South Gloucestershire NO_2 Programme Air Quality Assessment including air quality data from 2024

Introduction

2018 Targeted Feasibility Study (TFS) local authorities (LAs) are LAs that were directed to implement measures to address exceedances at specific named road links as a result of their TFS work that was published in the 2018 Supplement to the Nitrogen Dioxide (NO_2) Plan. This group consists of Dudley, Reading, Sandwell, South Gloucestershire and Wolverhampton.

This report assesses NO_2 monitoring data along the directed road links throughout the calendar year (January - December) 2024. Its purpose is to inform South Gloucestershire LA whether exceedances of the limit value for annual mean NO_2 at valid locations have been observed in 2024.

The assessment considers the locally available diffusion tube and continuous analyser data and includes UK Urban NO_2 Network (UUNN) monitoring locations and Automatic Urban and Rural Network (AURN) stations where this monitoring is available.

If an LA has no exceedances of the NO_2 limit value of 40 µg/m^3 registered by monitors in valid locations, along the LA's directed road links, that LA will be said to 'have achieved success' and will pass this assessment.

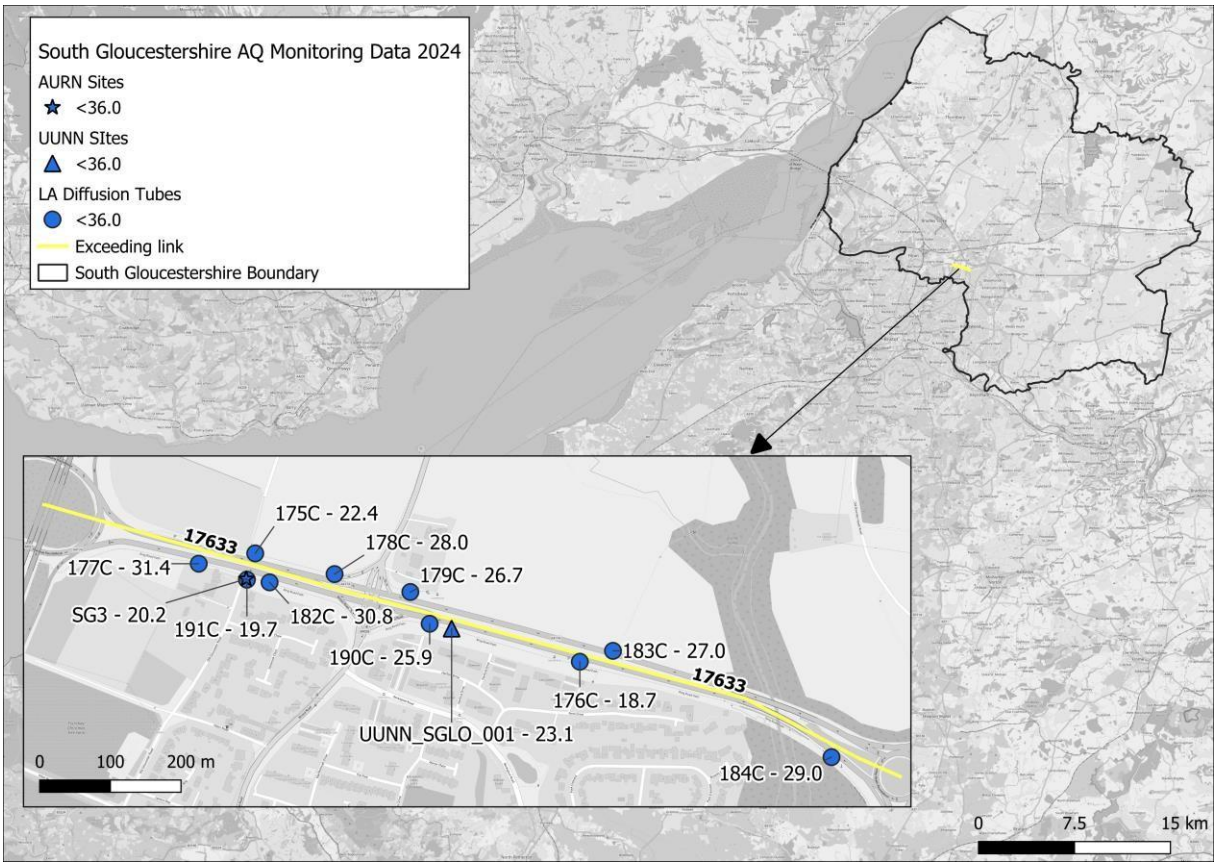
An LA must demonstrate that they have achieved success in two consecutive years (over the course of two reporting periods), before they can be said to "have maintained success" and be ready to exit the NO_2 Programme.

