Bath & North East Somerset Council

2016 Air Quality Annual Status Report (ASR)

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

August, 2016

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Report Reference number	R6ASR0716
Date	August 2016

Executive Summary

Air Quality in Bath & North East Somerset

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

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

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 long established collaboration between the four former Avon authorities (now referred to as the West of England authorities) in this regard and the Travel West brand acknowledges the fact that the commuter doesn'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, particularly on the Primary Route Network of the A46/A36 travelling between the motorway network and the south coast is an issue. The lack

of alternative routes generally means that the streets are often congested, despite a relatively high proportion of people walking to work and substantial investments in cycling and walking infrastructure. (4)

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 G. Details of the AQMAs can also be found at http://www.bathnes.gov.uk/services/environment/pollution/air-quality/. In July 2016 a new Air Quality Action Plan for the Keynsham and Saltford AQMAs was adopted listing actions to improve air quality within the AQMAs. Bath's Air Quality Action Plan will be reviewed and updated in 2016.

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

Bath and North East Somerset Council had 80 NO_2 monitoring sites and 3 particulate matter monitoring sites in 2015. 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 I. This year the Council has changed which factor it uses and further information is contained in Appendix D.

Monitoring results of NO_2 in 2015 were on average slightly lower than in 2014. All sites which exceeded the NO_2 air quality objective were within the current AQMAs except one site at Whitchurch (DT32). This site which was moved in 2015 at the request of local residents was above the air quality objective at the building façade (44 micrograms per cubic metre [$\mu g/m^3$]). As this site did not have a full year of data, further work is being undertaken to determine if an AQMA is required.

The annual mean particulate matter not exceeding 10 micrometres in diameter (PM_{10}) concentrations in 2015 were similar to 2014 but there were slightly more exceedances of the 24 hour mean. 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 showed an annual average of 10 µg/m^3 which is below the annual average objective.

Actions to Improve Air Quality

There are a number of initiatives taking place across the district that are helping to improve air quality. The reopening of the two tunnels shared use railway path and a new 'Next bike' cycle hire scheme facilitates active travel and supports Bath's relatively high proportion of walking and cycling commuters. A new road scheme in the central area of Widcombe has meant that through-traffic has moved away from the commercial and residential street of Widcombe Parade and this has resulted in a significant drop in recorded concentrations of NO_2 from 49 µg/m^3 in 2014 to 31 µg/m^3 in 2015 following completion of the works.

The Council has continued to support the Freight Consolidation Service that uses an electric lorry to deliver to over 40 retail outlets in central Bath from a transhipment depot at Avonmouth. This has resulted in more than an 80% journey reduction and over 50% reduction in energy consumption, with a significant reduction in HGV emissions.

A successful Clean Bus Technology Fund bid means that 35 buses across the West of England area are being retrofitted to meet Euro 5 and 6 standards. Also, as part of the measures to reduce emissions of the private car and encourage use of public transport, 375 bus stops have had raised pavements to facilitate access for less able people and 169 stops have had Real Time Information installed, as well as all existing shelters being replaced.

Variable message signs have been installed at outer and inner locations on radial routes in Bath to help reduce unnecessary journeys and encourage the use of Park and Ride sites.

The Source West electric vehicle charging network that was introduced with the Local Sustainable Transport Fund grant is now being upgraded and expanded following a successful West of England Go Ultra Low City Scheme bid. This will see a doubling of charging points across the sub-region and a number of measures designed to encourage the uptake of ultra-low emission vehicles and improve air quality.

'Source West' electric vehicle charging point in Keynsham.

In July of 2016 the Air Quality Action Plans for Keynsham and Saltford [(5)] were published following an extensive consultation period. The measures in each of the action plans are shown in section 2.2. The actions include a trial one way system on Keynsham High Street, advice on tree/shrub planting to mitigate air pollution effects and further electric vehicle charging points as part of the Go Ultra Low City Scheme.

Local Priorities and Challenges

The priority for the coming year is to renew the Air Quality Action Plan for Bath [6]. The Council is consulting on generating options for the plan in the winter of 2016, with a view to adopting the plan in 2017. In preparation for this, the Council has enhanced its monitoring capabilities with the purchase of two new lamppost mounted monitors that send live air quality data to the Council. These are being deployed across the district to respond to air quality concerns.

AQMesh Automatic air pollution monitor - Sydney Place, Bath.

The challenges for Bath are made greater by its' attractiveness and status as a UNESCO World Heritage Site which means that it has a significant amount of tourist traffic, its environmentally sensitive setting and the existence of the Primary Route network on the city streets of the A46 and A36.

The air quality issue (action plans and AQMAs) carries a high strategic profile in Bath and North East Somerset Council, as demonstrated in the following strategic documents:

- **The Core Strategy** (7) lists the AQMAs as part of the Key Strategies and Plans. The strategy states that 'To enable the delivery of the spatial strategy for Bath it will be necessary to implement….Air Quality Action Plan'. In 6.101, the strategy states that 'the reduction of the adverse effects of transport on climate change and air quality, particularly in AQMAs in Bath and Keynsham and in future AQMAs, will be managed in accordance with the NPPF.' The strategy also includes the saved policy from the Local Plan: *'POLICY ES.10 Development will not be permitted where it would: (i) have an adverse impact on health, the natural or built environment or amenity of existing or proposed uses by virtue of odour, dust and/or other forms of air pollution; or (ii) be likely to suffer unacceptable nuisance as a result of proximity to existing sources of odour, dust and /or other forms of air pollution.'*

- **The Joint Local Transport Plan** (8) (four former Avon authorities) states the improving air quality is one of its four aims to improve safety, health and security and it is 'Goal 3' to improve air quality in the AQMAs. Strategy 8.4 outlines the approach to improving air quality.

- **The Corporate Strategy's** (9) 1st priority is to create 'cleaner, greener and healthier communities' and within it the Directorate Plans include a plan to 'Improve Air Quality through the air quality action plans for Keynsham, Saltford and Bath…'

- The Council has an Environmental Sustainability Partnership, which is a cross-party councillor and officer board that the air quality issue has recently been presented at and oversees work across the district relating to environmental sustainability and climate strategy.

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 14

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 (former Avon authorities including Bath and North East Somerset).

The Council are in the process of renewing the Air Quality Action Plan for Bath [(6)]. Stakeholder groups and the public will be invited to get involved in the process of developing the plan, as the Council seeks to take a collaborative approach. For example, the council is engaging with Transition Bath (a pressure group) at an early stage of the plans' development. 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.

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1 Local Air Quality Management

This report provides an overview of air quality in Bath & North East Somerset Council during 2015. 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 I.1 in Appendix I.

2 Actions to Improve Air Quality

2.1 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 AQAP within 12-18 months setting out measures it intends to put in place in pursuit of 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 AQMAs, including maps of AQMA boundaries are available online at http://www.bathnes.gov.uk/services/environment/pollution/air-quality/. Maps of current AQMAs in Bath & North East Somerset are also in Appendix G.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
The Bath London Road Air Quality Management Area - 2013	NO_2 annual mean NO_2 1-hour mean	Bath	The area covers the major road network in Bath, encompassing any buildings whose facades are within the area.	Bath Air Quality Action Plan - 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	NO_2 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.	Air Quality Action Plans for Keynsham and Saltford - 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	NO_2 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 150 metres south of the Glen.	Air Quality Action Plans for Keynsham and Saltford - http://www.bathnes.gov.uk/sites/default/files/keynsham_and_saltford_air_quality_action_plans_2016_1.pdf

2.2 Progress and Impact of Measures to address Air Quality in Bath & North East Somerset Council

Bath & North East Somerset Council has taken forward a number of measures during the current reporting year of 2015 in pursuit of improving local air quality. Table 2.2 below summarises progress with measures as listed in the Bath Air Quality Action Plan 2011 [6]. The subsequent Tables 2.3 and 2.4 include the measures as identified in the Air Quality Actions Plans for Keynsham and Saltford – adopted July 2016 [5].

More detail on these measures can be found in their respective Action Plans; the Bath Air Quality Action Plan [6], and Keynsham and Saltford Air Quality Action Plan [5].

Key completed measures are:

- Bath Transport Package;
    - 50% increase in P&R parking space provision;
    - Raised pavements at 375 stops to ease access on and off buses for older disabled people, and those with prams;
    - The addition of 169 electronic Real Time Information displays at busy stops;
    - Complete replacement of existing shelters and the addition of new bus shelters at other popular stops.
    - Variable message signing on main radial routes
- Source West electric vehicle charging point infrastructure (20 public and 10 business sockets) installed across the district;
- A low carbon bus trial that led to the purchase and operation of 8 diesel-electric hybrid buses for the 3 Park and Ride sites in Bath;
- Freight transhipment scheme using an electric lorry that delivers to 40 retail outlets in Bath. This has led to an average monthly reduction in deliveries of 77%;
- A cycle hire scheme with 14 bike stations in Bath and 877 users per month;
- Live air pollution data displayed on the website;

- Clean Vehicle Technology Fund bus retrofitting; and a
- New Rossiter Road highway layout removing through-traffic from the residential and commercial properties on Widcombe Parade and reduced annual mean nitrogen dioxide to below the national objective limit.

Progress on the following measures has been slower than expected:

- Low emission zone related initiatives: following an application by the Council to impose a turning movement 'environmental weight restriction' on a junction on the Primary Route Network being turned down by Highways England and neighbouring authorities. Feasibility work continues on an alternative scheme in the light of recent guidance on Clean Air Zones;
- Eco Stars: there was no budget for implementing a scheme, the implementation of an LEZ was intended to be a prerequisite and other measures took priority;
- Improving Building Emissions Assessment: there was no budget for progressing this measure as resources were focussed on other measures which would deliver greater benefits.

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;
- Renewal of the Air Quality Action Plan for Bath [(6)];
- 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 West of England Devolution Deal public consultation has just been completed and it is now for the Secretary of State for Communities and Local Government to decide on the outcome of the deal, which will enable commencement of a number of transport initiatives that include MetroWest rail enhancements and may include a Clean Air Zone. The likely air quality

benefits of this and other schemes that may be funded by the Devolution Deal will be quantified once the outcome of the consultation is known;

- 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 Tables 2.3 and 2.4 below.

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

- Renew the Air Quality Action Plan for Bath;
- 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 [(10)], namely;
    - A new park and ride to the east of Bath;
    - Feasibility work relating to an A46/36 link;
- To implement the Keynsham Transport Strategy [(11)] and Placemaking Plans [(11)] that have now been adopted including;
    - Improving bus links;
    - Enhanced rail service frequencies;
    - Railway line electrification;
- Develop Transport Strategies for the Chew Valley and Somer Valley.

Table 2.2. below details progress with measures as listed in the Bath Air Quality Action Plan 2011. The subsequent tables 2.3 and 2.4 include the measures as identified in the Air Quality Action Plans for Keynsham and Saltford – adopted in July 2016.

Table 2.2 – Progress on Measures to Improve Air Quality – Bath Action Plan

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning / Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Bath Transport Package	Traffic Management	Other	Bath and North East Somerset Council	2011 – 2016	Public transport patronage (P&R). Vehicles using the P&R.	n/a	Expansion of P&R spaces from 1,990 to 2,860 between 2012 and 2015. 4 EV charging sockets installed at each of the park and ride sites. Bus infrastructure works included: - Raised pavements at 375 stops to ease access on and off buses for older disabled people, and those with prams; - The addition of 169 electronic Real Time Information displays at busy stops; - Complete replacement of existing shelters and the addition of new bus shelters at other popular stops. Variable message sign on radial routes for parking availability and P&R promotion. Extension of 10am to 6pm traffic restrictions on central streets. New level surface / shared space improving the pedestrian experience in the City Centre. The usage of the 3 P&R sites overall grew from 1,627,317 in 2012/13 to 2,123,944 in 2014/15.	Completed.	Survey data on recent P&R expansions not yet available.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning / Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
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	2011	Modelled NO_2 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 NO_2 emissions reduction of 7% but only marginal changes in resulting concentrations. Further progress subject to Devolution Deal consultation outcome.
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	2011 - 2014	Fuel usage / costs.	n/a	Complete. As a result, 8 hybrid electric buses now in use 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.
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	2011 - 2015	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.	Considerable subsidy currently required and greater commercial viability is required to secure the future of the scheme.
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	2011	HGV traffic flows. NO_2 levels.	n/a		Complete.	HGV AADT on Upper Bristol Road (City side/east of Windsor Bridge) since 2007 are as follows: 2007 - 352, 2008 - 534, 2009 - 387, 11/03/10 - 233, 01/02/11 - 240,13/09/11 - 177, 07/02/12 - 131. Peak in 2008 coincided with Southgate redevelopment. General decrease compared to 2010, but reason is inconclusive.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning / Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
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	2011	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.
7	Electric Vehicle Recharging Points	Promoting Low Emission Transport	Procuring alternate refuelling infrastructure to promote low emission vehicles, EV recharging, gas fuel recharging	Bath and North East Somerset Council	2011	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	Successful GO Ultra Low City Scheme bid means there will be a doubling of the number of charging points in the West of England from 200 to 400 points, as well as further initiatives including the installation of 'charging hubs'; further rapid chargers; demonstrator vehicles; and100 council fleet vehicles converted to ULEVs by 2021 across the West of England.
8	Improve Building Emission Assessments	Policy guidance and development control	Other policy	Bath and North East Somerset Council	2011	Number of air quality assessments including spreadsheet tool.		None.		No progress to date.
9	ECO Stars Vehicle Recognition Scheme	Vehicle fleet efficiency	Fleet efficiency and recognition schemes	Bath and North East Somerset Council	2011	Number of haulage operators & vehicles audited. HGV vehicle mix survey (number plate and engine standard).		None.		No progress to date.
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	2011	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.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning / Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
11	Monitoring of Bus Fleet Quality	Vehicle fleet efficiency	Promoting low emission public transport	First Group and Bath and North East Somerset Council	2011 -	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. Successful Clean Bus Technology Fund bid means 35 buses across the West of England area will be upgraded / retrofitted to Euro 5 or 6.	2026	New vehicles will deliver at least as good a saving as measure 3.
12	Transport & Travel Information	Public information	Via the internet	Bath and North East Somerset Council	2011	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 by the Bath area bus satisfaction survey. The target is for overall satisfaction to improve from 38% in 2003/4 to 44% in 2011/12.	n/a	The addition of 169 electronic Real Time Information displays at busy stops. Overall satisfaction has increase to 52% in 2015.	Complete.	Bus checker app implemented as part of LSTF West of England project and available via www.travelwest.info
13	Alternative Exhaust Emissions Abatement	Vehicle fleet efficiency	Vehicle retrofitting programmes	Bristol City Council	2011	Number of retrofitted HGVs.	n/a	No progress on HGVs, but Clean Bus Technology Fund has enabled 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	

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning / Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
14	Rossiter Road Traffic Management Measures	Traffic management	Strategic highway improvements, re-prioritising road space away from cars, inc access management, selective vehicle priority, bus priority, high vehicle occupancy lane	Bath and North East Somerset Council		Traffic flows. NO_2 levels.	Moving traffic from receptors.	Completed 2015 and annual mean NO_2 levels reduced from 49 in 2014 to 31 µg/m3 in 2015 on Widcombe Parade.	Complete.	Physical work has commenced.
15	Promotional Website	Public information	Via the internet	Bath and North East Somerset Council		Number of visits to website.	n/a	Air Quality Hack event resulted in website upgrade improving live data dials in line with National Air Pollution Index.	2017	Further monitoring mobile stations (AQMesh) to be added and seeking funds for further developments.
16	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)	Further low emission pool cars provided with new charging points at Keynsham offices.	2018	Current plan covers 2015-2018

Table 2.3: Keynsham Air Quality Action Plan Measures (adopted July 2016)

	Measure	EU category	EU Classification	Responsibility/lead authority	Key Performance indicator	Target pollution reduction in the AQMA	Associated Improvements	Timescale
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 highways improvement	Project Delivery.	Reduction in nitrogen dioxide concentrations. Traffic Counts. Reduction in emissions of nitrogen oxides.	Predicted reduction of approximately 3 µg/m3 NO_2 on High Street and approximately 1 microgram increase on some areas of alternative route. No significant improvement predicted on Charlton Road.	Reduction in PM10 and PM2.5	During and within 6 months of completion of the trial.
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.	N/A	May 2018
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.	Reduction in PM_{10} and $PM_{2.5.}$	Adopted by planning Policy by May 2017, and then dependent upon developer implementation.
4	Increase public charging points through 'Ultra Low West' (Source West) EV charging infrastructure programme.	Promoting Low Emission Transport	Procuring alternative refuelling infrastructure	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.	Reduction in PM_{10} and $PM_{2.5}$	Between August 2016 and August 2021
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	Absorption of Greenhouse gas emissions	Recommend 6 months during trial and then implemented fully if air quality benefits are identified.
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.	Reduction in PM_{10} and $PM_{2.5}$	Adopted by planning Policy by May 2017, and then dependent upon developer implementation.
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		May 2018
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	Reduction in congestion Health related improvements	Core Strategy plan period up to 2029.
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	Improved awareness of the issues locally	December 2017
10	Keynsham Greenway links to National Cycle Network 4, Wellsway School and riverside path	Transport Planning and Infrastructure	Cycle network	Transportation, Bristol City Council, South	Delivery of project. Number of cycle trips from annual surveys.	N/A	Reduction in congestion Health related	2018-2023

	Measure	EU category	EU Classification	Responsibility/lead authority	Key Performance indicator	Target pollution reduction in the AQMA	Associated Improvements	Timescale
	into Bristol and S Glos with new bridge over River Avon.			Gloucestershire Council, Sustrans, developers.			improvements	
11	Work with Community Transport to promote the use of Low emission dial-a-ride vehicles.	Promoting Low Emission Transport	Public Vehicle Procurement	Keynsham and District Dial and Ride	Low emission vehicle journeys / miles.	% reduction in NOx emissions compared to a diesel.	Reduction in PM_{10} and $PM_{2.5}$ Reduction in Greenhouse gas emissions	2020.
12	Identify, influence and publicise pedestrian and cycling facility improvements	Transport Planning and Infrastructure	Other	B&NES & First Group.	Audit of infrastructure completed. Recommendation will be integrated into this plan. Walking and cycling surveys	N/A	Reduction in congestion Health related improvements	Part of Strategy for Keynsham document – yet to be adopted.
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	N/A	Ongoing
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	Reduction in congestion Health related improvements	Part of Strategy for Keynsham document – yet to be adopted.
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)	Reduction in PM_{10} and $PM_{2.5}$ Reduction in Greenhouse gas emissions	May 2020
16	Increase public education messages which promote healthier choices for short journeys	Promoting Travel Alternatives	Incentivise active travel campaign & infrastructure	B&NES Public Protection and Health Improvement	Delivery of a public education campaign	No reduction in concentration. Exposure reduction	Reduction in congestion Health related improvements	May 2018
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	Reduction in congestion Health related improvements	Part of Strategy for Keynsham document – yet to be adopted.
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	Reduction in congestion Health related improvements	May 2019
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.	Project implementation. Rail patronage per service at Keynsham (annual rail survey).	Offsets less efficient modes.	Reduction in congestion Health related improvements	Spring 2019

Table 2.4 Saltford Air Quality Action Plan Measures

	Measure	EU category	EU Classification	Responsibility/Lead authority	Key Performance indicator	Target pollution reduction in the AQMA	Associated Improvements	Timescales
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.	N/A	May 2018
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	Absorption of Greenhouse gas emissions	Throughout lifetime of action plan.
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.	Deflects air pollution from property facades, absorbs carbon dioxide	May 2018
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.	Reduction in PM10 and PM2.5 Reduction in Greenhouse gas emissions	
5	Increase public charging points through 'Ultra-Low West' (Source West) electric vehicle charging infrastructure programme	Promoting Low Emission Transport	Procuring alternative refuelling infrastructure	B&NES Public Protection and Health Improvement,	Number of charge points. Number of charging sessions.	% reduction in NOx emissions compared to a diesel.	Reduction in PM10 and PM2.5 Reduction in Greenhouse gas emissions	Between August 2016 and August 2021
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		May 2018
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	Improved awareness of the issues locally	December 2016
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.	Reduction in PM10 and PM2.5 Reduction in Greenhouse gas emissions Reduction in congestion Health related improvements	Adopted by planning Policy by May 2017, and then dependent upon Developer implementation.
9	Work with Community Transport to promote the use of Low emission dial-a-ride vehicles.	Promoting Low Emission Transport	Public Vehicle Procurement	KADDAR.	Low emission vehicle journeys / miles.	% reduction in NOx emissions compared to a diesel.	Reduction in PM10 and PM2.5 Reduction in Greenhouse gas emissions	2020
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.	Reduction in PM10 and PM2.5 Reduction in Greenhouse gas emissions	May 2020

	Measure	EU category	EU Classification	Responsibility/Lead authority	Key Performance indicator	Target pollution reduction in the AQMA	Associated Improvements	Timescales
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	N/A	Ongoing
12	Increase public education messages which promote healthier choices for short journeys	Promoting Travel Alternatives	Incentivise active travel campaign & infrastructure	B&NES Public Protection and Health Improvement	Delivery of a public education campaign	No reduction in concentration. Exposure reduction	Reduction in congestion Health related improvements	May 2018
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	Reduction in congestion Health related improvements	May 2019
14	Continue feasibility work on reopening Saltford Station.	Transport Planning and Infrastructure	Public transport improvements - station	B&NES, First Group, Network Rail & MetroWest partners	Completed feasibility study	Requires air quality assessment	Greenhouse gas emissions from trains accelerating from station – unless electric overheads used for stopping service	5 years

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

As detailed in Policy Guidance LAQM.PG16 (Chapter 7) [14], 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 [18].

