2023 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management, as amended by the Environment Act 2021

Date: May, 2023

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Report Reference Number	DBC_ASR_2023 v2
Date	May 2023

Executive Summary: Air Quality in Our Area

Air Quality in Dacorum

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[1,2].

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017. Between 2017 and 2025, the total cost to the NHS and social care of air pollution for where there is more robust evidence for an association to air pollution, is estimated to be £1.60 billion for PM2.5 and NO^2 combined.[4]

Since 1997 English local authorities have been charged with the duty of undertaking regular review and assessment of local air quality. This involves comparing local air quality against nationally set objectives for a range of pollutants. These objectives exist to protect health and the environment. As part of their review and assessment local authorities should identify areas of concern where the objective limits are unlikely to be met and, where there is relevant exposure, e.g. housing, schools, health centres / hospitals.

Assessment can be based on prediction techniques such as air quality modelling and / or other methods such as air quality monitoring. Where objectives are unlikely to be met, the local authority must declare an air quality management area and put together a plan to improve local air quality. Collectively this process is known as local air quality management (LAQM).

When comparing air quality in Dacorum just with the nationally set objectives for air pollution, then air quality can be regarded as ‘good’.

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[1] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

[2] Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

[3] Defra. Air quality appraisal: damage cost guidance, July 2020

[4] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

The Council made declarations in 2012 for 3 Air Quality Management Areas (AQMA) covering 3 distinct areas of the district, that being:

- AQMA 1: Lawn Lane, Hemel Hempstead
- AQMA 2: London Road, Apsley
- AQMA 3: High Street, Northchurch **(revoked in April 2023)**

All three AQMAs had been declared due to an exceedance of the annual mean objective of 40µg/m^3 for nitrogen dioxide (NO_2) due to contributions from road transportation sources; furthermore the increase of use of solid fuel burning within residential area is also contributing to this due to the recent popularity of wood burners in the home.

While air quality levels in the Lawn Lane and London Road AQMA remained at more than 40µg/m^3 below the objective limits as they did in the 2022 Annual Status Report (ASR), these will continue to be monitored to see if exposure levels rise to 'pre-covid' levels, if the trend continues over the next 2 years, both locations can be considered for revocation. However, consistent improvements to Northchurch and compliance with the relevant objectives for 5 consecutive years has led to its revocation. The revocation came into effect on 4th April 2023.

As road traffic activity returned to normal, or close to normal, during the months of Summer 2021 following easing of movement restrictions due to the Covid-19 pandemic, it was expected that local air quality levels could revert back to their pre-pandemic levels. However, the 2nd half of 2021 and throughout 2022 shows this may not be the case and that sustained reduced levels that remain below the expected levels of exceedance may be achieved. The increase in home and remote working as the 'new normal' appears to naturally have had a positive impact on road traffic emissions.

In the 2021 ASR, only one site had shown to exceed the AQ objective levels and this is the Diffusion Tube location DC5, a roadside location at Queensway, near to Old Town High St, Hemel Hempstead (505528 Easting, 207651 Northing). This has remained slightly above the objective levels; as a result, the Diffusion Network has been amended to redeploy tubes from low risk areas and extend the monitoring in the surrounding area of Queensway and Old Town High Street. This is in order to identify the extent of the exceedance as none of the 3 other tubes located in the surrounding area are showing exceedances. This change took effect in January 2023 and data will be available in the 2024 ASR.

The changes made by the Council to the diffusion tube network in 2023 will be reflected in the reporting format in next year's ASR; however this document is reporting the 2022 data and as such the format of the data is the same as recent years.

In addition to diffusion tube monitoring the Council continues to utilise one real-time analyser in the Northchurch AQMA for this Report, as of next year the analyser will be relocated. No exceedances were measured against either of the objectives relevant to Particulate Matter at this location.

With the revocation of the Northchurch AQMA, the Real Time Analyser will be transferred from Northchurch to the London Rd, Apsley AQMA area at Apsley Community Centre (on the corner of London Rd and Durrants Hill). Due to logistics and available space, relocation to the Lawn Lane AQMA could was not viable, given the size of the analyser.

In 2023 officers successfully obtained three additional monitors provided by Hertfordshire County Council (HCC) which are being deployed to Swing Gate School, Lawn Lane and Bennett's End Rd. These are stationary HCC assets however the data and results will be made available to the Council (as well as Swing Gate School) in order to assess levels at those locations.

Officers also secured a Capital Bid to not only fund the relocation and upgrading of the Real Time Analyser from Northchurch to Apsley, but also acquired three Zephyr Air Quality Monitoring devices. These will be deployed initially at three fixed locations however have the ability to be redeployed and/or used as mobile monitoring stations. These will be deployed from June 2023, one of these will be stationed at the former location of the Northchurch Analyser in order to continue to monitor the area as a precaution; the other two will be located initially at Durrants Hill Rd (near to the flats adjacent to the single lane bridge) and Queensway (Junction with Alexandra Rd and Old Town High Street) respectively.

These devices monitor Nitrogen Dioxide, Nitric Oxide, Ozone, PM1, PM2.5 and PM10 in real time. While they are not as accurate as the Real Time Analyser however they are mobile and more cost effective allowing us to monitor further locations for Particulate Matter despite this not currently being a statutory obligation.

Hertfordshire County Council have acquired licenses for RapidAIR, a modelling software for countywide assessments of the potential impacts of new or expanded developments on air quality using existing traffic, air quality and emissions datasets. This has been made

available for use to DBC and Lead Officers for Science and Pollution teams, have undertaken training on the use of this software.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, there are some areas where local action is needed to protect people and the environment from the effects of air pollution.

The Environmental Improvement Plan[5] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term $PM_{2.5}$ targets. The National Air Quality Strategy, due to be published in 2023, will provide more information on local authorities' responsibilities to work towards these new targets and reduce $PM_{2.5}$ in their areas. The Road to Zero[6] details the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

As reported in the 2022 ASR the function of the AQAP steering group was reinstated, the first assembly of which has taken place on 24th June 2022 and has met quarterly since.

Following feedback from the reconvened group, the Council was able to make some updates to its draft AQAP following earlier appraisal from DEFRA. This included revisions to source apportionment work, which detailed the causes of poor air quality (based on breakdown of vehicle by classification), the feasibility appraisal of options and measures, and prioritisation. This will form part of the new AQAP due to be revised for 2024.

The latest appraisal from DEFRA shows a move in the right direction in terms of monitoring, management and reporting but has referred to the impending expiry of the current AQAP. The most recent appraisal summary is reproduced at section 2. Given the changes in structure and responsibilities, in addition to the revocation of the Northchurch AQMA, it is considered that a revised AQAP is looked at this year which is being done in conjunction with HCC Public Health and Air Quality teams, Dacorum Borough Council's

[5] Defra. Environmental Improvement Plan 2023, January 2023

[6] DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

Climate Change and Sustainability, Planning and Strategic Planning Teams and HCC Highways.

As a result of the creation of the Climate Emergency and Sustainability team in July 2020 and implementation of a Climate and Ecological Emergency (CEE) Strategy and Action Plan, the CEE action plan has echoed and championed a number of the measures set out within the air quality action plan, the new AQAP will outline and confirm the way these action plans and therefore departments will work together.

The Council has taken forward the proposal for an electric vehicle (EV) charging infrastructure study to determine future EV demand and identity which areas EV charge points would be best served to support wider public adoption of EV. A total of £415,360 of grant funding has been award by the Office for Zero Emission Vehicles (OZEV), with support of the Energy Saving Trust, for additional charging points for our residents who have plug-in electric vehicles. The project will provide 104 charging points across 18 car parks. The funding covers 60%, with the remaining 40 per cent being provided by Connected Kerb (who will be working with their rapid charging partner Osprey Charging Network).

Once the new charge points are in place, Dacorum will be the borough/district with the highest number of EV charge points throughout Hertfordshire and Dacorum will also move into the top 20 per cent nationally. Contracts are due to be signed before the end of the financial year and work will commence soon after.

The DBC Lead Pollution Officer is now sat on the Transport group for the HCCSP (Herefordshire Climate Change and Sustainability Partnership) and the Council is working with HCC Public Health Team and Air Strategy Lead in targeting the existing Air Quality Alert System as a data tool for vulnerable members of the public to identify days and areas of likely poor air quality incidents.

Conclusions and Priorities

Within the region of South West Herts, notable growth is still planned in Dacorum as well as neighbouring authorities of Luton, St Albans and Watford and therefore important that new development has a role to play in sustainability and improvement of local air quality. The Council continues to participate in the Herts and Beds air quality group that meets to discuss air quality matters affecting the County as a whole.

The Environmental and Community Protection (ECP) team will also continue to support and provide input into development of the local plan. Consultation closed in March 2021. As part of its consultation response ECP recommended a sustainability design guide noting that various obligations of national planning policy as regards healthy communities, transport and climate change require similar outcomes and exploiting these obligations to promote the co-benefits. For example travel plans produced under a transport obligation can support cycle schemes and which can promote health, and emissions reduction both in respect of climate and air quality.

The residual impact of COVID-19 on ambient average NO_2 concentrations had a clear benefit in respect of the Council's air quality. The pandemic accelerated the shift towards home working meaning some of the positive effectors on air quality may remain to an extent, thus reducing demand on local roads during peak hours of congestion.

The Council also identified a new potential area of exceedance as a result of new monitoring introduced for 2020. This was identified at a single receptor point on Queensway close to the Old Town. This was the only location for the 2021 data reported which had exceeded the Air Quality Objectives. The 2022 data shows that while this has reduced in levels from the previous year, is still slightly above the objective levels and remains a location of interest as a result. Further monitoring and data capture in the vicinity has now been deployed to assess the potential causes of this included 3x NOx Diffusion Tubes and a Zephyr Air Quality Monitor, the data collected from these additional monitoring locations will be shown in the 2024 ASR.

In regards to particulate matter PM10, 2.5 and 1 the trend and impact of solid fuel use namely wood burning stoves within domestic properties has led to a doubling of solid fuel use since 2005, which now means that as of 2018, residents burning in their home contributes to 38% of airborne particulates[7]. The societal trend of wood burning appliances being installed, particularly during Covid-19 lockdown home improvement projects has likely led to an exponential increase in this impact.

As such, the focus of DBC & HCC has been directed to focus on solid fuel burning in regards to management of particulates, HCC are spearheading a communications campaign with the support of the borough councils throughout the county regarding this. The ECP team have been allocated funds from Defra of £11,170 per year for 3 years initially, to hopefully boost resources to focus on potentially expanding and enforcing Smoke Control Areas.

In addition to this, officers are becoming aware of increasing study and research into accumulative levels of non-exhaust particulate emissions from road transport which is due

to the impact of tyre, brake and road wear caused by heavier electric vehicles, which is likely to surpass the particulates from combustion engines in the near future. The balance between the reduction of carbon and nitrogen based emissions and particulates continues to be an ongoing discussion at a national and international level, in addition to being a local concern.

Local Engagement and How to get involved

As part of the delivery of the AQAP and subsequent amendments, the Council intends to consult when appropriate on individual measures. This will include actively consulting with key partners, the public and businesses.

In regard to maintaining contact with the public the Council will continue to ensure that reports and monitoring results are made publically available through the Council's web pages. Furthermore, Social Media engagement through the Councils Communications team will be utilised in advising the public on various incentives and actions through the year including Clean Air Day and seasonal air quality considerations like garden clearance (appropriate waste management) wood burning stove use and so on.

Working with HCC, Dacorum are feeding into an Air Quality Alert system which will hope to provide advice and guidance to those vulnerable and at high risk of being physically impaired by the effects of incidents of poor air quality.

[7] Defra Solid Fuel Regulations August 2018

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Local Air Quality Management

This report provides an overview of air quality in Dacorum during 2022. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Dacorum to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

Actions to Improve Air Quality

Opportunities to progress actions to improve air quality had been limited in regards to addressing the previous commentary provided by DEFRA in respect of the Council's Air Quality Action Plan (AQAP), this is due to staff redeployment to address Covid-19 concerns however this has now been concluded for just over a year.

The Air Quality Action Plan was agreed by Defra in August 2020 with focus being on updating source apportionment work and undertaking a feasibility assessment and prioritisation of AQAP measures. This is now back to being a key focus and with the re-initiation of the Air Quality Steering Group in June 2022 and is being addressed with more priority.

Work is being undertaken to review the validity of some points due to changes in departmental structures, roles and responsibilities at local and county council level; these are summarised below. As the AQAP is due to be reviewed this year, these amendments will be reflected in the next ASR.

