AIR QUALITY MANAGEMENT AREA 2 REVIEW

Air Quality Management Area 2 Review

ISSUED BY:

CANNOCK CHASE COUNCIL
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DATE: MAY 2025

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EXECUTIVE SUMMARY

The Environment Act 1995 places a duty on local authorities to undertake a periodic review and assessment of air quality within their area. Local authorities are under a duty to declare an air quality management area where assessment indicates that a relevant receptor is exposed to air quality that is not, or is not likely to, meet air quality objectives.

In 2012, Cannock Chase Council identified the area around 268 (A5) Watling Street to be an area where the air quality objective for nitrogen dioxide of 40 µg/m^3 (annual mean) was not likely to be achieved, and should therefore be declared to be an air quality management area.

On 1 September 2014, the Cannock Chase Council made the Cannock Chase Council Air Quality Management Area No 2 Order.

Air quality monitoring demonstrates that In 2016, the air quality objective was breached; there have been no further breaches, with the air quality objective being comfortably achieved since 2020.

A review of the available air quality monitoring data and anticipated future trends has been undertaken; it is recommended that Air Quality Management Area 2 be revoked.

1 INTRODUCTION

1.1 LEGAL BACKGROUND

The Environment Act 1995 places a duty on local authorities to undertake a periodic review and assessment of air quality within their area. A local authority is required to declare an air quality management area (AQMA) where the assessment indicates that an air quality objective is not, or is not likely to be, achieved.

In 2012, Cannock Chase Council (the Council) completed a detailed assessment of air quality at 268 (A5) Watling Street. The assessment found that the annual mean nitrogen dioxide (NO_2) concentration fluctuated around the air quality objective of 40 µg/m^3. On this basis, a recommendation was made to declare an AQMA, centred around 268 Watling Street.

AQMA 2 was declared in September 2014 (Appendix 1).

In 2021, the Council commissioned Air Quality Consultants to review AQMA 1 - 3 (Appendix 2). On AQMA 2, monitoring data from 2017 onwards indicated continuous compliance with the annual NO_2 objective; it was anticipated that this would continue, but further monitoring was required before revocation could be considered.

In 2024, the Council reviewed the available monitoring data, and found that the objective continues to be achieved in AQMA 2. This is reported on in the Council's 2024 annual status review (ASR), which goes on to recommend that the revocation of AQMA 2 be put to the Council. This proposal was accepted by the Department of Food and Rural Affairs (DEFRA).

This report has been prepared in support of a formal proposal to the Council to revoke AQMA 2.

1.2 NITROGEN DIOXIDE

NO_2 is a brown gas, which is generated as a result of the combustion of fuel. Thus, the main man-made source of NO_2 is from vehicle exhaust fumes, which contain nitrogen oxide (NO and NO_2, collectively NO_x)

NO_x reacts with oxygen (O_2) and ozone (O_3) in one of two ways:

1. $NO + O_3 = NO_2 + O_2$
2. $NO + NO_x + O_2 = 2\ NO_2$

NO_2 is known to have an impact on lung function; NO_2 presents a greater risk to people with impaired lung function due to a medical condition, such as asthma.

2 REVIEW OF AQMA 2

2.1 DESCRIPTION OF AQMA 2

AQMA 2 covers the A5 (Watling Street) from the roundabout where the A34, A460 and A5 meet, to the district boundary (before the roundabout with the A452) with Walsall Metropolitan Borough Council; the AQMA is not continuous, as two parts of the A5 fall within South Staffordshire Council.

Land to the north of AQMA 2 is predominantly occupied by the M6 Toll and fields; there are no relevant receptors within 35 m on this side of the A5.

Land to the south of AQMA 2 is (in Cannock District) largely agricultural, although there are some commercial land uses, including a petrol station, Watling Street Business Park, and stables associated with Norton Hall Farm.

Three residential properties have been identified to the south of the A5:

- 268 Watling Street, 2.2 m distant.
- Fleur De Lys Cottage (262 Watling Street), approximately 11 m distant.
- Fleur De Lys Farmhouse (260 Watling Street), approximately 18 m distant.

268 Watling Street is the most exposed relevant receptor to NO_2 from the A5. If the annual NO_2 objective is achieved at 268 Watling Street, it is highly likely to be the case at other properties.

2.2 MONITORING DATA

2.2.1 MONITORING LOCATIONS AND METHOD

Diffusion tubes are a common way to monitor atmospheric NO_2. A diffusion tube is about 8 cm long and is made of clear plastic. It is supplied with two silicone caps fitted at either end. One of the caps contains a gauze, which has been coated with a chemical that reacts with atmospheric nitrogen.

The tube is deployed by removing the cap which does not contain the gauze, and attaching it to a clip at the monitoring location (in this case, street furniture). 268 WS is shown as Figure 1.

The gauze, now exposed to the air, reacts with atmospheric nitrogen.

After a month, the tube is collected, and the cap at the open end is replaced; this seals the tube, preventing further exposure of the gauze.

The tube is returned to the laboratory, where it is analysed. As the length of time the gauze has been exposed and the amount of chemical that has reacted are known, the average atmospheric concentration of NO_2 over that period can be calculated.

Figure 1Diffusion tube 268 WS

2.2.2 Monitoring Locations

Monitoring locations are presented as Figure 2, with relevant information in Table 1.

Table 1 Receptor and monitoring locations

Location	Mounting position	Distance from carriageway (m)	Distance from relevant receptor (m)	Direction from relevant receptor	Position relative to carriageway
268 Watling Street (receptor)	N/A	2.2	N/A	N/A	South
268 WS	Lamp post	1.9	16	West	South
268 WSA	Road sign	5.2	107	West	North
268 WSB	Road sign	1.2	120	East	North

2.2.3 Monitoring Data Limitations

Monitoring data obtained at 268 WSA and 268 WSB has been used to assess the relationship between proximity to the A5 and NO_2(as discussed in Section 2.4.1).

