Silvertown Tunnel Scheme Air Quality Baseline Monitoring Report

Second Year of Monitoring, 2022
The Silvertown Tunnel Order 2018 No. 574

Transport for London

Project number: 60636520

November 2023

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
Charlotte Haddon Graduate Air Quality Consultant	Anna Savage Technical Director - Air Quality	David Deakin Technical Director – Air Quality	David Deakin Technical Director – Air Quality

Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	April 2023	Draft for comment	DD	David Deakin	Technical Director
2	November 2023	Final	DD	David Deakin	Technical Director
3	November 2023	Revised Final	DD	David Deakin	Technical Director

Distribution List

# Hard Copies	PDF Required	Association / Company Name

Prepared for:

Transport for London

Prepared by:

Charlotte Haddon
Graduate Air Quality Consultant
T: +44 (0) 7879 398 382
E: charlotte.haddon@aecom.com

AECOM Infrastructure & Environment UK Limited
Sunley House
4 Bedford Park, Surrey
Croydon CRO 2AP
United Kingdom

T: +44 20 8639 3500
aecom.com

Table of Contents

Figures

Tables

1. Executive Summary

Air quality in London

1.1 Tackling air pollution across the capital is a key focus for the Greater London Authority (GLA) and Transport for London (TfL). The Mayor of London has adopted a number of policies to improve air pollution. In recent years, these have included the expansion of the Ultra Low Emission Zone (ULEZ) to outer London, and progressive improvements to the TfL bus fleet, all of which has met or exceeded Euro VI standards since 2021 and which now includes over 1,100 zero emission vehicles. Taken together, the Mayor's policies are expected to extend the average life expectancy of a child born in London in 2013 by 5-6 months, and overall, the population of London is expected to gain around 6.1 million life years from 2013 to 2051[1].

1.2 It is noted that air pollution concentrations during 2020 and 2021 were influenced by changes in travel behaviour and traffic flows as a result of the Covid-19 pandemic and national lockdowns as well the more recent fuel crisis situation in late 2021. The overall indications in London are that traffic flows are back to pre-pandemic levels, so 2022 concentrations are unlikely to be influenced as much as the proceeding years by atypical traffic conditions.

Silvertown Tunnel Monitoring

1.3 This report presents the results of the second year of Nitrogen Dioxide (NO_2) monitoring for 2022 for TfL's Silvertown Tunnel Scheme. Monitoring was conducted using low-cost diffusion tubes at 38 locations and at three continuous monitoring sites to provide reference standard data. These locations are shown in Appendix A.

1.4 The monitoring is required to meet the commitments TfL made as part of the Development Consent Order (DCO) [2] and Monitoring and Mitigation Strategy (MMS) [3] to conduct pre and post Scheme monitoring to compare concentrations.

1.5 In line with the MMS, this report presents NO_2 concentrations, in comparison to the Air Quality Strategy (AQS) Objective Values. Data from both Scheme and local authority monitoring sites that are likely to reflect potential impacts from the tunnel are provided. This report does not provide information on $PM_{2.5}$ or describe results against thresholds outside of the AQS as this is not part of the MMS and DCO requirements for the Scheme.

1.6 The headline results at the continuous monitoring sites show that measured NO_2 concentrations in 2022 complied with the AQS Objective values at locations close to the Scheme (see Table 1-1).

Table 1-1. Summary of 2022 NO_2 Concentrations at Continuous Monitoring Sites

Statistic	Tunnel Avenue (TL4)	Hoola Tower (TL5)	Britannia Gate (TL6)	AQS Objective
Annual Mean NO_2 (µg/m^3)	32.4	22.8	24.6	40
Number of 1-hour mean NO_2 concentrations exceeding objective value of 200 µg/m^3	0	0	0	18
Data Capture Rate showing proportion of valid measurements (%)	99.6	99.6	99.5	-

[1] https://www.london.gov.uk/sites/default/files/london_health_burden_of_current_air_pollution_and_future_health_benefits_of_mayoral_air_quality_policies_january2020.pdf
[2] https://infrastructure.planninginspectorate.gov.uk/projects/london/silvertown-tunnel/
[3] TR010021-001726-8.84 Monitoring and Mitigation Strategy R2 .pdf (planninginspectorate.gov.uk)

1.7 2022 annual mean concentrations at TL4 and TL6 declined from 2021 by 5.5% and 6.8% respectively, while concentrations at TL5 concentrations increased from 2021 to 2022 by 4.6%.

1.8 Of the 38 diffusion tube monitoring sites, the annual mean NO_2 concentrations complied with the AQS objectives in the vicinity of the tunnel. There were exceedances recorded at two sites in the wider area compared to three sites in 2021. Exceedances in 2022 were seen at:

- DT3 Douglas Road, Newham Way (41.4 µg/m^3); and
- DT24 A3 Blackheath Hill (41.1 µg/m^3).

1.9 Across all diffusion tube sites, there was an average reduction in concentration by 0.5% with reductions at 23 of the 38 sites and increases at 15 sites.

2. Introduction

Air quality in London

2.1 Tackling air pollution across the capital is a key focus for the Greater London Authority (GLA) and Transport for London (TfL). The Mayor of London has adopted a number of policies to improve air pollution. In recent years, these have included the expansion of the Ultra Low Emission Zone (ULEZ), introduction of 12 low emission bus zones, funding more than 20 Low Emission Neighbourhoods in 15 boroughs and improvements to the TfL bus fleet. With these policies in place, the life expectancy of a child born in London in 2013 would improve by 5-6 months than without them, and overall, the population of London would gain around 6.1 million life years from 2013 to 2050[4].

2.2 Levels of air pollution are measured at more than 100 continuous monitoring and 1000's of diffusion tube sites across London to determine compliance against the UK's Air Quality Strategy (AQS) Objective Values 2010 (see Table 3-1). The World Health Organisation (WHO)[5] has developed their own guidelines for outdoor ambient air quality which are more stringent than the UK Air Quality Objectives (AQO). However, the WHO guidelines have not been adopted into UK legislation. The Silvertown DCO sets out the legal requirements and commitments regarding the appropriate air quality limits in which the scheme was assessed against and will be reassessed in the refreshed assessment and reported in the Environmental Compliance Assessment.

2.3 A combination of Mayoral policies and ongoing reductions in background pollution has resulted in improvements in measured air quality (AQ) levels across London. Trends are presented and discussed in the ULEZ 2021 inner London expansion one year report[6], the 2023 outer London expansion is expected to deliver further benefits. The following reductions are evidenced:

- There were 47,000 fewer vehicles seen in the ULEZ on an average day in October 2022 (a reduction of 5%) and early estimates suggest traffic flows are around 2% lower than the weeks before the 2021 inner London expansion launched.
- NO_2 concentrations alongside roads in inner London are estimated to be 21% lower than they would have been without the ULEZ and its 2021 inner London expansion. In central London, NO_2 concentrations are estimated to be 46% lower than they would have been.
- All monitoring sites on the boundary of the 2021 inner London expanded ULEZ have seen reductions in NO_2 concentrations, with an estimated 19-27% reduction in pollution on the boundary compared to a scenario without the ULEZ.

Monitoring Overview

2.4 The Silvertown Tunnel Scheme (the "Scheme") involves the construction of a 1.4 km twin-bore road tunnel under the Thames which will be the first in London in over 30 years. It will be a modern tunnel which will, combined with a user charge and a network of zero-emissions buses, improve cross-river public transport and will improve the reliability and resilience of the wider road network and by reducing congestion on the road network. The scheme will help:

- Effectively eliminate delays and queues at the Blackwall Tunnel, with journey times up to 20 minutes faster;
- Reduce the environmental impact of traffic congestion on some of London's most polluted roads; and

[4] https://www.london.gov.uk/sites/default/files/london_health_burden_of_current_air_pollution_and_future_health_benefits_of_mayoral_air_quality_policies_january2020.pdf
[5] World Health Organization (WHO) 2021. https://apps.who.int/iris/bitstream/handle/10665/345329/9789240034228-eng.pdf?sequence=1&isAllowed=y
[6] https://www.london.gov.uk/programmes-strategies/environment-and-climate-change/environment-and-climate-change-publications/inner-london-ultra-low-emission-zone-expansion-one-year-report

- Provide more opportunities to cross the river by public transport with a network of zero-emission buses offering new routes and better access to more destinations.

2.5 The scheme was subject to a full Environmental Impact Assessment (EIA) at the DCO stage which was rigorously tested at the examination. However, it was determined that there was some uncertainty associated with NO_2 effects that required further monitoring closer to the scheme opening date. Following the outcomes of the Environmental Statement (ES) and as part of the DCO [7], the Monitoring and Mitigation Strategy (MMS)[8] was developed. The MMS sets out the requirements for further air quality monitoring relating to pre and post Scheme opening. The monitoring will also be used in the refreshed assessment of Scheme impacts which must be completed to:

- Set the User Charges;
- Define the requirement for and form of localised mitigation for residual effects; and
- Specify the bus network through the Silvertown Tunnel that will operate on opening.

2.6 For this process TfL are updating the relevant transport and environmental models, rerunning the models, and developing its proposals for each element in conformity with the commitments, policies and procedures set out in the relevant certified documents and any DCO requirements.

2.7 TfL has implemented a series of Air Quality monitoring programmes for the scheme, this included wider NO_2 monitoring for the ES in 2015/2016 and NO_2 monitoring in 2019 around the Hoola Tower close to the northern tunnel portal. The ES concluded that other pollutants (including particulates) complied with the relevant AQS Objectives, therefore this report presents the baseline monitoring as set out in the MMS where only NO_2 monitoring is required.

2.8 This report presents the results of the second year of NO_2 monitoring for 2022, in the context of the AQS Objective Values. Data from Scheme specific monitoring sites and selected local authority roadside monitoring sites close to the tunnel openings are reported.

Monitoring Requirements

2.9 The MMS states that NO_2 monitors should be sited as below:

a) where the Scheme is forecast to bring about a change in air quality in excess of 0.4 $\mu g/m^3$ where annual mean concentrations are above the national air quality objective value;

b) where the Scheme could lead to traffic diverting to alternative routes which were not foreseen in the original assessment; and

c) to ensure the monitoring locations are representative of relevant exposure at sensitive receptors.

2.10 The MMS also included a map of proposed AQ monitoring locations which were chosen based on the outcomes of the ES and the criteria set out in paragraph 2.10. Based on the above requirements and using the proposed monitoring locations, TfL had a number of meetings with Silvertown Tunnel Implementation Group (STIG) representatives for the five local authorities where the monitoring locations were proposed, to agree the monitoring locations. Following the agreement with STIG representatives, 38 triplicate passive diffusion tubes were installed across London Borough (LB) of Newham, Royal Borough (RB) of Greenwich, LB Tower Hamlets, LB Lewisham and LB Southwark, to provide information on NO_2 levels across the wider road network that may be affected by changes in traffic levels associated with the Scheme. The location of these diffusion tube sites is shown in Figure A1 in Appendix A.

2.11 In addition, three continuous monitoring sites (CMS) with NO_x analysers were installed close to the tunnel openings at roadside locations where Scheme impacts are likely to be greatest. The CMS were installed at Tunnel Avenue (TL4) in RB Greenwich, Hoola Tower (TL5) and Britannia

[7] Silvertown Tunnel | National Infrastructure Planning (planninginspectorate.gov.uk)
[8] TR010021-001726-8.84 Monitoring and Mitigation Strategy R2 .pdf (planninginspectorate.gov.uk)

Gate (TL6) both in LB Newham. The locations of these monitors are shown in Figure A2 in Appendix A.

2.12 In line with the MMS and DCO requirements, NO_2 will be monitored for three year's pre-Scheme opening and for a minimum of three year's post-Scheme opening in 2025 to provide data to inform baseline conditions and Scheme impacts.

2.13 As there are a number of existing local authority monitoring sites located close to the tunnel openings, data from selected sites in this area has also been included within this report to provide a fuller coverage of the baseline conditions. The locations of these selected sites are given in Figure A3 in Appendix A.

2.14 This report provides the results of the second full year of air quality baseline monitoring undertaken between 1st January 2022 and 31st December 2022. The report describes the monitoring locations and presents the results in the context of the relevant UK AQS objectives. Any exceedances of these objectives are highlighted and a comparison with data from the first year of monitoring is given.

2.15 Monitoring of construction dust and particulates is being carried out separately to the monitoring presented in this report. The construction air quality monitoring programme is managed by Riverlinx Construction Joint Venture who are contracted to complete the design and construction of the Silvertown Tunnel.

3. Air Quality Objectives

3.1 Table 3-1 sets out the UK AQS Objectives that are of relevance to the air quality monitoring programme.

3.2 The table defines the averaging period and an associated Objective that should not be exceeded. For short-term Objectives there may be an allowable number of exceedances. For example, the UK AQS Objective for 1-hour NO_2 concentrations is an hourly mean NO_2 concentration of 200 µg/m^3 to be exceeded 18 times or fewer per year. This is equivalent to the 99.79th percentile of hourly mean NO_2 concentrations.

Table 3-1. Air Quality Objectives and Guidelines

Pollutant	Averaging Period	AQS Objective (µg/m^3)	Not to be Exceeded More Than
Nitrogen dioxide (NO_2)	Annual	40	-
	1-hour	200	18 hours (99.79th percentile)

4. Air Quality Monitoring Locations

Scheme Continuous Monitoring Stations (CMS)

4.1 Details of the CMS are shown in Table 4-1, along with a link to the relevant webpages of the London Air Quality Network (LAQN), where additional information about each site can be found and monitoring data can be downloaded. The monitoring site IDs are consistent with those in the LAQN for other existing TfL CMSs (TL1-3 are existing monitors in the network).

4.2 Tunnel Avenue, Greenwich (TL4) is in the Royal Borough of Greenwich alongside the A102 Blackwall Tunnel southern approach near to the location of the southern portal for the proposed Silvertown Tunnel. Hoola Tower (TL5) is located at the northern end of the proposed tunnel opening close to Hoola West Tower and Britannia Gate (TL6) is located at the northern end of the proposed tunnel opening on Silvertown Way. Both TL5 and TL6 are located in the London Borough of Newham. The locations of these monitoring stations are shown in Figure A2 in Appendix A.

4.3 Monitoring began at site TL4 and TL6 in December 2020 and in March 2021 at TL5 due to additional work required to provide power to the monitor.

4.4 All three stations are reference standard equipped with chemiluminescence analysers for the measurement of NO_x and NO_2.

Scheme Diffusion Tube Monitoring Locations

4.5 The diffusion tubes were installed in December 2020 at roadside sites close to the tunnel openings, on the approaching road links and on key routes north and south of the River Thames. Monitoring is conducted within the boroughs of Newham, Tower Hamlets, Lewisham, Greenwich and Southwark. Three of the diffusion tube sites are co-located with the three CMS; TL4, TL5 and TL6.

4.6 The Scheme ES[9] concluded that the greatest potential air quality impact would be at residential properties at the Hoola Tower, Tidal Basin Road in Newham. An additional six diffusion tube locations were therefore placed around the Hoola Tower building to further understand the potential air quality concentrations and impacts in this specific area.

4.7 A total of 38 diffusion locations were agreed with STIG, with triplicate diffusion tubes sited at each location. Details of the sites are in Table 4-2 and their locations are shown in Figure A1 in Appendix A. The tubes were prepared and analysed by Staffordshire Highways Laboratory, using the 20% triethanolamine (TEA) in water method of analysis. The methods used for the preparation and analysis of passive diffusion tubes match those used in the Scheme specific monitoring reported in the ES.

Local Authority Monitoring Locations

4.8 There are a number of local authority run air quality monitoring sites around the tunnel openings. These include CMSs, diffusion tubes and low-cost sensors through Breathe London. NO_2 concentrations from representative roadside sites within 2km of the tunnel have been included in this report to provide additional baseline data, in addition to a nearby urban background site. These locations are situated in Greenwich, Newham and Tower Hamlets, as shown in Table 4-3.

