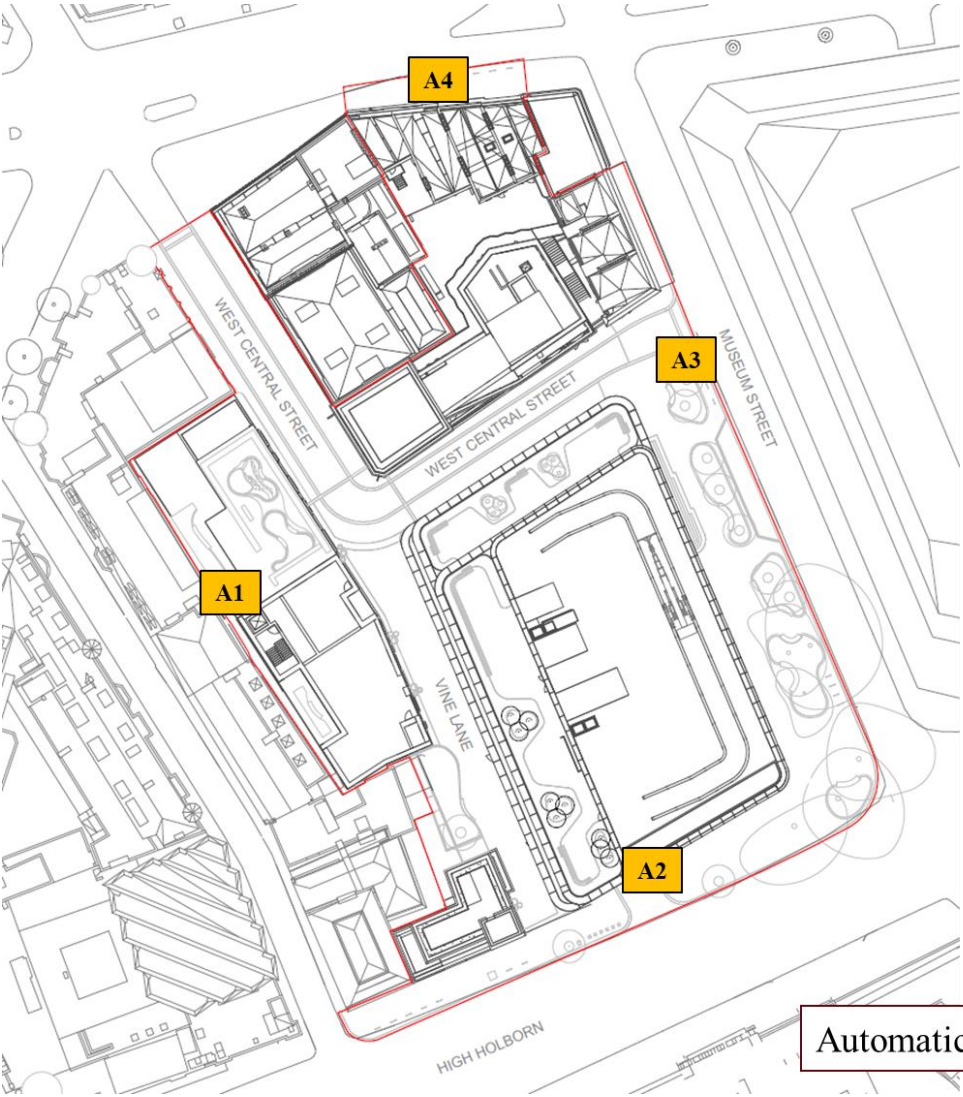
¹ Camden Planning Application Website: Air Quality Assessment (2023/2510/P)
<https://camdocs.camden.gov.uk/HPRMWebDrawer/Record/10111511/file/document?inline> [Accessed 30/08/2024]

closes to those receptors in order to identify any increases in dust at the most sensitive locations. The proposed indicative locations are shown in Table 1 in Figure 2. The below locations have been selected based on security and accessibility reasons. It should also be noted that they will be relocated to similar locations once the hoarding is erected. The Council will be notified should the monitors be relocated.

