Stoke-on-Trent City Council

City of
Stoke-on-Trent

2018 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management

June 2018

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Stoke-on-Trent City Council

REPORT SIGN OFF SHEET

City of
Stoke-on-Trent

Report Title	2018 Air Quality Annual Status Report
Prepared by	Public Protection
Endorsement	Monitoring and managing air quality remains a priority for Stoke-on-Trent City Council. Identifying problem areas and ensuring that actions are taken to improve air quality forms an important element in protecting the health and wellbeing of our residents and we are committed to an ongoing programme to deliver improvements where they are needed.
Approved for submission to Defra by	Martyn Brindley Strategic Manager Public Protection Stoke-on-Trent City Council **Signature:** M. Brindley **Date: 22/8/18**

Executive Summary: Air Quality in Our Area

Air Quality in Stoke-on-Trent

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 and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

The main pollutant of concern in Stoke-on-Trent is nitrogen dioxide (NO_2). High concentrations of NO_2 are associated with busy, congested roads. In 2017, we monitored NO_2 at 70 locations throughout the city. Most of the monitoring locations are at, or close to, residential properties next to busy roads and road junctions. There continues to be a steady downward trend in concentrations of NO_2 in all of the areas where we monitor, with the exception of one site, DT17 at Basford, where the trend in concentration is unchanged. Monitoring at this location is carried out where Etruria Road enters a steep-sided cutting with trees that form a canopy over the road, which together may inhibit dispersal of pollutants.

The current Stoke-on-Trent Air Quality Management Area (AQMA) covers the whole of the city. A copy of the AQMA order can be found online here.

In our 2017 report, we said that we intended to work towards revoking the current city-wide AQMA and to declare discrete AQMAs in specific areas where an objective is exceeded. However, after further consideration we now plan to keep the designated AQMA and concentrate on action planning to improve air quality both city-wide and in discrete areas of exceedance.

Unfortunately, progress in action planning has been slower than anticipated. This is partly due to departmental reorganisation and a reduction in staff numbers. In addition, the council has responded to a Ministerial Direction to complete a Feasibility

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

Study to investigate actions to reduce NO_2 where Defra's Pollution Climate Mapping (PCM) model indicated an exceedance of the EU limit value. The area for the exceedance, Etruria Road (A53) between the A500 and Festival Park roundabouts has no residential properties close to the road and so the UK Air Quality Objective (UK AQO) was not exceeded. The study was submitted to Defra by the deadline date of 31 July 2018.

Preliminary discussions between some members of the Stoke-on-Trent Air Quality Strategy Group, made up of representatives from colleagues within the council, neighbouring local authorities, relevant highways authorities and other interested groups, have started, but further work on the options for action planning to provide a holistic approach to targeted air quality improvement is still needed. Our planning will give priority to actions aimed at reducing NO_2 in the areas with the highest concentrations and greatest number of affected residents.

We are continuing to work towards improving air quality and ensuring that residents are not subject to additional pollution sources by liaising with colleagues within the planning and highways departments of the council. We comment on planning applications with regard to air quality, alerting planners if we a have any concerns that a development may result in air quality which may be harmful to health.

Actions to Improve Air Quality

The review of our current action plan has been slower than anticipated for the reasons stated above and regrettably we have made little progress since the last report.

Conclusions and Priorities

As the AQMA is city-wide, all exceedances of the objective in 2017 have occurred within the AQMA.

Our priorities for 2018/19 are to work on formulating a new air quality action plan (AQAP).

Local Engagement and How to get Involved

We will invite representatives from residents' groups and other community groups to take part in the preparation of the AQAP.

In the past we have attempted to engage with the public by sending out questionnaires, but the response was very poor. Going forward, we intend to make best use of digital resources and social media platforms to encourage more engagement. Comments from representatives of community groups or residents associations in the hot-spot areas are always welcome and are encouraged to take part in our consultation exercises, by contacting:

Public Protection

Stoke-on-Trent City Council

Albion Street

Stoke-on-Trent

ST1 1QL

public.protection@stoke.gov.uk

We all have a part to play in helping to improve air quality by:

- avoiding using the car, especially for short journeys
- walking
- cycling http://www.mapmyride.com/gb/stoke-on-trent-eng/
- using public transport https://www.firstgroup.com/potteries/plan-journey/timetables/?operator=21&page=1&redirect=no
- sharing a lift

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1 Local Air Quality Management

This report provides an overview of air quality in Stoke-on-Trent during 2017. 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 or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Stoke-on-Trent City Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of the AQMA declared by Stoke-on-Trent City Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://www.stoke.gov.uk/site/scripts/google_results.php?q=AQMA – see full list at http://uk-air.defra.gov.uk/aqma/list. Alternatively, see Appendix D: Maps of Monitoring Locations and AQMA, which provides for maps of air quality monitoring locations in relation to the AQMA.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)				Action Plan		
						At Declaration		Now		Name	Date of Publication	Link
Stoke-on-Trent Air Quality Management Area 2011	Declared 04/04/2006	NO2 Annual Mean	Stoke-on-Trent	An area encompassing the whole of the city	YES	52	µg/m³	67	µg/m³	Stoke-on-Trent City-wide AQAP	2014	https://www.stoke.gov.uk/downloads/file/64/city_aqap_2014pdf.
Stoke-on-Trent Air Quality Management Area 2011	Amended 09/05/11	NO2 1 Hour Mean	Stoke-on-Trent	An area encompassing the whole of the city	YES	52	µg/m³	67	µg/m³	Stoke-on-Trent City-wide AQAP	2014	https://www.stoke.gov.uk/downloads/file/64/city_aqap_2014pdf.

☒ **Stoke-on-Trent City Council confirm the information on UK-Air regarding their AQMA(s) is up to date**

2.2 Progress and Impact of Measures to address Air Quality in Stoke-on-Trent

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

- *On the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources and pollutants, with the provisos listed in the commentary below.*
- *Following the completion of this report, Stoke on Trent City Council should submit an Annual Status Report in 2018.*

Stoke-on-Trent City Council has taken forward a number of direct measures during the current reporting year of 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More detail on these measures can be found in the Action Plan and the Local Transport Plan. Key completed measures are:

- AQ10 Vehicle fleet efficiency – a total of 4904, mainly freight vehicles operating throughout the Staffordshire area. No additional funding has been available to extend the programme beyond March 2017.
- AQ1 UTC, congestion management.
- AQ7b Parking restrictions outside schools - promoting travel alternatives have continued throughout 2017.

Stoke-on-Trent City Council expects the following measures to be completed over the course of the next reporting year:

- AQ5a Phase 2 & Phase 3 Promoting alternative travel
- HDS1 Real-time bus information service.

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

- HSD6 Leek Road corridor improvements - UTC, congestion management. This project has currently been put on hold.
- HBE1 Community Rail Partnership - Rail Industry timescales and constraints lead to long lead in time for requested service improvements.

- HBE2 Concessionary Bus Pass Scheme - reducing bus network = reduced opportunities for bus travel for pass holders - could lead to more private car/taxi trips.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Stoke-on-Trent City Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of the Stoke-on-Trent City-wide AQMA.

In the 2017 ASR we reported that we had plans to revoke the city-wide AQMA and declare discrete AQMAs in exceedance area. However, after reviewing the process, it was considered that this would delay production of action plans considerably. Therefore, we now plan to retain the existing AQMA and concentrate on producing an updated AQAP which will look at air quality both city-wide and in the discrete hot-spot areas.

Progress on this has been slow, due to Public Protection and Transportation departmental reorganisations and staff changes. We were also required to respond to the Ministerial Direction issued to the council to produce a Feasibility Study of measures to reduce concentrations of nitrogen dioxide (NO_2) on the A53, Etruria Road where the PCM model had indicated an exceedance of the NO_2 EU limit value. This involved officer time had that had not been scheduled, thereby causing delays in LAQM duties, including progress in action planning. We completed the Feasibility Study and submitted it by the deadline date of 31 July 2018.

We plan to prioritise a review of the AQAP, and hope to include some of the measures put forward in the Feasibility Study, subject to being accepted by Defra and the necessary funding to implement them being available.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
AQ10	Staffordshire ECO Stars Fleet Recognition Scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Stoke-on-Trent CC, Newcastle-under-Lyme BC, Stafford BC, Staffordshire Moorlands BC, Cannock Chase DC, Lichfield DC, East Staffordshire BC, South Staffordshire DC, Defra AQ Grant	2014	2015-16	Reduced emissions	Expected emission reduction 7 tonne NOx/yr, 2.22 tonne PM_{10}/yr, 11615 tonne CO2/yr	PROGRAMME COMPLETE	31/03/2017	Initial funding ended March 2017. Additional funding needed to extend membership of the scheme after March 2017.
AQ8	Stoking Employment in North Staffordshire	Promoting Travel Alternatives	Workplace Travel Planning	Partnership with Staffordshire County Council and NS Chamber of Commerce: Local Sustainable Transport Fund	2011/12	2012-15	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Calculated Annual NOx Reductions 17,750 kg/yr	PROGRAMME COMPLETED	2016	NA
AQ5a	Station Gateway (Phase 1), University Quarter (Phase 2) and Uni Boulevard (Phase 3)	Promoting Travel Alternatives	Promote use of rail and inland waterways	LA lead and City Council Capital funding and Local Growth Deal funding	2014/15	Unknown	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Calculated Annual NOx Reductions 480 kg/yr	Proposals being assessed as part of the current City Centre Access Study	2017/18	Phase 1 completed 2012. Phase 2 being progressed.
AQ5b	Leek Road Traffic Management Improvements	Traffic Management	UTC, Congestion management, traffic reduction	LA lead and City Council Capital funding and Local Growth Deal funding	2014/15	2015 - 2017	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Calculated Annual NOx Reductions 480 kg/yr	Proposals being assessed as part of the current City Centre Access Study	2017/18	Phase 1 completed 2016. Phase 2 being progressed.

AQ2	Cobridge Traffic Management Improvements (including Waterloo Road Corridor)	Traffic Management	UTC, Congestion management, traffic reduction	LA lead and funding source	2011/12	2012/13	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Calculated Annual NOx Reductions 389 kg/yr	Scheme completed	NA	NA
AQ4a	Lichfield Street Improvements	Transport Planning and Infrastructure	Bus route improvements	LA lead and funded: Local Transport Plan Capital Programme	2013/14	Unknown	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Calculated Annual NOx Reductions 322 kg/yr	Proposals being assessed as part of the current City Centre Access Study	Unknown	
AQ4b	Leek Road / Victoria Road Junction - Safety Scheme	Promoting Travel Alternatives	Promotion of walking	LA lead and funding source	2013/15	Unknown		Calculated Annual NOx Reductions 321 kg/yr	Proposals being assessed as part of the current City Centre Access Study	Unknown	
AQ1	Burslem Town Centre Traffic Management Improvements	Traffic Management	UTC, Congestion management, traffic reduction	LA lead and funding source	2013/14	2014-2017	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Calculated Annual NOx Reductions 299 kg/yr	Preliminary design	Completion expected Spring 2018	Phases 1 & 2 complete. Phase 3 completion expected Spring 2018
AQ3	Victoria Road Corridor Improvements	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high	LA lead and funding source	2011/12	2012/13	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Calculated Annual NOx Reductions 297 kg/yr	Scheme completed	NA	NA

			vehicle occupancy lane								
AQ7a	Parking restrictions outside schools	Promoting Travel Alternatives	School Travel Plans	LA lead and funding source	2011/12	2012-14	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Calculated Annual NOx Reductions 272 kg/yr	Scheme completed	NA	NA
AQ7b	Walk to School Outreach–Living Streets	Promoting Travel Alternatives	School Travel Plans	Living Streets and local authority consortium: Local Sustainable Transport Fund	2011/12	2012-15	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Calculated Annual NOx Reductions 272 kg/yr	Programme in Delivery	Programme extended to 31/3/2020 through DfT Access Fund	Relaxation of catchment areas = longer distances travelled = impact on walking
AQ7c	Access to Education - Sustrans	Promoting Travel Alternatives	School Travel Plans	Sustrans and local authority consortium: Local Sustainable Transport Fund	2011/12	2012-15	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Calculated Annual NOx Reductions 272 kg/yr	PROGRAMME COMPLETED	2016	NA
AQ4c	City Road Corridor Improvements	Promoting Travel Alternatives	Promotion of cycling	LA lead and funding source	2014/15	2015/16	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Calculated Annual NOx Reductions 266 kg/yr	Preliminary discussions	31/12/2016	
AQ9	Clean Air Grant	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV		2012	2013/14	Improved journey times. Improved mode share of journey. Improved average	Calculated Annual NOx Reductions 57 kg/yr	In Delivery as per progress reports Project Reference 2622012	NA	NA

			recharging, Gas fuel recharging				congestion (miles/minute)				
AQ6	Victoria Street / Shelton New Road Junction Improvement	Promoting Travel Alternatives	Promotion of walking	LA lead and funding source	2011/12	2012/13	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Calculated Annual NOx Reductions 21 kg/yr	Scheme completed	NA	NA
HDS1	Real Time Bus Information	Promoting Travel Alternatives	Other	In partnership with First Potteries and D&G Bus: Local Transport Plan Capital Programme	2017/18	2017/18	Improved journey times. Improved mode share of journey.	Not calculated	New bus operator ticket machines will enable this project to be re-started	31/03/2019	System compatability; procurement processes; agreemnt on sharing of running costs with operators
HDS2	Improved Access to Health and Leisure facilities	Transport Planning and Infrastructure	Other	LA lead and funding source	2015/16/17/18	2015/16/17/18	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Not calculated	Ongoing annual programme of work which will encourage walking and cycling as a means of transport to key leisure / Health destinations. Improved access to Tunstall Park now completed incl pedestrian crossing & cycling facilities and road safety measures.	Ongoing Annual Programme	
HDS3	Programme of Bus Stop Improvements	Transport Planning and Infrastructure	Bus route improvements	Local Transport Plan Capital Programme	2015/16/17/19	2015/16/17/19	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Not calculated	Delivery of 3 Bus Stop Improvements incl Real Time information screens, new bus shelters & Raised kerbs	Ongoing Annual Programme	
HDS4	Wilson Road / New Inn Lane Junction	Traffic Management	UTC, Congestion management, traffic reduction	LA lead and funding source	2015/16	2016/17	Improved journey times. Improved mode share of journey.	Not calculated	Detailed Design Complete. 3rd Party Land to be acquired	31/03/2017	

	Improvement						Improved average congestion (miles/minute)				
HDS5	Etruria Valley Major Highway & Transport Scheme	Transport Planning and Infrastructure	Other	LA lead and funding source	2013/14/15	2015/16/17/18/19	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Not calculated	Preliminary design complete	31/012/18	
HDS6	Leek Road Corridor Improvements(Growth Deal)	Traffic Management	UTC, Congestion management, traffic reduction	LA lead and City Council Capital funding and Local Growth Deal funding	2015/16	2015/16/17/18	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Modelling in progress	Outline Design and costing	31/12/2018	
HDS7	Etruria Road Corridor Improvements(Growth Deal)	Traffic Management	UTC, Congestion management, traffic reduction	LA lead and funding source	2015/16	2015/16/17/19	Improved journey times. Improved mode share of journey. Improved average congestion (miles/minute)	Not calculated	Outline Design and costing	31/01/2019	
HDS8	City Centre Ring Road (completion)	Traffic Management	Other	LA lead and funding source	2015/16/17	2017/18/19	Improved journey times. Improved average congestion (miles/minute)	Not calculated	Feasibility, outline design, initial costing	31/12/2019	
HDS9	Arbourfield Drive / Dividy Rd Junction Improvement	Transport Planning and Infrastructure	Other	LA lead and funding source	2013/14	2014/15	Improved journey times. Improved average congestion (miles/minute)	Not calculated	Scheme under construction	31/04/2015	

HDS10	Trentham Lakes / A50 Strategic Signing	Traffic Management	UTC, Congestion management, traffic reduction	LA lead and funding source	2014/15	2015/16	Improved journey times. Improved average congestion (miles/minute)	Not calculated	Design underway	30/09/2015	
HDS11	Potteries Way / Bucknall Rd Junction Improvement	Traffic Management	UTC, Congestion management, traffic reduction	LA lead and funding source	2017/18	2018/19	Improved journey times. Improved average congestion (miles/minute)	Not calculated	Nil	31/03/2019	
HBE1	Community Rail Partnership	Promoting Travel Alternatives	Promote use of rail and inland waterways	LA lead and funding source	Commenced in 2005	ongoing	Increased use of local rail services	Not calculated	Above average passenger growth from work of partnership. Wider Stakeholder Partnership for the line also established to call for improved frequency and capacity on this East Midlands service	Ongoing – new East Midlands franchise due to start in 2018	Rail Industry timescales and constraints lead to long lead in time for requested service improvements
HBE2	Concessionary Bus Pass Scheme	Promoting Travel Alternatives	Other	LA lead and funding source	ongoing	ongoing	Maintaining use of local bus services	Not calculated	ongoing	ongoing	reducing bus network = reduced opportunities for bus travel for pass holders - could lead to more private car/taxi trips
HBE3	Home to Work Scheme	Promoting Travel Alternatives	Personalised Travel Planning	LA lead and funding source	Commenced 2011	ongoing	Number of clients assisted	Not calculated	PROGRAMME COMPLETED	Completed	
FP1	Fleet Renewal	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	LA lead and funding source	Commenced	2016/17	Reduced emissions	Not calculated	Completed 2016/17		
Sot2	Wayfinding Programme	Promoting Travel Alternatives	Promotion of walking	LA lead and funding source	2016/17	2017/18	Improved journey times. Improved mode share of journey. Improved average congestion	Not calculated	Contracts let for design and build. Community engagement progressing well.	First phase being delivered from July 2018	Delays in signs installed

							(miles/minute)				
Sot1	Participation in Rail North Association and West Midlands Rail	Promoting Travel Alternatives	Promote use of rail and inland waterways	LA lead and funding source	Commenced in 2015	ongoing	Increased use of local rail services	Not calculated	Ongoing – proposed extra Northern Sunday services from December 2018, new rolling stock late 2018. New local stations links to Birmingham to be introduced in new West Midlands franchise in December 2018.	Ongoing – extra Northern Sunday services from December 2018, new rolling stock late 2018. New West Midlands Franchise will provide new links from local stations late 2018.	Additional improvements are difficult to achieve with constrained rail network capacity

2.3 $PM_{2.5}$ – 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.

Particulate matter, or PM, is the term used to describe particles found in the air, including dust, dirt and liquid droplets. PM comes from both natural and man-made sources, including traffic emissions and Saharan-Sahel dust. These particles can be suspended in the air for long periods of time, and can travel across large distances.

PM less than 10 micrometres in diameter (PM_{10}) pose a health concern because they can be inhaled into and accumulate in the respiratory system. PM less than 2.5 micrometres in diameter ($PM_{2.5}$) are referred to as "fine" particles and are believed to pose the greatest health risks, as they can lodge deeply into the lungs and also pass into the bloodstream.

$PM_{2.5}$ is the pollutant which has the biggest impact on public health and on which the Public Health Outcomes Framework (PHOF) indicator 3.01[4] is based.

The Royal College of Physicians (RCP) undertook a review in February 2016[5] where they found that long term exposure to air pollution impairs lung function growth in children, and that outdoor exposure is linked to lung cancer in adults. Within Staffordshire it is estimated that 4.8%of all deaths can be attributed to exposure to $PM_{2.5}$, compared to 5.1% across England (40,000 deaths annually)[6]. Overall, the estimated cost to individuals and society is more than £20 billion annually for the UK.

2.3.1 Particulate Matter ($PM_{2.5}$) Levels in Staffordshire and Stoke-on-Trent

A number of the Staffordshire Authorities currently monitor locally for PM_{10}. Defra's Automatic Urban and Rural Network (AURN) site Stoke-on-Trent Centre has a

[4] Public Health Outcomes Framework 2016 – 2019 indicator 3.01 Fraction of mortality attributable to particulate air pollution https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/3/gid/1000043/pat/6/par/E12000005/ati/102/are/E10000028/iid/30101/age/230/sex/4

[5] ['Every Breath we Take: The Lifelong Impact of Air Pollution; Report of a working Party, February 2016, ISBN 978-1-86016-567-2],

[6] Mortality attributable to particulate air pollution Public Health Outcomes Framework

dedicated $PM_{2.5}$ monitor. Table 2.3 presents data on the local level of $PM_{2.5}$ annual mean concentrations for the Staffordshire Authorities. Where the data is derived from PM_{10} monitoring this has been adjusted by applying a correction factor of 0.7 to derive the $PM_{2.5}$ component. The correction factor has been derived from the average of all ratios of $PM_{2.5}/PM_{10}$ for the years from 2010 to 2014 for forty sites within the Automatic Urban and Rural Network (AURN) where these substances are measured on an hourly basis and follows the guidance published in LAQM (TG16).

Table 2.3 - Annual Mean PM_{10} and $PM_{2.5}$ results of monitoring by Staffordshire Authorities 2012 to 2017

Authority	Site Type	Monitor Location	OS Grid Ref		Year				
					2013	2014	2015	2016	2017
Newcastle under Lyme	Roadside	Queen`s Gardens	E385057	PM_{10}	22.5	22	22.9	(5)	(5)
			N346137	$PM_{2.5}$	15.75[(1)]	15.4[(1)]	16[(1)]	(5)	(5)
Cannock Chase	Roadside	Cannock A5190	E401392 N309954	PM_{10}	-	-	-	-	14
				$PM_{2.5}$	-	-	-	-	9.8
Stoke on Trent	Roadside	Basford	E386288	PM $_{10}$	-	-	-	-	23
			N346802	$PM_{2.5}$	-	-	-	-	16
	Roadside	A50 Meir Tunnel	E392548	PM $_{10}$	-	-	20[(2)]	20	18
			N342572	$PM_{2.5}$	-	-	14[(2)]	14	13
	Urban Background	Stoke on Trent Central	E388351 N347895	PM $_{2.5}$	10	10	12	12	9
	Roadside	Middleport	E385780	MP10	25	24	22	(3)	(3)
			N349376	PM2.5	18[(1)]	17[(1)]	15[(1)]	(3)	(3)
East Staffordshire	Roadside	Derby Tum	E424671 N324019	PM $_{10}$	29	31	23	(4)	(4)
				PM $_{2.5}$	20.3[(1)]	21.7[(1)]	16.1[(1)]	(4)	(4)

Notes: [(1)]$PM_{2.5}$ results are derived from PM_{10} monitored results corrected with a 0.7 correction factor in accordance with TG16 – Annex B: Derivation of $PM_{2.5}$ to PM_{10} Ratio. All other results are directly monitored.
[(2)] Valid data capture for 2015 was 59%. The site was commissioned on 22 May 2015.
(3) Middleport monitor was decommissioned at the end 2015
(4) East Staffordshire`s monitors were decommissioned 2016
(5) Newcastle under Lyme monitors were Decommissioned 2016

As can be seen from the results, concentrations of $PM_{2.5}$ within the Staffordshire Authorities are below the 2020 EU limit value of 25µg/m³.

2.3.2 $PM_{2.5}$ and Mortality in Staffordshire & Stoke-on-Trent

Although the levels of $PM_{2.5}$ within the County and City of Stoke on Trent are 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 within Staffordshire and Stoke-on-Trent. This is revealed in data obtained from Public Health England used to inform Public Health Outcomes Framework indicator 3.01[7] as shown in Table 2.5.

The percentage estimated number of deaths attributable to $PM_{2.5}$ in adults over 30 has been translated into the estimated number of attributable deaths for each local authority area within Staffordshire, and are shown in Table 2.4. The data presented to 2013 is the latest data available at time of publication of this report. Approximately 5% of deaths within the County can be attributed to $PM_{2.5}$.

Table 2.4 - Estimated number of deaths by local authority area attributable to $PM_{2.5}$ within Staffordshire for adults over 2012 to 2016

District/County	Percentage
Newcastle-under-Lyme	4.7%
Stafford	4.8%
East Staffordshire	5.1%
South Staffordshire	4.9%
Lichfield	5.1%
Staffordshire Moorlands	4.4%
Cannock Chase	5.0%
Tamworth	5.4%
Stoke on Trent	4.9%
Staffordshire County	4.9%
England	5.2%

[7] Estimated number of deaths by local authority area attributable to PM2.5 within Staffordshire for adults over 2012 to 2016 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/520457/At_a_glance.pdf

Table 2.5 - Public Health Outcomes Framework Indicator 3.01- Fraction of annual all cause adult mortality attributable to anthropogenic (human made) particulate air pollution (measured as fine particulate matter, $PM_{2.5}$) for Staffordshire Authorities 2012 to 2016[8]

Estimated numbers of annual all-cause adult mortality attributable to anthropogenic (human-made) particulate air pollution (measured as fine particulate matter, $PM_{2.5}$*) for Staffordshire 2012 to 2016[8]
*** Fraction of annual all-cause adult mortality attributable to anthropogenic (human-made) particulate air pollution (measured as fine particulate matter, $PM_{2.5}$*)**

	2012			2013			2014			2015			2016		
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	Deaths - all causes persons 30+	%*	Estimated attributable deaths	Deaths - all causes persons 30+	%*	Estimated attributable deaths
Newcastle-under-Lyme	1218	4.6	60	1295	4.9	60	55	4.7	60	55	4.2	50	1291	4.7	60
Stafford	1195	4.6	50	1261	4.9	60	65	4.8	60	60	4.7	60	1254	4.8	60
East Staffordshire	966	4.8	60	1097	5.1	60	55	5.1	50	55	4.8	50	1065	5.6	60
South Staffordshire	1162	4.8	60	1102	5.1	60	55	5	50	55	4.7	60	1128	5.1	60
Lichfield	953	5	50	1050	5.1	50	50	5	50	50	4.6	50	1044	5.5	60
Staffordshire Moorlands	1020	4.2	40	1085	4.7	50	45	4.5	50	45	4	40	1110	4.6	50
Cannock Chase	844	4.8	40	787	5.1	40	45	5.1	40	45	4.6	40	879	5.4	50
Tamworth	553	5.2	30	592	5.5	30	35	5.4	30	30		30	615	6	40
Stoke on Trent	2386	4.9	115	2412	5.2	125	2318	5.0	115	2479	4.9	110	2454	5.0	120
Staffordshire County	7911	4.7	372	8269	5	420	400	4.9	400	390	4.5	390	8386	5.2	430

[8] Source Public Health England https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/3/gid/1000043/pat/6/par/E12000005/ati/102/are/E10000028/iid/30101/age/230/sex/4

2.3.3 Actions being taken within Staffordshire to reduce $PM_{2.5}$

A number of the Staffordshire Authorities are currently involved in implementing measures to reduce levels of N02 within their areas, which are detailed elsewhere in this report. Whilst there is currently no statutory duty imposed on Local Authorities in England to reduce $PM_{2.5}$, a number of the measures are complementary. A mapping exercise completed by the Staffordshire Air Quality Forum members details the measures currently in place which are considered to have an impact in reducing $PM_{2.5}$ within the County. These are produced in Table 2.6 below;

Table 2.6 - Actions being taken within Staffordshire to reduce $PM_{2.5}$

Measures category	Measure Classification	Effect on reducing NOx and PM_{10} emissions(low, medium, high)	Reduces PM2.5 emissions	Local Authority								
				Stoke on Trent CC	Staffordshire Moorlands DC	Newcastle under -Lyme BC	Stafford BC	Cannock Chase DC	East Staffs BC	Lichfield DC	South Staffs DC	Tamworth BC
Traffic Management	Urban Traffic Control systems, Congestion management, traffic reduction	low	✓	✓	UTC in Leek Town Centre	UTC in areas of Newcastle Town Centre AQMA and Kidsgrove AQMA	UTC in Stafford Town Centre	UTC in Cannock Town Centre	UTC in Burton Town Centre. Planned A444 corridor study. Burton town centre regeneration. B5017 corridor improvements between Wellington Rd/Shobnall Rd& Postern Rd. Tatenhill & Rangemore improvements	Investigations ongoing into UTC in areas of Lichfield City Centre		UTC in Tamworth Town Centre at Ventura Park
	Reduction of speed limits, 20mph zones	low	✓	✓			20mph zones near some schools in residential areas	20mph zones in Brereton, Hednesford and Rugeley	20 mph zones near some schools in residential areas		20mph zones in Trysull, Bradley, Kinver and Bilbrook	
	Road User Charging (RUC)/ Congestion charging	low	✓					M6 Toll		M6 Toll	M6 Toll	
	Anti-idling enforcement	low	✓									
	Other		✓									
Promoting Travel Alternatives	Workplace Travel Planning	low	✓		Staffordshire CC has successfully acquired funding for a 2 year work & school travel plan programme for work in the vicinity of AQMAS in Staffs & Stoke. https://www.staffordshire.gov.uk/transport/greentravel/travelplans/home.aspx							
	Encourage / Facilitate home-working	low	✓	Agile working adopted by Stoke-on-Trent CC			✓	Homeworking policy adopted	Homeworking policy adopted		Agile working policy adopted	Homeworking policy adopted
	School Travel Plans	low	✓	Modeshift STARS	https://www.staffordshire.gov.uk/activeschooltravel							
	Promotion of cycling	low	✓	Stoke-on-Trent Cycle Map & Guide	https://www.staffordshire.gov.uk/transport/cycling/Cycle-maps/cyclemaps.aspx							
	Promotion of walking	low	✓	Wayfinding and Living Streets projects	https:/www.staffordshire.gov.uk/environment/eLand/RightsofWay/PromotedRoutes/home.aspx							
	Staffordshire Share a Lift Scheme		☐		https://www.staffordshire.gov.uk/transport/greentravel/carsharing/Car-sharing.aspx							