[9] TR010021-000472-Transport for London - Chapter 6 Air Quality.pdf (planninginspectorate.gov.uk)

Table 4-1. Scheme Continuous Monitoring Station Site Details

Site ID	Site Address, London Borough	Site Type	X (m)	Y (m)	Height (m)	Distance to Kerb (m)	Distance to Relevant exposure (m)	Distance to Tunnel Portal (m)	LAQN Website Link
TL4	Tunnel Avenue, Greenwich	Roadside	539223	179250	1.3	13.0	260	30	TL4
TL5	Hoola Tower, Newham	Roadside	539936	180732	1.5	2.6	10	115	TL5
TL6	Britannia Gate, Newham	Roadside	540339	180263	1.4	5.8	7	700	TL6

Table 4-2. Scheme Diffusion Tube Site Details

Site ID	Site Address, London Borough	Site Type	X (m)	Y (m)	Height (m)	Distance to Kerb (m)	Distance to Relevant exposure (m)	Distance to Tunnel Portal (km)
DT1	3 Washington Close, Tower Hamlets	Roadside	538028	182780	3.0	0.9	2.3	2.7
DT2	Tynne Court on A12 Blackwall Tunnel, Tower Hamlets	Roadside	538101	182040	2.5	0.5	5.5	2.1
DT3	Douglas Road, Newham Way, Newham	Roadside	540302	181769	2.8	3.9	5.4	1.1
DT4	1041 Newham Way, Newham	Roadside	542221	182127	2.3	3.3	11.2	2.8
DT5	Strait Road / 3 Campion Close, Newham	Roadside	542911	180913	2.9	1.6	6.7	3.1
DT6	Hanameel Street / North Woolwich Road, Newham	Roadside	540635	180130	2.8	2.9	25.1	1.0
DT7	John Wilson Street / St Mary Street, Greenwich	Roadside	543181	179034	2.3	2.6	6	3.8
DT8	Southern Way, Greenwich	Roadside	539926	178964	2.5	12.0	8.6	0.7

Site ID	Site Address, London Borough	Site Type	X (m)	Y (m)	Height (m)	Distance to Kerb (m)	Distance to Relevant exposure (m)	Distance to Tunnel Portal (km)
DT9	Westcombe Hill / Westerdale Road, Greenwich	Roadside	540257	178208	2.6	0.7	12.9	1.5
DT10	Sun-in-the-Sands, Greenwich	Roadside	540770	176945	2.4	10.3	2.4	2.8
DT11	311 Prince Regent Lane, Newham	Roadside	541098	181646	3.0	3.1	4.7	1.6
DT12	Robin Hood Lane, Tower Hamlets	Roadside	538357	180968	2.8	0.4	2.5	1.4
DT13	46 Ming Street, Tower Hamlets	Roadside	537347	180722	2.9	7.3	12.6	2.4
DT14	East Parkside, Greenwich	Roadside	539578	179536	2.5	>50	125.2	0.4
DT15	45 Siebert Road, Greenwich	Roadside	540423	177707	2.4	16.0	10.5	2.0
DT16	Switch House, Tower Hamlets	Roadside	538925	180938	2.9	0.6	20.8	0.8
DT17	East India Dock Road, Tower Hamlets	Roadside	538721	181180	2.9	1.2	7.3	1.1
DT18	13 College Approach, Greenwich	Roadside	538327	177780	2.7	1.0	0.8	1.7
DT19	8 Silvertown Way, Newham	Roadside	539498	181422	2.6	1.2	9	0.7
DT20	68 Lower Road, Southwark	Roadside	535253	179314	2.0	2.9	0	4.0
DT21	Evelyn Street, Lewisham	Roadside	537124	177699	2.7	3.5	9.1	2.6
DT22	85 Evelyn Street, Lewisham	Roadside	536220	178443	2.5	6.1	5.3	3.1
DT23	43 Rotherhithe Old Road, Southwark	Roadside	535676	178798	2.6	0.4	9.9	3.6
DT24	A2 Blackheath Hill, Greenwich	Roadside	538410	176743	2.8	2.6	4.6	2.6
DT25	Old Kent Road, Southwark	Roadside	534986	177422	2.6	10.0	21	4.6
DT26	Lower Road, Southwark	Roadside	535936	178720	2.6	8.0	7.3	3.3

Site ID	Site Address, London Borough	Site Type	X (m)	Y (m)	Height (m)	Distance to Kerb (m)	Distance to Relevant exposure (m)	Distance to Tunnel Portal (km)
DT27	1 Silvertown Way, Newham	Roadside	539642	181158	2.3	0.8	5.8	0.5
DT28	Lanrick Road, Tower Hamlets	Roadside	538961	181331	2.5	2.2	7.3	1.0
DT29	Deptford Church Street, Lewisham	Roadside	537398	177488	2.3	8.2	12.5	2.6
Hoola 1	Hoola Tower - 3 Tidal Basin Rd, Newham	Roadside	539905	180737	1.3	25.0	0	0.1
Hoola 2	Hoola Tower - 3 Tidal Basin Rd, Newham	Roadside	539907	180733	1.3	15.0	0	0.1
Hoola 3	Hoola Tower - 3 Tidal Basin Rd, Newham	Roadside	539909	180729	1.3	10.0	0	0.1
Hoola 5	Hoola Tower - 3 Tidal Basin Rd, Newham	Roadside	539915	180766	1.5	14.0	0	0.1
Hoola 6	Hoola Tower - 3 Tidal Basin Rd, Newham	Roadside	539938	180749	2.7	16.8	2.8	0.1
Hoola 10	Hoola Tower - 3 Tidal Basin Rd, Newham	Roadside	539922	180730	2.5	2.5	2.8	0.1
TL4	Tunnel Avenue*, Greenwich	Roadside	539223	179250	1.3	13.0	33.5	0.0
TL5	Hoola Tower - 3 Tidal Basin Rd*, Newham	Roadside	539936	180732	1.5	2.6	10.6	0.1
TL6	Britannia Gate / Silvertown Way*, Newham	Roadside	540339	180263	1.4	5.8	5.9	0.7

Table 4-3 Relevant Local Authority Site Details

Site ID	Site Address, London Borough	Site Type	X (m)	Y (m)	Height (m)	Distance to Kerb (m)	Distance to Relevant exposure (m)	Distance to Tunnel Portal (km)
TH4	Blackwall Tunnel Northern Approach, Tower Hamlets	Roadside	538290	181452	3	3	28.6	1.6
GN6	John Harrison Way, Greenwich	Roadside	539687	179123	3	3	23.7	4.6
GR8	Woolwich Flyover, Greenwich	Roadside	540208	178373	3	3	9.1	1.3
GW36(11)	Boord St, Greenwich	Roadside	539319	179235	2	30	11.9	8.1
GW50	Woolwich Flyover, Greenwich	Roadside	540208	178373	2	3.5	6.8	1.3
GW51 (28)	Bugsbys Way, Greenwich	Roadside	539638	179024	2	2	41.4	4.6
GW61	John Harrison Way, Greenwich	Roadside	539687	179123	2	3.5	23.7	4.6
NM3	Wren Close, Newham	Background	539889	181469	3	>50	15	7.4
10	Tant Avenue, Newham	Background	539747	181477	1.5	27.8	9.6	7.5
20	Canning Town Roundabout, Newham	Roadside	539687	179123	1.5	0.3	33.5	8.2
73	John Smith Mews, Tower Hamlets	Kerbside	538747	180754	2.3	0.5	12.3	1.0
85	Portree Street, Tower Hamlets	Kerbside	538890	181301	2.3	0.5	4.9	1.0
86	Newport Avenue, Tower Hamlets	Kerbside	538954	180872	2.6	0.5	15.5	8.1
Breathe London*	Silvertown Tunnel Access Corridor	Roadside	539517	181362	3	0.5	>50	7.4
Breathe London*	Blackwall Tunnel Approach	Roadside	538290	181452	3	3	28.6	1.6

Notes 1: *Co-located with CMS
Notes 2 **Breathe London -details estimated

5. Scheme Continuous Monitoring Results

Data Processing

5.1 All data have gone through a process of Quality Assurance/Quality Control (QA/QC) to ensure that monitoring data is fit for purpose. The CMS are calibrated every two weeks and calibration data is sent to the Environmental Research Group (ERG), who are responsible for data management, data validation and ratification as part of the LAQN. This ensures that the data collected and reported are reliable and consistent.

5.2 Data capture rates are used to determine the useability of the data. If data capture for the year is below 85% (as specified in Defra's Technical Guidance LAQM.TG(22)[10]), it is considered less precise. The automatic monitoring sites are also subject to 6 monthly external audits and servicing.

5.3 Full details of the QA/QC procedures are provided in Appendix C.

Tunnel Avenue (TL4), Greenwich

5.4 Table 5-1 summarises the results for the period 1st January 2022 to 31st December 2022 ('the monitoring period') for the TL4 CMS.

5.5 Data capture for the monitoring period was 99.6%. This is above the recommended 85% minimum data capture defined by The Department for Environment, Food and Rural Affairs (Defra) for data quality purposes.

5.6 The annual mean NO_2 concentration was 32.4 µg/m^3. This achieves the annual mean NO_2 AQS Objective of 40 µg/m^3. Data from this site were not annualised as the data capture rate was above 75%.

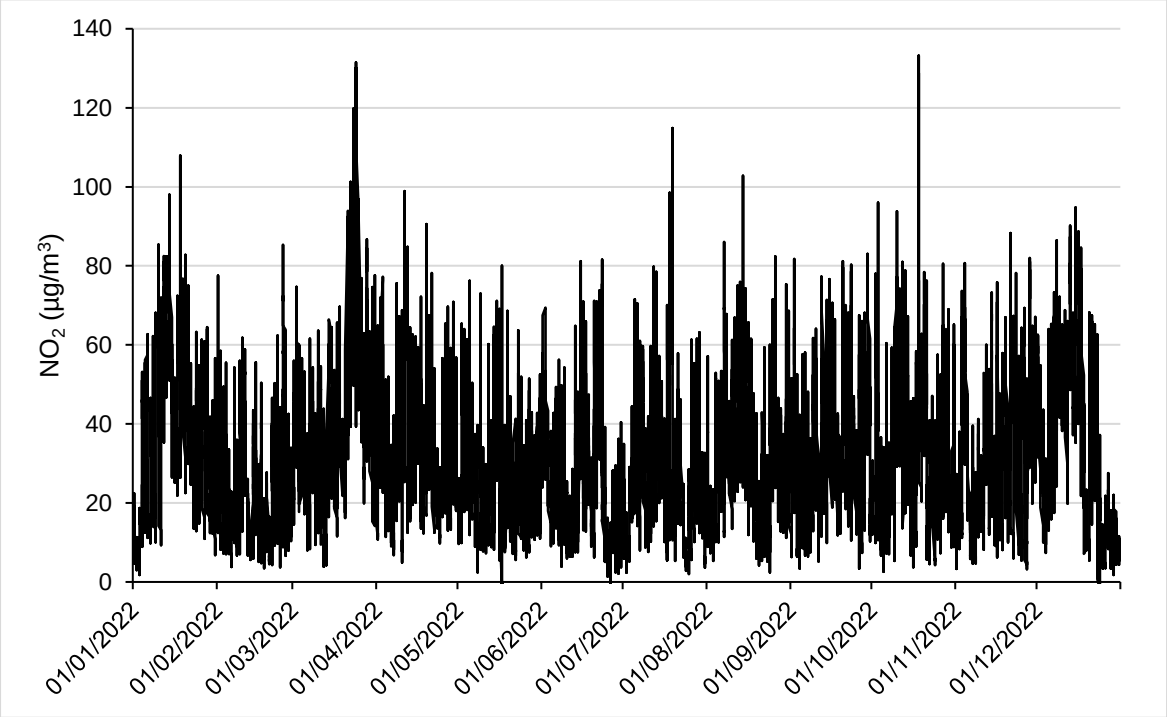
5.7 The maximum 1-hour mean NO_2 concentration was 133.2 µg/m^3, which meant that the 1-hour mean NO_2 AQS Objective value of 200 µg/m^3 was not exceeded during the monitoring period. This is within the 18 permitted hours of exceedance and therefore the 1-hour mean NO_2 AQS Objective was achieved.

Table 5-1. Tunnel Avenue (TL4) Air Quality Monitoring Results, 2022

Statistic	NO_x	NO	NO_2
Annual Mean (µg/m^3)	56.6	15.8	32.4
Number of 1-hour mean NO_2 concentrations exceeding objective value of 200 µg/m^3	-	-	0
Data Capture (%)	99.6	99.6	99.6

[10] https://laqm.defra.gov.uk/air-quality/featured/uk-regions-exc-london-technical-guidance/

Figure 5-1. Time Series Plot of 1-hour Mean NO_2 Concentrations at TL4 – Tunnel Avenue Greenwich, 1st January 2022 to 31st December 2022



5.8 Monitored hourly values clearly vary over the year, with higher peaks seen around March – April 2022, and lower concentrations observed during the summer period, at the start of January, and end of February and December. The seasonal variation observed at TL4 is similar to that observed at Newham's Wren Close urban background monitoring site (Figure 7-4) and across all other roadside sites.

Hoola Tower (TL5), Newham

5.9 Table 5-2 summarises the results for the period 1st January 2022 to 31st December 2022 ('the monitoring period') for the TL5 CMS.

5.10 Data capture for the annual monitoring period was 99.6%. This is above the recommended 85% minimum data capture defined by The Department for Environment, Food and Rural Affairs (Defra) for data quality purposes.

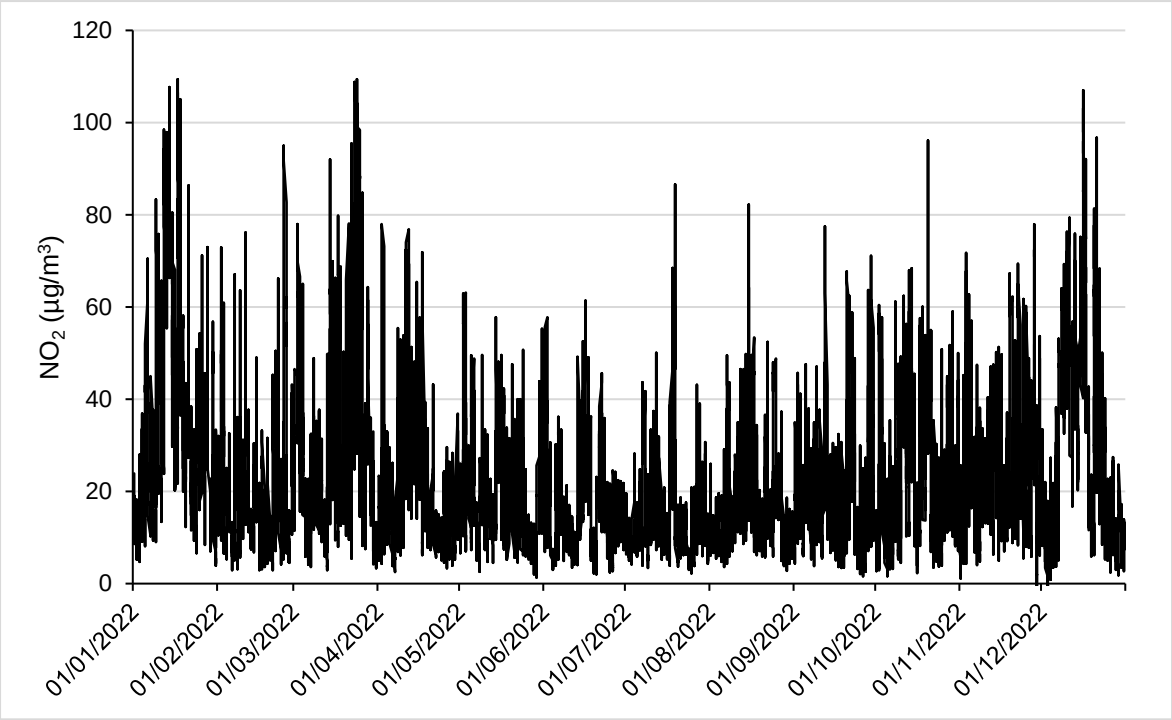
5.11 The annual mean NO_2 concentration was 22.8 µg/m^3. This achieves the annual mean NO_2 AQS Objective of 40 µg/m^3. Data from this site were not annualised as the data capture rate was above 75%.

5.12 The maximum 1-hour mean NO_2 concentration was 109.4 µg/m^3, which meant that the 1-hour mean NO_2 AQS Objective value of 200 µg/m^3 was not exceeded during the monitoring period. This is within the 18 permitted hours of exceedance and therefore the 1-hour mean NO_2 AQS Objective was achieved.

Table 5-2. Hoola Tower (TL5) Air Quality Monitoring Results, 2022

Statistic	NO_x	NO	NO_2
Annual Mean (µg/m^3)	33.9	7.2	22.8
Number of 1-hour mean NO_2 concentrations exceeding objective value of 200 µg/m^3	-	-	0
Data Capture (%)	99.6	99.6	99.6

Figure 5-2. Time Series Plot of 1-hour Mean NO_2 Concentrations at TL5 – Hoola Tower Newham, 1st January 2022 to 31st December 2022



5.13 Hourly values were highest in March – April and in the autumn/winter period, especially during January and December, excluding the last few days of December and the first few days of January which showed much lower concentrations. As indicated in Figure 7-4, the seasonal variation observed at TL5 follows a similar trend to that observed at LB Newham's Wren Close urban background monitoring site. This trend is seen across all sites.

5.14 It is noted that there are a number of idling delivery vehicles often immediately outside the monitoring unit observed during site visits which may be affecting concentrations. These delivery vehicles are associated with the residential properties in the Hoola Tower and are not related to the construction of the scheme.

