TONBRIDGE & MALLING BOROUGH COUNCIL

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2024 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, 2024

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Executive Summary: Air Quality in Our Area

Air Quality in Tonbridge & Malling Borough Council

Breathing in polluted air affects our health and costs the NHS and our society billions of pounds each year. Air pollution is recognised as a contributing factor in the onset of heart disease and cancer and can cause a range of health impacts, including effects on lung function, exacerbation of asthma, increases in hospital admissions and mortality. In the UK, it is estimated that the reduction in healthy life expectancy caused by air pollution is equivalent to 29,000 to 43,000 deaths a year[1].

Air pollution particularly affects the most vulnerable in society, children, the elderly, and those with existing heart and lung conditions. Additionally, people living in less affluent areas are most exposed to dangerous levels of air pollution[2].

Table ES 1 provides a brief explanation of the key pollutants relevant to Local Air Quality Management and the kind of activities they might arise from.

Table ES 1 - Description of Key Pollutants

Pollutant	Description
Nitrogen Dioxide (NO_2)	Nitrogen dioxide is a gas which is generally emitted from high-temperature combustion processes such as road transport or energy generation.
Sulphur Dioxide (SO_2)	Sulphur dioxide (SO_2) is a corrosive gas which is predominantly produced from the combustion of coal or crude oil.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Particulate matter is everything in the air that is not a gas. Particles can come from natural sources such as pollen, as well as human made sources such as smoke from fires, emissions from industry and dust from tyres and brakes. PM_{10} refers to particles under 10 micrometres. Fine particulate matter or $PM_{2.5}$ are particles under 2.5 micrometres.

[1] UK Health Security Agency. Chemical Hazards and Poisons Report, Issue 28, 2022.

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

The main pollutant of concern in Tonbridge & Malling Borough Council (TMBC) is NO_2. NO_2 has continued to decrease this year with all AQMAs showing a decrease in NO_2, this is in line with the national trend 2023, with all AQMAs now below the 40µg/m^3 limit. AQMA 4 in Wateringbury has for the first time since its creation dropped below the 40µg/m^3 limit to 38.9 but this is still within 10% of the limit so will likely remain an AQMA for the next 3-5 years at least. AQMA 1 has recently been approved for revocation by Councillors, with AQMAs 3,5,6 & 7 up for review and possible revocation in 1 to 2 years' time if current trends of falling NO_2 levels continue.

TMBC is not aware of any new sources of pollution within its boundaries. TMBC continues to work with other councils in Kent as part of the Kent and Medway Air Quality Partnership and with the UK Health Security Agency in working on projects that can be used across Kent not just in our own borough. TMBC has supported Canterbury City Council and Tunbridge Wells Borough Council with match funding towards DEFRA Air Quality grants for projects including Pollution Patrol education packs for schools and helping doctors understand the signs and health impacts of air pollution and as well as offering advice to patients on how to reduce exposure to air pollution.

In 2023 TMBC completed phase one of its Anti-Idling project with schools following grant funding awarded in 2022 Read about our air quality initiatives – Tonbridge and Malling Borough Council (tmbc.gov.uk)

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[3] sets out actions that will drive continued improvements to air quality and to meet the new national interim and long-term targets for fine particulate matter ($PM_{2.5}$), the pollutant of most harmful to human health. The Air

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

Quality Strategy[4] provides more information on local authorities' responsibilities to work towards these new targets and reduce fine particulate matter in their areas.

The Road to Zero[5] details the Government's approach to reduce exhaust emissions from road transport through a number of mechanisms, in balance with the needs of the local community. This is extremely important given that cars are the most popular mode of personal travel and the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

Tonbridge & Malling Borough Councils focus for 2023 has been on EV charging and Anti idling around 5 schools with a view to widening this to more schools in 2024.

We have also started to increase vegetation in the borough by creating green vegetation roofs to some bus shelters in Tonbridge.

Following award of the DEFRA Air Quality Grant in 2022, five suitable schools were identified for participation. Spread across the Borough the selected schools were located away from main roads to minimise the influence on air quality monitoring from such sources.

Monitoring of Nitrogen Dioxide (NO2) and Particulate Matter (PM10 and PM2.5) was carried out using five SCS Praxis OP Cubes (one at each school location) at or as near as possible to the school gate. Sensors were erected on 7 November 2022 and monitoring continued through to 10 August 2023.

Data management and QA/QC work for the sensor monitoring was subcontracted to Ricardo Energy and Environment and data was made available to participating schools and the public via Ricardos Air Quality England Website

Prior to the start of engagement with the schools, the Councils Civil Enforcement Officers (CEOs) visited the roads around each of the participating schools in early December 2022 to identify approximate numbers of car users and those who wait with engines idling.

[4] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

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

Engagement with the schools began in February 2023 running through to April and involved presentations to school assemblies and more focused talks to school Eco clubs.

During this period of engagement anti idling signage of different types was erected on roads around the schools and on school gates/fences, and further counts of car users and those idling engines at drop off/pick up were made.

In June CEOs again visited roads around the participating schools to identify numbers of car users and those idling engines. Project staff also engaged with parents on the school run to speak with them about air pollution and a short questionnaire was completed if appropriate.

Data indicates that over the course of the monitoring period there was an improvement in AQ at each site. However, various plots including the Time Series Plot and Calendar Plots show similarities in pollution levels across all sites, which suggests weather and wider pollution events dominate. It is therefore hard to discern how much local pollutant levels were influenced by this project. However, no sites appear likely to exceed an AQ limit value.

Tallies of car users and those idling their engines at the start and end of this project appear to vary little. The results of the questionnaire provide some reasoning in so far as over 50% of respondents live more than two miles from the school with some also going/coming directly from work, they consider the car their only form of transportation. Anti Idling signage type is a key factor with respondents to the questionnaire preferring signage in which the anti-idling message is clear and unambiguous. This type of signage will be taken forward across the borough in areas where engine idling is considered an issue.

Conclusions and Priorities

No exceedances were recorded in Tonbridge & Malling Borough Council. Trends are very similar to the previous two years with marginal increases in some areas following the lows of the Covid lockdowns in 2020. This continues to be the new norm of pollution levels due to increased uptake of electric vehicles on the road and with companies continuing to allow employees to work from home, NO_2 levels do not appear to be returning to pre-

pandemic levels across most sites as very few sites are showing any signs of increasing levels.

The M20 runs through the northern half of the borough and has now had three full years of running as a smart motorway with running lanes now including the hard shoulder lane, traffic has moved more freely along the motorway. It can be said that turning the M20 into a 4 lane smart motorway combined with lower traffic levels and more electric vehicles on the road, has improved the air quality in the surrounding AQMA area. With three years of full lane use on the M20 and at least 6 years of monitoring within the AQMA being below 10% of the NO_2 Annual Objective, AQMA 1 has recently been approved for revocation by Councillors and staff are in the process of formal revocation which should be achieved by the end of 2024.

There are no plans at present to update the Air Quality Action Plan as no areas are showing a significant rise in air quality levels or approaching pre-pandemic levels.

The challenge now for Tonbridge & Malling is to find the next incentive for everyone to make in helping towards reducing levels in air pollution that working from home has done for improving air quality by a significant level.

Local Engagement and How to get Involved

With road transport being the main source of air pollution within Tonbridge & Malling, the public can get involved in helping reduce the release of air pollution and thus improving air quality within the Borough by looking at alternative means of travel. The following are possible alternatives to private travel that would contribute to improving air quality within the Borough:

- Use public transport where available – This reduces the number of private vehicles in operation reducing pollutant concentration through the number of vehicles and reducing congestion.
- Walk or cycle if your journey allows – From choosing to walk or cycle for your journey the number of vehicles is reduced and also there is the added benefit of keeping fit and healthy.
- Car/lift sharing – Where a number of individuals are making similar journeys, such as travelling to work or to school car sharing reduces

the number of vehicles on the road and therefore the amount of emissions being released. This can be promoted via travel plans through the workplace and within schools.

- Alternative fuel / more efficient vehicles – Choosing a vehicle that meets the specific needs of the owner, fully electric, hybrid fuel and more fuel-efficient cars are available and all have different levels benefits by reducing the amount of emissions being released.

Further information about air quality including all Tonbridge & Malling monitoring data, details on the main pollutants associated with air quality and an emissions calculator for travel options is included on the Kent Air website - http://www.kentair.org.uk

Local Responsibilities and Commitment

This ASR was prepared by the Environmental Health Department of Tonbridge & Malling Borough Council with the support and agreement of the following officers and departments:

Crispin Kennard

Steven Saxbee

This ASR has been approved by:

Eleanor Hoyle, Director of Planning, Housing and Environmental Health

This ASR has not been signed off by a Director of Public Health.

If you have any comments on this ASR please send them to Steven Saxbee at:

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1 Local Air Quality Management

This report provides an overview of air quality in Tonbridge & Malling Borough Council during 2023. 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 Tonbridge & Malling Borough Council 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 Tonbridge & Malling Borough Council can be found in Table 2.1. The table presents a description of the 6 AQMAs that are currently designated within Tonbridge & Malling Borough Council. Appendix D: Maps 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

Due to the widening of the M20 that was started in 2018 and completed in 2020 We propose to revoke AQMA 1 M20 by end of 2024 (see monitoring section). AQMAs 3,5,6 & 7 will be reviewed again once results for 2024 are known and can be revoked in 2025 providing the levels don't increase as there will have then been 4 clear years below the objective limit and being three clear of 10% of this limit, and does not include the covid years of 2020 & 2021 (see graphs). AQMA 7 has been within 10% of the limit for the first two of the 6 years it is recorded as being compliant.

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
M20 AQMA 1	May-01	NO2 Annual Mean	An area extending 39m from the centreline along the M20 motorway between the points where it passes below New Hythe Lane, Larkfield to the west and where it crosses Hall Road, Aylesford to the east.	YES	Modelled predicted exceedances	N/A	10	Tonbridge and Malling Borough Council Air Quality Action Plan June 2011	Read about our air quality initiatives – Tonbridge and Malling Borough Council (tmbc.gov.uk)
Tonbridge High Street AQMA 3	Jun-05	NO2 Annual Mean	An area incorporating the High Street between Botany and the High Street/Vale Road roundabout, Tonbridge.	NO	53.3	N/A	4	Tonbridge and Malling Borough Council Air Quality Action Plan June 2011	Read about our air quality initiatives – Tonbridge and Malling Borough Council (tmbc.gov.uk)

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
Wateringbury AQMA 4	Jun-05	NO2 Annual Mean	An area incorporating the Red Hill/Tonbridge Road A26 crossroads in the Parish of Wateringbury.	NO	45.2	N/A	1	Tonbridge and Malling Borough Council Air Quality Action Plan June 2012	Read about our air quality initiatives – Tonbridge and Malling Borough Council (tmbc.gov.uk)
Aylesford AQMA 5	Oct - 08 amended 30/10/2020	NO2 Annual Mean	An area encompassing the A20 London Road with the junction with Hall Road and Mills Road in Aylesford.	NO	48	N/A	4	Tonbridge and Malling Borough Council Air Quality Action Plan June 2013	Read about our air quality initiatives – Tonbridge and Malling Borough Council (tmbc.gov.uk)
Larkfield AQMA 6	Oct - 08 amended 30/10/2020	NO2 Annual Mean	An area encompassing the A20 London Road in East Malling, Larkfield and Ditton, including the junction with New Hythe Lane.	NO	39	N/A	4	Tonbridge and Malling Borough Council Air Quality Action Plan June 2014	Read about our air quality initiatives – Tonbridge and Malling Borough Council (tmbc.gov.uk)

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
Borough Green AQMA 7	April-2013 Amended 30/10/2020	NO2 Annual Mean	Parts of Sevenoaks Road A25, Western Road and the High Street in Borough Green.	NO	46	N/A	6	Tonbridge and Malling Borough Council Air Quality Action Plan June 2015	Read about our air quality initiatives – Tonbridge and Malling Borough Council (tmbc.gov.uk)

☒ **Tonbridge & Malling Borough Council confirm the information on UK-Air regarding their AQMAs is up to date.**

☒ **Tonbridge & Malling Borough Council confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and Impact of Measures to address Air Quality in Tonbridge & Malling Borough Council

Defra's appraisal of last year's ASR concluded

1. The Council continue to address the comments from previous year's appraisals and update reports accordingly. This is welcomed and encouraged for future reports.
2. The Council has 6 active AQMAs. The LAQM guidance states that AQMAs with 3 or more consecutive years of compliance should be considered for revocation. Apart from Wateringbury (AQMA 4), this applies to the remaining 5 AQMAs, in particular AQMA 1 (M20) and AQMA 3 (Tonbridge High Street). The council should review the status of their AQMAs and consider if any should be revoked. - These are being actively reviewed and discussions due to be held within the council.
3. The council calculated the $PM_{2.5}$ concentration from their recorded PM_{10} concentration and reported it. This is welcomed and encouraged for future reports.
4. Table 2.1 suggests that AQMA 3 Tonbridge High Street has been compliant with AQS objectives for 3 years. However, Figure 2 shows it has been compliant for 5 years. This should be clarified.- it has in fact been compliant for 4 years once the old analyser results are included but the compliant period does start from the covid years so a further year of compliancy is required before it can be considered according to DEFRA.
5. ST5 and ZT7 are not included in table A.1. If they are going to be reported in future ASRs, they should be included in this table. – these are now included in the table.
6. The QAQC section of the report would benefit from a statement on whether distance correction was required for passive diffusion tubes. – this has been added.
7. Pollutant names are not subscripted throughout the report. Whilst this does not affect the readability of the report, the council should ensure to check the report for such errors in future reports. - This has been double checked.
8. Overall, the report is detailed, satisfies the criteria of relevant standards, and is a good source for members of the Public to find out about air quality in their area. The Council should continue their good work and submit an Annual Status Report in 2024.

Tonbridge & Malling Borough Council has taken forward a number of direct measures during the current reporting year of 2023 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. 14 measures are included within Table 2.2, with the type of measure and the progress Tonbridge & Malling Borough Council have made during the reporting year of 2023 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in their respective Action Plans. Key completed measures are:

Completion of phase 1 of EV charging

Tonbridge & Malling Borough Council expects the following measures to be completed over the course of the next reporting year:

- Explore the process for possible standardising Section 106 agreement funding from development for AQ improvements.
- Increasing Vegetation across the borough with green walls.
- Roll out phase 2 of the anti-idling campaign with further signage around more schools and other idling hot spots such as taxi ranks and bus stops.
- Continue engagement with schools on Air Pollution and simple steps to help tackle it.

Tonbridge & Malling Borough Council's priorities for the coming year are to:

- explore the process for possible standardising Section 106 agreement funding from development for AQ improvements so money can go towards other measures and monitoring.
- make progress in establishing a car club in the borough.

Tonbridge & Malling Borough Council worked to implement these measures in partnership with the following stakeholders during 2023:

- Kent County Council

The principal challenges and barriers to implementation that Tonbridge & Malling Borough Council anticipates facing are due to funding difficulties.

Progress on the following measures has been slower than expected:

1-Establish/Join a Quality Bus Partnership to help upgrade Bus Fleet is slow due to obtaining funding for this.

2- Review Taxi/Private Hire Vehicle Policy and license fees, implement a strategy to encourage a switch to low emission vehicles taking longer than expected due to not being able to find suitable location for charging stations close to the taxi ranks in the borough.

11- Local Cycling and Walking Infrastructure Plan due to delays in developing active travel strategy and local plan.

Tonbridge & Malling Borough Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in AQMAs 3,5,6 & 7.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Tonbridge & Malling Borough Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of AQMA 4 Wateringbury.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure Title	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
5	Create Anti-idling zone at Tonbridge taxi rank Develop and enforce a borough wide anti-idling campaign	Traffic Management	Anti-idling enforcement	2021	2022	Local Authority Environmental Health	N/A	NO	Not Funded	< £10k	Implementation	Measure is more an awareness raising tool, however it is also a useful measure to prevent vehicles idling and causing congestion in specific locations, which is a significant cause of emissions.	KPI measured via an annual review of the number of fixed penalty fines and number of complaints received. After an initial year of results the % change in penalty fines and complaints can be quantified.	completed at Tonbridge Taxi rank	Borough-wide anti idling enforcement at taxi ranks, bus stops, and outside schools etc. Social Media posts to encourage behavioural change.
10	Installation of electric charging points within Council car parks throughout the borough	Transport Planning and Infrastructure	Other	2021	2024	Local Authority Parking & Environmental Health	N/A	NO	Not Funded	£50k - £100k	Implementation	Small impact upon NO2 concentrations from measure individually, estimated to be less than 1µg/m3 based upon a low to medium uptake.	Small impact upon NO2 concentrations from measure individually, estimated to be less than 1µg/m3 based upon a low to medium uptake.	Phase one completed phase 2 underway	Council car parks, TMBC funded with possible assistance from KCC
11	Installation of green walls and increased vegetation across the borough	Other	Other	2021	2024	Local Authority Environmental Health & street scene	N/A	NO	Not Funded	£10k - 50k	Implementation	N/A	N/A	Plans on going	Investigate areas like Wateringbury where results are close to hourly mean or increasing vegetation can made a difference. To be installed as a physical barrier to increase distances between the road and pedestrians.
1	Establish/Join a Quality Bus Partnership to help upgrade Bus Fleet	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	2021	2023	Local Authority Environmental Health, Local bus companies	N/A	NO	Not Funded	< £10k	Planning	In areas of high bus usage, such as within the Tonbridge High Street AQMA an NO2, in conjunction with other measures a reduction of between 1 – 3µg/m3 is to be aimed for.	KPI measured via the % of buses meeting a set EURO standard.	After award of BSIP funding to KCC which they are now engaged in developing enhanced partnership structure	Establish or extend neighbouring QBP(s) to help drive up the quality and emissions performance of the local bus fleet. Engage with KCC public transport and neighbouring authorities. Pursue funding opportunities from DfT, Defra and

Measure No.	Measure Title	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
															elsewhere as appropriate. To make sure cleaner buses are used on all routes, especially those operating through AQMAs.
2	Review Taxi/Private Hire Vehicle Policy and license fees, implement a strategy to encourage a switch to low emission vehicles	Promoting Low Emission Transport	Taxi Licensing conditions	2021	2030	Local Authority Environmental Health, Local Authority Licencing dept	N/A	NO	Not Funded	< £10k	Implementation	To be confirmed once full fleet information is available – use of the Emissions Factor Toolkit (EFT) to define NOx emission reductions for changes within the fleet per annum.	KPI measured via the % of taxis and private hire vehicles meeting a set EURO standard.	Plans on going	All vehicles to be petrol hybrid Euro 5 or petrol and diesel euro 6 by 2025. By 2030 all vehicles to be zero or ultra low emissions such as electric or liquid petroleum gas
3	Explore opportunities to reduce emissions from local delivery HGV's/LGV's possibly through the formations of a Freight Quality Partnership	Freight and Delivery Management	Freight Partnerships for city centre deliveries	2021	2022	Local Authority Environmental Health, Local Authority Businesses Dept.	N/A	NO	Not Funded	£10k - 50k	Planning	To be confirmed once fleet information is available – use of the EFT to define NOx emission reductions for changes within a fleet.	KPI measured via the % vehicles meeting a set EURO standard, and/or by the % of business participation in recognition schemes.	Plans on going	Opportunities for sustainable urban freight deliveries at existing locations and for new developments, can also help promote recognition schemes such as ECO Stars. Through Kent Invicta Chamber of Commerce etc and on media / website
4	Develop and implement a borough-wide school transport scheme	Promoting Travel Alternatives	School Travel Plans	2021	2022	KCC & Local Authority Environmental Health	N/A	NO	Not Funded	£10k - 50k	Planning	Measure has the potential to have a medium to high impact upon short term NO2 concentrations close to schools depending on the uptake of the schemes across the borough. On a borough wide scale a lesser impact upon on concentrations would be realised.	KPIs may include the following: % reduction of children travelling to school in cars, % of children cycling or walking to school. Number of schools implementing individual school travel plans.	Plans on going	Walking buses, action to focus on school run drop offs, feasibility of school start time variations. Work closely with KCC in developing these travel plans and feasibility studies.