Directed Measures for South Gloucestershire

Table 1: Measures identified in the 2018 Supplement to the NO_2 Plan

LA	Location (Census ID)	Measure	Predicted year of success	Target Measure Implementation Date	Actual Measure Implementation Date
South Gloucestershire Council	17633	Traffic management measures	2019	31/08/2019	11/08/2019

Figure 1: Map indicating the location of the directed road link in South Gloucestershire with associated monitoring locations in 2024, labelled with the annual average NO_2 concentrations in µg/m³. *Note: diffusion tube 191C is co-located with Local Authority analyser SG3.*



Executive Summary

South Gloucestershire LA has **passed** the assessment for 2024.

- In 2024, there were **0 exceedances** observed at valid locations that are located along the directed road link. These monitors are deployed and owned by South Gloucestershire Council.
- There were **0 exceedances** observed on the UUNN (reporting 23.1µg/m^3 in 2024)
- There is 1 LA owned automatic analyser located on the directed road link 17633 where **0 exceedances** were observed (reporting 20.20 µg/m^3 in 2024).

The 2024 findings have been assessed for uncertainty, and the risk of exceedance next year can be found in **Annex A** and are summarised below:

- Findings have been ranked as having a **LOW** level of associated uncertainty. This is due to the annual mean concentrations being recorded in triplicate and several primary tubes giving good coverage of the directed road link.
- The risk of exceedance in the following year is ranked as **LOW.** The main contributing factors to this are:
    - There are no sites categorised as "exceeding" or "at risk" (within 10% of the limit value) in 2024.
    - Transport data shows traffic volume is above pre-covid levels but with accelerated fleet compliance resulting from near-by CAZ, headroom analysis indicates that traffic increases are unlikely to increase sufficiently to cause an exceedance (see **Annex C** for detail).

All monitoring sites which meet the Air Quality Standards Regulations 2010 (AQSR) siting criteria and data capture requirements are valid locations. Where these are not available along the directed road links in the LA, results from other monitoring sites which do not meet these criteria may be considered as valid locations subject to certain requirements. This ensures that the assessment is based on the best available evidence. See **Annex B for details on assessment criteria.**

A summary of the findings is presented in **Table 2** below.

Table 2: Summary of LA Success in 2024

Year	Success Achieved?	Details	Next Steps
2024	The LA has achieved success in 2023 and maintained this success in 2024.	0 primary/secondary/ tertiary exceedances. 0 primary "at risk" sites.	Exit

Actions

The LA is requested to undertake the following evidence-related actions:

- Exit from the TFS study.
- Required: South Gloucestershire to continue to report on their air quality as per LAQM requirements. This will capture any change in air quality following any future removal of measures in Table 1.

Results

Exceeding Locations

- No exceeding monitoring sites have been recorded in 2024.
- No exceedances have been reported on the UUNN along the directed link in 2024.
- No exceedances have been reported on the LA owned automatic analyser in 2024.

'At Risk' Locations

No monitoring locations have been identified as being 'At Risk' of recording an exceedance in future years in 2024.

