Bath & North East Somerset Council

2017 Air Quality Annual Status Report (ASR)

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

June, 2017

Local Authority Officer	Dr Nicola Courthold Robin Spalding Nick Helps
Department	Environmental Monitoring
Address	Bath & North East Somerset Council Lewis House Manvers Street Bath BA1 1JG
Telephone	01225 396622
E-mail	Environmental_Monitoring@bathnes.gov.uk
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Executive Summary: Air Quality in Our Area

Air Quality in Bath & North East Somerset Council

Air pollution is associated with a number of adverse health impacts, particularly respiratory conditions. It is also 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].

Bath & North East Somerset is a mainly rural district with Bath as the major urban area, together with the small towns of Keynsham, Radstock and Midsomer Norton. The main pollutant source within the area is road traffic. This is exacerbated in Bath with the city being set in a valley surrounded by hills which can trap the pollution within the city.

As the source of air pollution in Bath and North East Somerset is overwhelmingly from traffic, the approach to improving air pollution is by traffic and transport improvement measures. There is a strong collaboration between the four West of England authorities in this regard and the Travel West brand acknowledges the fact that commuters don't think in terms of authority boundaries. The Sustainable Transport Transition Year fund and the Go Ultra Low City Scheme (a West of England project) follow on from the successful Local Sustainable Transport Fund that the Travel West brand carried forward.

In Bath through traffic travels through the AQMA on four main corridors:

a) M4 junction 18 to A36 south;
b) M4 junction 18 to A367;

[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

c) A4 west (Bristol) to A36 south; and
d) A4 west to A4 east (with 7.5t weight limit).

The lack of alternative routes means that the streets are often congested during peak periods, despite a very high proportion of employed Bath residents using sustainable modes for travel to work. The 2011 census indicated that only 25% of employed Bath residents working in the city, drive to work. This has been supported by substantial investments in cycling and walking infrastructure.

In Bath & North East Somerset, three Air Quality Management Areas (AQMAs) have been declared for nitrogen dioxide (NO_2), including the major road network within Bath, Keynsham High Street and a small section of the A4 in Saltford. Details of the AQMAs are given in Table 2.1 and maps of the AQMAs are in Appendix E. Details of the AQMAs can also be found at http://www.bathnes.gov.uk/services/environment/pollution/air-quality/.

Particulate matter is also of concern; however monitored concentrations are below the air quality objectives (Appendix G).

Bath and North East Somerset Council had 96 NO_2 monitoring sites and 3 particulate matter monitoring sites in 2016. At the end of every year the Council reviews the information which it has collected throughout the year and applies a correction factor. Corrected data is then compared to the national air quality objectives which are detailed in Appendix G.

Monitoring results of NO_2 in 2016 were on average slightly lower than in 2015. At Widcombe High Street (DT18) concentrations had decreased by approximately 15 µg/m^3 due to the changes to the road scheme. New monitoring sites in the Temple Cloud Area showed exceedences of the NO_2 air quality objectives. An air quality management area will be declared in 2017 following a consultation on the extent of the area. New monitoring in Whitchurch also showed a possible exceedence of the annual average NO_2 air quality objective on the A37, as the monitoring at 5 of the sites was only for 8 months, this is continuing and a decision

will be made in early 2018 as to whether an AQMA is required. Monitoring at other new locations did not show any further hotspots.

The annual mean particulate matter not exceeding 10 micrometres in diameter (PM_{10}) concentrations in 2016 were similar to 2015. All results were within the air quality objectives.

A new particulate matter analyser was installed in July 2015 at Chelsea House (CM4), London Road, Bath, which measures particulate matter not exceeding 2.5 micrometres in diameter ($PM_{2.5}$). Monitoring at this site in 2016 showed an annual average concentration of 11 µg/m^3.

Actions to improve air quality

Key completed measures in 2016 are:

- Continued roll-out of real-time bus passenger information displays;
- Roadside variable message signs installed on A4 and A36;
- Expansion of NextBike bicycle Hire scheme in Bath, now at 16 locations with approximately 877 users per month, generating 250,000 hires between June 2014 and August 2016.
- The Council has pledged to change 25% of its light duty fleet to ultra-low emission vehicles by 2021. Four ULEVs have already been purchased and are in operation in B&NES. The Council is also using the funding to purchase electric two wheelers for parking officers.
- Preparation for experimental (12 month) one way system in Keynsham High Street (implemented in May 2017);
- Corporate Travel Plan

Bath & North East Somerset Council has also been working with local stakeholder groups to develop a new air quality action plan for Bath. This will be consulted on and adopted in 2017.

Conclusions and priorities

In 2016 monitoring at existing locations showed a slight decrease in concentrations at most locations. New monitoring at Temple Cloud exceeded the air quality objectives and the extent of the AQMA will be consulted on in 2017. Monitoring in Whitchurch also shows potential exceedences, further monitoring is being carried out and a decision will be made in 2018 on the extent of any potential AQMA for this area.

During 2016 a number of actions were completed and work began on developing a new action plan for Bath.

Bath & North East Somerset Council's priorities for the coming year are:

- Consult on and adopt a new Air Quality Action Plan for Bath, based on 4 key areas;
    - to reduce emissions, including a transfer to low emission vehicles and a reduction in the number of vehicle miles travelled;
    - reduce concentrations, to reduce human exposure to pollution;
    - raise awareness, so that residents can take steps to reduce their contribution to emissions and learn ways to reduce their exposure; and
    - protect vulnerable groups, including children, elderly people and those with health issues.
- Consult on an declare a new AQMA for the Temple Cloud Area
- Further monitoring in Whitchurch to determine the extent of any possible AQMA

Local engagement and how to get involved

As the main source of air pollution in Bath and North East Somerset is from road sources, the Council wishes to encourage a greater amount of active travel across the district. The cycling infrastructure in Bath and North East Somerset is improving all the time and there are more opportunities to hire bikes. 'Next Bike' now has 16

bike stations across Bath and the national cycle network provides good 'off-road' connections with Radstock, Frome, Bristol, Bradford-on-Avon and Trowbridge among other places.

We recommend that people visit the 'Travel West' website (www.travelwest.info/), as this provides live data on public transport for journey planning as well as route information for walkers and cyclists; car clubs; traffic reports; electric vehicle charging infrastructure; and other information that simplifies travel choices. This site is administered by the West of England Local Enterprise Partnership.

The Council are in the process of renewing the Air Quality Action Plan for Bath[4]. Stakeholder groups and the public were invited to get involved in the process of developing the plan, as the Council seeks to take a collaborative approach. For further information on getting involved with developing the air quality action plan and for current and historic data on air quality levels visit the Council's website: www.bathnes.gov.uk/air-quality.

[4] 'The Bath Air Quality Action Plan 2011'. The new plan is going out to consultation summer 2017.

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1 Local Air Quality Management

This report provides an overview of air quality in Bath & North East Somerset Council during 2016. 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 Bath & North East Somerset 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 G.1 in Appendix G.

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 AQMAs declared by Bath & North East Somerset 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 http://www.bathnes.gov.uk/services/environment/pollution/air-quality/. Alternatively, see Appendix E, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

Bath & North East Somerset Council propose to declare a new AQMA in the Temple Cloud area (see monitoring section).

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 (inc. date of publication)
						At Declaration	Now	
The Bath London Road Air Quality Management Area - 2013	Declared 1 February 2002, Amended v1 19 August 2005, Amended v2 30 July 2008, Amended v3 18 July 2013	NO2 Annual Mean	Bath	The area covers the major road network in Bath, encompassing any buildings whose facades are within the area.	YES	London Road AURN 2001	London Road AURN 2016 - 48µg/m3	Bath Air Quality Action Plan (2011) - http://www.bathnes.gov.uk/sites/default/files/20110303_final_bath_air_quality_action_plan.pdf
The Bath London Road Air Quality Management Area - 2013	Declared 18 July 2013	NO2 1 Hour Mean	Bath	The area covers the major road network in Bath, encompassing any buildings whose facades are within the area.	YES	Lambridge - 2012 - 62 µg/m3	Lambridge - 2016 - 60 µg/m3	Bath Air Quality Action Plan (2011) - http://www.bathnes.gov.uk/sites/default/files/20110303_final_bath_air_quality_action_plan.pdf
The Keynsham High Street Air Quality Management Order 2010	Declared 31 July 2010	NO2 Annual Mean	Keynsham	An area covers the town centre and extends along the High Street and Charlton Road encompassing the facades of the buildings within the area.	NO	Saltford - The Crown 2012 - 47 µg/m3	Saltford - The Crown 2016 - 41 µg/m3	Air Quality Action Plans for Keynsham and Saltford (2016) - http://www.bathnes.gov.uk/sites/default/files/keynsham_and_saltford_air_quality_action_plans_2016_1.pdf
The Saltford Air Quality Management Area 2013	Declared 4 July 2013	NO2 Annual Mean	Saltford	An area which covers the Bath Road, Saltford, encompassing any buildings whose facades are within the area, extending from its junction with Beech Road until 150m south of the Glen	NO	Keynsham - High Street 2009 - 45 µg/m3 at façade	Keynsham - High Street 2016 - 42 µg/m3 at façade	Air Quality Action Plans for Keynsham and Saltford (2016) - http://www.bathnes.gov.uk/sites/default/files/keynsham_and_saltford_air_quality_action_plans_2016_1.pdf

☒ **Bath & North East Somerset 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 Bath & North East Somerset Council

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

- There are accepted reasons for adopting nationally derived correction factors to adjust diffusion tube results. However, it is equally important to ensure that data for hotspot locations are not underestimated by the choice of bias factors. The distance correction factor should be applied where sites are not representative of relevant exposure;
- Reference should be made to the procedures highlighted within the new Technical Guidance LAQM TG16, for further development of action plan measures, taking note of the correct use of EU categories, reduction targets and performance indicators.
- The revised Bath Air Quality Action Plan provides the opportunity to review remedial options to meet air quality objectives. Integration of the Action Plan with the Local Transport Plan may also provide an incentive to continue to co-ordinate action on air quality measures; and
- The Council may find it helpful to review the source apportionment and required levels of emissions from road traffic in pollution hotspots;

Bath & North East Somerset Council has taken forward a number of direct measures during the current reporting year of 2016 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 Bath Air Quality Action Plan and Keynsham and Saltford Action Plan. Key completed measures are:

- Continued roll-out of real-time bus passenger information displays;
- Roadside variable message signs installed on A4 and A36;
- Flood mitigation works to support the new homes, businesses, and community facilities at Bath Riverside;
- Expansion of NextBike bicycle Hire scheme in Bath, now at 16 locations with approximately 877 users per month, generating 250,000 hires between June 2014 and August 2016.

- Electric vehicle recharging points
- The Council has pledged to change 25% of its light duty fleet to ultra-low emission vehicles by 2021. Four ULEVs have already been purchased and are in operation in B&NES. The Council is also using the funding to purchase electric two wheelers for parking officers.
- Preparation for experimental (12 month) one way system in Keynsham High Street (implemented in May 2017);
- Corporate Travel Plan

  Measures implemented include:

  - dedicated staff electric charge points installed;
  - pool bikes (3no. standard and 2no. electric) available for staff business travel;
  - one electric pool car and 2no low emission petrol pool cars available;
  - Adult cyclist training deployed;
  - Cycle mileage for business @ 40p per mile;
  - Corporate membership of NextBike hire scheme in Bath for staff business use;
  - Discounted bus tickets for the main business mileage corridor between Bath and Keynsham;
  - District Online street level photography layer for virtual site inspections;
  - Travel Decision Tree embedded in mileage forms to enable informed travel management;
  - Transfer to HMRC rates for business mileage and removal of essential car user designation;
  - New secure cycle parking facilities and improvements to existing facilities;
  - Lift-sharing database for commuting & in work trips;
  - Passenger mileage to incentivise lift sharing for business travel;

- Intranet staff travel information including live public transport timetables, - promotional campaign for Cyclewise salary sacrifice scheme;
- Staff travel road shows in all office locations;
- Free Dr Bike cycle maintenance sessions for staff;
- I.T. based solutions to reduce the need for travel to work and between office locations (Citrix home working technology, portable devices & virtual conferencing facilities); and
- 10 % bio fuel is added to all depot held diesel and Ad Blue is also added to fleet lorry diesel.

Bath & North East Somerset Council expects the following measures to be completed over the course of the next reporting year:

- Further improvements in live data provision on the Council's website;
- Expansion of the electric vehicle charging network as part of the £7million West of England Go Ultra Low City Scheme award, including the introduction of rapid chargers into the authority area;
- The measures in the Keynsham and Saltford Air Quality Action Plans[5] including electric vehicle infrastructure, Keynsham High Street one way scheme; tree planting between the roads and building facades; and other measures as listed in Table 2.2 below.

Bath & North East Somerset Council's priorities for the coming year are:

- to reduce emissions, including a transfer to low emission vehicles and a reduction in the number of vehicle miles travelled;
- reduce concentrations, to reduce human exposure to pollution;
- raise awareness, so that residents can take steps to reduce their contribution to emissions and learn ways to reduce their exposure; and

[5] 'Air Quality Action Plans for Keynsham and Saltford 2016.' (http://www.bathnes.gov.uk/sites/default/files/keynsham_and_saltford_air_quality_action_plans_2016_1.pdf)

- protect vulnerable groups, including children, elderly people and those with health issues.

Specific actions will include:

- Renewal of the Bath Air Quality Action Plan;
- Deliver the initial measures funded by the Go Ultra Low City Scheme to encourage the uptake of Ultra Low Emission Vehicles and lower transport emissions in the AQMAs;
- Secure funding for transport measures through the Devolution Deal and forthcoming Access Fund following on from the Sustainable Transport Transition Fund and Local Sustainable Transport Fund;
- To progress the policies contained within the Bath Transport Strategy [6],
- To implement the Keynsham Transport Strategy [7] and Placemaking Plans [8] that have now been adopted
- Develop Transport Strategies for the Chew Valley and Somer Valley.

The principal challenges and barriers to implementation that Bath & North East Somerset Council anticipates facing are:

In Bath:

1) long-distance traffic, particularly HGVs, passing through the Bath AQMA on three separate corridors (in both directions):
   a) South Wales, South Midlands, Gloucestershire and north Bristol to Frome, West & South Wiltshire (inc. Salisbury) Dorset, Bournemouth and Poole (plus Southampton and Portsmouth for South Wales & north Bristol traffic) via M4 junction 18/A46T to A36T. Two separate historic schemes to link the A36 and A46 trunk roads were both abandoned by the Department for Transport in the 1990s;

[6] 'Getting Around Bath – A Transport Strategy for Bath, November 2014' (http://www.bathnes.gov.uk/sites/default/files/sitedocuments/getting_around_bath_transport_strategy_-_final_issue_web_version.pdf)
[7] 'Getting Around Keynsham Transport Strategy (http://www.bathnes.gov.uk/sites/default/files/siteimages/Parking-and-Travel/getting_around_keynsham_-_final_version.pdf)
[8] 'Bath and North East Somerset Placemaking Plan, part 3 – Keynsham' (http://www.bathnes.gov.uk/sites/default/files/sitedocuments/Planning-and-Building-Control/Planning-Policy/Placemaking-Plan/draft_pmp_vol_3_keynsham.pdf)

b) Bristol to West & South Wiltshire (inc. Salisbury), Dorset, Bournemouth, Poole, Southampton and Portsmouth (as above) via A4 and A36T (linking the two largest conurbations in South West England); and
c) M4 Junction 18 to Norton Radstock (in Bath & North East Somerset) & parts of Mendip District, Somerset.

2) The A4 bisects the northern part of the city centre, with a very high level of both pedestrian crossing and vehicle turning movements, creating significant and sporadic congestion with subsequent high vehicle emissions in canyon-like streets;
3) High proportion of diesel vehicles (HGV, large vans, coaches, buses and cars) which is exacerbated by the volume of long distance traffic, as described in (1) above and the popularity of Bath for domestic and international tourism, attracting over 100 diesel coaches a day to Bath city centre in the summer.
4) High level of HGVs serving local businesses using strategic network and narrow streets within AQMA, with subsequent conflicts with high pedestrian volumes;
5) Narrow highway widths on strategic routes within Bath make the provision of on-highway bus and cycles lanes difficult or impractical;
6) Diesel buses held up in congestion which is predominately caused by private cars generating higher emissions than would otherwise be produced in a less congested network;
7) Irregular railway services at the three local railway stations within the District with timetable gaps of over an hour during parts of the day. The MetroWest scheme, planned to be delivered within the next 5 years, will bring half hourly services to all three stations to/from Bristol, with direct services to the Severn Beach line in Bristol.
8) Lack of local railway stations on the Great Western Mail line in Bath & North East Somerset and Wiltshire, following historic closure of such stations and difficulty of reopening due to lack of existing local rail services and signalling issues (to be overcome by MetroWest scheme).
9) Indefinite postponement of rail electrification on the Great Western Railway through Bath by the Department for Transport has delayed the replacement of diesel as a fuel for intercity trains which pass through the centre of Bath AQMA (although planned new diesel-electric trains will be an improvement from the existing historic diesel inter-city fleet).

In Saltford:

The A4 through Saltford, part of the long distance route as described in 1(b) above, is incompatible with meeting the needs of local people and business, with subsequent congestion and associated pollution for large parts of the day. However, there appears to be no definitive local support for a bypass solution.

In Keynsham:

Long distance traffic from the M5/M4/M32 and A4174 Avon Ring Road to Norton Radstock & Paulton area (via B3116 and A39) passes through Keynsham High Street, adding to the volume of local traffic. It is expected that the one way scheme implemented in May 2017 will encourage more of this traffic to access the B3116 via the A4 Broadmead roundabout, thereby avoiding the Keynsham AQMA.

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

- Proposed Bath Clean Air Zone delayed due to unsuccessful DEFRA funding bid;

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Bath & North East Somerset Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of The Bath London Road AQMA 2013, The Keynsham High Street AQMA 2010 and The Saltford AQMA 2013.

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
Bath 1	Bath Transport Package	Traffic Management	Other	Bath and North East Somerset Council			Park & Ride (P&R) bus patronage; and vehicles using the P&R	n/a	890 additional P&R spaces between 2012 and 2015. 4 EV charging sockets installed at each P&R site. Bus infrastructure works included: Raised pavements at 375 stops to ease access on and off buses; 169 Real Time Passenger Information displays; Replacement of existing shelters and the addition of new bus shelters. Variable message sign on radial routes for parking info. and P&R promotion Extension of 10am to 6pm traffic restrictions in Stall Street and Lower Borough Walls. Seven Dials shared space and cycle scheme. Closure of Saw Close car park (22 spaces). Patronage at the 3 P&R sites overall grew by 16% between 2008/09-20016/17.	Substantially Complete.	Planned relocation of Mineral Water Hospital needs to take place before next phase of vehicular restrictions are implemented. This is due to meeting the needs of disabled drivers & passengers.
Bath 2	Cleveland Bridge area restrictions feasibility study [& Low Emission Zone Feasibility Study]	Promoting Low Emission Transport	Low Emission Zone (LEZ)	Bath and North East Somerset Council			Modelled NO2 levels.	n/a	LEZ Feasibility Study completed and findings available online and in full on request. Further feasibility work underway following Clean Air Zones guidance publication and including identification in Devolution Deal Consultation Document.	Initial study complete.	Possible NO2 emissions reduction of 7% but only marginal changes in resulting concentrations. Further progress subject to Devolution Deal consultation outcome.

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
Bath 3	Low Carbon Bus Trial (CIVITAS 1.3)	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	University of the West of England, First Group and Bath and North East Somerset Council			Fuel usage / costs.	n/a	Complete. As a result, 8 hybrid electric buses now in used on the 3 park and ride services.	Complete.	39% improved fuel economy (mpg). 28% fuel saving (l/100km). Overall operating cost increase of £0.03/km (but due in part to prototype status). NOx comparison unavailable.
Bath 4	Urban Freight Transhipment (CIVITAS 7.2)	Freight and Delivery Management	Freight Consolidation Centre	University of the West of England, Bath and North East Somerset Council and DHL			HGV traffic flows. Electric vehicle. Number of participating businesses. NOx emissions.	1% p.a. from HGVs (provisional target)	>80% journey reduction eg May 2013 - 115 deliveries to consolidation centre and 23 EV deliveries from centre. 55.7% reduction in energy consumption. 38 businesses with 40 retail outlets. Average monthly reduction in deliveries since January 2011 when scheme started is 77%. 91 deliveries in to centre and 22 out for Bath in May 2016.	Ongoing.	Following a review of the economic viability of the operation, the Council has cancelled its contract and ongoing subsidy for the operation, effective from 1st April 2017. DHL, the current operator of the scheme is currently reviewing their commercial viability for the service and are continuing the service until such time as they decide it is no longer a viable enterprise
Bath 5	Improved Enforcement of TROs (CIVITAS 3.4 - Demand Management Strategies)	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	Bath and North East Somerset Council			HGV traffic flows. NO2 levels.	n/a		Complete.	The trial indicated that identifying breaches of the 7.5 tonne weight limit and informally contacting the relevant operators led to a reduction in HGV volumes. For details see 2016 ASR.
Bath 6	Bicycle Hire including Electric Bikes (CIVITAS 6.4 and 6.5)	Transport Planning and Infrastructure	Public cycle hire scheme	Bath and North East Somerset Council			Vehicle mix (% bikes). No. of hires.	n/a	New cycle hire facility launched 2014 with PAYG at 9 stations across Bath. 5 further hire stations added to total 14 in 2016.	2018	Over 15,000 hires between June 2014 and June 2016. 877 users per month. Electric bikes to be included in 2017/18.

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
Bath 7	Electric Vehicle Recharging Points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	Bath and North East Somerset Council			Vehicle mix (count of electric vehicles). Number of charges p.a. Number of different users.	1% of private car emissions p.a. (provisional target)	Charging sessions increase across West of England charge point commensurate with national uptake of ULEVs.	2021	The West of England GUL City Scheme outlines an increase in charge points sub-regionally from 200 to 400 points, including 'charging hubs'; further rapid chargers; demonstrator vehicles; and 100 council fleet vehicles converted to ULEVs by 2021 across the West of England. Potential hurdles include a shifting emphasis towards home-charging and on-street charging solutions as vehicle ranges increase and uptake becomes more mainstream.
Bath 8	Improve Building Emission Assessments	Policy Guidance and Development Control	Other policy	Bath and North East Somerset Council			Number of air quality assessments including spreadsheet tool.		No progress		
Bath 9	ECO Stars Vehicle Recognition Scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Bath and North East Somerset Council			Number of haulage operators & vehicles audited. HGV vehicle mix survey (number plate and engine standard).		No progress		
Bath 10	Review Council and Emergency Service Vehicle Fleet	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	Bath and North East Somerset Council			Euro engine standard survey.	5% p.a. (provisional target)	Review undertaken by Energy Saving Trust for successful Go Ultra Low City Scheme Bid. As a result the Council has pledged to change 25% of light duty fleet to ultra-low emission vehicles by 2021. 4 ULEVs already purchased and operating in B&NES.	2021	No progress has been made re emergency fleet.

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Bath 11	Monitoring of Bus Fleet Quality	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	First Group and Bath and North East Somerset Council			Euro engine standard survey. Number of emissions abatement retrofit / original design.	5% emissions over whole fleet p.a. (provisional target)	OLEV Low Emission Bus Scheme bid unsuccessful. Fleet monitored as part of Low Emission Zone Feasibility Study. Clean Bus Technology Fund paid for retrofitting of 35 buses across the West of England to Euro 5 or 6. At least 10 Euro 6 buses are in operation in Bath and a detailed review of the fleet will be undertaken as part of the Clean Air Zone proposals.	2026	Full audit of fleet planned as part of Clean Air Zone proposals.
Bath 12	Transport & Travel Information	Public Information	Via the Internet	Bath and North East Somerset Council			Number of signs. Contribute to achieving a target increase in bus passenger journeys per annum of 3% on a 2001/2 base level of 9.184m. Contribute to achieving an improvement in favourability recorded for B&NES within the West of England Bus Satisfaction Survey.	n/a	248 real time bus passenger information displays installed across B&NES. Overall bus passenger satisfaction in 2016 stood at 41% very satisfied and 47% fairly satisfied, in 2016.	Complete.	Bus checker app implemented as part of LSTF West of England project and available via www.travelwest.info

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
Bath 13	Alternative Exhaust Emissions Abatement	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	Bristol City Council			Number of retrofitted HGVs.	n/a	No progress since previous ASR 2016. No progress on HGVs, but Clean Bus Technology Fund used for retrofitting of 35 buses across the West of England to Euro 5/6. Also Clean Vehicle Technology Fund award (joint bid) enabled Thermal Management Technology (TMT) to 42 buses across the West of England fitted as standard with Selective Catalytic Reduction (SCR) to increase the exhaust back pressure on the engine, increasing temperatures and allowing the existing SCR system to operate more effectively, reducing nitrogen oxides.	2017	
Bath 14	Rossiter Road Traffic Managemen t Measures	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Bath and North East Somerset Council			Traffic flows. NO2 levels.	Moving traffic from receptors.	Completed 2015 and annual mean NO2 levels reduced from 49 in 2014 to 28 µg/m3 in 2016 on Widcombe Parade.	Complete.	
Bath 15	Promotional Website	Public Information	Via the Internet	Bath and North East Somerset Council			Number of visits to website.	n/a	Work currently underway to add further live data from AQMesh monitors to air quality dials on the website.	2017	

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
Bath 16	B&NES Corporate Travel Plan	Promoting Travel Alternatives	Workplace Travel Planning	Bath and North East Somerset Council			Business mileage. Modal shift (e.g. number of employees transferred from private car to bike, walking or public transport bus for commuting.	1% p.a. (provisional target)	Low emission pool cars provided at Keynsham office in association with Europcar, including Renault Zoe E.V (with charging point), Auris Hybrid and 3 Fiat 500's.	2018	Current plan covers 2015-2018
Keynsham 1	Quantify the benefits from the one way system pilot for the High Street including monitoring and modelling of air quality impacts.	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Project Delivery.	2017	2017-2018	Reduction in nitrogen dioxide concentrations. Traffic Counts. Reduction in emissions of nitrogen oxides.	Predicted reduction of approximately 3 µg/m3 NO2 on High Street and approximately 1 microgram increase on some areas of alternative route. No significant improvement predicted on Charlton Road.	Planning stage complete. 12 month one way trial: May 2017-May 2018. AQMesh and extra diffusion tubes located on Keynsham High Street.	2018	
Keynsham 2	Targeted information campaign for the most vulnerable groups (i.e. asthmatics, Chronic Obstructive Pulmonary Disease etc.).	Public Information	Other	B&NES Public Protection and Health Improvement, Public Health, Research and Intelligence Team, Clinical Commissioning Group, Sirona Care and Health.			The number of hits on website. Number of initiatives delivered.	No reduction in concentration in Nitrogen Dioxide, however there would be an exposure reduction for residents.	In progress – designing scheme with Public Health Team.		