The Public Health England 'Public Health Outcomes Framework' indicator '3.01 Fraction of mortality attributable to particulate air pollution' for Bath and North East Somerset Council for the latest year of 2013 is 4.8%. This compares against an average across the South West region of 4.5% and 5.3% nationally [13].

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 compares with Bristol St Paul's, (the closest $PM_{2.5}$ monitor in the national network)(UK data archive website, Table H.1 [15]). Levels at Bristol St Paul's have been declining since 2011 and were 33% lower in 2015 than in 2011. 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) [16].

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 will be involved in the development of the revised Bath Action Plan. Many of the actions in the Keynsham and Saltford action plans will reduce $PM_{2.5}$ as well as NO_2; details of the specific actions are given in Table 2.3 and 2.4. Bath & North East Somerset Council will be reviewing the Bath Action Plan in winter 2016 and the effects of the measures on $PM_{2.5}$ will be considered in this review.

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 2015. Table A.1 in Appendix A shows the details of the sites. Monitoring was carried out for NO_2 and PM_{10} and a new $PM_{2.5}$ analyser was installed at Chelsea House, London Road, Bath (CM4) in July 2015.

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 E.

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

Non-Automatic Monitoring Sites

Bath & North East Somerset Council undertook non- automatic (passive) monitoring of NO_2 at 76 sites during 2015 using diffusion tubes. Table A.2 in Appendix A shows the details of the sites.

7 new sites were introduced in August 2015 to respond to public requests and to enhance our monitoring within the AQMA and to check other key locations e.g. close to the main Royal United Hospital (RUH). These were:

- Bear Flat
- RUH North
- RUH South
- Oak St
- Angel Place
- Green Park
- Anglo Terrace

Monitoring at 8 sites was discontinued in July 2015 as they were all consistently below the objective. These were:

- Hungerford Road
- St Marks Road
- Chelsea Road
- Fountain Buildings
- Kingston Road
- Henry Street
- Batheaston 3 (near 268 London Road West)
- Batheaston - Brow Hill

A further 4 sites were moved closer to areas where people were likely to be affected (relevant exposure). These were:

- Brock St (now known as Bennett Street)
- Windsor Bridge
- Wells Road
- Whitchurch

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

Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tube results are included in Appendix D.

During 2015 Bath & North East Somerset also carried out monitoring at three locations using AQ Mesh samplers. They monitor NO_2 using electrochemical sensors giving real-time results every 15 minutes. At these sites triplicate diffusion tubes were co-located for comparison. It is planned to co-locate these samplers with a continuous analyser for a period during 2016.

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

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for “annualisation” and bias. Further details on adjustments and bias are provided in Appendix D.

Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 contained within Appendix A, compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix C.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

Automatic Monitoring Data

Results from automatic monitoring of NO_2 are shown in Tables A.3 and A.5 and Figure B.1. The London Road (CM1) monitoring site exceeded the annual average objective but is already within the AQMA. The London Road (CM1) and Chelsea House (CM4) sites measured values in excess of 200 µg/m^3, however they did not exceed this value more than 18 times, which is the number of exceedances allowed for the hourly objective.

The trend data shows that 2015 was not a peak year for NO_2, with monitoring results being lower than previous years at 3 sites (Figure B.1, Appendix B). Only Chelsea House (CM4) was slightly higher than in 2014 which is believed to be due to roadworks being carried out close to the site. 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.4 and Figures B.2-B.9. The results have been corrected by bias factors as described in LAQM.TG16[(16)]. In 2015, the choice of bias factor was reviewed and after consultation with DEFRA 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 D. The raw monthly diffusion tube monitoring data is shown in Appendix C.

The results using the local bias factor show that in 2015 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
- Dorchester Street AQM2
- Gay Street - top
- George Street
- High Street/Guildhall
- James Street West
- Keynsham – 10 High Street
- Keynsham – Somerfield
- Lambridge
- Little Stanhope Street
- London Road
- Manvers Street
- Morley Terrace
- Newbridge Hill
- Newbridge Road
- Oak Street
- Paragon
- Saltford – The Crown
- St James' Parade
- Upper Bristol Road
- Victoria Buildings
- Walcot Terrace
- Wells Road (new)
- Wells Road (old)
- Wells Road/Upper Oldfield Park
- Whitchurch (new)
- Widcombe High Street (pre works)

All the monitoring sites except Bear Flat, Newbridge Hill and Whitchurch (new) 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[(16)] the level at the closest relevant exposure would be below 40 µg/m^3 (distance adjustment results are shown in Table C.1 with further details on calculations in Appendix D). At Whitchurch (new) the level at the closest relevant exposure (residential property) is 44 µg/m^3 which is above the objective. The Council is currently carrying out a more detailed assessment of air quality in Whitchurch to determine if there is a problem in the area. This will be reported in the ASR in 2017 and if necessary Bath & North East Somerset Council will move to declare an Air Quality Management Area for the affected location within Whitchurch at the earliest opportunity.

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:

- Keynsham – 1a Charlton Road
- Lansdown Crescent
- RUH North
- Salford – 562 Bath Road
- Thomas Street
- Upper Wellsway
- Warminster Road
- Widcombe School
- Widcombe School AQM3
- Windsor Bridge (old)
- Windsor Bridge (new)

The trends in diffusion tube monitoring since 2005 are shown in Figures B.2-B.9 in Appendix B, (the data plotted in 2015 uses the local bias factor). Overall, monitoring results of NO_2 in 2015 were slightly lower than in 2014.

Warminster Road and Beckford Road showed much lower concentrations in 2015, this is due to the A36 being closed between March-July outside of Bath leading to less traffic congestion on the roads leading to the road closure.

Monitoring in Widcombe has also shown a significant drop in concentrations. This is due to a new road layout being created to move through traffic out of the pedestrian centre and away from residential properties. Pre and post work monitoring shows a drop of 12 µg/m^3 at Widcombe Parade (DT18) due to the change in layout. 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 5 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
- Dorchester Street AQM2
- Lambridge
- Wells Road (new)

The results from the AQMesh monitoring sites are consistent with local diffusion tube monitoring. The Widcombe School AQMesh & Dorchester Street AQMesh were close to those of the diffusion tubes and the Bathwick Street AQMesh results were higher than the co-located diffusion tubes (Figure B.10). It is planned to co-locate these samplers with a continuous analyser during 2016 to calculate a bias factor to correct the results of further monitoring.

Particulate Matter (PM_{10})

Monitoring for PM_{10} has been carried out at 2 sites during 2015 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.6 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.7 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 2015 and the number of exceedances of the 24 hour objective was below 35 at both sites (Tables A.6 and A.7). Figures B.11-B.12 shows that the levels of PM_{10} are similar to previous years at Windsor Bridge and are slightly higher at Chelsea House due to roadworks by the site.

The peaks above the 24 hour objective in March, April and December 2015 were due to high pressure bringing pollution across from Europe (March and April) and Saharan dust (December). These were also seen in other areas of the UK[(15)]. At Chelsea House there were a number of exceedances of the 24 hour objective in May due to roadworks and resurfacing close to the monitoring site.

Particulate Matter ($PM_{2.5}$)

Bath & North East Somerset Council started monitoring $PM_{2.5}$ in July 2015. Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations. The result corrected to an annual mean was 10 µg/m^3, this is the same as at the Bristol St Paul's site in 2015 and is less than the annual mean objective of 25µg/m^3 for $PM_{2.5}$.

Appendix A: Monitoring Results

Site Details

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

(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	N	N/A	N/A	N	3.3
DT88	Angel Place	Roadside	374884	164348	NO_2	Y	0	2.65	N	2.25
DT90	Anglo Terrace	Roadside	375288	165758	NO_2	Y	2.5	1.6	N	2.25
DT62	Argyle Terrace	Roadside	373211	164743	NO_2	Y	4	3	N	2.8
DT58	Batheaston – 240 London Road West	Roadside	377643	167365	NO_2	N	0	1	N	2.5
DT56	Batheaston – Brow Hill	Kerbside	377779	167453	NO_2	N	1	0.5	N	2.4
DT57	Batheaston – High St 3	Roadside	377628	167369	NO_2	N	0	2	N	2.7
DT14	Bathwick Street	Roadside	375602	165365	NO_2	Y	1	1	N	2.5
DT81	Bathwick Street AQM1	Kerbside	375532	165419	NO_2	Y	4	0.5	Y	2.5
DT84	Bear Flat	Roadside	374604	163806	NO_2	N	5.7	1.85	N	2.25
DT15	Beckford Road	Roadside	375733	165414	NO_2	Y	7	1	N	2.7
DT83	Bennett Street	Urban Centre	374860	165337	NO_2	Y	4.5	0	N	2.25
DT03	Broad Street	Kerbside	375008	165145	NO_2	Y	2	0.5	N	2.5

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)
DT06	Brock Street	Urban Centre	374572	165323	NO_2	N	2	N/A	N	2.7
DT37	Charlotte Street	Roadside	374622	164994	NO_2	Y	3	1	N	2.7
DT36	Chelsea Road	Roadside	373044	165120	NO_2	Y	0	12	N	2.7
DT51	Cleveland Place West	Roadside	375255	165718	NO_2	Y	2.9	3	N	2.65
DT52	Daniel Street	Urban Centre	375544	165331	NO_2	Y	3	N/A	N	2.7
DT42	Dorchester Street	Kerbside	375230	164383	NO_2	Y	2	0.5	N	2.7
DT82	Dorchester Street AQM2	Kerbside	375227	164384	NO_2	Y	2	0.5	Y	2.5
DT38	Fountains Buildings	Urban Centre	375005	165290	NO_2	N	1	N/A	N	2.7
DT05	Gay Street – Top	Roadside	374797	165161	NO_2	Y	3	1	N	2.6
DT04	George Street	Roadside	374899	165159	NO_2	Y	3	1	N	2.3
DT89	Green Park Road	Roadside	374634	164595	NO_2	N	0	6	N	2.25
DT40	Henry Street	Urban Centre	375185	164594	NO_2	N	3	N/A	N	2.4
DT01	High Street/ Guildhall	Roadside	375108	164866	NO_2	Y	2	1	N	2.8

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)
DT07	Hungerford Road	Urban centre	373361	165216	NO_2	N	1	N/A	N	2.5
DT45	James Street West	Roadside	374697	164763	NO_2	Y	0	5	N	2.7
DT33	Keynsham	Urban Background	364803	168237	NO_2	N	8	1	N	2.6
DT66	Keynsham – 10 High Street	Roadside	365360	168815	NO_2	Y	1	1	N	2.5
DT64	Keynsham – 1a Charlton Road	Roadside	365305	168657	NO_2	Y	4	1	N	2.8
DT70	Keynsham – Bath Hill	Roadside	365496	168521	NO_2	Y	1	4	N	2.3
DT65	Keynsham - Charlton Rd	Roadside	365399	168701	NO_2	Y	3	1	N	2.7
DT69	Keynsham – Rock Road	Roadside	365428	168435	NO_2	N	0	2	N	3.0
DT70a	Keynsham - Somerdale	Urban Centre	365553	168990	NO_2	N	6	1.9	N	2.2
DT67	Keynsham - Somerfield	Roadside	365457	168496	NO_2	Y	2	1	N	2.8
DT63	Keynsham – Station Road	Roadside	365409	168846	NO_2	Y	3	1	N	2.7
DT68	Keynsham - Temple St	Roadside	365489	168363	NO_2	N	0	3	N	2.8
DT41	Kingston Road	Urban Centre	375223	164525	NO_2	N	3	N/A	N	2.0

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)
DT55	Lambridge	Roadside	376451	166502	NO_2	Y	0	4	N	2.6
DT47	Lansdown Crescent	Roadside	374800	165708	NO_2	Y	1	2	N	2.5
DT46	Little Stanhope Street	Roadside	374490	164971	NO_2	Y	0	2	N	2.6
DT11	London Road	Roadside	375533	165897	NO_2	Y	3	1	N	2.7
DT39	Manvers Street	Roadside	375247	164591	NO_2	Y	3	2	N	2.3
DT61	Morley Terrace	Roadside	373484	164846	NO_2	Y	0	3	N	2.5
DT29	MSN High Street	Roadside	366466	154190	NO_2	N	3	1	N	3.0
DT30	MSN Westfield Primary Sch	Urban Background	367280	153840	NO_2	N	0	N/A	N	2.6
DT35	Newbridge Hill	Roadside	373090	165219	NO_2	N	7	2	N	2.4
DT34	Newbridge Road	Roadside	373092	165106	NO_2	Y	5	1	N	2.3
DT87	Oak Street	Roadside	374702	164414	NO_2	Y	0	2.65	N	2.25
DT48	Paragon	Roadside	375044	165527	NO_2	Y	1	1	N	2.6
DT27	Radstock - Fortescue Rd	Roadside	368876	154908	NO_2	N	16	2	N	2.7
DT85	RUH – North	Roadside	373073	165983	NO_2	N	7	1.5	N	2.25
DT86	RUH – South	Roadside	373041	165898	NO_2	N	10	2	N	2.45

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)
DT77	Saltford - 562 Bath Road	Roadside	368778	166687	NO_2	Y	0	2	N	2.2
DT75	Saltford - The Crown	Roadside	368375	166988	NO_2	Y	0	3	N	2.6
DT71	Saltford Library	Roadside	368187	167117	NO_2	N	11	3	N	2.6
DT43	St James' Parade	Roadside	375053	164418	NO_2	Y	2	1	N	2.8
DT19	St Marks Road	Urban Centre	375189	164221	NO_2	N	10	N/A	N	2.9
DT50	Thomas Street	Urban Centre	375318	165812	NO_2	Y	0	N/A	N	2.9
DT09	Upper Bristol Road	Roadside	373993	165174	NO_2	Y	5	1	N	2.6
DT26	Upper Wellsway	Roadside	373576	161908	NO_2	N	0	3	N	2.0
DT60	Victoria Buildings	Roadside	374039	164760	NO_2	Y	2	2	N	2.9
DT52-54	Walcot Terrace (3 tubes	Roadside	375462	165843	NO_2	Y	0	3	Y	2.5
DT16	Warminster Road	Roadside	376063	165492	NO_2	Y	18	4	N	2.4
DT20	Wells Road	Kerbside	374716	164303	NO_2	Y	2	1	N	2.7
DT20	Wells Road (new)	Roadside	374760	164310	NO_2	Y	0	1.5	N	2.25

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)
DT21	Wells Road/Upper Oldfield Park	Roadside	374454	164202	NO_2	Y	3	1	N	2.7
DT32	Whitchurch	Roadside	361227	167747	NO_2	N	1	6	N	2.7
DT32	Whitchurch (new)	Roadside	361242	167652	NO_2	N	2.7	1.5	N	2.25
DT18	Widcombe High Street	Roadside	375414	164216	NO_2	Y	0	5	N	2.5
DT17	Widcombe School	Roadside	375634	164406	NO_2	Y	5	1	N	2.6
DT82	Widcombe School – AQM3	Roadside	375634	164406	NO_2	Y	5	1	N	2.6
DT08	Windsor Bridge	Roadside	373420	165107	NO_2	Y	4	2	N	2.6
DT08	Windsor Bridge (new)	Roadside	373518	165124	NO_2	Y	0	3.5	N	2.25
CM1	London Road	Roadside (pumped analyser	375461	165843	Benzene	N	0	3	N	2.6
AQM1	Bathwick Street	Kerbside	375532	165419	NO_2	Y	4	0.5	AQMesh	2.5
AQM2	Dorchester Street	Kerbside	375227	164384	NO_2	Y	2	0.5	AQMesh	2.5
AQM3	Widcombe School	Roadside	375634	164406	NO_2	Y	5	1	AQMesh	2.7

(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.

Monitoring Results

Table A.3 – Annual Mean NO_2 Monitoring Results – Continuous sites

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
						2011	2012	2013	2014	2015
CM1	London Road	Roadside	Automatic	-	99	**57**	**56**	**57**	**57**	**54**
CM2	Guildhall	Roadside	Automatic	-	92.9	**42**	**41**	37	34	34
CM3	Windsor Bridge	Roadside	Automatic	98	41.6	**51**	**56**	**46**	35	33
CM4	Chelsea House	Roadside	Automatic	-	90.7	**45**	**49***	33*	27	31

Notes: Exceedances of the NO_2 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%).