Britannia Gate (TL6), Newham

5.15 Table 5-3 summarises the results for the period 1st January 2022 to 31st December 2022 ('the monitoring period') for the TL6 CMS.

5.16 Data capture for the monitoring period was 99.5.%. This is above the recommended 85% minimum data capture defined by Defra for data quality purposes.

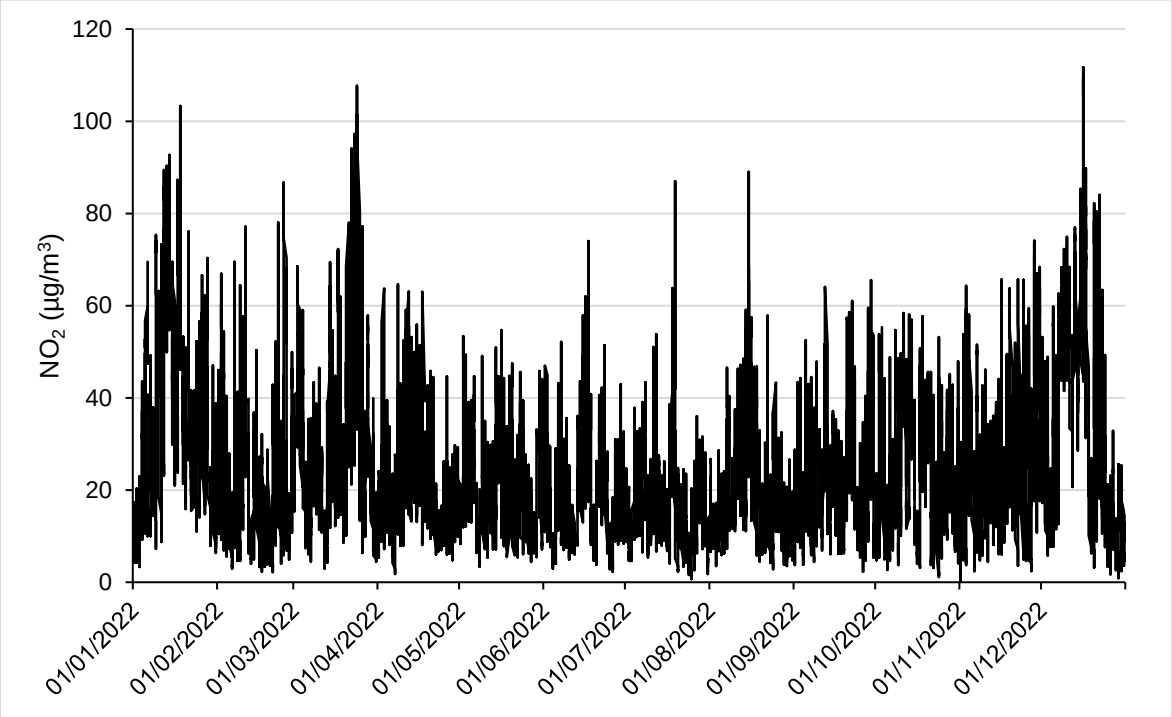
5.17 The annual mean NO_2 concentration was 24.6 µg/m^3. This achieves the annual mean NO_2 AQS Objective of 40 µg/m^3. Data from this site were not annualised as the data capture rate was above 75%.

5.18 The maximum 1-hour mean NO_2 concentration was 111.7 µg/m^3, which meant that the 1-hour mean NO_2 AQS Objective value of 200 µg/m^3 was not exceeded during the monitoring period. This is within the 18 permitted hours of exceedance and therefore the 1-hour mean NO_2 AQS Objective was achieved.

Table 5-3. Brittania Gate (TL6) Air Quality Monitoring Results, 2022

Statistic	NO_x	NO	NO_2
Annual Mean (µg/m^3)	42.8	11.8	24.6
Number of 1-hour mean NO_2 concentrations exceeding objective value of 200 µg/m^3	-	-	0
Data Capture (%)	99.5	99.5	99.5

Figure 5-3. Time Series Plot of 1-hour Mean NO_2 Concentrations at TL6 – Britannia Gate Newham, 1st January 2022 to 31st December 2022



5.19 Hourly concentrations show a similar patten to the other two CMS, with higher peak values during spring in particular during March – April and autumn/winter periods, excluding the last few days of December and the first few days of January. Lower concentrations are observed during the summer from May to August. This trend across the year is also broadly similar to the data collected at local authority monitoring sites (see Section 7).

Comparison to 2021

5.20 The trends observed in the monthly data are broadly consistent between 2021 and 2022 where concentrations generally increase in the autumn and winter and decrease in the spring and summer months. However, a peak was observed in March – April 2022 which was not present in 2021.

5.21 The annual average concentrations observed at TL4 and TL6 decreased from 2021 to 2022 by 5.5 and 6.8% respectively while the levels at TL5 increased by 4.6%.

6. Scheme Diffusion Tube Monitoring Results

Data Processing

6.1 Diffusion tube data is processed by Staffordshire Highways Laboratory using a preparation method of 20% TEA in water. In line with Defra guidance, data have been adjusted using a factor based on the difference between diffusion tube readings and readings from a continuous reference monitor, called a bias adjustment factor. Two factors have been calculated, one based on co-located tubes with the three continuous monitoring sites and a second using data from the national basis factor database which is based on multiple co-location studies for the laboratory.

6.2 Full details of the QA/QC procedure are provided in Appendix C.

Summary

6.3 The results of the diffusion tube monitoring survey for the period 6th January 2022 to 7th January 2023 are summarised in Table 6-1. The data report has been adjusted using the 2022 national bias adjustment factor as this approach is more conservative than using a locally derived factor.

6.4 The complete monthly diffusion tube data including local and nationally adjusted results for the monitoring period can be found in Appendix B.

Table 6-1. Scheme Diffusion Tube Monitoring Results

Site	Raw Annual Mean NO_2 Concentration ($\mu g/m^3$)	Triplicate Data Capture Rate (%)	National Bias Adjusted 2022 Annual Mean NO_2 Concentration ($\mu g/m^3$)	National Bias Adjusted 2021 Annual Mean NO_2 Concentration ($\mu g/m^3$)	Percentage Change from 2021 to 2022
DT1	28.0	100.0%	24.3	25.1	-3.1%
DT2	40.0	91.7%	34.8	37.6	-7.3%
DT3	47.6	91.7%	**41.4**	**40.2**	3.0%
DT4	35.4	100.0%	30.8	30.7	0.3%
DT5	25.2	100.0%	21.9	22.2	-1.3%
DT6	31.0	100.0%	26.9	26.1	3.2%
DT7	32.7	100.0%	28.4	30.6	-7.1%
DT8	33.8	100.0%	29.4	28.4	3.4%
DT9	40.2	100.0%	34.9	35.0	-0.2%
DT10	30.4	91.7%	26.5	28.5	-7.1%
DT11	39.5	100.0%	34.4	31.5	9.2%

Site	Raw Annual Mean NO_2 Concentration ($\mu g/m^3$)	Triplicate Data Capture Rate (%)	National Bias Adjusted 2022 Annual Mean NO_2 Concentration ($\mu g/m^3$)	National Bias Adjusted 2021 Annual Mean NO_2 Concentration ($\mu g/m^3$)	Percentage Change from 2021 to 2022
DT12	42.3	100.0%	36.8	37.8	-2.6%
DT13	29.6	91.7%	25.8	26.9	-4.2%
DT14	27.2	91.7%	23.6	23.6	0.2%
DT15	30.8	91.7%	26.8	28.5	-5.9%
DT16	31.6	100.0%	27.5	28.6	-3.8%
DT17	44.7	100.0%	38.9	**42.2**	-7.8%
DT18	40.6	100.0%	35.3	35.4	-0.3%
DT19	41.1	100.0%	35.8	31.4	13.9%
DT20	30.0	91.7%	26.1	26.0	0.5%
DT21	34.8	83.3%	30.3	26.5	14.3%
DT22	31.0	100.0%	27.0	30.1	-10.3%
DT23	41.1	100.0%	35.8	36.8	-2.8%
DT24	47.3	100.0%	**41.1**	**42.6**	-3.5%
DT25	27.9	100.0%	24.3	25.8	-5.9%
DT26	27.1	100.0%	23.6	23.8	-0.8%
DT27	36.8	100.0%	32.0	32.5	-1.6%
DT28	36.3	100.0%	31.6	33.0	-4.3%
DT29	25.9	100.0%	22.5	23.6	-4.5%
TL4	35.8	100.0%	31.1	31.9	-2.4%
TL5	31.5	66.7%	25.8	27.6	-6.7%
TL6	29.3	100.0%	25.5	27.0	-5.6%

*Notes: Concentrations in **bold** denote exceedances of the annual mean AQS objective value. Concentrations at site TL5 have been annualised due to low data capture.*

6.5 Throughout the monitoring period, any relevant local site-specific issues identified are recorded to assist in analysing trends. Issues noted during 2022 are outlined below:

- February 2022 – Construction and digging immediately surrounding DT16 and DT21;
- March 2022 – Construction surrounding DT21 was more extensive than in February 2022, the concentration in March was greater than February;

- March 2022 – Planters with trees added between the CM3 monitor and the road;
- May – June 2022 – The boundary of construction surrounding DT21 was moved, the monitoring site was now located within the construction site boundary; and
- November & December 2022 – Power generator located next to DT19 which is likely to have affected the results. Concentrations do appear higher during these periods.

6.6 All of the diffusion tube monitoring locations except TL5 recorded data capture of greater than 75% in 2022 and therefore did not require annualisation. TL5 only had a data capture of 66.7% and therefore annualisation had to be carried out. Details on the annualisation factor used can be found in Appendix A.

6.7 Using the national bias adjustment factor, there were two diffusion tube locations where the adjusted period mean NO_2 concentration exceeded the 40 µg/m^3 annual mean AQS Objective. These were:

- Site DT3 (Douglas Road, Newham Way); and
- Site DT24 (A3 Blackheath Hill).

6.8 Due to the long exposure periods needed for diffusion tube sampling, it is not possible to make direct comparisons against the 1-hour mean NO_2 AQS Objective. As a proxy, Defra suggests using an annual mean NO_2 concentration of 60 µg/m^3 for diffusion tube measurements to determine the likelihood of the short-term AQS Objective being achieved or exceeded[11]. There were no diffusion tube sites where the annual mean NO_2 concentration exceeded 60 µg/m^3 and therefore the 1-hour mean NO_2 AQS Objective is expected to have been met.

6.9 The highest average monthly NO_2 concentrations were monitored during the winter months with another peak in March, as is consistent with the UK-wide trend observed in the continuous monitoring data. The lowest concentrations occurred between April and August 2022, with a smaller dip in concentrations visible in February between the peaks in the winter and April.

Additional Monitoring at the Hoola Tower

6.10 In addition to the monitoring locations specified within the MMS, a number of additional NO_2 diffusion tubes were located around the Hoola West Tower, located on Tidal Basin Road in Newham.

6.11 There is the potential for increases in NO_2 concentrations due to the Scheme at this location given the Hoola Towers' proximity to tunnel portal and changes in road network with the Scheme. Data from these supplementary locations will provide additional information on NO_2 concentrations around the Tower.

Table 6-2. Scheme Diffusion Tube Monitoring Results at Hoola Tower

Site	Raw Period Mean NO_2 Concentration (µg/m^3)	Data Capture Rate (%)	National Bias Adjusted Annual Mean 2022 NO_2 Concentration (µg/m^3)	National Bias Adjusted Annual Mean 2021 NO_2 Concentration (µg/m^3)	Percentage Change from 2021 to 2022
Hoola 1	28.8	100.0%	25.1	24.3	3.1%
Hoola 2	30.2	100.0%	26.3	25.2	4.2%
Hoola 3	29.6	100.0%	25.7	23.8	8.2%
Hoola 5	32.1	83.3%	27.9	25.5	9.5%
Hoola 6	33.5	100.0%	29.1	27.9	4.4%
Hoola 10	31.3	91.7%	27.3	26.7	2.1%

[11] Microsoft Word - TG_NO2 relationship_report_draft1.doc (defra.gov.uk)

6.12 The data show that the measured 2022 concentrations at all diffusion tube sites around the Hoola Tower are below the AQS objective value at all sites.

6.13 In 2022, NO_2 concentrations were highest at Hoola 6, located to the east of the West Tower. The concentration measured at Hoola 10 located close to Tidal Basin Road were similar to the value for the tube at TL5, co-located with the continuous monitoring site. Hoola 10 is slightly further west than TL5 and is located approximately 30 m closer to the A1011/Silvertown Way. Generally, concentrations at TL5 were slightly higher in the winter than at Hoola 10 whilst the concentrations at Hoola 10 were marginally higher during the summer.

Comparison to 2021

6.14 Annual mean NO_2 concentrations at 23 of the 38 diffusion tube monitoring locations decreased from 2021 to 2022, whilst the remaining 15 locations increased (see Table 6-1 and Table 6-2). Across all sites, there was a reduction of 0.5% (1.5 µg/m^3).

6.15 Three diffusion tube monitoring sites exceeded the AQS objective in 2021: DT3; DT17; and DT24. The concentration at DT3 increased from 40.2 µg/m^3 in 2021 to 41.4 µg/m^3 in 2022 while DT24 reduced from 42.6 µg/m^3 to 41.1 µg/m^3, these two sites remained above the AQS objective. DT17 also decreased, from 42.2 µg/m^3 to 38.9 µg/m^3 in 2022 which is below the AQS objective.

6.16 For the national adjusted mean concentrations, there are increases from 2021 to 2022 at 15 diffusion tube monitoring locations, including at all six monitors close to the Hoola Tower. The ranged from 0.1 µg/m^3 to 4.4 µg/m^3. The largest increases were again seen at DT11 (2.9 µg/m^3), DT19 (4.4 µg/m^3), DT21 (3.8 µg/m^3) and Hoola 5 (2.4 µg/m^3).

7. Local Authority Monitoring Results

Selected Continuous Monitoring Results

Blackwall (TH4), Tower Hamlets

7.1 Table 7-1 summarises the 2022 results for the TH4 CMS. Hourly data are provided in Figure 7-1.

7.2 Data for the monitoring period has been fully ratified and data capture for the monitoring period was 62.1% due to a loss of data between January and June 2022. This is below the recommended 85% minimum data capture defined by Defra for data quality purposes.

7.3 The period mean NO_2 concentration was 36.5 µg/m^3. This achieves the annual mean NO_2 AQS Objective of 40 µg/m^3.

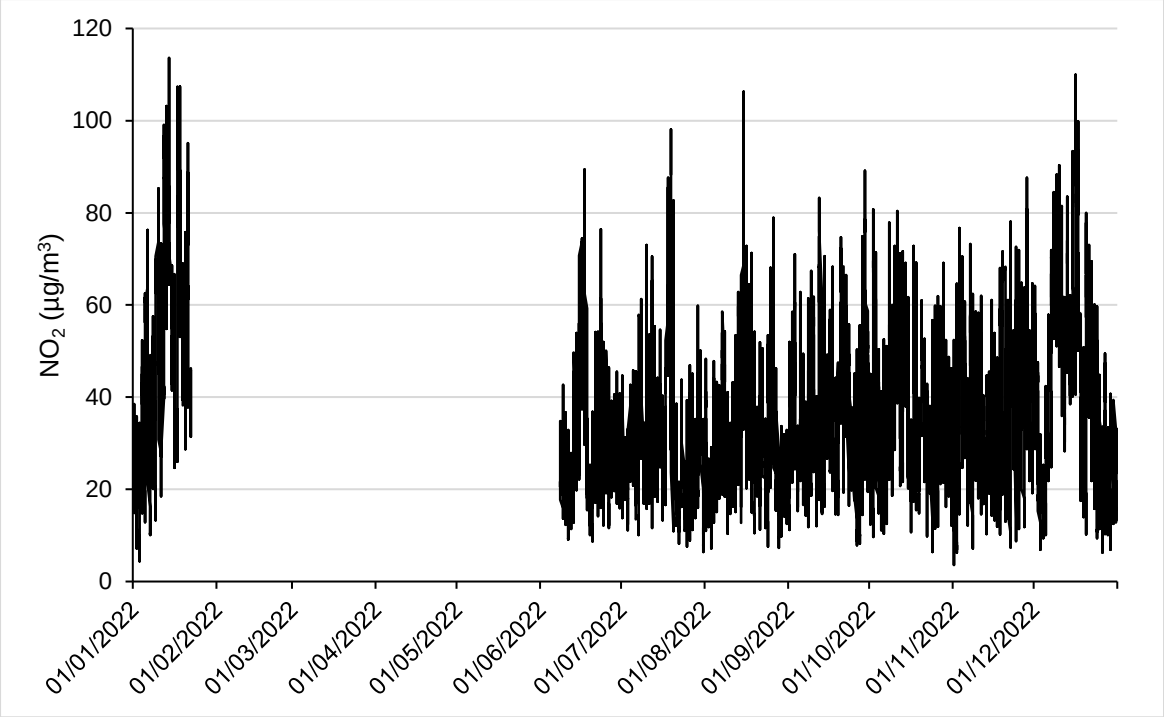
7.4 The 1-hour mean NO_2 AQS Objective value of 200 µg/m^3 was not exceeded on any occasions during the monitoring period. This is within the 18 permitted hours of exceedance and therefore the 1-hour mean NO_2 AQS Objective was achieved.