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
Keynsham 3	This Action Plan influences planning policy to require electric vehicle charge points for each new property.	Promoting Low Emission Transport	Other	Developer and B&NES Planning Development Control.			Number of properties where a power spur for an electric vehicle charge point is installed. Number of planning applications approved with a vehicle charge point as an advisory or required condition.	% reduction in NOx emissions compared to a diesel.	Placemaking Plan states that electric charging facilities will be sought where practical	Ongoing	
Keynsham 4	Increase public charging points through 'Ultra Low West' (Source West) EV charging infrastructure programme.	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	B&NES Public Protection and Health Improvement			Number of charge points. Number of charging sessions per year.	% reduction in NOx emissions compared to a diesel.	2 public charge points and 2 charge points for council fleet installed. Further installations subject to emerging GUL programme.	2016-2021	
Keynsham 5	Recommend tree planting in future infrastructure programmes	Other	Other	Keynsham Connecting Communities Forum, Keynsham in Bloom (town council), Public Protection and Health Improvement, Public Health, Highways & Parks.			Number of trees planted.	Provision of a barrier to protect residents and visitors	Keynsham High St enhancement likely to be first application of this action. Awaiting outcome of one-way trial.		

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
Keynsham 6	This Action Plan influences planning policy to encourage the provision of cycle parking for each new property.	Promoting Travel Alternatives	Promotion of cycling	Developer and B&NES Planning DC.			Number of new properties with cycle storage. Number of planning applications approved with cycle storage as advisory or required condition.	% reduction in NOx emissions compared to a diesel.	Placemaking Plan requires provision for cycling in new developments	2016-2029	
Keynsham 7	Explore the promotion of an "Electric Zone".	Promoting Low Emission Transport	Other	Public Protection and Health Improvement & Highways.			Number of signs erected. Number of electric vehicles in peak hours on High Street/Ashton Way with a manual traffic count. Number of charging sessions.	N/A	No progress to date.		Partly dependent on emerging GUL programme and outcome of one-way trial for certainty over any on-street installations.
Keynsham 8	Influence the design of developments to improve access to public transport, cycling and walking routes.	Transport Planning and Infrastructure	Other	B&NES Placemaking Plan / Planning DC.			Number of approved planning applications with minimum 30 minute bus frequency in or adjacent to site (with 100 metre of the site).	Negligible	Placemaking Plan requires developments to facilitate walking, cycling and public transport	2016-2029	
Keynsham 9	Support the creation of a local "Air Quality Action Group".	Public Information	Other	Connecting Communities Forum			Established as part of the remit of existing of new group.	N/A	No progress.		

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
Keynsham 10	Keynsham Greenway links to National Cycle Network 4, Wellsway School and riverside path into Bristol and S Glos with new bridge over River Avon.	Transport Planning and Infrastructure	Cycle network	Transportation, Bristol City Council, South Gloucestershire Council, Sustrans, developers.	Feasibility study in 2017	Est. 2019	Delivery of project. Number of cycle trips from annual surveys.	Funding secured	No progress	2023	Sufficient contributions to cover final cost and delivery of housing.
Keynsham 11	Work with Community Transport to promote the use of Low emission dial-a-ride vehicles.	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	Keynsham and District Dial and Ride			Low emission vehicle journeys / miles.	% reduction in NOx emissions compared to a diesel.	No progress		Appropriate vehicle availability, plus budget and fleet renewal programme.
Keynsham 12	Identify, influence and publicise pedestrian and cycling facility improvements	Transport Planning and Infrastructure	Other	B&NES & First Group.	2017	2018-2023	Audit of infrastructure completed. Recommendation will be integrated into this plan. Walking and cycling surveys	N/A	Keynsham Transport Strategy approved in 2016	2023	

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
Keynsham 13	Lobby government for incentivising uptake of non-diesel cars.	Other	Other	Public Protection and Health Improvement & Public Health.			Letter sent.	In itself, no improvement, however, there is a quantifiable reduction in emissions with each new Ultra Low Emission Vehicle which is introduced to replace a diesel vehicle	Recently submitted a consultation response (June 2017) to the DEFRA consultation: 'Improving air quality: national plan for tackling nitrogen dioxide in our towns and cities' .		
Keynsham 14	Identify and publicise priority cycling routes to support a cycling culture for all.	Transport Planning and Infrastructure	Cycle network	B&NES Environmental Services, Sustrans & South Gloucestershire Council.			Cycling routes identified.	n/a	Network cycle maps plus a range of route maps available on the Council's website, supported by printed versions and cycling events.	Ongoing	
Keynsham 15	Encourage low emission bus services in Keynsham	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	B&NES Public Transportation			Number of bus routes serviced by a Low emission vehicle	% reduction in NOx emissions compared to a diesel. (or milligrams)	No progress.		The proposed Bath Clean Air Zone will be framed such that Keynsham AQMA will also benefit low emission vehicles.
Keynsham 16	Increase public education messages which promote healthier choices for short journeys	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	B&NES Public Protection and Health Improvement			Delivery of a public education campaign	No reduction in concentration. Exposure reduction	B&NES-wide Active Lifestyle campaigns and activities undertaken		

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
Keynsham 17	Work with bus operators on improved services, ticketing and simplified fare structure.	Transport Planning and Infrastructure	Bus route improvements	B&NES Public Transportation			B&NES area bus usage figures. Annually Bus Passenger Satisfaction surveys for B&NES (Transport Focus).	n/a	First Group, the region's largest bus operator launch mobile ticketing (mTickets) in October 2016.	Ongoing	
Keynsham 18	Support the provision of improved lighting on cycle path.	Transport Planning and Infrastructure	Cycle network	B&NES Property Services			Lighting provided to key locations.	n/a	No progress in B&NES, but Bristol City Council has installed solar studs within their boundary.		Concerns about effects on bat corridor, which may be offset by 'bat hat' option.
Keynsham 19	Advocate increased rail service via "MetroWest" - resulting in increase from hourly to half-hourly rail service.	Transport Planning and Infrastructure	Other	B&NES Environmental Services & other former Avon authorities.	2017-2019	2020-2021	Project implementation. Rail patronage per service at Keynsham (annual rail survey).	Offsets less efficient modes.	Part of MetroWest Phase 1 being developed by the West of England.	2021	
Saltford 1	Targeted information campaign advice for the most vulnerable groups (i.e. asthmatics, Chronic Obstructive Pulmonary Disorder etc.).	Public Information	Other	B&NES Public Protection and Health Improvement, Public Health, Research and Intelligence Team, Clinical Commissioning Group, Sirona Care and Health.			The number of hits on website. Number of initiatives	No reduction in concentration. Reduction in exposure to NO2 and fine particles.	No progress		

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
Saltford 2	Recommend tree planting in future infrastructure programmes	Other	Other	Community Air Quality Group (utilising Keynsham Connecting Communities Forum).			Number of trees planted.	Provision of a barrier to protect residents and visitors	Included in Joint Spatial Plan		
Saltford 3	Advice to land owners on planting that can help to protect their properties from air pollution.	Other	Other	B&NES Public Protection and Health Improvement, Highways & Planning			Number of hits on website	No reduction in concentration. Reduction in exposure to NO2 and fine particles.	No progress		
Saltford 4	Influence planning policy to support the increase of electric vehicle charge point infrastructure for each new property.	Promoting Low Emission Transport	Other	Developer and B&NES Planning DC			Number of properties where a power spur for an electric vehicle charge point is installed. Number of planning applications approved with a vehicle charge point as an advisory or required condition.	% reduction in NOx emissions compared to a diesel.	Placemaking Plan states that electric charging facilities will be sought where practical	2016-2029	

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
Saltford 5	Increase public charging points through 'Ultra-Low West' (Source West) electric vehicle charging infrastructure programme	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	B&NES Public Protection and Health Improvement,			Number of charge points. Number of charging sessions.	% reduction in NOx emissions compared to a diesel.	No progress.		
Saltford 6	Explore the promotion of an "Electric Zone".	Promoting Low Emission Transport	Other	B&NES Public Protection and Health Improvement, & Highways.			Number of signs. Number of electric vehicles in peak hour on A4.	N/A	No progress.		Partly dependent on emerging GUL programme and outcome of one-way trial for certainty over any on-street installations.
Saltford 7	Support the creation of a local "Air Quality Action Group".	Public Information	Other	Connecting Communities Forum and B&NES Public Protection and Health Improvement,			Established as part of the remit of existing of new group.	N/A	No progress.		Build on good relationship with parish council.
Saltford 8	Influence planning policy to encourage the provision of cycle parking for each new property.	Promoting Travel Alternatives	Promotion of cycling	Developer and B&NES Planning DC			Number of new properties with cycle storage. Number of planning applications approved with cycle storage as advisory or required condition.	% reduction in NOx emissions compared to a diesel.	Placemaking Plan requires provision for cycling in new developments	2016-2029	

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
Saltford 9	Work with Community Transport to promote the use of Low emission dial-a-ride vehicles.	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	KADDAR.			Low emission vehicle journeys / miles.	% reduction in NOx emissions compared to a diesel.	No progress		
Saltford 10	Encourage low emission bus services in Saltford.	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport	B&NES Public Transportation			Number of bus routes serviced by a Low emission vehicle	% reduction in NOx emissions compared to a diesel.	No progress		The proposed Bath Clean Air Zone will be framed such that Saltford AQMA will also benefit low emission vehicles.
Saltford 11	Lobby government for incentivising uptake of non-diesel cars.	Other	Other	B&NES Public Protection and Health Improvement			Government response and changes to legislation.	In itself, no improvement, however, there is a reduction with each new ULEV introduced replaced a diesel vehicle	No progress		
Saltford 12	Increase public education messages which promote healthier choices for short journeys	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	B&NES Public Protection and Health Improvement			Delivery of a public education campaign	No reduction in concentration. Exposure reduction	B&NES-wide Active Lifestyle campaigns and activities undertaken	On going	
Saltford 13	Support the provision or improved lighting on cycle path.	Transport Planning and Infrastructure	Cycle network	B&NES Property Services			Lighting provided to key locations at least	n/a	No progress		Concerns about effects on bat corridor, which may be offset by 'bat hat' option.
Saltford 14	Continue feasibility work on reopening Saltford Station.	Transport Planning and Infrastructure	Public transport improvements- interchanges stations and services	B&NES, First Group, Network Rail & MetroWest partners			Completed feasibility study	Requires air quality assessment	GWR requested to undertake timetabling work to determine if an additional station is feasible within MetroWest phase 1 timetable.		Supported by West of England Authorities, but not part of MetroWest phases 1 and 2. Awaiting results of GWR timetabling work.

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16[9] (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.

The Public Health England 'Public Health Outcomes Framework' indicator '3.01 Fraction of mortality attributable to particulate air pollution [10] (particulates under 2.5 micrometers in diameter as opposed to nitrogen dioxide)' for Bath and North East Somerset Council in 2015 (the most recent year available) is 4.1% (compared to 4.8% in 2013). This is lower than the values across the South West region of 4.3% and 4.7% nationally.

In 2015 Bath & North East Somerset Council started to monitor $PM_{2.5}$ at Chelsea House, London Road, Bath (CM4), this a roadside site set 9 m back from the road. Monitoring from this location shows a slight decrease in 2016 from 2015. Due to its small size $PM_{2.5}$ can travel large distances in the air. 40-50% of $PM_{2.5}$ levels can be from sources outside the local authority boundary (LAQM.TG16)[11].

Environmental Monitoring are working with Public Health on mitigating the impacts of $PM_{2.5}$ within Bath & North East Somerset by developing a project as part of the Keynsham and Saltford Air Quality Action Plans that provides targeted information to vulnerable groups through health workers. Public Health are represented on the Air Quality working group which developed the Keynsham and Saltford Action Plans and has been involved in the development of the revised Bath Action Plan. Many of the actions in the action plans will reduce $PM_{2.5}$ as well as NO_2; details of the specific actions are given in Table 2.2.

[9]

[10] http://www.phoutcomes.info/public-health-outcomes-framework#gid/1000049

[11] Local Air Quality Management - Technical Guidance (TG16), April 2016 (https://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf)

Within Bath & North East Somerset the area depicted by the city of Bath is a smoke control area. Details of this area can be found at http://www.bathnes.gov.uk/services/environment/pollution/smoke-control. Within this area the Council works to ensure that only authorised fuels or appliances are used.

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

3.1 Summary of Monitoring Undertaken

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

Automatic Monitoring Sites

Bath & North East Somerset Council undertook automatic (continuous) monitoring at 4 sites during 2016. Table A.1 in Appendix A shows the details of the sites. Monitoring was carried out for NO_2 and PM_{10} and a $PM_{2.5}$ in 2016.

National monitoring results are available at https://uk-air.defra.gov.uk/ (the London Road Continuous NO_2 analyser is listed as Bath Roadside).

Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. Whilst we are fully compliant with the national air quality objective with respect to benzene, Bath & North East Somerset Council has a benzene monitor which is part of the national non-automatic hydrocarbon network located at the London Road continuous site (CM1). Results from this site are available at https://uk-air.defra.gov.uk/data/non-auto-data?uka_id=UKA00306&network=nahc&s=View+Site listed as Bath Roadside and details are also given in Appendix D.

Maps showing the location of the monitoring sites are provided in Appendix E. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

Non-Automatic Monitoring Sites

Bath & North East Somerset Council undertook non- automatic (passive) monitoring of NO_2 at 92 sites during 2016. Table A.2 in Appendix A shows the details of the sites.

27 new sites were introduced in 2016, there were 4 specific study areas and a further 8 monitors to respond to public requests and to check other key locations. These were:

- Whitchurch
  - Whitchurch 1 – close to 151 Bristol Road
  - Whitchurch 2 – close to 121 Bristol Road
  - Whitchurch 3 – junction of A37 and Church Road
  - Whitchurch 4 - junction of A37 and Staunton Lane
  - Whitchurch 5 – opposite the Church
- Temple Cloud
  - Temple Cloud 1 – close to The Patches
  - Temple Cloud 2 – junction of A37 and Temple Inn Lane
  - Temple Cloud 3 – close to Myrtle Cottage
  - Temple Cloud 4 – close to Trinity Cottage
  - Temple Cloud 5 – close to Old Post Office House
- Newbridge
  - Newbridge 1 – close to 68 Newbridge Hill
  - Newbridge 2 – close to St Mary's Primary School
  - Newbridge 3 – close to 104 Newbridge Road
  - Newbridge 4 – close to 129 Newbridge Road
- Keynsham One-way trial
  - Keynsham – Ashton Way
  - Keynsham - West View Road
  - Keynsham – Victoria Church
  - Keynsham – High Street B (close to 59 High Street)
  - Keynsham – Fish bar
- Other sites
  - Bathampton High Street
  - Lower Oldfield Park
  - Upper Swainswick
  - Lower Camden Place
  - Batheaston – London Road West B – close to 158a London Road West
  - Larkhall - St Saviours School
  - Julian Road
  - Keynsham – Bath Hill South

Maps showing the location of the monitoring sites are provided in Appendix E.

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.

During 2016 Bath & North East Somerset also carried out monitoring at three locations using AQ Mesh samplers. They monitor NO_2, PM_{10} and $PM_{2.5}$ using electrochemical sensors giving real-time results every 15 minutes. In 2016 each site

was co-located with a continuous analyser at Chelsea House (CM4) for a period during 2016. Offset and slope correction factors were calculated from this data and applied to monitoring carried out at other locations around the district (Appendix D)

Monitoring of non-LAQM parameters including pollen and local meteorology was also carried out by Bath & North East Somerset, details are in Appendix D.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, "annualisation" and distance correction. Further details on adjustments are provided in Appendix C.

Nitrogen Dioxide (NO_2)

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 40 µg/m^3. For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B.

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 200 µg/m^3, not to be exceeded more than 18 times per year.

Automatic Monitoring Data

Results from automatic monitoring of NO_2 are shown in Tables A.3 and A.4 and Figure A.1. The London Road (CM1) monitoring site exceeded the annual average objective but is already within the AQMA. All sites measured values less than 200 µg/m^3, therefore the hourly objective was met.

The trend data shows that 2016 was not a peak year for NO_2, with monitoring results being lower than previous years at all sites (Figure A.1, Appendix A). The results from Windsor Bridge remain significantly lower than in the previous years of 2011-2013. During 2013 the site was relocated due to junction changes and the monitor

has moved 2m further from the kerb. The site is now a similar distance from the road to the residential properties which are located opposite the monitoring point.

Diffusion Tube Monitoring Data

The results of the diffusion tube monitoring are shown in Table A.3 and Figures A.2-A.10. The results have been corrected by bias factors as described in LAQM.TG16 [12]. In 2016, the choice of bias factor was reviewed and the local bias factor was chosen in preference to the national bias factor, with the clarification that using this factor will overestimate results from sites which are not directly comparable with the co-located reference site on London Road, Bath. An explanation for this is provided in Appendix C. The raw monthly diffusion tube monitoring data is shown in Appendix B.

Existing Sites

The results from existing sites using the local bias factor show that in 2016 the annual average objective was exceeded at the following locations:

- Angel Place
- Anglo Terrace
- Argyle Terrace
- Bathwick Street AQM1
- Bathwick Street
- Bear Flat
- Broad Street
- Charlotte Street
- Cleveland Place West
- Dorchester Street
- Gay Street - top
- George Street
- High Street/Guildhall
- James Street West
- Keynsham – High Street
- Keynsham – Somerfield
- Lambridge
- London Road
- Manvers Street
- Morley Terrace
- Newbridge Hill
- Newbridge Road
- Paragon
- Saltford – The Crown
- St James' Parade
- Upper Bristol Road
- Victoria Buildings
- Walcot Terrace
- Wells Road (new)
- Wells Road/Upper Oldfield Park

All the monitoring sites except Bear Flat and Newbridge Hill are within an AQMA. The monitoring sites at Bear Flat and Newbridge Hill are located away from a building façade and following the guidance in LAQM.TG16 [13] the level at the closest

[12] 'Local Air Quality Management – Technical Guidance (TG.16) April 2016' (https://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf)
[13] Local Air Quality Management - Technical Guidance (TG16), April 2016 (https://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf)

relevant exposure would be below 40 µg/m^3 (distance adjustment results are shown in Table B.1 with further details on calculations in Appendix C).

In addition to the above sites, there are also 11 other sites (identified below) having levels which are between 36-40 µg/m^3. All the monitoring sites except RUH North and Upper Wellsway are within an AQMA. Bath & North East Somerset Council will continue to monitor at these locations and take action if the concentrations remain high at sites outside the AQMAs:

- Beckford Road
- George Street
- Keynsham – Charlton Road B
- Lansdown Crescent
- Little Stanhope Street
- Oak Street
- RUH North
- Salford – Bath Road
- Upper Wellsway
- Warminster Road
- Widcombe School
- Windsor Bridge (new)

The trends in diffusion tube monitoring since 2006 are shown in Figures A.2-A.9 in Appendix A. Overall, monitoring results of NO_2 in 2016 were slightly lower than in 2015 although no long term trend is obvious.

Monitoring of NO_2 at Widcombe High Street (DT18) has shown a significant drop in concentrations (around 15 µg/m^3). This is due to a new road layout being created to move through traffic out of the pedestrian centre and away from residential properties. This site is now below the objective and is expected to stay at this level. There are currently no plans to amend the AQMA to remove this small link.

Monitoring from 3 sites was at or above 60 µg/m^3. These sites are all within the Bath AQMA which has been varied to include the 1 hour objective as detailed monitoring is not available at these locations:

- Anglo Terrace
- Dorchester Street
- Lambridge

Whitchurch Study

Following a high result in 2015 at the Whitchurch site monitoring site a wider study was commissioned. A further 5 monitoring locations in Whitchurch were added to the network in May 2016. Figure E.8 in Appendix E is a map showing the locations of the monitoring sites. The results from the study show that levels are just above the objective at 4 locations, this decreases to 2 locations at the façade of properties. These locations are on the A37 where properties are close to the road and the junction with Staunton Lane.

A decision has been taken not to declare at this time as there is not enough evidence at all sites. Further monitoring at sites with limited data will be carried out in 2017 and a decision will be made in early 2018.

Temple Cloud Study

Following a request from Cameley Parish Council a diffusion tube was installed in May 2016 on the A37 in at Temple Cloud in a narrow section of road, which also included a street canyon (Figure E.9 in Appendix E). The initial results from this monitored suggested that concentrations at this section of the A37 may be high. A further 4 monitoring sites were added in September to see the extent of the high levels.

The results shown in Table A.2 show that all the monitoring locations after bias and annual corrections exceeded the annual average objective and one site was also likely to exceed the one-hour objective as it was over 60 µg/m^3. The results of 3 sites reduced at the façade, however only one site met the objective.

Based on the results of the survey, an AQMA will be declared for the A37 in Temple Cloud. The Council will be consulting on the extent of the area to be included and the AQMA will be declared at the earliest opportunity.

Newbridge Study

Following a concern raised over the levels of NO_2 in Newbridge close to the hospital, a 4 diffusion tube monitors were installed for 3 months (May-August 2016). The locations of these monitors are shown in Figure E.2 in Appendix E.

The results shown in Table A.2 show that all the monitoring locations after bias and annual corrections are below 40 µg/m^3. Two sites are between 36-40 µg/m^3, however when adjusted to façade all sites were below 31 µg/m^3. No further action is being taken in this area.

Keynsham One-way Trial

As part of the Getting around Keynsham Transport Strategy, the Council is trialling a one-way system in the centre of Keynsham. To monitor the effects of the scheme, 5 additional diffusion tubes have been located in the town. The diffusion tubes were installed in September 2016 to have 6-month pre-trial monitoring. Locations of the monitoring sites are shown in Figure E.5 in Appendix E. The results shown in Table A.2 show that all the monitoring locations after bias and annual corrections are below 40 µg/m^3.

Other new sites

In 2016 a further 8 diffusion tubes were installed around the authority. The results shown in Table A.2 show that all the monitoring locations after bias and annual corrections are below 40 µg/m^3. The site at Keynsham – Bath Hill South was close to 40 µg/m^3, monitoring will continue at this site. If it continues to be high or exceeds the air quality objective in the future, the Keynsham AQMA will be extended.

AQMesh Results

In 2016 comparison of the two AQMesh analysers was carried out at the Chelsea House continuous analyser. After corrections for slope and offset the results showed that the annual average results of the AQMesh compared well with the continuous analysers, however peaks, particularly for PM were exaggerated (Table D.2).

The analysers were also used to monitor at Larkhall and Sydney Place. The results from these locations are shown in Table D.3. The results show that there is no issue at Larkhall. At Sydney Place, the NO_2 concentration exceeds the air quality objective at the roadside, however using the NO_2 fall off calculator it is below the objective at the façade of the property. The PM_{10} 24 hour mean is close to the objective and only

calculated for 4 months so possible indicates and exceedance at the roadside, however the comparison showed that the peaks were being exaggerated and PM_{10} also decreases with distance from the road.

Particulate Matter (PM_{10})

Monitoring for PM_{10} has been carried out at 2 sites during 2016 using BAM1020 analysers. The data has been corrected to Gravimetric equivalent by dividing by 1.2. QA/QC procedures are described in Appendix D.

Chelsea House is located on the façade of a residential property and Windsor Bridge is at a worse case location on the opposite side of the junction to the residential properties. In 2013 the Windsor Bridge site was moved across the junction due to changes in the road layout.

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.

The results show that the annual average objective was not exceeded during 2016 and the number of exceedances of the 24 hour objective was below 35 at both sites (Tables A.5 and A.5). Figures A.11-A.12 shows that the levels of PM_{10} are similar to previous years at Windsor Bridge and Chelsea House.

The peaks above the 24 hour objective in March, November and December 2016 were due to high pressure bringing pollution across from Europe (March) and calm conditions limiting dispersion (November and December). These were also seen in other areas of the UK.

Particulate Matter ($PM_{2.5}$)

Bath & North East Somerset Council started monitoring PM2.5 in July 2015. Table A.7 in Appendix A presents the ratified and adjusted monitored PM2.5 annual mean concentrations for the past 2 years.

The results show that concentrations of PM2.5 dropped slightly in 2016 compared to 2015, however there is currently not enough data to establish a long-term trend at this site.