The assessment of air quality at the relevant receptor is based on monitoring at 268 WS, which is representative of that at 268 Watling Street.

268 WSA and 268 WSB are not located near to a point of relevant exposure. Monitoring data from 268 WSA and 268 WSB are not directly relevant to the assessment of air quality at the relevant receptor, due to:

1. Distance from the carriageway.

   NO_2 concentrations reduce with an increase in distance from the source (the carriageway). 268 WS most closely aligns with the relevant receptor in this regard.

2. Distance from relevant receptor.

   268 WS is the closest monitoring location to the receptor. This minimises potential influences from differences in traffic speed (as traffic speed may be different along different stretches of highway).

3. Influence of traffic direction.

   268 WS is on south side of the carriageway, whilst 268 WSA and 268 WSB are on the north. There may be differences in the composition, speed, and flow of eastbound traffic and westbound traffic.

2.2.4 RESULTS

For the purposes of this report, air quality monitoring data for the past 13 years has been collated and is presented in Table 2 and Figure 4.

Table 2 2014-2024 air quality monitoring data for AQMA 2

Site	Annual concentration of NO_2 (µg/m³)												
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
268 WS	39.5	36.2	32.5	35.9	47.4	36.9	39	37	27.6	27.1	28.9	27.4	25.3
268 WSA								41.5	28.2	29	28.2	27.1	24.2
268 WSB								57	31.6	37.6[1]	38.7	39.7	34.5

[1] A figure of 18.4 µg/m³ was reported in the 2022 ASR, was based on data which included uncorrected errors - the corrected result is reported in this table.