Table 7-1. Blackwall (TH4) Air Quality Monitoring Results, 2022

Statistic	NO_x	NO	NO_2
Annual Mean (µg/m^3)	75.2	25.2	36.5
Number of 1-hour mean NO_2 concentrations exceeding objective value of 200 µg/m^3	-	-	0
Data Capture (%)	62.1	62.1	62.1

Note: Data capture rate was low. Data have not been annualised.

Figure 7-1. Time Series Plot of 1-hour Mean NO_2 Concentrations at TH4 – Blackwall Tower Hamlets, 1st January 2022 to 31st December 2022



7.5 Trends in annual mean concentrations over the last six years at TH4 are shown in Table 7-2. The measured data show that concentrations have declined by 35% over this period and have been below the annual mean objective for the last three years.

Table 7-2. Annual mean NO_2 concentrations at Blackwall (TH4) between 2017 - 2022

Statistic	2017	2018	2019	2020	2021	2022	Percentage change
Annual Mean (µg/m^3)	**56.1**	**50.7**	**47.4**	38.6	37.4	36.5	-35%
Data Capture (%)	96.2	98.9	98.6	98.9	98.9	62.1	-

*Note: Concentrations in **bold** above the annual mean AQS objective value*

John Harrison Way (GN6), Greenwich

7.6 Table 7-3 summarises the 2022 results for the GN6 CMS. Hourly data are provided in Figure 7-2.

7.7 Data for the monitoring period has been fully ratified and the data capture for the monitoring period was 90.5%. This is above the recommended 85% minimum data capture defined by Defra for data quality purposes.

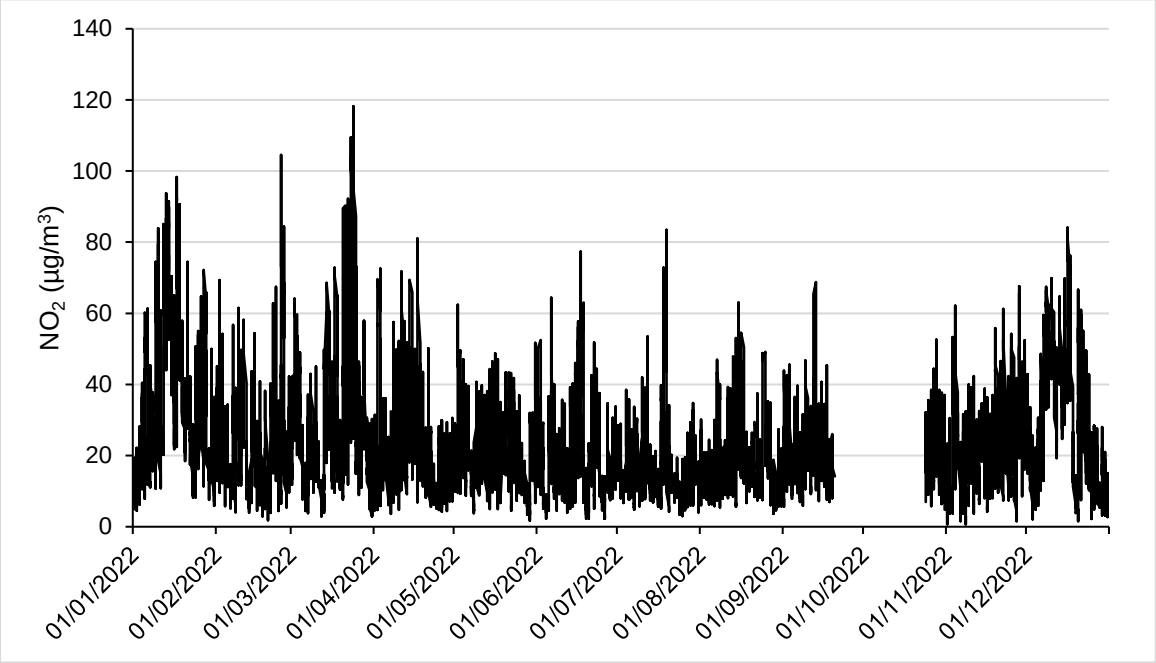
7.8 The period mean NO_2 concentration was 23.2 µg/m^3. This achieves the annual mean NO_2 AQS Objective of 40 µg/m^3.

7.9 The 1-hour mean NO_2 AQS Objective value of 200 µg/m^3 was not exceeded on any occasions during the monitoring period. This is within the 18 permitted hours of exceedance and therefore the 1-hour mean NO_2 AQS Objective was achieved.

Table 7-3. John Harrison Way (GN6) Air Quality Monitoring Results, 2022

Statistic	NO_x	NO	NO_2
Annual Mean (µg/m^3)	36.8	8.8	23.2
Number of 1-hour mean NO_2 concentrations exceeding objective value of 200 µg/m^3	-	-	0
Data Capture (%)	90.5	90.5	90.5

Figure 7-2. Time Series Plot of 1-hour Mean NO_2 Concentrations at GN6 – John Harrison Way-Greenwich, 1st January 2022 to 31st December 2022



7.10 GN6 is located approximately 500 m southeast of AECOM's TL4 monitoring site. The sites are not positioned on the same road, with TL4 located on Tunnel Avenue off A102, and GN6 on John Harrison Way which is a smaller road. GN6 monitored an annual mean NO_2 concentration of 23.2 µg/m^3, whereas TL4 recorded a higher annual mean NO_2 concentration of 34.3 µg/m^3, likely to be because it is positioned nearer the A102.

7.11 Trends in annual mean concentrations over the last five years at GN6 are shown in Table 7-4. The measured data show that concentrations have declined by 31% over this period.

Table 7-4. Annual mean NO_2 concentrations at John Harrison Way (GN6) between 2017 - 2022

Statistic	2017	2018	2019	2020	2021	2022	Percentage change
Annual Mean (µg/m^3)	-	33.7	32.9	25.6	25.3	23.2	-31%
Data Capture (%)	-	43.0	100.0	100.0	97.3	90.5	-

Woolwich Flyover (GR8), Greenwich

7.12 Table 7-5 summarises the 2022 results for the GR8 CMS. Hourly data are provided in Figure 7-3.

7.13 Data for the monitoring period has been fully ratified and data capture for the monitoring period was 97.9 %. This is above the recommended 85% minimum data capture defined by Defra for data quality purposes.

7.14 The period mean NO_2 concentration was 40.0 µg/m^3 which just is below the annual mean NO_2 AQS Objective of 40 µg/m^3.

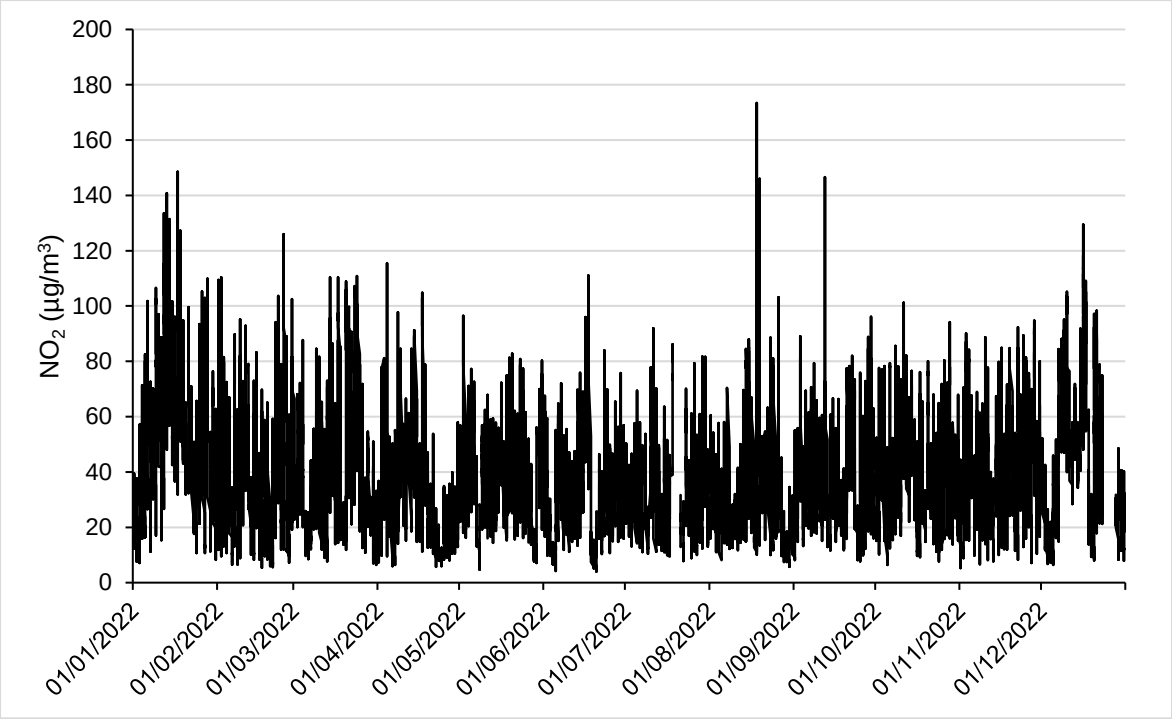
7.15 The 1-hour mean NO_2 AQS Objective value of 200 µg/m^3 was not exceeded on any occasions during the monitoring period. This is within the 18 permitted hours of exceedance and therefore the 1-hour mean NO_2 AQS Objective was achieved.

Table 7-5. Woolwich Flyover (GR8) Air Quality Monitoring Results, 2022

Statistic	NO_x	NO	NO_2
Annual Mean (µg/m^3)	94.0	35.2	40.0
Number of 1-hour mean NO_2 concentrations exceeding objective value of 200 µg/m^3	-	-	0
Data Capture (%)	97.9	97.9	97.9

*Note: Concentrations in **bold** above the annual mean AQS objective value*

Figure 7-3. Time Series Plot of 1-hour Mean NO_2 Concentrations at GR8 – Woolwich Flyover-Greenwich, 1st January 2022 to 31st December 2022



7.16 GR8 is located 1.3 km south of AECOM's TL4 monitoring site. GR8 monitored an annual mean NO_2 concentration of 40.0 µg/m^3, whereas TL4 recorded an annual mean NO_2 concentration of 32.4 µg/m^3. Both sites are roadside monitoring locations, however TL4 is positioned further back from the road (13 m from the kerb) compared to GR8 which is located 3 m from the nearest kerb.

7.17 Trends in annual mean concentrations over the last six years at GR8 are shown in Table 7-6. The measured data show that concentrations have declined by 39% over this.

Table 7-6. Annual mean NO_2 concentrations at Woolwich Flyover (GR8) between 2017 - 2022

Statistic	2017	2018	2019	2020	2021	2022	Percentage change
Annual Mean (µg/m^3)	**65.3**	**56.7**	**52.3**	**43.2**	**40.3**	40.0	-39%
Data Capture (%)	91.8	95.6	99.7	98.4	100.0	97.9	-

*Note: Concentrations in **bold** above the annual mean AQS objective value and concentrations in bold and underlined are at risk of exceedance of the hourly mean objective value*

Wren Close (NM3), Newham

7.18 Table 7-7 summarises the 2022 results for the NM3 urban background CMS. Hourly data are provided in Figure 7-4.

7.19 Data for the monitoring period has been fully ratified and data capture for the monitoring period was 98.5%. This is above the recommended 85% minimum data capture defined by Defra for data quality purposes.

7.20 The period mean NO_2 concentration was 21.8 µg/m^3. This achieves the annual mean NO_2 AQS Objective of 40 µg/m^3.

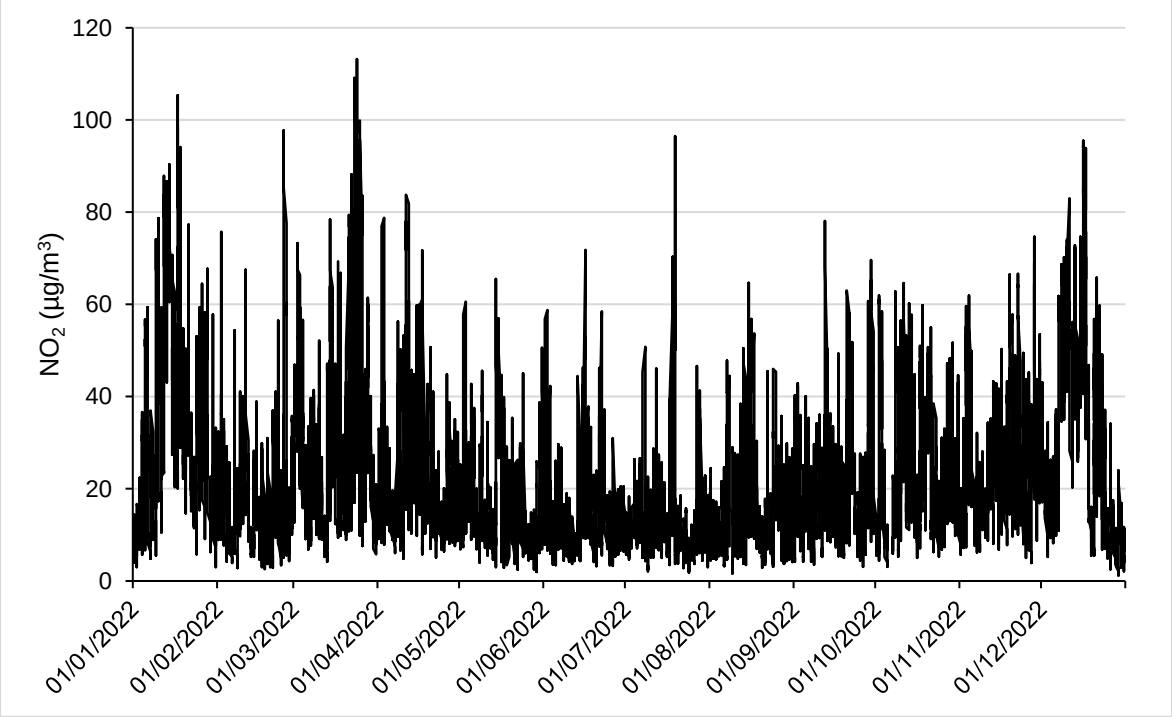
7.21 The 1-hour mean NO_2 AQS Objective value of 200 µg/m^3 was not exceeded on any occasions during the monitoring period. This is within the 18 permitted hours of exceedance and therefore the 1-hour mean NO_2 AQS Objective was achieved.

7.22 The trend in recorded NO_2 concentrations over the course of 2022 at Wren Close mirror those recorded at previously mentioned roadside sites. Concentrations increased in spring and winter, with peak concentrations around January, March – April and December. Concentrations are lowest in the summer months and the end of December and start of January.

Table 7-7. Wren Close (NM3) Air Quality Monitoring Results, 2022

Statistic	NO_x	NO	NO_2
Annual Mean (µg/m^3)	29.6	5.1	21.8
Number of 1-hour mean NO_2 concentrations exceeding objective value of 200 µg/m^3	-	-	0
Data Capture (%)	98.5	98.5	98.5

Figure 7-4. Time Series Plot of 1-hour Mean NO_2 Concentrations at NM3 – Wren Close-Newham, 1st January 2022 to 31st December 2022



7.23 Trends in annual mean concentrations over the last six years at NM3 are shown in Table 7-8. The measured data show that concentrations have declined by 28% over this period.

Table 7-8. Annual mean NO_2 concentrations at Wren Close (NM3) between 2017 - 2022

Statistic	2017	2018	2019	2020	2021	2022	Percentage change
Annual Mean (µg/m^3)	30.1	28.5	28.0	20.3	20.7	21.8	-28%
Data Capture (%)	97.5	96.7	99.7	94.0	95.1	98.5	

Breathe London Sensors

7.24 There are two roadside Breathe London sensors located close to the northern portal of Blackwall Tunnel, within Tower Hamlets and Newham. One is co-located with TH4 at Blackwall Tunnel Northern Approach and one on Silvertown Way (Silvertown Town access corridor) close to the bus station.

7.25 Both sites had high data capture rates for 2022, and annual mean NO_2 concentrations were 39.3 µg/m^3 at Blackwall Tunnel (compared to 36.5 µg/m^3 at the TH4 reference monitor) and 28.2 µg/m^3 at Silvertown Way. The nearest Scheme diffusion tubes to the Silvertown Way sensor are DT19 and DT27 on the other side of the road. 2022 concentrations measured by the two tube sites were higher at 35.8 µg/m^3 and 32.0 µg/m^3 respectively, but it is noted that levels at DT19 were influenced by a generator situated close to the site at the end of the year.