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	London Road	Roadside	375462	165844	NO_2 Benzene	Y	Chemiluminescent Pumped BTX tubes	0	3	2.6
CM2	Guildhall	Roadside	375111	164857	NO_2	Y	Chemiluminescent	1	2	1.3
CM3	Windsor Bridge	Roadside	373593	164861	NO_2 , PM_{10}	Y	Chemiluminescent BAM1020	2	4	2.0
CM4	Chelsea House	Roadside	375419	165853	NO_2 , PM_{10}, $PM_{2.5}$	Y	Chemiluminescent BAM1020 BAM1020 (smart heated)	0	9	2.0
CM6	Leisure Centre	Urban Centre	375430	164770	Met. Data Pollen	N	Various Burkard Sporewatch Pollen Trap	N	N/A	On roof

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)
DT23	Alexandra Park	Urban Background	375105	163991	NO_2	NO	N/A	N/A	NO	3.3
DT88	Angel Place	Roadside	374884	164348	NO_2	YES	0	2.65	NO	2.25
DT90	Anglo Terrace	Roadside	375288	165758	NO_2	YES	2.5	1.6	NO	2.25
DT62	Argyle Terrace	Roadside	373211	164743	NO_2	YES	4	3	NO	2.8
DT58	Batheaston – London Road West A	Roadside	377643	167365	NO_2	NO	0	1	NO	2.5
DT14	Bathwick Street	Roadside	375602	165365	NO_2	YES	1	1	NO	2.5
DT81	Bathwick Street AQM1	Kerbside	375532	165419	NO_2	YES	4	0.5	YES	2.5
DT84	Bear Flat	Roadside	374604	163806	NO_2	NO	5.7	1.85	NO	2.25
DT15	Beckford Road	Roadside	375733	165414	NO_2	YES	7	1	NO	2.7
DT83	Bennett Street	Urban Centre	374860	165337	NO_2	YES	4.5	0	NO	2.25
DT03	Broad Street	Kerbside	375008	165145	NO_2	YES	2	0.5	NO	2.5
DT37	Charlotte Street	Roadside	374622	164994	NO_2	YES	3	1	NO	2.7

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)
DT51	Cleveland Place West	Roadside	375255	165718	NO_2	YES	2.9	3	NO	2.65
DT52	Daniel Street	Urban Centre	375544	165331	NO_2	YES	3	N/A	NO	2.7
DT42	Dorchester Street	Kerbside	375230	164383	NO_2	YES	2	0.5	NO	2.7
DT05	Gay Street – Top	Roadside	374797	165161	NO_2	YES	3	1	NO	2.6
DT04	George Street	Roadside	374899	165159	NO_2	YES	3	1	NO	2.3
DT89	Green Park Road	Roadside	374634	164595	NO_2	NO	0	6	NO	2.25
DT01	High Street/ Guildhall	Roadside	375108	164866	NO_2	YES	2	1	NO	2.8
DT45	James Street West	Roadside	374697	164763	NO_2	YES	0	5	NO	2.7
DT33	Keynsham	Urban Background	364803	168237	NO_2	NO	8	1	NO	2.6
DT66	Keynsham – High Street A	Roadside	365360	168815	NO_2	YES	1	1	NO	2.5
DT64	Keynsham – Charlton Road B	Roadside	365305	168657	NO_2	YES	4	1	NO	2.8
DT70	Keynsham – Bath Hill	Roadside	365496	168521	NO_2	YES	1	4	NO	2.3

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)
DT65	Keynsham - Charlton Rd A	Roadside	365399	168701	NO_2	YES	3	1	NO	2.7
DT69	Keynsham – Rock Road	Roadside	365428	168435	NO_2	NO	0	2	NO	3.0
DT70a	Keynsham - Somerdale	Urban Centre	365553	168990	NO_2	NO	6	1.9	NO	2.2
DT67	Keynsham - Somerfield	Roadside	365457	168496	NO_2	YES	2	1	NO	2.8
DT63	Keynsham – Station Road	Roadside	365409	168846	NO_2	YES	3	1	NO	2.7
DT68	Keynsham - Temple St	Roadside	365489	168363	NO_2	NO	0	3	NO	2.8
DT55	Lambridge	Roadside	376451	166502	NO_2	YES	0	4	NO	2.6
DT47	Lansdown Crescent	Roadside	374800	165708	NO_2	YES	1	2	NO	2.5
DT46	Little Stanhope Street	Roadside	374490	164971	NO_2	YES	0	2	NO	2.6
DT11	London Road	Roadside	375533	165897	NO_2	YES	3	1	NO	2.7
DT39	Manvers Street	Roadside	375247	164591	NO_2	YES	3	2	NO	2.3

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)
DT61	Morley Terrace	Roadside	373484	164846	NO_2	YES	0	3	NO	2.5
DT29	MSN High Street	Roadside	366466	154190	NO_2	NO	3	1	NO	3.0
DT30	MSN Westfield Primary Sch	Urban Background	367280	153840	NO_2	NO	0	N/A	NO	2.6
DT35	Newbridge Hill	Roadside	373090	165219	NO_2	NO	7	2	NO	2.4
DT34	Newbridge Road	Roadside	373092	165106	NO_2	YES	5	1	NO	2.3
DT87	Oak Street	Roadside	374702	164414	NO_2	YES	0	2.65	NO	2.25
DT48	Paragon	Roadside	375044	165527	NO_2	YES	1	1	NO	2.6
DT27	Radstock - Fortescue Rd	Roadside	368876	154908	NO_2	NO	16	2	NO	2.7
DT85	RUH – North	Roadside	373073	165983	NO_2	NO	7	1.5	NO	2.25
DT86	RUH – South	Roadside	373041	165898	NO_2	NO	10	2	NO	2.45
DT77	Saltford - Bath Road	Roadside	368778	166687	NO_2	YES	0	2	NO	2.2
DT75	Saltford - The Crown	Roadside	368375	166988	NO_2	YES	0	3	NO	2.6

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)
DT71	Saltford Library	Roadside	368187	167117	NO_2	NO	11	3	NO	2.6
DT43	St James' Parade	Roadside	375053	164418	NO_2	YES	2	1	NO	2.8
DT50	Thomas Street	Urban Centre	375318	165812	NO_2	YES	0	N/A	NO	2.9
DT09	Upper Bristol Road	Roadside	373993	165174	NO_2	YES	5	1	NO	2.6
DT26	Upper Wellsway	Roadside	373576	161908	NO_2	NO	0	3	NO	2.0
DT60	Victoria Buildings	Roadside	374039	164760	NO_2	YES	2	2	NO	2.9
DT52-54	Walcot Terrace (3 tubes)	Roadside	375462	165843	NO_2	YES	0	3	YES	2.5
DT16	Warminster Road	Roadside	376063	165492	NO_2	YES	18	4	NO	2.4
DT20	Wells Road	Kerbside	374716	164303	NO_2	YES	2	1	NO	2.7
DT20	Wells Road (new)	Roadside	374760	164310	NO_2	YES	0	1.5	NO	2.25
DT21	Wells Road/Upper Oldfield Park	Roadside	374454	164202	NO_2	YES	3	1	NO	2.7
DT32	Whitchurch	Roadside	361227	167747	NO_2	NO	1	6	NO	2.7

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)
DT32	Whitchurch (new)	Roadside	361242	167652	NO_2	NO	2.7	1.5	NO	2.25
DT18	Widcombe High Street	Roadside	375414	164216	NO_2	YES	0	5	NO	2.5
DT17	Widcombe School	Roadside	375634	164406	NO_2	YES	5	1	NO	2.6
DT08	Windsor Bridge	Roadside	373420	165107	NO_2	YES	4	2	NO	2.6
DT08	Windsor Bridge (new)	Roadside	373518	165124	NO_2	YES	0	3.5	NO	2.25
AQM1	Bathwick Street	Kerbside	375532	165419	NO_2	YES	4	0.5	AQMesh	2.5
New Sites for 2016										
DT91	Bathampton High Street	Roadside	377683	166408	NO_2	NO	0	1.1	NO	2.3
DT94	Batheaston – London Road West B	Roadside	377290	167097	NO_2	NO	0	1.25	NO	2.5
DT93	Lower Camden Place	Kerbside	375070	165900	NO_2	NO	3.3	0.23	NO	2.3
DT92	Lower Oldfield Park	Roadside	373988	164403	NO_2	NO	6.2	1.5	NO	2.6

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)
DT95	Larkhall- St Saviours School	Roadside	375902	166721	NO_2	NO	7.2	0.2	NO	2.55
DT96	Temple Cloud 1	Roadside	362219	157923	NO_2	NO	0	1.5	NO	2.4
DT97	Whitchurch 1	Roadside	361335	167431	NO_2	NO	5.2	1.2	NO	2.5
DT98	Whitchurch 2	Roadside	361276	167555	NO_2	NO	0	1.3	NO	2.3
DT99	Whitchurch 3	Kerbside	361235	167630	NO_2	NO	1.75	0.9	NO	2.4
DT100	Whitchurch 4	Roadside	361326	167606	NO_2	NO	5	1.6	NO	2.26
DT101	Whitchurch 5	Roadside	361235	167824	NO_2	NO	4	1.6	NO	2.5
DT102	Julian Road	Roadside	374791	165485	NO_2	NO	17	1.85	NO	2.57
DT103	Newbridge 1	Roadside	372696	165489	NO_2	NO	7	1.9	NO	2.5
DT104	Newbridge 2	Roadside	372663	166274	NO_2	NO	12	1.65	NO	2.45
DT105	Newbridge 3	Roadside	372542	165205	NO_2	NO	10	3.05	NO	2.5
DT106	Newbridge 4	Roadside	372725	165088	NO_2	NO	5.3	2.3	NO	2.55
DT109	Temple Cloud 3	Roadside	362344	157658	NO_2	NO	2	1.67	NO	2.55
DT110	Temple Cloud 4	Roadside	362262	157799	NO_2	NO	4	1	NO	2.05
DT111	Temple Cloud 5	Roadside	362234	157880	NO_2	NO	0	1	NO	2.4

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)
DT108	Temple Cloud 2	Roadside	362179	158055	NO_2	NO	6.2	1.25	NO	2.58
DT107	Keynsham – Bath Hill South	Roadside	365710	168339	NO_2	NO	0	1.3	NO	2.45
DT112	Keynsham – Ashton Way	Roadside	365375	168594	NO_2	NO	35	1.5	NO	2.55
DT113	Keynsham - West View Road	Roadside	365217	168505	NO_2	NO	4.5	1.5	NO	2.55
DT114	Keynsham – Victoria Church	Kerbside	365414	168684	NO_2	YES	11.5	0.5	NO	2.65
DT115	Keynsham – High Street B	Roadside	365447	168586	NO_2	YES	1.8	1.1	NO	2.4
DT116	Keynsham – Fish bar	Roadside	365462	168533	NO_2	YES	4	1	NO	2.5
DT92a	Upper Swainswick	Roadside	376161	168130	NO_2	NO	0	1	NO	2.15

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 Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
						2012	2013	2014	2015	2016
CM1	London Road	Roadside	Automatic	96	96	**56**	**57**	**57**	**54**	**48**
CM2	Guildhall	Roadside	Automatic	97	97	**41**	37	34	34	34
CM3	Windsor Bridge	Roadside	Automatic	99	99	**56**	**46**	35	33	33
CM4	Chelsea House	Roadside	Automatic	98	98	**49***	33*	27	31	29
DT23	Alexandra Park	Urban Background	Diffusion Tube	92	92	17	17	14	15	14
DT88	Angel Place	Roadside	Diffusion Tube	92	92	-	-	-	**55**	**47**
DT90	Anglo Terrace	Roadside	Diffusion Tube	100	100	-	-	-	**73**	**69**
DT62	Argyle Terrace	Roadside	Diffusion Tube	100	100	**46**	**45**	**48**	**49**	**48**
DT58	Batheaston – London Road West A	Roadside	Diffusion Tube	100	100	34	34	38	35	32
DT14	Bathwick Street	Roadside	Diffusion Tube	92	92	**48**	**50**	**54**	**51**	**45**
DT81	Bathwick Street AQM1	Kerbside	Diffusion Tube		42	-	-	**62**	**56**	**54**
DT84	Bear Flat	Roadside	Diffusion Tube	75	75	-	-	-	**43**	**45**
DT15	Beckford Road	Roadside	Diffusion Tube	100	100	**41**	**43**	**43**	35	37
DT83	Bennett Street	Urban Centre	Diffusion Tube	92	92	-	-	-	22	24
DT03	Broad Street	Kerbside	Diffusion Tube	100	100	**62**	**59**	**62**	**57**	**48**
DT37	Charlotte Street	Roadside	Diffusion Tube	83	83	**42**	**43**	**44**	**44**	**46**
DT51	Cleveland Place West	Roadside	Diffusion Tube	100	100	**51**	**55**	**58**	**55**	**50**

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2016 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
						2012	2013	2014	2015	2016
DT13	Daniel Street	Urban Centre	Diffusion Tube	100	100	28	30	29	28	27
DT42	Dorchester Street	Kerbside	Diffusion Tube	92	92	**66**	**67**	**71**	**73**	**67**
DT05	Gay Street – Top	Roadside	Diffusion Tube	100	100	**43**	**42**	**48**	**40.4**	**41**
DT04	George Street	Roadside	Diffusion Tube	100	100	**43**	**44**	**47**	**42**	39
DT89	Green Park Road	Roadside	Diffusion Tube	100	100	-	-	-	30	28
DT01	High Street/ Guildhall	Roadside	Diffusion Tube	92	92	**43**	**45**	**46**	**40.3**	**40.4**
DT45	James Street West	Roadside	Diffusion Tube	100	100	**41**	**45**	**43**	**43**	**44**
DT33	Keynsham	Urban Background	Diffusion Tube	100	100	19	18	17	16	16
DT66	Keynsham – High Street A	Roadside	Diffusion Tube	100	100	**46**	**44**	**50**	**47**	**46**
DT64	Keynsham – Charlton Rd B	Roadside	Diffusion Tube	100	100	38	39	39	37	38
DT70	Keynsham – Bath Hill	Roadside	Diffusion Tube	83	83	32	31	36	33	31
DT65	Keynsham – Charlton Road A	Roadside	Diffusion Tube	100	100	35	37	39	35	35
DT69	Keynsham – Rock Road	Roadside	Diffusion Tube	100	100	27	29	28	25	26

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2016 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
						2012	2013	2014	2015	2016
DT70A	Keynsham - Somerdale	Urban Centre	Diffusion Tube		42	23	23	27	26	24
DT67	Keynsham – Somerfield	Roadside	Diffusion Tube	92	92	**44**	**44**	**46**	**42**	**40.0**
DT63	Keynsham – Station Road	Roadside	Diffusion Tube	83	83	32	33	36	34	34
DT68	Keynsham – Temple Street	Roadside	Diffusion Tube	100	100	26	28	28	26	24
DT55	Lambridge	Roadside	Diffusion Tube	100	100	**62**	**60**	**64**	**65**	**60**
DT47	Lansdown Crescent	Roadside	Diffusion Tube	100	100	**42**	**41**	**42**	38	38
DT46	Little Stanhope Street	Roadside	Diffusion Tube	100	100	39	**43**	**41**	**41**	39.7
DT11	London Road	Roadside	Diffusion Tube	100	100	**48**	**48**	**51**	**44**	**41**
DT39	Manvers Street	Roadside	Diffusion Tube	100	100	**53**	**49**	**54**	**50**	**44**
DT61	Morley Terrace	Roadside	Diffusion Tube	100	100	**44**	**46**	**45**	**43**	**40.4**
DT29	MSN High Street	Roadside	Diffusion Tube	100	100	20	24	22	21	20
DT30	MSN Westfield Primary School	Urban Background	Diffusion Tube	100	100	15	17	17	14	15
DT35	Newbridge Hill	Roadside	Diffusion Tube	92	92	**45**	**46**	**45**	**43**	**41**
DT34	Newbridge Road	Roadside	Diffusion Tube	100	100	**45**	**44**	**49**	**42**	**40.2**
DT87	Oak Street	Roadside	Diffusion Tube	100	100	-	-	-	**43**	38

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2016 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
						2012	2013	2014	2015	2016
DT48	Paragon	Roadside	Diffusion Tube	92	92	**48**	**48**	**48**	**44**	**42**
DT27	Radstock - Fortescue Rd	Roadside	Diffusion Tube	100	100	31	33	34	34	31
DT85	RUH – North	Roadside	Diffusion Tube	92	92	-	-	-	36	36
DT86	RUH – South	Roadside	Diffusion Tube	100	25	-	-	-	35	31
DT77	Saltford - Bath Road	Roadside	Diffusion Tube	92	92	39	37	**42**	39	36
DT75	Saltford - The Crown	Roadside	Diffusion Tube	100	100	**47**	**44**	**50**	**43**	**40.5**
DT71	Saltford Library	Roadside	Diffusion Tube	83	83	36	27	37	34	35
DT43	St James' Parade	Roadside	Diffusion Tube	92	92	**59**	**57**	**58**	**58**	**57**
DT50	Thomas Street	Urban Centre	Diffusion Tube	100	100	38	37	38	38	34
DT09	Upper Bristol Road	Roadside	Diffusion Tube	83	83	**47**	**47**	**49**	**46**	**47**
DT26	Upper Wellsway	Roadside	Diffusion Tube	100	100	32	30*	39.6	39	39
DT60	Victoria Buildings	Roadside	Diffusion Tube	100	100	**55**	**57**	**55**	**50**	**52**
DT52-54	Walcot Terrace (3 tubes)	Roadside	Diffusion Tube	100	100	**56**	**57**	**57**	**53**	**48**
DT16	Warminster Road	Roadside	Diffusion Tube	100	100	**40**	**40**	**43**	37	39.6
DT21	Wells Rd/Upper Oldfield Park	Roadside	Diffusion Tube	100	100	**42**	**48**	**50**	**44**	**47**

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2016 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
						2012	2013	2014	2015	2016
DT20	Wells Road (old)	Kerbside	Diffusion Tube	-	-	**49**	**50**	**51**	**46**	**-**
DT20	Wells Road (new)	Roadside	Diffusion Tube	100	100	-	-	-	**62**	**55**
DT32	Whitchurch (old)	Roadside	Diffusion Tube	-	-	32	28	33	32	-
DT32	Whitchurch (new)	Roadside	Diffusion Tube	83	83	-	-	-	**52**	**47**
DT18	Widcombe High Street	Roadside	Diffusion Tube	-	-	**44**	**43**	**49**	**43**	**-**
DT18	Widcombe High Street (post works)	Roadside	Diffusion Tube	100	100	-	-	-	31	28
DT17	Widcombe School	Roadside	Diffusion Tube	92	92	38	35	38	39	38
DT08	Windsor Bridge	Roadside	Diffusion Tube	-	-	35	36	33	37	-
DT08	Windsor Bridge (new)	Roadside	Diffusion Tube	100	100	-	-	-	38	37
New Sites for 2016										
DT91	Bathampton High Street	Roadside	Diffusion Tube	100	100	-	-	-	-	31
DT94	Batheaston – London Road West B	Roadside	Diffusion Tube	100	100	-	-	-	-	34
DT93	Lower Camden Place	Kerbside	Diffusion Tube	100	100	-	-	-	-	36

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2016 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
						2012	2013	2014	2015	2016
DT92	Lower Oldfield Park	Roadside	Diffusion Tube	100	67	-	-	-	-	38
DT95	Larkhall- St Saviours School	Roadside	Diffusion Tube	86	50	-	-	-	-	19
DT96	Temple Cloud 1	Roadside	Diffusion Tube	88	58	-	-	-	-	**90**
DT97	Whitchurch 1	Roadside	Diffusion Tube	88	58	-	-	-	-	**46**
DT98	Whitchurch 2	Roadside	Diffusion Tube	88	58	-	-	-	-	**43**
DT99	Whitchurch 3	Kerbside	Diffusion Tube	100	67	-	-	-	-	30
DT100	Whitchurch 4	Roadside	Diffusion Tube	88	58	-	-	-	-	37
DT101	Whitchurch 5	Roadside	Diffusion Tube	100	67	-	-	-	-	**50**
DT106	Julian Road	Roadside	Diffusion Tube	100	33	-	-	-	-	36
DT102	Newbridge 1	Roadside	Diffusion Tube	75	25	-	-	-	-	28
DT103	Newbridge 2	Roadside	Diffusion Tube	100	33	-	-	-	-	29
DT104	Newbridge 3	Roadside	Diffusion Tube	100	33	-	-	-	-	36
DT105	Newbridge 4	Roadside	Diffusion Tube	100	33	-	-	-	-	37
DT109	Temple Cloud 3	Roadside	Diffusion Tube	100	33	-	-	-	-	**46**
DT110	Temple Cloud 4	Roadside	Diffusion Tube	100	33	-	-	-	-	**53**
DT111	Temple Cloud 5	Roadside	Diffusion Tube	100	33	-	-	-	-	**51**
DT108	Temple Cloud 2	Roadside	Diffusion Tube	80	33	-	-	-	-	**48**
DT107	Keynsham – Bath Hill South	Roadside	Diffusion Tube	100	75	-	-	-	-	39.8

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
						2012	2013	2014	2015	2016
DT112	Keynsham – Ashton Way	Roadside	Diffusion Tube	100	33	-	-	-	-	26
DT113	Keynsham - West View Road	Roadside	Diffusion Tube	100	33	-	-	-	-	21
DT114	Keynsham – Victoria Church	Kerbside	Diffusion Tube	100	33	-	-	-	-	35
DT115	Keynsham – High Street B	Roadside	Diffusion Tube	100	33	-	-	-	-	33
DT116	Keynsham – Fish bar	Roadside	Diffusion Tube	100	25	-	-	-	-	28
DT92a	Upper Swainswick	Roadside	Diffusion Tube	100	25	-	-	-	-	17

☒ **Diffusion tube data has been bias corrected**
☒ **Annualisation has been conducted where data capture is <75%**
☐ **If applicable, all data has been distance corrected for relevant exposure (See Table B.1 for distance correction)**

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 measured at automatic monitoring sites

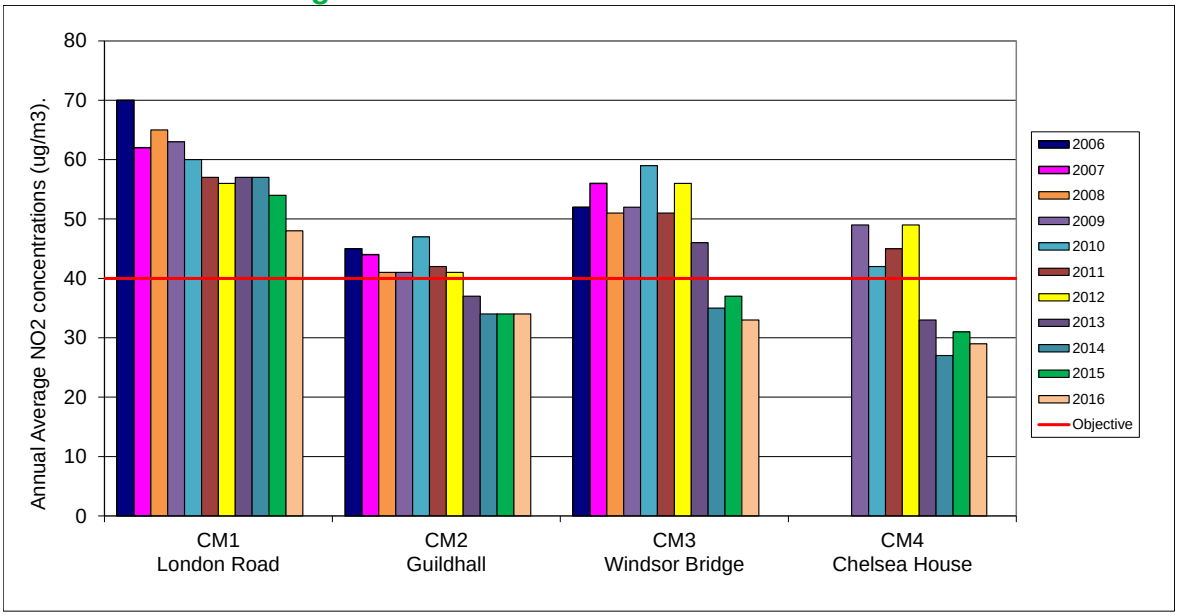


Figure A.2 – Trends in Annual Mean NO_2 Concentration Measured at Diffusion Tube Monitoring Sites –Sites within the AQMA (1)

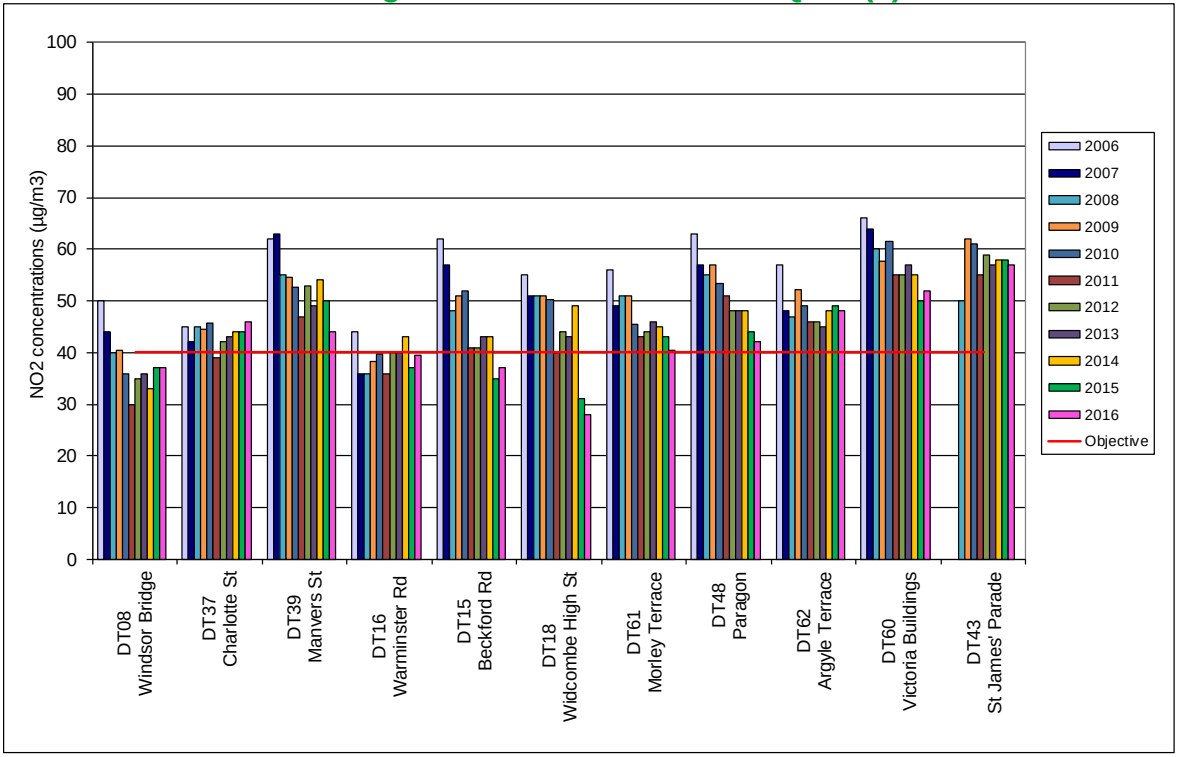


Figure A.3 – Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Sites within the AQMA (2).