An overview of the measures proposed as part of the AQAP are:

- Maintaining close links with the Local Transport Plan, Local Planning and Public Health
- Influencing emission reduction from new developments
- Potential to relocate bus stops and on-street parking in the Northchurch AQMA
- Clean Air Zone feasibility study
- Workplace parking levy
- Private hire and taxi vehicle emissions policy
- Advanced quality bus partnership
- Reducing council emissions
- Electric vehicle charging infrastructure study / strategy
- Promoting sustainable travel and discouraging the use of single car journeys

Following the Climate Emergency declaration, in 2020, a sixth priority was added to the Council's Corporate Plan - The Climate and Ecological Emergency (CEE) which encompasses four core targets:

- To achieve net zero emissions (scopes 1 and 2) as an organisation by 2030
- To achieve net zero emissions for our council housing stock (approximately 10,500 homes) by 2050 at the latest
- To support the borough in becoming net zero by 2050 at the latest
- To support an increase in biodiversity within the borough as much as possible

A Climate Emergency and Sustainability Programme Lead Officer was appointed in July 2020. The role of this officer is to develop and support the delivery of the CEE strategy and action plan in order to achieve these targets. The four key focuses for this CEE work are sustainable transport, energy use in buildings, sustainable communities and biodiversity. The officer has been invited to, and is actively involved in, the Air Quality Steering Group from June 2022. This role is currently vacant at the time of writing however the Sustainability Officer has been attending in lieu of the Lead Officer.

Some of the early work of the AQAP has been transposed in the CEE Action Plan and through the work of the lead officer progress has begun on the development of an Electric Vehicle Strategy for the borough. Currently we are unable develop this EV strategy further as we are waiting for the Government to release its Transport Decarbonisation Plan and Hertfordshire County Council to release its own Electric Vehicle Strategy as both of these documents from higher governing bodies affect the work that we will be able to do locally. However, we have been able to make progress in some areas. Most notably:

- An internal Sustainable Transport - Climate Emergency group has been established, with an Electric Vehicle sub-group.
- An Electric Vehicle Charging Infrastructure study has been carried out with a sustainability consultant. The key highlights from this work to are:
    - Within Dacorum it is anticipated we will have at least 30,000 EVs by 2030
    - At least one third of households in the district are unable to charge at home
    - Between 600-700 on-street EV charge points will be required to meet demand

- An ongoing Electric Vehicle Residents Survey has been launched on our website which has already had nearly 2000 responses.

The Council has taken forward the proposal for an electric vehicle (EV) charging infrastructure study to determine future EV demand and identity which areas EV charge points would be best served to support wider public adoption of EV. A total of £415,360 of grant funding has been award by the Office for Zero Emission Vehicles (OZEV), with support of the Energy Saving Trust, for additional charging points for our residents who have plug-in electric vehicles. The project will provide 104 charging points across 18 car parks. The funding covers 60%, with the remaining 40 per cent being provided by Connected Kerb (who will be working with their rapid charging partner Osprey Charging Network).

Once the new charge points are in place, Dacorum will be the borough/district with the highest number of EV charge points throughout Hertfordshire and Dacorum will also move into the top 20 %nationally. Contracts are due to be signed before the end of the financial year and work will commence soon after.

One of our internal high level actions will be to decarbonise the Council's fleet by 2030 (recognising that waste collection vehicles may take longer than this depending on technologies).

We will also be working on a variety of behavioural change initiatives within the borough to encourage more sustainable transport.

Aside from transport, additional studies are also taking place into the current tree stock and external consultant support being provided to shape future tree planting strategies for around the borough.

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives. Based on the 2022 data, there are no exceedances within the existing AQMA areas, therefore the 'Level of Exceedance, Current Year' is not applicable.

A summary of AQMAs declared by Dacorum can be found in Table 2.1. The table presents a description of the 2 AQMA(s) that are currently designated within Dacorum, and the 1 recently revoked. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMA(s) and also the air quality monitoring locations in relation to the AQMA(s). The air quality objectives pertinent to the current AQMA designation(s) are as follows:

- NO_2 annual mean

As noted in the preceding chapter the Council has now revoked AQMA No.3 Northchurch following consultation with all relevant bodies and this will be the last year Northchurch will be shown as an AQMA in these reports, diffusion tube monitoring in the area however, will remain in place in addition to the deployment of 1x Zephyr Air Quality Monitor for a further year to continue to monitor levels post revocation, while the Real Time Analyser is moved to Apsley.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance : Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Lawn Lane, Hemel Hempstead	1st June 2012	NO2 Annual Mean	An area encompassing a number of properties overlooking to Lawn Lane, and the boundary declared between Belswains Lane and Seaton Road	NO	57	**n/a**	Under review	Under review
London Road, Apsley	1st June 2012	NO2 annual mean	An area encompassing a number of properties overlooking London Road, and the boundary declared between Featherbed Lane and Weymouth Street	NO	55.9	**n/a**	Under review	Under review
High Street, Northchurch	June 2012, amended Oct 2013, **Revoked April 2023**	NO2 annual mean	An area encompassing a number of properties overlooking High Street, Northchurch, and the boundary declared between Mandelyns and Bell Lane	NO	42.2	n/a	Under review	Under review

- **Dacorum Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date.**
- **Dacorum Borough Council confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and Impact of Measures to address Air Quality in Dacorum

Defra's appraisal of last year's ASR concluded:

The report is well structured, detailed, and provides the information specified in the Guidance. The following comments are designed to help inform future reports:

1. The report has addressed comments from the previous round of appraisals. The Councils hard work in improving their ASRs is welcomed.
2. Robust and accurate QA/QC procedures were applied and there is clear reasoning for the calculation of a national bias adjustment factor. To ensure accuracy, The Council should consider including a screen capture of the national bias adjustment factor selected from the National Diffusion Tube Bias Adjustment Factor Spreadsheet.
3. Some of the policy text, for example around the Environment Act, which was amended in 2021, is now outdated and so could be updated.
4. There is a formatting issue in *Table A.6 – Annual Mean PM10 Monitoring Results* whereby the annual mean PM_{10} monitoring results are incorrectly shown in bold. A result should only be shown in bold if it is above the PM_{10} annual mean objective of 40µg/m^3. As these values are below the annual mean objective, they should not be bold.
5. The Council have provided a clear map of the diffusion tube monitoring network; trends are displayed and discussed in the report, this is welcomed.
6. The Council are required to publish an AQAP and a detailed assessment of progress within Table 2.2 in the following monitoring year. Updates to the new AQAP are expected to be included in next year's ASR.
7. Overall, the report is detailed, concise and satisfies the criteria of relevant standards. The council should continue their good and thorough work.

Dacorum Borough Council has three Air Quality Management Areas (AQMA) declared within their jurisdiction: AQMA 1: Lawn Lane, Hemel Hempsted (declared in 2012); AQMA 2: London Road, Apsley (declared in 2012); and AQMA 3: High Street, Northchurch (declared in 2012). All three AQMAs are declared for exceedances of the annual mean objective of 40µg/m^3 for nitrogen dioxide (NO_2). The Council has proposed to revoke AQMA 3 in 2023, providing that recorded NO_2 concentrations remain below the objective value. The Council stated that they will continue to review future monitoring data to ascertain whether the AQMAs are still required.

The most recent Air Quality Action Plan (AQAP) was published in 2015 for all three current AQMAs. This is outside the usual 5-year time frame at which DEFRA recommends a new AQAP should be produced. The Council stated that it will prioritise finalising the draft AQAP in 2022.

The Council undertook automatic (continuous) monitoring at one site during 2021: CM1, Highstreet, Northchurch. The automatic site monitors NO_2, PM_{10} and $PM_{2.5}$. In 2021, there were no exceedances of the annual mean objectives for NO_2. There were no exceedances of the annual mean objective for PM_{10} and no exceedances of the annual mean objective for $PM_{2.5}$.

The Council undertook non-automatic (i.e., passive) monitoring of NO_2 at 49 sites during 2021. During 2021, there was one exceedances of the annual mean air quality objective at site DC5, which recorded an annual mean NO_2 concentration of 46 µg/m^3, the maximum concentration recording across the borough. Monitoring data in 2021 showed decreases at most monitoring locations within the borough when compared to 2020 data. The Council attribute this decrease to reduced commuting and more hybrid working following the COVID-19 pandemic.

The Council has robust QA/QC procedures for diffusion tube monitoring, which were applied appropriately and accurately to the 2021 monitoring data. The national bias adjustment factor has been applied and justified. Annualisation was carried out at CM1 for PM_{10} and $PM_{2.5}$ and at three diffusion tube sites, DC 18, DC23, DC42. Distance correction was required for two sites, DC4 and DC5, as concentrations were within at least 10% of the annual mean air quality objective of 40 µg/m^3. All calculations were clearly outlined.

During 2021, Dacorum Borough Council progressed several key measures to help further improve air quality within the district. These include:

- Establishing an internal Sustainable Transport – Climate Emergency group;
- Carrying out an Electric Vehicle Charging Infrastructure study; and
- A commitment to apply for the government's On-Street Residential Chargepoint Scheme (ORCS).

On the basis of the evidence provided by the local authority the conclusions reached are **accepted** for all sources and pollutants. Following the completion of this report, Dacorum Borough Council should submit an Annual Status Report in 2023.

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The Air Quality Expert Group (2015) estimate that UK emissions contribute to approximately 50-55% of the total annual average $PM_{2.5}$ in the UK. The European Environment Agency estimates that road transport sources contribute to 13% of European emissions of $PM_{2.5}$ in 2013. Data presented by the Air Quality Expert Group (2015) estimated the contribution from traffic to be 7% in the UK. This emphasises that a large proportion of airborne $PM_{2.5}$ originate from other sources, including sea-salt, inorganic aerosols, organic aerosols and non-traffic generated rural and urban particulates including biomass burning both domestic and commercial.

The obligation placed upon local authorities in respect of $PM_{2.5}$ is that they are expected to work towards reducing emissions and concentrations of $PM_{2.5}$ in their local area as practicable and consider action if necessary to address $PM_{2.5}$ issues in their area, and aligning those interests with those shared by Public Health.

However policy guidance LAQM.PG16 does not prescribe what the local authority role should be; it is for the local authority in consultation with its public health officials and others to consider how it wishes to define this role.

Whilst there are no numerical limit values prescribed for $PM_{2.5}$ for England and no statutory obligations on local authorities in respect of monitoring concentrations of $PM_{2.5}$ in the ambient air, the EU Ambient Air Quality Directive has identified 25ug/m^3 as a limit value to be met by 2020 and the World Health Organisation (WHO) has set an air quality guideline of 10ug/m^3 (reducing to 5ug by 2030) as an annual mean for $PM_{2.5}$.

The only specific indicator for $PM_{2.5}$ is included within the Public Health Outcomes Framework (Public Health Outcome Indicator (PHOI) 3.01) which is stated as:

'The fraction of annual all-cause mortality attributable to long-term exposure to current levels of anthropogenic particulate pollution.'

This indicator is based on an estimated amount of $PM_{2.5}$ derived by Defra modelling from local measurement, including one site in Borehamwood, Hertfordshire and another in Bedfordshire. That data has been adjusted by way of population to give a population weighted figure before its use in deriving the PHOI.

The $PM_{2.5}$ focused PHOI reflects the adverse impact that this type of air pollution can have on public health as a result of the fine particles being carried deep into the lungs where they can cause inflammation and a worsening of heart and lung diseases.

Within Hertfordshire joint working on air quality issues between the local authorities and Hertfordshire County Council for $PM_{2.5}$ as part of the Herts and Beds air quality group has included a local monitoring project. The aim has enabled the collection of real-time direct measurements of $PM_{2.5}$ concentrations from multiple locations within Hertfordshire in order to address the paucity of $PM_{2.5}$ data available within the County.

The most recent report remains the Hertfordshire Local Authorities Report on Particulate Matter ($PM_{2.5}$) in Ambient Air in 2021 for Hertfordshire County Council Public Health (February 2023). This identifies that it is important to recognise that the figures published for PHOI 3.01 are estimates and therefore cannot be used for performance monitoring; they can only provide an indication of the scale of the issue. Further information on the use of health related air quality data is available at: https://hertshealthevidence.org/documents/thematic/airqualitydatafaq-briefing-2019-07.pdf.

It is for this reason that the report does not make direct reference to the PHOI figures, but uses the population weighted Defra modelled $PM_{2.5}$ concentrations in their place.

The report makes the following broad observations:

- Breaches of the moderate and high daily air pollution index typically occur in the winter months when weather conditions are more likely to be still and cold.
- Peak concentrations often coincide with local contributions from celebrations associated with the use of fireworks, but unlike in 2020, these local contributions will not necessarily be sufficient to breach the moderate air pollution index level.
- Elevated concentrations are associated with air pollution that has built up from the continent or further afield and transported to Britain.
- Elevated concentrations can also be associated with ‘normal’ background concentrations of $PM_{2.5}$ that are exacerbated by locally derived road vehicle pollution, or one off events.

- At this stage the impact of the Covid-19 lockdowns in 2020 and 2021, if any are hard to discern from the available data.
- Defra modelled $PM_{2.5}$ concentrations for each local authority area are broadly consistent with the concentrations being measured by the analysers within each local authority

Where data capture rates have been reliable the mean annual average concentrations of $PM_{2.5}$ have been reducing gradually.

The Daily Air Quality Index for air pollution is a UK Air Information resource to inform the public on levels of air pollution and provides recommended actions and health advice. The index is numbered 1-10 and divided into four bands, low (1) to very high (10). Air pollution bandings are defined as:

- Moderate is defined as being above 36µg/m^3 but less than 54µg/m^3
- High is defined as being between 54µg/m^3 and 70µg/m^3
- Very High is defined as being 71µg/m^3 or higher

All are calculated as a 24-hour running mean.

