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 Tunbridge Wells Borough

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

Tunbridge Wells is a borough in the county of Kent. Kent is the most populous County Council area in the Southeast Region. There are currently estimated to be 1,593,200 people living within the Kent County Council area.

The borough of Tunbridge Wells consists of the main town of Royal Tunbridge Wells and several small towns and villages including Paddock Wood, Cranbrook and Hawkhurst. The borough is largely rural in character.

The mid-year population of the borough in 2022 was 116,000, which represents 7.3% of the population of Kent, based on figures from Kent County Council[1]. This was up from 115,200 in 2011 and is expected to rise to 128,700 by 2030. The main roads which serve the borough include the A26, A264, A267 and the A21.

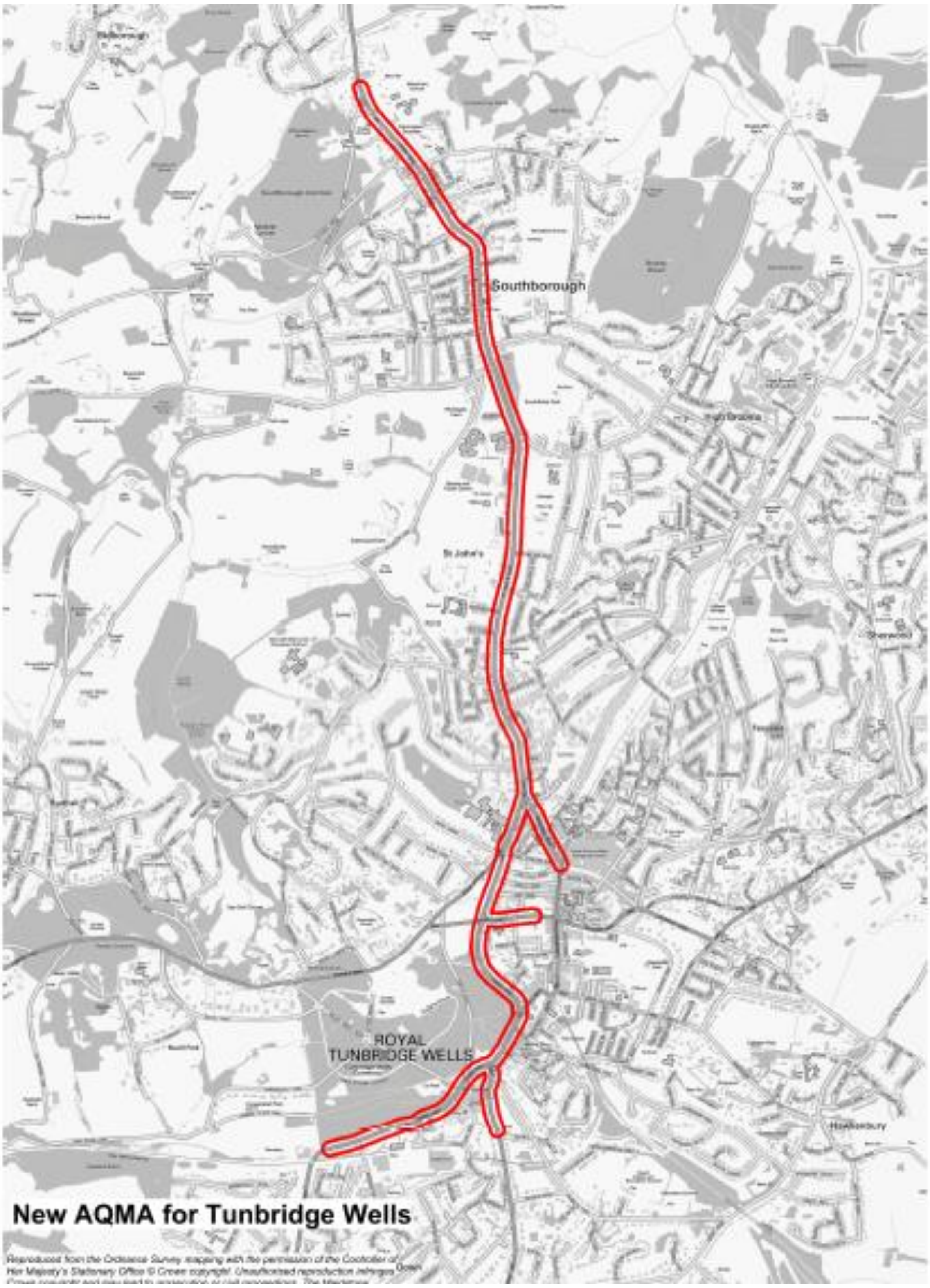
Royal Tunbridge Wells suffers from congestion, particularly on the approach roads to the town centre. Other pollution sources, including commercial, industrial, and domestic sources, also contribute to the background pollution concentrations.

At the start of 2023, there were two Air Quality Management Areas (AQMAs) declared in the Borough, both due to exceedances of the annual mean Air Quality Strategy (AQS) objective for nitrogen dioxide (NO_2).

The A26 (Town Centre) AQMA

The main A26 (Town Centre) AQMA (A26 AQMA) was originally declared in 2005 and extended in 2011 due to exceedances outside of the original AQMA boundaries. At the end of 2016, Tunbridge Wells BC commissioned Air Quality Consultants Ltd to review the boundaries of its AQMA again. The review concluded that the northern and southern ends of the AQMA could be extended, but that the width of the AQMA could be reduced. This process was formally completed in 2018, with the new AQMA taking effect from 1st September 2018.

Map of Tunbridge Wells A26 AQMA.



The Air Quality Action Plan adopted by the Council in 2010 was largely completed by 2017, therefore a new action plan was produced during 2018 to cover the period 2018 to 2023. The new plan was adopted by the council in early 2019 and several actions were implemented, although progress in 2020 and 2021 was hampered by the COVID pandemic.

More recently, our efforts were more focused on declaring the AQMA in Hawkhurst and the subsequent development of the associated Air Quality Action Plan and progress on the A26 AQAP has been given a lower priority because of the recognition that compliance with all objectives in the main AQMA had already been achieved for several years.

The 2023 annual mean NO_2 level, measured at the A26 St John's Roadside automatic monitoring location decreased to 23µgm^{-3} from 25µgm^{-3} in 2022. Out of 31 diffusion tube monitoring sites, two sites showed an increased level, four sites were unchanged, which we define as the 2023 level being within ±1µgm^{-3} of the 2022 level, and 25 tube sites indicated a lower level in 2023 compared to 2022. The average change across all 31 sites was a reduction of 3.52µgm^{-3}.

The 1-hour objective for NO_2 was met yet again at the automatic monitoring station, with no instances of the hourly mean exceeding 200µgm^{-3}. No exceedances of the hourly mean have been recorded in the last five years. We believe there has probably been a continuing trend of reductions in underlying NO_2 levels across the borough in the last 6 or 7 years. In analysing the trends for pollutant levels for the years 2020 and 2021, it is important to acknowledge the significance of the COVID-19 pandemic on individual and institutional behavioural changes which may have led to lower-than-predicted pollutant levels. Consequently, these years may not accurately reflect typical air quality trends, and the data should be interpreted with caution.

We have seen a steady decline in NO_2 levels at the automatic monitoring station over the past nine years, during which annual mean NO_2 levels have dropped from 48ugm^3 in 2014 to 23 ugm^3 in 2023. This reflects a national downward trend in pollution levels which is occurring because of the introduction of Euro VI engines, increased uptake of electric and hybrid vehicles, and the natural disappearance of some of the oldest and most polluting vehicles from the roads as they reach the end of their service lives. Since 2016, there have been no exceedances of the annual mean objective at relevant receptors in the A26 AQMA.

In 2023, the highest annual mean level of nitrogen dioxide measured in the Borough was 40.8µgm^{-3} recorded at site TW82. This was the only site at which an exceedance of the NO_2 annual mean objective was recorded. An exceedance was also recorded at this site in 2022 and 2021. TW82, a new site in 2021 is located by Dorin Court on the Pembury Road. Pembury Road is one of the busier roads in Tunbridge Wells, and is prone to congestion at peak times, so high NO_2 levels would be expected by the roadside, however, the road is very wide, with few obstacles to the dispersion of NO_2, and the residential properties are well spaced and set well back from the road. Thus the 40.8µgm^{-3} recorded at the tube site was distance corrected to 25.8µgm^{-3} at the nearest relevant receptor.

One other site recorded a level within 10% of annual mean objective for NO_2 in 2023, namely TW41. TW41 is on the London Road near the Pantiles, in the main Tunbridge Wells A26 AQMA. It recorded an NO_2 level of 39.5µgm^{-3}, which was distance corrected down to 29.6µgm^{-3} at the nearest residential receptor. TW41 was one of the few sites in the Borough where a small increase in NO_2 levels was recorded in 2023 compared to 2022.

It has been clear for some time that the A26 AQMA has been compliant with all air quality objectives for several years. Whilst we might have revoked the AQMA sooner, we were aware that reductions in pollution levels were generally seen in 2020 and 2021 because of the Covid pandemic, and we wanted to see what happened to levels in 2022 before making any recommendation to revoke. However, 2022 levels were very similar to those in 2021, therefore during 2023, Officers prepared a report to TWBC Cabinet recommending the revocation of the AQMA. The report will be presented to Cabinet in early 2024.

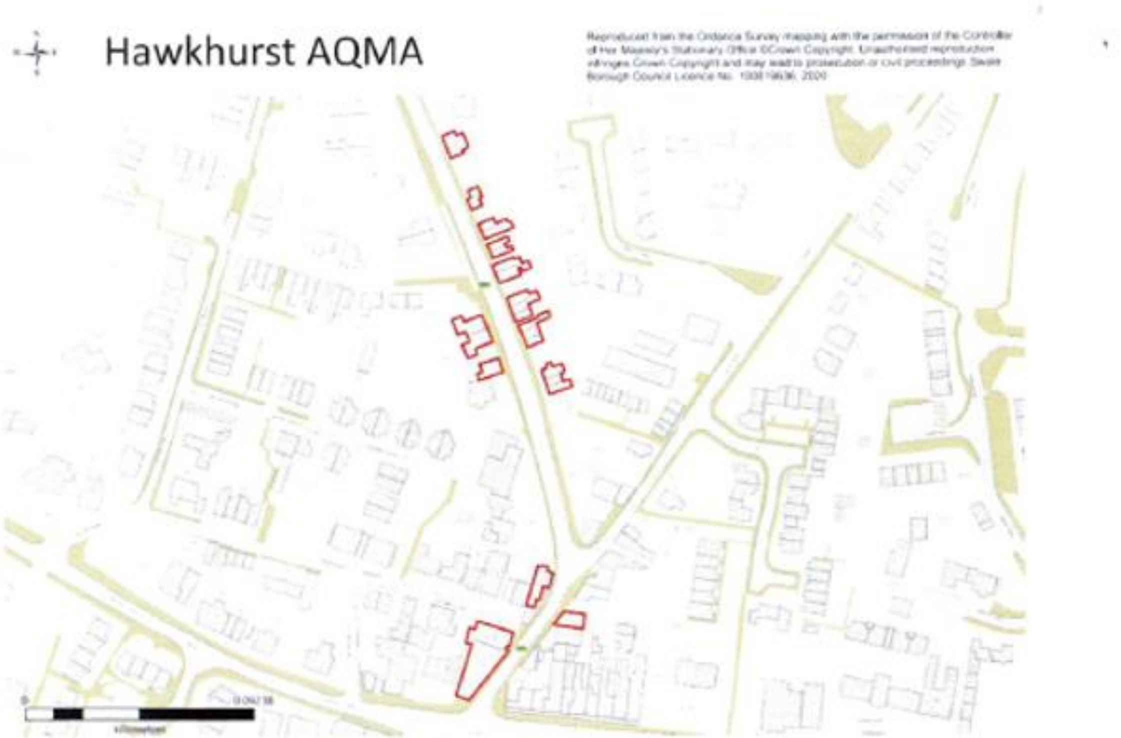
The Hawkhurst AQMA

A new AQMA was declared in Hawkhurst (Hawkhurst AQMA) at the end of 2021. This was based on a detailed assessment carried out in 2020 by Air Quality Consultants Ltd (AQC) based on data from 2019 and reported in the 2021 ASR. Initially, 8 diffusion tube sites were in and around the Hawkhurst AQMA, although some of these produced very low readings and were discontinued at the start of 2023.

TW63 is a triplicate site in the new Hawkhurst AQMA, and the annual mean recorded there in 2022 was 44.1µgm^{-3}, making it the highest reading site in the Borough that year. The site was not distance corrected by the diffusion tube data processing tool since it is on the façade of a building, but there is no residential occupancy in that part of the building at ground floor level. The nearest relevant residential exposure is at first floor level and is a little further down the hill, so receptors are less affected by queuing traffic. Therefore, it is almost certain to be below the objective. This is confirmed by the original Detailed Assessment on which the Hawkhurst AQMA was declared, where this receptor was modelled at 35.8µgm^{-3} at first floor level in 2019, when the level recorded at TW63 was 52.7µgm^{-3}.

In 2023, the level at TW63 dropped dramatically to 33.3µgm^{-3}. It was notable that all the diffusion tubes in Hawkhurst had lower readings in 2023 than 2022. The average reduction was about 6.5µgm^{-3}, which was almost double the average reduction in the Borough as a whole. There has clearly been a marked improvement in air quality in Hawkhurst, although at present we don't have a specific explanation for this.

Map of Hawkhurst AQMA



Whilst developing the Hawkhurst AQAP in 2022/23, TWBC developed a planning position statement for Hawkhurst as an interim measure, which describes how air quality considerations will be addressed for planning applications in the vicinity of Hawkhurst. The planning position statement can be found here: -

Hawkhurst Planning Position Statement

TWBC also held a public consultation on proposed measures to be included in the Hawkhurst Air Quality Action Plan. The consultation ran between 29th September and 27th November 2022. Following the consultation, a draft AQAP was produced and approved by TWBC Cabinet in March 2023. It was subsequently approved by DEFRA but required some amendments. The finalised AQAP was published in September 2023.

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 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 several 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 most Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

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

[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

Our main priorities during 2023 were to get the Hawkhurst Action Plan finalised and published, and to begin the process of revoking the A26 AQMA. Some of the key actions from the new action plan which we have also been working on in 2023 are:-

Information Campaign to residents of the new AQMA

As part of this action, we plan to introduce some street signs to inform people that they are in an AQMA. Some initial designs for signage have been produced, although a final design has yet to be chosen. Some examples are shown below.

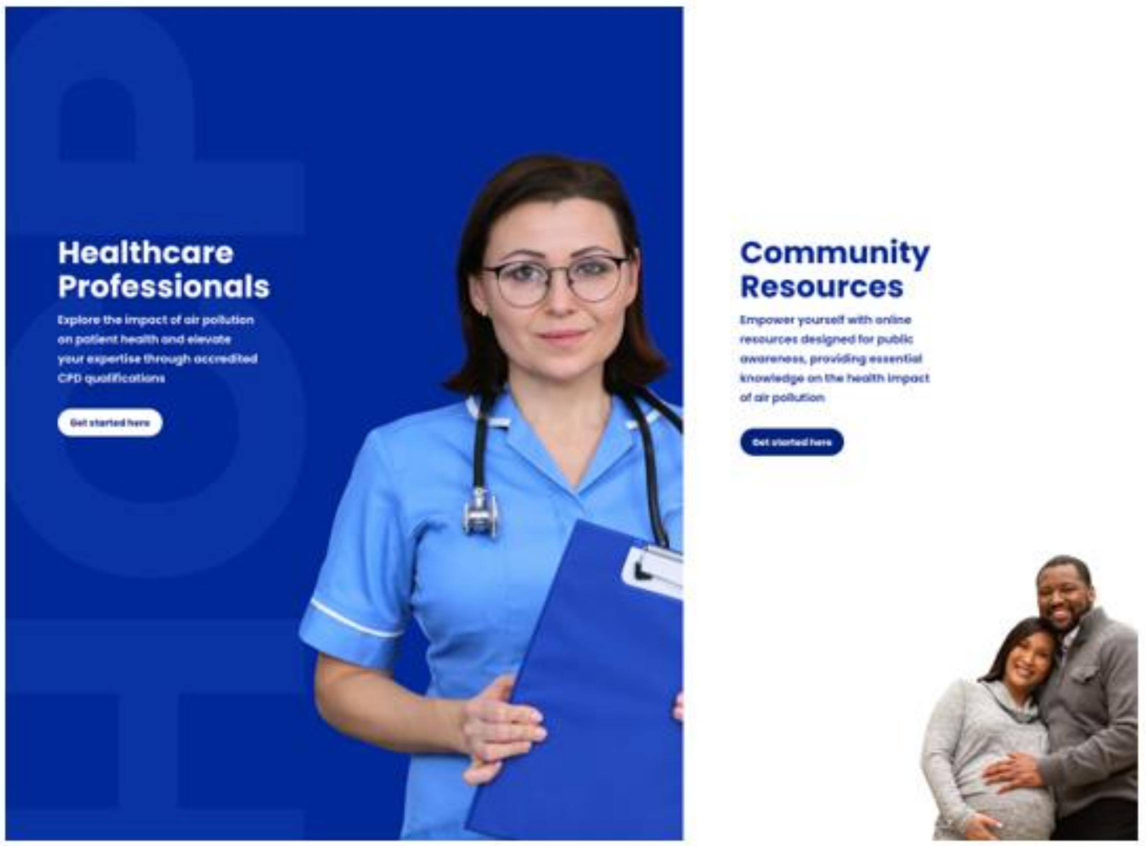
Extension to the Clean Air for Schools (CAFS) programme, with emphasis on roll-out of the Pollution Patrol Resource.

We have been pleased with the Pollution Patrol resource which was developed by TMC Communications Ltd as part of a DEFRA funded project, however, the take up amongst schools has been somewhat disappointing, despite several initiatives to promote the project. We are getting towards the end of the DEFRA funding for this project and our focus has been on trying to find a commercial sponsor to continue to develop, maintain and support the project once the DEFRA funding has finished.

Prioritise the AQMA and surrounding areas for roll out of new DEFRA funded Health Professionals AQ resource.

Work on the resource has progressed well during 2023. The development is being undertaken by TMC Communications Ltd, who developed the Pollution Patrol resource for us, in collaboration with Global Action Plan Ltd. Some examples of artwork being developed for the project are shown below.

Home Page



Practitioners Landing Page

Anti-idling signage campaign across the Borough, focussing on schools and other known or identified problem areas.

Two different styles of anti-idling sign have been designed; one for the Mid-Kent shared service, and one based on artwork from the Pollution Patrol Project. A modest start has been made on deploying these signs with about 20 having been deployed to date, in priority locations near schools.

Conclusions and Priorities

The main conclusions of the 2024 ASR are: -

Only one monitoring site in Tunbridge Wells Borough recorded an exceedance of the NO_2 annual mean objective in 2023. The site was TW82, which is on the Pembury Road, which recorded an annual mean of 40.8µgm^{-3}, therefore a marginal exceedance. However, the is not representative of relevant receptor exposure since the properties are set well back from the road at this location, with the reading distance corrected to 25.8µgm^{-3} at the nearest relevant receptor. Therefore, no monitoring location in Tunbridge Wells Borough exceeded the annual mean objective for NO_2 when distance corrected to the nearest relevant receptor.