	Promote use of rail and inland waterways	medium	✓	North Staffordshire Community Rail Partnership	North Staffordshire Community Rail Partnership operating along the North Staffordshire Line includes Blythe Bridge Rail Station. The County Council Draft Rail Strategy is available from: http://moderngov.staffordshire.gov.uk/documents/s69891/Appendix%201%20for%20Rail%20Strategy.pdf	North Staffordshire Community Rail Partnership operating along the North Staffordshire Line includes Blythe Bridge Rail Station. The County Council Draft Rail Strategy is available from: http://moderngov.staffordshire.gov.uk/documents/s69891/Appendix%201%20for%20Rail%20Strategy.pdf	North Staffordshire Community Rail Partnership operating along the North Staffordshire Line includes Blythe Bridge Rail Station. The County Council Draft Rail Strategy is available from: http://moderngov.staffordshire.gov.uk/documents/s69891/Appendix%201%20for%20Rail%20Strategy.pdf ✓	SCC is a member of West Midlands Rail Ltd which will bring a change in the way that local rail services are managed and operated. The County Council Draft Rail Strategy is available from: Link & Link	Community Rail Partnership operating along the North Staffordshire Line and includes Uttoxeter Rail Station. The County Council Draft Rail Strategy is available from: http://moderngov.staffordshire.gov.uk/documents/s69891/Appendix%201%20for%20Rail%20Strategy.pdf			
Transport Planning and Infrastructure	Local Transport Plans and District Strategies	high	✓	Local Transport Plan	https://www.staffordshire.gov.uk/transport/transportplanning/localtransportplan/Integrated-transport-documents/East-Staffordshire-Transport.pdf							
	Public transport improvements -interchanges stations and services	low	✓	Improvements around Stoke-on-Trent railway station in development		Kidsgrove Station interchange planned 2018	Recent improvements completed at Stafford Rail Station	Planned improvements at Cannock Station as part of Mill Green development	Planned improvements at Burton Rail Station	Planned improvements at Lichfield City station as part of Friarsgate development. Lichfield Trent Valley improvements to make station accessible		Planned improvements at Tamworth station
	Public cycle hire scheme	low	✓	Stoke Railway Station 'Brompton Dock' Bike Hire & Cycle Hub				In house Cycle to work scheme				
	Cycle network	low	✓	Stoke-on-Trent Cycle Map & Guide	www.saffordshire.gov.uk/transport/cycling/cyclemaps/cyclemaps.aspx							
	Bus route improvements	high	✓	Improvements around Stoke-on-Trent railway station in development	Continued delivery of demand responsive public transport Moorlands Connect, bus infrastructure improvements to route 9 Biddulph-Hanley	RTPI routes 3 & 4 Newcastle Town Centre. Improved future bus services to Chatterley Valley	RTPI Stafford Town Centre, A34 RTPI and bus priority measures, Stafford. Improved bus priority and interchange on A518, Stafford post-SWAR	Proposed improvements to services 23,24 and 26 in Rugeley, service 2 Cannock-Walsall and	Removal of obstructions on New Street	New central bus station. New or extended services to Fradley. New bus infrastructure Burntwood Town Centre. RTPI Lichfield City Centre.	Improved bus infrastructure Gt Wyrley to Bloxich corridor, & on routes 256 Wombourne to Stourbridge, 255 Wolverhampton to Merry Hill, 5 Codsall to Wolverhmapton, 1 Huntington to Walsall and 54 Stafford to Wolverhampton.	Improved bus infrastructure route 2 Tamworth-Perrycrofts. RTPI Tamworth Town Centre and Ventura Park. Victoria Road, Tamworth upgraded interchange.

								service 32/33 Pye Green				
Alternatives to private vehicle use	Bus based Park & Ride	medium	✓					nil				
	Car Clubs	low	✓					nil				
Policy Guidance and Development Control	Planning applications to require assessment of exposure / emissions for development requiring air quality impact assessment	high	✓				✓	Local plan - Policy CP16 - Climate Change and Sustainable Resource Use Cannockchase. Www.cannockchasedc.gov.uk/sites/default/files/local_plan_part_1_09.04.14_low_res.pdf	http://www.eaststaffsbc.gov.uk/planning/planning-policy/local-plan-2012-2031	-		
Policy Guidance and Development Control	Air Quality Strategy		☐	Local Air Quality Strategy - Stoke-on-Trent City Council			✓	nil	http://www.eaststaffsbc.gov.uk/environmental-health/pollution/bonfires			
	Planning Guidance for developers		☐	To develop planning guidance for developers and to develop into SPD once Local Plan Policies in Place			✓	http://www.cannockchasedc.gov.uk/residents/planning/planning-policy/supplementary-planning-policy-	http://www.eaststaffsbc.gov.uk/environmental-health/pollution/bonfires			

								documents				
	Developer Contributions based on damage cost calculation		☐	To develop policies to secure contributions to offset pollution				http://www.cannockchasedc.gov.uk/sites/default/files/local_plan_part_1_09.04.14_low_res.pdf	Yes			
	Planning Policies		☐	To influence policies to support improvements in emissions through development of Staffordshire and Stoke-on-Trent Joint Local Plan			✓		http://www.eaststaffsbc.gov.uk/sites/default/files/docs/pollution/Air%20Quality%20Policy%20for%20Development%20Control			
	STOR Sites (Short Term Operating Reserve) Energy Generation. Regulation via planning / permitting regime	high	✓	To lobby Central Government via appropriate forums (e.g. Staffordshire Air Quality Forum / Midlands Joint Advisory Council) for consideration of air quality implications at a national level and to support local authorities and developers with appropriate guidance.								
	Low Emissions Strategy	high	✓									
Freight and Delivery Management	Freight Consolidation Centre	medium	✓									
	Route Management Plans/ Strategic routing strategy for HGV's	high	✓		https://www.staffordshire.gov.uk/transport/transportplanning/localtransportplan/appendixl-staffordshirefreightstrategy.pdf							

	Quiet & out of hours delivery	low	✓				✓	✓				
	Delivery and Service plans	medium	✓									
	Freight Partnerships for city centre deliveries	high	✓									
Vehicle Fleet Efficiency	Driver training and ECO driving aids	medium	✓				✓	✓	ESBC staff undertaken ECO driving			
	Promoting low emission public transport	high	✓									
	Vehicle retrofitting programmes	medium	✓									
	Fleet efficiency and recognition schemes	medium	✓	Staffordshire and Stoke-on-Trent Eco-Stars http://www.ecostars-uk.com/eco-stars-schemes/								
Promoting low emission transport	Low emission zone (LEZ) Clean Air Zone (CAZ)	high	✓									
	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	high	✓					Waste fleet vehicles comply with Euro VI.				
	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	high	✓				✓					
	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	high	✓				✓					
	Priority parking for LEV's	high	✓	Electric Vehicle charging spaces								
	Taxi Licensing conditions	medium	✓	Hackney Carriage & Private Hire Licensing Policy 2016-2019								
	Taxi emission incentives	medium	✓									

Environmental permits	Introduction/increase of environment charges through permit systems and economic instruments (Permit fees set centrally)	medium	✓				✓	Unable to achieve at a local level without central government approval				
	Measures to reduce pollution through IPPC Permits going beyond BAT	medium	✓	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211863/env-permitting-general-guidance-a.pdf (Chapter 15)								
	Large Combustion Plant Permits and National Plans going beyond BAT	high	✓									
	Other	??	✓									
Other measures	Smoky Diesel Hotline		☐	https://www.gov.uk/report-smoky-vehicle								
	A5 and M6 Partnership		☐					http://www.hinckley-bosworth.gov.uk/info/10020/strategies_plans_and_policies/1272/a5_partnership			Strategy for the A5 2011-2026	
	Domestic Smoke Control advice and Enforcement		☐	Smoke control advice	-	-	✓	http://www.cannockchasedc.gov.uk/residents/environmental-health/environmental-protection/chimney-smoke	http://www.eaststaffsbc.gov.uk/environmental-health/pollution/smoke-control-areas	-	https://www.sstaffs.gov.uk/environment/smoke-control-areas.cfm	
	Garden Bonfires - Advice and nuisance enforcement		☐	Garden bonfires advice	-	-	✓	http://www.cannockchasedc.gov.uk/residents/environmental-health/environmental-protectio	http://www.eaststaffsbc.gov.uk/environmental-health/pollution/bonfires	-	https://www.sstaffs.gov.uk/crime-nuisances/bonfires-and-smoke.cfm	http://www.tamworth.gov.uk/air-quality

								n/bonfire-smoke-nuisance				
	Commercial burning advice and enforcement		□		-	-	✓	http://www.cannockchasedc.gov.uk/residents/environmental-health/environmental-protection/bonfire-smoke-nuisance	http://www.eaststaffsbc.gov.uk/environmental-health/pollution/bonfires			http://www.tamworth.gov.uk/air-quality
	Multi agency working with Fire Service and Environment Agency for trade burning		□		-	-	✓	Information shared as appropriate				Information shared as appropriate
	Multi agency working with Staffordshire Fire Service and Local Authority Building Control regarding chimney fires and complaints about DIY domestic heating systems		□		-	-		Information shared as appropriate				
	Stoke-on-Trent Low Carbon District Heat Network		□	Stoke-on-Trent Low Carbon District Heat Network	-	-						

2.3.4 $PM_{2.5}$ in Staffordshire & Stoke-on-Trent - Next steps

As $PM_{2.5}$ 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 2019 ASR.

✓To agree a target for reducing Fraction of All Cause Mortality from $PM_{2.5}$ in each district, city and county authority by 2020

✓To agree a target for reducing $PM_{2.5}$ exposure (calculated from PM_{10} exposure / background maps / local monitoring where available)

✓To maintain compliance with the 2020 EU limit value of 25µg/m3

✓ To include Public Health Outcome Framework Indicator 3.01 in the Staffordshire and District Authority and City Council Joint Strategic Needs Assessment for 2018/2019 onwards and to report progress to the relevant Health and Wellbeing Boards.

✓ 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. There is currently a conflict in national policy which is seeking security of energy supply and the drive to reduce anthropogenic $PM_{2.5}$. Recent approaches to DEFRA have revealed a lack of suitable guidance to local authorities and STOR operators.
- To lobby for a suitable damage cost calculation to reflect the cost to society from $PM_{2.5}$ and to support this through local and national planning policies.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

Stoke-on-Trent City Council undertook automatic (continuous) monitoring at two sites during 2017. In addition, there are two Automatic Urban and Rural Network (AURN) sites in the city. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at https://uk-air.defra.gov.uk/.

There have been no changes to the location of automatic monitors during 2017. However, a PM_{10} monitor was added to the existing NO_2 monitor at the Basford site at the beginning of 2017. This was to ascertain whether there were exceedances of the PM_{10} objectives in addition to the exceedance of the annual mean NO_2 objective. Monitoring has shown that the PM_{10} objectives were not exceeded in 2017. Therefore no amendment or additional AQMA was necessary.

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

Stoke-on-Trent City Council undertook non- automatic (passive) monitoring of NO_2 at 68 sites during 2017. Table A.2 in Appendix A shows the details of the sites.

A change to the monitoring strategy resulted in 27 diffusion tube sites being discontinued at sites where monitoring had shown consistent results below the annual mean objective. This made the diffusion tubes available for use at new monitoring sites at 34 locations at or close to residential properties adjacent to major roads or junctions in the city. The new sites were chosen because either no monitoring had been undertaken in the area or existing monitoring showed that an

exceedance of the annual mean object was occurring nearby and further investigation of the geographical extent of the exceedance was justified.

The decommissioned sites were DT5, DT6, DT7, DT11, DT12, DT18, DT19, DT21, DT22, DT25, DT26, DT27, DT30, DT31, DT33, DT35, DT36, DT38, DT39, DT43, DT46, DT47, DT48, DT57, DT60, DT68 and DT69. In addition, a new location for 2017 (DT87) was decommissioned after one month, as the tube had been sited close to a catering cooker exhaust and was, therefore an unsuitable location. Maps showing the location of the existing and new monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias and distance correction. None of the sites had less than 75% data capture. Therefore, annualisation calculations were not required. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

All NO_2 monitoring locations are within the city-wide AQMA. Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in Appendix B.

A general downward trend in concentration can be seen in monitored concentrations throughout the city. Comments on trends at specific geographical areas are included with trend graphs in Appendix A.

The UK Air Quality Objective (UK AQO) and EU Limit Value (EU LV) of 40 µg/m³ continue to be exceeded at some areas in the city, including some of the new monitoring locations. The value of the UK AQO and EU LV are included on all graphs to indicate which sites exceed.

Distance correction has not been applied to results shown on trend graphs. However, at locations where the monitoring site is closer to the road than the nearest property,

NO_2 fall-off with distance calculator available on the LAQM Support website LAQM TG (16)[9] has been used to estimate the concentration at the nearby property. Distance calculation results, if carried out, are discussed in the text accompanying graphs in Appendix A. Distance correction calculations are included in Appendix C Table C 3.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year. This air quality objective has never been exceeded in the city at a continuous monitor.

However, one diffusion tube site DT17 resulted in an annual mean concentration greater than 60µg/m^3, which indicates that an exceedance of the 1-hour mean objective is also likely at this site. The diffusion tube is slightly closer to the road than the nearby property. However, after applying distance correction, the concentration at the property is likely to be greater than 60 µg/m³. A slight downward trend is shown at this site.

3.2.2 Particulate Matter (PM_{10})

Table A.5 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

There has been no exceedance of either the annual or daily mean objectives for PM_{10}.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.7 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 5 years.

The 2017 concnetration was less than the WHO recommended concentration of 10 µg/m³.

[9] NO2 fall-off with distance calculator available on the LAQM Support website https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	Stoke-on-Trent Centre AURN	Urban Background	388351	347895	NO_2; $PM_{2.5}$; O_3; benzene	YES	Chemiluminescent; TEOM/FDMS;UV Absorbtion; Non-automatic pumped	1	5	4
CM2	Joiners Square	Roadside	388743	346457	NO_2	YES	Chemiluminescent	0.4	4.6	2.9
CM3	Middleport	Roadside	Decommissioned 2015							
CM4	Fenton	Industrial	Decommissioned 2013							
CM5	Basford	Roadside	386288	346802	NO_2	YES	Chemiluminescent	5.7	4.2	2.1
CM6	Stoke-on-Trent A50 Roadside AURN	Roadside	392584	342572	NO_2	YES	Chemiluminescent; TEOM/FDMS	10.8	3.8	4

Notes:

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

(2) N/A if not applicable.

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

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT1	1994/01	Urban Background	386402	343705	NO_2	YES	9	1.5	NO	2.8
DT2	1999/01	Roadside	389884	347289	NO_2	YES	0	2	NO	2.5
DT3	1999/02	Urban Background	390612	350793	NO2	YES	6.5	2	NO	2.7
DT4	2001/04	Roadside	392705	342518	NO2	YES	0	9	NO	3
DT5	2001/11	Roadside	387850	345473	NO2	YES	0	2.6	NO	2.8
DT6	2001/13	Roadside	387173	345935	NO2	YES	2.3	2	NO	2.6
DT7	2002/01	Roadside	385739	349537	NO2	YES	0	2.6	NO	2.6
DT8	2003/02	Roadside	388356	347892	NO2	YES	7	15	YES	3.3
DT9	2005/01	Roadside	387625	348516	NO2	YES	0	4.6	NO	2.9
DT10	2005/02	Roadside	386927	349854	NO2	YES	0	3.7	NO	2.4
DT11	2005/03	Roadside	386822	349811	NO2	YES	0	4.2	NO	2.9
DT12	2005/04	Roadside	385886	349757	NO2	YES	NA	3.7	NO	2.5
DT13	2005/07	Roadside	392472	342634	NO2	YES	3.3	4.8	NO	2.9
DT14	2005/08	Roadside	392588	342579	NO2	YES	1.7	2	NO	2.9
DT15	2005/11	Roadside	389335	344693	NO2	YES	0	2	NO	2.4
DT16	2005/13	Roadside	385974	346574	NO2	YES	0	2.6	NO	2.6
DT17	2005/14	Roadside	386271	346782	NO2	YES	0.8	1.8	NO	2.6
DT18	2005/15	Roadside	386631	342851	NO2	YES	0.2	2.9	NO	2.5
DT19	2005/16	Roadside	388790	346319	NO2	YES	2.1	3.3	NO	2.6

DT20	2005/17	Roadside	388841	346641	NO2	YES	0	2	NO	2.3
DT21	2005/19	Roadside	389998	347181	NO2	YES	0	2.5	NO	2.7
DT22	2005/20	Roadside	386720	349748	NO2	YES	0	2.2	NO	2.6
DT23	2005/22	Roadside	388704	347607	NO2	YES	0	2.8	NO	2.6
DT24	2005/23	Roadside	393201	342409	NO2	YES	0	1.8	NO	2.7
DT25	2005/28	Roadside	386841	350154	NO2	YES	0	1.8	NO	2.7
DT26	2005/30	Roadside	386766	350336	NO2	YES	0	1.9	NO	2.6
DT27	2005/31	Roadside	386746	350389	NO2	YES	3.6	2.7	NO	2.5
DT28	2005/33		Decommissioned end 2015							
DT29	2005/34	Roadside	386904	349828	NO2	YES	0	5.8	NO	2.6
DT30	2005/36	Roadside	387015	349894	NO2	YES	0	2.7	NO	2.5
DT31	2005/39	Roadside	387823	348317	NO2	YES	0	1.6	NO	2.5
DT32	2005/41	Roadside	388700	346420	NO2	YES	2.8	3.2	NO	2.5
DT33	2005/44	Roadside	389149	345234	NO2	YES	4.7	1.9	NO	2.7
DT34	2005/45	Roadside	389231	345026	NO2	YES	0	1.9	NO	2.5
DT35	2005/47	Roadside	389408	344620	NO2	YES	3	3.4	NO	2.3
DT36	2005/48	Roadside	392834	342432	NO2	YES	2.2	2.2	NO	2.4
DT37	2005/50	Roadside	393260	342460	NO2	YES	0	3.6	NO	2.5
DT38	2005/51	Roadside	393151	342331	NO2	YES	0	3.3	NO	2.6
DT39	2005/54	Roadside	393122	342248	NO2	YES	0	3.5	NO	2.6
DT40	2005/56	Roadside	392777	342409	NO2	YES	0	11	NO	2.7
DT41	2005/57	Roadside	392741	342435	NO2	YES	0	11	NO	2.6
DT42	2005/58	Roadside	392676	342481	NO2	YES	2.6	16	NO	2.5
DT43	2005/59	Roadside	392611	342521	NO2	YES	NA	1.2	NO	2.5

DT44	2005/62		Decommissioned end 2015							
DT45	2008/05		Decommissioned end 2015							
DT46	2008/09	Roadside	388659	346716	NO2	YES	NA	1.8	NO	2.4
DT47	2008/10	Roadside	388632	346850	NO2	YES	NA	1.8	NO	2.5
DT48	2008/12	Roadside	388538	347100	NO2	YES	NA	1.7	NO	2.5
DT49	2008/13	Roadside	388536	347143	NO2	YES	NA	2.8	NO	2.5
DT50	2009/02		Decommissioned end 2015							
DT51	2009/04	Roadside	386382	346859	NO2	YES	2.3	18.3	NO	2.6
DT52	2009/05	Roadside	385813	346544	NO2	YES	2	2.6	NO	2.6
DT53	2010/01	Roadside	387938	345939	NO2	YES	0	2.6	NO	2.5
DT54	2010/02		Decommissioned end 2014							
DT55	2010/05	Roadside	393320	342206	NO2	YES	0	5	NO	2.7
DT56	2012/01	Roadside	386288	346802	NO2	YES	3.1	4.2	YES	2.1
DT57	2012/04	Roadside	388488	347227	NO2	YES	3.3	8.5	NO	2.5
DT58	2012/05		Decommissioned end 2015							
DT59	2012/06		Decommissioned end 2015							
DT60	2012/07	Roadside	386806	350240	NO2	YES	0	1.5	NO	2.5
DT61	2014/01	Roadside	390710	350261	NO2	YES	0	1.9	NO	
DT62	2014/02		Decommissioned end 2014							
DT63	2016/01	Roadside	385928	346563	NO2	YES	0	2	NO	2.6
DT64	2016/02	Roadside	385937	346531	NO2	YES	1	1.6	NO	2.6
DT65	2016/03	Roadside	385943	346504	NO2	YES	0	1.8	NO	2.6
DT66	2016/04	Roadside	385979	346316	NO2	YES	0	1.7	NO	2.7

DT67	2016/05	Roadside	386023	346150	NO2	YES	2.1	2.1	NO	2.4
DT68	2016/06	Roadside	386160	345769	NO2	YES	9	1.3	NO	2.4
DT69	2016/07	Roadside	386008	345645	NO2	YES	3.4	4.6	NO	2.5
DT70	2016/08	Roadside	385982	345398	NO2	YES	6.6	1.6	NO	2.4
DT71	2016/09	Roadside	386151	345474	NO2	YES	9.6	0.7	NO	2.4
DT72	2017/01	Roadside	386017	346135	NO2	YES	2	2.36	NO	2.6
DT73	2017/02	Roadside	386019	345935	NO2	YES	0	2.4	NO	2.4
DT74	2017/03	Roadside	393293	342508	NO2	YES	1.7	1.8	NO	2.6
DT75	2017/04	Roadside	393369	342177	NO2	YES	6.9	2.9	NO	2.6
DT76	2017/05	Roadside	385929	349766	NO2	YES	0.9	1.6	NO	2.4
DT77	2017/06	Roadside	385957	349761	NO2	YES	4.4	1.9	NO	2.4
DT78	2017/07	Roadside	386161	349594	NO2	YES	0	2.4	NO	2.4
DT79	2017/08	Roadside	386240	349581	NO2	YES	0	2.2	NO	2.4
DT80	2017/09	Roadside	386400	349571	NO2	YES	0	2.5	NO	2.4
DT81	2017/10	Roadside	386456	349598	NO2	YES	0.8	2.2	NO	2.3
DT82	2017/11	Roadside	386606	349653	NO2	YES	0	2.2	NO	2.4
DT83	2017/12	Roadside	390703	350221	NO2	YES	2.1	1.9	NO	2.3
DT84	2017/13	Roadside	386918	349850	NO2	YES	0.6	3	NO	2.3
DT85	2017/14	Roadside	386959	349850	NO2	YES	0	2.5	NO	2.2
DT86	2017/15	Roadside	386983	349861	NO2	YES	0	2.4	NO	2.3
DT87	2017/16	Roadside	386984	349711	NO2	YES	NA	NA		NA
DT88	2017/17	Roadside	387427	348830	NO2	YES	1.9	1.5	NO	2.2
DT89	2017/18	Roadside	387498	348698	NO2	YES	10.5	1.9	NO	2.3
DT90	2017/19	Roadside	387558	348623	NO2	YES	0	1.7	NO	2.3
DT91	2017/20	Roadside	387659	348482	NO2	YES	2.28	2.66	NO	2.2

DT92	2017/21	Roadside	388725	346464	NO2	YES	0	4.7	NO	2.4
DT93	2017/22	Roadside	388673	346371	NO2	YES	2.27	3.02	NO	2.3
DT94	2017/23	Roadside	388335	345880	NO2	YES	1.88	2.72	NO	2.3
DT95	2017/24	Roadside	388234	345746	NO2	YES	1.9	2.7	NO	2.3
DT96	2017/25	Roadside	388168	345665	NO2	YES	1.5	5.6	NO	2.3
DT97	2017/26	Roadside	387972	346002	NO2	YES	0	5	NO	2.3
DT98	2017/27	Roadside	388007	346159	NO2	YES	2.2	2.4	NO	2.3
DT99	2017/28	Roadside	388656	347612	NO2	YES	0	2.9	NO	1.8
DT100	2017/29	Roadside	388636	347614	NO2	YES	0	2.9	NO	1.9
DT101	2017/30	Roadside	385999	345936	NO2	YES	0	2.4	NO	2.3
DT102	2017/31	Roadside	386154	345824	NO2	YES	0	3	NO	2.3
DT103	2017/32	Roadside	388114	345483	NO2	YES	0	5.5	NO	2.4
DT104	2017/33	Roadside	387978	345650	NO2	YES	0	2.5	NO	2.4

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2013	2014	2015	2016	2017
CM1	Urban Background	Automatic	99	99	**29**	**28**	**28**	**28**	**26**
CM2	Roadside	Automatic	93	93	**40**	37	**40**	**45**	**38**
CM5	Roadside	Automatic	94	94	**49**	**50**	**47**	**50**	**51**
CM6	Roadside	Automatic	99	99			**61**	**61**	**56**
DT1	Urban Background	Diffusion Tube	100		20	19	21	20	19
DT2	Roadside	Diffusion Tube	92		**43**	**42**	**43**	**44**	**49**
DT3	Urban Background	Diffusion Tube	100		19	17	18	19	18
DT4	Roadside	Diffusion Tube	100		**41**	36	38	37	37
DT5	Roadside	Diffusion Tube			35	34	33	34	
DT6	Roadside	Diffusion Tube			36	34	34	36	
DT7	Roadside	Diffusion Tube			33	31	33	34	
DT8	Roadside	Diffusion Tube	100		27	25	27	29	26
DT9	Roadside	Diffusion Tube	100		**43**	**44**	**51**	**48**	**51**
DT10	Roadside	Diffusion Tube	92		36	35	37	38	36
DT11	Roadside	Diffusion Tube			35	34	34	36	
DT12	Roadside	Diffusion Tube			36	**45**	**49**	**49**	

DT13	Roadside	Diffusion Tube	100		39	39	**42**	37	39
DT14	Roadside	Diffusion Tube	100		**43**	**40**	**41**	**41**	**40**
DT15	Roadside	Diffusion Tube	100		**40**	39	**43**	**43**	**44**
DT16	Roadside	Diffusion Tube	92		**49**	**49**	**53**	**54**	**51**
DT17	Roadside	Diffusion Tube	92		**75**	**76**	**77**	**80**	**71**
DT18	Roadside	Diffusion Tube			38	39	36	**42**	
DT19	Roadside	Diffusion Tube			31	30	34	35	
DT20	Roadside	Diffusion Tube	100		39	37	**43**	**40**	**40**
DT21	Roadside	Diffusion Tube			39	36	38	**40**	
DT22	Roadside	Diffusion Tube			36	37	38	39	
DT23	Roadside	Diffusion Tube	100		**40**	**40**	**41**	**44**	**43**
DT24	Roadside	Diffusion Tube	100		**44**	**43**	**42**	**44**	**44**
DT25	Roadside	Diffusion Tube			36	36	35	38	
DT26	Roadside	Diffusion Tube			30	28	29	31	
DT27	Roadside	Diffusion Tube			29	28	38	31	
DT28	Roadside	Diffusion Tube			31	30	29		
DT29	Roadside	Diffusion Tube	100		**42**	39	**42**	**41**	**43**
DT30	Roadside	Diffusion Tube			34	32	34	37	
DT31	Roadside	Diffusion			37	36	36	**40**	

		Tube							
DT32	Roadside	Diffusion Tube	100		**41**	38	38	**44**	37
DT33	Roadside	Diffusion Tube			30	32	32	36	
DT34	Roadside	Diffusion Tube	92		**53**	**45**	**46**	**52**	**49**
DT35	Roadside	Diffusion Tube			35	34	37	39	
DT36	Roadside	Diffusion Tube			36	34	38	38	
DT37	Roadside	Diffusion Tube	92		**43**	**41**	**44**	**45**	**45**
DT38	Roadside	Diffusion Tube			34	33	35	37	
DT39	Roadside	Diffusion Tube			39	38	38	39	
DT40	Roadside	Diffusion Tube	100		**44**	**43**	39	**41**	36
DT41	Roadside	Diffusion Tube	100		**42**	**40**	37	**41**	32
DT42	Roadside	Diffusion Tube	100		37	**43**	37	37	30
DT43	Roadside	Diffusion Tube			38	36	38	**41**	
DT44	Roadside	Diffusion Tube			35	33	33		
DT45	Roadside	Diffusion Tube			34	32	33		
DT46	Roadside	Diffusion Tube			39	33	37	37	
DT47	Roadside	Diffusion Tube			**41**	39	39	**40**	
DT48	Roadside	Diffusion Tube			**46**	**46**	**47**	**47**	
DT49	Roadside	Diffusion Tube	75		37	34	38	38	**40**

DT50	Roadside	Diffusion Tube			25	22	22		
DT51	Roadside	Diffusion Tube	100		38	38	38	**40**	38
DT52	Roadside	Diffusion Tube	100		**51**	**48**	**51**	**52**	**50**
DT53	Roadside	Diffusion Tube	100		38	38	39	38	35
DT54	Roadside	Diffusion Tube			34	32			
DT55	Roadside	Diffusion Tube	100		**40**	38	**41**	**40**	**40**
DT56	Roadside	Diffusion Tube	100		**49**	**46**	**50**	**50**	**49**
DT57	Roadside	Diffusion Tube			34	37	33	**40**	
DT58	Roadside	Diffusion Tube			34	33	32		
DT59	Roadside	Diffusion Tube			33	31	29		
DT60	Roadside	Diffusion Tube			37	36	34	37	
DT61	Roadside	Diffusion Tube	92			37	**41**	**42**	**42**
DT62	Roadside	Diffusion Tube				28			
DT63	Roadside	Diffusion Tube	100					**55**	**53**
DT64	Roadside	Diffusion Tube	83					38	38
DT65	Roadside	Diffusion Tube	83					**41**	**41**
DT66	Roadside	Diffusion Tube	100					34	33
DT67	Roadside	Diffusion Tube	100					**53**	**50**
DT68	Roadside	Diffusion						26	