However, beyond its participation in the Herts and Beds Air Quality group the Council currently has no specified measures for emissions reduction for $PM_{2.5}$, and as a result of the pandemic there has been limited progress on the draft AQAP.

As aforementioned within this report the Council is working to various net zero targets for our organisation, our housing stock, as well as the wider borough, and is developing and delivering a CEE Strategy and Action Plan to achieve these. This includes a number of high level actions, including fleet decarbonisation, improvement of energy efficiency in all of our built assets and housing stock, and investigating the role that renewables can play in the borough, with a likely emphasis on solar.

Whilst climate change focuses on greenhouse gas emissions reduction this can play a complimentary role in respect of local air quality management and vice versa. The CEE Action Plan incorporates elements from the draft AQAP as regards reductions from Council emissions.

Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

This section sets out the monitoring undertaken within 2022 by Dacorum Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 to allow monitoring trends to be identified and discussed.

Summary of Monitoring Undertaken

Automatic Monitoring Sites

Dacorum Borough Council undertook automatic (continuous) monitoring at one site during 2022. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The Herts and Beds Air Quality Monitoring Service page https://www.airqualityengland.co.uk/local-authority/?la_id=408 presents automatic monitoring results for Dacorum Borough Council, and forms part of the UK-Air website.

This location will be changing, as it is currently installed within the now revoked Northchurch AQMA, it is being moved to another AQMA in Apsley.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

Non-Automatic Monitoring Sites

Dacorum Borough Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 49 sites during 2022.

New sites were introduced in 2020 to consider areas not previously identified under previous rounds of review and assessment and where air quality concerns may be present. Sites were selected based on either local knowledge and / or reports produced by consultants for new development that suggested ambient NO_2 levels approaching the annual average objective.

Further adjustments are being made in 2023 to this network to focus on more problematic areas and remove monitoring from roadside locations which have consistently been at or lower than background levels.

Table A.2 in Appendix A presents the details of the non-automatic sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. annualisation and/or distance correction), are included in Appendix C.

Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

Nitrogen Dioxide (NO_2)

As with the data of the 2021 ASR only 1 exceedance was measured across the district through the year's average, following bias adjustment and distance drop off calculations. This is the same location as last year, DC4 at Queensway and Old Town High St, however the 2021 ASR annual average at 46µg/m^3 has now reduced to 42.6µg/m^3 this year showing a marked improvement of 7.7% reduction.

Diffusion tube monitoring has increased in the area for the forthcoming year to identify the spread of the exceedance however no exceedances were registered at the 3 other locations within the immediate vicinity. A 'Zephyr' unit is being installed nearby to assess hourly readings and look at daily trends in regard to air pollution concentrations.

Whereas in previous years local monitoring remained well above the objective limit the Lawn Lane and London Road AQMAs, the effect on local air quality, likely arising from 'stay at home' / 'stay local' instruction resulted in further improvements on previous years, bringing both AQMA areas below the exceedance limits. This is a substantial improvement borough wide and, as the first full years monitoring post-Covid-19 travel restrictions, shows a marked improvement on the air quality across the borough.

Taking the average of the triplicate exposure in the London Road AQMA in 2021 the annual average was 28.8µg/m^3. At the same location in 2022 this was 28.6µg/m^3, an improvement of 0.2µg/m^3.

Taking the average of the triplicate exposure in the Lawn Lane AQMA in 2021 the annual average was 29.5µg/m^3. At the same location in 2022 this was 28.3µg/m^3, an improvement of 1.2µg/m^3.

As both locations have shown a continued improvement, albeit at a small amount, both AQMA averages have remained at over 10µg/m^3 below health limits post-covid and therefore below declarable AQMA levels. As such, both AQMAs will begin to be considered for revocation if this trend continues, the 2020 and 2021 data will not form part of this consideration given restrictions on non-essential movement during this time.

The work of the Herts and Beds Air Quality Group has included commissioning work 'COVID19 lockdown effects on air quality' which examined the impact of lockdown on ambient air quality data.

This page can be found at:
https://www.airqualityengland.co.uk/assets/reports/408/HertfordshireandBedfordshire_report_covid_analysis.html#monthly_change_in_pollutant_concentrations

Noting the measured reduction in transport use (Hertfordshire Traffic and Road Transport Data Report) and the corresponding improvement in local air quality it highlights the scale of reduction required to bring about improvement in local air quality. To bring NO_2 levels close to or within objective limits it has taken a national lockdown and thus demonstrates the difficult challenges presented with action planning to reduce activity on local roads and promote modal shift. However, with this continuing to drop post-lockdown in 2021, a further year will be needed to assess whether the changes in culture (increases in remote working, reliance on grocery delivery and so on) will have a lasting impact.

In the Northchurch AQMA measured concentrations for 2022 are well below the objective limit. In its previous ASR the Council reported 4 years of compliance. To support revocation of the AQMA, Policy Guidance LAQM.PG16 specifies this will typically be feasible after three or more years of compliance. Monitoring from 2020 and 2021 had represented a 3rd and 4th year of compliance, although results in 2020/21 clearly arise from an atypical year. The continued improvement through 2022 supports the decision to revoke AQMA 3 which was carried out under council seal on 04/04/2023 and updated on the Defra LAQM portal on 12/04/2023.

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2022 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

Particulate Matter (PM_{10})

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

The Council has been monitoring PM_{10} and $PM_{2.5}$ at the automatic monitoring station on the High Street, Northchurch, since August 2015. As stated previously this is due to be relocated to Apsley during the forthcoming financial year (2023/24).

No exceedances were measured for either of the objectives relevant to PM_{10} and a slight increase on the previous years' data. Noting that road transport appears not to be as significant a contributor to local PM_{10} concentrations as NO_2 concentrations the concentration reduction as a result of the pandemic is not as marked.

Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years. The objective for $PM_{2.5}$ is not a numerical objective, but an expectation that local authorities should work towards reducing emissions/concentrations of fine particulate matter.

The annual average measured for 2022 was 10µg/m^3, which has shown the annual mean increasing by 1µg/m^3 on the 2021 statistics.

For 2022 the data capture at this station achieved 90%, showing improvements made onsite in regards to the recording technology and logger have worked.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	High Street, Northchurch	Roadside	497295	208901	NO2; PM10; PM2.5	YES	Chemiluminescent; FIDAS	10	3	2

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable

Table A.2 – Details of Non-Automatic Monitoring Sites

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser	Height (m)
DC1	Cotterells	Roadside	505355	206504	NO2	N	5.0	1.0	No	2.0
DC2	Southhill Road BG	Background	505251	206960	NO2	N	4.0	0.5	No	2.0
DC3	Leighton Buzzard Road	Roadside	505339	207238	NO2	N	6.5	2.5	No	2.0
DC4	LB Road / Coombe Street	Roadside	505340	207207	NO2	N	8.0	2.0	No	2.0
DC5	Queensway 1	Roadside	505528	207651	NO2	N	1.0	2.0	No	2.0
DC6	Queensway 2	Roadside	505545	207649	NO2	N	0.0	3.0	No	2.0
DC7	Queensway 3	Roadside	505587	207686	NO2	N	0.0	3.0	No	2.0
DC8	Old Town Background	Background	505533	207842	NO2	N	0.0	15.0	No	2.0
DC9	Kylna Court	Roadside	507848	208000	NO2	N	6.0	2.0	No	2.0
DC10	New Park Drive	Urban Background	507774	207313	NO2	N	8.0	1.0	No	2.0
DC11	Green Dell Way	Urban Background	508013	207155	NO2	N	8.0	2.0	No	2.0
DC13	St Albans Rd 2	Roadside	507880	207170	NO2	N	5.5	2.5	No	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser	Height (m)
DC14	St Albans Rd 3	Roadside	507716	207047	NO2	N	8.5	1.5	No	2.0
DC15	Markyate 1	Roadside	506227	216317	NO2	N	0.0	2.0	No	2.0
DC16	Markyate 2	Roadside	506093	216501	NO2	N	0.0	1.5	No	2.0
DC17	Gravel Path	Roadside	499703	207838	NO2	N	0.0	1.0	No	2.0
DC18	Chapel Street, Berkhamsted	Roadside	499448	207870	NO2	N	2.0	2.0	No	2.0
DC19	Prices Edward Street, Berkhamsted	Urban Background	499207	207754	NO2	N	43.0	2.0	No	2.0
DC20	High Street Berkhamsted 1	Roadside	498990	207924	NO2	N	3.0	3.0	No	2.0
DC21	High Street Berkhamsted 2	Roadside	499095	207874	NO2	N	1.5	3.5	No	2.0
DC22	High Street Berkhamsted 3	Roadside	499131	207838	NO2	N	1.0	4.0	No	2.0
DC23	Lower Kings Road 1	Roadside	499129	207942	NO2	N	1.5	2.5	No	2.0
DC24	Lower Kings Road 2	Roadside	499125	207900	NO2	N	1.5	0.8	No	2.0
DC25	Kings Road 1	Roadside	499108	207835	NO2	N	0.0	2.0	No	2.0
DC26	Kings Road 2	Roadside	499095	207838	NO2	N	0.0	1.0	No	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser	Height (m)
DC27	BFI 1 Shooters Way	Roadside	498323	206948	NO2	N	3.0	2.0	No	2.0
DC28	BFI 2 Shooters Way	Roadside	498318	206950	NO2	N	0.0	2.0	No	2.0
DC29	Stone Cottages, Kings Road	Roadside	498289	207005	NO2	N	0.0	7.0	No	2.0
DC30	The Meads	Roadside	497472	208730	NO2	N	8.0	2.0	No	2.0
DC31	High Street 1A Northchurch	Roadside	497346	208835	NO2	N	1.5	1.0	No	2.0
DC32	High Street 1B Northchurch	Roadside	497346	208835	NO2	Northchurch	1.5	1.0	No	2.0
DC33	High Street 1C Northchurch	Roadside	497346	208835	NO2	Northchurch	1.5	1.0	No	2.0
DC34	New Road	Roadside	497355	208852	NO2	Northchurch	0.0	1.5	No	2.0
DC35	High Street 2A Northchurch	Roadside	497335	208860	NO2	Northchurch	0.0	3.0	No	2.0
DC36	High Street 2B Northchurch	Roadside	497335	208860	NO2	Northchurch	0.0	3.0	No	2.0
DC37	High Street 2C Northchurch	Roadside	497335	208860	NO2	Northchurch	0.0	3.0	No	2.0
DC38	Northchurch Analyser A	Roadside	497295	208901	NO2	Northchurch	4.0	3.0	Yes	2.0
DC39	Northchurch Analyser B	Roadside	497295	208901	NO2	Northchurch	4.0	3.0	Yes	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser	Height (m)
DC40	Northchurch Analyser C	Roadside	497295	208901	NO2	Northchurch	4.0	3.0	Yes	2.0
DC41	High Street 3 Northchurch	Roadside	497306	208874	NO2	Northchurch	0.0	2.0	No	2.0
DC42	Brook Street 1 Tring	Roadside	492611	212006	NO2	Northchurch	0.0	2.5	No	2.0
DC43	Brook Street 2 Tring	Roadside	492680	212663	NO2	No	1.0	1.0	No	2.0
DC44	Watford Rd Kings Lanley	Roadside	507611	201620	NO2	No	23.0	2.0	No	2.0
DC45	High Street Kings Langley	Roadside	507168	202802	NO2	No	1.0	3.0	No	2.0
DC46	Belswains Lane Hemel Hempstead	Roadside	507005	204677	NO2	No	3.0	1.0	No	2.0
DC47	London Rd Apsley 1A	Roadside	505677	205513	NO2	No	0.0	1.5	No	2.0
DC48	London Rd Apsley 1B	Roadside	505677	205513	NO2	London Road	0.0	1.5	No	2.0
DC49	London Rd Apsley 1C	Roadside	505677	205513	NO2	London Road	0.0	1.5	No	2.0
DC50	London Rd Apsley 2A	Roadside	505737	205443	NO2	London Road	1.0	2.0	No	2.0
DC51	London Rd Apsley 2B	Roadside	505737	205443	NO2	London Road	1.0	2.0	No	2.0
DC52	London Rd Apsley 2C	Roadside	505737	205443	NO2	London Road	1.0	2.0	No	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser	Height (m)
DC53	London Rd Apsley 3	Roadside	505770	205430	NO2	London Road	1.5	3.5	No	2.0
DC54	London Rd Apsely 4	Roadside	505696	205509	NO2	London Road	0.0	4.0	No	2.0
DC55	London Rd Apsely 5	Roadside	505797	205436	NO2	London Road	0.0	2.0	No	2.0
DC56	Durrants Hill 1A	Roadside	505734	205519	NO2	London Road	1.0	2.0	No	2.0
DC57	Durrants Hill 1B	Roadside	505734	205519	NO2	London Road	1.0	2.0	No	2.0
DC58	Durrants Hill 1C	Roadside	505734	205519	NO2	London Road	1.0	2.0	No	2.0
DC59	Lawn Lane HH 1A	Roadside	505969	205726	NO2	Lawn Lane	1.0	1.0	No	2.0
DC60	Lawn Lane HH 1B	Roadside	505969	205726	NO2	Lawn Lane	1.0	1.0	No	2.0
DC61	Lawn Lane HH 1C	Roadside	505969	205726	NO2	Lawn Lane	1.0	1.0	No	2.0
DC62	Lawn Lane HH 2A	Roadside	505930	205740	NO2	Lawn Lane	0.0	1.0	No	2.0
DC63	Lawn Lane HH 2B	Roadside	505930	205740	NO2	Lawn Lane	0.0	1.0	No	2.0
DC64	Lawn Lane HH 2C	Roadside	505930	205740	NO2	Lawn Lane	0.0	1.0	No	2.0
DC65	Lawn Lane HH 3A	Roadside	505901	205788	NO2	Lawn Lane	5.5	1.5	No	2.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	Tube Co-located with a Continuous Analyser	Height (m)
DC66	Lawn Lane HH 3B	Roadside	505901	205788	NO2	Lawn Lane	5.5	1.5	No	2.0
DC67	Lawn Lane HH 3C	Roadside	505901	205788	NO2	Lawn Lane	5.5	1.5	No	2.0
DC68	Lawn Lane HH 4	Urban Background	506053	205664	NO2	Lawn Lane	0.0	29.0	No	2.0