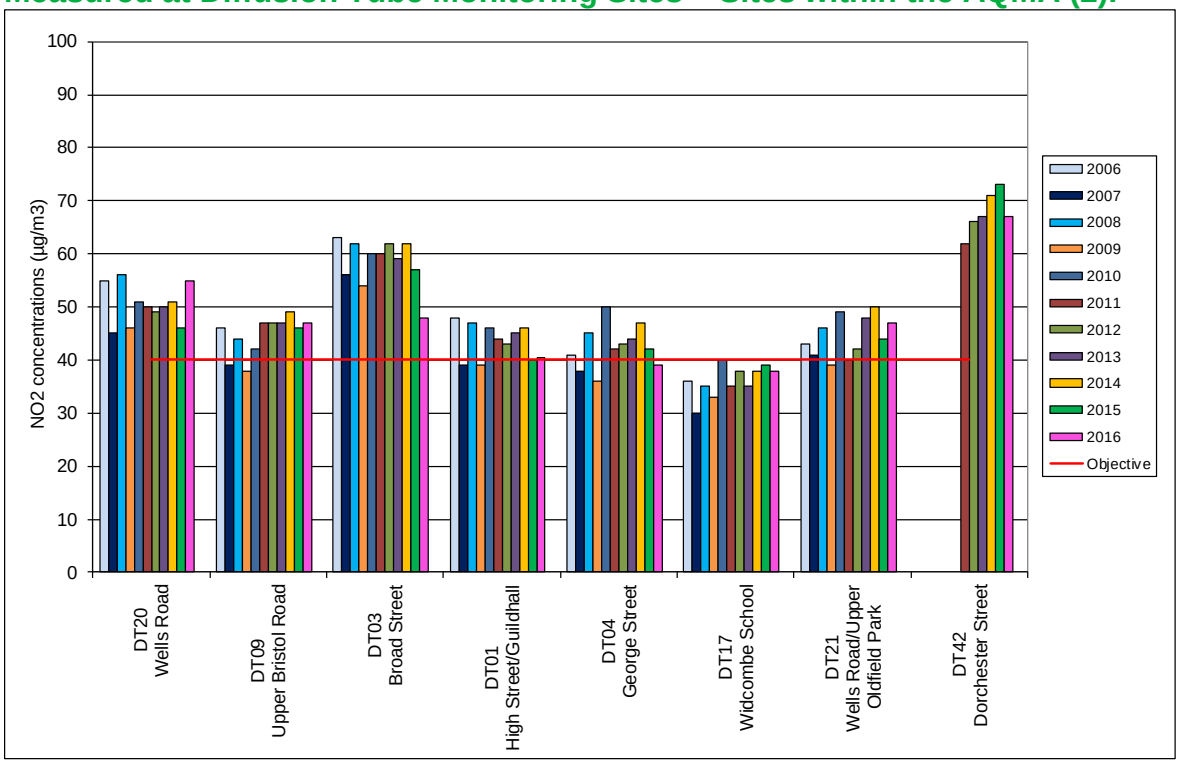


Figure A.4 – Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Sites within the AQMA (London Road Area)

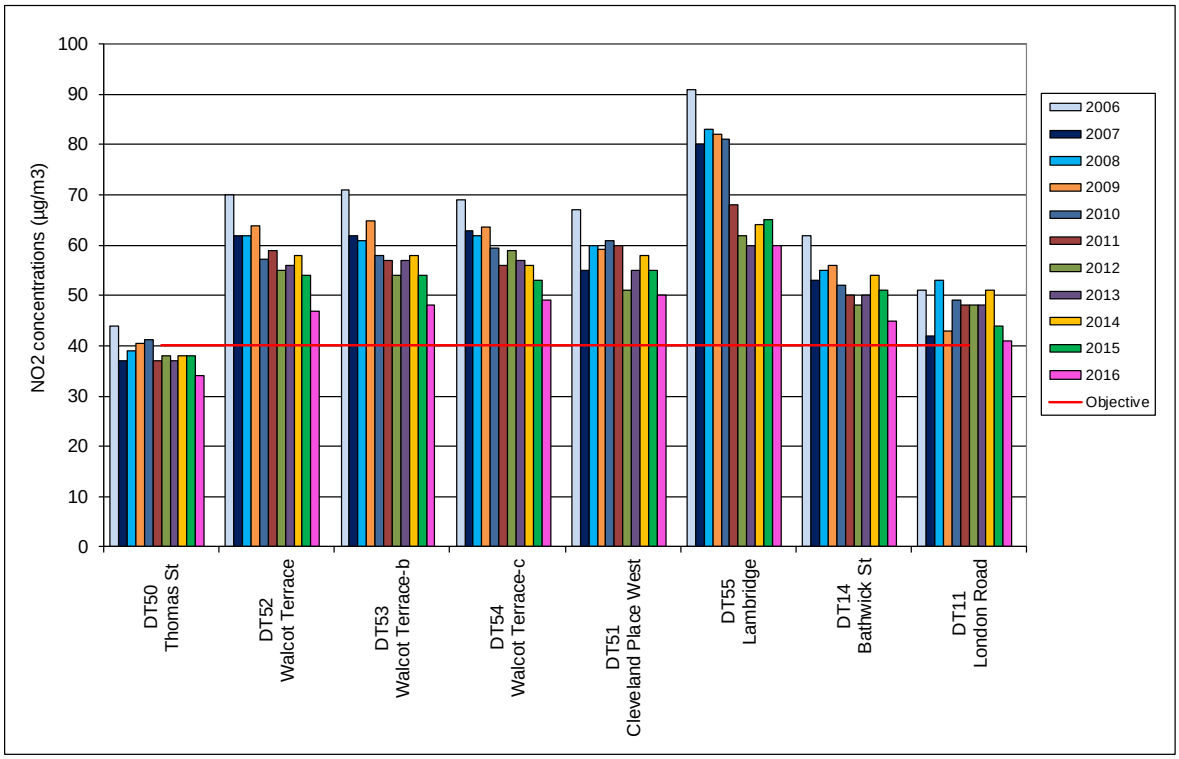


Figure A.5 – Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Roadside Sites (1)

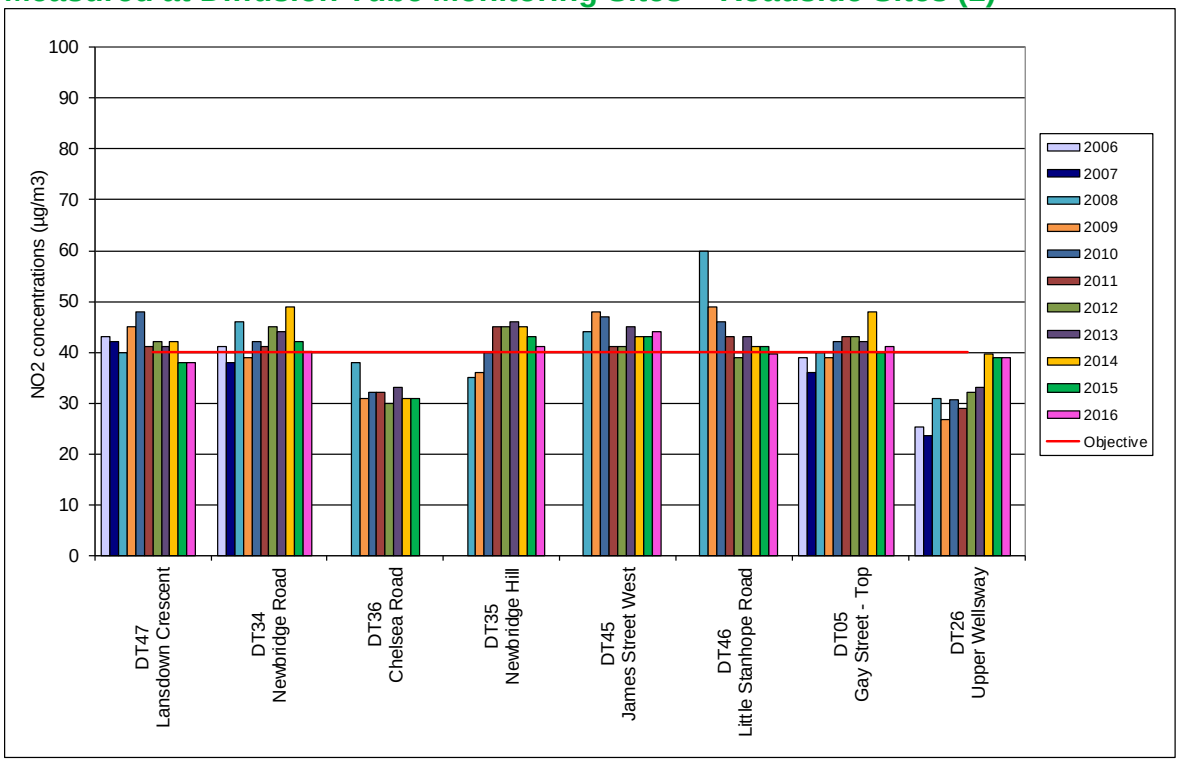


Figure A.6 – Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Roadside Sites (2)

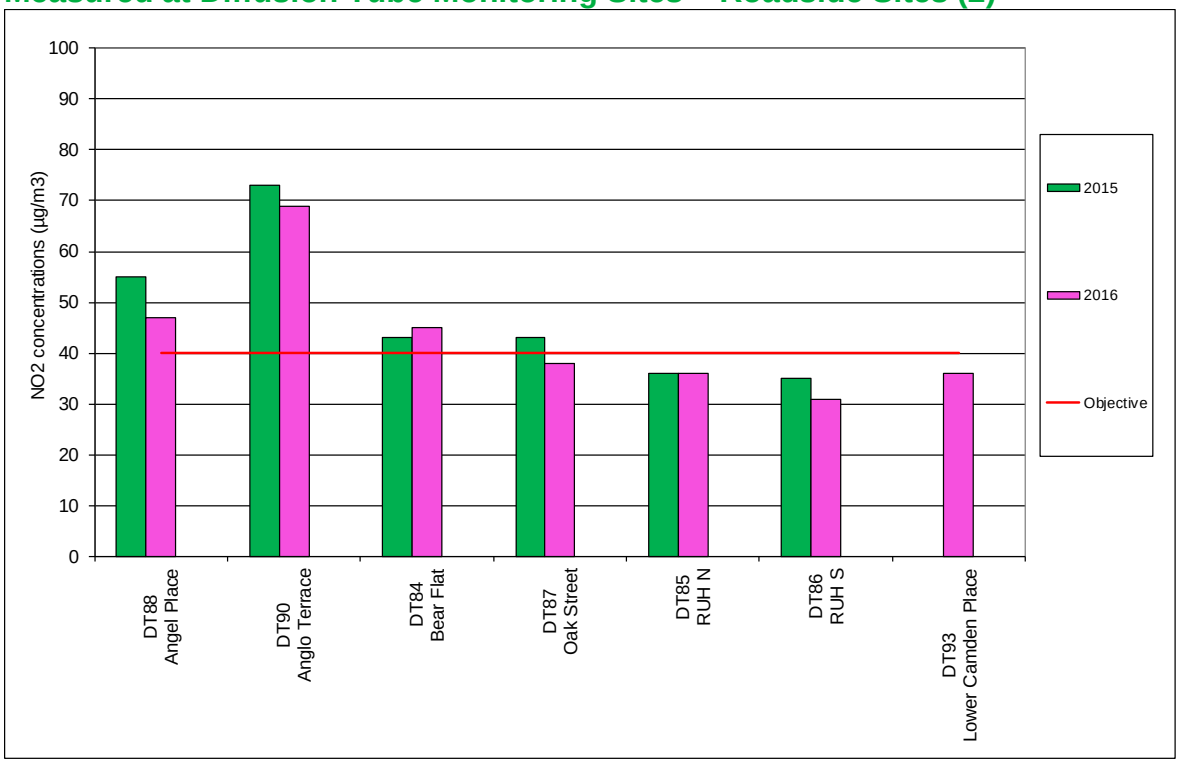


Figure A.7 – Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Urban Centre and Background Sites

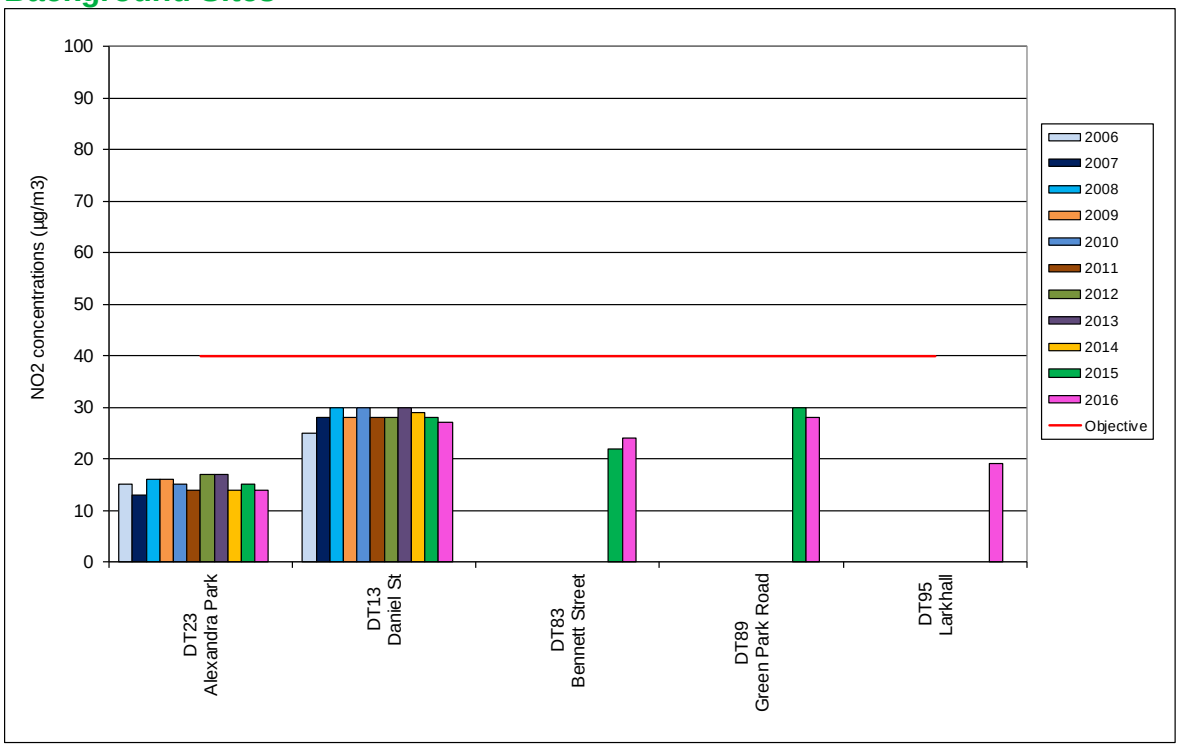


Figure A.8 – Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Sites outside Bath

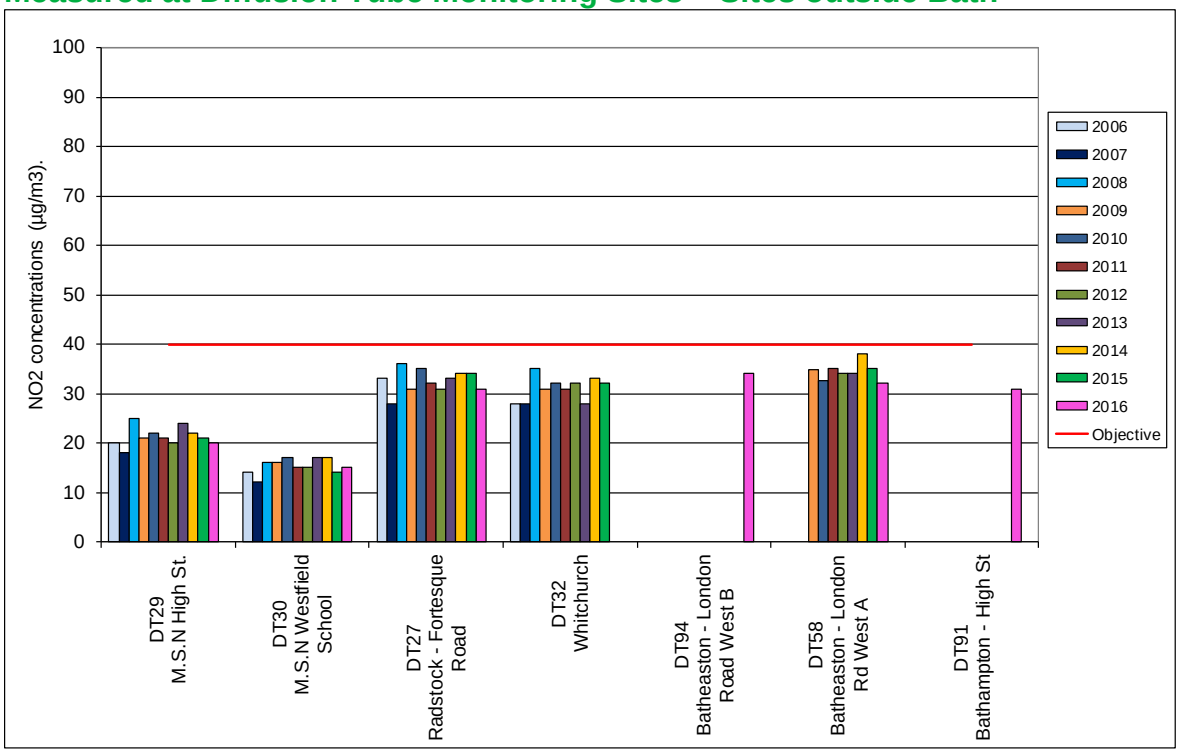


Figure A.9 – Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Sites in Keynsham

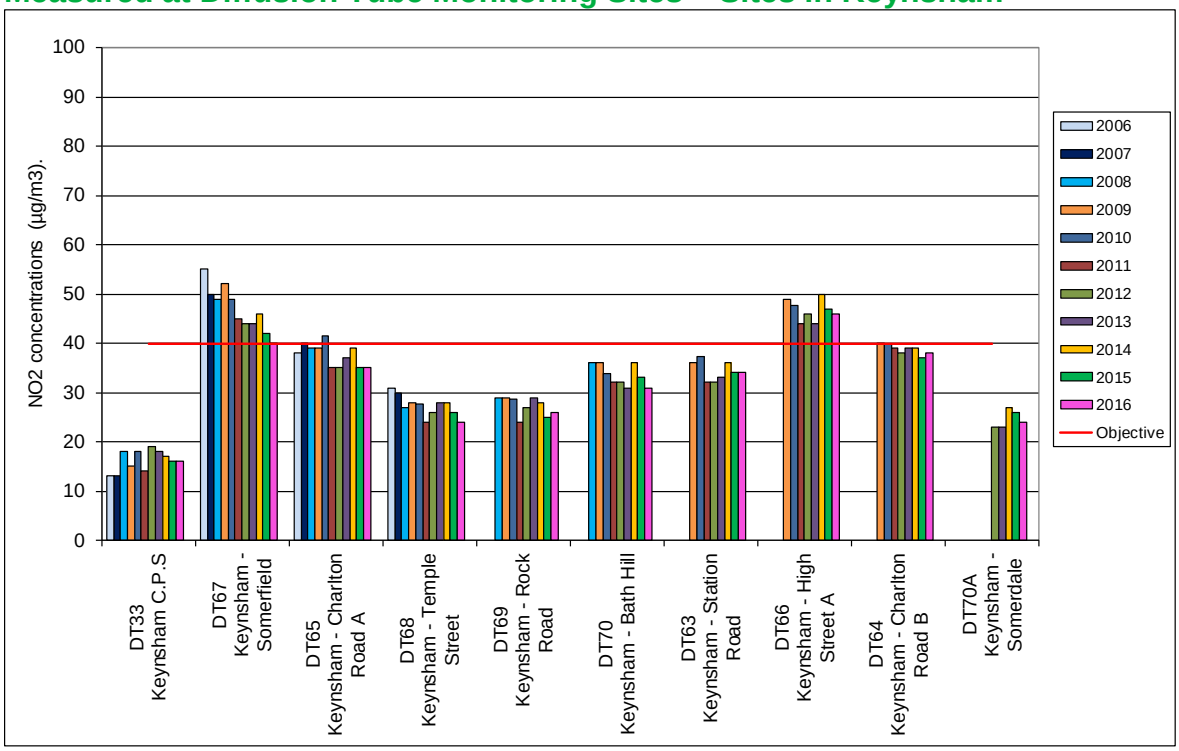


Figure A.10 – Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Sites in Saltford

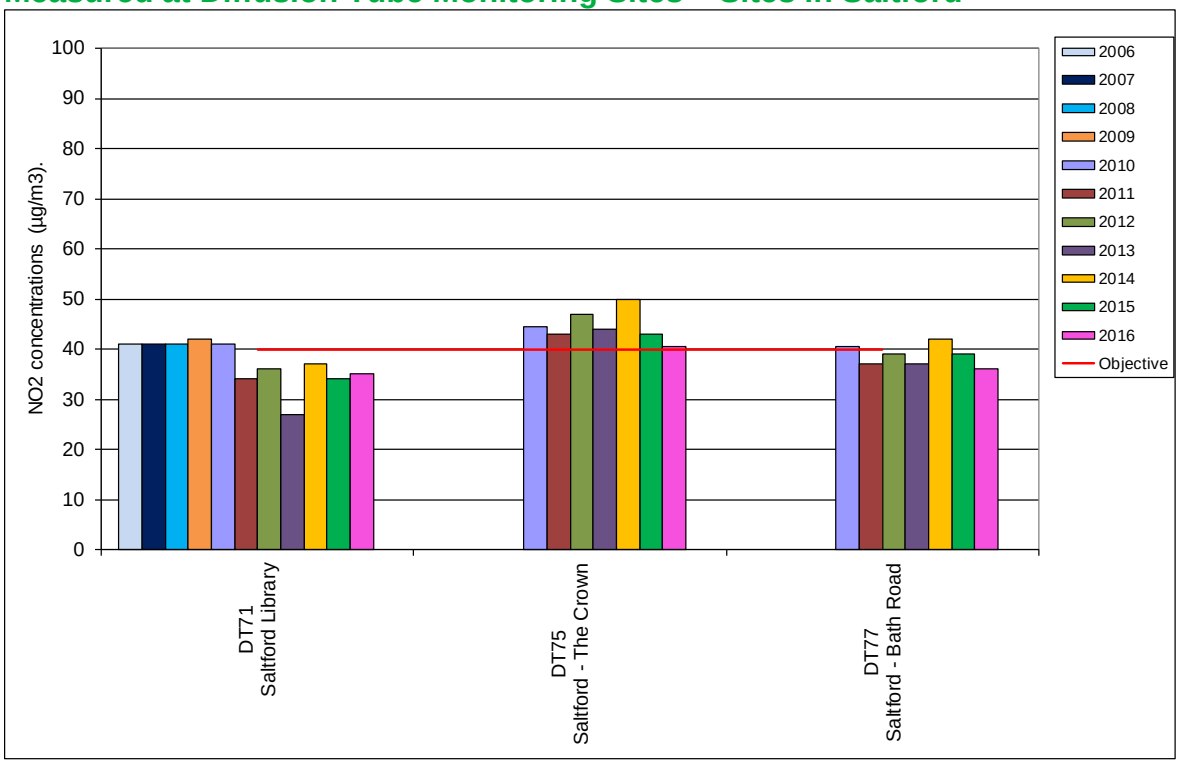


Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
						2012	2013	2014	2015	2016
CM1	London Road	Roadside	Automatic	96	96	2	4	10	1	0
CM2	Guildhall	Roadside	Automatic	97	97	1	1	0	0	0
CM3	Windsor Bridge	Roadside	Automatic	99	99	4 (178)	0 (160)	0	0 (105)	0
CM4	Chelsea House	Roadside	Automatic	98	98	0 (104)	0 (86)	0	1	0

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 Name	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
CM3	Windsor Bridge	Roadside	94.4	94.4	24	28	22	22	23
CM4	Chelsea House	Roadside	94	94	21	21	19	22	18

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

Notes:
Exceedances of the PM_{10} annual mean objective of 40µg/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 Name	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
					2012	2013	2014	2015	2016
CM3	Windsor Bridge	Roadside	94.4	94.4	17 (40)	11 (42)	3	6	5
CM4	Chelsea House	Roadside	94	94	7 (35)	2 (31)	3	13	0

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.