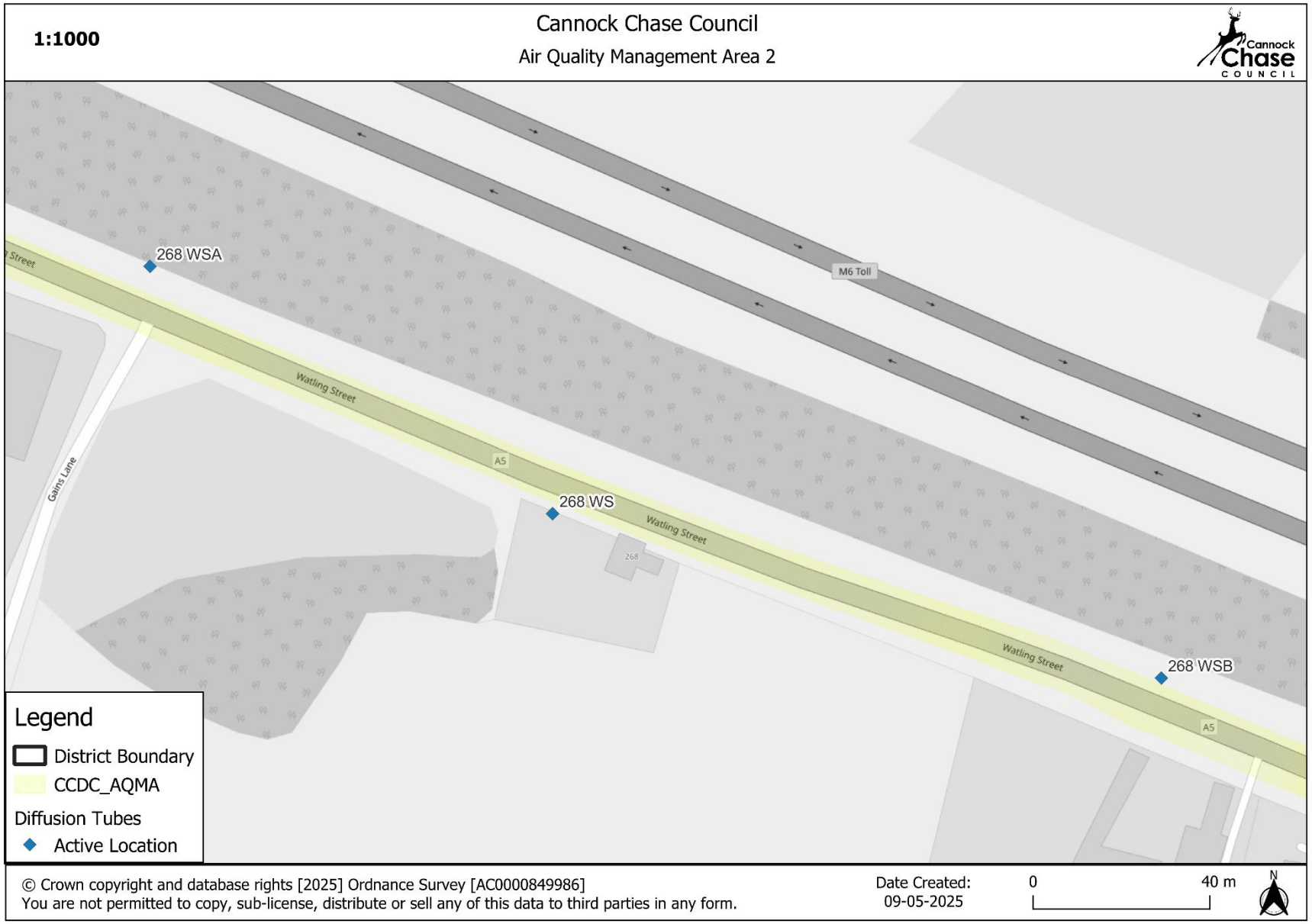

Figure 2 Monitoring locations in AQMA 2

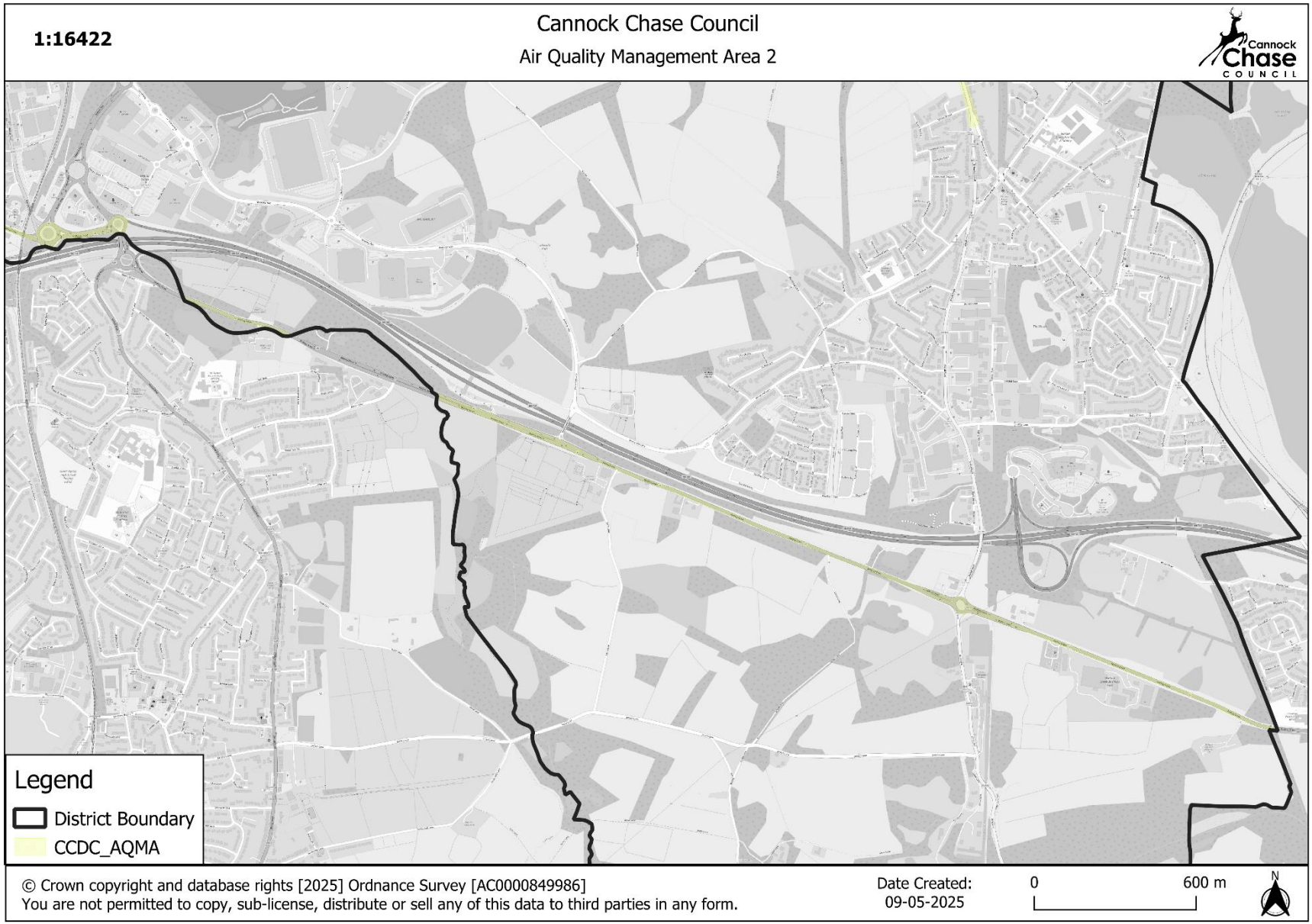

Figure 3 AQMA 2

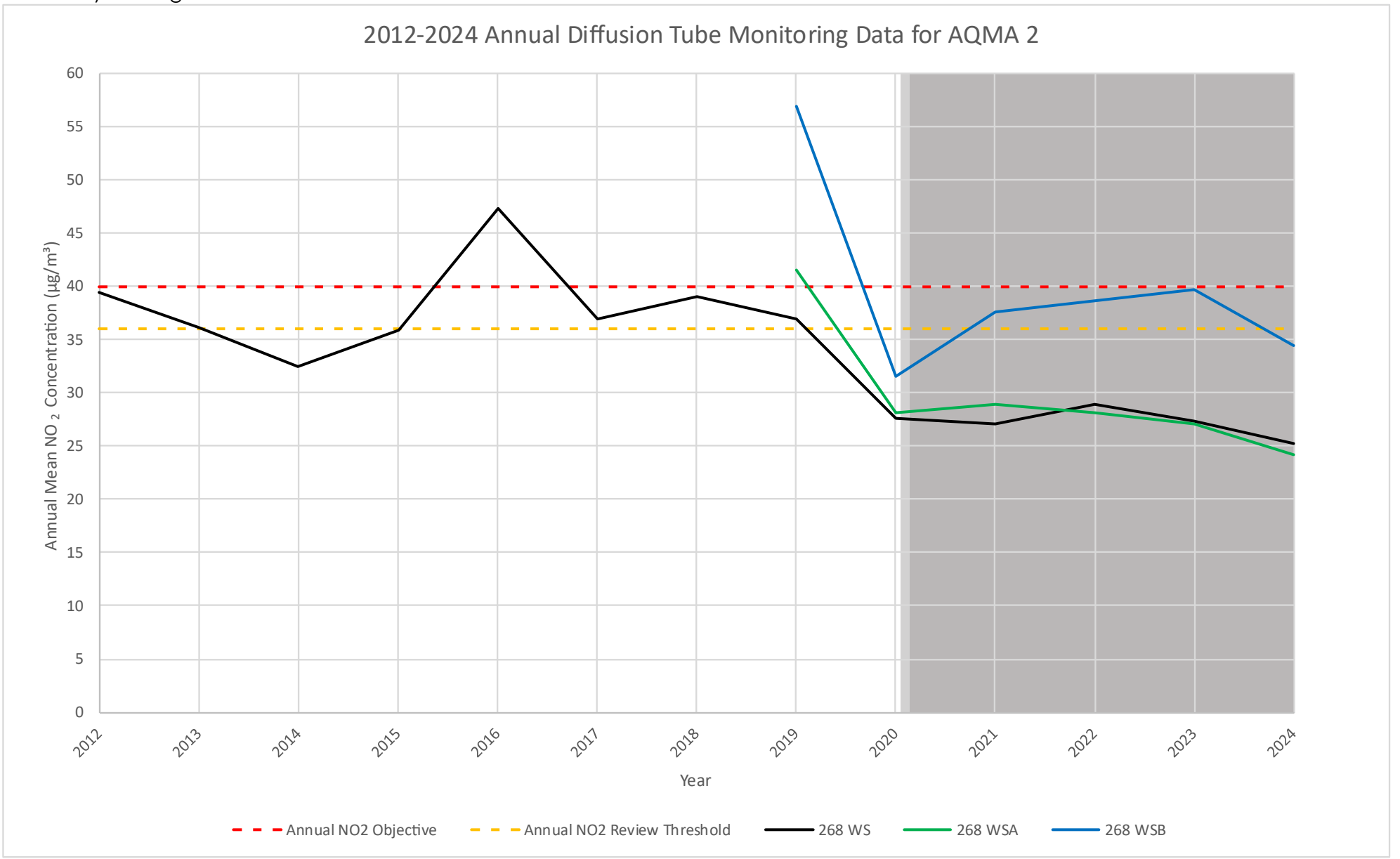

Figure 4 2012-2024 monitoring data for AQMA 2 (the shaded area represents the last 5 years of data).

2.3 2021 Review

In 2021, the Council commissioned Air Quality Consultants to prepare a review of air quality in the District. The report was completed on 16 April 2021, and relevant sections are reproduced as Appendix 2.

The report considered annual air quality monitoring data between 2014 - 2019, and found continuous compliance with the objective from 2017, with the expectation that compliance would continue. However, the margin of error inherent to diffusion tube monitoring meant that there was insufficient evidence to justify revocation of AQMA 2 at that time.

The report recommended that monitoring be continued and, if annual mean NO_2 continued to comply with the objective, then AQMA 2 should be revoked.

2.4 2025 Review

2.4.1 Dispersion of Traffic Emissions

Monitoring data shows consistently higher NO_2 at 268 WSB than at 268 WS or 268 WSA. The likely reason for this is explained below:

1. The only significant difference between the three locations are their proximities to the A5 (Table 1).

2. Monitoring data (Figure 4) shows that NO_2 at 268 WS and 268 WSA appear to be correlated; that is, NO_2 concentrations at these locations are similar.

3. NO_2 at 268 WSB is consistently higher than at 268 WS or 268 WSA.

4. The only logical reason for any difference is the relative proximity of each monitoring location to the A5.