Table A.4 – Annual Mean NO_2 Monitoring Results – Diffusion tubes

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
						2011	2012	2013	2014	2015
DT23	Alexandra Park	Urban Background	Diffusion Tube	-	100	14	17	17	14	15
DT88	Angel Place	Roadside	Diffusion Tube	100	42	-	-	-	-	**55**
DT90	Anglo Terrace	Roadside	Diffusion Tube	100	42	-	-	-	-	**73**
DT62	Argyle Terrace	Roadside	Diffusion Tube	-	83	**46**	**46**	**45**	**48**	**49**
DT58	Batheaston – 240 London Road West	Roadside	Diffusion Tube	-	100	35	34	34	38	35
DT56	Batheaston – Brow Hill	Kerbside	Diffusion Tube	83	42	33	34	32	35	35

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
						2011	2012	2013	2014	2015
DT57	Batheaston – High St 3	Roadside	Diffusion Tube	100	50	28	26	25	26	25
DT14	Bathwick Street	Roadside	Diffusion Tube	-	100	**50**	**48**	**50**	**54**	**51**
DT81	Bathwick Street AQM1	Kerbside	Diffusion Tube	-	100	-	-	-	**62**	**56**
DT84	Bear Flat	Roadside	Diffusion Tube	100	42	-	-	-	-	**43**
DT15	Beckford Road	Roadside	Diffusion Tube	-	92	**41**	**41**	**43**	**43**	35
DT83	Bennett Street	Urban Centre	Diffusion Tube	100	42	-	-	-	-	22
DT03	Broad Street	Kerbside	Diffusion Tube	-	92	**60**	**62**	**59**	**62**	**57**
DT06	Brock Street	Urban Centre	Diffusion Tube	100	50	22	26	27	23	23
DT37	Charlotte Street	Roadside	Diffusion Tube	-	100	39	**42**	**43**	**44**	**44**
DT36	Chelsea Road	Roadside	Diffusion Tube	100	50	32	30	33	31	31
DT51	Cleveland Place West	Roadside	Diffusion Tube	-	100	**60**	**51**	**55**	**58**	**55**
DT13	Daniel Street	Urban Centre	Diffusion Tube	-	100	28	28	30	29	28
DT42	Dorchester Street	Kerbside	Diffusion Tube	-	100	**62**	**66**	**67**	**71**	**73**
DT82	Dorchester Street AQM2	Kerbside	Diffusion Tube	100	25	-	-	-	**81**	**70**
DT38	Fountains Buildings	Urban Centre	Diffusion Tube	100	50	29	34	32	33	32
DT05	Gay Street – Top	Roadside	Diffusion Tube	-	100	**43**	**43**	**42**	**48**	**40.4**
DT04	George Street	Roadside	Diffusion Tube	-	100	**42**	**43**	**44**	**47**	**42**

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
						2011	2012	2013	2014	2015
DT89	Green Park Road	Roadside	Diffusion Tube	100	42	-	-	-	-	30
DT40	Henry Street	Urban Centre	Diffusion Tube	100	50	36	33	35	34	32
DT01	High Street/ Guildhall	Roadside	Diffusion Tube	-	100	**44**	**43**	**45**	**46**	**40.3**
DT07	Hungerford Road	Urban centre	Diffusion Tube	100	50	20	22	23	22	20
DT45	James Street West	Roadside	Diffusion Tube	-	92	**41**	**41**	**45**	**43**	**43**
DT33	Keynsham	Urban Background	Diffusion Tube	-	100	14	19	18	17	16
DT66	Keynsham – 10 High Street	Roadside	Diffusion Tube	-	100	**44**	**46**	**44**	**50**	**47**
DT64	Keynsham – 1a Charlton Rd	Roadside	Diffusion Tube	-	83	39	38	39	39	37
DT70	Keynsham – Bath Hill	Roadside	Diffusion Tube	-	75	32	32	31	36	33
DT65	Keynsham – Charlton Road	Roadside	Diffusion Tube	-	83	35	35	37	39	35
DT69	Keynsham – Rock Road	Roadside	Diffusion Tube	-	83	24	27	29	28	25
DT70A	Keynsham - Somerdale	Urban Centre	Diffusion Tube	-	92	-	23	23	27	26
DT67	Keynsham – Somerfield	Roadside	Diffusion Tube	-	83	**45**	**44**	**44**	**46**	**42**

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
						2011	2012	2013	2014	2015
DT63	Keynsham – Station Road	Roadside	Diffusion Tube	-	83	32	32	33	36	34
DT68	Keynsham – Temple Street	Roadside	Diffusion Tube	-	92	24	26	28	28	26
DT41	Kingston Road	Urban Centre	Diffusion Tube	100	50	31	29	30	29	29
DT55	Lambridge	Roadside	Diffusion Tube	-	100	**68**	**62**	**60**	**64**	**65**
DT47	Lansdown Crescent	Roadside	Diffusion Tube	-	100	**41**	**42**	**41**	**42**	38
DT46	Little Stanhope Street	Roadside	Diffusion Tube	-	100	**43**	39	**43**	**41**	**41**
DT11	London Road	Roadside	Diffusion Tube	-	100	**48**	**48**	**48**	**51**	**44**
DT39	Manvers Street	Roadside	Diffusion Tube	-	100	**47**	**53**	**49**	**54**	**50**
DT61	Morley Terrace	Roadside	Diffusion Tube	-	100	**43**	**44**	**46**	**45**	**43**
DT29	MSN High Street	Roadside	Diffusion Tube	-	83	21	20	24	22	21
DT30	MSN Westfield Primary School	Urban Background	Diffusion Tube	-	100	15	15	17	17	14
DT35	Newbridge Hill	Roadside	Diffusion Tube	-	100	**45**	**45**	**46**	**45**	**43**
DT34	Newbridge Road	Roadside	Diffusion Tube	-	100	**41**	**45**	**44**	**49**	**42**
DT87	Oak Street	Roadside	Diffusion Tube	80	33	-	-	-	-	**43**
DT48	Paragon	Roadside	Diffusion Tube	-	92	**51**	**48**	**48**	**48**	**44**
DT27	Radstock - Fortescue Rd	Roadside	Diffusion Tube	-	92	32	31	33	34	34
DT85	RUH – North	Roadside	Diffusion Tube	100	42	-	-	-	-	36

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration (µg/m^3) [3]				
						2011	2012	2013	2014	2015
DT86	RUH – South	Roadside	Diffusion Tube	100	42	-	-	-	-	35
DT77	Saltford - 562 Bath Road	Roadside	Diffusion Tube	-	100	37	39	37	**42**	39
DT75	Saltford - The Crown	Roadside	Diffusion Tube	-	100	**43**	**47**	**44**	**50**	**43**
DT71	Saltford Library	Roadside	Diffusion Tube	-	100	34	36	27	37	34
DT43	St James' Parade	Roadside	Diffusion Tube	-	100	**55**	**59**	**57**	**58**	**58**
DT19	St Marks Road	Urban Centre	Diffusion Tube	100	50	26	30	31	32	29
DT50	Thomas Street	Urban Centre	Diffusion Tube	-	100	37	38	37	38	38
DT09	Upper Bristol Road	Roadside	Diffusion Tube	-	100	**47**	**47**	**47**	**49**	**46**
DT26	Upper Wellsway	Roadside	Diffusion Tube	-	92	29	32	30*	39.6	39
DT60	Victoria Buildings	Roadside	Diffusion Tube	-	100	**55**	**55**	**57**	**55**	**50**
DT52-54	Walcot Terrace (3 tubes)	Roadside	Diffusion Tube	-	100	**57**	**56**	**57**	**57**	**53**
DT16	Warminster Road	Roadside	Diffusion Tube	-	100	36	**40**	**40**	**43**	37
DT21	Wells Rd/Upper Oldfield Park	Roadside	Diffusion Tube	-	100	**40**	**42**	**48**	**50**	**44**
DT20	Wells Road (old)	Kerbside	Diffusion Tube	100	58	**50**	**49**	**50**	**51**	**46**
DT20	Wells Road (new)	Roadside	Diffusion Tube	100	42	-	-	-	-	**62**
DT32	Whitchurch (old)	Roadside	Diffusion Tube	100	58	31	32	28	33	32

Site ID	Site Name	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
						2011	2012	2013	2014	2015
DT32	Whitchurch (new)	Roadside	Diffusion Tube	100	42	-	-	-	-	**52**
DT18	Widcombe High Street	Roadside	Diffusion Tube	100	42	**40**	**44**	**43**	**49**	**43**
DT18	Widcombe High Street (post works)	Roadside	Diffusion Tube	100	58	-	-	-	-	31
DT17	Widcombe School	Roadside	Diffusion Tube	-	83	35	38	35	38	39
DT82	Widcombe School AQM3	Roadside	Diffusion Tube	100	75	-	-	-	-	39.8
DT08	Windsor Bridge	Roadside	Diffusion Tube	86	58	30	35	36	33	37
DT08	Windsor Bridge (new)	Roadside	Diffusion Tube	100	42	-	-	-	-	38

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 Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.5 – 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 2015 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
						2011	2012	2013	2014	2015
CM1	London Road	Roadside	Automatic	-	99	2	2	4	10	1
CM2	Guildhall	Roadside	Automatic	-	92.9	0	1	1	0	0
CM3	Windsor Bridge	Roadside	Automatic	98	41.6	0 (165)	4 (178)	0 (160)	0	0 (105)
CM4	Chelsea House	Roadside	Automatic	-	90.7	0	0 (104)	0 (86)	0	1

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.6 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Name	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
CM3	Windsor Bridge	Roadside	-	95.1	27	24	28	22	22
CM4	Chelsea House	Roadside	-	97.8	21	21	21	19	22

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

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

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

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

Table A.7 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Name	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} 24-Hour Means > 50$\mu g/m^3$ (3)				
					2011	2012	2013	2014	2015
CM3	Windsor Bridge	Roadside	-	95.1	10 (40)	17 (40)	11 (42)	3	6
CM4	Chelsea House	Roadside	-	97.8	6 (34)	7 (35)	2 (31)	3	13

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

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

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

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

Table A.8 – $PM_{2.5}$ Monitoring Results

Site ID	Site Name	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
CM4	Chelsea House	Roadside	85	40	-	-	-	-	10

(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 Technical Guidance LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Appendix B: Monitoring Results – Trend Graphs

Figure B.1 Trends in Annual Mean Nitrogen Dioxide Concentrations measures at Automatic Monitoring Sites

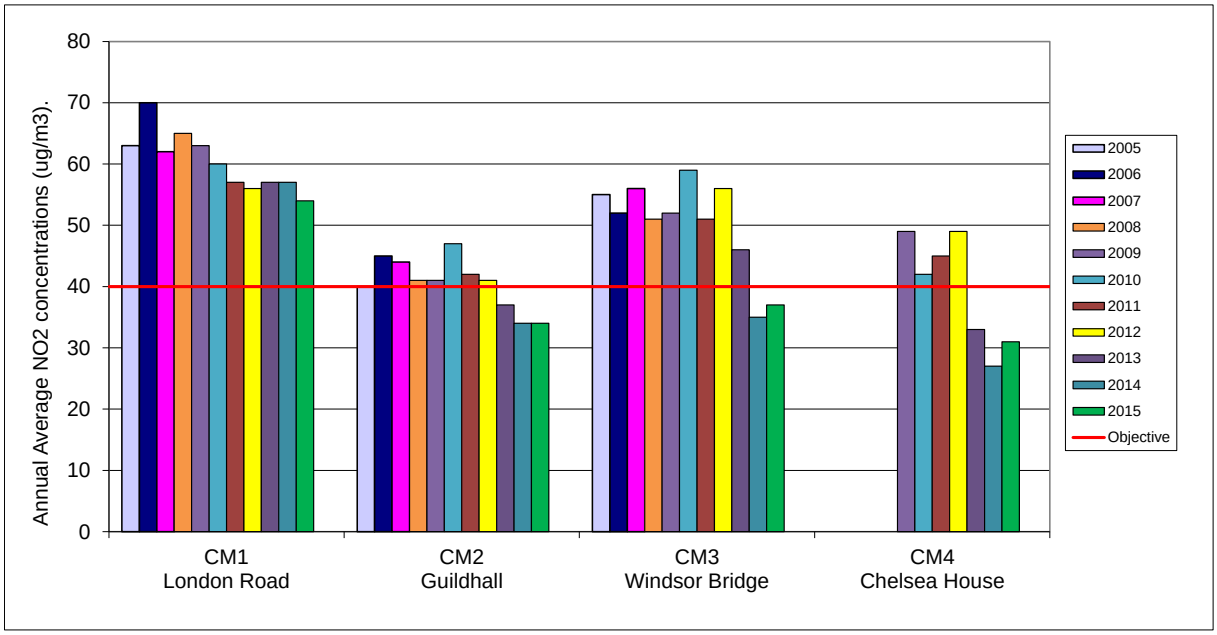


Figure B.2 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Round 1 Sites within the AQMA

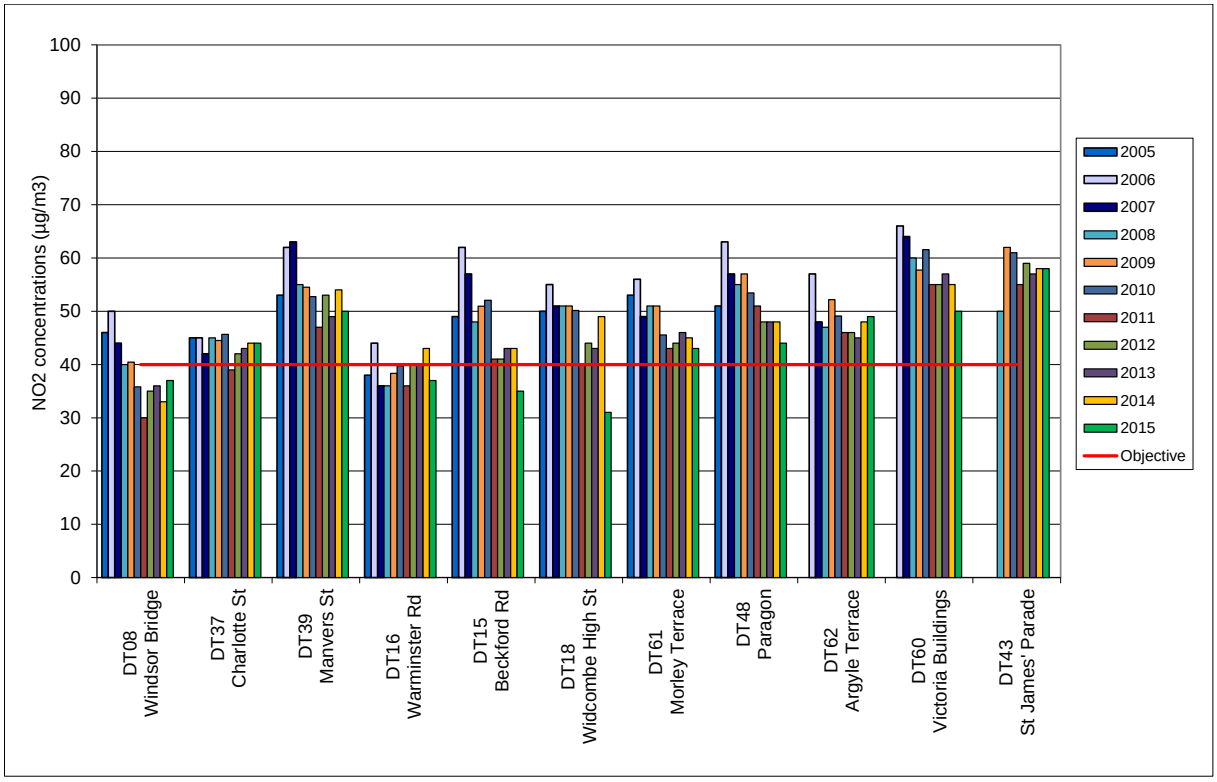


Figure B.3 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Round 2 Sites within the AQMA.

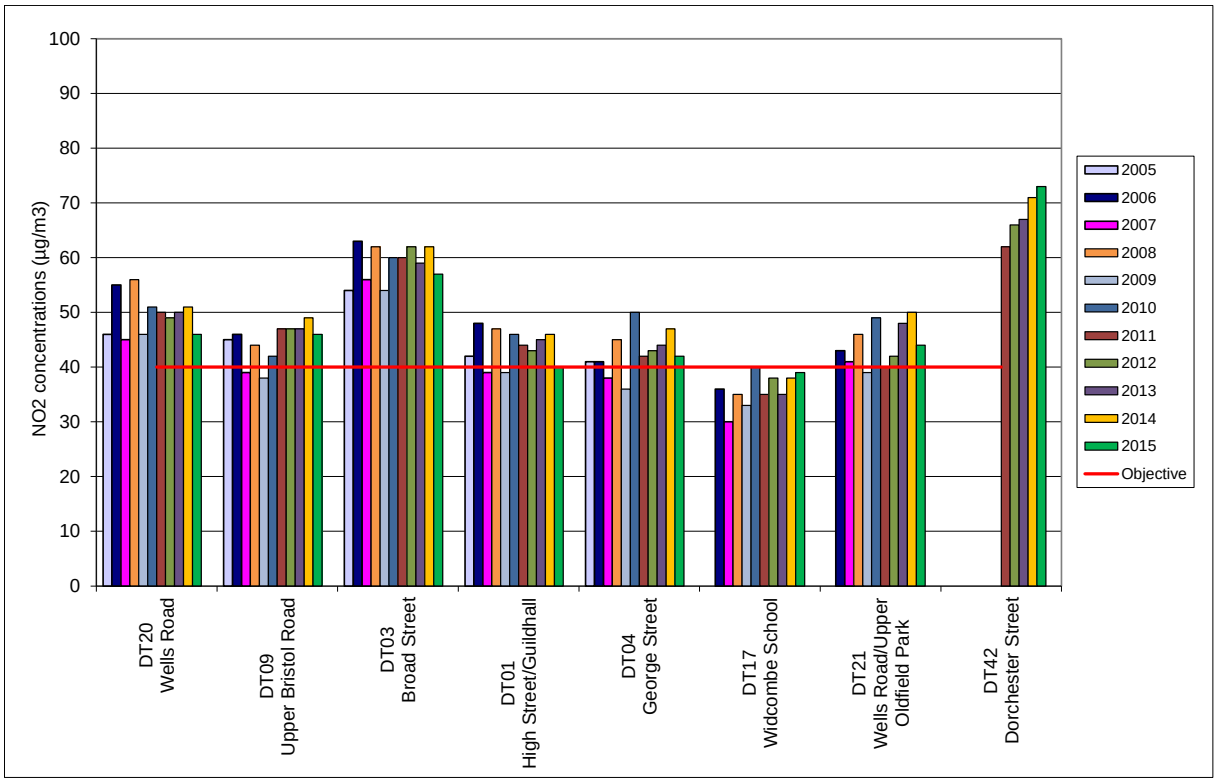


Figure B.4 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Sites within the London Road AQMA

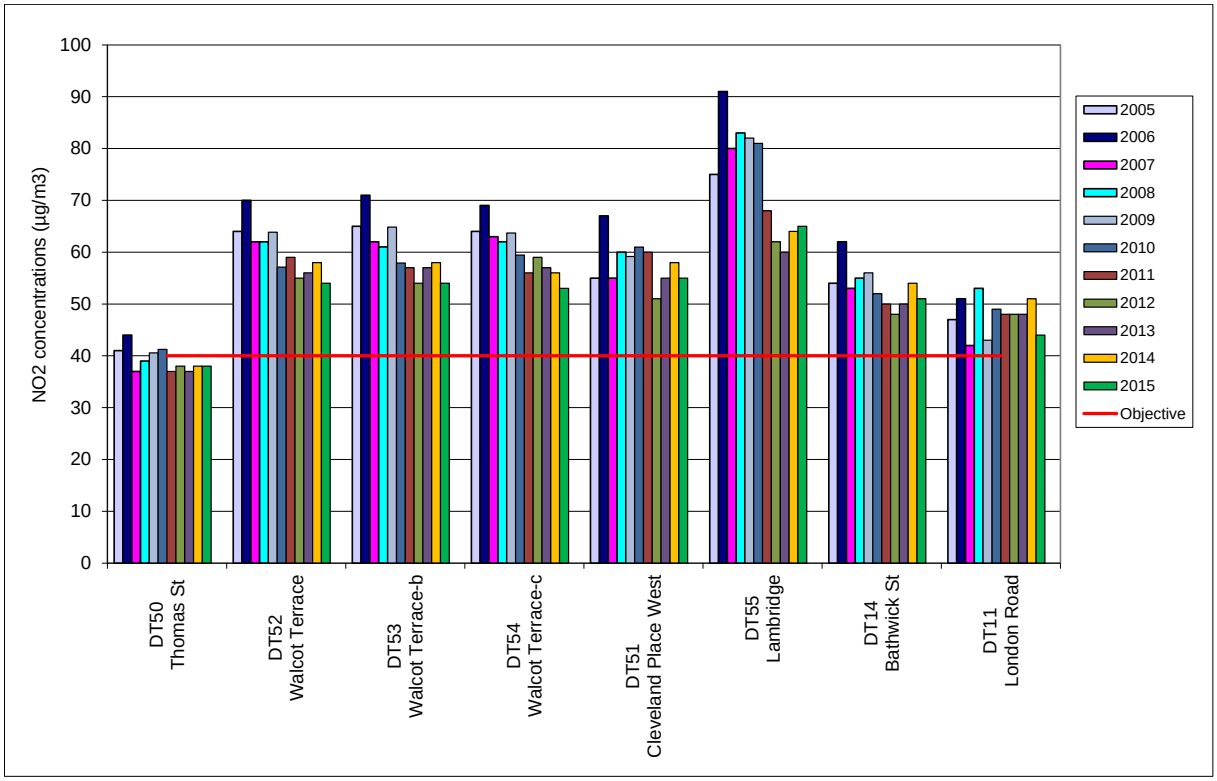


Figure B.5 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Roadside Sites

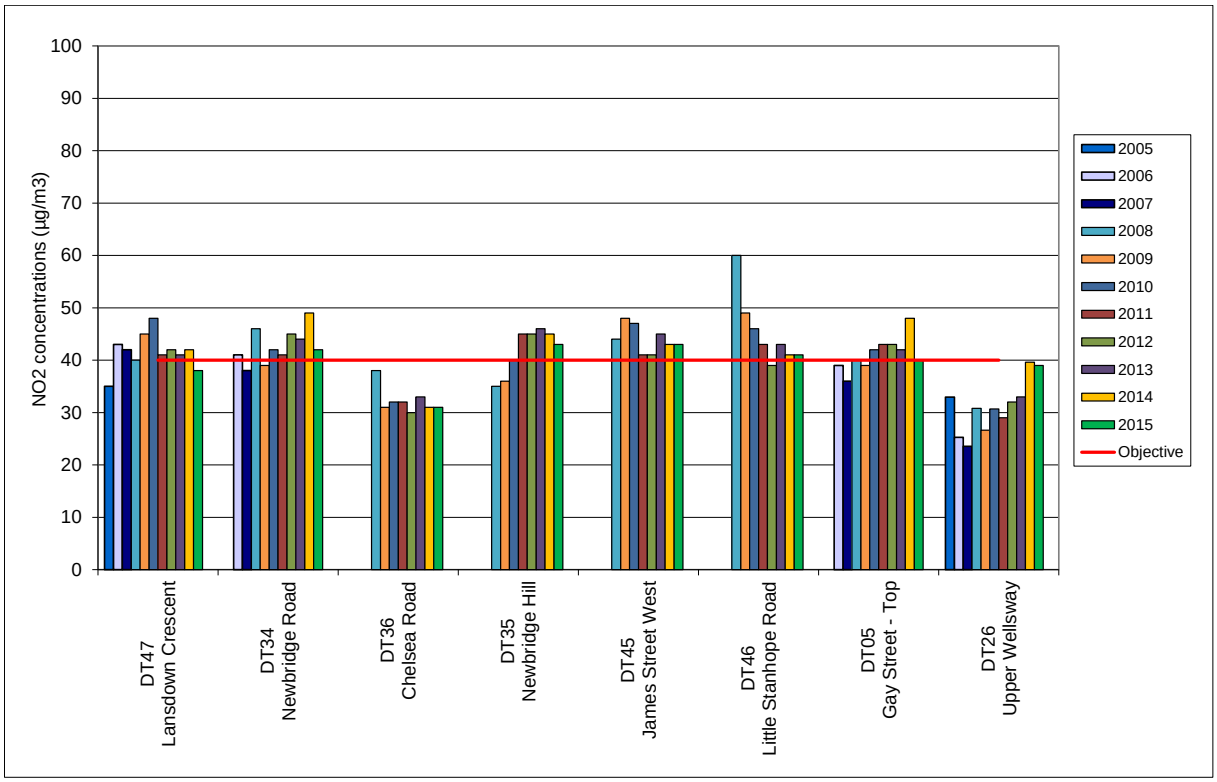


Figure B.6 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Urban Centre and Background Sites