		Tube							
DT69	Roadside	Diffusion Tube						25	
DT70	Roadside	Diffusion Tube	100						25
DT71	Roadside	Diffusion Tube	100						21
DT72	Roadside	Diffusion Tube	92						31
DT73	Roadside	Diffusion Tube	100						35
DT74	Roadside	Diffusion Tube	100						**48**
DT75	Roadside	Diffusion Tube	100						**44**
DT76	Roadside	Diffusion Tube	100						38
DT77	Roadside	Diffusion Tube	92						**47**
DT78	Roadside	Diffusion Tube	100						**43**
DT79	Roadside	Diffusion Tube	100						**40**
DT80	Roadside	Diffusion Tube	100						34
DT81	Roadside	Diffusion Tube	100						34
DT82	Roadside	Diffusion Tube	92						35
DT83	Roadside	Diffusion Tube	92						**42**
DT84	Roadside	Diffusion Tube	92						38
DT85	Roadside	Diffusion Tube	100						33
DT86	Roadside	Diffusion Tube	92						38

DT87	Roadside	Diffusion Tube	8%						
DT88	Roadside	Diffusion Tube	100						34
DT89	Roadside	Diffusion Tube	92						**40**
DT90	Roadside	Diffusion Tube	100						39
DT91	Roadside	Diffusion Tube	100						**51**
DT92	Roadside	Diffusion Tube	100						35
DT93	Roadside	Diffusion Tube	92						29
DT94	Roadside	Diffusion Tube	92						34
DT95	Roadside	Diffusion Tube	92						32
DT96	Roadside	Diffusion Tube	100						31
DT97	Roadside	Diffusion Tube	100						33
DT98	Roadside	Diffusion Tube	100						28
DT99	Roadside	Diffusion Tube	75						**52**
DT100	Roadside	Diffusion Tube	83						**50**
DT101	Roadside	Diffusion Tube	83						29
DT102	Roadside	Diffusion Tube	83						31
DT103	Roadside	Diffusion Tube	67						27
DT104	Roadside	Diffusion Tube	58						**42**

☒ **Diffusion tube data has been bias corrected**

☒ **Annualisation has been conducted where data capture is <75%**

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.**

(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%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.1 – Trends in Annual Mean NO_2 Concentrations at Automatic Monitors

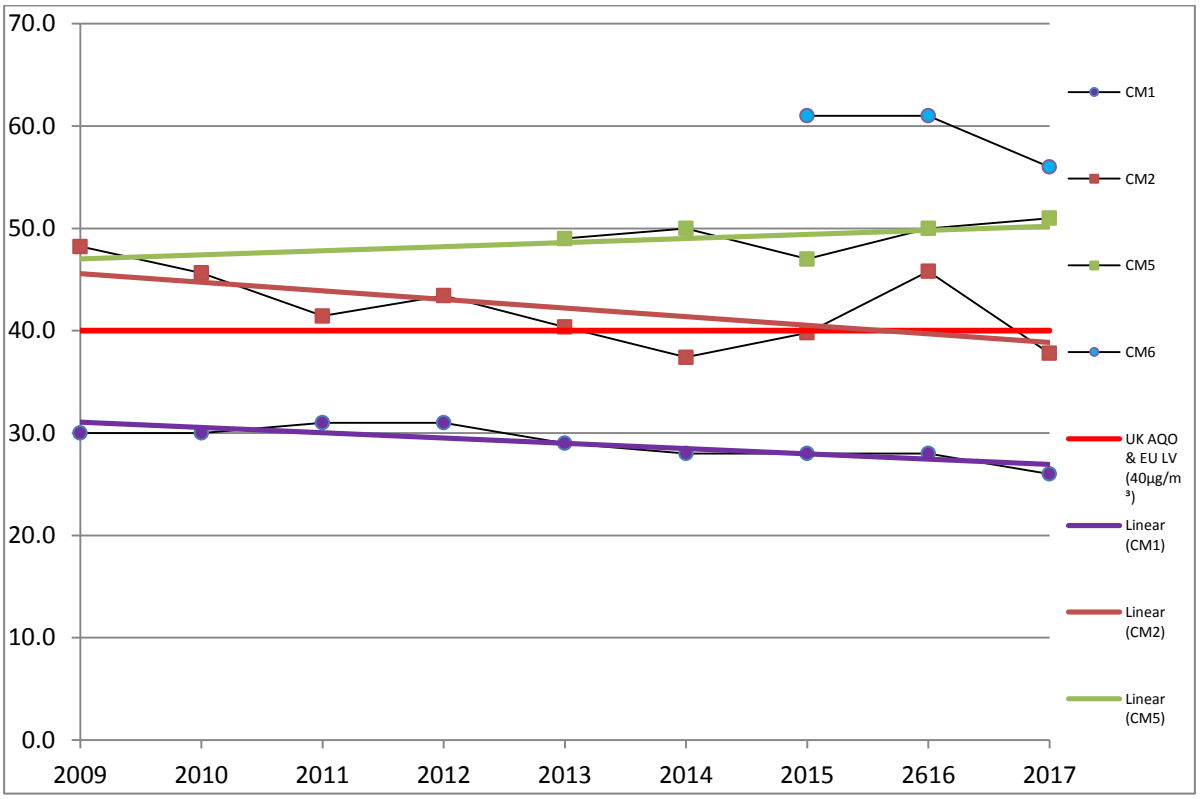
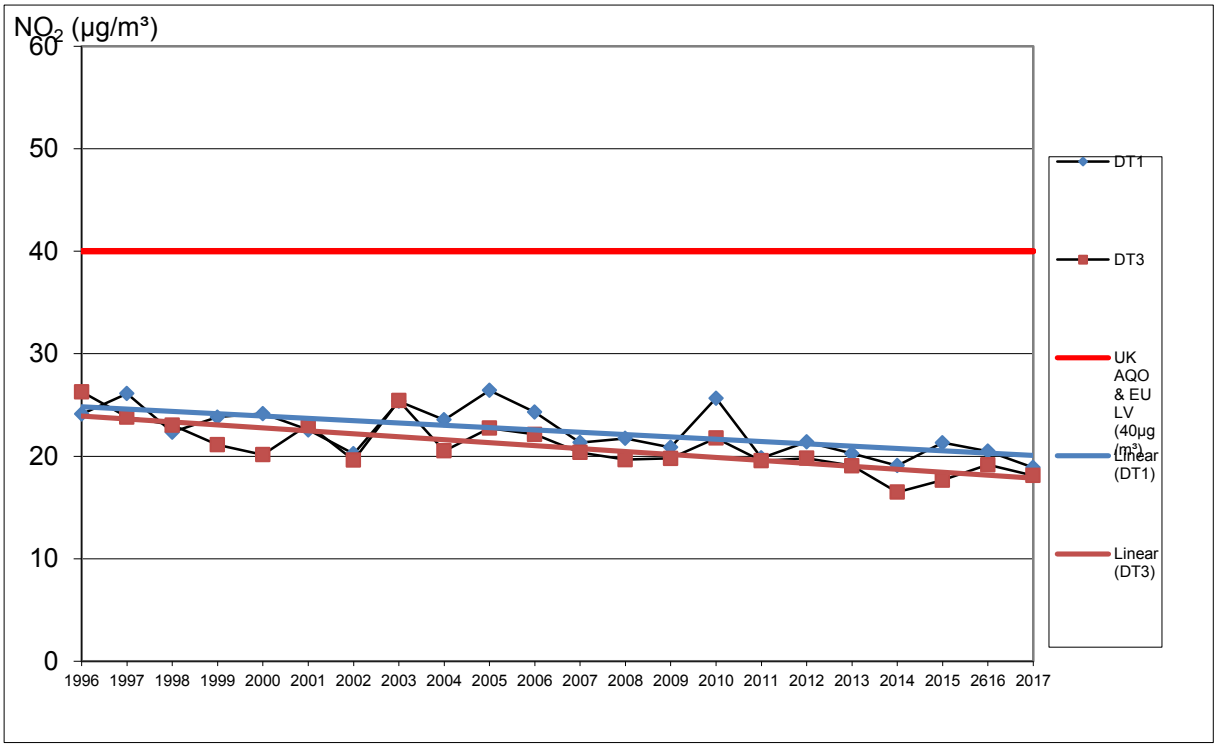


Figure D. 1 shows the location of the automatic monitors.

A downward trend is shown at CM1 (AURN Stoke-on-Trent Centre) and CM2. 2017 concentrations at both sites are below the UK AQO. CM1 is located in the City-centre and is classified as a Defra urban background site. CM2 is located adjacent to properties on the A50, Victoria Road near to the junction with the A52, Leek Road. CM5 shows a slightly increasing trend and remains above the UK AQO. This monitor is closer to the A53, Etruria Road, Basford than the nearest residential property. The distance corrected annual mean is 46 µg/m³, which is above the UK AQO. There is insufficient data to perform trend analysis at CM6. The UK AQO is exceeded at this Meir site. However, the monitor is closer to the A50 trunk road than residential properties. The distance corrected concentration at the properties is 43 µg/m³ and therefore above the UK AQO. However, diffusion tubes located closer to the properties on this road than the automatic monitor are all below the UK AQO (see Figure A. 14 and accompanying text regarding distance correction).

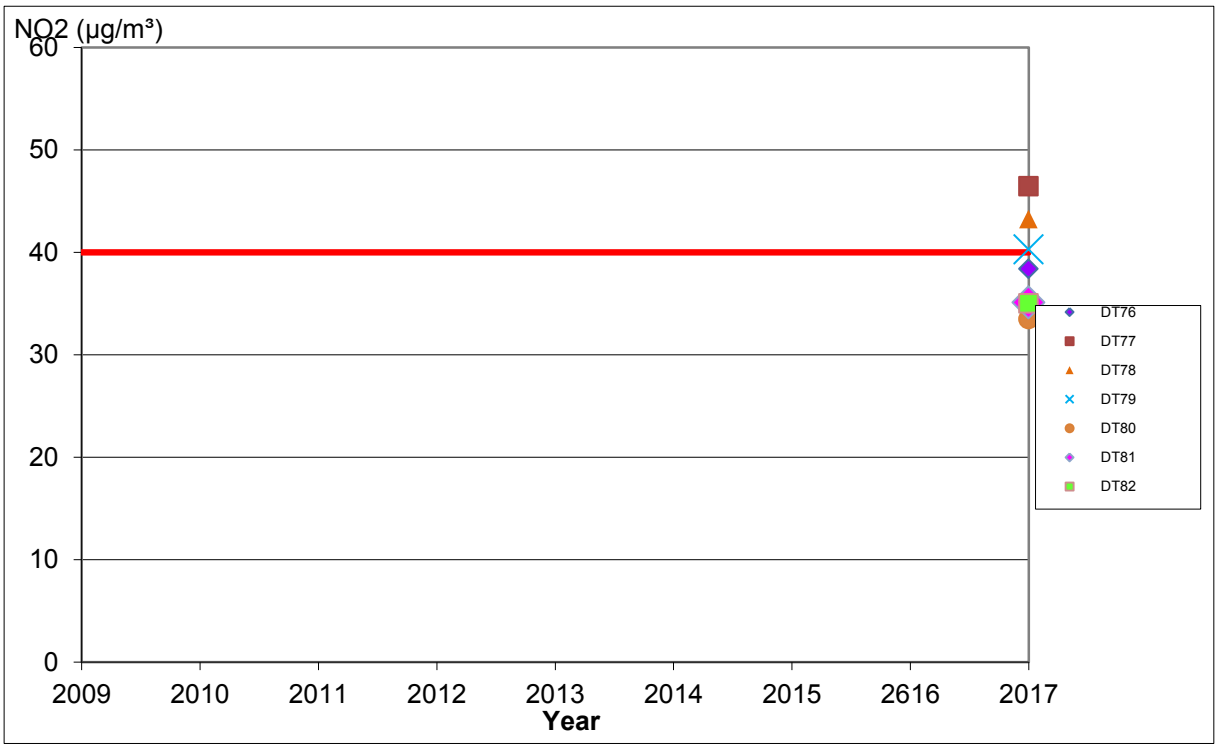
Figure A. 2 – Trend in Annual NO_2 concentrations at background diffusion tube sites



The downward trend continues to be seen at the two background diffusion tube sites. The average concentration for these two sites (20.8 µg/m³) was used in distance correction calculations.

The location of the tubes can be seen in Figure D. 2.

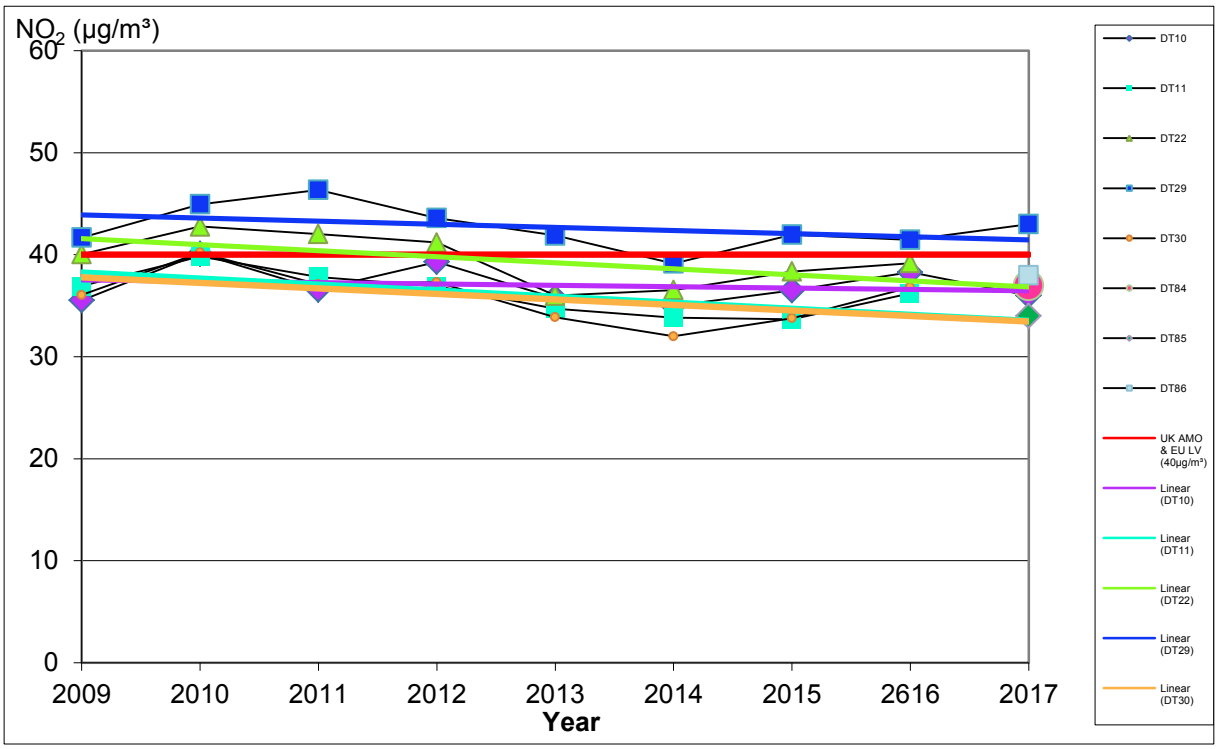
Figure A. 3 – Trend in Annual NO_2 concentrations at Newcastle Street diffusion tube sites



All seven of the sites at Newcastle Street were new in 2017, therefore, no trend data is available. Newcastle Street (B5051) is a major route from the A500 to Burslem town centre. Diffusion tubes were located along the length of the road to determine whether the UK AQO is exceeded. Diffusion tubes DT77, DT78 and DT79 located to the west (see Figure D. 3) all had concentrations above the UK AQO. Distance correction was carried out on DT76 and DT77, resulting in concentration of 37 µg/m³ and 39 µg/m³ respectively.

DT80, DT81 and DT82 located toward the east (see Figure D. 4) were all below the UK AQO.

Figure A. 4 – Trend in Annual NO_2 concentrations at Burslem Centre diffusion tube sites

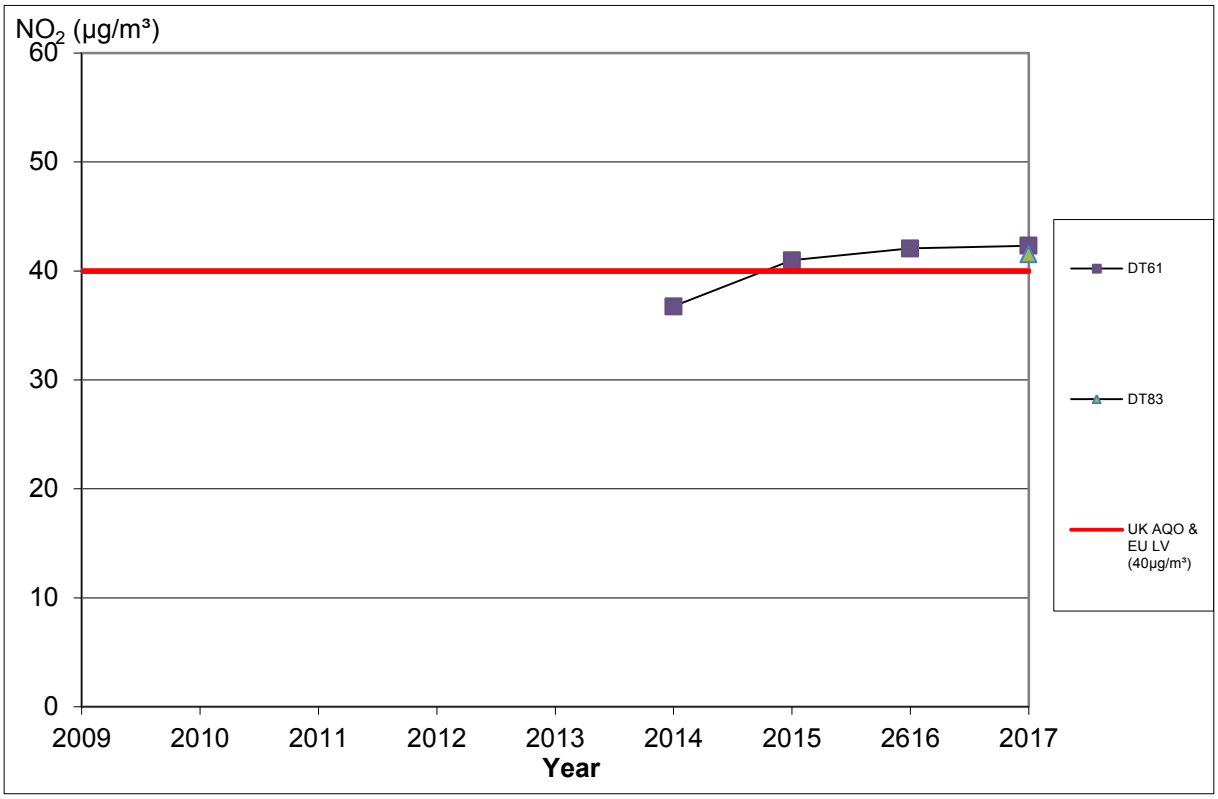


A general downward trend is seen in this area. Sites DT11, DT22 and DT30 were decommissioned at the end of 2016 as results had remained consistently below the UK AQO. Diffusion tubes were located at three new sites; DT84, DT85 and DT86 to determine whether the UK AQO is exceeded on the B5051, Moorland Road near to the junction with the A50, Waterloo Road. There is residential accommodation above the commercial properties at DT85 and DT86 locations. DT84 currently has commercial use and therefore is not a relevant receptor, but this site was chosen at worst-case and to gather data for any future proposed change of use.

Concentrations at all three sites were below the UK AQO. One site has remained at or above the objective in this area; DT26, located at the façade of the Post Office Vaults Public House. The pub is classed as a relevant location, as there is residential accommodation above the pub.

The location of the tubes can be seen on Figure D. 5.

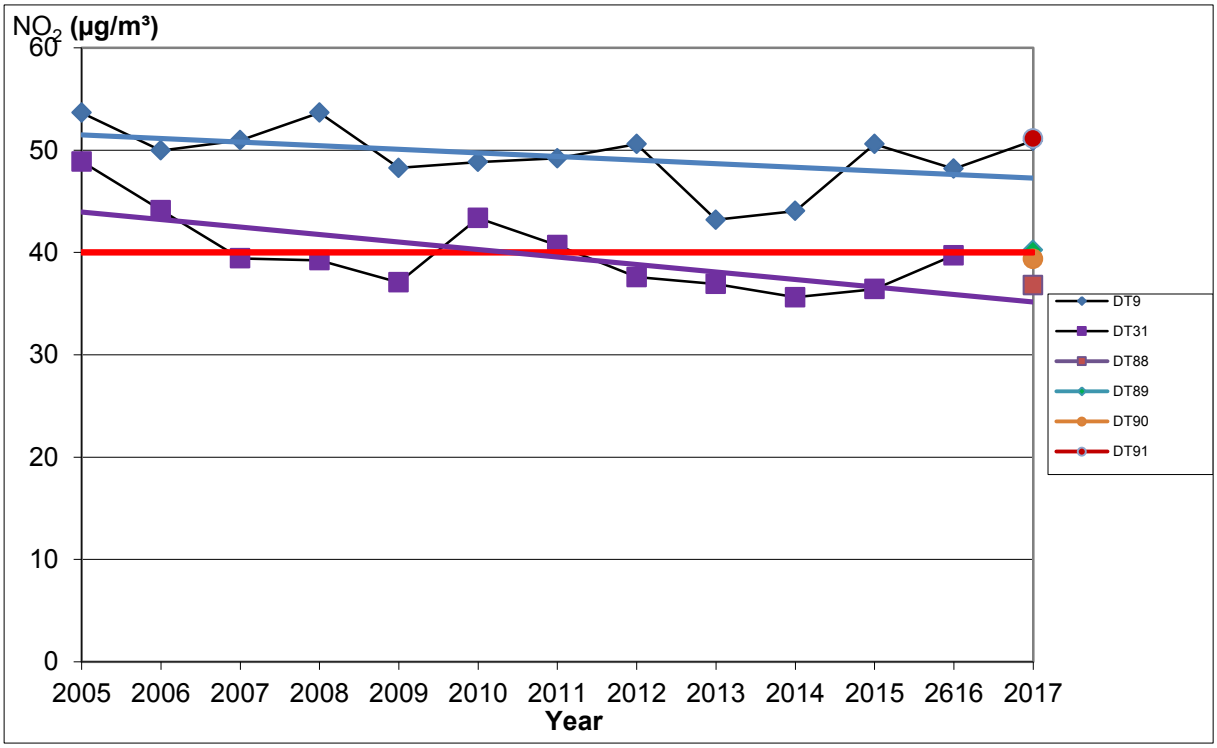
Figure A. 5 – Trend in Annual NO_2 concentrations at Milton diffusion tube sites



No trend analysis is available, as monitoring has only been carried out at DT61 for four years. This site remains above the UK AQO. The tube is located close to the Travellers Rest Public House, which has residential accommodation above the pub. A second diffusion tube, DT83 was sited approximately 50 m to the south to determine whether the UK AQO is exceeded at this location, adjacent to residential property. Distance correction was applied at this site, as the tube is closer to the road than the property. The distance corrected concentration was 38 µg/m³ and therefore lower than the UK AQO at DT83.

The location of the tubes is shown on Figure D. 6.

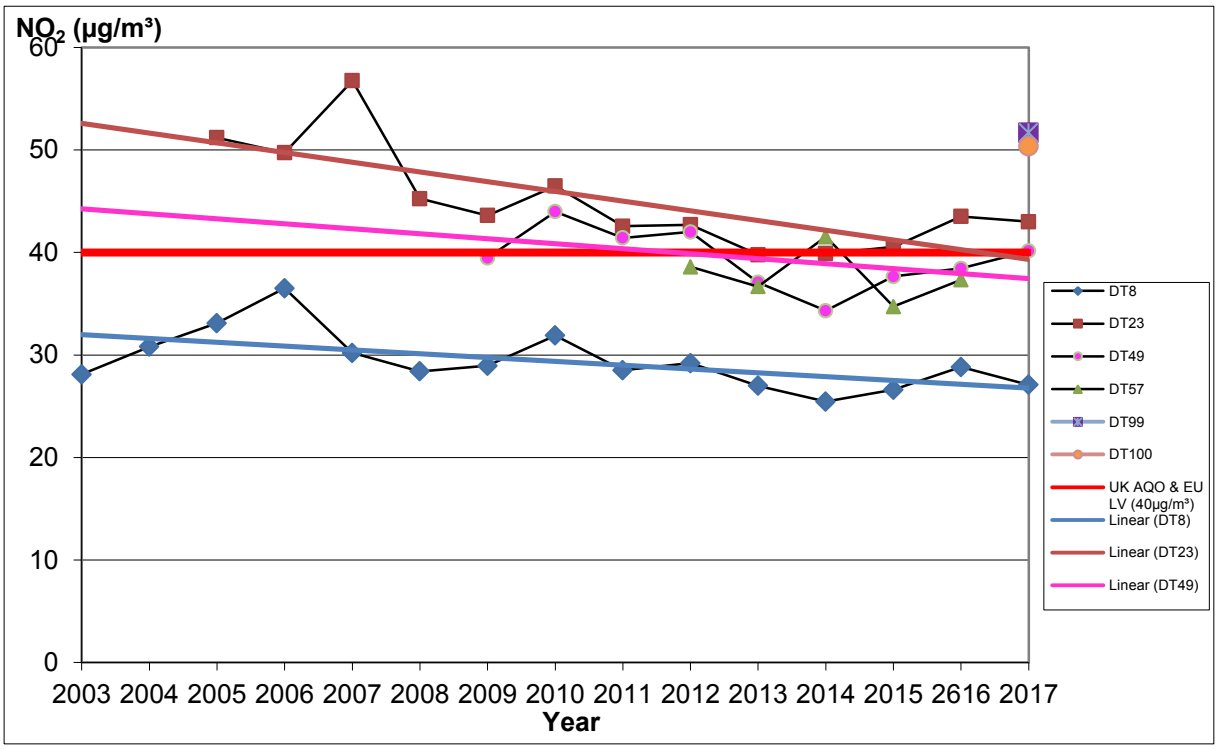
Figure A. 6 – Trend in Annual NO_2 concentrations at Cobridge diffusion tube sites



Site DT31 was decommissioned at the end of 2016, as results had been consistently below the UK AQO and a downward trend had been shown at this site. Site DT9, located at a residential property close to the junction of the A50, Waterloo Road with the A53 Cobridge Road remains above the UK AQO. To determine whether the UK AQO was exceeded at other locations in this area, three additional diffusion tubes were sited on Waterloo Road, to the north of the junction, DT88, DT89 and DT90, and one to the south and south, DT91. Distance correction was carried out for DT88, DT89 and DT91, as all were located closer to the road than the nearest property. The concentration at the property closest to DT88 and DT89 was 34µg/m³ and 32 µg/m³ respectively and therefore below the UK AQO. However the distance corrected result for DT91, located to the south of DT9 was 47 µg/m³ and therefore exceeds the UK AQO. DT 90 is not representative of, but is as close as practicable to the nearest residential property. The property is located at the same distance from the road but a few metres further north from the junction of A50 and A53. The concentration at this site is slightly below the UK AQO at 39 µg/m³.

The locations of the tubes can be seen on Figure D. 7.

Figure A. 7 – Trend in Annual NO_2 concentrations at City-centre diffusion tube sites



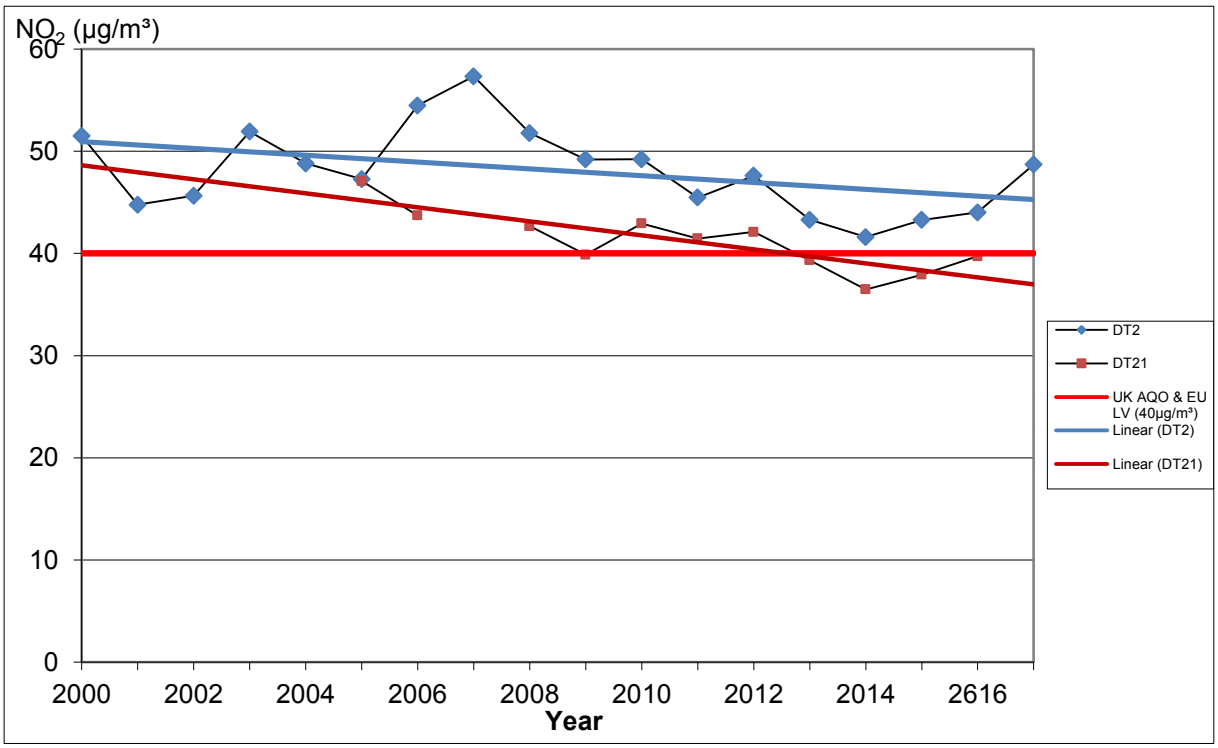
DT57 was decommissioned at the end of 2016, following results consistently below the UK AQO. The location of DT8, DT23, DT99 and DT100 are shown on Figure D. 8. DT 8 is co-located with CM1, Stoke-on-Trent Centre AURN monitor, where concentrations show a downward trend and have remained consistently below the UK AQO.