Many monitoring locations in the Borough have recorded levels in 2023 lower than they were in 2022, and very significantly lower than they were in 2019, pre-Covid. This further strengthens the case for revoking the A26 AQMA.

There seems to have been a particular improvement in the Hawkhurst area, where the highest reading tube site in 2022, TW63, recorded 44.1µgm^{-3} in 2022, had reduced to 34.5µgm^{-3} in 2023. This site is in Cranbrook Road in Hawkhurst, in the new Hawkhurst AQMA. It is near the traffic lights and is affected by queuing traffic. However, it is not directly representative of residential receptors. The nearest residential receptor is further away from the traffic lights, thus less affected by the queuing traffic, and is at first floor level.

Since the Hawkhurst diffusion tubes have not measured any exceedances, it is likely that we will want to remodel the Hawkhurst AQMA in the next year or two, in order to clarify whether or not all the receptors sites previously identified as exceeding the NO_2 annual mean, are now compliant – this is not straightforward to ascertain directly from the diffusion tube results, owing to the topographical variations in the AQMA and the fact that there are receptors at first floor, ground floor and basement levels.

Both PM_{10} and $PM_{2.5}$ levels, as measured at the automatic monitoring station on the A26, also reduced in 2023 compared to 2022.

The PM_{10} annual mean level reduced to 20µgm^{-3} in 2023, from 21µgm^{-3} in 2022. The $PM_{2.5}$ annual mean level decreased to 7µgm^{-3} in 2023 from 8µgm^{-3} in 2022, although we note that the 2022 figure was based on only 56% data capture and could not be annualised. Figures for both pollutants are comfortably below the relevant objectives. PM_{10} levels in Tunbridge Wells have been consistently below the objective level of 40µgm^{-3} for many years and $PM_{2.5}$ levels appear likely to comply with proposed future objectives of 12µgm^{-3} by 2028 and 10µgm^{-3} by 2040.

Our Priorities for 2024 are as follows: -

To continue delivering the Hawkhurst Air Quality Action Plan published in 2023.

To launch the DEFRA funded Health Care Professionals Air Quality Resource, hopefully on Clean Air Day in June 2024.

Continue rolling out the Pollution Patrol resource, and encouraging take up by schools, and to try to secure its long-term future.

Local Engagement and How to get Involved.

As the main source of air pollution within Tunbridge Wells Borough Council is transport, the easiest way for the public to get involved with helping improving air quality within the area would be to look at alternatives to the way they usually travel.

The following are suggested alternatives to private travel that would contribute to improving the air quality within the Borough:

- ☐ Use public transport where available – This reduces the number of private vehicles on the roads thus helping to reduce congestion and air pollution levels;
- ☐ Walk or cycle if your journey allows – Choosing to walk or cycle your journey reduces the number of vehicles on the road and regular exercise helps keep people fit and healthy;
- ☐ Car/lift sharing – Where a few 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 is being promoted via travel plans through the workplace and within schools; and
- ☐ 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 of benefits in reducing the amount of emissions being released. The installation of Electric Vehicle charging points is being promoted using conditions attached to relevant planning permissions, although to some extent this has been superseded by changes to Approved Document S of the Building Regulations 2010, which came into effect on 15th June 2022. These require at least one EV charging point to be installed in almost all new and retrofit properties.

Logo of Clean Air for Schools Project (from School Assembly material)

During 2023, we continued our engagement with schools, via our Clean Air for Schools and Pollution Patrol projects. We have engaged with over 100 primary schools since 2018 across the three Mid Kent boroughs, by delivering interactive assemblies, creating a CAFS information section on each local authority website and creating additional teaching material. Notably, student teachers completing their Post-Graduate Certificate of Education at some of our participating schools have integrated Pollution Patrol materials into their environmental studies and sustainability units, and this may be a promising area for future development of these resources. We have encountered varied levels of engagement with school administrators for these projects since our initial outreach, and to continue the momentum built up from these projects, we initiated a prize draw incentivising the use of these materials in primary schools. Additionally, we have been actively seeking feedback from teachers, educators, senior leaders, and other school-adjacent stakeholders to ensure the efficacy and relevance of the resources developed. We continue to use a targeted approach in areas with declared Air Quality Management Areas (for example the Hawkhurst AQMA) and have acquired Travel Plans for secondary school pupils who live around this area. These Travel Plans are to be reviewed and discussed with appropriate stakeholders in the upcoming monitoring year so that they can be considered in future Annual Status Reports.

We regularly engage with our partners in Kent County Council, particularly in the Highways and Active Travel Teams, via our quarterly meetings of the Hawkhurst Air Quality Action Plan Steering Group, and in the Public Health Team via the Kent and Medway Air Quality Partnership Group. The Air Quality Partnership is also our opportunity to engage with our air quality colleagues across Kent, and with the data management team at Ricardo.

For further information about air quality in Tunbridge Wells, and in Kent more generally, please visit www.kentair.org.uk

Local Responsibilities and Commitment

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

Dr Stuart Maxwell – Mid Kent Environmental Health Service

Delainey Curry – Mid Kent Environmental Health Service

Kelly Shew – Mid Kent GIS Team

Timings preclude our ASRs being approved by Councillors prior to submission to DEFRA.

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 Dr Stuart Maxwell at:

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1 Local Air Quality Management

This report provides an overview of air quality in Tunbridge Wells Borough 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 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 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 Tunbridge Wells 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 Tunbridge Wells Borough Council can be found in Table 2.1. The table presents a description of the 2 AQMAs that are currently designated within Tunbridge Wells Borough. The A26 AQMA is expected to be revoked early in 2024. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and 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

We propose to revoke the A26 AQMA during 2024 since compliance with all LAQM objectives has been recognised for some years. (See monitoring section).

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
A26 AQMA	Declared <2005>, Amended <2011> Amended 2018	NO_2 Annual Mean	The A26 between Park Road and Neville Terrace also including Grosvenor Road, at 0-30m from the road (centre line)	NO	41.8	16.8	5	TWBC AQAP 2018	https://laqm.defra.gov.uk/1rsw2/submit/progress.php?z&revId=7360
Hawkhurst AQMA	Declared 2021,	NO_2 Annual Mean	Residential properties in the southern part of Cranbrook Road in the centre of Hawkhurst	NO	56.7	34.5	Will require modelling of some receptors to confirm	Hawkhurst AQAP September 2023	https://www.laqmportal.co.uk/mwg-internal/de5fs23hu73ds/progress?id=1sC71_TvoRApwQfNU--SGcbr2PzMROzxFOdIBNRQutg,

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

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

2.2 Progress and Impact of Measures to address Air Quality in Tunbridge Wells Borough

1. Defra's appraisal of last year's ASR concluded The Council should seek approval from the Director of Public Health for future ASRs. Collaboration and consultation with those who have responsibility for Public Health is expected to increase support for measures to improve air quality, with co-benefits for all.

   In our view, LAs are already given insufficient time to produce the ASRs, so it would be unrealistic to have the ASRs approved by the Director of Public Health prior to submission to DEFRA, although this could be done afterwards. Given that there are 12 LAs in Kent, this would also represent a lot of additional work for the Director of Public Health.

2. QA/QC procedures are appropriate, with sufficient evidence provided in the Appendix.

3. Tunbridge Wells Borough Council have detailed its measures in place to reduce $PM_{2.5}$ in the area. The Council have also referred to the Public Health Outcome Framework relating to air quality and have provided the D01 indicator, with a comparison to the national average. This is welcomed and should be continued with regular reviews of the measures to ensure they are still relevant.

4. The Council have stated that they will begin the process of the revocation of the A26 AQMA, due to more than 3 years of compliance with the relevant standard. This is commended, as keeping AQMAs in place longer than required risks diluting their meaning and impacting public trust in LAQM.

   The revocation process advanced significantly during 2023

5. The Council's presentation of trend graphs is very useful as they clearly identify trends within certain areas. The Council do also provide a good discussion of trends of pollutants within the area.

6. The Council have included two additional appendices which are both relevant, this is welcomed.

7. The formatting of the report could generally be improved, for example ensuring all red standard text is removed, and that there are no 'Error! Reference Source not found' within the report.

Tunbridge Wells 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. Nine measures are included within Table 2.2, with the type of measure and the progress Tunbridge Wells 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.

Tunbridge Wells Borough Council expects the following measures to be completed over the course of the next reporting year:

Extension to the Clean Air for Schools (CAFS) programme, with emphasis on roll-out of the Pollution Patrol Resource.

We continue to engage with schools whenever opportunities arise, and we also continue to encourage them to sign up to use the Pollution Patrol Resource

Tunbridge Wells Borough Council's priorities for the coming year are: -

In partnership with Maidstone Borough Council, to find commercial sponsorship for the Pollution Patrol resource to try to ensure that it continues to be available and kept up to date after the DEFRA funding is exhausted.

To continue the development of the Health Care Practitioner's Air Quality Resource, which forms the basis of our latest DEFRA funded project.

Tunbridge Wells Borough Council has worked to implement their Action Plan measures in partnership with the following stakeholders during 2023:

- Kent County Council
- Tunbridge Wells Borough Council
- TMC Communications
- Matts Monitors Ltd
- Ricardo PLC
- Air Quality Consultants Ltd
- Hawkhurst Parish Council

The Detailed Assessment carried out in 2020, on which the Hawkhurst AQMA was based, predicted that compliance would be achieved by the end of 2024, although monitoring suggests that compliance may already have been achieved. However, topographical variations within the AQMA (varying gradients and an intermittent street canyon) combined with the fact that there are receptors at first floor, ground floor and basement level, means that it is difficult to directly relate tube results to possible exceedances at receptors. It is therefore likely that previous modelling will need to be updated to ascertain whether compliance has been achieved at all of the modelled receptors. It is clear that, of the 29 properties included in the Hawkhurst AQMA, compliance will already have been achieved at many, and it would be possible to amend the AQMA to remove these properties from it. However, because of the small number of properties involved and the resources that would be required to progress the amendment, TWBC are unlikely to pursue this option, since the whole AQMA could potentially be revoked in the next two to three years.

Tunbridge Wells Borough Council therefore anticipates that the measures stated above and in Table 2.2 will achieve compliance in the Hawkhurst AQMA but the previous modelling will need to be updated to confirm exactly when this would happen.

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
1	New improved traffic signals at crossroad	Traffic Management	Strategic highway improvements, Re-prioritising Road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	2022	2028	Mid Kent Environmental Health, Kent County Council,	Private Sector s106 Agreements	NO	Funded	£50k - £100k	Planning	MOVA systems reduce delays by 10-20%	Upgraded MOVA signals installed	Construction plans have been approved, awaiting developer implementation- linked to future development in Hawkhurst	Funding available from S106 to replace current VA signals. Query if this will be fully effective if current parking continues to prevent flow of traffic
2	Working with schools to promote active travel and travel plans	Public Information	Via other mechanisms	2022	2030	Mid Kent Environmental Health, Kent County Council	Existing TWBC budgets and DEFRA Pollution Patrol Project	YES	Funded	< £10k	Implementation	Reduced traffic idling around schools during pick up/drop off times	All Hawkhurst primary schools signed up to Pollution Patrol, Travel Plans for schools of Hawkhurst pupils updated annually.	Secondary schools identified (Cranbrook = 68, Holmewood = 45, Mascalls = 11, TW Boys = 5, WoK = 5, Hillview = 4, Skinners' School = 3, Others (less than three pupils) = 10, Total = 154 Pupils. Travel plans for all HH pupils received. Engagement with specific schools to begin 2024	Clean Air for Schools Scheme by TWBC already implemented. Competing with other green school initiatives.
3	Awareness campaign including signage	Public Information	Other	2021	2025	Mid Kent Environmental Health, Tunbridge Wells Borough Council Communications, Kent County Council	Existing TWBC budgets	NO	Funded	< £10k	Implementation	Reduced traffic idling within AQMAs	Achieve conditions favourable for AQMA revocation	Anti-idling signs designed. Signs to be installed in 2024	Subject to KCC allowances of street furniture

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
4	Increased EV points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2018	2028	Kent County Council	KCC budgets	NO	Funded	£10k - 50k	Planning	Reduced emissions from petrol and diesel vehicles	Increase in number of EV charging points	200 EVCPs installed to date with a further 200 in development under KCC EVCP network, 24 sockets installed under Rapid Taxi charger project, 52 EVCP's installed in Parish communities across Kent under The Parish Charger Network, Ultra Rapid Charging Hubs project in development, Partnership between KCC and OZEV to develop/test ultra rapid charging under the LEVI Pilot Project	KCC's programme of EVCP delivery focussing primarily on off-street provision within Local Authority car parks
5	Work with planning development to improve mitigation of businesses in Gills Green	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2023	2040	Mid Kent Environmental Health, Tunbridge Wells Borough Council Planning Policy	Existing TWBC departmental budgets	NO	Funded	< £10k	Planning	Reduction in emissions from commuter and freight traffic to and from Gills Green	Active Travel infrastructure enacted for any new development	Not yet commenced	This action relates specifically to single large development at the Gills Green Business Park
6	Ensure all developments are in accordance with current AQ policies in emerging local plan	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2023	2038	Mid Kent Environmental Health, Tunbridge Wells Borough Council Planning Policy	Existing TWBC departmental budgets	NO	Funded	< £10k	Implementation	Minimise AQ impacts of new developments	Development of Air Quality Guidance specific to Hawkhurst Area	Hawkhurst Planning Position Statement has been developed as an interim measure	Important to ensure new development is compliant. Already ongoing
7	Have awareness of potential impact of cross boundary development	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2023	2040	Tunbridge Wells Borough Council Planning	Existing TWBC departmental budgets	NO	Funded	< £10k	Implementation	Minimise AQ impacts of new developments	Consultation with cross-boundary Local Authority Environmental Health departments regarding major developments	Ongoing	Influence is limited to consultee status. Good working relationship with neighbouring Local Authorities

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
8	Explore options to limit and mitigate the effects of HGVs on the crossroads in Hawkhurst	Traffic Management	Other	2023	2024	Kent County Council	KCC Budgets	NO	Funded	< £10k	Planning	Minimise AQ impacts of HGV traffic	Reduction of HGV movement along Hawkhurst AQMA	Identifying options	Measure reworded to reflect difficulty and time needed to identify suitable alternatives. KCC note that crossroads are located at junction of two A roads suitable for most traffic, A229 and A268. Deemed not suitable for HGV restrictions or rerouting due to lack of suitable diversion route and impact on access and deliveries for business and agriculture.
9	Prioritise Hawkhurst in the rollout of new DEFRA funded GPs air quality training resource	Public Information	Via other mechanisms	2023	2029	Mid Kent Environmental Health	Existing TWBC departmental budgets, DEFRA funding	YES	Funded	< £10k	Planning	N/A	Hawkhurst GP Surgery Sites pilot resource	Resource due to be launched in June 2024	Feedback on resource to be acquired via pilot.

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.

New (2022) data from the Public Outcomes Framework (indicator D01) indicates that the fraction of deaths, attributable to $PM_{2.5}$, in Tunbridge Wells is 4.7%. This is lower than the national average of 5.8%.

$PM_{2.5}$ monitoring commenced in Tunbridge Wells Borough in 2022. The purchase and installation of the instrument was undertaken in the early part of the year and became operational during May 2022. Overall, in 2022 we achieved 56% data capture and the measured $PM_{2.5}$ level was 8µgm^{-3}. In 2023, we achieved 99.6% data capture, and the measured annual mean level was 7µgm^{-3}. Therefore, we have not only met the current objective for $PM_{2.5}$ but we appear to be on course to meet the proposed future objectives as well.

LAQM.TG22 Table A1 Action Toolbox provides a list of measures that can be implemented to tackle $PM_{2.5}$, and some of these measures are included in our AQAP including anti idling campaigns, encouraging behavioural change (CAFS and via the development of the Pollution Patrol which includes an element on domestic burning) and promotion of cycling and walking (Actions 2 and 3 in the AQAP). Similar messages are being included in the development of the DEFRA funded Healthcare Practitioner's Resource. Roll out of the resource in the Hawkhurst area will be prioritised (Action 9 of the AQAP) However, it is recognised that any measures employed to reduce NO_2 and PM_{10} will also have a beneficial effect on $PM_{2.5}$.

[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 Tunbridge Wells 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

Tunbridge Wells Borough Council undertook automatic (continuous) monitoring at 1 site during 2023. Table A.1 in Appendix A shows the details of the automatic monitoring sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. The https://www.kentair.org.uk/data page presents automatic monitoring results for Tunbridge Wells Borough Council, with automatic monitoring results also available through the UK-Air website .

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

Tunbridge Wells Borough Council undertook non- automatic (i.e., passive) monitoring of NO_2 at 23 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.