Table 1 Proposed indicative monitoring locations

Monitoring ID	Indicative location	Indicative height
A1	West Central Street (parallel to Grape Street)	1.5m
A2	High Holborn, roof level of Domino's	5m
A3	West Central Street, adjacent to Musuem Street and at the facade of the vacant carpark	4m
A4	New Oxford Street, roof level	6m

Figure 2 Indicative locations of monitoring equipment



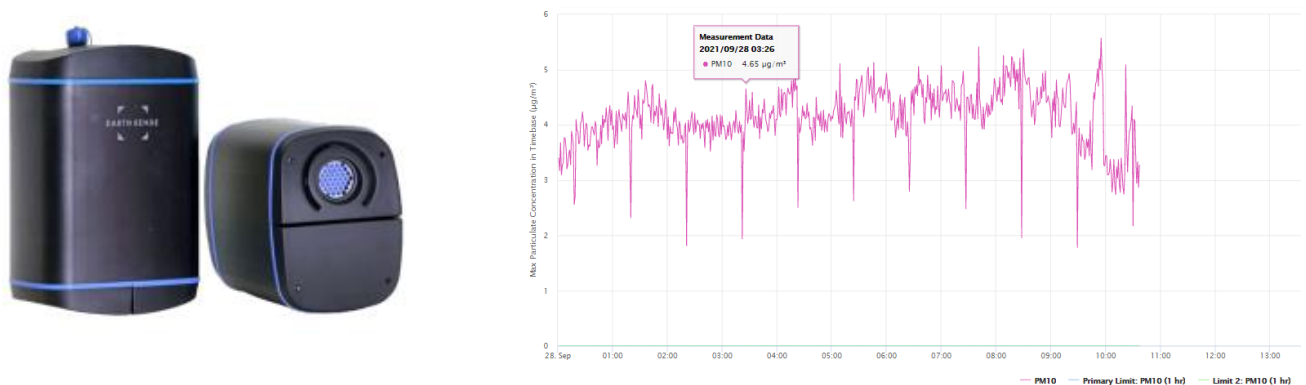
2.2 Monitors specification

Automatic sensors will be used to collect real-time data, and to facilitate the monitoring of PM₁₀. Air quality sensors are suitable for monitoring short-term or long-term pollution hotspots. The proposed automatic monitors being used are Zephyr manufactured by EarthSense Systems Ltd², which are certified against the Environment Agency's MCERTS Scheme for indicative ambient particulate monitoring. The Zephyr will actively sample air through the optical sensor for particulates and electrochemical sensor for NO₂. The sensor performance will also be tested and calibrated against reference standard analysers prior to dispatch. In addition to PM₁₀ monitoring, the sensors will also be used to collect NO₂ and PM_{2.5} concentrations.

The proposed monitoring will be undertaken following industry's best practice in accordance with GLA's Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance³ and the Institute of Air Quality Management (IAQM) guidance on monitoring in the vicinity of demolition and construction sites⁴.

The concentrations for NO₂, PM₁₀ and PM_{2.5} will be determined for chosen averaging periods, and the collected data is sent to a web-based location (Figure 3). This is considered to be an efficient method to manage any exceedances and ongoing data analysis for reporting purposes. The monitors can be housed in a lamp post box powered by mains electricity or powered by battery or solar power.

Figure 3: Automatic sensor (left) and associated web based data example (right)



2.3 Monitoring duration

For baseline monitoring, the automatic sensors will be on site to collect air quality data for three months prior to the start of demolition and construction works. At the time of writing, the demolition works are due to commence in February 2025, the baseline monitoring period is estimated to begin in October and collect three months of data before the development works. The monitors can be retained and maintained by the contractors on site for the duration of the demolition and construction works. The detailed construction programme is not available when preparing this air quality method statement, however the abovementioned monitoring duration and approach will be adopted and implemented for both baseline and

² Zephyr specification, available at <https://www.earthsense.co.uk/> [Accessed August 2024]

³ Greater London Authority (2014) The Control of Dust and Emissions during Construction and Demolition, Supplementary Planning Guidance, 2014

⁴ Institute of Air Quality Management (IAQM) (2018a) Guidance on Monitoring in the Vicinity of Demolition and Construction Sites (version 1.1).

construction monitoring. Any changes to the monitoring arrangements will be submitted to the Local Planning Authority and approved in writing.

2.4 Data analysis

All monitored data collected by the automatic samplers will be made available through an online portal, including means, peaks and full fluctuations of gases and particulates. The measurement periods are 1 minute to 1 hour and raw data is sent by a cellular network to a web-based browser where tables and graphs can be accessed. The online portal would be checked on a weekly basis to confirm the automatic sensors are functioning correctly.