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2018	2019	2020	2021	2022
CM1	497295	208901	Roadside	Automatic	99	29.3	24.0	19.0	18.0	18.0

- **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**
- **Reported concentrations are those at the location of the monitoring site (annualised, as required), i.e. prior to any fall-off with distance correction.**

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
DC1	505355	206504	Roadside	100	100.0	32.1	31.8	31.2	27.1	27.3
DC2	505251	206960	Background	100	100.0				12.7	13.1
DC3	505339	207238	Roadside	100	100.0				34.8	34.2
DC4	505340	207207	Roadside	100	100.0				36.5	34.3
DC5	505528	207651	Roadside	100	100.0				**49.4**	**45.6**
DC6	505545	207649	Roadside	92.3	92.3				24.9	23.1
DC7	505587	207686	Roadside	92.3	92.3				28.7	28.5
DC8	505533	207842	Background	100	100.0				12.9	13.7
DC9	507848	208000	Roadside	100	100.0				27.3	26.4
DC10	507774	207313	Urban Background	100	100.0				15.4	16.0
DC11	508013	207155	Urban Background	100	100.0				17.3	16.3
DC13	507880	207170	Roadside	92.3	92.3				29.2	26.8
DC14	507716	207047	Roadside	100	100.0				25.7	25.1
DC15	506227	216317	Roadside	100	100.0	23.0	22.4	20.8	15.6	14.8

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
DC16	506093	216501	Roadside	100	100.0	19.3	19.6	19.1	14.7	14.0
DC17	499703	207838	Roadside	100	100.0	23.6	25.1	25.3	19.4	18.2
DC18	499448	207870	Roadside	100	100.0	17.6	16.1	16.9	12.9	12.1
DC19	499207	207754	Urban Background	100	100.0	18.1	17.9	17.5	13.6	13.3
DC20	498990	207924	Roadside	100	100.0				21.3	19.2
DC21	499095	207874	Roadside	100	100.0				24.9	23.4
DC22	499131	207838	Roadside	100	100.0				24.4	22.9
DC23	499129	207942	Roadside	100	100.0	33.3	29.2	30.7	21.6	22.7
DC24	499125	207900	Roadside	100	100.0				20.8	22.5
DC25	499108	207835	Roadside	100	100.0				21.2	21.4
DC26	499095	207838	Roadside	67.4	67.4				26.6	25.6
DC27	498323	206948	Roadside	100	100.0	35.7	33.3	29.0	22.1	21.0
DC28	498318	206950	Roadside	100	100.0	35.0	35.5	32.5	23.5	22.5
DC29	498289	207005	Roadside	100	100.0	25.3	27.2	24.0	17.1	17.0

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
DC30	497472	208730	Roadside	100	100.0	23.4	24.7	24.7	20.5	20.2
DC31	497346	208835	Roadside	100	100.0	**42.3**	33.0	32.7	30.1	29.1
DC32	497346	208835	Roadside	100	100.0	**40.4**	34.2	32.9	31.2	30.7
DC33	497346	208835	Roadside	100	100.0	**42.6**	33.6	33.9	31.2	30.9
DC34	497355	208852	Roadside	89.8	89.8				19.5	18.6
DC35	497335	208860	Roadside	100	100.0	34.2	36.2	38.6	27.1	23.4
DC36	497335	208860	Roadside	100	100.0	33.1	35.5	37.6	26.9	25.0
DC37	497335	208860	Roadside	100	100.0	35.2	37.8	37.2	27.9	25.7
DC38	497295	208901	Roadside	100	100.0	23.9	25.4	23.8	18.1	17.6
DC39	497295	208901	Roadside	100	100.0	23.4	25.9	24.3	18.9	17.8
DC40	497295	208901	Roadside	100	100.0	23.9	24.8	24.9	18.7	18.2
DC41	497306	208874	Roadside	100	100.0				22.8	22.2
DC42	492611	212006	Roadside	92.3	92.3				20.3	19.0
DC43	492680	212663	Roadside	85.4	85.4				17.5	17.0

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
DC44	507611	201620	Roadside	100	100.0				31.9	28.2
DC45	507168	202802	Roadside	100	100.0				20.8	20.0
DC46	507005	204677	Roadside	100	100.0	32.2	32.9	30.4	23.2	22.5
DC47	505677	205513	Roadside	100	100.0	**54.0**	**48.6**	**48.6**	37.6	36.8
DC48	505677	205513	Roadside	100	100.0	**55.8**	**48.3**	**47.1**	38.5	37.9
DC49	505677	205513	Roadside	100	100.0	**52.9**	**48.3**	**49.9**	36.1	35.8
DC50	505737	205443	Roadside	100	100.0				30.0	30.3
DC51	505737	205443	Roadside	100	100.0				30.7	31.7
DC52	505737	205443	Roadside	100	100.0				30.1	30.3
DC53	505770	205430	Roadside	100	100.0				26.1	24.8
DC54	505696	205509	Roadside	100	100.0				28.7	27.6
DC55	505797	205436	Roadside	89.8	89.8				29.6	29.4
DC56	505734	205519	Roadside	100	100.0	27.5	26.2	27.6	22.3	21.8
DC57	505734	205519	Roadside	100	100.0	29.1	27.5	26.6	22.0	23.5

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2022 (%) [2]	2018	2019	2020	2021	2022
DC58	505734	205519	Roadside	100	100.0	28.6	28.0	28.8	22.9	21.0
DC59	505969	205726	Roadside	89.8	89.8	31.2	28.5	30.6	24.1	23.2
DC60	505969	205726	Roadside	100	100.0	38.5	29.2	29.8	24.9	22.4
DC61	505969	205726	Roadside	93.1	93.1	31.7	29.4	29.4	26.5	22.1
DC62	505930	205740	Roadside	100	100.0	**48.9**	**48.7**	**52.1**	35.8	32.7
DC63	505930	205740	Roadside	100	100.0	**55.6**	**48.6**	**51.0**	36.0	34.7
DC64	505930	205740	Roadside	100	100.0	**54.6**	**48.3**	**49.3**	35.1	36.2
DC65	505901	205788	Roadside	100	100.0				28.2	26.3
DC66	505901	205788	Roadside	100	100.0				27.3	28.1
DC67	505901	205788	Roadside	100	100.0				27.1	28.8
DC68	506053	205664	Urban Background	100	100.0	21.1	20.6	20.2	15.3	16.3

- **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16**
- **Diffusion tube data has been bias adjusted**
- **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction**

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

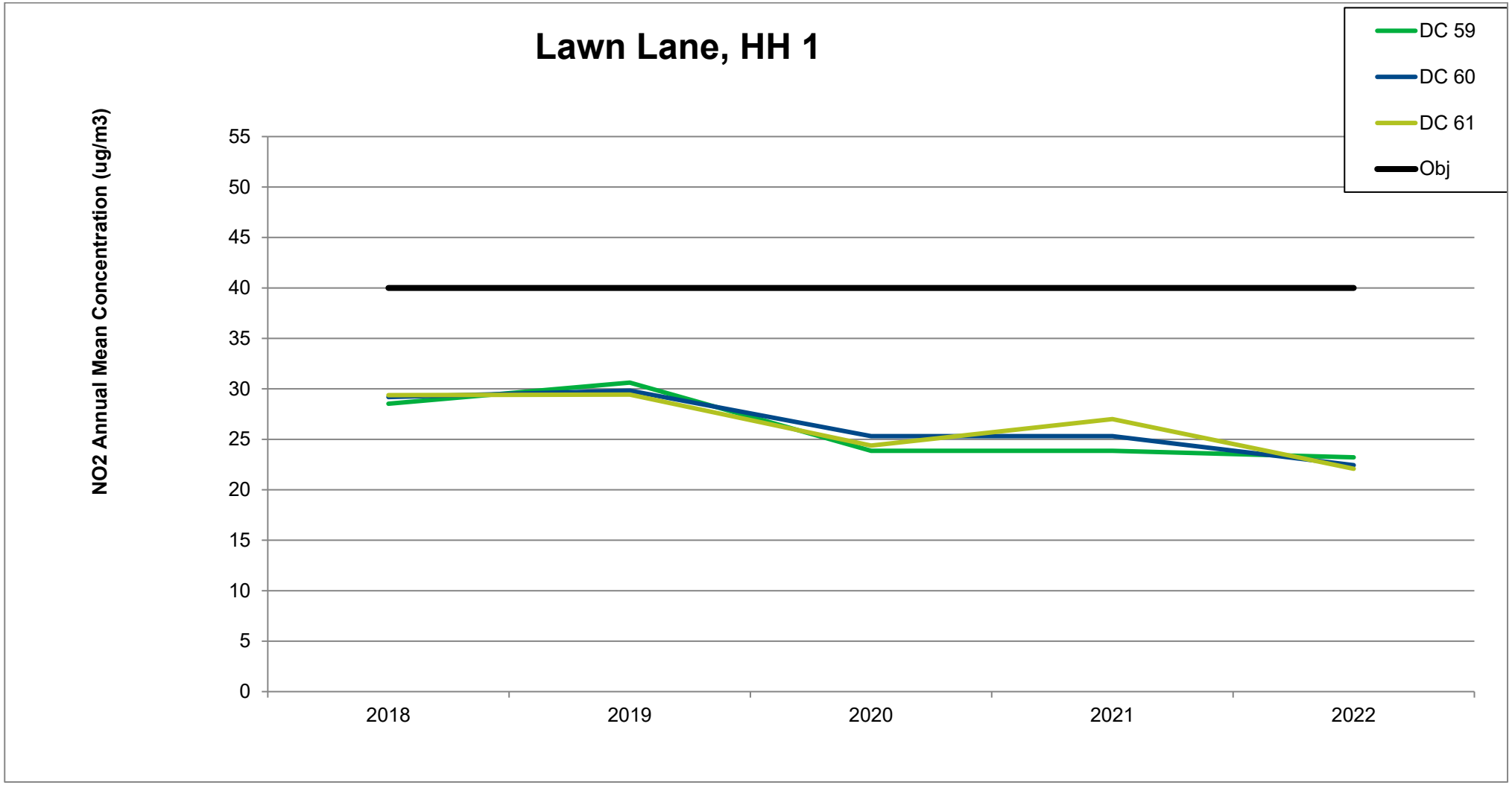
(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

