2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: June 2022

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Endorsement from the Director of Health and Care, Staffordshire County Council

Staffordshire County Council (SCC) is committed to working with partners to ensure that Staffordshire will be a place where improved health and wellbeing is experienced by all. Poor air quality has a negative impact on public health, with potentially serious consequences for individuals, families, and communities. Identifying problem areas and ensuring that actions are taken to improve air quality forms an important element in protecting the health and wellbeing of Staffordshire residents. Improving air quality is often a complex issue, presenting a multi-agency challenge – so it is essential that all agencies work together effectively to deliver improvements where they are needed.

As Director of Health and Care across Staffordshire I endorse this Annual Status Report which sets out the position in all the Local Authorities across Staffordshire and Stoke-on-Trent focusing on human made pollution with particulate matter.

The Air Aware project “phase 2” continues through 2022 until March 2023. The project delivers behaviour change to increase active travel, decrease car use, and raise awareness of air quality issues through five elements. These are business and school engagement, communications and campaigns, electric vehicles, and air quality monitoring in three targeted locations, Burton, Leek and Cannock. Campaigns include Anti-Idling, walking and cycle activities and Clean Air Day. These have been countywide engaging a large number of businesses and schools. The programme will focus on reducing levels of NO and PM, which will be monitored at key locations.

In addition, Officers from Newcastle Borough Council, Stoke City Council and Staffordshire County Council are jointly working under Ministerial Direction to improve transport related air pollution in North Staffordshire.

Dr Richard Harling

Director of Health and Care
Staffordshire County Council
[1 June 2022]

Executive Summary: Air Quality in Our Area

Air Quality in Cannock Chase

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

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[3], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[4].

The main pollutant of concern in the Cannock Chase Council area is nitrogen dioxide. Nitrogen dioxide is a gas, with the chemical formula NO_2. It is chemically related to nitric oxide (nitrogen monoxide), a colourless gas with the chemical formula NO.

Together, NO and NO_2 are known as NOx. NOx is released into the atmosphere when fuels are burned (for example, petrol or diesel in a car engine or natural gas in a domestic central heating boiler or power station). NO_2 can affect our health. There is evidence that high levels of it can inflame the airways in our lungs and, over a long period of time, affect how well our lungs work. People with asthma are particularly affected. NO_2 can also affect vegetation.

NOx is produced when fossil fuels (coal, natural gas and so on) are burned. Road transport is the largest source of NOx emissions in the UK and is the main contributor to localised problems in Cannock Chase district. Strict European standards require emissions from vehicles to improve over time. This is achieved by improvements in engine

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

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

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

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

design and fitting three-way catalysts to petrol cars. The importance of road transport is even greater in urban areas.

NOx emissions from burning fossil fuels are mainly as NO, although some sources can release a lot of NOx as NO_2. Reactions in the atmosphere can subsequently turn NO into NO_2.

Cannock Chase Council has monitored for nitrogen dioxide over a number of years, which has identified hotspots where national objectives have been exceeded, and people are likely to be exposed to poor air quality for prolonged lengths of time whereby health impacts could be experienced. These are at locations next to the following roads:

• A5 Watling Street in Bridgtown ---------- (AQMA No.1)

• A5 Watling Street between Churchbridge and the Turf Island --- (AQMA No.2)

• A5190 Cannock Road, Heath Hayes ---------- (AQMA No.3)

Three Air Quality Management Areas (AQMAs) have been declared to address these exceedences:

AQMAs No. 1 and 2 cover the entire length of the A5 in the district between the eastern boundary with Walsall and western boundary with South Staffordshire.

AQMA No. 3 was declared in 2017 and located around the ‘Five Ways Island’ area of Heath Hayes.

Plans are shown in Appendix D: Map(s) of Monitoring Locations and AQMAs. Details have also been uploaded to the Defra website.

Levels in all AQMAs have decreased since 2016, which appeared to be a high pollution year. This is shown in Figure A.1.

All three AQMAs have shown some decrease in recent years, primarily due to improvements in engine technology. Prior to 2016 it had been hoped that if improved pollution levels were sustained, the AQMA designations for the A5 could be revoked. An external review of AQMAs has shown that AQMA 1 can now be revoked, and AQMA 2 to be reviewed in one to two years to determine whether that can be revoked also. Whilst dialogue has taken place with Highways England over the years, it has proved difficult to identify action plan measures. Improvements in air quality appear to be the result of improved fleet technology rather than local action.

Monitoring on the A5190 Cannock Road, Heath Hayes near Five Ways Island continues to decrease. Modelling of pollution levels at first floor level at the relevant receptor

demonstrates that levels of NO_2 are below the objective, to the extent that revocation can be made. Traffic levels have returned to pre-covid levels, yet air quality remains similar to that experienced during lockdown to the extent that the annual mean NO_2 objective is now measured at ground floor level. Although the area is also subject to significant local plans, development allocations and the combination of improved engine technology (including uptake of electric vehicles) and planned infrastructure improvements will ensure that the objective will continue to be achieved.

Staffordshire County Council are undertaking studies on infrastructure changes to accommodate local plan growth, and air quality modelling is an integral part of that process. Air quality monitoring has been ongoing since 2014, and includes a number of diffusion tube sites, an AURN automatic monitor plus collocated diffusion tubes for bias adjustment purposes. Intensive school and business travel planning has taken place by Staffordshire County Council to address exceedance in this area.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy[5] sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

[5] Defra. Clean Air Strategy, 2019

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

Action	Partner organisations	Impact
School and workplace travel planning	Staffordshire County Council	School travel planning has had the more significant impact of the two streams. High level of engagement achieved at the Heath Hayes primary schools prior to lockdown. These projects delivered through the Air Aware project, coordinated by Staffordshire County Council, and includes several district councils on the management board, including CCDC. A business travel network was launched in Cannock to specifically engage with large employers in Cannock. This is aimed at sharing good practice amongst members, and benefit from collective action. A number of businesses are actively engaged in travel planning with Staffordshire County Council. A new (number 3) bus route was launched in 2021 An anti-idling campaign was rolled out to businesses in the district in the bid to reduce tailpipe emissions. Schools in the Heath Hayes, Norton Canes and Great Wyrley have been engaged in the Air Aware project, which influences school commuting behaviour on the A5190 and A5, where air quality management areas are located. These schools have run anti-idling

Action	Partner organisations	Impact
		and active travel campaigns. County council colleagues have provided lesson plans and display signs to schools to promote these issues. Tailored travel plans have been provided to 4 schools in the district.
Commencement of projects to promote uptake of low emission vehicles.	See below:	See below
(i) Taxis	CCDC Licencing Section Energy Savings Trust	A taxi operator survey has been completed, which demonstrates that the current fleet is dominated by Euro 5 diesels, which have poor air quality performance and high carbon emissions. There is scope for improvement in this area if operators can be incentivised to change to cleaner alternatives. The Licensing Department will shortly consult on policy changes for the transition to an entirely ULEV (Ultra low emission vehicles) fleet by the early 2030s.
(ii) On street charging	CCDC project officer	A project is currently under way to secure a network of on street charging points in residential areas where it would otherwise be difficult for residents to charge electric vehicles at home, such as areas of terrace

Action	Partner organisations	Impact
		housing. Funding is currently available from the government's On Street Residential Charging Scheme ('ORCS'), but a detailed scheme needs to be prepared to access this funding stream. To further support this initiative, a green transport strategy is also being prepared, which aims to increase the uptake of active and green transportation, improve the provision of electric charging facilities and understanding the reasons and choices of travel in the district. A sustainable transport strategy is currently being developed.
Local plans development in Heath Hayes / Wimblebury	CCDC planning policy and Staffordshire County Highways	To account for future allocated growth in and around AQMA 3 (Five Ways Island, Heath Hayes), Staffordshire County Council are considering the future transport infrastructure of the area and ensure that adverse air quality impacts are avoided.

Conclusions and Priorities

The conclusions from this year's ASR are:

Conclusion	Summary
Exceedences of air quality objectives within or outside of AQMAs.	None
Significant trends	There has been a year-on-year improvement in air quality over recent years. However, although 2020 saw more marked reductions due to Covid lockdown measures (which reduced road traffic significantly), 2021 still maintained relatively low air quality levels. This is encouraging and demonstrates that nation policies are continuing to improve air quality.
Possibility of revoking AQMAs.	A review of existing AQMAs has concluded that the following can be revoked: ▪ AQMA 1 ▪ AQMA 3 This is supported by air quality monitoring undertaken in 2021. Trends at AQMA 2 continue to indicate that this may be revoked in the near future, but due to the uncertainties associated with the impact of the covid pandemic, further monitoring and assessment is required to ensure that the decision is correct.
New developments that may have an impact on air quality.	A number of planning applications for major developments were identified in 2021. However, none of them are associated with significant operational impact on air quality.

Conclusion	Summary
	Most however, require mitigation to minimise the construction phase impact on air quality, which is primarily dust emission control. These applications are: CH/21/0366 & CH/21/0405 - McArthur Glen Designer Outlet Village, Mill Green, Eastern Way, Cannock *** SCC/21/0031, SCC/21/0075/EIA-SC, SCC/22/0021/VOC-ES & SCC/22/0050/EIA-SCO (Staffordshire County Council applications) - Poplars Waste Disposal Site, Lichfield Rd., Cannock. *** CH/21/0231 - Units 8 & 9 Orbital Retail Park, Voyager Drive, Cannock
Action Plan	Updating AQAP was deferred in light of the conclusions of AQMA review and detailed assessment. Requires update upon possible revocation of AQMAs.

Local Engagement and How to get Involved

If residents and businesses reduce the amount of fuel and chemicals used, it will improve air quality. The following ways can help:

Commute

- Visit Air Aware Staffordshire[7] which includes:
  - Bulletins for inspiration and information on ways and initiatives to reduce pollution from travelling,
  - Pledge to leave the car at home one day a week. See also http://www.staffssaferroads.co.uk/[8],
  - Turning off car engines,
  - Car share once per week,
  - Cycling / scooting,
  - Servicing vehicles,
  - Home working,
  - Public Transport,
  - Low / zero carbon vehicles,
  - Renewable energy use at home.

Energy Efficiency

- Improving the energy efficiency of your home / school / workplace will help reduce energy bills, as well reducing the air pollution associated with power generation.
- For further information, please visit the Energy Savings Trust (EST) website[9], which is a non-profit organisation that promotes energy savings, funded by the Government and private sector.

Around The Home

- Use water-based or low solvent paints, glues, varnishes, and wood preservatives, look for brands with a low VOC content.

[7] https://www.staffordshire.gov.uk/DoingOurBit/Get-Inspired/Clean-green-and-safe/Air-aware/Air-aware.aspx

[8] https://staffssaferroads.co.uk/

[9] https://energysavingtrust.org.uk/

- Make sure your home is well ventilated especially during DIY or cleaning.
- Have your central heating system checked regularly to avoid risking exposure to toxic carbon monoxide.
- Keep wood stoves and fireplaces well maintained, and make sure that wood burners are exempted[10] for use in smoke control areas. Ready to use wood bought from a Woodsure Certified Supplier[11] will offer the following benefits:
    - Dry, Ready to Burn wood/logs & briquettes make any appliance more efficient.
    - Burning dry wood instead of wet wood is part of the solution to reducing the impact on our environment.
    - Burning wet wood increases emissions and has a greater impact on air quality.
    - Any appliance and chimney system will suffer from smoke produced from wet wood, which increases maintenance and repair requirements, making it harder for chimney sweeps to keep systems in safe, effective condition.
    - Burning waste and treated wood (e.g., old furniture) can emit harmful fumes.

- Before organising days out, check the air pollution forecast[12].
- Purchase "Green Power" for the electricity in your home. (Contact your power supplier).
- Be energy efficient- make sure your house is well insulated and use energy efficient appliances (link[13]).
- Use trigger sprays rather than aerosols.
- Don't light bonfires or barbecues when air pollution levels are high.
- Never burn household waste, especially plastics, rubber, and treated timber.

Cannock Chase Council's air quality reports and action plan documents are accessible from the following link[14].

[10] https://smokecontrol.defra.gov.uk/appliances.php?country=england

[11] https://woodsure.co.uk/

[12] https://uk-air.defra.gov.uk/forecasting/

[13] http://energysavingtrust.org.uk/energy-at-home/

[14] https://www.cannockchasedc.gov.uk/residents/environmental-health/environmental-protection/air-quality-management

For enquires or suggestions on how to improve air quality please use one of the following:

Write to:	The Environmental Protection Section, Cannock Chase Council, Beecroft Road, Cannock, Staffordshire. ST18 0YS
Email:	Environmentalhealth@cannockchasedc.gov.uk
Telephone	01543 462621

For general information and air quality forecasts, Defra provide information at the link[15]. Forecasting uses a user-friendly index band to quickly demonstrate general short term air levels in a localised area, and supplements this with advice for 'at risk individuals' and the general public.

Local Responsibilities and Commitment

This ASR was prepared by the environmental health department of Cannock Chase Council with the support and agreement of the following officers and departments:

Wayne Baillie - Lead Officer

Stephen Moore - Technical support

This ASR has been approved by:
Joss Presland - Head of Environment and Healthy Lifestyles

This ASR has been signed off by a Director of Public Health

[15] https://uk-air.defra.gov.uk/

If you have any comments on this ASR, please send them to Mr W. Baillie at:

Environmental Health Dept.,
Civic Centre,
Cannock Chase Council,
Beecroft Road,
Cannock,
Staffordshire. WS11 1BG

Telephone: 01543 462621

Email: environmentalhealth@cannockchasedc.gov.uk

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1 Local Air Quality Management

This report provides an overview of air quality in Cannock Chase District during 2021. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) 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 in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Cannock Chase 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

Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Cannock Chase Council can be found in Table 2.1. The table presents a description of the 3 AQMAs that are currently designated within Cannock Chase. Appendix D: Map(s) of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The air quality objectives pertinent to the current AQMA designations are as follows:

- NO_2 annual mean.

We propose to revoke AQMAs No.1 and No.3 (see additional document: AQMA Review: Cannock Chase, April 2021 in Appendix C).

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Cannock Chase Council AQMA 1	Declared 2006	NO_2 Annual Mean	A5 Watling Street, Longford & Bridgtown + Wolverhampton Road, Wedges Mills	YES	44.7	27	Action Plan for AQMA No 1 & 2	http://www.cannockchasedc.gov.uk/business/environmental-health/environmental-protection/local-air-quality-management
Cannock Chase Council AQMA 2	Declared 2014	NO_2 Annual Mean	A5 Watling Street, Churchbridge to Norton Canes	YES	36.2	27.1	Action Plan for AQMA No 1 & 2	http://www.cannockchasedc.gov.uk/business/environmental-health/environmental-protection/local-air-quality-management
Cannock Chase Council AQMA 3	Declared 2017	NO_2 Annual Mean	Sections of roads serving 'Five Ways Island', Heath Hayes.	NO	45.9	32.5	E.g., Action Plan for AQMA No. 3	

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

☐ **Cannock Chase Council confirm that all current AQAPs have been submitted to Defra.**

Progress and Impact of Measures to address Air Quality in Cannock Chase District

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

Appraisal Comment	CCDC comment
Tables A6 to A9 have been included, although there is no data to be reported. Suggest that these tables are removed from future ASRs.	Noted and addressed in this report.
The report states the Council's intention to progress the revocation of AQMA 1 and continue to assess the status of AQMAs 2 and 3 following further monitoring and analysis. This is supported in the independent AQMA review undertaken, which has been supplied as supporting evidence.	This measure has not been progressed, however is still relevant.
The QA/QC section has duplication when referring to the bias adjustment methodology, with conflicting and incorrect information presented.	Noted and addressed in this document.
The value calculated for the local bias adjustment factor is different from the value reported in the Diffusion Tube Data Processing Tool;	Noted and addressed in this document.
The value for the national bias adjustment factor given in Table C.1 is incorrect;	Noted and addressed in this document.

Appraisal Comment	CCDC comment
No clear justification for the use of the national bias adjustment factor over the local. The Council should include a clear justification of the reasons for selecting one factor over another;	Noted and addressed in this document
Diffusion tube mapping is robust and clearly demonstrates the extent of the monitoring network. It would be beneficial if the maps were larger on the page.	Size restricted due to standardised in house formatting.

Cannock Chase Council, with partnering organisations, have taken forward a number of direct measures during the current reporting year of 2021 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 Cannock Chase Council and Staffordshire County Council have made during the reporting year of 2021 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 are not currently detailed in their respective action plans for reasons explained elsewhere in this document.

Key completed measures are

Measure being taken	Commentary
Review of air quality management areas and detailed assessment by independent expert consultants. This has identified compliance with two out the three AQMAs. This in turn has caused further delay in producing an action plan, as identifiable measures are primarily aimed at the two compliant AQMAs	This report was completed in 2021 and provided in full elsewhere in this document. • Evidence for revocation of AQMA 1 is that 'Based on the measured annual mean nitrogen concentrations having been below the objective in 2017, 2018 and 2019, and less than 90% of the objective in 2018 and 2019, combined with recent trends in the

Measure being taken	Commentary
	data, it is recommended that this AQMA is revoked'. • 'The detailed assessment has, therefore, demonstrated that there were no exceedances of the annual mean nitrogen dioxide objective at locations of relevant exposure within AQMA 3 in 2019, and therefore this AQMA can also be revoked. Concentrations of nitrogen dioxide in future years are likely to reduce further due to changes to the vehicle fleet, as demonstrated by the monitoring trends presented in this report. However, increases in traffic will be introduced as large developments identified in Local Plans materialise. This will be countered by improved junction / road network. The implications require further quantification.
Cannock Chase Council have worked closely with Staffordshire County Council on connectivity projects (under the name 'Air Aware') aimed at improving air quality in and around its AQMAs. These are as follows: • Workplace travel planning. The Cannock Business Travel Network is a grant funded project aimed at larger businesses in Cannock and involves local government, travel providers and business.	• Partnership working with the local transport authority remains a high priority to deliver air quality improvements and will be an ongoing process. <u>Business support</u> • The launch of the business travel plan in Cannock was attended by 2 businesses, 2 public service operators and local government officers • 4 businesses have now been engaged with individually.