A robust QA procedure will be in place to result in useful data being collected, including removal of erroneous data, automatic data sense checks and reviews. This will take place as part of the reporting procedure detailed in Section 3. Once the data have been reviewed, the data will be assessed in line with long and short-term air quality standards presented in Appendix A.

2.5 Detection of exceedances

For the duration of the development works, the automatic monitoring will be set up to allow for detection of exceedances through an alert system. Following the IAQM's monitoring guidance⁵, a Site Action Level (SAL) for PM₁₀ concentrations is 190µg/m³ averaged over a 1-hour period will be used for the reference-equivalent samplers. An interim SAL at 250µg/m³ averaged over 15-minute is also recommended to be set up, this is to provide an early reminder to alert the site staff to action on reducing dust emission should PM₁₀ concentrations be increasing towards the SAL of 190µg/m³.

The alert system will notify the onsite manager or responsible personnel, should exceedances be detected. The site and construction activities would then require to be inspected, as soon as practicable, and appropriate mitigation measure should be reviewed or reinforced. An incident log should also be completed and filed; an example of the incident form is presented in Appendix B.

3. Reporting

Prior to commencement of construction works, a baseline monitoring report will be produced, summarising PM₁₀, PM_{2.5} and NO₂ data collected from the automatic sensors.

For the duration of the construction works, monthly summary reports will be produced as per condition 45's requirement, in which will include PM₁₀ data collected from the automatic sensors in accordance with the details approved. It is also considered to be reasonable for condition 45 to be discharged following the submission of the month 3 monitoring report. This this will be confirmed between Arup and LBC as part of this condition 45 discussion.

⁵ IAQM (2018) Guidance on Monitoring in the Vicinity of Demolition and Construction Sites

Appendix A

Air Quality Standards

In order to evaluate the air quality around the site it is helpful to understand relevant thresholds set out in international, national and local air quality standards. The World Health Organization (WHO) guidelines represent the international standards, while the UK standards are set out by the Air Quality Standards Regulations. Locally, the Council has set air quality standards⁶ more stringent than the national ones and in line with the WHO air quality guidelines⁷.

Some pollutants have standards expressed as annual average concentrations due to their chronic impacts on health or the natural environment, i.e. effects occur after a prolonged period of exposure to elevated concentrations. Other pollutants have standards expressed as 24-hour, 1-hour or 15-minute average concentrations due to their acute impacts on health or the natural environment, i.e. after a relatively short period of exposure. Some pollutants have standards expressed in terms of both long and short-term concentrations.

3.1 International standards

The WHO publishes guidelines for air quality which reflect the latest body of evidence on health impacts of different air pollutants (these differ from legal limits which take into account both health impacts and the practical feasibility of achieving the targets). The WHO guidelines are not legally binding, however they are recognised globally by policy-makers to inform evidence-based legislation and policies to improve air quality.

The latest guidelines were published in September 2021⁸ and were the first update since 2005⁹. Recognising that many places are not close to achieving the latest guidelines published in 2021, the WHO has also introduced a series of ‘interim targets’ designed to be used as incremental steps towards meeting the final air quality guidelines.

Table 2 sets out the latest WHO guidelines and interim targets for NO₂, PM₁₀ and PM_{2.5} as well as comparison with the previous 2005 guidelines.

Table 2: WHO air quality guidelines and interim targets

Pollutant	Averaging period	2021					2015
		Interim target (µg/m³)				Guideline (µg/m³)	Guideline (µg/m³) ¹
		1st	2nd	3rd	4th		
NO ₂	Annual mean	40	30	20	—	10	40
	Short term (24-hour) ²	120	50	—	—	25	—
PM ₁₀	Annual mean	70	50	30	20	15	20
	Short term (24-hour) ²	150	100	75	50	45	50

⁶ London Borough of Camden (2021) Camden Planning Guidance: Air Quality

⁷ <https://www.who.int/news-room/feature-stories/detail/what-are-the-who-air-quality-guidelines>

⁸ World Health Organization (2021). WHO global air quality guidelines – Particulate matter (PM_{2.5} and PM₁₀), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide.

⁹ World Health Organization (2006). Air quality guidelines – Global update 2005.