Selected Diffusion Tube Monitoring Results

7.26 Selected results from local authority diffusion tube monitoring surveys at roadside locations for the years 2017 - 2022 are summarised in Table 7-9. Data have been extracted from the latest Air Quality Annual Status Reports (ASRs) for Newham[12], Greenwich[13] and Tower Hamlets[14].

7.27 Of the selected results, the AQS objective was not exceeded at any sites in 2022.

Table 7-9. Selected Local Authority Diffusion Tube Monitoring Results, 2017-2022

Site	Site Name and Local Authority	Distance to Road (m)	Bias Adjusted Annual Mean NO_2 Concentration ($\mu g/m^3$)						Percentage change
			2017	2018	2019	2020	2021	2022	
GW36(11)	Boord Street, Greenwich	30.0	**56.4**	**46.9**	**49.3**	**41.0**	30.5	23.0	-59%
GW50	Woolwich Flyover, Greenwich	3.0	**69.5**	**54.3**	**53.2**	**49.0**	**41.0**	36.0	-48%
GW51 (28)	Bugby's Way, Greenwich	2.0	**43.6**	37.0	39.0	30.0	29.0	26.0	-40%
GW61	John Harrison Way, Greenwich	3.0	28.1	31.9	32.8	26.0	23.0	23.0	-18%
NHM-10	Tant Avenue E16, Newham	30.0	30.0	27.0	25.0	20.0	16.0	20.0	-33%
NHM-20	Canning Town Round about, Newham	0.3	**56.0**	**58.0**	**57.0**	33.0	29.0	33.0	-41%
73	John Smith Mews, Tower Hamlets	0.5	**40.0**	32.0	31.0	24.6	26.0	22.3	-44%
85	Portree Street, Tower Hamlets	0.5	**48.0**	**45.0**	38.0	34.3	33.5	31.6	-34%

[12] London Borough of Newham (2022). Air Quality Annual Status Report for 2022. Available at: https://www.newham.gov.uk/public-health-safety/air-quality-newham/2
[13] Royal Borough of Greenwich (2022). Air Quality Annual Status Report for 2022. Available at: https://www.royalgreenwich.gov.uk/downloads/download/183/air_quality_reports
[14] London Borough of Tower Hamlets (2022). Monitoring data available at https://www.towerhamlets.gov.uk/lgnl/environment_and_waste/environmental_health/pollution/air_quality/Advanced_information_on_air_quality/Monitoring.aspx

Site	Site Name and Local Authority	Distance to Road (m)	Bias Adjusted Annual Mean NO_2 Concentration ($\mu g/m^3$)						Percentage change
			2017	2018	2019	2020	2021	2022	
86	Newport Avenue, Tower Hamlets	0.5	33.0	30.0	28.0	21.7	24.6	22.5	-32%

*Note: Concentrations in **bold** denote exceedances of the annual mean AQS objective value and those **bold and underlined** are at risk of exceedance of the hourly mean objective. Concentrations in 2020 have been affected by the Covid-19 pandemic including lockdowns, and must be interpreted with caution.*

7.28 The measured concentrations at the selected local authority sites close to the Scheme have decreased since 2017 by between 18-59%.

7.29 Several of AECOM's Scheme-specific monitoring locations are situated in close proximity to local authority managed sites. A comparison against these sites shows concentrations are similar which provides confidence in the results reported for the Scheme as outlined below.

- AECOM's site DT19 is positioned on A1011 Silvertown Way, 90 m south of Newham's monitoring site NHM-20. In 2022, DT19 monitored an annual mean NO_2 concentration of 35.9 $\mu g/m^3$, which is similar to the 2022 concentration monitored at Newham's site NHM-20 of 33 $\mu g/m^3$.
- Tower Hamlets' site 86 is located 60 m south of AECOM's site DT16, on Newport Avenue. In 2022, DT16 monitored an annual mean NO_2 concentration of 27.5 $\mu g/m^3$, which is slightly higher than the 2021 annual mean NO_2 concentration monitored by Tower Hamlets' site 86.
- AECOM's site DT28 is located on Lanrick Road, approximately 70 m from Tower Hamlets' site 85. In 2022, the monitored concentration at DT28 was 31.6 $\mu g/m^3$, which is the same as the 2022 concentration of 31.6 $\mu g/m^3$ monitored at Tower Hamlets' site 85.

8. Summary

Overview

8.1 Transport for London (TfL) is conducting air quality monitoring to assess the environmental impact of the Silvertown Tunnel Scheme. Monitoring was conducted at 38 NO_2 diffusion tube locations and three NOx continuous monitoring sites. The results of the monitoring reported here represent the second year of baseline NO_2 monitoring results for 2022.

8.2 The 2022 monitoring data has been shared with the Silvertown Tunnel Implementation Group (STIG). An annual report will be produced for each year of monitoring to determine the baseline trends pre-Scheme opening and Scheme impacts post-opening.

8.3 There are three local authority roadside CMSs in the vicinity of the Scheme:

- TH4 Blackwall (Tower Hamlets);
- GN6 John Harrison Way (Greenwich); and
- GR8 Woolwich Flyover (Greenwich).

8.4 In 2022, there were no exceedances of the annual mean objective for NO_2 at these sites. A maximum concentration of 32.4 µg/m^3 was recorded at TL4 (Tunnel Avenue).

8.5 Average daily concentrations follow a similar trend at all three CMSs, as evident in Figure 8-1. The trends observed in the monthly data were broadly consistent between 2021 and 2022, concentrations generally increase in the autumn and winter and decrease in the spring and summer months. However, a peak was observed in March – April 2022 which was not present in 2021. The annual average concentrations observed at TL4 and TL6 declined from 2021 to 2022 while concentrations at TL5 increased by 4.6%.

8.6 The results of the diffusion tube monitoring survey during 2022 indicate that, annual mean NO_2 concentrations comply with the AQS objective at all but two of the 38 monitoring sites, including those sites in the vicinity of the tunnel.

8.7 Exceedances of the AQS NO_2 annual objective were recorded at the following two sites:

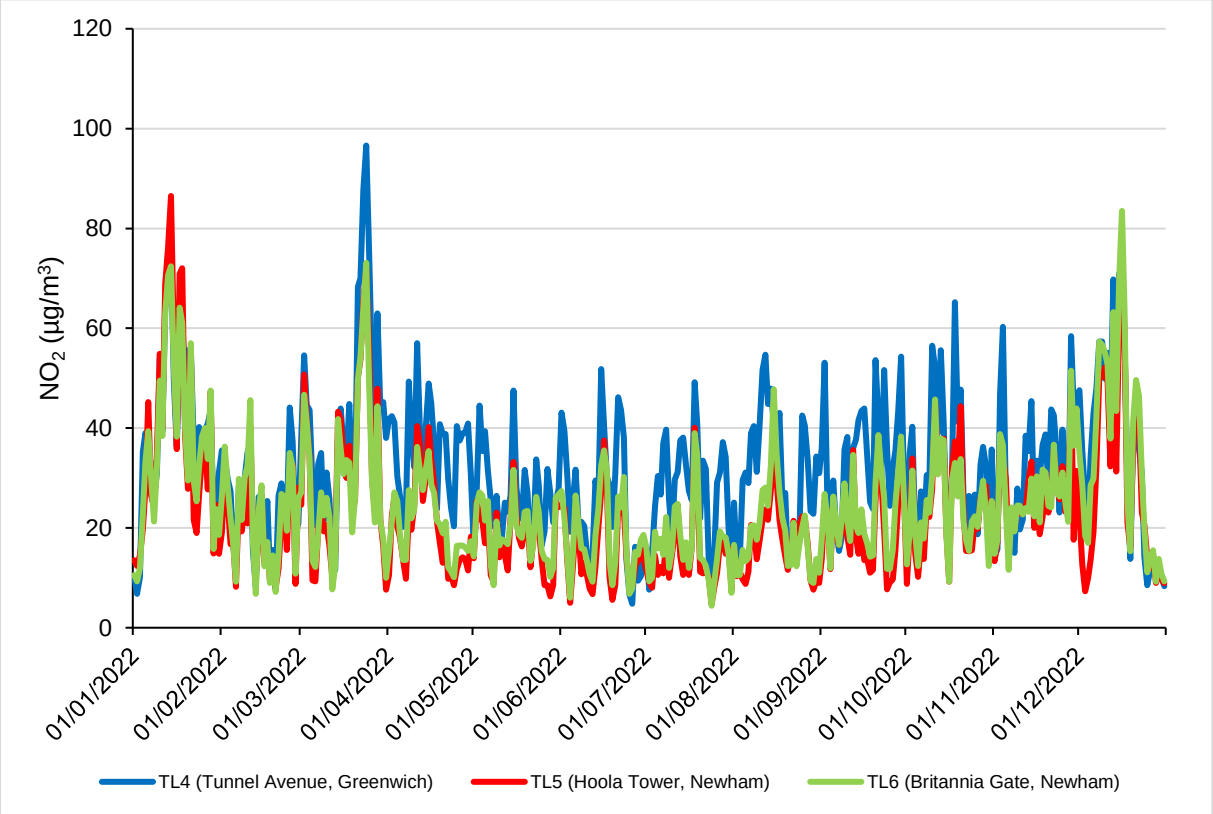
- DT3 Douglas Road, Newham Way (41.4 µg/m^3); and
- DT24 A3 Blackheath Hill (41.1 µg/m^3).

8.8 The concentrations at 23 out of 38 scheme diffusion tube monitoring locations reduced from 2021 to 2022 whilst concentrations at the remaining 15 increased. Overall, across all sites, there was a small reduction in concentrations by 1.5 µg/m^3 (0.5%). In 2021, there were three exceedances of the AQS objective which reduced to exceedances at two sites in 2022.

8.9 The annual mean NO_2 concentrations at all three scheme continuous monitoring sites complied with the AQS objective in 2022 with a maximum concentration of 32.4 µg/m^3 recorded at TL4 (Tunnel Avenue), this was a small reduction of 5.5% compared to 2021.

8.10 It is expected that annual mean NO_2 concentrations will continue to decline due to continued vehicle fleet improvements as a results of London wide measures such as the ULEZ and wider interventions including electrification of the vehicle fleet.

Figure 8-1. Daily NO_2 Concentration Data at AECOM's continuous monitoring sites, 2022



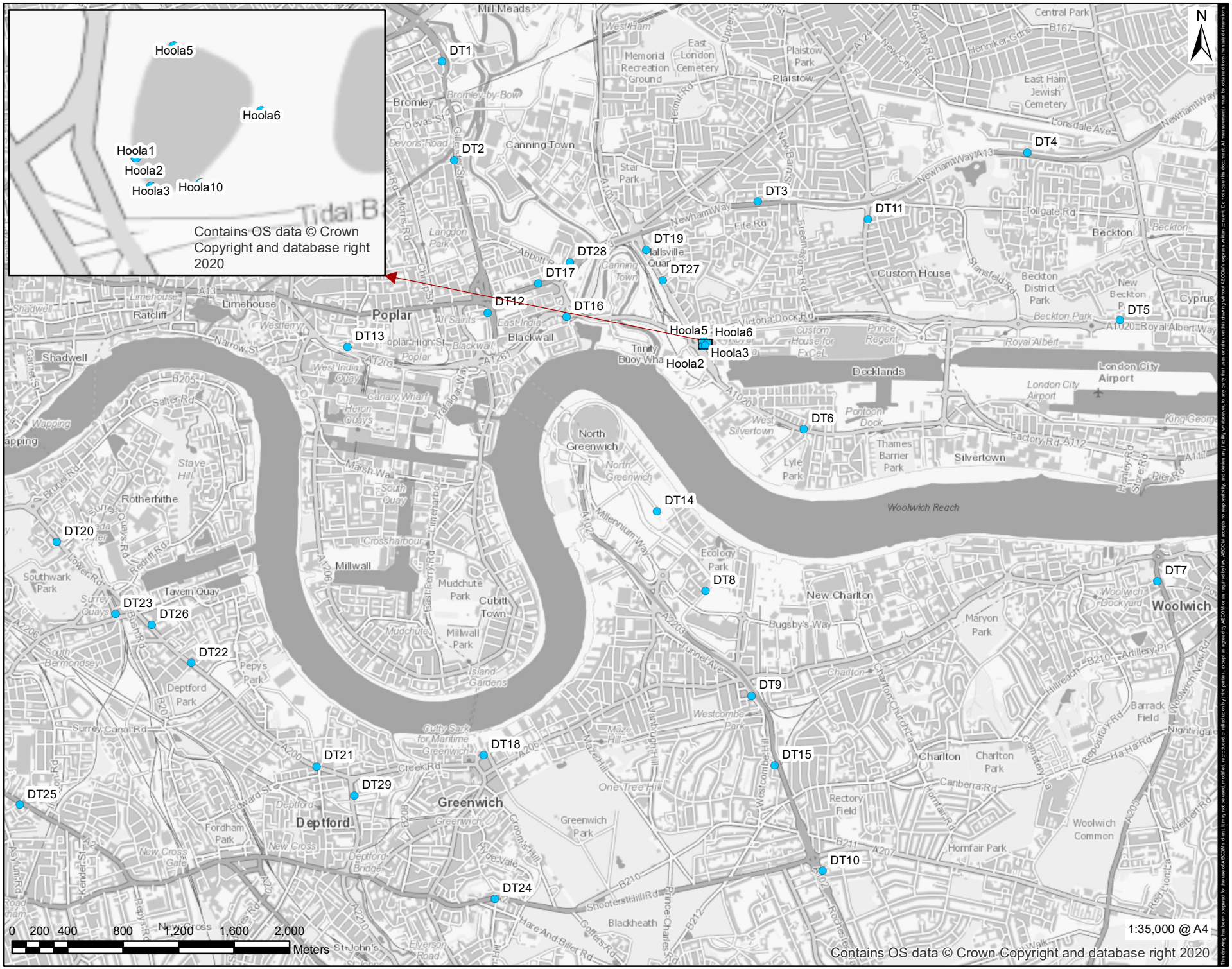
8.11 Of the selected local authority diffusion tube monitoring locations within the study area, there was only one exceedance of the annual mean objective for NO_2 in 2021, at GW50 (Woolwich Flyover). GW50 is co-located with the continuous monitor; GR8 which complied with the objective.

Next Steps

8.12 NO_2 monitoring will continue each year at the same sites for a minimum of three year's pre-Scheme and then for a minimum of 3 years after. Annual monitoring reports will be produced summarising yearly concentrations, and analysis will be undertaken to determine yearly trends in concentrations across sites.

8.13 Post-opening, additional analysis will be undertaken with the aim of isolating the impacts of the Scheme, which may include the use of statistical analysis, removal of seasonal and meteorological influences, consideration of wider London data and trend interpretation.