Measure being taken	Commentary
• School travel plans. Largely aimed at schools in and around AQMA 3 in Heath Hayes. • Intensive active travel campaign and infrastructure in AQMAs. This is particularly aimed at parents that habitually drive children to school. • Public events to promote EV vehicle uptake	• Travel surveys have been completed with two large employers in Cannock • Initiative proposals due to be presented in 2022, consisting of: o Launch of 'number 3' bus route o Focus on rail and bus travel due to existing cycle infrastructure o 6 business locations now support the Staffordshire County Council Anti-Idling Campaign <u>School Support</u> • 6 schools engaged in the Air Aware project within the district, 3 in Heath Hayes area, 3 in Norton Canes area and 1 near the A5 at Great Wyrley. • Schools have run an anti-idling campaign to promote air quality awareness and encourage parents directly to switch off their engines around schools. This campaign is delivered by the pupils themselves with support of staff. • All schools promoting a series of campaigns throughout the school year to promote active travel and raise awareness of air quality. These include Clean Air Day, Walk to School Week, Walk to School Month, Bike Week, Sustrans Big Walk and Wheel, etc. • Lesson plans available for schools to access promoting air quality and awareness of pollution. • Assemblies in schools to raise awareness of air pollution. • Signage for schools to remind parents/residents of anti-idling. • Travel Plans for schools, currently 4 schools with active travel plans.

Measure being taken	Commentary
	• Parking buddies allocated to 4 schools to keep cars from parking immediately outside school. See case study in Figure 2.
Projects to support uptake of ultra-low emission vehicles (ULEVs) - Taxis	CCDC Licensing Section and Energy Savings Trust (EST). Completion of taxi operator survey, conducted by EST. The findings being: Provision of data and explanations to help the council understand the current mix of vehicles in the taxi fleet and assist with policy decisions. There are a large number of Euro 5 diesel vehicles in the fleet, which is a common problem across the UK, as it leads to poor air quality and high carbon emissions. Recommendation that the council should act now to encourage the switch to electric as soon as possible, taking comfort in the fact that at least 86 vehicles in the fleet should be able to do this easily. Many drivers have already chosen hybrid vehicles, meaning the industry is open to alternatives. Further incentives may be required to ensure the council meets its climate change and air quality targets.

Cannock Chase Council expects the following measures to be completed over the course of the next reporting year, and prioritised in order:

Priority level	Measure to be taken	Commentary
1	Revoke AQMAs 1 and 2	This was a priority last year. However, staffing resource pressures interrupted the formal process. However, this process will be resurrected this year.
2	Ongoing Review of monitoring results in AQMA 2	This report demonstrates ongoing compliance with the annual mean NO_2 objective. A further year of compliance should be sufficient to allow consideration to revoke the current AQMA.
3	Develop an action plan for non-revoked AQMAs	This has been deferred until AQMAs 1 and 3 have been revoked. We are mindful that AQMA 2 may be revoked in the near future. Furthermore, the AQMA is based on exceedance at a single residential property and action plan measures are severely limited due to the source being a strategic trunk road.
4	Continue with current air quality monitoring	To support LAQM process. No changes planned. This is essential to evaluate air quality in the district.

Priority level	Measure to be taken	Commentary
5	Support uptake of ULEV through On Street Residential Charging Scheme ('ORCS').	Led by CCDC's Project Manager (Capital). Work ongoing and awaiting public survey findings. The aim would be to provide on street electric vehicle charging infrastructure strategically throughout the district in locations where residents have little access to off street parking, and hence little scope for private charging facilities. A sustainable transport strategy is in development to support this process (see below).
6	Produce an Air Quality Developer Guide	A draft Air Quality Developer Guide has been produced. This requires a review and finalisation before publishing on the council's website.
7	Partnership working with Staffordshire County Council (Air Aware)	As detailed above. As the main transport and connectivity authority serving the area, SCC are well placed to influence air quality in the district and considered to be the main partner in action planning.

Priority level	Measure to be taken	Commentary
8	Produce policies and procedures for developer contributions towards air quality mitigation measures.	Current planning policies do allow for developer contributions towards off site mitigation measures. However, it is considered that detailed procedures would allow the process to occur in a more effective manner, particularly if a suite of mitigation measures were available. This would involve joint working between several departments including Planning Policy, Legal, Environmental Health and relevant Highways Authority. Unfortunately, demands on staff time have prevented progress in this area. This measure is also dependent on the next measure.

Priority level	Measure to be taken	Commentary
9	Green Transport Strategy	Development of this strategy is ongoing and being led by CCDC's Project Manager (Capital). The aims of the document will be to: • Increasing the uptake of Active and Green Transportation whilst at the same reducing the use of petrol and diesel vehicle journeys • To drive the uptake of electric vehicle, use, by implementing a detailed charging strategy which accounts for current and future demand across the district • By working in close partnership with the Energy Savings Trust and Staffordshire County Council to increase the number of publicly available vehicle charging points • Taking into account the reasons and choices of travel within the district Though development of planning policies and strategic projects.
10	Projects to support uptake of ultra-low emission vehicles (ULEVs) - Taxis	Although taxis are not considered to have a significant impact on AQMAs, they provide an important transport function for the district. Uptake of ULEVs will influence air quality in areas of high activity such as town centres and help make provision of charging infrastructure viable.

Cannock Chase Council worked to implement these measures in partnership with the following stakeholders during 2021:

- Staffordshire County Council

- Energy Savings Trust
- Staffordshire Air Quality Forum - consisting of:
    - district / borough / city / county councils in Staffordshire and Stoke, including representations from Environmental Health, Public Health, Highways and Connectivity departments
    - UK Health Security Agency

The principal challenges and barriers to implementation that Cannock Chase Council anticipates facing are:

- Staff changes
- Partnership working to deliver outcomes
- Funding to deliver sustainable / active transport infrastructure

Progress on the following measures has been slower than expected due to:

Staff changes in Environmental Health has created resource pressures and reduction in specialist knowledge. This impacted delivery of last year's priorities. However, arrangements are now in place to overcome this hurdle for 2022/23.

Cannock Chase Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in AQMAs 1,2 and 3.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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	Junction Improvements: Watling Street / Walkmill Lane / North Street	Transport Planning and Infrastructure	Other		2019	Highways England					Aborted				Detailed Assessment report demonstrates that AQMA now complying with standards. Process of revocation underway.
2	Develop procedures to secure developer contributions towards mitigation measures	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance		2022/23	CCDC		No			Planning		Developer contributions likely to utilised towards sustainable transport infrastructure (esp. cycling). - The A5 corridor is a particular focus, affecting AQMAs 1 & 2. - Policies already in place but would benefit from further enhancement of details.	Draft planning guidance document prepared.	Staff time
3	Develop a common Air Quality SPD / Air Quality Developer Guide	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance		2022	CCDC	N/A	No	Not funded		Planning		Completion of document and made available online.	Draft document completed.	Staff time
4	Travel plans for businesses within AQMAs	Promoting travel alternatives	Workplace travel planning	2018	2023	Staffordshire County Council	Defra	Yes	Funded	£100k - £500k (county wide|)	Implementation	Not measured	• Number of businesses engaged. • Number of travel surveys completed • Number of businesses supporting anti-idling campaign	Phase 1 complete (2018-20), Phase 2 2021-23)	Phase 1 completed, phase 2 is targeting new businesses in Cannock area through current networks. New electric vehicle leased to demonstrate to businesses in phase 2. Performance indicator statistics cited above.
5	Travel Plans for Schools within AQMAs	Promoting travel alternatives	School travel plans	2018	2023	Staffordshire County Council	Defra / Public Health	Yes	Partially funded	£100k - £500k (county wide)	Implementation	Variable amongst schools. See Figure 1	Diffusion tube monitoring Number of schools engaged in Air Aware project Number of schools with travel plans	Phase 1 complete (2018-20), Phase 2 2021-23)	Ongoing monitoring of travel plans for schools
6	Anti-idling campaigns at schools in vicinity of AQMAs	Promoting travel alternatives	Intensive active travel campaign & Infrastructure	2019	2023	Staffordshire County Council	Defra /SCC	Yes	Partially funded	<£10k (county wide)	Implementation	Yes, during the campaign	Number of drivers idling outside the schools who have run the campaign have fallen	6 schools have taken part	Awareness Campaign to all parents who drive to school. Parents sign pledge to receive reminder emails

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	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
															(legacy)
7	Public awareness campaigns	Public information	Via leaflets	2018	2023	Staffordshire County Council	Defra	Yes	Funded	£50k - £100k (county wide)	Implementation	Not measured	Surveys and consultations	Some public events to raise awareness in phase 1, further planned for phase 2	Public events held in Cannock in phase 1 and more planned for phase 2 with new EV to promote electric vehicles. Also comms campaigns targeted at AQMA areas in Cannock
8		Promoting low emission transport	Other	2021		CCDC and Energy Savings Trust			Not funded		Implementation	Not measured	Number of ULEV taxis	Trade comments noted on trade willingness to engage with EV's and proposals for charging points	Taxi policies to ensure transition to ULEVs by early 2030s under development and due for consultation. "Driver's day" was provided in 2021.
9		Promoting low emission transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2021		CCDC& Energy Savings Trust			Not funded		Planning	Not measured	Number of on street EV charging points	Commencing scoping exercise Draft green transport strategy prepared.	Aim to apply for ORCS funding towards on street charging infrastructure

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

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

Although the levels of $PM_{2.5}$ within the Cannock Chase District is below the 2020 EU Limit value, the impact on adult mortality directly attributable to $PM_{2.5}$ is nonetheless still an important public health issue. This is revealed in data obtained from Public Health England used to inform Public Health Outcomes Framework indicator D017, as shown below.

The estimated percentage number of deaths attributable to $PM_{2.5}$ in adults over 30 has been translated into the estimated number of attributable deaths and are shown in Figure 2. Data for other Staffordshire and England are also shown for comparison. The data presented to 2020 is the latest data available at time of publication of this report. Approximately on average 6.2% of deaths between 2018 to 2020 within the Cannock Chase District can be attributed to $PM_{2.5}$. (Note the method for calculating this figure has changed we only have the data for 2018,2019 & 2020 using this new method).

Table 3: Public Health Outcomes Framework Indicator 3.01 - Fraction of annual all-cause mortality attributable to anthropogenic (human made) particulate air pollution (measured as fine particulate matter, $PM_{2.5}$) for Staffordshire Authorities 2018 to 2020

Area	Percentage
Cannock Chase district	6.2
Staffordshire	6.0
England	6.6

Table 4: Estimated percentage of deaths by local authority area attributable to $PM_{2.5}$ within Staffordshire for adults over 30, 2018 to 2020

	2018			2019			2020		
District/County	Deaths - all causes persons 30+	%*	Estimated attributable deaths	Deaths - all causes persons 30+	%*	Estimated attributable deaths	Deaths - all causes persons 30+	%*	Estimated attributable deaths
Cannock Chase	976	6.4	60	908	7.2	70	1046	5.1	50
Staffordshire	8798	6.1	530	8692	7.0	610	10227	4.9	500

Table 5: Measures being taken by Cannock Chase Council to address $PM_{2.5}$

Measure	Impact on NOx and PM_{10}	New or existing measure	Comment
Urban Traffic Control	Yes - low	Existing & evolving	In Cannock Town Centre Update - Junction operational improvements
20 mph zones	Yes - low	Existing	In Brereton, Hednesford & Rugeley.
Road user charging	Yes - low	Existing	For M6 Toll
Workplace travel planning	Yes - low	Existing	See Table 2.2 link[16] link[17]
School travel planning	Yes - low	Existing	See Table 2.2 Link[18]

[16] https://www.staffordshire.gov.uk/Transport/Air-quality/Businesses.aspx

[17] https://www.staffordshire.gov.uk/Transport/Air-quality/Air-quality-overview.aspx

[18] https://www.staffordshire.gov.uk/Transport/Air-quality/Schools.aspx

Measure	Impact on NOx and PM10	New or existing measure	Comment
Encourage / facilitate home working	Yes - low	Existing & evolving	Whilst the Council adopted a Homeworking Policy in January 2013, this policy was to address ad hoc requests for homeworking by individual employees and has not been used as the route to extend homeworking arrangements in response to the coronavirus pandemic. Instead, the Council is shortly to begin a trial of a role / worker type approach to work location, which will see individual roles assessed based on service need to determine how and where each role works. The model includes both dual (home and office based) and mixed (home / office / site) categories. It is anticipated that the results of the trial will inform the Council's longer-term approach to work locations with the expectation that homeworking will remain a key feature of the working week for those roles where this is appropriate.
Promotion of cycling	Yes - low	Existing & evolving	Link[19] Link[20]

[19] https://www.staffordshire.gov.uk/Transport/cycling/Home.aspx

[20] https://www.chasefit.co.uk/activity/cycling.html

Measure	Impact on NOx and PM10	New or existing measure	Comment
Promotion of walking	Yes - low	Existing & evolving	Link[21] Link[22] Update - New and improved pedestrian facilities including controlled crossings. Improved access to rail stations for walking and cycling
Staffordshire Share-a-lift scheme	Yes - low	Yes	Link[23] Link[24]
Promote use of rail and inland waterways	Yes - medium	Yes	Staffordshire County Council rail strategy[25]
Local Transport Plans & District Strategies	Yes - medium	Existing & evolving	Link[26] Link[27]

[21] https://www.staffordshire.gov.uk/environment/RightsofWay/PromotedRoutes/home.aspx

[22] https://www.chasefit.co.uk/activity/walking.html

[23] https://www.staffordshire.gov.uk/Transport/Car-sharing.aspx

[24] https://www.staffordshire.gov.uk/DoingOurBit/Get-Inspired/Clean-green-and-safe/Air-aware/Hop-in-a-car.aspx

[25] https://www.staffordshire.gov.uk/Transport/transportplanning/documents/Rail-strategy/Documents/Rail-Strategy.pdf

[26] https://www.staffordshire.gov.uk/Transport/transportplanning/documents/Documents/Cannock-Transport.pdf

[27] https://www.cannockchasedc.gov.uk/sites/default/files/infrastructure_delivery_plan_2019_update.pdf

Measure	Impact on NOx and PM10	New or existing measure	Comment
Public cycle hire	Yes - low	Yes	In-house cycle to work scheme via Link[28]
Cycle network	Yes - low	Existing & evolving	Link[29] Update - Active Travel Fund measures – Hednesford Rd, Cannock
Bus route improvements	Yes - medium	Evolving	Link[30] Recent introduction of the number 3 bus service between Cannock and Brownhills. This will run through Kingswood Lakeside development park and has initial S106 funding for five years. This has direct benefits for AQMAs in Cannock.
Planning applications to require assessment of exposure / emissions for development requiring air quality impact assessment.	Yes - high	Yes	Local plan policies (under review[31]) Current policy CP16. Link[32]

[28] https://www.cyclescheme.co.uk/

[29] https://www.staffordshire.gov.uk/Transport/cycling/Documents/Cycling-in-Cannock-Chase-Issue-8.pdf

[30] https://www.staffordshire.gov.uk/Transport/buses/Plan-your-journey/Cannock-and-Rugeley.aspx

[31] https://www.cannockchasedc.gov.uk/residents/planning/planning-policy/cannock-chase-local-plan

[32] http://www.cannockchasedc.gov.uk/sites/default/files/local_plan_part_1_09.04.14_low_res.pdf

Measure	Impact on NOx and PM10	New or existing measure	Comment
Planning guidance for developers	Yes	Yes	Link[33]
Developer contributions based on damage cost calculation	Yes - high	Yes	Link[34]
Public vehicle procurement - prioritising uptake of low emission vehicles	Yes - medium	Existing & evolving	Waste fleet vehicles comply with Euro VI. Vehicle fleet audit by Energy Savings Trust.
Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel Recharging.	Yes - high	Existing & evolving	Currently a single CCDC owned charging facility at Hednesford Park, Hednesford WS12 1QR. CCDC currently commencing an ORCS funding bid to acquire on street charging facilities for appropriate areas of the district. Similar considerations being taken at Staffordshire County Council.
Taxi licensing conditions	Yes medium	Yes	All vehicles are less than 3.5 years when first licensed, resulting in some benefit from the Euro 6 standards

[33] http://www.cannockchasedc.gov.uk/residents/planning/planning-policy/supplementary-planning-policy-documents

[34] http://www.cannockchasedc.gov.uk/sites/default/files/local_plan_part_1_09.04.14_low_res.pdf

Measure	Impact on NOx and PM10	New or existing measure	Comment
A5 & M6 Partnerships	Yes - low	Yes	Link[35]
Domestic smoke control and enforcement	Yes - high	Yes	Link[36]
Garden bonfires - advice and nuisance	Yes - localised PM10 benefit	Yes	Link[37]
Commercial burning advice and enforcement	Yes	Yes	Link[38]

2.1.1 PM2.5 in Staffordshire & Stoke-On-Trent - Next Steps

As PM2.5 is an issue requiring collaboration between the district, county and city authorities within Staffordshire, the following actions are proposed in addition to those outlined in the action plan. Progress on these and the action plan will be detailed in the 2022 ASR. This has been delayed due to the Covid Pandemic

[35] https://www.hinckley-bosworth.gov.uk/info/10020/strategies_plans_and_policies/1272/a5_partnership

[36] https://www.cannockchasedc.gov.uk/residents/environmental-health/environmental-protection/smoke-control

[37] https://www.cannockchasedc.gov.uk/residents/environmental-health/environmental-protection/nuisances-bonfires

[38] https://www.cannockchasedc.gov.uk/residents/environmental-health/environmental-protection/nuisances-bonfires

- To agree a target for reducing the fraction of All-Cause Mortality from $PM_{2.5}$ in each district, city, and county authority by 2020 this was delayed due to disruption caused by the Covid Pandemic
- To agree a target for reducing $PM_{2.5}$ exposure (calculated from PM_{10} exposure / background maps / local monitoring where available) this was delayed due to disruption caused by the Covid Pandemic
- To maintain compliance with the 2020 EU limit value of 25µg/m3
- To include Public Health Outcome Framework Indicator D01 in the Staffordshire and District Authority and City Council Joint Strategic Needs Assessment for 2019/2020 onwards and to report progress to the relevant Health and Wellbeing Boards. This was delayed due to disruption caused by the Covid Pandemic
- To continue to identify risks affecting $PM_{2.5}$ which need to be addressed at a national level e.g.
- A number of authorities within Staffordshire are receiving applications for STOR (Short Term Operating Reserve) sites to supplement power to the National Electricity Grid at times of peak demand. These sites typically operate during the autumn / winter months and can be high emitters of PM.