Pollutant	Averaging period	2021				2015	
		Interim target (µg/m ³)				Guideline (µg/m ³)	Guideline (µg/m ³) ¹
		1st	2nd	3rd	4th		
PM _{2.5}	Annual mean	35	25	15	10	5	10
	Short term (24-hour) ²	75	50	37.5	25	15	25

¹ Provided for information | ² 99th percentile (i.e. 3-4 exceedances per year)

3.2 National standards

The Air Quality Standards Regulations 2010 (amended in 2016) were based on European Union (EU) legislation (Directive 2008/50/EC¹⁰) which defined the policy framework for 12 air pollutants known to have harmful effects on human health or the natural environment. The EU legislation set air quality limit values (pollutant concentrations not to be exceeded by a certain date) and the transposed legislation into national law required the Secretary of State for the Environment to ensure compliance with them.

Following the UK's exit from the EU, the Air Quality Standards Regulations (EU-derived domestic legislation) were retained under section 2 of the European Union (Withdrawal) Act 2018. Practical amendments to ensure air quality management would continue were made via the Air Quality (Amendment of Domestic Regulation) (EU Exit) Regulations 2019¹¹.

The UK government also published the Environmental Improvement Plan¹² in January 2023, which forms the first revision of the 25 Year Environment Plan. It sets out targets and commitments for air quality, including interim targets for PM_{2.5} (as mandated by the Environment Act 2021). The PM_{2.5} targets have been passed into legislation through the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023¹³.

Table 3 sets out the national air quality standards and targets for NO₂, PM₁₀ and PM_{2.5}.

Table 3: National air quality standards

Pollutant	Averaging period	Air quality standard (µg/m ³)
NO ₂	Annual mean	40
	1-hour mean ¹	200
PM ₁₀	Annual mean	40
	24-hour mean ²	50
PM _{2.5}	Annual mean	20
		12 (interim target to be achieved by 2028)
		10 (target to be achieved by 2040)

¹⁰ 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.

¹¹ The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019, SI 2019/74.

¹² Department for Environment, Food and Rural Affairs (2023) Environmental Improvement Plan 2023.

¹³ The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023, SI 2023/96.

Pollutant	Averaging period	Air quality standard ($\mu\text{g}/\text{m}^3$)
¹ not to be exceeded more than 18 times a year (99.8th percentile)		
² not to be exceeded more than 35 times a year (90.4th percentile)		

3.3 Local standards

The Council has adopted the more stringent standards of $38\mu\text{g}/\text{m}^3$ for NO_2 ($40\mu\text{g}/\text{m}^3$ less 5% to take into account potential for uncertainty around NO_2 data), and the WHO guideline limits for PM_{10} ($20\mu\text{g}/\text{m}^3$) and $\text{PM}_{2.5}$ ($10\mu\text{g}/\text{m}^3$) as annual mean concentrations.

The London Environment Strategy¹⁴ also outlines the London Mayor's aim to achieve the WHO 2005 guideline for annual mean $\text{PM}_{2.5}$ concentration of $10\mu\text{g}/\text{m}^3$ by 2030.

3.4 Comparison of annual mean air quality standards

Table 4 provides a comparison of the international, national and local air quality standards for the pollutants of concern (NO_2 and $\text{PM}_{2.5}$).

Table 4: Comparison of annual mean air quality standards

Pollutant	Annual mean standard ($\mu\text{g}/\text{m}^3$)		
	WHO ¹	National	LBC
NO_2	10	40	38
PM_{10}	20	40	20
$\text{PM}_{2.5}$	5	12 or 10 ²	10
¹ 2021 guideline values			
² Interim target of $12\mu\text{g}/\text{m}^3$ to be achieved by 2028 and long term target of $10\mu\text{g}/\text{m}^3$ to be achieved by 2040			

¹⁴ Greater London Authority (2018) London Environment Strategy.

Appendix B

Incident form

Date and time	
Name and address of contact	
Name of person onsite who will investigate	
Incident Report	
Initial investigation of the cause	
Details of any measure taken in response to the incident	
Note: Keep the completed form in the file to should further discussions required with your auditors or regulators when they visit.	

Job number

Date

03 September 2024

DOCUMENT CHECKING

	Prepared by	Checked by	Approved by
Name	Charlotte Aves	Angie Chan	James Bellinger
Signature	