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: June, 2023

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Executive Summary: Air Quality in Our Area

Air Quality in Charnwood

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 29,000 to 43,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

As expected, the 2022 annual mean NO_2 concentrations for all monitor locations are returning to a more stabilised pattern following on from the recorded concentration levels observed during 2020, when transport movement and business activities were disrupted due to the impact of Covid-19. Encouragingly most sites have returned lower concentrations during the 2022 reporting period than those reported for 2021 in the previous ASR. Whether this is a result of daily commuter movements continuing to be influenced by the uptake in homeworking, or in-part being the result of older, more polluting, vehicles being slowly replaced by the gradual percentage shift to 'cleaner' more environmentally friendly vehicles such as electric cars, it continues either way to ensure another year of full compliance with the national NO_2 Air Quality Objectives throughout Charnwood for 2022.

[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, January 2023

[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

Following an unfortunate on-site fire at the Mountsorrel quarry in November 2022 which led to a period of significant visible fugitive dust emissions from site being observed, interest from the community has been re-focussed on how dust control measures are controlled, monitored, and reported by both Charnwood Borough Council and the operators, Tarmac.

Since the declaration of the AQMA in 2011 we are committed to continuing our work with the quarry to reduce dust levels through preparation and implementation of the Dust Management and Monitoring Plan (DMMP). Further to our own monitoring data reported through the ASR, additional on-site site and off-site monitoring is undertaken by Dustscan AQ on behalf of Tarmac. This covers 13 locations around the quarry plus 2 additional locations following the fire at the site. Interim liaison meetings continue to be held with Tarmac between the review period of the DMMP at least every two years, in which on-going operation monitoring compliance and the wider aspects of operations are reviewed in terms of:

• breaches of the NAQS 24-hour and annual mean objectives for PM_{10};

• exceedances of the nuisance dust deposition and soiling rates;

• changes to the PPC permit regime; or

• following any reasonable request of CBC or the Mineral Planning Authority following changes to NAQS for $PM_{2.5}$

As discussed in the Section 3.1.1 *Automatic Monitoring Sites,* there have been concerns raised with CBC relating to data availability (and thus the integrity) that we were seeing from the Partisol monitor, CM1. We acknowledge these comments in terms of the immediacy of data for public consumption and have since moved to improve transparency by providing more regular updates via our website and being able to now offer $PM_{2.5}$ concentrations. A link to this information can be found at: https://www.charnwood.gov.uk/pages/mountsorrel_quarry.

Although we still believe that both PM_{10} and $PM_{2.5}$ levels within Charnwood monitored close to the quarry boundary still represent the ‘worst-case’ location for ‘dust’ in the borough, results are continuing to indicate a continued compliance with the national Air Quality Objectives and a continued reduction in overall mean concentrations. It is acknowledged that several of the daily monitored ‘exceedances’ have occurred at times when neighbouring (and wider national) authorities are also reporting increased concentrations, the assumption being that local conditions are also being influenced by the

transboundary movement of particulates outside of the control of the operator, or indeed Charnwood Borough Council. Again, the data in the link above compares locally monitored concentrations to those on a more regional scale at Leicester and Nottingham.

The monitoring of SO_2 concentrations around the Great Central Railway (GCR) engine sheds continues. We have again experienced difficulties with the reliability of the analyser over the past 12 months. As discussed in the Section 3.1.1 *Automatic Monitoring Sites*, whilst the data has been sufficient to report on during 2022 the decision to replace the current 'AQMesh' analyser (CM2) with a 'Zephyr' analyser was taken early in 2023. Consequently, the SO_2 data presented in this year's ASR will be the last available from CM2.

From the data obtained during 2022 we continue to believe we have adherence with the SO_2 NAQO's.

Further information about the work of the Council in respect to Local Air Quality Management can be found on our webpages at:

http://www.charnwood.gov.uk/pages/airpollution

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.

Charnwood Borough Council continues to work with partners across the county to collaborate and deliver actions in relation to air quality and health.

We have an active role in the Leicester, Leicestershire and Rutland Air Quality Forum, and is a member of the East Midlands Air Quality Network. Both bodies improve the sharing of information and aid consistency of approach.

Collaboration work with Public Health colleagues at Leicestershire County Council continues with scheduled meetings held under the '*Air Quality and Health Partnership*' to discuss emerging issues and to provide a formal forum to update Action Plan delivery as part of the Public Health Outcomes Framework.

[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

Conclusions and Priorities

2022 monitoring throughout the borough has been fully in compliance with the air quality objectives, both inside and outside of the existing AQMAs.

Concentrations for NO_2 were again expectedly up on 2020 levels but in most instances lower than those reported last year in 2021 following the initial recovery phase from Covid-19. In general, they continue to follow a longer-term downward trend.

Whilst we continue to consider the merits of moving to revoke several AQMAs (particularly the Syston AQMA) the increasing interest from both Members and the wider public's attention are now clearly focussed on the significant impact that poor air quality has on health, meaning that those neighbourhoods in proximity to previously declared AQMAs now have a wider interest than merely accepting the acknowledgement of NAQO compliance by formal revocation. Anecdotally, several Councillors across the borough have informally expressed to this department that they would like to see existing AQMAs extended, or additional ones designated in reaction to the public's perception of pollution, despite their being no underlying data to suggest their requirement.

Therefore, from a practical point of view, by maintaining the AQMAs (initially declared in response to areas proven subject to elevated public exposure) they continue to provide an additional level of scrutiny and safeguarding for 'sensitive' local areas in an era of sustained residential development. We therefore maintain that undertaking the revocation of any existing AQMA at this time could be considered untimely at this point

The Environment Act 2021 and associated consultations that have evolved from it are allowing us to re-evaluate and refocus on identifying an appropriate targeted AQAP going forward, should one be necessary in view of many years' full compliance with all NAQOs, despite the AQMAs remaining in place for the above reasons.

As discussed in our earlier reports; there is on-going public interest in the potential impact from the newly operational (early 2023) Newhurst Energy-from-Waste (EfW) facility at Shepshed. As an emerging activity of 'concern' much of our focus during 2023 will be in continuing to establish particulate concentration levels (PM_{10}, $PM_{2.5}$) in this area of Charnwood and supplementing existing NO_2 monitoring to gather a better understanding of exposure concentrations in the locale, which is also subject to extensive future planning development.

Local Engagement and How to get Involved

In order to help local people and visitors to travel easily in and around Charnwood and Leicestershire as well as to reach places further afield, all whilst reducing the burden on the environment; more information about the local buses, cycling paths, car share schemes, local air travel and road traffic and weather conditions can be found on our public transport and sustainable travel website pages at:

Public transport and sustainable travel.

Alternatively, follow the direct links below for information on:

- Cycling, pedestrian and other pathways located within Charnwood.
- Leicestershire Sustainable Travel
- The 'Chose How You Move' Car share scheme

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Charnwood Borough Council.

If you have any comments on this ASR please send them to Peter Weatherill at:

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1 Local Air Quality Management

This report provides an overview of air quality in Charnwood 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 order to achieve and maintain the objectives and the dates by which each measure will be carried out. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Charnwood 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.

2 Actions to Improve Air Quality

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 18 months. The AQAP should specify how air quality targets will be achieved and maintained, and provide dates by which measures will be carried out.

A summary of AQMAs declared by Charnwood can be found in Table 2.1. The table presents a description of the 4 AQMAs that are currently designated within Charnwood. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO_2 annual mean for Loughborough and Syston;
- PM_{10} 24-hour mean for Mountsorrel;
- SO_2 15 minute mean for Great Central Railway (GCR)

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	Number of Years Compliant with Air Quality Objective	Name and Date of AQAP Publication	Web Link to AQAP
Loughborough	Declared 2001, Amended 2004	NO2 Annual Mean	An area encompassing several properties around the town centre	NO	Unknown (in excess of 40 µg/m3)	25.5 µg/m3 (Leicester Rd)	9 years	Charnwood Local Air Quality Management – Final Action Plan 2006 [under review]	Removed due to age
Syston	Declared 2001, Amended 2004	NO2 Annual Mean	Residential properties along Melton Rd and Sandford Rd	NO	Unknown (in excess of 40 µg/m3)	26.5 µg/m3 (1116 Melton Rd)	15 years	Charnwood Local Air Quality Management – Final Action Plan 2006 [under review]	Removed due to age
Great Central Railway (GCR)	Declared 2001	SO2 15 Minute Mean	An area encompassing residential properties near The Great Central Railway	NO	Unknown (in excess of 266 µg/m3 more than 35 times a year)	191µg/m3 (99.9th percentile) of the 15min means	6 years	Charnwood Local Air Quality Management – Final Action Plan 2006 [under review]	Removed due to age

Mountsorrel	Declared 2011	PM10 Annual Mean	An area encompassing residential properties near Mountsorrel Quarry	NO	60 recorded exceedences (from 313 valid samples) of the 24-hour mean	3 recorded exceedences of the 24-hour mean **[Monitor CM5]**	11 years	Charnwood Local Air Quality Management – Final Action Plan 2006 [under review]	https://www.charnwood.gov.uk/files/documents/dust_management_and_monitoring_plan/DMMP%202017%20v.2%20FINAL.pdf

☒ **Charnwood Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date.**

☒ **Charnwood Borough Council confirm that all current AQAPs have been submitted to Defra.**

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

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

*"On the basis of the evidence provided by the local authority the conclusions reached are **accepted** for all sources and pollutants".*

Commentary on the report was as follows:

"*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 contains numerous trend graphs for both NO_2 and PM_{10}, which is commended. Further discussion on trends would be a useful addition to the report and would further demonstrate the Council's understanding of spatial and temporal trends in air quality across CBC. Where applicable, reference to any measures within the AQAP contributing to reductions in pollutant concentrations is also encouraged.

   Response: Trend commentary has been expanded to include comparison graphs between Charnwood monitoring sites and data obtained from Leicester and Nottingham AURN locations to further inform on regional spatial and temporal trends in respect of both $PM_{2.5}$ and PM_{10}

2. It would be beneficial for the Council to include a screen grab of the national bias adjustment factor spreadsheet depicting the factor applied. Should the local factor be applied in future, evidence to demonstrate correct calculation of this factor will be required.

   Response: A screen grab showing the derivation of the national bias adjustment factor has been included.

3. Diffusion tube mapping is sufficient, with sites labelled in accordance with the IDs listed in the results tables. This is commended, and encouraged for future reports.

   Response: Comment welcomed.

4. The Council have stated their intention to keep all AQMA designations in place at this time despite previous consideration of the revocation of several AQMAs, citing uncertainty surrounding both the implications of the Environment Act 2021 on AQOs. Moreover, whilst full compliance with current AQOs has been achieved in CBC during 2020 and 2021, the Council have acknowledged the pandemic as a large factor in the reduced pollutant concentrations, particularly for 2020, and that the longer-term impacts of covid recovery, both locally and at a national level, is unlikely to be fully reflected until 2022 data is presented at a later date. This decision is supported.

   Response: Comment welcomed. We will continue to keep the current AQMA designations under review at this time, considering both revised legislation/guidance in respect of the individual pollutants themselves and in respect to specific local circumstances.

5. It is understood that the Council's AQAP for the Loughborough, Syston and Great Central Railway AQMAs is currently under review. It is expected that a full progress update be provided within the Council's 2023 ASR and inclusion of a list of draft actions to be included in the next AQAP is strongly encouraged, given the decision to keep all AQMA designations at this time.

   Response: A review of the Council's future obligations, commitments and continuing development of the LAQM process is still to be undertaken.

Many measures which Charnwood continue to seek to implement to address air quality/climate change issues are not thought of in isolation at departmental level but rather form an integral but broader strategic approach by both the Council and across the County of Leicestershire. There are several detailed strategic documents that are monitored and reported on elsewhere.

Local Plan (2021-2037). This is a multi-faceted document that has been strategically developed to acknowledge the wider perspective with consideration given to current national and local legislative and economic challenges, simultaneously safeguarding the environment and building healthy communities within Charnwood.

It supports a carbon neutral borough and includes Policies to improve air quality by encouraging sustainable new developments, with extensive tree planting required for public spaces on new developments and providing support for communities to identify opportunity areas for wind and solar energy infrastructure.

There are also proposed measures to minimise need for travel by private car and prioritise public transport, walking and cycling. Improved bus services to offer increased speed and reliability, including for residents with mobility issues. A significant increase in electric vehicle charging points, including at each new home with a parking space

The Charnwood Local Plan 2021-37 was submitted to Government at the end of 2021 and the examination process has now started.

More information on the submitted Local Plan with a summary and details towards its measure of progress can be viewed on the Council website through the following link:

https://www.charnwood.gov.uk/pages/charnwood_local_plan_2021_37

Climate Change Strategy. The Climate Change Strategy 2018-2030 sets out the Council's aim of influencing and empowering residents, community groups, schools and businesses in the borough to help them to mitigate climate change by reducing their carbon emissions and also aims to implement carbon reduction projects to reduce the carbon emissions of its own buildings.

More information on the Strategy can be found at:

https://www.charnwood.gov.uk/pages/climate_change_strategy

With the Action Plan available to download from:

Charnwood Climate Change Strategy 2018-2030.pdf

Carbon Neutral Plan 2030. The Charnwood Carbon Neutral Plan 2030, an ambitious plan to achieve Carbon Neutrality from the Council's operations by 2030.

More information on the Plan can be found at:

https://www.charnwood.gov.uk/pages/2030_carbon_neutral

With the 2021-2022 Monitoring Report available to download from:

Carbon Neutral Plan 2030 Monitoring Report (2021-2022).pdf

Work continues with Leicestershire Public Health colleagues and other county-wide partners towards positive outcomes in respect of the continuing Joint Strategic Needs Assessment (JSNA). This work links back to part of the Public Health Outcomes Framework that examines indicators that help us understand trends in public health.

The JSNA that recommended the formation of the Air Quality and Health Partnership can be found here: https://www.lsr-online.org/uploads/jsna-air-quality-2019-v10-final.pdf

With the 2020-23 action plan being found here: Improving Air Quality and Health Across Leicestershire 2020-2023.pdf

As the Partnership look to formally close-off the work during the lifetime of that plan, work is already underway in drafting an updated 2023-2026 plan, identifying targeted communications and campaigns with priority groups and key organisations about air quality and health across Leicestershire

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Working towards becoming Carbon neutral-planting of 14000 trees on Council land at Hathern	Public Information		2022		Forestry England, CBC, Hathern parish council		NO						ongoing	The project is also expected to contribute to the Council's commitment to become Carbon Neutral by 2030. It is estimated that after 30 years, Hathern Community Woodland will have the potential to capture up to 1,323 tonnes carbon dioxide. In addition 4000 trees have been given away to residents.
2	Improve air quality information on CBC website	Public Information	Via the Internet	2022		CBC		NO							webpage made easier to access information and reports from Council's continuous monitors. All information and reports are updated at the start of each month on the website

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
3	Ensure dedicated resources are in place to implement the management and delivery of the Carbon Neutral Plan	Other						NO							The Climate Action Board meets every 2 months to ensure that the Carbon Neutral Plan actions are managed and delivered effectively while ensuring delivery is financially sustainable. The current, approved Capital Plan contains a Climate Action Fund budget of £1 million available to progress individual projects. We also have a dedicated fulltime Sustainability Officer
4	Develop and implement an environmental behavioural change programme and work with teams to showcase positive changes in environmental practice	Promoting Low Emission Transport						NO							Green Rewards is an ongoing programme to reward colleagues for taking positive sustainability and wellbeing actions. Colleagues are encouraged to collect points which can lead to prizes and help the Council reduce its carbon footprint.21,691 positive sustainable actions recorded. To date: 9129kg of avoided CO2

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
															recorded. 16,387kWh of avoided electricity recorded
5	Create a EV charging network across the district (public and private car parks, petrol stations, on street)	Promoting Low Emission Transport						NO							The Council has been awarded funding under the On-street Residential ChargePoint Scheme for installation of chargers at Sileby and Anstey. This installation will be starting in the next few weeks.
6	Encouraging active travel- project improving 2KM of canal towpaths in Loughborough	Promoting Low Emission Transport						NO							To improve access and signage to increase walking, cycling and boating along waterway
7	Encourage switch to electric vehicles	Promoting Low Emission Transport						NO							1x Hybrid pool vehicle for use by Council staff. The hybrid was chosen due to the difficulties in sourcing an electric vehicle. 1 x Electric Bike has also been approved. Pest

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
															control vans changed to electric and 2 EV charges installed at the council depot.
8	Adoption of Carbon Neutral Plan	Promoting Low Emissions		2022				NO						Completed	Office lights changed to LED and fitted with motion sensors and automated dimming. Saving the council 35 tonnes a year in C02 emissions.
9	general communications with public and organisations about air quality and health	Public Information		2022				NO						ongoing	With Leics. Public health deliver consistent, clear messages about air quality and health across a range of communication channels. Delivering cross organisational approach to Clean Air Day using national themes and sharing ideas.
10	increased air quality monitoring	Public Information		2022				NO						additional monitors installed	additional monitoring around Newhurst energy recovery facility with low cost sensors to provide PM10 & PM2.5 data for public reassurance

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
11	public participation campaign- Encouraging active travel	Promoting Low Emission Transport		2022				NO						Completed	Active Charnwood used the 'Beat the Street' initiative to encourage encouraged 4,867 players to use scooters and bikes as alternatives to conventional travel methods. Such schemes encourage residents to participate in active travel which reduces congestion and traffic in hotspot areas such as schools.
12	planning policy Implementation of air quality policies in the local plan.	Other						NO							the Environmental Services Team provides advice to the Development Services Team in relation to planning applications. The construction and demolition phases associated with proposed developments are potential sources of PM2.5. Where appropriate, we will recommend controls over dust. Any new point sources that have a potential to contribute to levels of PM2.5

Measure No.	Measure	Category	Classification	Year Measure Introduced in AQAP	Estimated / Actual Completion Date	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
															will be assessed and controlled.

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8), 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.

Charnwood Borough Council considers some of the following measures (either independently or in combination) when assessing $PM_{2.5}$ levels within the borough:

Local Monitoring. 2 portable 'Zephyr' analyser units, capable of measuring $PM_{2.5}$, were acquired during 2021. The units are currently deployed in relation to potential sensitive areas of concern within the borough with a view to establish local community concentration levels at what could be considered potential worst-case levels of exposure:

Unit 1: Located in the vicinity of Mountsorrel AQMA and monitored in conjunction with additional third-party data under the Mountsorrel Quarry DMMP through collaboration with Tarmac Trading Ltd and their consultants, DustScanAQ

Unit 2: Located on an arterial route into Loughborough from the M1 J23. The unit has been sited with specific consideration being given to establishing PM concentrations in the area which is near to the commissioning and operation of the Newhurst Energy-from-Waste (EfW) facility at Shepshed. The 42MW operation is able to process up to 350,000 tonnes of non-recyclable waste annually and expected to generate enough electricity to power around 80,000 homes a year. Whilst plant discharges for the facility itself will fall under the remit of the Environment Agency as part of separate Environmental Permitting regulations, any wider impact on ambient air quality is the responsibility of CBC to monitor.

The monitoring of any potential impact from the facility, primarily from particulate matter, has been made at the request of the Leicestershire Incinerator Scrutiny Group (LISG) and local MPs / Councillors. It is hoped that CBC data will be referenced against several $PM_{2.5}$ analysers procured by Loughborough University for their own independent on-site study into similar.

***National $PM_{2.5}$ Monitoring*.** There are approximately eighty $PM_{2.5}$ monitoring stations within the AURN. Monitoring data from sites located either close to, or within the local authority area, provide a good indicator as to likely $PM_{2.5}$ concentrations within the Council area. Outputs from both the Leicester University and Nottingham Centre analysers are routinely cross-referenced against our own analysers ($PM_{2.5}$ and PM_{10}) when collating data in respect of CBCs own interests.