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

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

Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Cannock Chase District Council undertook automatic (continuous) monitoring at 1 site during 2021. Table A.1 in Appendix A shows the details of the automatic monitoring sites. The UK Air [39] page presents automatic monitoring results for Cannock Chase 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

Cannock Chase Council undertook non- automatic (i.e., passive) monitoring of NO_2 at 15 sites during 2021. 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: Map(s) of Monitoring Locations and AQMAs. 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.

[39] https://uk-air.defra.gov.uk/data/flat_files?site_id=CANK

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.

3.1.3 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 2021 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.

Exceedences	No exceedences of either NO_2 objectives were recorded in 2021.
Conclusions	2021 can be considered as being more representative than 2020. Whilst traffic levels returned to pre-covid values, air quality remained at low levels. This strengthens the previous conclusions that AQMAs 1 and 3 now comply with the annual mean NO_2 objective. AQMA 3 appears to also comply, but a further year's data will be necessary to provide a high level of certainty.
Monitoring network	No changes are proposed.

3.1.4 Particulate Matter (PM_{10})

No PM_{10} monitoring was undertaken in 2021.

3.1.5 Particulate Matter ($PM_{2.5}$)

No $PM_{2.5}$ monitoring was undertaken in 2020.

3.1.6 Sulphur Dioxide (SO_2)

No SO_2 monitoring was undertaken in 2020.

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)
HHMS	Cannock A5190 Roadside	Roadside	401392	309954	NO_2	YES - AQMA 3	Chemiluminescent;	32	6	1.5

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)
MORT	Cannock Mortuary	Urban Background	397540	309767	NO_2	No	0.0	n/a	No	2.7
BTL-B	Bridgtown Traffic Lights - Bungalow	Roadside	397952	308567	NO_2	AQMA 1	0.0	5.0	No	1.8
67 WS	67 Watling Street, Bridgtown	Roadside	398051	308512	NO_2	AQMA 1	0.0	7.8	No	1.1
54 WS	54 Watling Street, Bridgtown	Roadside	398250	308428	NO_2	AQMA 1	0.0	5.2	No	1.2
HF	Horsefair, Rugeley	Roadside	404465	317741	NO_2	No	0.0	7.2	No	2.4
268 WS	268 Watling Street	Roadside	400731	307419	NO_2	AQMA 2	0.0	3.8	No	2.3
HHFW	Five Ways Island, Heath Hayes	Roadside	401563	309940	NO_2	AQMA 3	0.0	1.6	No	2.4
CNKRd	Cannock Road, Heath Hayes	Roadside	401421	309965	NO_2	AQMA 3	1.5	2.0	No	2.4
268 WSA	268 Watling Street A	Roadside	400635	307479	NO_2	AQMA 2		3.5	No	2.0
268 WSB	268 Watling Street B	Kerbside	400863	307385	NO_2	AQMA 2		<1	No	2.0
LICH RD	A5190 Lichfield Road, Cannock	Kerbside	398976	309866	NO_2	No	14.0	1.0	No	2.0
HH01	Outside Heath Hayes Academy, Wimblebury Road, Heath Hayes	Roadside	401629	310590	NO_2	AQMA 3	6.8	2.0	No	3.0

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
FW01	Outside Five Ways Academy, Hednesford Road, Heath Hayes	Roadside	400900	310607	NO_2	AQMA 3	31.0	2.0	No	3.0
GM01	Outside Gorsemoor Primary School, Gorsemoor Road, Heath Hayes	Roadside	400723	310189	NO_2	No	35.0	5.0	No	3.0
HHMS1, HHMS2, HHMS3	Cannock A5190 Roadside Monitoring Site	Roadside	401392	309954	NO_2	AQMA 3	32.0	6.0	Yes	1.5

Notes:

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

(2) N/A if not applicable.

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

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2017	2018	2019	2020	2021
Cannock A5190 Roadside	401392	309954	Roadside	96.7	96.7	22.7	17.5	21.5	14.4	15.7

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

☒ **Reported concentrations are those at the location of the monitoring site (annualised, as required), i.e., prior to any fall-off with distance correction.**

Notes:

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

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

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

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

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

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

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

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2017	2018	2019	2020	2021
MORT	397540	309767	Urban Background	100	100.0	16.1	22.4	16.1	13.2	15.6
BTL-B	397952	308567	Roadside	100	100.0	34.0	24.6	25.6	25.6	27.0
67 WS	398051	308512	Roadside	100	100.0	32.7	25.0	33.8	17.9	20.1
54 WS	398250	308428	Roadside	92	99.7	37.5	34.3	31.2	24.7	21.9
HF	404465	317741	Roadside	100	100.0	31.7	29.8	23.3	24.1	25.8
268 WS	400731	307419	Roadside	100	100.0	36.9	39.0	37.0	27.6	27.1
HHFW	401563	309940	Roadside	100	100.0	**49.5**	**44.5**	**43.9**	31.4	32.5
CNKRd	401421	309965	Roadside	100	100.0	29.6	25.2	34.2	25.0	25.7
268 WSA	400635	307479	Roadside	100	100.0		**41.8**	**41.5**	28.2	29.0
268 WSB	400863	307385	Kerbside	100	100.0		**50.0**	**57.0**	31.6	18.4
LICH RD	398976	309866	Kerbside	100	100.0			19.4	23.4	26.2
HH01	401629	310590	Roadside	100	100.0			19.4	14.1	17.6
FW01	400900	310607	Roadside	92	99.7			13.0	18.3	25.1
GM01	400723	310189	Roadside	100	100.0			15.4	12.9	16.1
HHMS1, HHMS2, HHMS3	401392	309954	Roadside	100	100.0	16.8	17.2	31.2	16.2	19.3

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

☒ **Diffusion tube data has been bias adjusted.**

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e., prior to any fall-off with distance correction.**

Notes:

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

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

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

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

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

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

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

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

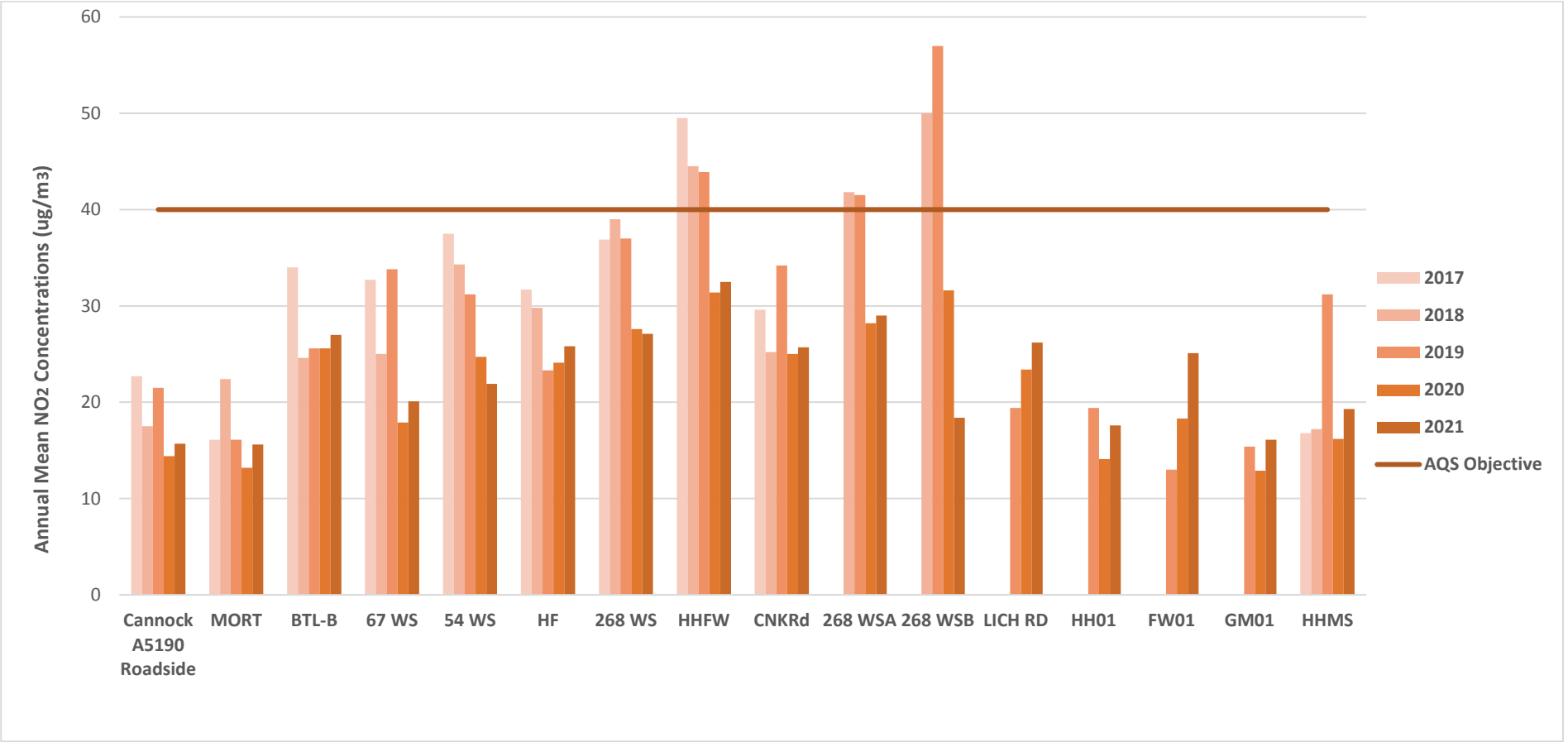

Figure 1: Annual mean NO_2 at school gate roadside locations, and comparison with indicative exceedance of 1-hour objective levels

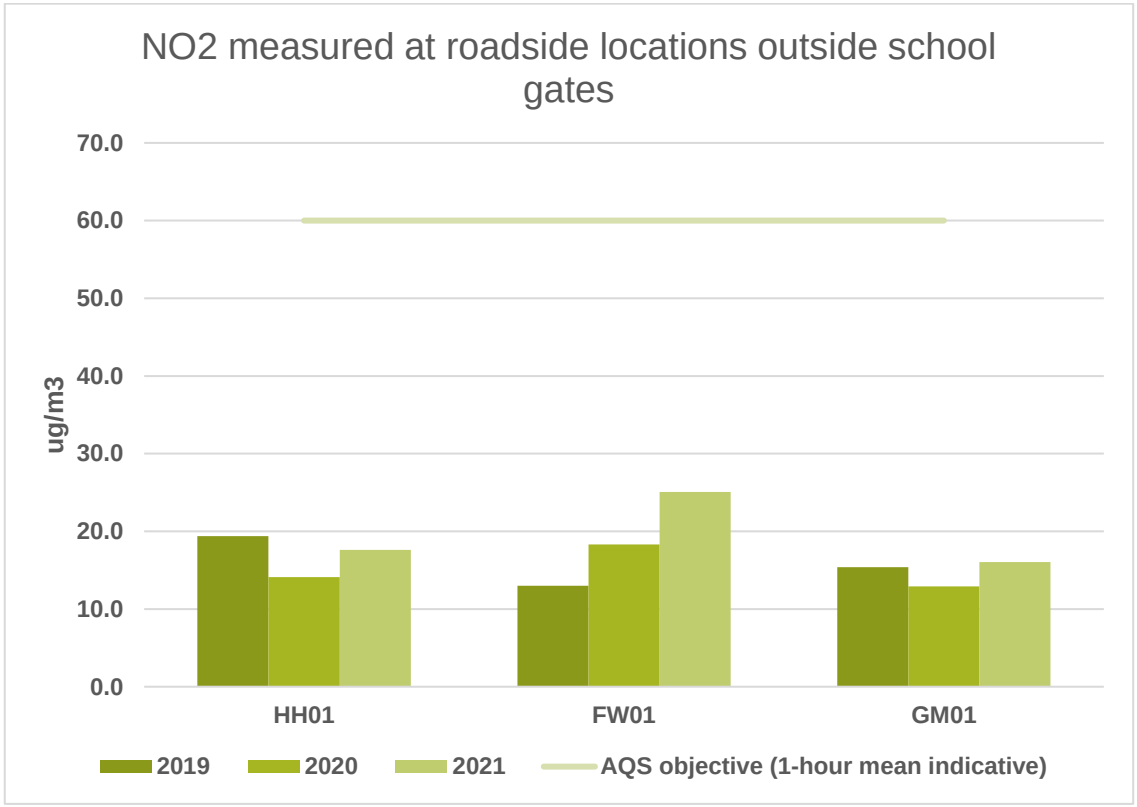

Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2017	2018	2019	2020	2021
Cannock A5190 Roadside	401392	309954	Roadside	96.7	96.7	0	0 (95.7)	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%).

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

Not applicable all results zero.

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

Not Monitored.

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

Not applicable.

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

Not Monitored.

Figure A.4 – Trends in Number of 24-Hour Mean PM_{10} Results > 50$\mu g/m^3$

Not applicable.

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

Not Monitored**.**

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

Not applicable.

Table A.9 – SO_2 2021 Monitoring Results, Number of Relevant Instances

Not Monitored.

Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted 0.86	Annual Mean: Distance Corrected to Nearest Exposure	Comment
MORT	397540	309735	20.9	21.2	14.2	8.5	10.6	9.3	11.7	12.3	16.2	14.4	18.4	18.1	18.1	15.6	-	
BTL-B	397952	308567	40.6	36.7	33.4	30.1	31.8	28.0	32.9	28.6	35.6	27.6	33.2	30.9	31.4	27.0	-	
67 WS	398051	308512	29.3	26.4	22.9	19.6	19.5	18.6	21.3	20.6	25.9	20.4	25.7	23.1	23.4	20.1	-	
54 WS	398250	308428	37.1	36.9	30.2	I/S	34.0	28.9	32.8	31.6	35.5	28.3	33.9	24.7	25.5	21.9	-	
HF	404465	317741	35.1	28.8	31.2	21.1	29.9	26.3	45.4	26.4	33.7	29.4	36.5	29.7	30.0	25.8	-	
268 WS	400731	307419	38.6	37.5	30.3	35.7	35.8	35.3	42.6	37.7	42.6	29.2	40.4	31.0	31.5	27.1	-	
HHFW	401563	309940	43.6	41.8	37.4	51.2	42.9	41.9	53.5	45.5	49.7	39.2	53.0	37.3	37.8	32.5	-	
CNKRd	401421	309965	37.9	34.9	30.7	29.5	30.0	31.5	35.7	34.8	39.5	29.0	42.8	29.3	29.9	25.7	-	
268 WSA	400635	307479	35.5	37.1	34.6	33.5	35.2	30.4	35.3	31.8	42.3	35.2	44.7	33.6	33.8	29.0	-	
268 WSB	400863	307385	2.2	41.2	49.7	37.0	41.0	24.2	62.5	51.3	57.9	14.8	57.3	21.9	21.5	18.4	-	
LICH RD	398976	309866	35.7	19.7	27.0	19.9	29.6	24.8	30.0	31.0	36.2	29.8	34.2	30.3	30.5	26.2	-	
HH01	401629	310590	23.7	18.5	15.4	11.5	14.5	13.1	15.0	14.7	11.8	20.1	24.6	20.4	20.5	17.6	-	
FW01	400900	310607	31.2	23.8	26.3	I/S	21.0	16.3	18.1	15.6	24.2	24.8	31.5	29.2	29.1	25.1	-	
GM01	400723	310189	23.9	19.2	16.0	9.0	11.6	10.8	11.1	12.4	16.4	16.7	21.9	18.5	18.7	16.1	-	
HHMS1	401392	309954	27.5	21.7	20.3	18.7	16.8	15.4	18.7	18.2	23.3	18.3	26.2	23.6	-	-	-	Triplicate Site with HHMS1, HHMS2 and HHMS3 - Annual data provided for HHMS3 only
HHMS2	401392	309954	28.6	23.5	20.4	17.9	17.0	15.6	18.5	18.1	22.8	18.6	25.1	21.4	-	-	-	Triplicate Site with HHMS1, HHMS2 and HHMS3 - Annual data provided for HHMS3 only
HHMS3	401392	309954	27.0	25.3	21.3	19.5	17.3	15.5	18.1	19.3	22.7	16.2	25.5	21.8	22.5	19.3	-	Triplicate Site with HHMS1, HHMS2 and HHMS3 - Annual data provided for HHMS3 only

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1.**

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

☐ **Local bias adjustment factor used.**

☒ **National bias adjustment factor used.**

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

☒ **Cannock Chase District Council confirm that all 2021 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 Cannock Chase Council During 2021

The following table provides information on identified new sources with a potential to impact air quality. This includes sources that are operational, have planning permission granted or have been identified at an earlier stage of the planning process:

Table 6 - Significant Planning Applications 2021

Planning Reference	Location	Planning Proposal	Comments
CH/21/0366	McArthur Glen Designer Outlet West Midlands, Mill Green, Eastern Way, Cannock, WS11 7JZ	EIA Screening Opinion: Erection of up to 13,055 sq. m (GEA) of commercial units comprising retail uses at ground floor (Class A1), erection with associated access and hard/soft landscaping (all matters reserved except access)	Air quality impact limited to the construction phase only. Controlled by a construction environment management plan
SCC/21/0031/ (Staffordshire County Council	Poplars Waste Disposal Site, Lichfield Road,	Request for an EIA scoping opinion in connection with proposals to retain the Poplars	An environmental statement addendum to clarify air quality mitigation

	CANNOCK, WS11 8NQ	Anaerobic Digestion facility approved under planning permission CH.13/09/721 MW after the cessation of landfilling at Poplars to make the facility permanent - Poplars Waste Disposal Site, Lichfield Road, CANNOCK, WS11 8NQ	measures to be provided.
CH/21/0405	McArthur Glen Designer Outlet West Midlands, Mill Green, Eastern Way, Cannock, WS11 7JZ	Environmental Impact Development - Outline Planning Application for the construction of a multi storey car park, increasing the overall level of car parking spaces up to 2,500 across the McArthur Glen Designer Outlet West Midlands, realignment of existing service road and all other works with all matters reserved except scale.	Air quality impact is limited to the construction phase only. Controlled by a construction environment management plan. No additional traffic generation above that predicted during the original planning application for the designer outlet village.