Monitoring locations are identified as being 'At Risk' of recording an exceedance in future years if they meet this criterion:

- 2024 annual average within 10% of the limit value: given measurement uncertainty and year on year variations which would be expected due to factors such as meteorology, there is a reasonable chance of these exceeding the following year.

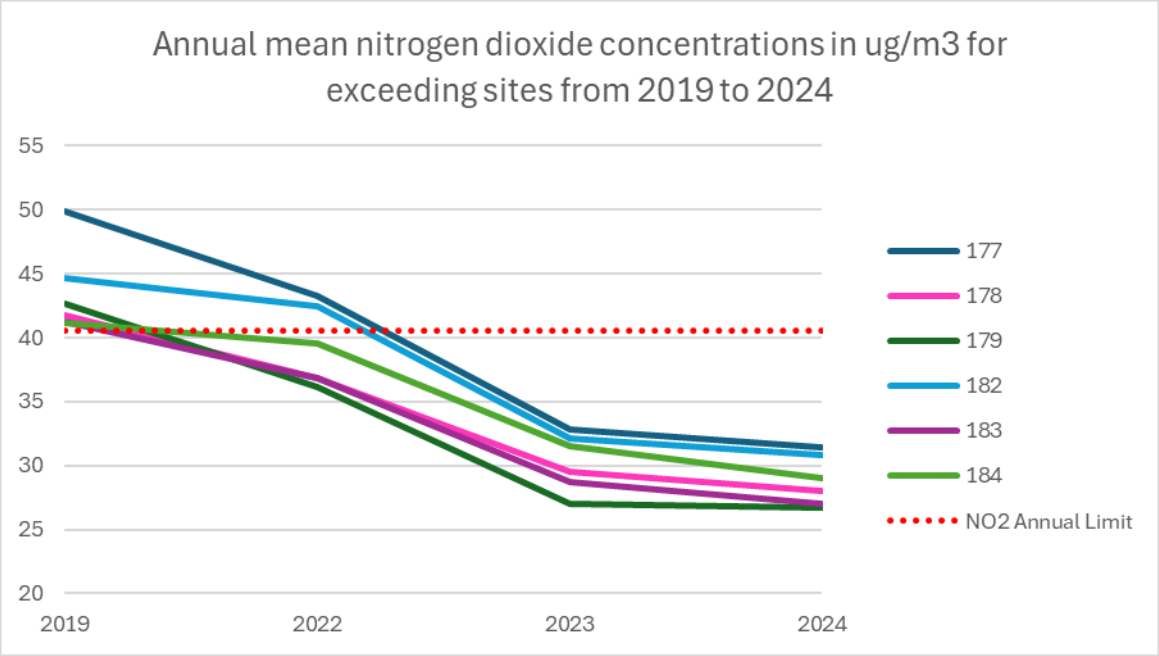
JAQU recommends the LA keeps "at risk" sites under close observation. The average annual mean nitrogen dioxide (NO_2) levels at both "exceeding" and "at risk" sites have shown a consistent downward trend from 2019 to 2024[1]. All monitoring tubes have recorded compliant levels - below the "at-risk" threshold - for the past two years (2023 and 2024). Between 2019 and 2024, annual mean NO_2 levels at continuously monitored sites fell by 29–37%. The highest concentration, 31.4 µg/m³ at site 177C, was 22.5% below the limit value of 40.5 µg/m³ (see **Figure 2**).

Additionally, transport data suggests that improvements in fleet composition - likely due to the implementation of Bristol's nearby Clean Air Zone (CAZ)-make it unlikely that NO_2 levels will exceed the limit in 2025.

Given this evidence, the risk of future exceedance is categorised as **LOW.**

[1] if 2020 and 2021 are excluded as COVID-19 pandemic impacted years.

Figure 2: Trend in annual mean NO_2 concentrations for exceeding sites from 2019 to 2024 in µg/m³.
Highest NO_2 concentration reported in 2024 for sites that have previously exceeded is below the limit value at 31.4µg/m³.