Measure No.	Measure Title	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
5	Create Anti-idling zone at Tonbridge taxi rank Develop and enforce a borough wide anti-idling campaign	Traffic Management	Anti-idling enforcement	2021	2022	Local Authority Environmental Health	N/A	NO	Not Funded	< £10k	Implementation	Measure is more an awareness raising tool, however it is also a useful measure to prevent vehicles idling and causing congestion in specific locations, which is a significant cause of emissions.	KPI measured via an annual review of the number of fixed penalty fines and number of complaints received. After an initial year of results the % change in penalty fines and complaints can be quantified.	completed at Tonbridge Taxi rank	Borough-wide anti idling enforcement at taxi ranks, bus stops, and outside schools etc. Social Media posts to encourage behavioural change.
6	Pilot a Car Club within the Council for individuals use in local communities	Alternatives to private vehicle use	Car Clubs	2021	2023	Local Authority Environmental Health	N/A	NO	Not Funded	£10k - 50k	Implementation	NOx emission reduction achieved by the Council will be able to be calculated annually.	The introduction of pool cars can result in a reduction of approximately 20% in business mileage. KPI relating to usage at the Council can be measurements of reduction in annual mileage undertaken per team.	Plans on going	Car club campaigns, possibility to include advertising and sponsorship opportunities.
7	Continue to explore traffic improvement options at Wateringbury crossroads, emphasis on looking at capacity and flow	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2021	2024	KCC Highways & Local Authority Environmental Health	N/A	NO	Not Funded	< £10k	Implementation	An improvement to the Wateringbury crossroads would aim to reduce NO2 concentrations by between 1 – 5µg/m3.	KPI to be formulated once option has been developed, to be based around vehicle turning counts and/or queuing statistics.	On going but one report summitted by KCC	May be too costly to implement ideal solution & lack of adequate space
8	Encourage companies to allow home working at least one day a week	Promoting Travel Alternatives	Encourage / Facilitate home-working	2021	2031	Local Authority Environmental Health & Business department	N/A	NO	Not Funded	< £10k	Implementation	Small impact upon NO2 concentrations from measure individually, estimated to be less than 5µg/m3. Based	Small impact upon NO2 concentrations from measure individually, estimated to be less than 5µg/m3. Based	On going. Many companies continue to allow home working after pandemic.	To promote on website multimedia and targeted adds campaigns to local office based companies using momentum from for

Measure No.	Measure Title	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
												on small uptake	on small uptake		home working from Covid restrictions
9	Explore the process for possible standardising Section 106 agreement funding from development for AQ improvements	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2021	2023	Local Authority Planning & Environmental Health	N/A	NO	Not Funded	< £10k	Implementation	N/A	N/A	Plans on going	Standardising the process for securing S106 agreements for AQ to be linked with planning department to ensure harmonious implementation. Conditions to be more specific in planning decisions regarding green energy, low emission vehicle and EV parking (policy compliant).
10	Installation of electric charging points within Council car parks throughout the borough	Transport Planning and Infrastructure	Other	2021	2024	Local Authority Parking & Environmental Health	N/A	NO	Not Funded	£50k - £100k	Implementation	Small impact upon NO2 concentrations from measure individually, estimated to be less than 1µg/m3 based upon a low to medium uptake.	Small impact upon NO2 concentrations from measure individually, estimated to be less than 1µg/m3 based upon a low to medium uptake.	Phase one completed phase 2 underway	Council car parks, TMBC funded with possible assistance from KCC
11	Installation of green walls and increased vegetation across the borough	Other	Other	2021	2024	Local Authority Environmental Health & street scene	N/A	NO	Not Funded	£10k - 50k	Implementation	N/A	N/A	Plans on going	Investigate areas like Wateringbury where results are close to hourly mean or increasing vegetation can made a difference. To be installed as a physical barrier to increase distances between the road and pedestrians.
12	Raise public awareness through the launch of a Travel Choices Campaign	Public Information	Via the Internet	2021	2022	Local Authority Environmental Health & KCC	N/A	NO	Not Funded	£10k - 50k	Implementation	Small impact upon NO2 concentrations from measure individually, estimated to be less than 1µg/m3.	Small impact upon NO2 concentrations from measure individually, estimated to be less than 1µg/m3.	Plans on going	Possibility of partnership with ‘Step Ahead of the Rest’ KCC Active travel programme. Social Media advertising. Community projects.
13	Prepare a new Local Cycling and Walking	Transport Planning and Infrastructure	Cycle network	2021	2022	Local Authority Planning &	N/A	NO	Not Funded	< £10k	Implementation	N/A	N/A	Plans on going	Identify if there any specific routes that can be improved

Measure No.	Measure Title	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
	Infrastructure plan (LCWIP)					Environmental Health									upon or require the introduction of new routes.
13b	Delivery of identified cycling and walking schemes	Transport Planning and Infrastructure	Cycle network	2021	2030	KCC & Local Authority Planning & Environmental Health	N/A	NO	Not Funded	£10k - 50k	Implementation	Small impact upon NO2 concentrations from measure individually, estimated to be less than 1µg/m3 based upon a low to medium uptake	KPIs to include: Usage of rental schemes. Numbers of cycle to work schemes. Implementation of new routes per annum. Obtain figures from use of new cycle hub and Tonbridge station	Plans on going	Following the completion of the LCWIP, the identified cycling and walking routes will be improved / new routes are to be introduced. In addition cycle to work schemes are to be encouraged and supported through local campaigns, events and planning negotiations. Active travel to be promoted in partnership with KCC – Kent Connected. Tie in with 11.
14	Education and encouragement in terms of air quality across the borough: public workshops, leaflet campaigns, advertising, approaching schools, businesses, community centres	Public Information	Via leaflets	2021	2023	Local Authority Environmental Health	N/A	NO	Not Funded	£10k - 50k	Implementation	Small impact upon NO2 concentrations from measure individually, estimated to be less than 1µg/m3.	Usage statistics for public transport and zero emission transport options (walking and cycling) across the borough per annum. Most of the individual parts to this measure can be developed immediately, again it may be beneficial to have a KPI relating to implementation time.	Plans on going.	Available AQ information, current issues, what the council is doing paired with what the public can do as a bottom up approach. Provision of workshops, physical and digital leaflets, drop in sessions, dedicated phone-line etc. Social media visibility is a key element with potential to link to other KES/ELES communications. Community Champions / case studies

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

As detailed in Policy Guidance LAQM.PG22 (Chapter 8) and the Air Quality Strategy[6], local authorities are expected to work towards reducing emissions and/or concentrations of fine particulate matter ($PM_{2.5}$)). There is clear evidence that $PM_{2.5}$ (particulate matter smaller 2.5 micrometres) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Tonbridge & Malling Borough Council is taking the following measures to address $PM_{2.5}$: A PM_{10} monitor is installed at Borough Green from which $PM_{2.5}$ can be calculated. -5.9 has been used for the nation factor for a roadside site and this has been deducted from our PM_{10} yearly average of 21.7µg/m^3 to give a $PM_{2.5}$ yearly average of 15.8µg/m^3.

New Anti-idling signs at Tonbridge Taxi rank will help reduce $PM_{2.5}$ particles and plans are already underway to reduce anti idling around schools across the borough (measure 5). Although not specifically aimed at reducing $PM_{2.5}$ particles many of the measures aimed at reducing NO_2 from traffic will also help to reduce $PM_{2.5}$ particles. Measure 10 to increase charging point across the borough will also help increase the uptake of electric vehicles and reduce $PM_{2.5}$ particles generated from exhaust fumes.

[6] Defra. Air Quality Strategy – Framework for Local Authority Delivery, August 2023

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

This section sets out the monitoring undertaken within 2023 by Tonbridge & Malling Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2019 and 2023 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Tonbridge & Malling Borough Council undertook automatic (continuous) monitoring at 2 sites during 2023. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The Kent and Medway Air Quality (kentair.org.uk) page presents automatic monitoring results for Tonbridge & Malling Borough Council.

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.

3.1.2 Non-Automatic Monitoring Sites

Tonbridge & Malling Borough Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 54 sites during 2023. 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 2023 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.

All 54 sites had pollution levels below the 40µg/m^3 for the very first time in 2023 since the creation of AQMA's in Tonbridge & Malling. One site for Tonbridge & Malling was within 10% of the limit and this was a triplicate site (TN42, TN76 & TN77) within AQMA 3 Wateringbury at 38µg/m^3. There are no plans to create new AQMAs based on this years results and continuing tread of levels falling within many of the AQMAs and wider areas across Tonbridge & Malling. Sites for 2024 monitoring period will be reduced from 54 to 37 sites following low results over last few years across the borough with a couple of sites upgraded to triplicate sites.

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 (data ratified by Ricardo PLC) 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.
All data has been properly ratified. PM_{10} 24-hour mean objective only exceeded 50µg/m^3 3 times this year at Borough Green so well within the permitted 35 times per year (this is

compared to 12 times in 2022). We have only been using the PM_{10} monitor at Borough Green for the past two years so it is difficult to comment on trends but the results show the level of PM_{10} has fallen by 3.3µg/m^3 in 2023 when compared to 2022. There are no plans in declare any new AQMAs based on 2023 PM_{10} results.

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.

We have only been using the PM_{10} monitor at Borough Green in conjunction with the national factor deviving $PM_{2.5}$ from PM_{10} results for the past two years so it is difficult to comment on the trend but results do show they have fallen by nearly 1µg/m^3 compared to in 2022 for $PM_{2.5}$.

Using the nation factor of 5.9 this is then decuted from the yearly average PM_{10} result to give the estimated $PM_{2.5}$ result. All data has been properly ratified by Ricardo PLC.

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)
ZT8	Borough Green	Roadside	560583	157337	NO_2	YES AQMA 7	Chemiluminescent	15.93	2.42	1.72
ZT8	Borough Green	Roadside	560583	157337	PM_{10}	YES AQMA 7	Beta Attenuation	15.75	2.6	1.69
ZT9	Tonbridge High Street	Urban Centre	558890	146203	NO_2	YES AQMA 3	Chemiluminescent	15	6m	6.2

Notes:

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

(2) N/A if not applicable

Table A.2 – Details of Non-Automatic Monitoring Sites2

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)
TN5a	131 Hall road Aylesford	Roadside	572611	158545	NO_2	Yes, AQMA 1	0.0	26.7	No	2.4
TN7b	202 New Hythe Lane	Roadside	570391	159032	NO_2	Yes, AQMA 1	0.0	33.3	No	1.8
TN10	Offham Road, West Malling	Suburban	567617	157635	NO_2	No	12.5	1.7	No	2.1
TN18	Wilson Road, Tonbridge	Suburban	560263	148509	NO_2	No	6.3	2.0	No	3.0
TN33	Tonbridge Road, Wateringbury (Red Hill Corner)	Roadside	569201	153486	NO_2	Yes, AQMA 4	0.0	1.3	No	2.8
TN35	High Street, Tonbridge (no 35, WH Smith)	Roadside	558948	146277	NO_2	Yes, AQMA 3	0.0	3.8	No	2.5
TN43	Tonbridge Road, Wateringbury (Red Hill)	Roadside	569187	153498	NO_2	Yes, AQMA 4	0.0	2.6	No	2.6
TN44	High Street, Tonbridge(no 46a)	Roadside	558929	146271	NO_2	Yes, AQMA 3	0.0	3.3	No	2.4
TN47	London Road, Ditton (nos 516)	Urban Background	571399	158375	NO_2	No	0.0	23.0	No	1.8
TN57	London Road, Larkfield (no 743)	Roadside	570467	158328	NO_2	No	0.0	4.8	No	1.7
TN60, TN62, TN63	London Road, Aylesford (no 290)	Roadside	572423	157932	NO_2	Yes, AQMA 5	0.0	6.5	No	1.6

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)
TN70, TN72, TN73	55, Sevenoaks Road, Borough Green	Roadside	560567	157328	NO_2	Yes, AQMA 7	0.0	2.5	No	1.9
TN45, TN74, TN75	High Street, Tonbridge (no 10)	Roadside	558864	146166	NO_2	Yes, AQMA 3	0.0	2.3	No	2.5
TN42, TN76, TN77	Tonbridge Road, Wateringbury (Opposite Garage)	Roadside	569226	153475	NO_2	Yes, AQMA 4	0.0	1.3	No	2.4
TN80b	218 Station Road, Aylesford	Roadside	572124	158627	NO_2	Yes, AQMA 1	0.0	35.8	No	2.0
TN86	Flat 21 High Street	Roadside	560867	157302	NO_2	No	0.0	2.5	No	2.2
TN93	16 Sevenoaks Road	Roadside	560717	157266	NO_2	No	11.3	1.5	No	2.3
TN95	Harrison Road	Suburban	560831	157004	NO_2	No	7.8	1.7	No	2.3
TN96	1 Bordyke, Tonbridge	Roadside	559148	146889	NO_2	No	0.0	3.5	No	2.0
TN83, TN98, TN99	424 New Hythe Lane	Roadside	570740	159667	NO_2	No	0.0	4.1	No	2.4
TN102	39 Whitepost Wood La	Roadside	572768	157186	NO_2	No	2.6	14.5	No	2.2
TN104	158 London Rd (E of mouth of Hermitage Lane)	Roadside	572976	157726	NO_2	No	0.0	8.2	No	2.2
TN106, TN150, TN151	794 London Rd, Larkfield	Roadside	570193	158327	NO_2	Yes, AQMA 6	0.0	2.3	No	2.2

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)
TN109	St Augustines, Quarry Hill, Tonbridge	Roadside	558743	145922	NO_2	No	0.0	4.0	No	2.2
TN110	88 High St, Tonbridge	Roadside	559012	146433	NO_2	No	0.0	4.6	No	2.1
TN118	1a Marion Cottages, Maidstone Road, Wrotham Heath	Roadside	563209	157995	NO_2	No	0.0	4.4	No	2.0
TN119	66 High Street, Aylesford	Kerbside	572924	158986	NO_2	No	0.0	0.7	No	2.0
TN122	Post office 192-194 Tonbridge road Wateringbury	Roadside	569168	153501	NO_2	Yes, AQMA 4	0.0	1.4	No	2.1
TN123	11 Rochester Road	Roadside	573130	159010	NO_2	No	0.0	1.8	No	2.0
TN124	19 The Lindins	Roadside	572152	158544	NO_2	Yes, AQMA 1	0.0	10.0	No	2.1
TN125	35 Pembury Road	Urban Background	558856	145731	NO_2	No	0.0	12.8	No	2.0
TN130	31 Western Road	Roadside	560790	157351	NO_2	No	0.0	4.5	No	2.1
TN131, TN132, TN133	49 Quarry Hill	Roadside	558616	145696	NO_2	No	0.0	5.4	No	2.0
TN134	5 Brook Street	Roadside	558515	145617	NO_2	No	0.0	11.0	Yes	2.0
TN135	Medway Wharf Road	Roadside	559056	146445	NO_2	No	0.0	0.7	No	2.4
TN136	205 Holborough Road	Roadside	570430	162502	NO_2	No	0.0	3.3	No	2.6

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)
TN137	Robin Hood Lane M2	Roadside	575090	162364	NO_2	No	22.0	9.1	No	1.8
TN138	16 Common Road	Roadside	574511	162156	NO_2	No	0.0	22.0	No	2.1
TN139	456 Maidstone Road Chatham	Roadside	574651	162613	NO_2	No	9.0	34.0	No	2.2
TN140	48 New Road Ditton	Roadside	571165	158230	NO_2	No	5.0	1.6	No	2.5
TN141	Monitor	Roadside	560583	157337	NO_2	Yes, AQMA 7	16.0	2.4	No	1.5
TN142	2 Borough Green Road	Roadside	561119	157864	NO_2	No	0.0	15.0	No	2.0
TN143	Lamp post outside Wrotham school	Roadside	561151	157867	NO_2	No	27.0	3.5	No	2.4
TN144, TN159, TN160	40 High Street, East Malling	Roadside	570161	156966	NO_2	No	0.0	2.1	No	2.1
TN145	1 Chapel Street, East Malling	Roadside	570165	156874	NO_2	No	0.0	0.9	No	2.2
TN146	Bell Court London Rd, Larkfield	Roadside	570452	158368	NO_2	No	0.0	12.5	No	2.2
TN147	13 Eaton Place, New Hythe	Roadside	570718	159593	NO_2	No	0.0	5.8	No	2.0
TN148	14 Blackthorne Drive, Larkfield	Roadside	570682	158852	NO_2	Yes, AQMA 1	0.0	38.0	No	2.0
TN149	163 The Avenue, Aylesford	Roadside	572494	158480	NO_2	Yes, AQMA 1	0.0	28.0	No	2.0
TN152	Lamp Post New Road Ditton	Roadside	571233	158337	NO_2	No	5.0	1.7	No	2.2
TN153	86 Hadlow road	Roadside	559611	147047	NO_2	No	0.0	10.6	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)
TN154	No 159 Castle Way	Roadside	569232	159801	NO_2	No	0.0	22.5	No	1.9
TN155	Shipbourne Rd Lamppost	Roadside	559201	147206	NO_2	No	3.0	1.5	No	2.5
TN156, TN157, TN158	Lamp post By RBL on Hermitage La	Roadside	572750	157567	NO_2	No	5.0	1.7	No	2.4

Notes:

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

(2) N/A if not applicable.