SCC/21/0075/EIA-SC (Staffordshire County Council)	Poplars Waste Disposal Site, Lichfield Road, CANNOCK, WS11 8NQ	Request for an EIA scoping opinion - proposed modifications to the consented operations at Poplars Landfill Site, including a revised restoration profile	An environmental statement addendum to clarify air quality mitigation measures to be provided. Air quality impact is restricted to the construction phase only.
SCC/22/0021/VOC-ES (Staffordshire County Council)	Poplars Landfill Site, Lichfield Road, CANNOCK, WS11 8NQ	Application to vary conditions 2 (approved plans), 3 (finished levels) and 23 (restoration and aftercare) of permission CH.446/88 (as amended by CH.446/88/721 MW D10 (revised restoration scheme) and CH.446/88 PWA (4) D3 (phasing)) to relocate landfill void space, to revise the restoration profile and surface water management, and to update the phasing of the operations.	Air quality concerns scoped out.

SCC/22/0050/EIA-SCO	Poplars Landfill Site, Lichfield Road, CANNOCK, WS11 8NQ	Request for an EIA Scoping Opinion for additional changes to existing infrastructure in the original planning application including: 1. Provision of a 6th Digester tank, to be the same height and volume as the existing tanks positioned in the footprint of the tank farm; 2. New coolers relocated to the east of Digester 1 to move them away from the main office building and to provide for easier maintenance; and, 3. Installation of a larger gas container on the existing footprint to reduce the need to flare excess gas which cannot be stored, thus maximising electricity generation	An environmental statement addendum to clarify air quality mitigation measures to be provided. The additional tank is to be provided in order to improve efficiency of processing the current feedstock quantities. The net effect should reduce emissions to air.

CH/21/0231	Units 8 & 9 Orbital Retail Park, Voyager Drive, Cannock, WS11 8XP	External alterations to elevations associated with the amalgamation of Units 8 and 9 to accommodate a food store, relaxation of the range of goods currently restricted under Planning Permissions CH/97/0377 and CH/10/0454, to allow the sale of food and drink, other associated works	Air quality assessment provided which demonstrated that air quality within the adjacent AQMA will be negligible.

Additional Air Quality Works Undertaken by Cannock Chase Council During 2021

Cannock Chase Council commissioned an AQMA review and detailed assessment of AQMA. In summary, the findings are:

It is recommended that Cannock Chase AQMA (AQMA 1) is revoked. This recommendation is based on measurements representing the worst-case locations of relevant exposure within the AQMA being under the objective and either remaining steady or decreasing over the last three years.

It is recommended that CCDC AQMA 2 remains in place at this time and existing monitoring continues. If measured concentrations at the only monitoring site representative of relevant exposure (268WS) remain below the objective in the near future, then the AQMA should be

revoked. It is, however, recommended that the spatial extent of the AQMA is amended to only include the properties that are directly adjacent to the A5 in the vicinity of the monitoring sites; properties further afield are set back considerably further from the road and will not experience objective exceedances.

Detailed dispersion modelling has been carried out for AQMA 3, which has demonstrated that there were no exceedances of the annual mean nitrogen dioxide objective at locations of relevant exposure within AQMA 3 in 2019, and therefore this AQMA should also be revoked.

The full report is listed below.

AQMA Review :
Cannock Chase

April 2021

Experts in air quality
management & assessment

Client	Cannock Chase Council	**Principal Contact**	Stephen Moore

Job Number	J4433

Report Prepared By:	[redacted]

Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
J4433A/1/F1	16 April 2021	Final	[redacted]

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1 introduction

1.1 This note sets out a review of the three Air Quality Management Areas (AQMAs) in Cannock Chase District and includes detailed modelling of AQMA 3. It has been carried out by Air Quality Consultants Ltd on behalf of Cannock Chase District Council (CCDC) to determine whether any of the AQMAs can be amended or revoked. It has been prepared taking account of the requirements set out in LAQM.TG(16)[40] for amending or revoking AQMA orders. The professional experience of the Consultants who have undertaken the review is summarised in Appendix A1.

[40] Defra (2018) Local Air Quality Management Technical Guidance (TG16).

2 Review of AQMAs

2.1 CCDC has declared three AQMAs for exceedances of the annual mean nitrogen dioxide (NO_2) objective, as a result of emissions from traffic. AQMAs 1 and 2, declared in 2006 and 2014, respectively, encompass properties adjacent to the A5. AQMA 3 was declared in 2017 and encompasses the 'Five Ways Island' area of Heath Hayes. The AQMAs are shown in Figure 1.

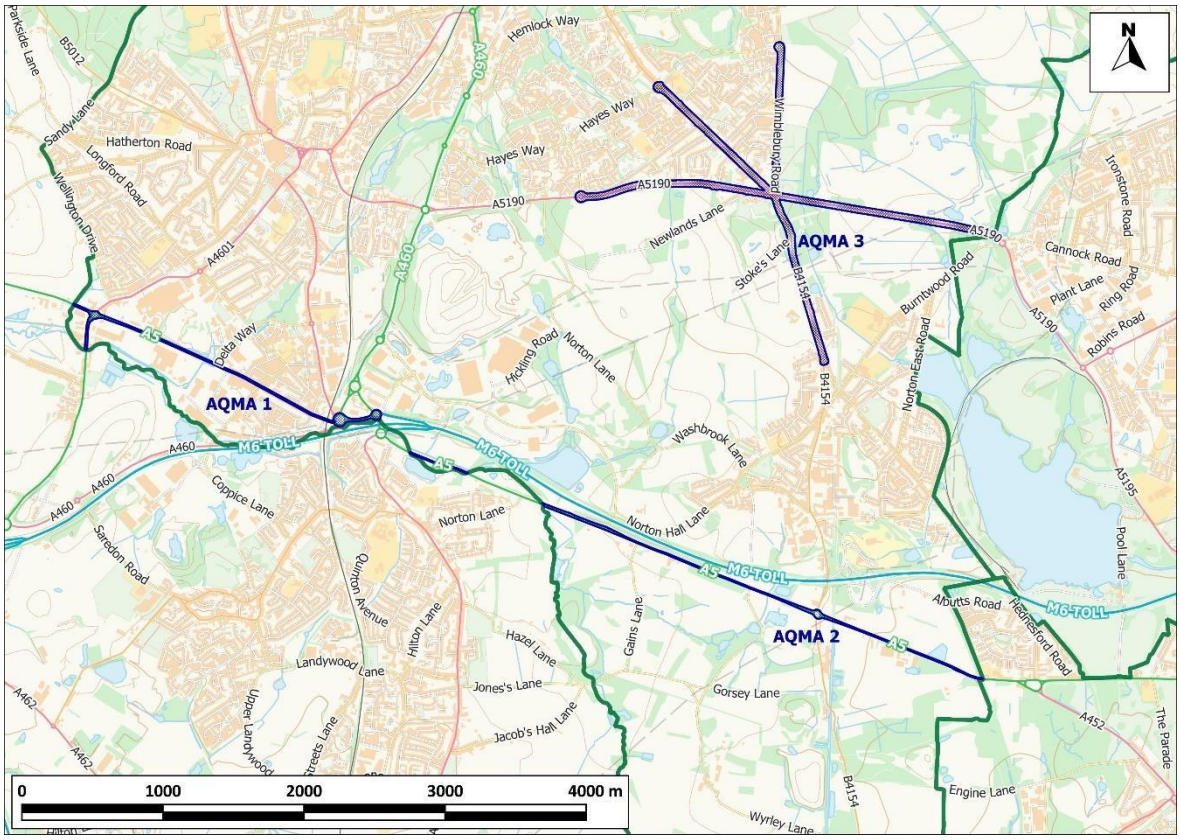

Figure 1: AQMAs in Cannock Chase District

2.2 The following sections present monitoring data for each of the AQMAs shown in Figure 1

Cannock Chase AQMA (AQMA 1)

2.3 Monitoring is carried out using diffusion tubes at three locations within AQMA 1 (BTL-B, 67WS and 54WS); Figure 2 shows the locations of the monitors and the 2019 annual mean concentrations. The monitors are representative of worst-case exposure in the AQMA, being located at the façades of the residential properties nearest the A5.

2.4 As shown in Figure 3 and Table 1, concentrations of nitrogen dioxide increased between 2014 and 2016 at all three sites. Exceedances of the objective were recorded at site BTL-B in 2015 and 2016, and at site 54WS in 2016. Since 2016 there has been a decreasing trend in annual mean concentrations at sites BTL-B and 54WS. Except for a drop in measured concentrations in 2018, generally steady concentrations have been measured at site 67WS since 2016, with all years being below the objective.

2.5 Based on the measured annual mean nitrogen concentrations having been below the objective in 2017, 2018 and 2019, and less than 90% of the objective in 2018 and 2019, combined with recent trends in the data, it is recommended that this AQMA is revoked.

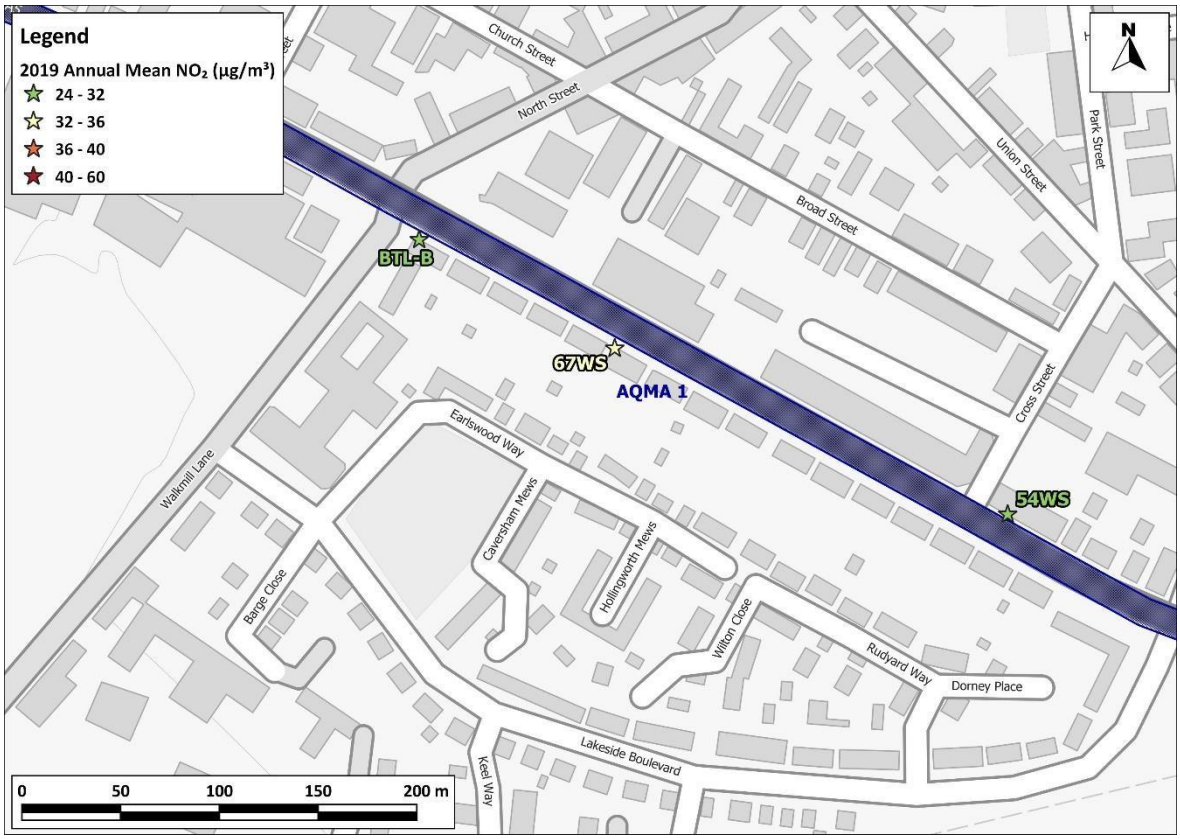

Figure 2: Air Quality Monitoring in Cannock Chase AQMA (AQMA 1)

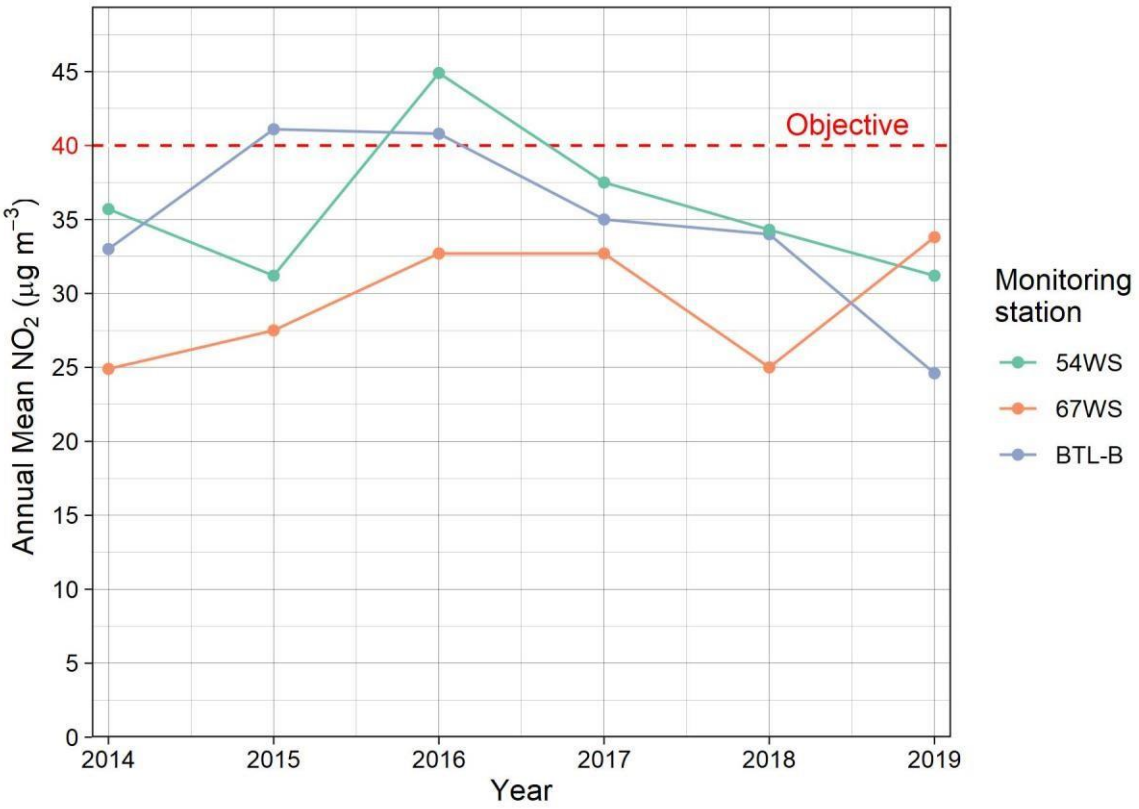

Figure 3: Annual Mean NO_2 Concentrations in Cannock Chase AQMA (AQMA 1)

Table 1: Summary of Nitrogen Dioxide Monitoring (2014-2019) in Cannock Chase AQMA (AQMA 1) (µg/m^3)

Site	Site Type [b]	Location	Distance to kerb (m)	R [c]	2014	2015	2016	2017	2018	2019
BTL-B	RS	Bridgetown Traffic Lights - Bungalow	5	Yes	33.0	**41.1**	**40.8**	35.0	34.0	24.6
67WS	RS	67 Watling Street, Bridgtown	7.8	Yes	24.9	27.5	32.7	32.7	25.0	33.8
54WS	RS	54 Watling Street, Bridgtown	5.2	Yes	35.7	31.2	**44.9**	37.5	34.3	31.2

[a] Exceedances of the objective are shown in bold.