Figure A.11 - Trends in Mean PM_{10} Concentrations at Windsor Bridge

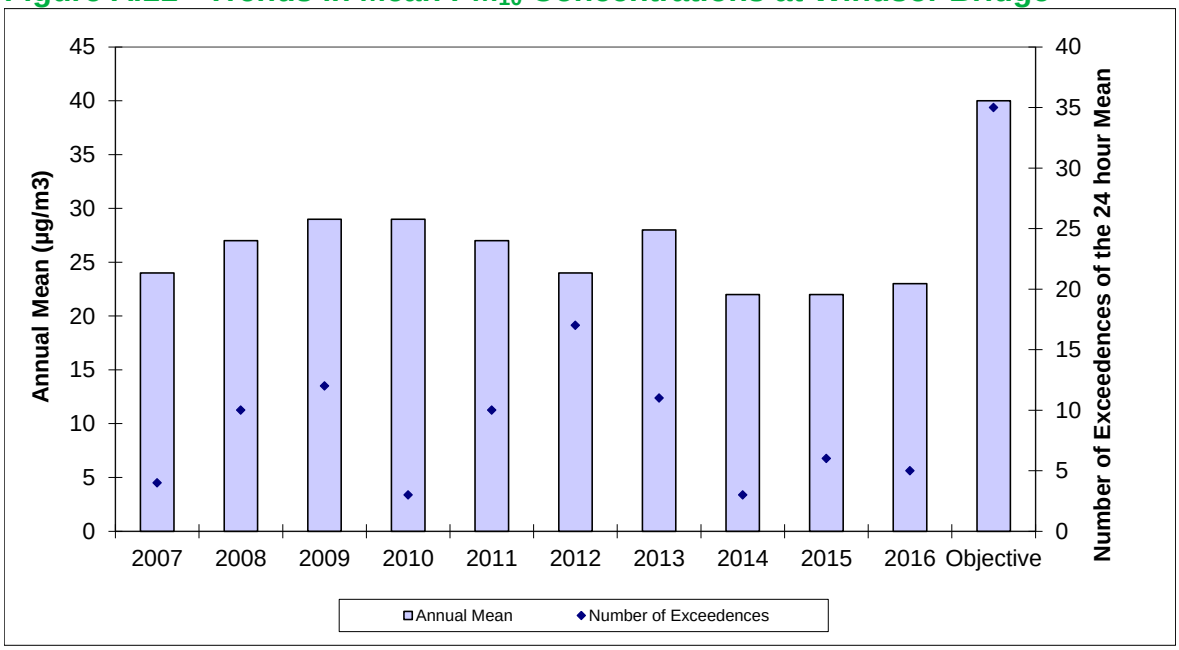


Figure A.12 - Trends in Mean PM_{10} Concentrations at Chelsea House

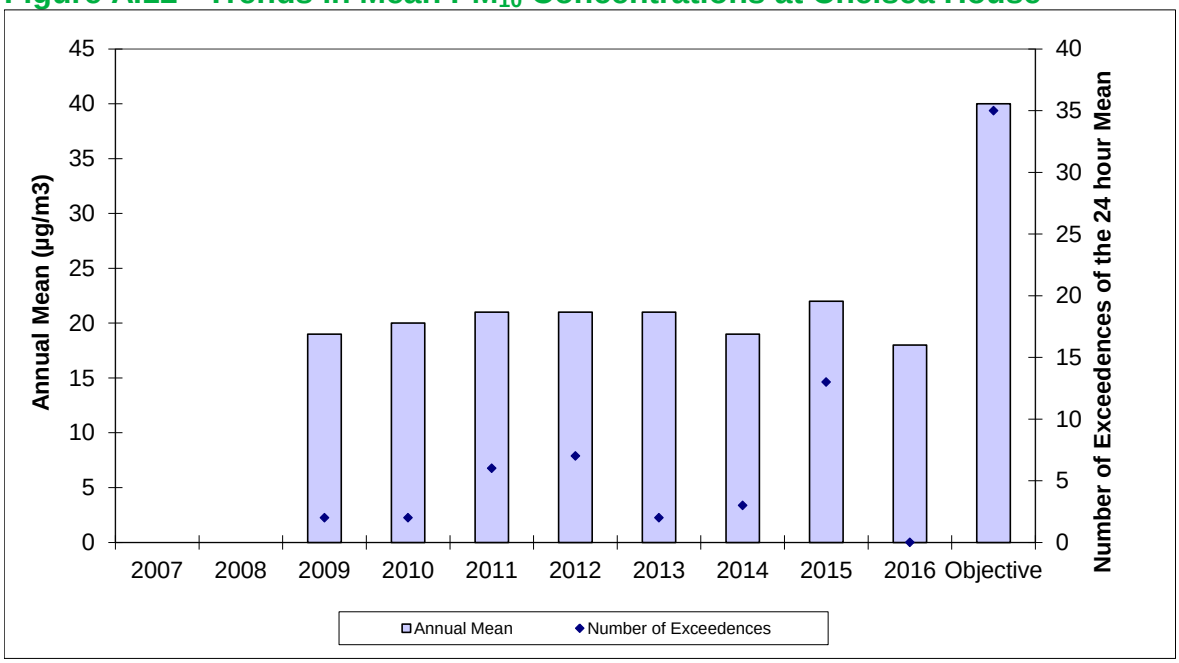


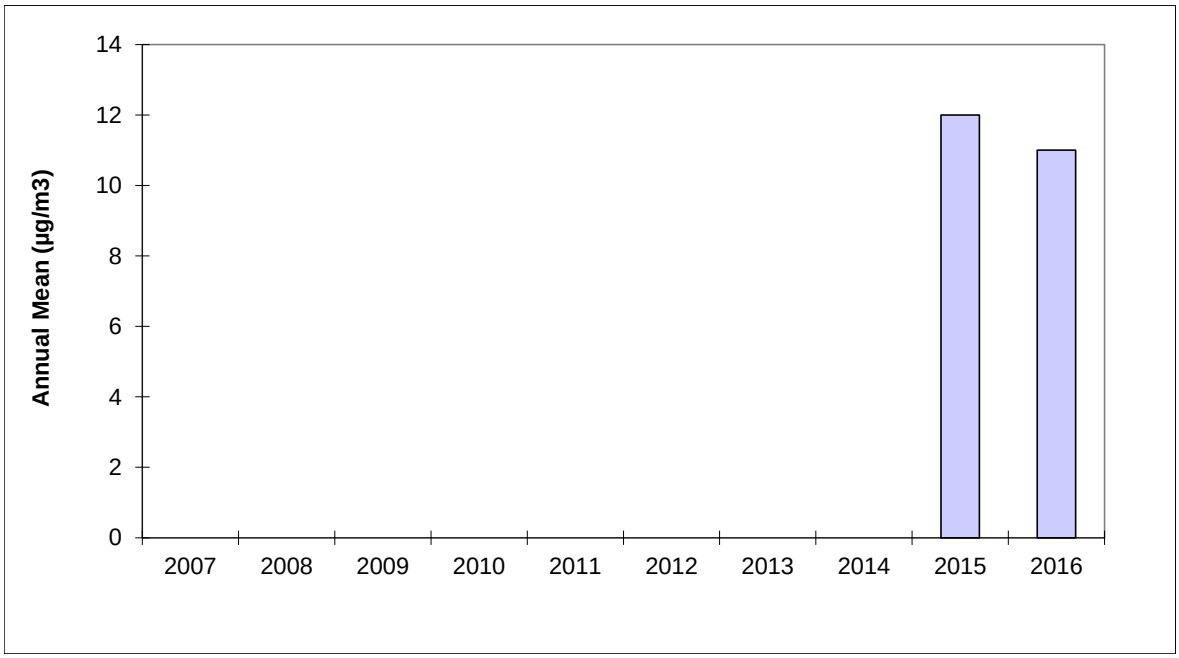
Table A.7 – $PM_{2.5}$ Monitoring Results

Site ID	Site Name	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
CM4	Chelsea House	Roadside	98.2	98.2	-	-	-	12	11

☒ **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.13 - Trends in Annual Mean PM2.5 Concentrations at Chelsea House



Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO2 Monthly Diffusion Tube Results - 2016

Site ID	Site Name	NO_2 Mean Concentrations ($\mu g/m^3$)															
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean			
														Raw Data	Bias Adjusted (0.99) (1)	Annual adjusted (1)	Distance Corrected to Nearest Exposure (2)
DT23	Alexandra Park	16.4	17.4	20.0	14.3	12.3	12.4	7.1	8.3	11.6	17.5	17.7		14.1	14.0		
DT88	Angel Place	48.7	51.5	47.4	43.9	51.6	48.7	46.6	42.5		45.6	46.3	52.7	**47.8**	**47.3**		**47.3**
DT90	Anglo Terrace	71.2	67.1	75.5	75.7	77.8	80.5	54.6	62.3	60.4	71.2	67.8	78.3	**70.2**	**69.5**		**57.9**
DT62	Argyle Terrace	49.6	47.6	51.8	46.3	48.2	48.6	36.1	42.2	41.6	56.5	53.5	57.2	**48.3**	**47.8**		**40.4**
DT58	Batheaston – London Road West A	37.6	32.9	31.2	33.0	34.2	32.6	22.9	23.8	32.1	31.6	34.0	42.4	32.4	32.0		32
DT14	Bathwick Street	53.7	52.0	43.2	43.9	45.6	41.0	44.9	43.8	41.2		44.4	49.4	**45.7**	**45.3**		**40.9**
DT81	Bathwick Street AQM1	68.0	55.6	54.9	57.5	59.0								**59.0**	**58.4**	**53.7**	38.3
DT84	Bear Flat	37.4	40.9	49.5	48.6	40.1	46.9				41.0	41.8	59.9	**45.1**	**44.6**		34.7
DT15	Beckford Road	40.5	43.3	39.9	37.7	41.0	40.3	29.9	29.6	29.7	40.5	38.6	40.5	37.6	37.2		27.5
DT83	Bennett Street	28.3	27.9	27.1	25.8	23.3	19.8	14.9	16.0	22.2	27.7	31.5		24.1	23.8		19.8
DT03	Broad Street	55.3	51.6	51.6	48.8	42.5	48.1	40.6	43.5	42.0	47.6	51.1	53.4	**48.0**	**47.5**		38
DT37	Charlotte Street	44.0	45.6		48.4	44.0	40.1	42.4	35.2		50.4	55.6	54.1	**46.0**	**45.5**		36.7
DT51	Cleveland Place West	58.5	51.6	52.8	51.8	55.8	47.5	45.9	46.4	42.6	50.9	49.7	52.1	**50.5**	**50.0**		**43.7**
DT52	Daniel Street	34.5	31.7	29.6	25.7	24.9	21.8	15.6	17.8	19.8	30.1	34.3	41.5	27.3	27.0		
DT42	Dorchester Street	66.4	69.8	76.1	68.0	66.9	63.8	75.6	74.9	57.6	64.9		57.1	**67.4**	**66.7**		**51.7**
DT05	Gay Street – Top	47.4	46.3	45.3	42.8	40.7	39.3	24.7	28.0	32.2	47.6	44.2	55.0	**41.1**	**40.7**		33.2

Site ID	Site Name	NO_2 Mean Concentrations (µg/m^3)															
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean			
														Raw Data	Bias Adjusted (0.99) (1)	Annual adjusted (1)	Distance Corrected to Nearest Exposure (2)
DT04	George Street	43.6	40.8	47.9	41.8	41.3	39.0	28.3	30.3	35.3	41.5	44.0	44.3	39.8	39.4		32.3
DT89	Green Park Road	31.6	32.0	30.1	31.8	27.7	26.8	15.3	17.4	23.2	31.9	33.9	40.3	28.5	28.2		28.2
DT01	High Street/ Guildhall	44.4	44.2	43.2	40.8	41.9	39.9		29.6	29.9	45.6	43.0	45.9	**40.8**	**40.4**		34.6
DT45	James Street West	49.1	47.9	46.7	50.1	45.4	38.3	26.2	34.5	29.2	57.0	49.7	55.4	**44.1**	**43.7**		**43.7**
DT33	Keynsham	17.0	19.5	16.0	17.2	14.5	14.3	7.5	8.6	12.2	21.3	21.8	25.8	16.3	16.1		
DT66	Keynsham – High Street A	47.8	48.8	46.8	48.2	46.8	45.0	43.6	43.9	42.9	49.3	50.6	45.5	**46.6**	**46.1**		**41.6**
DT64	Keynsham – Charlton Rd B	47.5	38.6	39.4	38.0	40.7	35.9	31.1	31.5	33.0	39.5	40.7	43.3	38.3	37.9		30.1
DT70	Keynsham – Bath Hill	31.8	28.8		34.4		30.7	21.1	26.1	23.9	35.6	39.2	43.5	31.5	31.2		30.1
DT65	Keynsham - Charlton Rd A	32.3	35.9	36.2	40.8	38.9	34.3	26.0	26.6	33.3	37.2	42.2	45.4	35.8	35.4		29.4
DT69	Keynsham – Rock Road	25.5	27.4	29.0	27.0	25.9	26.7	15.5	16.6	19.7	31.2	35.0	35.1	26.2	26.0		26
DT70a	Keynsham - Somerdale	29.1	27.3	24.8							34.8	29.9		29.2	28.9	24	
DT67	Keynsham - Somerfield	36.8	41.3	39.9	48.4		45.1	32.3	36.1	38.8	44.2	48.3	32.9	**40.4**	40.0		34.8
DT63	Keynsham – Station Road	35.1	37.2	37.7		36.4	32.9	22.5	24.4	30.2		39.6	45.0	34.1	33.8		28.3

Site ID	Site Name	NO_2 Mean Concentrations (µg/m^3)															
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean			
														Raw Data	Bias Adjusted (0.99) (1)	Annual adjusted (1)	Distance Corrected to Nearest Exposure (2)
DT68	Keynsham - Temple St	24.7	26.1	25.1	24.3	22.5	22.2	16.6	17.1	21.8	23.8	29.3	32.5	23.8	23.6		23.6
DT55	Lambridge	60.2	54.2	63.2	62.8	67.5	69.0	65.0	63.5	52.8	57.0	50.4	58.6	**60.3**	**59.7**		**59.7**
DT47	Lansdown Crescent	37.3	35.0	42.0	42.7	40.2	39.7	29.4	26.6	31.9	41.6	41.7	48.2	38.0	37.6		35.4
DT46	Little Stanhope Street	43.8	38.3	44.1	43.4	44.0	37.7	27.6	28.5	31.5	46.0	42.8	53.2	**40.1**	39.7		39.7
DT11	London Road	49.6	44.5	43.9	42.3	44.1	40.6	34.5	33.9	33.4	40.4	44.6	44.5	**41.3**	**40.9**		33.4
DT39	Manvers Street	49.5	48.2	51.8	52.0	49.7	40.7	36.5	34.3	34.6	48.0	42.9	44.9	**44.4**	**44.0**		37.6
DT61	Morley Terrace	40.4	42.4	39.8	43.9	47.5	43.4	31.9	36.7	36.2	41.3	39.4	47.0	**40.8**	**40.4**		**40.4**
DT29	MSN High Street	22.1	22.6	22.2	20.7	16.6	17.5	13.5	14.1	17.2	24.0	23.9	29.7	20.3	20.1		
DT30	MSN Westfield Primary Sch	17.4	16.7	17.0	15.1	14.8	11.6	7.6	8.8	11.2	19.3	16.6	23.9	15.0	14.8		
DT35	Newbridge Hill	41.8	40.1	47.2	45.9	43.5	42.6	30.3	29.9	34.8	47.1	44.5	49.5	**41.4**	**41.0**		31.3
DT34	Newbridge Road	48.5	45.0	41.8	43.7	42.3	34.1	25.5	32.1	35.6	44.0	42.2	52.9	**40.6**	**40.2**		30.7
DT87	Oak Street	41.5	43.6	36.8	42.5	42.3	35.3	32.6	31.7	34.0	38.2	44.5	43.5	38.9	38.5		38.5
DT48	Paragon	44.2	42.4	47.8	41.9	42.2	40.8	40.7	38.0	39.1	43.7	44.5		**42.3**	**41.9**		38
DT27	Radstock - Fortescue Rd	34.8	34.3	36.0	31.2	29.3	30.3	24.8	24.6	28.0	33.7	36.5	35.4	31.6	31.2		22.3
DT85	RUH – North	41.9	40.3		35.4	35.4	38.1	31.7	29.6	33.3	35.2	36.7	46.5	36.7	36.4		27.9
DT86	RUH – South	40.4	38.6	36.8										38.6	38.2	31.3	24
DT77	Saltford - Bath Road	40.2	38.7	35.9	40.9	37.8	35.1	31.6	34.6	35.7	32.0	35.9		36.2	35.9		35.9
DT75	Saltford - The Crown	46.7	43.4	44.1	45.1	46.3	36.9	31.0	31.6	37.6	45.6	46.0	36.2	**40.9**	**40.5**		**40.5**

Site ID	Site Name	NO_2 Mean Concentrations (µg/m^3)															
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean			
														Raw Data	Bias Adjusted (0.99) (1)	Annual adjusted (1)	Distance Corrected to Nearest Exposure (2)
DT71	Saltford Library	33.2	35.3	37.7	36.8	34.3	32.7	24.3	26.6			36.4	52.5	35.0	34.6		26.4
DT43	St James' Parade	62.0	51.2	61.7	60.9	63.3	56.2	48.7		47.4	65.8	53.0	60.7	**57.4**	**56.8**		**47.3**
DT50	Thomas Street	38.3	34.4	40.9	37.2	36.7	32.6	25.8	26.9	29.8	36.9	36.8	41.7	34.8	34.5		
DT09	Upper Bristol Road	52.6	50.3	48.7	49.0	50.8		39.0	37.9		43.7	50.9	49.7	**47.3**	**46.8**		35
DT26	Upper Wellsway	34.4	40.9	48.7	38.5	44.7	37.2	25.2	28.6	31.0	47.5	40.7	52.2	39.1	38.7		38.7
DT60	Victoria Buildings	57.5	53.8	54.4	59.6	58.0	52.4	44.2	44.9	45.8	52.6	50.7	59.6	**52.8**	**52.3**		**46.1**
DT52	Walcot Terrace	56.1	45.1	47.5	48.6	53.2	49.4	46.9	42.8	45.0	47.0	43.5	48.6	**47.8**	**47.3**		**47.3**
DT53	Walcot Terrace	54.3	45.4	45.8	51.1	55.6	48.7	50.3	46.2	45.4	44.8	46.7	51.9	**48.8**	**48.4**		**48.4**
DT54	Walcot Terrace	55.1	48.6	50.8	50.5	55.3	48.8	48.1	48.2	44.3	42.8	45.6	52.7	**49.2**	**48.7**		**48.7**
DT16	Warminster Road	43.2	44.6	44.9	45.0	31.5	31.8	30.7	33.9	33.8	44.8	48.6	46.8	40.0	39.6		27.4
DT20	Wells Road	56.4	66.0	63.5	57.8	64.2	58.1	47.0	53.8	43.8	64.0	29.1	60.9	**55.4**	**54.8**		**54.8**
DT21	Wells Road/Upper Oldfield Park	45.2	46.8	48.9	43.9	56.8	48.9	31.2	36.1	40.3	56.2	52.4	62.0	**47.4**	**46.9**		37.7
DT32	Whitchurch	48.9	48.0	44.7	47.8	49.6	42.9	41.8			50.6	45.3	52.0	**47.2**	**46.7**		**40.3**
DT18	Widcombe High Street	33.0	31.3	31.1	28.3	26.6	25.4	21.7	24.4	25.1	32.0	32.1	33.8	28.7	28.4		28.4
DT17	Widcombe School	42.7	39.9	42.7	40.1	36.5	31.3	34.5	30.3	33.2	41.5		45.6	38.0	37.7		30
DT08	Windsor Bridge	45.3	38.6	39.8	37.9	36.4	30.4	29.9	29.5	30.6	38.9	42.1	46.1	37.1	36.8		36.8

Site ID	Site Name	NO_2 Mean Concentrations (µg/m^3)															
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean			
														Raw Data	Bias Adjusted (0.99) (1)	Annual adjusted (1)	Distance Corrected to Nearest Exposure (2)
New Sites for 2016																	
DT91	Bathampton High Street	28.9	32.3	33.8	32.5	28.5	29.8	24.5	24.6	28.5	37.1	37.6	40.5	31.6	31.2		31.2
DT94	Batheaston – London Road West B	38.1	34.8	37.4	33.1	42.0	35.1	27.3	29.6	31.2	29.1	40.1	36.0	34.5	34.1		34.1
DT93	Lower Camden Place	44.3	41.8	38.7	37.8	33.7	32.1	25.5	26.1	30.0	40.7	44.5	44.0	36.6	36.2		26.8
DT92	Lower Oldfield Park				39.1	33.2	30.6	20.3	21.5	28.1	35.8	50.4		32.4	32.0		25.5
DT95	Larkhall- St Saviours School		21.0	19.2	17.6		16.5	11.6	11.5					16.2	16.1	19.1	16.3
DT96	Temple Cloud					84.7	82.2		72.3	77.8	93.0	103.3	83.9	**85.3**	**84.5**	**90.4**	**90.4**
DT97	Whitchurch 1					49.4	40.5		36.1	24.9	51.4	50.0	53.4	**43.7**	**43.2**	**46.2**	34.9
DT98	Whitchurch 2					46.1	43.9	36.0	34.6		45.1	50.7	46.7	**43.3**	**42.9**	**42.8**	**42.8**
DT99	Whitchurch 3					30.6	24.6	13.6	17.3	32.6	39.5	31.8	33.8	28.0	27.7	29.6	26.3
DT100	Whitchurch 4					36.6	30.7	29.5	25.3	45.5	38.5		40.1	35.2	34.8	37.3	29.9
DT101	Whitchurch 5					50.5	50.2	39.9	44.3	27.1	51.6	58.4	52.1	**46.8**	**46.3**	**49.5**	39.6
DT106	Julian Road				32.6	28.7	26.2	19.7						26.8	26.6	35.8	24.1

Site ID	Site Name	NO_2 Mean Concentrations (µg/m^3)															
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean			
														Raw Data	Bias Adjusted (0.99) (1)	Annual adjusted (1)	Distance Corrected to Nearest Exposure (2)
DT102	Newbridge 1					19.5	18.4		15.6					17.8	17.6	27.7	23.6
DT103	Newbridge 2					22.5	21.4	16.5	15.0					18.8	18.7	29.3	24.3
DT104	Newbridge 3					35.4	20.1	16.9	21.2					23.4	23.2	36.4	30.8
DT105	Newbridge 4					29.0	23.7	22.3	18.8					23.5	23.2	36.5	30
DT109	Temple Cloud 3									41.2	58.6	52.4	68.4	**55.2**	**54.6**	**46.4**	**40.7**
DT110	Temple Cloud 4									56.8	72.7	73.6	49.3	**63.1**	**62.5**	**53.1**	**40.4**
DT111	Temple Cloud 5									51.1	75.8	56.2	59.4	**60.6**	**60.0**	**51**	**51**
DT108	Temple Cloud 2								41.9	46.7		59.9	58.0	**51.6**	**51.1**	**47.5**	34.9
DT107	Keynsham – Bath Hill South				45.0	40.0	39.0	42.1	35.9	39.7	37.6	36.7	45.6	**40.2**	39.8		39.8
DT112	Keynsham – Ashton Way									22.8	32.9	32.8	35.9	31.1	30.8	26.2	17.7
DT113	Keynsham - West View Road									15.9	25.0	28.3	30.3	24.9	24.6	20.9	18.8

Site ID	Site Name	NO_2 Mean Concentrations (µg/m^3)														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
														Raw Data	Bias Adjusted (0.99) (1)	Annual adjusted (1)	Distance Corrected to Nearest Exposure (2)
DT114	Keynsham – Victoria Church									33.2	41.3	46.2	44.0	**41.2**	**40.8**	34.6	23
DT115	Keynsham – High Street B									22.5	47.5	41.6	42.9	38.6	38.2	32.5	28.8
DT116	Keynsham – Fish bar										35.6	37.8	36.1	36.5	36.1	27.5	23.1
DT92a	Upper Swainswick	22.7	19.1	19.5										20.4	20.2	16.6	16.6

☒ **Local bias adjustment factor used**
☐ **National bias adjustment factor used**
☒ **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) 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

Diffusion Tube Bias - National Adjustment Factors

The diffusion tubes were analysed by Somerset Scientific Services in 2012-2015 and prior to that by Bristol Scientific Services. The method of analysis is 20% triethanolamine (TEA) in water. They confirm that they are following the harmonised practice guidance document and have a satisfactory AIR-PT result [14].

Monthly National Bias	2012	0.95 (Somerset, 2 studies)(26 v06/13)
	2013	0.90 (Somerset, 3 studies)(26 v03/14)
	2014	0.89 (Somerset, 8 studies)(26 v03/15)
	2015	0.90 (Somerset, 10 studies)(26 v06/16)
	2016	0.88 (Somerset, 3 studies)(26 v03/17)

Diffusion Tube Bias - Local Co-location Factors

A local bias factor has been calculated following the FAQ guidance on R&A website [15]. This has been calculated using monitoring data from the Walcot Terrace sites (now located at Walcot Buildings) (triplicate tubes) which are co-located with the London Road continuous monitor.

Monthly Local Bias	2012	0.95 (Somerset)
	2013	1.01 (Somerset)
	2014	1.09 (Somerset)
	2015	1.06 (Somerset)
	2016	0.99 (Somerset)

Discussion of Choice of Which Bias Factor to Use

Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference (more accurate) chemiluminescence continuous analyser.