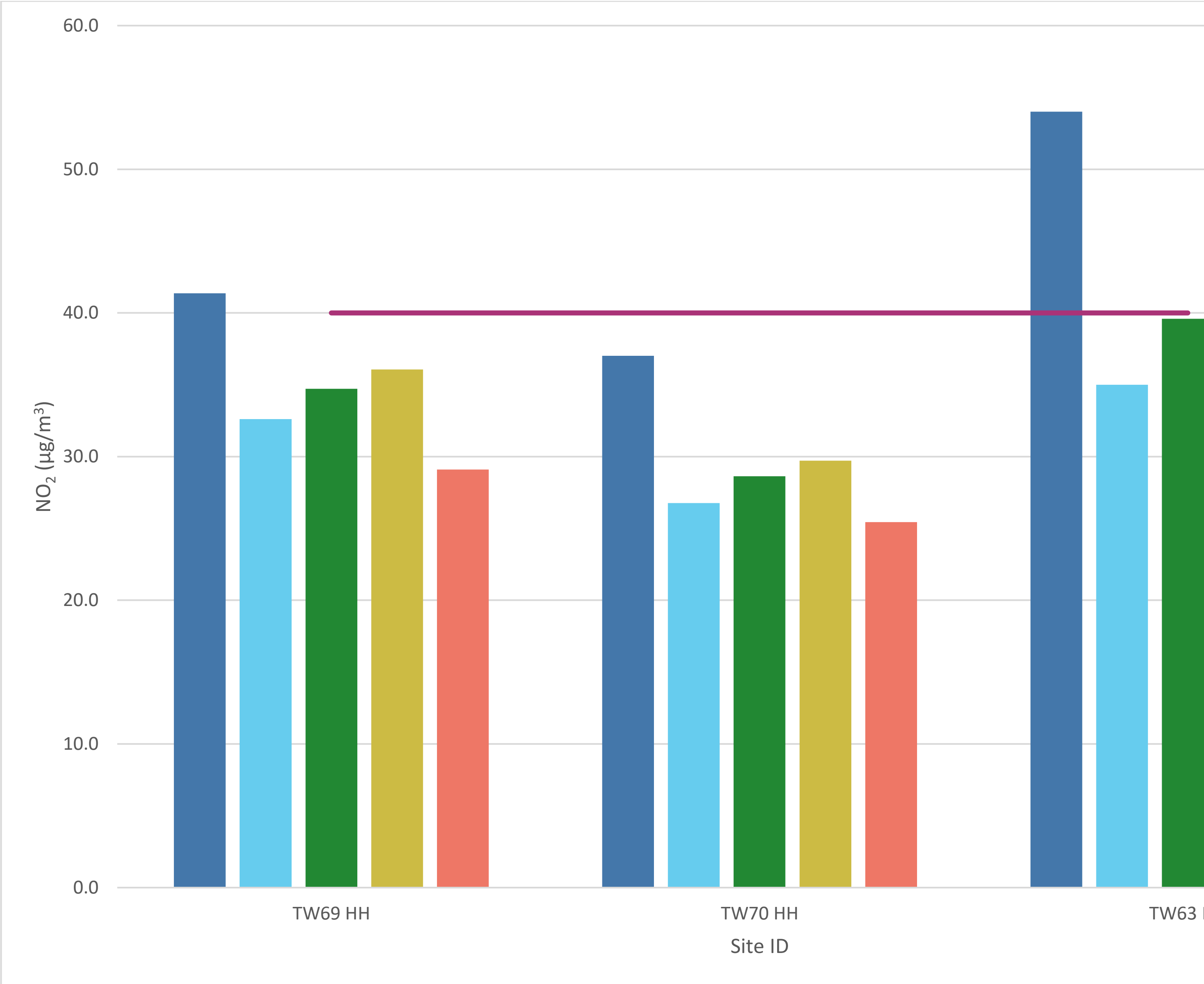


Figure A.5 – Trends in Annual Mean NO_2 Concentrations outside of the Tunbridge Wells AQMAs (Sites TW02-TW55)

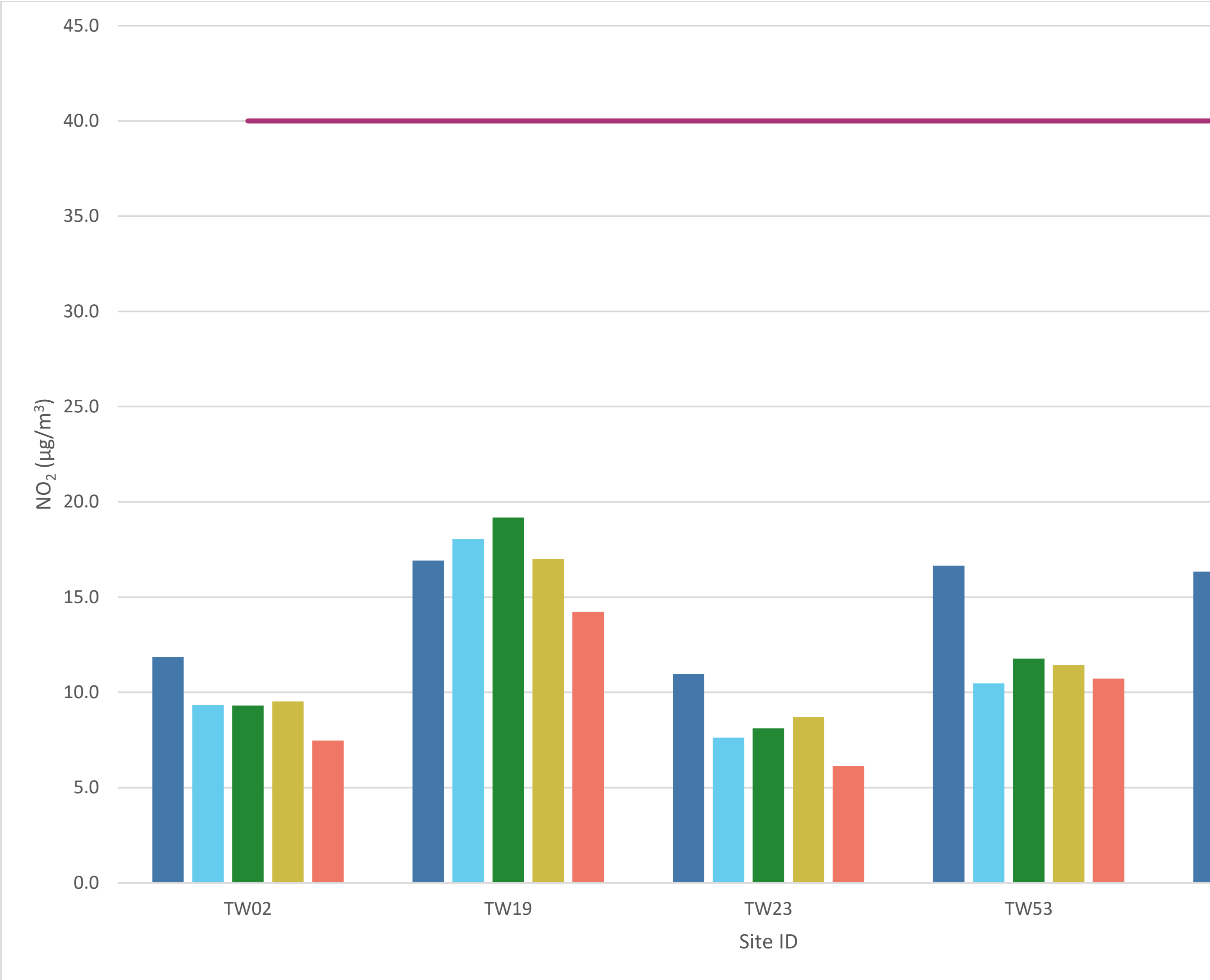


Figure A.6 – Trends in Annual Mean NO_2 Concentrations outside of the Tunbridge Wells AQMAs (Sites TW60-TW77)

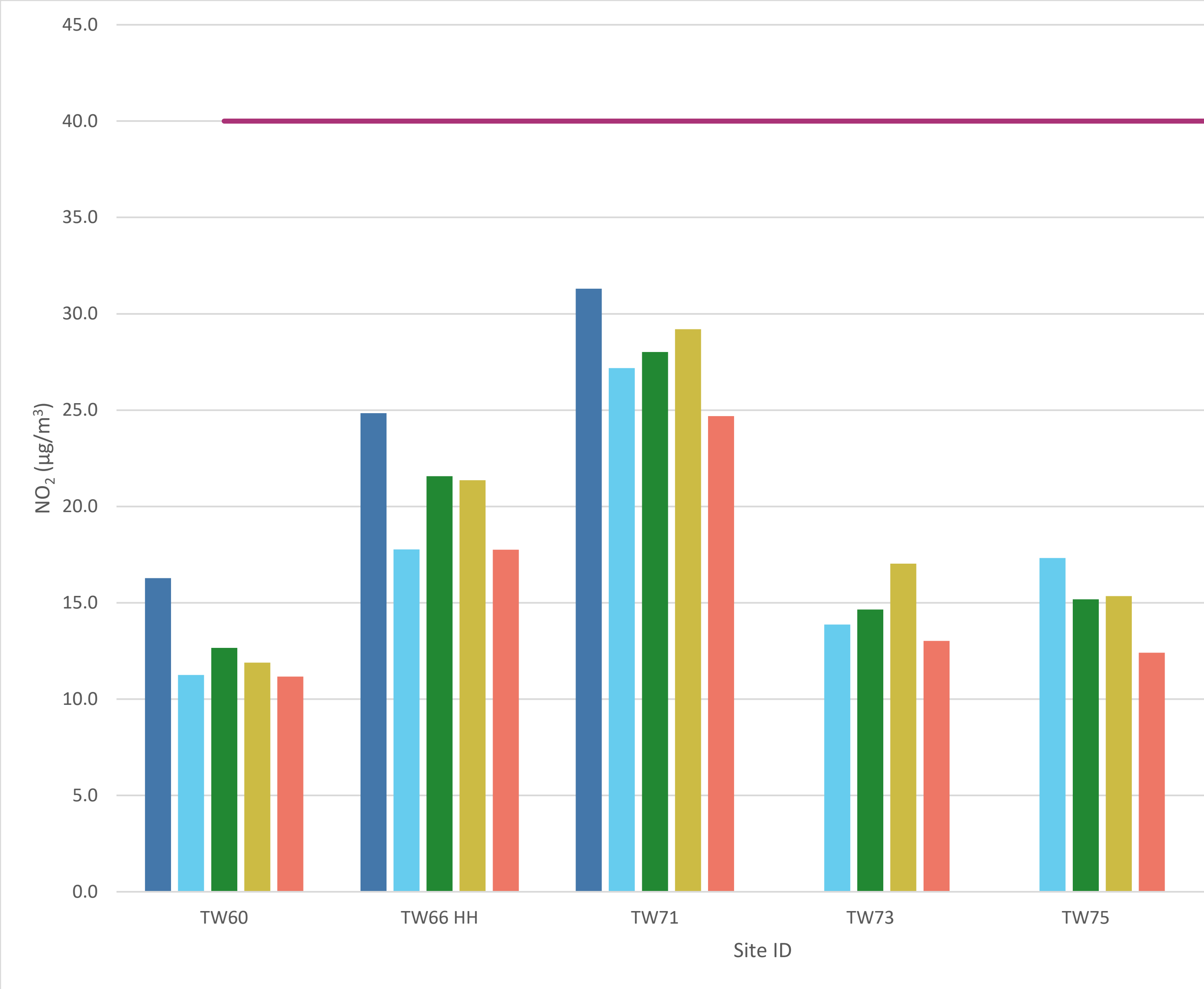


Figure A.7 – Trends in Annual Mean NO_2 Concentrations outside of the Tunbridge Wells AQMAs (Sites TW80HH-TW85)

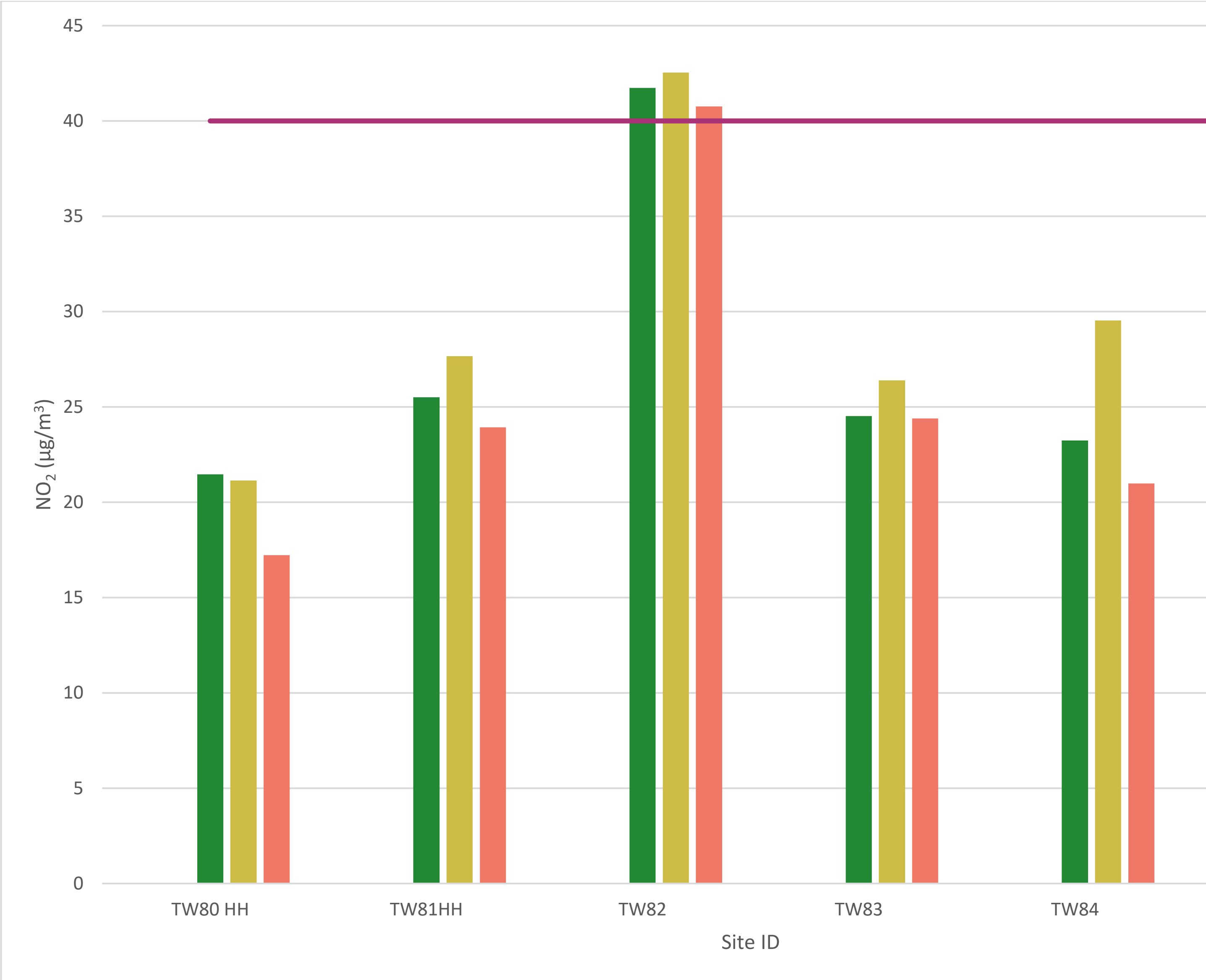


Figure A.8 – Trends in Annual Mean NO_2 Concentrations outside of the Tunbridge Wells AQMAs (Sites TW86-TW88)

Figure A.9 – Trends in Annual Mean NO_2 Concentrations for Urban Background Sites (TW02, TW23, TW60)

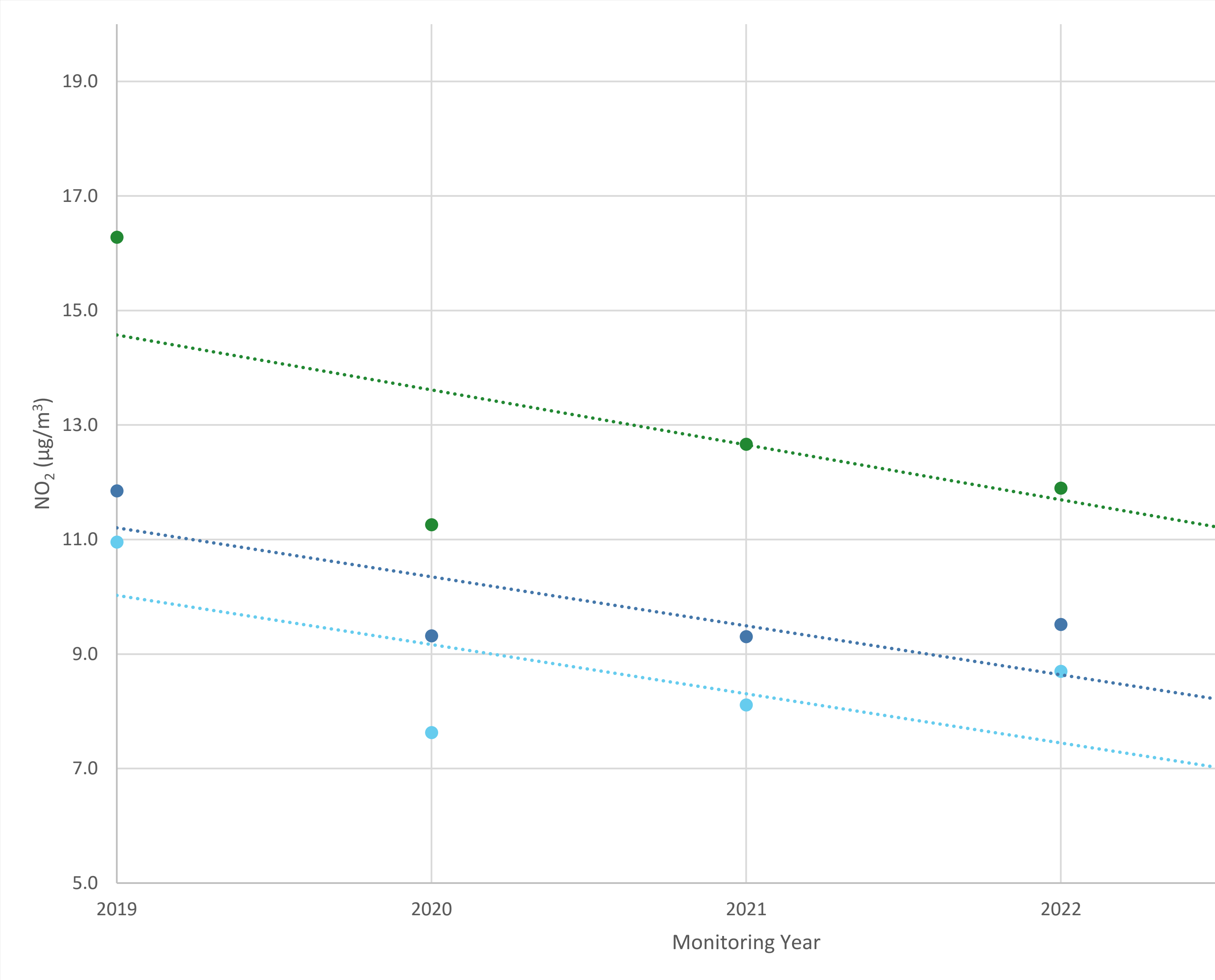


Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

In 2023, there were no exceedances of the NO_2 annual mean objective at any site following distance correction to the nearest relevant exposure. The highest reading site in the Borough was TW82, which recorded an annual mean level of 40.8µgm^{-3} at the monitoring site. However, this was distance corrected to 25.8µgm^{-3} at the nearest relevant receptor which is set well back from the road. The next highest reading site in the Borough was TW41, which is situated in the London Road, near the Pantiles. This was one of the few sites in the Borough which recorded a small increase compared to 2022, having increased from 38.3µgm^{-3} to 39.5µgm^{-3} in 2023. The automatic monitoring station has not recorded any exceedance of the hourly mean in the years 2019 to 2023, and no diffusion tube has recorded an annual mean NO_2 level in excess of 60µgm^{-3}, therefore exceedances of the hourly mean objective for NO_2 are not thought likely in the Borough.

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. PM_{10} levels in the years 2019 to 2023 have been quite consistent, ranging between 21µgm^{-3} in 2019 and 18µgm^{-3} in 2020, the first year affected by lockdown. In 2022, the level was back to 21µgm^{-3}, but this reduced to 20µgm^{-3} in 2023. These levels are well below the objective. There has never been an AQMA declared or considered for exceedances of any PM_{10} objective.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year. There were no individual exceedances of the objective in 2023, therefore the overall objective was not exceeded.

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 two years.