[b] RS = Roadside.

[c] Site representative of relevant exposure?

CCDC AQMA 2

2.6 Monitoring is carried out using diffusion tubes at three locations within AQMA 2 (268 WS, 268 WSA and 268 WSB), as shown in Figure 4 and Table 2. While there are three sections to this AQMA, only the section where monitors are installed has relevant exposure near to the road, and only monitoring

site 268 WS is representative of relevant exposure for the annual mean objective; the site is located on the lamppost immediately to the west of the residential property that is nearest to the A5 in the area, with the tube at approximately the same distance from the road as the building façade. Site 268 WS is also the only site with long-term measurements; the annual mean concentrations between 2014 and 2019 are shown in Figure 5.

2.7 Measured nitrogen dioxide concentrations increased between 2014 and 2016, when an exceedance of the objective was recorded. Concentrations have been below the objective in all years since, but within 10% of it (i.e., not below 36 µg/m^3). Considering the uncertainty associated with diffusion tube measurements, it is possible that the objective may have been exceeded in recent years. However, it should be expected that, with the ongoing uptake of cleaner vehicles with demonstrably lower emissions, concentrations will reduce in the near future, thus it is considered unlikely that an objective exceedance will be measured at site 268 WS in years beyond 2019.

2.8 Measurements at sites 268 WSA and 268 WSB suggest higher concentrations on the north side of the A5, which would be expected given that prevailing winds usually have a southerly element, and the sites are closer to the M6. However, there is no relevant exposure on this side of the road, thus these measurements cannot be relied upon to determine the need for an AQMA in a purely qualitative review.

2.9 It is judged that there is not enough evidence available at this time to determine whether AQMA 2 should be revoked, but it is considered that there would be little benefit to undertaking detailed dispersion modelling of concentrations here. Instead, it is recommended that monitoring is continued at site 268 WS; if the post-pandemic annual mean concentrations continue to be below the objective, then at that time the AQMA should be revoked. It would also be reasonable to amend the spatial extent of the AQMA to cover only those few properties that are directly adjacent to the southern side of the road in the vicinity of the monitoring sites; properties further afield are set back considerably further from the road and will not experience objective exceedances.

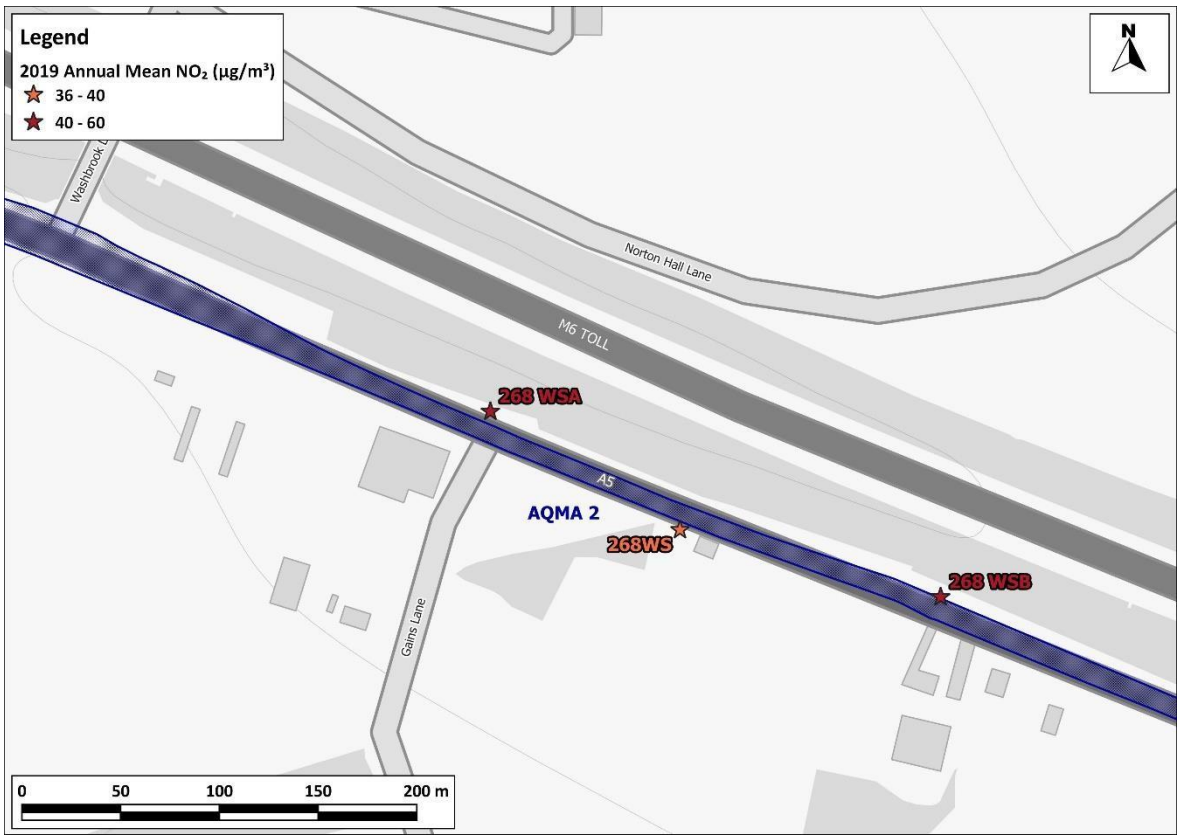

Figure 4: Air Quality Monitoring in CCDC AQMA 2

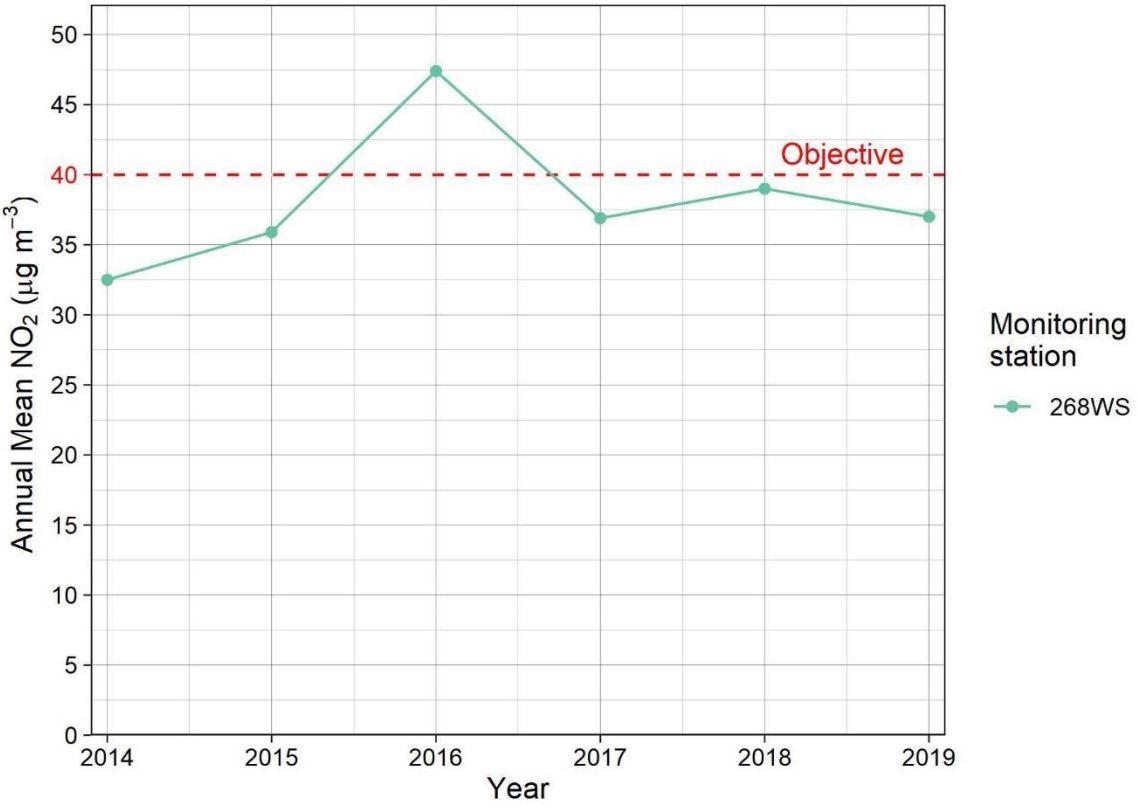

Figure 5: Annual Mean Nitrogen Dioxide Concentrations in CCDC AQMA 2

Table 2: Summary of Nitrogen Dioxide Monitoring (2014-2019) in CCDC AQMA 2 (µg/m^3)

Site	Site Type [b]	Location	Distance to kerb (m)	R [c]	2014	2015	2016	2017	2018	2019
268 WS	RS	268 Watling Street	3.75	Yes	32.5	35.9	**47.4**	36.9	39.0	37.0
268 WSA	RS	268 Watling Street A	3.5	No	-	-	-	-	-	**41.5**
268 WSB	KS	268 Watling Street B	<1	No	-	-	-	-	-	**57.0**

[a] Exceedances of the objective are shown in bold.

[b] RS = Roadside, KS = Kerbside.

[c] Site representative of relevant exposure?

AQMA 3 (Five Ways Island)

2.10 Monitoring is carried out using one automatic monitoring station (HHMSAuto) and nine diffusion tubes (HHFW, CNKRD, HFRDRD, HH01, HH02, FW01, FW02, GM01 and GM02) within and around

AQMA 3 (Five Ways Island), as shown in Figure 6. Long-term monitoring has been carried out at the automatic monitoring station and three diffusion tube sites (Figure 7 and Table 3).

2.11 Site HHFW has recorded exceedances of the objective in each of the past six years. Measurements at site CNKRD were above the objective in 2015 and 2016, but not in any year since, despite being on the same side of the road as HHFW, suggesting that the extent of any exceedances is likely limited to the immediate vicinity of the roundabout. Measurements at the sites first deployed in 2019 have all been well below the objective.

2.12 It should be noted that monitoring site HHFW is located on the façade of a public house, which would not normally represent relevant exposure in terms of the annual mean objective. While some public houses may have permanent residents, the residential parts of the building would tend to be at first floor level, where concentrations will be lower, and likely below the objective. As such and given that concentrations at site CNKRD have been below the objective in recent years, there may be no relevant exposure to the annual mean objective exceedances in AQMA 3.

2.13 It is recommended that detailed dispersion modelling of traffic emissions in the vicinity of the roundabout is carried out to determine whether any properties that are representative of relevant exposure are likely to have experienced an objective exceedance in 2019. This analysis has been undertaken and is presented in section 3 of this report.

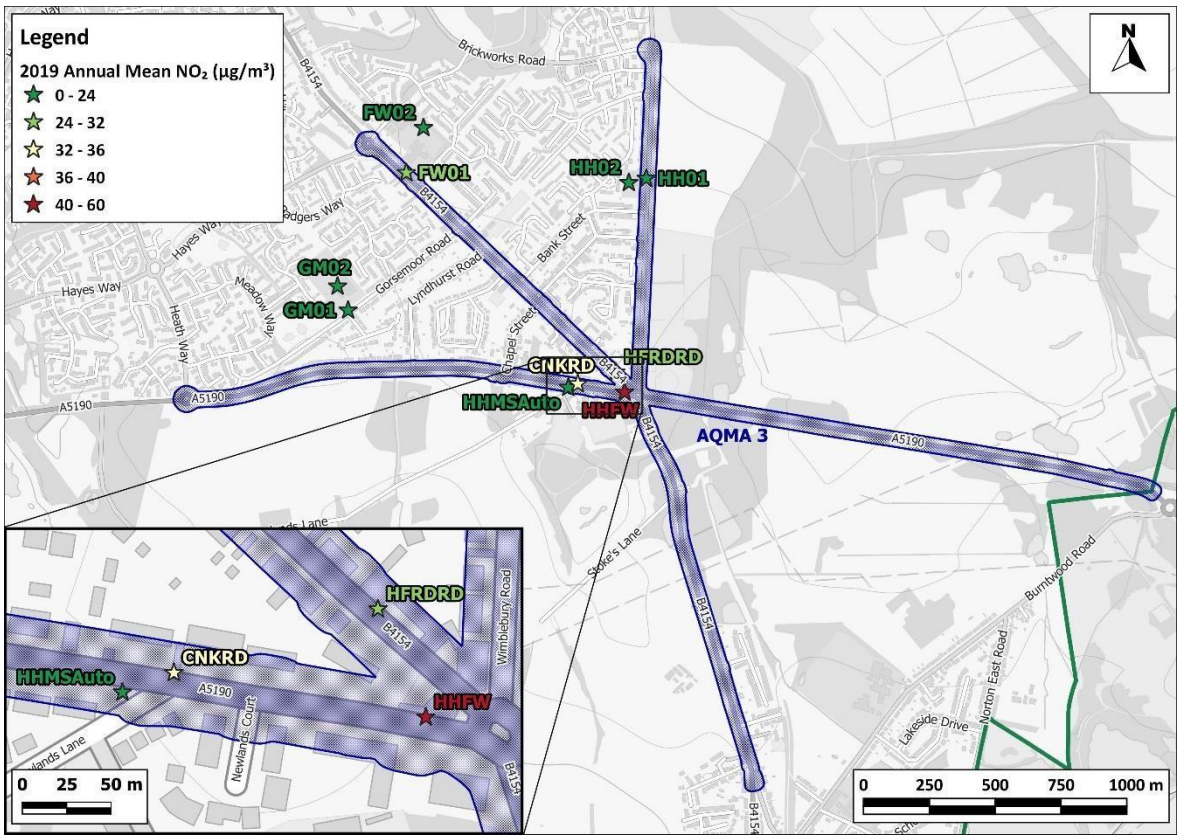

Figure 6: Air Quality Monitoring in AQMA 3 (Five Ways Island)

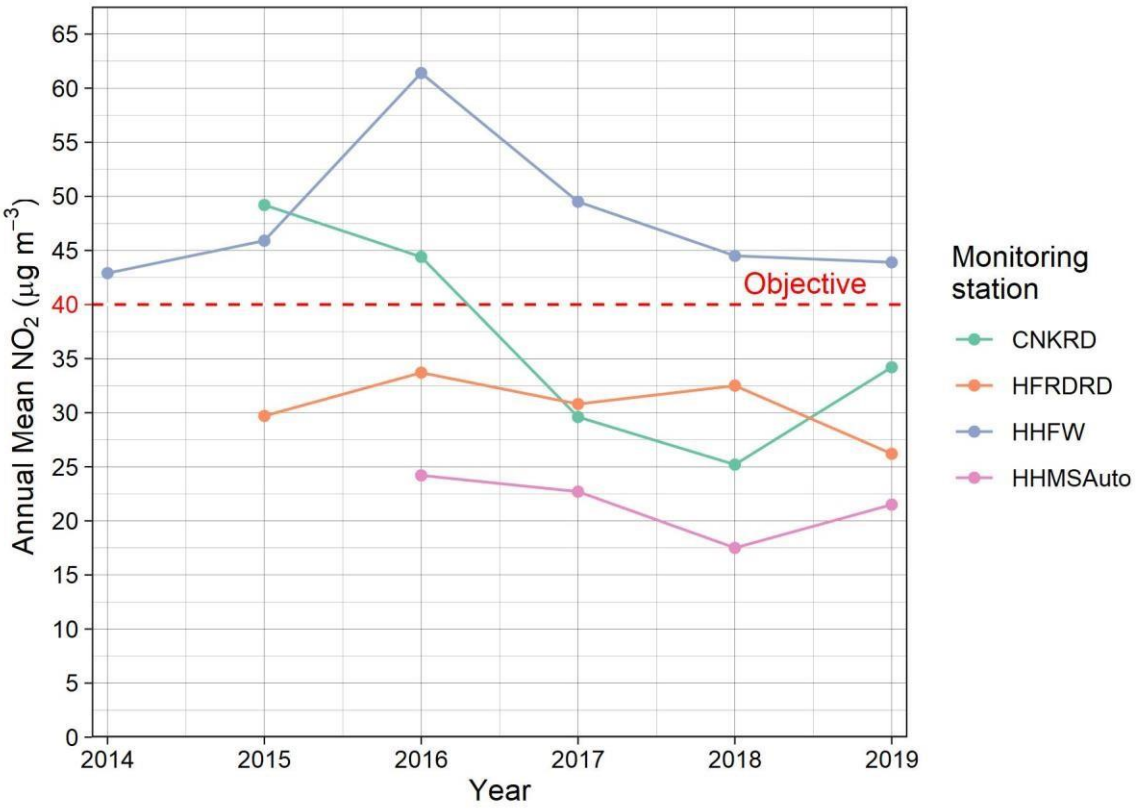

Figure 7: Annual Mean Nitrogen Dioxide Concentrations in AQMA 3 (Five Ways Island)

Table 3: Summary of Nitrogen Dioxide Monitoring (2015-2019) in AQMA 3 (Five Ways Island) (µg/m^3)

Site	Site Type [b]	Location	Distance to kerb (m)	R [c]	2014	2015	2016	2017	2018	2019
HHMSAuto	RS	Cannock A5190	6	No	-	-	24.2	22.7	17.5	21.5
HHFW	RS	Five Ways Island	1.6	Yes	**42.9**	**45.9**	**61.4**	**49.5**	**44.5**	**43.9**
CNKRD	RS	Cannock Road	2		-	**49.2**	**44.4**	29.6	25.2	34.2
HFRDRD	RS	Hednesford Road	3.2	Yes	-	29.7	33.7	30.8	32.5	26.2
Site	**Site Type [b]**	**Location**	**Distance to kerb (m)**	**R [c]**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
HH01	RS	Heath Hayes Academy	2	No	-	-	-	-	-	19.4
HH02	UB	Heath Hayes Academy	54	N/A	-	-	-	-	-	13.0

FW01	RS	Five Ways Academy	2	No	-	-	-	-	-	28.7
FW02	UB	Five Ways Academy	97	N/A	-	-	-	-	-	15.4
GM01	RS	Gorsemoor Primary School	5	No	-	-	-	-	-	16.9
GM02	UB	Gorsemoor Primary School	82	N/A	-	-	-	-	-	14.0

[a] Exceedances of the objective are shown in bold.