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
ZT8	560583	157337	Roadside	82	100	N/A	N/A	22.9	24.2	21.8
ZT9	558890	146203	Urban Centre	100	100	N/A	N/A	N/A	22.5	24.8
ZT5	558877	146185	Urban Centre	N/A	N/A	48	30	N/A	N/A	N/A
ZT7	569165	153493	Roadside	N/A	N/A	24	18	18.3	N/A	N/A

☒ **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.**

☐ **Where exceedances of the NO_2 annual mean objective occur at locations not representative of relevant exposure, the fall-off with distance concentration has been calculated and reported concentration provided in brackets for.**

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 2023 (%) [2]	2019	2020	2021	2022	2023
TN5a	572611	158545	Roadside	100	100.0	28.5	24.3	22.4	21.5	21.2
TN7b	570391	159032	Roadside	100	100.0	30.4	24.8	26.1	23.0	21.7
TN10	567617	157635	Suburban	100	100.0	15.2	11.4	11.0	11.3	9.8
TN18	560263	148509	Suburban	100	100.0	13.2	11.1	10.3	10.4	8.7
TN33	569201	153486	Roadside	100	90.4	**46.4**	**42.1**	39.5	36.8	33.8
TN35	558948	146277	Roadside	100	92.3	35.6	28.3	29.3	25.4	25.2
TN43	569187	153498	Roadside	100	100.0	33.8	27.4	27.7	28.2	23.4
TN44	558929	146271	Roadside	100	82.7	32.3	26.8	27.1	22.1	25.9
TN47	571399	158375	Urban Background	100	100.0	17.9	14.7	14.4	14.1	12.6
TN57	570467	158328	Roadside	100	100.0	30.7	24.9	24.3	22.0	21.3
TN60, TN62, TN63	572423	157932	Roadside	100	100.0	**42.1**	32.1	31.0	30.4	28.1
TN70, TN72, TN73	560567	157328	Roadside	100	92.3	38.1	29.8	30.6	30.4	27.2
TN45, TN74, TN75	558864	146166	Roadside	100	100.0	36.6	28.8	29.7	28.4	24.8
TN42, TN76, TN77	569226	153475	Roadside	100	100.0	**54.6**	**44.8**	**46.5**	**44.8**	38.3
TN80b	572124	158627	Roadside	100	100.0	26.6	23.0	23.3	24.0	21.3
TN86	560867	157302	Roadside	100	90.4	20.6	16.6	17.4	17.0	13.9
TN93	560717	157266	Roadside	100	100.0	31.7	24.9	22.6	19.6	21.8
TN95	560831	157004	Suburban	100	100.0	13.4	10.5	12.3	10.1	8.8
TN96	559148	146889	Roadside	100	100.0	28.9	20.6	23.6	23.1	20.1

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 2023 (%) [2]	2019	2020	2021	2022	2023
TN83, TN98, TN99	570740	159667	Roadside	100	100.0	32.5	27.4	26.8	27.1	25.0
TN102	572768	157186	Roadside	100	100.0	18.8	14.5	15.7	14.8	12.1
TN104	572976	157726	Roadside	100	92.3	34.8	28.9	30.1	22.9	26.1
TN106, TN150, TN151	570193	158327	Roadside	100	100.0	**41.5**	31.0	34.7	33.3	26.5
TN109	558743	145922	Roadside	100	100.0	35.1	26.2	26.5	23.9	22.4
TN110	559012	146433	Roadside	100	82.7	27.6	22.8	24.6	21.7	20.8
TN118	563209	157995	Roadside	100	100.0	31.3	25.7	21.0	24.7	21.7
TN119	572924	158986	Kerbside	100	100.0	27.8	21.9	23.6	20.9	19.3
TN122	569168	153501	Roadside	100	100.0	35.8	27.0	28.2	24.9	22.9
TN123	573130	159010	Roadside	100	82.7		23.4	23.2	23.8	21.0
TN124	572152	158544	Roadside	100	100.0		20.2	21.9	23.0	17.3
TN125	558856	145731	Urban Background	100	100.0		14.0	13.9	14.1	11.7
TN130	560790	157351	Roadside	100	90.4		16.8	19.1	18.0	15.4
TN131, TN132, TN133	558616	145696	Roadside	100	100.0		23.6	24.5	23.5	20.8
TN134	558515	145617	Roadside	100	100.0		16.7	17.0	18.0	14.6
TN135	559056	146445	Roadside	100	100.0		21.5	20.9	22.0	18.5
TN136	570430	162502	Roadside	100	100.0			33.1	23.5	19.6
TN137	575090	162364	Roadside	100	100.0			31.7	30.2	28.7
TN138	574511	162156	Roadside	100	100.0			17.8	19.8	16.8
TN139	574651	162613	Roadside	100	90.4			20.4	18.6	16.8
TN140	571165	158230	Roadside	100	92.3			18.2	16.1	17.7
TN141	560583	157337	Roadside	100	100.0			21.5	23.4	20.1
TN142	561119	157864	Roadside	100	100.0				13.6	11.6
TN143	561151	157867	Roadside	100	67.3				13.8	12.6
TN144, TN159, TN160	570161	156966	Roadside	100	100.0				29.3	25.2

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 2023 (%) (2)	2019	2020	2021	2022	2023
TN145	570165	156874	Roadside	100	100.0				24.9	22.0
TN146	570452	158368	Roadside	100	100.0				17.9	15.3
TN147	570718	159593	Roadside	100	100.0				19.0	18.7
TN148	570682	158852	Roadside	100	84.6				18.3	15.5
TN149	572494	158480	Roadside	100	100.0				22.0	15.1
TN152	571233	158337	Roadside	100	100.0				16.1	19.4
TN153	559611	147047	Roadside	100	100.0					15.6
TN154	569232	159801	Roadside	100	100.0					15.8
TN155	559201	147206	Roadside	100	84.6					18.4
TN156, TN157, TN158	572750	157567	Roadside	100	100.0					28.5
TN5a	572611	158545	Roadside	100	100.0	28.5	24.3	22.4	21.5	21.2
TN7b	570391	159032	Roadside	100	100.0	30.4	24.8	26.1	23.0	21.7

☒ **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 – Trends in Annual Mean NO_2 Concentrations