The annual mean PM2.5 concentration measured at the automatic monitoring station was in 2023 was 7µgm^{-3}. This was the first full year of PM2.5 monitoring in the Borough. In 2022 we recorded an annual mean of 8µgm^{-3}, but the analyser was only installed in May of 2022, therefore only 56% data capture was achieved in that year. The monitored levels are comfortably below the current and proposed future objectives.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	A26 St Johns Road, Southborough	Roadside	558260	141599	NO_2; PM_{10} $PM_{2.5}$	YES (St Johns Tunbridge Wells)	Chemiluminescent; TEOM, BAM	18	4	3

Notes:

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

(2) N/A if not applicable

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
TW02	11 THE HURST, TUNBRIDGE WELLS	Urban Background	560000	141300	NO_2	No	6.0	1.6	No	2.4
TW19	Maidstone Road, Paddock Wood	Roadside	566800	144800	NO_2	No	2.5	1.8	No	2.5
TW20	Mount Ephraim, T. Wells	Roadside	558300	139800	NO_2	No	2.8	2.0	No	2.3
TW23	Neville Gate, T. Wells	Urban Background	558800	138300	NO_2	No	16.0	0.7	No	2.4
TW25	Flying Dutchman	Roadside	558136	142017	NO_2	Yes	1.8	2.6	No	2.9
TW34.1, TW34.2	The Cutout St John Road TW AQ	Roadside	558250	141750	NO_2	Yes (A26)	14.0	4.0	Yes	3.0
TW34.3	The Cutout St John Road TW AQ	Roadside	558250	141750	NO_2	Yes (A26)	14.0	4.0	Yes	3.0
TW41	by 38 The Pantiles, London Rd/Pantiles, Tunbridge Wells	Roadside	558076	138762	NO_2	Yes (A26)	4.8	1.8	No	2.3
TW53	Warrington Road, Paddock Wood	Roadside	567638	144732	NO_2	Yes (A26)	9.0	1.8	No	2.0
TW55	Badsell Road opposite Mascalls park., Paddock Wood	Roadside	566746	144112	NO_2	No	11.0	1.8	No	2.5

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)
TW58	Union House, Tunbridge Wells	Roadside	557927	138609	NO_2	Yes (A26)	7.4	1.3	No	2.5
TW60	12 Goarse Road	Urban Background	560230	140150	NO_2	No	10.0	30.0	No	2.4
TW63.1 HH, TW63.2 HH, TW63.3 HH	Cranbrook Road, Hawkhurst Smugglers Rest triplicate (new January 2020)	Roadside	576065	130604	NO_2	Yes (Hawkhurst)	0.0	1.0	No	2.2
TW66 HH	8 The Colonade, Rye Road, Hawkhurst re-opened site	Roadside	576103	130566	NO_2	No	2.0	2.0	No	2.4
TW69 HH	Near Substation, Cranbrook Road, Hawkhurst	Roadside	576062	135116	NO_2	Yes (Hawkhurst)	3.0	2.5	No	1.6
TW70 HH	Outside 8/9 Cranbrook Road, Hawkhurst	Roadside	576051	130734	NO_2	Yes (Hawkhurst)	0.2	1.2	No	1.8
TW71	Tube on post just besides of entrance next to Seven Springs Home	Roadside	560838	140389	NO_2	No	7.0	1.5	No	2.6
TW72	Southborough new flats	Roadside	558140	142080	NO_2	Yes	2.0	3.0	No	2.0
TW73	Summervale Road	Roadside	558137	142215	NO_2	Yes	15.0	4.5	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)
TW74	Papa Johns	Roadside	557354	138128	NO_2	Yes	0.0	5.0	No	1.6
TW75	6 Bayhall Road (Prev HH9 tube in 2020)	Roadside	559208	139317	NO_2	No	3.0	3.0	No	1.8
TW77	Liptraps lane (opp Robin Hood Pub) New Jan 21	Roadside	559813	140829	NO_2	No	24.0	3.0	No	2.8
TW80 HH	Cranbrook Stone Street HH11 new Feb 21	Kerbside	577758	136010	NO_2	No	1.0	0.5	No	1.8
TW81HH	Goudhurst Chemist on the High St HH12 New Feb 21	Kerbside	572277	137785	NO_2	No	0.0	0.0	No	1.2
TW82	Pembury Road - By Dorin Court Pembury Rd TN2 3RH New Feb 21	Roadside	559166	139398	NO_2	No	7.5	1.0	No	2.6
TW83	Carrs Corner Roundabout Crescent Road TN1 2UN New Feb 21	Roadside	558778	139491	NO_2	No	0.0	2.6	No	2.6
TW84	50 Camden Road TW TN1 2QD Alisha Barbers new Feb 21	Roadside	558789	139777	NO_2	No	0.6	1.0	No	2.0
TW85	68 Camden Road TW TN1 2QP	Roadside	558825	139824	NO_2	No	0.4	1.4	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)
	Rosie Baylis New Feb 21									
TW86	By TW free school Mount Ephraim TN4 8FA New Feb 21	Roadside	558276	139876	NO_2	Yes	17.2	1.3	No	1.8
TW87	Langton Green Road/ Third Street LG TN3 0ER New Feb 21	Roadside	554552	139178	NO_2	No	11.6	1.1	No	2.0
TW88	Rusthall High Street - Laundrette TN4 8RW New Feb 21	Kerbside	556128	139700	NO_2	No	3.1	0.7	No	1.8

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 ($\mu g/m^3$)

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
CM1	558260	141599	Roadside	99	99	34	31	26	25	23

☒ **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 2023.**

Notes:

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

Exceedances of the NO_2 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.

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/m³)

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
TW02	560000	141300	Urban Background	67.3	67.3	11.9	9.3	9.3	9.5	7.5
TW19	566800	144800	Roadside	65.4	65.4	16.9	18.0	19.2	17.0	14.2
TW20	558300	139800	Roadside	84.6	84.6	34.8	24.7	27.9	29.5	21.5
TW23	558800	138300	Urban Background	84.6	84.6	11.0	7.6	8.1	8.7	6.1
TW25	558136	142017	Roadside	84.6	84.6	30.7	22.2	22.6	26.3	18.1
TW34.1, TW34.2	558250	141750	Roadside	76.9	76.9	31.3	24.7	25.6	24.8	21.8
TW34.3	558250	141750	Roadside	76.9	76.9	25.6	25.6	25.6	24.8	21.9
TW41	558076	138762	Roadside	67.3	67.3	**48.7**	34.5	35.9	38.3	39.5
TW53	567638	144732	Roadside	75	75.0	16.7	10.5	11.8	11.4	10.7
TW55	566746	144112	Roadside	67.3	67.3	16.3	13.7	16.7	19.6	14.6
TW58	557927	138609	Roadside	69.2	69.2	**42.9**	31.3	27.5	29.5	26.1
TW60	560230	140150	Urban Background	92.3	92.3	16.3	11.3	12.7	11.9	11.2

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
TW63.1 HH, TW63.2 HH, TW63.3 HH	576065	130604	Roadside	82.7	82.7	**52.7**	34.8	**40.4**	**44.1**	34.5
TW66 HH	576103	130566	Roadside	82.7	82.7	24.8	17.8	21.6	21.4	17.7
TW69 HH	576062	135116	Roadside	82.7	82.7	**41.4**	32.6	34.7	36.1	29.1
TW70 HH	576051	130734	Roadside	82.7	82.7	37.0	26.8	28.6	29.7	25.4
TW71	560838	140389	Roadside	48.07692308	48.1	31.3	27.2	28.0	29.2	24.7
TW72	558140	142080	Roadside	42.30769231	42.3		29.0	20.3	21.3	19.0
TW73	558137	142215	Roadside	84.61538462	84.6		13.9	14.6	17.0	13.0
TW74	557354	138128	Roadside	42.30769231	42.3		18.0	19.7	18.6	19.8
TW75	559208	139317	Roadside	76.92307692	76.9		17.3	15.2	15.3	12.4
TW77	559813	140829	Roadside	76.92307692	76.9			23.9	24.7	20.7
TW80 HH	577758	136010	Kerbside	30.76923077	30.8			20.0	21.1	17.2
TW81HH	572277	137785	Kerbside	48.07692308	48.1			25.5	27.7	23.9
TW82	559166	139398	Roadside	59.61538462	59.6			**41.7**	**42.5**	**40.8**

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2023 (%) (2)	2019	2020	2021	2022	2023
TW83	558778	139491	Roadside	67.30769231	67.3			24.5	26.4	24.4
TW84	558789	139777	Roadside	75	75.0			23.2	29.5	21.0
TW85	558825	139824	Roadside	75	75.0			19.0	19.8	15.2
TW86	558276	139876	Roadside	61.53846154	61.5			15.9	14.6	13.9
TW87	554552	139178	Roadside	25	25.0			19.0	18.8	17.9
TW88	556128	139700	Kerbside	76.92307692	76.9			14.3	13.9	11.2

☒ **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 for Diffusion Tubes Within the St John's Road AQMA

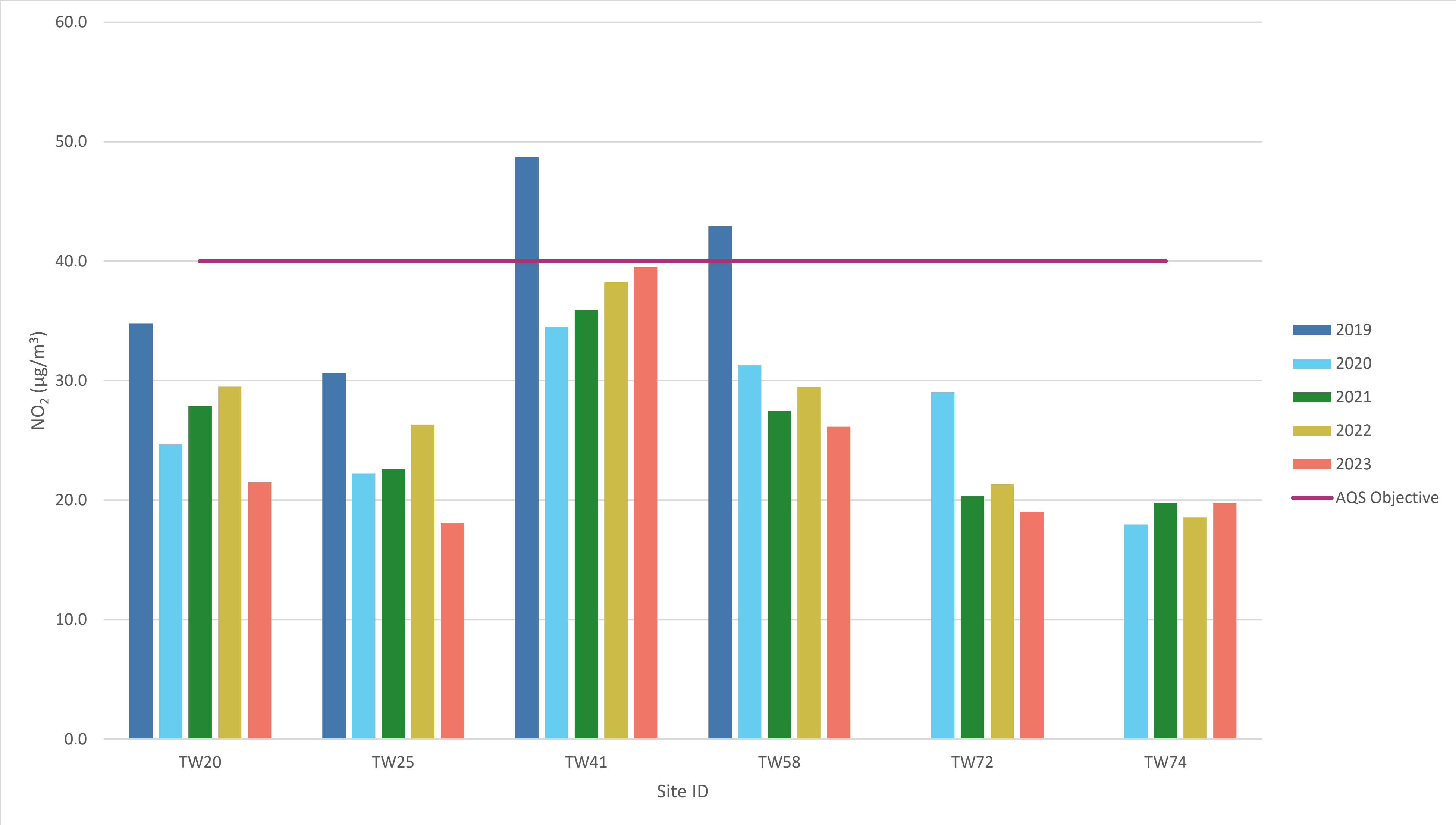


Figure A.2 – Trends in Annual Mean NO_2 Concentrations at Site 34 Co-Located at St John's Automatic Monitoring Station Within the Tunbridge Wells AQMA

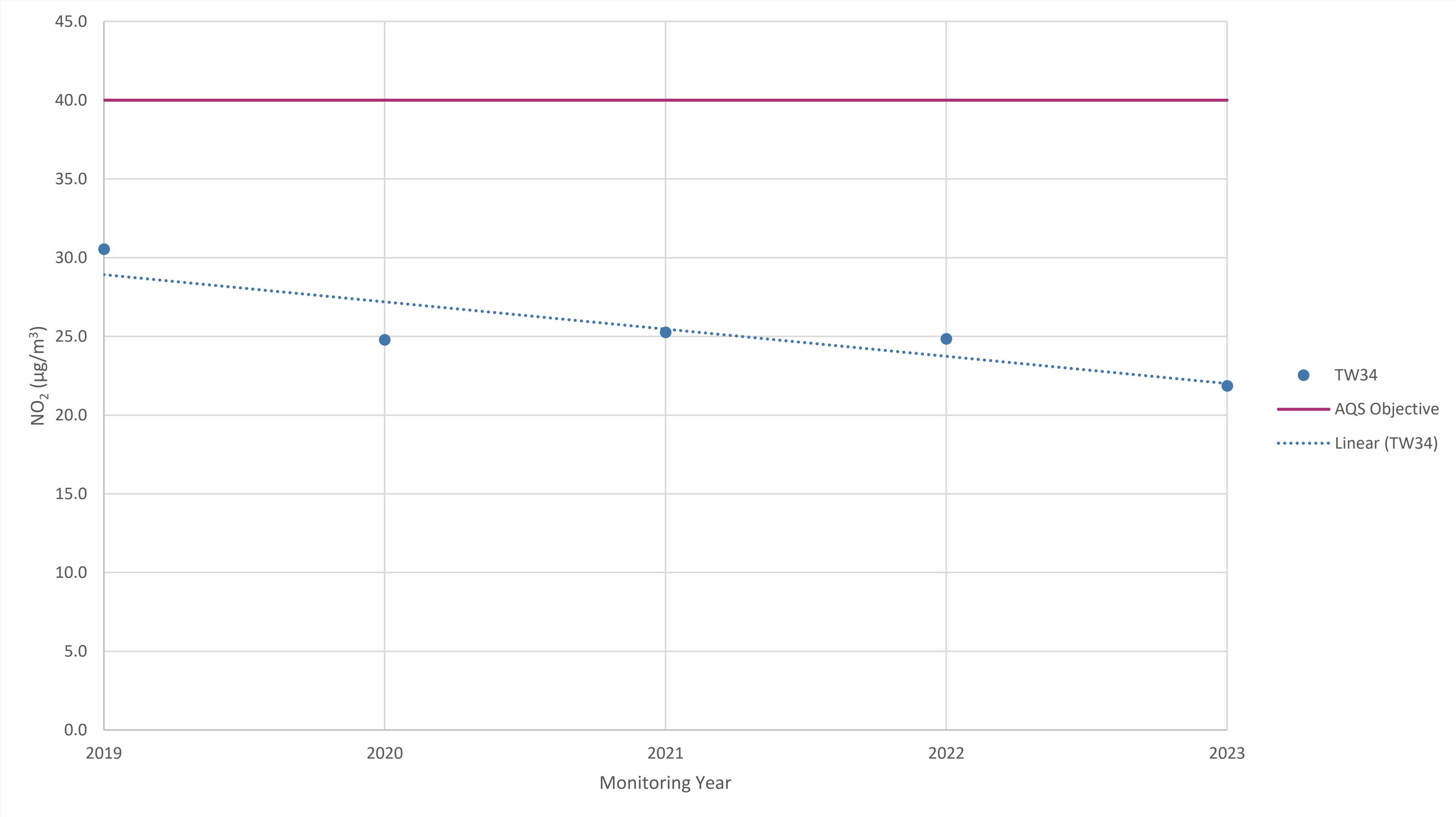


Figure A.3 – Trends in Annual Mean NO_2 Concentrations at St John's Automatic Monitoring Station

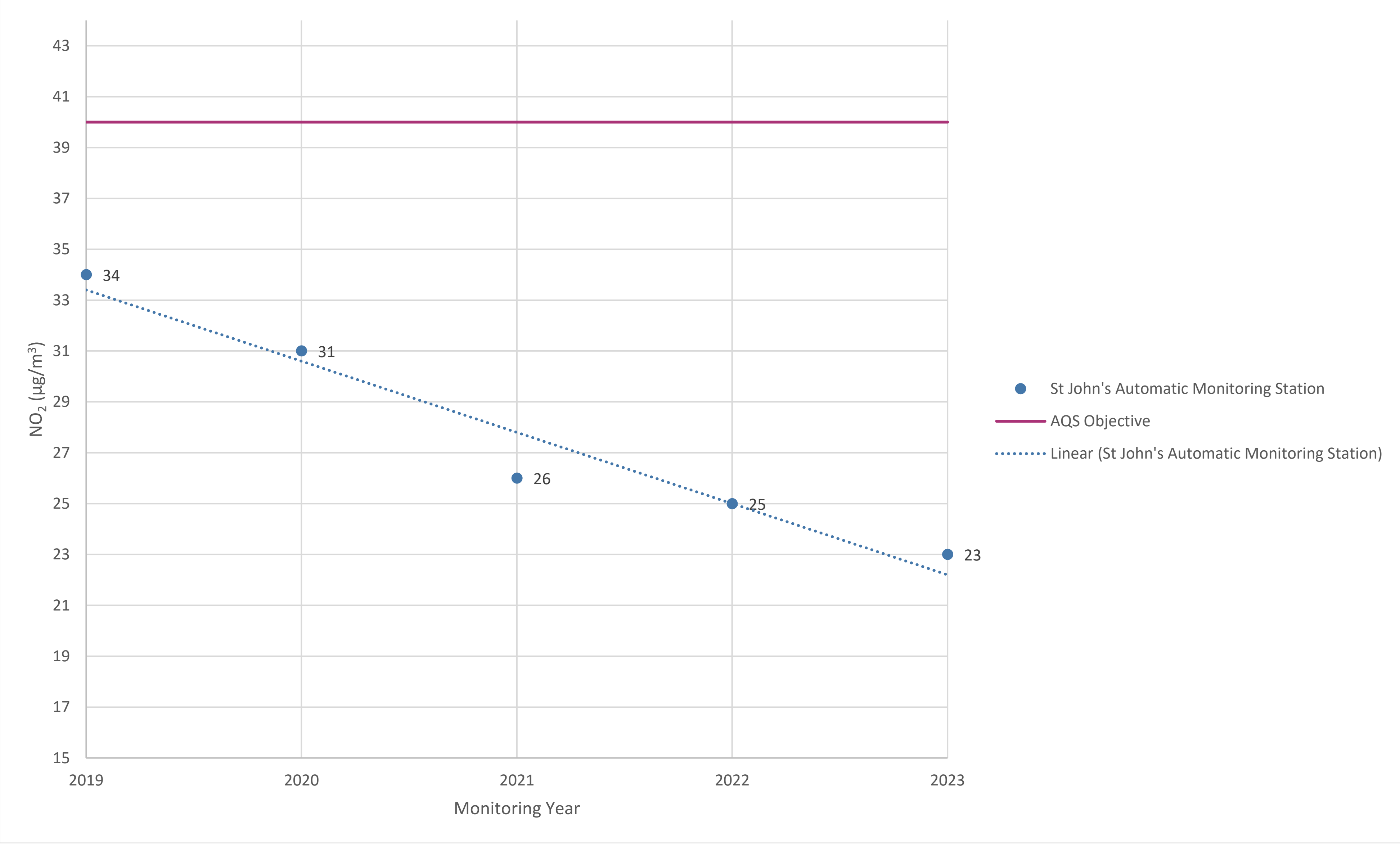


Figure A.4 – Trends in Annual Mean NO_2 Concentrations for Diffusion Tubes Within the Hawkhurst AQMA