[b] RS = Roadside, UB = Urban Background.

[c] Site representative of relevant exposure?

3 Detailed Assessment of AQMA 3

3.1 Annual mean concentrations of nitrogen dioxide in 2019 throughout AQMA 3 have been predicted using the ADMS-Road's dispersion model, with vehicle emissions derived using Defra's Emission Factor Toolkit (EFT) (v10.1). Full details of the approach, including the model inputs and the model verification, are provided in Appendix A2.

3.2 Figure 8 presents a contour plot of 2019 annual mean nitrogen dioxide concentrations at Five Ways Island Roundabout; it was only in the vicinity of this roundabout that concentrations above 40 µg/m^3 were predicted in the vicinity of locations of relevant exposure.

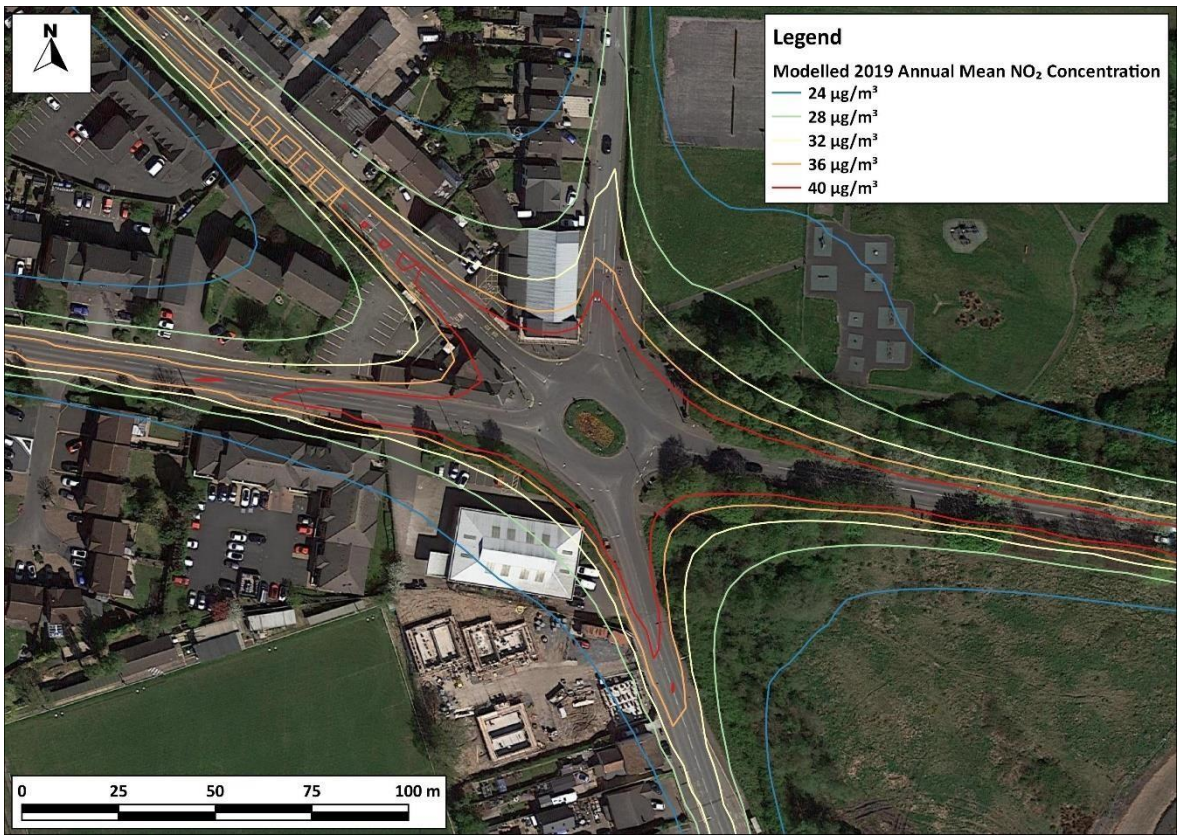

Figure 8: Modelled 2019 Annual Mean NO_2 Concentrations in AQMA 3

Imagery ©2021 Google.

3.3 Figure 8 demonstrates that there are only two buildings within the area of exceedance of the annual mean objective; one is a carpet and bed showroom to the north of the roundabout, which is not relevant exposure (and hence the air quality objectives are not applicable), and the other is the Five Ways Inn to the west, which does not include relevant exposure at ground-floor level but may include permanent residential accommodation at first-floor level. Modelled annual mean nitrogen dioxide concentrations at receptors located on the first-floor level façade of the Five Ways Inn are presented in Figure 9. The concentrations are all well below the objective.

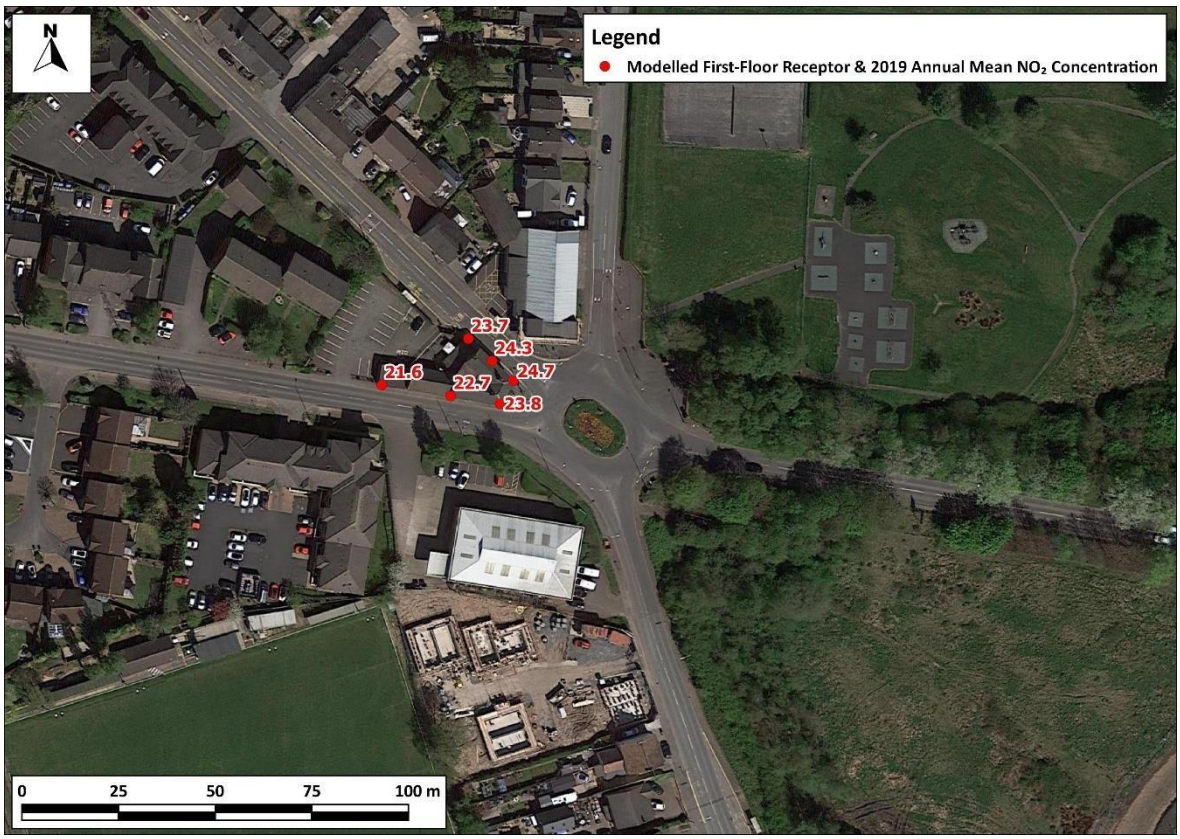

Figure 9: Modelled 2019 Annual Mean NO_2 Concentrations at First-Floor Level of the Five Ways Inn

Imagery ©2021 Google.

3.4 The detailed assessment has, therefore, demonstrated that there were no exceedances of the annual mean nitrogen dioxide objective at locations of relevant exposure within AQMA 3 in 2019, and thus that this AQMA can also be revoked. Concentrations of nitrogen dioxide in future years are likely to reduce further due to changes to the vehicle fleet, as demonstrated by the monitoring trends presented in this report.

4 Summary

4.1 It is recommended that Cannock Chase AQMA (AQMA 1) is revoked. This recommendation is based on measurements representing the worst-case locations of relevant exposure within the AQMA being under the objective and either remaining steady or decreasing over the last three years.

4.2 It is recommended that CCDC AQMA 2 remains in place at this time and existing monitoring continues. If measured concentrations at the only monitoring site representative of relevant exposure (268WS) remain below the objective in the near future, then the AQMA should be revoked. It is, however, recommended that the spatial extent of the AQMA is amended to only include the properties that are directly adjacent to the A5 in the vicinity of the monitoring sites; properties further afield are set back considerably further from the road and will not experience objective exceedances.

4.3 Detailed dispersion modelling has been carried out for AQMA 3, which has demonstrated that there were no exceedances of the annual mean nitrogen dioxide objective at locations of relevant exposure within AQMA 3 in 2019, and therefore this AQMA should also be revoked.

5 Appendices

A1 Professional Experience

[redacted] BSc (Hons) MSc PhD CSci MIEnvSc MIAQM

[redacted] is an Associate Director with AQC, with more than 20 years' relevant experience. She has been involved in air quality management and assessment, and policy formulation in both an academic and consultancy environment. She has prepared air quality review and assessment reports, strategies and action plans for local authorities and has developed guidance documents on air quality management on behalf of central government, local government, and NGOs. She has led on the air quality inputs into Clean Air Zone feasibility studies and has provided support to local authorities on the integration of air quality considerations into Local Transport Plans and planning policy processes. [redacted] has appraised local authority air quality assessments on behalf of the UK governments and provided support to the Review and Assessment helpdesk. She has carried out numerous assessments for new residential and commercial developments, including the negotiation of mitigation measures where relevant. She has also acted as an expert witness for both residential and commercial developments. She has carried out BREEAM assessments covering air quality for new developments. [redacted] has also managed contracts on behalf of Defra in relation to allocating funding for the implementation of air quality improvement measures. She is a Member of the Institute of Air Quality Management, Institution of Environmental Sciences and is a Chartered Scientist.

[redacted], BSc (Hons) CSci MIEnvSc MIAQM

[redacted] is a Principal Consultant with AQC with over nine years' relevant experience. He has undertaken air quality assessments for a wide range of projects, assessing many different pollution sources using both qualitative and quantitative methodologies, with most assessments having included dispersion modelling (using a variety of models). He has assessed road schemes, airports, energy from waste facilities, anaerobic digesters, poultry farms, urban extensions, rail freight interchanges, energy centres, waste handling sites, sewage works and shopping and sports centres, amongst others. He also has experience in ambient air quality monitoring, the analysis and interpretation of air quality monitoring data, the monitoring and assessment of nuisance odours and the monitoring and assessment of construction dust. He is a Member of the Institute of Air Quality Management and is a Chartered Scientist.

[redacted], BSc (Hons)

[redacted] is an Assistant Consultant with AQC, having joined in September 2020. He holds a BSc in Meteorology and Climate Science from the University of Leeds and is currently finishing his PhD at the University of Edinburgh, which investigates population exposure to air pollution and its inequality in the UK. [redacted] has a keen interest in modelling and data science. He is now gaining experience in the field of air quality monitoring and assessment.

A2 Modelling Methodology

Receptors

A2.1

Concentrations of annual mean nitrogen dioxide have been predicted across a source-oriented grid of receptors, along with a background Cartesian grid, to enable the production of contour plots. The receptor grid has been modelled at a height of 1.5 m above ground level and is shown in Figure A2.1. Additional receptors have been modelled at the façade of the Five Ways Inn at the locations shown in Figure 9, to reflect first-floor level exposure; these receptors have been modelled at 4.5 m height. Concentrations have also been modelled at the automatic and diffusion tube monitoring sites located within AQMA 3, in order to verify the model outputs.

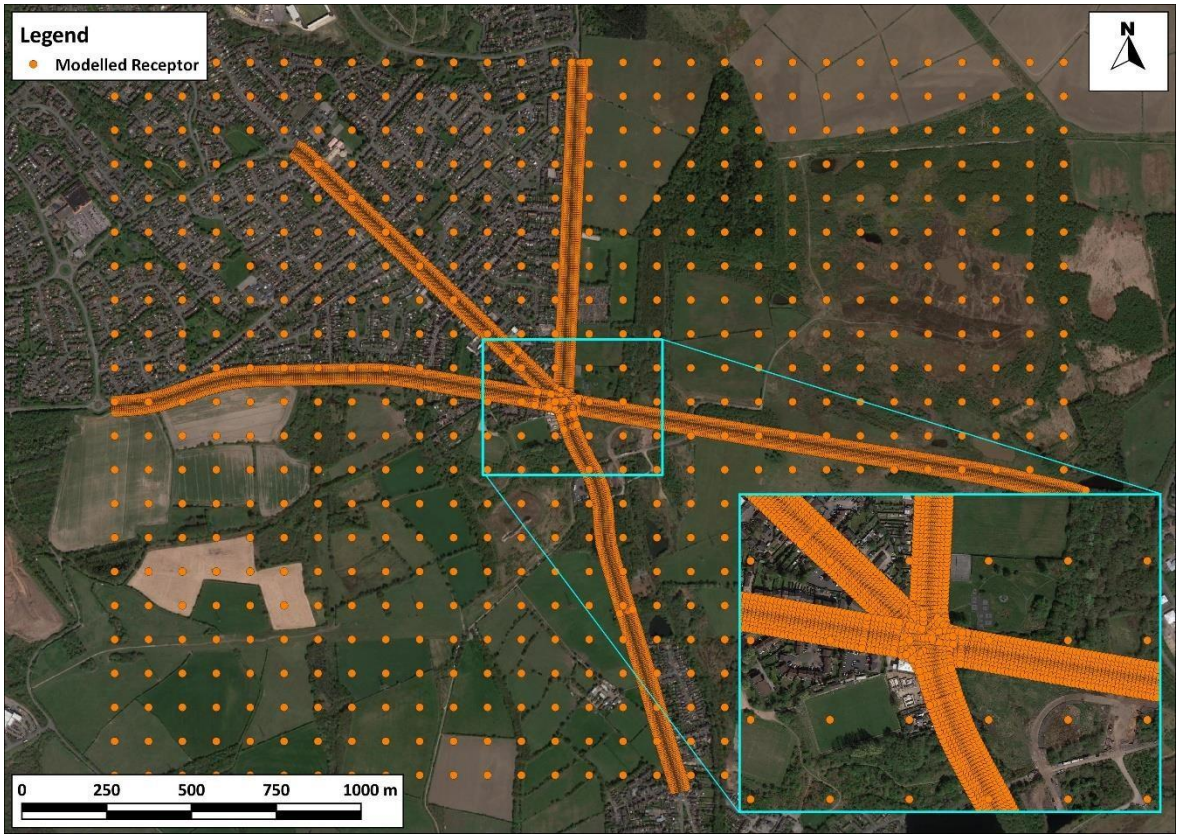

Figure A2.1: Gridded Receptors

Imagery ©2021 Google.

Background Concentrations

A2.2 Background concentrations have been defined using Defra's 2018-based background maps (Defra, 2021a), calibrated against local measurements made at the HH02, FW02 and GM02 background diffusion tube monitoring sites. The locations of the monitoring sites are shown in Figure 6. The measured nitrogen dioxide concentrations at these sites in 2019 were, on average, 1.18 times higher than the 2019 mapped background concentrations. All mapped background nitrogen dioxide concentrations for the grid squares covering the study area have therefore been calibrated by applying a factor of 1.18. Background concentrations at individual receptors were interpolated from the grid of calibrated background concentrations, to avoid step changes in concentrations between background grid squares.

Model Inputs

A2.3 Predictions have been carried out using the ADMS-Road's dispersion model (v5). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 10.1) published by Defra.

A2.4 Vehicle flows and fleet composition data have initially been taken from a classified count carried out at the Five Ways Island roundabout in 2017. The peak hour (7:30-9:30 AM + 4-6 PM) movements from the count data have been factored to AADT flows by comparison with 2019 DfT count data for the A5190[41]. The traffic data used in this assessment are summarised in Table A2.1. Diurnal and monthly flow profiles for the traffic have been derived from the national profiles published by DfT[42].

Table A2.1: Summary of Traffic Data used in the Assessment (AADT Flows)

Road Link	AADT	% Car	% LGV	% Rigid HGV	% Artic HGV	% Bus/ Coach	% Motorcycle
A5190 West	13,191	82.7	12.9	3.0	0.6	0.3	0.5
B4154 North	10,644	83.5	13.7	1.3	0.0	1.0	0.6
Wimblebury Road	4,819	83.1	13.7	2.5	0.2	0.1	0.5
A5190 East	17,821	83.0	13.2	2.6	0.5	0.1	0.5
B4154 South	10,018	84.1	12.3	1.7	0.1	1.1	0.6

A2.5 Figure A2.2 shows the road network included within the model, along with the speed at which each link was modelled. Traffic speeds have been estimated based on professional judgement, taking account of the road layout, speed limits and the proximity to a junction.