A downward trend is seen for DT23, located on Bucknall New Road, but it continues to exceed the UK AQO. Two new tubes were located adjacent to properties on Bucknall New Road with proposed change-of-use to residential. The properties are nearer to the junction of Bucknall New Road and Potteries Way than DT23. DT99 and DT100 show that the UK AQO is also exceeded at these two locations and the concentration is higher than that at DT23.

Figure D. 9 shows the location of DT49. There is a downward trend at this location. This tube is not representative of a receptor, but a planning application has been submitted for a residential development in this area. An Air Quality Assessment has been received in support of the application, which shows that the UKAQO is likely to be exceeded https://planning.stoke.gov.uk/online-applications/files/34E9713681AAC81B39616D9159E266DE/pdf/61804_FUL-

AIR_QUALITY_ASSESSMENT-252650.pdf . The applicant has proposed mitigation in the form of mechanical ventilation at the affected properties.

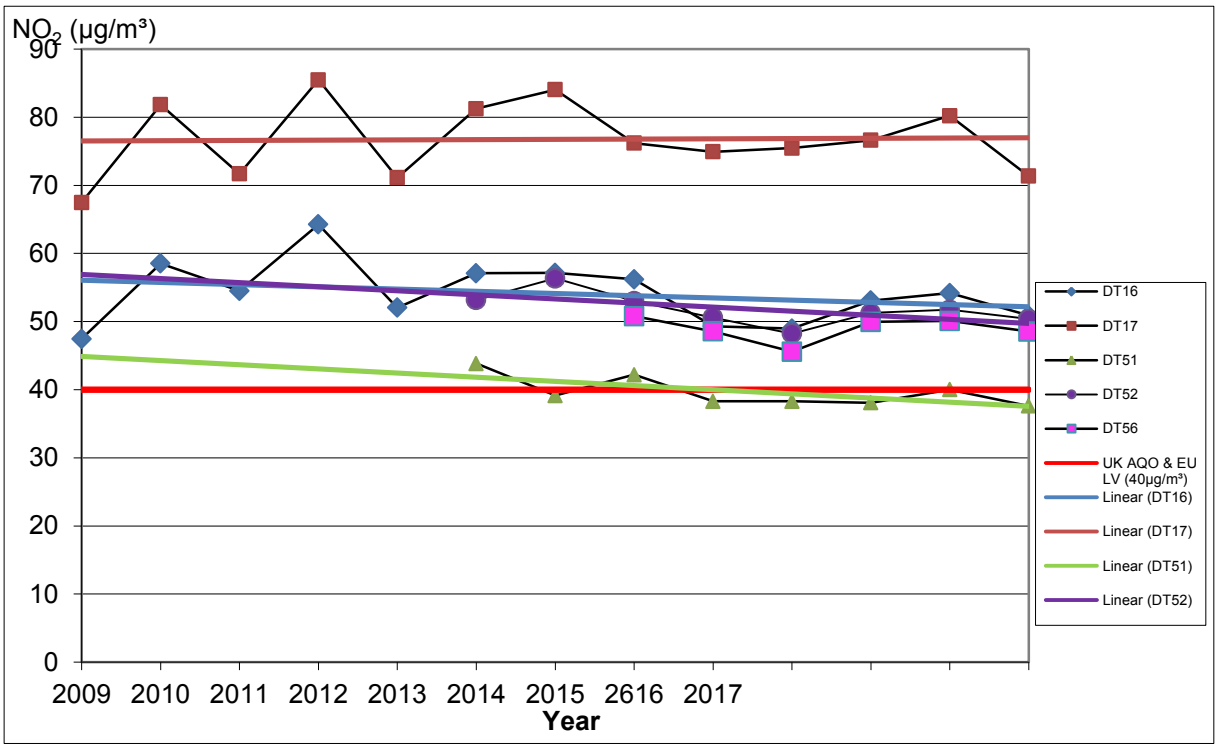
Figure A. 8 – Trend in Annual NO_2 concentrations at Bucknall diffusion tube sites



The graph shows a downward trend in this area. DT21 was decommissioned at the end of 2016, as results had been consistently below the UK AQO. DT2 is located near to the traffic light controlled junction of Dividy Road and Werrington Road, is representative of receptors and has remained above the UK AQO.

Diffusion tube locations are shown on Figure D. 10.

Figure A. 9 – Trend in Annual NO_2 concentrations at Etruria Road, Basford diffusion tube sites



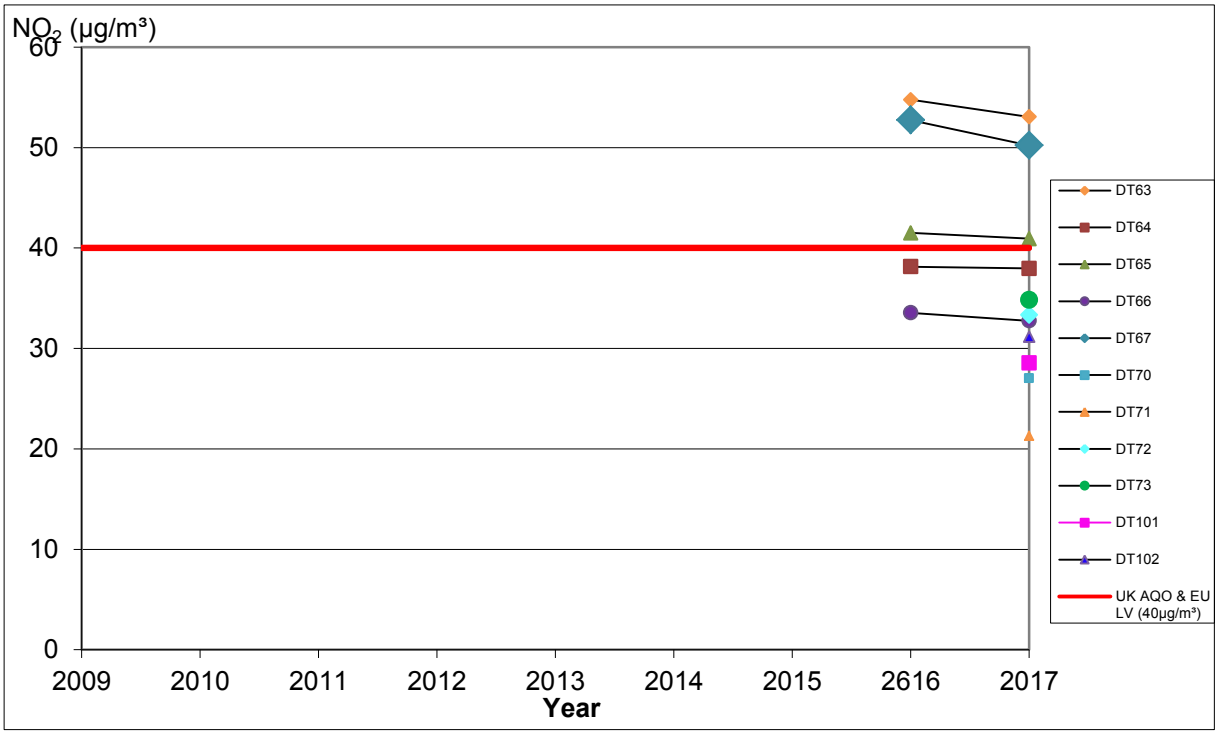
The location of the tubes in this area is shown in D. 11 and D. 12.

A general downward trend is shown at monitoring sites on Etruria Road, however, only one of the sites was below the UK AQO, DT51.

DT17 has the highest concentrations of 71 µg/m³. The tube is only a little closer to the road than the carriageway and after distance correction the concentration at the façade is calculated to be 68 µg/m³. Therefore, it is likely that the hourly UK AQO is exceeded at the property. The tube is located at the entrance to a cutting, forming a canyon with a tree canopy that may inhibit dispersal of pollutants when in-leaf.

DT56 is co-located with CM5. Distance correction at DT56 and CM5 result in concentrations of 44 µg/m³ and 46 µg/m³ respectively. DT16 and DT52, located further to the west are both above the UK AQO. DT52 is located closer to the road than the receptor. Distance correction resulted in a concentration of 46 µg/m³ and therefore, the UK AQO is likely to be exceeded at the property.

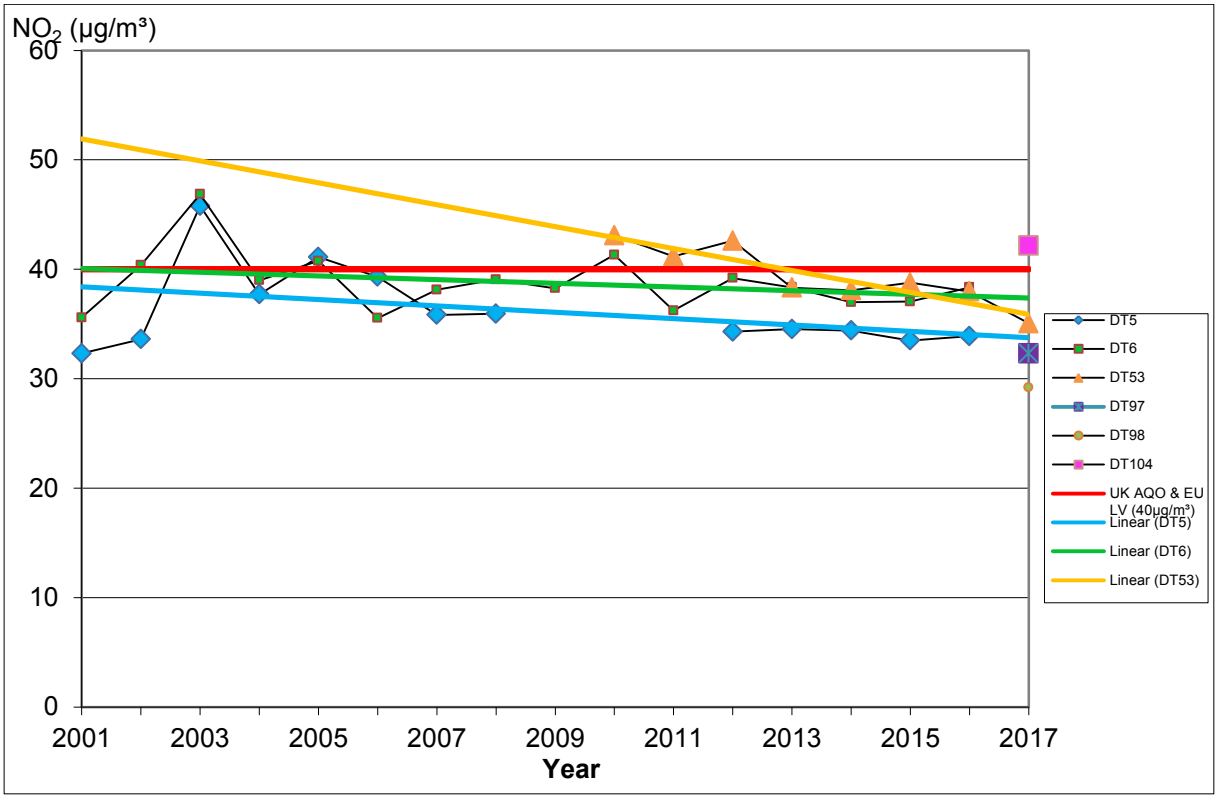
Figure A. 10 – Trend in Annual NO_2 concentrations at Victoria Street, Basford and Hartshill diffusion tube sites



Diffusion tubes in this area have been in place for either one or two years, therefore, trend analysis is not possible. Tubes in this area were added to determine whether the UK AQO was exceeded at Victoria Street, Shelton New Road and Hartshill Road. Etruria Road, Shelton New Road and Harthill Road are three major routes between the borough of Newcastle-under-Lyme and the city of Stoke-on-Trent. Victoria Street is heavily trafficked as it links Harthill Road, Shelton New Road and Etruria Road. The Location of the tubes is shown in Figure D. 13, D. 14 and D. 15. The UK AQO is exceeded at DT63, DT65 and DT67. DT64 is located closer to the road than the property. Distance correction resulted in a concentration at the façade within 10% of the UK AQO at 36 µg/m³. DT63, DT64 and DT65 are located near to the junction of Victoria Street and Etruria Road. DT67 is located on Shelton New Road close to the junction with Victoria Street. This tube is closer to the road than the nearest property. Distance correction at this location indicates that the UK AQO is exceeded at the façade of the property, as the corrected concentration is 45 µg/m³. Diffusion tube DT73, on Victoria Street close to the junction with Hartshill Road is below the UK AQO, as are the two tubes on Hartshill Road, DT101 (close to the junction with Victoria Street) and DT102 (close to a pedestrian crossing).

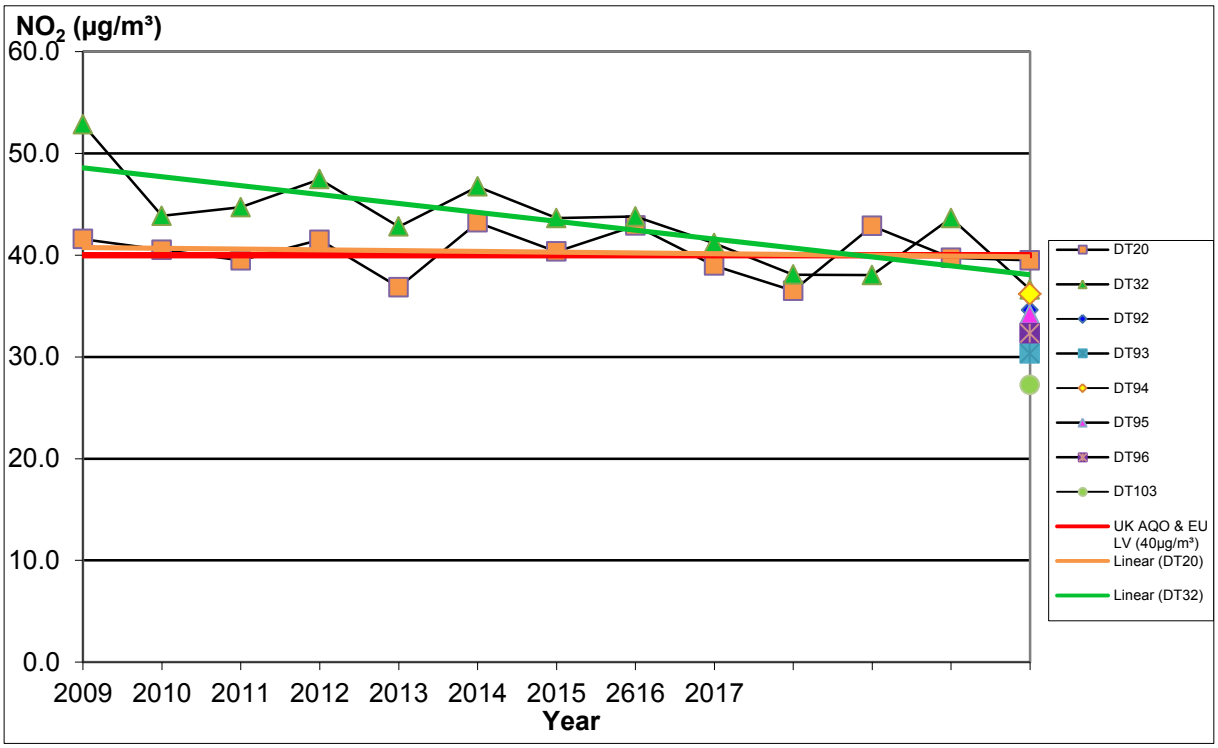
DT70 and DT71 on Ashlands Road were located at the request of a city councillor, in response to concerns from local residents that minibuses used to ferry NHS staff from a carpark via Ashlands Road was detrimental to air quality. The concentrations of 25 µg/m³ and 21 µg/m³ were significantly below the UK AQO and monitoring was discontinued at the end of 2017. The location of the tubes is shown in D. 16.

Figure A. 11 – Trend in Annual NO_2 concentrations at College Road and Station Road, Stoke



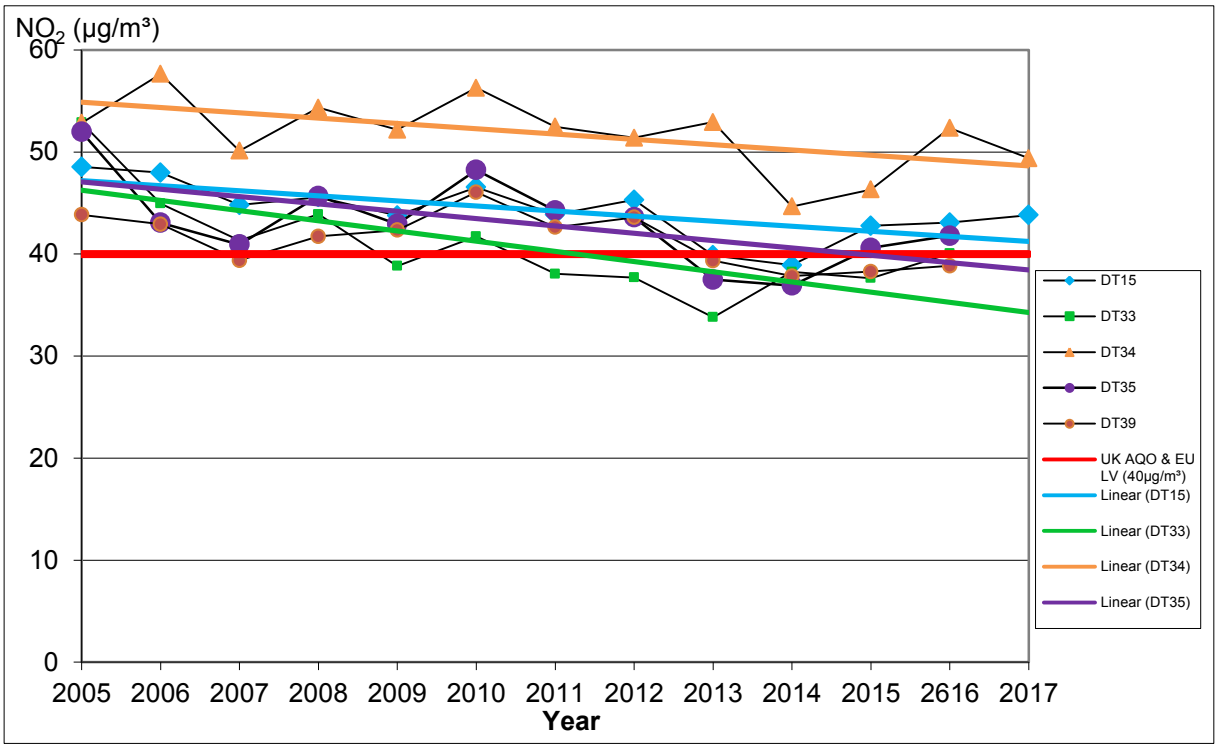
A downward trend in concentrations is seen in this area. Tube locations are shown in Figures D. 17 and D. 18. DT5 and DT6 were discontinued at the end of 2016, as concentrations had remained below the UK AQO. Two new sites DT97 and DT98 were added in 2017 on College Road. This is a major bus route between the railway station and the city-centre. DT104 located on the footpath outside the railway station was also added in 2017. Major re-routing of traffic away from this area is planned; therefore, 2017 data would represent baseline concentrations. DT104 is not representative of residential receptors. The hourly mean UK AQO is not likely to be exceeded at this location, as the annual mean concentration is less than 60 µg/m³.

Figure A. 12 – Trend in Annual NO_2 concentrations at Leek Road, Stoke



There is a general downward trend at long-term monitoring sites on this road. Tube locations are shown in Figures D. 19, D. 20 and D. 21. All 2017 concentrations are below the UK AQO, though DT20 is equal to the objective. DT20 is located at the façade of the Village Tavern Public House, which has residential use at the first floor. New locations in this area were added in 2017 to obtain baseline data for the planned re-routing of traffic around the station, as mentioned above; together with re-alignment of traffic lanes on Leek Road at the approach to the junction with Station Road; and changes to the approach lanes to the roundabout at the junction of Leek Road (A52) and Victoria Road (A50). However, this project has been put on hold for the time-being.

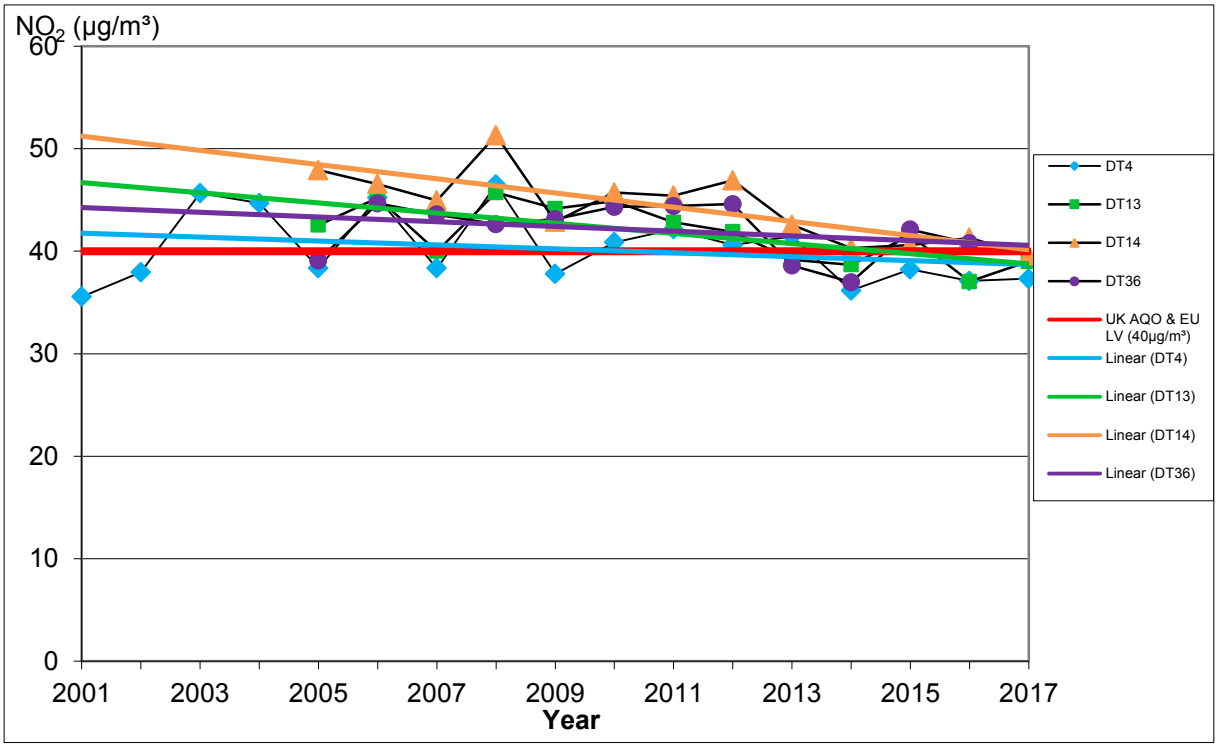
Figure A. 13 – Trend in Annual NO_2 concentrations at Victoria Road, Fenton



The graph shows a downward in this area. At the end of 2016, DT33 and DT35 were discontinued as in each case the tube was closer to the road than the property was. Distance corrected concentrations had been consistently below the UK AQO at both sites. DT15 and DT34 remain above the UK AQO. Victoria Road (A50) is a main route from the A50 trunk road to the city centre. It is a major bus route to the south of the city and HGVs use this road to access Fenton Industrial Estate and Berryhill Industrial Estate.

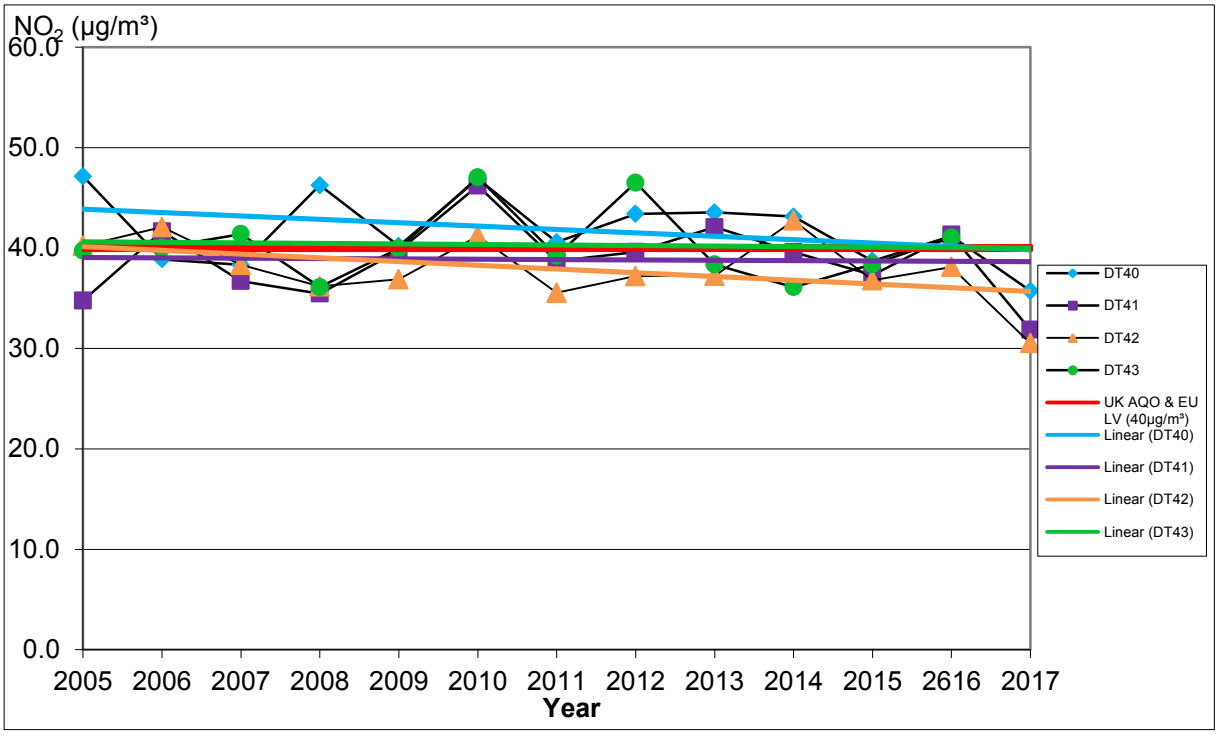
Location of the tubes is shown on Figure D. 22.

Figure A. 14 – Trend in Annual NO_2 concentrations west of Meir Tunnel and north of the A50 trunk road



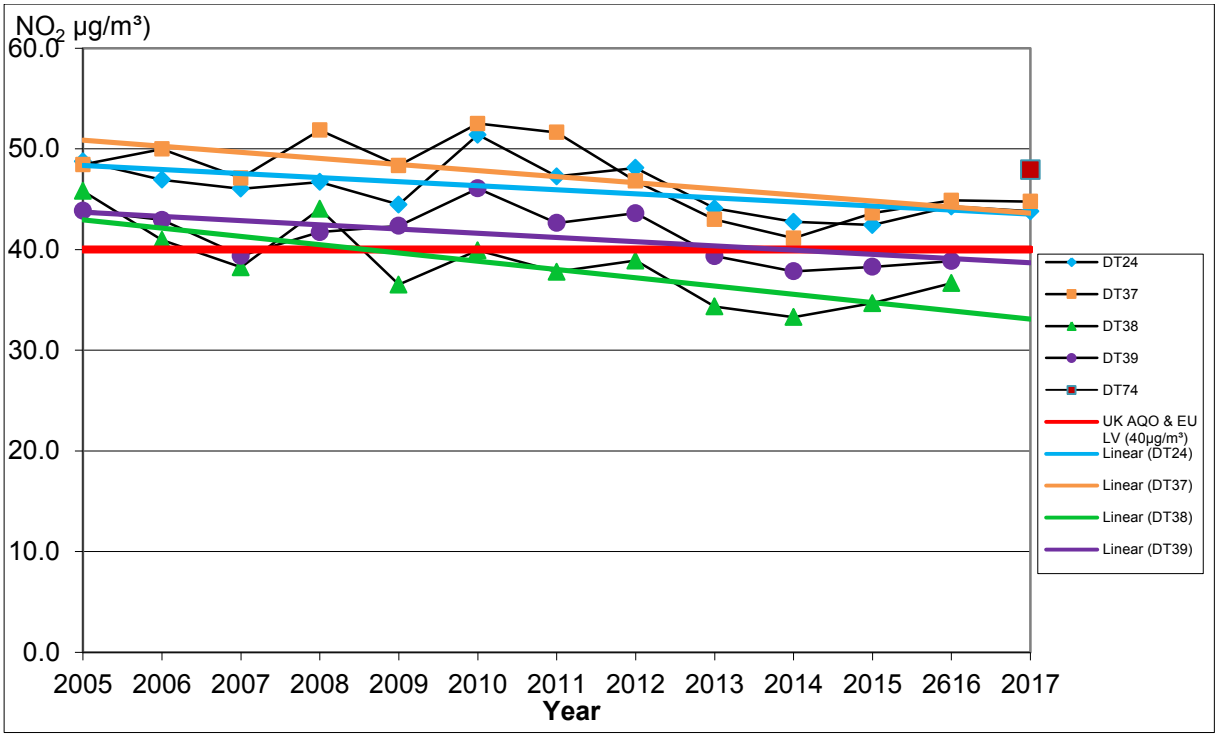
A downward trend is shown in this area. The location of the tubes is shown in Figures D. 23 and D. 24. DT13 and DT14 are closer to the road than the nearest receptor. Distance correction for these two tubes resulted in concentrations of 36 µg/m³ and 37 µg/m³ respectively. DT4, located on a residential property, has remained below the UK AQO for the past four years. DT36 was discontinued at the end of 2016. The tube was located closer to the road than the tube and distance correction had shown that results at the façade were below the UK AQO in the previous four years.