5. Monitoring data shows that there was a reduction in NO_2 at all locations during Covid-19, when Government restrictions on travel resulted in a significant reduction in traffic.

   The reduction in NO_2 was proportionally larger at 268 WSB than it was at 268 WS or 268 WSA, which illustrates the greater influence of traffic emissions at 268 WSB than at 268 WS and 268 WSA (Table 3).

   That the concentrations of NO_2 at 268 WS and 268 WSA are similar suggests that NO_2 from traffic emissions largely dissipate between 1.2 m and 1.9 m of the highway. The façade of the relevant receptor, 268 Watling Street, is 2.2 m from the highway.

Table 3 Monitoring data analysis

Site	Annual concentration of NO_2 ($\mu g/m^3$)		Proportional fall in concentration of NO_2 (%)
	2019	2020	
268 WS	37	27.6	25.4
268 WSA	41.5	28.2	32
268 WSB	57	31.6	44.6

2.4.2 Air Quality Trends at 268 WS

Air quality trends at 268 WS are described below:

2012-2016 - There is an erratic trend, but NO_2 concentrations are generally steady, usually between 36 - 40 µg/m^3; there is an spike in 2016, when the NO_2 concentration reached 47.4 µg/m^3.

2017-2019 - NO_2 concentrations returned to a steady trend of about 38 µg/m^3.

2019-2020 - The abrupt reduction in NO_2 concentrations in 2020 is likely to be linked to the reduction in traffic associated with Government restrictions on movement during the Covid-19 pandemic (Figure 5).

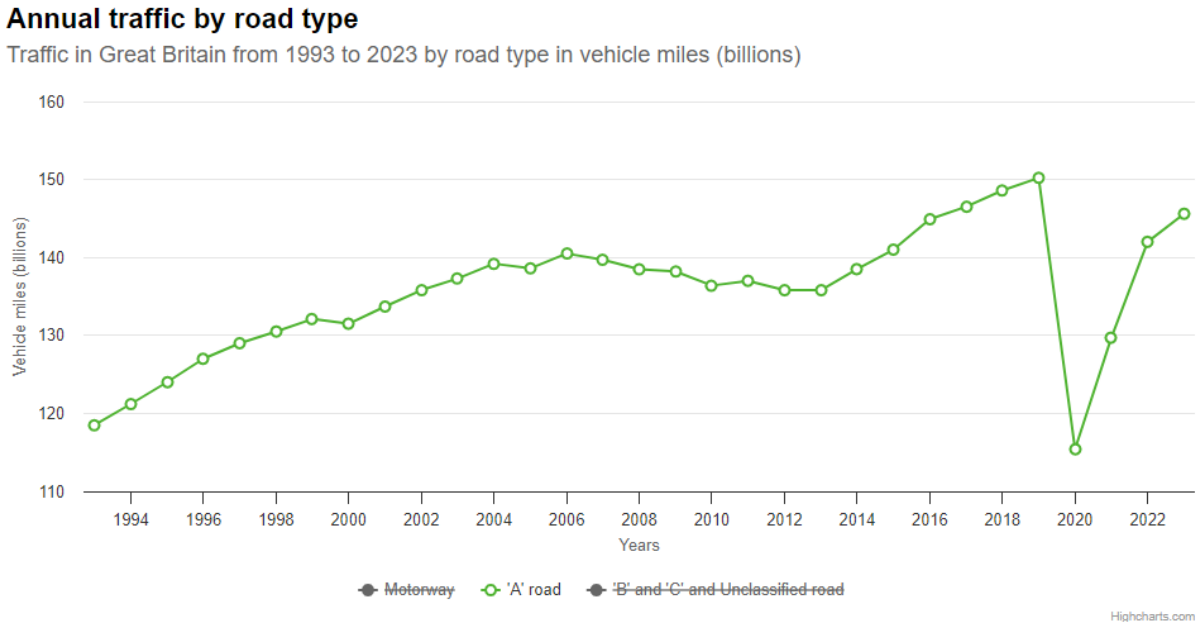

Figure 5 Annual Great Britain 'A' road traffic flow (Department for Transport, n.d.)