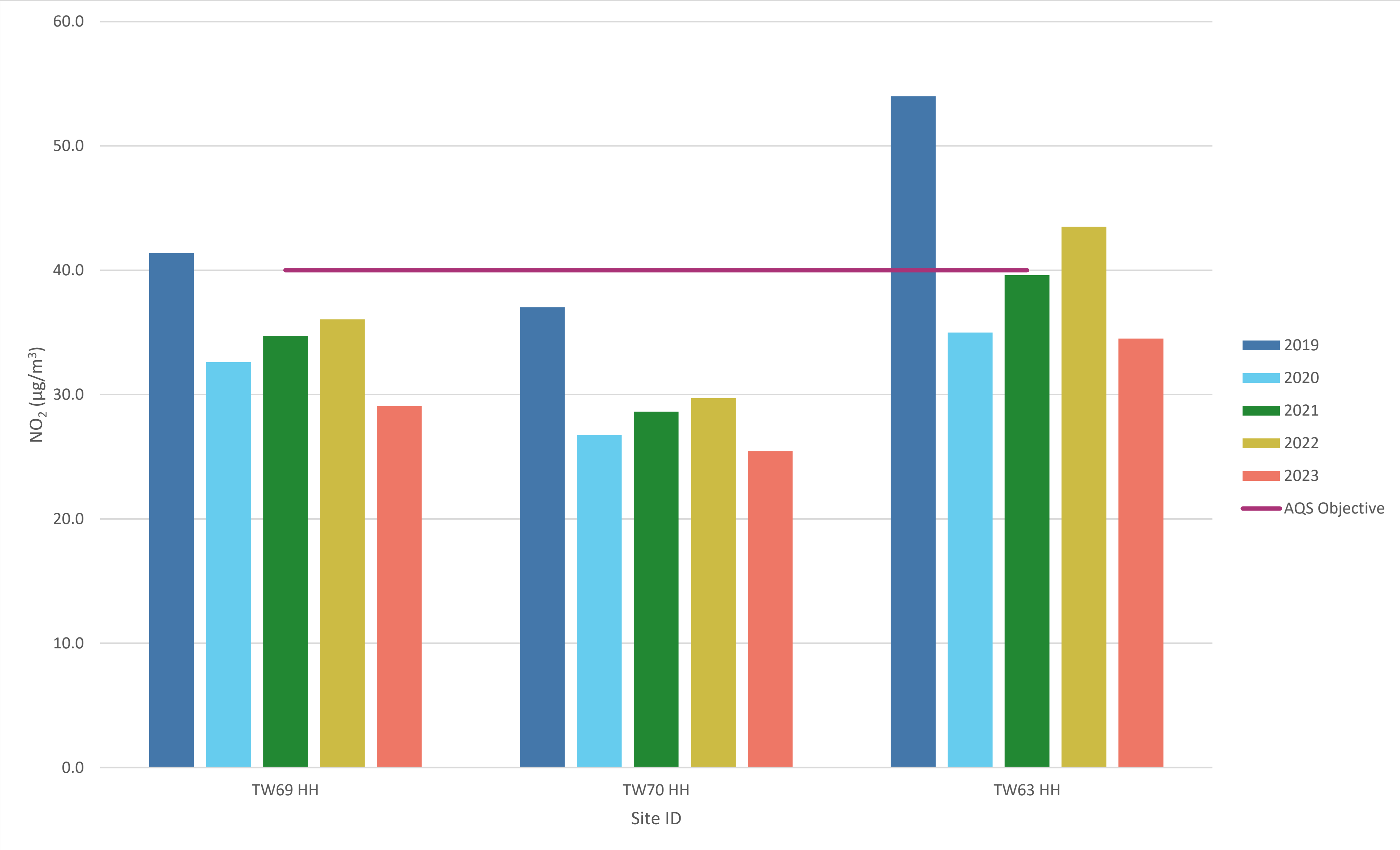


Figure A.5 – Trends in Annual Mean NO_2 Concentrations outside of the Tunbridge Wells AQMAs (Sites TW02-TW55)

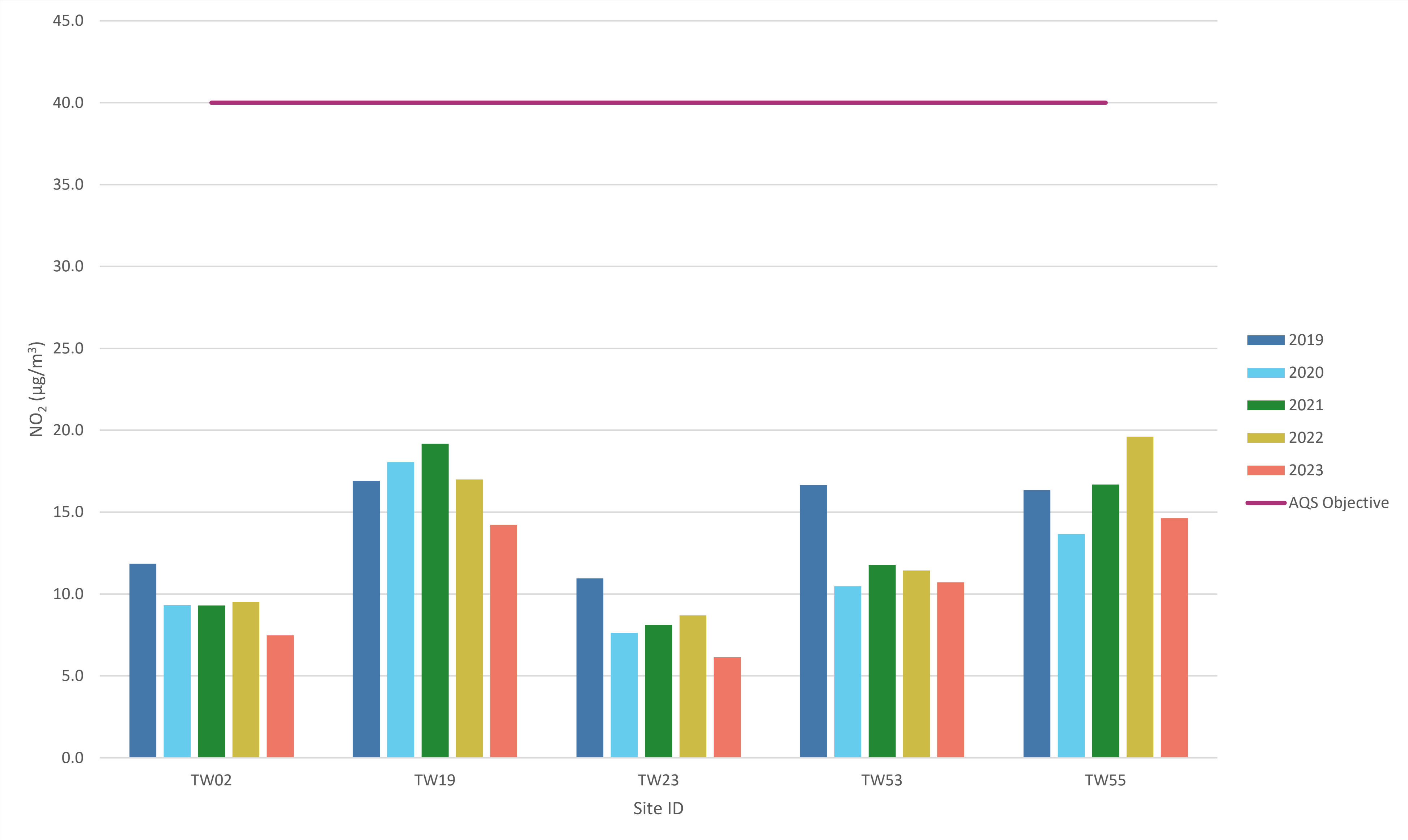


Figure A.6 – Trends in Annual Mean NO_2 Concentrations outside of the Tunbridge Wells AQMAs (Sites TW60-TW77)

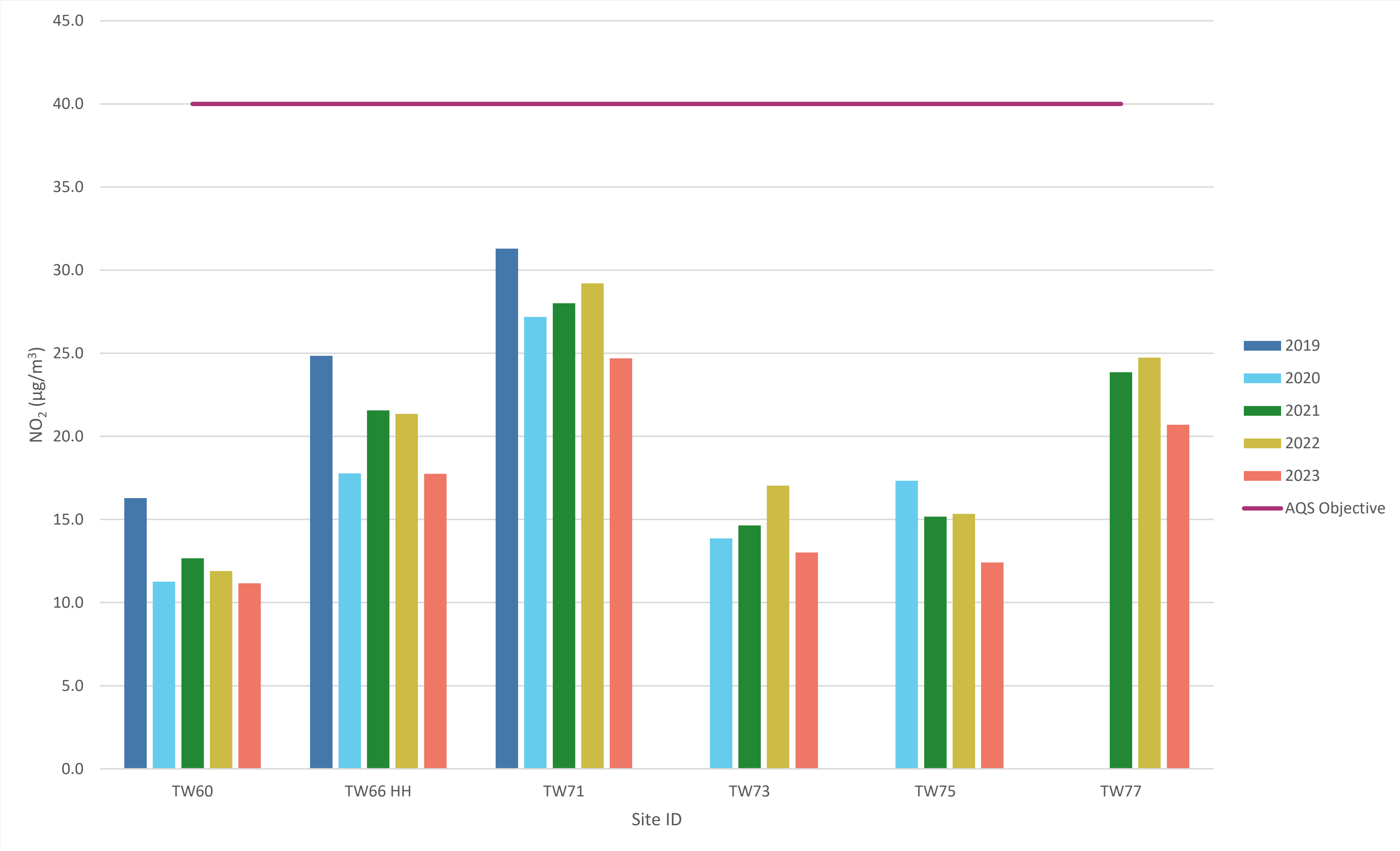


Figure A.7 – Trends in Annual Mean NO_2 Concentrations outside of the Tunbridge Wells AQMAs (Sites TW80HH-TW85)

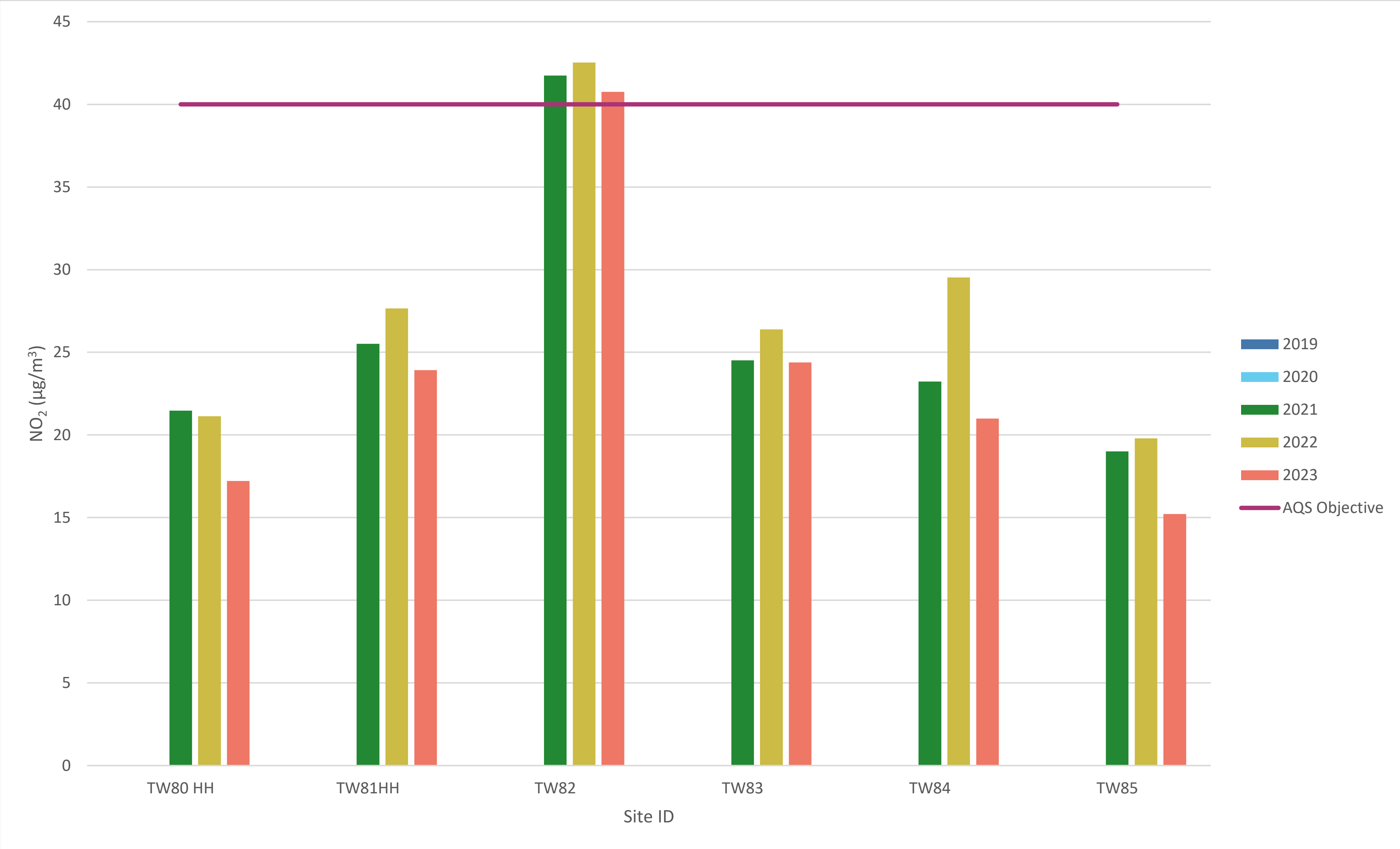


Figure A.8 – Trends in Annual Mean NO_2 Concentrations outside of the Tunbridge Wells AQMAs (Sites TW86-TW88)

Figure A.9 – Trends in Annual Mean NO_2 Concentrations for Urban Background Sites (TW02, TW23, TW60)

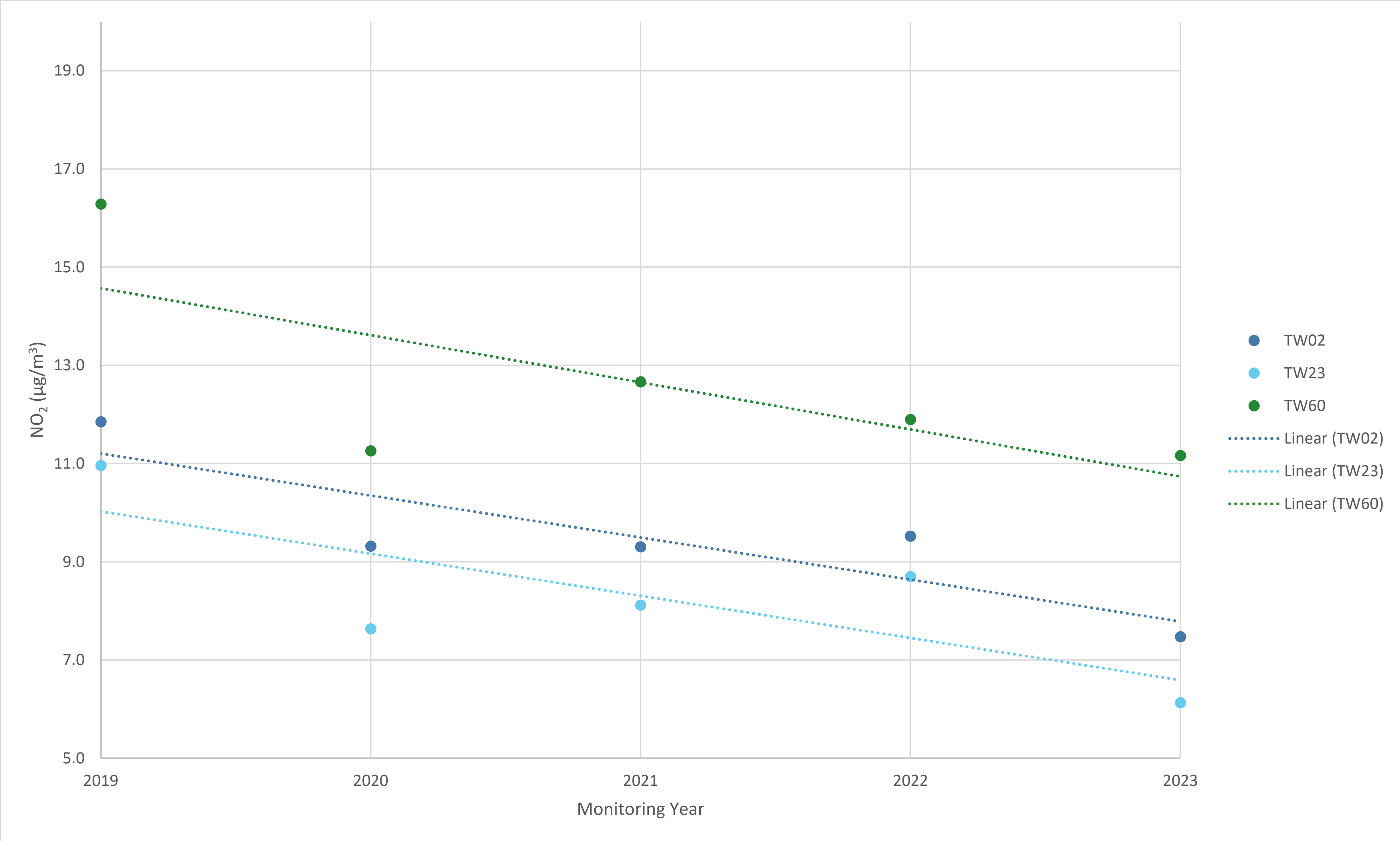


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

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
CM1	558250	141750	Roadside	99	99	0	0	0	0	0