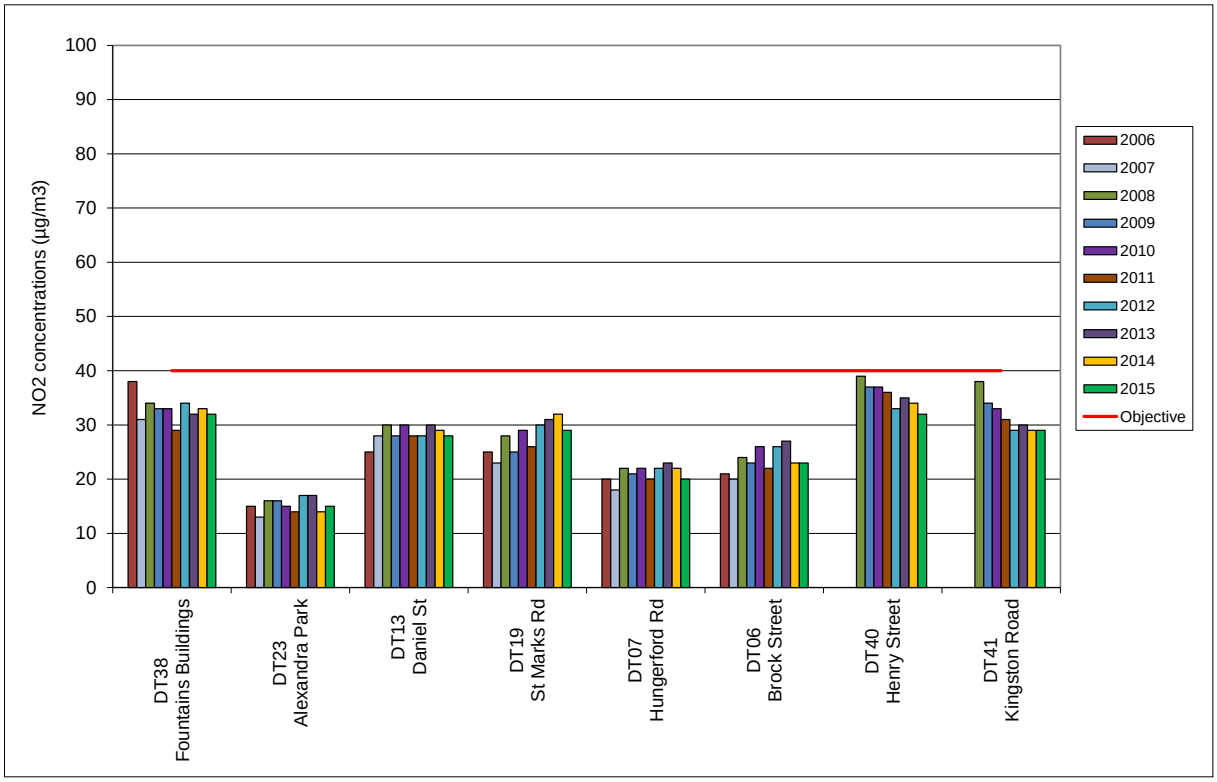


Figure B.7 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Sites outside Bath

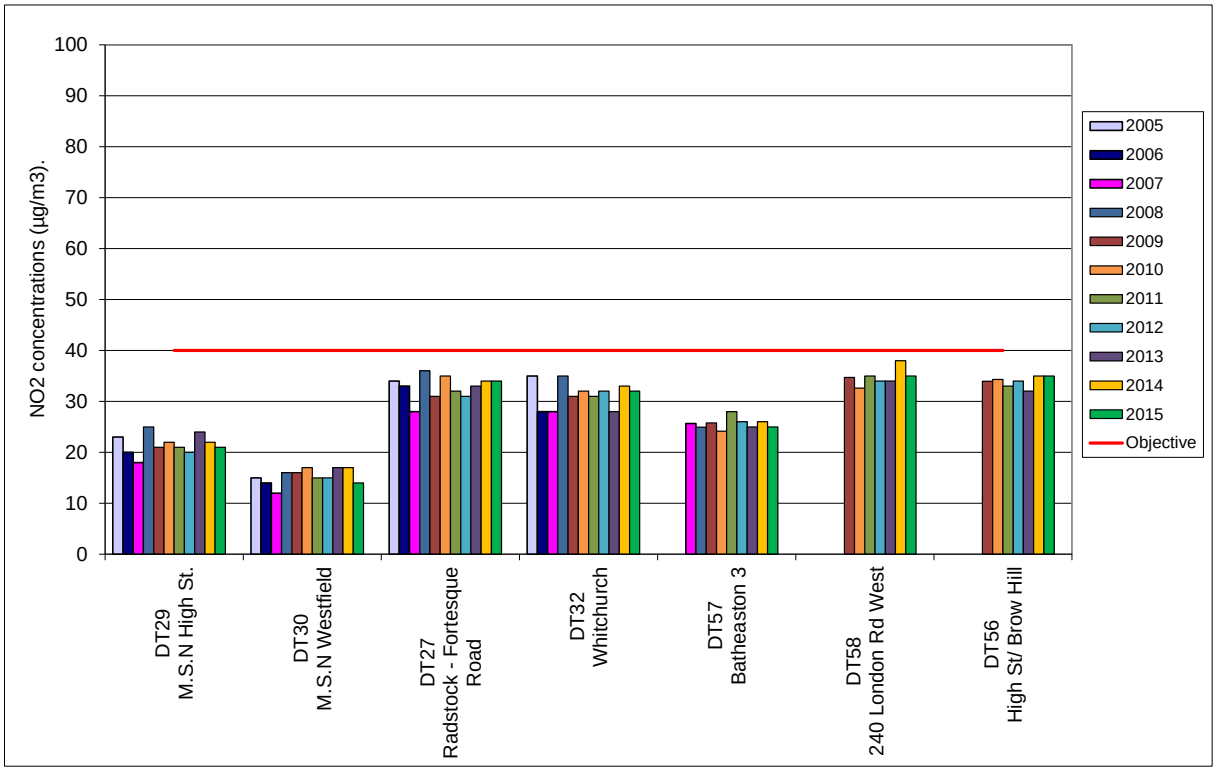


Figure B.8 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Sites in Keynsham

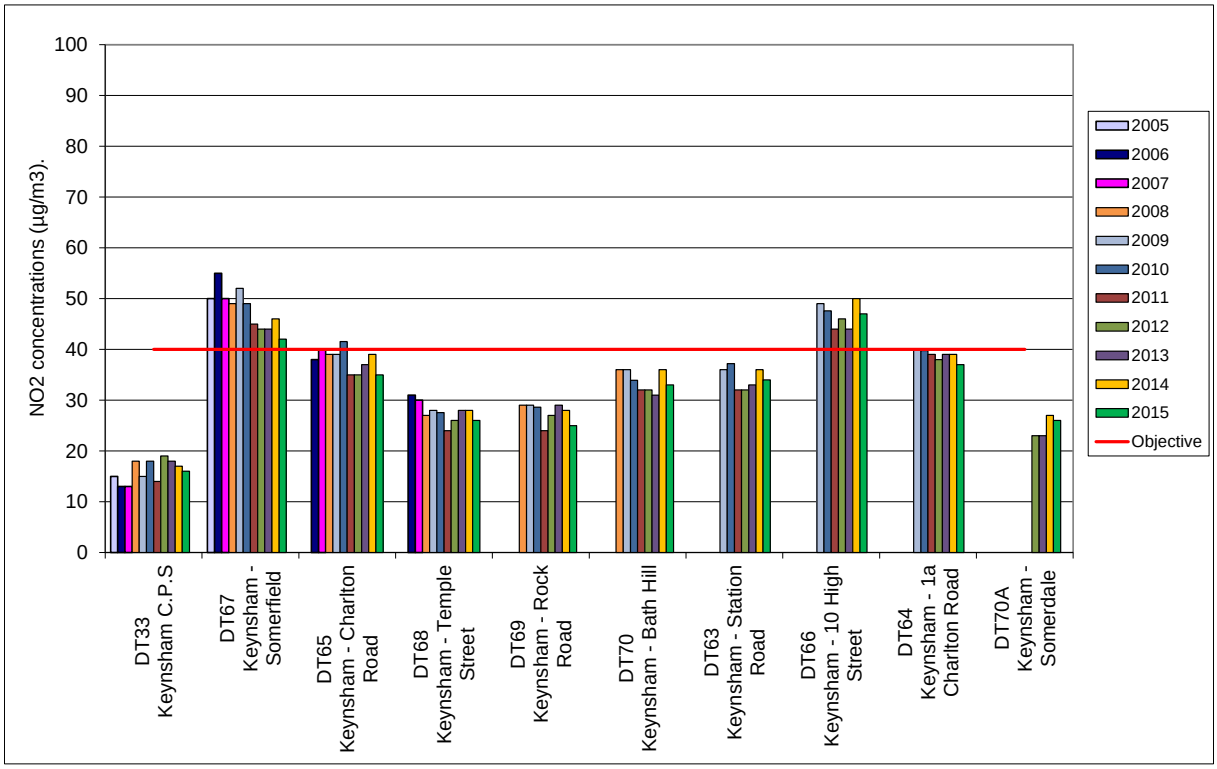


Figure B.9 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites – Sites in Saltford

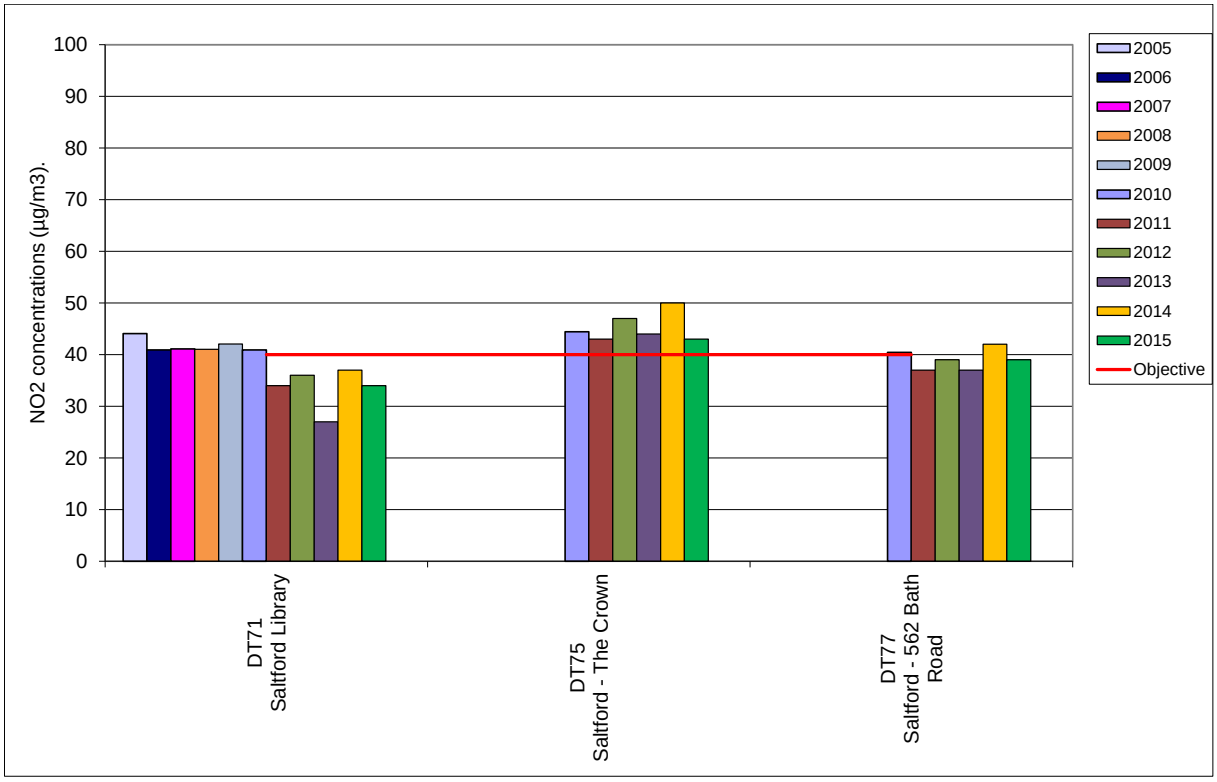


Figure B.10 Comparison of the co-located diffusion tubes with the AQMesh Monitors

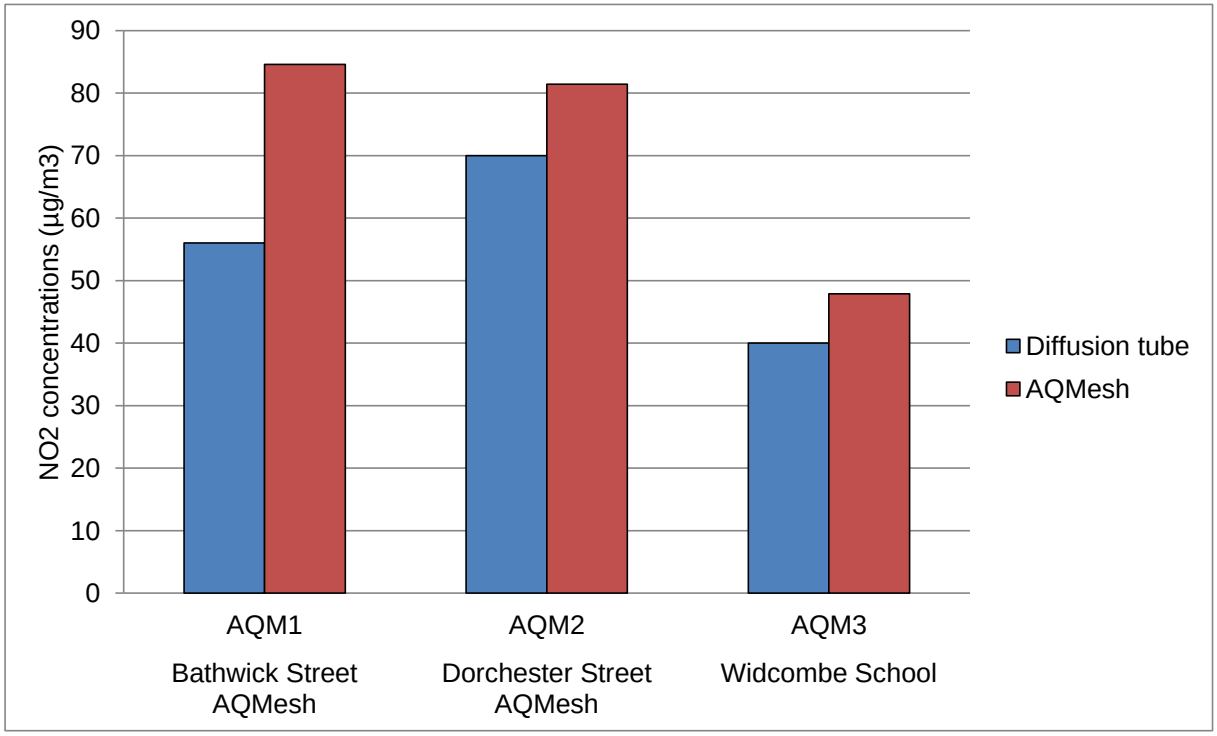


Figure B.11 Trends in Annual Mean PM10 Concentrations – Windsor Bridge

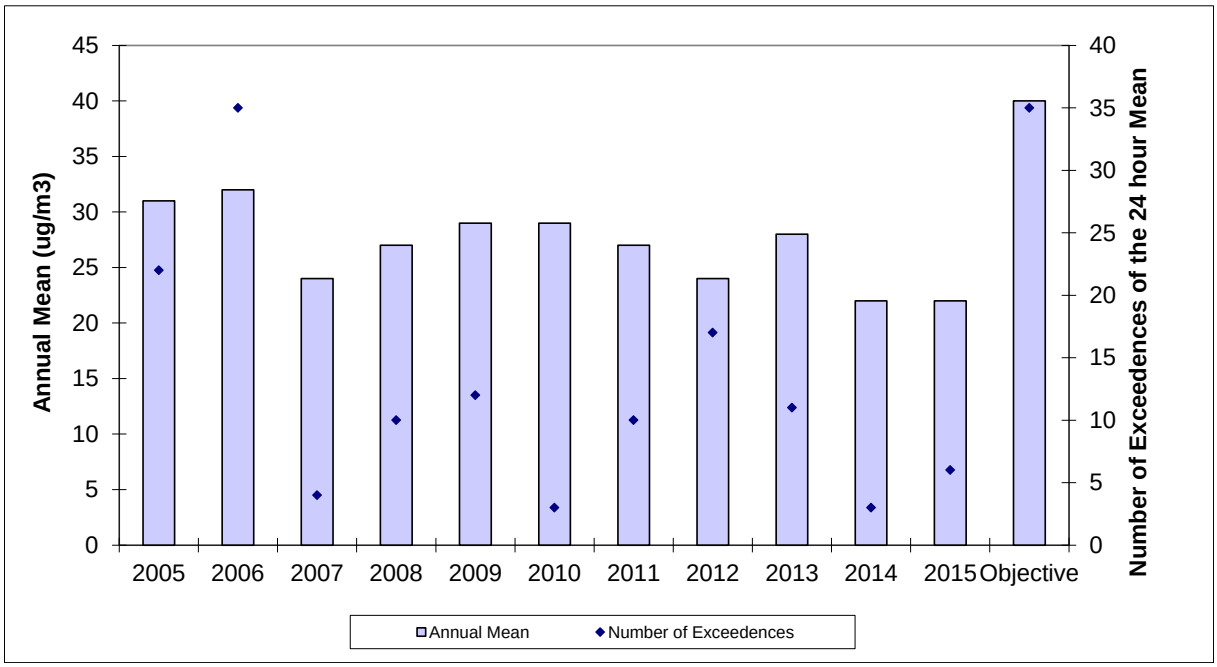
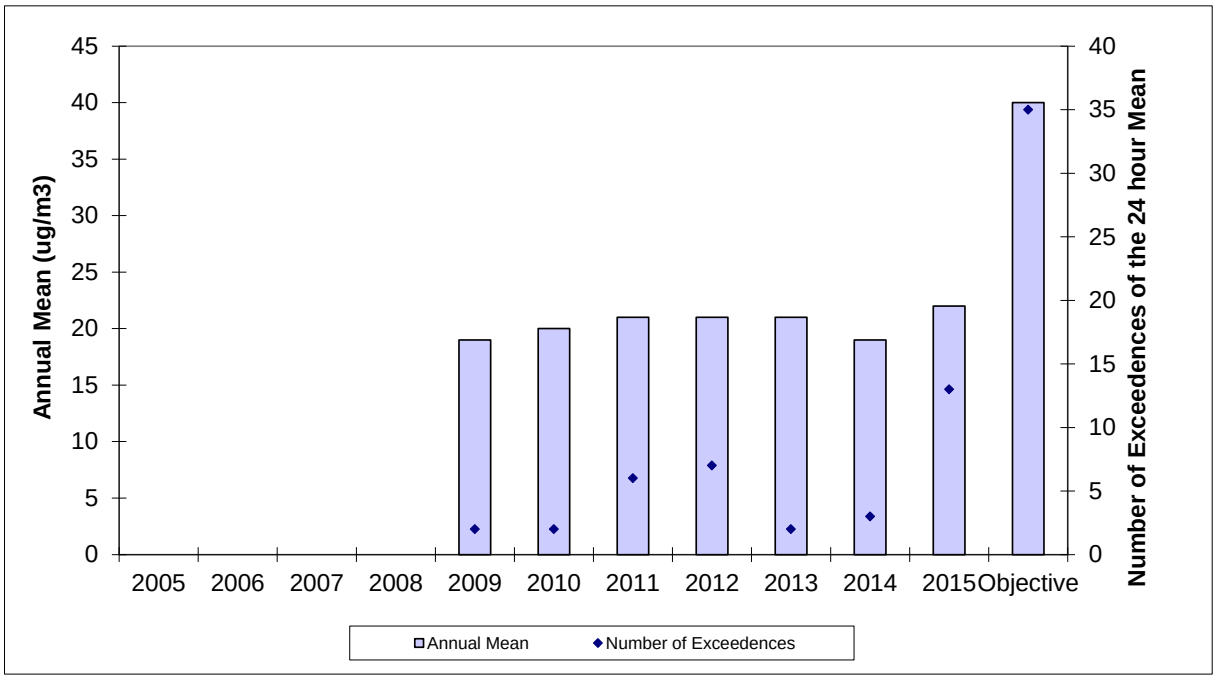