In Bath and North East Somerset there is a choice of using either a local bias factor (calculated at a co-located site in Bath [London Road, Continuous analyser], where three diffusion tubes were located next to the reference continuous analyser), or the national bias factor (this is a combined factor which averages a number of local bias factor studies for the analytical laboratory and diffusion tube preparation method).

[14] https://laqm.defra.gov.uk/documents/AIR-PT-Rounds-6-to-16-(Jan-2015---Oct-2016).pdf
[15] https://laqm.defra.gov.uk/laqm-faqs/

Bath and North East Somerset has submitted its local bias factor to be included in the national average bias factor. Guidance on the choice of bias factor is given in LAQM.TG16 (Box 7.11) and includes consideration on diffusion tube locations compared with the co-location site, exposure period and number of studies contributing to the national bias factor.

The guidance in the LAQM.TG16 tends to suggest that the choice of a single bias correction factor is required for all diffusion tubes from the local authority. However, the bias correction factor chosen will only be appropriate for locations where a similar traffic characteristics, street geometry, and distance from kerbside are repeatable. If a bias factor from a co-located site that is closer to a background location is used, the application of its bias factor to roadside locations will be likely to provide an underestimate of true concentrations and vice-versa for using a bias factor, derived from a roadside or kerbside site, that is applied to monitoring locations, further away from the kerb, the results are likely to be overestimated.

In Bath & North East Somerset the local bias is derived from a roadside co-located site on a congested road with traffic flows in the region of 20,000 vehicles a day, with 7% Heavy Diesel Vehicles (HDV's). Using this factor will represent sites within the Bath and Saltford AQMAs well but is likely to overestimate sites outside the AQMAs, particularly at urban background, urban centre locations or roadside sites with significantly different traffic flows. In 2016 the national factor for Somerset Scientific Services is made up from 3 studies across a range of locations so may not best represent the sites within the Bath AQMA, but would be better for the sites outside the AQMA.

Bath and North East Somerset Council used the local bias factor for diffusion tube results because individual factors which represent all locations within the authority are not available. After feedback from DEFRA, it is better to ensure that the correct bias factor is at locations where there is more exposure (within the AQMA) than to overestimate the concentrations at sites outside the AQMA which are not showing an issue. This choice is consistent with the recommendations in LAQM.TG16

(Box 7.11) and recommendations from the LAQM helpdesk [16]. Using the local bias factor is likely to result in concentrations at approximately 37 sites being overestimated.

In 2011-15 the local bias adjustment factors were used to correct the diffusion tube data as they were the same as or higher than the national bias factor leading to a worse case result. The corrected concentrations would have been 11 % lower if the national bias factor had been used in 2016. The choice of factor will be reviewed annually.

PM Monitoring Adjustment

The PM_{10} measurements are made using an unheated BAM1020 and have been corrected by dividing by 1.2 as recommended in the LAQM.TG16.

QA/QC of automatic monitoring

The Council's continuous analysers follow a QA/QC programme; the London Road Monitor is the Bath AURN affiliate site and is managed as part of that network. The Guildhall, Windsor Bridge and Chelsea House sites follow the QA/QC programme below.

- There are daily checks on the data to ensure analysers and communications are working and faults are reported as soon as possible.
- The sites are inspected and calibrated checks are made once a month by a member of the Environmental Quality Team at Bristol City Council, using certified traceable gases. The sites are also visited once a month by a trained AURN Local Site Operator (LSO) to change the filters and check the analysers. These are planned so the site is visited once a fortnight.
- The analysers are also serviced and re-calibrated at six monthly intervals by the equipment suppliers.
- The results of all service, maintenance and calibration checks are held and used for ratification and scaling of the data.

[16] https://laqm.defra.gov.uk/helpdesk/laqm-helpdesk.html

In 2015 & 2016 the continuous data for Guildhall, Windsor Bridge and Chelsea House was corrected by AQDM. Previously the data corrected in house and was scaled on a time-linear basis from the zero and span readings obtained from the calibration checks. The instrument span was calculated using the method in LAQM.TG16 and the span and offset values are applied to the data using Opsis Enviman software. The data is viewed and spurious data is identified and removed where appropriate. A copy of the original data is kept for reference.

QA/QC of diffusion tube monitoring

The diffusion tubes were analysed by Somerset Scientific Services in 2012-2016 and prior to that by Bristol City Council Scientific Services. They are not UKAS accredited for the analysis of the diffusion tubes but they do participate in the AIR-PT scheme formally the Workplace Analysis Scheme for Proficiency (WASP). The latest AIR-PT report [17] for nitrogen dioxide for the laboratory indicates a performance classification as satisfactory for all periods.

Short-term to Long-term Data adjustment

During 2016 26 diffusion tubes had data capture less than 75%. To estimate the annual mean from the short-term monitoring period the method in LAQM.TG(16) was followed. Four sites were selected from the national network within 50 miles of Bath; Cardiff Centre, Bristol St Paul's, Newport and Cwmbran. The adjusted monitored concentrations are shown in Table B.1 and the sites which the specific adjustment factor is applied to are detailed below each table.

[17] https://laqm.defra.gov.uk/documents/AIR-PT-Rounds-6-to-16-(Jan-2015---Oct-2016).pdf

Table C.1 - Ratio for Short-term to Long-term Data Adjustment – Sites January-March 2016

Long-term site	Site Type	Annual Mean 2016	Period Mean 2016	Ratio (Am/Pm)
Bristol St Paul's	Urban Background	27.4	33.5	0.82
Cardiff Centre	Urban Background	23.2	28.7	0.81
Cwmbran	Urban Background	13.0	16.4	0.79
Newport	Urban Background	21.9	25.7	0.85
			Average	0.82

Applied to; Upper Swainswick and RUH South

Table C.2 - Ratio for Short-term to Long-term Data Adjustment – Sites May-August 2016

Long-term site	Site Type	Annual Mean 2016	Period Mean 2016	Ratio (Am/Pm)
Bristol St Paul's	Urban Background	27.4	17.8	1.54
Cardiff Centre	Urban Background	23.2	16.6	1.4
Cwmbran	Urban Background	13.0	6.9	1.89
Newport	Urban Background	21.9	15.2	1.44
			Average	1.57

Applied to; Newbridge 1, Newbridge 2, Newbridge 3 and Newbridge 4

Table C.3 - Ratio for Short-term to Long-term Data Adjustment - Sites beginning May 2016

Long-term site	Site Type	Annual Mean 2016	Period Mean 2016	Ratio (Am/Pm)
Bristol St Paul's	Urban Background	27.4	25.7	1.06
Cardiff Centre	Urban Background	23.2	21.3	1.09
Cwmbran	Urban Background	13.0	12.0	1.08
Newport	Urban Background	21.9	20.7	1.06
			Average	1.07

Applied to; Temple Cloud 1 and Whitchurch 1-5

Table C.4 - Ratio for Short-term to Long-term Data Adjustment – Larkhall (February-August 2016)

Long-term site	Site Type	Annual Mean 2016	Period Mean 2016	Ratio (Am/Pm)
Bristol St Paul's	Urban Background	27.4	23.0	1.19
Cardiff Centre	Urban Background	23.2	20.9	1.11
Cwmbran	Urban Background	13.0	9.9	1.32
Newport	Urban Background	21.9	18.9	1.16
			Average	1.19

Applied to; Larkhall

Table C.5 - Ratio for Short-term to Long-term Data Adjustment – Sites beginning September 2016

Long-term site	Site Type	Annual Mean 2016	Period Mean 2016	Ratio (Am/Pm)
Bristol St Paul's	Urban Background	27.4		
Cardiff Centre	Urban Background	23.2		
Cwmbran	Urban Background	13.0		
Newport	Urban Background	21.9		
			Average	0.

Applied to; Temple Cloud 3-5, Keynsham – Ashton Way, Keynsham - West View Road, Keynsham – Victoria Church, Keynsham – High Street B (close to 59 High Street) and Keynsham – Fish bar

Table C.6 - Ratio for Short-term to Long-term Data Adjustment – Keynsham - Fish Bar (Beginning October 2016)

Long-term site	Site Type	Annual Mean 2016	Period Mean 2016	Ratio (Am/Pm)
Bristol St Paul's	Urban Background	27.4	36.7	0.75
Cardiff Centre	Urban Background	23.2	27.9	0.83
Cwmbran	Urban Background	13.0	18.8	0.69
Newport	Urban Background	21.9	28.8	0.76
			Average	0.76

Applied to; Keynsham – Fish Bar

Table C.7 - Ratio for Short-term to Long-term Data Adjustment – Temple Cloud 2 (Beginning August 2016)

Long-term site	Site Type	Annual Mean 2016	Period Mean 2016	Ratio (Am/Pm)
Bristol St Paul's	Urban Background	27.4	29.6	0.92
Cardiff Centre	Urban Background	23.2	23.5	0.99
Cwmbran	Urban Background	13.0	14.7	0.89
Newport	Urban Background	21.9	23.2	0.94
			Average	0.93

Applied to; Temple Cloud 2

Table C.8 - Ratio for Short-term to Long-term Data Adjustment – Lower Oldfield Park (April-November 2016)

Long-term site	Site Type	Annual Mean 2016	Period Mean 2016	Ratio (Am/Pm)
Bristol St Paul's	Urban Background	27.4	22.5	1.21
Cardiff Centre	Urban Background	23.2	20.5	1.13
Cwmbran	Urban Background	13.0	10.0	1.3
Newport	Urban Background	21.9	19.3	1.14
			Average	1.2

Applied to; Lower Oldfield Park

Table C.9 - Ratio for Short-term to Long-term Data Adjustment – Bathwick Street AQM1 (January-May 2016)

Long-term site	Site Type	Annual Mean 2016	Period Mean 2016	Ratio (Am/Pm)
Bristol St Paul's	Urban Background	27.4	29.3	0.93
Cardiff Centre	Urban Background	23.2	25.9	0.89
Cwmbran	Urban Background	13.0	13.9	0.93
Newport	Urban Background	21.9	23.9	0.92
			Average	0.92

Applied to; Bathwick Street AQM1

Table C.10 - Ratio for Short-term to Long-term Data Adjustment – Keynsham - Somerdale (poor data capture)

Long-term site	Site Type	Annual Mean 2016	Period Mean 2016	Ratio (Am/Pm)
Bristol St Paul's	Urban Background	27.4	32.7	0.84
Cardiff Centre	Urban Background	23.2	28.2	0.82
Cwmbran	Urban Background	13.0	15.8	0.82
Newport	Urban Background	21.9	26.3	0.83
			Average	0.83

Applied to; Keynsham – Somerdale

Table C.11 - Ratio for Short-term to Long-term Data Adjustment – Julian Road (April-July 2016)

Long-term site	Site Type	Annual Mean 2016	Period Mean 2016	Ratio (Am/Pm)
Bristol St Paul's	Urban Background	27.4	19.9	1.38
Cardiff Centre	Urban Background	23.2	18.9	1.23
Cwmbran	Urban Background	13.0	8.3	1.57
Newport	Urban Background	21.9	17.9	1.23
			Average	1.35

Applied to; Julian Road

Distance adjustment to closest receptor

Concentrations of NO_2 fall off rapidly as you move away from the roadside. It is not always possible to locate diffusion tubes on building facades representing worst case exposure. For diffusion tube sites which have been located in roadside locations, the distance adjustment calculator on the LAQM helpdesk website has been applied. A local background of 14.0 µg/m^3 was used (from Alexandra Park, DT23). Table A.2 below shows the distances used in the calculator and Table B.1 shows the original bias adjusted and annualised results and the concentration at the façade for these sites. Urban centre, urban background and sites at the building façade have not been adjusted.

Appendix D: Other monitoring

Benzene

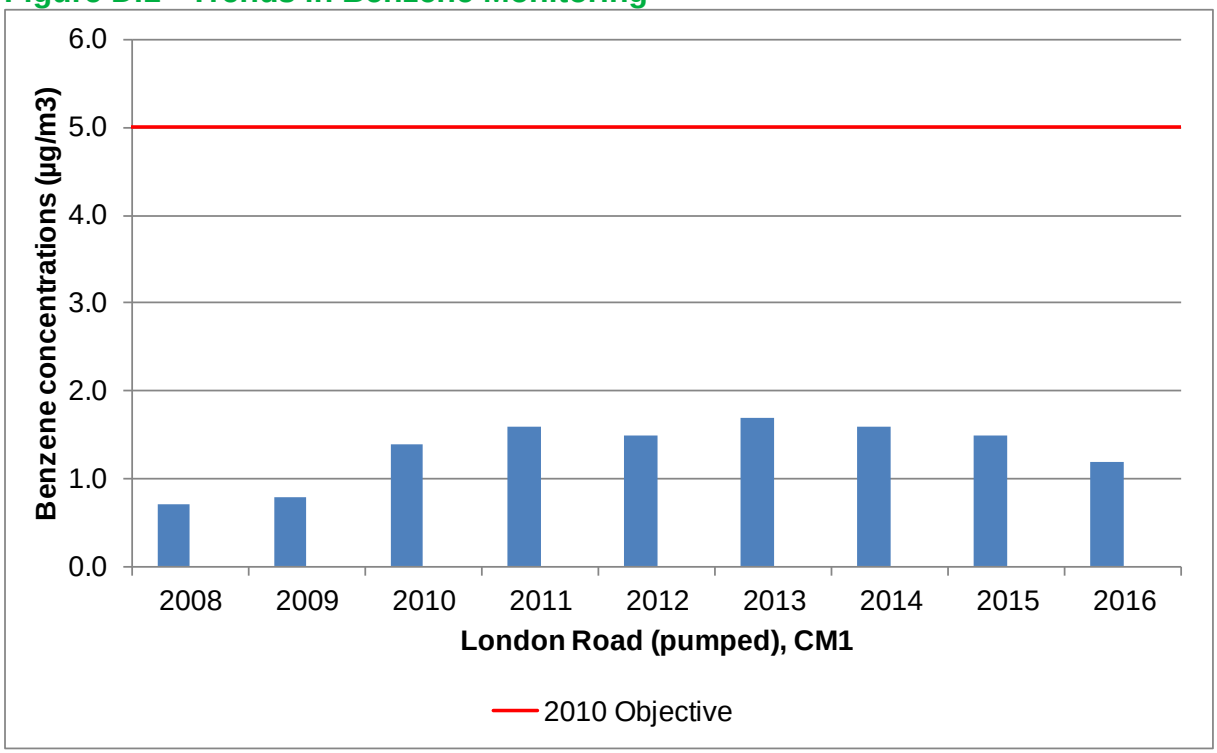
Monitoring results for benzene are shown in Table D1 and Figure D.1. The results show that there are no exceedances of the benzene objectives during 2016.

Trends in benzene show that levels in 2016 were similar to previous years (Figure D.1).

Table D.1 - Results of Benzene Monitoring

Site ID	Site Name	Data Capture for 2016 (%)	Annual Mean (µg/m^3)				
			2012	2013	2014	2015	2016
CM1	London Road (Pumped)		1.5	1.7	1.6	1.5	1.2
	Annual Mean Objective: 5 µg/m^3						

Figure D.1 - Trends in Benzene Monitoring



Grass Pollen

Pollen is a naturally occurring pollutant, which affects 10% of the population in the form of hay fever. Sufferers experience constantly itching and streaming eyes and noses, and in 30% of cases, pollen related asthma. Hay fever causes havoc with domestic, social and working life. More working days are lost nationally due to hay fever than from industrial injuries.

Not all hay fever sufferers are allergic to all types of pollen and this is why some people suffer at any certain times while others suffer the whole of the summer. The most common culprit is grass pollen, which tends to be liberated in large quantities on warm sunny days.

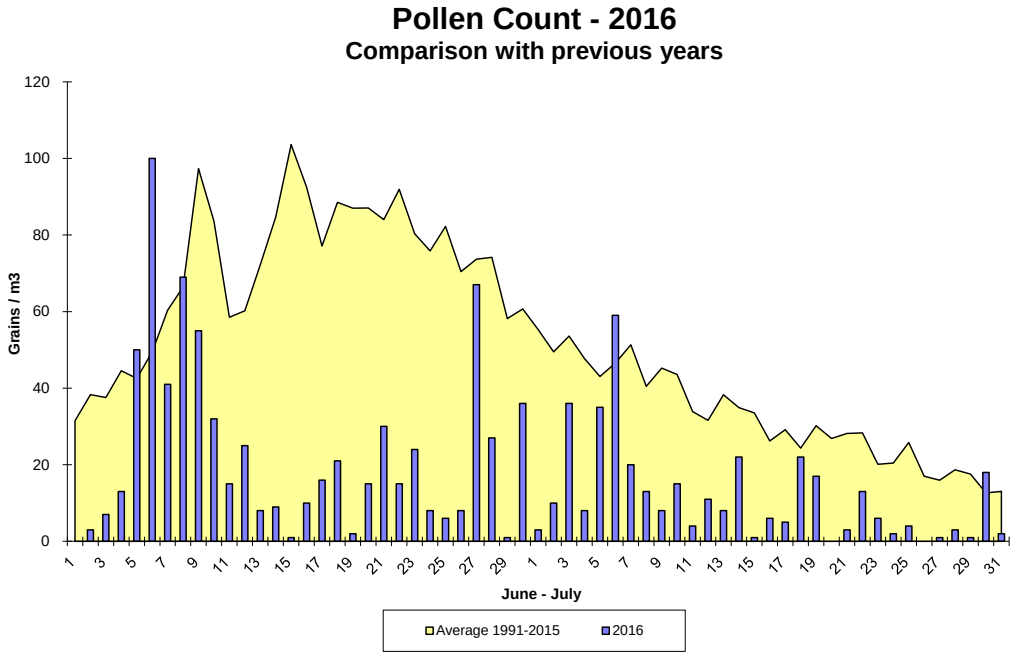
Unlike other pollutants, the amount of pollen in the air cannot be regulated or prevented. There is, however, great advantage for sufferers to be aware of the daily pollen count and pollen forecast to enable them to gauge the effectiveness of their drugs and to plan ahead to minimise exposure to expected high levels of pollen.

Bath & North East Somerset Council has monitored Grass Pollen since 1991 as part of a network now co-ordinated by The Meteorological Office.

Figure D.2 compares the 2016 pollen readings with the averaged data collected from 1991 to 2015. The trend differs from previous years, with the counts being generally lower with only the peaks being in early June and early July. Most hay fever sufferers experience symptoms when the count rises above 50 grains per cubic metre.

There was 0 day when the count was greater than 100 grains per cubic metre which compares with a mean of 5 days in the previous ten years and 5 days where the count was greater than 50 grains compared with a mean of 13 in the previous ten years.

Figure D.2 - Results from Pollen Monitoring



Meteorology

Since January 2000 meteorology data has been collected in Central Bath. Data collected includes wind speed and direction, air temperature, rainfall and pressure.

The wind direction for 2015 shows a similar pattern to previous years with peaks at W, SW and NE (Figures D.3-D.4). It should be noted that the data is collected for 15 minute averages; therefore peak gusts are not seen.

The temperature profile is typical of the UK [18] with the August and September 2016 being above average and April and November being slightly below average. The maximum temperatures were similar to previous years, with temperatures reaching 32.6 ºC in July but lower than average in April and October. The minimum temperature reached -5 ºC in January and December 2016 (Figures D.5-D.7). This was similar to the UK pattern.

Rainfall in Bath followed a similar pattern to that monitored by The Met. Office for the SW [19] but generally lower, with above average levels in March, May and November and particularly dry months in July, August and October (Figure D.8). The total

[18] http://www.metoffice.gov.uk/climate/uk/summaries/actualmonthly
[19] http://www.metoffice.gov.uk/climate/uk/summaries/2016

rainfall in Bath (707 mm) was lower than the England total of 821 mm, as Bath was not affected by the flooding which hit parts of the UK.