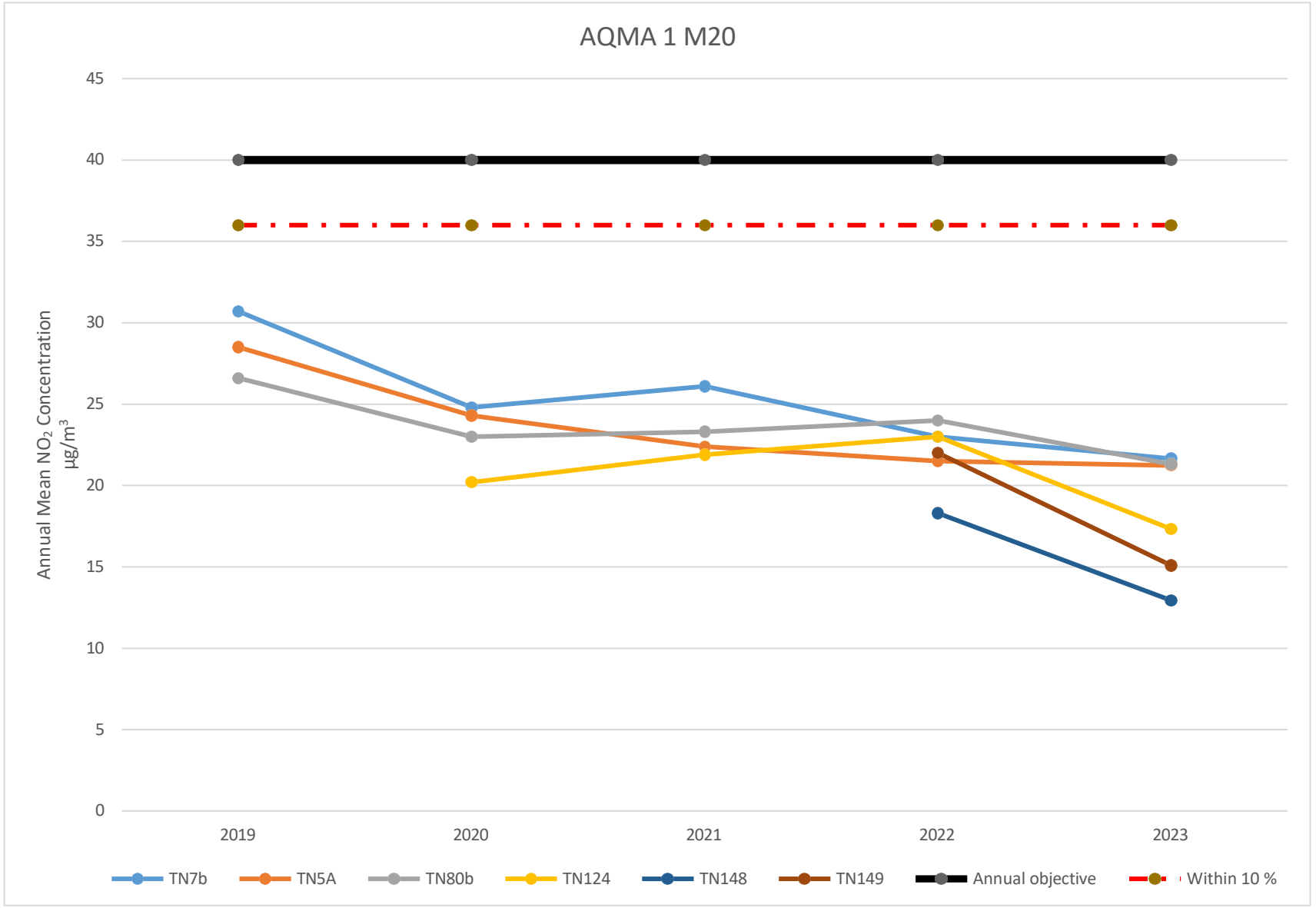


Figure A.2 – Trends in Annual Mean NO_2 Concentrations AQMA 3

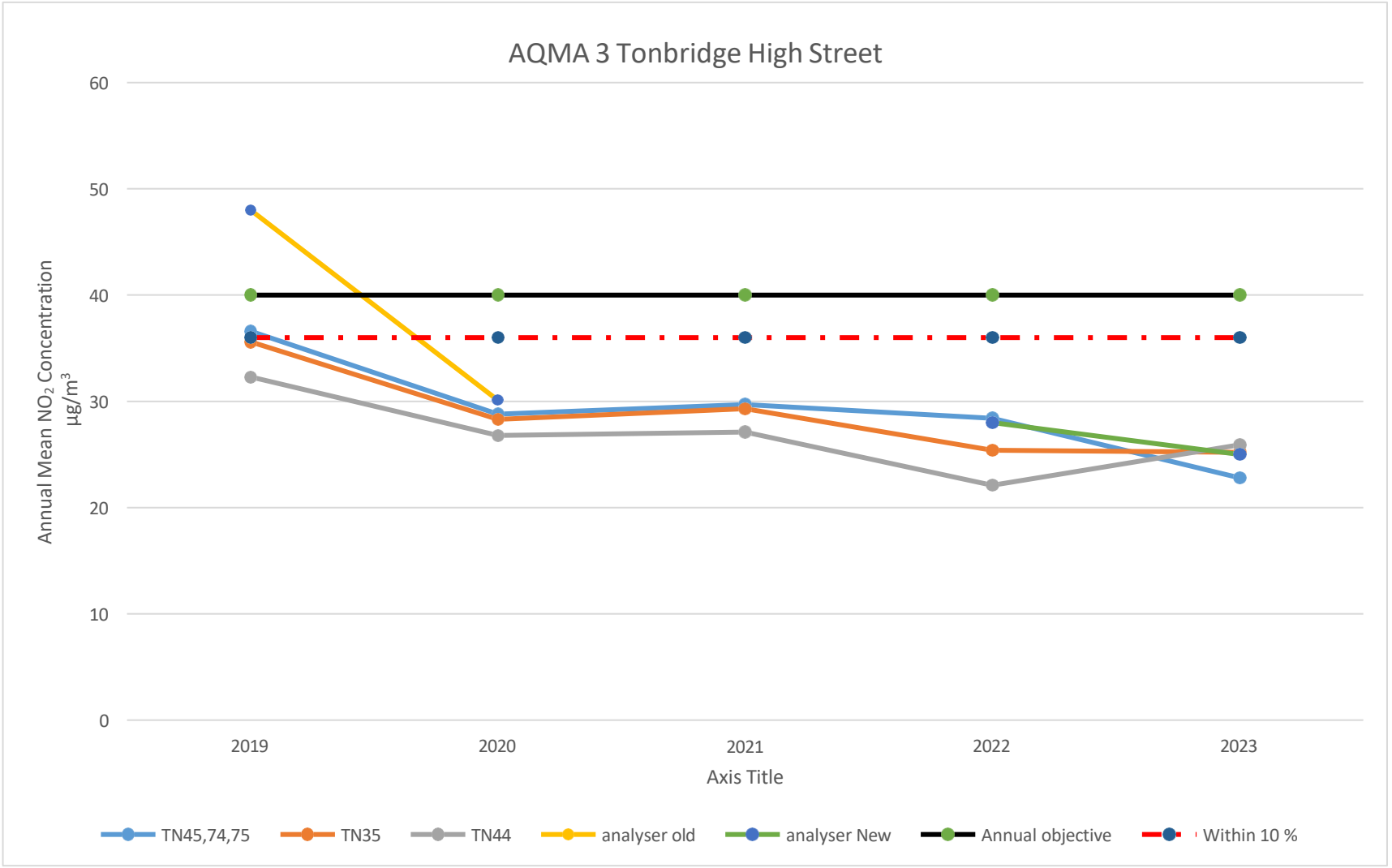


Figure A.3 – Trends in Annual Mean NO_2 Concentrations AQMA 4

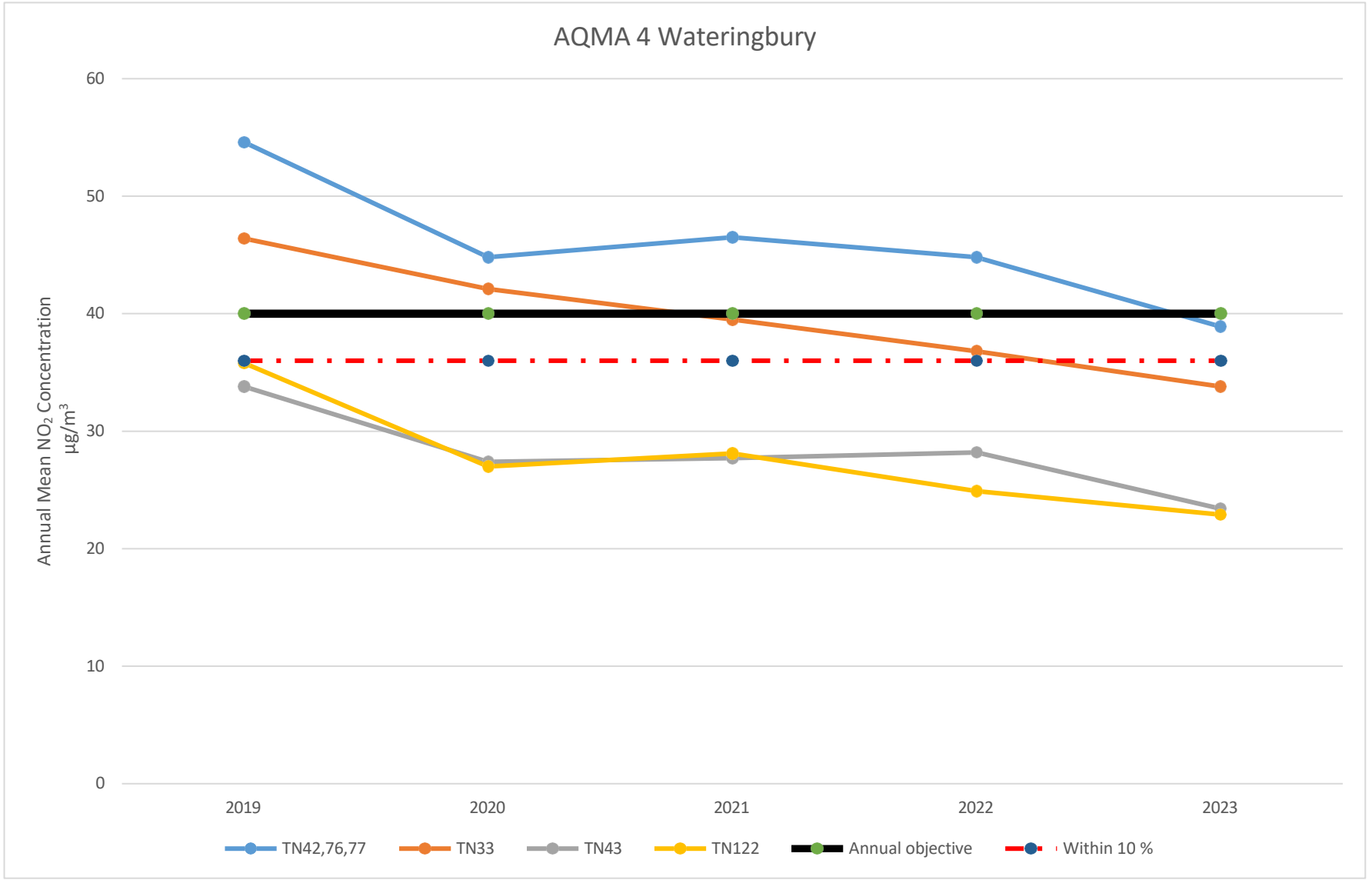


Figure A.4 – Trends in Annual Mean NO_2 Concentrations AQMA 5

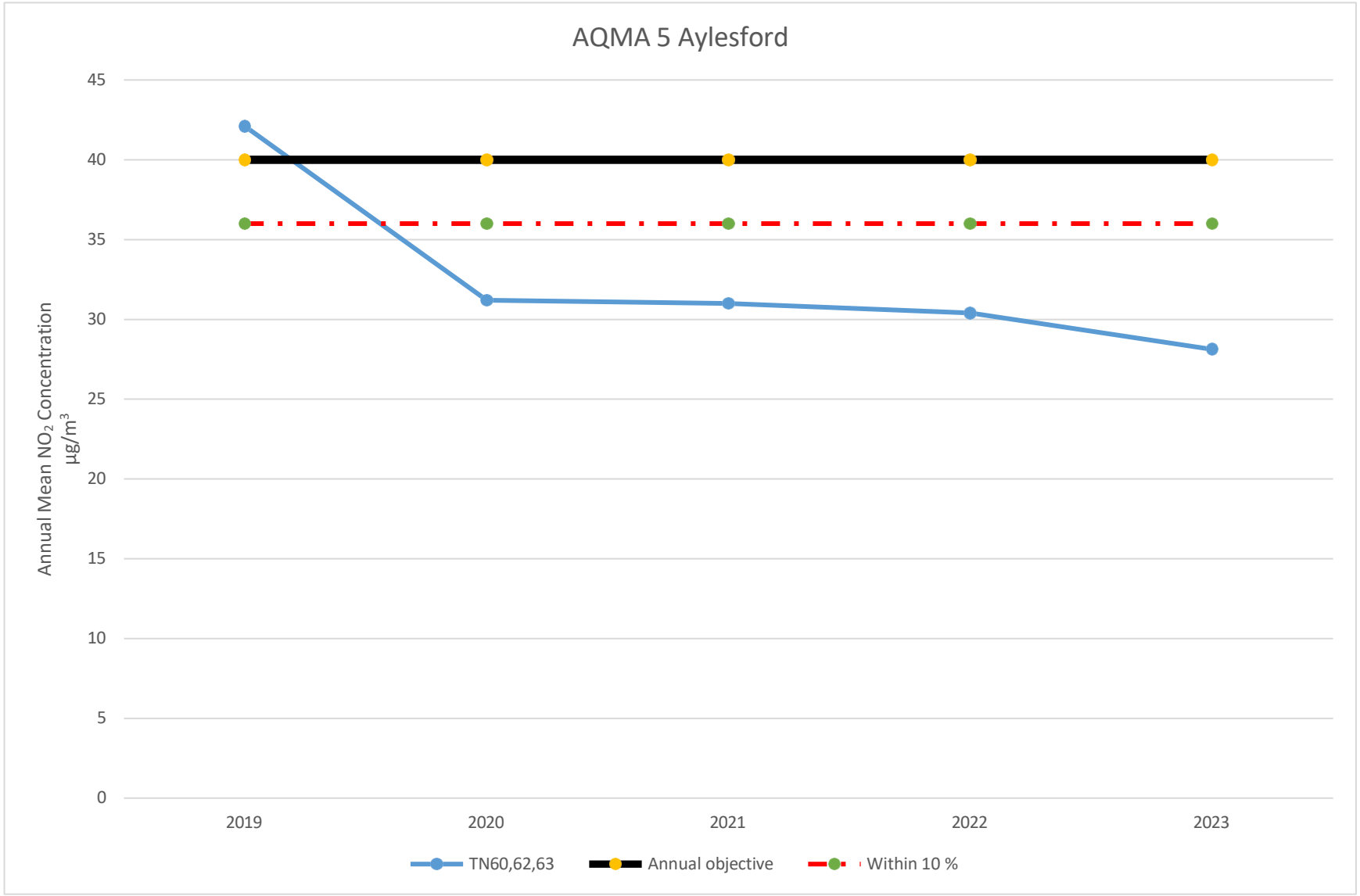


Figure A.5 – Trends in Annual Mean NO_2 Concentrations AQMA 6

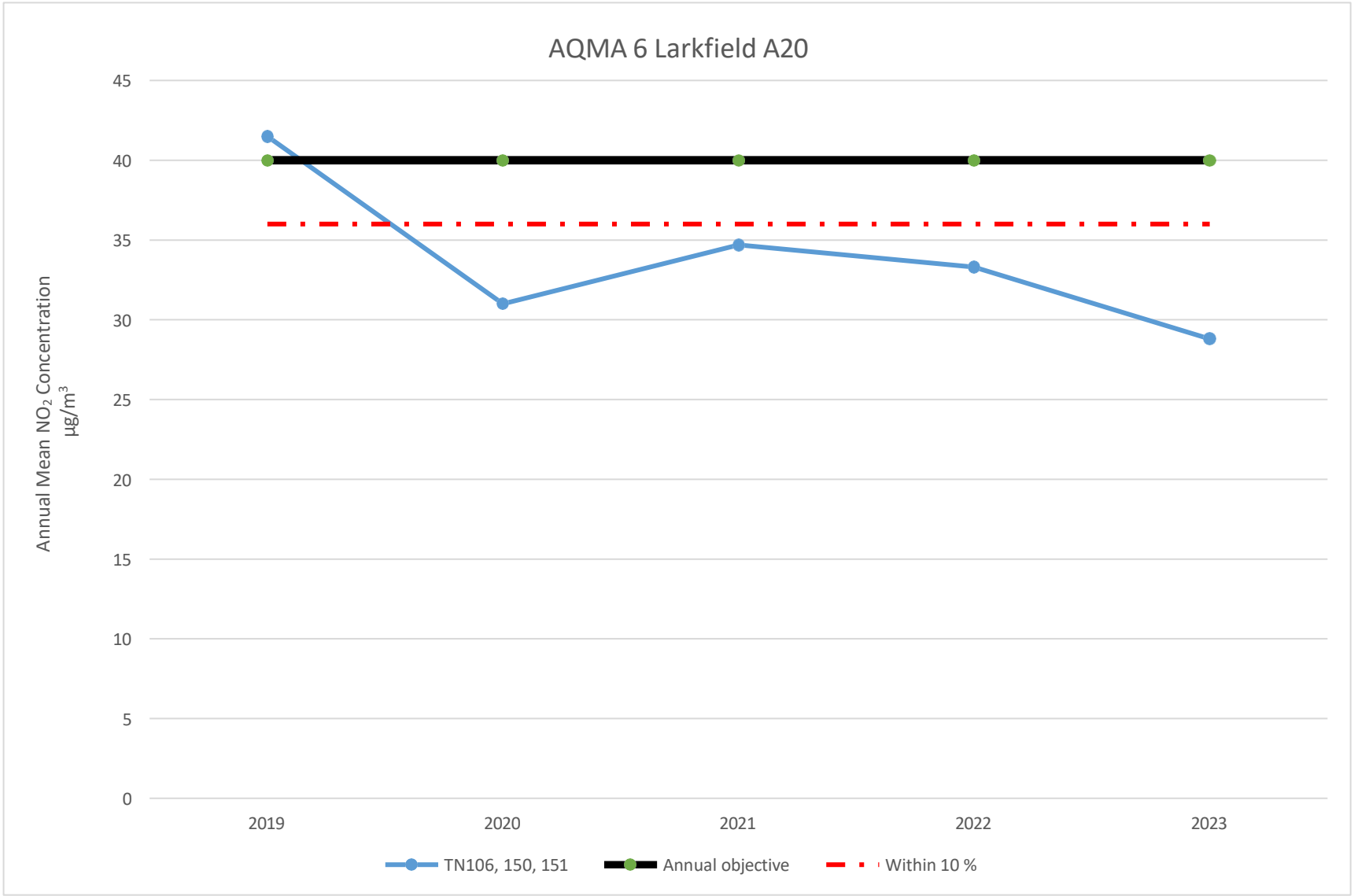


Figure A.6 – Trends in Annual Mean NO_2 Concentrations AQMA 7

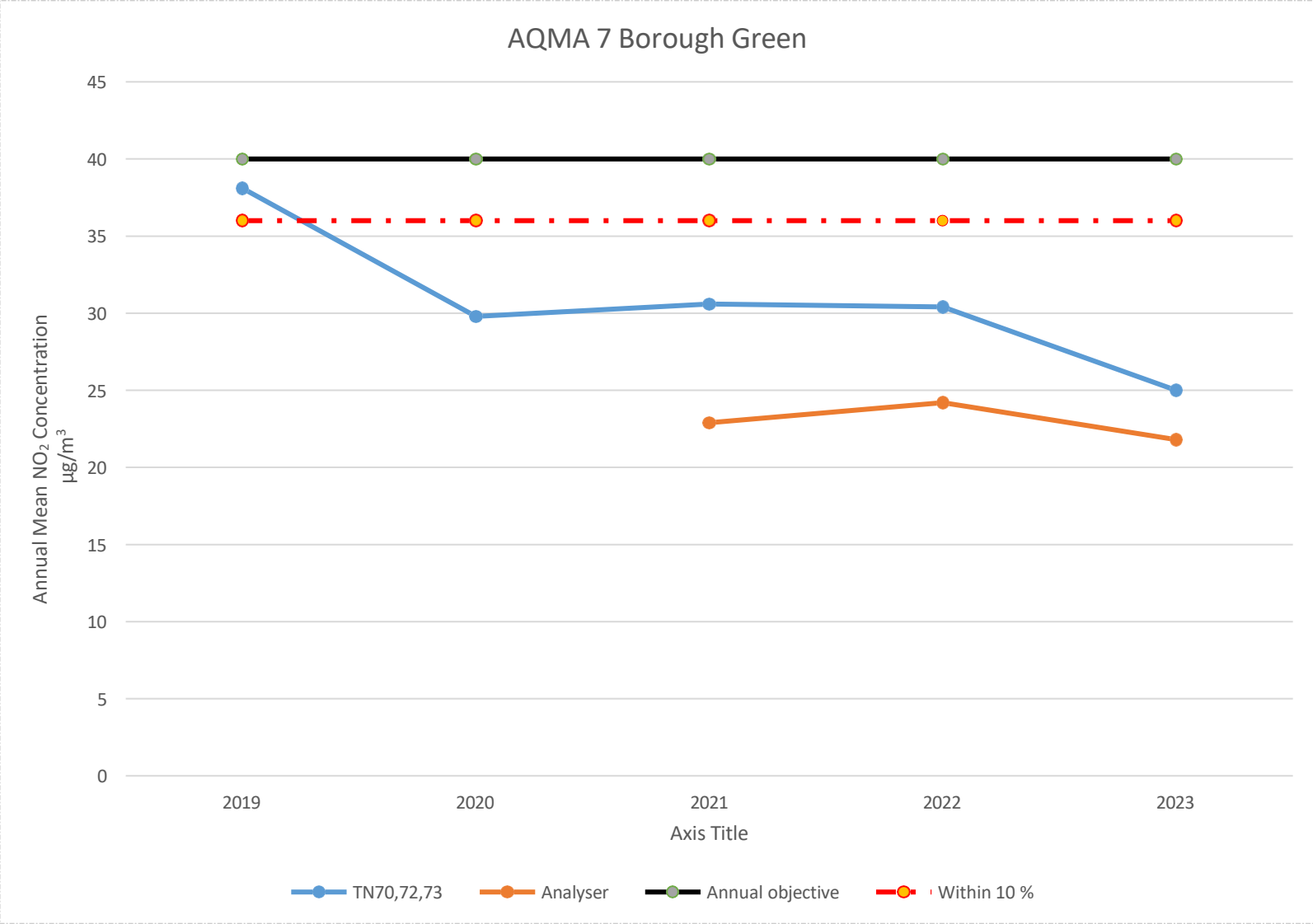


Figure A.7 – Trends in Annual Mean NO_2 Concentrations Backgrounds

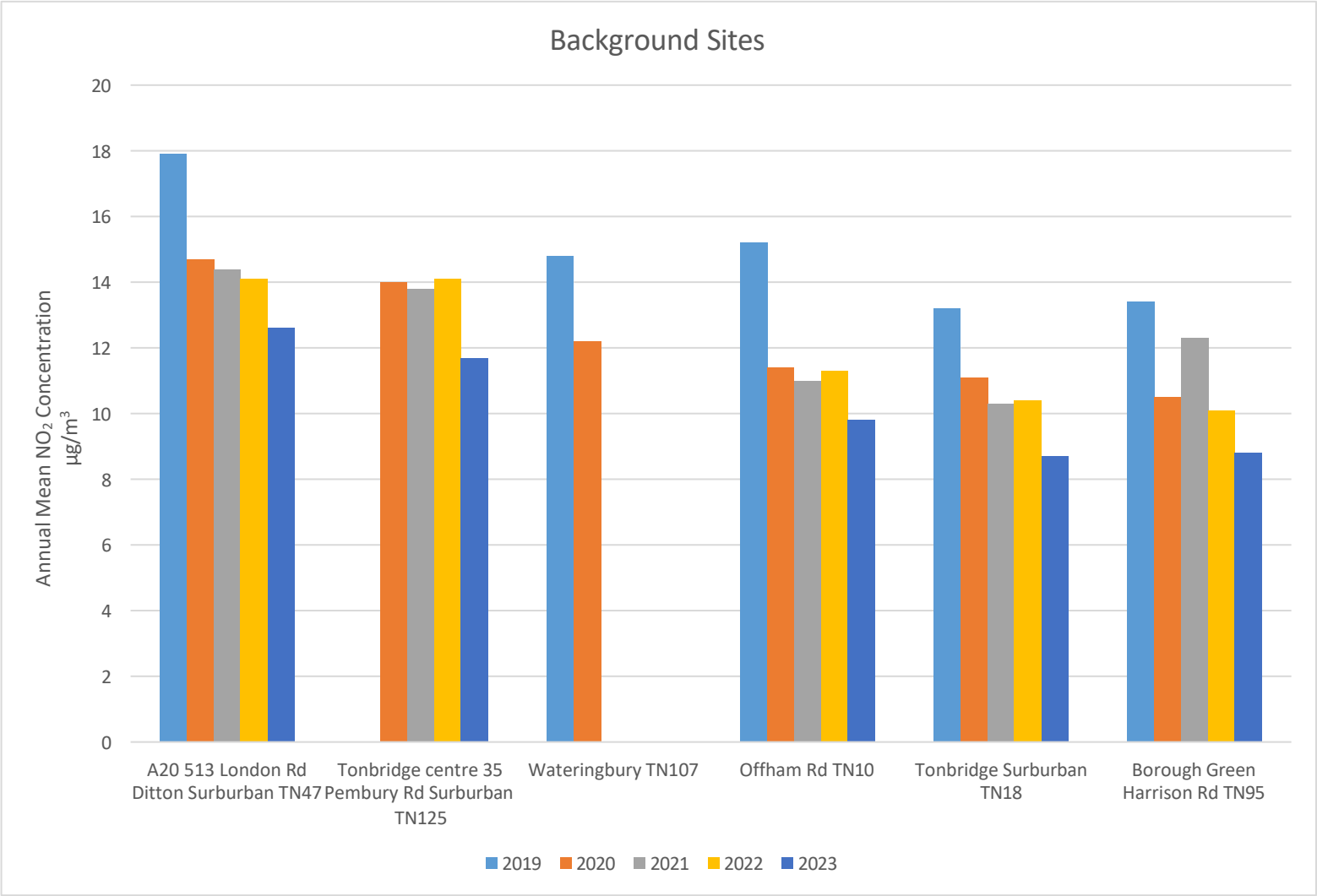


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
ZT8	560583	157337	Roadside	82	100	N/A	N/A	0	0	0 (87.9)
ZT9	558890	146203	Urban Centre	100	100	N/A	N/A	N/A	0	0
ZT5	558877	146185	Urban Centre	N/A	N/A	0 (147)	0 (119)	N/A	N/A	N/A
ZT7	569165	153493	Roadside	N/A	N/A	1 (92)	0	0	N/A	N/A

Notes:

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

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

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

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

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

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
ZT8	560583	157337	Roadside	99	100	N/A	N/A	24	25	21.7

☒ **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.2 – Trends in Annual Mean PM_{10} Concentrations

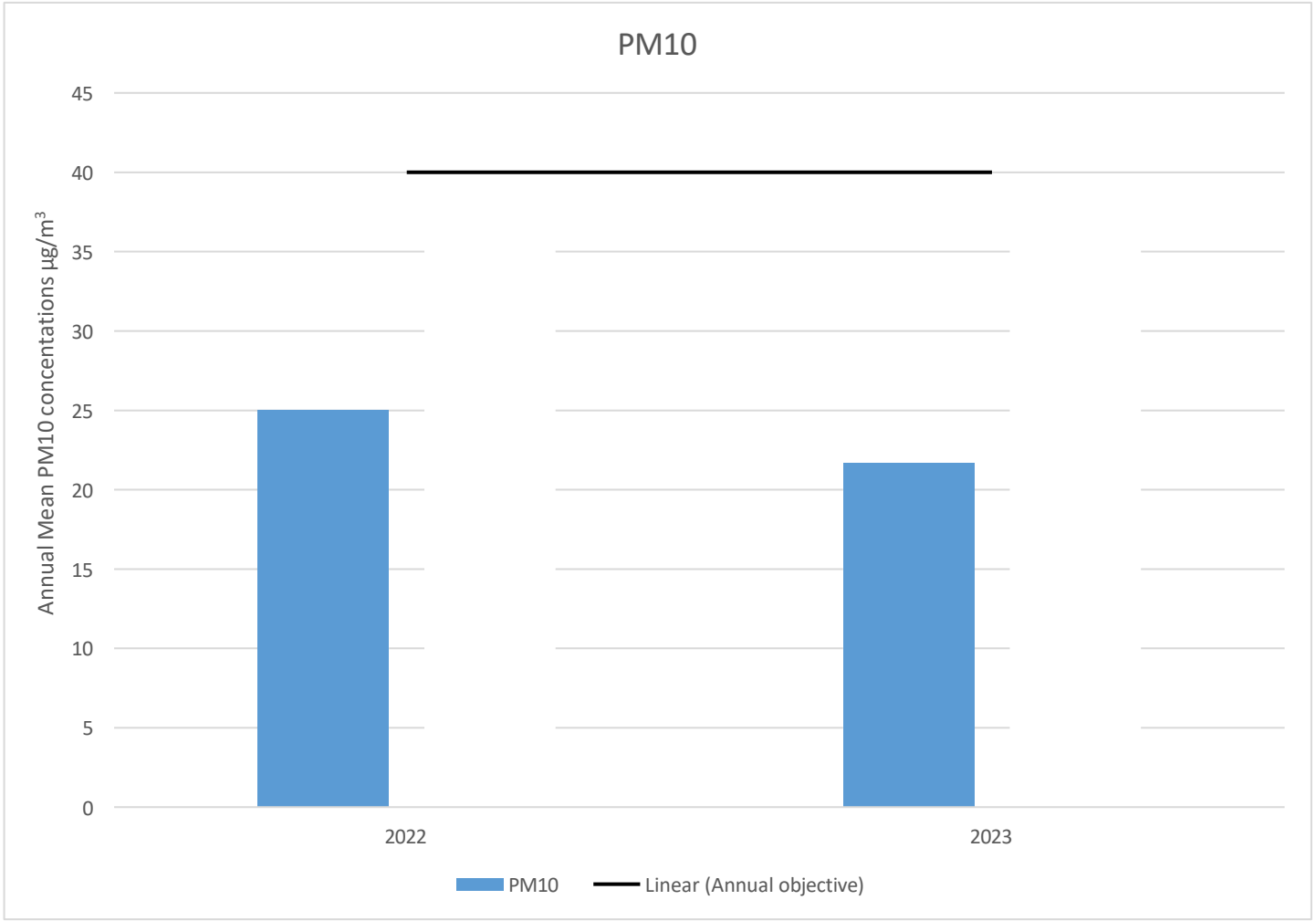


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
ZT8	560583	157337	Roadside	99	100	N/A	N/A	6	12	3

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.3 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m^3