Notes:

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

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

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

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

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

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

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
CM1	558250	141750	Roadside	99.6	99.6	**21**	**18**	**19**	**21**	**20**

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

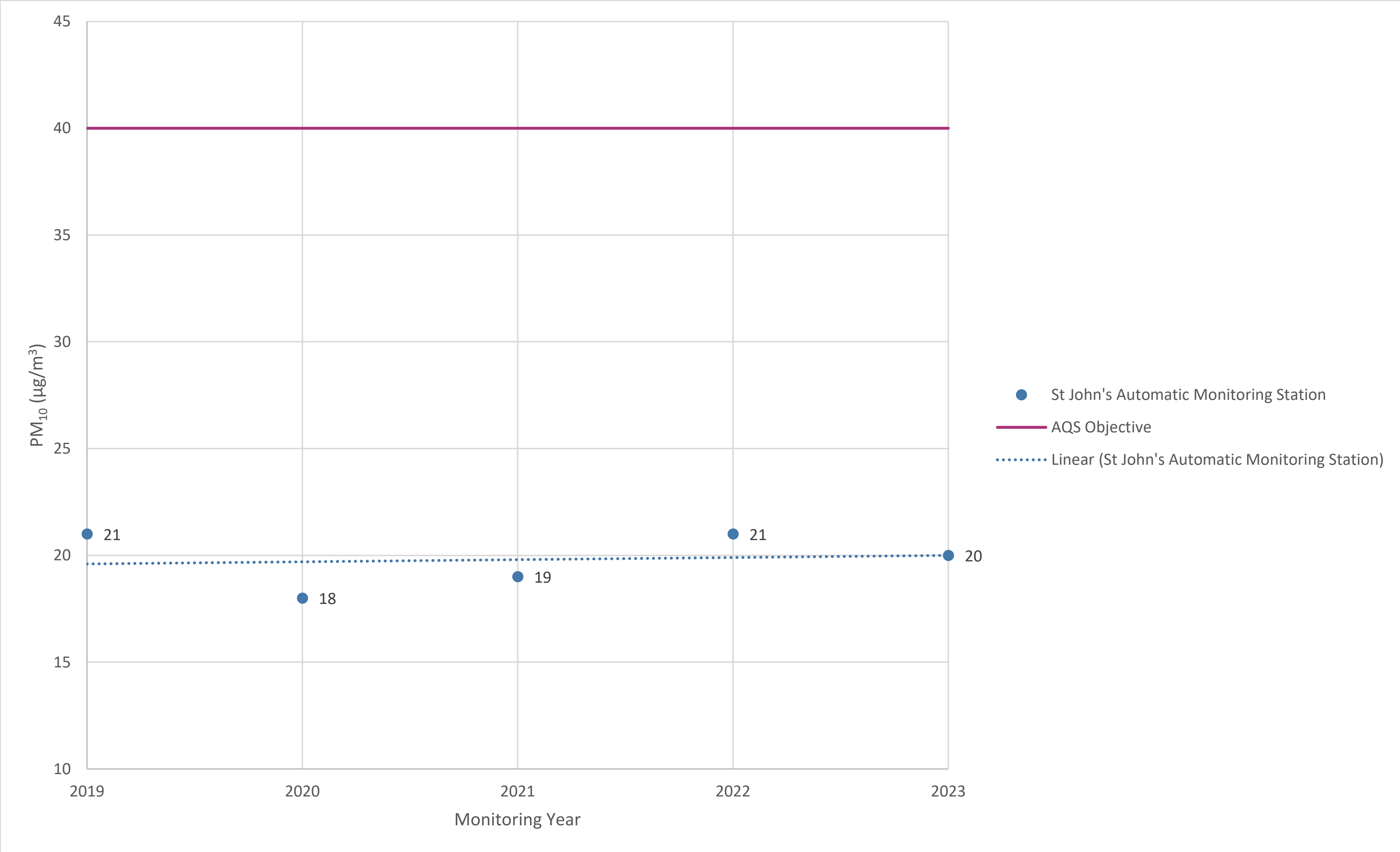


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

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
CM1	558250	141750	Roadside	99.6	99.6	13	10	1	2	0

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.11 – Trends in Number of 24-Hour Mean PM_{10} Results > 50µg/m³

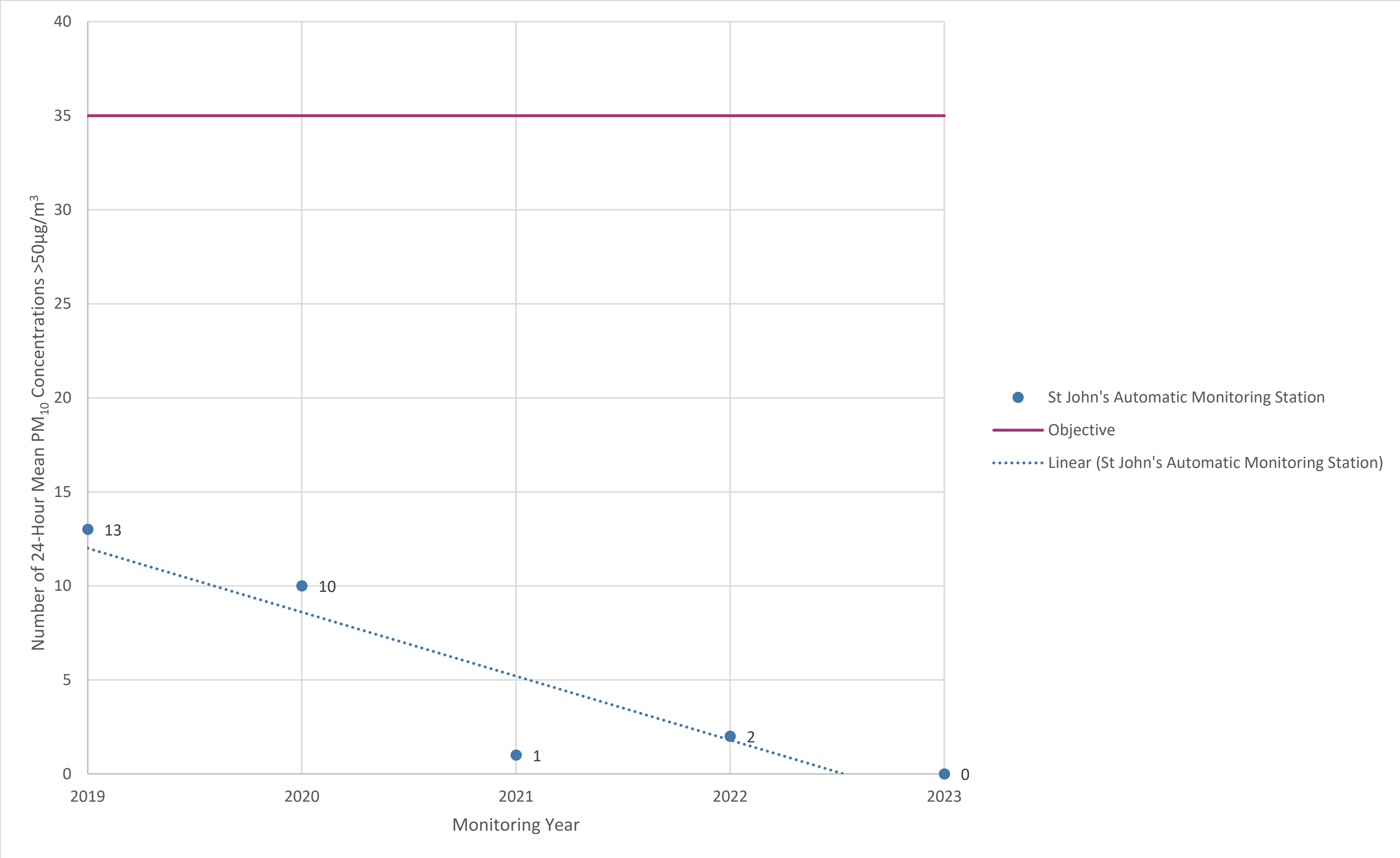


Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)

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
CM1	558250	141750	Roadside	92.3	92.3				8	7

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

Notes:

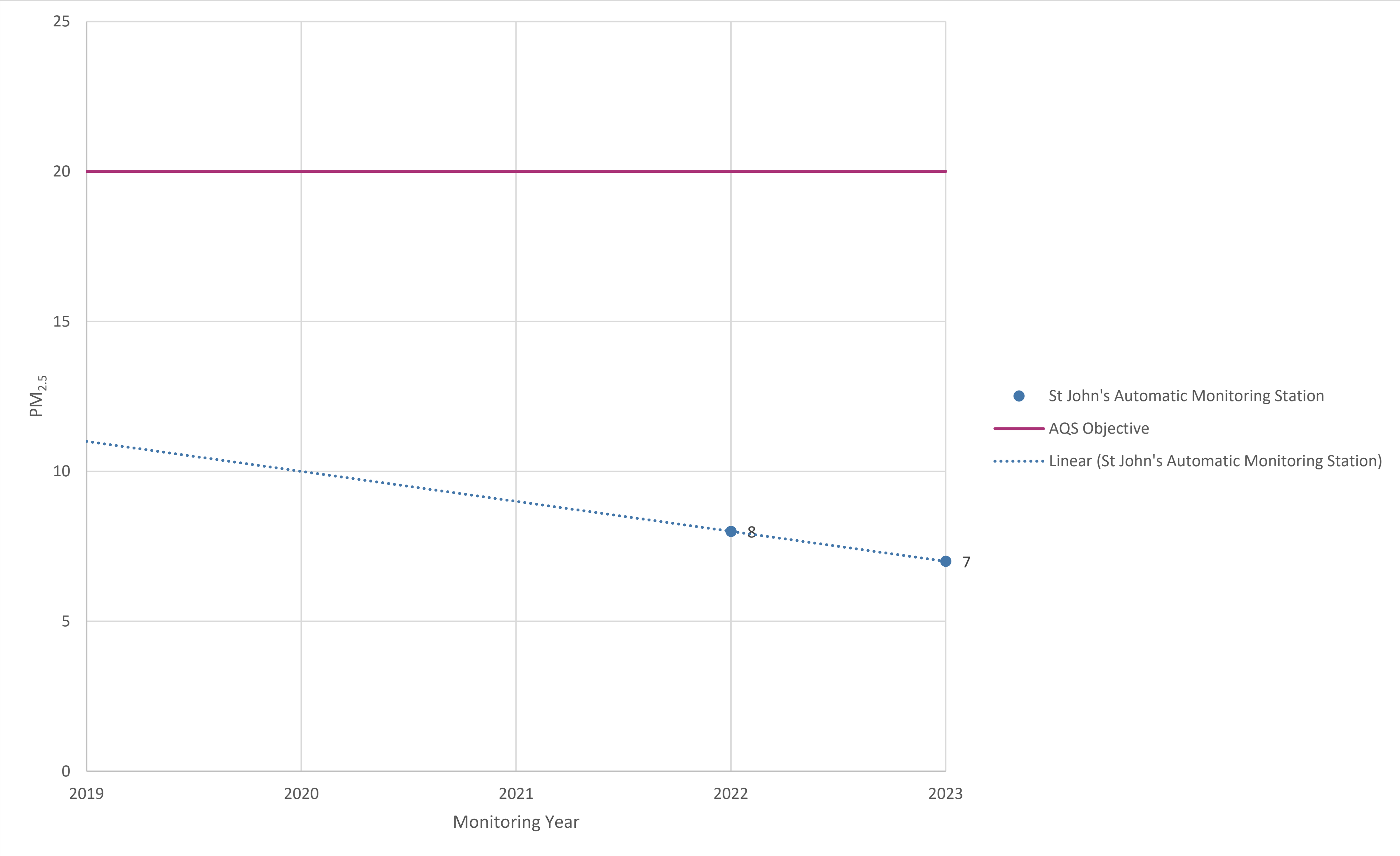
The annual mean concentrations are presented as $\mu g/m^3$.

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



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

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

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2023

Table B.1 – NO_2 2023 Diffusion Tube Results (µg/m³)

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
TW02	560000	141300	x	x	x	9.3	8.0	9.0	7.3	8.8	10.6	x	7.2	10.0	8.8	7.5	-	
TW19	566800	144800	x	x	x	18.5	17.9	x	15.7	17.0	22.8	20.9	9.5	14.9	17.2	14.2	-	
TW20	558300	139800	x	x	33.9	29.0	31.3	29.4	26.6	31.4	29.9	36.2	15.1	16.1	27.9	21.5	-	
TW23	558800	138300	x	x	10.1	7.2	7.4	8.2	6.6	5.2	7.8	9.0	9.4	8.7	8.0	6.1	-	
TW25	558136	142017	x	x	33.5	23.5	23.2	21.2	19.6	22.9	19.3	24.7	28.1	19.2	23.5	18.1	-	
TW34.1	558250	141750	x	x	32.7	28.0	x	33.4	22.9	27.4	28.5	24.0	27.4	30.0	-	-	-	
TW34.2	558250	141750	x	x	35.1	36.1	x	32.6	24.3	24.6	29.5		23.9	25.8	28.3	21.8	-	
TW34.3	558250	141750	x	x	28.5	29.1	x	33.5	23.3	27.5	30.5	28.6	26.7	27.9	28.4	21.9	-	
TW41	558076	138762	x	x	52.8	45.3	40.3	46.9	37.4	42.5	46.4	x	x	39.8	43.9	39.5	29.6	
TW53	567638	144732	x	x	x	11.3	12.3	11.2	9.2	9.6	35.4	11.0	14.9	10.4	13.9	10.7	-	
TW55	566746	144112	x	x	x	17.8	20.9	16.9	12.2	18.0	18.0	16.2	20.1	x	17.5	14.6	-	
TW58	557927	138609	x	x	34.0	31.8	33.7	41.1	32.4	35.9	x	x	21.0	13.2	30.4	26.1	-	
TW60	560230	140150	38.6	x	13.0	11.7	10.6	11.0	9.3	11.7	15.2	14.9	14.0	9.5	14.5	11.2	-	
TW63.1 HH	576065	130604	46.0	x	x	44.3	32.3	49.0	45.7	43.5	60.5	53.0	x	x	-	-	-	
TW63.2 HH	576065	130604	43.7	x	x	46.5	38.8	41.9	43.5	44.6	62.9	44.8	47.2	33.8	-	-	-	
TW63.3 HH	576065	130604	45.8	x	x	60.2	33.3	42.2	46.9	40.8	65.6	48.9	28.9	37.7	44.9	34.5	-	
TW66 HH	576103	130566	32.3	x	x	22.9	18.0	20.0	21.0	22.4	26.2	22.8	28.1	16.8	23.1	17.7	-	

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
TW69 HH	576062	135116	49.6	x	x	34.2	32.8	36.4	38.9	32.9	44.1	36.6	46.0	26.4	37.8	29.1	-	
TW70 HH	576051	130734	33.4	x	x	36.4	26.9	31.1	34.2	33.5	43.3	39.4	35.6	16.7	33.1	25.4	-	
TW71	560838	140389	x	x	x	25.0	21.2	29.1	x	x	36.3	33.8	x	29.8	29.2	24.7	-	
TW72	558140	142080	x	x	21.0	19.6	16.4	21.4	24.1	x	x	x	x	x	20.5	19.0	-	
TW73	558137	142215	x	x	20.5	18.7	20.0	18.8	10.9	16.2	19.1	15.9	17.9	11.1	16.9	13.0	-	
TW74	557354	138128	x	x	23.2	23.8	20.0	24.1	15.4	x	x	x	x	x	21.3	19.8	-	
TW75	559208	139317	x	x	17.6	15.4	14.0	15.7	13.9	15.5	19.1	20.4	13.5	x	16.1	12.4	-	
TW77	559813	140829	x	x	31.6	24.6	19.1	24.5	26.4	27.3	29.6	35.0	23.9	x	26.9	20.7	-	
TW80 HH	577758	136010	31.3	x	x	15.5	19.5	x	x	x	26.0	x	x	x	23.1	17.2	-	
TW81 HH	572277	137785	34.5	x	x	x	38.5	32.5	32.8	x	12.2	26.6	x	x	29.5	23.9	-	
TW82	559166	139398	x	x	45.9	45.5	40.3	48.7	39.2	40.3	56.1	x	x	x	45.1	**40.8**	25.8	
TW83	558778	139491	x	x	25.3	26.2	27.7	28.7	21.0	23.5	33.3	35.8	x	x	27.7	24.4	-	
TW84	558789	139777	x	x	x	1.4	18.5	30.8	34.9	33.8	31.1	45.2	14.1	35.5	27.3	21.0	-	
TW85	558825	139824	x	x	x	1.9	17.5	17.8	19.5	19.2	22.5	28.7	20.7	30.0	19.8	15.2	-	
TW86	558276	139876	x	x	17.7	18.4	19.5	18.7	x	12.6	x	16.4	16.4	x	17.1	13.9	-	
TW87	554552	139178	x	x	23.2	19.1	19.5	x	x	x	x	x	x	x	20.6	17.9	-	
TW88	556128	139700	x	x	15.9	13.4	18.1	14.0	11.2	12.0	17.0	11.7	18.1	x	14.6	11.2	-	

☒ **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.**

☒ **Tunbridge Wells 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 **<u>bold and underlined</u>**.

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 Tunbridge Wells Borough Council During 2023

Tunbridge Wells Borough Council has not identified any new sources relating to air quality within the reporting year of 2023

Additional Air Quality Works Undertaken by Tunbridge Wells Borough Council During 2023

During 2023, Officers at Tunbridge Wells Borough Council prepared a report to present to Councillors, recommending the revocation of the Tunbridge Wells A26 AQMA, which has been compliant with all LAQM objectives for the past five years. The report will be presented at the March 2024 meeting of the Tunbridge Wells Borough Council Cabinet.

QA/QC of Diffusion Tube Monitoring

All diffusion tubes deployed in Tunbridge Wells Borough during 2023 were supplied by Socotec (Didcot). Socotec is a UKAS accredited laboratory and participates in the in the new AIR-PT (Proficiency Test) Scheme previously known as the Workplace Analysis Scheme for Proficiency (WASP)) for NO_2 tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO_2 concentrations reported are of a high calibre. The lab follows the procedures set out in the Harmonisation Practical Guidance. Socotec is a UKAS accredited laboratory and participates in the in the new AIR-PT (Proficiency Test) Scheme previously known as the Workplace Analysis Scheme for Proficiency (WASP)) for NO_2 tube analysis and the Annual Field Inter-Comparison Exercise. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO_2 concentrations reported are of a high calibre. The lab follows the procedures set out in the Harmonisation Practical Guidance. In the latest available results, Socotec Didcot scored as follows: AIR-PT AR055 (Jan to Feb 2023) 100%, AIR-PT AR056, (May to June 2023) 100%, AIR-PT AR057 (July to August 2023) 100% and AIR-PT AR058 (September to October 2023) 100%. The percentage score reflects the results deemed to be satisfactory based upon the z-score of < ± 2. Based on 28 studies, 100% of all local Authority co-location studies in 2023, using the 50% TEA in acetone preparation method, were rated as ‘good’ (tubes are considered to have "good" precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%). All diffusion tubes were deployed in accordance with the 2023 diffusion tube calendar, however, some data from January and February deployed tubes was rejected when an episode of staff sickness prevented some tubes from being collected and deployed on the correct date, which in turn led to subsequent confusion over the actual exposure periods for those tubes.