Figure D.3 - Wind Rose showing the frequency in each direction

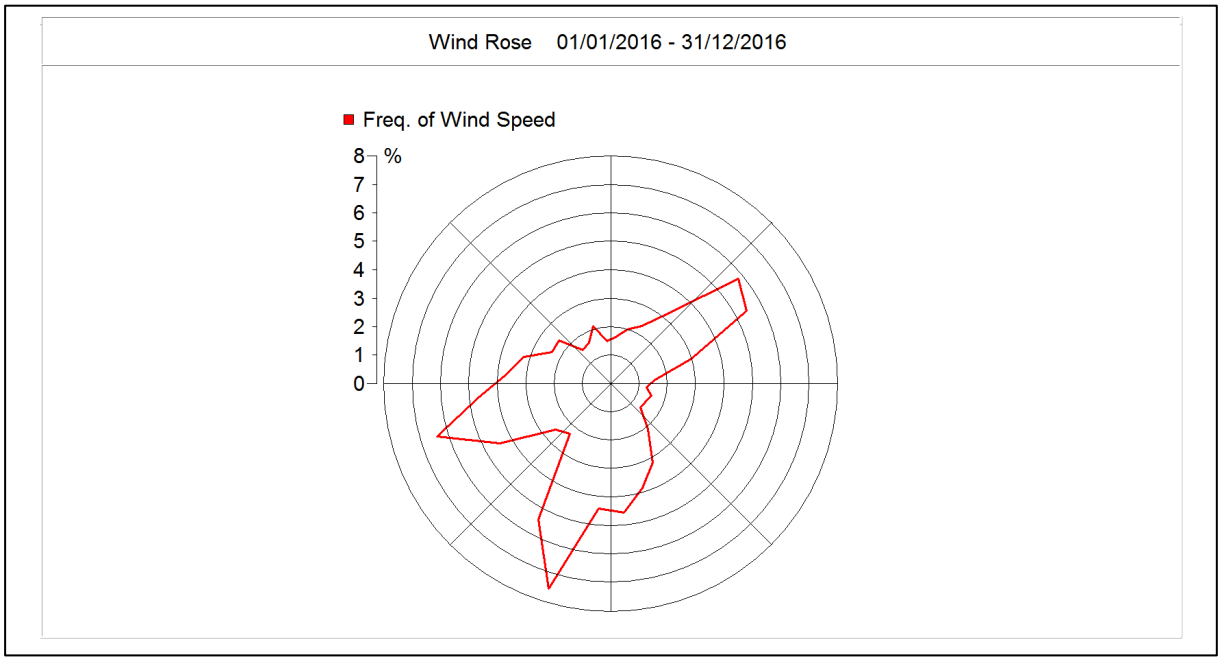


Figure D.4 - Wind Rose

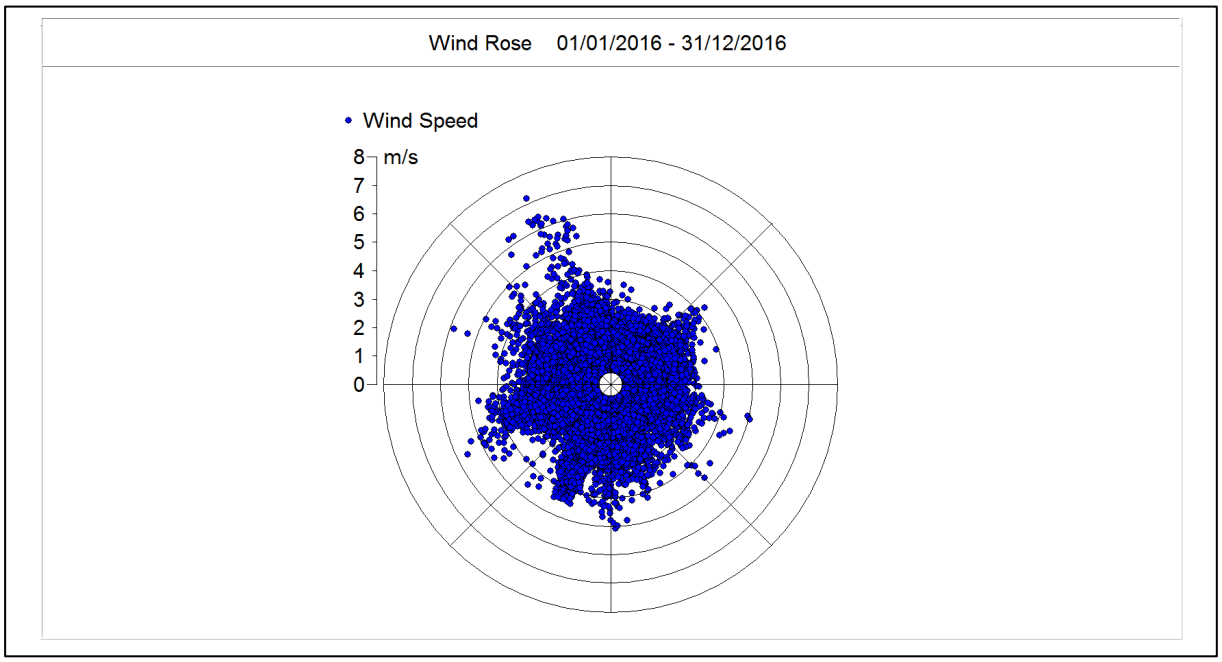


Figure D.5 - Trends in Average Monthly Temperature

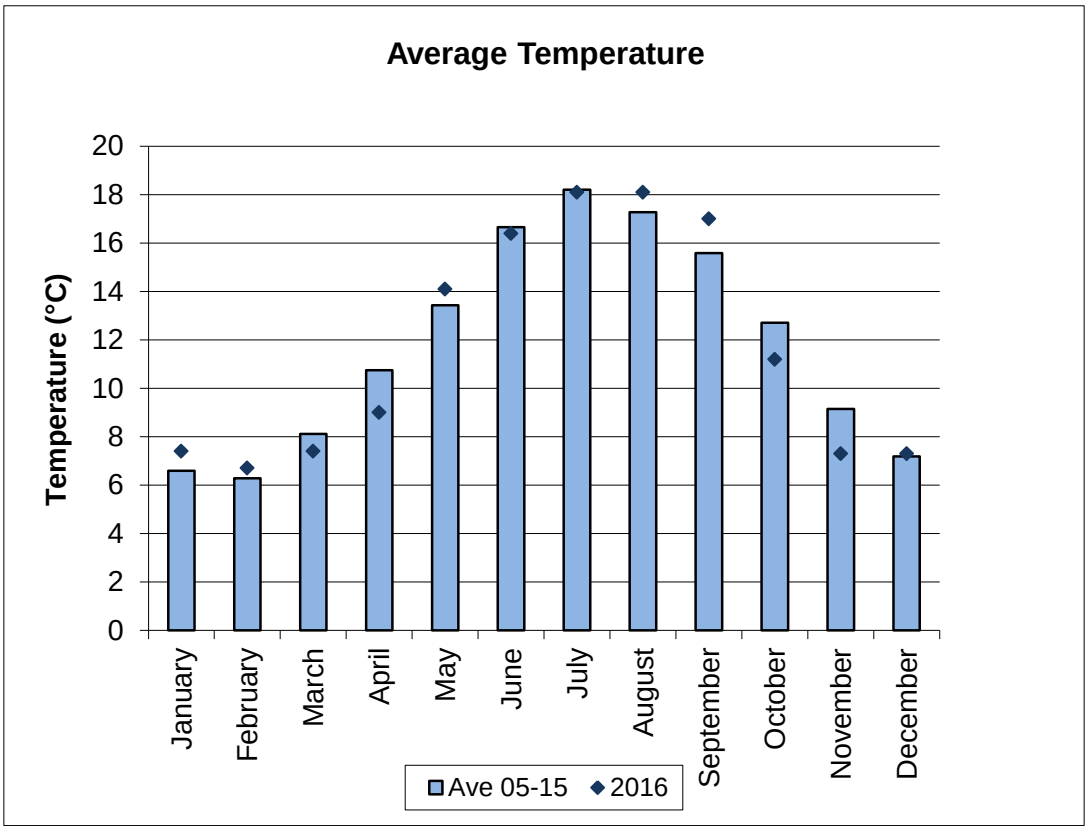


Figure D.6 - Trends in Maximum Monthly Temperature

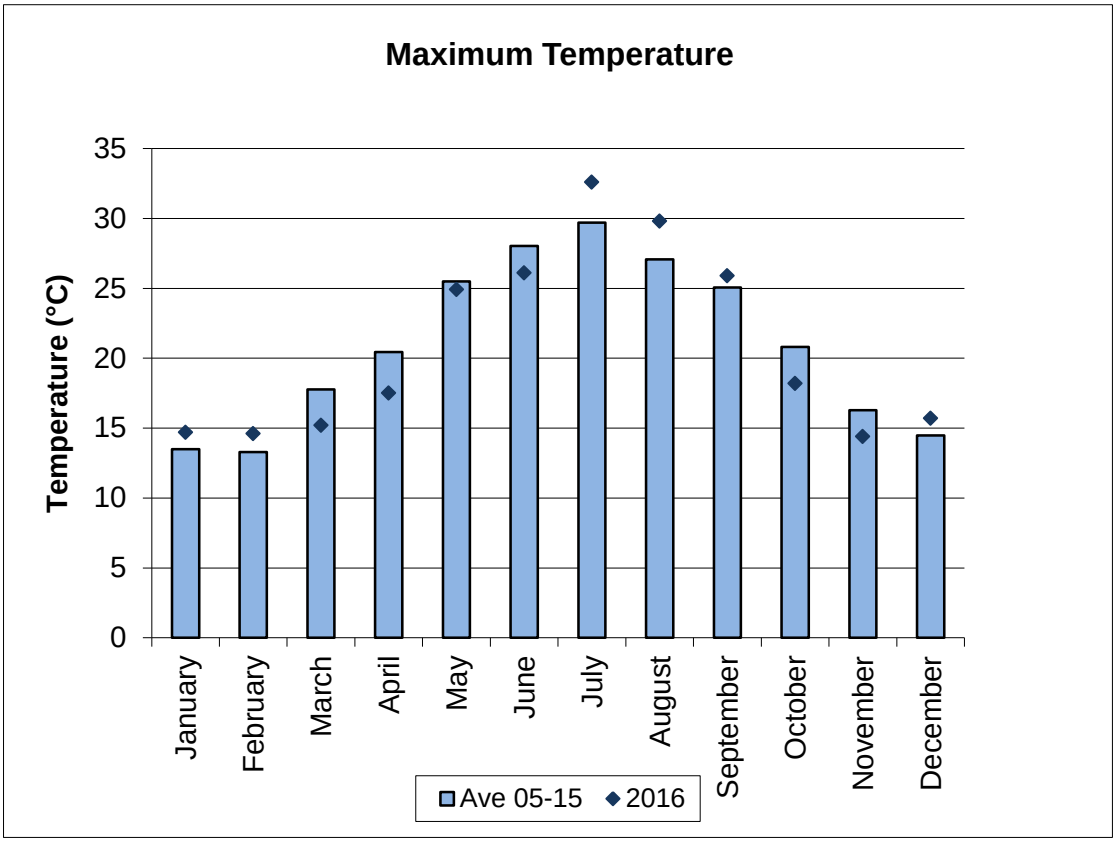


Figure D.7 - Trends in Minimum Monthly Temperature

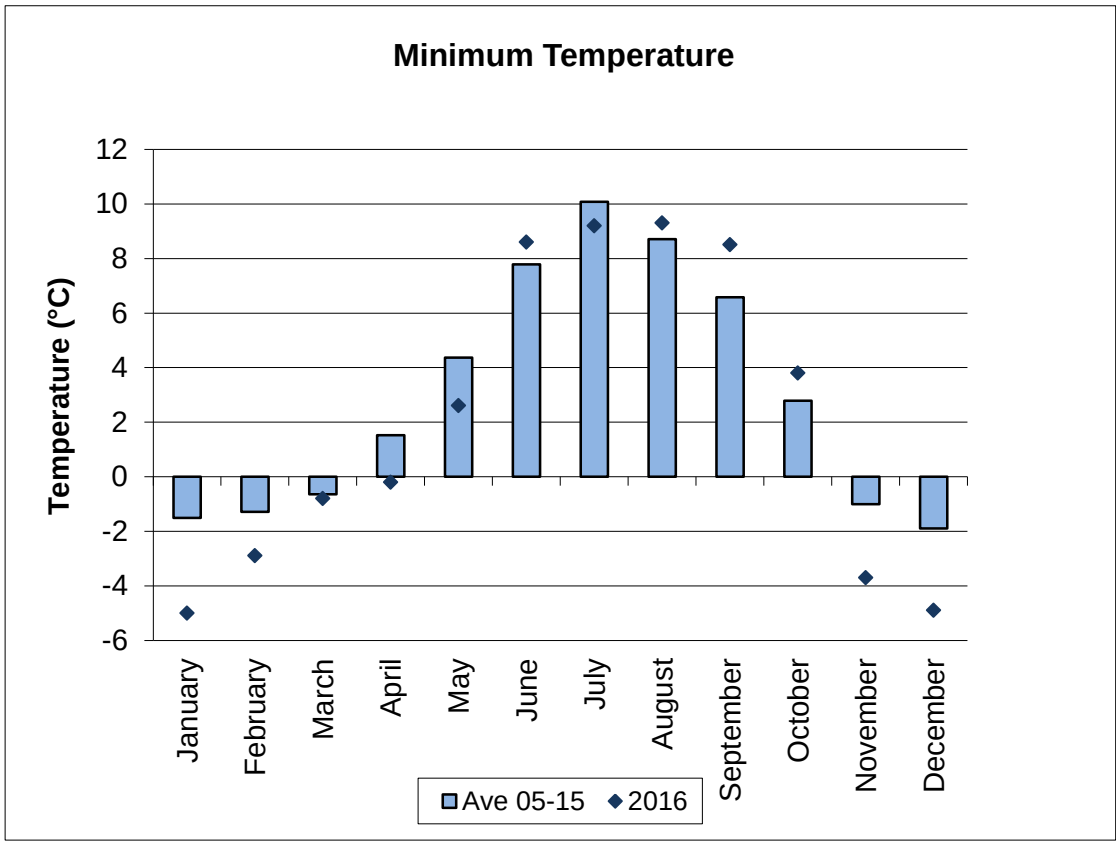
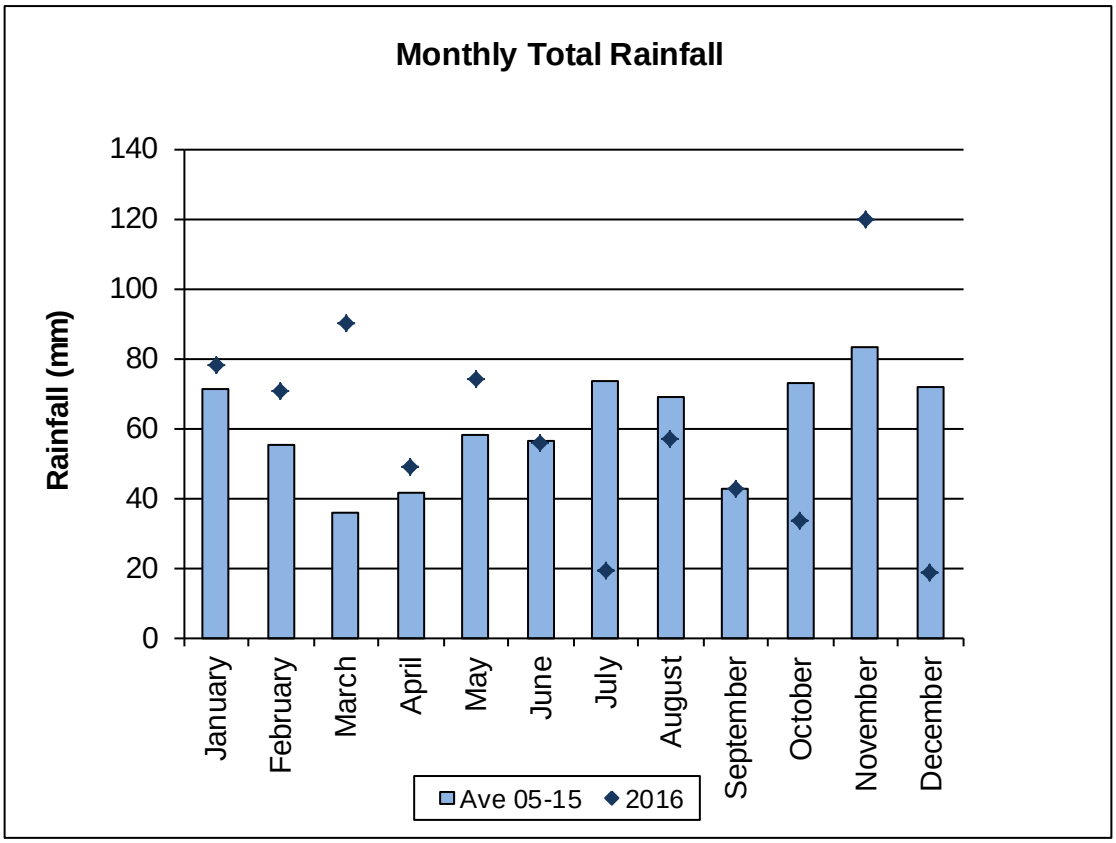


Figure D.8 - Trends in the Total Monthly Rainfall



AQMesh comparison

Table D.2 - Comparison of AQMesh analysers when co-located with the continuous analyser at Chelsea House

Analyser	Annual Mean NO_2 ($\mu g/m^3$)	NO_2 1-Hour Means > 200$\mu g/m^3$ (1)	Annual Mean PM_{10} ($\mu g/m^3$)	PM_{10} 24-hour Means >50 $\mu g/m^3$ (2)	Annual Mean $PM_{2.5}$
May-August					
AQMesh – Luther	29	0 (93)	16	0 (28)	9
Chelsea House	24	0 (56)	16	0 (25)	9
August-November					
AQMesh – Wallander	26	0 (76)	18	4 (32)	11
Chelsea House	27	0 (78)	18	0 (23)	11

(1) If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.
(2) If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets

Table D.3 - Results from AQMesh analysers

Analyser	Annual Mean NO_2 ($\mu g/m^3$)	NO_2 1-Hour Means > 200$\mu g/m^3$ (3)	Annual Mean PM_{10} ($\mu g/m^3$)	PM_{10} 24-hour Means >50 $\mu g/m^3$	Annual Mean $PM_{2.5}$
August-December – at Sydney Place					
AQMesh – Luther	51	1 (175)	37	31 (78)	19
AQMesh – Luther at façade	35				
May-November – at Larkhall					
AQMesh – Wallander	10	0 (44)	13	1 (22)	8