Discussion

In 2024, no sites were reported as exceeding nitrogen dioxide (NO_2) limits or being at risk of doing so. The LA has demonstrated two consecutive years of compliance along the directed link (17633), and available evidence indicates that the risk of non-compliance in 2025 is **LOW.** On this basis, the LA is considered eligible to exit.

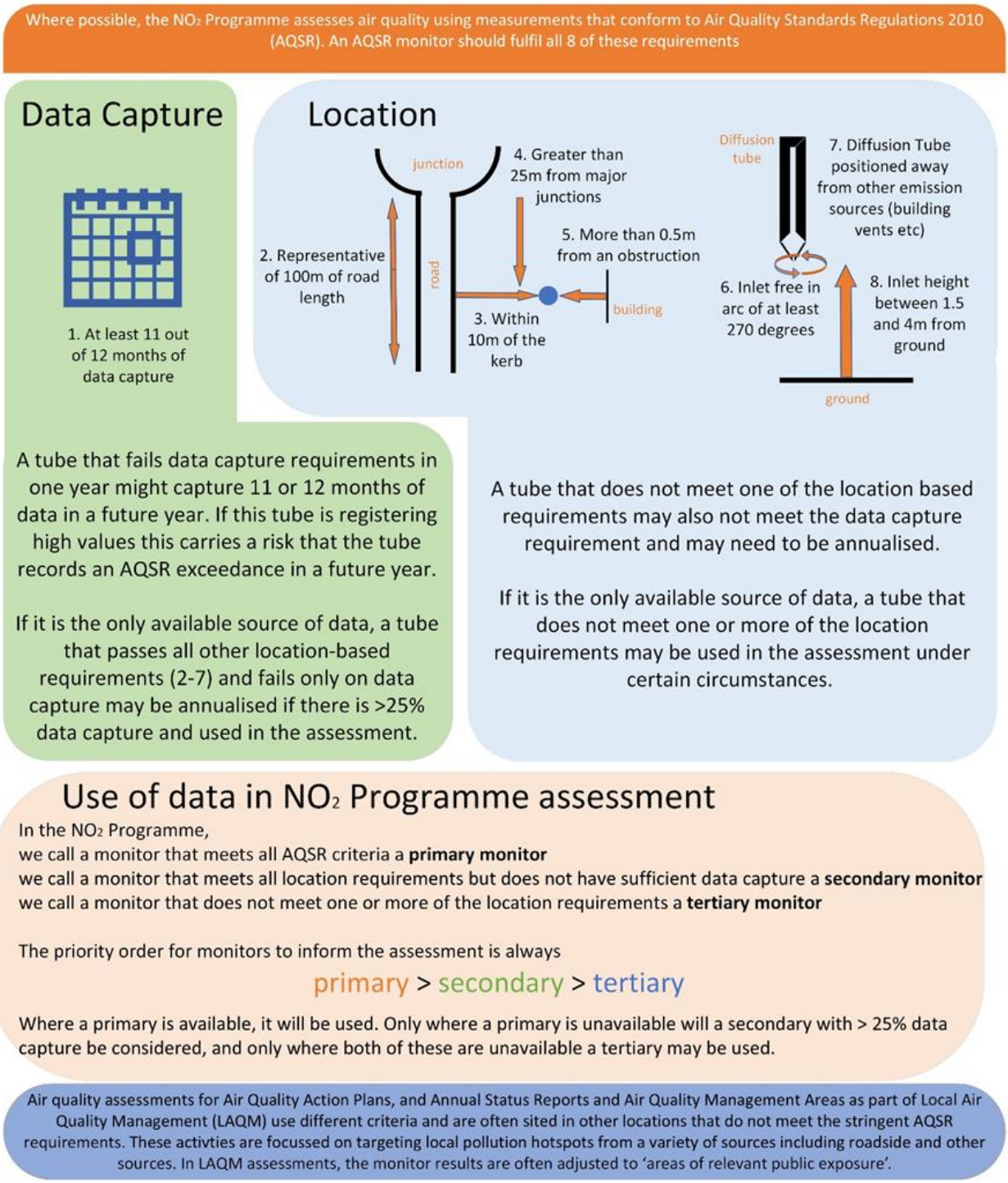
South Gloucestershire has not made a final decision regarding the removal of its Targeted Feasibility Study (TFS) measures and there is uncertainty about the timelines for measure removal and other codependent road works. After a review of the traffic and NO_2 monitoring results trends it was decided that a modelling study is not proportionate in this case. The LA is requested to submit monitoring data following the removal of the measure in the event that this does go ahead.