***National $PM_{2.5}$ Modelling*.** Defra maintains national background maps, which are provided for each 1km × 1km grid square across the UK. By plotting the $PM_{2.5}$ mapped data for the appropriate base year, $PM_{2.5}$ concentrations can be identified within the local authority area. Although considered quite coarse resolution, such information may prove useful to local authorities in directing actions to areas that are most in need of reductions in $PM_{2.5}$ levels.

Public Health Outcomes Framework

Beneath is a summary relating to the Public Health Outcomes Framework indicator D01 which measures the fraction of morality attributable to particulate air pollution.

Further information on the PHOF can be found at: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework .

Data for Charnwood can be found at: https://fingertips.phe.org.uk/static-reports/public-health-outcomes-framework/at-a-glance/E07000130.html?area-name=Charnwood

Public Health Outcomes Framework - at a glance summary

Charnwood

Key

Significance compared to goal / England average:

Significantly worse	Significantly lower	Increasing / Getting worse	Increasing / Getting better
Not significantly different	Significantly higher	Decreasing / Getting worse	Decreasing / Getting better
Significantly better	Significance not tested	Increasing	Decreasing
		No significant change	Could not be calculated

Indicator	Age	Sex	Period	Value	Value (Region)	Value (England)	Unit	Recent trend	Change from previous
D01 - Fraction of mortality attributable to particulate air pollution (new method)	30+ yrs	Persons	2021	6.14	5.56	5.50	%	-	-

Notes

- Indicators that are shaded blue rather than red/amber/green are presented in this way because it is not straightforward to determine for these indicators whether a high value is good or bad.
- The Change from previous column shows whether there has been a change in value compared to the previous data point. Statistically significant changes highlighted in this column have been calculated by comparing the confidence intervals for the respective time points. If the confidence intervals do not overlap, the change has been flagged as significant.
- Recent trend refers to the analysis done in the Fingertips tool which tests for a statistical trend. Changes in this column are calculated using a chi-squared statistical test for trend. This is currently only available for certain indicator types; full details are available in the tool.
- Increases or decreases are only shown if they are statistically significant. Where no arrow is shown, no comparison has been made. This may be due to the fact that the required data to make the comparison is not available for the time point, or that no confidence interval values are available for the indicator.

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

This section sets out the monitoring undertaken within 2022 by Charnwood Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2018 and 2022 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Charnwood Borough Council undertook automatic (continuous) monitoring at 3 sites during 2022. Table A.1 in Appendix A shows the details of the automatic monitoring sites.

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.

CM2

This 'AQMesh' unit began at the start of 2022 to continue to operate in respect of acquiring SO_2 concentrations at a residential property close to the GCR. As previously reported, it has experienced extended failures in terms of PCB board and battery life-expectancy during the past few years. Unfortunately, 2022 again saw a further issue connected to the system battery that meant we were unable to record any data from 12th March 2022 until 20th April, at which time the unit was swapped by the manufacturer for a substitute unit. Although the replacement unit has operated reasonably consistently from installation (being reported on under Table A.9), the decision to replace this unit in early 2023 with a 'Zephyr' (which will additionally be used to inform on local $PM_{2.5}$/PM_{10} levels) means that the 2022 part-year data for CM2 will be the last presented for this particular (AQMesh) analyser.

CM5

In recognising comments from the community in respect to the existing PM_{10} monitoring at Mountsorrel - previously undertaken by a 'Partisol' unit [CM1] - in that:

i. **Data being made available to the public was appearing outwardly 'delayed'**

   (i.e., sample exposures → batch filter returns to the external lab for analysis → results back to CBC → collation and update of results for CBCs website)

   and

ii. **That the dependability of the Partisiol data was becoming compromised through unreliability.**

   This being due to recurring failures with the daily mechanical filter exchange and having then to reactively schedule Officer time to visit site to re-set the exchange sequence. The unit has been in operation since late 2011 which is a timescale longer than initially envisioned. Although data is showing AQO compliance for consecutive years, valid data capture rates have begun to decline over recent reporting periods (2020 and Covid-19 restrictions excepted) . We have however endeavoured to keep this unit functioning for as long as possible by means to monitor ongoing conditions due to continuing public scrutiny.

Furthermore, as $PM_{2.5}$ concentrations have now become an AQO consideration under LAQM, as well as becoming questioned locally, a decision to move towards establishing monitoring information from an analyser able to provide a resolution to the above issues needed to be taken, whilst noting that the Partisol in its current configuration is not able to measure $PM_{2.5}$.

2022 data is therefore presented from the Zephyr analyser first deployed during May 2021 and it is hoped that this monitor will address the above issues.

In addition, the portable nature of the Zephyr offers a wider degree of flexibility in terms of location siting. This potentially allows other communities surrounding the quarry perimeter to be considered as possible locations for future monitoring.

CM6

Data from CM6 is being reported on for the first time. This unit has been located alongside the A512 to the east of Shepshed / M1 J23 and towards the west of Loughborough to obtain data (PM_{10}, $PM_{2.5}$ and NO_2) in respect of public interest surrounding the operation of the Newhurst Energy-from-Waste (EfW) facility at Shepshed as well as future planned local development outlined for the area.

3.1.2 Non-Automatic Monitoring Sites

Charnwood Borough Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 48 sites (54 tubes) during 2022. 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.

3.2 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.

3.2.1 Nitrogen Dioxide (NO_2)

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.

There were no exceedances of the annual air quality objectives in 2022.

Excluding 2020, which was heavily impacted by the circumstances surrounding Covid, the 2022 data suggests that NO_2 concentrations across the borough are still indicative of a continuing downward trend. Whilst the gradient of the curves are appearing to reduce in rate of reduction, and in some areas (Thurmaston and Syston) appear to have almost 'stabilised', there are no locations where we feel further, more detailed, monitoring is required.

3.2.2 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.

There were no exceedances of the air quality objectives in 2022.

3.2.3 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.

There were no exceedances of the air quality objectives in 2022.

Close observation of both PM_{10} and $PM_{2.5}$ concentrations across the borough are kept by CBC due to local concerns in respect to Mountsorrel Quarry and the Newhurst Energy-from-Waste (EfW) facility at Shepshed. Additional third-party data in respect to these pollutants is also regularly reviewed with the quarry operators and also partners at Loughborough University.

PM_{10} AQO compliance has been shown for many years in respect to the quarry and comparisons between particulate monitoring locations in Charnwood are also reviewed

against the AURN (Automatic Urban and Rural Network) stations at Leicester University and Nottingham Centre.

It is often the case that 24-hour episodes of raised PM10 levels observed at the Mountsorrel location coincide with increased concentrations also being recorded at the AURN samplers in Leicester and Nottingham. This is an indicator that some elevated results might be regional and 'transboundary' in nature and therefore not likely to be associated with operations at Mountsorrel Quarry, which we consider to be a ‘worst case’ location for particulates within the borough.

Regular data updates in respect to our monitor near the quarry can be found at: https://www.charnwood.gov.uk/pages/mountsorrel_quarry

Trends between the CBC PM_{10} and $PM_{2.5}$ data, for both the Mountsorrel and Loughborough monitors, against those of the Leicester and Nottingam AURNs can be compared under Figure A4(i)(ii) and Figure A5(i)(ii)

3.2.4 Sulphur Dioxide (SO2)

Table A.9 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2022 with the air quality objectives for SO_2.

There were no exceedances of the air quality objectives in 2022.

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)
CM2	Great Central Railway	Industrial	454380	319768	SO_2	YES (GCR)	Electrochemical Sensor ('AQMesh')	0	N/A	~1.5
CM5	Mountsorrel	Industrial	457355	315396	PM_{10}, $PM_{2.5}$	YES (Mountsorrel)	Electrochemical Sensor ('Zephyr')	~34	N/A	~1.5
CM6	Loughborough	Other	450477	318529	PM_{10}, $PM_{2.5}$, NO_2	No	Electrochemical Sensor ('Zephyr')	~50	~20	~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.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) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
DT1	Ratcliffe Rd (L'boro)	Roadside	454087	320392	NO2	YES. Loughborough AQMA	0.0	3.0	No	0.7
DT2	Shelthorpe Rd (L'boro)	Roadside	454234	318657	NO2	NO	8.0	3.0	No	2.3
DT3	Forest Rd (L'boro)	Roadside	452833	318776	NO2	NO	0.0	6.0	No	1.8
DT4	Haydon Rd (L'boro)	Roadside	452314	319620	NO2	YES. Loughborough AQMA	8.0	6.0	No	2.0
DT5	Alan Moss Rd / Epinal Way (L'boro)	Roadside	452173	319924	NO2	YES. Loughborough AQMA	0.0	15.0	No	1.8
DT6	Epinal Way / Ling Rd (L'boro)	Roadside	453678	318678	NO2	NO	0.0	9.0	No	2.3
DT7	Leicester Rd (L'boro)	Roadside	454002	319253	NO2	YES. Loughborough AQMA	0.0	3.0	No	2.3
DT8	Derby Rd (L'boro)	Roadside	453231	320028	NO2	YES. Loughborough AQMA	3.0	3.0	No	2.3
DT9	Derby Rd / Briscoe Avn (L'boro)	Roadside	452670	320527	NO2	YES. Loughborough AQMA	3.0	4.0	No	2.3
DT10, DT11, DT12	Durham Rd 3 (L'boro)	Urban Background	452352	320697	NO2	NO			No	2.3

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) [1]	Distance to kerb of nearest road (m) [2]	Tube Co-located with a Continuous Analyser?	Tube Height (m)
DT13	Alan Moss Rd / A6 Derby Rd (L'boro)	Roadside	452903	320212	NO2	YES. Loughborough AQMA	0.0	8.0	No	1.8
DT14	High St (L'boro)	Roadside	453730	319596	NO2	YES. Loughborough AQMA	0.0	3.0	No	2.3
DT15	Market Place (L'boro)	Urban Centre	453611	319540	NO2	YES. Loughborough AQMA			No	2.3
DT16	Ashby Rd (L'boro)	Roadside	453189	319709	NO2	YES. Loughborough AQMA	0.0	4.0	No	2.3
DT17	Cow Hill Lodge (Shepshed)	Roadside	448876	318307	NO2	NO	0.0	10.0	No	1.8
DT18	Roseberry St (L'boro)	Roadside	452697	319921	NO2	NO	3.0	3.0	No	2.3
DT19	Melton Rd Town Centre (Syston)	Roadside	462777	311692	NO2	YES. Syston AQMA	3.0	3.0	No	2.3
DT20	1123 Melton Rd (Syston)	Roadside	461809	310728	NO2	YES. Syston AQMA	0.0	6.0	No	1.8
DT21	1116 Melton Rd (Syston)	Roadside	462373	311254	NO2	Yes. Syston AQMA	0.0	6.0	No	2.0
DT22	Loughborough Rd (Birstall)	Roadside	459233	309233	NO2	NO	0.0	15.0	No	1.8
DT23	A6 (Birstall)	Roadside	459178	309890	NO2	NO	2.0	5.0	No	2.3

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) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
DT24	21 Humberstone Lane (Thurmaston)	Roadside	460821	308757	NO2	NO	0.0	6.0	No	1.8
DT25	43 Humberstone Lane (Thurmaston)	Roadside	460895	308747	NO2	NO	0.0	5.0	No	1.8
DT26	22 Humberstone Lane (Thurmaston)	Roadside	460835	308784	NO2	NO	0.0	5.0	No	1.8
DT27	Ashby Rd Central (Shepshed)	Roadside	448121	318257	NO2	NO	12.0	2.0	No	2.3
DT28	Loughborough Rd (Hathern)	Roadside	450260	321922	NO2	NO	30.0	3.0	No	2.3
DT29	Barrow Street (L'boro)	Roadside	453901	319488	NO2	NO	0.0	10.0	No	2.0
DT30	School Street (L'boro)	Urban Background	453946	319619	NO2	NO	5.0	3.0	No	2.3
DT31	Fennel Street (L'boro)	Roadside	453694	319890	NO2	NO	0.0	3.0	No	2.3
DT32	High Street (Syston)	Roadside	462369	311809	NO2	YES. Syston AQMA	0.0	4.0	No	2.3
DT33, DT34, DT35	Syston AQMS 3	Roadside	462540	311428	NO2	YES. Syston AQMA	10.0	3.0	No	1.8
DT36, DT37, DT38	Baxter Gate AQMS 3	Kerbside	453687	319672	NO2	YES. Loughborough AQMA		1.0	No	1.8

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) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
DT39	Nottingham Rd (L'boro)	Roadside	454154	320116	NO2	NO	0.0	3.0	No	2.3
DT40	156 Ratcliffe Rd (L'boro)	Roadside	454285	320294	NO2	NO	0.0	6.0	No	1.8
DT41	156 Meadow Lane (L'boro)	Roadside	453933	320663	NO2	NO	0.0	8.0	No	1.8
DT42	31 Station Boulevard (L'boro)	Roadside	454142	320593	NO2	NO	0.0	9.0	No	1.8
DT43	91 Wharncliffe Rd (L'boro)	Roadside	454250	319682	NO2	NO	0.0	4.0	No	1.8
DT44	3 Simpson Cl (Syston)	Suburban	461499	310459	NO2	NO	0.0	30.0	No	1.8
DT45	1 Brackenfield Way (Thurmaston)	Suburban	461994	309975	NO2	NO	0.0	8.0	No	1.8
DT46	74 Hathern Rd (Shepshed)	Roadside	448311	320511	NO2	NO	0.0	8.0	No	1.8
DT47	7 Shepshed Rd (Hathern)	Roadside	449935	322227	NO2	NO	0.0	11.0	No	1.8
DT48	37 Darwin Crescent (L'boro)	Suburban	450942	321076	NO2	NO	0.0	15.0	No	1.8
DT49	Far Street (Wymeswold)	Roadside	460313	323521	NO2	NO	1.0	2.0	No	2.3
DT50	Cropston Rd (Anstey)	Roadside	455141	308686	NO2	NO	1.0	3.0	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) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
DT51	15 Leicester Rd (Anstey)	Roadside	455167	308549	NO2	NO	0.0	4.0	No	2.3
DT52	22 Main Street (Barkby)	Rural	463483	309880	NO2	NO	0.0	4.0	No	2.3
DT53	Frederick Street (L'boro)	Roadside	453277	319248	NO2	NO	0.0	4.0	No	2.3
DT60	Nanpantan Rd (L'boro)	Roadside	451629	317677	NO2	NO	9.0	3.0	No	2.3

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)

Historic IDs/data in respect of CM3 & CM4 are presented for information purposes only (analysers now removed / site details in previous reports)

Site 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
[CM3]	453687	319672	Kerbside	N/A	N/A	29	-	-	-	-
[CM4]	462540	311428	Roadside	N/A	N/A	27.6	-	-	-	-
CM6	450477	318529	Other	81.4	81.4	-	-	-	-	11.8

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

☒ **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.TG22 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
DT1	454087	320392	Roadside	100	100.0	20.9	21.8	16.0	18.2	17.2
DT2	454234	318657	Roadside	100	100.0	20.0	20.7	14.2	17.1	16.0
DT3	452833	318776	Roadside	100	100.0	24.1	25.7	18.3	22.1	20.2
DT4	452314	319620	Roadside	91.7	100.0	23.1	25.7	18.4	20.9	19.7
DT5	452173	319924	Roadside	100	100.0	20.4	21.4	14.9	17.1	16.1
DT6	453678	318678	Roadside	91.7	100.0	26.0	27.7	19.0	22.9	21.2
DT7	454002	319253	Roadside	100	100.0	33.5	33.0	23.2	28.6	25.5
DT8	453231	320028	Roadside	50	100.0	28.8	27.0	16.7	20.0	20.1
DT9	452670	320527	Roadside	100	100.0	22.5	23.3	16.2	18.3	17.7
DT10, DT11, DT12	452352	320697	Urban Background	100	100.0	17.2	18.1	12.4	14.0	13.5
DT13	452903	320212	Roadside	100	100.0	24.9	25.3	17.8	21.3	20.2
DT14	453730	319596	Roadside	100	100.0	28.4	30.8	20.1	24.7	23.3
DT15	453611	319540	Urban Centre	100	100.0	17.3	19.1	12.4	14.4	13.3

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
DT16	453189	319709	Roadside	100	100.0	28.0	30.2	20.0	24.9	23.8
DT17	448876	318307	Roadside	100	100.0	23.3	26.6	17.8	18.5	17.7
DT18	452697	319921	Roadside	100	100.0	17.0	17.6	12.4	13.8	13.1
DT19	462777	311692	Roadside	100	100.0	26.1	27.0	19.1	23.1	21.8
DT20	461809	310728	Roadside	100	100.0	24.1	24.1	17.5	19.9	19.8
DT21	462373	311254	Roadside	100	100.0	32.1	34.2	23.7	26.2	26.5
DT22	459233	309233	Roadside	100	100.0	26.3	27.1	19.5	22.7	21.3
DT23	459178	309890	Roadside	100	100.0	29.4	26.0	17.1	25.1	22.8
DT24	460821	308757	Roadside	100	100.0	28.3	30.6	21.0	26.5	26.3
DT25	460895	308747	Roadside	91.7	100.0	29.7	30.4	20.5	24.6	24.3
DT26	460835	308784	Roadside	91.7	100.0	24.1	24.1	16.0	19.7	19.8
DT27	448121	318257	Roadside	100	100.0	33.9	22.2	21.2	23.8	23.7
DT28	450260	321922	Roadside	100	100.0	25.0	20.3	16.9	20.1	18.7
DT29	453901	319488	Roadside	100	100.0	23.3	25.2	18.5	22.6	19.8

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
DT30	453946	319619	Urban Background	100	100.0	19.6	20.6	14.5	15.9	16.0
DT31	453694	319890	Roadside	100	100.0	28.9	28.3	19.8	23.0	22.6
DT32	462369	311809	Roadside	100	100.0	26.0	25.7	18.3	24.6	24.3
DT33, DT34, DT35	462540	311428	Roadside	100	100.0	26.8	28.1	21.1	23.4	22.7
DT36, DT37, DT38	453687	319672	Kerbside	100	100.0	28.8	28.1	19.1	23.6	21.5
DT39	454154	320116	Roadside	100	100.0	32.6	29.7	20.3	23.8	22.6
DT40	454285	320294	Roadside	100	100.0	22.2	22.0	15.6	18.1	17.3
DT41	453933	320663	Roadside	100	100.0	22.8	21.7	15.4	18.0	16.6
DT42	454142	320593	Roadside	100	100.0	22.5	23.4	16.1	18.7	17.8
DT43	454250	319682	Roadside	100	100.0	24.0	28.3	18.0	20.9	19.7
DT44	461499	310459	Suburban	100	100.0	20.8	21.5	15.2	17.8	17.6
DT45	461994	309975	Suburban	100	100.0	19.6	19.2	14.9	19.0	18.9
DT46	448311	320511	Roadside	100	100.0	20.4	19.8	13.9	15.8	14.8
DT47	449935	322227	Roadside	91.7	100.0	21.9	22.6	15.7	18.1	16.9

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
DT48	450942	321076	Suburban	100	100.0	14.3	13.9	8.6	10.4	10.0
DT49	460313	323521	Roadside	100	100.0	27.7	25.7	17.3	20.7	19.9
DT50	455141	308686	Roadside	100	100.0		31.3	24.1	28.0	26.2
DT51	455167	308549	Roadside	100	100.0	23.6	22.8	14.8	16.8	16.8
DT52	463483	309880	Rural	91.7	100.0	17.7	17.7	12.5	14.4	13.3
DT53	453277	319248	Roadside	100	100.0		26.2	17.3	21.4	21.0
DT60	451629	317677	Roadside	100	100.0				12.1	11.4

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

☒ **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.TG22 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%).