Figure B.12 Trends in Annual Mean PM10 Concentrations – Chelsea House



Appendix C: Full Monthly Diffusion Tube Results for 2015

Table C.1 – NO_2 Monthly Diffusion Tube Results - 2015

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 (1)	Annual adjusted (2)	Façade adjusted (3)
DT23	Alexandra Park	18.7	21.7	20.0	10.8	8.9	10.5	7.7	10.5	15.6	22.3	12.5	8.0	13.9	14.8	-	
DT88	Angel Place								44.4	50.3	55.1	56.1	44.3	**50.1**	**53.1**	**55.2**	**55.2**
DT90	Anglo Terrace								61.1	75.4	78.1	51.6	64.1	**66.1**	**70.1**	**72.9**	**60.7**
DT62	Argyle Terrace	49.2	52.3	46.9	43.5	36.3			42.5	44.4	48.6	48.8	48.2	**46.1**	**48.8**	-	**41.3**
DT58	Batheaston - 240 London Rd West	32.8	43.2	37.7	31.2	28.2	23.6	27.7	30.7	32.0	29.5	40.6	37.2	32.9	34.8	-	34.8
DT56	Batheaston - Brow Hill	38.7	38.7	38.1		28.9	25.9							34.0	36.0	35.0	31.1
DT57	Batheaston 3	29.2	30.2	27.8	20.7	20.4	19.2							24.6	26.1	25.3	25.3
DT14	Bathwick Street	57.5	70.9	52.0	35.9	39.4	42.7	47.1	46.1	40.2	47.1	47.0	48.0	**47.8**	**50.7**	-	**45.7**
DT81a	Bathwick St AQM1	59.1	72.4	55.2	44.1	46.6	53.3	53.6	56.4	53.7	55.3	55.5	48.2	**54.5**	**57.7**	-	**41.0**
DT81b	Bathwick St AQM1	59.0	72.4	61.2	47.1	49.1	51.4	52.5	59.6	53.1	59.9	56.3	46.5	**55.7**	**59.0**	-	**41.8**
DT81c	Bathwick St AQM1	56.6	67.9	61.0	45.4	48.1	52.5	49.0	61.3	51.9	57.7	61.7	46.4	**55.0**	**58.3**	-	**41.4**
DT84	Bear Flat								37.0	40.9	58.7	36.9	23.2	39.3	**41.7**	**43.3**	34.1
DT15	Beckford Road	39.6	42.6	35.9	23.8	23.5	26.9	28.1	34.7	41.1		38.8	29.8	33.2	35.1	-	26.6

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 (1)	Annual adjusted (2)	Façade adjusted (3)
DT83	Bennett Street								21.6	21.2	30.4	25.6	23.4	24.4	25.6	26.9	22.0
DT03	Broad St	54.9	61.6	66.2	45.8	50.4	53.0		56.1	47.9	56.8	51.2	48.6	**53.9**	**57.1**	-	**45.1**
DT06	Brock St	24.8	26.6	26.2	19.3	15.1	15.9							21.3	22.6	23.0	
DT37	Charlotte St	47.3	54.4	49.3	41.8	34.1	32.6	34.2	36.3	43.8	50.9	42.4	31.4	**41.5**	**44.0**	-	35.8
DT36	Chelsea Road	34.3	37.3	34.8	27.3	22.6	22.2							29.8	31.6	30.6	30.6
DT51	Cleveland Place West	51.5	63.1	56.0	46.0	52.6	52.2	46.1	50.0	41.6	50.3	55.8	56.7	**51.8**	**54.9**	-	**47.9**
DT13	Daniel St	36.5	39.6	35.3	23.0	20.7	17.6	16.0	20.4	26.3	30.7	26.7	25.4	26.5	28.1	-	
DT42	Dorchester Street	72.1	78.3	69.9	67.2	77.2	67.9	72.3	68.1	59.8	69.6	69.8	56.0	**69.0**	**73.2**	-	**56.6**
DT82a	Dorchester Street AQMesh 2	82.0	96.4											**89.2**	**94.5**	**70.9**	**54.9**
DT82b	Dorchester Street AQMesh 2	79.4	87.7	93.2										**86.8**	**92.0**	**69.0**	**53.6**
DT82c	Dorchester Street AQMesh 2	78.3		99.8										**89.1**	**94.4**	**70.8**	**54.9**
DT38	Fountains Buildings	35.7	39.4	37.2	23.4	28.3	20.5							30.8	32.6	31.7	31.7
DT05	Gay St - Top	40.1	50.8	44.1	41.3	32.3	31.6	28.1	35.9	34.7	47.0	38.7	32.9	38.1	**40.4**	-	33.2
DT04	George St	42.8	53.6	47.9	33.7	32.2	32.6	28.3	41.7	41.1	54.2	37.2	31.8	39.8	**42.1**	-	34.5
DT89	Green Park Road								22.9	28.5	36.1	25.4	21.9	27.0	28.6	29.8	29.8

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 (1)	Annual adjusted (2)	Façade adjusted (3)
DT40	Henry St	37.0	39.4	39.4	26.2	23.3	21.1							31.1	33.0	32.0	
DT01	High Street	39.7	53.1	50.3	31.9	32.6	32.1	27.0	37.5	39.1	47.7	30.0	35.1	38.0	**40.3**	-	34.7
DT07	Hungerford Rd	25.7	26.0	23.1	15.1	14.3	12.7							19.5	20.7	20.0	
DT45	James Street West	41.2	48.6	43.5	36.0	33.4		31.7	38.7	42.9	48.3	45.5	35.1	**40.4**	**42.9**	-	**42.9**
DT33	Keynsham	20.2	22.0	22.7	13.7	10.1	9.9	9.7	12.5	16.5	23.8	13.4	9.7	15.3	16.2	-	15.6
DT65	Keynsham - Charlton Road	34.2	40.7			26.9	30.9	27.5	36.4	32.0	43.4	29.8	25.2	32.7	34.7	-	29.1
DT67	Keynsham - Somerfield	51.7		51.8		36.7	37.7	31.9	34.7	35.1	49.8	35.0	29.7	39.4	**41.8**	-	35.8
DT66	Keynsham - 10 High Street	44.2	57.2	39.3	39.3	45.0	42.4	40.8	46.8	41.7	48.5	44.3	43.3	**44.4**	**47.1**	-	**42.6**
DT64	Keynsham - 1a Charlton Rd	36.1	39.2	39.2	34.8		30.0	29.1	35.4		40.6	35.3	33.4	35.3	37.4	-	30.1
DT70	Keynsham - Bath Hill	34.6	39.5	36.8	34.0	28.5		23.0	31.7	27.6			23.4	31.0	32.8	-	31.7
DT69	Keynsham - Rock Road	27.6	33.8			18.4	20.0	17.2	21.8	26.1	30.9	20.5	22.7	23.9	25.3	-	25.3
DT70A	Keynsham - Somerdale	30.9	34.1	28.2	16.3	18.1		18.8	22.8	23.8	29.9	23.1	25.3	24.7	26.1	-	22.4
DT63	Keynsham - Station Rd	36.8	40.8	38.9	25.8	25.7		25.1	26.4		43.3	29.3	26.5	31.9	33.8	-	28.5
DT68	Keynsham - Temple St	30.1	35.1	31.8		18.7	18.4	19.1	22.3	22.2	33.7	21.8	18.6	24.7	26.2	-	26.2

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 (1)	Annual adjusted (2)	Façade adjusted (3)
DT41	Kingston Road	33.9	35.5	33.3	26.7	21.5	20.5							28.6	30.3	29.4	
DT55	Lambridge	60.7	69.1	63.4	59.8	62.8	63.4	58.1	54.4	60.5	63.1	58.5	59.7	**61.1**	**64.8**	-	**64.8**
DT47	Lansdown Crescent	37.6	44.0	41.6	37.4	34.5	34.7	25.9	35.4	29.4	45.0	32.5	31.6	35.8	37.9	-	35.7
DT46	Little Stanhope	40.2	52.4	43.9	39.6	32.0	31.2	29.0	37.7	40.4	46.2	41.5	34.2	39.0	**41.4**	-	**41.4**
DT11	London Road	47.2	48.2	49.7	46.8	39.5	39.3	27.3	39.0	38.1	42.4	41.6	39.7	**41.6**	**44.1**	-	35.9
DT29	M.S.N High St.	23.8	23.4	23.8	15.0	15.1	17.2			20.5	21.8	20.0	15.9	19.6	20.8	-	19.1
DT30	M.S.N Westfield	16.0	19.7	20.0	12.2	9.6	10.6	7.9	9.8	14.7	16.7	12.3	10.3	13.3	14.1	-	
DT39	Manvers St	47.5	59.3	56.3	41.9	45.2	41.3	36.4	41.9	39.4	56.1	55.9	42.1	**46.9**	**49.7**	-	**42.2**
DT61	Morley Terrace	43.6	47.3	43.4	35.8	37.7	35.5	35.0	41.7	41.0	45.5	40.1	39.0	**40.5**	**42.9**	-	**42.9**
DT35	Newbridge Hill	44.3	49.0	47.9	39.1	36.5	37.9	36.4	35.5	41.6	48.3	38.5	33.8	**40.7**	**43.2**	-	33.2
DT34	Newbridge Rd	48.0	50.8	46.6	30.8	36.9	30.7	31.0	35.8	35.6	45.8	42.3	39.6	39.5	**41.9**	-	32.1
DT87	Oak Street									38.5	47.2	37.4	31.9	38.7	**41.0**	**42.7**	**42.7**
DT48	Paragon	54.8	50.9	41.2	36.2	35.0	33.0	29.2	40.5	40.5	46.0	43.2	41.8	**41.0**	**43.5**	-	39.5
DT27	Radstock - Roundabouts	41.2	38.9	38.0	29.8	27.1	26.8	22.3		30.4	35.8	31.2	28.2	31.8	33.7	-	24
DT85	RUH North								30.6	31.1	35.5	33.2	33.6	32.8	34.8	36.2	27.2
DT86	RUH South								29.4	28.0	35.7	32.0	31.1	31.3	33.2	34.5	25.5

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 (1)	Annual adjusted (2)	Façade adjusted (3)
DT77	Saltford - 562 Bath Road	41.4	45.7	40.6	31.2	35.1	35.6	32.0	40.1	33.5	35.5	38.4	31.6	36.7	38.9	-	38.9
DT75	Saltford - The Crown	47.0	49.9	47.3	42.7	28.3	32.0	29.4	41.5	41.5	48.5	42.4	40.3	**40.9**	**43.4**	-	**43.4**
DT71	Saltford Library	39.7	41.5	40.7	24.6	28.2	29.2	21.9	27.9	34.6	46.4	27.2	19.3	31.8	33.7	-	26.2
DT43	St James Parade	55.1	63.3	58.5	55.9	48.8	49.3	50.9	51.7	53.9	65.4	53.7	47.9	**54.5**	**57.8**	-	**48.3**
DT19	St Marks Rd	34.0	34.5	33.3	22.9	20.5	20.6							27.6	29.3	28.4	
DT50	Thomas St	43.5	46.9	40.1	35.0	30.9	29.9	26.9	30.3	36.4	41.9	37.9	32.6	36.0	38.2	-	
DT09	Upper Bristol Rd	49.6	52.9	47.9	41.7	34.2	35.0	36.8	38.3	39.0	50.2	47.8	45.1	**43.2**	**45.8**	-	34.6
DT26	Upper WellsWay	35.7	41.8	43.2	40.5	29.0	29.5		35.2	37.5	40.6	37.0	33.7	36.7	38.9	-	38.9
DT60	Victoria Terrace	50.1	55.2	52.4	37.6	45.7	41.9	39.4	47.7	46.2	65.1	50.0	33.4	**47.0**	**49.9**	-	**44.2**
DT52	Walcott Terrace	54.8	61.4	63.0	54.3	49.6	48.1	46.6	47.8	43.8	44.5	48.3	53.1	**51.3**	**54.4**	-	**54.4**
DT53	Walcott Terrace	52.6	60.3	58.0	52.9	48.2	48.2	48.0	47.2	45.0	45.1	53.0	55.7	**51.2**	**54.2**	-	**54.2**
DT54	Walcott Terrace	50.8	63.6	57.3	54.6	52.1	43.7	46.5	49.3	42.3	44.3	47.7	52.6	**50.4**	**53.4**	-	**53.4**
DT16	Warminster Road	39.5	46.5	31.4	22.9	20.4	21.6	28.3	38.6	42.4	49.0	37.6	36.9	34.6	36.7	-	26.3
DT21	Wells Rd/Upper Oldfield Park	39.4	50.5	52.3	42.5	34.6	37.7	28.8	41.2	45.2	53.8	40.3	31.8	**41.5**	**44.0**	-	35.8
DT20	Wells Road - new								48.4	55.6	66.2	63.1	49.1	**56.5**	**59.9**	**62.3**	**62.3**
DT20	Wells Road - old	44.0	51.7	50.2	46.5	36.8	39.3	30.5						**42.7**	**45.3**	**46.2**	39.2

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 (1)	Annual adjusted (2)	Façade adjusted (3)
DT32	Whitchurch - new								47.8	43.3	52.1	49.5	42.9	**47.1**	**49.9**	**51.9**	**43.5**
DT32	Whitchurch - old	28.7	39.9	41.8	29.3	21.9	21.9	20.0						29.1	30.8	31.5	30.7
DT18	Widcombe High Street - after						26.0	22.7	23.4	27.9	34.7	29.3	23.9	26.8	28.4	31.2	31.2
DT18	Widcombe High Street - before	54.9	55.2	46.7	34.2	35.0								**45.2**	**47.9**	**42.6**	**42.6**
DT17	Widcombe School	45.2	48.5	43.3	29.7	32.4	27.0	35.5		34.2	45.5		30.6	37.2	39.4	-	30.5
DT82a	Widcombe School AQMesh 3				29.0	32.4	27.0	35.5		34.2	45.5		30.6	33.5	35.5	39.4	30.5
DT82b	Widcombe School AQMesh 3				31.2	31.1	29.8	32.5	42.0	34.4	42.7	33.6	29.1	34.0	36.0	**40.0**	30.9
DT82c	Widcombe School AQMesh 3					31.9	32.3	33.5		32.6	46.5	36.1	28.3	34.5	36.6	**40.1**	31
DT08	Windsor Bridge - new								34.0	31.3	40.8	35.1	32.7	34.8	36.9	38.4	38.4
DT08	Windsor Bridge - old	36.2	40.4	39.7	29.3	29.5	32.6							34.6	36.7	37.4	31.6

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 D for details on bias adjustment

(2) See Appendix D for details of annual adjustment carried out for sites with <75% data capture

(3) See Appendix D for details of façade adjustment, carried out for all roadside sites using calculator on LAQM website [20].

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

Diffusion Tube Bias 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[18].

Monthly National Bias	2011	0.83 (Bristol, 8 studies)[26]
	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]

Factor from Local Co-location Studies

A local bias factor has been calculated following the FAQ guidance on R&A website[21]. 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	2011	0.89 (Bristol)
	2012	0.95 (Somerset)
	2013	1.01 (Somerset)
	2014	1.09 (Somerset)
	2015	1.06 (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). 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 2015 the national factor for Somerset Scientific Services is made up from 10 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[22]. Using the local bias factor is likely to result in concentrations at approximately 37 sites being overestimated.

In 2011-14 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.

For reasons of transparency, Table D.1 below shows the differences between the concentrations calculated using the local and national bias factor in 2015 for monitoring sites close to or exceeding the objective. The corrected concentrations would have been 18% lower if the national bias factor had been used.

The diffusion tube results including both national and local bias factors will continue to be provided in future Annual Status Reports and the choice of factor will be reviewed annually.