Annex A: Detail on the Risk and Uncertainty Assessment Matrix

Factor	Evidence	Rating
RISK		
Exceeding locations	None	LOW
At-risk Locations	None	LOW
Modelled measured comparison	N/A	N/A
Meteorology	N/A	N/A
Transport	• Traffic flows are following national patterns with manual counts near the exceeding link showing traffic volumes are above pre-COVID levels. • Exceedance link may see continued traffic increases but improved fleet compliance as a result of near-by Bristol CAZ should mitigate air quality impacts. • Headroom analysis shows traffic would need to increase by 10% to cause exceedance, annual increase is 3-4% so this is deemed unlikely.	LOW
Behavioural Change	N/A	N/A
UNCERTAINTY		
Exceeding locations	None	LOW
At-risk Locations	None	LOW
Secondary Locations	None	LOW
Tertiary Locations	None included in assessment	LOW
Monitoring data availability	• All sites are primary at key locations and are in triplicate	LOW

Annex B: AQSR requirements and NO_2 Programme assessment

Figure 3: AQSR requirements summary and NO_2 Programme Assessment.
See NO_2 Programme local plan assessment and AQSR & LAQM regime difference for more information.



Monitoring locations in the LA have been separated into three categories based on whether the monitor conforms to these AQSR requirements, shown in **Table 3**. All primary monitors in the geographical scope of the LAs Clean Air Plan will be considered in the state assessments and inform the result. JAQU will check that monitoring is available on key road links, defined as:

- Locations where an exceedance was modelled in the Local NO_2 Plan Without Measures Scenario, for the year when success with measures was predicted.
- Locations where an exceedance has been measured (by monitoring of any category) in the year of assessment.

In these locations, where there are multiple monitors available that report on the same stretch of road, the following priority order is used:

Primary > Secondary > Tertiary

Where available, a primary monitor always takes priority. Where a primary measurement is not available, a secondary measurement will be considered (if available) after being annualised provided that secondary monitor has greater than 25% data capture rate. If neither of these measurements are available, a measurement from a tertiary monitor may be used to inform the assessment outcome for a key road link. Secondary and tertiary monitoring outside of the key road links are not considered in the state assessment.

If sites of the same classification are co-located, the most accurate measurement is used to inform the assessment outcome for a key road link.

Table 3: Categories for monitoring locations

Category	Definition	Usage in assessment
Primary	Any monitoring point that meets all AQSR criteria for assessment location and data capture.	Always considered in state assessments. Where these are present, they take priority for assessment outcome over other monitor categories.
Secondary	Any monitoring point that does not meet the AQSR criteria for data capture, but that does meet all location- based AQSR requirements.	Only considered if on a key road link where there is no primary monitoring available. Provided there is greater than 25% (3 months) of data capture, these monitors can be annualised and used in state assessments if there is no primary monitor available. However, doing so introduces additional uncertainty that will be recognised in the assessment.

Category	Definition	Usage in assessment
		JAQU requires that measurements at these locations must be reported in the following year.
Tertiary	Any monitoring point that does not meet one or more of the location-based AQSR criteria.	Only considered if on a key road link where there is no primary or secondary monitoring available. Use of tertiary monitoring is subject to certain requirements and doing so introduces additional uncertainty that will be recognised in the assessment. The location of any exceedances in this category should be verified in person to confirm that the reported locations are accurate.