Appendix A Monitoring Locations



AECOM

PROJECT
Silvertown Tunnel

CLIENT
Transport for London

CONSULTANT
AECOM Limited
10th Floor Sunley House
4 Bedford Park
Croydon, CR0 2AP
T: +444-20-8639-3500
www.aecom.com

LEGEND
- Scheme Diffusion Tube Monitoring Location

NOTES
Service Layer Credits: Contains OS data © Crown Copyright and database right 2022

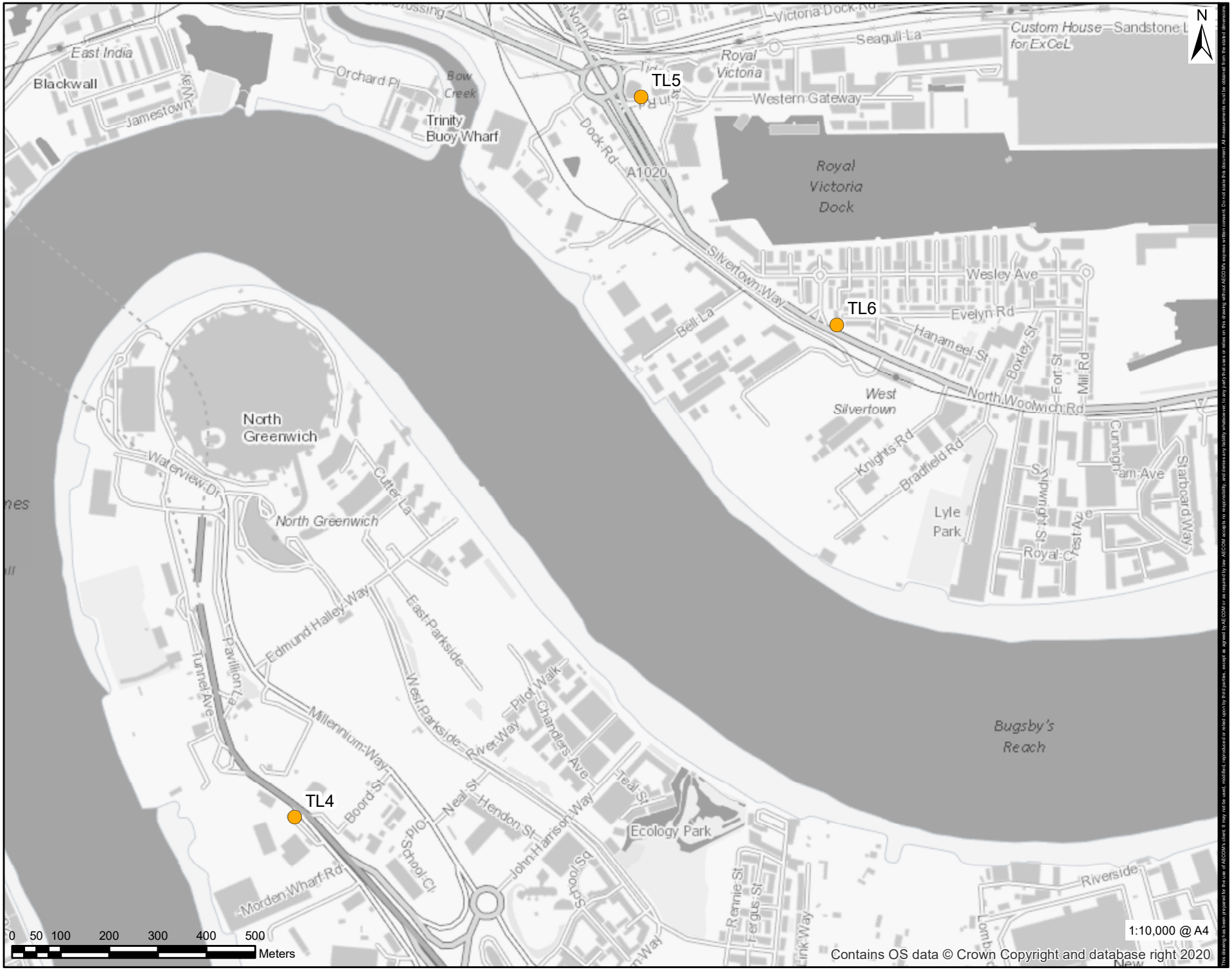
ISSUE PURPOSE
FINAL

PROJECT NUMBER
60636520

SHEET TITLE
Location of Scheme Diffusion Tubes

SHEET NUMBER
Figure A1

Filename: \\na.aecomnet.com\fs\EMEA\Croydon-UKCRD1\DCS\Projects\EGE\60636520_SilvertownTMMS\400_Technical\438_Air Quality Modelling\GIS\Report Figures\Scheme_DT.mxd
Revision: 1 Drawn: AG Checked: PF Approved: AS Date: 24/03/2022



AECOM

PROJECT
Silvertown Tunnel

CLIENT
Transport for London

CONSULTANT
AECOM Limited
10th Floor Sunley House
4 Bedford Park
Croydon, CR0 2AP
T: +444-20-8639-3500
www.aecom.com

LEGEND
Scheme Continuous Monitor

NOTES
Service Layer Credits: Contains OS data © Crown Copyright and database right 2022

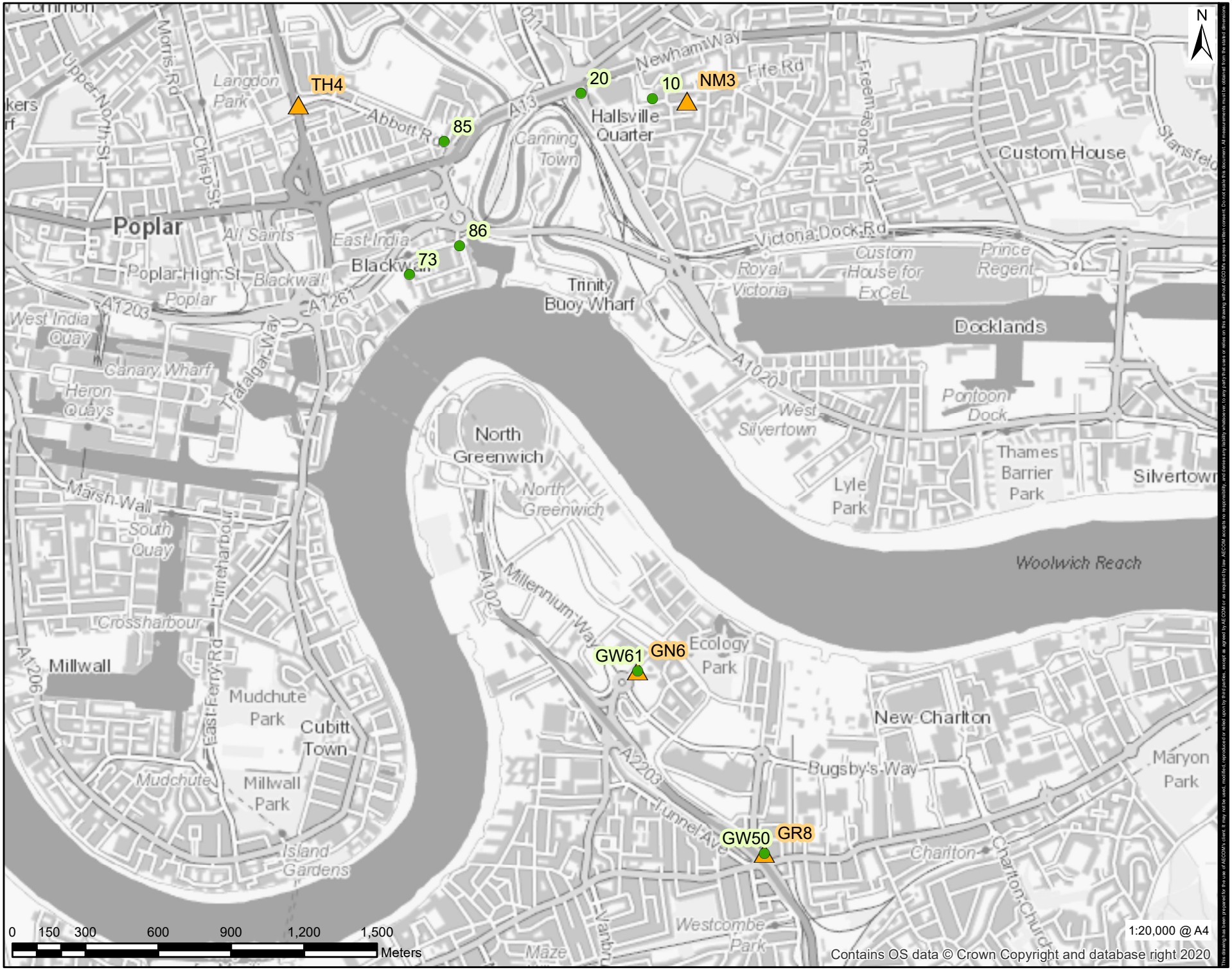
ISSUE PURPOSE
FINAL

PROJECT NUMBER
60636520

SHEET TITLE
Location of Scheme Continuous Monitors

SHEET NUMBER
Figure A2

Filename: \\na.aecomnet.com\ifs\EMEA\Croydon-UKCRD1\DCS\Projects\EGE\60636520_SilvertownTMMS\400_Technical\438_Air Quality Modelling\GIS\Report Figures\Scheme_CMS.mxd
Revision: 1 Drawn: AG Checked: PF Approved: AS Date: 20/06/2022



AECOM

PROJECT
Silvertown Tunnel

CLIENT
Transport for London

CONSULTANT
AECOM Limited
10th Floor Sunley House
4 Bedford Park
Croydon, CR0 2AP
T: +444-20-8639-3500
www.aecom.com

LEGEND

- Selected Local Authority Automatic Monitoring Location
- Selected Local Authority Diffusion Tube Monitoring Location

NOTES
Service Layer Credits: Contains OS data © Crown Copyright and database right 2022

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60636520

SHEET TITLE
Selected Local Authority Monitoring Locations

SHEET NUMBER
Figure A3

Filename: \\na.aecomnet.com\lfs\EMEA\Croydon-UKCRD1\DCS\Projects\EGE\60636520_SilvertownTMMS\400_Technical\438_Air Quality Modelling\GIS\Report Figures\LA_Selected DT.mxd
Revision: 1 Drawn: AG Checked: PF Approved: AS Date: 20/06/2022

Appendix B Monthly Diffusion Tube Data

Site Ref	NO_2 Concentration (µg/m^3)												2022 Raw Mean	2022 Raw Triplicate Mean	2022 Local Adjusted Mean	2022 National Adjusted Mean	2021 Local Adjusted Mean	2021 National Adjusted Mean
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec						
DT1a	38.3	24.8	35.6	22.0	20.6	21.5	22.8	23.7	29.4	31.4	31.2	35.5	28.1					
DT1b	39.4	24.4	36.9	23.2	21.2	21.1	23.6	23.9	28.4	30.8	30.7	33.3	28.1	28.0	23.5	24.3	23.6	25.1
DT1c	35.0	-	35.9	21.6	21.5	22.2	23.3	22.9	27.4	33.3	31.6	33.2	28.0					
DT2a	**53.0**	**-**	**44.3**	32.7	33.5	31.4	37.0	34.9	**43.5**	**42.5**	**44.5**	**45.0**	**40.2**					
DT2b	**50.0**	**-**	38.5	29.2	33.7	34.9	38.9	34.1	**46.2**	**42.2**	**42.1**	**47.6**	39.8	**40.0**	33.6	34.8	35.3	37.6
DT2c	**48.7**	**-**	**42.4**	31.2	32.3	34.3	37.4	34.8	**45.8**	**42.9**	**44.5**	**47.4**	**40.2**					
DT3a	**56.3**	**40.5**	**51.3**	36.7	37.3	**-**	**44.1**	**43.2**	**50.8**	**47.5**	**58.1**	**54.7**	**47.3**					
DT3b	**64.4**	**40.5**	**53.8**	32.2	39.1	**-**	**42.6**	**42.4**	**48.7**	**53.7**	**55.8**	**53.5**	**47.9**	**47.6**	**40.0**	**41.4**	37.7	**40.2**
DT3c	**53.8**	37.8	**54.2**	36.7	39.1	**-**	**44.6**	**43.4**	**50.3**	**53.4**	**-**	**53.4**	**46.7**					
DT4a	**-**	-	**45.8**	27.4	30.7	29.0	30.2	30.2	32.6	38.8	37.5	37.7	34.0					
DT4b	**56.6**	31.3	**42.2**	25.9	28.0	27.2	31.3	29.6	33.2	38.7	39.8	35.2	34.9	35.4	29.7	30.8	28.8	30.7
DT4c	**49.8**	36.6	**42.0**	28.2	30.7	31.2	31.3	28.8	34.7	39.3	35.8	**40.3**	35.7					
DT5a	36.9	23.5	29.2	20.5	20.8	19.7	19.3	20.0	22.9	28.0	27.6	28.2	24.7					
DT5b	37.0	21.6	29.6	21.0	20.9	17.8	20.7	19.1	22.1	28.0	28.0	29.2	24.6	25.2	21.2	21.9	20.8	22.2
DT5c	**41.4**	25.7	33.3	22.3	20.2	19.1	19.6	22.0	24.8	28.6	26.2	32.2	26.3					
DT6a	**44.8**	30.5	35.2	22.1	28.3	25.0	25.0	24.6	28.8	34.9	36.3	-	30.5					
DT6b	**44.0**	29.3	37.1	23.2	28.2	23.7	25.5	23.6	28.9	33.3	**-**	35.5	30.2	31.0	26.0	26.9	24.4	26.1
DT6c	**44.0**	-	35.5	22.7	28.0	26.7	26.1	24.8	29.5	34.4	36.8	36.0	31.3					
DT7a	**-**	26.3	38.7	25.9	25.9	25.5	31.9	32.7	33.8	32.6	32.8	38.6	31.3					
DT7b	-	29.6	**41.7**	28.0	27.9	27.7	31.9	33.6	-	33.5	32.4	36.3	32.3	32.7	27.5	28.4	28.7	30.6
DT7c	**44.4**	24.2	39.0	31.8	27.7	27.7	31.7	33.1	33.5	31.0	28.9	34.0	32.3					

Site Ref	NO_2 Concentration (µg/m³)																
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	2022 Raw Mean	2022 Raw Triplicate Mean	2022 Local Adjusted Mean	2022 National Adjusted Mean	2021 Local Adjusted Mean	2021 National Adjusted Mean
DT8a	**48.4**	31.8	39.4	30.9	25.0	27.7	27.4	30.3	31.9	36.9	37.1	32.6	33.3					
DT8b	**46.3**	33.7	39.9	27.5	29.2	28.5	29.9	30.5	32.7	35.3	34.9	36.6	33.8	33.8	28.4	29.4	26.7	28.4
DT8c	**48.5**	34.6	**41.9**	29.9	26.0	30.3	27.6	25.6	33.7	37.4	35.8	39.4	34.2					
DT9a	**52.7**	34.4	**49.4**	34.6	34.0	31.5	33.0	45.5	43.6	38.7	39.6	**43.6**	**40.1**					
DT9b	**55.0**	33.3	**48.8**	36.8	34.0	34.1	37.6	44.8	42.7	33.8	37.3	**43.6**	**40.2**	**40.2**	33.7	34.9	32.9	35.0
DT9c	**53.0**	33.3	**47.0**	36.9	36.1	32.3	37.6	43.7	43.5	38.0	37.8	**44.3**	**40.3**					
DT10a	**47.6**	-	34.6	27.1	25.3	24.4	26.1	26.3	32.6	27.8	32.5	36.2	31.0					
DT10b	**47.0**	-	33.8	25.7	25.1	25.0	25.5	25.3	31.0	27.7	29.8	35.2	30.1	30.4	25.6	26.5	26.7	28.5
DT10c	**46.2**	-	33.2	25.1	26.0	24.8	25.4	24.9	32.5	-	31.4	35.8	30.5					
DT11a	**61.6**	34.1	37.6	30.2	33.4	36.1	37.7	38.1	**45.0**	**40.8**	34.5	39.7	39.1					
DT11b	**-**	30.4	39.6	30.7	33.6	33.7	35.1	39.7	**46.1**	39.9	**40.2**	**43.5**	37.5	39.5	33.2	34.4	29.5	31.5
DT11c	**-**	30.3	39.9	30.8	33.4	33.0	37.3	39.8	**45.8**	**43.8**	**42.3**	**42.2**	38.1					
DT12a	**48.4**	**43.2**	**51.4**	33.8	39.1	39.0	36.9	39.8	**40.9**	**47.8**	**48.2**	**49.3**	**43.2**					
DT12b	**49.9**	39.1	**46.5**	33.1	38.2	36.8	37.5	**40.6**	39.5	**49.5**	**46.0**	**47.1**	**42.0**	**42.3**	35.6	36.8	35.5	37.8
DT12c	**47.3**	39.6	**47.0**	35.9	38.2	37.6	39.1	39.4	38.8	**48.1**	**46.2**	**45.2**	**41.9**					
DT13a	**-**	-	38.6	22.1	-	-	**-**	23.5	26.4	34.3	31.3	-	29.4					
DT13b	**44.0**	-	39.0	22.2	23.9	-	26.1	-	26.6	32.2	31.0	33.9	31.0	29.6	24.9	25.8	25.2	26.9
DT13c	**43.1**	-	35.1	22.2	23.9	23.3	-	25.9	27.5	-	-	32.5	29.2					
DT14a	**-**	31.9	33.2	22.2	23.1	-	19.8	20.6	26.5	32.2	30.6	37.4	27.8					
DT14b	**-**	28.7	31.4	21.6	23.0	22.2	19.6	21.3	26.2	31.0	34.2	33.3	26.6	27.2	22.8	23.6	22.1	23.6
DT14c	**-**	32.4	30.1	21.7	24.4	22.4	19.7	21.0	27.9	31.9	33.7	39.4	27.7					
DT15a	**40.4**	21.8	**44.1**	-	23.4	20.8	26.2	33.9	-	27.3	26.2	36.2	30.0					
DT15b	**42.9**	23.0	**44.1**	33.3	22.7	21.4	26.7	32.2	-	30.1	24.8	36.9	30.7	30.8	25.9	26.8	26.8	28.5
DT15c	**-**	26.1	**42.3**	33.0	24.3	21.7	27.9	34.4	-	28.0	27.1	39.3	30.4					