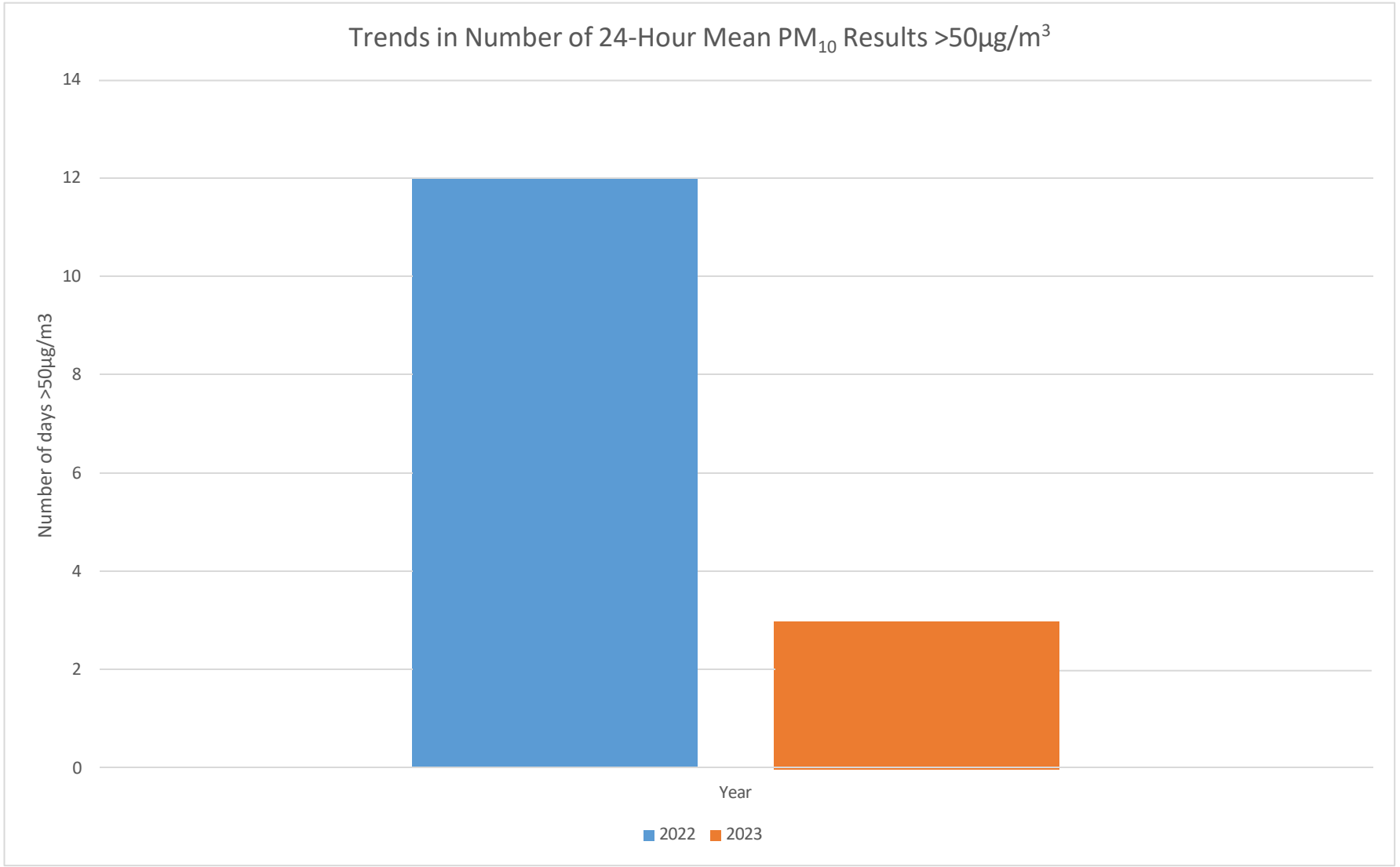


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
ZT8	560583	157337	Roadside	99	100	n/a	n/a	n/a	18.6	15.8

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

Notes:

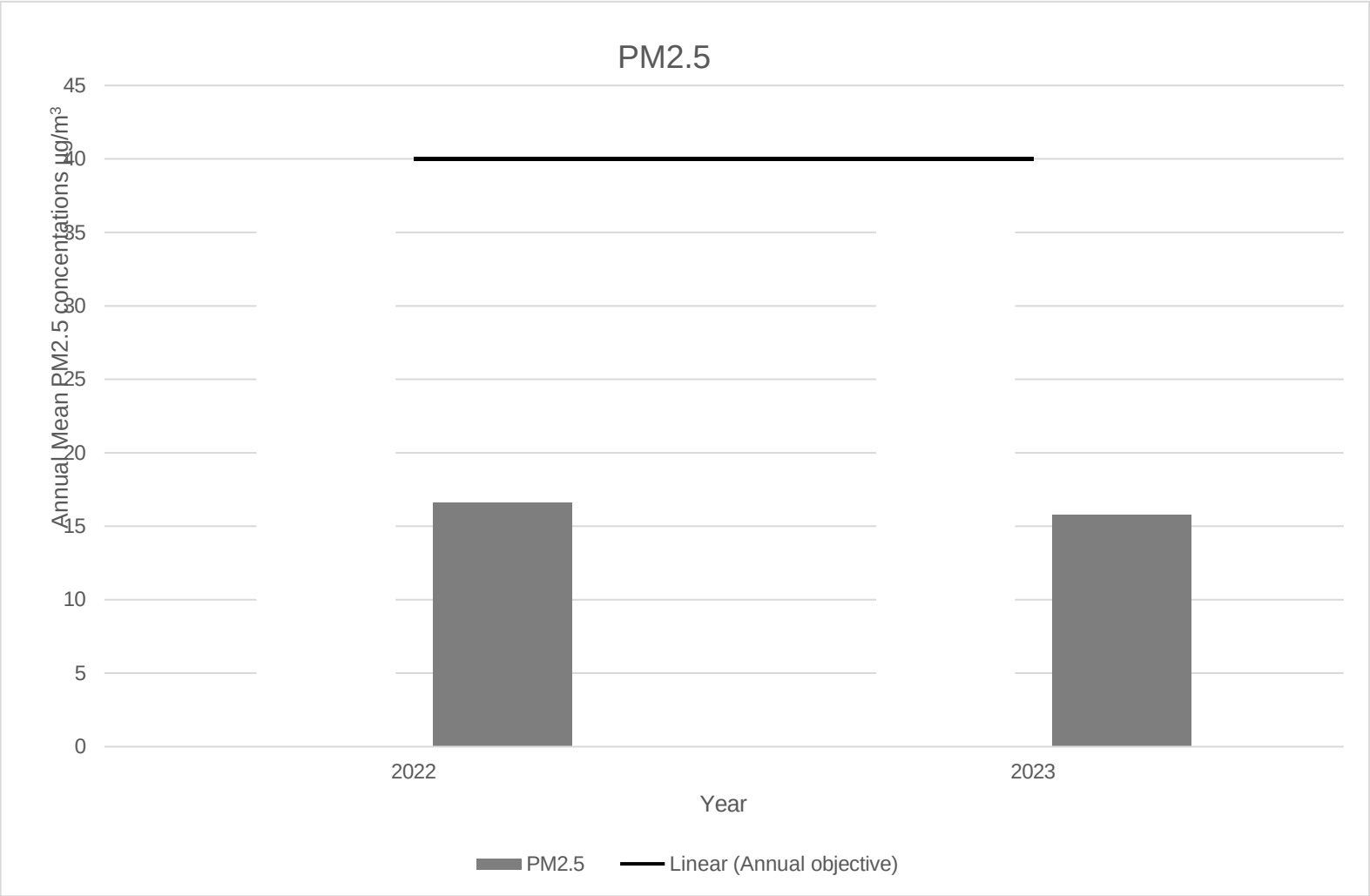
The annual mean concentrations are presented as $\mu g/m^3$.

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.4 – Trends in Annual Mean $PM_{2.5}$ Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO_2 2023 Diffusion Tube Results ($\mu g/m^3$)

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 <(0.77)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
TN5a	572611	158545	34.6	35.8	28.0	23.3	23.1	22.4	26.0	23.8	29.8	29.4	29.8	25.0	27.6	21.2	-	
TN7b	570391	159032	35.4	37.4	25.5	27.1	25.1	22.6	22.5	28.1	29.9	31.1	30.1	22.7	28.1	21.7	-	
TN10	567617	157635	15.0	17.2	11.1	10.8	11.1	11.3	9.6	11.0	14.5	14.2	14.3	12.0	12.7	9.8	-	
TN18	560263	148509	16.9	18.3	10.4	9.0	9.6	9.9	5.6	7.1	11.4	12.5	15.9	9.2	11.3	8.7	-	
TN33	569201	153486	51.6	55.4	39.9	47.7	47.0		28.9	41.8	50.9	45.7	47.5	26.0	43.9	33.8	-	
TN35	558948	146277	37.8	40.6	36.4	34.3		35.2	23.9	28.3	36.3	34.1	30.0	22.5	32.7	25.2	-	
TN43	569187	153498	37.7	37.8	27.4	27.0	32.7	29.3	26.5	28.4	29.7	32.6	31.5	24.2	30.4	23.4	-	
TN44	558929	146271	36.5	40.2	34.4	27.9	32.8	30.4	29.2		30.9	36.7	38.0		33.7	25.9	-	
TN47	571399	158375	23.9	25.0	13.7	13.8	13.7	13.1	9.4	14.2	20.0	16.4	20.5	12.4	16.3	12.6	-	
TN57	570467	158328	34.6	38.3	26.2	26.2	22.6	25.3	24.3	26.1	31.0	27.4	29.0	20.4	27.6	21.3	-	
TN60	572423	157932	43.7	43.3	33.8	35.0	29.6	34.3	37.6	34.7	36.1	41.2	39.2	27.4	-	-	-	
TN62	572423	157932	39.5	43.2	32.3	35.5	32.2	34.0	36.8	36.1	39.7	43.2	40.9	29.6	-	-	-	
TN63	572423	157932	42.4	44.2	32.6	33.6	33.0	32.0	35.2	35.0	40.5	42.7	34.8	30.1	36.5	28.1	-	
TN70	560567	157328	40.3	32.1	34.7	35.1	30.3	33.6	34.5	32.0		38.2	39.2	33.0	-	-	-	
TN72	560567	157328	36.5	37.4	34.8	35.2	28.9	29.6	36.0	33.9		36.3	40.6	33.8	-	-	-	
TN73	560567	157328	42.4	43.3		34.5	31.3	34.3	35.6	31.6		43.2	35.2	35.2	35.4	27.2	-	
TN45	558864	146166	42.8	39.0	38.0	29.7	32.8	28.8	27.7	26.9	30.5	34.6		27.3	-	-	-	
TN74	558864	146166	38.8	41.4	34.5	31.8	32.9	28.0	26.1	29.7	35.6	32.9		26.3	-	-	-	
TN75	558864	146166	42.3	42.1	32.0	29.6	31.5	28.3	24.6	26.5	34.6	31.4	31.1	28.3	32.2	24.8	-	
TN42	569226	153475	58.8	61.8	49.7	54.9	48.5	54.6	36.4	43.0	62.1	52.7	28.5	34.4	-	-	-	
TN76	569226	153475	59.9	62.2	38.4	55.9	51.3	52.3	38.8	49.9	60.3	51.7	56.8	29.9	-	-	-	
TN77	569226	153475	42.7	65.7	43.8	53.5	48.3	50.6	36.4	49.5	56.9	52.6	58.8	38.5	49.7	38.3	-	
TN80b	572124	158627	39.3	36.7	29.7	26.0	19.7	18.9	19.5	23.9	29.6	30.2	33.4	25.3	27.7	21.3	-	
TN86	560867	157302	24.6	23.7	17.5	13.9	17.6	16.6	13.3	15.1	19.5	21.2		15.5	18.0	13.9	-	
TN93	560717	157266	34.4	37.2	25.9	27.9	27.4	30.0	18.1	25.8	30.9	29.8	33.1	20.0	28.4	21.8	-	
TN95	560831	157004	19.0	15.8	10.2	9.2	11.0	9.6	8.2	8.5	11.2	12.4	13.6	9.1	11.5	8.8	-	

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 <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
TN96	559148	146889	27.7	32.3	25.6	31.0	32.1	29.3	17.9	19.0	26.4	26.0	28.5	17.7	26.1	20.1	-	
TN83	570740	159667	39.7	41.9		30.3	26.9	30.0	28.4	32.3	36.6	40.0	35.3	20.4	-	-	-	
TN98	570740	159667	38.1	41.7	28.6	30.3	25.0	30.1	28.0	32.6	36.6	34.9	31.8	25.0	-	-	-	
TN99	570740	159667	40.5	42.9	28.6	29.9	25.6	29.6	28.0	33.2	37.4	36.0	38.5	24.0	32.4	25.0	-	
TN102	572768	157186	20.5	23.5	12.9	17.5	21.0	15.9	9.9	12.8	16.9	14.2	18.0	6.1	15.8	12.1	-	
TN104	572976	157726	38.1	43.7	26.7	29.8	30.8	31.5	29.7	33.7	40.3	34.7	34.0		33.9	26.1	-	
TN106	570193	158327	43.8	47.9	30.0	36.9	38.3	36.2	31.9	32.8	43.1	39.2	40.1	25.0	-	-	-	
TN150	570193	158327	28.2	31.8	31.0	32.1	28.5	27.9	26.9	26.1	33.8	32.4	29.0	22.1	-	-	-	
TN151	570193	158327	43.8	47.9	30.0	36.9	38.3	36.2	31.9	32.8	43.1	39.2	40.1	25.0	34.4	26.5	-	
TN109	558743	145922	28.2	31.8	31.0	32.1	28.5	27.9	26.9	26.1	33.8	32.4	29.0	22.1	29.2	22.4	-	
TN110	559012	146433		33.3	29.0	26.4	26.8	24.7	26.3		28.1	29.4	25.2	20.7	27.0	20.8	-	
TN118	563209	157995	31.5	33.0	29.0	30.3	30.1	25.5	24.5	24.9	31.7	28.5	29.6	20.0	28.2	21.7	-	
TN119	572924	158986	32.6	30.8	21.6	21.0	14.0	21.5	20.8	21.0	22.7	26.4	48.3	20.4	25.1	19.3	-	
TN122	569168	153501	35.8	39.8	24.3	31.8	32.7	33.7	20.1	25.9	32.3	29.1	34.1	17.4	29.8	22.9	-	
TN123	573130	159010	35.4	35.7	23.6	26.5	24.2	21.5	21.4	22.2	28.6	34.1			27.3	21.0	-	
TN124	572152	158544	30.9	26.0	24.5	23.7	27.4	22.4	11.1	21.2	20.7	24.4	24.6	13.3	22.5	17.3	-	
TN125	558856	145731	21.3	22.2	15.0	15.2	10.9	12.2	8.0	12.7	15.8	17.5	20.3	11.4	15.2	11.7	-	
TN130	560790	157351	23.8	25.6	19.1	19.1	18.1	18.5	19.1	16.2	20.6	24.1		15.5	20.0	15.4	-	
TN131	558616	145696	30.2	32.4	28.0	28.0	30.8	27.9	21.8	23.2	24.3	29.2	28.7	17.4	-	-	-	
TN132	558616	145696	29.3	33.3	27.5	30.8	28.3	27.1	19.8	23.0	30.8	27.3	29.6	17.6	-	-	-	
TN133	558616	145696	29.6	33.3	29.1	30.5	28.9	25.9	21.9	21.4	30.3	34.9	25.2	16.6	27.1	20.8	-	
TN134	558515	145617	24.2	24.5	16.1	18.9	15.1	16.8	16.0	15.7	21.9	19.1	21.8	16.9	18.9	14.6	-	
TN135	559056	146445	30.0	28.9	25.5	20.6	18.8	17.4	21.1	21.4	29.2	27.1	27.4	21.0	24.0	18.5	-	
TN136	570430	162502	31.9	34.1	22.0	23.3	23.2	21.9	18.6	22.1	29.8	30.7	28.1	19.8	25.5	19.6	-	
TN137	575090	162364	32.3	49.7	39.1	35.4	36.9	32.4	37.1	35.4	41.2	36.3	39.7	31.7	37.3	28.7	-	
TN138	574511	162156	29.6	32.1	14.2	19.6	19.5	18.6	20.3	22.4	23.9	26.3	22.4	12.7	21.8	16.8	-	
TN139	574651	162613	30.9	30.6	23.1	18.1	25.4		13.8	19.9	23.4	20.4	24.6	10.0	21.8	16.8	-	
TN140	571165	158230	32.9	29.7	34.2		19.9	19.0	16.2	18.0	20.2	17.9	28.1	16.4	23.0	17.7	-	
TN141	560583	157337	32.8	31.6	23.3	22.0	23.4	25.8	19.9	24.4	27.8	28.6	34.0	19.1	26.1	20.1	-	
TN142	561119	157864	19.4	19.5	13.8	15.0	16.2	13.6	12.1	11.5	16.4	16.3	16.7	10.9	15.1	11.6	-	
TN143	561151	157867	20.4	23.2	16.3	14.8	18.9	12.4		13.0				10.5	16.2	12.6	-	Annualised result

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 <(x.x)>	Annual Mean: Distance Corrected to Nearest Exposure	Comment
TN144	570161	156966	40.1	42.8	29.7	32.0	27.9	30.6	31.7	28.0	35.9	36.7	34.4	24.2	-	-	-	
TN159	570161	156966	42.1	41.9	25.9	29.1	30.7	29.9	29.2	30.5	35.1	34.2	33.9	26.8	-	-	-	
TN160	570161	156966	41.8	41.0	33.9	29.7	29.7	28.3	31.0	26.2	35.6	35.9	36.4	27.6	32.8	25.2	-	
TN145	570165	156874	33.9	35.7	26.4	28.7	26.4	28.4	22.6	23.3	31.3	35.2	27.8	23.2	28.6	22.0	-	
TN146	570452	158368	27.4	29.0	16.8	18.2	18.2	14.8	15.9	17.4	20.8	21.2	22.5	16.0	19.9	15.3	-	
TN147	570718	159593	31.7	32.0	16.7	23.0	21.8	17.8	20.4	22.4	30.3	25.8	30.8	18.0	24.2	18.7	-	
TN148	570682	158852	28.6	29.1	21.1			23.0	9.5	18.8	16.1	19.5	23.8	12.3	20.2	15.5	-	
TN149	572494	158480	23.4	27.1	20.5	21.9	19.7	16.9	9.7	18.8	20.0	21.4	23.7	12.2	19.6	15.1	-	
TN152	571233	158337	34.7	34.0	24.8	21.6	26.5	23.7	18.3	21.6	26.1	25.7	28.3	16.7	25.2	19.4	-	
TN153	559611	147047	24.6	26.5	18.9	20.2	18.4	15.8	14.5	17.2	21.2	23.5	24.3	17.3	20.2	15.6	-	
TN154	569232	159801	23.3	25.8	19.2	20.8	19.5	18.9	16.9	19.6	24.4	24.3	19.5	13.7	20.5	15.8	-	
TN155	559201	147206	30.6	31.9	24.4	22.9		16.0	18.8	18.1	25.5	25.4	25.9		24.0	18.4	-	
TN156	572750	157567	46.9	50.6	36.5	35.9	31.0	35.0	36.1	37.6	45.2	39.7	39.5	26.8	-	-	-	
TN157	572750	157567	45.7	27.8	36.3	27.5	34.6	34.3	37.2	38.9	43.3	44.0	43.2	24.6	-	-	-	
TN158	572750	157567	39.3	49.4	35.4	33.7	30.9	37.8	33.7	36.6	45.4	38.5	26.4	27.2	37.0	28.5	-	

- **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.**
- **Tonbridge & Malling Borough Council confirm that all 2023 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 Tonbridge & Malling Borough Council During 2023

Tonbridge & Malling Borough Council has not identified any new sources relating to air quality within the reporting year of 2023.

Additional Air Quality Works Undertaken by Tonbridge & Malling Borough Council During 2023

Following award of the DEFRA Air Quality Grant in 2022, five suitable schools were identified for participation. Spread across the Borough the selected schools were located away from main roads to minimise the influence on air quality monitoring from such sources.