Figure A.1 – A.11 Trends in Annual Mean NO_2 Concentrations

The following plots show the trends in Annual Mean concentrations measured at selected diffusion tube (DT) monitoring sites

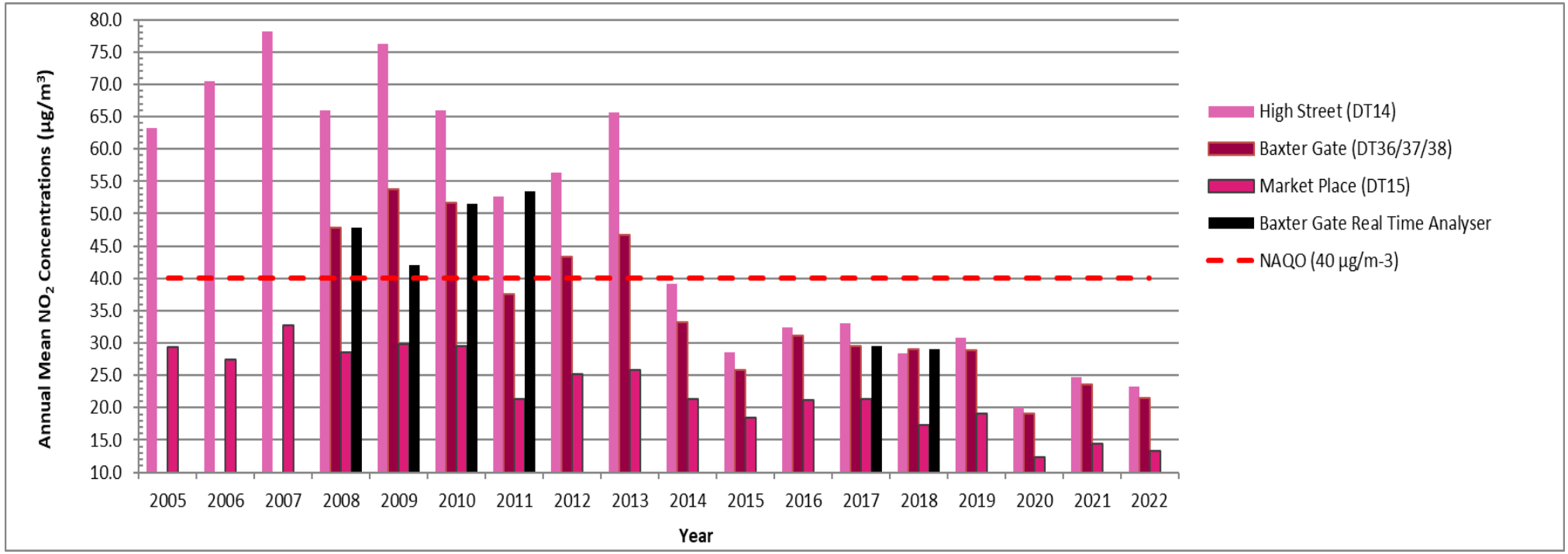


Figure A.1 Plot of NO_2 Concentration against Year for Loughborough Town Centre (i) sites

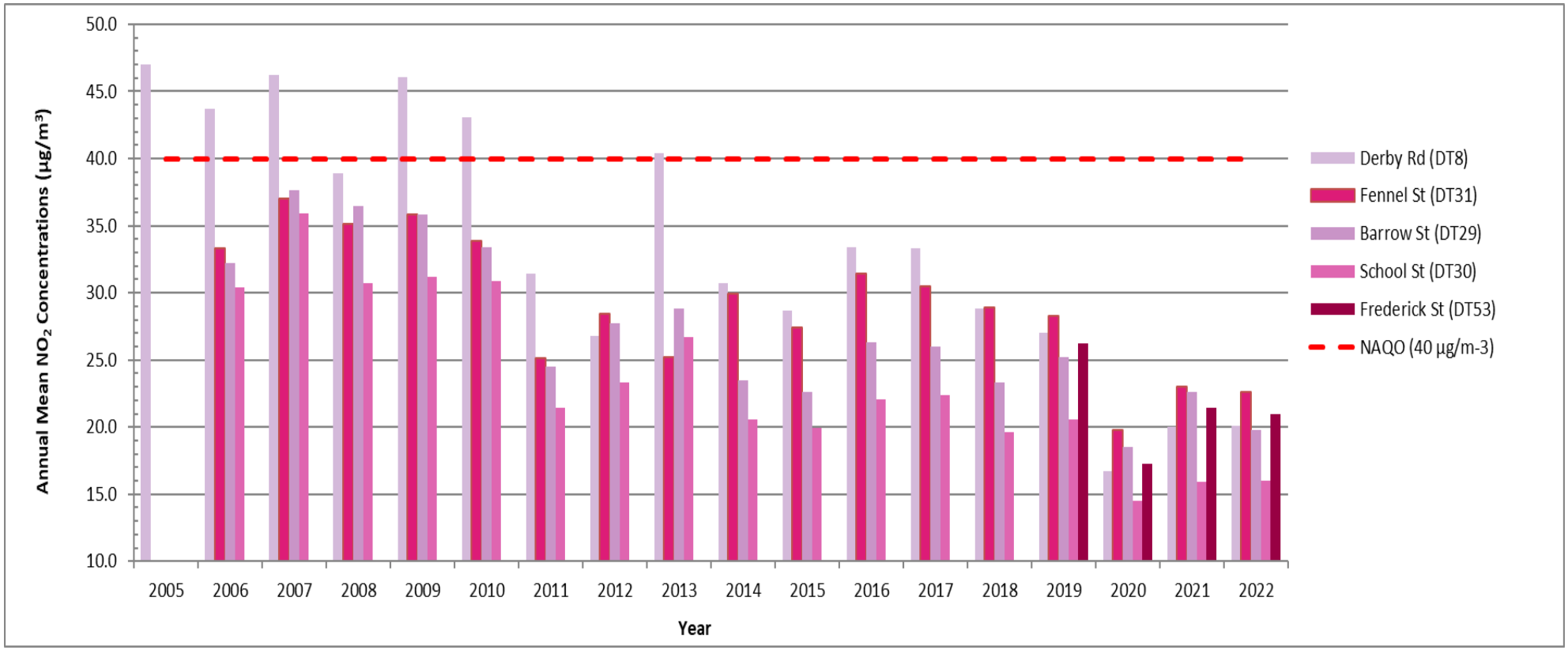


Figure A.2 Plot of NO_2 Concentration against Year for Loughborough Town Centre (ii) sites