When secondary measurements are considered in the assessment, the results are first annualised. Tertiary measurements are only used when primary or secondary measurements are unavailable on key road links. Modelling has been carried out to quantify the impacts on measured NO_2 concentrations where location AQSR criteria are not met, allowing for consideration of tertiary measurements within state assessments in certain cases by accounting for these impacts. Where modelling has indicated significant positive or negative mean impacts on measured NO_2 concentrations, a 'tolerance limit value' is calculated. This is applicable only for the AQSR criteria: 'distance to obstruction', 'height of diffusion tube', and 'representative of at least a 100m stretch of road'. Measured concentrations at sites which do not meet AQSR criteria for these reasons are compared to the tolerance limit value which provides analytical context to indicate if a similar site meeting all location AQSR criteria would exceed the annual mean limit value.

A 'tolerance limit value' is not calculated for measured concentrations at sites which do not meet other location AQSR criteria, details on how these are approached are shown in **Table 4**. To account for variability in the modelled impacts, a range is calculated and applied to measured values at tertiary sites, shown in **Table 4**. This represents the additional uncertainty introduced due to the use of tertiary measurements.

Example for a tertiary measurement not meeting '≥0.5 m from an obstruction' criterion, with a measured concentration of 41.5 µg/m^3:

- Modelling shows mean impact for <0.5 m to an obstruction is +2.5 µg/m^3.
- Mean impact + annual mean limit value = tolerance limit value: 40.5 + 2.5 = 43.0 µg/m^3.
- Variation from mean impact for this criterion is -0.3; +0.4.
- Applied to measured value to determine variability range: 41.5 – 0.3 = 41.2 µg/m^3, 41.5 + 0.4 = 41.9 µg/m^3.
- Range is fully below tolerance limit value; site is not considered as an exceedance.

A summary of how each locational factor is accounted for is shown in **Table 4**. These values have been updated based on the most recent modelling conducted in 2025. Certain situations and combinations of AQSR criteria not being met cannot be accounted for with this method, and results from such monitors will not be considered in the state assessments.

Table 4: Use of tertiary measurements

Failure Criteria	Tolerance Limit Value (µg/m³)	Lower Range of Measurement (µg/m³)	Upper Range of Measurement (µg/m³)
Distance to Obstruction [significant impact]	43.0	-0.3	+0.4
Height (applied per 1m) [significant impact]	41.6 (1m too low) 39.4 (1m too high)	-0.8	+0.8
Representative of 100m [significant impact]	40.9	-0.2	+0.4
Distance to Major Junction [no significant impact]	Not calculated: annual mean limit value of 40.5 applied.	-2.8	+2.6
Free Inlet	Tolerance limit value and range not calculated: analysis indicates this is linked to distance to obstruction.		
Distance to Kerb >10m	Tolerance limit value and range not calculated: not sufficient data available within the model on monitoring locations >10m from the kerb to quantify impacts.		
Close to other Emission Sources	Measurement is not used: unlikely to be measuring roadside emissions.		

Annex C: Transport

Local Traffic Data Assessment

As per DfT road traffic statistics, overall traffic in the UK has been increasing post COVID. Review of annual traffic stats shows that for South Gloucestershire as a whole traffic is following the national trend with a drop in 2020 traffic due to COVID-19 but traffic profile in the following years shows a gradual increase, surpassing pre-COVID traffic levels since 2021.