Figure A. 15 – Trend in Annual NO_2 concentrations west of Meir Tunnel and south of the A50 trunk road



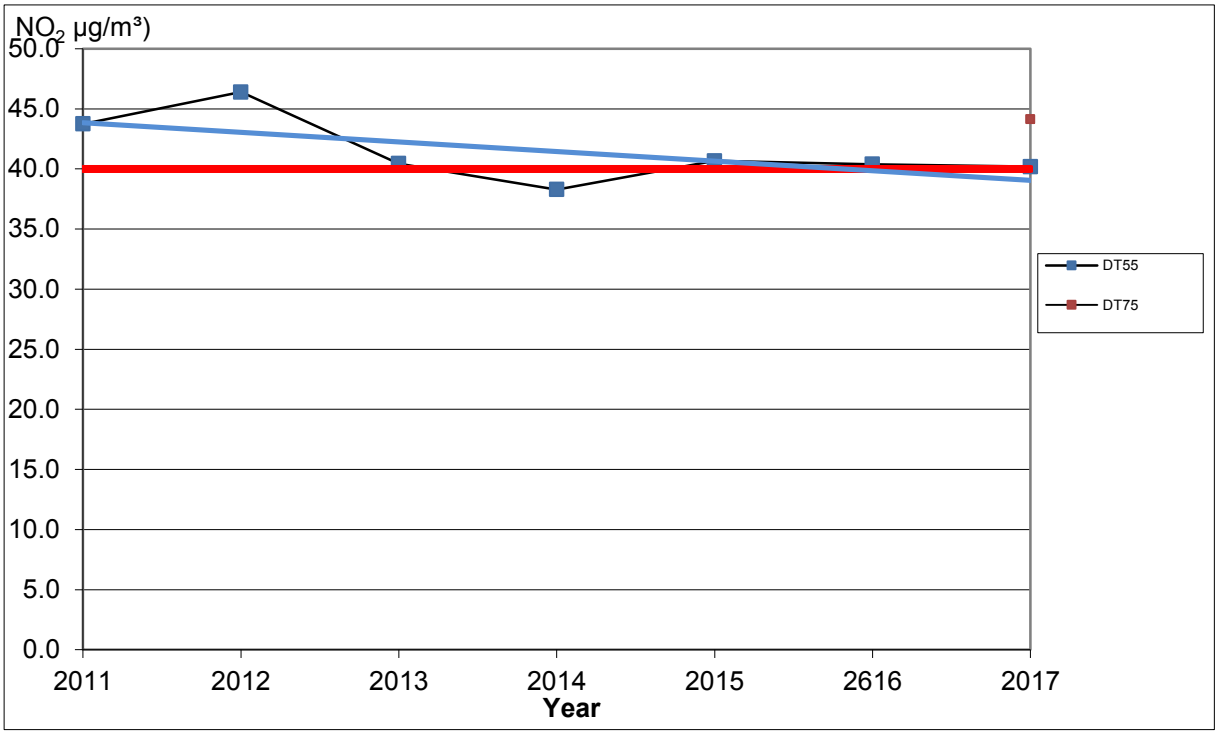
A downward trend is seen at these locations and all are below the UK AQO. DT43 was discontinued at the end of 2016, as it was not representative of receptors. Tube locations are shown in D. 24.

Figure A. 16 – Trend in Annual NO_2 concentrations at Weston Road, Meir



DT38 and DT39 were discontinued at the end of 2016, as results had remained below the UK AQO for the previous four years. A downward trend is shown at location on Weston Road. A new site was set up in 2017, DT74 to determine whether the exceedance of the UK AQO at DT37 extended further north on Weston Road. DT74 is located closer to the road than the property. Distance correction resulted in a concentration of 44 µg/m³ at the façade; therefore, the UK AQO is likely to be exceeded. Location of the tubes is shown on D. 25.

Figure A. 17 – Trend in Annual NO2 concentrations east of the Meir Tunnel and north of the A50 trunk road



Monitoring shows a downward trend in concentrations at this location. The concentration at DT55 is equal to the UK AQO. An additional monitoring point was added in 2017 to determine whether there was an exceedance of the objective further to the east. DT75 is located closer to the road than the tube. Distance correction indicates that the UK AQO is not likely to be exceeded at the nearest property. The location of the tubes is shown on Figure D. 26.

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2013	2014	2015	2016	2017
CM1	Urban Background	Automatic	99	99	0	0	0	0	0
CM2	Roadside	Automatic	93	93	2 (185)	0 (124)	1	0 (127)	0
CM5	Roadside	Automatic	94	94	3	4	0	2 (160)	2
CM6	Roadside	Automatic	99	99	-	-	3 (179)	12	4

Notes:

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.**

(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%).

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

Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2013	2014	2015	2016	2017
CM1	Urban Centre	Decommissioned 2015	NA	20	18	17	-	-
CM3	Roadside	Decommissioned 2015	NA	25	24	22	-	-
CM4	Industrial	Decommissioned 2013	NA	10	-	-	-	-
CM5	Roadside	97	97	-	-	-	-	23
CM6	Roadside	95	95	-	-	20	20	18

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

Exceedances of the PM_{10} annual mean objective of 40$\mu g/m^3$ are shown in **bold.**

(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%).

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2013	2014	2015	2016	2017
CM1	Urban Centre	Decommissioned 2015	NA	6	8	0 (29)	-	-
CM3	Roadside	Decommissioned 2015	NA	10 (35)	15	7	-	-
CM4	Industrial	Decommissioned 2013	NA	10 (35)	-	-	-	-
CM5	Roadside	97	97	-	-	-	-	10
CM6	Roadside	95	95	-	-	1 (29)	5	3

Notes:

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold.**

(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%).

(3) If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

Table A.7 – $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2017 (%) (2)	$PM_{2.5}$ Annual Mean Concentration (µg/m^3) (3)				
				2013	2014	2015	2016	2017
CM1	Urban Centre	94	94	14	13	12	12	9

☒ **Annualisation has been conducted where data capture is <75%**

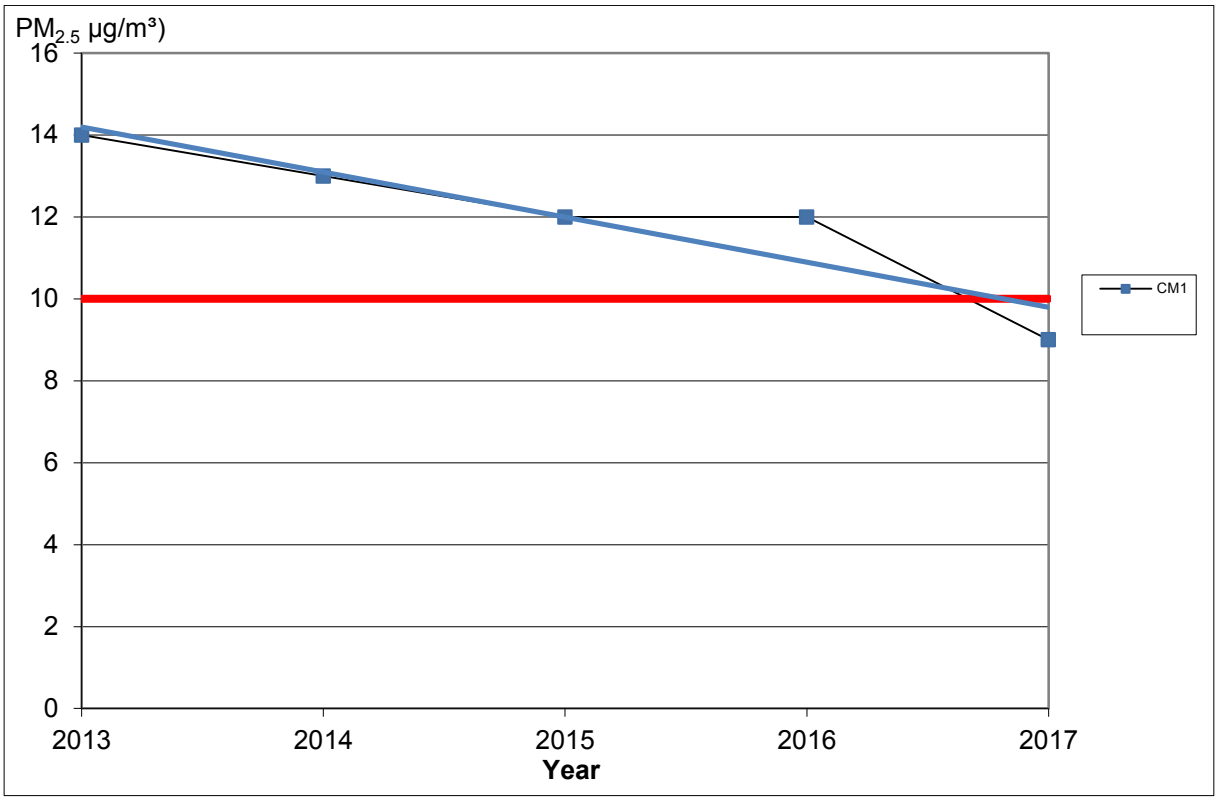
Notes:

(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%).

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.18 – Trends in Annual Mean $PM_{2.5}$ Concentrations



The graph shows a downward trend in $PM_{2.5}$ concentrations. The result for 2017 was less than the WHO recommendations for $PM_{2.5}$.

Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2017

Site ID	NO_2 Mean Concentrations (µg/m^3)														
													Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.89) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
DT1	38.0	27.5	22.2	13.3	14.8	12.5	15.3	16.1	20.2	19.3	26.8	28.8	21.2	18.9	
DT2	65.2	53.5	47.6	34.5	43.1	47.0	44.4	46.1	48.4	51.6	< 1.0	120.5	54.7	**48.7**	
DT3	36.8	25.1	22	11.1	13.3	13.3	13.7	14.6	17.8	19.4	29	28.3	20.4	18.1	
DT4	44.9	46.7	42.6	29	36	39.8	37	38	42.4	44	50.2	52.5	41.9	37.3	
DT8A	44.6	35.9	31.1	26	25.7	24	25.4	25.7	31.4	28.1	38.8	38.2	31.2	27.8	
DT8B	39.1	30.7	32.7	18.2	24.9	21.6	26.3	24.7	32	25.3	37.4	38.5	29.3	26.1	
DT8C	38.9	34.8	30.9	24.1	23.2	I/S	25.3	25	32.9	27.4	37.8	38.3	30.8	27.4	
DT9	59.1	61	60	35.1	42.8	62	52.2	60.9	59.3	60.3	64.9	69.1	57.2	**50.9**	
DT10	46	42.1	41.3	40.6	37.8	34.6	37.7	37.1	44.7	40.1	43.1	I/S	40.5	36.0	
DT13	65.9	50	47.1	35.1	39.8	37.6	32.5	37.4	43.6	44.5	44	48.3	43.8	39.0	36.2
DT14	61.1	52.2	49.4	30.2	42.5	41.2	38.2	38.6	47.1	45.9	48.3	39.1	44.5	39.6	36.9
DT15	61.6	52.5	52.8	36.5	38.3	44.5	41.8	49.3	50.9	48.8	60.8	53	49.2	**43.8**	
DT16	I/S	58.4	60.1	41.9	51.8	57.5	53.6	55.2	59.3	62.7	64	64.4	57.2	**50.9**	
DT17	99	94.3	87.5	56.7	80.7	I/S	56.3	82.2	71.7	79.8	83.9	89.9	80.2	**71.4**	**68.0**
DT20	63.9	45.5	43.3	26.2	34.8	38.7	38.2	34.5	47	44.6	58.2	57.5	44.4	39.5	
DT23	60	51.6	47.5	39	40.4	38.5	42.5	45.3	53.5	44.2	62.6	54.8	48.3	**43.0**	
DT24	60.3	52.1	50.7	42.1	44	45.8	42.2	46.5	51.5	48.4	56.7	50.3	49.2	**43.8**	

DT29	60.6	53.6	53.9	34.3	40.2	45.2	39.7	43.2	46.9	48.5	53.7	54.8	47.9	**42.6**	
DT32	57.2	47	44.2	32	38	35.2	35.4	32.3	43.2	39.5	45.2	44.6	41.2	36.6	34.0
DT34	79	I/S	95.9	40.1	54.8	47.3	46	46	53.8	50.2	57	40.3	55.5	**49.4**	
DT37	65.3	61.3	52.5	30.9	48.5	48.3	39.9	I/S	48.6	52.5	52.8	52.6	50.3	**44.8**	
DT40	51.5	50.4	49.3	27.4	49.5	35.8	33.4	32.4	43.2	32.4	37.9	38.5	40.1	35.7	
DT41	44	47.7	40.8	26.7	45.9	32	31.9	26.6	38.8	28.7	33.9	32.6	35.8	31.9	
DT42	52.1	38.7	44.2	27.8	37.1	28.3	28.4	24.6	36.3	23.9	37.4	32.8	34.3	30.5	
DT49	59.3	I/S	42	30.5	31.9	36.8	I/S	38.5	47	I/S	67.4	52.6	45.1	**40.1**	
DT51	55.1	46.6	44.2	31.1	40.4	33.8	35.9	39.8	44.1	40.7	49.8	45.8	42.3	37.6	36.6
DT52	71.7	64.5	58.1	36.7	47.5	49.4	52.9	54.1	59.1	58.8	66.9	59.4	56.6	**50.4**	**46.2**
DT53	46.8	48.1	43	28	31.8	30	33.1	31.5	40	42.3	51.4	46.7	39.4	35.1	
DT55	66.5	53.1	47.8	34.3	38.1	40.5	36	37.9	45.1	45.1	51.9	45.5	45.2	**40.2**	
DT56A	67	58.4	54.9	41.7	45.2	55.4	27.5	57.3	62.6	56.1	56.3	60.4	53.6	**47.7**	**44.2**
DT56B	62.3	60.4	56	38.4	47.8	53.7	53	51.7	61.3	60.5	55.1	55.2	54.6	**48.6**	**44.2**
DT56C	69.5	63.7	57.1	37.2	45.5	58	50.3	54.3	59.9	57.6	54.4	58.1	55.5	**49.4**	**44.2**
DT61	65.4	47	53	41.2	39.8	42.4	41.2	I/S	43.5	44.4	53	52.2	47.6	**42.3**	
DT63	72.9	60.8	59.7	48.3	44.4	59.1	52.9	57.3	59.9	60.2	71	68.8	59.6	**53.1**	
DT64	66	I/S	52.6	28.5	34.4	34.9	32.7	36.7	41.6	I/S	47.9	51.3	42.7	38.0	36.1
DT65	65.1	54.3	50.2	34.1	37.2	40.1	40.2	42.4	48	48.2	I/S	I/S	46.0	**40.9**	
DT66	58.7	41.6	38.6	28.4	27.7	28.8	28.7	29	38.1	36.7	43	42.2	36.8	32.7	
DT67	78.8	78.1	59.6	39.3	47.3	54.2	47.9	47.7	55.1	52.8	54.5	61.8	56.4	**50.2**	**45.4**
DT70	34.6	37.5	34.4	16.9	17.3	27	26.7	25.9	32.4	34.2	38.7	38.6	30.4	27.0	
DT71	35.3	28.5	25.7	13.6	23.8	16.3	17.8	18.4	22.9	23.2	31	30.7	23.9	21.3	
DT72	57.2	I/S	41.9	27.8	40.6	29.8	33.1	32.1	42.5	28.9	41.5	36.7	37.5	33.3	
DT73	55.1	46.2	42.9	25	29.2	33.7	32	35.5	39.6	38.5	42.7	49.1	39.1	34.8	
DT74	70	54.7	57.8	39.9	47.5	53.9	43.3	52.9	56.5	55.4	60.4	53.7	53.8	**47.9**	**43.8**
DT75	62.2	59.5	53.9	34.1	35.4	46.5	43.3	44.8	51.6	49.5	58.7	55.5	49.6	**44.1**	36.8

DT76	66.5	50.8	49.1	26	39	37	35.7	37.2	41.6	43.1	45.7	45.8	43.1	38.4	36.7
DT77	66.9	59.3	57.2	36.7	45.8	45.8	I/S	46.7	55.8	49.4	55.9	54.7	52.2	**46.5**	39.4
DT78	64.5	51.9	49.8	32.4	36.9	73.3	39.4	38.1	47.7	44.4	53.5	50.9	48.6	**43.2**	
DT79	59.9	50.9	47.9	35.9	38.7	40.2	39.6	39.8	45.3	45.4	50.9	48.6	45.3	**40.3**	
DT80	52.7	48.3	43.5	27.2	31	28.2	31	32.2	38	34.6	40.8	44.1	37.6	33.5	
DT81	57.8	43.5	41.9	28.4	34.4	30.4	31.2	32	42.9	35.8	50	45	39.4	35.1	
DT82	55.2	I/S	40.5	29.2	35.8	34.4	35.2	33.8	40.2	37.8	45.5	45	39.3	35.0	
DT83	62.9	I/S	48.6	43.6	35.9	39.1	40.2	40.4	48.1	43.7	58.5	52.2	46.7	**41.5**	37.9
DT84	I/S	46.3	46	34.7	38.7	36.4	40.2	41.1	47.8	41.7	50.1	47.5	42.8	38.1	37.3
DT85	59.3	45.5	45	22.7	36	34.6	33.4	34.1	41.5	38.7	43.3	46.9	40.1	35.7	33.0
DT86	57.4	49.1	49.4	25.7	36.7	40	36.4	39.3	42.9	46.6	I/S	50.3	43.1	38.3	
DT87	89.4	< 1.0	I/S	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0	0.0	
DT88	59.4	43.8	92.9	23.6	31.5	30.9	28.5	32.1	38.7	33.7	40.8	40.4	41.4	36.8	34.0
DT89	62.5	51.9	45.7	25.8	36.6	39.6	I/S	42	45.4	46.2	51.9	49.9	45.2	**40.3**	31.7
DT90	68.5	50.6	51	31.5	44.1	33.9	37.3	34.3	42.7	38.8	52.5	45.6	44.2	39.4	
DT91	63.1	57.6	61.4	48.2	48.7	57.9	53.3	53.9	60.1	58.8	67.6	59	57.5	**51.1**	**46.5**
DT92	55.2	42.6	41.7	25.4	33.7	30.1	34.8	29.4	41.2	35	52.4	45.1	38.9	34.6	
DT93	53.3	38.9	40.2	16.4	26.9	28.8	30.1	29.9	35.1	33.8	41.5	I/S	34.1	30.3	
DT94	55.9	45.1	I/S	29.9	28.2	30.3	33	34.5	41.1	44.7	50.4	54	40.6	36.2	
DT95	53.7	43.9	40.8	26.2	29.7	31.2	30.4	31.7	39	I/S	47.1	48.5	38.4	34.2	
DT96	54	41.1	38.4	16.3	25.8	27.6	29.1	30.7	36.1	39.4	48.5	48.5	36.3	32.3	
DT97	53.7	39.6	38.3	21.3	29.7	29.8	29.3	30.3	39.5	40.3	46.9	45.5	37.0	32.9	
DT98	48.2	37.4	33	19	25.7	24.1	26.2	25.8	35.7	32.1	45.3	41.1	32.8	29.2	
DT99	69.6	57.8	57.2	45.3	I/S	52	I/S	52.2	I/S	51.8	73.2	63.4	58.1	**51.7**	
DT100	I/S	58	57.8	36.6	52.6	I/S	55.6	53.9	63.2	54.8	67.5	65.8	56.6	**50.4**	
DT101	N/A	N/A	35.7	23.5	31	22.9	29.3	27.1	38.1	31.1	43	39	32.1	28.5	
DT102	N/A	N/A	41.8	20.9	32.9	28.4	32.5	30.6	38.1	34.2	47.5	43.3	35.0	31.2	

DT103A	N/A	N/A	N/A	N/A	28.8	28.1	31.3	27.8	37.3	35.8	48.7	41.6	30.6	27.2	
DT103B	N/A	N/A	N/A	N/A	32.5	30.1	29.7	30.2	39.5	36.8	48.8	39.6	31.4	28.0	
DT103C	N/A	N/A	N/A	N/A	25.6	30.1	30.1	28.9	35.8	33.7	43.5	41.2	29.4	26.2	
DT104	N/A	N/A	N/A	N/A	N/A	49.9	48.6	50.6	54.4	55.9	60	60.3	47.4	**42.1**	

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

☒ **Annualisation has been conducted where data capture is <75%**

☒ **Where applicable, data has been distance corrected for relevant exposure**

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.**

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

C1 Changes to sources

A new biomass boiler has been installed at a Timber Process which is regulated by the council under the Pollution Prevention and Control (England & Wales) Regulations 2016. A detailed Air Quality Assessment submitted in support of the application to vary the Permit, concluded that the stack height was sufficient to ensure adequate dispersal of pollutants and to ensure that there would not be a significant increase in pollutant concentrations at receptors. The report is available on request.

C2 Monitoring/Modelling conclusions

Monitoring has shown that the UK AQO is exceeded in some areas of the city. The current AQMA covers the whole of the city, therefore modelling and monitoring completed since the last report have not shown a requirement for the AQMA to be amended or revoked.

C3 QA/QC

Automatic monitors

Servicing

The council owned monitors are serviced every six months by a reputable service provider, in accordance with LAQM TG (16) paragraph 7.173.

Calibrations

Calibration of nitrogen dioxide analysers are carried out fortnightly by Stoke-on-Trent City Council personnel in accordance with Defra guidance LAQM TG (16) paragraph 7.171

Data management

Data management was carried by Stoke-on-Trent City Council in accordance with Defra guidance LAQM TG (16) paragraphs 7.174 to 7.178. Data from automatic monitors was collected daily via modems and stored in a database on a central server using Envitech Europe Ltd Envista ARM software. During Daily Checks,

Validation, Rescaling and Ratification procedures, all changes were recorded in a data review log together with comments and justification for any changes made.

Daily Checks

The following checks are carried out:

- Has data been polled since the previous check was carried out?
- Has an LSO calibration/engineer's calibration or been completed since the previous check was carried out: if so, invalidate NOx, NO & NO2 for time period of zero and span.
- TEOM filter change: invalidate PM_{10} data 60 minutes from the start time of the filter change.
- Overnight zero: check that the value is no greater than 4 ppb compared to the previous day.
- Overnight span: NO2 data should not change by more than 5% from previous day.
- Missing data: attempt a manual poll of data.
- Data Screening: does data follow a typical trend? If it does not, investigate possible reasons why. Decide whether to invalidate data and/or whether a call-out to the service provider is needed.

Quarterly Review

Validation

Data is reviewed quarterly to identify, log and invalidate anomalous data. Suspected anomalous data is compared to data from other monitors in the city, including the AURN Stoke-on-Trent Centre and AURN Stoke-on-Trent A50 Roadside sites. Anomalous data is invalidated and the reason is recorded in the Validation Log.

Rescaling

LSO calibration data is compared to the cylinder specification to obtain a span correction factor. Correction for zero drift is also carried out. All factors that are applied are recorded with the data set that they are applied to.

Rescaling factors are calculated in the following way:

Worked example:

NOx

LSO calibration zero response: 3ppb

Cylinder specified concentration: 451 ppb

LSO span response: 447 ppb

Scaling factor (F) = Cylinder concentration

(span-zero)

Scaling factor (F) = 451 = 1.0577

(447- 3)

Raw ambient data recorded = 71 ppb

Subtract zero (3ppb) = 68 ppb

Multiply by scaling factor (1.0577) = 71.92 ppb

NO

LSO calibration zero response: 2ppb

Cylinder specified concentration: 450 ppb

LSO span response: 448 ppb

Scaling factor (F) = Cylinder concentration

(span-zero)

Scaling factor (F) = 450 = 1.0090

(448- 2)

Raw ambient data recorded = 59 ppb

Subtract zero (2ppb) = 57 ppb

Multiply by scaling factor (1.0577) = 57.51 ppb

NO2

NO2 = rescaled NOx – rescaled NO

NO2 = 71.92 ppb – 57.51 ppb = 14.41 ppb

Conversion factor for NO2 ppb to µg/m³ = 1.91

NO2 = 14.41 x 1.91 = 27.5 µg/m³

Ratification

Rescaled data is again reviewed. Any remaining anomalous data is removed. The data is finalised and no further changes are made.

Diffusion tubes

The 2017 national bias adjustment factor for Staffordshire Scientific Services of 0.89 was applied to diffusion tubes. This factor was considered to represent monitoring locations in the city and be consistent with previous reporting. There is good data capture and good laboratory precision. Bias correction factor details are shown in Table C 1 below. The laboratory precision is shown in Table C 2

Annualisation was not required at any monitoring site as data capture was not less than 75%.

Where diffusion tubes were located closer to the road than the nearest property, distance correction has been applied. The calculations are shown in Table C 3.

Table C 1 - Bias Adjustment for Staffordshire Scientific Services

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/18

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

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

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

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

This spreadsheet will be updated at the end of June 2018

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[1]

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[5]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method	Year[1]	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[2]	Bias Adjustment Factor (A) (Cm/Dm)
Staffordshire Scientific Services	20% TEA in water	2017	R	East Staffordshire Borough Council	12	50	47	6.4%	G	0.94
Staffordshire Scientific Services	20% TEA in water	2017	O	South Staffordshire Council	11	29	41	-30.4%	G	1.44
Staffordshire Scientific Services	20% TEA in water	2017	UB	Wigan Council	11	26	18	46.7%	G	0.68
Staffordshire Scientific Services	20% TEA in water	2017	R	Stoke-on-Trent City Council	12	55	52	5.1%	G	0.95
Staffordshire Scientific Services	20% TEA in water	2017	UB	Stoke-on-Trent City Council	12	30	26	17.3%	G	0.85
Staffordshire Scientific Services	20% TEA in water	2017	R	Salford City Council	12	46	44	4.8%	G	0.95
Staffordshire Scientific Services	20% TEA in water	2017	UB	Salford City Council	12	32	26	21.4%	G	0.82
Staffordshire Scientific Services	20% TEA in water	2017	R	Cannock Chase Council	10	26	22	20.3%	G	0.83
Staffordshire Scientific Services	20% TEA in water	2017	KS	Manchester City Council	11	64	65	-1.4%	G	1.01
Staffordshire Scientific Services	20% TEA in water	2017	UC	Manchester City Council	11	40	35	13.9%	G	0.88
Staffordshire Scientific Services	20% TEA in water	2017	SI	Manchester City Council	12	25	24	6.3%	G	0.94
Staffordshire Scientific Services	50% TEA in acetone	2017	R	Stockport MBC	9	49	44	11.5%	G	0.90
Staffordshire Scientific Services	50% TEA in acetone	2017	R	Stockport MBC	12	29	20	41.0%	G	0.71
Staffordshire Scientific Services	20% TEA in water	2017	KS	Marylebone Road Intercomparison	12	89	79	13.1%	G	0.88
Staffordshire Scientific Services	20% TEA in water	2017		Overall Factor[3] (14 studies)				Use		0.89

Table C 2 – Laboratory precision

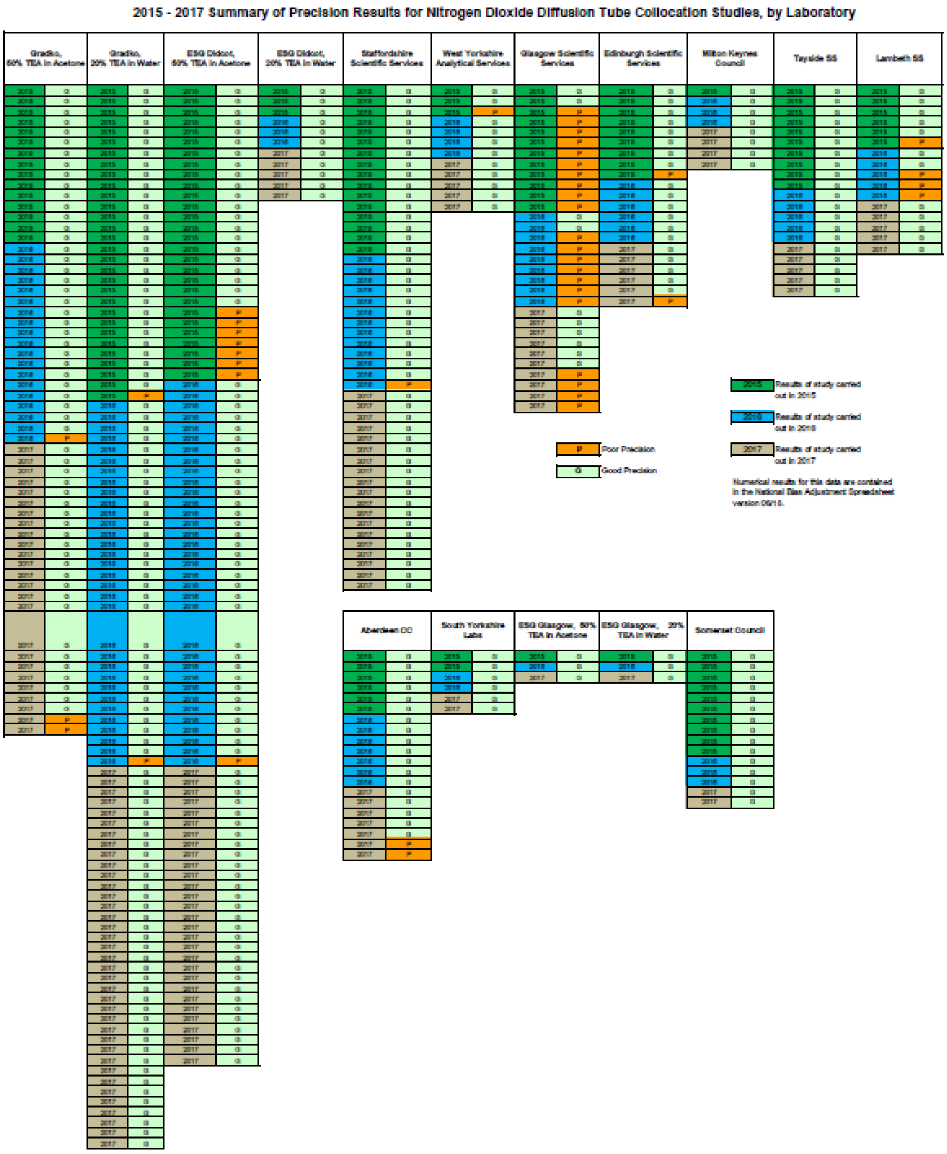


Table C 3 - Distance Correction Calculations

Enter data into the pink cells

Site Name/ID	Distance (m)		NO_2 Annual Mean Concentration (µg/m^3)			Comment
	Monitoring Site to Kerb	Receptor to Kerb	Background	Monitored at Site	Predicted at Receptor	
CM2	4.6	5.0	20.8	38.0	*37.6*	Predicted concentration at Receptor within 10% the AQS objective.
CM5	5.7	9.9	20.8	51.5	**46.2**	Predicted concentration at Receptor above AQS objective.