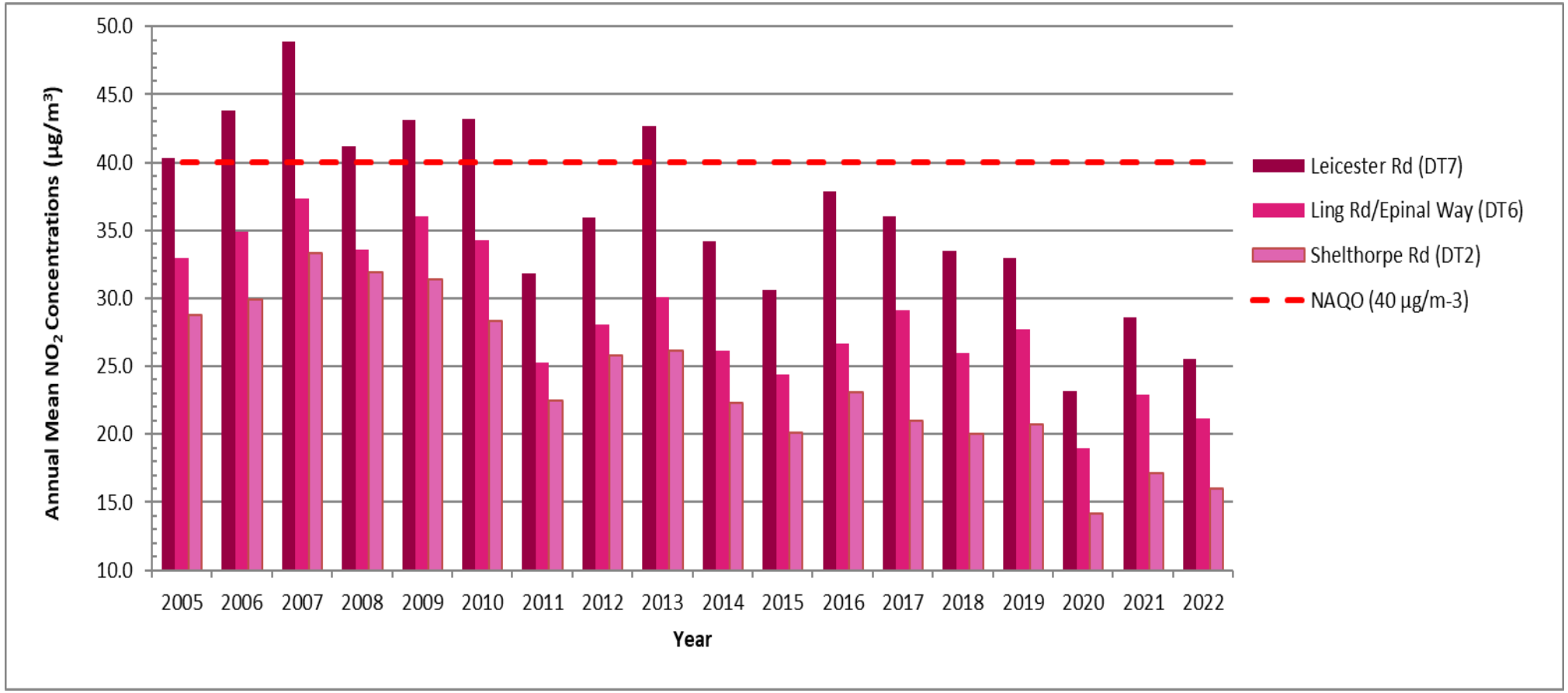


Figure A.3 Plot of NO_2 Concentration against Year for Loughborough South sites

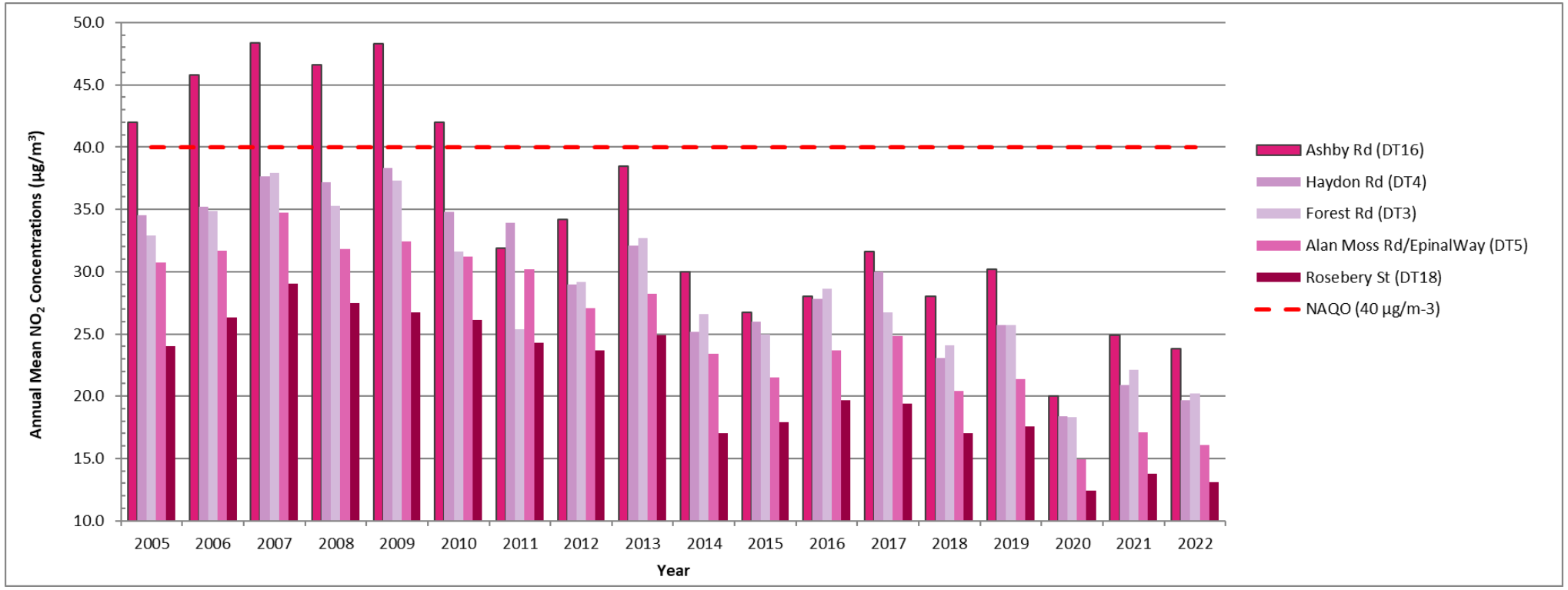


Figure A.4 Plot of NO_2 Concentration against Year for Loughborough West sites

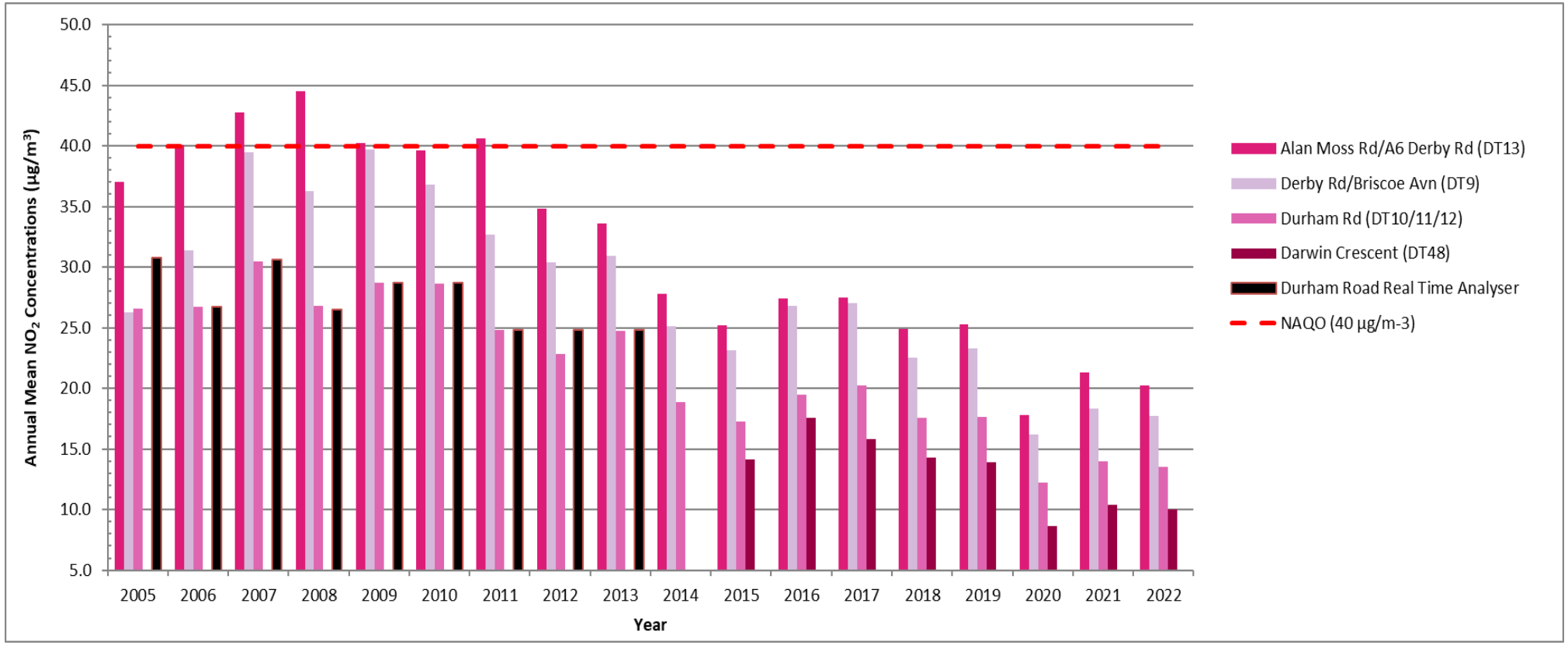


Figure A.5 Plot of NO_2 Concentration against Year for Loughborough North sites

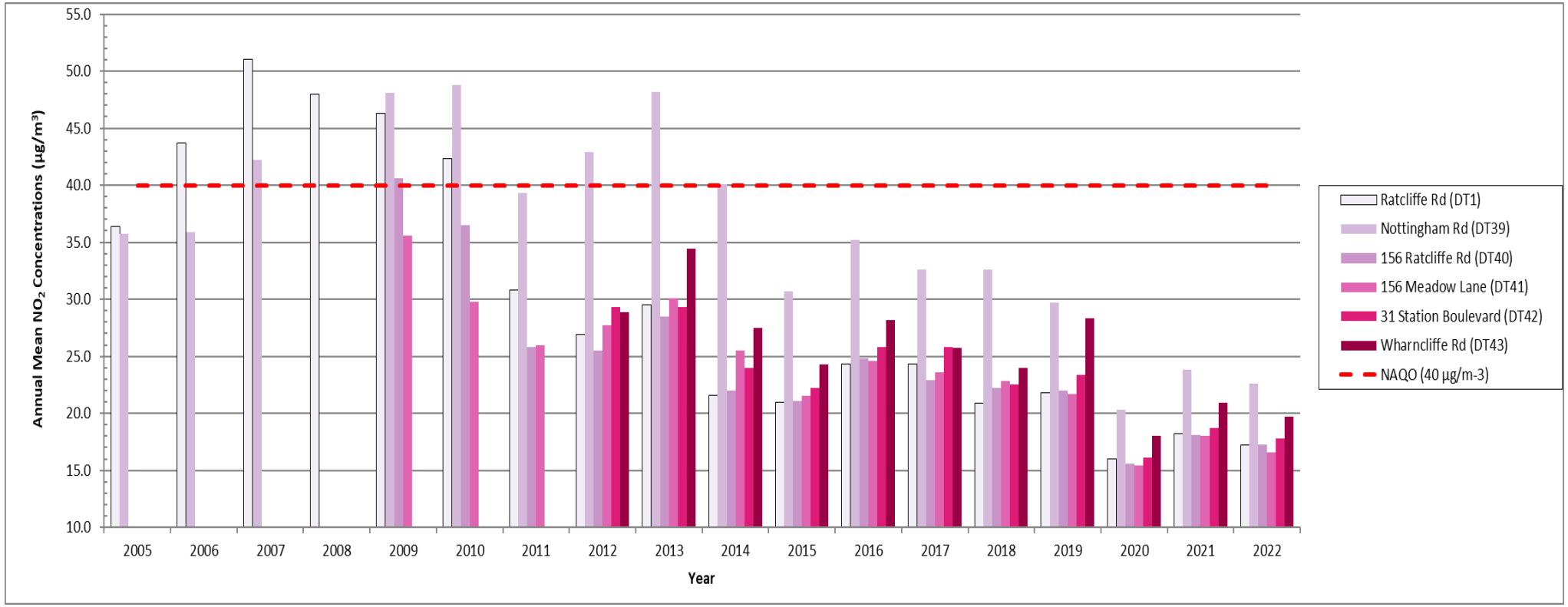


Figure A.6 Plot of NO_2 Concentration against Year for Loughborough East sites

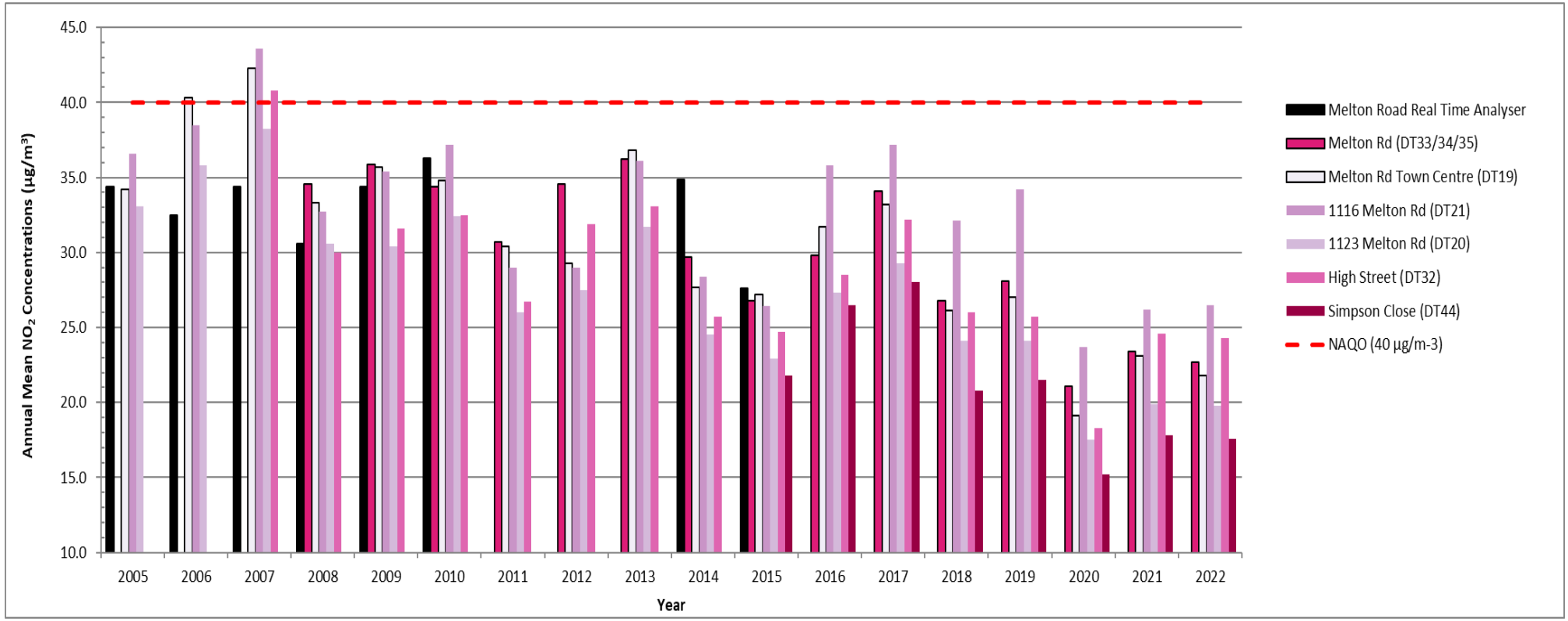


Figure A.7 Plot of NO_2 Concentration against Year for Syston sites

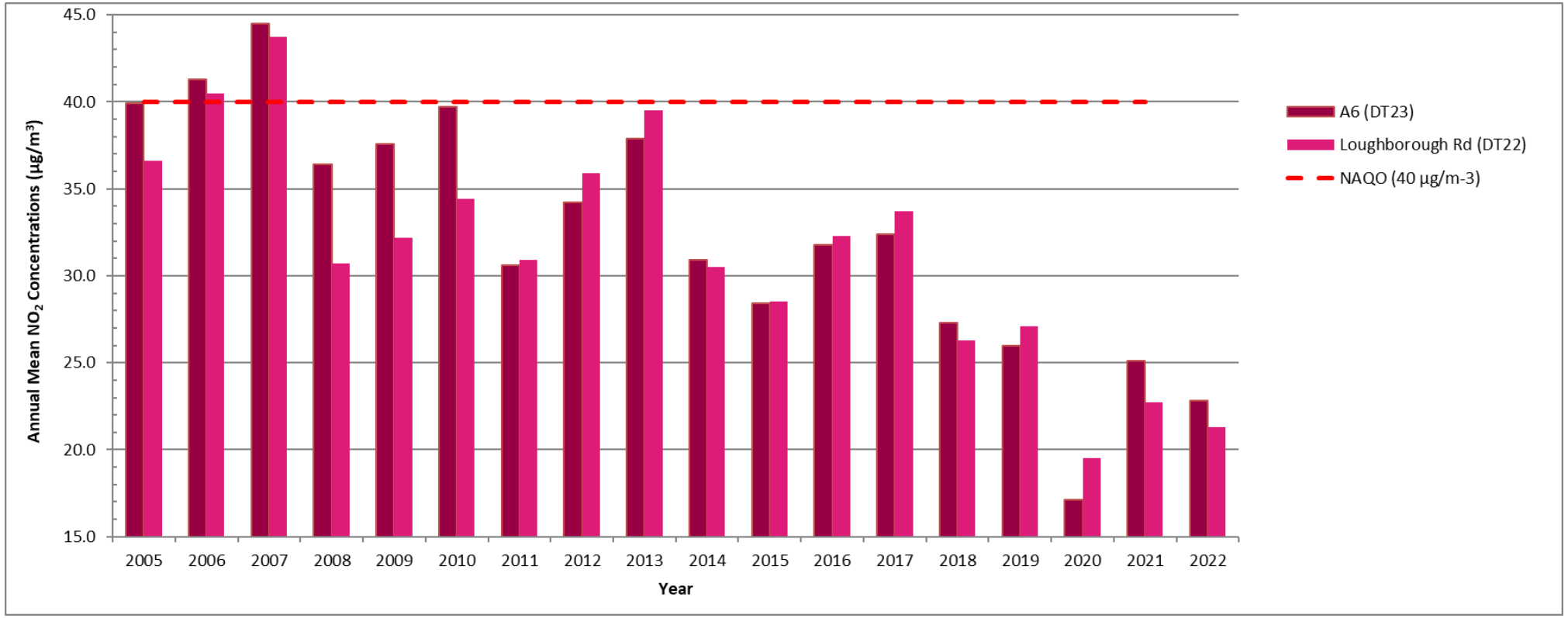


Figure A.8 Plot of NO_2 Concentration against Year for Birstall sites

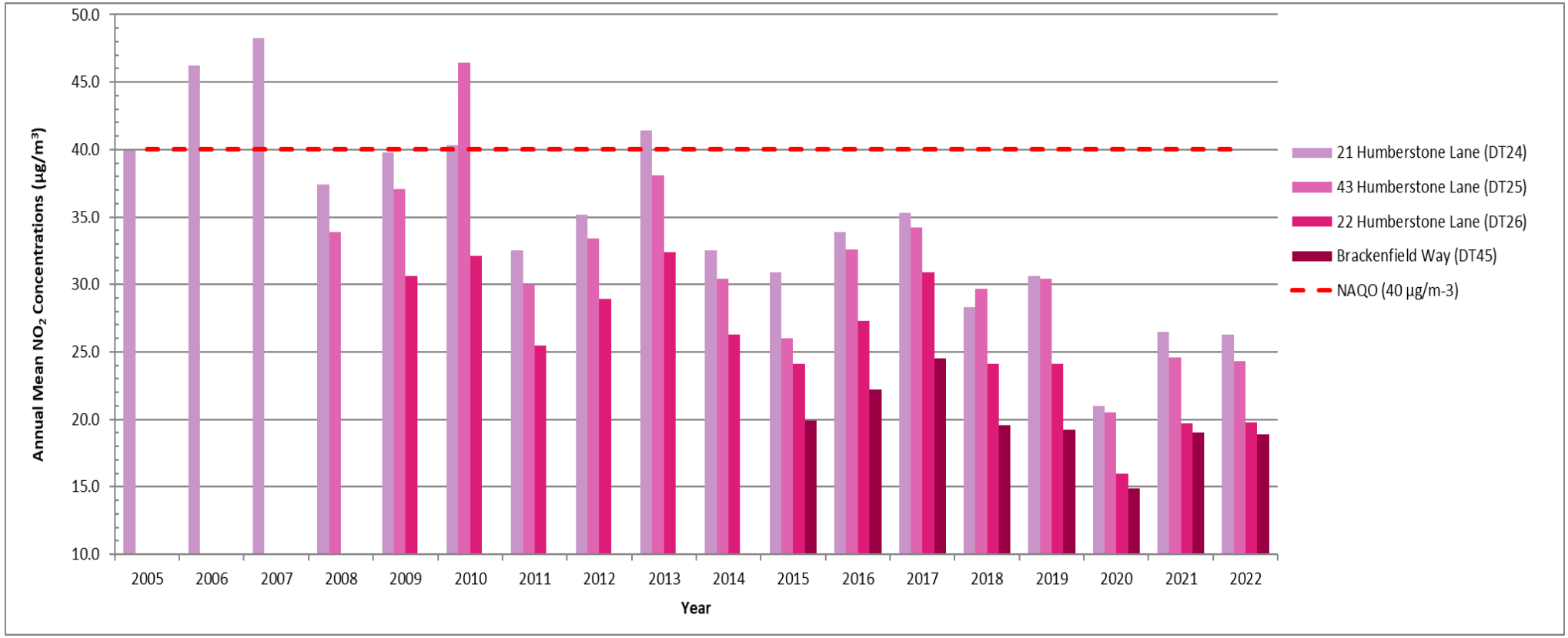


Figure A.9 Plot of NO_2 Concentration against Year for Thurmaston sites

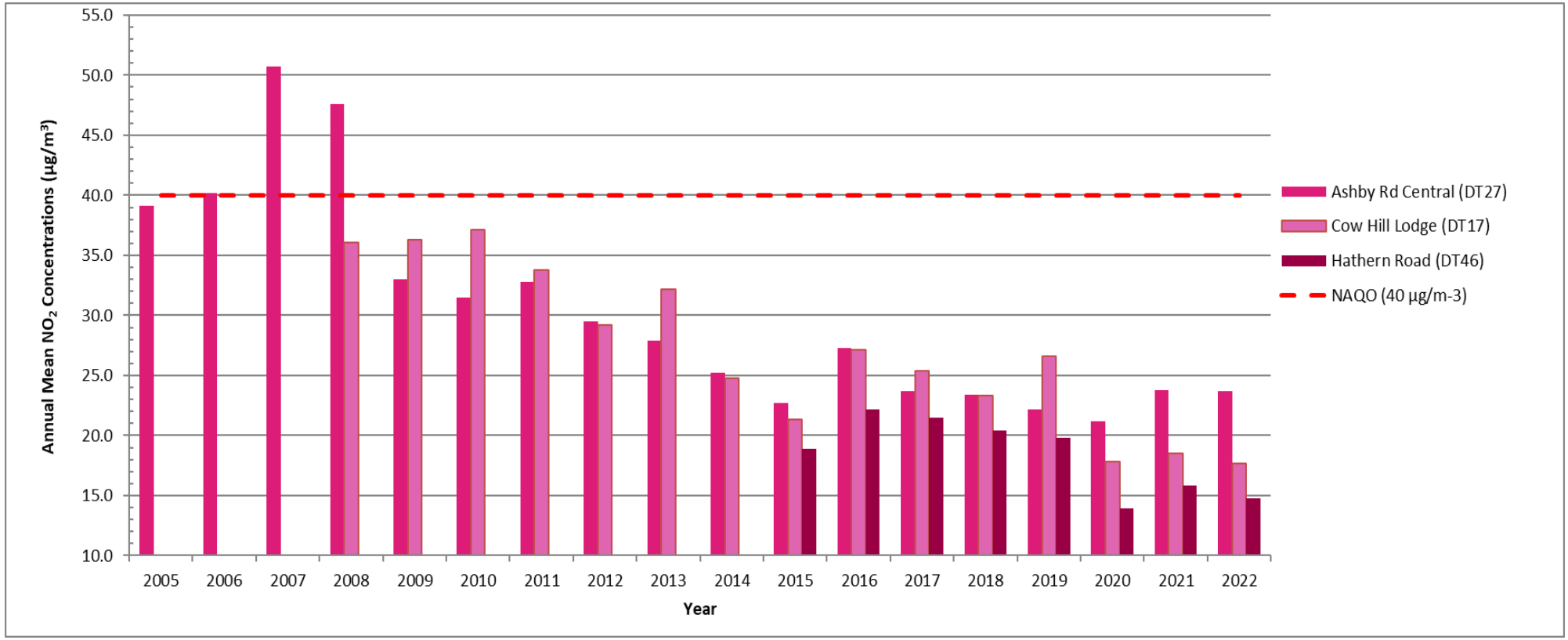


Figure A.10 Plot of NO_2 Concentration against Year for Shepshed sites

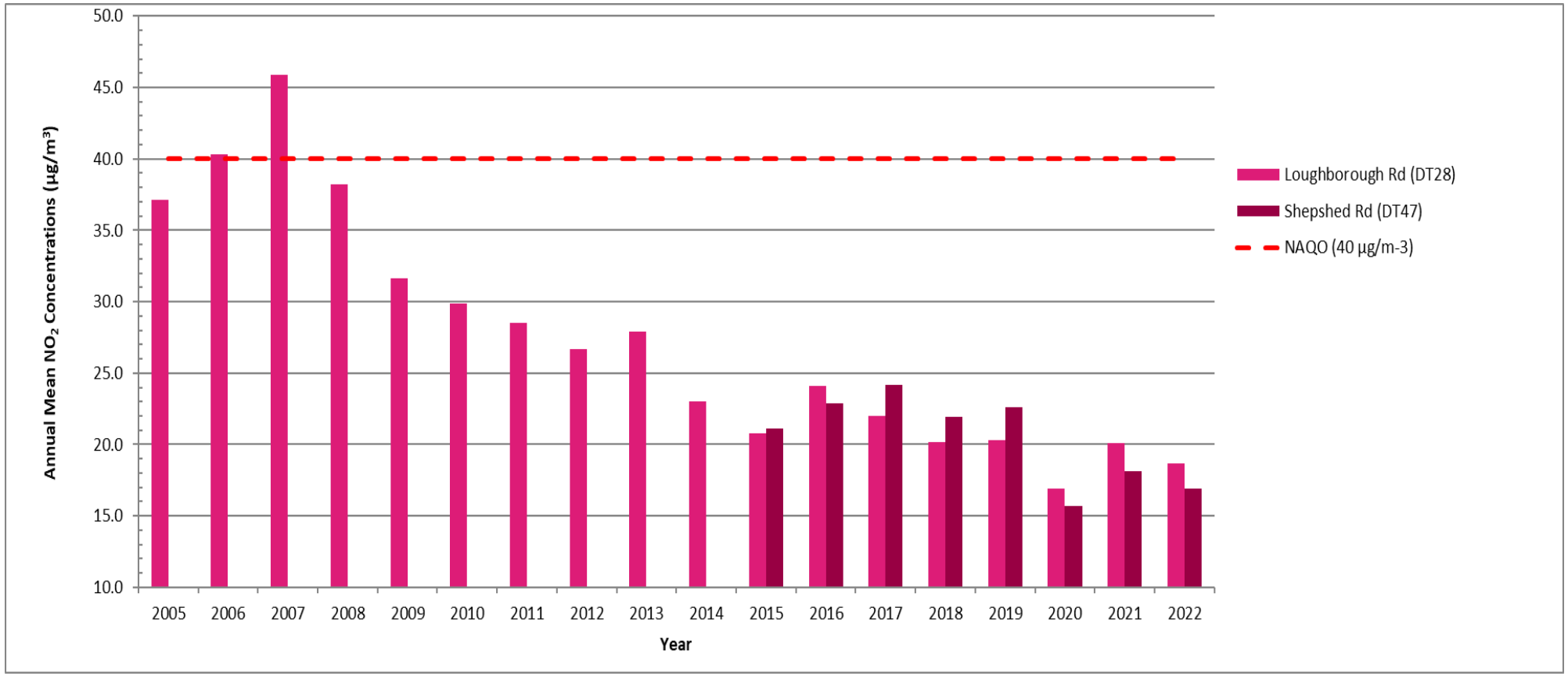


Figure A.11 Plot of NO_2 Concentration against Year for Hathern sites

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

Historic IDs/data in respect of CM3 & CM4 are presented for information purposes only (analysers now removed / site details in previous reports)

Site 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
[CM3]	453687	319672	Kerbside	N/A	N/A	[95.9]	-	-	-	-
[CM4]	462540	311428	Roadside	N/A	N/A	0	-	-	-	-
CM6	450477	318529	Other	81	81	-	-	-	-	0 [65.3]

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%).

Figure A.2 – Trends in Number of NO_2 1-Hour Means > 200µg/m^3

Insufficient data at this time.

Table A.6 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)

Historic ID /data in respect of CM1 presented for information purposes only (analyser no longer operational / full site details in previous reports)

Site 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
[CM1]	457355	315396	Industrial	N/A	N/A	24.7	22.6	-	20	-
CM5	457355	315396	Industrial	100	100	-	-	-	14.9	14.5
CM6	450477	318529	Other	89.9	89.9	-	-	-	-	13.3

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

Notes:

The annual mean concentrations are presented as $\mu g/m^3$.

Exceedances of the PM_{10} annual mean objective of $40\mu g/m^3$ are shown in **bold**.

All means have been "annualised" as per LAQM.TG22 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%).