Exceedance link traffic

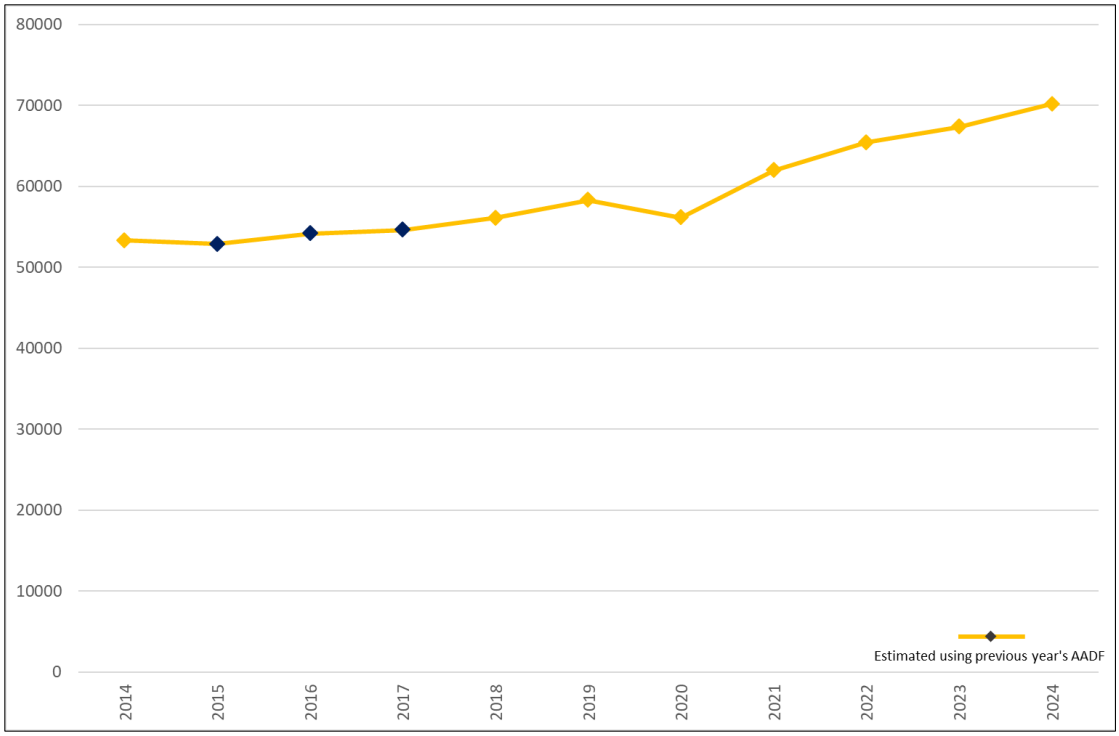
The two permanent automated traffic counters (ATCs) installed on the exceedance link have not been operational since 2022 therefore no site-specific traffic data was available for this assessment.

Review of DfT's manual count point data for the exceedance link (site ID 17633), including bidirectional data, indicates an increasing traffic trend, with the expected impact of COVID in 2020. Since 2021, traffic levels at the exceedance link have exceeded pre-COVID levels, mirroring both national and overall SG trends. See **Figure 4** and **Figure 5**.

While no bespoke ANPR surveys were conducted for this assessment, fleet improvement on the exceedance link is expected due to Bristol CAZ. The CAZ has been operational since November 2022 and is anticipated to have accelerated the transition to compliant vehicles within the local area. The reduction in NO_2 levels can be attributed to decline in the number of polluting vehicles using the affected link for journeys to/from central Bristol via the M32 junction.

Figure 4: Locations of DfT Road Traffic Statistics Manual Count points near exceedance location

Figure 5: DfT – Average Annual Daily flow (AADF) on A4174 - Road traffic Statistics 2014-2024



Headroom analysis

Headroom analysis indicates traffic would need to increase by 10% in order to exceed in the future. With a typical annual traffic growth increase of 3-4% this is deemed unlikely to occur in the near future[2]. Steady decreases in NO_2 concentration during this period increase the confidence that this threshold is unlikely to be breached due to standard traffic growth.

[2] This increase is deemed unlikely to occur with the assumption that there is an absence of significant changes to traffic patterns, road layout or changes to the surrounding land-use.