Monitoring of Nitrogen Dioxide (NO2) and Particulate Matter (PM10 and PM2.5) was carried out using five SCS Praxis OP Cubes (one at each school location) at or as near as possible to the school gate. Sensors were erected on 7 November 2022 and monitoring continued through to 10 August 2023.

Data management and QA/QC work for the sensor monitoring was subcontracted to Ricardo Energy and Environment and data was made available to participating schools and the public via Ricardos Air Quality England Website

Prior to the start of engagement with the schools, the Councils Civil Enforcement Officers (CEOs) visited the roads around each of the participating schools in early December 2022 to identify approximate numbers of car users and those who wait with engines idling.

Engagement with the schools began in February 2023 running through to April and involved presentations to school assemblies and more focused talks to school Eco clubs.

During this period of engagement anti idling signage of different types was erected on roads around the schools and on school gates/fences, and further counts of car users and those idling engines at drop off/pick up were made.

In June CEOs again visited roads around the participating schools to identify numbers of car users and those idling engines. Project staff also engaged with parents on the school run to speak with them about air pollution and a short questionnaire was completed if appropriate.

Data indicates that over the course of the monitoring period there was an improvement in AQ at each site. However, various plots including the Time Series Plot and Calendar Plots show similarities in pollution levels across all sites, which suggests weather and wider pollution events dominate. It is therefore hard to discern how much local pollutant levels were influenced by this project. However, no sites appear likely to exceed an AQ limit value.

Tallies of car users and those idling their engines at the start and end of this project appear to vary little. The results of the questionnaire provide some reasoning in so far as over 50% of respondents live more than two miles from the school with some also going/coming directly from work, they consider the car their only form of transportation. Anti Idling signage type is a key factor with respondents to the questionnaire preferring signage in which the anti-idling message is clear and unambiguous. This type of signage will be taken forward across the borough in areas where engine idling is considered an issue.

This study helped with measure 5 in developing anti idling signage for our anti idling campaign with signs set to be placed in wider areas including other schools not involved in the study.

QA/QC of Diffusion Tube Monitoring

Tonbridge & Malling Borough Council uses Socotec Didcot Laboratory which has UKAs accreditation and supplies diffusion tubes with 50% TEA in acetone. It takes part in the AIR-PT intercomparison scheme for comparing spiked Nitrogen Dioxide diffusion tubes, SOCOTEC currently holds the highest rank of a Satisfactory laboratory.

All monitoring was completed in adherence with the 2023 Diffusion Tube Monitoring Calendar.

Diffusion Tube Annualisation

All but one of the diffusion tube monitoring locations within Tonbridge & Malling Borough Council recorded data capture of 75% therefore only TN143 on Borough Green Road was required for the monitoring data to be annualised.

Table C.1 – Annualisation Summary (concentrations presented in µg/m^3)

As the diffusion tube TN143 went missing 4 times the data had to undergo annualisation to get the annual mean. Where possible similar site locations were chosen to obtain the annualisation factors to site TN143.

Site ID	Annualisation Factor Thanet Birchington Roadside	Annualisation Factor Maidstone Rural	Annualisation Factor <Site 3 Name>	Annualisation Factor <Site 4 Name>	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
TN143	1.0414	0.9855			1.0135	16.2	16.4

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2023 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.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.

Tonbridge & Malling Borough Council have applied a national bias adjustment factor of 0.77 from to the 2023 monitoring data from spreadsheet 03/24. A summary of bias adjustment factors used by Tonbridge & Malling Borough Council 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
2023	National	3/24	0.77
2022	National	03/23	0.76
2021	National	03/22	0.78
2020	National	03/21	0.77
2019	National	03/20	0.75

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 03/24

Follow the steps below in the correct order to show the results of relevant co-location studies

Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods

Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet

This spreadsheet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2024

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[5]	Bias Adjustment Factor (A) (Cm/Dm)
3197	SOCOTEC Didcot	50% TEA in acetone	2023	UB	City Of York Council	11	15	12	27.9%	G	**0.78**
3198	SOCOTEC Didcot	50% TEA in acetone	2023	R	City Of York Council	11	22	17	26.8%	G	**0.79**
3199	SOCOTEC Didcot	50% TEA in acetone	2023	R	City Of York Council	9	22	17	33.7%	G	**0.75**
3200	SOCOTEC Didcot	50% TEA in acetone	2023	R	City Of York Council	10	31	25	26.1%	G	**0.79**
3201	SOCOTEC Didcot	50% TEA in acetone	2023	UB	Gravesham Borough Council	12	19	15	25.6%	G	**0.80**
3202	SOCOTEC Didcot	50% TEA in acetone	2023	UB	Gravesham Borough Council	12	23	19	18.4%	G	**0.84**
3203	SOCOTEC Didcot	50% TEA in acetone	2023	R	Ipswich Borough Council	9	26	20	33.0%	G	**0.75**
3204	SOCOTEC Didcot	50% TEA in acetone	2023	R	Ipswich Borough Council	12	36	27	34.3%	G	**0.74**
3207	SOCOTEC Didcot	20% TEA in water	2023	KS	New Forest District Council	10	32	21	50.1%	G	**0.67**
3208	SOCOTEC Didcot	50% TEA in acetone	2023	R	North East Lincolnshire Council	12	43	26	61.9%	G	**0.62**
3209	SOCOTEC Didcot	50% TEA in acetone	2023	UB	North East Lincolnshire Council	10	13	10	29.1%	G	**0.77**
3210	SOCOTEC Didcot	50% TEA in acetone	2023	R	North East Lincolnshire Council	11	24	21	18.0%	G	**0.85**
3217	SOCOTEC Didcot	50% TEA in acetone	2023	R	Cardiff Council / Shared Regulatory Services	11	41	34	22.2%	G	**0.82**
3218	SOCOTEC Didcot	50% TEA in acetone	2023	UB	Torfaen County Borough Council	11	12	9	43.9%	G	**0.70**
3220	SOCOTEC Didcot	50% TEA in Acetone	2023	R	East Suffolk Council	12	29	21	38.9%	G	**0.72**
3223	SOCOTEC Didcot	50% TEA in Acetone	2023	R	Wrexham County Borough Council	11	17	14	25.2%	G	**0.80**
3226	SOCOTEC Didcot	50% TEA in Acetone	2023	R	Horsham District Council	12	21	17	23.5%	G	**0.81**
3227	SOCOTEC Didcot	50% TEA in Acetone	2023	R	Horsham District Council	10	25	17	43.5%	G	**0.70**
3228	SOCOTEC Didcot	50% TEA in Acetone	2023	R	Horsham District Council	10	23	24	-5.4%	G	**1.06**
3234	SOCOTEC Didcot	50% TEA in Acetone	2023	UI	North Lincolnshire Council	10	14	11	26.2%	G	**0.79**
3235	SOCOTEC Didcot	50% TEA in acetone	2023	R	Bridgend Council	11	32	27	20.8%	G	**0.83**
3237	SOCOTEC Didcot	50% TEA in acetone	2023	R	Cambridge City Council	12	22	18	24.8%	G	**0.80**
3250	SOCOTEC Didcot	50% TEA in acetone	2023	R	Leeds City Council	10	39	29	32.3%	G	**0.76**
3251	SOCOTEC Didcot	50% TEA in acetone	2023	KS	Leeds City Council	10	30	20	48.9%	G	**0.67**
3252	SOCOTEC Didcot	50% TEA in acetone	2023	R	Leeds City Council	12	25	19	30.0%	G	**0.77**
3253	SOCOTEC Didcot	50% TEA in acetone	2023	UC	Leeds City Council	11	26	19	40.0%	G	**0.71**
3266	SOCOTEC Didcot	20% TEA in water	2023	KS	Marylebone Road intercomparison	11	52	38	37.1%	G	**0.73**
3267	SOCOTEC Didcot	50% TEA in acetone	2023	KS	Marylebone Road intercomparison	11	53	38	41.4%	G	**0.71**
3279	SOCOTEC Didcot	20% TEA in water	2023	R	South Oxfordshire Distric Council	12	22	16	33.9%	G	**0.75**
3280	SOCOTEC Didcot	20% TEA in water	2023	R	South Oxfordshire District Council	10	33	29	15.8%	G	**0.86**
3284	SOCOTEC Didcot	50% TEA in acetone	2023	R	Vale Of White Horse District Council	10	22	18	21.2%	G	**0.83**
3285	SOCOTEC Didcot	50% TEA in acetone	2023	UB	Wirral Council	11	15	13	16.7%	G	**0.86**
3670	SOCOTEC Didcot	20% TEA in water	2023		**Overall Factor[3] (4 studies)**				**Use**		**0.75**
3671	SOCOTEC Didcot	50% TEA in acetone	2023		**Overall Factor[3] (28 studies)**				**Use**		**0.77**
3677											

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 Tonbridge & Malling Borough Council required distance correction during 2023.

QA/QC of Automatic Monitoring

The Environment Officer preforms the Local Site Operator duties for the automatic monitoring sites within Tonbridge & Malling Borough Council and Ricardo completes the data management for Tonbridge & Malling borough Council. Calibrations take place once a month with independent QA/QC audits are conducted annually to AURN standards by Ricardo Energy & Environment. Analysers are routinely serviced at 6 monthly intervals by a competent equipment support unit.

Datasets are ratified following AURN standard QA/QC and ratification processes, within TG(22) guidelines, on a quarterly basis. Data will be processed and scaled using all available manual and automatic calibrations. Data for 2023 is ratified.

Live & historic data is available through https://kentair.org.uk/data/data-selector.

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

$PM_{2.5}$ was worked out from the PM_{10} monitored at Borough Green. A national correction factor of 5.9 was deducted from the PM_{10} result of 21.7µg/m^3 to give derived $PM_{2.5}$ value of 15.840µg/m^3.

Automatic Monitoring Annualisation

All automatic monitoring locations within Tonbridge & Malling Borough Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data.

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 NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, automatic annual mean NO_2 concentrations corrected for distance are presented in Table A.3. No distance correction was required for any of the diffusion tubes as those that are not located on resident's properties are below 40µg/m^3.

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

Figures – Maps of Non-Automatic Monitoring Site

Figure D1 Locations of current and old diffusion tubes for AQMA 1 M20

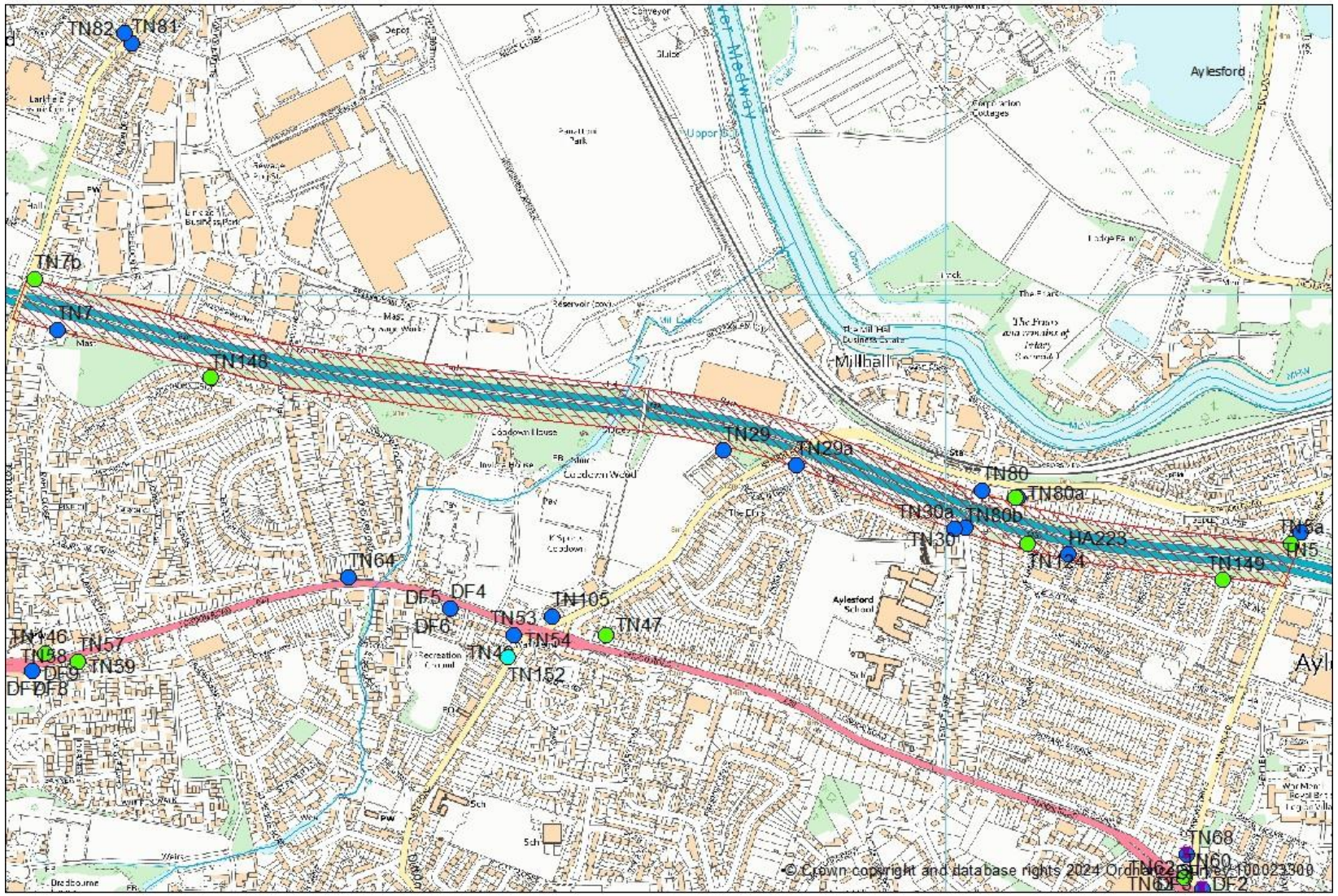


Figure D2 Locations of current and old diffusion tubes for AQMA 3 Tonbridge High Street