Table D.1 Annual Mean concentrations at diffusion tubes greater than 35 µg/m^3 using both national and local bias

Site ID	Site Name	In AQMA?	NO_2 Annual Mean Concentration (µg/m^3) (3)					
			2011	2012	2013	2014	2015 National bias	2015 Local Bias
DT88	Angel Place	Y	-	-	-	-	**47**	**55**
DT90	Anglo Terrace	Y	-	-	-	-	**62**	**73**
DT62	Argyle Terrace	Y	**46**	**46**	**45**	**48**	**42**	**49**
DT58	Batheaston – 240 London Road West	N	35	34	34	38	30	35
DT56	Batheaston – Brow Hill	N	33	34	32	35	31	35
DT14	Bathwick Street	Y	**50**	**48**	**50**	**54**	39	**51**
DT81	Bathwick Street AQM1	Y	-	-	-	**62**	**50**	**58**
DT84	Bear Flat	N	-	-	-	-	37	**43**
DT15	Beckford Road	Y	**41**	**41**	**43**	**43**	30	35
DT03	Broad Street	Y	**60**	**62**	**59**	**62**	**49**	**57**
DT37	Charlotte Street	Y	39	**42**	**43**	**44**	37	**44**

Site ID	Site Name	In AQMA?	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)					
			2011	2012	2013	2014	2015 National bias	2015 Local Bias
DT51	Cleveland Place West	Y	**60**	**51**	**55**	**58**	**47**	**55**
DT42	Dorchester Street	Y	**62**	**66**	**67**	**71**	**62**	**73**
DT82	Dorchester Street AQM2	Y	**-**	**-**	**-**	**81**	**59.6**	**70**
DT05	Gay Street – Top	Y	**43**	**43**	**42**	**48**	34	**40.4**
DT04	George Street	Y	**42**	**43**	**44**	**47**	36	**42**
DT01	High Street/ Guildhall	Y	**44**	**43**	**45**	**46**	34	**40.3**
DT45	James Street West	Y	**41**	**41**	**45**	**43**	36	**43**
DT66	Keynsham – 10 High Street	Y	**44**	**46**	**44**	**50**	40.0	**47**
DT64	Keynsham – 1a Charlton Rd	Y	39	38	39	39	32	37
DT65	Keynsham – Charlton Road	Y	35	35	37	39	32	35
DT67	Keynsham – Somerfield	Y	**45**	**44**	**44**	**46**	36	**42**
DT55	Lambridge	Y	**68**	**62**	**60**	**64**	**55**	**65**
DT47	Lansdown Crescent	Y	**41**	**42**	**41**	**42**	32	38
DT46	Little Stanhope Street	Y	**43**	39	**43**	**41**	36	**41**
DT11	London Road	Y	**48**	**48**	**48**	**51**	37	**44**
DT39	Manvers Street	Y	**47**	**53**	**49**	**54**	**42**	**50**
DT61	Morley Terrace	Y	**43**	**44**	**46**	**45**	36	**43**
DT35	Newbridge Hill	N	**45**	**45**	**46**	**45**	37	**43**
DT36	Newbridge Road	Y	**41**	**45**	**44**	**49**	36	**42**
DT87	Oak Street	Y	-	-	-	-	36	**43**
DT48	Paragon	Y	**51**	**48**	**48**	**48**	37	**43**
DT85	RUH – North	N	-	-	-	-	31	36
DT77	Saltford - 562 Bath Road	Y	37	39	37	**42**	33	39
DT75	Saltford - The Crown	Y	**43**	**47**	**44**	**50**	37	**43**
DT43	St James' Parade	Y	**55**	**59**	**57**	**58**	**49**	**58**
DT50	Thomas Street	Y	37	38	37	38	32	38
DT09	Upper Bristol Road	Y	**47**	**47**	**47**	**49**	39	**46**

Site ID	Site Name	In AQMA?	NO_2 Annual Mean Concentration (µg/m^3) [3]					
			2011	2012	2013	2014	2015 National bias	2015 Local Bias
DT26	Upper Wellsway	N	29	32	30*	39.6	33	39
DT60	Victoria Buildings	Y	**55**	**55**	**57**	**55**	**42**	**50**
DT52-54	Walcot Terrace (3 tubes)	Y	**57**	**56**	**57**	**57**	**46**	**54**
DT16	Warminster Road	Y	36	**40**	**40**	**43**	31	37
DT21	Wells Rd/Upper Oldfield Park	Y	**40**	**42**	**48**	**50**	37	**44**
DT20	Wells Road (old)	Y	**50**	**49**	**50**	**51**	39	**46**
DT20	Wells Road (new)	Y	-	-	-	-	**53**	**62**
DT32	Whitchurch (old)	N	31	32	28	33	26	32
DT32	Whitchurch (new)	N	-	-	-	-	**44**	**52**
DT18	Widcombe High Street	Y	**40**	**44**	**43**	**49**	36	**43**
DT18	Widcombe High Street (post works)	Y	-	-	-	-	27	31
DT17	Widcombe School	Y	35	38	35	38	34	39
DT82	Widcombe School AQM3	Y	-	-	-	-	34	40.0
DT08	Windsor Bridge	Y	30	35	36	33	32	37
DT08	Windsor Bridge (new)	Y	-	-	-	-	33	38

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.**

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[16].

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.

In 2015 the continuous data 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[16] 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 2012-2015 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 [18] for nitrogen dioxide for the laboratory indicates a performance classification as satisfactory for all periods.

Short-term to Long-term Data adjustment

During 2015 26 diffusion tubes and 2 continuous analysers had data capture less than 75%. To estimate the annual mean from the short-term monitoring period the method in LAQM.TG(16)[3] was followed. Four sites were selected from the national network within 50 miles of Bath; Cardiff Centre, Bristol St Paul's, Newport and Cwbran. The missing periods in Cardiff Centre were mainly during the first part of the year and Newport were mainly at the end of the year, these sites was not used when the data capture for the period was <85%. The adjusted monitored concentrations are shown in Table C.1 and the site which the specific adjustment factor is used are detailed below each table.

Table D.2 Ratio for Short-term to Long-term Data Adjustment – Sites ending June 2015

Long-term site	Site Type	Annual Mean 2015	Period Mean 2015	Ratio (Am/Pm)
Cwmbran	Urban Background	11.6	12.6	0.92
Bristol St Paul's	Urban Background	26.3	25.9	1.01
Newport	Urban Background	20.8	21.5	0.96
			Average	0.97

Applied to; Hungerford Road, St Mark's Road, Chelsea Road, Fountains Buildings, Kingston Road, Henry Road, Batheaston 3, Batheaston – Brow Hill and Brock Street.

Table D.3 Ratio for Short-term to Long-term Data Adjustment – Sites beginning August 2015

Long-term site	Site Type	Annual Mean 2015	Period Mean 2015	Ratio (Am/Pm)
Cardiff Centre	Urban Background	26.7	23.1	1.16
Cwmbran	Urban Background	11.6	11.5	1.01
Bristol St Paul's	Urban Background	26.3	27.9	0.94
			Average	1.04

Applied to; Bear Flat, RUHN, RUHS, Oak Street, Angel Place, Green Park Road, Anglo Terrace, Bennett Street, Windsor Bridge (new), Wells Road (new) and Whitchurch (new)

Table D.4 Ratio for Short-term to Long-term Data Adjustment - Sites ending July 2015

Long-term site	Site Type	Annual Mean 2015	Period Mean 2015	Ratio (Am/Pm)
Cwmbran	Urban Background	11.6	11.7	0.99
Bristol St Paul's	Urban Background	26.3	24.9	1.06
Newport	Urban Background	20.8	20.2	1.03
			Average	1.02

Applied to; Windsor Bridge (old), Wells Road (old) and Whitchurch (old)

Table D.5 Ratio for Short-term to Long-term Data Adjustment –Widcombe High Street pre layout changes

Long-term site	Site Type	Annual Mean 2015	Period Mean 2015	Ratio (Am/Pm)
Cwmbran	Urban Background	11.6	14.1	0.83
Bristol St Paul's	Urban Background	26.3	27.0	0.97
Newport	Urban Background	20.8	23.7	0.88
			Average	0.89

Table D.6 Ratio for Short-term to Long-term Data Adjustment – Widcombe High Street post layout changes

Long-term site	Site Type	Annual Mean 2015	Period Mean 2015	Ratio (Am/Pm)
Cwmbran	Urban Background	11.6	9.9	1.18
Bristol St Paul's	Urban Background	26.3	25.8	1.02
Newport	Urban Background	20.8	18.7	1.11
			Average	1.10

Table D.7 Ratio for Short-term to Long-term Data Adjustment - Dorchester Street AQMesh2 2015

Long-term site	Site Type	Annual Mean 2015	Period Mean 2015	Ratio (Am/Pm)
Cwmbran	Urban Background	11.6	16.7	0.70
Bristol St Paul's	Urban Background	26.3	32.5	0.81
Newport	Urban Background	20.8	27.8	0.75
			Average	0.75

Table D.8 Ratio for Short-term to Long-term Data Adjustment – Widcombe School AQMesh 2015

Long-term site	Site Type	Annual Mean 2015	Period Mean 2015	Ratio (Am/Pm)
Cardiff Centre	Urban Background	26.7	24.6	1.09
Cwmbran	Urban Background	11.6	10.1	1.15
Bristol St Paul's	Urban Background	26.3	24.2	1.08
Newport	Urban Background	20.8	18.6	1.12
			Average	1.11

Table D.9 Ratio for Short-term to Long-term Data Adjustment – Windsor Bridge Continuous Analyser

Long-term site	Site Type	Annual Mean 2015	Period Mean 2015	Ratio (Am/Pm)
Cwmbran	Urban Background	11.6	14.1	0.82
Bristol St Paul's	Urban Background	26.3	26.8	0.98
Newport	Urban Background	20.8	22.9	0.91
			Average	0.90

Table D.10 Ratio for Short-term to Long-term Data Adjustment – Chelsea House $PM_{2.5}$

Long-term site	Site Type	Annual Mean 2015	Period Mean 2015	Ratio (Am/Pm)
Cardiff Centre	Urban Background	9.6	8.3	1.15
Bristol St Paul's	Urban Background	10.2	8.3	1.24
Newport	Urban Background	9.6	8.6	1.11
			Average	1.17

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 14.8 µg/m^3 was used (from Alexandra Park, DT23). Table D.11 below shows the distances used in the calculator, 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.

Table D.11 Distance adjustment to closest receptor

Site ID	Site Name	Site Type	In AQMA?	Distance from monitor to kerb of nearest road (m)	Distance from receptor to kerb of nearest road (m)	Annual average		
						Bias Adjusted (1)	Annual adjusted (2)	Façade adjusted (3)
DT23	Alexandra Park	Urban Background	N	N/A	N/A	14.8	-	-
DT88	Angel Place	Roadside	Y	2.65	2.65	**53.1**	**55.2**	**55.2**
DT90	Anglo Terrace	Roadside	Y	1.6	4.1	**70.1**	**72.9**	60.7
DT62	Argyle Terrace	Roadside	Y	3	7	**48.8**	-	41.3
DT58	Batheaston - 240 London Rd West	Roadside	N	1	1	34.8	-	34.8
DT56	Batheaston - Brow Hill	Kerbside	N	0.5	1.5	36	35	31.1
DT57	Batheaston 3	Roadside	N	2	2	26.1	25.3	25.3
DT14	Bathwick Street	Roadside	Y	1	2	**50.7**	-	45.7
DT81a	Bathwick St AQM1	Kerbside	Y	0.5	4.5	**57.7**	-	41
DT81b	Bathwick St AQM1	Kerbside	Y	0.5	4.5	**59**	-	41.8
DT81c	Bathwick St AQM1	Kerbside	Y	0.5	4.5	**58.3**	-	41.4
DT84	Bear Flat	Roadside	N	1.85	7.55	**41.7**	**43.3**	34.1
DT15	Beckford Road	Roadside	Y	1	8	35.1	-	26.6
DT83	Bennett Street	Kerbside	Y	0.5	5	25.6	26.9	22
DT03	Broad St	Kerbside	Y	0.5	2.5	**57.1**	-	45.1
DT06	Brock St	Urban Centre	N	N/A	N/A	22.6	23	-

Site ID	Site Name	Site Type	In AQMA?	Distance from monitor to kerb of nearest road (m)	Distance from receptor to kerb of nearest road (m)	Annual average		
						Bias Adjusted (1)	Annual adjusted (2)	Façade adjusted (3)
DT37	Charlotte St	Roadside	Y	1	4	**44**	-	35.8.
DT36	Chelsea Road	Roadside	Y	12	12	31.6	30.6	30.6
DT51	Cleveland Place West	Roadside	Y	3	5.9	**54.9**	-	47.9
DT13	Daniel St	Urban Centre	Y	N/A	N/A	28.1	-	-
DT42	Dorchester Street	Kerbside	Y	0.5	2.5	**73.2**	-	**56.6**
DT82a	Dorchester Street AQMesh 2	Kerbside	Y	0.5	2.5	**94.5**	**70.9**	**54.9**
DT82b	Dorchester Street AQMesh 2	Kerbside	Y	0.5	2.5	**92**	**69**	**53.6**
DT82c	Dorchester Street AQMesh 2	Kerbside	Y	0.5	2.5	**94.4**	**70.8**	**54.9**
DT38	Fountains Buildings	Urban Centre	N	N/A	N/A	32.6	31.7	31.7
DT05	Gay St - Top	Roadside	Y	1	4	**40.4**	-	33.21
DT04	George St	Kerbside	Y	1	4	**42.1**	-	34.5
DT89	Green Park Road	Roadside	N	6	6	28.6	29.8	29.8
DT40	Henry St	Urban Centre	N	N/A	N/A	33	32	-
DT01	High Street	Roadside	Y	1	3	**40.3**	-	34.7
DT07	Hungerford Rd	Urban centre	N	N/A	N/A	20.7	20	-
DT45	James Street West	Roadside	Y	5	5	**42.9**	-	42.9

Site ID	Site Name	Site Type	In AQMA?	Distance from monitor to kerb of nearest road (m)	Distance from receptor to kerb of nearest road (m)	Annual average		
						Bias Adjusted (1)	Annual adjusted (2)	Façade adjusted (3)
DT33	Keynsham	Urban Background	N	1	9	16.2	-	-
DT65	Keynsham - Charlton Road	Roadside	Y	1	4	34.7	-	29.1
DT67	Keynsham - Somerfield	Roadside	Y	1	3	**41.8**	-	35.8
DT66	Keynsham - 10 High Street	Roadside	Y	1	2	**47.1**	-	42.6
DT64	Keynsham - 1a Charlton Rd	Roadside	Y	1	5	37.4	-	30.1
DT70	Keynsham - Bath Hill	Roadside	Y	4	5	32.8	-	31.7
DT69	Keynsham - Rock Road	Roadside	N	2	2	25.3	-	25.3
DT70A	Keynsham - Somerdale	Urban Background	N	1.9	7.9	26.1	-	-
DT63	Keynsham - Station Rd	Roadside	Y	1	4	33.8	-	28.5
DT68	Keynsham - Temple St	Roadside	N	3	3	26.2	-	26.2
DT41	Kingston Road	Urban Centre	N	N/A	N/A	30.3	29.4	-
DT55	Lambridge	Roadside	Y	4	4	**64.8**	-	**64.8**
DT47	Lansdown Crescent	Roadside	Y	2	3	37.9	-	35.7

Site ID	Site Name	Site Type	In AQMA?	Distance from monitor to kerb of nearest road (m)	Distance from receptor to kerb of nearest road (m)	Annual average		
						Bias Adjusted (1)	Annual adjusted (2)	Façade adjusted (3)
DT46	Little Stanhope	Roadside	Y	2	2	**41.4**	-	41.4
DT11	London Road	Roadside	Y	1	4	**44.1**	-	35.9
DT29	M.S.N High St.	Kerbside	N	1	4	20.8	-	19.1
DT30	M.S.N Westfield	Urban Background	N	N/A	N/A	14.1	-	-
DT39	Manvers St	Roadside	Y	2	5	**49.7**	-	42.2
DT61	Morley Terrace	Roadside	Y	3	3	**42.9**	-	42.9
DT35	Newbridge Hill	Roadside	N	2	9	**43.2**	-	33.2
DT34	Newbridge Rd	Roadside	Y	1	6	**41.9**	-	32.1
DT87	Oak Street	Roadside	Y	2.65	2.65	**41**	**42.7**	42.7
DT48	Paragon	Roadside	Y	1	2	**43.5**	-	39.5
DT27	Radstock - Roundabouts	Roadside	N	2	18	33.7	-	24
DT85	RUH North	Roadside	N	1.5	8.5	34.8	36.2	27.2
DT86	RUH South	Roadside	N	2	12	33.2	34.5	25.5
DT77	Saltford - 562 Bath Road	Roadside	Y	2	2	38.9	-	38.9
DT75	Saltford - The Crown	Roadside	Y	3	3	**43.4**	-	43.4
DT71	Saltford Library	Roadside	N	3	14	33.7	-	26.2
DT43	St James Parade	Roadside	Y	1	3	**57.8**	-	**48.3**
DT19	St Marks Rd	Urban Centre	N	N/A	N/A	29.3	28.4	-

Site ID	Site Name	Site Type	In AQMA?	Distance from monitor to kerb of nearest road (m)	Distance from receptor to kerb of nearest road (m)	Annual average		
						Bias Adjusted (1)	Annual adjusted (2)	Façade adjusted (3)
DT50	Thomas St	Urban Centre	Y	N/A	N/A	38.2	-	-
DT09	Upper Bristol Rd	Roadside	Y	1	6	**45.8**	-	34.6
DT26	Upper WellsWay	Roadside	N	3	3	38.9	-	38.9
DT60	Victoria Terrace	Roadside	Y	2	4	**49.9**	-	44.2
DT52	Walcott Terrace	Roadside	Y	3	3	**54.4**	-	**54.4**
DT53	Walcott Terrace	Roadside	Y	3	3	**54.2**	-	**54.2**
DT54	Walcott Terrace	Roadside	Y	3	3	**53.4**	-	**53.4**
DT16	Warminster Road	Roadside	Y	4	22	36.7	-	26.3
DT21	Wells Rd/Upper Oldfield Park	Roadside	Y	1	4	**44**	-	35.8
DT20	Wells Road - new	Roadside	Y	1.5	1.5	**59.9**	**62.3**	**62.3**
DT20	Wells Road - old	Kerbside	Y	1	3	**45.3**	**46.2**	39.2
DT32	Whitchurch - new	Roadside	N	1.5	4.2	**49.9**	**51.9**	43.5
DT32	Whitchurch - old	Roadside	N	6	7	30.8	31.5	30.7
DT18	Widcombe High Street - after	Roadside	Y	5	5	28.4	31.2	31.2
DT18	Widcombe High Street - before	Roadside	Y	5	5	**47.9**	**42.6**	42.6
DT17	Widcombe School	Roadside	Y	1	6	39.4	-	30.5

Site ID	Site Name	Site Type	In AQMA?	Distance from monitor to kerb of nearest road (m)	Distance from receptor to kerb of nearest road (m)	Annual average		
						Bias Adjusted (1)	Annual adjusted (2)	Façade adjusted (3)
DT82a	Widcombe School AQMesh 3	Roadside	Y	1	6	35.5	39.4	30.5
DT82b	Widcombe School AQMesh 3	Roadside	Y	1	6	36	**40**	30.9
DT82c	Widcombe School AQMesh 3	Roadside	Y	1	6	36.6	**40.1**	31
DT08	Windsor Bridge - new	Roadside	Y	3.5	3.5	36.9	38.4	38.4
DT08	Windsor Bridge - old	Roadside	Y	2	6	36.7	37.4	31.6

Appendix E: Other monitoring

Benzene

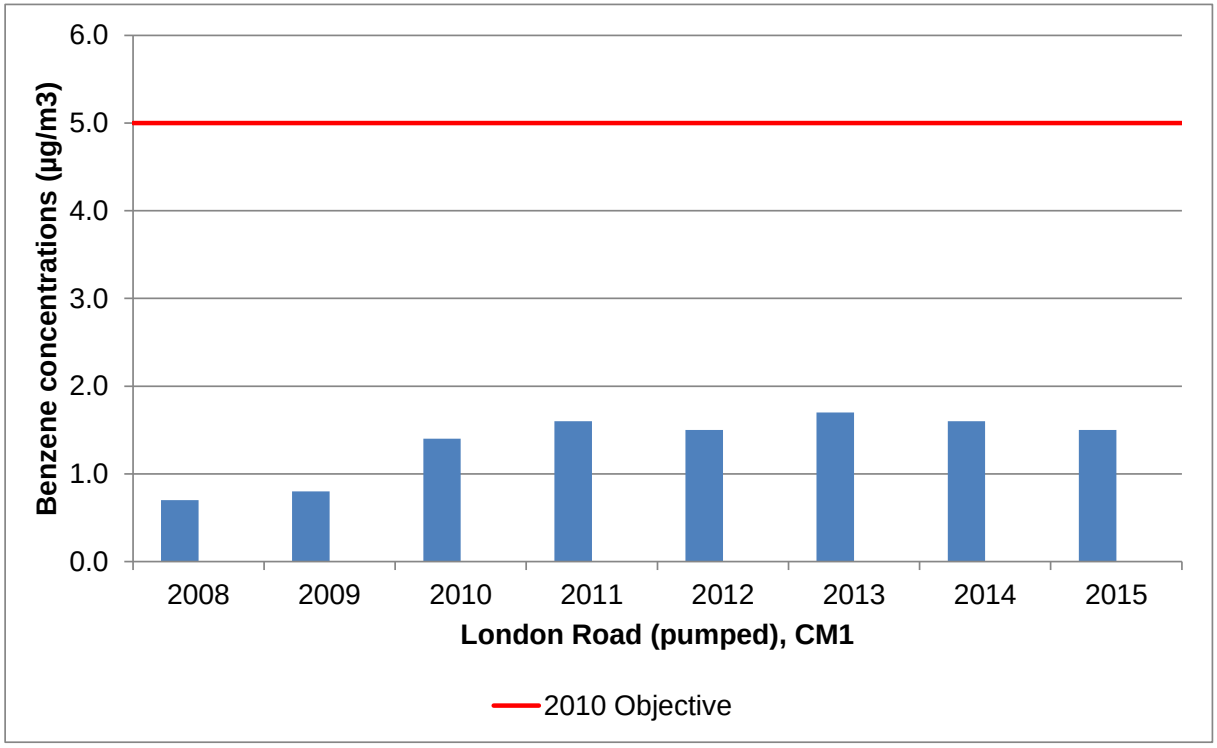
Monitoring results for benzene are shown in Table E.1 and Figure E.1. The results show that there are no exceedances of the benzene objectives during 2015.