CM6	3.8	14.6	20.8	56.0	**42.9**	Predicted concentration at Receptor above AQS objective.
DT13	4.8	8.1	20.8	39.0	*36.2*	Predicted concentration at Receptor within 10% the AQS objective.
DT14	2.0	3.7	20.8	39.6	*36.9*	Predicted concentration at Receptor within 10% the AQS objective.
DT17	1.8	2.6	30.8	71.4	**68.0**	Predicted concentration at Receptor above AQS objective.
DT32	3.2	6.0	20.8	36.6	34.0	

DT51	18.3	20.6	20.8	37.6	*36.6*	Predicted concentration at Receptor within 10% the AQS objective. Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution. Warning: your monitor is more than 10m further from the kerb than your receptor - treat result with caution.
DT52	2.6	4.6	20.8	50.4	**46.2**	Predicted concentration at Receptor above AQS objective.
DT56	4.2	7.3	20.8	48.5	**44.2**	Predicted concentration at Receptor above AQS objective.
DT64	1.6	2.6	20.8	38.0	*36.1*	Predicted concentration at Receptor within 10% the AQS objective.
DT67	2.1	4.2	20.8	50.2	**45.4**	Predicted concentration at Receptor above AQS objective.

DT74	1.8	3.5	20.8	47.9	**43.8**	Predicted concentration at Receptor above AQS objective.
DT75	2.9	9.8	20.8	44.1	*36.8*	Predicted concentration at Receptor within 10% the AQS objective.
DT76	1.6	2.5	20.8	38.4	*36.7*	Predicted concentration at Receptor within 10% the AQS objective.
DT77	1.9	6.3	20.8	46.5	*39.4*	Predicted concentration at Receptor within 10% the AQS objective.
DT83	1.9	4.0	20.8	41.5	*37.9*	Predicted concentration at Receptor within 10% the AQS objective.

DT84	3.0	3.6	20.8	38.1	*37.3*	Predicted concentration at Receptor within 10% the AQS objective.
DT85	1.5	3.4	20.8	35.7	33.0	
DT88	1.5	3.4	20.6	36.8	33.9	
DT89	1.9	12.4	20.6	40.3	31.7	
DT91	2.7	4.9	20.8	51.1	**46.5**	Predicted concentration at Receptor above AQS objective.