Figure D3 Locations of current and old diffusion tubes for AQMA 4 Wateringbury

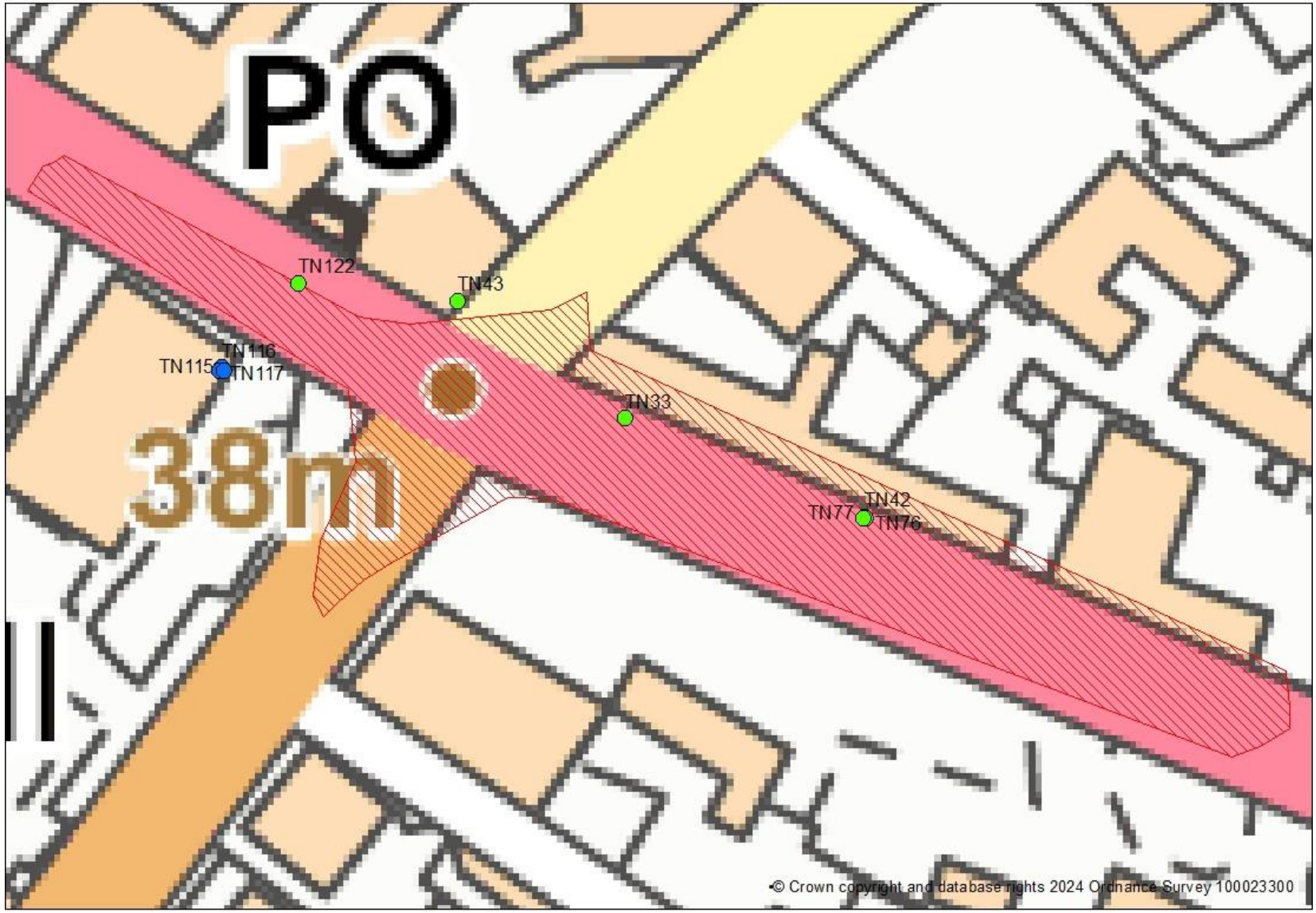


Figure D4 Locations of current and old diffusion tubes for AQMA 5 Aylesford

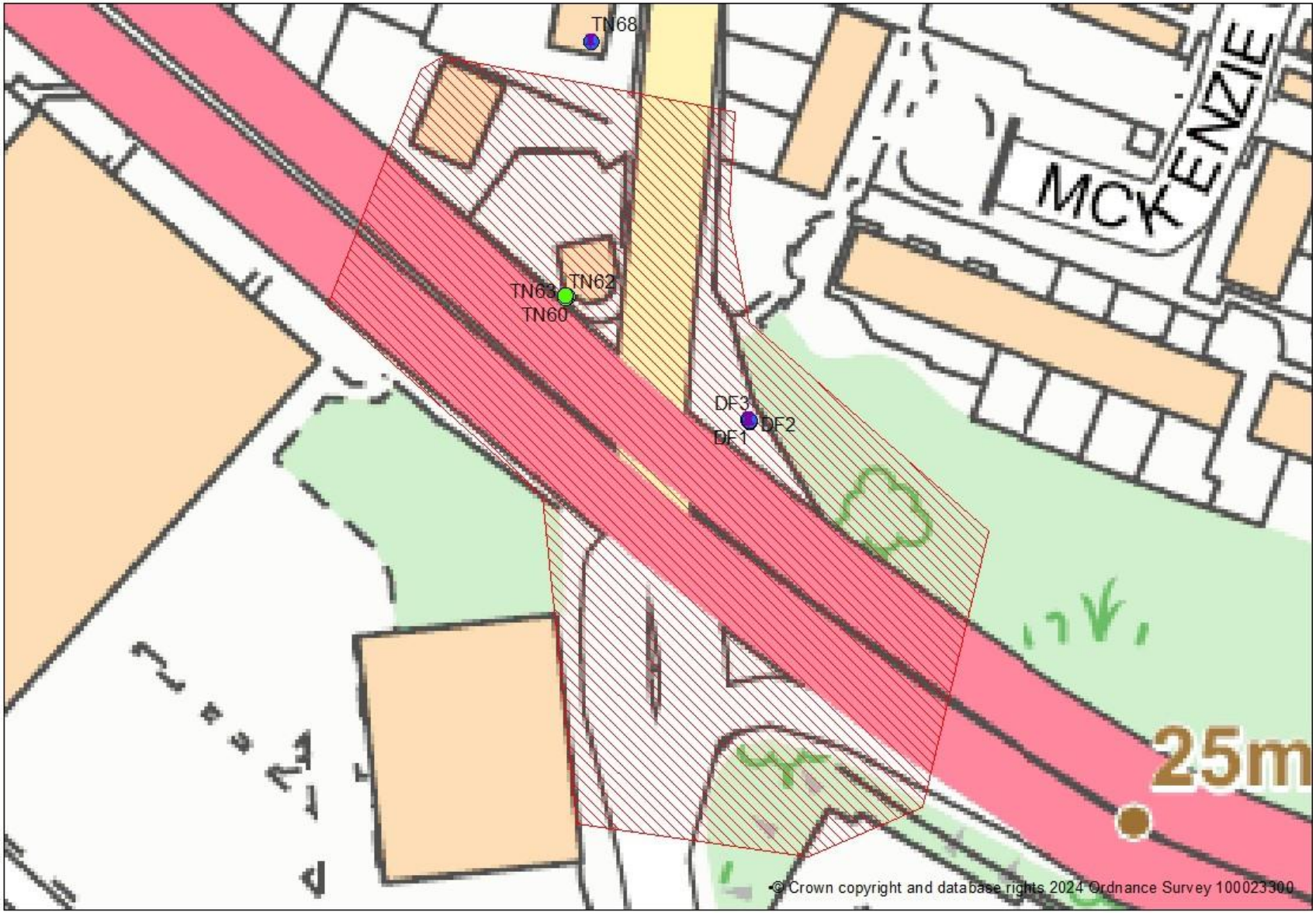
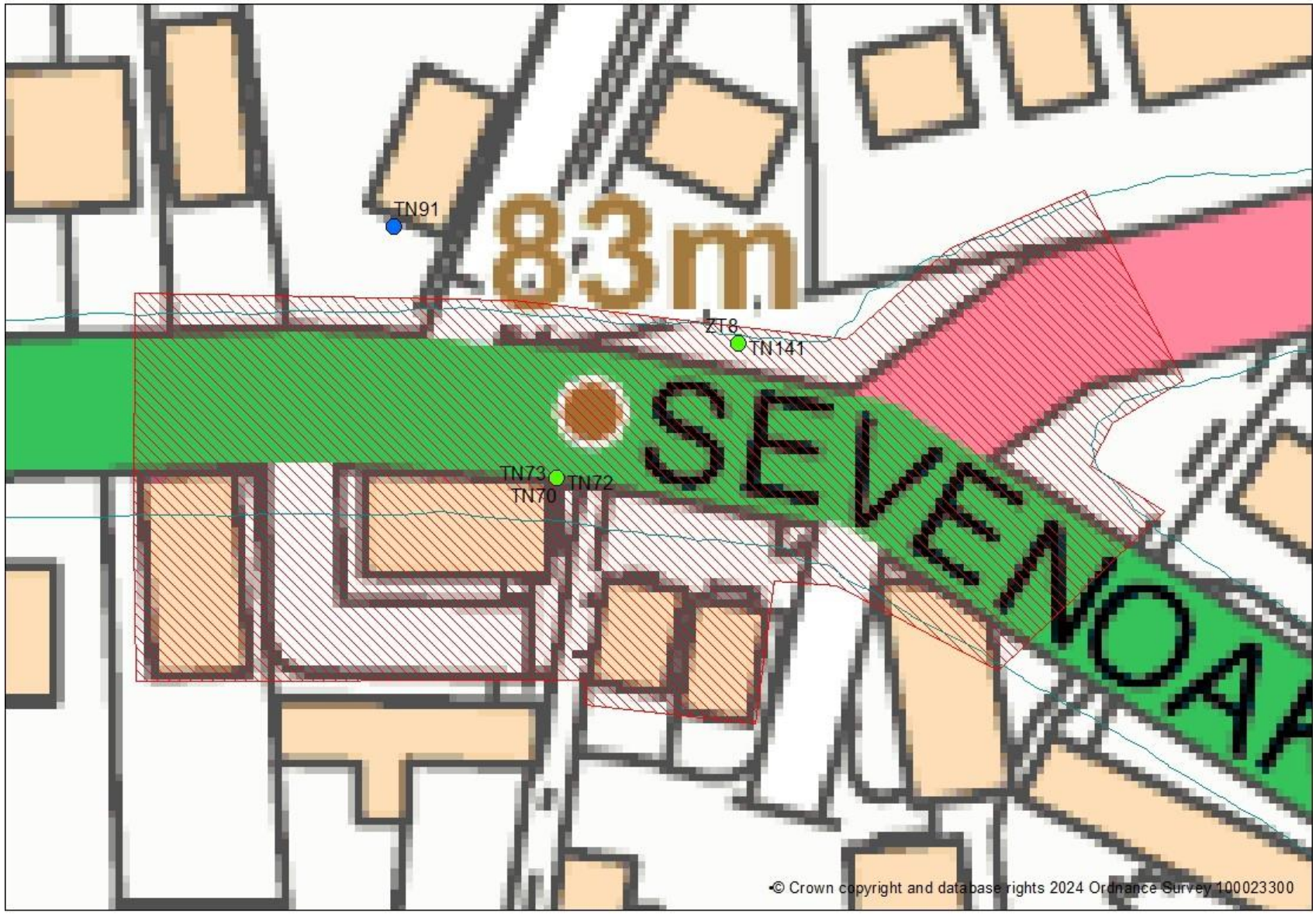


Figure D5 Locations of current and old diffusion tubes for AQMA 6 Larkfield

Figure D6 Locations of current and old diffusion tubes for AQMA 7 Borough Green



Appendix E: Summary of Air Quality Objectives in England

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

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

Appendix F: DEFRA Air Quality Grant 2021/22 - Final Report

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

Tonbridge & Malling Borough Council DEFRA Air Quality Grant 2021/22 - Final Report

Grant Determination Number 31/5979 and 31/5980. Ecm64115 itt_9158 and itt_9157

- Date: December, 2023
-

Information	<Local Authority Name> Details
Local Authority Officer	Crispin Kennard
Department	Environment Protection
Address	Gibson Building Gibson Drive Kings Hill West Malling Kent ME19 4LZ
Telephone	01732 876180
E-mail	Environmental.protection@tmbc.gov.uk
Report Reference Number	TMBCAQG21/22.final
Date	December 2023

Air Quality Grant 2021/22 - Final Report

Grant Determination Number 31/5979 and 31/5980. Ecm64115

itt_9158 and itt_9157

Contents

Project Aims

This project looks to work with selected schools gathering baseline data on engine idling focusing on drop off/pick up times, including monitoring of pollutants with a suitable mobile air quality sensor.

A different range of signage options will be erected at the schools to establish which may be most effective in changing behaviour. Post intervention data recorded to establish the effectiveness of the intervention.

The project aims to increase knowledge and awareness of particulate matter in areas where no monitoring has previously been undertaken but where sensitive receptors such as children frequent, and ultimately increase awareness of air quality issues and improve air quality by reducing pollutants including particulate matter.

Executive Summary

Following award of the DEFRA Air Quality Grant, five suitable schools were identified for participation. Spread across the Borough the selected schools were located away from main roads to minimise the influence on air quality monitoring from such sources.
Monitoring of Nitrogen Dioxide (NO^2) and Particulate Matter (PM^{10} and $PM^{2.5}$) was carried out using five SCS Praxis OP Cubes (one at each school location) at or as near as possible to the school gate. Sensors were erected on 7 November 2022 and monitoring continued through to 10 August 2023, later than originally planned but data was successfully captured none the less.

Data management and QA/QC work for the sensor monitoring was subcontracted to Ricardo Energy and Environment. Data was made available to participating schools and the general public via Ricardos Air Quality England Website Tonbridge and Malling Borough Council - Air Quality monitoring service (airqualityengland.co.uk) Although the monitoring sites are now closed, the data is still available via this link.

Prior to the start of engagement with the schools, the Councils Civil Enforcement Officers (CEOs) visited the roads around each of the participating schools in early December 2022 to identify approximate numbers of car users and those who wait with engines idling.
Engagement with the schools began in February 2023 running through to April and involved presentations to school assemblies and more focused talks to school Eco clubs.
During this period of engagement anti idling signage of different types was erected on roads around the schools and on school gates/fences, and further counts of car users and those idling engines at drop off/pick up were made.
In June CEOs again visited roads around the participating schools to identify numbers of car users and those idling engines. Project staff also engaged with parents on the school run to speak with them about air pollution and a short questionnaire was completed if appropriate.

A Summary of Air Quality (AQ) monitoring data from the five sensors is available to all at Tonbridge & Malling School Sensors Report this report also includes data from reference monitoring stations at Tonbridge High Street, and Borough Green Roadside for comparison.

Data indicates that over the course of the monitoring period there was an improvement in AQ at each site. However, various plots including the Time Series Plot and Calendar Plots show similarities in pollution levels across all sites, which suggests weather and wider pollution events dominate. It is therefore hard to discern how much local pollutant levels were influenced by this project. However, no sites appear likely to exceed an AQ limit value.

Tallies of car users and those idling their engines at the start and end of this project appear to vary little. The results of the questionnaire provide some reasoning in so far as over 50% of respondents live more than two miles from the school with some also going/coming directly from work, they consider the car their only form of transportation. Anti Idling signage type is a key factor with respondents to the questionnaire preferring signage in which the anti-idling message is clear and unambiguous. This type of signage will be taken forward across the borough in areas where engine idling is considered an issue.

At the end of engagement there is an underspend on grant money of £1,192 Revenue and £6,925.06 Capital. This will be put toward anti idling resources including more signage as we roll out the anti-idling message to more schools and other areas across the borough where engine idling is an issue, including taxi ranks and bus stops.

Work undertaken and differences to initial proposal

In hindsight the proposed timescale for this project was ambitious.

Original timeline

March 2022
Begin engagement by contacting all schools in the Borough to identify suitable candidate for participation in Phase one.
Identify and order appropriate mobile air quality monitors (allowing 6 weeks lead time for delivery).

June 2022
Begin phase one, install mobile monitors at identified school sites to obtain background data (term and holiday) prior to engagement with schools.

September/October 2022
Begin phase one engagement with schools and erect anti-idling signage.

November/December 2022
Review effectiveness of engagement and produce report on outcomes.

January 2023
Rollout anti-idling campaign across the Borough using mobile air quality monitors at selected sites to confirm outcomes are in line with those expected.

In practice, on award of the grant in March 2022, it was noted that Councillors had to sign off on the grant spend which took several weeks to achieve. Although contact was made with schools during this time, and the five participating schools identified, ultimately the air quality sensors were not ordered until 25 May.

The type of sensors eventually ordered were not those originally quoted for or mentioned in the grant application. Whilst the remit for the sensors to monitor Nitrogen Dioxide (NO^2) and Particulate Matter (PM^{10} and $PM^{2.5}$) was retained, ultimately the capital cost for the five sensors purchased (SCS Praxis OP Cubes) was significantly less than that quoted in the application. This led to the decision to bring in our usual AQ data managers Ricardo to carry out QA/QC and data management tasks for the sensors which we had originally planned to be done in house. This we feel leads to greater confidence in the sensor results, whilst still being well within the budget of the grant awarded.

Unfortunately, as the sensors are built to order, further problems arose when component shortages meant the sensors were not delivered until September 2022.
The need for the Highways Authority (Kent County Council in this instance) to carry out checks to ensure the streetlamps were able to accommodate the sensors had also been overlooked and permission was not granted until late October. The sensors were eventually erected, and baseline data began to be logged in early November some five months later than planned.

Council Civil Enforcement Officers (CEOs) carried out checks in early December 2022 on the roads around the schools to tally car use and those cars stationary with engines idling.

Engagement with the five schools began in early February 2023. This work was carried out around times convenient for the schools and involved full school assemblies discussing air pollution and then more focused discussions with the schools Eco clubs, where we looked at the results of the sensors to that point. This was well received in all instances; however, it was apparent that each school had challenges programming in the presentation and talks around their existing lesson plans. Work at the five schools was therefore not competed until April where initially only two months had been planned.

During the period of engagement with the school's, anti-idling signage was also erected on roads around the schools pushing the anti-idling message as planned.

At the end of the engagement with school children, CEOs again visited roads around the participating schools to identify numbers of car users and those idling engines. Project staff also engaged with parents on the school run to speak with them about air pollution and a short questionnaire was completed if appropriate. Sensor monitoring continued into the start of the school summer break so that AQ could be assessed without any school traffic. Originally this was planned to occur at the beginning the monitoring, but for reasons already given there was a delay in obtaining the sensors, however monitoring at the end achieves the same objective.

Proposal type and benefits/challenges of this model.

This was a Sole proposal. Originally, we had considered partnering with the University of Kent at Canterbury to assist with the behaviour change aspect of the project. Unfortunately, we could not reach agreement before the grant submission deadline and the decision was taken to run as a sole project. At no point did we consider joining with another Local Authority.

As a benefit of this delivery model, we were able to make decisions unhindered by the wants or needs of a partner with the full flexibility that entails. Project staff could work and develop presentations as they felt appropriate, and the equipment purchased through the grant would remain ours at the end of the project.

A disadvantage of this model is that it limits resources to those within this authority. This includes the knowledge and experience of staff. In this respect, this is the first AQ project funded by grant money for some years, and staff were inexperienced with the bureaucracy both within the Council and as required as part of the project updates to DEFRA. This has presented challenges and is in part responsible for the timeline slippages. However, although the timeline slipped the aims and objectives have remained unchanged.

Effectiveness of project

The project looked to reduce pollution emissions at/near the school gate by reducing engine idling and/or car usage and to raise aware of air pollution including particulate matter.

Once set up, the air quality sensors collected useful data on pollutants which could be viewed on a national website Tonbridge and Malling Borough Council - Air Quality monitoring service (airqualityengland.co.uk) by school children and parents alike. This allowed children to engage much better with the idea of air pollution as they could see a visible representation and could define that pollution often rose around school drop off and pick up times.

The sensor monitoring results which are summarised at Table 1 below, and in more detail at Tonbridge & Malling School Sensors Report indicate some improvement in AQ at the five sites between November 2022 and August 2023. However, it is difficult to discern how much of this is linked to the project, and how much is due to the weather as there are similarities in results across all sites on certain days, and it would normally be expected for pollutants such as NO^2 to be poorer during colder weather anyway, as inversion layers keep them closer to ground level.

Management of the AQ sensor data through the project was managed by Ricardo who also manage day to day LAQM data for the Council. Initially the plan had been to manage the sensor data in house. However, the reduced capital costs of the sensors eventually purchased allowed us to bring in Ricardo who were also able to co-locate the sensors at the start and end of the project with more sensitive AQ analysers to provide greater faith in the accuracy and ultimate ratification of sensor data. Irrespective of the question around the effects of this project on AQ at the participating schools, it can be confirmed that there is little likelihood of the areas around the schools exceeding any AQ limit value for NO^2 or Particulate Matter.

From checks, the number of people using cars to bring children to school and those subsequently leaving their engine idling whilst waiting, seemed to vary very little between the start and end of the project. However, numbers were lower than expected to begin with, and only 6 cars maximum were noted to be idling at a school on a given day (Table 2). Coupled with the fact no car idling identified was within 10m of a sensor, it is likely that the weather is the main driver in the improvements noted in AQ over the period. As to the number of cars, the response by parents to the questionnaire showed that across the five schools, over 50% of respondents lived more than two miles from the school (Chart 1 below) and 42% gave distance as a factor in driving rather than walking to school (Chart 3). 19% of respondents also said that going to/coming from work was a consideration in driving to the school.

A decision was taken to trial the anti-idling signage using temporary A4 size ‘correx’ boards. Chart 7 shows that these were not very effective and went unnoticed by 70% of respondents. A further question also made clear that people prefer unambiguous signage such as Option B (Chart 8) which was preferred by over 50% of respondents. This design will be used as the basis of further purchases using remaining grant money. Furthermore, signage will now be purchased using more durable material in a larger size, to progress the anti-idling message across other areas of the Borough.