Trends in benzene show that levels in 2015 were similar to previous years (Figure E.1).

Table E.1 Results of Benzene Monitoring

Site ID	Site Name	Data Capture for 2014 (%)	Annual Mean (µg/m^3)				
			2011	2012	2013	2014	2015
CM1	London Road (Pumped)	100	1.6	1.5	1.7	1.6	1.5
	Annual Mean Objective: 5 µg/m^3						

Figure E.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.

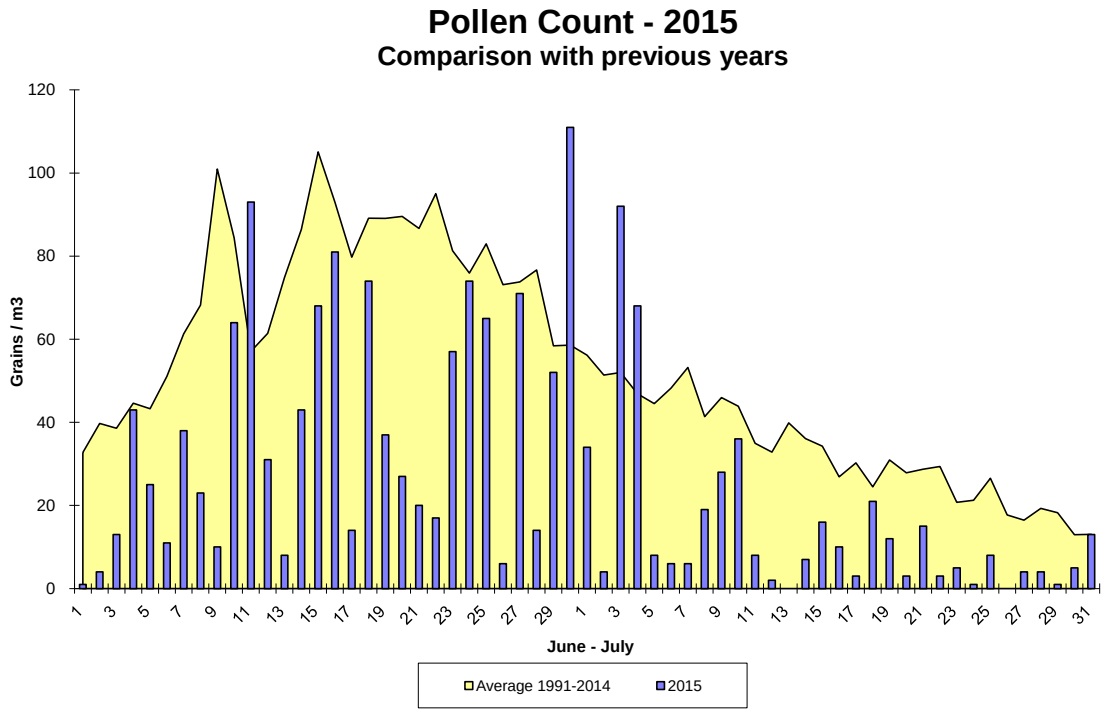
Unlike other pollutants, the amount of pollen in the air cannot be regulated or prevented. There is, however, great advantage for sufferers to be aware of the daily pollen count and pollen forecast to enable them to gauge the effectiveness of their drugs and to plan ahead to minimise exposure to expected 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 E.2 compares the 2015 pollen readings with the averaged data collected from 1991 to 2014. The trend differs from previous years, with the counts being lower in early summer with only the peaks being in late June and early July. Most hay fever sufferers experience symptoms when the count rises above 50 grains per cubic metre.

There was 1 day when the count was greater than 100 grains per cubic metre which compares with a mean of 7 days in the previous ten years and 13 days where the count was greater than 50 grains compared with a mean of 18 in the previous ten years.

Figure E.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 E.3-E.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[30] with the November and December 2015 being above average and May-September being slightly below average. The maximum temperatures were similar to previous years, with temperatures reaching 32.5ºC in July but lower than average in May and September. The minimum temperate reached -3 ºC in January 2015, with minimum temperatures between May and September being lower than average and December higher than average (Figures E.5-E.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[30] but generally lower, with above average levels in January, July, August and

December and particularly dry months in March, April, June and October (Figure E.8). The total rainfall in Bath (674 mm) was lower than the England total of 1272 mm, as Bath missed was not affected by the major flooding which hit parts of the UK.

Figure E.3 Wind Rose showing the frequency in each direction

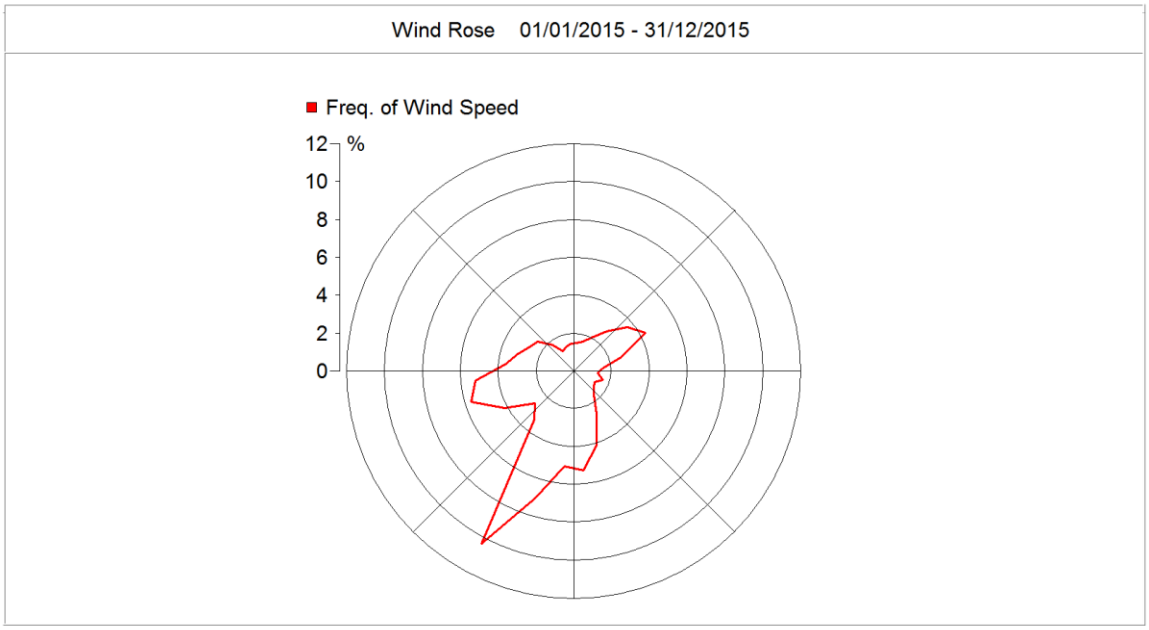


Figure E.4 Wind Rose

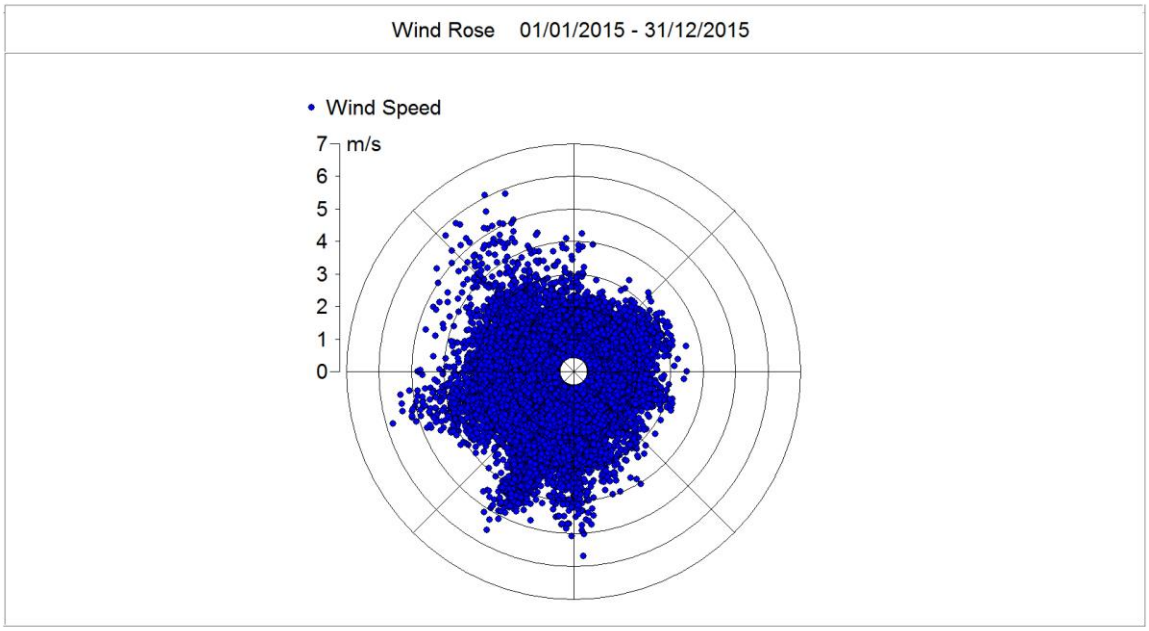


Figure E.5 Trends in Average Monthly Temperature

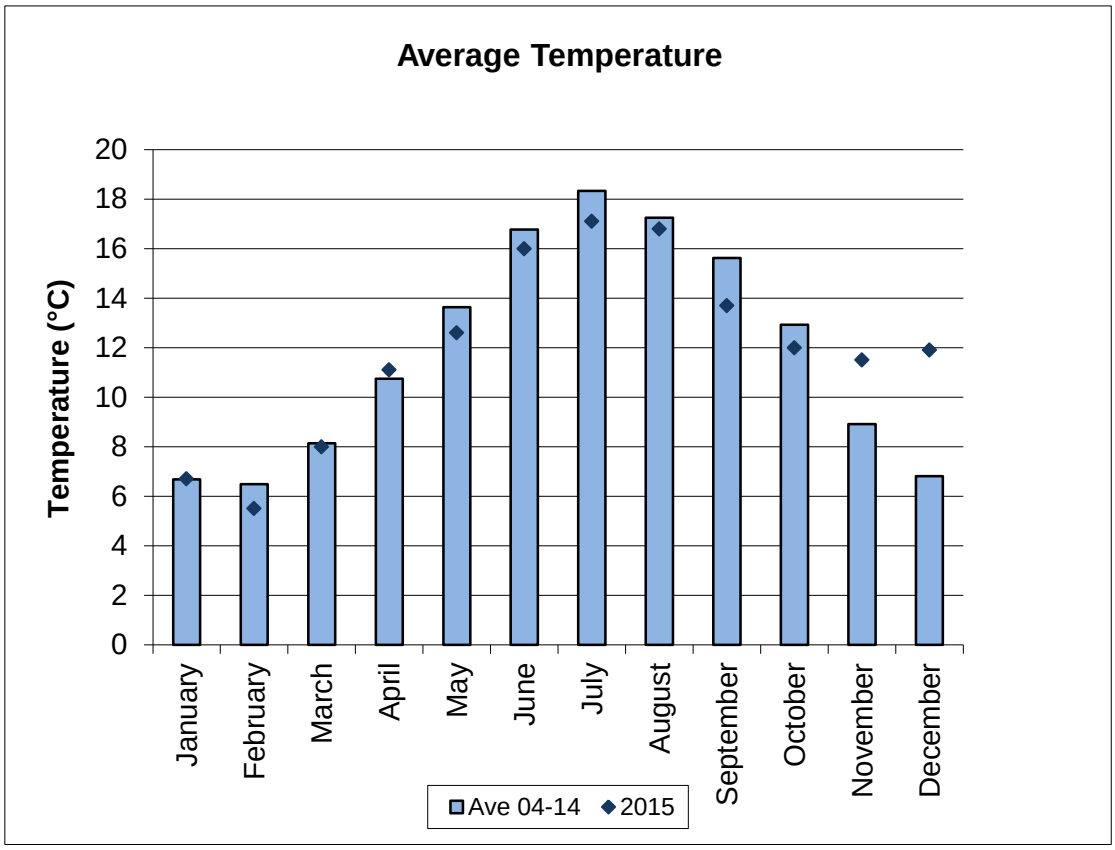


Figure E.6 Trends in Maximum Monthly Temperature

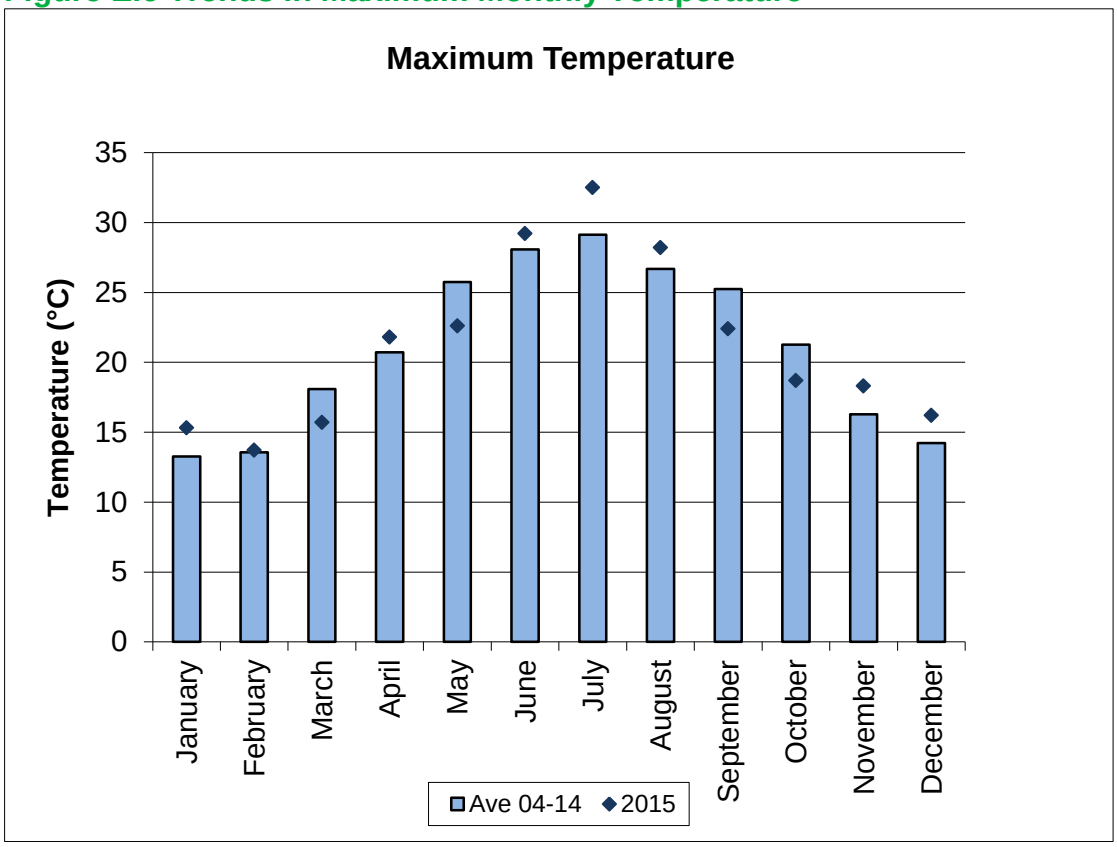


Figure E.7 Trends in Minimum Monthly Temperature

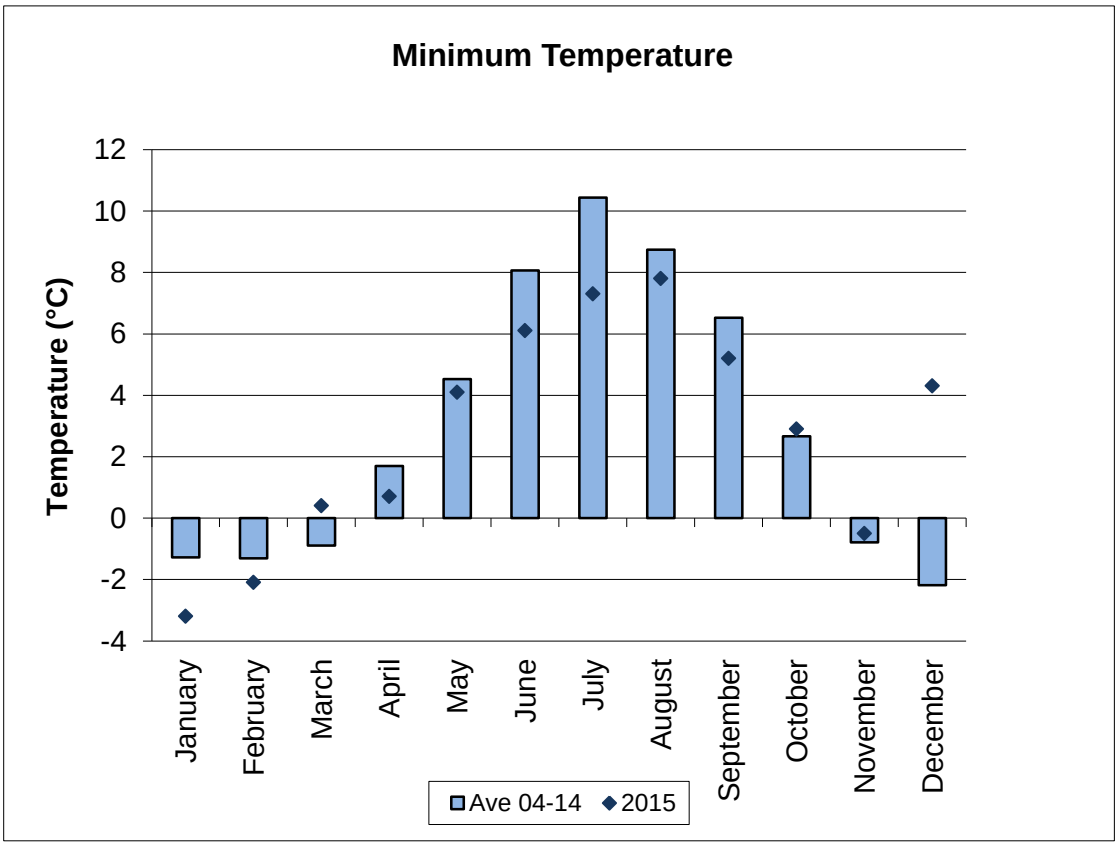
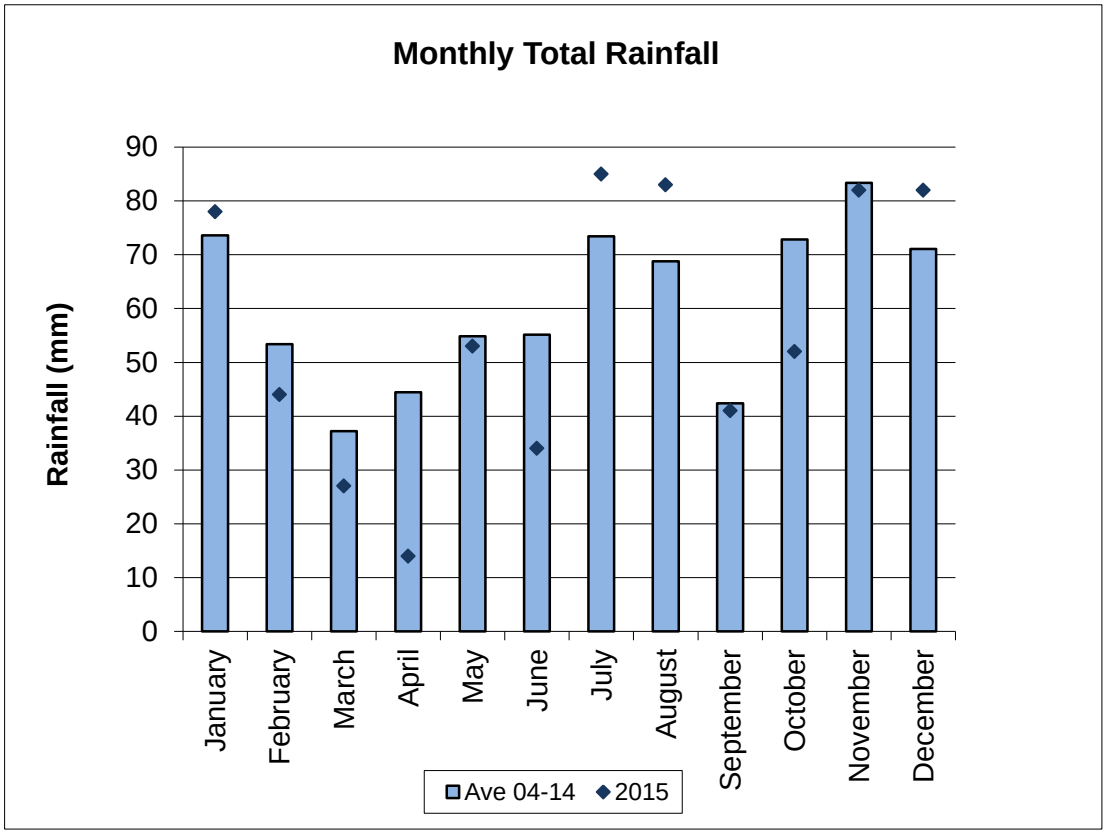