Site Ref	NO_2 Concentration (µg/m³)												2022 Raw Mean	2022 Raw Triplicate Mean	2022 Local Adjusted Mean	2022 National Adjusted Mean	2021 Local Adjusted Mean	2021 National Adjusted Mean
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec						
DT16a	**44.6**	28.8	38.3	24.2	23.3	22.0	27.8	32.1	32.5	34.0	32.0	38.3	31.5					
DT16b	**44.1**	29.7	39.2	25.7	26.8	23.5	27.9	26.9	33.2	34.0	30.6	**41.2**	31.9	31.6	26.6	27.5	26.8	28.6
DT16c	**43.5**	31.8	37.9	22.8	23.3	22.2	29.2	29.1	34.0	35.2	30.5	37.8	31.4					
DT17a	**54.1**	**42.6**	**50.0**	38.2	**43.6**	**41.0**	**44.7**	**48.3**	**49.1**	**49.7**	**41.6**	**49.2**	**46.0**					
DT17b	**54.5**	35.8	**50.7**	36.8	39.5	37.2	**40.4**	**44.4**	**49.4**	**47.3**	**42.9**	**45.1**	**43.7**	**44.7**	37.6	38.9	39.5	**42.2**
DT17c	**48.6**	39.1	**50.8**	38.4	39.6	**40.8**	**43.5**	**44.4**	**48.4**	**49.6**	**44.1**	**46.7**	**44.5**					
DT18a	**50.0**	34.3	**49.8**	34.8	37.5	34.6	39.1	39.7	**46.1**	**43.6**	**42.4**	**-**	**41.1**					
DT18b	**50.5**	33.5	**45.6**	33.0	36.1	34.2	37.5	**41.6**	**43.6**	**44.9**	**40.7**	**40.3**	**40.1**	**40.6**	34.1	35.3	33.2	35.4
DT18c	**49.2**	30.9	**48.7**	37.1	35.7	35.5	37.7	**42.4**	**46.8**	38.5	**42.6**	**41.5**	**40.6**					
DT19a	**45.7**	29.0	**44.8**	30.0	33.8	28.3	33.0	36.2	37.6	**42.1**	**68.0**	**69.2**	**41.5**					
DT19b	**52.7**	31.7	**40.2**	31.4	32.1	29.0	35.9	37.3	**40.4**	**40.2**	**68.1**	**64.0**	**41.9**	**41.1**	34.5	35.8	29.5	31.4
DT19c	**46.4**	**-**	**43.2**	27.9	31.1	28.9	31.9	35.4	38.5	39.4	**62.0**	**64.0**	**40.8**					
DT20a	**41.3**	-	39.3	23.1	24.1	24.9	24.9	25.6	32.6	35.7	30.7	31.1	30.3					
DT20b	**41.7**	**-**	36.3	22.7	22.6	24.0	25.5	26.4	30.9	33.8	32.9	33.4	30.0	30.0	25.2	26.1	24.4	26.0
DT20c	39.8	-	36.8	24.3	23.5	24.0	24.3	24.2	30.9	33.0	32.5	34.4	29.8					
DT21a	**48.8**	28.7	35.5	-	22.5	24.0	-	**43.6**	**42.7**	34.6	32.5	31.8	34.5					
DT21b	**43.4**	30.5	37.5	-	22.5	-	-	**44.3**	**45.7**	32.7	33.4	35.0	36.1	34.8	29.3	30.3	24.8	26.5
DT21c	**41.1**	29.4	39.0	-	23.8	25.0	-	**43.6**	**44.5**	36.2	33.4	34.7	35.1					
DT22a	**42.7**	27.8	**44.0**	26.1	25.8	23.5	25.6	33.0	31.3	32.7	31.4	37.4	31.8					
DT22b	**41.4**	27.4	**40.6**	27.5	24.5	22.8	24.1	28.9	31.7	31.8	30.5	35.9	30.6	31.0	26.1	27.0	28.2	30.1
DT22c	**41.5**	29.0	**41.0**	25.5	24.5	23.2	24.9	28.0	31.8	31.8	30.9	36.5	30.7					
DT23a	**49.4**	32.4	**55.7**	38.2	37.8	37.5	**42.2**	**47.4**	**44.8**	38.5	39.6	**40.4**	**42.0**					
DT23b	**48.0**	31.4	**50.0**	**40.8**	36.0	37.6	**41.0**	**46.6**	**44.3**	**43.5**	36.4	38.4	**41.2**	**41.1**	34.5	25.8	34.5	36.8
DT23c	**44.8**	31.6	**48.8**	39.8	35.8	35.0	**40.0**	**48.2**	**43.6**	**40.8**	36.5	37.0	**40.2**					

Site Ref	NO_2 Concentration (µg/m³)												2022 Raw Mean	2022 Raw Triplicate Mean	2022 Local Adjusted Mean	2022 National Adjusted Mean	2021 Local Adjusted Mean	2021 National Adjusted Mean
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec						
DT24a	-	**47.8**	**50.9**	35.3	**44.6**	**50.2**	**42.6**	**47.4**	**45.0**	**47.0**	**51.1**	-	**46.2**					
DT24b	**56.6**	**51.9**	**52.8**	31.4	**44.9**	**46.4**	**43.8**	**45.5**	**47.4**	**52.9**	**52.0**	**47.2**	**47.7**	**47.3**	39.7	**41.1**	**40.2**	**42.9**
DT24c	**57.6**	**51.3**	**50.5**	35.4	**46.5**	**43.9**	**42.2**	**44.1**	**47.6**	**49.7**	**46.3**	**47.0**	**46.8**					
DT25a	**40.2**	21.1	36.2	23.1	22.6	19.5	24.0	28.6	29.1	26.8	27.7	35.6	27.9					
DT25b	**43.5**	21.8	33.8	24.4	22.4	19.2	24.7	27.6	28.2	26.5	27.4	33.9	27.8	27.9	23.4	24.3	24.2	25.8
DT25c	39.6	-	36.0	24.1	22.5	19.7	24.7	28.2	30.3	27.2	27.5	35.4	28.7					
DT26a	**42.4**	27.5	34.8	22.0	18.6	20.4	20.8	20.9	28.1	29.7	29.5	33.8	27.4					
DT26b	**41.6**	25.2	35.1	22.4	22.5	21.1	20.7	20.7	26.6	29.6	28.1	33.5	27.3	27.1	22.8	23.6	22.3	23.8
DT26c	**42.1**	28.3	33.9	20.7	20.3	20.6	20.4	20.9	27.8	29.7	26.8	30.2	26.8					
DT27a	**49.4**	-	**40.1**	32.0	28.4	30.2	33.8	35.0	**42.8**	**40.2**	36.4	**43.6**	37.4					
DT27b	**48.7**	33.5	37.5	-	-	29.3	38.7	32.7	**43.4**	39.9	**40.0**	**43.1**	38.7	36.8	30.9	32.0	30.5	32.5
DT27c	**47.7**	31.0	33.2	27.5	28.1	30.0	35.3	34.7	39.5	**40.0**	**-**	**49.2**	36.0					
DT28a	**41.6**	**-**	39.8	28.6	30.2	33.6	34.3	32.1	34.7	**45.9**	39.2	**40.6**	36.4					
DT28b	**42.5**	34.6	37.7	32.3	29.9	33.1	36.1	32.1	34.6	**44.1**	38.3	**43.5**	36.6	36.3	30.5	31.6	30.9	33.0
DT28c	**43.2**	36.4	**-**	30.2	26.4	34.9	34.7	-	34.1	**43.3**	37.8	**40.0**	36.1					
DT29a	39.6	23.4	31.5	22.7	19.5	20.4	20.8	23.4	28.4	26.2	26.7	27.2	25.8					
DT29b	**40.2**	23.2	30.1	20.2	19.3	19.9	20.2	23.4	28.6	26.1	25.3	31.3	25.7	25.9	21.8	22.5	22.1	23.6
DT29c	**41.7**	22.8	30.2	22.0	18.9	20.2	20.7	22.5	28.3	27.7	27.0	33.0	26.3					
Hoola 1a	**43.4**	27.9	34.7	19.5	21.0	-	25.6	24.5	23.1	33.8	30.1	37.2	29.2					
Hoola 1b	**44.9**	27.1	32.4	19.3	22.5	22.7	-	24.6	27.6	31.0	-	39.2	29.1	28.8	24.2	25.1	22.8	24.3
Hoola 1c	**42.1**	31.5	35.8	19.6	24.7	-	22.4	24.1	26.9	32.5	30.7	34.4	29.5					
Hoola 2a	**46.0**	30.8	-	20.4	23.9	21.1	22.5	25.0	30.0	-	-	**-**	27.5					
Hoola 2b	**48.1**	-	35.3	19.9	23.0	23.6	22.1	21.4	27.5	36.1	37.1	37.3	30.1	30.2	25.4	26.3	23.6	25.2
Hoola 2c	**41.2**	-	33.7	22.1	19.7	26.0	24.4	23.6	26.3	34.4	**40.4**	36.7	29.9					

Site Ref	NO_2 Concentration (µg/m^3)																
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	2022 Raw Mean	2022 Raw Triplicate Mean	2022 Local Adjusted Mean	2022 National Adjusted Mean	2021 Local Adjusted Mean	2021 National Adjusted Mean
Hoola 3a	**46.8**	-	33.8	20.6	21.9	23.5	23.8	25.2	29.1	35.6	36.0	-	29.6					
Hoola 3b	**44.5**	29.9	37.0	19.0	21.2	22.6	23.9	23.6	28.1	35.0	32.3	34.1	29.3	29.6	24.9	25.7	22.4	23.8
Hoola 3c	**47.2**	-	33.6	20.2	24.0	23.3	23.1	23.1	28.6	34.0	32.8	-	29.0					
Hoola 5a	**50.5**	-	35.0	-	23.3	25.9	26.8	27.5	30.6	33.6	29.9	33.9	31.7					
Hoola 5b	**50.8**	**-**	**40.4**	-	26.8	24.1	24.6	25.3	28.7	36.1	29.5	37.2	32.4	32.1	27.0	27.9	23.9	25.5
Hoola 5c	**50.3**	-	39.8	-	23.0	27.1	25.7	24.3	31.5	32.9	-	37.8	32.5					
Hoola 6a	**46.3**	37.6	37.7	21.6	22.9	23.5	25.0	24.3	31.1	**43.1**	33.8	<1.2	31.5					
Hoola 6b	**50.0**	37.6	**40.3**	21.8	23.8	25.9	25.2	25.6	30.0	**44.1**	**43.1**	**43.1**	34.2	33.5	28.1	29.1	26.2	27.9
Hoola 6c	**48.1**	30.0	37.5	21.4	25.1	27.6	24.8	25.1	32.1	36.7	**44.0**	**49.2**	33.5					
Hoola 10a	**46.6**	-	37.1	22.2	22.9	23.5	24.4	21.8	30.3	39.8	39.2	36.4	31.3					
Hoola 10b	**41.7**	-	**43.3**	19.7	23.4	24.3	26.9	25.9	29.3	**40.1**	33.9	35.1	31.2	31.3	26.3	27.3	25.0	26.7
Hoola 10c	**48.0**	-	**41.9**	-	23.3	23.5	24.1	24.9	31.4	37.4	37.0	33.4	32.5					
TL4a	**49.3**	33.5	**44.6**	30.1	27.0	30.9	35.7	**40.1**	36.4	34.8	32.5	36.6	36.0					
TL4b	**48.2**	34.3	**46.6**	33.2	29.0	29.0	34.7	39.9	37.4	35.3	33.8	37.6	36.6	35.8	30.1	31.1	29.9	31.9
TL4c	**47.4**	34.2	**43.4**	32.1	26.8	30.2	35.1	37.0	32.0	34.0	33.8	32.4	34.9					
TL5a	**50.9**	28.4	32.8	-	-	24.9	-	-	**-**	37.9	-	37.3	35.4					
TL5b	**43.1**	30.2	33.5	21.5	-	20.3	23.5	-	-	-	-	37.3	29.9	31.5	26.5[(1)]	25.8[(1)]	25.9	27.6
TL5c	**49.3**	**-**	33.7	21.0	-	24.5	23.3	-	-	36.8	-	35.1	32.0					
TL6a	**41.4**	28.6	32.5	21.9	24.3	24.6	23.8	23.4	28.7	35.4	33.2	34.9	29.4					
TL6b	**41.0**	28.0	32.5	21.5	24.8	24.0	24.6	22.6	30.1	33.2	32.5	34.0	29.1	29.3	24.6	24.6	25.3	27.0
TL6c	**43.9**	26.0	36.7	22.8	22.9	-	26.0	25.2	29.2	32.4	32.8	30.9	29.9					

*Note: Concentrations in **bold** above the AQS objective value*

Appendix C Data Quality Assurance

C.1 Scheme Continuous Monitoring Sites

The equipment used at the three CMS are Teledyne API T200 chemiluminescence NO_x analysers. Calibrations of these continuous monitors are carried out with certified calibration gases for each analyser. Routine calibrations are undertaken manually every 2 weeks by AECOM for TL4, TL5 and TL6.

The QA/QC procedures followed by AECOM reflect those used in the UK Automatic Urban and Rural Network (AURN) and those outlined in the Technical Guidance; LAQM.TG(22).

The calibration data are sent to ERG, who are responsible for data management, data validation and ratification. Independent site audits are carried out annually and includes UKAS accredited on-site gas cylinder certification and on-site testing of sampling system efficiency.

LAQM.TG(22) specifies a 85% data capture threshold for assessing compliance with limit and guidance values. If the 85% threshold is not achieved, the data are still useful, but less precise than required for formal assessment.

C.2 Scheme Diffusion Tube Sites

Diffusion tubes for NO_2 are provided by Staffordshire Highways Laboratory using a preparation method of 20% TEA in water. This method conforms to the guidelines set out in Defra's 'Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance' document.

Staffordshire Highways Laboratory participates in the AIR-PT scheme. AIR is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). The AIR-PT scheme started in April 2014, combining two long running PT schemes: LGC Standards STACKS PT scheme and HSL WASP PT scheme.

AIR NO_2 PT forms an integral part of the UK NO_2 Network's QA/QC and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes. Defra and the Devolved Administrations advise that diffusion tubes used for air quality assessments should be obtained from laboratories that have demonstrated satisfactory performance in the AIR-PT scheme. Staffordshire Laboratories have achieved this during 2022.

Diffusion Tube Annualisation

Diffusion tubes require annualisation if they record data capture of less than 75%, but greater than 25%. All of the diffusion tube monitoring locations except TL5 recorded data capture of greater than 75% and therefore did not require annualisation. TL5 only had a data capture of 66.7% and therefore annualisation had to be carried out. Three Urban Background sites were used to calculate an Annualisation Bias Factor: London Bloomsbury, London Hillingdon and London Westminster. An Annualisation Bias Factor of 0.87 was calculated and applied to the Raw Triplicate Mean value of 31.5 $\mu g/m^3$. An annualised mean of 25.8 $\mu g/m^3$ was calculated for TL5.

Diffusion Tube Bias Adjustment Factors.

The diffusion tube data have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

A national bias adjustment factor was obtained from the national Diffusion Tube Bias Adjustment Factors Spreadsheet. The national bias adjustment factor for tubes prepared by Staffordshire Scientific Services using to 20% TEA in Water preparation method for 2022 is 0.87, as depicted in Table C.1 and Figure C.1.

Table C.1 2022 National Bias Adjustment Factor

Laboratory	Preparation Method	2022 Factor
Staffordshire Scientific Services	20% TEA in Water	**0.87**

Figure C.1 National Bias Adjustment Factor Derivation

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/23

Follow the steps below in the correct order to show the results of relevant co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2023
LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List. If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List. If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List. If a year is not shown, we have no data[2].

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[4]	Bias Adjustment Factor (A) (Cm/Dm)
Staffordshire Scientific Services	20% TEA in water	2022	KS	Manchester City Council	12	49	43	13.8%	G	**0.88**
Staffordshire Scientific Services	20% TEA in water	2022	UC	Manchester City Council	12	29	29	0.4%	G	**1.00**
Staffordshire Scientific Services	20% TEA in water	2022	SI	Manchester City Council	12	17	16	12.1%	G	**0.89**
Staffordshire Scientific Services	20% TEA in water	2022	KS	Marylebone Road Intercomparison	12	51	42	20.5%	G	**0.83**
Staffordshire Scientific Services	20% TEA in water	2022	UB	Salford City Council	12	23	22	6.9%	G	**0.94**
Staffordshire Scientific Services	20% TEA in water	2022	B	Salford City Council	10	13	11	16.3%	G	**0.86**
Staffordshire Scientific Services	20% TEA in water	2022	R	Salford City Council	12	40	34	17.6%	G	**0.85**
Staffordshire Scientific Services	20% TEA in water	2022	R	Bury Council	11	24	21	16.0%	G	**0.86**
Staffordshire Scientific Services	20% TEA in water	2022	R	East Staffordshire Borough Council	10	39	31	23.9%	G	**0.81**
Staffordshire Scientific Services	20% TEA in water	2022	UB	Stoke-On-Trent City Council	11	23	20	17.1%	G	**0.85**
Staffordshire Scientific Services	20% TEA in water	2022	UB	Wigan Council	12	21	17	21.6%	G	**0.82**
Staffordshire Scientific Services	20% TEA in water	2022	R	Wigan Council	12	27	22	22.6%	G	**0.82**
Staffordshire Scientific Services	20% TEA in water	2022		**Overall Factor[3] (12 studies)**				Use		**0.87**

A local bias adjustment factor was also calculated from the average the triplicate co-location of diffusion tubes at the TL4, TL5 and TL6 continuous monitoring stations. This factor is slightly lower than the national bias adjustment factor.