Figure A.3 – Trends in Annual Mean PM_{10} Concentrations

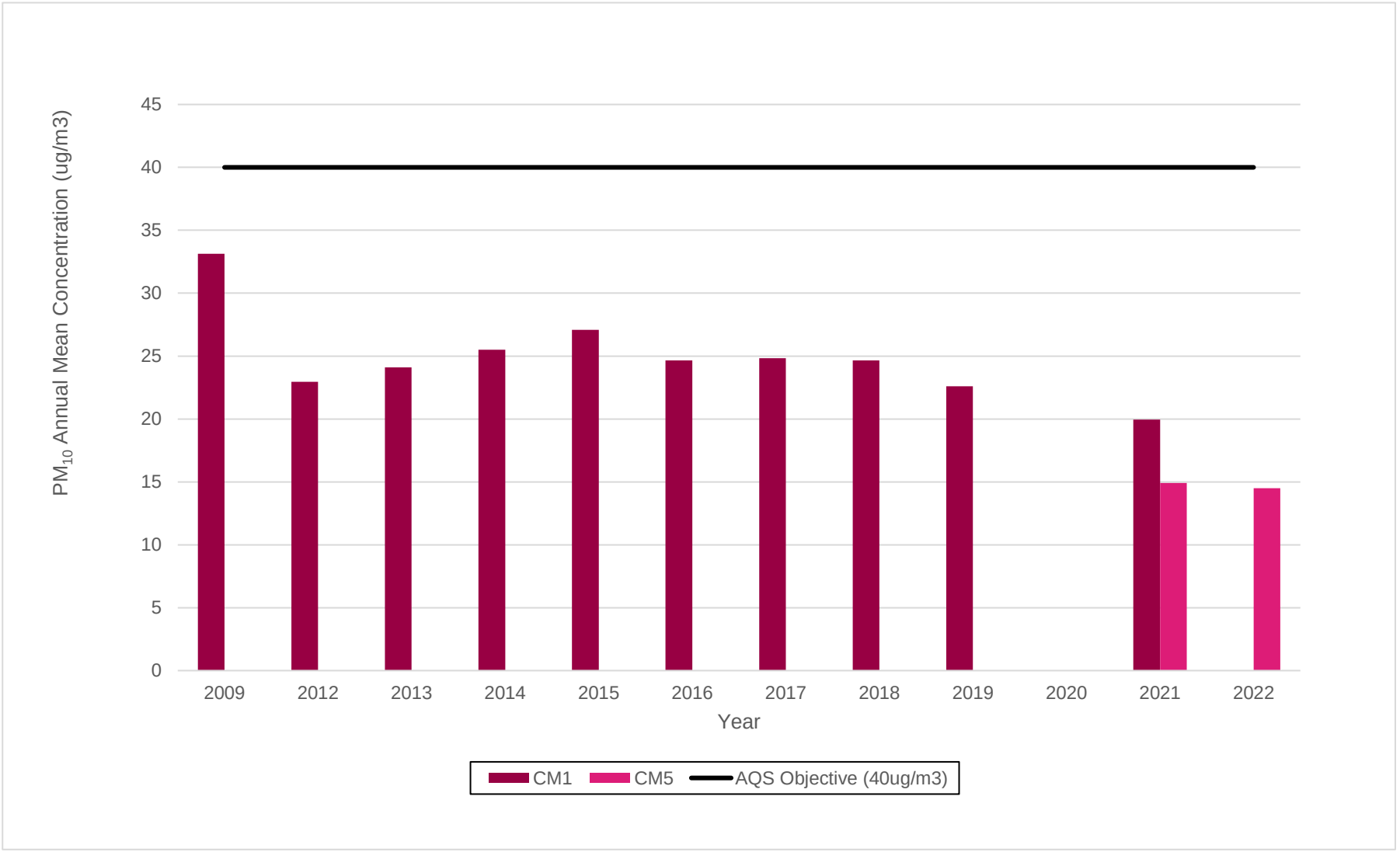


Figure A.3 Plot of PM_{10} Annual Mean Concentrations against Year for the Mountsorrel Quarry monitoring sites

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

Historic ID /data in respect of CM1 presented for information purposes only (analyser no longer operational / full site details in previous reports)

Site 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
[CM1]	457355	315396	Industrial	N/A	N/A	[46.3]	[43.1]	[40.7]	[38.6]	-
CM5	457355	315396	Industrial	100	100	-	-	-	[23.9]	3
CM6	450477	318529	Other	89.9	89.9	-	-	-	-	2

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%).

Figure A.4 – Trends in 90.4th Percentile of 24-Hour Mean PM_{10} Results > 50µg/m^3 at Mountsorrel

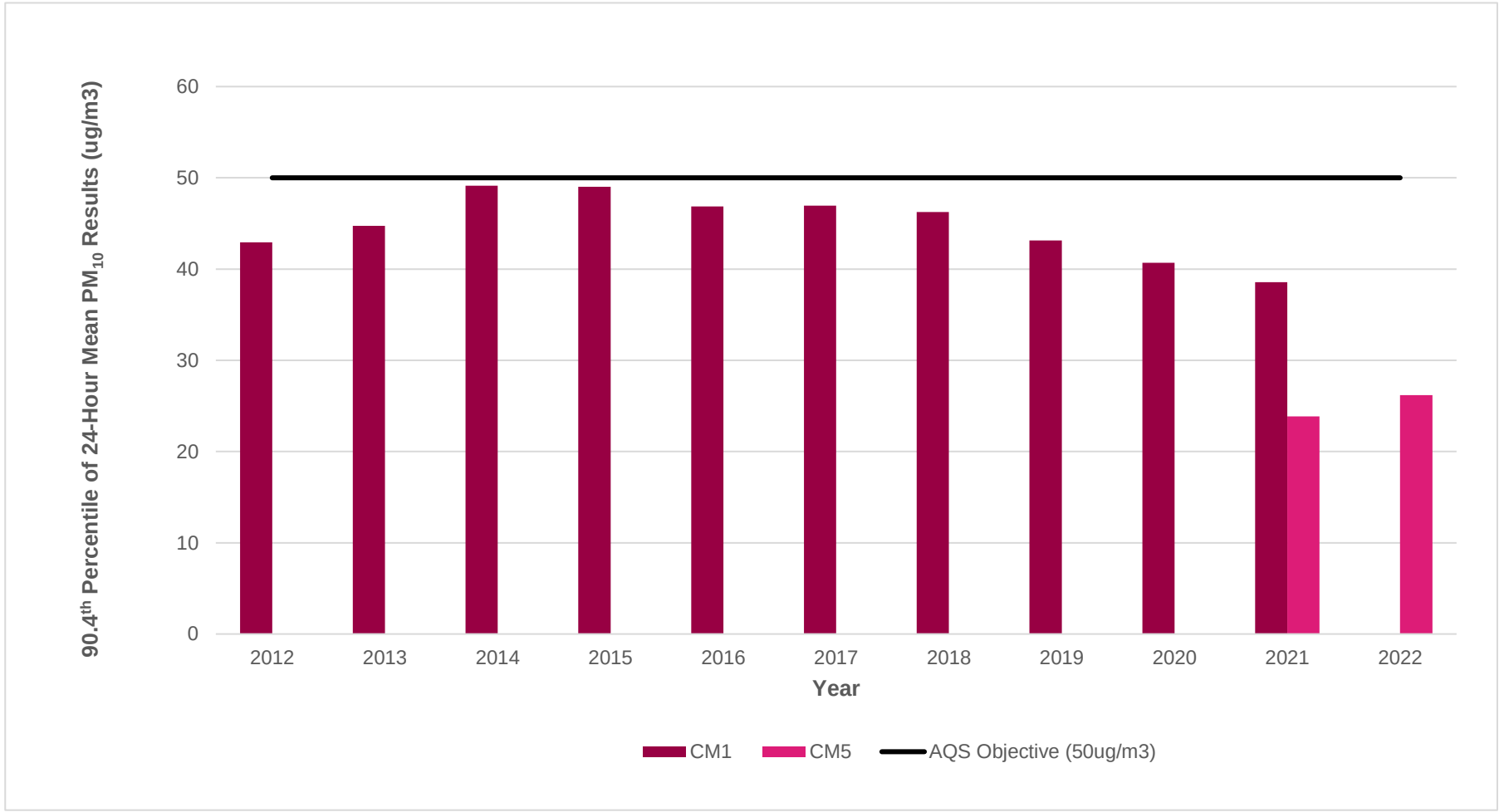


Figure A.4 Plot of the 90.4th Percentile of 24-Hour Mean Concentration against Year for the Mountsorrel Quarry monitoring sites

Note: For comparison purposes 2022 data for CM5 has been plotted as the equivalent 90.4th percentile (at 26.2) derived from the 24-hour means, rather than the absolute number of exceedances (3)

Figures A.4(i) & A.4(ii) – 24-Hour Mean PM_{10} Monitoring Results, compared against Leicester University and Nottingham Centre AURNs

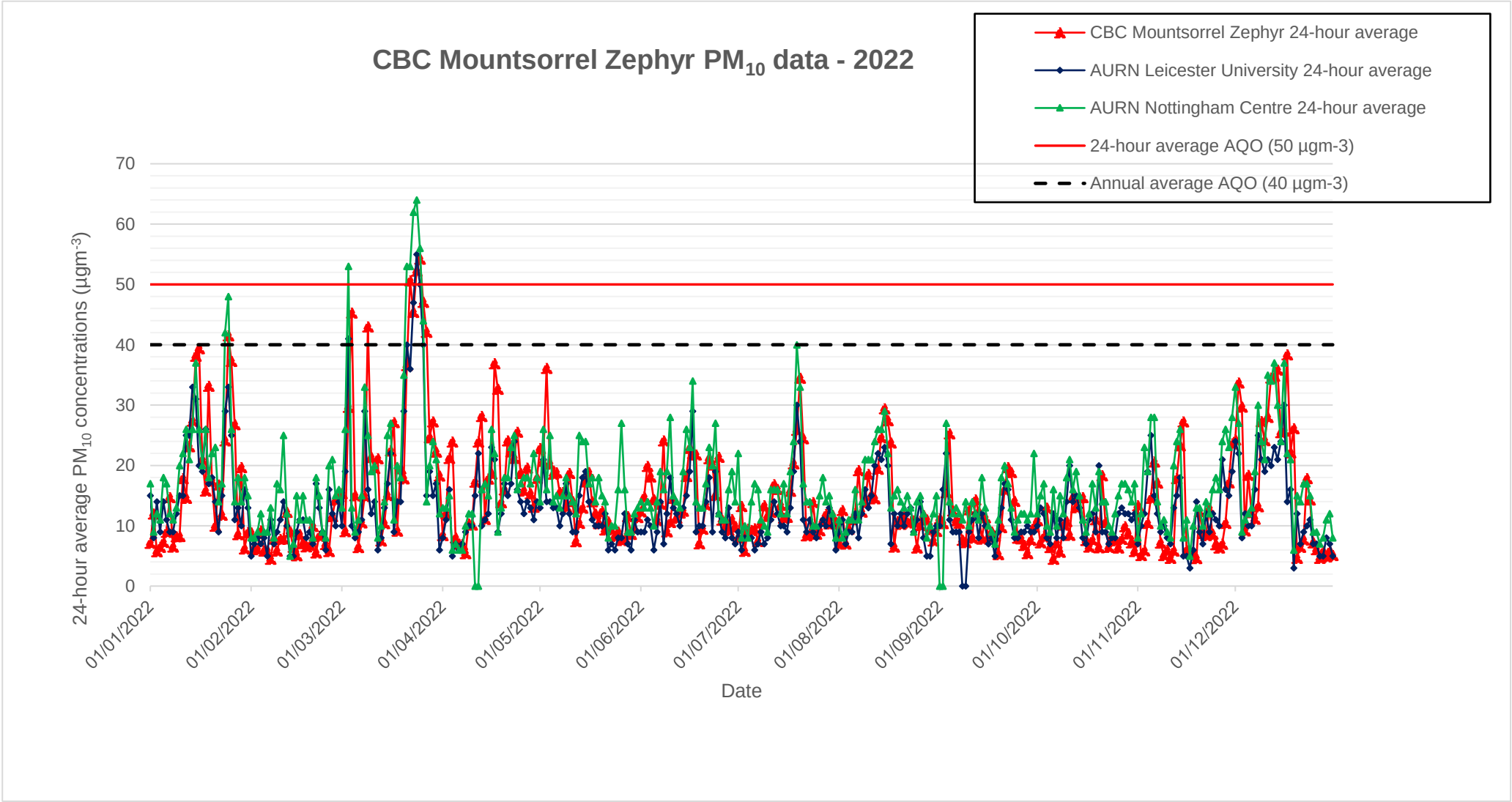


Figure A.4 (i) Plot of the 24-Hour Mean PM_{10} Concentrations at CM5 against Leicester University and Nottingham Centre AURNs

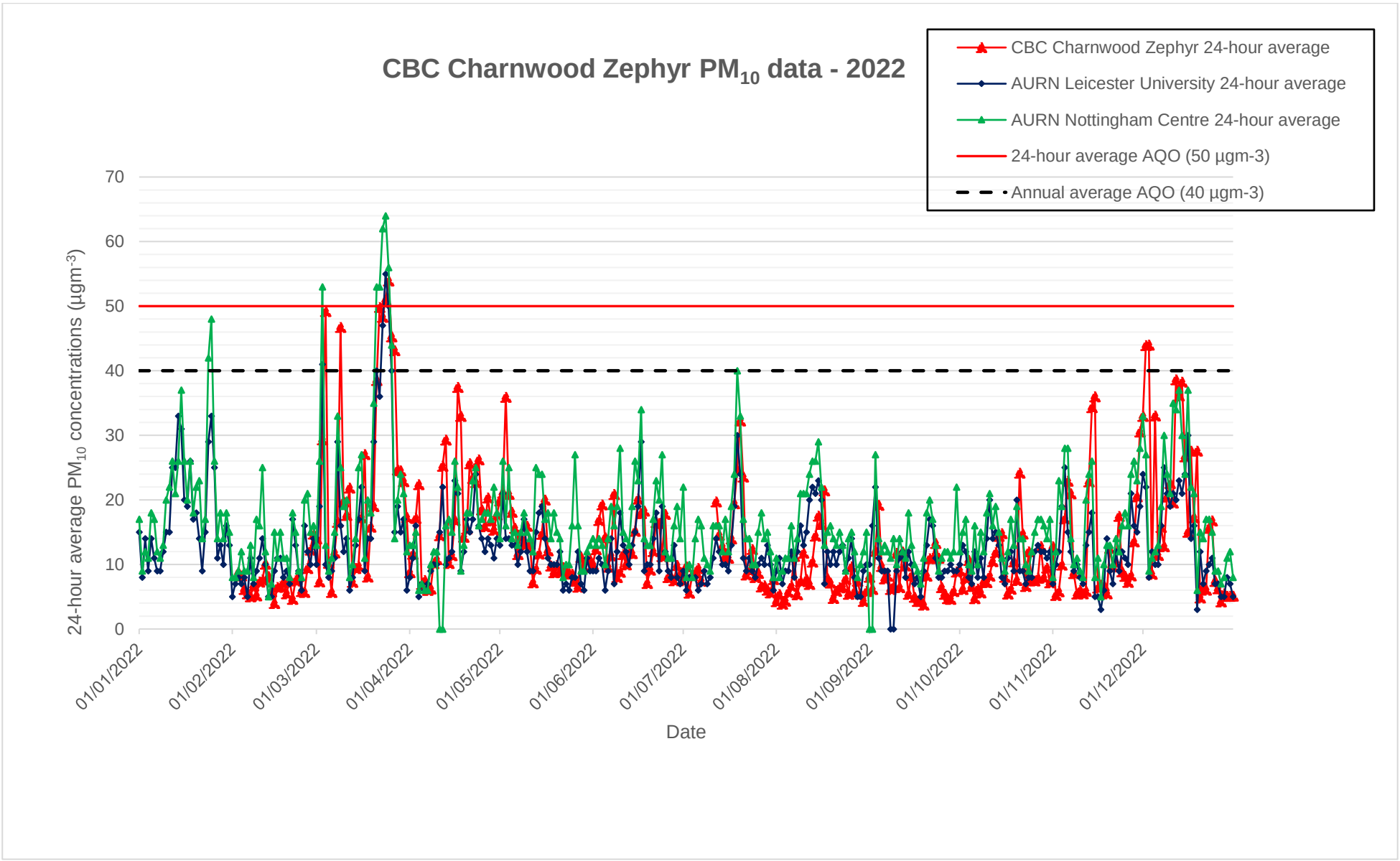


Figure A.4 (ii) Plot of the 24-Hour Mean PM_{10} Concentrations at CM6 against Leicester University and Nottingham Centre AURNs

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 2022 (%) (2)	2018	2019	2020	2021	2022
CM5	457355	315396	Industrial	100	100	-	-	-	12.3	12.2
CM6	450477	318529	Other	89.9	89.9	-	-	-	-	11.2

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.**

Notes:

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

All means have been "annualised" as per LAQM.TG22 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%).

Figure A.5 – Trends in Annual Mean $PM_{2.5}$ Concentrations

Insufficient data at this time.

Figures A.5(i) & A.4(ii) – 24-Hour Mean $PM_{2.5}$ Monitoring Results, compared against Leicester University and Nottingham Centre AURNs

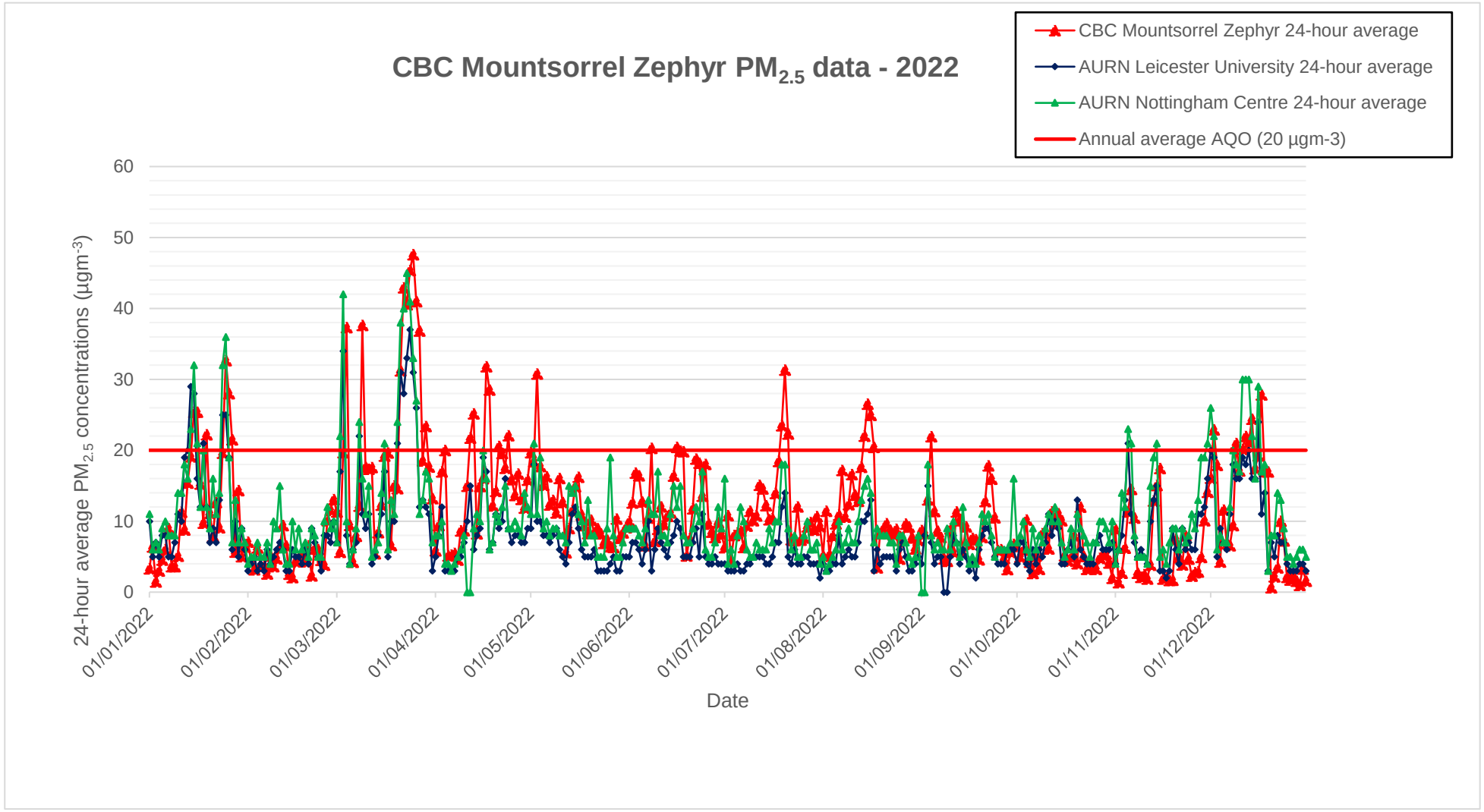


Figure A.5 (i) Plot of the 24-Hour Mean $PM_{2.5}$ Concentrations at CM5 against Leicester University and Nottingham Centre AURNs