2020-2024 - NO_2 concentrations fell in 2020 to around 27 µg/m^3, and show a steady to slightly decreasing trend.

The following factors are likely to be responsible for generally reducing NO_2 trends.

1. Tightening of vehicle emission standards.

   Vehicle emission standards were introduced in 1992, and have gradually been tightened. Whilst this has not influenced traffic flows, it has reduced the amount of NO_x from traffic emissions (Table 4).

   The average car is scrapped after 14 years, which means that few cars produced to pre-Euro 5 standards will be in use. It also means that the trend of reducing NO_x from traffic emissions should continue, especially as any Euro 4 standard vehicles will be at least 14 years old in 2025.

Table 4 Car emission standards

Euro standard	Emission limit (g/km)	
	Petrol	Diesel
Euro 1 (1/7/1992)	0.97 (NO_x and hydrocarbons)	0.97 (NO_x and hydrocarbons)
Euro 2 (1/1/1996)	0.5 (NO_x and hydrocarbons)	0.7 (NO_x and hydrocarbons)
Euro 3 (1/1/2000)	0.15 (NO_x)	0.5 (NO_x)
Euro 4 (1/1/2006)	0.08 (NO_x)	0.25 (NO_x)
Euro 5 (1/9/2011)	0.06 (NO_x)	0.18 (NO_x)
Euro 6 (1/9/2015)	0.06 (NO_x)	0.08 (NO_x)
Euro 7 (2026)	0.06 (NO_x)	0.06 (NO_x)

2. Changes to traffic composition.

   Current Government policy is to phase out the sale of new petrol and diesel cars by 2030. This has resulted in a change to public vehicle purchasing habits, as more people choose to purchase electric and hybrid vehicles (Figure 6).

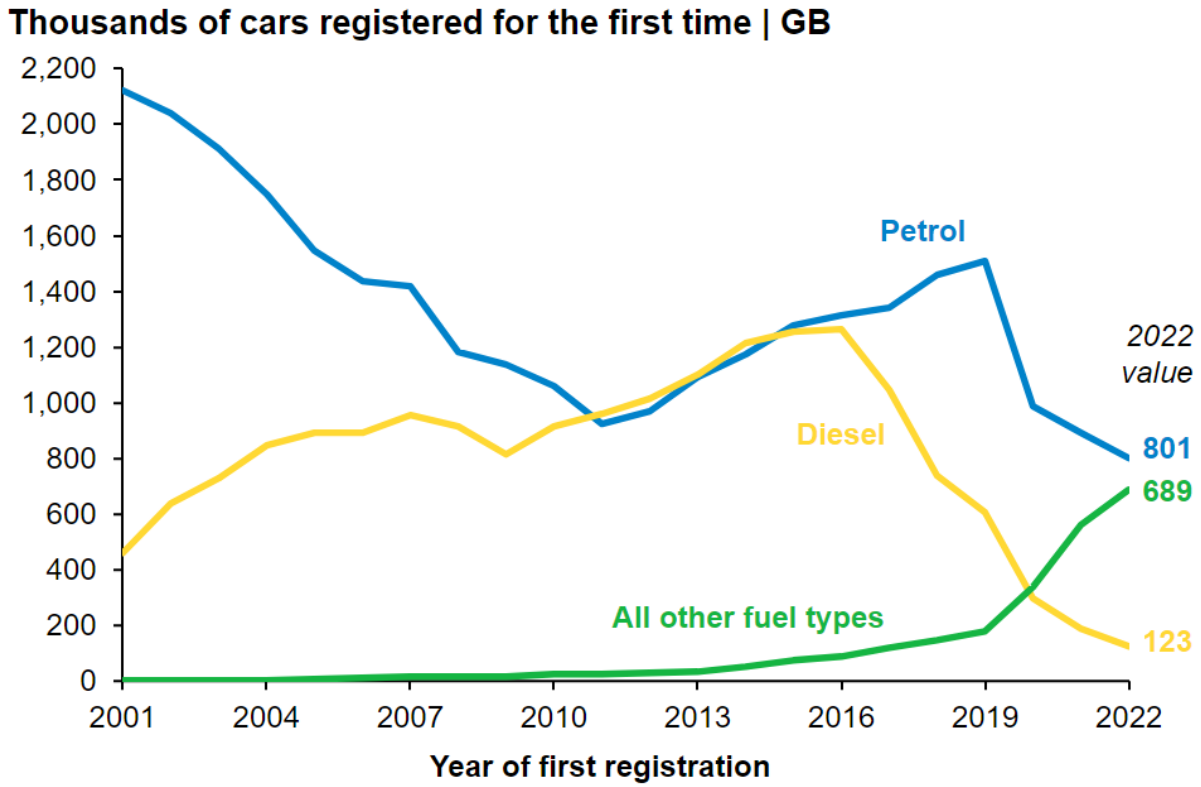

Figure 6 Cars registered for the first time by fuel type in Great Britain, 2001-2022 (DEFRA, 2023).