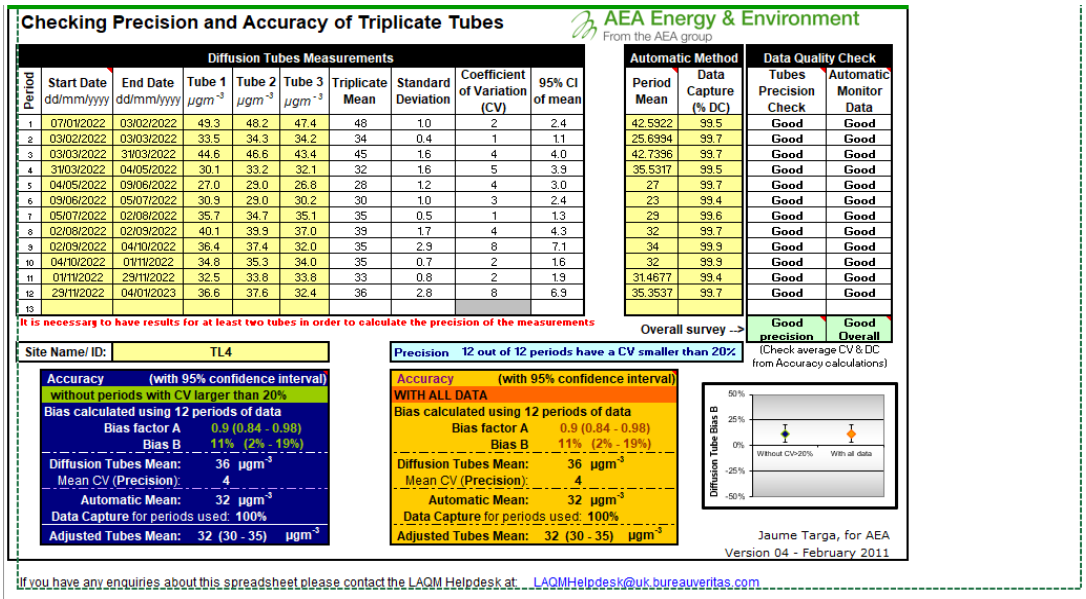
Calculation of the local bias adjustment factor is presented in Table C.2.

Table C.2 Local Bias Adjustment Factor Calculation

Continuous Monitor	Bias A
TL4	0.9
TL5	0.78
TL6	0.84
Average	**0.84**

Figures C.2, C.3 and C.4 depict the derivation of the Local Bias factors for each of TL4, TL5 and TL6, respectively.

Figure C.2 Local Bias Adjustment Factor Calculation for TL4



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm⁻³	Tube 2 µgm⁻³	Tube 3 µgm⁻³	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	07/01/2022	03/02/2022	49.3	48.2	47.4	48	1.0	2	2.4
2	03/02/2022	03/03/2022	33.5	34.3	34.2	34	0.4	1	1.1
3	03/03/2022	31/03/2022	44.6	46.6	43.4	45	1.6	4	4.0
4	31/03/2022	04/05/2022	30.1	33.2	32.1	32	1.6	5	3.9
5	04/05/2022	09/06/2022	27.0	29.0	26.8	28	1.2	4	3.0
6	09/06/2022	05/07/2022	30.9	29.0	30.2	30	1.0	3	2.4
7	05/07/2022	02/08/2022	35.7	34.7	35.1	35	0.5	1	1.3
8	02/08/2022	02/09/2022	40.1	39.9	37.0	39	1.7	4	4.3
9	02/09/2022	04/10/2022	36.4	37.4	32.0	35	2.9	8	7.1
10	04/10/2022	01/11/2022	34.8	35.3	34.0	35	0.7	2	1.6
11	01/11/2022	29/11/2022	32.5	33.8	33.8	33	0.8	2	1.9
12	29/11/2022	04/01/2023	36.6	37.6	32.4	36	2.8	8	6.9
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
42.5922	99.5	Good	Good
25.6994	99.7	Good	Good
42.7396	99.7	Good	Good
35.5317	99.5	Good	Good
27	99.7	Good	Good
23	99.4	Good	Good
29	99.6	Good	Good
32	99.7	Good	Good
34	99.9	Good	Good
32	99.9	Good	Good
31.4677	99.4	Good	Good
35.3537	99.7	Good	Good
		Good precision	Good Overall

Overall survey -->

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: TL4

Precision 12 out of 12 periods have a CV smaller than 20%

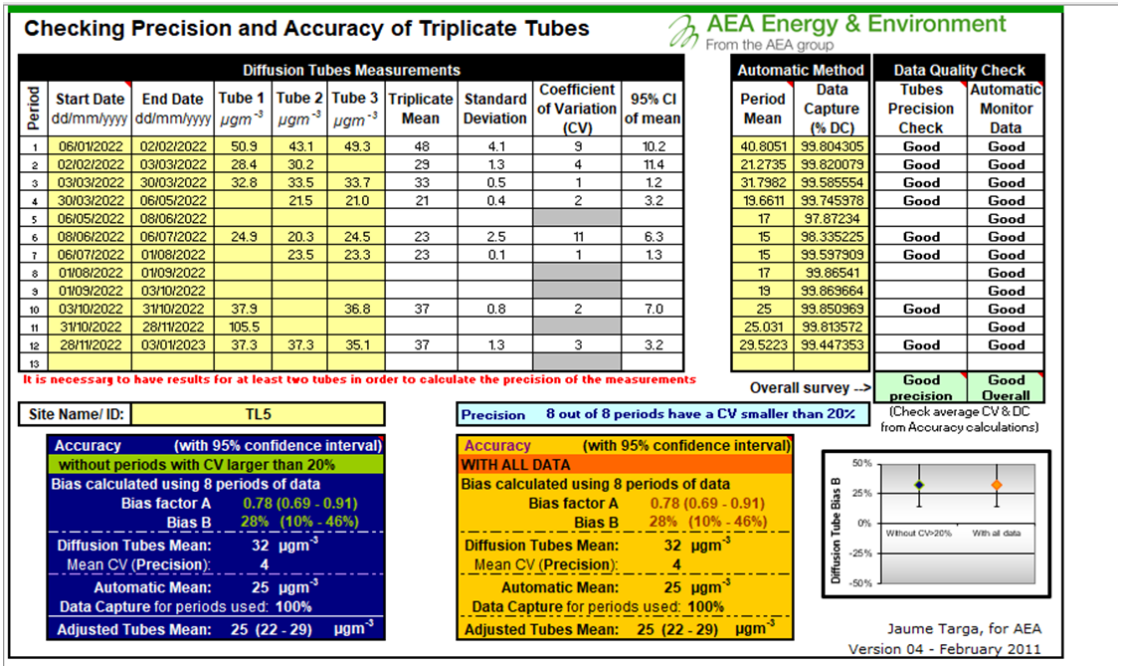
Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 12 periods of data
Bias factor A 0.9 (0.84 - 0.98)
Bias B 11% (2% - 19%)
Diffusion Tubes Mean: 36 µgm⁻³
Mean CV (Precision): 4
Automatic Mean: 32 µgm⁻³
Data Capture for periods used: 100%
Adjusted Tubes Mean: 32 (30 - 35) µgm⁻³

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A 0.9 (0.84 - 0.98)
Bias B 11% (2% - 19%)
Diffusion Tubes Mean: 36 µgm⁻³
Mean CV (Precision): 4
Automatic Mean: 32 µgm⁻³
Data Capture for periods used: 100%
Adjusted Tubes Mean: 32 (30 - 35) µgm⁻³

Jaume Targa, for AEA
Version 04 - February 2011

If you have any enquiries about this spreadsheet please contact the LAQM Helpdesk at: LAQMHelpdesk@uk.bureauveritas.com

Figure C.3 Local Bias Adjustment Factor Calculation for TL5



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm⁻³	Tube 2 µgm⁻³	Tube 3 µgm⁻³	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	06/01/2022	02/02/2022	50.9	43.1	49.3	48	4.1	9	10.2
2	02/02/2022	03/03/2022	28.4	30.2		29	1.3	4	11.4
3	03/03/2022	30/03/2022	32.8	33.5	33.7	33	0.5	1	1.2
4	30/03/2022	06/05/2022		21.5	21.0	21	0.4	2	3.2
5	06/05/2022	08/06/2022							
6	08/06/2022	06/07/2022	24.9	20.3	24.5	23	2.5	11	6.3
7	06/07/2022	01/08/2022		23.5	23.3	23	0.1	1	1.3
8	01/08/2022	01/09/2022							
9	01/09/2022	03/10/2022							
10	03/10/2022	31/10/2022	37.9		36.8	37	0.8	2	7.0
11	31/10/2022	28/11/2022	105.5						
12	28/11/2022	03/01/2023	37.3	37.3	35.1	37	1.3	3	3.2
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
40.8051	99.804305	Good	Good
21.2735	99.820079	Good	Good
31.7982	99.585554	Good	Good
19.6611	99.745978	Good	Good
17	97.87234		Good
15	98.335225	Good	Good
15	99.537909	Good	Good
17	99.86541		Good
19	99.869664		Good
25	99.850969	Good	Good
25.031	99.813572		Good
29.5223	99.447353	Good	Good
		Good precision	Good Overall

Overall survey -->

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: TL5

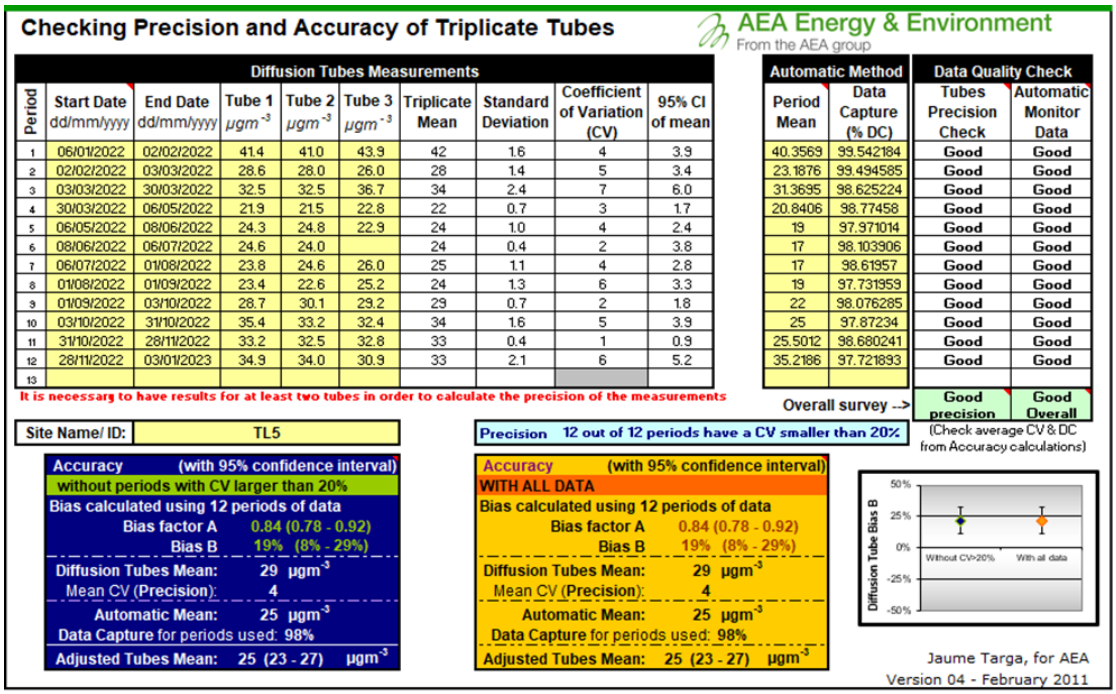
Precision 8 out of 8 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 8 periods of data
Bias factor A 0.78 (0.69 - 0.91)
Bias B 28% (10% - 46%)
Diffusion Tubes Mean: 32 µgm⁻³
Mean CV (Precision): 4
Automatic Mean: 25 µgm⁻³
Data Capture for periods used: 100%
Adjusted Tubes Mean: 25 (22 - 29) µgm⁻³

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 8 periods of data
Bias factor A 0.78 (0.69 - 0.91)
Bias B 28% (10% - 46%)
Diffusion Tubes Mean: 32 µgm⁻³
Mean CV (Precision): 4
Automatic Mean: 25 µgm⁻³
Data Capture for periods used: 100%
Adjusted Tubes Mean: 25 (22 - 29) µgm⁻³

Jaume Targa, for AEA
Version 04 - February 2011

Figure C.4 Local Bias Adjustment Factor Calculation for TL6



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm⁻³	Tube 2 µgm⁻³	Tube 3 µgm⁻³	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	06/01/2022	02/02/2022	41.4	41.0	43.9	42	1.6	4	3.9
2	02/02/2022	03/03/2022	28.6	28.0	26.0	28	1.4	5	3.4
3	03/03/2022	30/03/2022	32.5	32.5	36.7	34	2.4	7	6.0
4	30/03/2022	06/05/2022	21.9	21.5	22.8	22	0.7	3	1.7
5	06/05/2022	08/06/2022	24.3	24.8	22.9	24	1.0	4	2.4
6	08/06/2022	06/07/2022	24.6	24.0		24	0.4	2	3.8
7	06/07/2022	01/08/2022	23.8	24.6	26.0	25	1.1	4	2.8
8	01/08/2022	01/09/2022	23.4	22.6	25.2	24	1.3	6	3.3
9	01/09/2022	03/10/2022	28.7	30.1	29.2	29	0.7	2	1.8
10	03/10/2022	31/10/2022	35.4	33.2	32.4	34	1.6	5	3.9
11	31/10/2022	28/11/2022	33.2	32.5	32.8	33	0.4	1	0.9
12	28/11/2022	03/01/2023	34.9	34.0	30.9	33	2.1	6	5.2
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
40.3569	99.542184	Good	Good
23.1876	99.494585	Good	Good
31.3695	98.625224	Good	Good
20.8406	98.77458	Good	Good
19	97.971014	Good	Good
17	98.103906	Good	Good
17	98.61957	Good	Good
19	97.731959	Good	Good
22	98.076285	Good	Good
25	97.87234	Good	Good
25.5012	98.680241	Good	Good
35.2186	97.721893	Good	Good
Overall survey -->		Good precision	Good Overall

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: TL5

Precision: 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 12 periods of data
Bias factor A: 0.84 (0.78 - 0.92)
Bias B: 19% (8% - 29%)
Diffusion Tubes Mean: 29 µgm⁻³
Mean CV (Precision): 4
Automatic Mean: 25 µgm⁻³
Data Capture for periods used: 98%
Adjusted Tubes Mean: 25 (23 - 27) µgm⁻³

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A: 0.84 (0.78 - 0.92)
Bias B: 19% (8% - 29%)
Diffusion Tubes Mean: 29 µgm⁻³
Mean CV (Precision): 4
Automatic Mean: 25 µgm⁻³
Data Capture for periods used: 98%
Adjusted Tubes Mean: 25 (23 - 27) µgm⁻³

Jaume Targa, for AEA
Version 04 - February 2011

Royal Borough of Greenwich

Laboratory Details

- Diffusion Tubes are prepared and analysed by UKAS accredited Gradko International Ltd
- Diffusion Tubes are prepared using 50% triethanolamine with acetone
- For details attaining to 'results' – precision, bias adjustment factors; and reference methods please refer to - 'London Wide Environment Program (LWEP) Nitrogen Dioxide diffusion tube survey report, 2020.

Bias Factor

The Royal Borough of Greenwich has used the LWEP Bias Adjustment Factor for the last few years.

London Borough of Newham

Laboratory Details

- Diffusion Tubes are prepared and analysed by UKAS accredited Gradko International Ltd
- Diffusion Tubes are prepared using 50% triethanolamine with acetone

Bias Factor

A bias adjustment factor of 0.8 was applied to these tubes in both 2022 and 2021, derived from the LWEP.

London Borough of Tower Hamlets

Laboratory Details

- Diffusion Tubes are prepared and analysed by UKAS accredited Socotec UK Ltd
- Diffusion Tubes are prepared using 50% triethanolamine with acetone

Bias Factor

A bias adjustment factor of 0.76 was applied to these tubes in 2022, as derived from the national bias factor database. No local study was available.