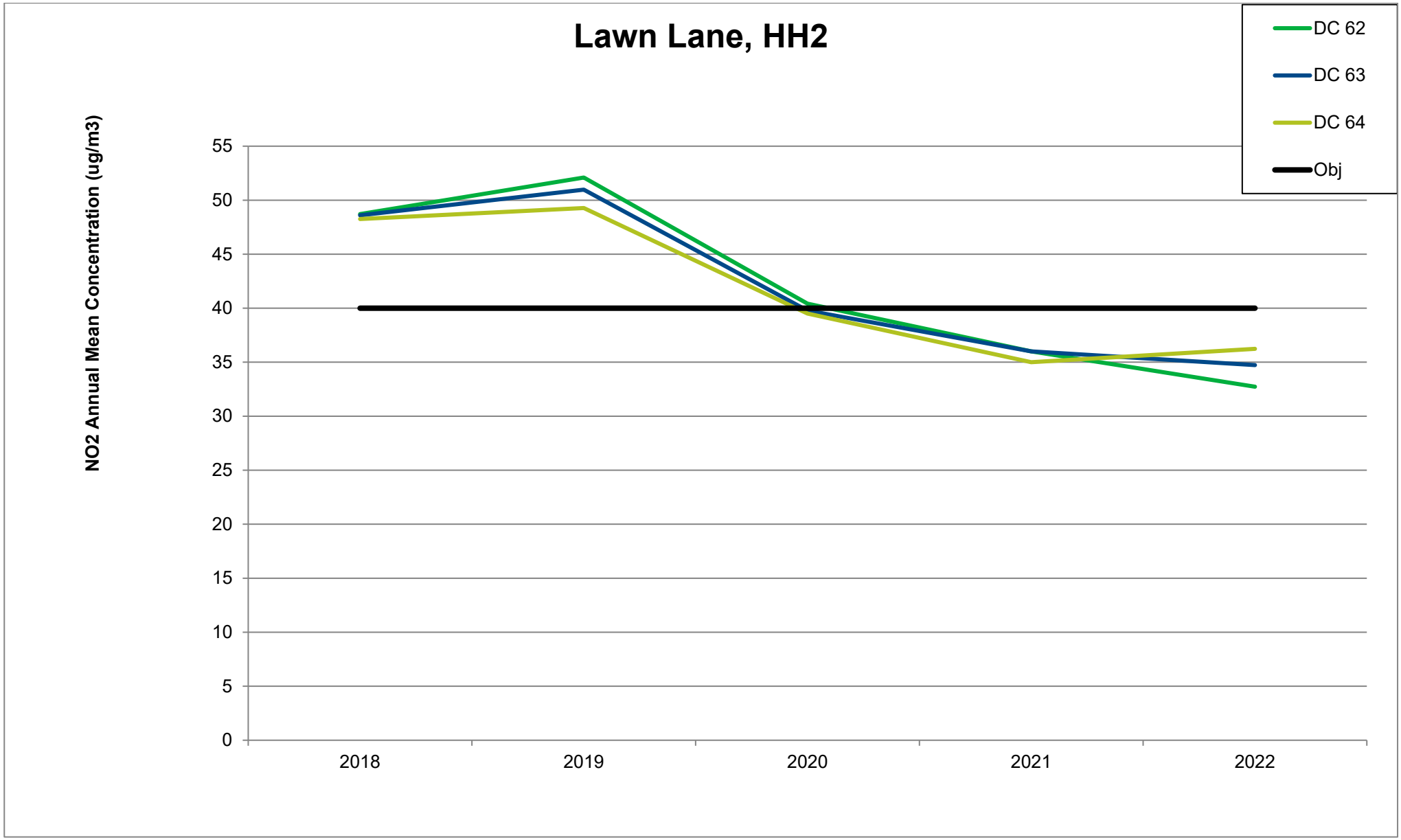
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Sites presenting data for 2020 & 2021 only represent new monitoring locations introduced following revisions to the local monitoring network.

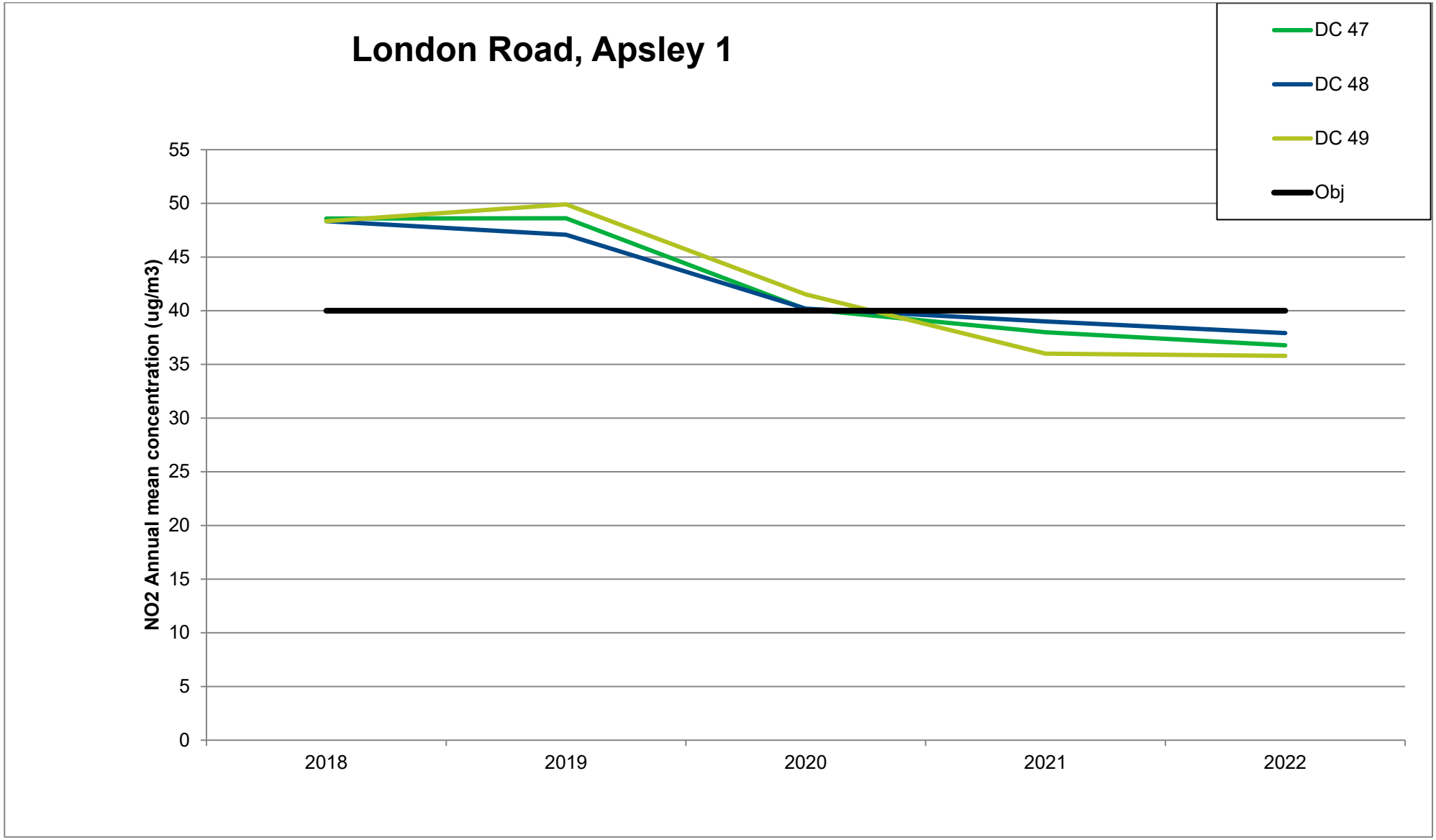
Figure A.1 – Trends in Annual Mean NO_2 Concentrations

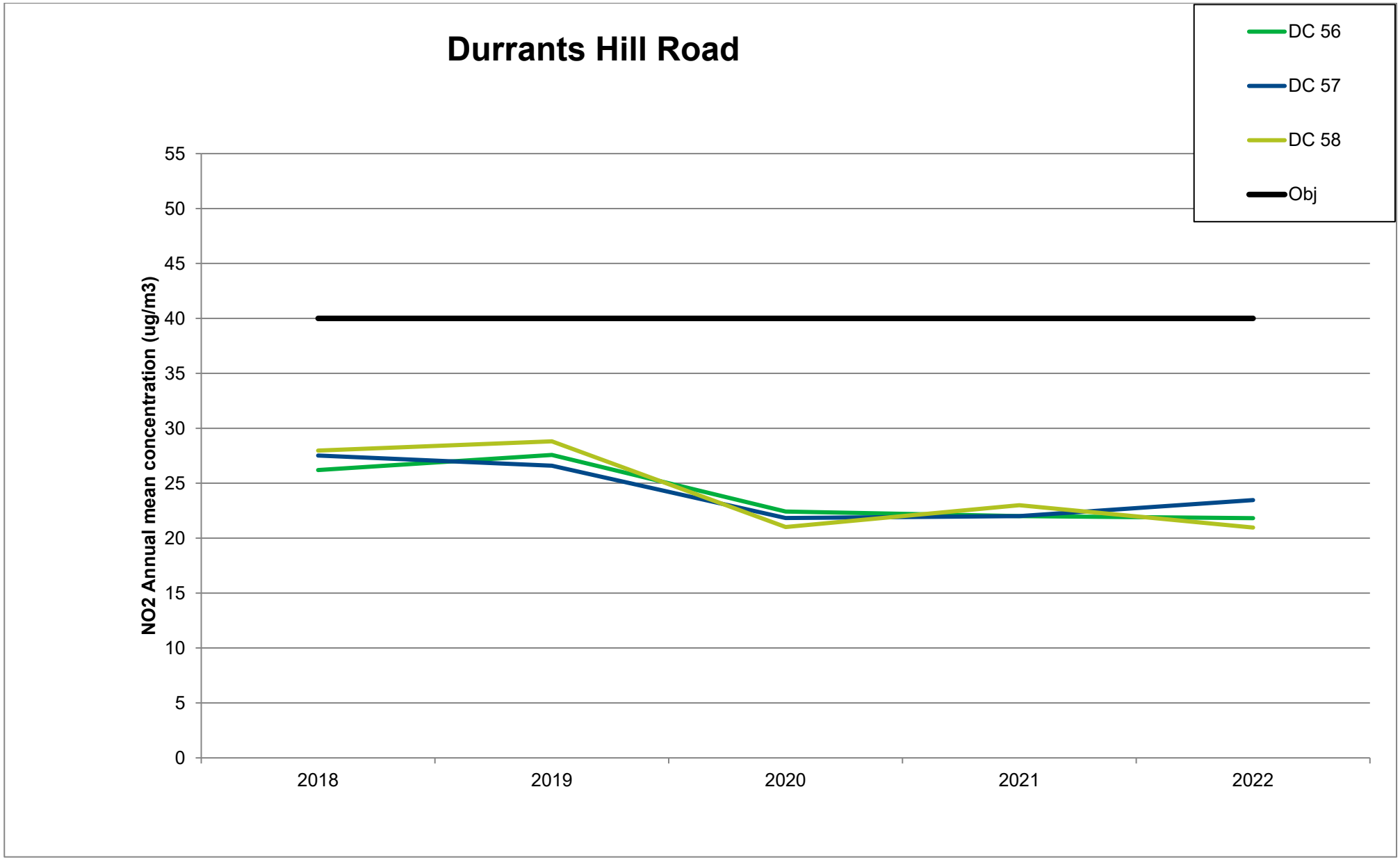
AQMA 1 – Lawn Lane, Hemel Hempstead



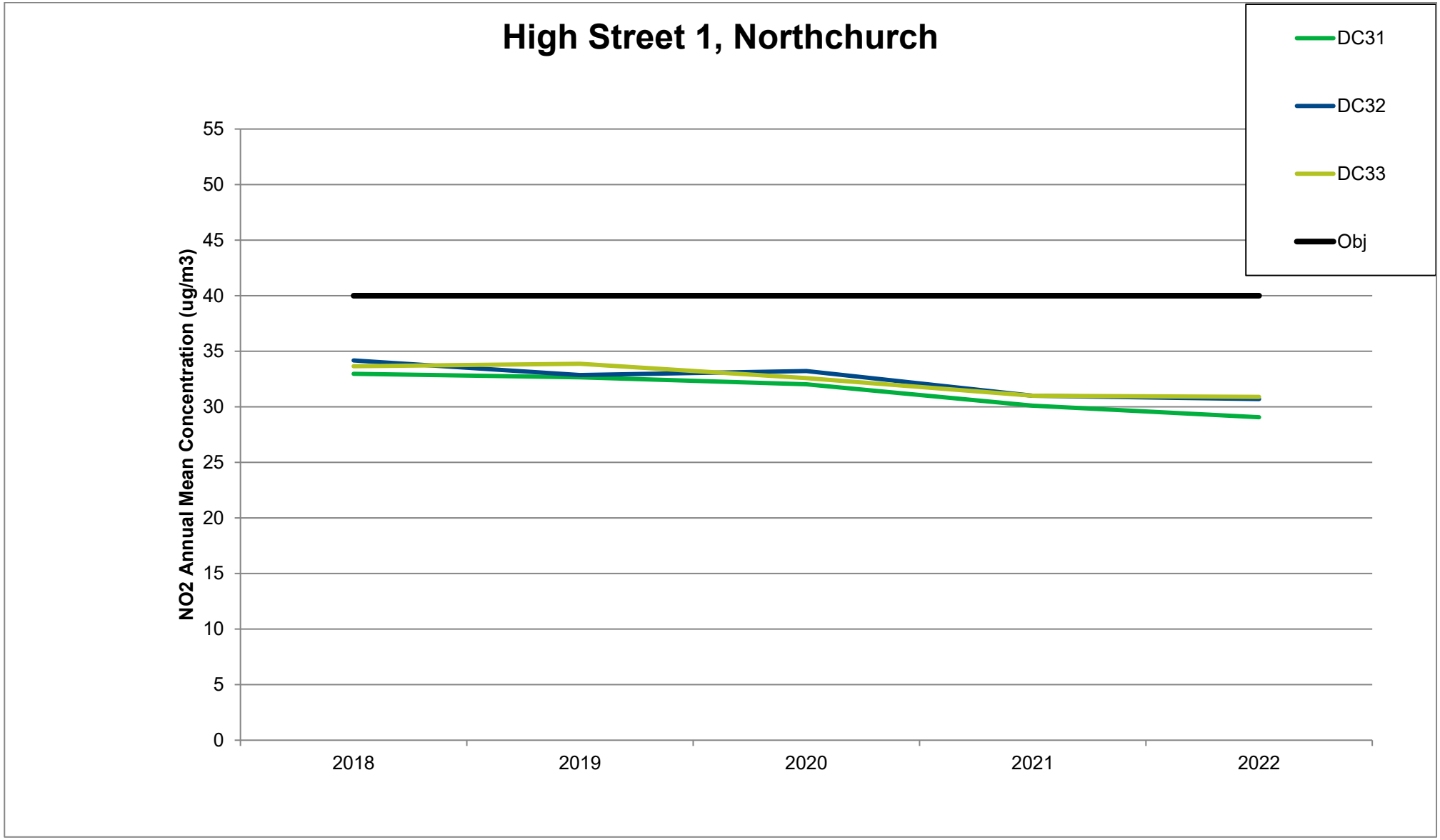

Lawn Lane, HH2
NO2 Annual Mean Concentration (ug/m3)
55
50
45
40
35
30
25
20
15
10
5
0
2018
2019
2020
2021
2022
DC 62
DC 63
DC 64
Obj