Table 1

Monthly results in µm^{-3} (data capture >75%)										
School	Pollutant	Nov 22	Dec 22	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	Jul 23
CG	NO2	12.8	25.3	24.3	23.2	16.0	16.3	12.5	11.0	9.0
	PM10	14.8	25.3	18.9	23.7	17.5	19.1	18.5	20.5	14.0
	PM2.5	8.5	16.8	10.0	14.3	8.6	11.2	8.4	8.7	5.4
RR	NO2	16.0	24.0	22.2	23.3	19.8	20.7	17.0	15.7	14.0
	PM10	13.2	17.2	14.0	19.1	12.5	16.7	15.8	18.7	13.3
	PM2.5	8.6	12.5	8.3	12.4	7.4	10.5	8.8	9.2	5.6
WM	NO2	15.4	23.2	23.1	26.3	23.3	22.6	16.3	18.6	16.4
	PM10	14.4	16.6	14.9	21.2	15.3	19.7	17.9	19.7	13.9
	PM2.5	8.8	11.0	8.5	13.5	8.4	12.0	9.0	9.4	5.0
DI	NO2	16.6	26.3	22.5	22.9	19.1	21.7	17.7	16.7	14.6
	PM10	14.8	24.4	20.5	22.2	14.5	18.9	17.3	19.9	13.7
	PM2.5	8.8	16.0	11.5	13.5	7.9	11.1	8.7	9.4	5.3
WAS	NO2	12.8	21.2	18.1	21.1	13.8	15.7	9.4	11.3	10.5
	PM10	13.6	16.8	13.6	19.8	12.6	16.0	15.5	18.2	12.7
	PM2.5	6.8	9.7	7.1	11.8	6.5	8.9	7.7	8.6	4.7

Table 2

	Cars recorded at schools AM/PM (engines idling)				
	CG	RR	WM	DI	WAS
05/12/2022	33 (4) AM 25 (0) PM				
06/12/2022		9 (0) AM 15 (2) PM			
08/12/2022			22 (3) AM 29 (2) PM		
13/12/2022				10 (1) AM 13 (1) PM	
06/01/2022					30 (6) AM 29 (5) PM
31/01/2023			20 (1) AM		
02/02/2023	18 (1) PM				
07/02/2023		16 (0) PM			28 (3) AM
08/02/2023				8 (0) AM	
23/02/2023	16 (2) PM				25 (3) AM
01/03/2023				8 (1) AM	
02/03/2023		12 (1) PM			
19/04/2023			25 (3) AM		
20/04/2023	19 (1) PM				

Chart 1

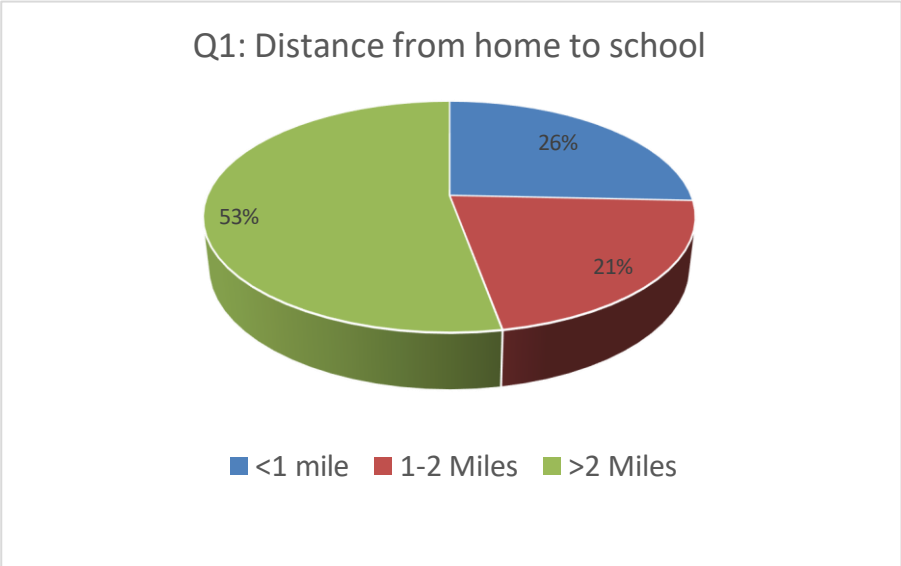


Chart 2

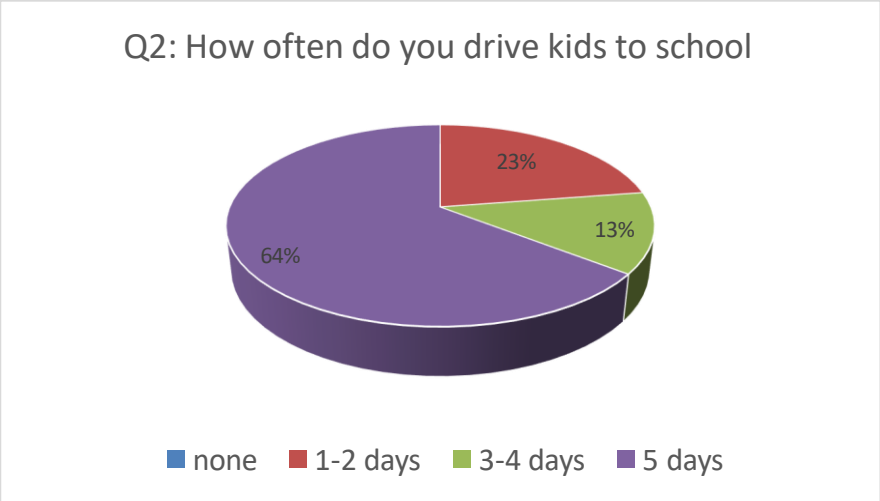


Chart 3

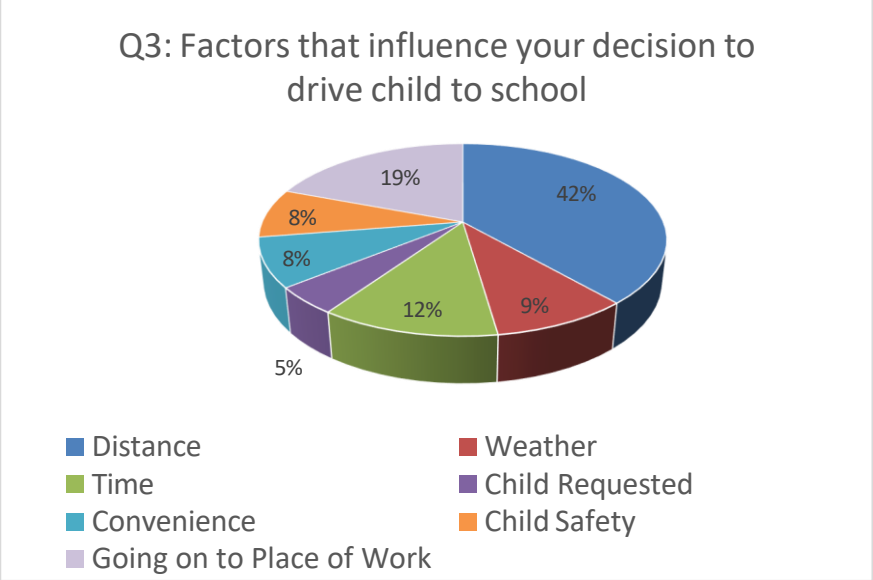


Chart 4

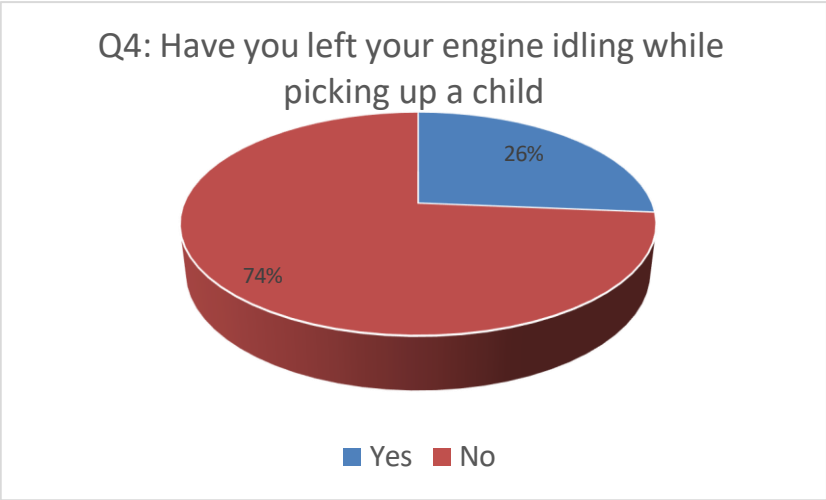


Chart 5

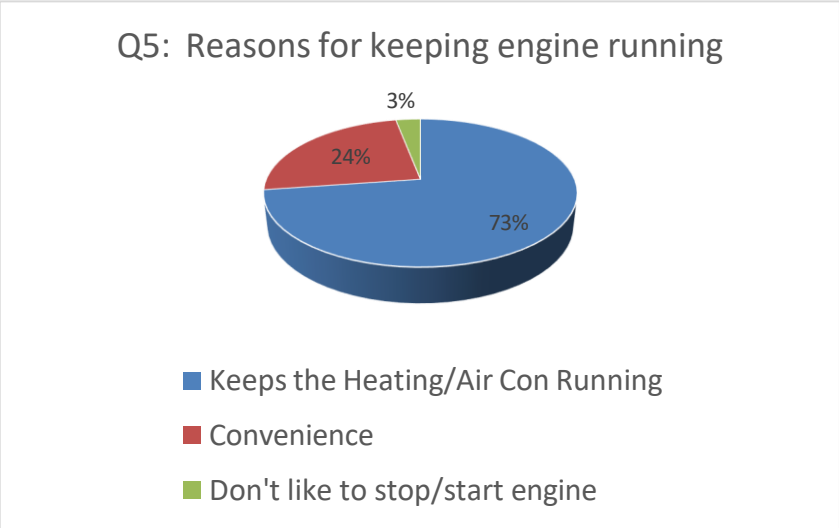


Chart 6

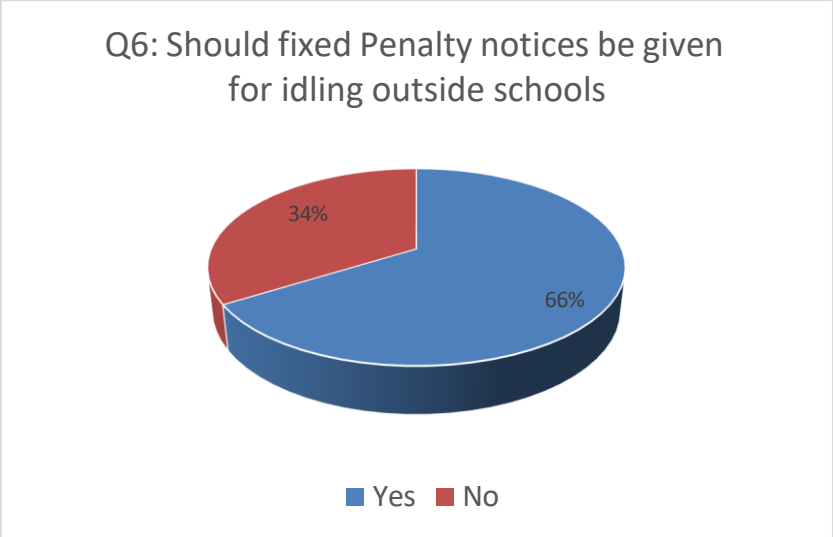


Chart 7

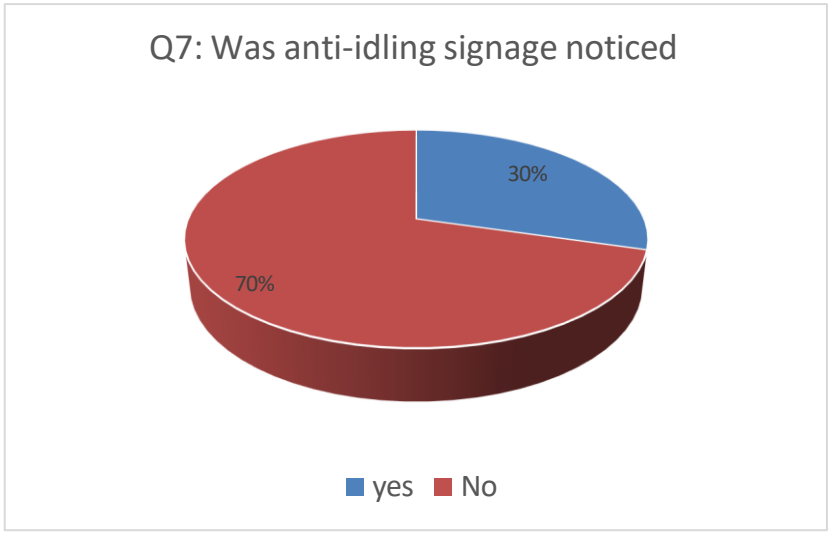
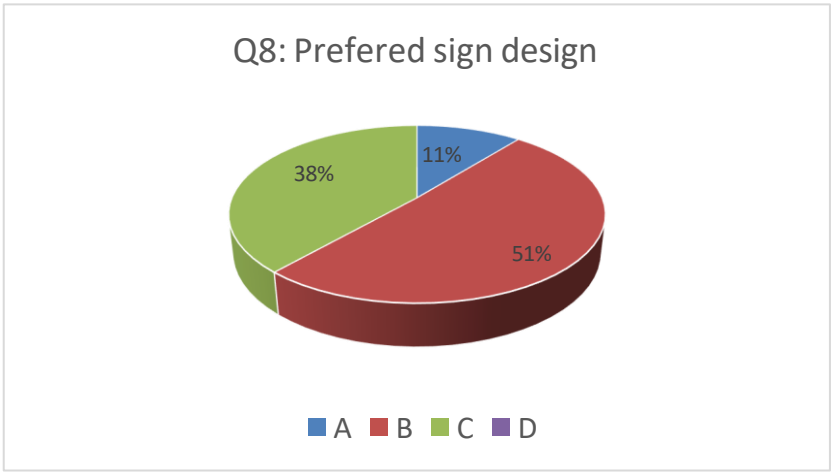


Chart 8



A B C D

Assessment of Project Delivery

As the first project of its type at the Council, this was a learning curve for those involved. In retrospect the initial plan to review monitoring data in house would have been impractical and the cost saving of the initial sensor purchase gave good flexibility to bring in our usual AQ data managers Ricardo. This provides good confidence in the sensor results which as planned were placed close to the school gates, at schools which were situated away from the main roads where pollution from that source is likely to have dominated results.

A decision was taken early on for the project manager to deliver the engagement with schools due to their knowledge in the subject area, thereby saving some staffing costs. In other aspects, the project was delivered as planned, with different 'anti idling signage being installed around the schools during the period of engagement, including designs A and B as shown in conjunction with Chart 8. However, initially a supply of 'correx board' signs in A4 size were purchased to see how noticeable/popular each were within the street scene. As results of the questionnaire show in Chart 7, most respondents had not noticed the signage. Further purchases of more durable signage have been made for A3 size as a minimum in design B which was the most popular with respondents (Chart 8).

The savings from initial quotes have resulted in a total grant underspend of £8,117.06 on this project. It is proposed that this money will be spent on further purchases of durable anti idling signage and other promotional material as the anti-idling message is rolled out to other schools and areas where idling is seen as an issue, such as bus stops and taxi ranks, as currently no other Council budget exists for this expense.

Stakeholder Engagement

The primary stakeholder engagement in this project were the school talks with the participating schools. Each involved a whole school assembly where a short animation outlining air pollution and its sources aimed at children was played, followed by discussions around how children travelled to school and how that could impact on air pollution. Follow up meetings with the schools Eco Clubs were then undertaken to reinforce the messages given during the assembly, and to discuss the monitoring and review some of the data to highlight the levels of pollution around the schools and what could be done to help improve air quality. In some instances, the children designed posters for their school and the Eco Clubs went on to present further information to their peers.

After engagement with the children, we undertook to discuss with parents the works we were doing and if appropriate a short questionnaire was completed. This work occurred at school pick up time as it was considered more likely to be able to capture responses and engage with parents.

At times through the project our media team also releases messages reinforcing the anti - idling message to the wider community.

Best Practice and Lessons Learned

The process of obtaining permission from the highways authority to erect the AQ sensors on the streetlamp columns has been more convoluted than anticipated and an additional cost encountered. The whole process has been a learning curve for staff and being the first DEFRA grant applied for in recent years, puts us on a good footing to understand the process better in any future grant application.

Knowledge Transfer

All data recorded from the sensors is publicly available at Tonbridge and Malling Borough Council - Air Quality monitoring service (airqualityengland.co.uk) . A detailed data report is also available in the reports tab Tonbridge & Malling School Sensors Report and these links will be published on the Council website in due course.
Future projects requiring the order of specialist equipment should be given much more modest timescales to compensate for any such delays. Issue such as this as well as data acquired through the questionnaire with parents, will be passed on during updates with peers.

Financial Breakdown

Part A Staff Costs							
Name	Job title/seniority	Role in project	Approx hours spent	Hourly rate and explanation	Defra Grant	Match funding	Total
Crispin Kennard	Environmental Protection Team Manager	Manages all elements of the project	95	£50.44 based on salary and overheads	N/A	£4,791.80	£4,791.80
Steven Saxbee	Environmental Protection Officer	Assists with all elements of project delivery	50	£29.15 based on salary and overheads	N/A	£1,457.50	£1,457.50
Staff 1	Civil Enforcement Officer	Assist with data collection	20	£21.74 based on salary and overheads	N/A	£434.80	£434.80
Staff 2	Civil Enforcement Officer	Assist with data collection	20	£21.74 based on salary and overheads	N/A	£434.80	£434.80
Total as of 30 November						£7,118.90	£7,118.90

Part B Capital and Revenue Purchases							
Activity/work package	Information	Defra Grant fund Revenue	Defra Grant fund Capital	Total - Sum of Defra funding	Match funded Revenue	Match funded Capital	Sum of Defra and Match funding
		£5,342	£31,322	£36,664			
Purchase mobile air quality monitors	Purchase of five mobile air quality sensors at £2,668 per sensor total £13,340	N/A	£13,340	£13,340	N/A	N/A	**£13,340**
Weather proof commando sockets	Weather proof commando socket option for sensors at £50 per sensor total £250	N/A	£250	£250	N/A	N/A	**£250**
Sensor co-location study	Co-location of sensors prior to deployment £285 per sensor total £1425	N/A	£1,425	£1,425	N/A	N/A	**£1,425**
Sensor QA/QC and ratification (6 months)	QA/QC works and ratification for sensors (6 months) £500 per sensor total £2,500	N/A	£2,500	£2,500	N/A	N/A	**£2,500**
Sensor system set up	Sensor system set up and placement of data on website total £1000	N/A	£1,000	£1,000	N/A	N/A	**£1,000**
Sim Card	Sim Card for sensors. £180 per sensor (per year). Total £900	£900	N/A	£900	N/A	N/A	**£900**
Data collection	Hourly data collection, checking and daily manual checks (6 months) £650 per sensor. Total £3,250	£3,250	N/A	£3,250	N/A	N/A	**£3,250**
Highways fee for attachments to street furniture	Fee payable to Kent Highways for attachments to street furniture (signage/monitors). Total £112	N/A	£112	£112	N/A	N/A	**£112**
Highways fee for load bearing tests	Fee to Kent Highways for load bearing tests on lampposts where sensors to be placed. Total £900	N/A	£900	£900	N/A	N/A	**£900**
Connection of sensors to lamp posts	Fee to PSR lighting to install sockets and erect sensors. Total £1,475	N/A	£1,475	£1,475	N/A	N/A	**£1,475**

Signage	A3 Anti-idling signage (dibond) 25 signs hole punched. Total £214	N/A	£214	£214	N/A	N/A	**£214**
Signage	A4 Anti-idling signage (correx) 50 signs hole punched. Total £169	N/A	£169	£169	N/A	N/A	**£169**
Banners	Anti idling banners x5 Total £176.94	N/A	£176.94	£176.94	N/A	N/A	**£176.94**
Signage	A3 Anti-idling signage (dibond) 20 Signs with rails and fixings.	N/A	£510	£510	N/A	N/A	**£510**
Removal of sensors	Removal of sensors by PSR Lighting. Total £900	N/A	£900	£900	N/A	N/A	**£900**
Sensor co-location study	Co-location of sensors at end of deployment £285 per sensor total £1425	N/A	£1,425	£1,425	N/A	N/A	**£1,425**
Total spend as of 30/11/2023		£4,150	£24,396.94	£28,546.94			**£28,546.94**
Unspent grant money as of 30/11/2023		£1,192	£6,925.06				

Signatory

Name of Officer at the local authority:

Crispin Kennard

Name of Local Authority:

Tonbridge and Malling Borough Council

Date:

15 December 2023

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
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
- Air Quality Strategy – Framework for Local Authority Delivery. August 2023. Published by Defra.