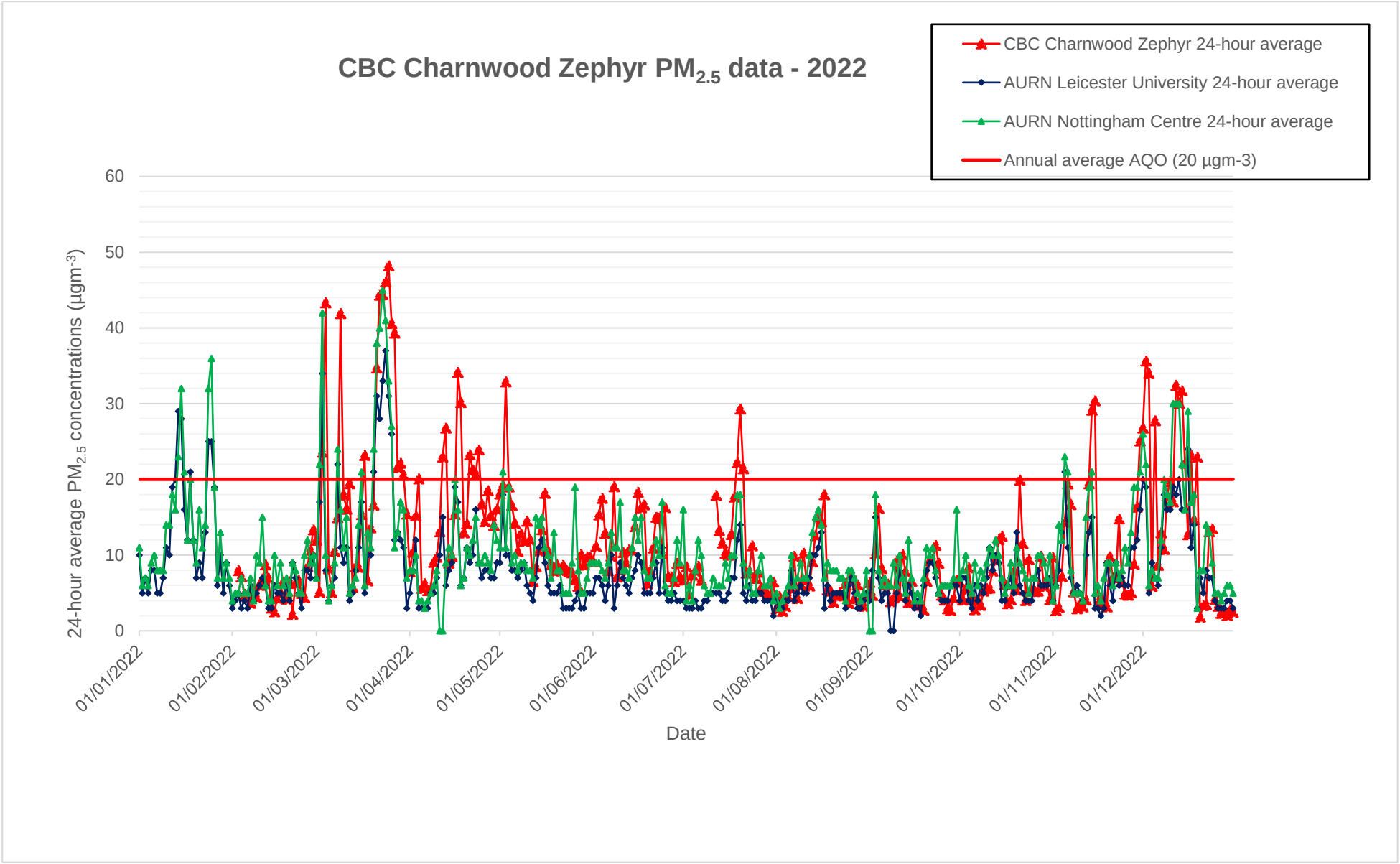


Figure A.5 (ii) Plot of the 24-Hour Mean $PM_{2.5}$ Concentrations at CM6 against Leicester University and Nottingham Centre AURNs

Table A.9 – SO_2 2022 Monitoring Results, Number of Relevant Instances

Site 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)	Number of 15-minute Means > 266µg/m³	Number of 1-hour Means > 350µg/m³	Number of 24-hour Means > 125µg/m³
CM2	454380	319768	Industrial	89	78	9 [191]	0 [115]	0 [49]

Notes:

Results are presented as the number of instances where monitored concentrations are greater than the objective concentration.

Exceedances of the SO_2 objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year).

If the period of valid data is less than 85%, the relevant percentiles are 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%).

Appendix B: Full Monthly Diffusion Tube Results for 2022

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

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.83)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
DT1	454087	320392	33.0	20.1	24.3	17.2	16.1	14.6	15.6	17.7	20.9	20.5	23.5	25.9	20.8	17.2	-	
DT2	454234	318657	29.2	16.5	27.3	18.4	12.7	13.3	12.9	16.2	20.7	18.1	21.0	25.6	19.3	16.0	-	
DT3	452833	318776	30.1	23.9	27.9	21.8	20.1	20.7	17.4	21.6	24.9	25.3	27.7	30.2	24.3	20.2	-	
DT4	452314	319620	31.6	24.8	26.1	18.2	19.3	20.4	19.3	18.9	24.6	27.6		30.9	23.8	19.7	-	
DT5	452173	319924	28.3	20.8	23.9	14.7	15.1	15.1	13.6	15.7	19.7	19.4	22.7	23.1	19.3	16.1	-	
DT6	453678	318678	31.6		26.9	23.1	21.3	19.2	21.6	22.2	27.6	26.2	29.4	32.3	25.6	21.2	-	
DT7	454002	319253	35.4	26.4	45.0	33.6	26.0	21.9	25.7	34.5	31.8	19.1	33.8	34.8	30.7	25.5	-	
DT8	453231	320028	31.6						15.4	21.0		22.6	26.8	29.5	24.5	20.1	-	
DT9	452670	320527	27.1	20.7	29.5	18.3	14.7	13.6	14.9	18.6	22.9	22.5	24.3	28.4	21.3	17.7	-	
DT10	452352	320697	22.7	15.2	24.9	13.4	11.4	9.5	10.1	15.0	17.2	15.2	18.8	22.7	-	-	-	Triplicate Site with DT10, DT11 and DT12 - Annual data provided for DT12 only
DT11	452352	320697	23.6	14.1	22.3	13.2	11.2	9.5	10.3	15.0	16.5	14.9	18.9	22.5	-	-	-	Triplicate Site with DT10, DT11 and DT12 - Annual data provided for DT12 only
DT12	452352	320697	25.5	13.8	23.8	14.8	11.0	10.0	9.8	14.6	16.9	15.0	18.4	22.8	16.2	13.5	-	Triplicate Site with DT10, DT11 and DT12 - Annual data provided for DT12 only
DT13	452903	320212	30.1	20.3	34.5	23.2	18.1	18.9	20.0	24.4	25.2	23.0	25.4	29.0	24.3	20.2	-	
DT14	453730	319596	35.9	27.8	32.6	24.3	20.3	20.6	21.9	25.3	28.5	29.7	34.2	35.5	28.0	23.3	-	
DT15	453611	319540	22.9	14.4	22.3	13.8	10.8	9.9	9.6	12.5	15.4	15.1	25.1	20.8	16.0	13.3	-	
DT16	453189	319709	34.5	28.3	36.4	24.3	24.9	24.3	23.5	24.2	28.2	29.5	33.6	32.6	28.7	23.8	-	
DT17	448876	318307	27.9	22.0	30.1	18.8	17.2	17.2	16.0	19.0	20.4	20.8	21.9	24.2	21.3	17.7	-	
DT18	452697	319921	23.9	14.7	23.1	13.3	11.7	10.0	9.8	11.7	14.9	16.1	17.6	22.7	15.8	13.1	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.83)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
DT19	462777	311692	34.7	26.9	31.5	22.3	22.3	20.7	19.1	25.8	27.5	25.0	28.1	31.8	26.3	21.8	-	
DT20	461809	310728	30.8	24.8	32.4	20.4	18.5	17.7	17.8	24.5	23.3	22.2	25.7	28.9	23.9	19.8	-	
DT21	462373	311254	45.9	31.8	33.2	29.9	25.6	24.7	24.3	30.1	32.2	30.5	32.6	41.9	31.9	26.5	-	
DT22	459233	309233	32.6	25.2	26.8	22.0	19.5	21.4	20.8	23.0	25.9	28.1	30.9	32.0	25.7	21.3	-	
DT23	459178	309890	36.0	23.5	37.0	24.5	19.8	20.2	20.8	26.8	28.0	27.4	31.9	34.5	27.5	22.8	-	
DT24	460821	308757	37.5	30.1	37.4	27.0	27.9	28.3	26.3	27.3	33.3	34.6	33.1	37.3	31.7	26.3	-	
DT25	460895	308747	36.1	28.4	36.5	24.4		26.6	18.3	24.5	30.7	30.8	32.2	33.0	29.2	24.3	-	
DT26	460835	308784	34.0	23.7	27.3		26.4	16.6	17.1	17.3	22.5	23.0	25.1	30.1	23.9	19.8	-	
DT27	448121	318257	34.5	26.1	38.9	28.0	24.0	23.7	24.3	28.6	30.7	25.9	28.9	29.7	28.6	23.7	-	
DT28	450260	321922	32.9	18.0	30.0	19.1	17.8	16.0	15.9	21.9	25.4	20.9	23.6	29.0	22.5	18.7	-	
DT29	453901	319488	32.0	22.5	32.8	23.1	18.7	16.7	15.6	20.2	23.0	23.3	25.4	32.4	23.8	19.8	-	
DT30	453946	319619	28.1	19.2	22.0	16.3	14.5	13.7	13.5	15.7	19.5	20.0	22.5	26.3	19.3	16.0	-	
DT31	453694	319890	35.2	22.8	37.1	26.9	22.1	19.5	21.4	25.1	28.4	27.0	29.4	31.6	27.2	22.6	-	
DT32	462369	311809	42.2	25.3	36.0	27.0	23.9	22.4	22.2	27.7	31.9	26.2	30.0	36.9	29.3	24.3	-	
DT33	462540	311428	40.3	31.4	28.8	21.7	25.1	21.7	21.4	25.1	24.9	28.3	30.6	34.3	-	-	-	Triplicate Site with DT33, DT34 and DT35 - Annual data provided for DT35 only
DT34	462540	311428	40.4	28.5	28.9	22.3	23.4	21.1	21.4	23.9	25.3	28.3	30.6	32.3	-	-	-	Triplicate Site with DT33, DT34 and DT35 - Annual data provided for DT35 only
DT35	462540	311428	41.7	31.8	28.6	22.2	24.4	20.6	21.4	24.1	23.4	26.5	29.1	30.7	27.3	22.7	-	Triplicate Site with DT33, DT34 and DT35 - Annual data provided for DT35 only
DT36	453687	319672	32.1	20.4	40.0	29.4	19.3	15.3	16.9	23.9	26.6	26.3	33.2	31.5	-	-	-	Triplicate Site with DT36, DT37 and DT38 - Annual data provided for DT38 only
DT37	453687	319672	29.1	20.9	38.2	26.2	19.0	15.1	17.3	24.1	26.3	24.1	38.0	32.4	-	-	-	Triplicate Site with DT36, DT37 and DT38 - Annual data provided for DT38 only
DT38	453687	319672	26.2	19.2	38.5	29.2	18.2	13.9	16.5	24.4	29.0	27.4	31.0	33.9	25.9	21.5	-	Triplicate Site with DT36, DT37 and DT38 - Annual data provided for DT38 only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.83)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
DT39	454154	320116	33.5	28.5	31.6	23.9	23.1	20.9	19.5	25.8	26.0	28.6	31.1	33.7	27.2	22.6	-	
DT40	454285	320294	29.3	19.3	27.9	20.2	16.0	15.8	13.7	19.0	21.5	19.7	21.7	26.5	20.9	17.3	-	
DT41	453933	320663	26.6	20.1	25.9	18.4	13.8	12.8	13.9	16.5	20.3	21.8	23.9	26.6	20.0	16.6	-	
DT42	454142	320593	32.0	19.6	28.3	19.5	17.8	15.4	15.8	20.7	22.7	19.6	22.3	23.9	21.5	17.8	-	
DT43	454250	319682	29.1	20.8	34.5	22.6	16.6	15.6	15.7	23.1	24.5	23.4	29.5	29.9	23.8	19.7	-	
DT44	461499	310459	32.2	25.7	24.0	17.1	14.1	14.8	14.1	15.1	19.3	22.5	25.7	29.5	21.2	17.6	-	
DT45	461994	309975	33.3	22.6	25.8	19.4	17.9	17.4	16.1	21.7	24.3	20.5	24.2	29.6	22.7	18.9	-	
DT46	448311	320511	21.0	13.7	25.3	15.2	13.7	12.6	14.3	17.7	19.7	16.3	21.1	23.4	17.8	14.8	-	
DT47	449935	322227	25.6	18.1	27.6	18.9	16.5	15.1	14.4		19.8	18.8	23.8	25.3	20.4	16.9	-	
DT48	450942	321076	17.8	11.0	16.7	9.5	7.9	6.7	7.7	9.2	12.2	11.5	15.1	18.8	12.0	10.0	-	
DT49	460313	323521	32.9	20.7	30.7	23.5	20.0	19.3	19.9	23.6	25.2	21.8	22.3	27.5	23.9	19.9	-	
DT50	455141	308686	46.0	29.6	34.7	27.5	27.9	27.5	26.0	30.3	31.0	28.5	33.2	37.2	31.6	26.2	-	
DT51	455167	308549	26.8	19.1	26.8	17.9	16.4	15.4	15.6	18.9	21.5	18.5	20.8	25.6	20.3	16.8	-	
DT52	463483	309880	26.1	16.3	18.8	13.0	11.8	10.1	12.1	13.6	17.3	14.6		23.0	16.1	13.3	-	
DT53	453277	319248	32.2	21.7	33.3	25.0	19.0	17.3	16.4	22.1	25.7	26.7	32.3	31.2	25.2	21.0	-	
DT60	451629	317677	21.4	13.6	15.2	12.3	10.6	9.3	9.6	11.7	13.5	12.0	15.8	20.1	13.8	11.4	-	

☒ **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.TG22.**

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

☒ **Where applicable, data has been distance corrected for relevant exposure in the final column.**

☒ **Charnwood Borough Council confirm that all 2022 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.

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

New or Changed Sources Identified Within Charnwood During 2022

Early monitoring in anticipation of the commissioning during early 2023 of the Newhurst Energy-from-Waste (EfW) facility at Shepshed was established. A portable 'Zephyr' analyser (CM6) has been located in proximity to a residential area on the western side of Loughborough (approx. 1.8km to the east of the facility in Shepshed) in response to concerns raised towards the influence of the process on local air quality.

Long-term we are continuing to consider the impact of largescale develop, as a number of on-going and proposed developments materialise around Charnwood. It is possible that these may have an impact on local air quality and thus monitoring is being conducted within proximity to understand background levels. A summary of these development sites are as follows:

- Garendon Park – sustainable urban extension west of Loughborough for 3,200 homes, 16 hectare of land for employment use, a new local centre with shops and local facilities, two new primary schools, sports facilities, open spaces, play area and a site for travelling show people.
- Extension of Mountsorrel Quarry towards Quorn and proposed sand and gravel extraction at One Ash Roundabout
- Ashby Road West development of 210 houses
- Land north of Willow Road, Barrow Upon Soar – 220 houses
- Land at Barkby Road/Queniborough Road, Syston – 252 dwelling
- Land south of Wymeswold Industrial Estate on Wymewold Land – 21 industrial units class B2/B8

We will continue to review our monitoring programme within the borough to consider any arising issues, or concerns from Members / the public.

Additional Air Quality Works Undertaken by Charnwood Borough Council During 2002

Charnwood Borough Council has not completed any additional works within the reporting year of 2022.

QA/QC of Diffusion Tube Monitoring

All NO_2 diffusion tubes for 2022 were supplied and analysed by Gradko using 20% TEA in water preparation.

As part of their provision of support to Local Authorities for air quality management, Defra and the Devolved Administrations provide a set of centralised QA/QC services, to assist Local Authorities using diffusive samplers for monitoring of ambient nitrogen dioxide (NO_2) concentration, as part of their Local Air Quality Management process.

This is aimed at the analytical laboratories that supply and analyse the diffusion tubes, and currently comprises:

Promotion of the independent AIR-PT scheme, operated by LGC Standards and supported by the Health and Safety Laboratory, with yearly assessment against agreed performance criteria. AIR-PT combines two long running PT schemes: LGC Standards STACKS PT scheme and HSL Workplace Analysis Scheme for Proficiency (WASP) PT scheme. For more information the AIR-PT scheme, please click **here**.

Performance summaries in the AIR-PT scheme for the laboratory chosen to prepare and analyse diffusion tubes on behalf of Charnwood Borough Council (Gradko), prepared by LGC for BV/NPL on behalf of Defra, are as per the following link:

AIR-PT-Rounds 37 to 50 (May 2020 to Jun 2022)

Released: Jun 2022 (PDF, 169 KB, 5 pages)

Results submitted were determined to be **satisfactory**

Diffusion Tube Annualisation

Annualisation for diffusion tube DT8 (Derby Road, L'boro) has been required as data for 2022 comprised only 6 monthly results - due to 'absent' tubes - following a full year of monitoring at this location, representing 50% data capture.

Table C.1 – Annualisation Summary (concentrations presented in µg/m3)

Annualisation for DT8 has been performed through the LAQM '*Diffusion Tube Data Processing Tool'*, a summary of which is shown beneath.

Site ID	Annualisation Factor <Leicester University>	Annualisation Factor <Nottingham Centre>	Annualisation Factor <Site 3 Name>	Annualisation Factor <Site 4 Name>	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
DT8	0.9912	0.9899	/	/	0.9906	24.5	24.3

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 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.TG22 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.

Charnwood Borough Council have applied a national bias adjustment factor of 0.83 to the 2022 monitoring data.

The national bias adjustment factor in this instance has been derived from the LAQM *'Diffusion Tube Bias Factors v03/23-FINAL'* tool, as follows:

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 spreadhseet 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)
Gradko	20% TEA in water	2022	R	Southampton City Council	12	34	31	8.4%	G	**0.92**
Gradko	20% TEA in water	2022	R	Worcestershire	11	13	12	4.2%	G	**0.96**
Gradko	20% TEA in water	2022	R	Lancaster City Council	13	34	27	25.8%	G	**0.79**
Gradko	20% TEA in water	2022	R	Lancaster City Council	12	28	24	15.2%	G	**0.87**
Gradko	20% TEA in water	2022		**Overall Factor [3] (27 studies)**				**Use**		**0.83**

A summary of bias adjustment factors used by Charnwood over the past five years is presented in Table C.2.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2022	National	03/23	0.83 (from 27 studies)
2021	National	03/22	0.84 (from 32 studies)
2020	National	03/21	0.81 (from 18 studies)
2019	National	03/20	0.93 (from 27 studies)
2018	Local	-	0.93 (northern sites) 0.91 (southern sites)

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been 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.

No diffusion tube NO_2 monitoring locations within Charnwood required distance correction during 2022.

QA/QC of Automatic Monitoring

Although no longer operational, historic data achieved from the Partisol PM_{10} analyser had been obtained under scheduled service by 'Matt's Monitors'. Where necessary any servicing/calibration/support in respect of our AQMesh SO_2 analyser is via the supplier i.e., Acoem UK (previously Air Monitors Ltd.) and similarly through *EarthSense* in respect of the 'Zephyr' portable analyser(s).

Any validation and ratification procedures follow Technical Guidance LAQM.TG(16)

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

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

Automatic Monitoring Annualisation

All automatic monitoring locations within Charnwood recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure can be estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website.

Whilst Charnwood operate a multi-pollutant portable 'Zephyr' analyser (CM6) for which NO_2 output readings may be of interest and have been included in this ASR, this unit is primarily being used to gain an understanding of particulates in the locale.