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

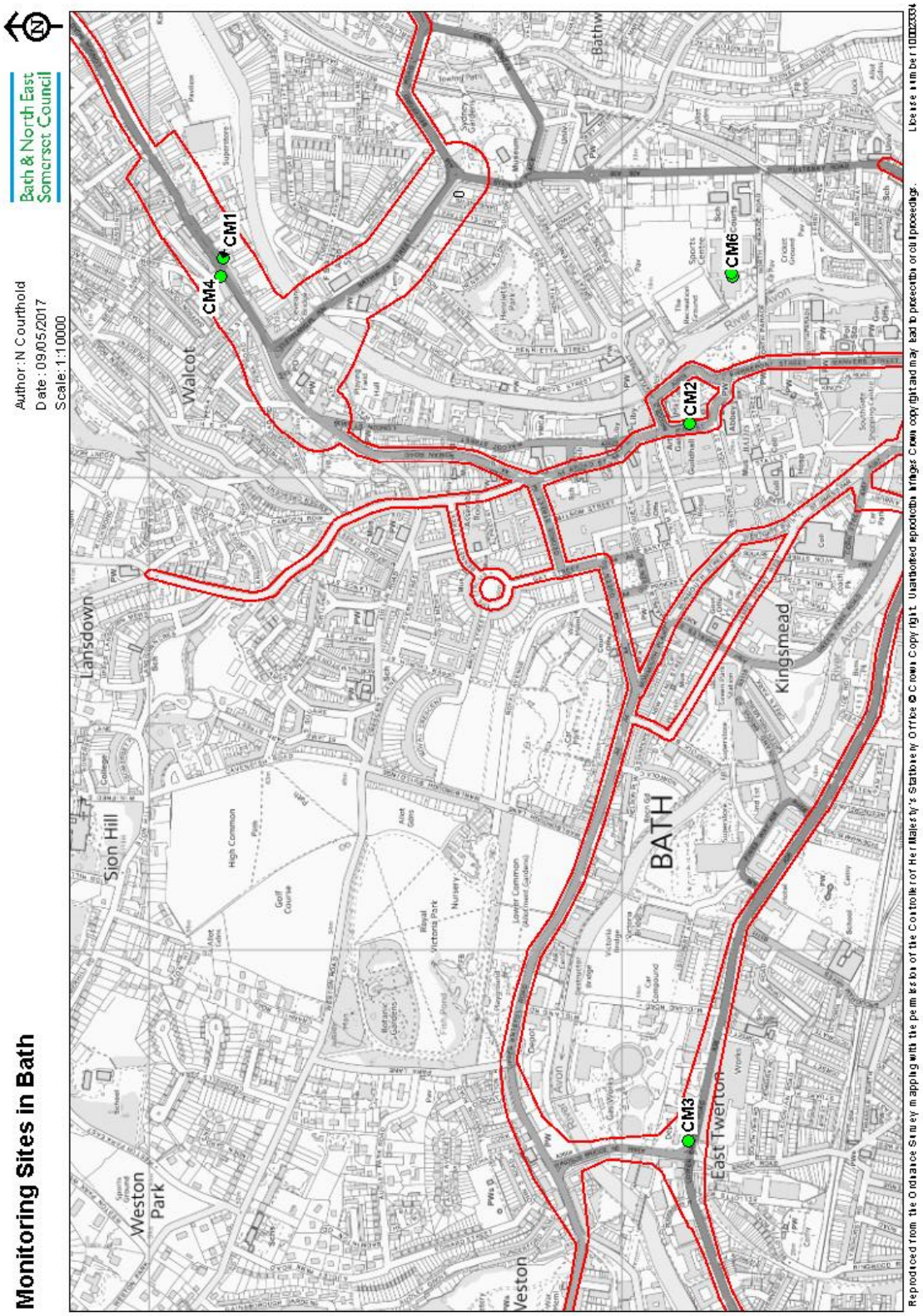


Figure E.1 Map showing automatic monitoring sites in Bath

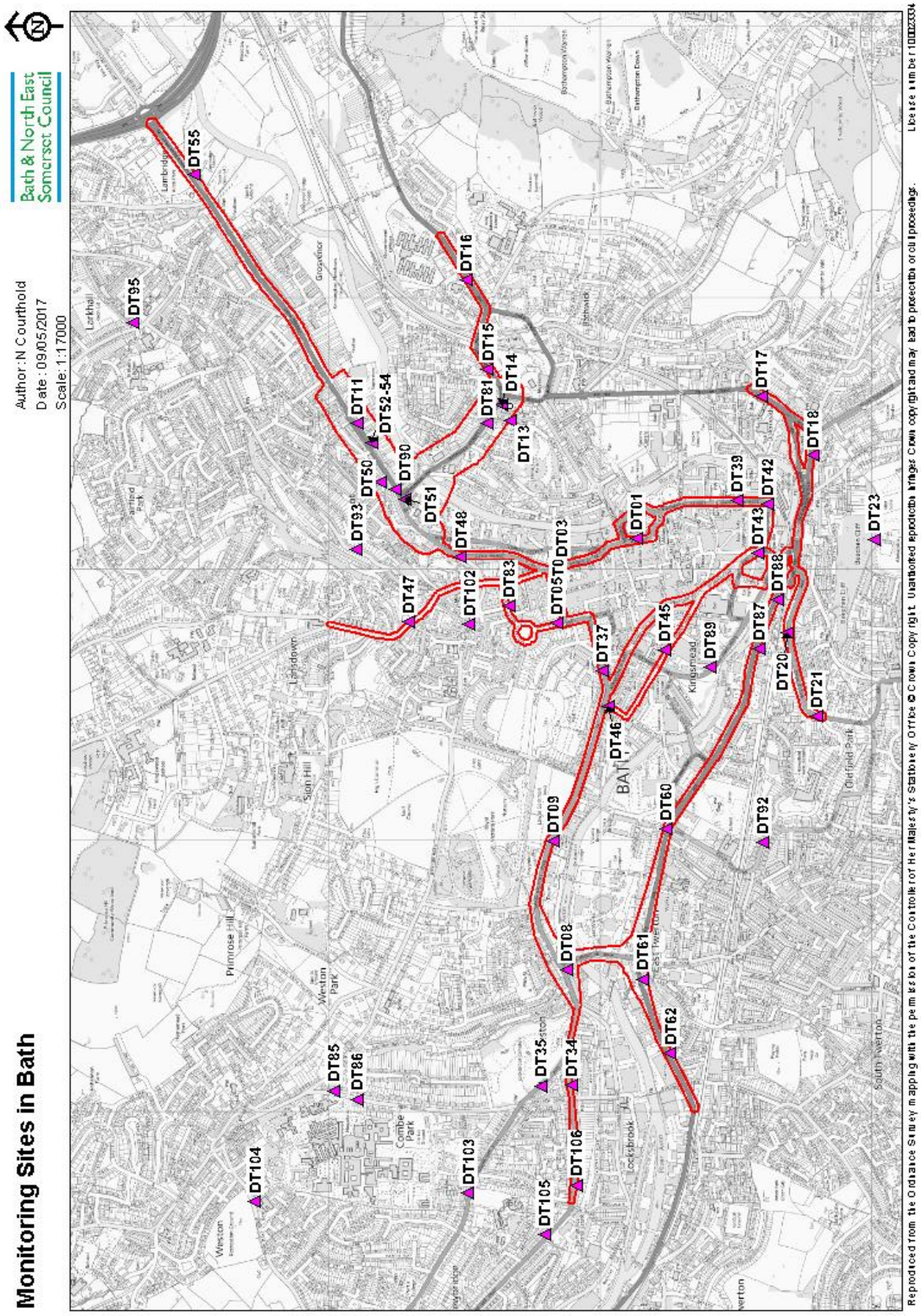


Figure E.2 Map showing monitoring sites and AQMA in Bath – North

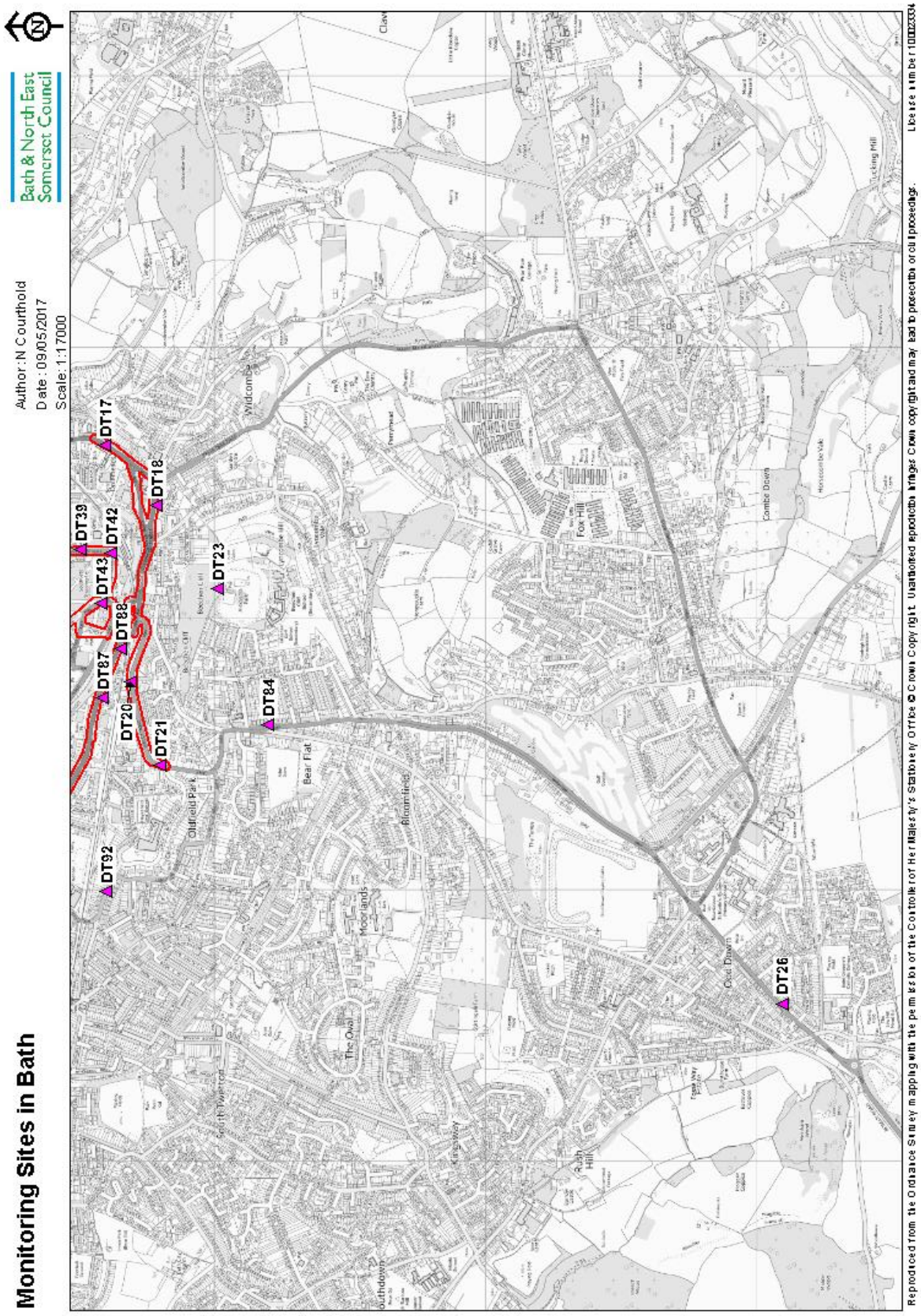


Figure E.3 Map showing monitoring sites in Bath –South

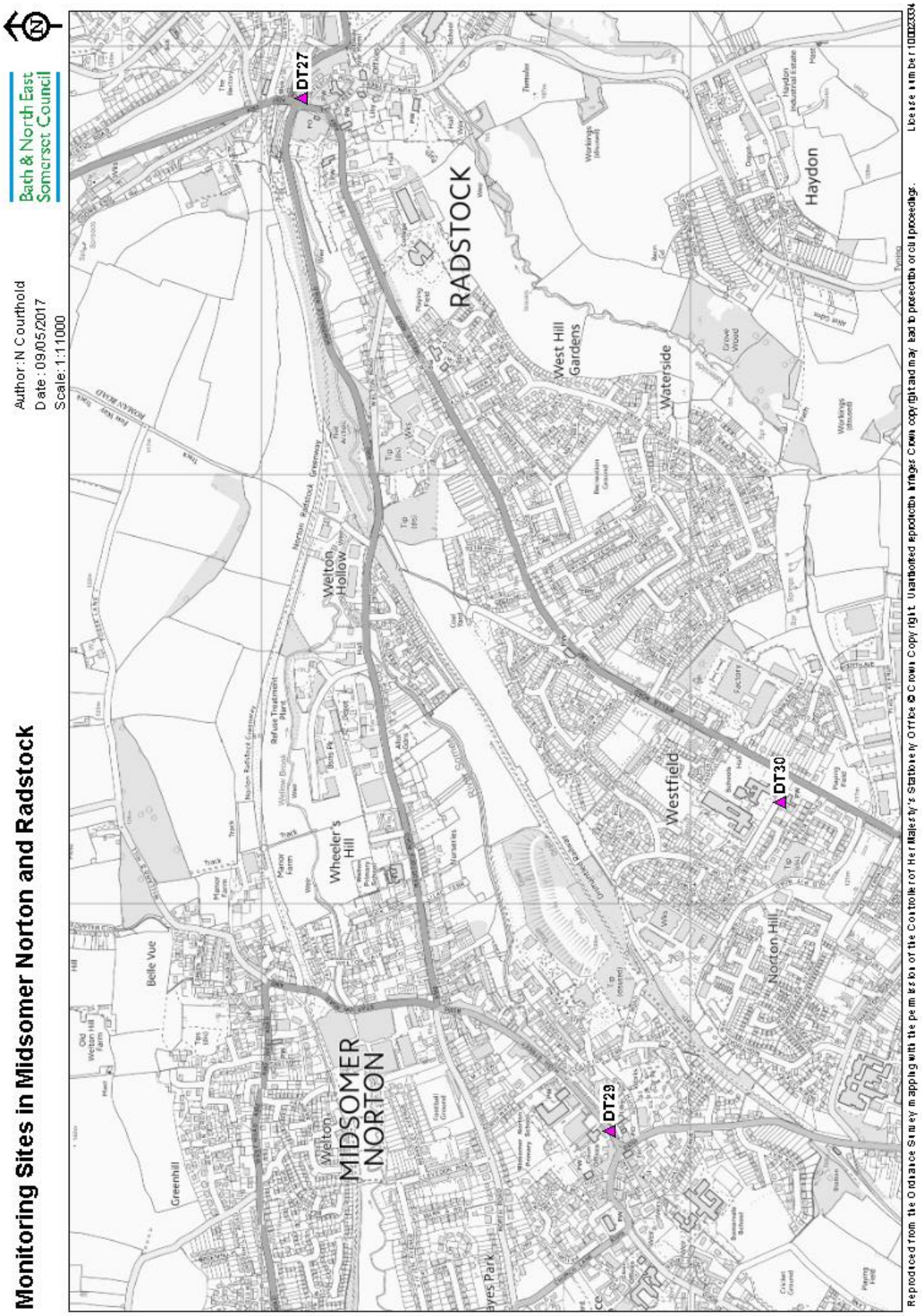


Figure E.4 Map showing monitoring sites in Midsomer Norton and Radstock

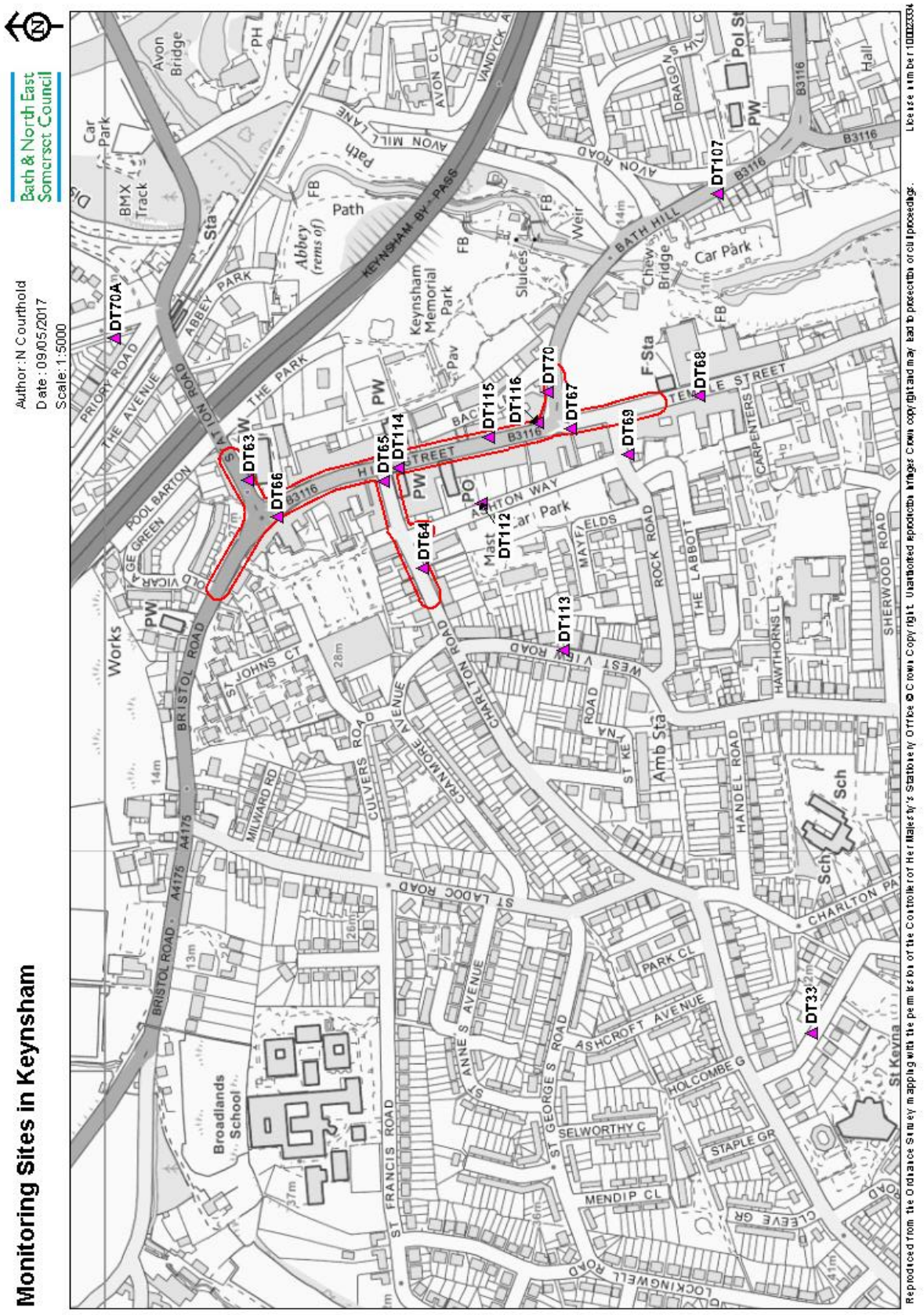


Figure E.5 Map showing monitoring sites and AQMA in Keynsham

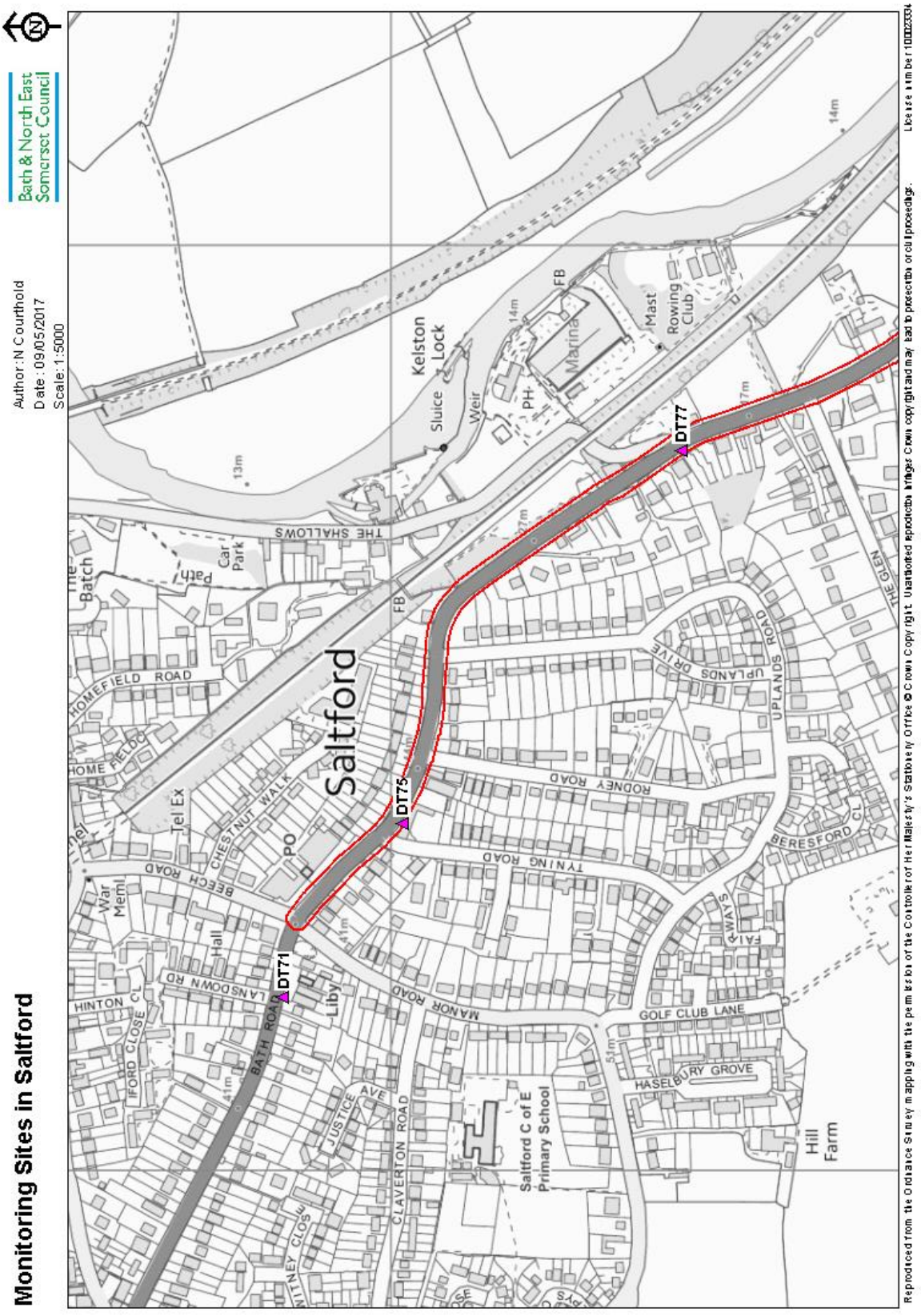


Figure E.6 Map showing monitoring sites and AQMA in Saltford

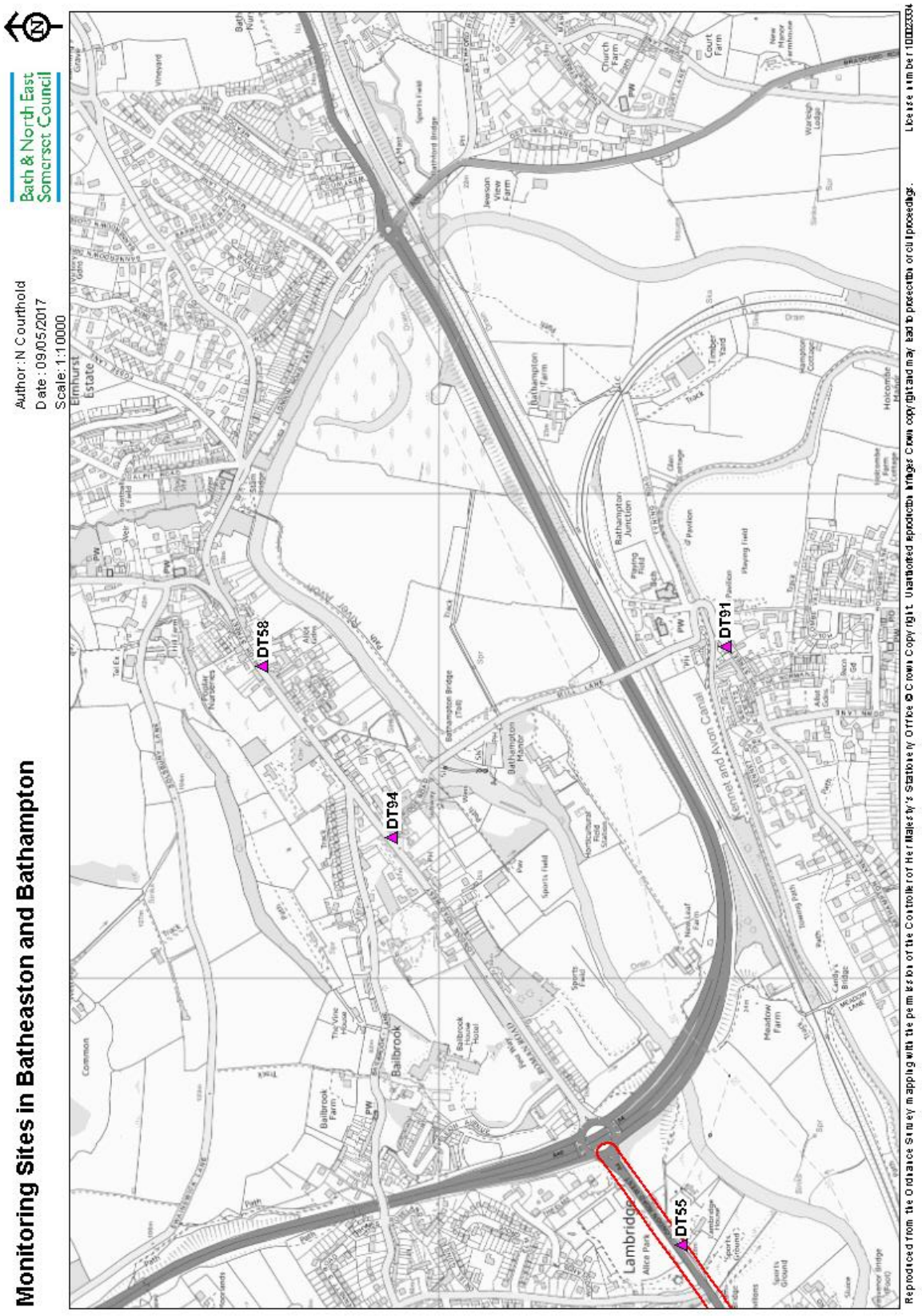


Figure E.7 Map showing monitoring sites in Batheaston

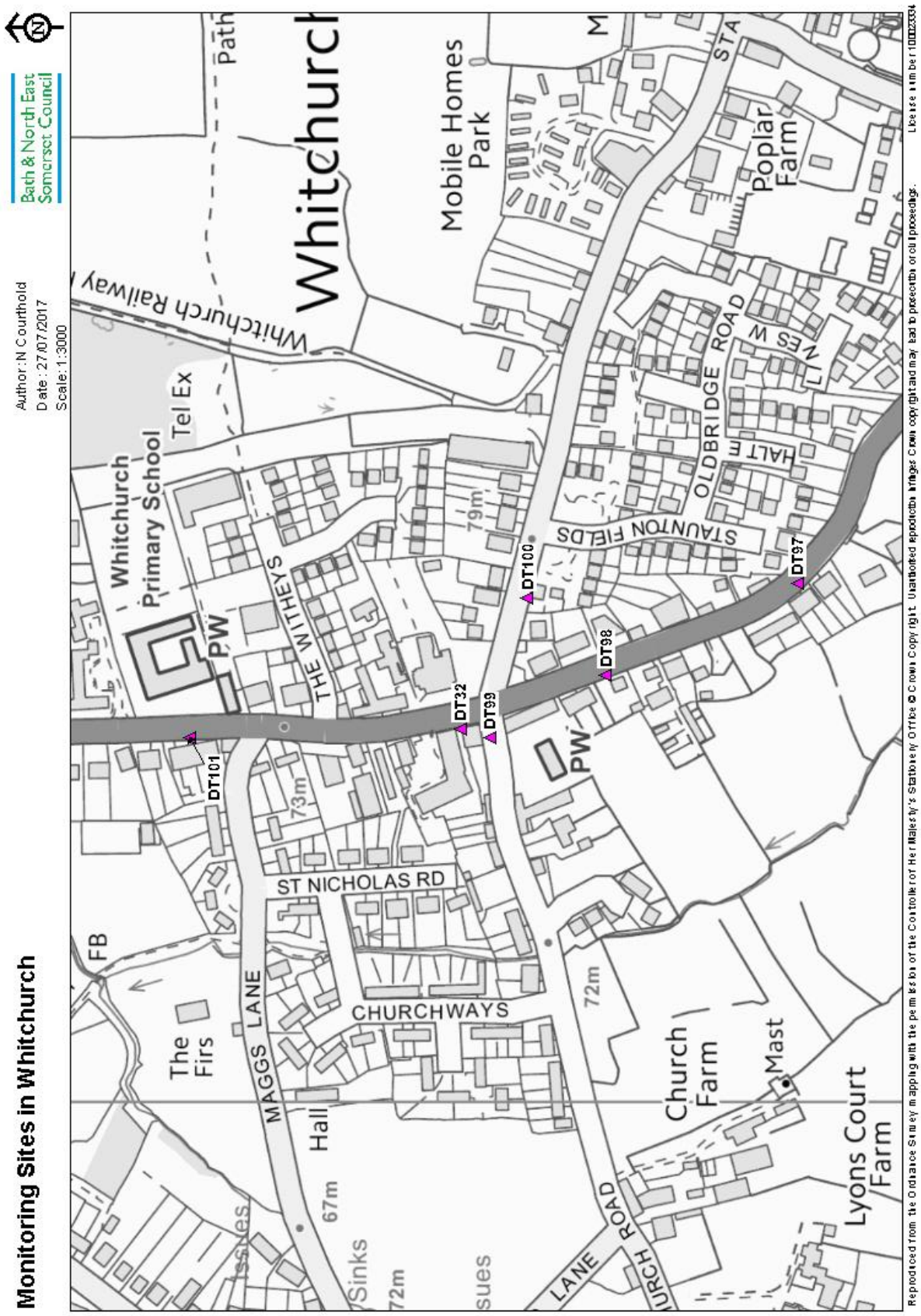


Figure E.8 Map showing monitoring sites in Whitchurch

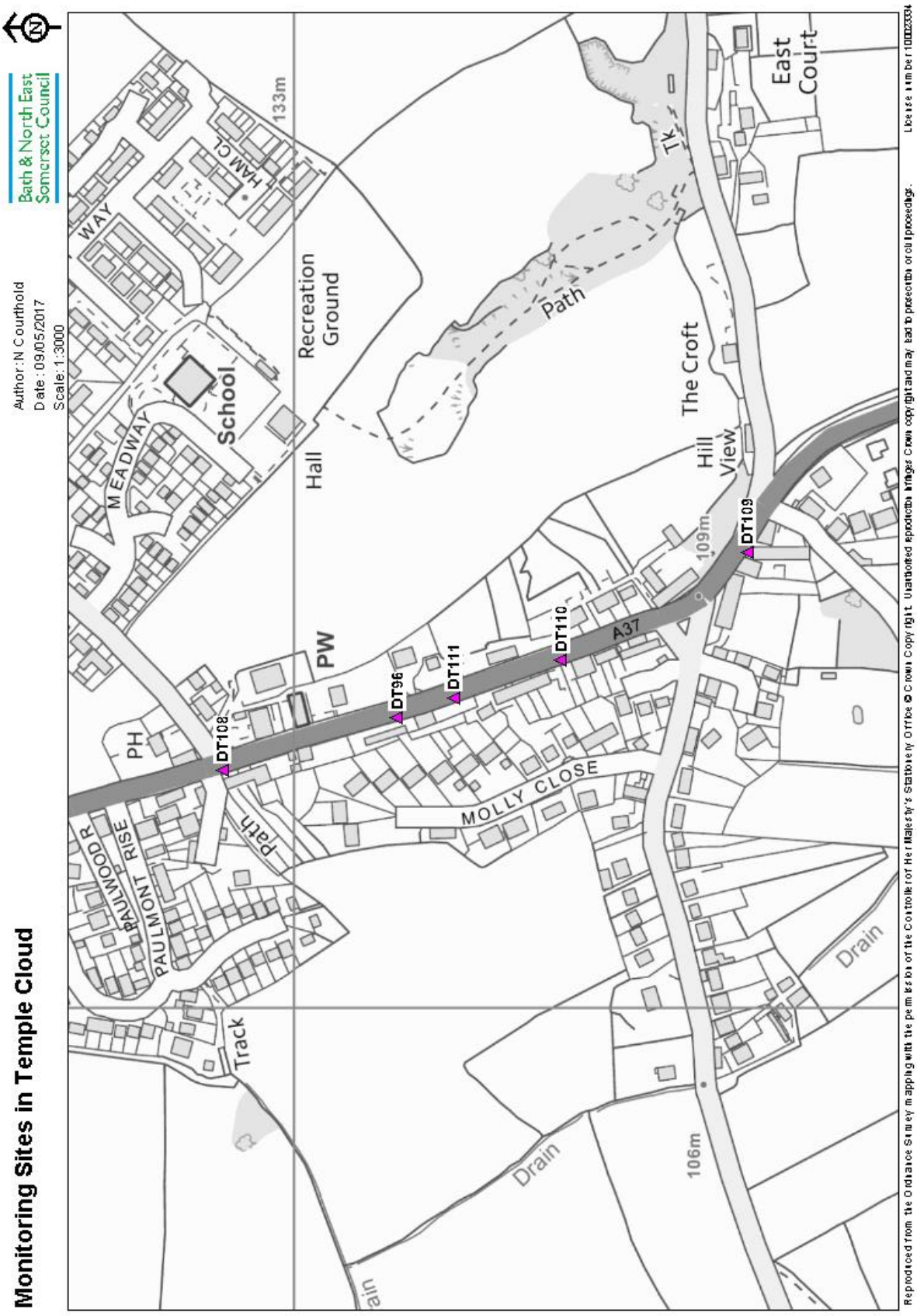


Figure E.9 Map showing monitoring sites in Temple Cloud

Appendix F: Supporting Technical Information – Additional Information

F.1 Screening Assessment

Road Traffic Sources

Road sources within Bath & North East Somerset have been assessed for:

- Narrow congested streets with residential properties close to the kerb
- Busy Streets where people spend 1-hour or more close to traffic
- Roads with high HGV flows
- Junctions
- New roads constructed or proposed
- Roads with significantly changed traffic flows and
- Bus and Coach Stations

Bath & North East Somerset Council confirms that there are no new/newly identified road traffic sources within Bath & North East Somerset.

Non-road Transport Sources

Bath & North East Somerset Council confirms that there are no new/newly identified non-road transport sources within Bath & North East Somerset.

Industrial Sources

Bath & North East Somerset Council confirms that there are no new/newly identified industrial sources within Bath & North East Somerset.

Commercial Sources

Bath & North East Somerset Council confirms that there are no new/newly identified commercial sources within Bath & North East Somerset.

Fugitive or Uncontrolled Sources

Bath & North East Somerset Council confirms that there are no new/newly identified fugitive sources within Bath & North East Somerset.

Appendix G: Summary of Air Quality Objectives in England

Table G.1 - Air Quality Objectives in England

Pollutant	Air Quality Objective[20]	
	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

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

Glossary of Terms

Abbreviation	Description
AADT	Annual Average Daily Traffic
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
AURN:	Automatic Urban and Rural Network
BAM1020	Beta Attenuation Monitor
CAZ	Clean Air Zone
DC	Development Control
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
EV	Electric Vehicle
HGV	Heavy Goods Vehicle
LAQM	Local Air Quality Management
LEZ	Low Emission Zone
LSTF	Local Sustainable Transport Fund
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NPPF	National Planning Policy Framework
OLEV	Office for Low Emission Vehicles
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
P&R	Park and Ride
PAYG	Pay as you go
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
SCR	Selective Catalytic Reduction
TMT	Thermal Management Technology
TRO	Traffic Regulation Order
ug/m^3	micrograms per cubic metre
ULEV	Ultra-Low Emission Vehicles

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4. Bath & North East Somerset Council (2011) Bath Air Quality Action Plan.

5. Bath & North East Somerset Council (2016) Keynsham and Saltford Air Quality Action Plans.

6. Bath and North East Somerset Council (2014) Getting Around Bath: Supporting Document - A Transport Strategy for Bath. Mott Macdonald. (http://www.bathnes.gov.uk/sites/default/files/sitedocuments/getting_around_bath_transport_strategy_-_final_issue_web_version.pdf)

7. Bath & North East Somerset Council (2016) Getting Around Keynsham Transport Strategy. Mott Macdonald. (http://www.bathnes.gov.uk/sites/default/files/siteimages/Parking-and-Travel/getting_around_keynsham_-_final_version.pdf)

8. Bath and North East Somerset Placemaking Plan, part 3 – Keynsham (http://www.bathnes.gov.uk/sites/default/files/sitedocuments/Planning-and-Building-Control/Planning-Policy/Placemaking-Plan/draft_pmp_vol_3_keynsham.pdf)

9. Department for Environment, Food and Rural Affairs (2016b) Part IV of the Environment Act 1995, Local Air Quality Management, Policy Guidance LAQM.PG(16). DEFRA, London.

10. Public Health Outcomes Framework (http://www.phoutcomes.info/public-health-outcomes-framework#gid/1000049)

11. Local Air Quality Management - Technical Guidance (TG16), April 2016 (https://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf)

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13. (As 10).

14. https://laqm.defra.gov.uk/documents/AIR-PT-Rounds-6-to-16-(Jan-2015---Oct-2016).pdf

15. https://laqm.defra.gov.uk/laqm-faqs/

16. https://laqm.defra.gov.uk/helpdesk/laqm-helpdesk.html

17. https://laqm.defra.gov.uk/documents/AIR-PT-Rounds-6-to-16-(Jan-2015---Oct-2016).pdf

18. http://www.metoffice.gov.uk/climate/uk/summaries/actualmonthly

19. http://www.metoffice.gov.uk/climate/uk/summaries/2016

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