Appendix D: Maps of Monitoring Locations and AQMA

Figure D. 1 - Map of automatic monitoring sites

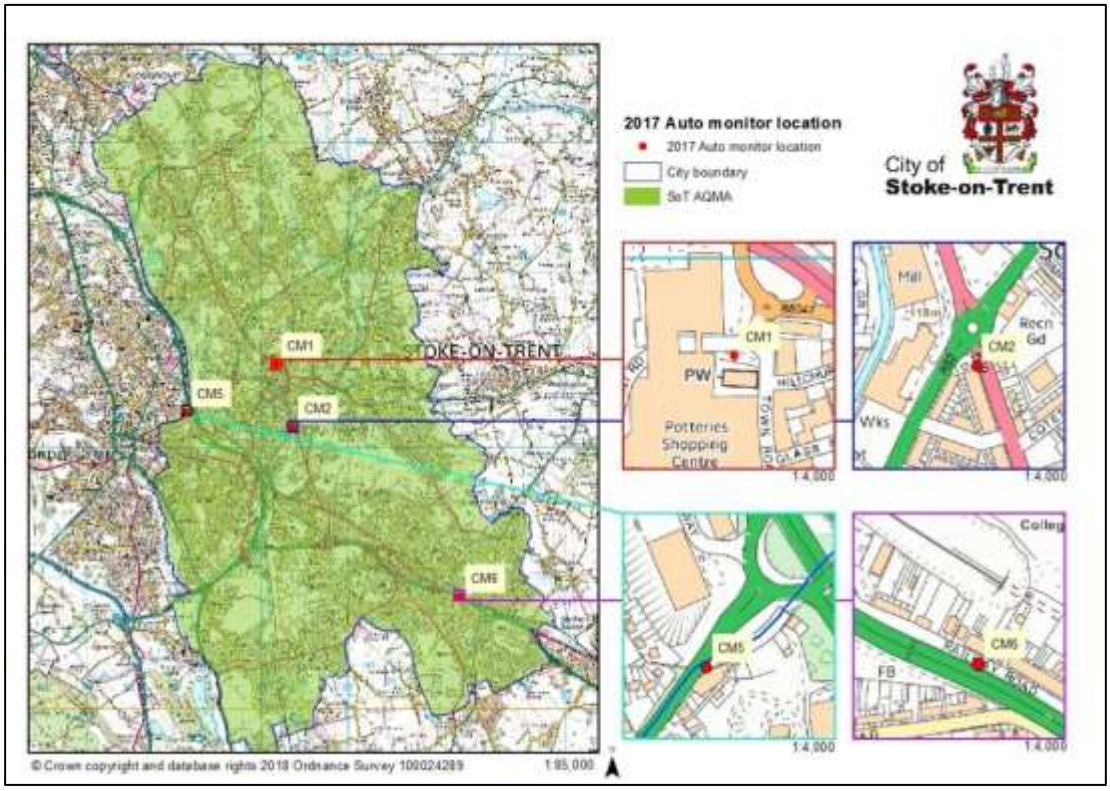


Figure D. 2 - Map of background diffusion tube sites

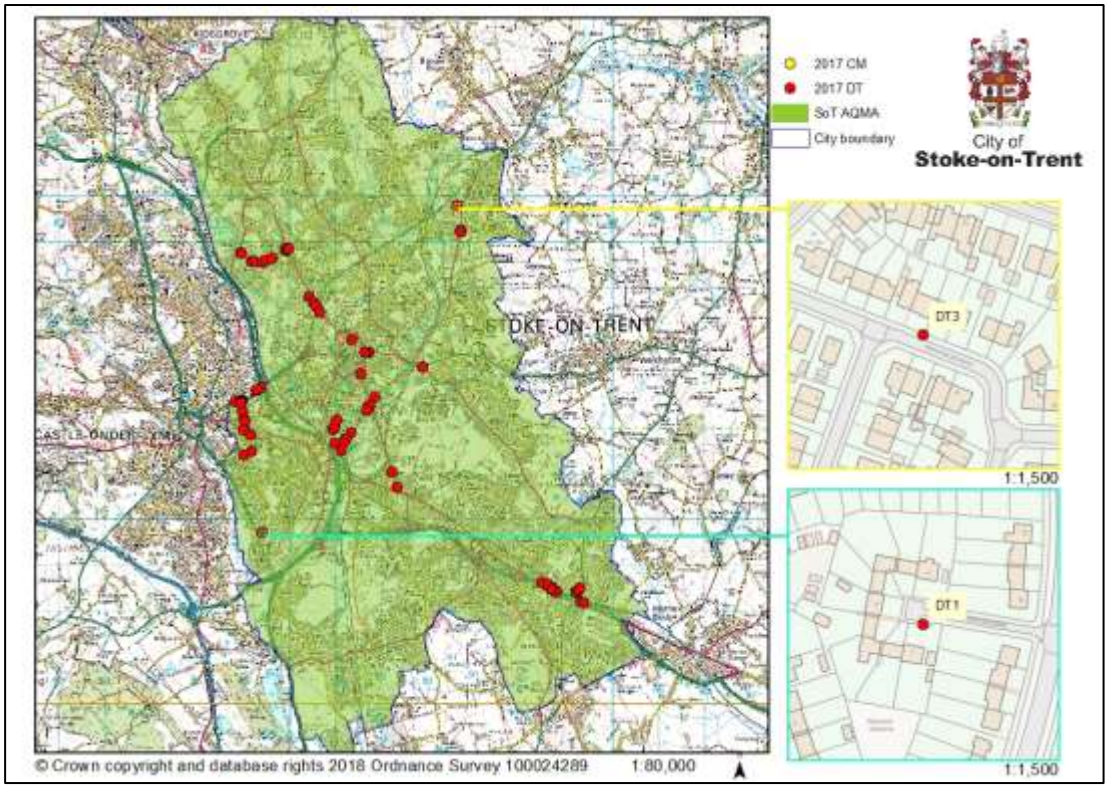


Figure D. 3 - Map of Newcastle Street (west) diffusion tube sites

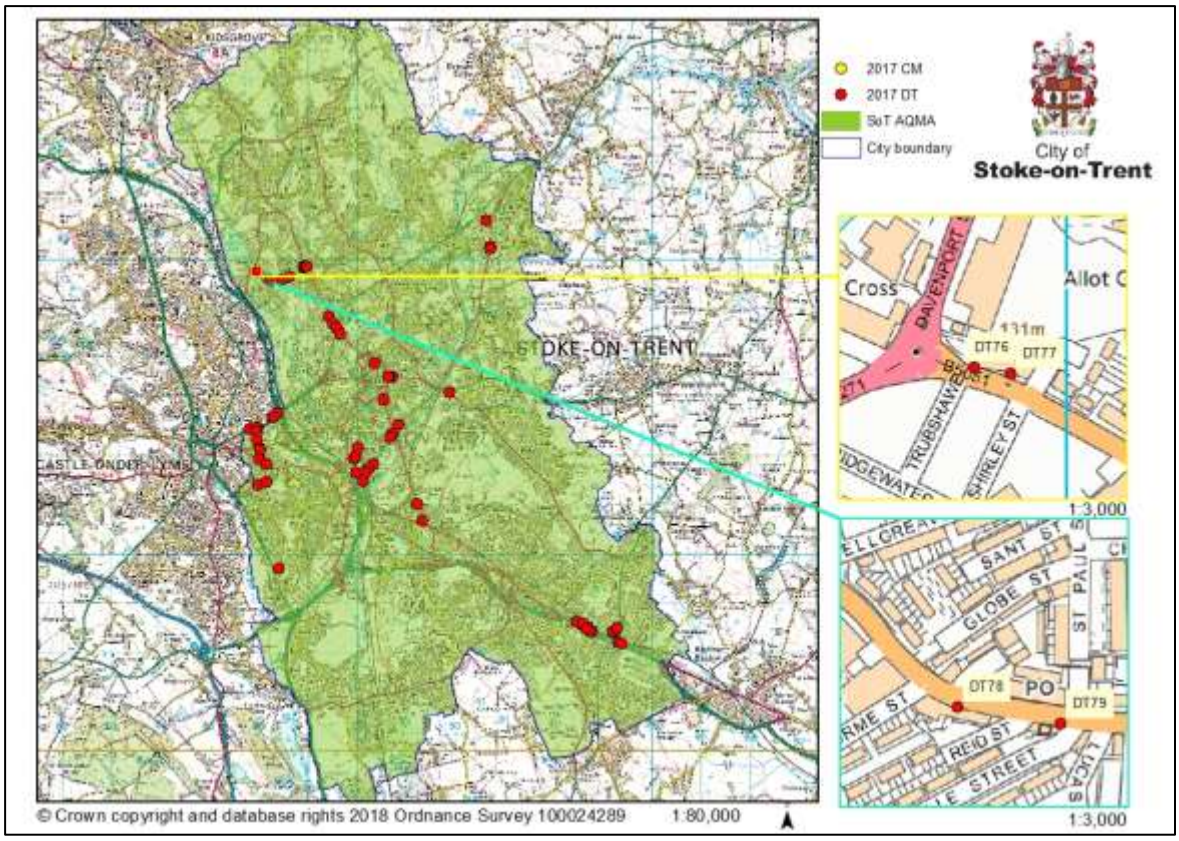


Figure D. 4 - Map of Newcastle Street (east) diffusion tube sites

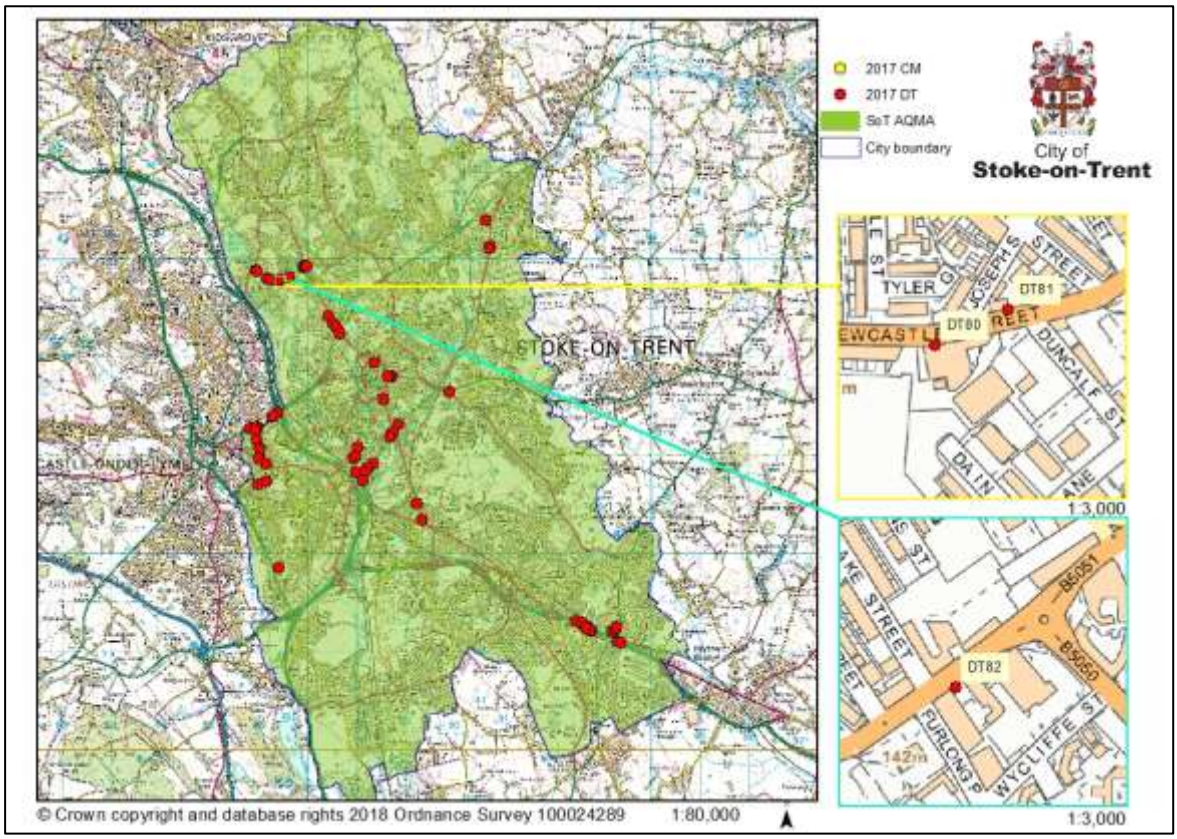


Figure D. 5 - Map of Burslem Centre diffusion tube sites

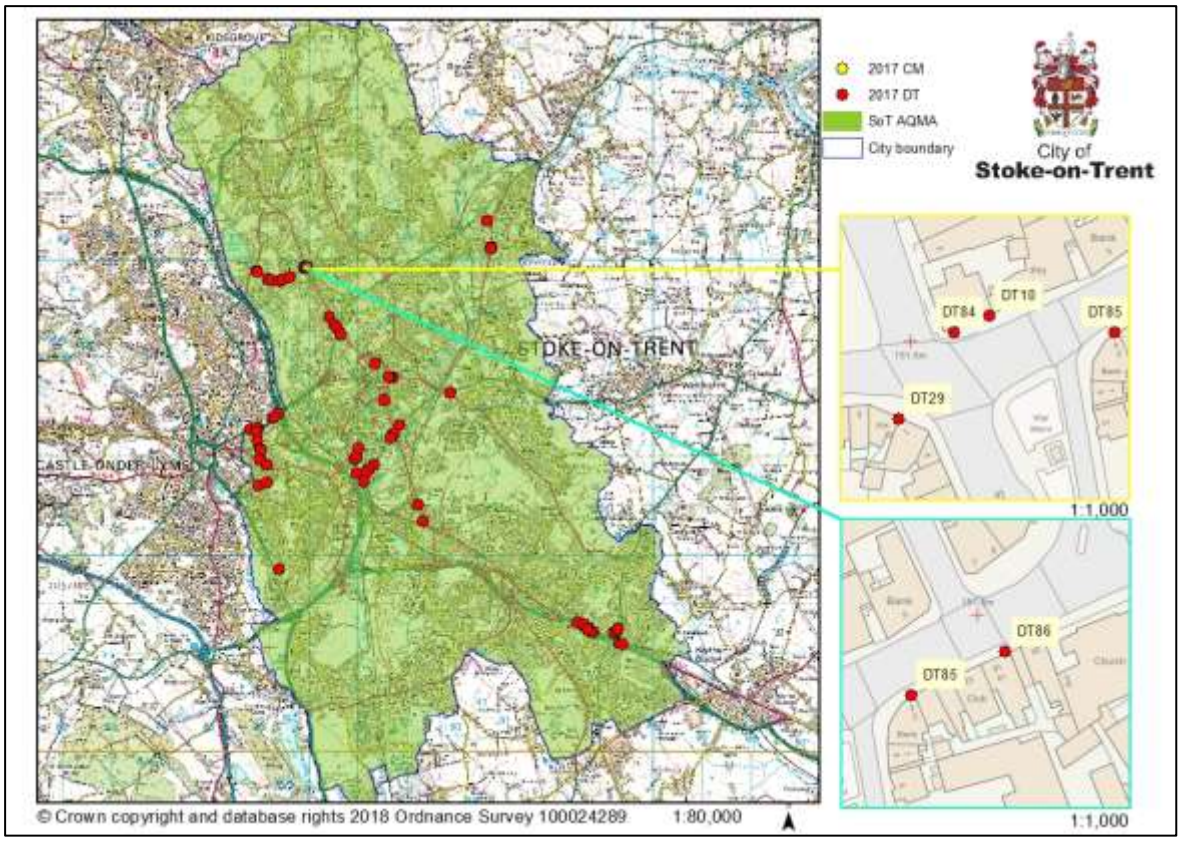


Figure D. 6 - Map of Milton diffusion tube sites

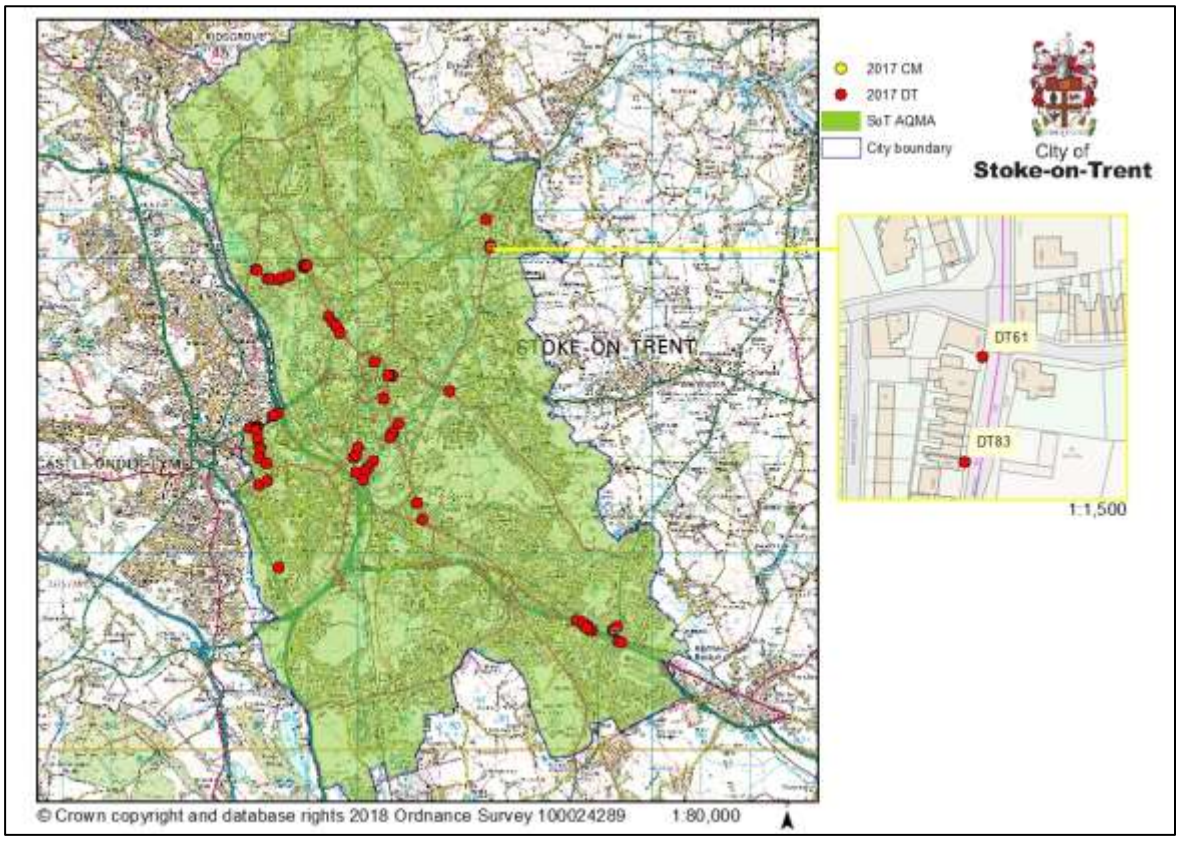


Figure D. 7 - Map of Cobridge diffusion tube sites

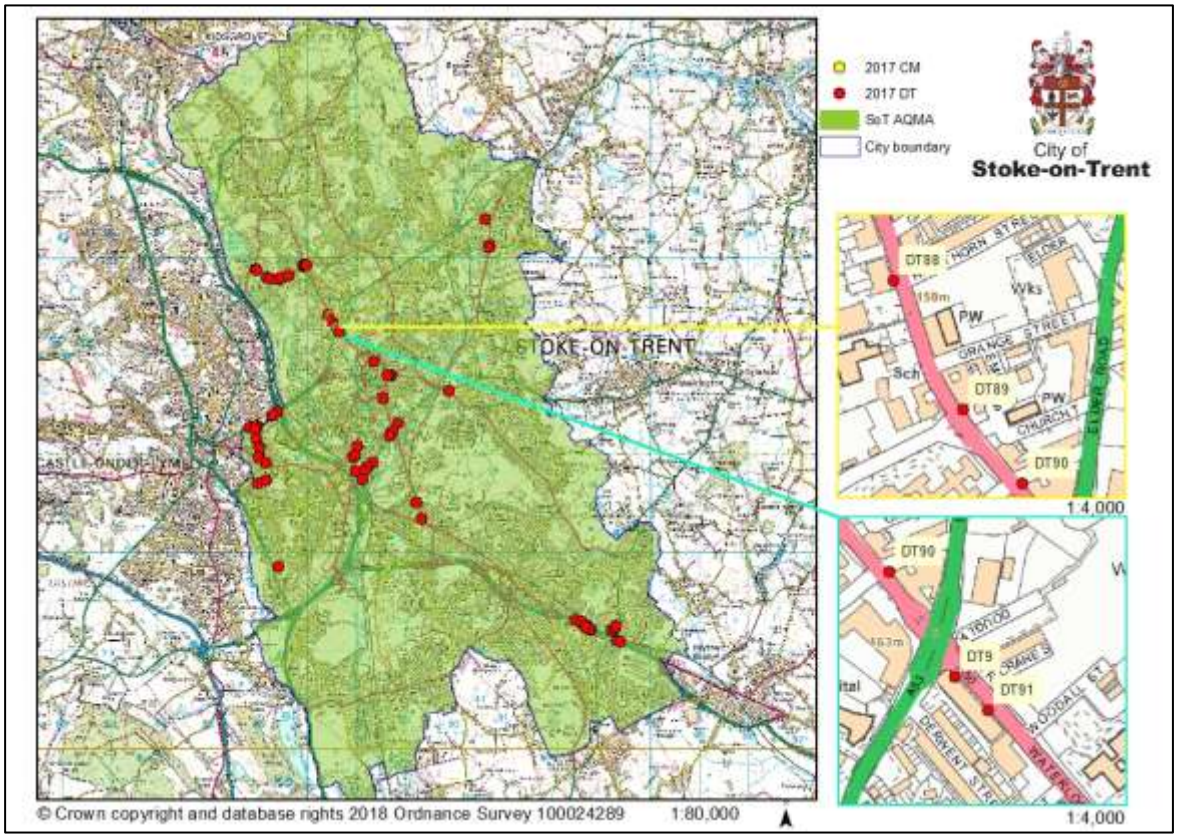


Figure D. 8 - Map of City-centre (north & east) diffusion tube sites

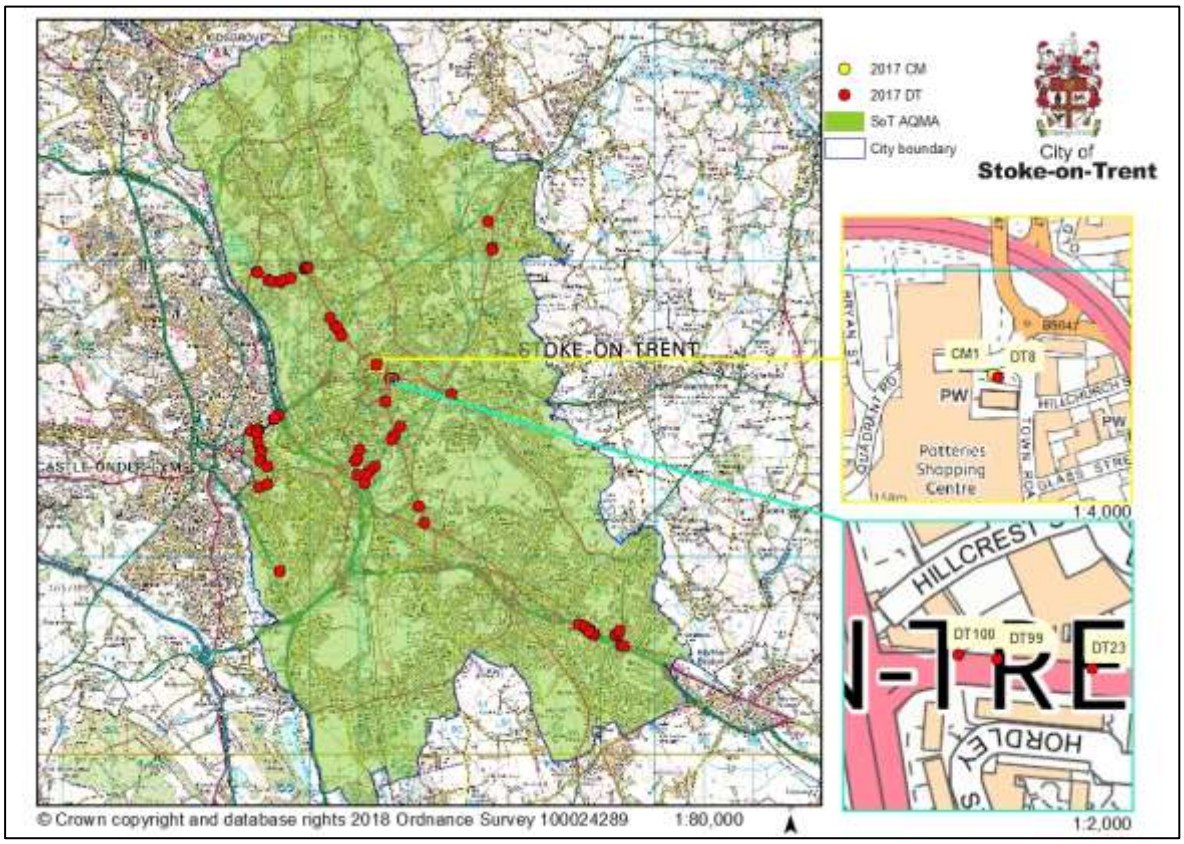


Figure D. 9 - Map of City-centre (south) diffusion tube sites

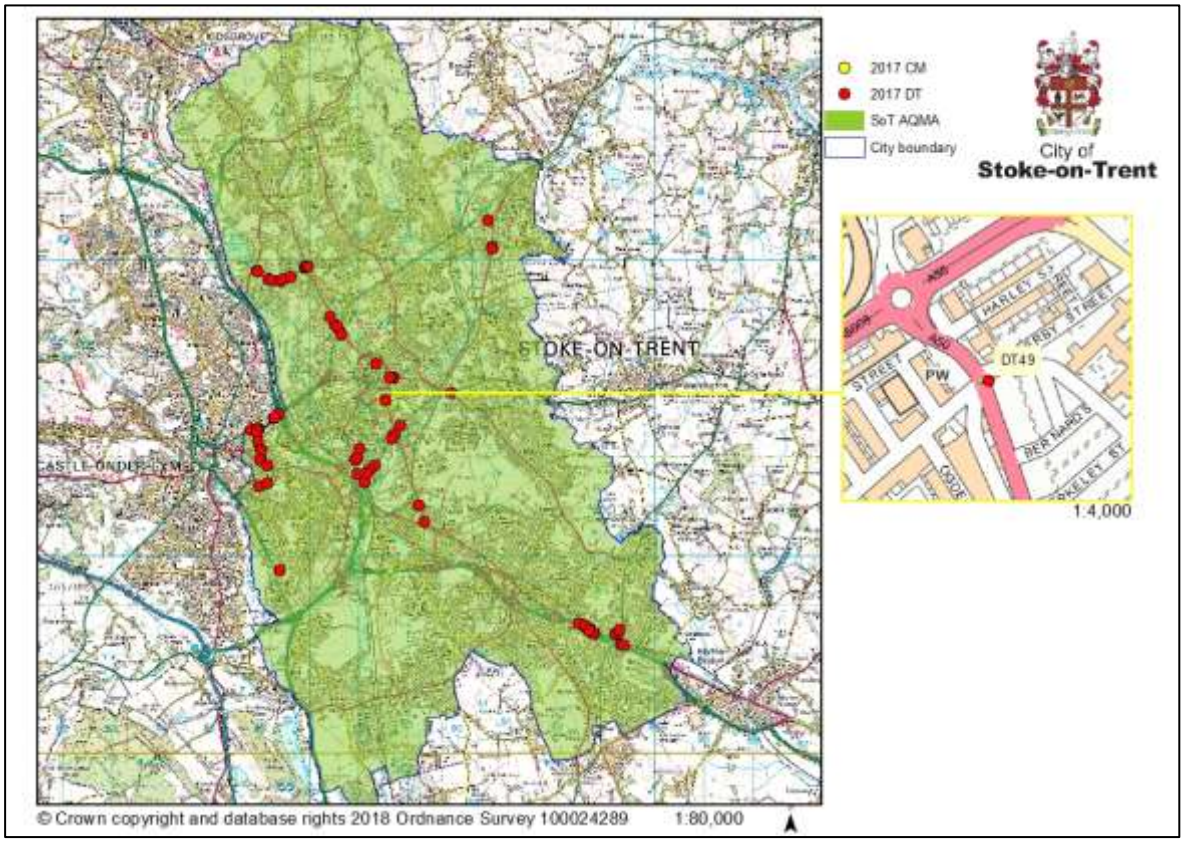


Figure D. 10 - Map of Bucknall diffusion tube sites

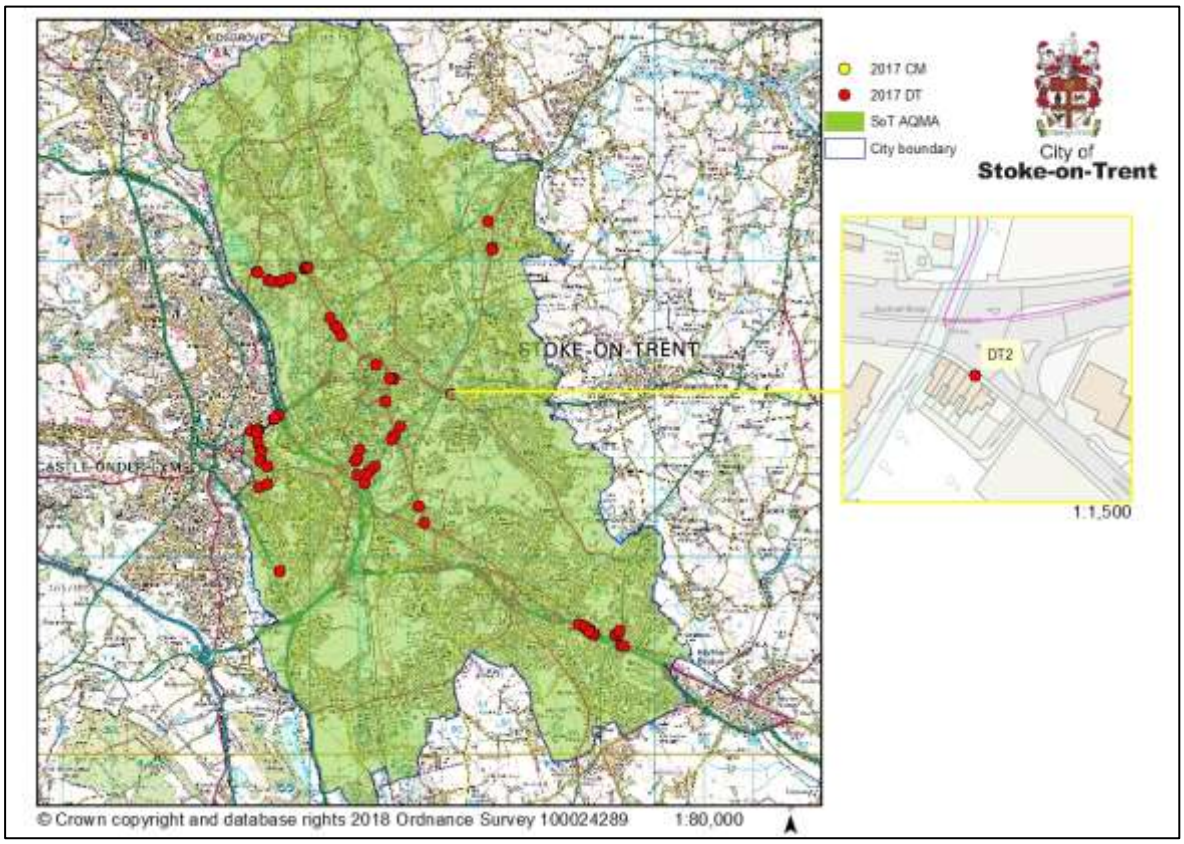


Figure D. 11 - Map of Basford (east) diffusion tube sites

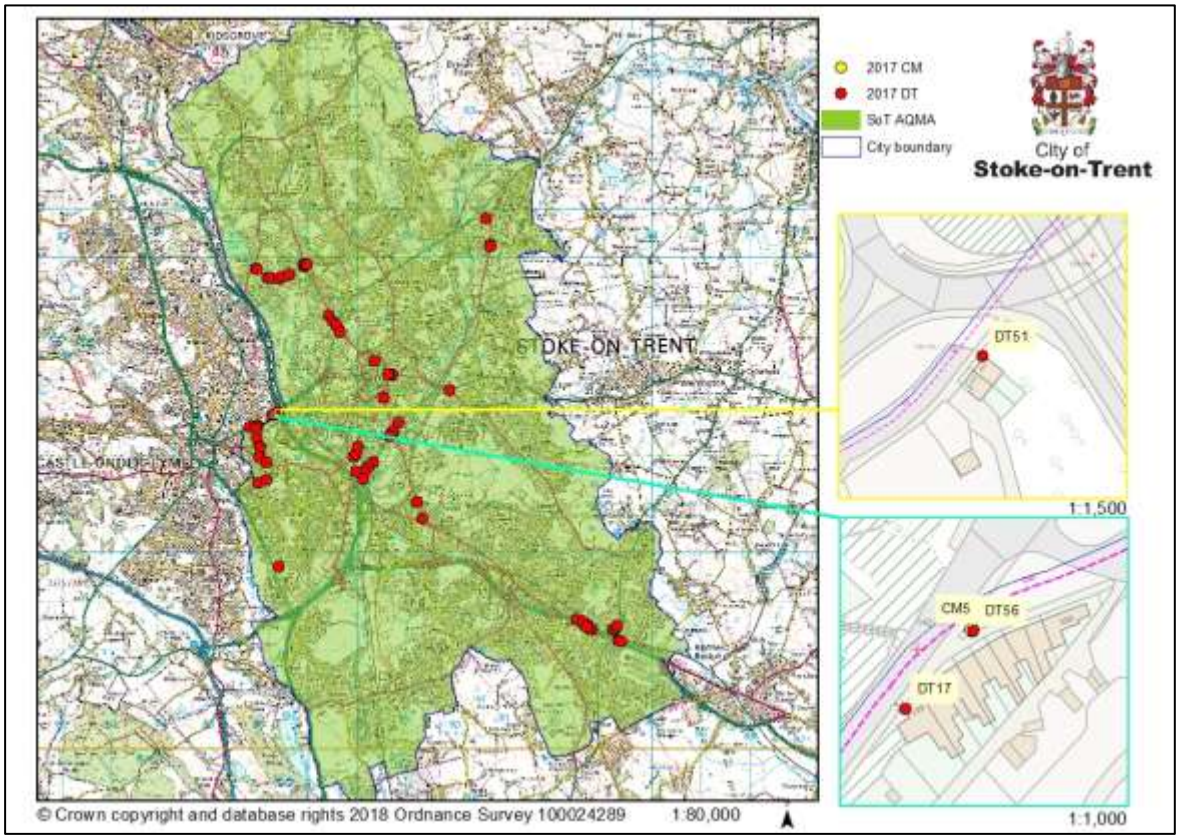


Figure D. 12 - Map of Basford (west) diffusion tube sites

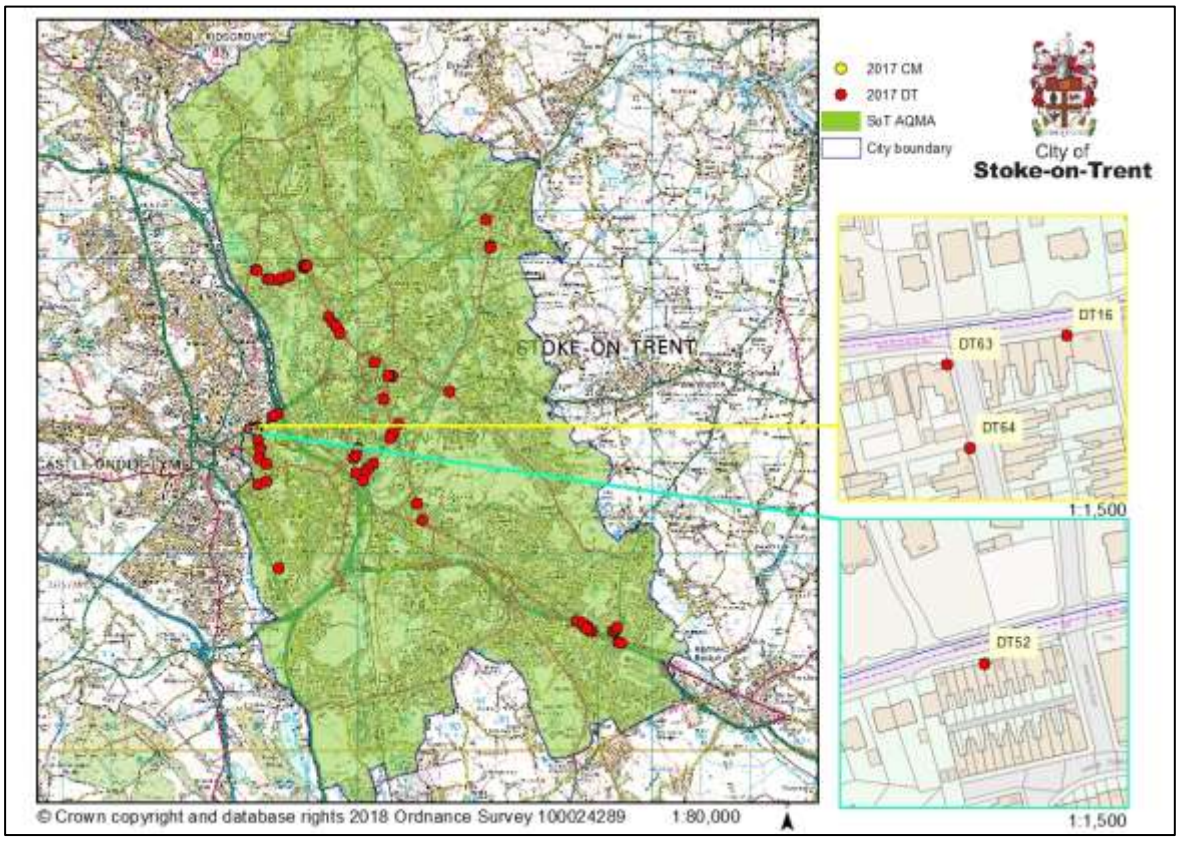


Figure D. 13 - Map of Victoria Street (north) diffusion tube sites

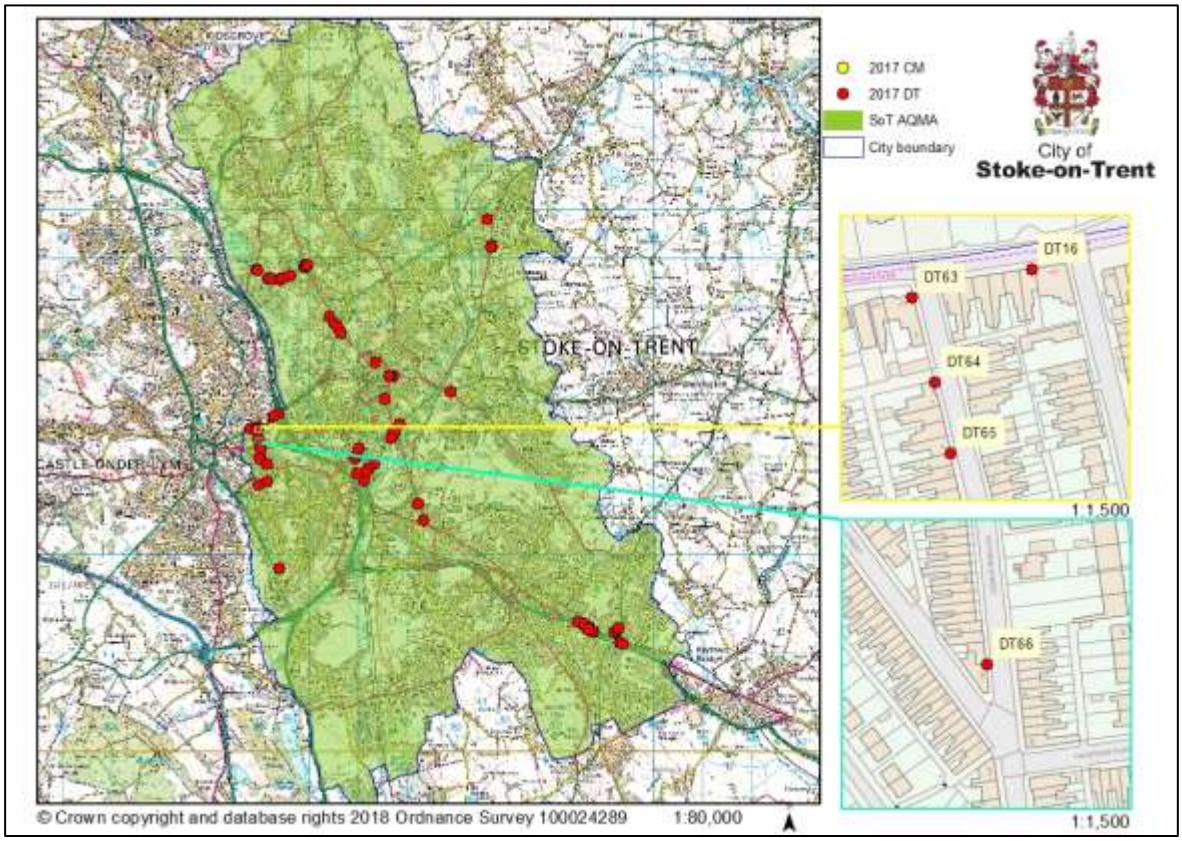


Figure D. 14 - Map of Victoria Street (south) diffusion tube sites

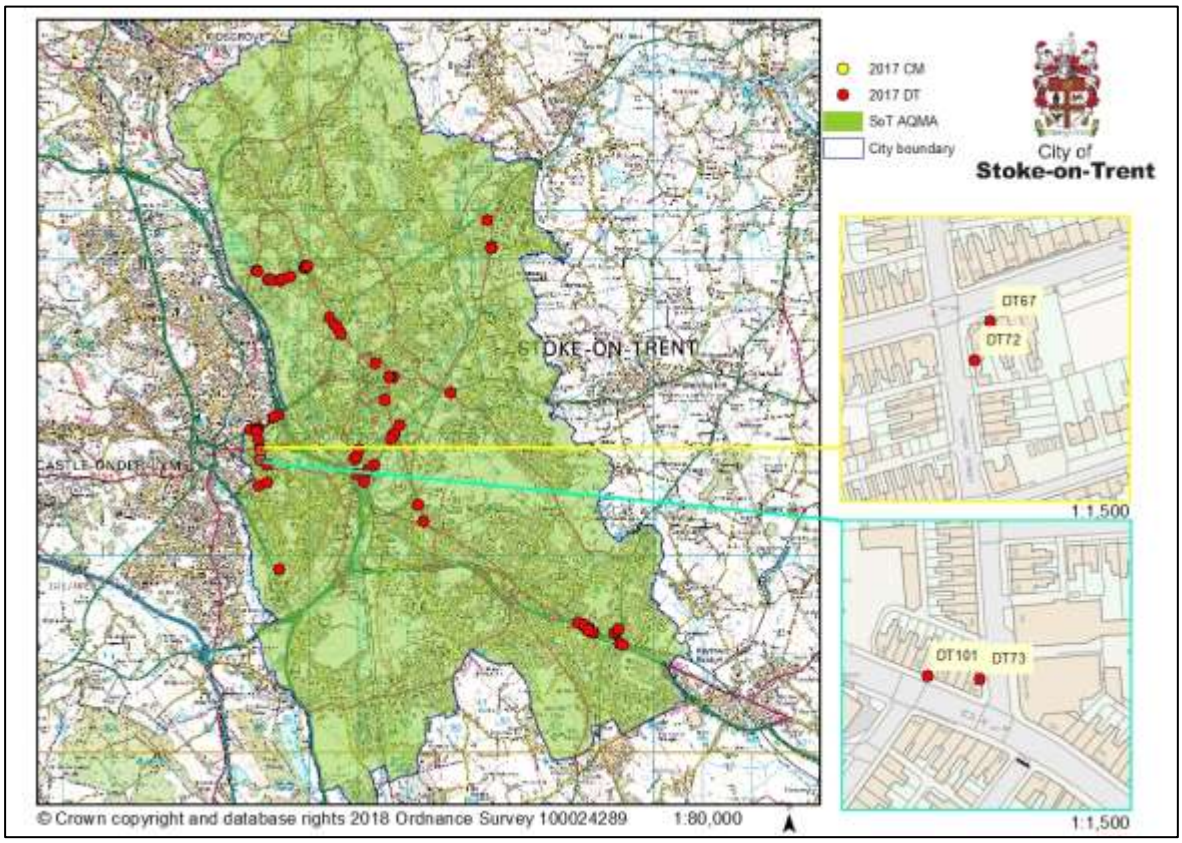


Figure D. 15 - Map of Hartshill Road diffusion tube sites

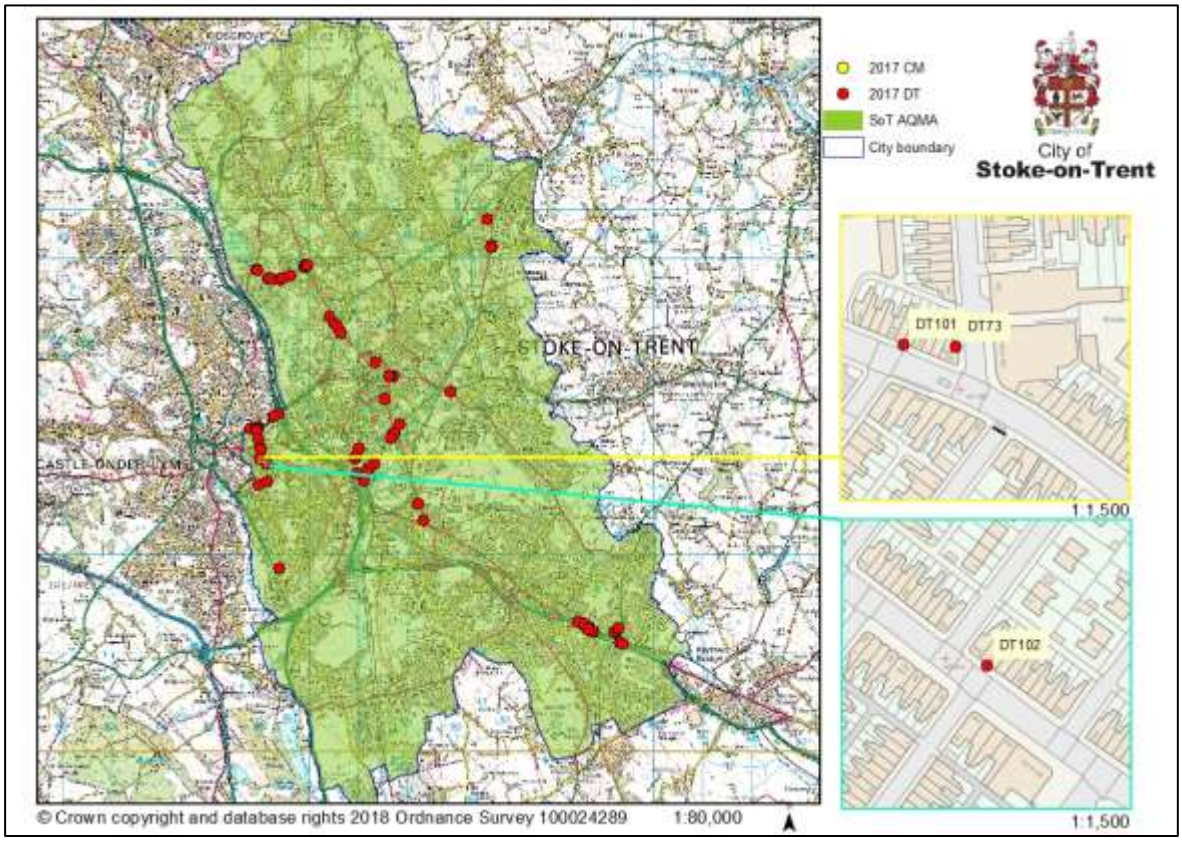