Diffusion Tube Annualisation

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

Site ID	Annualisation Factor Canterbury	Annualisation Factor Thurrock	Annualisation Factor <Site 3 Name>	Annualisation Factor <Site 4 Name>	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
TW02	1.1253	1.0862			1.1058	8.8	9.7
TW19	1.1105	1.0438			1.0771	17.2	18.5

Site ID	Annualisation Factor Canterbury	Annualisation Factor Thurrock	Annualisation Factor <Site 3 Name>	Annualisation Factor <Site 4 Name>	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean
TW41	1.1778	1.1587			1.1683	43.9	51.3
TW55	1.0949	1.0749			1.0849	17.5	19.0
TW58	1.1339	1.1008			1.1174	30.4	34.0
TW71	1.1139	1.0824			1.0981	29.2	32.1
TW72	1.2023	1.2069			1.2046	20.5	24.7
TW74	1.2023	1.2069			1.2046	21.3	25.7
TW80 HH	0.9368	1.0017			0.9692	23.1	22.4
TW81HH	1.0704	1.0348			1.0526	29.5	31.1
TW82	1.1592	1.1858			1.1725	45.1	52.9
TW83	1.1428	1.1451			1.1440	27.7	31.7
TW86	1.0415	1.0701			1.0558	17.1	18.1
TW87	1.0759	1.1820			1.1289	20.6	23.3

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2024 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 regarding 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.

Tunbridge Wells Borough Council have applied a national bias adjustment factor of 0.77 to the 2024 monitoring data. A summary of bias adjustment factors used by Tunbridge Wells Borough Council over the past five years is presented in Table C.2.

Tunbridge Wells Borough Council has applied a national bias adjustment factor of 0.77 to the 2023 monitoring data. A summary of bias adjustment factors used by Tunbridge Wells over the past five years is presented in Table C.2.

It is usually the case that if our data capture is good, we will choose a local bias correction factor in preference to a national one. In 2023, the diffusion tube data capture at the automatic monitoring site was relatively poor at only 75%, which would tend to make us cautious about using the local bias correction factor. We calculated the local bias correction factor to be 0.8. In the previous three years, the local bias correction factors came out to be 0.79, 0.76 and 0.76. Therefore, the calculated local bias correction factor appears slightly high. By contrast, the national bias correction factor for Socotec, 50% TEA in acetone, based on 28 studies, was 0.77. determined using version 03/24 of the national bias correction factor spreadsheet, was 0.77, which is in the middle of the range that we have used for the previous three years. Therefore, on balance and bearing in mind the relatively poor data capture, we elected to use the national bias correction factor to adjust the data for 2023.

Table C.2 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2023	National	03/24	0.77
2022	Local	-	0.79
2021	Local	-	0.76

2020	Local	-	0.76
2019	National	04/20	0.75

Table C.3 – Local Bias Adjustment Calculation

For completeness, the local bias correction factor calculation is shown below, even though we ultimately elected not to use it.

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias	9				
Bias Factor A	0.8 (0.71 - 0.91)				
Bias Factor B	25% (10% - 40%)				
Diffusion Tube Mean (µg/m³)	28.4				
Mean CV (Precision)	7.3%				
Automatic Mean (µg/m³)	22.8				
Data Capture	99%				
Adjusted Tube Mean (µg/m³)	22.8				

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.

Table C.4 – Non-Automatic NO_2 Fall off With Distance Calculations (concentrations presented in µg/m³)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
TW41	1.8	6.6	39.5	6.1	29.6	
TW82	1.0	8.5	40.8	6.1	25.8	

QA/QC of Automatic Monitoring

Calibration of the Tunbridge Wells A26 monitoring station is undertaken fortnightly by TWBC's Environmental Protection Team. Matts Monitors undertake 6 monthly servicing, and the QA/QC is part of the Kent and Medway Air Quality Monitoring Network (K&MAQMN) which includes daily data checks and annual audits. The K&MAQMN contract is run by Ricardo Energy and Environment who ratify the data. Data is available via the KentAir website www.kentair.org.uk All of TWBC's previous ASRs are available via the KentAir website.

QA/QC of Automatic Air Quality Instruments

Data ratification in Tunbridge Wells Borough was undertaken by Ricardo Energy and Environment

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QA/QC of Automatic Air Quality Instruments

Air quality measurements from automatic instruments are validated and ratified to the standards of the AURN and those described in the Local Air Quality Management – Technical Guidance LAQM (TG22) https://laqm.defra.gov.uk/technical-guidance

Validation

This process operates on data during the data collection stage. All data are continually screened algorithmically and manually for anomalies. There are several techniques designed to discover spurious and unusual measurements within a very large dataset. These anomalies may be due to equipment failure, human error, power failures, interference, or other disturbances. Automatic screening can only safely identify spurious results that need further manual investigation.

Raw data from the gaseous instruments (e.g., NOx, O_3, SO_2 and CO) are scaled into concentrations using the latest values derived from the manual and automatic calibrations. These instruments are not absolute and suffer drifts. Both the zero baseline (background) and the sensitivity may change over time. Regular calibrations with certified gas standards are used to measure the zero and sensitivity. However, these are only valid for the moment of the calibration since the instrument will continue to drift. Raw measurements from particulate instruments (e.g., PM_{10} and $PM_{2.5}$) generally do not require scaling into concentrations. The original raw data are always preserved intact while the processed data are dynamically scaled and edited.

Ratification

This is the process that finalises the data to produce the measurements suitable for reporting. All available information is critically assessed so that the best data scaling is applied, and all anomalies are appropriately edited. Generally, this operates at three-, six- or twelve-month intervals. However, unexpected faults can be identified during the instrument routine services or independent audits which are often at 6-monthly intervals. In practice, therefore, the data can only be fully ratified in 12-month or annual periods. The data processing performed during the three- and six-monthly cycles helps build a reliable dataset that is finalised at the end of the year.

There is a diverse range of additional information that can be essential to the correct understanding and editing of data anomalies. These may include

· The correct scaling of data

· Ignoring calibrations that were poor e.g., a spent zero scrubber

· Closely tracking rapid drifts or eliminating the data

· Comparing the measurements with other pollutants and nearby sites

· Corrections due to span cylinder drift

· Corrections due to flow drifts for the particulate instruments

· Corrections for ozone instrument sensitivity drifts

· Eliminating measurements for NO2 conversion inefficiencies

· Eliminating periods where calibration gas is in the ambient dataset

· Identifying periods where instruments are warming-up after a power cut

· Identification of anomalies due to mains power spikes

· Correcting problems with the date and time stamp

· Observations made during the sites visits and services

The identification of data anomalies, the proper understanding of the effects and the application of appropriate corrections requires expertise gained over many years of operational experience. Instruments and infrastructure can fail in numerous ways that significantly and visually affect the quality of the measurements. There are rarely simple faults that can be discovered by computer algorithms or can be understood without previous experience.

The PM_{10} concentrations require scaling into Gravimetric Equivalent concentration units by use of the Volatile Correction Model (VCM) http://www.volatile-correction-model.info or by corrections published by Defra https://uk-air.defra.gov.uk/networks/monitoring-methods?view=mcerts-scheme depending on the measurement technique.

QC Audits

Ricardo Energy & Environment carry out annual audits to rigorously evaluate analysers to obtain an assessment of performance level. This information, in conjunction with the full analyser data set and calibration and service records, help ensure data quality specifications have been met during the preceding period. Additionally, an assessment of the station calibration cylinder concentrations provides an indication that the cylinder concentrations remain stable and therefore suitable for data scaling purposes.

The following describes the audit process:-

1 Oxides of Nitrogen

1.1 Analyser Response Factors

A stable "intercalibration standard", validated against transfer standards, is transported to each site, and is sampled by the analyser.

The analyser also samples from a cylinder containing certified metrology grade zero air, or catalytic scrubbers of known efficiency.

The analyser factor quoted is the response to the intercalibration standard, expressed in $nmol.mol^{-1}.logged\ unit^{-1}$, with the zero point being the response to zero air.

For oxides of nitrogen analysers, the NO_x and NO channel response factors are derived from an NO in nitrogen cylinder.

1.2 Analyser Linearity

To determine analyser linearity, a series of amount fractions are produced (using dynamic dilution techniques) covering the analyser range. The analyser output is noted for each of these amount fractions. A linear regression is then carried out, relating analyser output to the dilution factor at each point. The linearity error is defined as the maximum residual of the regression slope.

1.3 Analyser noise levels.

This is defined here as the standard error of ten successive spot readings of analyser output when fully stabilised on zero (zero noise) or span (span noise) amount fraction.

1.4 NO_x analyser Converter Efficiency

NO_2 to NO Converter efficiency is determined using gas point titration as follows:

A stable amount fraction of NO is produced, (by two stage dynamic dilution) and the analyser outputs, NO_x and NO, are noted after a suitable stabilisation period.

Ozone is added to the sample, converting some NO to NO_2, note however, the total NO_x in the sample remains constant. Again, following appropriate stabilisation times, the NO_x and NO outputs are noted.

Converter (in)efficiency is defined as the change in scaled NO_x signal as a percentage ratio of the change in the scaled NO signal.

1.5 Estimation of Site Cylinder Amount fractions

The site cylinder amount fractions are evaluated by sampling from the site cylinder and using the analyser response factors, to derive their amount fraction.

2 Particle Analysers.

2.1 Analyser Flow Rates

Flow rates are measured by calibrated flow audit measurement systems. A leak check is also carried out.

2.2 Analyser Calibration Constants

TEOM Analyser calibration constants are measured by consideration of the change in frequency induced by placing pre-weighed masses on the analyser sensors.

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

PM_{10} Data from the TEOM used in TWBC is corrected using the Volatile Correction Model (VCM). PM2.5 data from the BAM used in TWBC, does not require the application of a correction factor.

Automatic Monitoring Annualisation

The automatic monitoring of PM_{10}, $PM_{2.5}$ and NO_2 within Tunbridge Wells Borough recorded data capture of greater than 75% in 2023 (99.6%, 92.3% and 99% respectively) therefore annualisation of the monitoring data was not required.

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, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No automatic NO_2 monitoring locations within Tunbridge Wells Borough required distance correction during 2023.