Although CM6 has been located with the consideration to monitor several pollutants, in this respect there has been some compromise in that it would not truly reflect NO_2 exposure at the nearest receptor, located approx. 50 metres away and further set-back from the arterial road closer to which the unit is located. We would however expect NO_2 exposure to be lower at any relevant receptor than the observed results indicate. As the NO_2 annual mean is reported at 11.8µg/m^3 for 2022 i.e. beneath the relevant annual mean AQO of 40µg/m^3, then it is felt there is no necessity to provide additional correction to this figure at this time.

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

The Borough of Charnwood

Loughborough Area Overview (Maps 1-5)

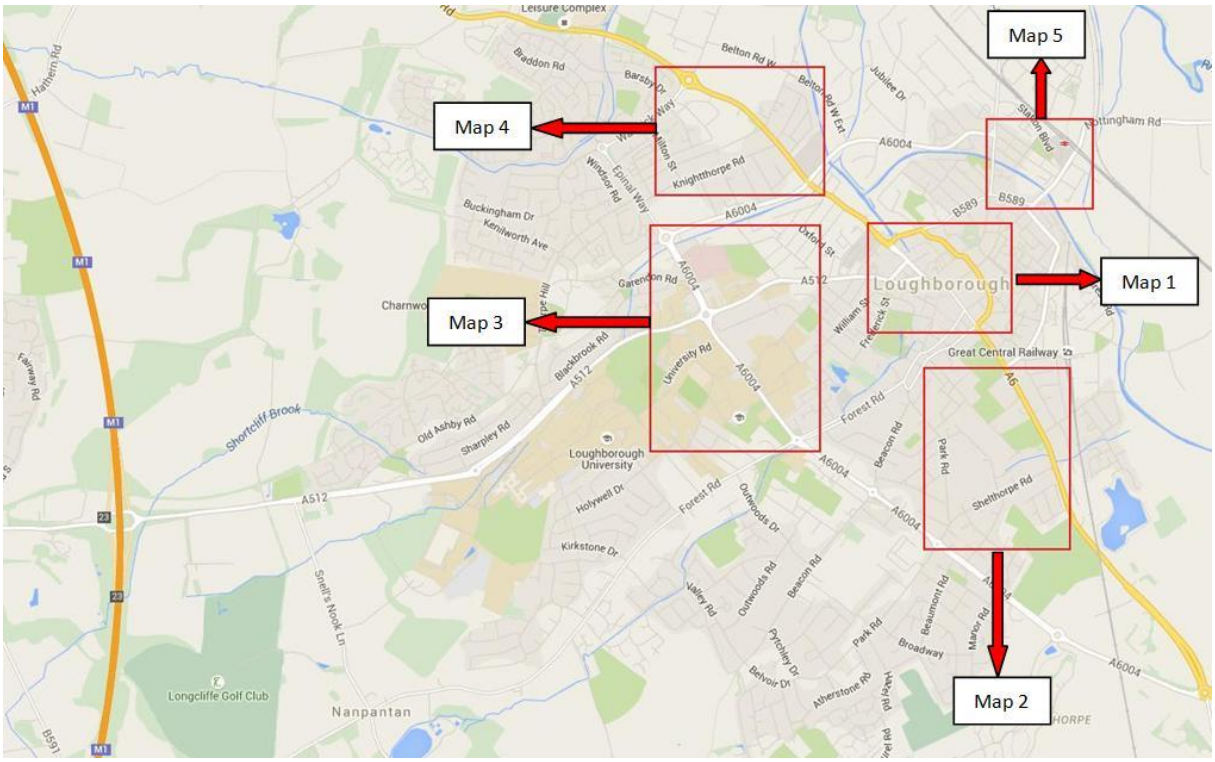
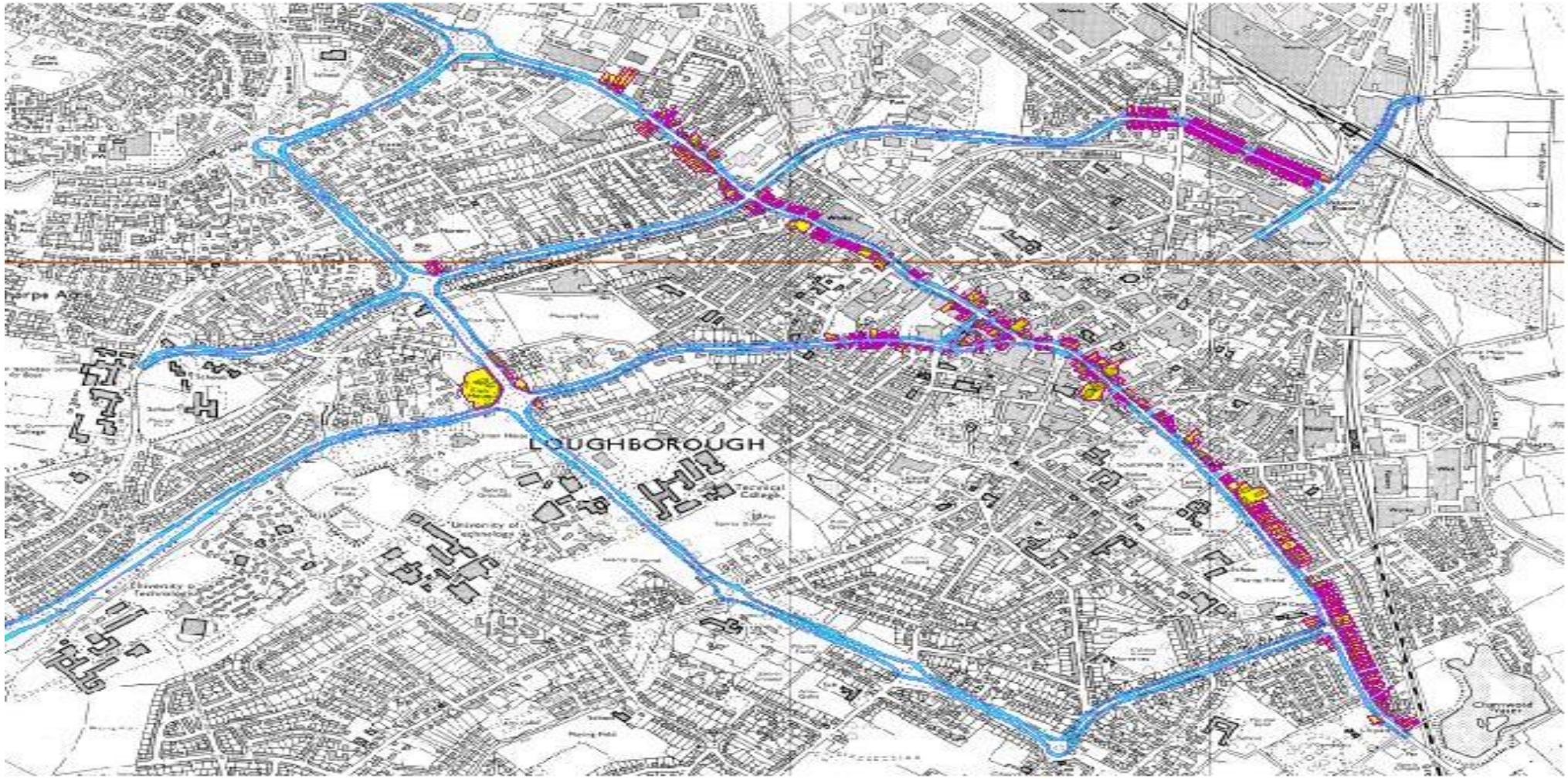


Figure D.1 – Map of the Loughborough AQMA



The area is designated in relation to a likely breach of the nitrogen dioxide (annual mean) objective as specified in the Air Quality Regulations (England)(Wales) 2000.

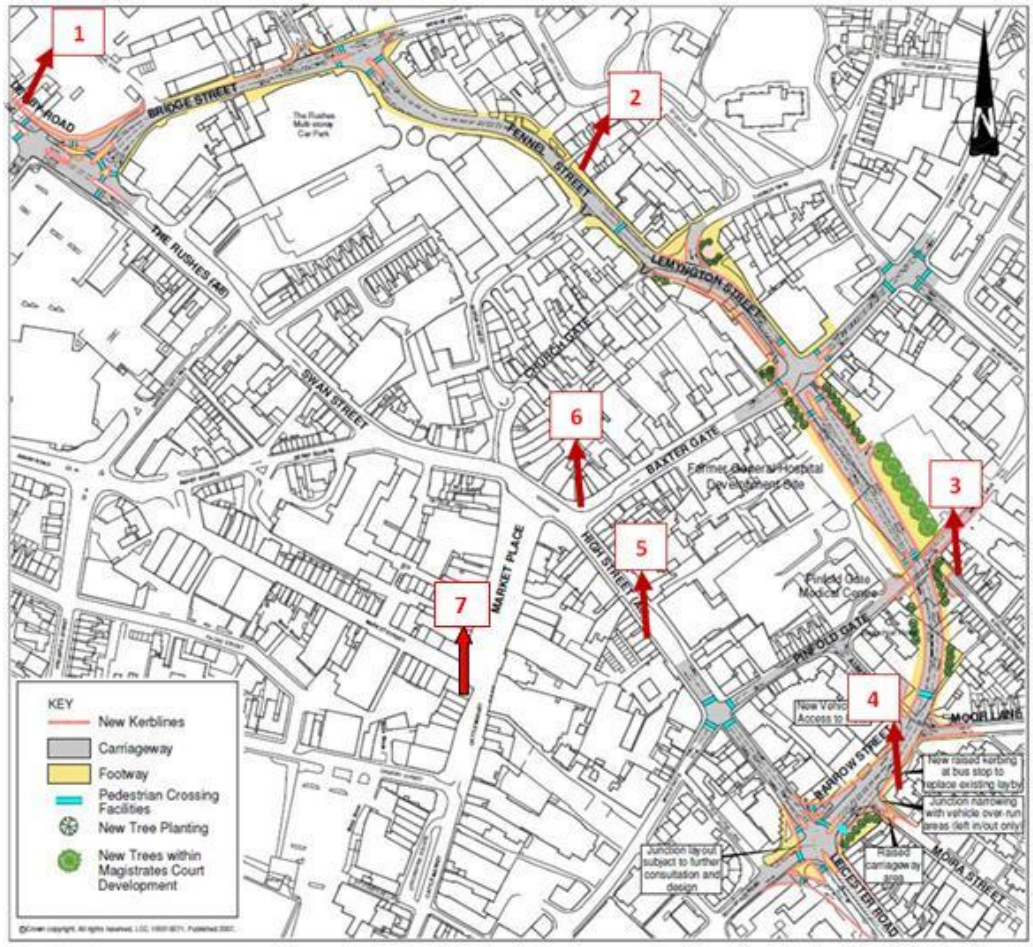
The land of the following highways and all publicly owned land within 10 meters of the kerbside of each highway:

- Leicester Road, High Street, Swan Street, The Rushes, Derby Road (From The Rushes to Warwick Way), Warwick Way, Epinal Way (From Warwick Way to Shelthorpe Road), Epinal Way Extension, Ashby Road (From Greenclose Lane to Epinal Way), Alan Moss Road (From Epinal Way to Derby Road), Greenclose Lane, Belton Road, Ratcliffe Road, Nottingham Road (From Brush Works entrance to Queens Road).

The following privately owned properties are included because we understand they are used for residential purposes and have a building facade less than 10 meters from the kerbside of the roads listed above:

- Leicester Road 2, 5a, 36-44, 58-94, 166
- High Street 3, 35
- Burton Walks The Lodge
- The Rushes 4-21, 41
- Ashby Road 31-59, 67-75, 85-95, 99-115, 119-125, 219, 20-46, 62a-92, 96-108, 142, 148, 150-172, 176, 190-192
- Ratcliffe Road 8-154, 3-141
- Glebe Street 32-36
- Storer Road 1
- Haydon Road 1&2
- Brisco Avenue 1&3
- Derby Road Station Hotel, 25a, 35, 107-151, 187, 191-209, 215-219, 223-225, 46-114, 120-124, 130-142, 156-162
- Cliffe Avenue 12b, 12d

Map 1: Loughborough Town Centre

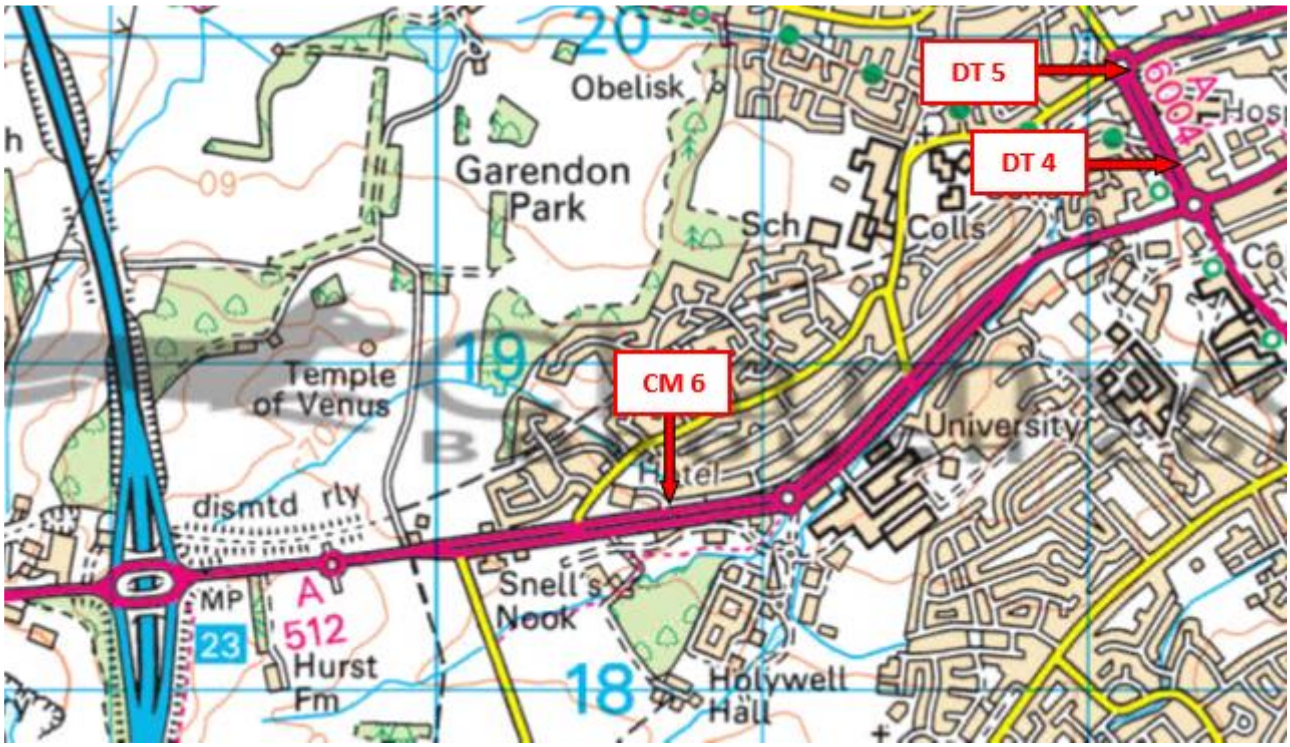


Map Position	Site ID	Site Name	Pollutant
1	DT8	Derby Road	NO_2
2	DT31	Fennel Street	NO_2
3	DT30	School Street	NO_2
4	DT29	Barrow Street	NO_2
5	DT14	High Street	NO_2
6	DT36, DT37, DT38	Baxter Gate AQMS 1, 2, and 3	NO_2
7	DT15	Market Place	NO_2

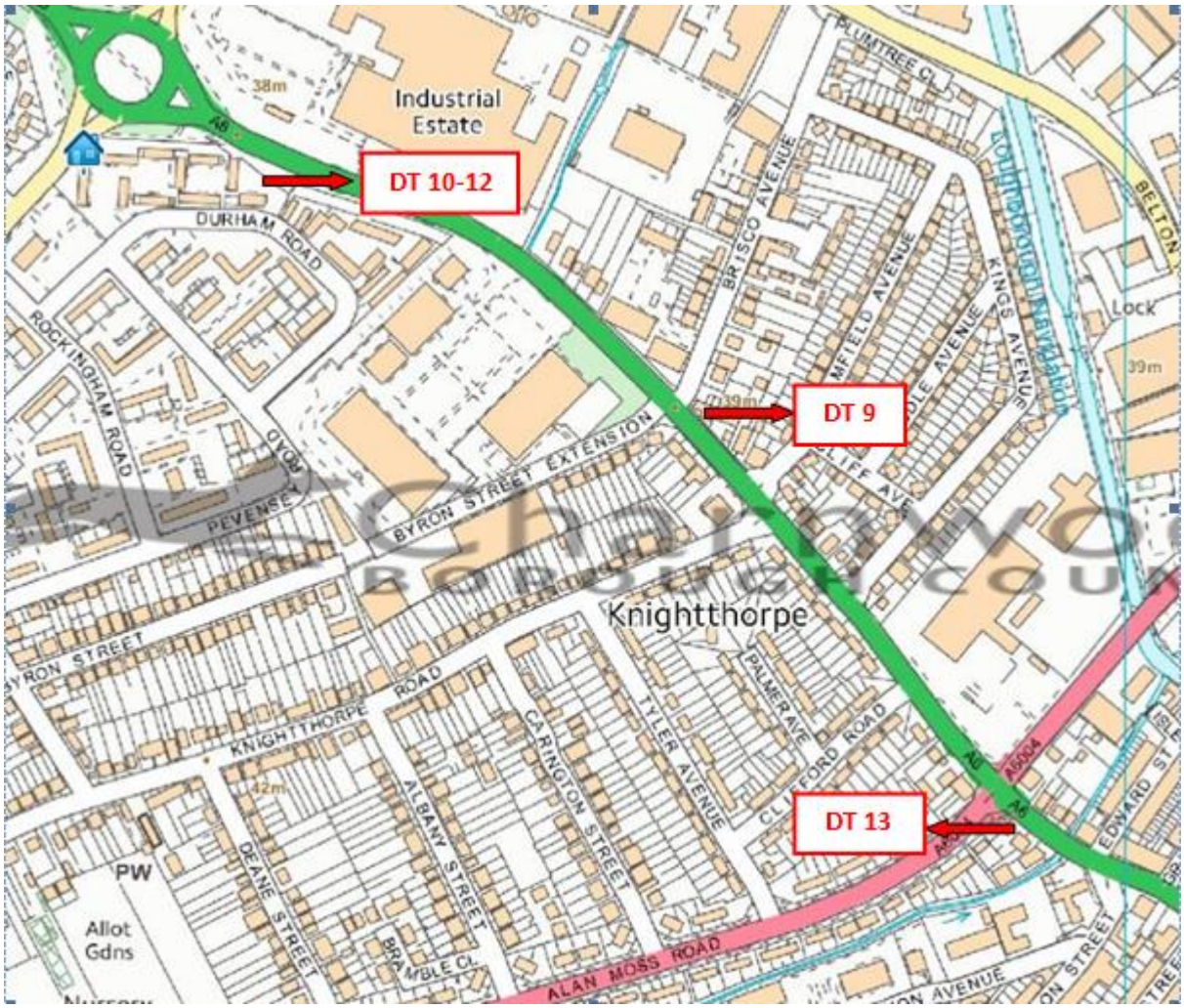
The above map shows the route of the Inner Relief Road which opened in November 2014. Traffic is now routed away from the town centre.