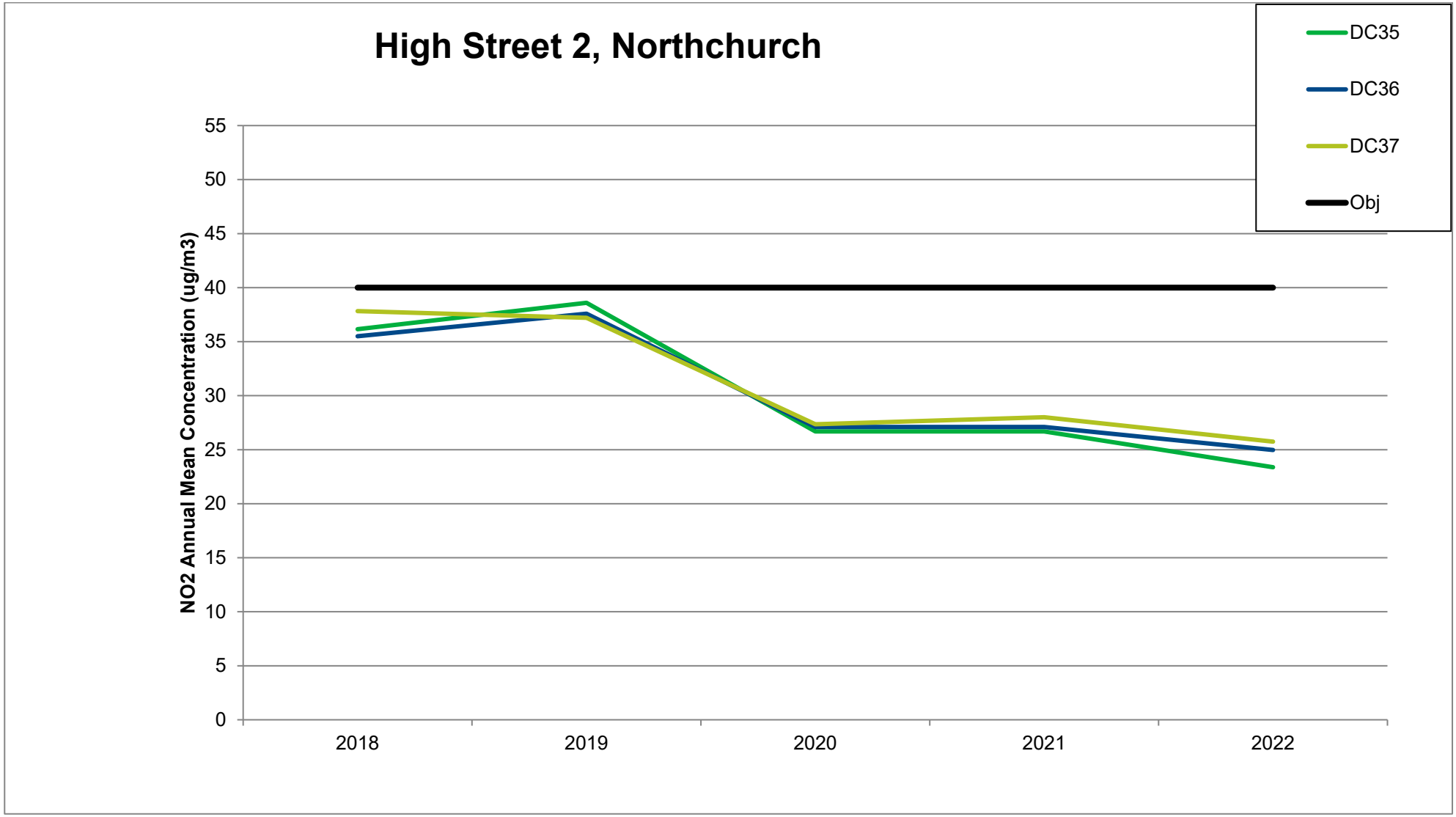
AQMA 2 – London Road, Apsley




Durrants Hill Road
DC 56
DC 57
DC 58
Obj
NO2 Annual mean concentration (ug/m3)
55
50
45
40
35
30
25
20
15
10
5
0
2018
2019
2020
2021
2022

AQMA 3 – Northchurch




High Street 2, Northchurch
DC35
DC36
DC37
Obj
NO2 Annual Mean Concentration (ug/m3)
55
50
45
40
35
30
25
20
15
10
5
0
2018
2019
2020
2021
2022

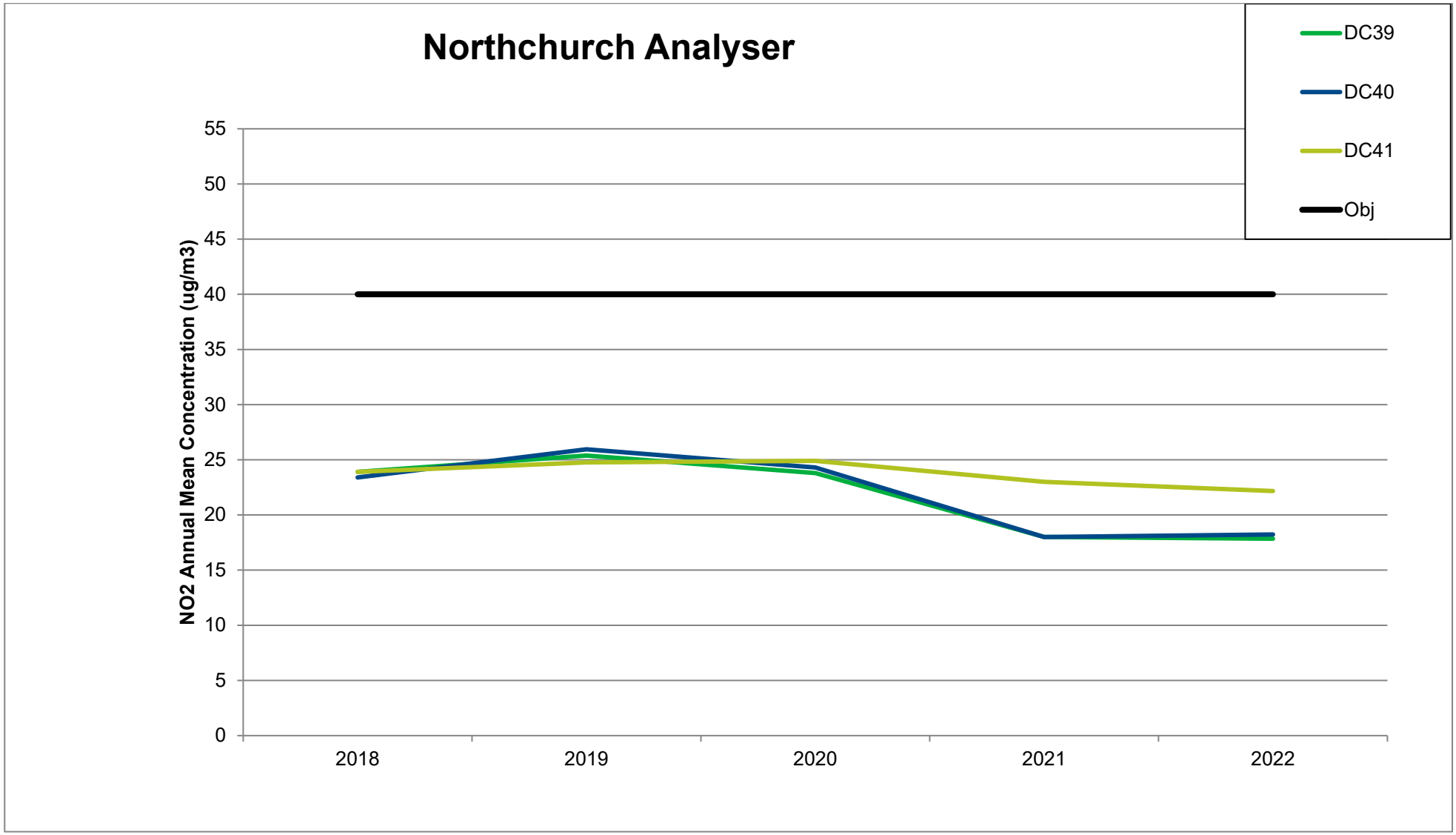

Northchurch Analyser
DC39
DC40
DC41
Obj
NO2 Annual Mean Concentration (ug/m3)
55
50
45
40
35
30
25
20
15
10
5
0
2018
2019
2020
2021
2022

Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021	2022
CM1	497295	208901	Roadside	92	92	0	0	0	0	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m^3 have been recorded.

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.6 – Annual Mean PM_{10} Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2017	2018	2019	2020	2021	2022
CM1	497295	208901	Roadside	91	91	**12**	**17**	**18**	**15**	**15**	**16**

- **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16**

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the PM_{10} annual mean objective of 40µg/m^3 are shown in **bold**

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021	2022
CM1	497295	208901	Roadside	91	91	0	3	8	1	1	5

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m^3 have been recorded.

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021	2022
CM1	497295	208901	Roadside	91	91	8	11	10	9	9	10

- **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

Notes:

The annual mean concentrations are presented as µg/m^3.

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2022 Diffusion Tube Results (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)			
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.76)	Distance Corrected to Nearest Exposure	Comments
DC1	505355	206504	48.4	34.8	50.0	31.0	31.7	27.6	32.8	32.6	33.4	33.0	37.1	39.4	36.0	27.3	-	
DC2	505251	206960	27.0	14.6	27.9	13.5	11.1	10.7	11.7	13.5	14.3	17.2	21.0	24.4	17.2	13.1	-	
DC3	505339	207238	61.9	50.5	47.9	35.9	40.4	45.5	45.3	46.9	42.8	51.9	23.3	48.2	45.0	34.2	-	
DC4	505340	207207	56.3	50.1	52.2	35.9	39.3	43.6	43.8	44.3	46.7	45.4	37.1	47.1	45.2	34.3	-	
DC5	505528	207651	67.9	51.9	72.7	61.8	54.1	57.2	64.5	64.8	71.7	47.2	47.7	58.8	60.0	**45.6**	**42.6**	**Exceedance**
DC6	505545	207649	39.8	32.3		25.8	27.5	27.0	32.1	30.0	30.5	35.0	21.1	33.8	30.4	23.1	-	
DC7	505587	207686		31.8	43.7	36.6	34.3	32.7	36.7	37.9	40.2	35.7	39.7	43.3	37.5	28.5	-	
DC8	505533	207842	26.5	18.9	27.7	14.3	13.2	11.5	13.3	13.5	15.9	19.5	19.2	23.3	18.1	13.7	-	
DC9	507848	208000	50.4	28.8	43.8	31.8	26.5	27.4	32.6	32.3	39.3	32.4	30.1	41.6	34.8	26.4	-	
DC10	507774	207313	32.9	19.3	31.7	15.5	14.8	13.8	14.9	16.4	22.8	19.2	25.8	25.6	21.1	16.0	-	
DC11	508013	207155	35.8	20.3	31.7	22.1	16.8	15.7	16.3	12.7	21.6	17.7	16.6	30.2	21.5	16.3	-	
DC12																-	-	**Not Deployed**
DC13	507880	207170	44.4	33.0	52.4	27.0	33.6	31.0		38.7	37.1	31.6	38.6	20.9	35.3	26.8	-	
DC14	507716	207047	45.4	27.2	46.9	27.5	23.5	27.0	27.5	31.5	30.6	35.0	37.2	36.6	33.0	25.1	-	
DC15	506227	216317	33.7	20.5	27.5	17.1	15.2	15.6	16.6	17.1	18.1	18.7	5.8	28.0	19.5	14.8	-	
DC16	506093	216501	27.8	15.0	33.6	19.0	13.2	12.6	16.3	19.1	20.0	18.0	5.1	21.6	18.4	14.0	-	
DC17	499703	207838	33.3	20.3	35.5	17.8	20.1	23.1	21.1	22.7	22.8	26.8	20.2	24.1	24.0	18.2	-	
DC18	499448	207870	27.0	15.7	23.9	11.8	12.0	10.7	12.8	12.3	13.7	16.3	11.9	23.2	15.9	12.1	-	