[41] DfT (2021) Road traffic statistics, Available: http://www.dft.gov.uk/matrix/.

[42] DfT (2020) DfT Road traffic statistics (TRA03), Available: https://www.gov.uk/government/statistical-data-sets/roadtraffic-statistics-tra.

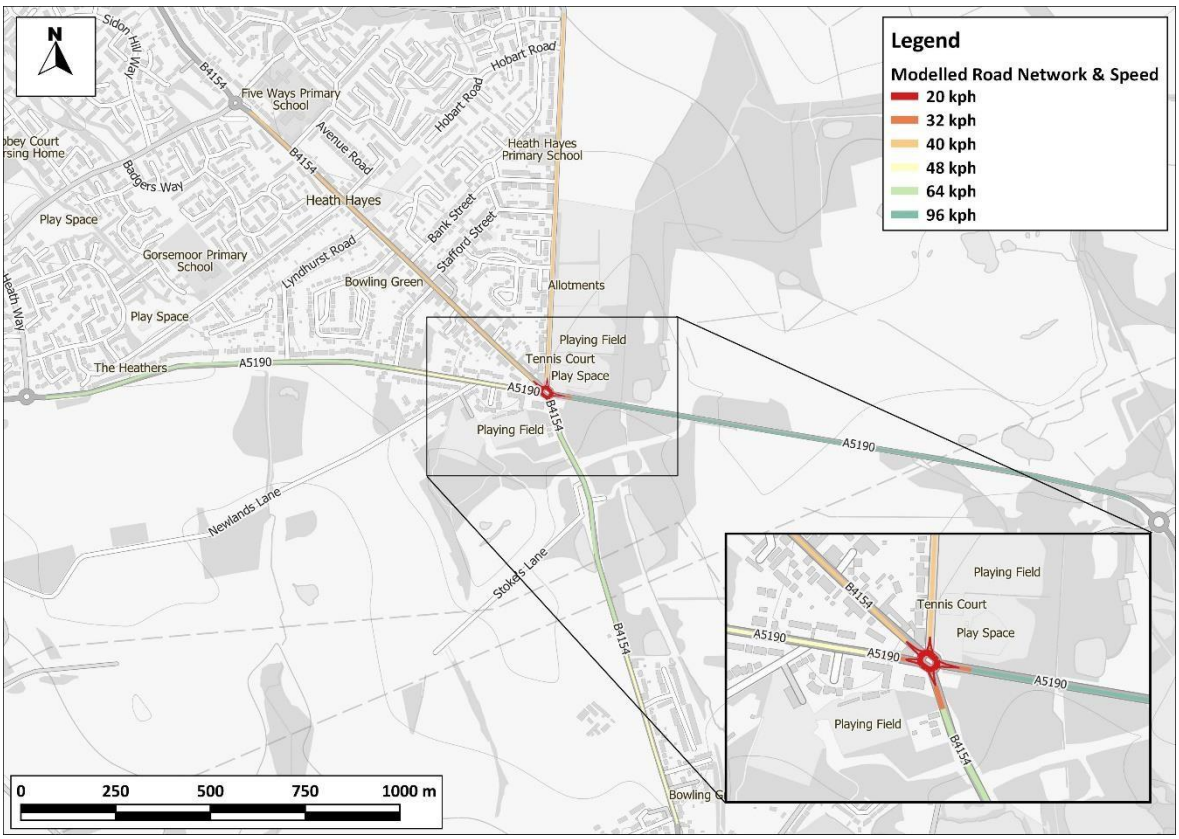

Figure A2.2: Modelled Road Network & Speed

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A2.6 Hourly sequential meteorological data in sectors of 10 degrees from Coleshill for 2019 have been used in the model. The Coleshill meteorological monitoring station is located 30 km to the southeast of Heath Hayes. It is deemed to be the nearest monitoring station representative of meteorological conditions in the vicinity of Heath Hayes; both are located at inland locations in the West Midlands where they will be influenced by the effects of inland meteorology over relatively flat-lying topography. A wind rose for the site for the year 2019 is provided in Figure A2.3. The station is operated by the UK Met Office. Raw data were provided by the Met Office and processed by AQC for use in ADMS. Meteorological model input parameters are summarised in Table A2.2 and, where considered necessary, discussed further below.

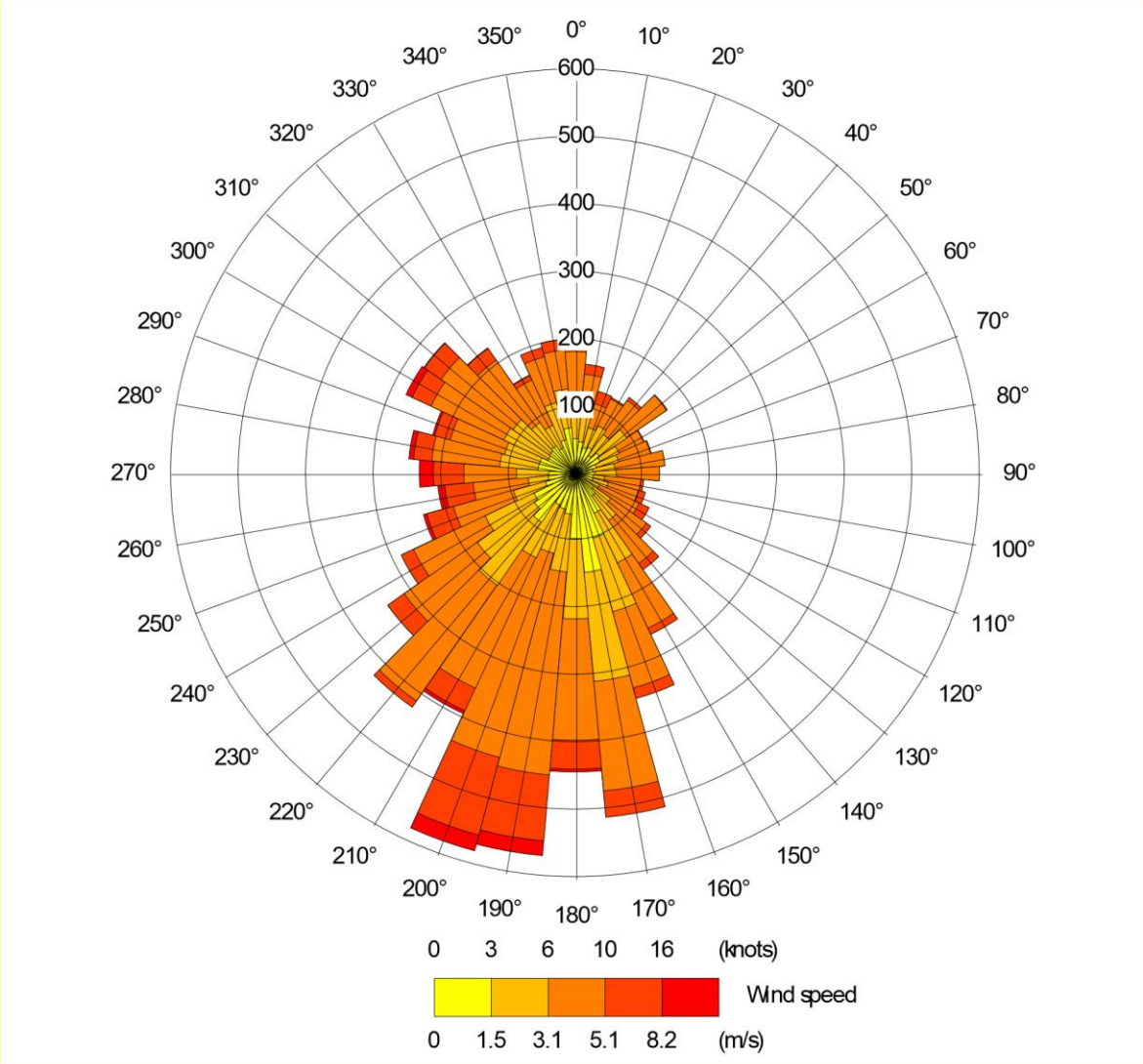


Figure A2.3: Coleshill 2019 Wind Rose

Table A2.2: Summary of Meteorological Model Inputs

Model Parameter	Value Used
Meteorological Monitoring Site	Coleshill
Meteorological Data Year	2019
Dispersion Site Surface Roughness Length (m)	0.5
Dispersion Site Minimum MO Length (m)	10
Met Site Surface Roughness Length (m)	0.2
Met Site Minimum MO Length (m)	1

Model Verification

A2.7 In order to ensure that ADMS-Roads accurately predicts local concentrations, it is necessary to verify the model against local measurements. The model has been run to predict the annual mean concentrations during 2019 at the HHMS automatic and HFRDRD, CNKRD, HHFW, FW01 and HH01

diffusion tube monitoring sites within AQMA 3. The locations of the monitoring sites are shown in Figure 6.

A2.8 Most nitrogen dioxide (NO_2) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides ($NOx = NO + NO_2$).

A2.9

The model output of road-NOx (i.e., the component of total NOx coming from road traffic) has been compared with the 'measured' road-NOx. Measured road-NOx has been calculated from the measured NO_2 concentrations and the predicted background NO_2 concentration using the NOx from NO_2 calculator (Version 8.1) available on the Defra LAQM Support website.

A2.10

The unadjusted model has under predicted the road-NOx contribution; this is a common experience with this and most other road traffic emissions dispersion models. An adjustment factor has been determined as the slope of the best-fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (Figure A2.4). The calculated adjustment factor of 2.339 has been applied to the modelled road-NOx concentration for each receptor to provide adjusted modelled road-NOx concentrations.

A2.11 The total nitrogen dioxide concentrations have then been determined by combining the adjusted modelled road-NOx concentrations with the predicted background NO_2 concentration within the NOx to NO_2 calculator. Figure A2.5 compares final adjusted modelled total NO_2 at each of the monitoring sites to measured total NO_2 and shows a close agreement.

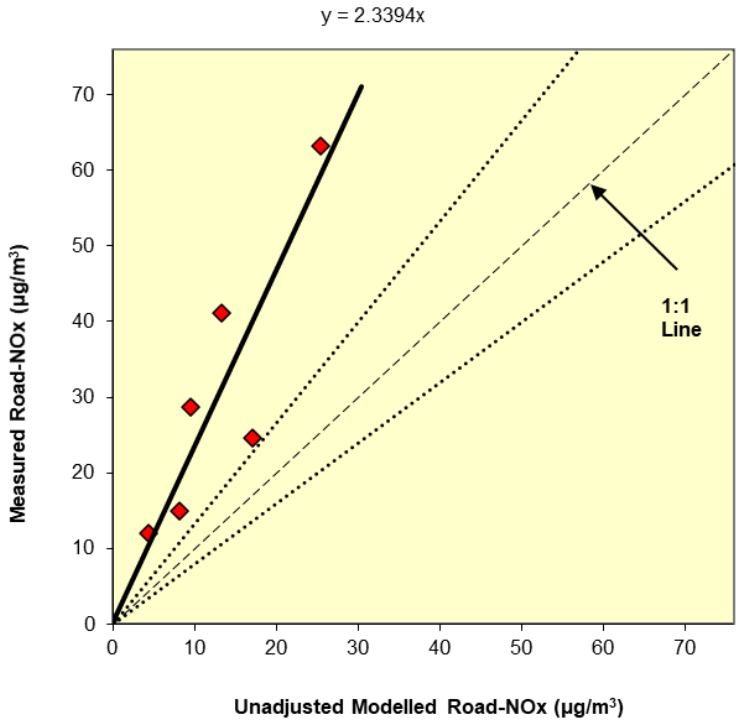


Figure A2.4: Comparison of Measured Road NOx to Unadjusted Modelled Road NOx Concentrations. The dashed lines show ± 25%.

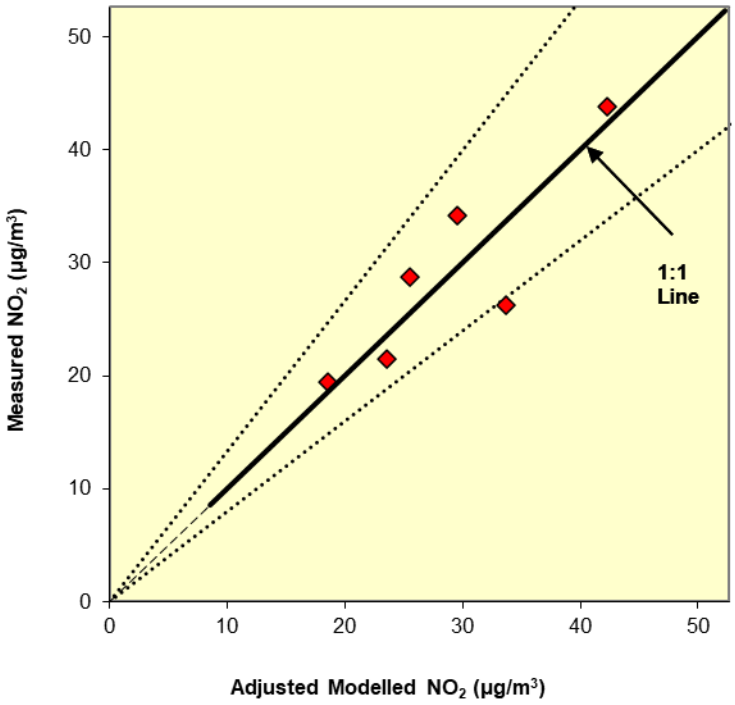


Figure A2.5: Comparison of Measured Total NO_2 to Final Adjusted Modelled Total NO_2 Concentrations. The dashed lines show ± 25%.

2.11.1 Table A2.3 shows the statistical parameters relating to the performance of the model, as well as the 'ideal' values[1]. The values calculated for the model demonstrate that it is performing well.

Table A2.3: Statistical Model Performance

Statistical Parameter	Model-Specific Value	'Ideal' Value
Correlation Coefficient [a]	0.88	**1**
Root Mean Square Error (RMSE) [b]	3.98	**0**
Fractional Bias [c]	0.00	**0**

[a] Used to measure the linear relationship between predicted and observed data. A value of zero means no relationship and a value of 1 means absolute relationship.

[b] Used to define the average error or uncertainty of the model. The units of RMSE are the same as the quantities compared (i.e. µg/m^3). TG16 (Defra, 2018b) outlines that, ideally, a RMSE value within 10% of the air quality objective (4µg/m^3) would be derived. If RMSE values are higher than 25% of the objective (10 µg/m^3) it is recommended that the model is revisited.

[c] Used to identify if the model shows a systematic tendency to over or under predict. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.

Post-processing

A2.12 The model predicts road-NOx concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO_2, has been processed through the NOx to NO_2 calculator available on the Defra LAQM Support website. The traffic mix within the calculator has been set to "All other urban UK traffic", which is considered

suitable for the study area. The calculator predicts the component of NO_2 based on the adjusted road-NOx and the background NO_2.

Figure 2: Air Aware. School Case Study

Staffordshire and Stoke-On-Trent Air Quality Project

Air Aware Staffordshire

School Case Study: Heath Hayes Academy

The Staffordshire and Stoke-On-Trent Air Quality Project (Air Aware Staffordshire) was a DEFRA funded project to work with Schools and Businesses in air quality management areas (AQMAs) in Staffordshire and Stoke-On-Trent. An iniΘal 15 schools were idenΘfied to work with in the first year and a further 10 idenΘfied to work with in year two.

Heath Hayes Primary Academy is located close to one of the highest polluted areas in the county near the 'Five Ways' island in Cannock. Air polluΘon levels exceed the legal limits and local and commuter traffic have been idenΘfied as contribuΘng factors. The aims and objecΘves of working with Heath Hayes and surrounding schools include reducing car use, raising acΘve travel, reducing local air polluΘon and raising awareness of air quality.

Heath Hayes has 193 Pupils from RecepΘon to year 6 (aged 5-11 years old) with an average size catchment area. There was a high propensity to drive with 60%of the pupils travelling to school by car. The headteacher was keen to reduce the number of cars around the school at pick up and drop off Θmes and to improve the air quality. The school was also in the boΣom 10% for obesity levels and the head was keen to improve pupil's health.

The School Travel Advisor worked closely with the school staff to develop the school travel plan using ModeshiŌ Stars to evidence the work they were doing and record the changes. Working together we idenΘfied a number of measures and objecΘves that would help achieve the outcomes.

Launching the Park & Stride

- To promote a new Park & Stride scheme.
- To promote cycling and scooΘng as an alternaΘve to the car.
- To increase cycle and scooter storage.
- To engage with parents and pupils to raise awareness of Air PolluΘon and it's effects.
- To increase the health and fitness of the pupils and lower exposure to polluΘon.

Department for Environment Food & Rural Affair

City of Stoke-on-Trent

Staffordshire County Council

The school appointed eight "AcƟve Travel Ambassadors" to help promote the iniƟaƟves and campaigns that were run as part of the travel plan. They met with the school travel plan champions and travel advisor on a regular basis to discuss campaigns and come up with creaƟve ideas and they played a key role in all of the campaigns and promoted the iniƟaƟves to their peers within school. They invited residents, PCSOs, Councillors and the local MP into school to see the work they were doing and to gain their support.

The school ran many campaigns during the 2 year project, delivered air quality lesson plans provided by the Travel Advisor, clubs to promote acƟve travel and sessions to raise awareness of air quality and road safety.