These trends are likely to have the following impacts:

- Electric vehicles do not produce exhaust emissions. As the proportion of electric vehicles in the general fleet increases, exhaust emissions will inevitably reduce.

- In particular, diesel registrations fell markedly in 2015; diesel vehicles emit more NO_2 than petrol vehicles. Thus, the proportion of NO_2 in residual traffic emissions should continue to fall (note that, whilst emission standards for NO_2 for diesel vehicles tightened considerably in 2015, it is still 33% higher than emission standards for petrol vehicles).

3. Changes to traffic flow.

   When Covid-19 began, the Government response was to impose restrictions on movement. Businesses had to adapt by allowing staff to work from home. In practice, the prevalence of inexpensive laptops and fast broadband speeds meant that this transition was relatively straightforward; staff could work and attend meetings online.

   What was a necessary change has been permanently adapted by many businesses, which has also led to a reduction in road traffic.

2.4.3 Comments on 268 WSA and 268 WSB

It is reiterated that there are no relevant receptors in the vicinity of 268 WSB, or (in the case of 268 WSB) at an equivalent distance from the A5.

3 CONCLUSIONS AND RECOMMENDATIONS

In thirteen years of air quality monitoring (2012 - 2024) at 268 WS, the annual air quality objective for NO_2 of 40 µg/m^3 was not achieved on one occasion (2016); the objective has been achieved every year since, and comfortably so since 2020.

It is anticipated that the trend of reducing NO_x emissions from road traffic will continue. Consequently, air quality in AQMA 2 is likely to continue to comply with the annual objective for NO_2.

Government guidance (DEFRA, 2022) states:

> *'The revocation of an AQMA should be considered following three consecutive years of compliance with the relevant objective as evidenced through monitoring. Where NO_2 monitoring is completed using diffusion tubes, to account for the inherent uncertainty associated with the monitoring method, it is recommended that revocation of an AQMA should be considered following three consecutive years of annual mean NO_2 concentrations being lower than 36 µg/m^3 (i.e. within 10% of the annual mean NO_2 objective).'*

Air quality monitoring data at 268 WS satisfies DEFRA guidance.

It is recommended that AQMA 2 be revoked.

REFERENCES

DEFRA, 2022. *Local Air Quality Management Technical Guidance (TG22)*. London: Crown Copyright.

DEFRA, 2023. *Vehicle licensing statistics: 2022.* [Online]
Available at: https://www.gov.uk/government/statistics/vehicle-licensing-statistics-2022/vehicle-licensing-statistics-2022
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Department for Transport, n.d. *Road traffic statistics.* [Online]
Available at: https://roadtraffic.dft.gov.uk/summary
[Accessed 2 September 2024].

APPENDIX 1

Air Quality Management Area Order

Environment Act 1995 Part IV Section 83(2)

Cannock Chase Council
AQMA Order

Cannock Chase Council, in exercise of the powers conferred upon it by Section 83(1) of the Environment Act 1995, hereby makes the following Order.

This Order may be cited/referred to as the Cannock Chase Council Air Quality Management Area No 2 and shall come into effect on 1st September 2014.

The area shown on the attached map in red is to be designated as an air quality management area (the designated area). The designated area incorporates stretches of the A5, Watling Street within the Cannock Chase Council area between the junction with the A34 and the district boundary with Walsall Metropolitan Borough Council at Brownhills. The map may be viewed at the Council Offices

This Area is designated in relation to a likely breach of the nitrogen dioxide annual mean objective as specified in the Air Quality Regulations 2000 This Order shall remain in force until it is varied or revoked by a subsequent order.

The Common Seal of Cannock Chase Council was hereto affixed on 1st SEPTEMBER 2014 and signed in the presence of

Authorised Signatory

23070.

Cannock Chase Council

Cannock Chase Council
Air Quality Management Area No.2

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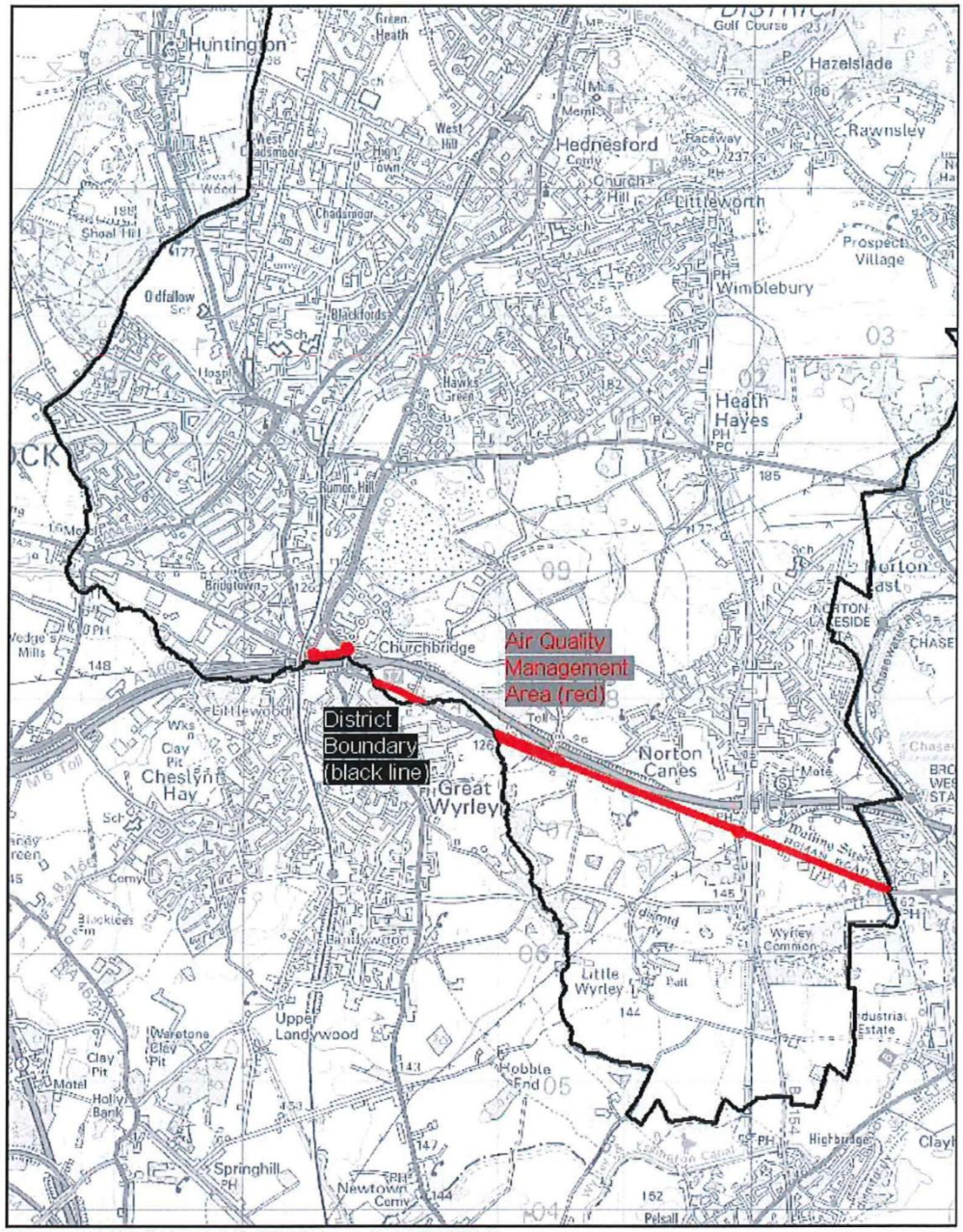