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)			
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.76)	Distance Corrected to Nearest Exposure	Comments
DC19	499207	207754	29.0	14.5	28.8	15.1	12.5	11.5	14.3	14.3	14.8	17.8	12.4	24.8	17.5	13.3	-	
DC20	498990	207924	36.8	20.1	42.3	27.2	18.0	18.6	22.6	27.5	25.2	22.6	9.2	32.5	25.2	19.2	-	
DC21	499095	207874	38.7	27.6	41.5	30.9	22.3	25.1	30.7	32.4	35.4	24.3	27.3	33.8	30.8	23.4	-	
DC22	499131	207838	40.7	31.6	36.5	21.8	25.5	27.9	27.3	22.5	27.0	31.8	34.9	34.8	30.2	22.9	-	
DC23	499129	207942	41.9	29.4	34.4	25.2	25.8	26.2	26.2	27.2	29.8	31.8	26.9	34.3	29.9	22.7	-	
DC24	499125	207900	37.8	25.5	40.9	29.0	23.1	26.2	26.8	27.9	27.9	29.5	29.4	31.0	29.6	22.5	-	
DC25	499108	207835	35.8	23.6	47.8	21.9	20.9	22.8	25.9	26.1	28.0	28.8	23.7	32.0	28.1	21.4	-	
DC26	499095	207838		34.1		30.1			32.6	29.4	32.4	35.1	35.7	39.6	33.6	25.6	-	
DC27	498323	206948	34.5	26.9	41.3	31.3	23.3	24.0	25.6	27.8	30.6	24.1	11.2	30.8	27.6	21.0	-	
DC28	498318	206950	42.9	32.9	41.4	27.3	25.8	27.2	27.8	30.7	30.1	22.7	14.5	32.6	29.7	22.5	-	
DC29	498289	207005	35.0	21.7	31.9	22.2	19.8	19.4	18.7	18.5	20.7	23.0	9.7	28.0	22.4	17.0	-	
DC30	497472	208730	43.5	22.6	32.7	28.5	20.3	19.9	22.1	22.7	26.4	16.6	28.1	35.2	26.6	20.2	-	
DC31	497346	208835	50.9	39.8	47.2	33.5	33.1	33.6	36.6	36.6	40.4	37.6	29.5	40.1	38.2	29.1	-	
DC32	497346	208835	50.9	41.2	49.6	34.6	36.3	35.5	37.6	36.6	37.9	36.6	47.2	40.7	40.4	30.7	-	
DC33	497346	208835	55.5	39.2	43.3	38.1	34.5	37.3	34.8	38.0	39.6	44.3	38.8	44.4	40.7	30.9	-	
DC34	497355	208852	36.3	21.6	33.5		18.1	19.7	22.7	23.4	24.3	24.2	14.9	30.8	24.5	18.6	-	
DC35	497335	208860	46.7	26.9	43.8	36.0	24.3	28.0	28.1	37.4	38.9	29.2	7.0	22.8	30.8	23.4	-	
DC36	497335	208860	39.9	26.1	46.7	30.8	25.6	27.2	29.6	36.6	35.9	34.3	30.1	31.5	32.9	25.0	-	
DC37	497335	208860	46.8	26.3	42.0	33.3	26.2	29.0	32.3	34.7	38.0	30.9	26.3	40.7	33.9	25.7	-	
DC38	497295	208901	32.1	21.2	35.6	21.2	18.0	18.5	21.2	20.8	21.9	20.7	18.9	28.4	23.2	17.6	-	

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)			
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.76)	Distance Corrected to Nearest Exposure	Comments
DC39	497295	208901	32.7	21.9	36.6	18.6	18.9	18.9	21.0	20.6	21.8	19.4	24.3	27.1	23.5	17.8	-	
DC40	497295	208901	28.9	22.7	37.0	19.3	17.8	18.0	20.8	22.0	22.6	20.5	27.6	30.7	24.0	18.2	-	
DC41	497306	208874	42.7	29.0	37.4	25.3	25.0	27.2	27.4	27.0	30.4	31.5	13.1	34.0	29.2	22.2	-	
DC42	492611	212006	36.5	28.6	37.5	21.8	19.5	21.7		21.8	24.5	23.3	10.5	29.6	25.0	19.0	-	
DC43	492680	212663			35.8	22.8	17.6	17.2	19.9	19.0	23.6	18.2	19.3	30.0	22.3	17.0	-	
DC44	507611	201620	50.0	37.4	46.7	29.6	31.6	36.2	35.0	36.5	38.7	42.5	18.4	43.2	37.2	28.2	-	
DC45	507168	202802	34.7	23.8	39.1	24.3	19.1	21.3	23.1	21.2	26.2	22.3	26.5	34.2	26.3	20.0	-	
DC46	507005	204677	26.2	31.6	37.4	25.2	24.9	25.6	29.2	29.7	31.4	30.7	34.4	28.2	29.5	22.5	-	
DC47	505677	205513	64.6	52.1	50.3	42.5	43.8	47.3	53.1	45.3	47.2	49.6	44.0	40.9	48.4	36.8	-	
DC48	505677	205513	61.5	53.0	56.8	41.7	42.4	47.7	54.2	44.6	48.4	47.7	47.4	53.3	49.9	37.9	-	
DC49	505677	205513	68.5	43.9	57.5	35.3	45.9	49.4	53.2	48.3	49.9	48.7	13.6	51.0	47.1	35.8	-	
DC50	505737	205443	53.7	42.6	50.4	34.0	34.3	35.1	39.0	38.8	39.8	40.8	25.1	44.9	39.9	30.3	-	
DC51	505737	205443	57.6	42.8	54.5	36.6	34.2	37.2	39.1	40.2	40.8	27.4	47.7	42.4	41.7	31.7	-	
DC52	505737	205443	56.7	41.5	52.6	35.6	33.5	34.9	40.6	38.2	40.0	41.9	24.3	38.5	39.9	30.3	-	
DC53	505770	205430	27.7	33.6	44.8	25.5	28.9	29.3	30.8	31.9	33.7	32.9	32.3	39.8	32.6	24.8	-	
DC54	505696	205509	35.4	31.7	50.9	37.0	29.1	29.6	32.4	37.6	37.6	34.8	37.8	42.1	36.3	27.6	-	
DC55	505797	205436	56.3	31.6	51.5		30.6	28.4	27.3	41.5	41.4	34.7	40.0	42.8	38.7	29.4	-	
DC56	505734	205519	37.6	27.4	42.6	23.5	22.6	25.2	28.2	33.6	30.2	23.5	24.7	25.4	28.7	21.8	-	
DC57	505734	205519	38.1	28.1	53.3	27.5	22.0	23.6	26.3	31.7	29.5	32.1	24.2	34.0	30.9	23.5	-	
DC58	505734	205519	20.4	26.8	45.1	27.5	22.6	25.9	26.8	32.9	28.5	29.7	11.1	33.7	27.6	21.0	-	

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	NO_2 Mean Concentrations (µg/m^3)												Simple Annual Mean (µg/m3)			
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.76)	Distance Corrected to Nearest Exposure	Comments
DC59	505969	205726	45.5	24.7	39.4		24.9	26.2	31.0	34.2	33.5	22.8	18.5	35.3	30.5	23.2	-	
DC60	505969	205726	37.6	28.6	37.0	24.0	24.2	23.8	27.8	32.3	31.6	25.8	28.0	33.6	29.5	22.4	-	
DC61	505969	205726	38.6		39.8	27.4	26.0	27.4	30.1	32.6	34.1	14.9	11.2	37.5	29.1	22.1	-	
DC62	505930	205740	65.1	46.7	47.1	42.1	40.0	45.1	48.3	48.6	46.6	42.9	11.6	32.7	43.1	32.7	-	
DC63	505930	205740	55.5	43.9	53.3	44.6	43.6	46.3	47.2	48.6	46.3	48.4	31.5	39.2	45.7	34.7	-	
DC64	505930	205740	56.4	48.5	54.0	41.0	39.8	47.7	51.6	51.7	46.0	40.5	45.8	49.1	47.7	36.2	-	
DC65	505901	205788	38.7	31.0	50.3	37.3	23.9	29.1	39.2	43.3	41.4	27.9	10.5	43.2	34.7	26.3	-	
DC66	505901	205788	43.1	27.1	52.7	36.1	26.8	29.7	36.2	42.3	41.1	34.6	35.6	38.4	37.0	28.1	-	
DC67	505901	205788	43.1	31.5	46.2	34.4	30.7	31.5	38.8	44.7	42.0	38.1	38.2	35.7	37.9	28.8	-	
DC68	506053	205664	32.5	18.4	28.6	19.1	13.9	12.7	16.1	19.4	20.8	20.7	23.8	30.9	21.4	16.3	-	

- **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1.**
- **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**
- **Local bias adjustment factor used.**
- **National bias adjustment factor used.**
- **Where applicable, data has been distance corrected for relevant exposure in the final column.**
- **Dacorum Borough Council confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

March and April data missing due to COVID-19 national lockdown. Other gaps in data occur due to missing diffusions tubes during exchange, e.g. theft of sampler.

DC12 Not yet deployed.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

New or Changed Sources Identified Within Dacorum During 2022

Dacorum Borough Council has not identified any new sources relating to air quality within the reporting year of 2022.

Additional Air Quality Works Undertaken by Dacorum Borough Council During 2022

Dacorum Borough Council has increased its monitoring capacity with the relocation of diffusion tubes, the relocation of the Real Time Continuous Monitoring Analyser and purchase of 3x Zephyr Air Quality Monitors.

QA/QC of Diffusion Tube Monitoring

Details relating to the following aspects of non-automatic (i.e. passive) monitoring using diffusion tubes:

- The supplier used for diffusion tubes within 2022 was SOCOTEC and the method of preparation was 50:50 acetone:triethanolamine. The tubes were desorbed with distilled water and the extract analysed using a segmented flow auto analyser with ultraviolet detection.
- SOCOTOEC confirms that the methods and procedures they follow meet the guidelines set out in Defra's "Diffusion Tubes for Ambient Monitoring: Practical Guidance". SOCOTEC also takes part in the WASP Proficiency Scheme and the laboratory performance is rated at the highest level of "good".
- Monitoring has been completed in adherence with the 2022 Diffusion Tube Monitoring Calendar.

Diffusion Tube Annualisation

Annualisation was required for a sole non-automatic monitoring site, the site requiring annualisation clearly defined along with details of the calculation method undertaken provided in Table C.2. Annualisation was required for any site with data capture less than 75% but greater than 25%.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 ASR 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.

Dacorum Borough Council have applied a national bias adjustment factor of 0.76 to the 2022 monitoring data. A summary of bias adjustment factors used by Dacorum Borough Council over the past five years is presented in Table C.1. Over the last 5 years the local bias adjustment has been equal or nearly equal to the National factor and our data is regularly provided to calculate this factor, therefore the national factor was used in 2023 due to time and resource constraints.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	National	March 2023	0.76
2021	National	July 2021	0.77
2020	Local	-	0.80
2019	Local	-	0.77
2018	Local	-	0.76

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location

relevant for exposure should be estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

Fall-off-with-distance calculations were required at 1 non-automatic monitoring sites, DC5 (Queensway, Old Town). The output from the Diffusion Tube Data Processing Tool is presented in Table C.4. Distance correction has been considered at any monitoring site where the annual mean concentration is greater than 36µg/m^3 and the monitoring site is not located at a point of relevant exposure.

QA/QC of Automatic Monitoring

This section provides details in relation to the following:

- Data management is completed by Ricardo on behalf of the Council with Local Site Operator (LSO) duties for the automatic monitoring sites undertaken by the Council.
- Calibration is undertaken once a month, with audit/servicing undertaken bi-annually
- Monitoring data presented within the ASR is ratified;
- Live/historic data is available as part of the Herts and Beds Air Quality Network. This is available from: https://www.airqualityengland.co.uk/local-authority/?la_id=408

PM_{10} and $PM_{2.5}$ Monitoring Adjustment

The type of PM_{10}/$PM_{2.5}$ monitor(s) utilised within Dacorum do not require the application of a correction factor.

Automatic Monitoring Annualisation

Annualisation was required for to correct automatic monitoring data for PM_{10}/$PM_{2.5}$. The annualisation data is be presented in Table C.2. Annualisation is required for any site with data capture less than 75% but greater than 25%.

NO_2 Fall-off with Distance from the Road

No automatic NO_2 monitoring locations within Dacorum required distance correction during 2022.