Map 2: Loughborough South

Map 3: Loughborough West



Map 4: Loughborough North



Map 5: Loughborough East

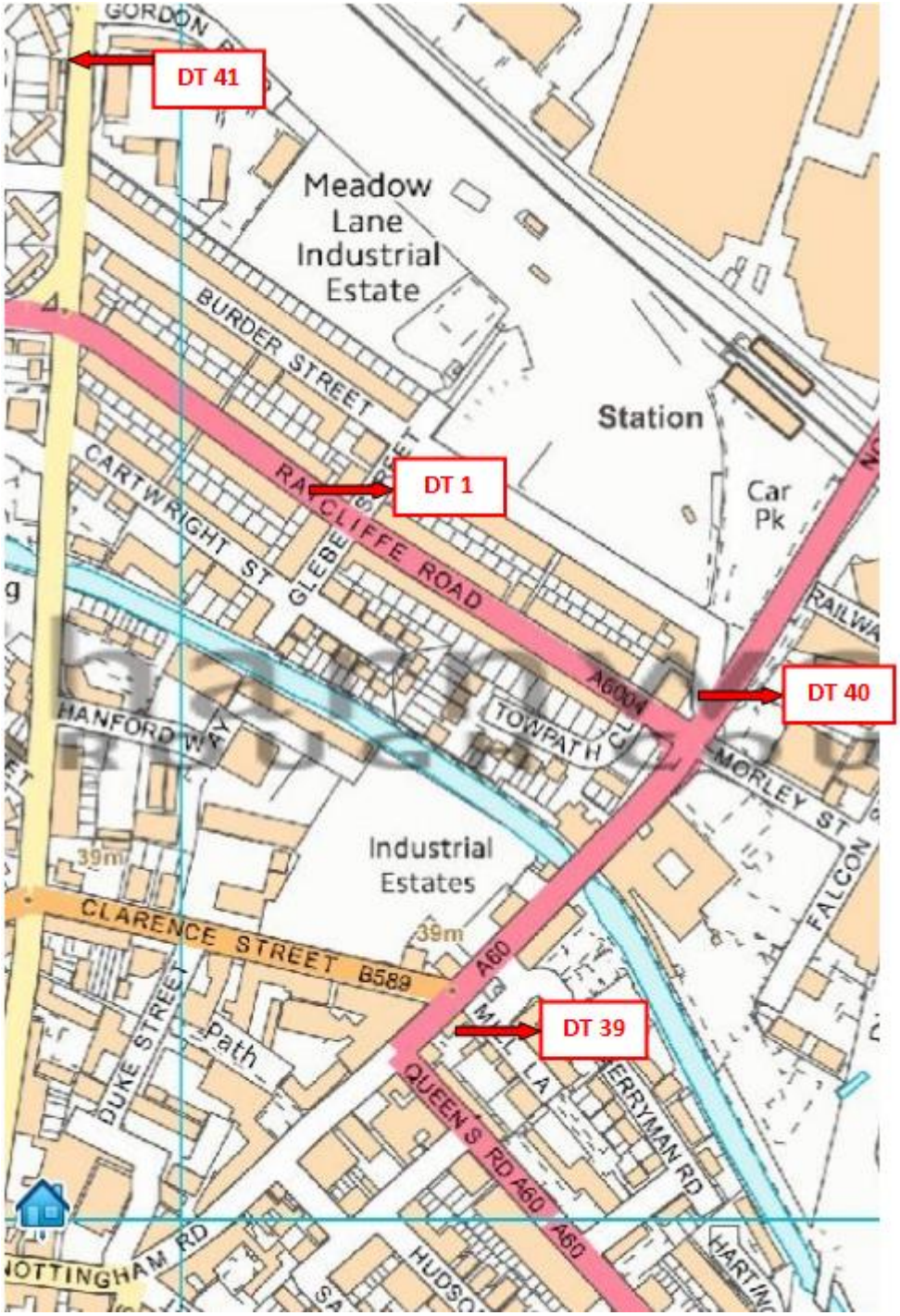


Figure D.2 – Map of the Syston AQMA

The location of monitoring sites are represented as follows:

- **DT33-35 (+ historically CM4)**
- **DT21**
- **DT20**
- **DT19**

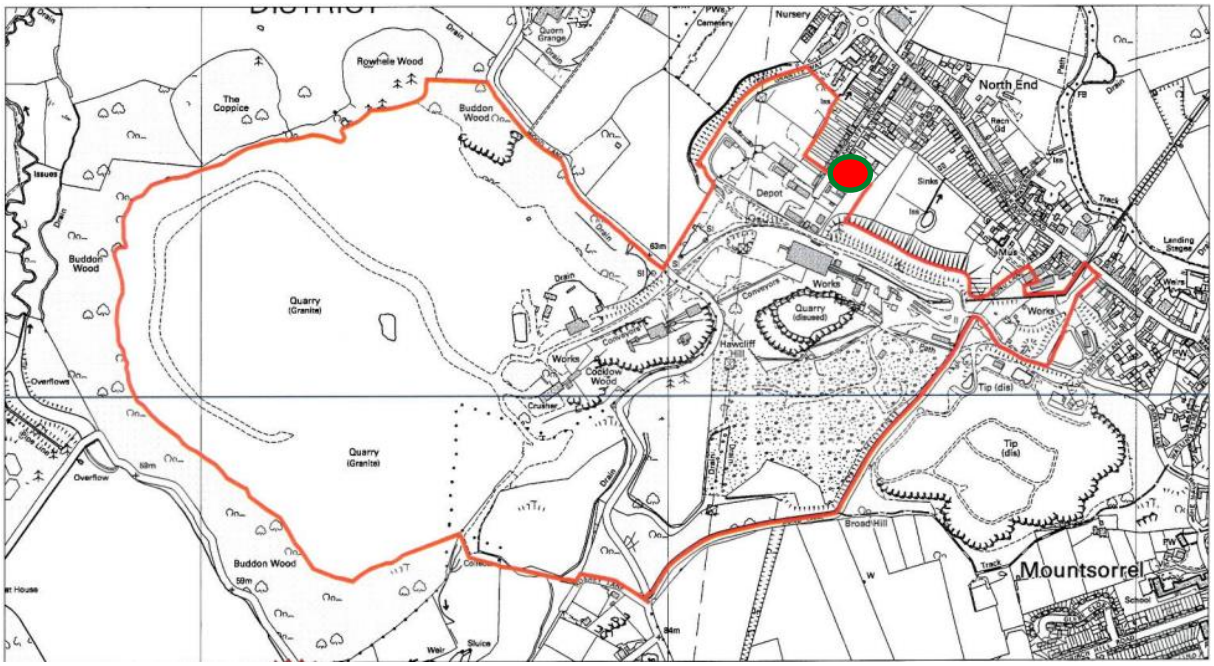
This area is designated in relation to a likely breach of the nitrogen dioxide (annual mean) objective as specified in the Air Quality Regulations (England & Wales) 2000.

The land of the A607 highway between the junctions with Wanlip Road and High Street, Syston and all publicly owned land within 10 meters of the kerbside of the highway.

The following privately owned properties are included because we understand they are used for residential purposes and have a building facade less than 10 meters from the kerbside of the roads listed above:

- Melton Road 1108-1126, 1182-1190, 1238-1260, 1091-1109, 1121-1141, 1163
- Midland Railway Hotel and Sandford Road number 2A

Figure D.3 – Map of the Mountsorrel AQMA



The properties and area declared in the Mountsorrel AQMA are bounded by the red border.

The location of automatic monitoring site CM5 (& historically CM1) is represented by the

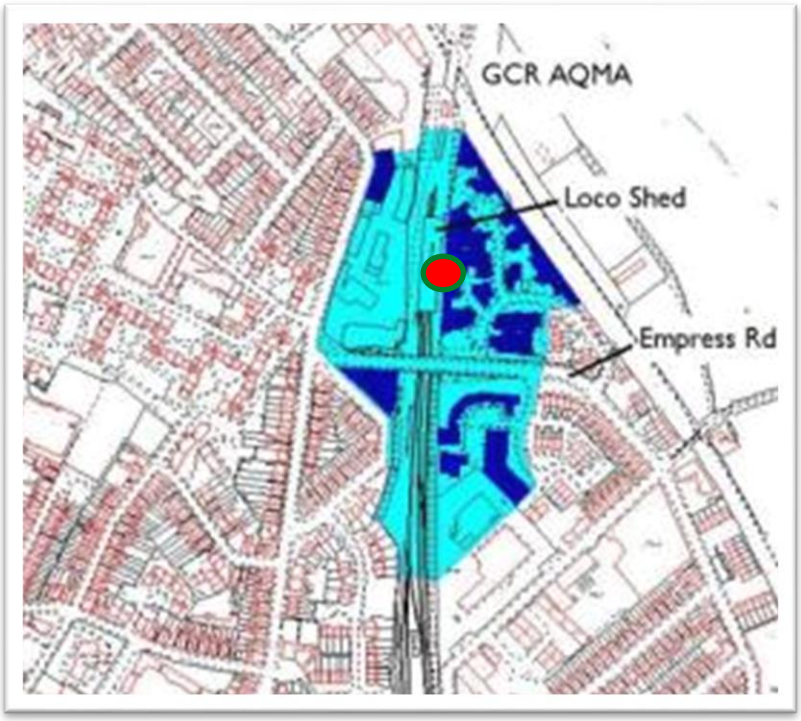
This area is designated in relation to a likely breach of the particulate matter (PM10) 24 hour mean National Air Quality Objective as specified in the Air Quality Regulations (England)(Wales) 2000.

- Hawcliffe Road 49-55 (odd) and 84 & 86 (even)
- Farnham Court, Bond Lane: 13-24

The designated area also incorporates sections of highways including all publicly owned land within 10 meters of the kerbside of each;

- Granite Way, Wood Lane, Rushey Lane, Bond Lane

Figure D.4 – Map of the Great Central Railway AQMA



The location of automatic monitoring site CM2 is represented by the

This area is designated in relation to a likely breach of the sulphur dioxide (fifteen minute mean) objective as specified in the Air Quality Regulations (England)(Wales) 2000.

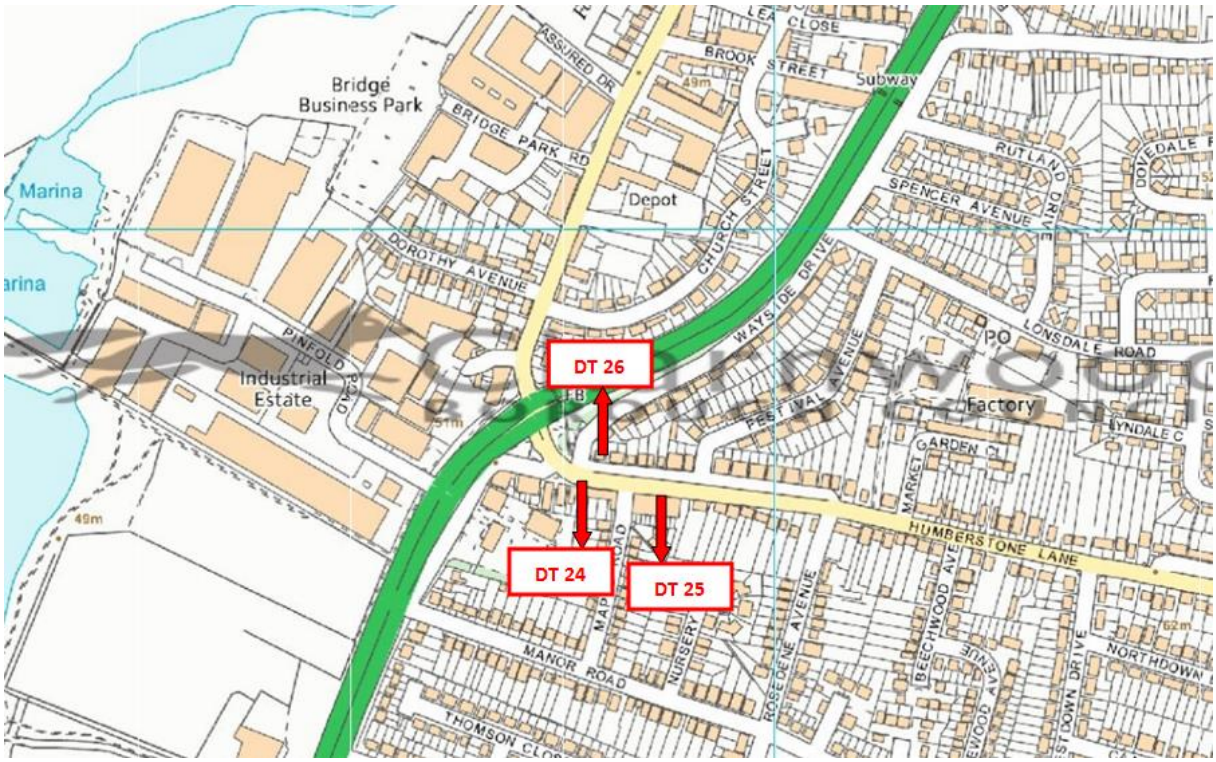
The area around the Great Central Railway that has been declared is based on computer modelling of the emissions from the railway locomotives at the engine sheds.

The private residential properties contained within the Area are:

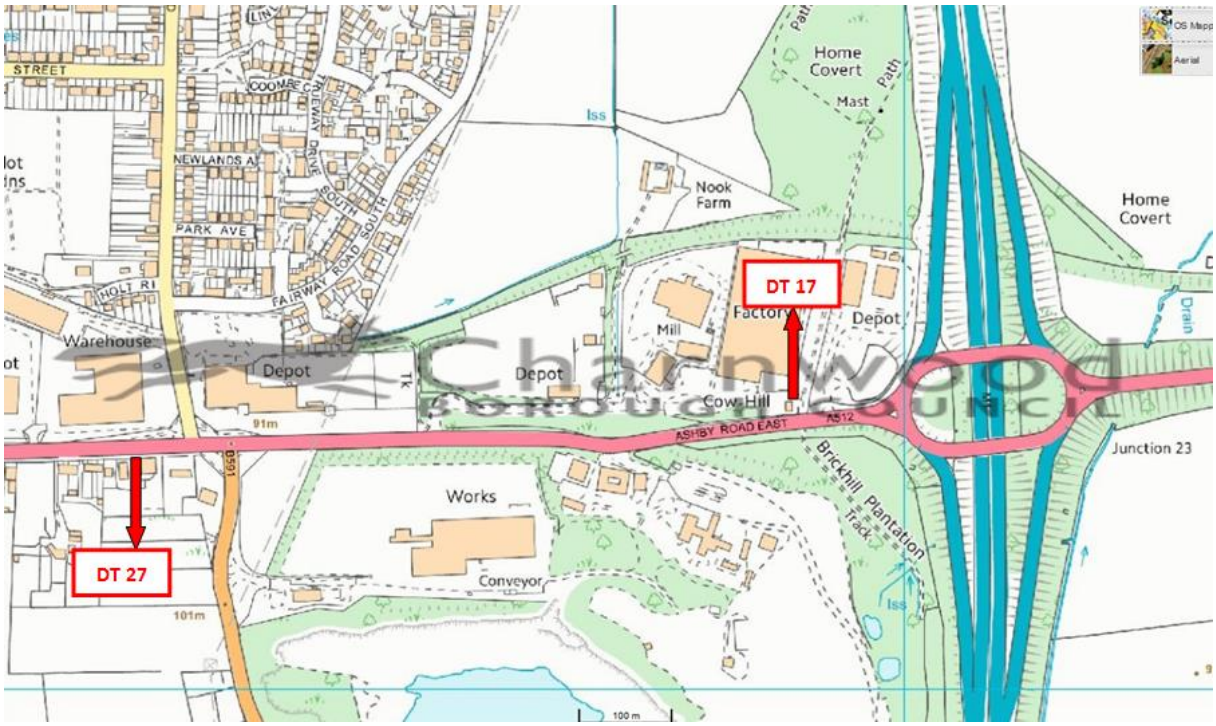
- Queens Road 62-74
- Warner Place 33-39
- Morris Close 5-65, Taylor House
- Holbein Close 2-18, 1-39
- Wolsey Way 19-45, 18-40

Map 7: Birstall

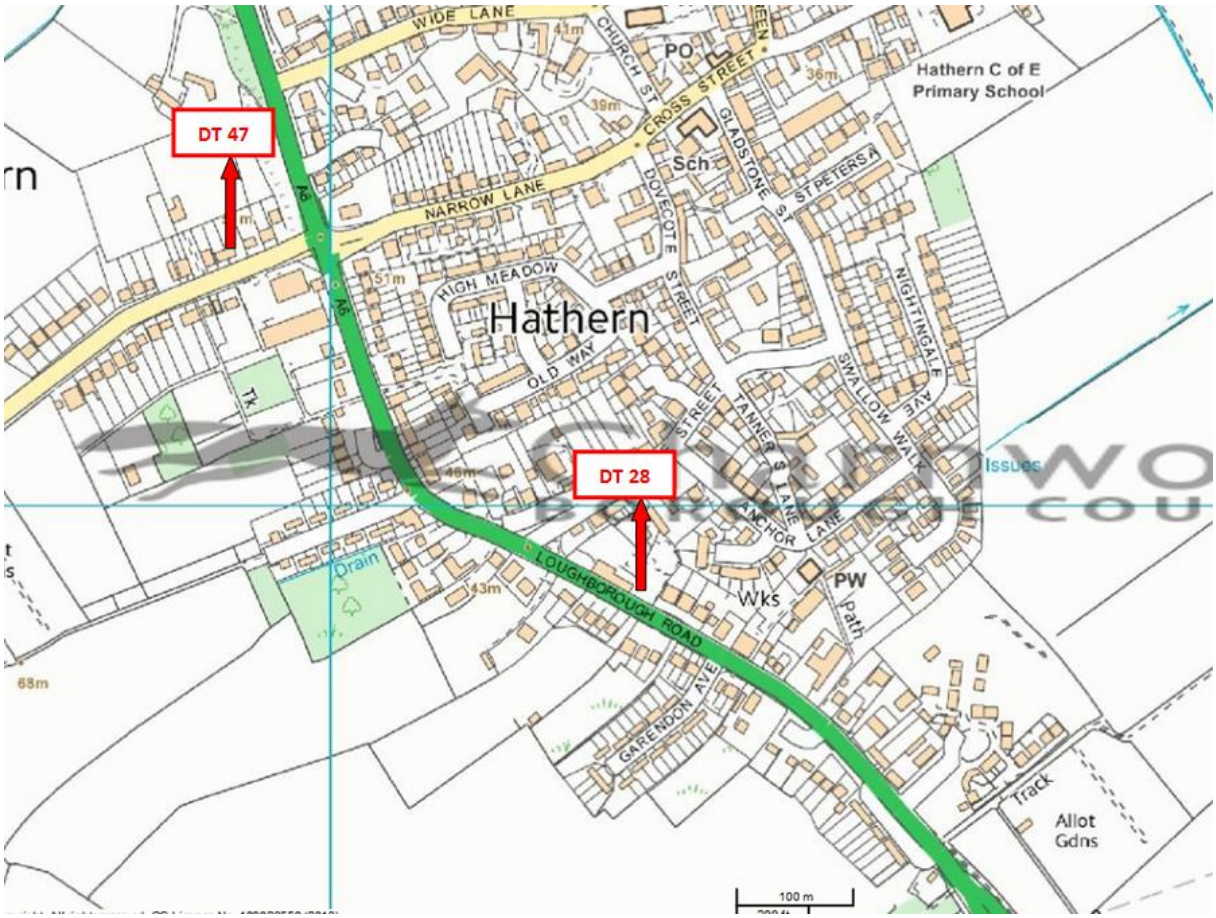
Map 8: Thurmaston



Map 9: Shepshed



Map 10: Hathern



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 ($PM_{2.5}$)	20µg/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).

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
CBC	Charnwood Borough Council
Defra	Department for Environment, Food and Rural Affairs
DMMP	Dust Management and Monitoring Plan
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
GCR	Great Central Railway
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.