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APPENDIX 2

Document Control

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

Job Number	J4433

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Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
J4433A/1/F1	16 April 2021	Final	Dr Clare Beattie (Associate Director)

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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)[1] for amending or revoking AQMA orders. The professional experience of the Consultants who have undertaken the review is summarised in Appendix A1.

[1] 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.

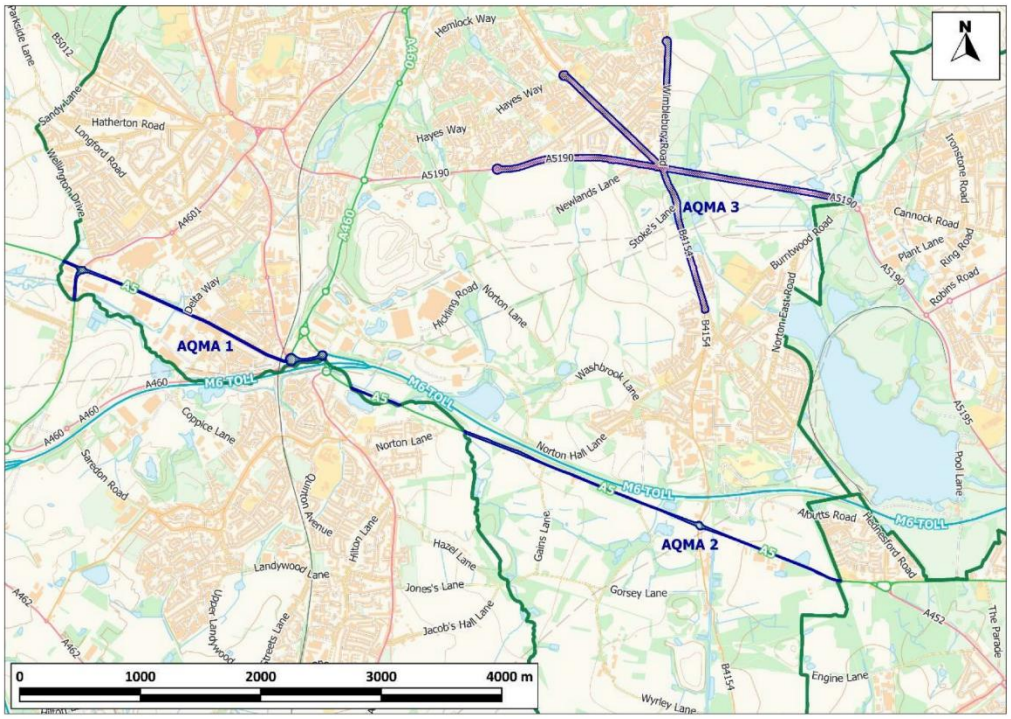

Figure 1: AQMAs in Cannock Chase District

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.