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3)

Diffusion Tube ID	Annualisation Factor Northchurch Analyser	Annualisation Factor Luton and Dunstable Hospital	Annualisation Factor Borehamwood Meadow Park	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m3)	Annualised Data Simple Annual Mean (µg/m3)	Comments
DC26	1.0415	1.0340	1.0072	1.0276	33.6	34.6	NO_2 correction

Notes:

Automatic monitoring stations used to annualise NO_2 were Northchurch, Borehamwood Meadow and Luton and Dunstable

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias					
Bias Factor A					
Bias Factor B					
Diffusion Tube Mean (µg/m^3)					
Mean CV (Precision)					
Automatic Mean (µg/m^3)					
Data Capture					
Adjusted Tube Mean (µg/m^3)					

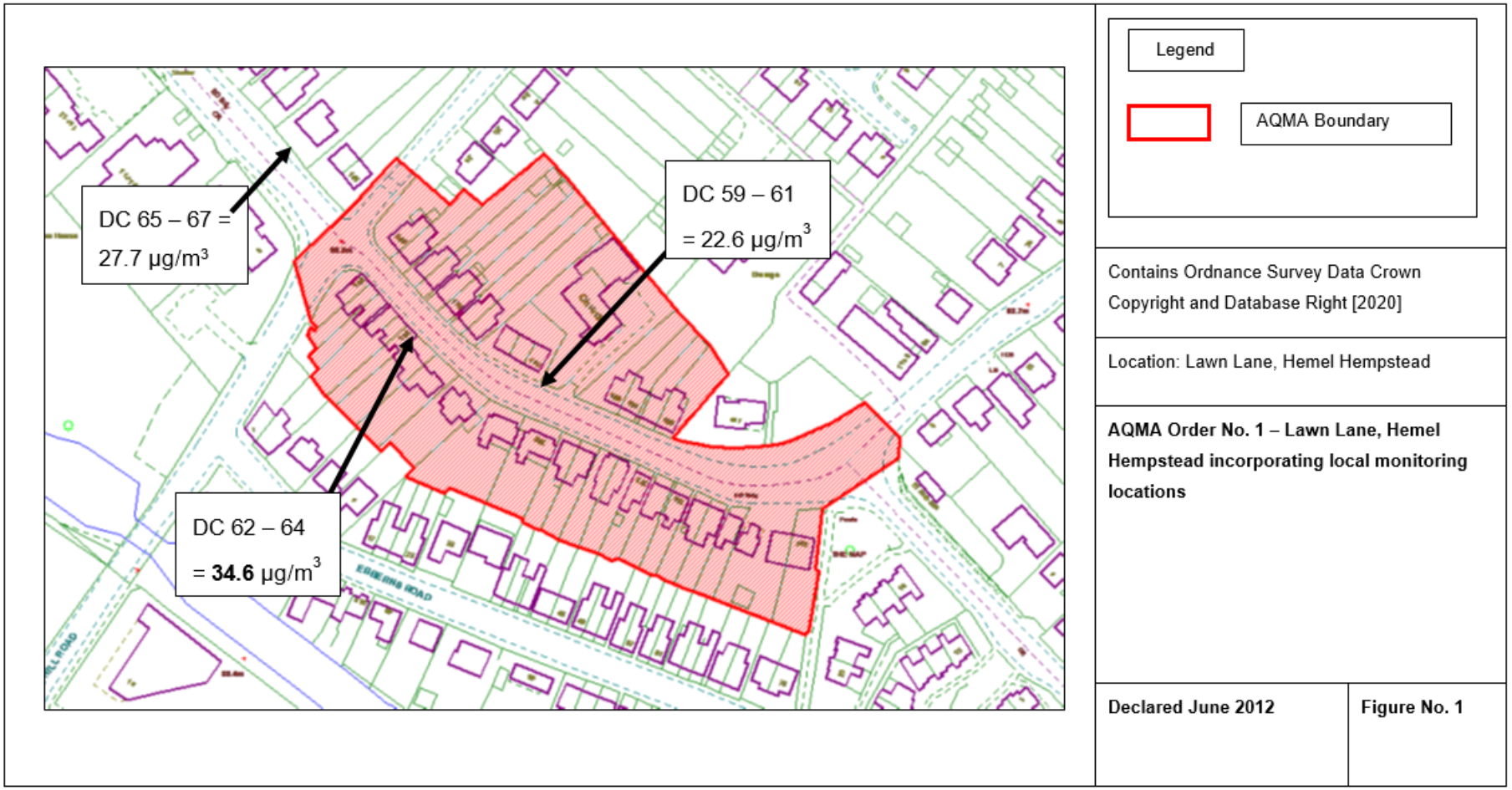
Notes:

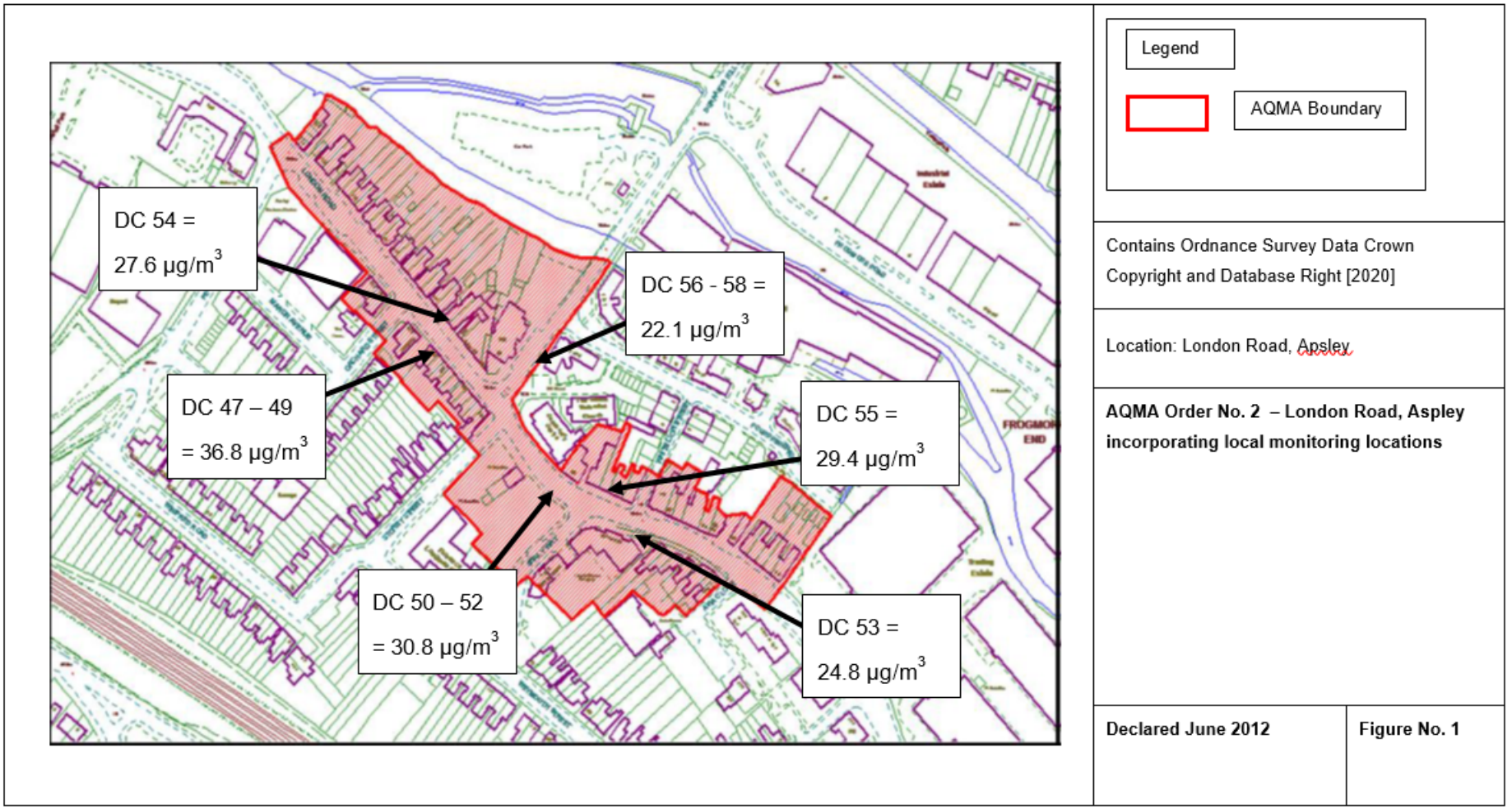
The national bias adjustment factor has been used to bias adjust the 2022 diffusion tube results as DBC input their local data into this model.

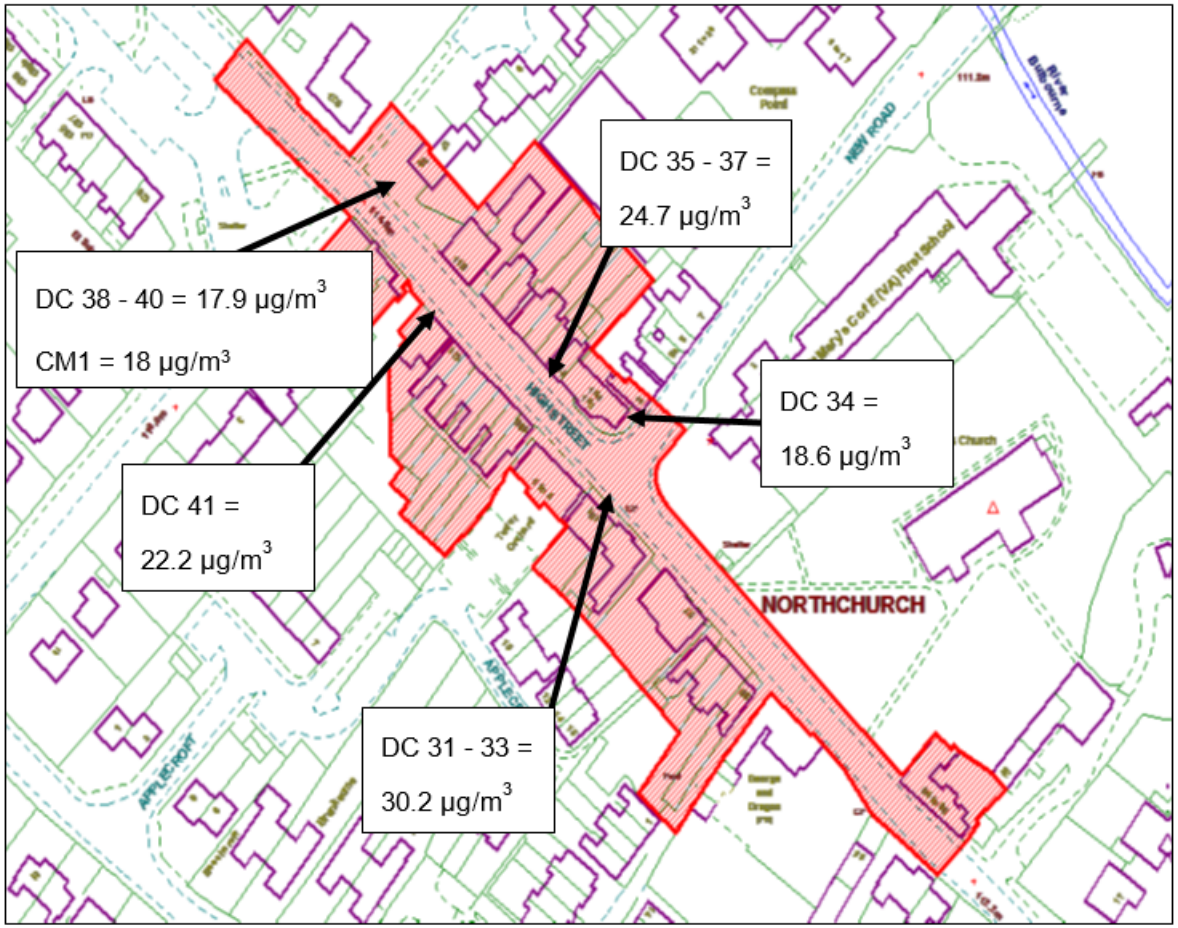
Table C.4 – NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
DC5	2.0	3.0	45.6	13.7	**42.6**	*Predicted concentration at Receptor above AQS objective.*

Appendix D: Map(s) of Monitoring Locations and AQMAs




DC 54 =
27.6 µg/m3
DC 47 – 49
= 36.8 µg/m3
DC 50 – 52
= 30.8 µg/m3
DC 56 - 58 =
22.1 µg/m3
DC 55 =
29.4 µg/m3
DC 53 =
24.8 µg/m3
Legend
AQMA Boundary
Contains Ordnance Survey Data Crown Copyright and Database Right [2020]
Location: London Road, Apsley
AQMA Order No. 2 – London Road, Aspley incorporating local monitoring locations
Declared June 2012
Figure No. 1



Legend

AQMA Boundary

Location: High Street, Northchurch

AQMA Order No. 3 – High Street, Northchurch incorporating local monitoring locations

Declared June 2012, amended Oct 2013

Figure No. 1

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[7]

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO_2)	40µg/m^3	Annual mean
Particulate Matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM_{10})	40µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO_2)	125µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO_2)	266µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[7] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: Large
Automatic Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes	Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved	Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved
Passive Monitoring – Data Capture (%)	More than 75% data capture	50 to 75% data capture	25 to 50% data capture	Less than 25% data capture
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)	25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)	>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	Tubes left out for two exposure periods	Tubes left out for three exposure periods	Tubes left out for more than three exposure periods
Passive Monitoring – Storage of Tubes	Tubes stored in accordance with laboratory guidance and analysed promptly.	Tubes stored for longer than normal but adhering to laboratory guidance	Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date	Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used
AQAP – Measure Implementation	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP
AQAP – New AQAP Development	Unaffected	Short delay (<6 months) in development of a new AQAP, but is on-going	Long delay (>6 months) in development of a new AQAP, but is on-going	No progression in development of a new AQAP

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
CEE	Climate and Ecological Emergency
Defra	Department for Environment, Food and Rural Affairs
DBC	Dacorum Borough Council
DT	Diffusion Tube
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
ECP	Environmental and Community Protection
EU	European Union
HCC	Hertfordshire County Council
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.