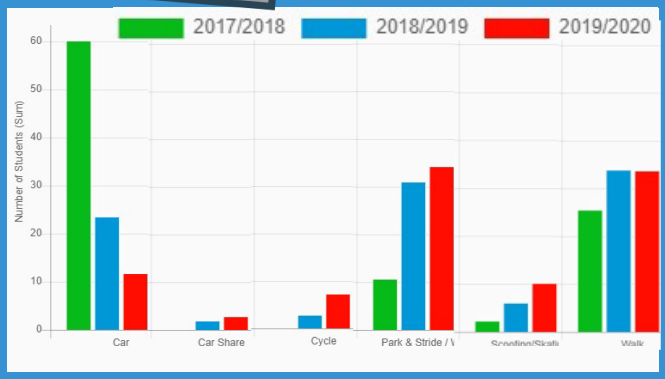
Some of the most notable campaigns were:

Clean Air Day; when the school invited parents in to see the acƟviƟes and delivered whole school lessons about air polluƟon.

An AnƟ-Idling Campaign; a County Council designed toolkit delivered by the Travel Ambassadors to target parents who were idling whilst picking up pupils from school, both of these gained huge media aΣenƟon and featured on BBC and ITV news.

Walk to School Week; where all children were encouraged to walk. They launched the Park & Stride scheme that week so even those sƟll travelling by car could walk some of the way.

Scoot to School Week; which was promoted to all children and saw a massive 60% of the children scooƟng to school at least once that week. They also ran aŌer school scooter club to help increase confidence on scooters, and installed addiƟonal storage.



Car use fell from 60% to 12%

Car share went from 0% to 3%

Cycling increased from 1% to 7%

Park & Stride rose from 10% to 34%

ScooƟng went up from 2% to 10%

Walking went up from 24% to 33%

All AcƟve Travel rose from 27% to 50%

Notable Achievements

Featured on TV News Broadcasts twice during the campaign

Monitoring showed a reducƟon in Air PolluƟon of up to 20%

Achieved Gold Status for the School Travel Plan

Visits MPs and Councillors to showcase achievements and raise awareness

Awarded Regional School of the Year at the NaƟonal ModeshiŌ Stars Awards for Travel Planning

QA/QC of Diffusion Tube Monitoring

Details of non-automatic (i.e., passive) monitoring using diffusion tubes are as follows:

Diffusion tubes are supplied and analysed by Staffordshire Scientific Services, Staffordshire County Council. The preparation method is 20 % TEA, 80 % water – pipetted.

The lab follows the procedures as set out in the Harmonisation Practical Guidance and is UKAS accredited for this method. It takes part in the NO_2 Network Field Inter-comparison, managed by Health and Safety Laboratory on behalf of AEA. Their lab code is 1017. The bias factor for 2021 is 0.86, which is calculated using local co-location data. The lab takes part in the WASP scheme managed by Health and Safety Laboratory. Lab code 1017. The latest results for this can be found at Link.[43]

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Cannock Chase District recorded data capture of 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 25% do not require annualisation.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2022 ASR has been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

[43] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/qa-qc-framework/

Cannock Chase Council have applied a national bias adjustment factor of 0.86 to the 2021 monitoring data. A summary of bias adjustment factors used by Cannock Chase Council over the past five years is presented in Table C.1.

TG16 provides guidance on where local/ national bias factors should be applied. Generally, the guidance suggests that a local factor would be more appropriate, however, the recommendation for use of a national factor where the survey consists of tubes exposed over a range of settings, which differ from the co-location site overrides other consideration in our instance. Although an automatic NO_2 monitoring site is located at Cannock A5190 roadside in AQMA3, this is a local road and not particularly representative of the A5 trunk road where AQMAs 1 and 2 are located, there is a significant number of HGV vehicles and various speed and queue variables. We feel that the amalgamated bias correction data for other Staffordshire highways lab customers reflects a range of road types and is consistent with their lab procedures. Therefore, more reliable than a local bias factor based on 1 monitoring location.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	03/22	0.86
2020	National	03/21	0.85
2019	National	Not Recorded	0.93
2018	National	Not Recorded	0.88
2017	National	Not Recorded	0.88
2016	National	Not Recorded	0.91

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No diffusion tube NO_2 monitoring locations within Cannock Chase Council required distance correction during 2021.

QA/QC of Automatic Monitoring

The Cannock A5190 Roadside monitoring site is classified as an AURN site. As such, the following apply:

Data Management	Arranged through AURN network
Local Site Operator (LSO) duties	Cannock Chase Council Environmental Health Department
Frequency of Calibrations	Fortnightly
Audit/servicing	Arranged by AURN network
Ratification process	Arranged by AURN Network
Data Availability	Link[44]

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

Not applicable

Automatic Monitoring Annualisation

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

NO_2 Fall-off with Distance from the Road

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

[44] https://uk-air.defra.gov.uk/data/flat_files?site_id=CANK

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

No automatic NO_2 monitoring locations within Cannock Chase Council required distance correction during 2021.

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

No annualisation of data required for this report.

Table C.3 – Local Bias Adjustment Calculation

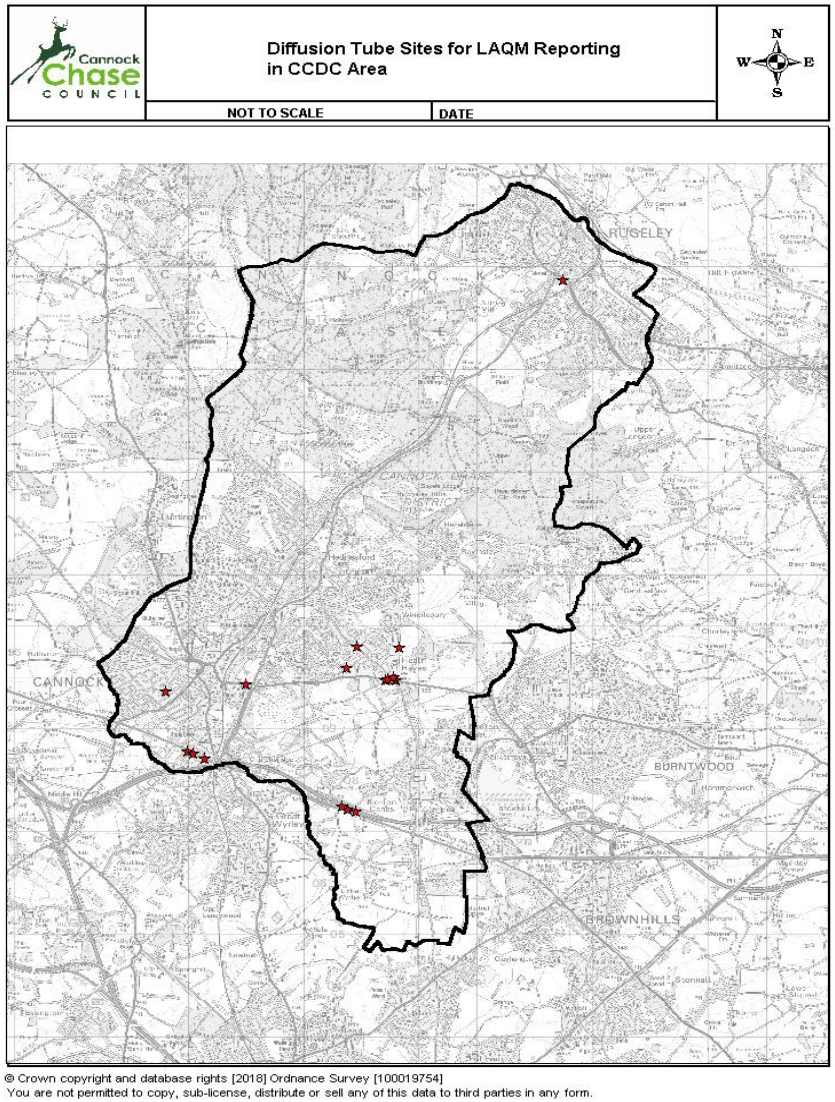
Local bias adjustment was not used in this report.

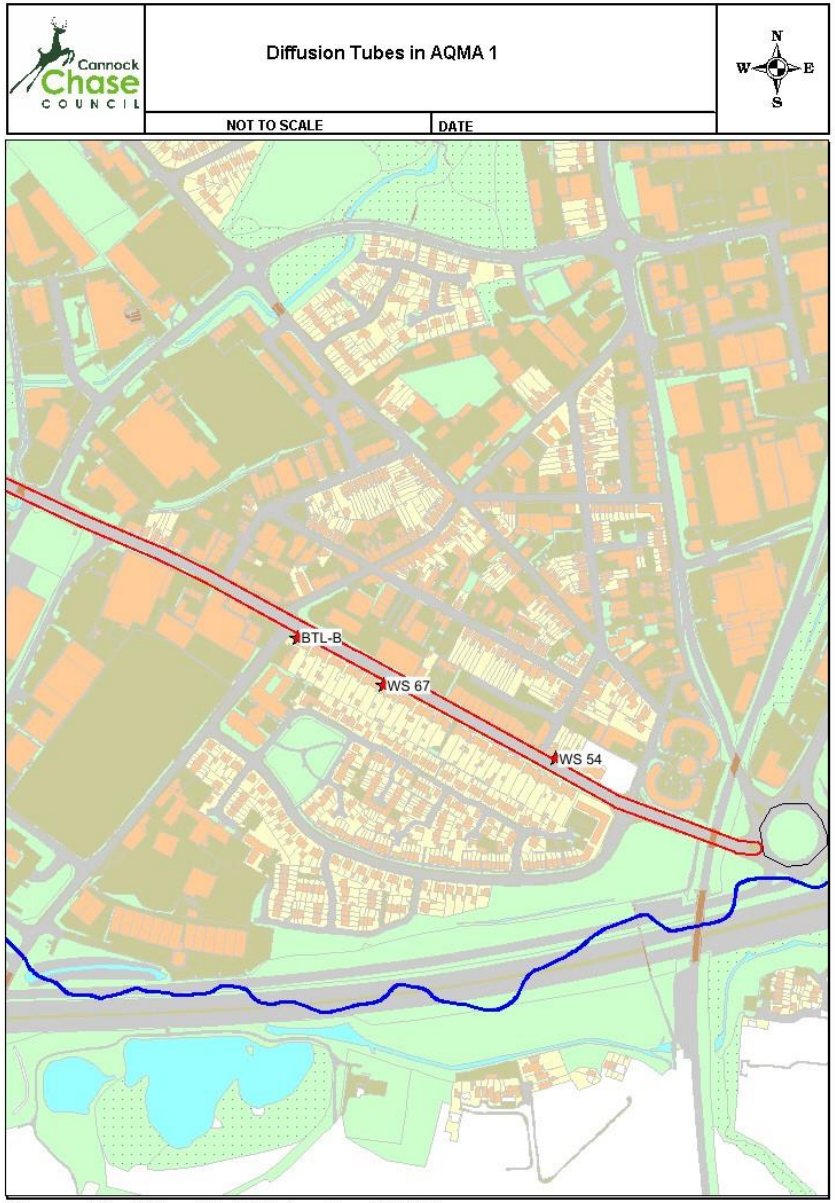
Table C.4 – NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

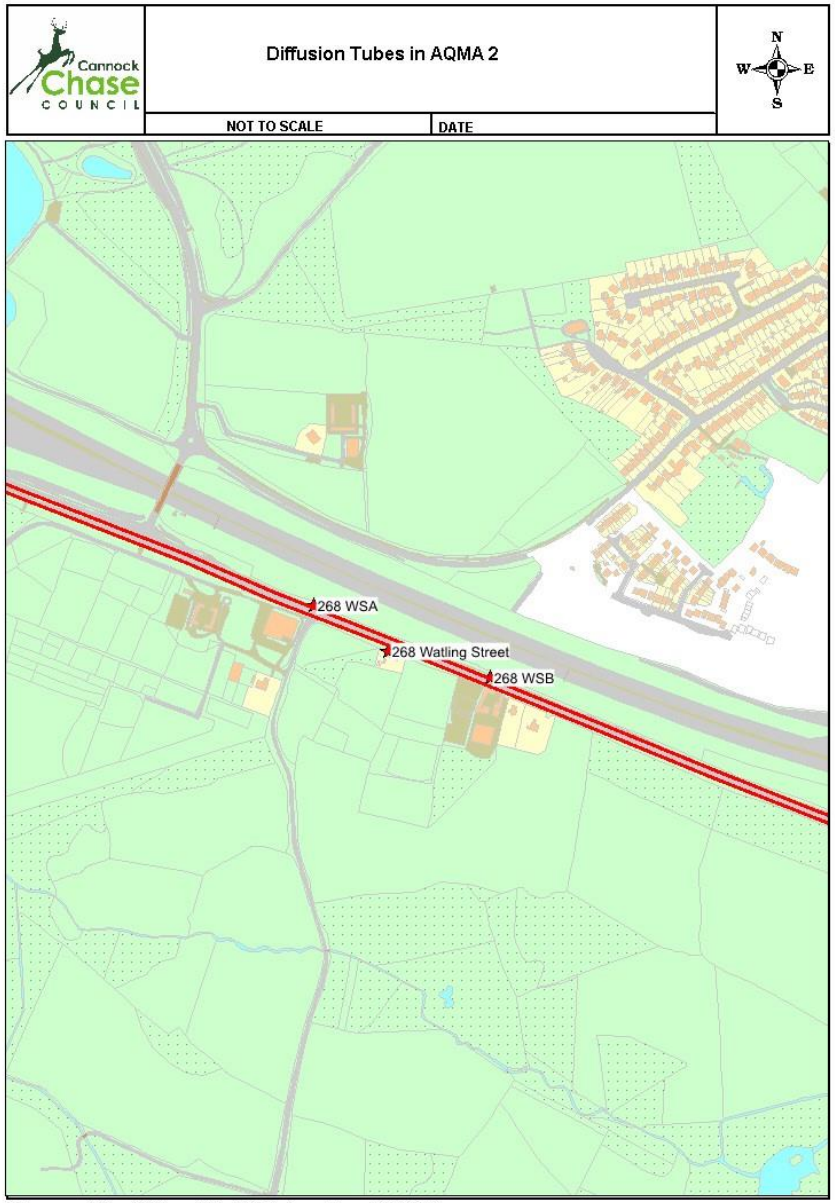
Not applicable for this document as there were no exceedances in the relevant locations

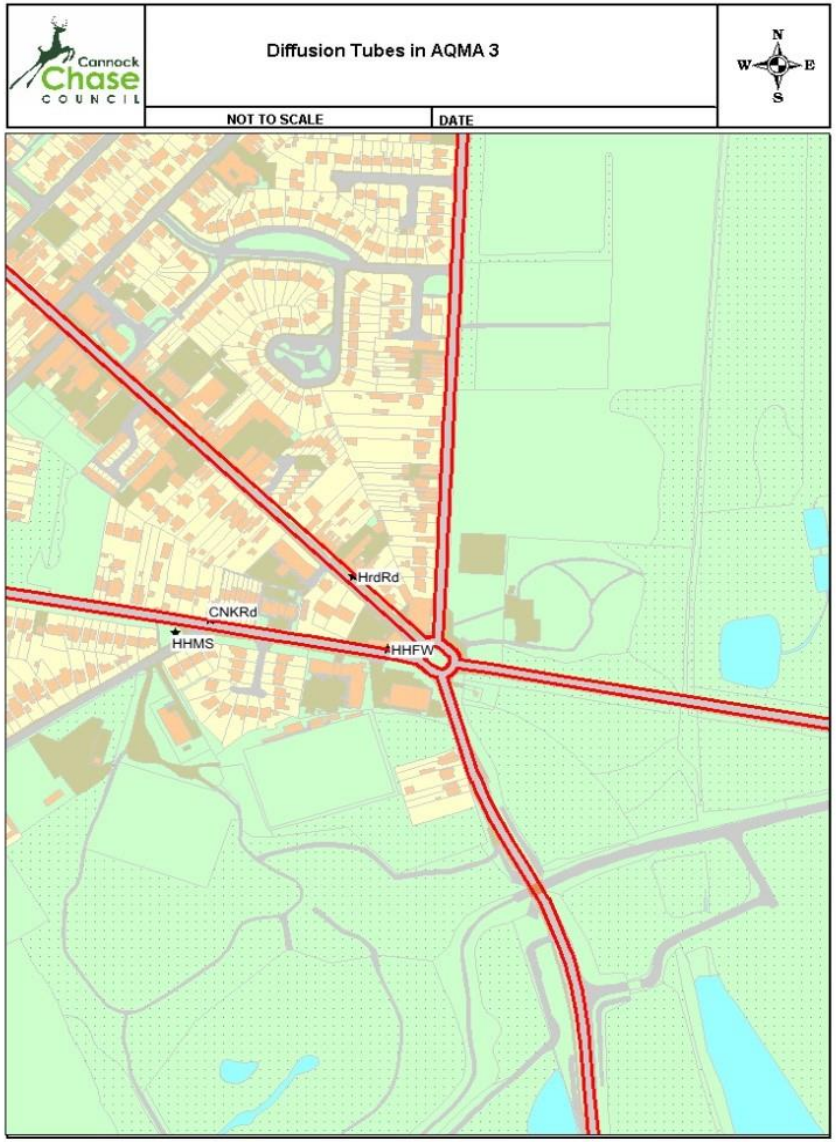
Appendix D: Map(s) of Monitoring Locations and AQMAs

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








Cannock Chase COUNCIL
Diffusion Tubes in AQMA 3
NOT TO SCALE
DATE
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Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[45]

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

[45] The units are in micrograms 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 Highways England
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.TG16. April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.