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

Figure D.1 – Map of all Non-Automatic Monitoring Site

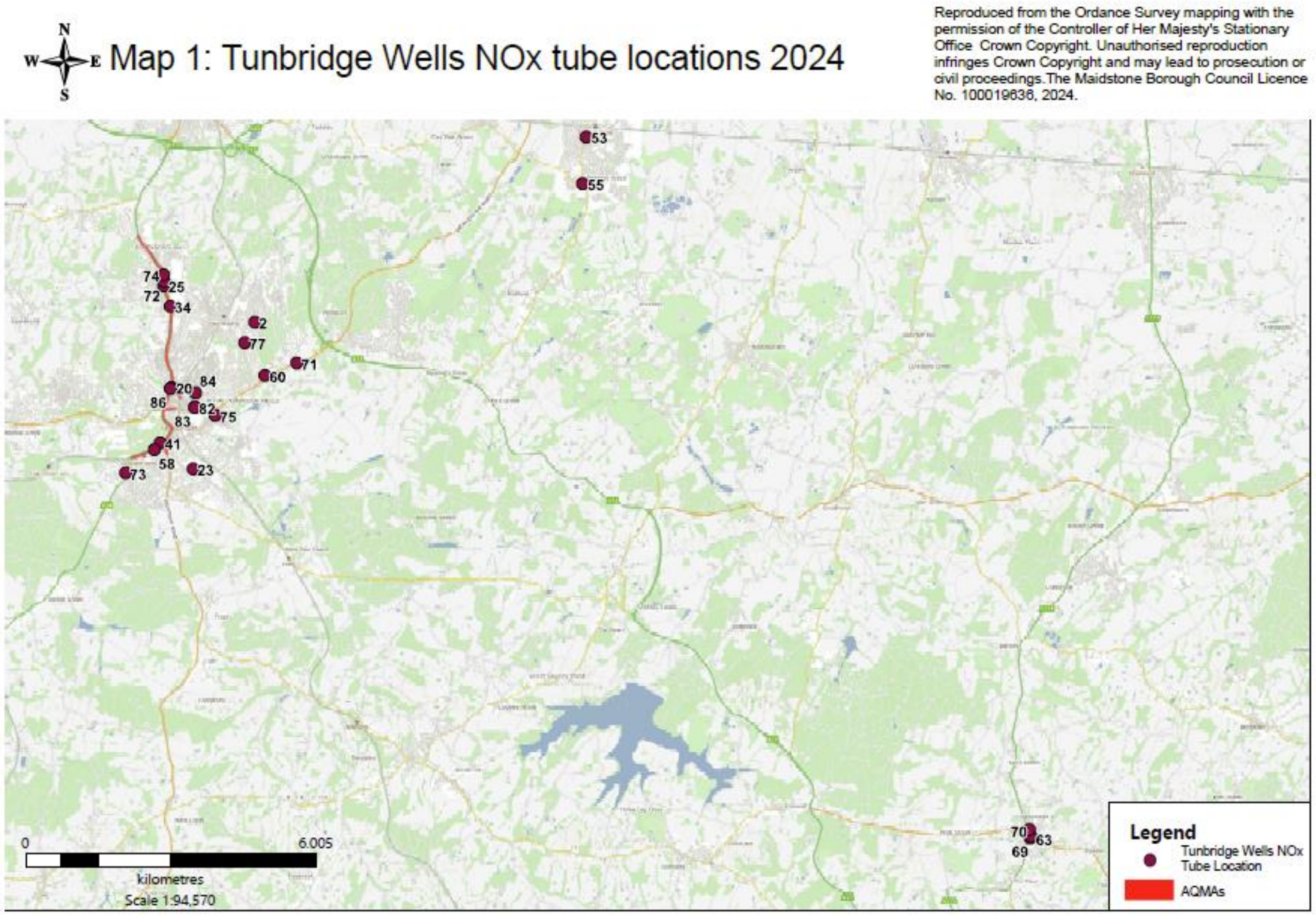


Figure D.2 – Map of Non-Automatic Monitoring Sites in Paddock Wood Ward

Map 2: TW 53 and TW 55

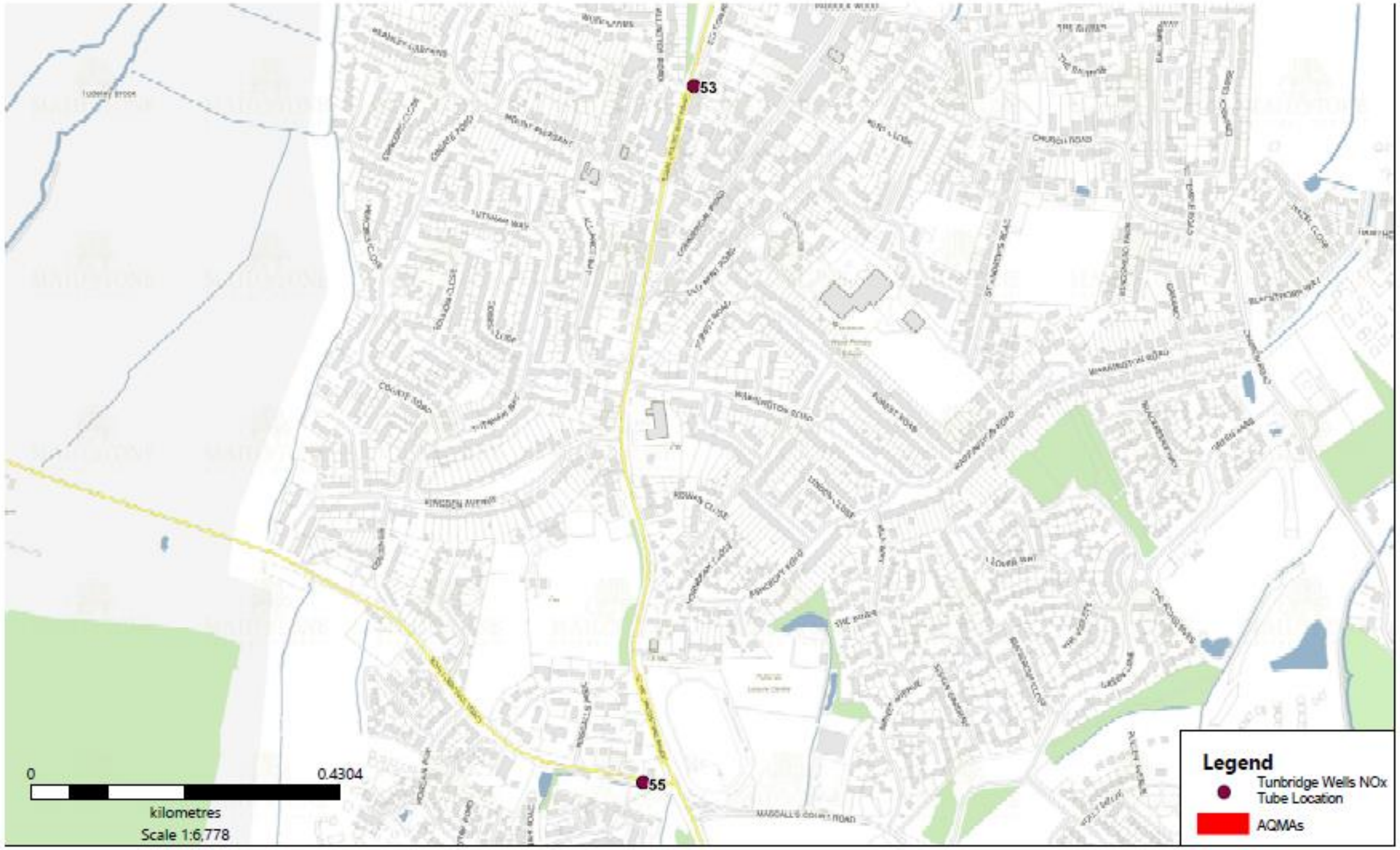


Figure D.3 – Map of Non-Automatic Monitoring Sites in Southborough Ward

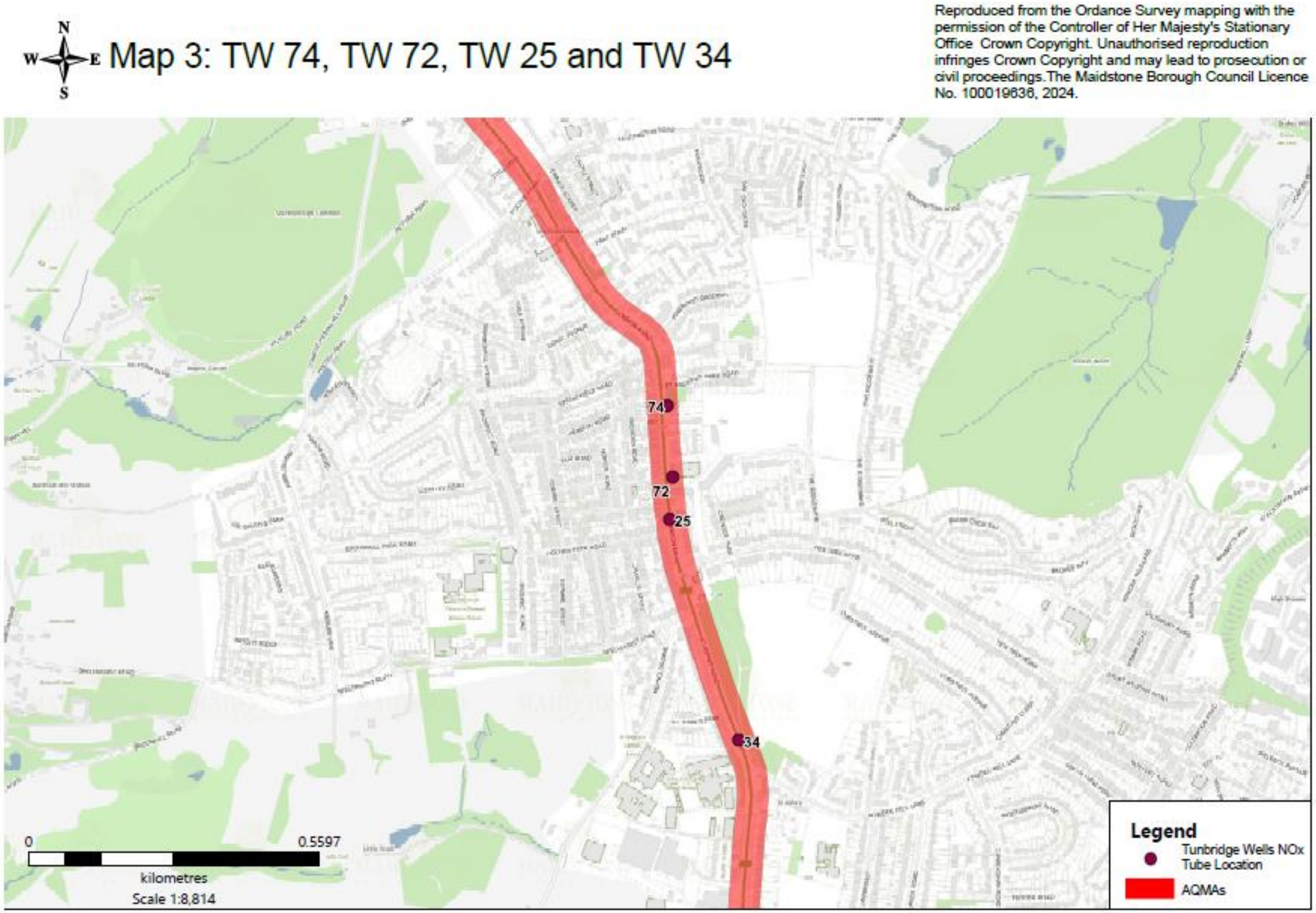


Figure D.4 – Map of Non-Automatic Monitoring Sites in Rural Tunbridge Wells Ward

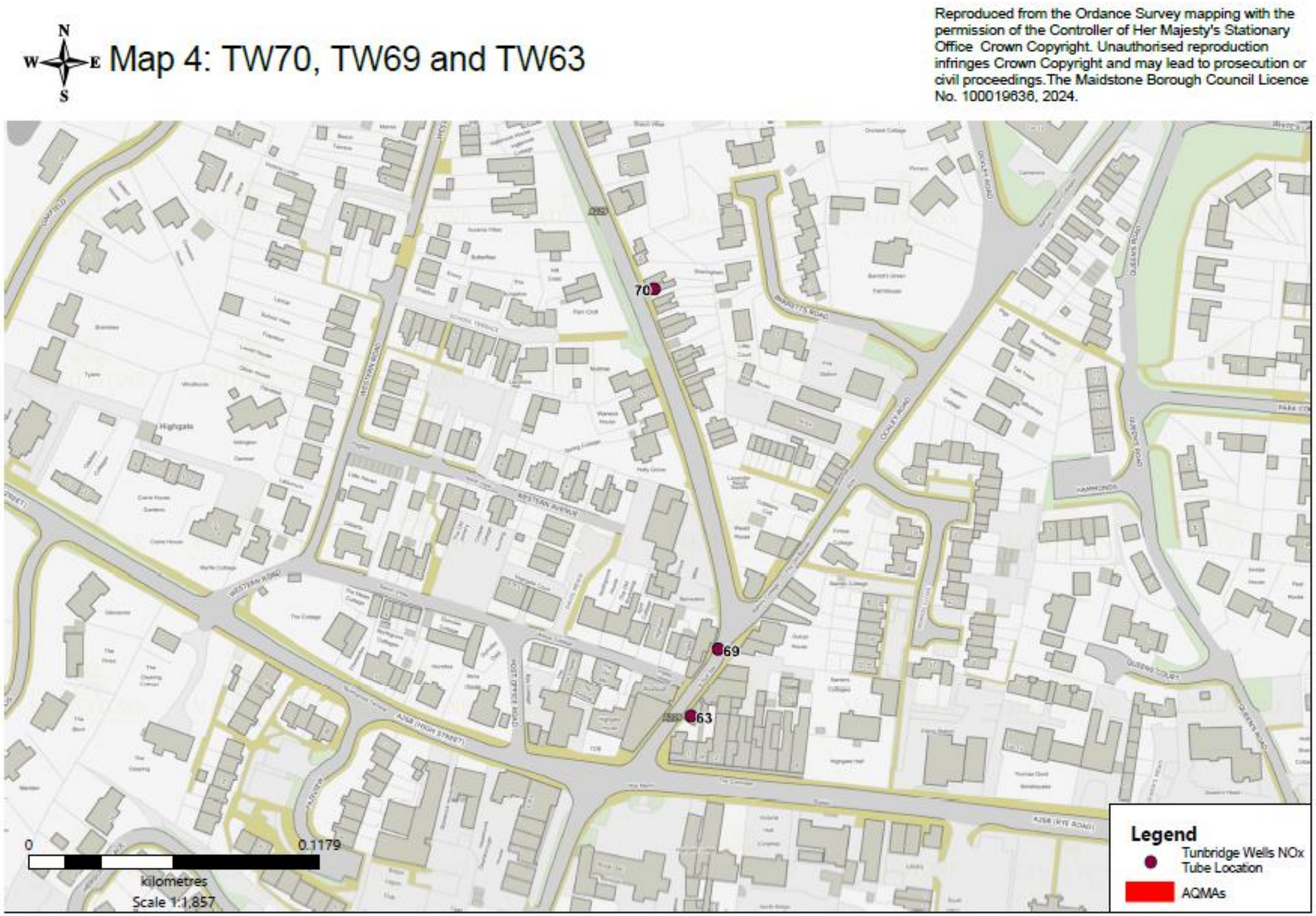


Figure D.5 – Map of Non-Automatic Monitoring Sites in Sherwood Ward

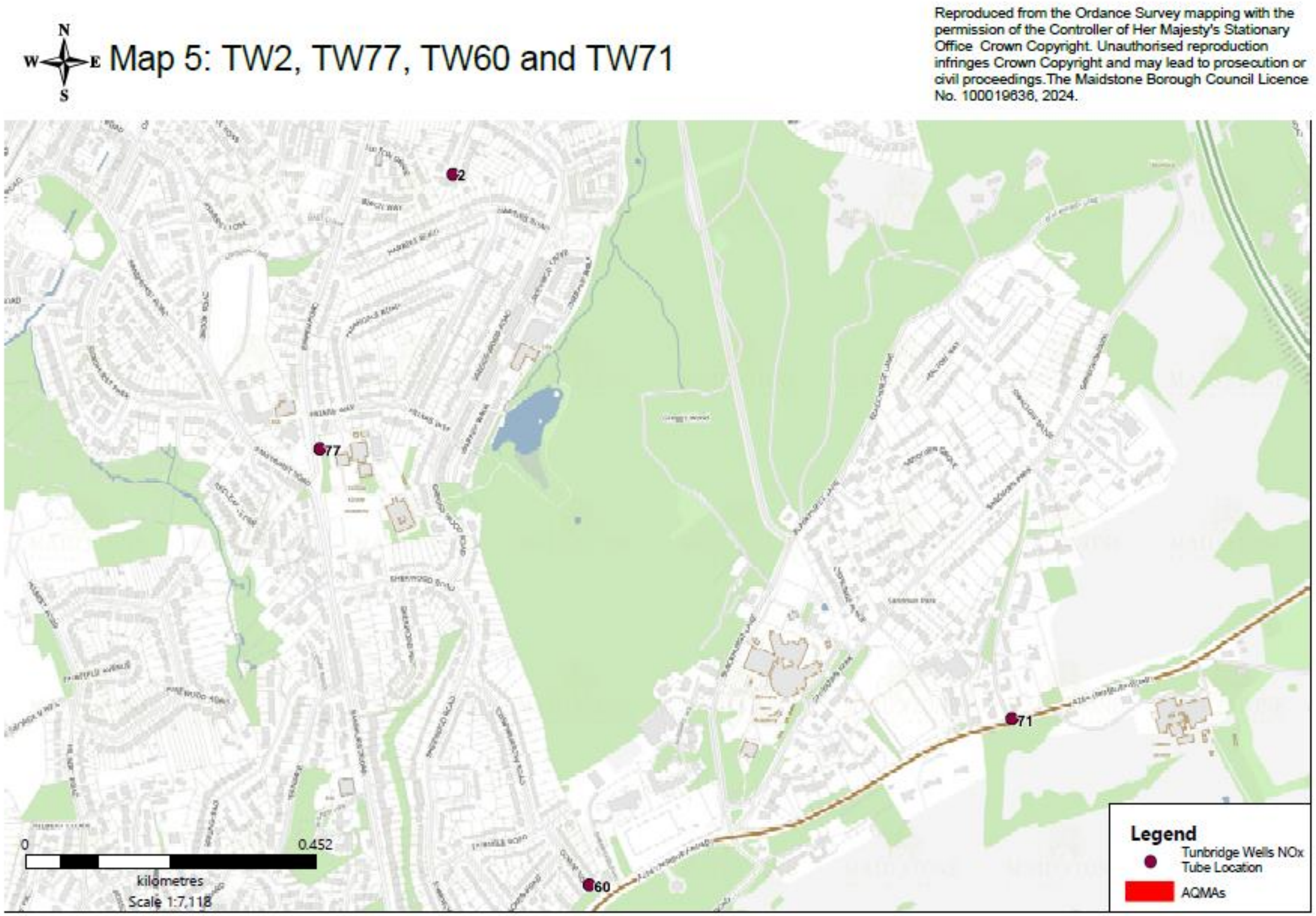


Figure D.6 – Map of Non-Automatic Monitoring Site in Park Ward

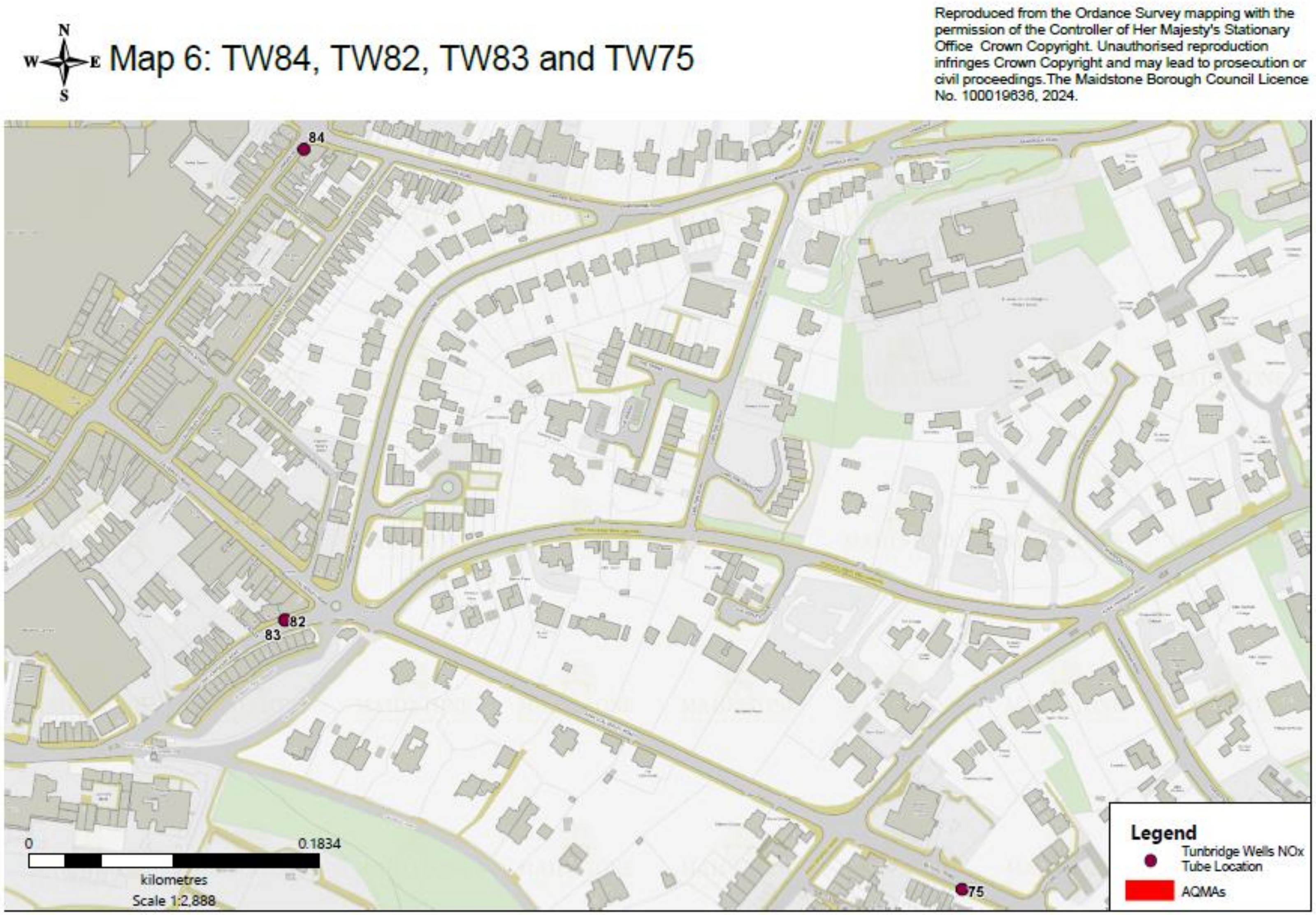
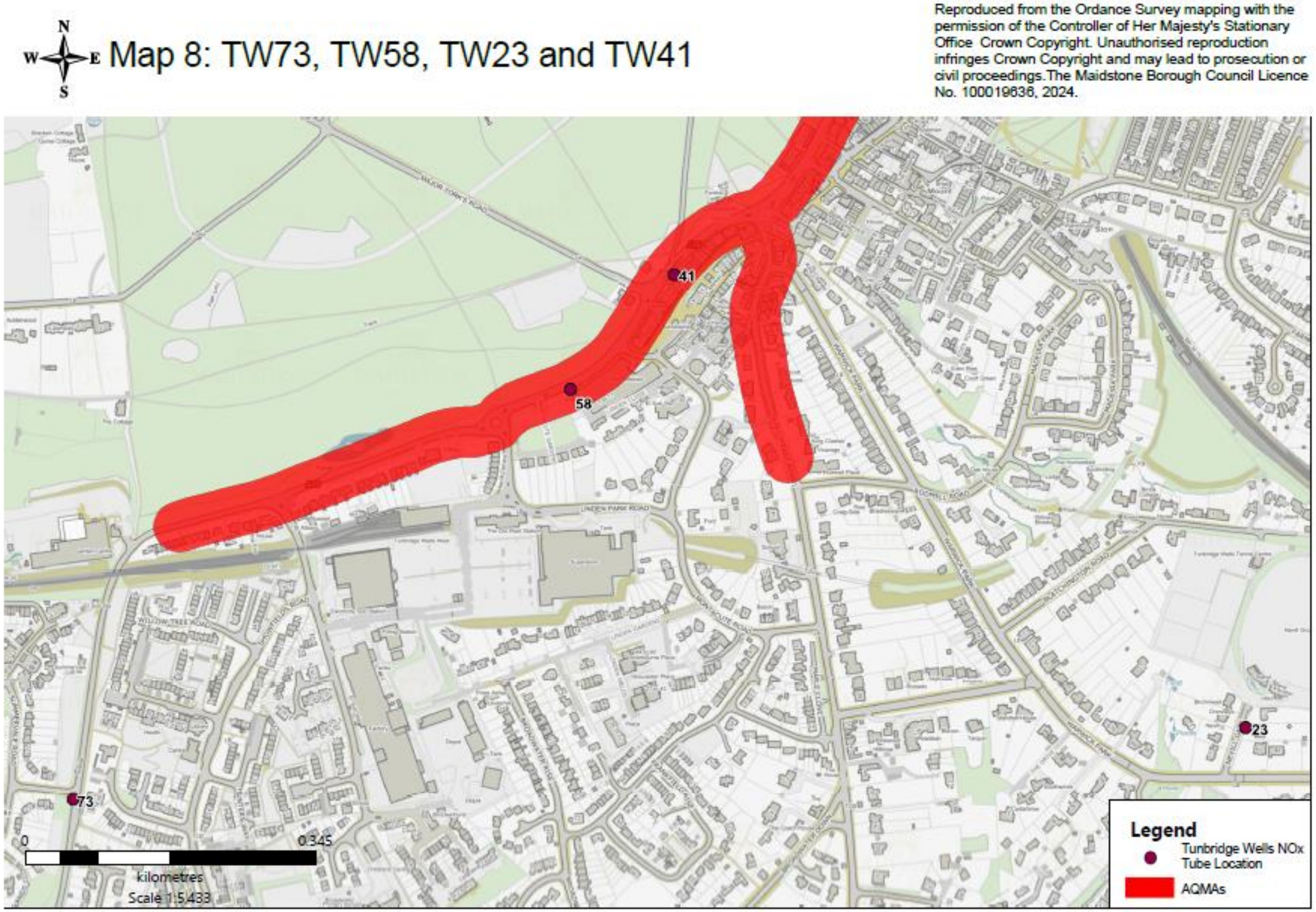


Figure D.7 – Map of Non-Automatic Monitoring Site in Culverden Ward

Figure D.8 – Map of Non-Automatic Monitoring Site in Pantiles Ward



Appendix E: Summary of Air Quality Objectives in England

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

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

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

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

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- Chemical hazards and poisons report: Issue 28. June 2022. Published by UK Health Security Agency
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- Kent and Medway Air Quality Partnership (2011) *Air Quality and Planning Technical Guidance (updated 2016)*
- National Diffusion Tube Bias Adjustment Spreadsheet, version 03/24 published in March 2024.
- Tunbridge Wells Borough Council Hawkhurst Air Quality Action Plan – February 2023
- http://www.phoutcomes.info/public-health-outcomes-framework#page/0/gid/1000043/pat/6/par/E12000008/ati/101/are/E07000114