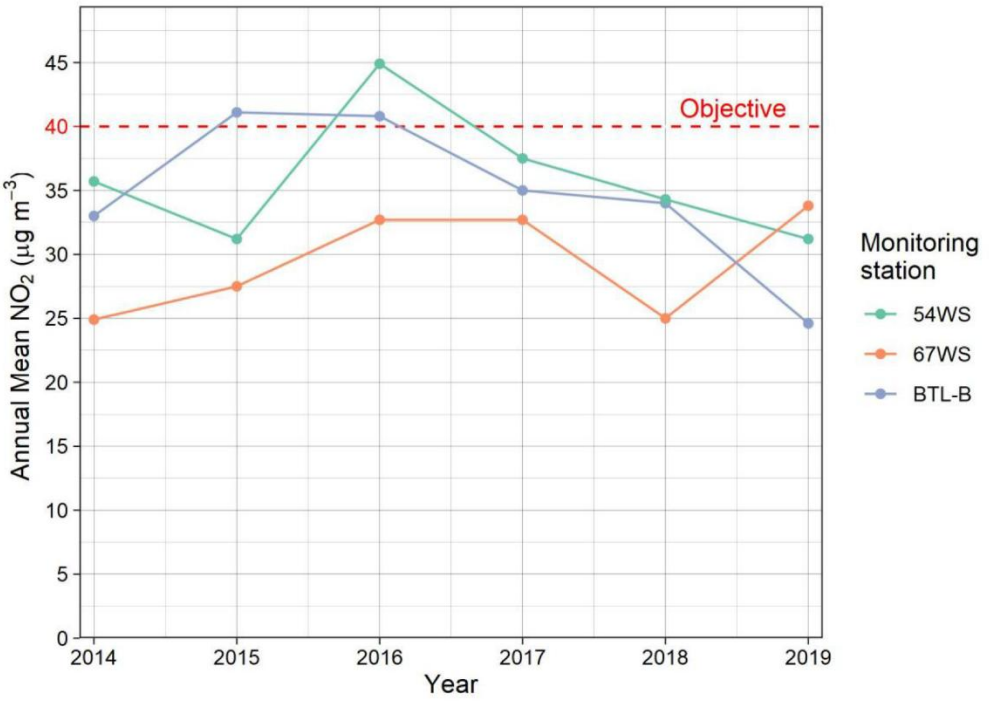

Figure 3: Annual Mean NO_2 Concentrations in Cannock Chase AQMA (AQMA 1)

Table 1: Summary of Nitrogen Dioxide Monitoring (2014-2019) in Cannock Chase AQMA (AQMA 1) (µg/m³)

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.

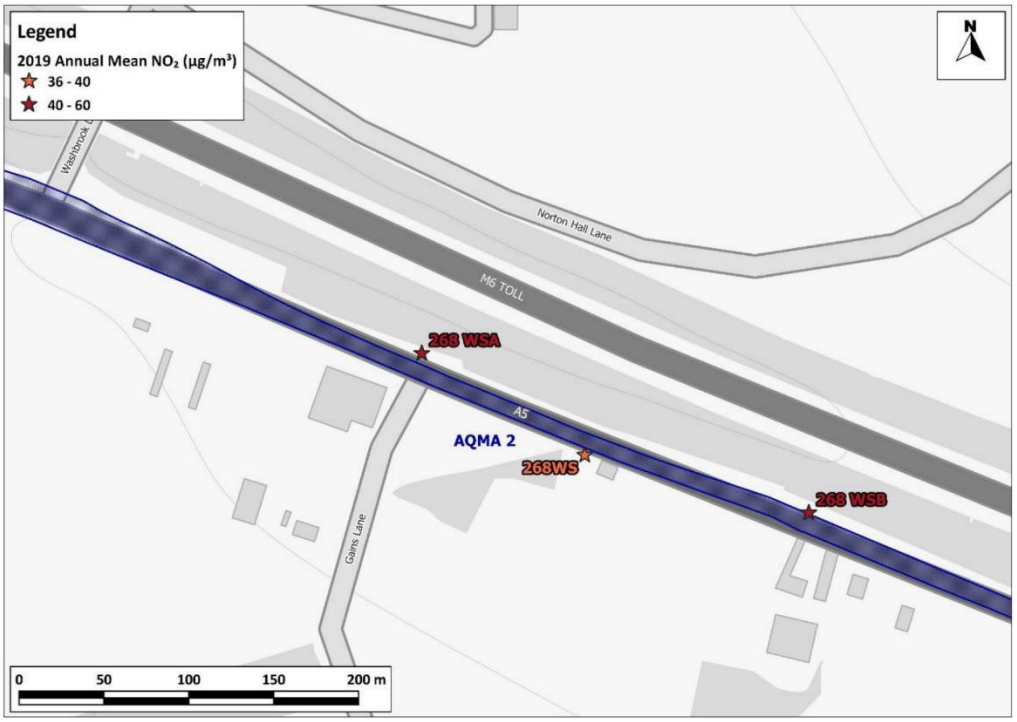

Figure 4: Air Quality Monitoring in CCDC AQMA 2

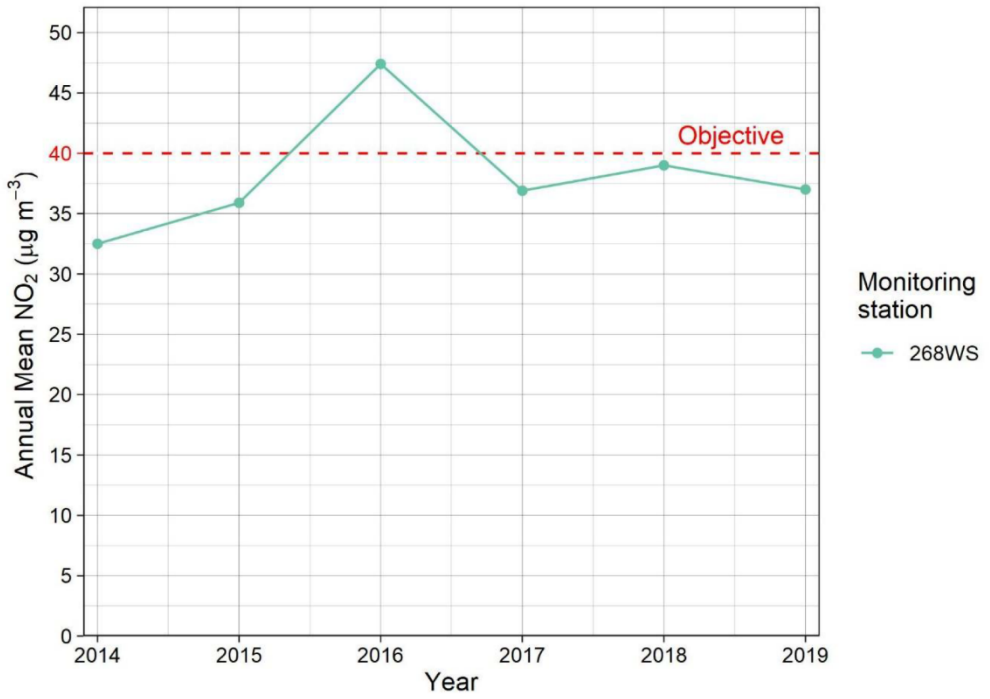

Figure 5: Annual Mean Nitrogen Dioxide Concentrations in CCDC AQMA 2

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