Figure D. 16 - Map of Ashlands Road diffusion tube sites

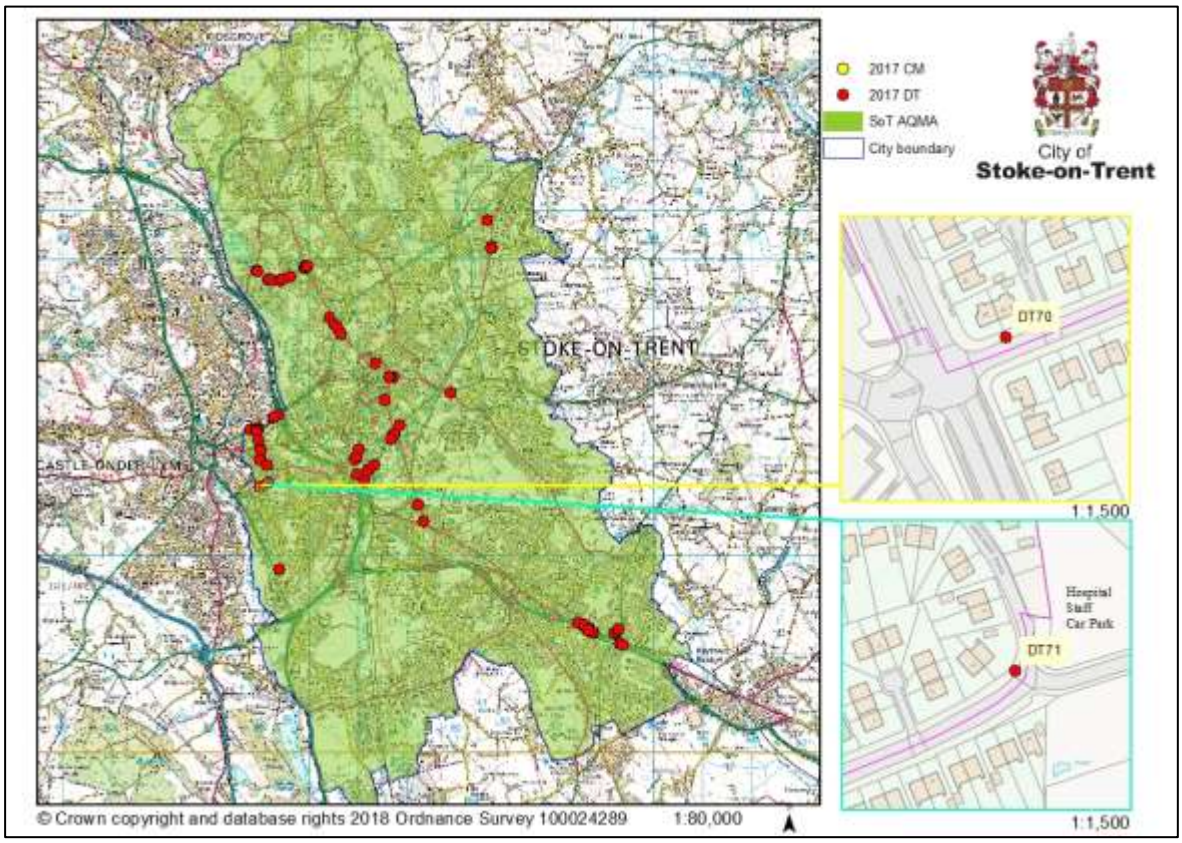


Figure D. 17 - Map of College Road (north) diffusion tube sites

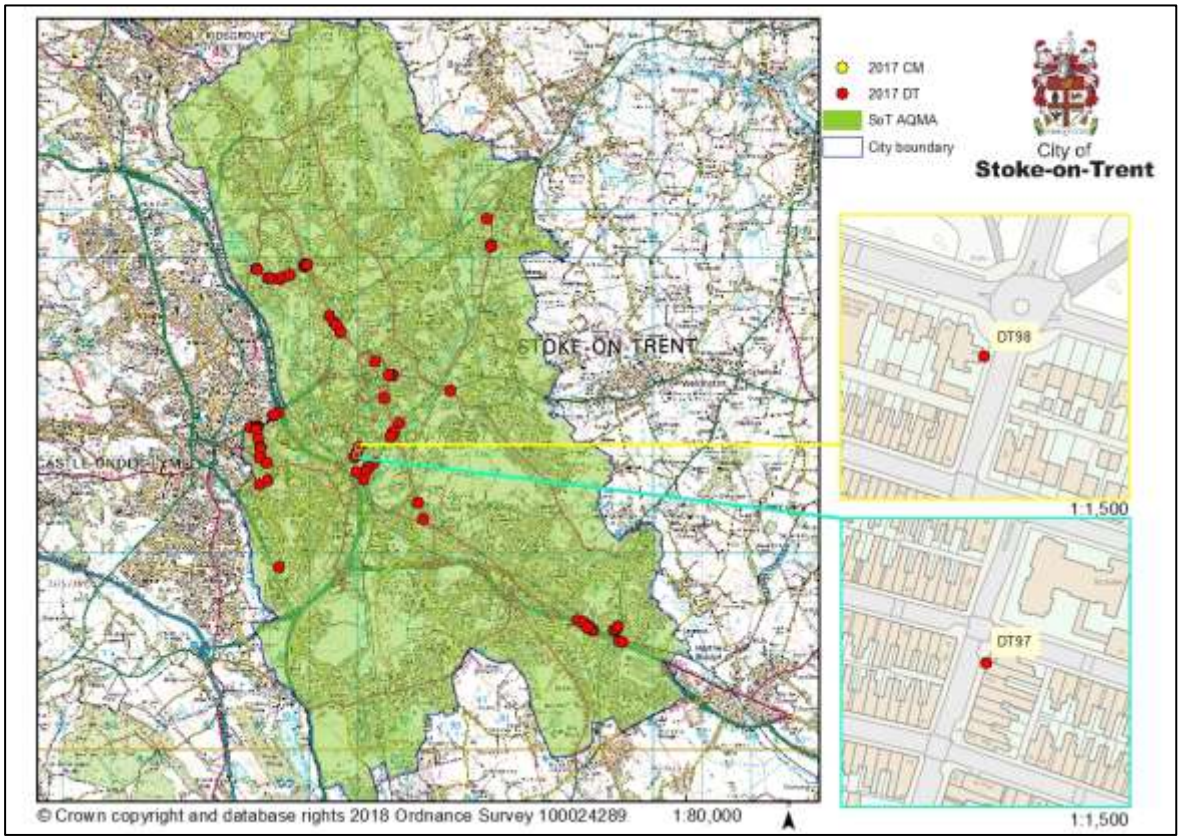


Figure D. 18 - Map of College Road (south) & Station Road diffusion tube sites

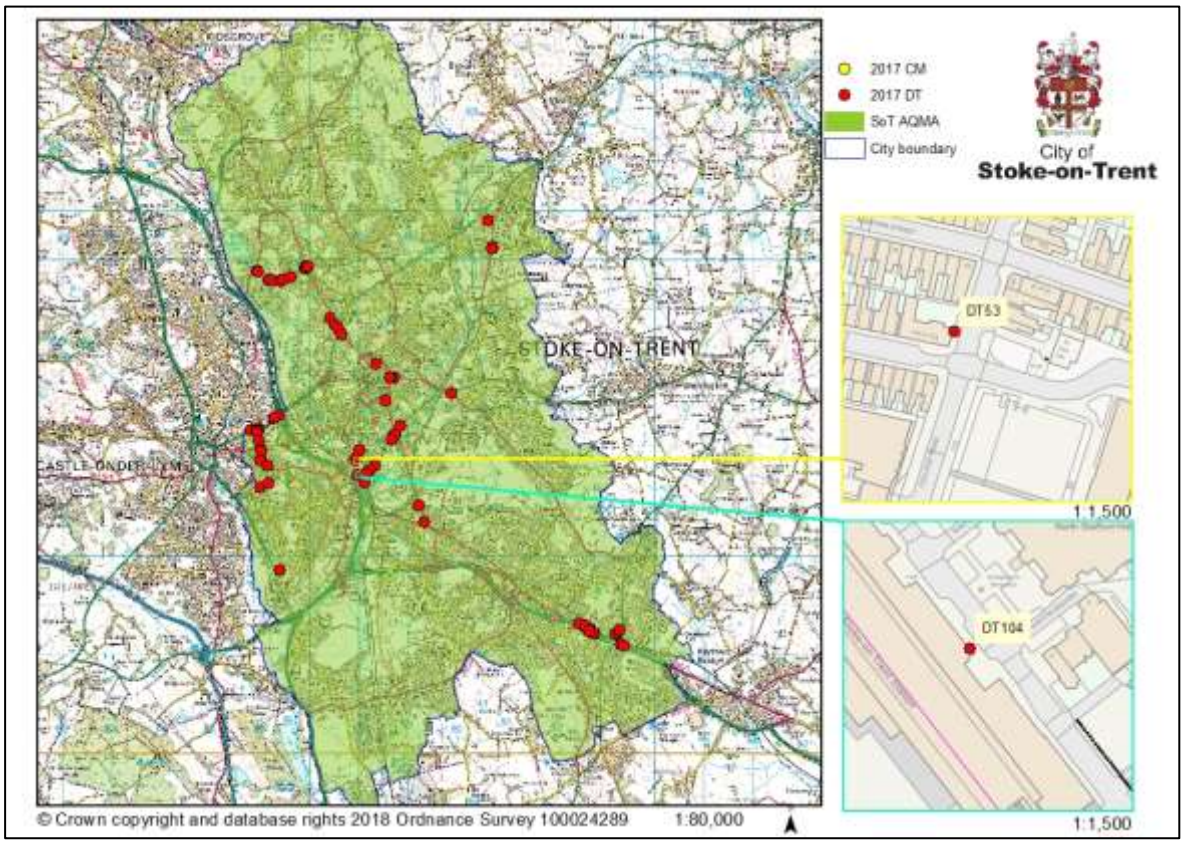


Figure D. 19 - Map of Leek Road (1) diffusion tube sites

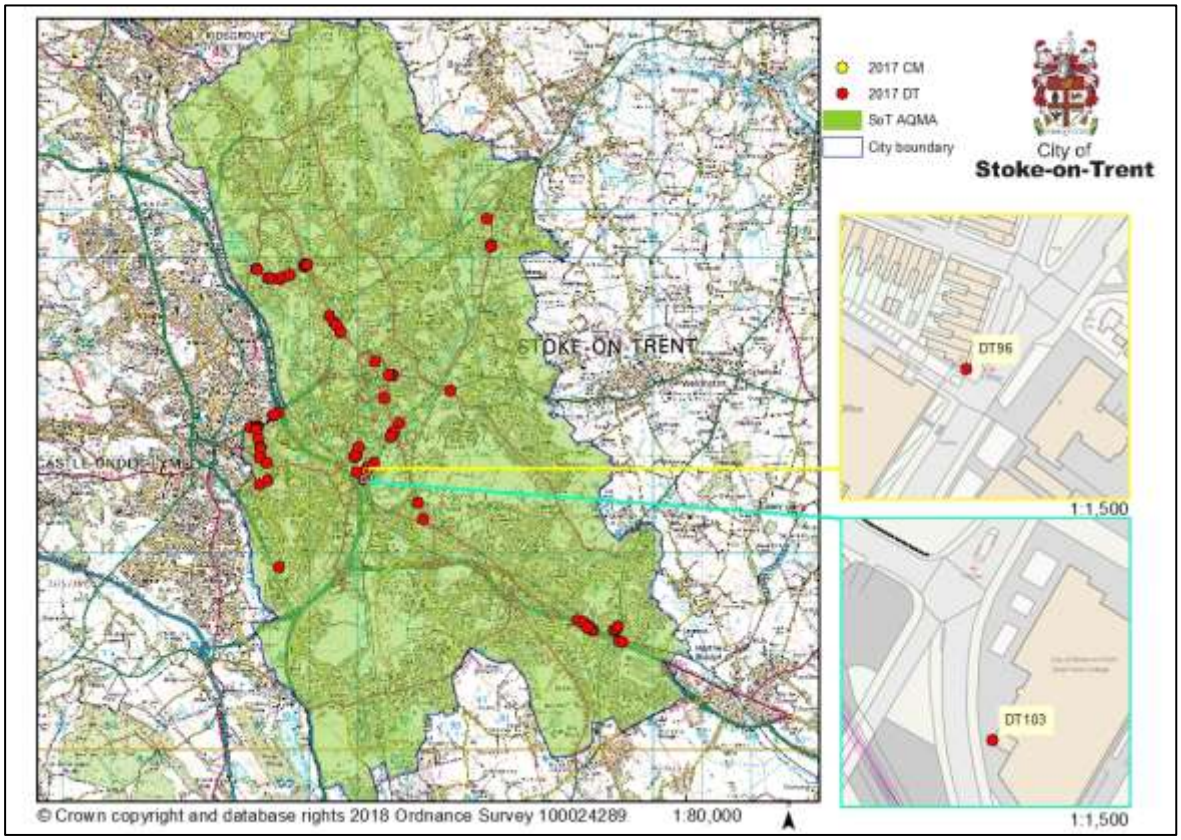


Figure D. 20 - Map of Leek Road (2) diffusion tube sites

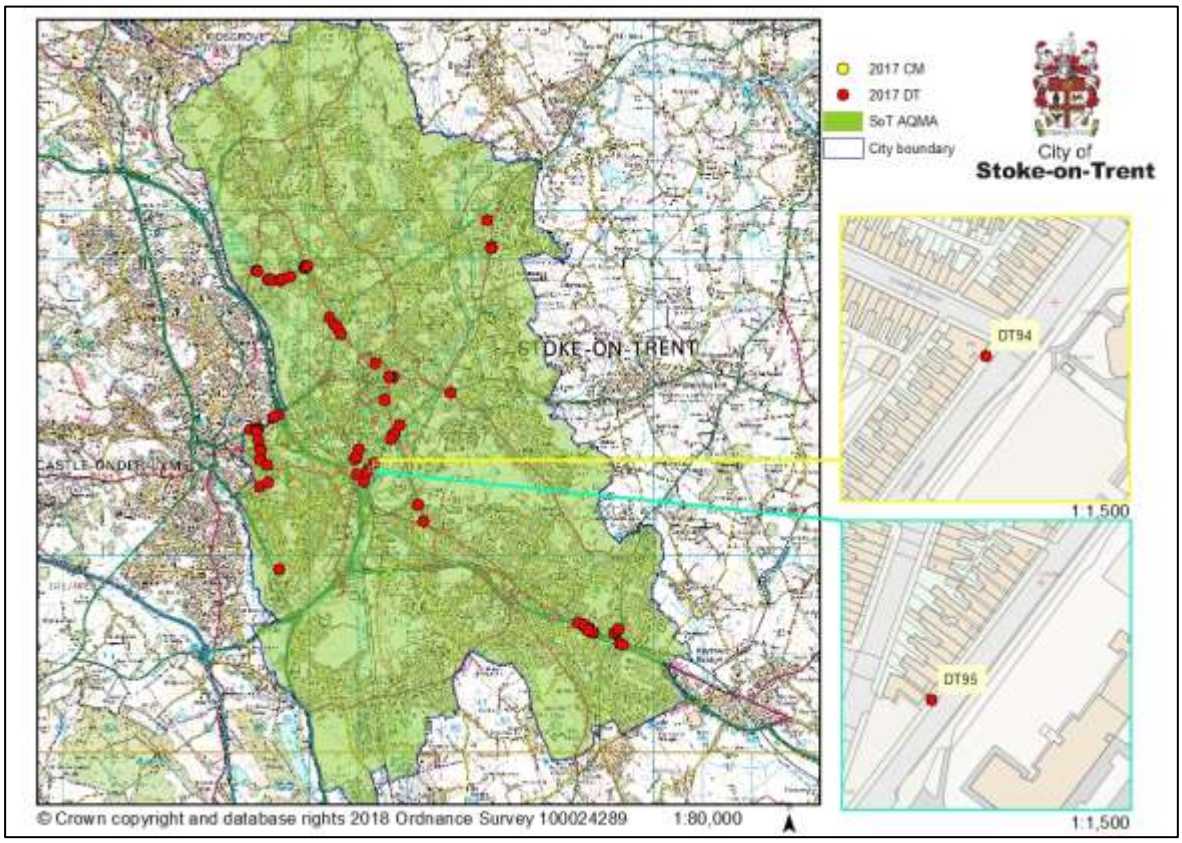


Figure D. 21 - Map of Leek Road (3) diffusion tube sites

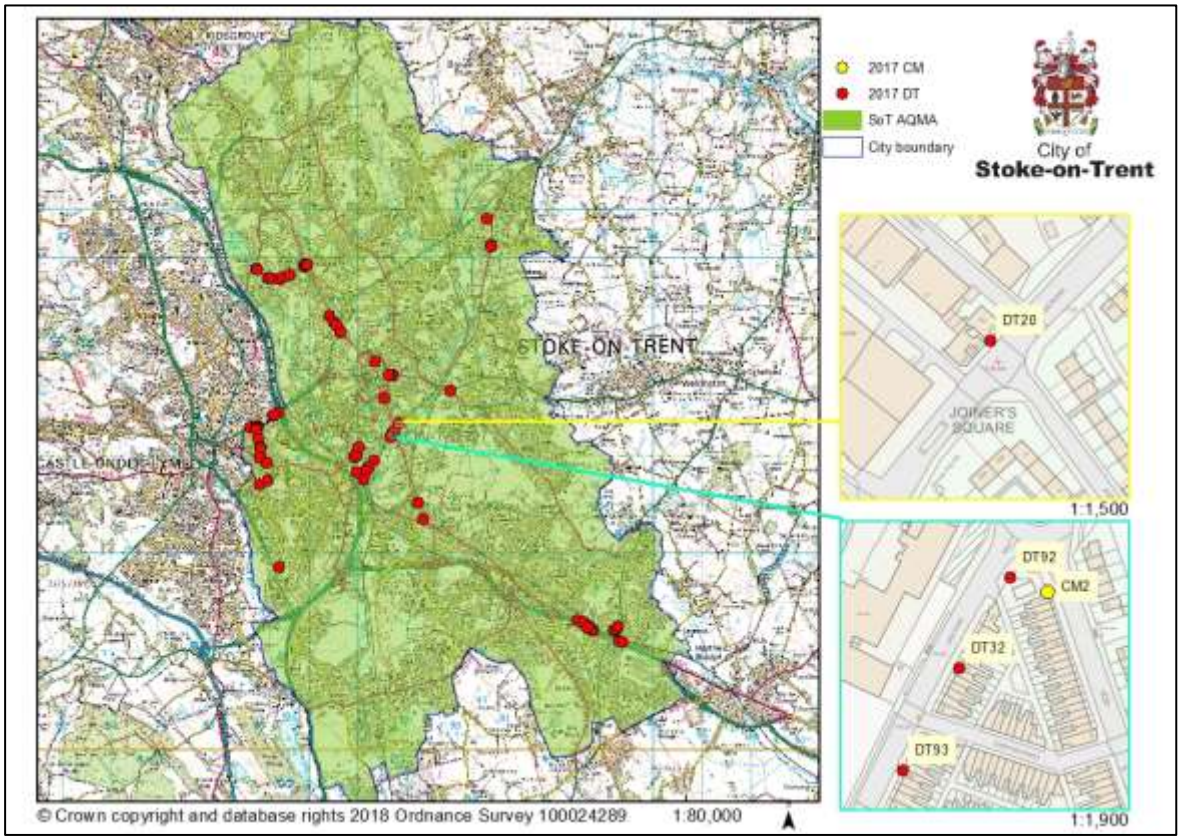


Figure D. 22 - Map of Victoria Road diffusion tube sites

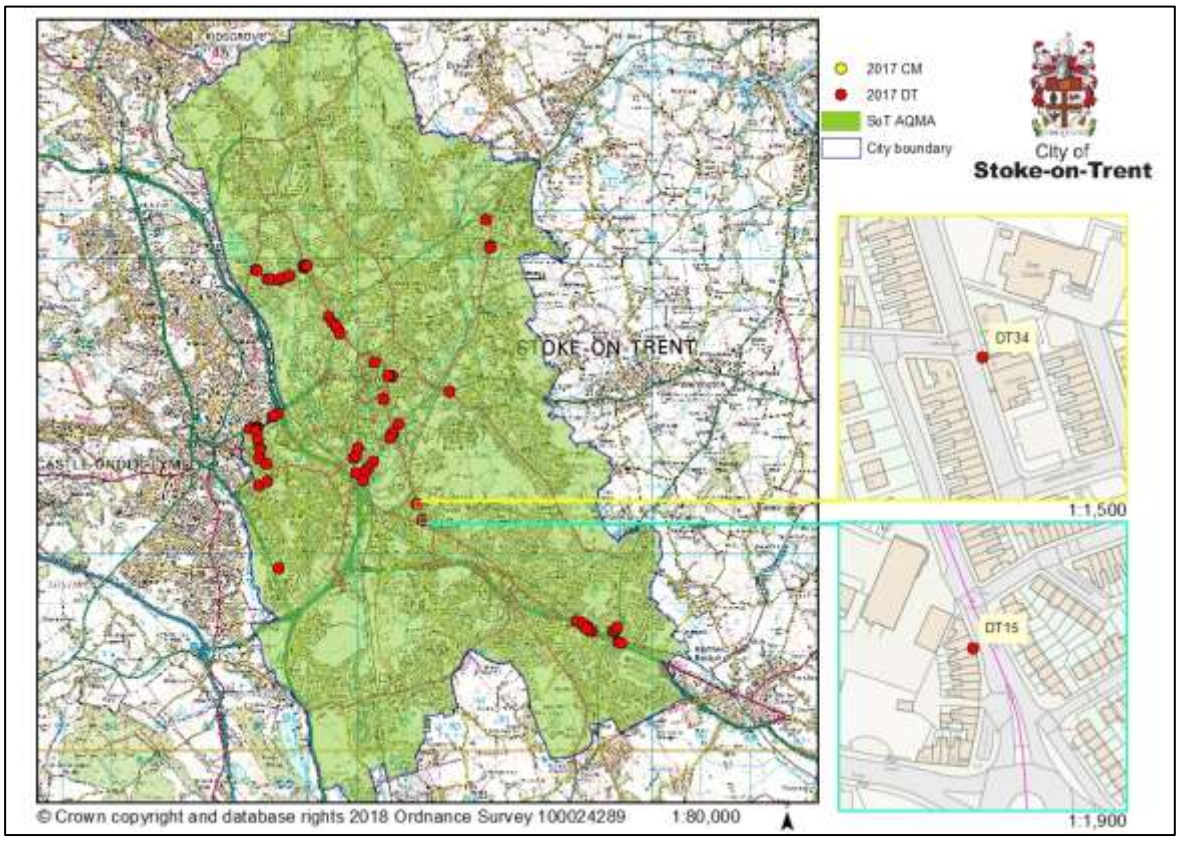


Figure D. 23 - Map of Meir (1) diffusion tube sites

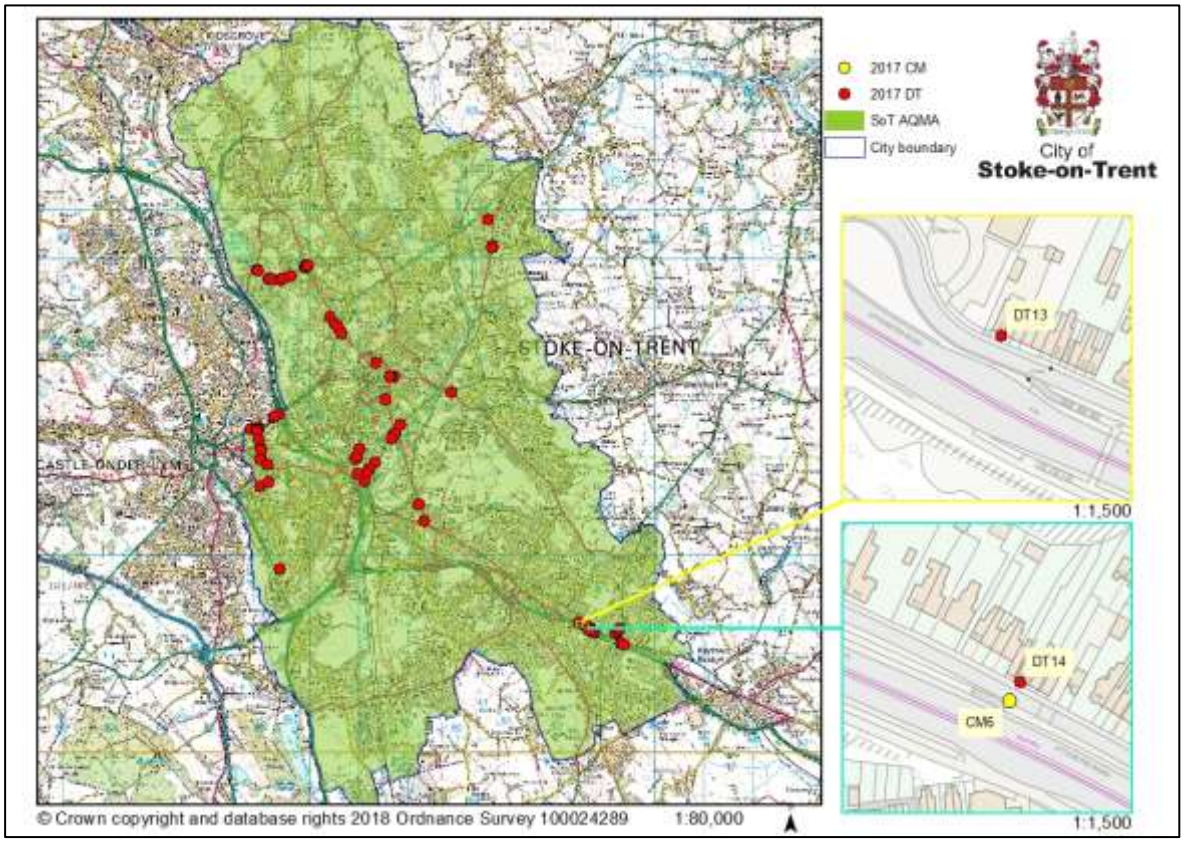


Figure D. 24 - Map of Meir 2) diffusion tube sites

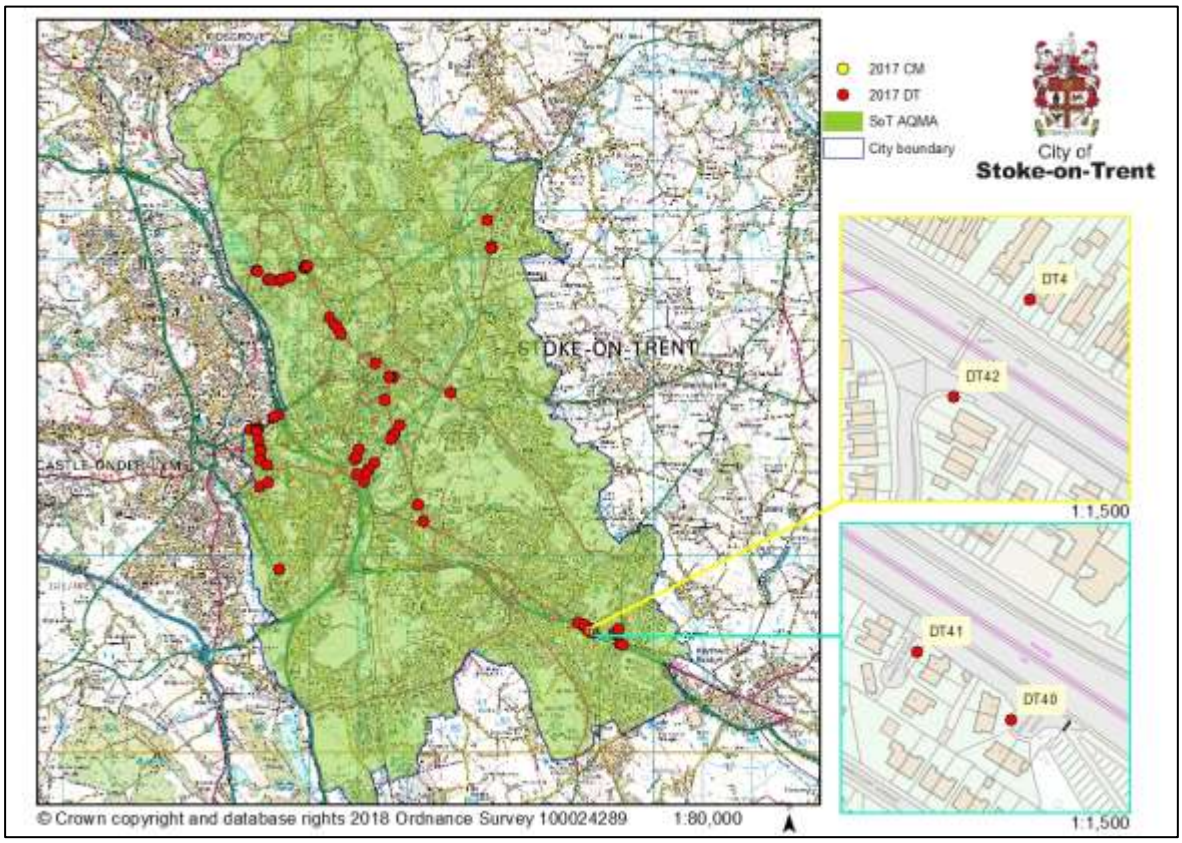


Figure D. 25 - Map of Meir (3) diffusion tube sites

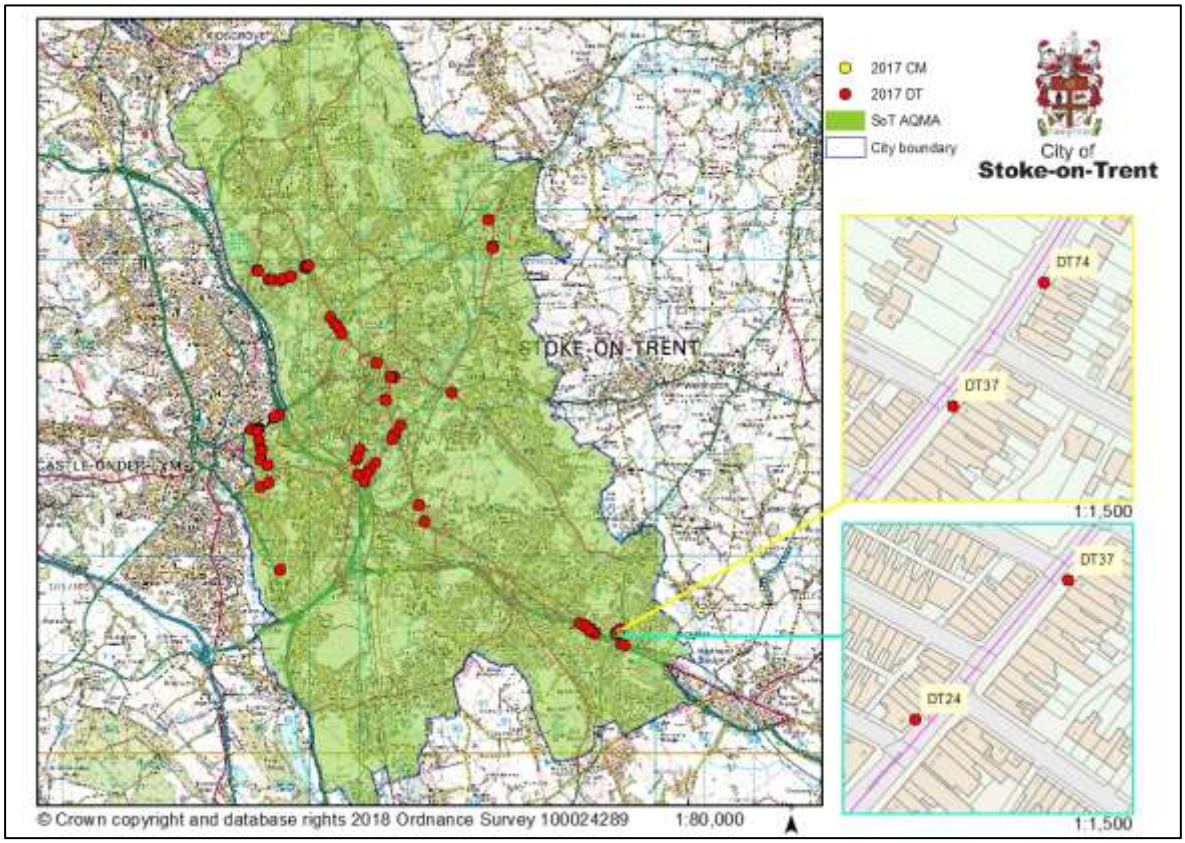
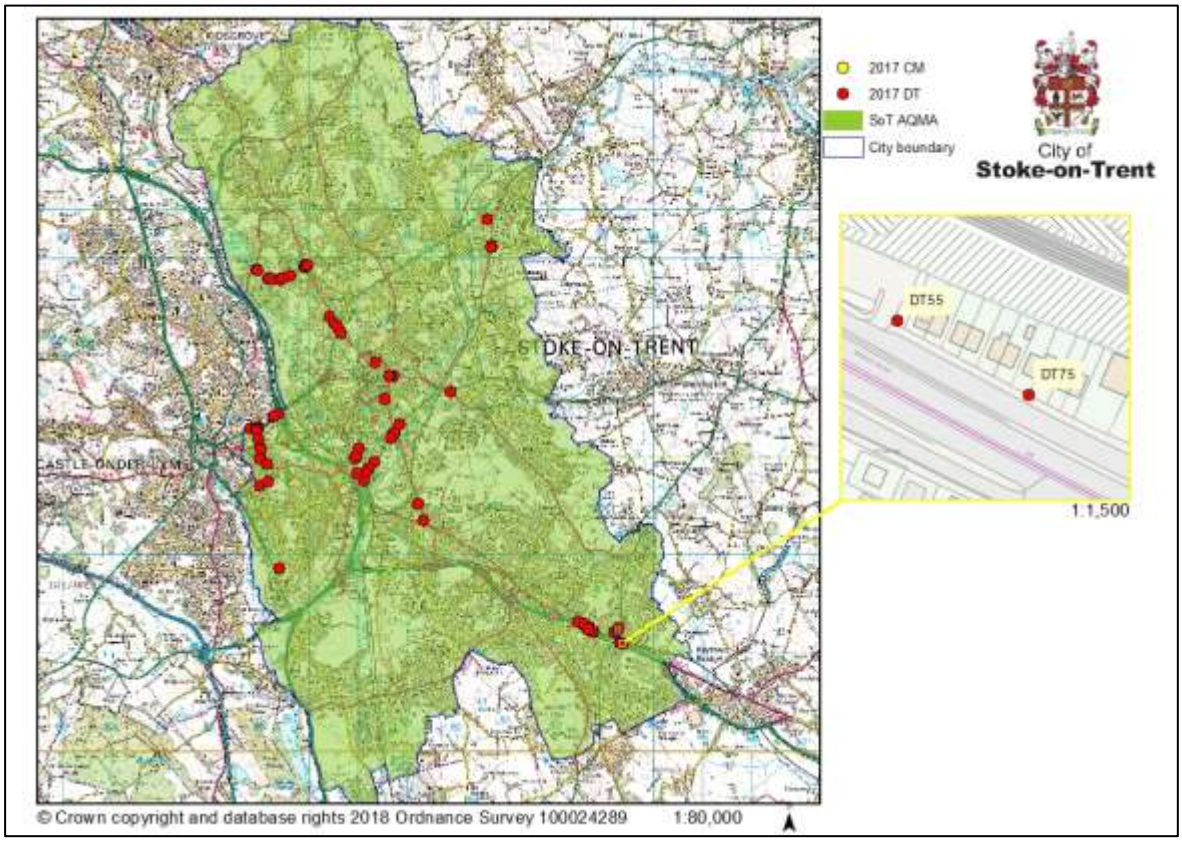


Figure D. 26 - Map of Meir (4) diffusion tube sites



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

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

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

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality 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 (micrometres or microns) 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
TEOM	Tapered Element Oscillating Microbalance
UK AQOHDS1	United Kingdom Air Quality Objective