Figure E.8 Trends in the Total Monthly Rainfall



Appendix F: Maps of Monitoring Locations

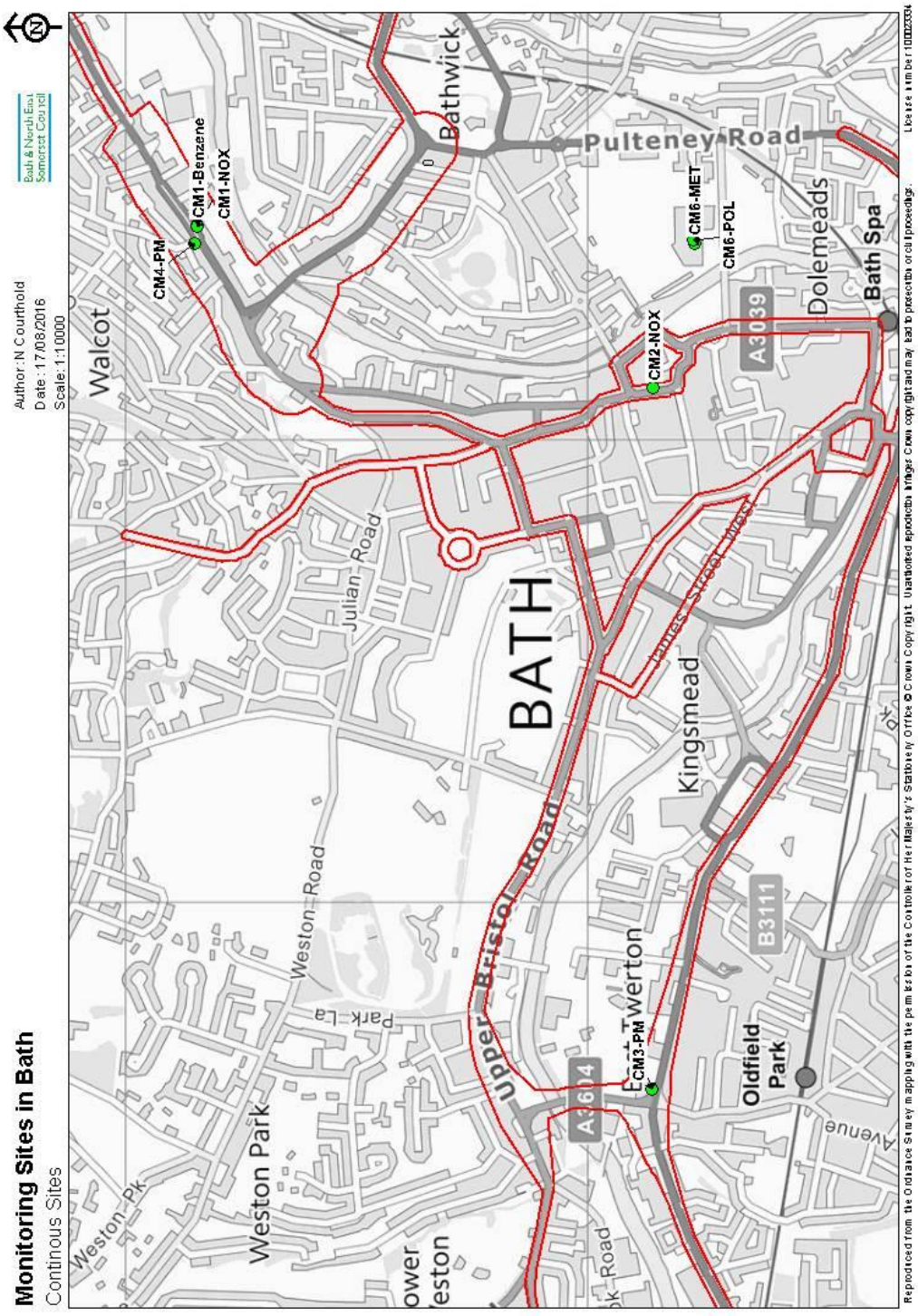


Figure F.1 Map showing automatic monitoring sites in Bath

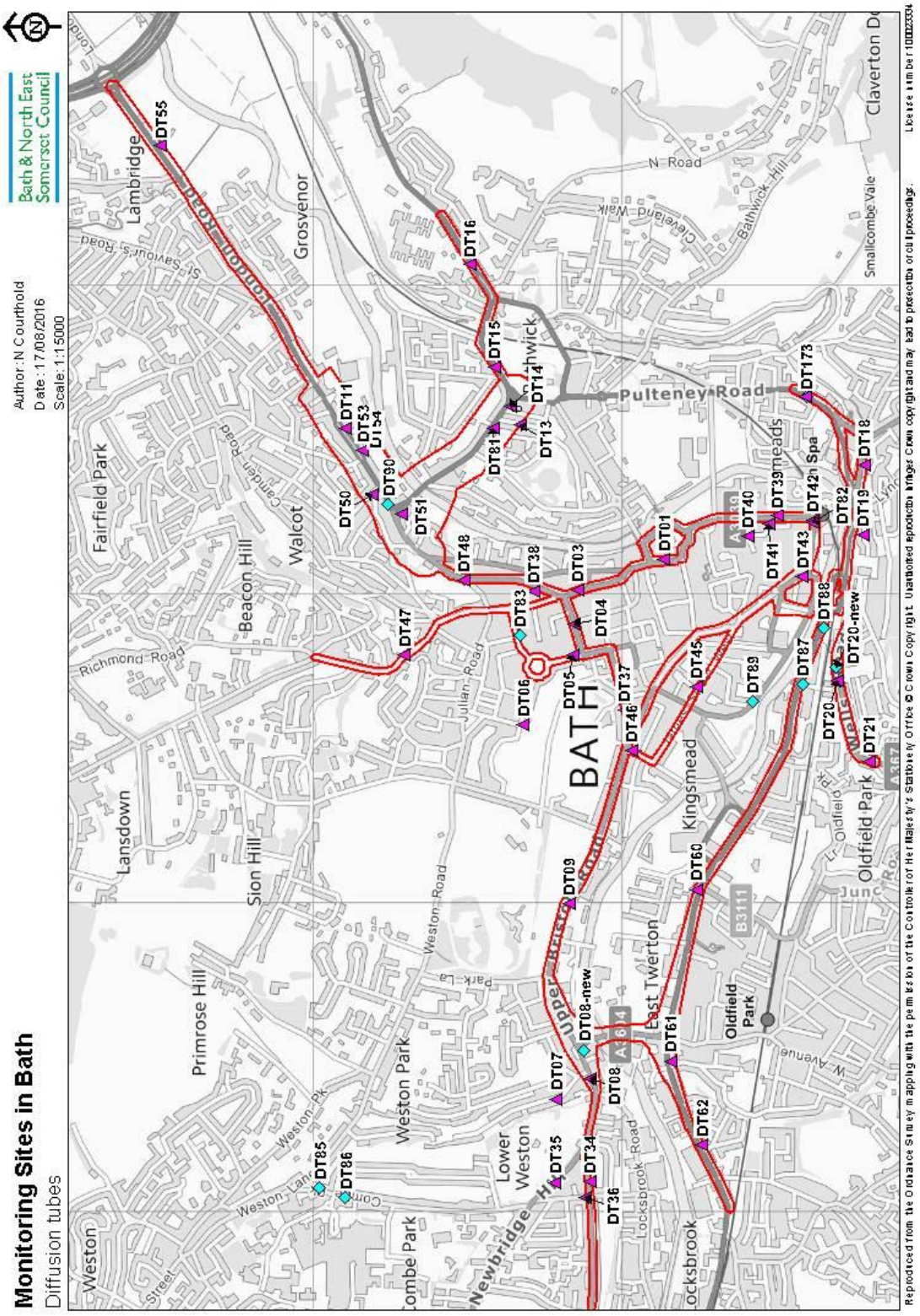


Figure F.2 Map showing monitoring sites in Bath – North East

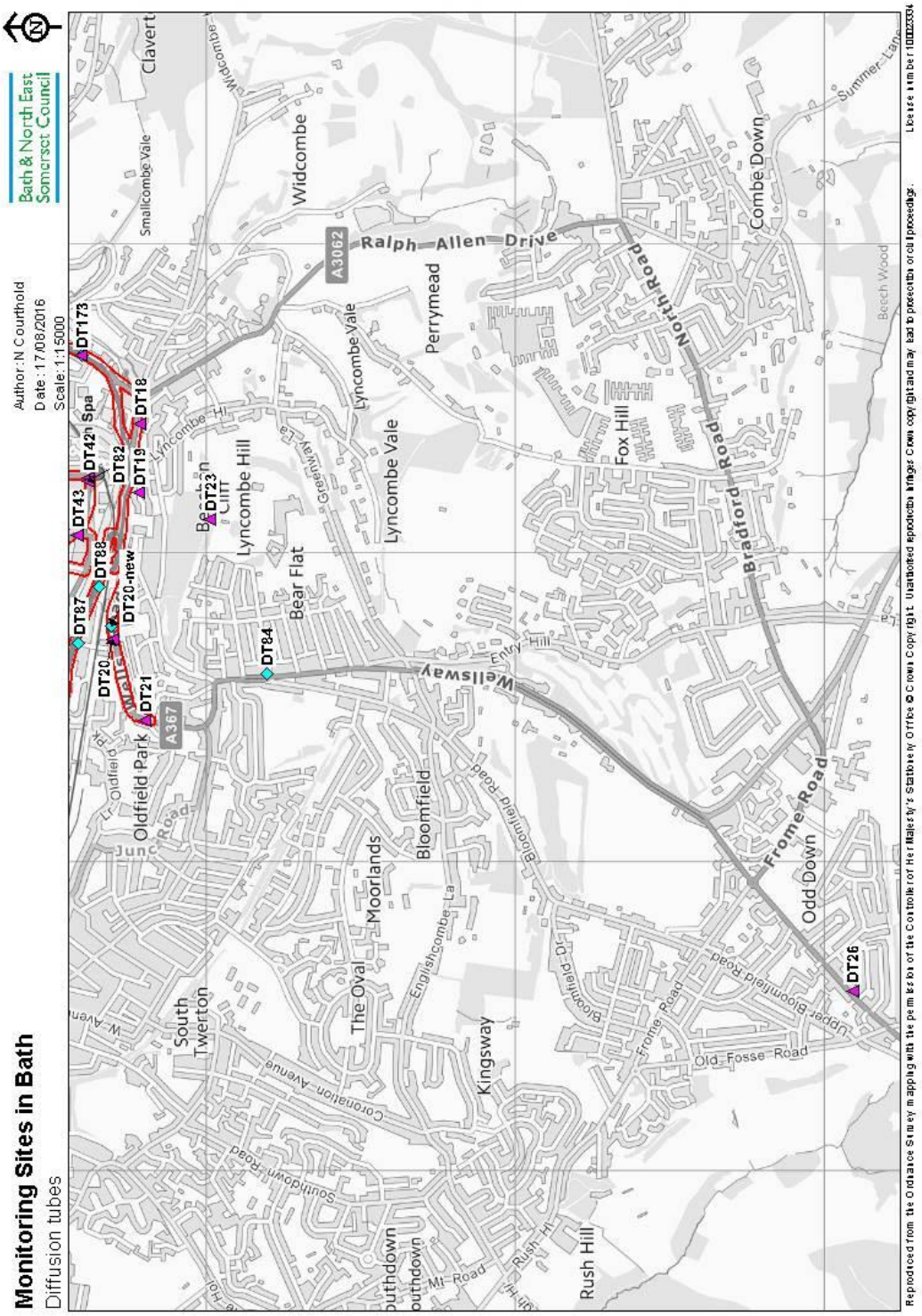


Figure F.3 Map showing monitoring sites in Bath –South

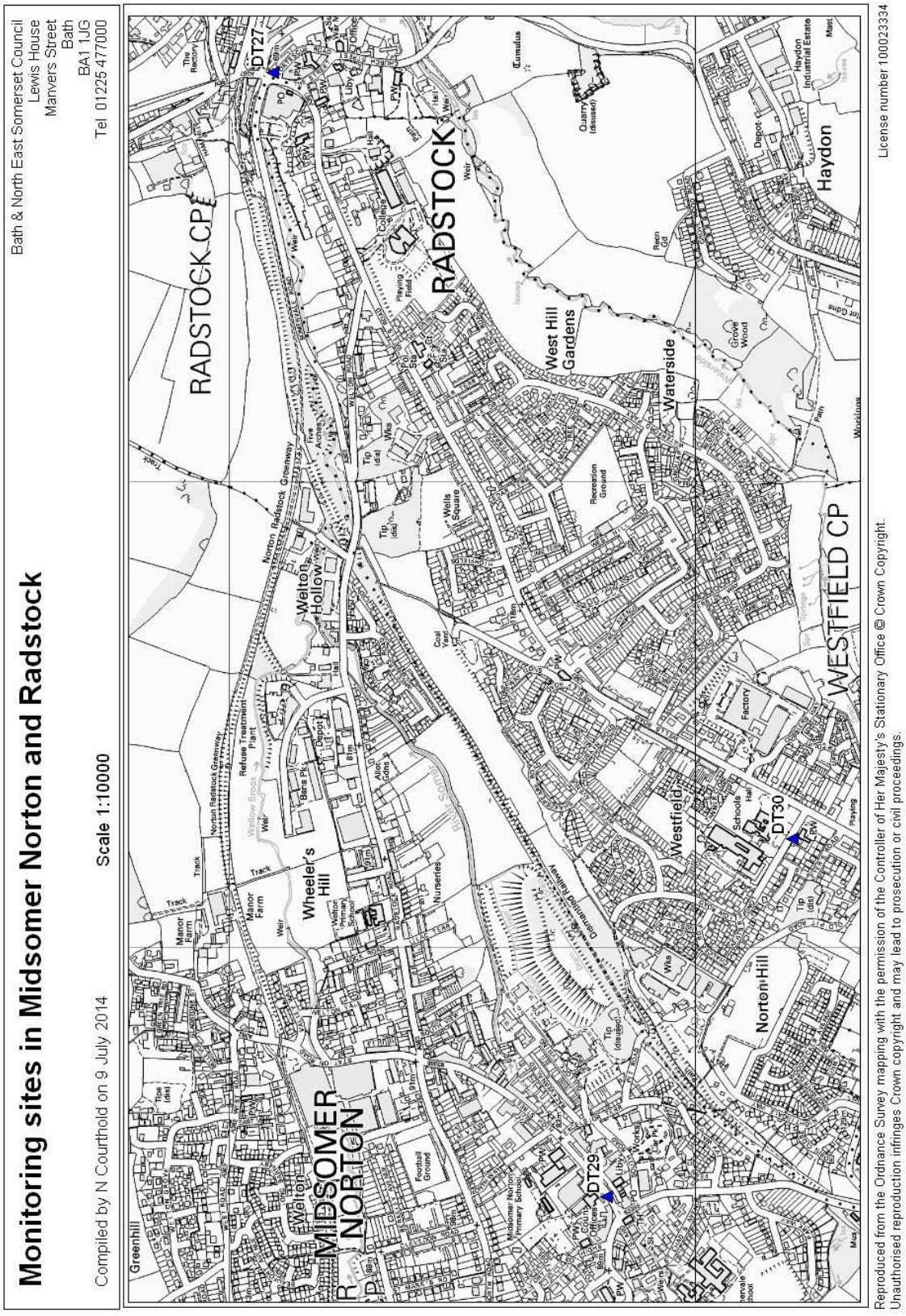


Figure F.4 Map showing monitoring sites in Midsomer Norton and Radstock

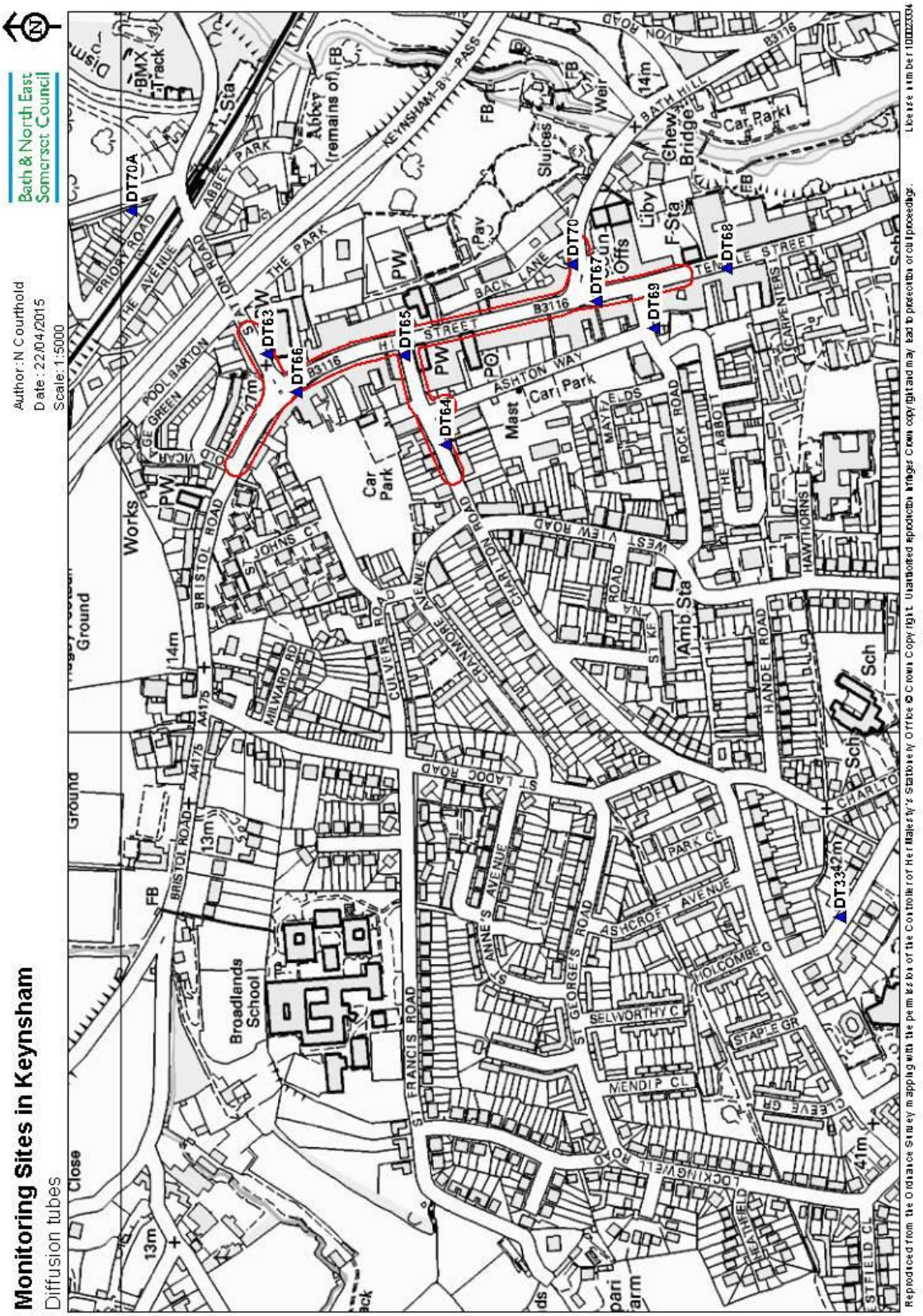


Figure F.5 Map showing monitoring sites in Keynsham

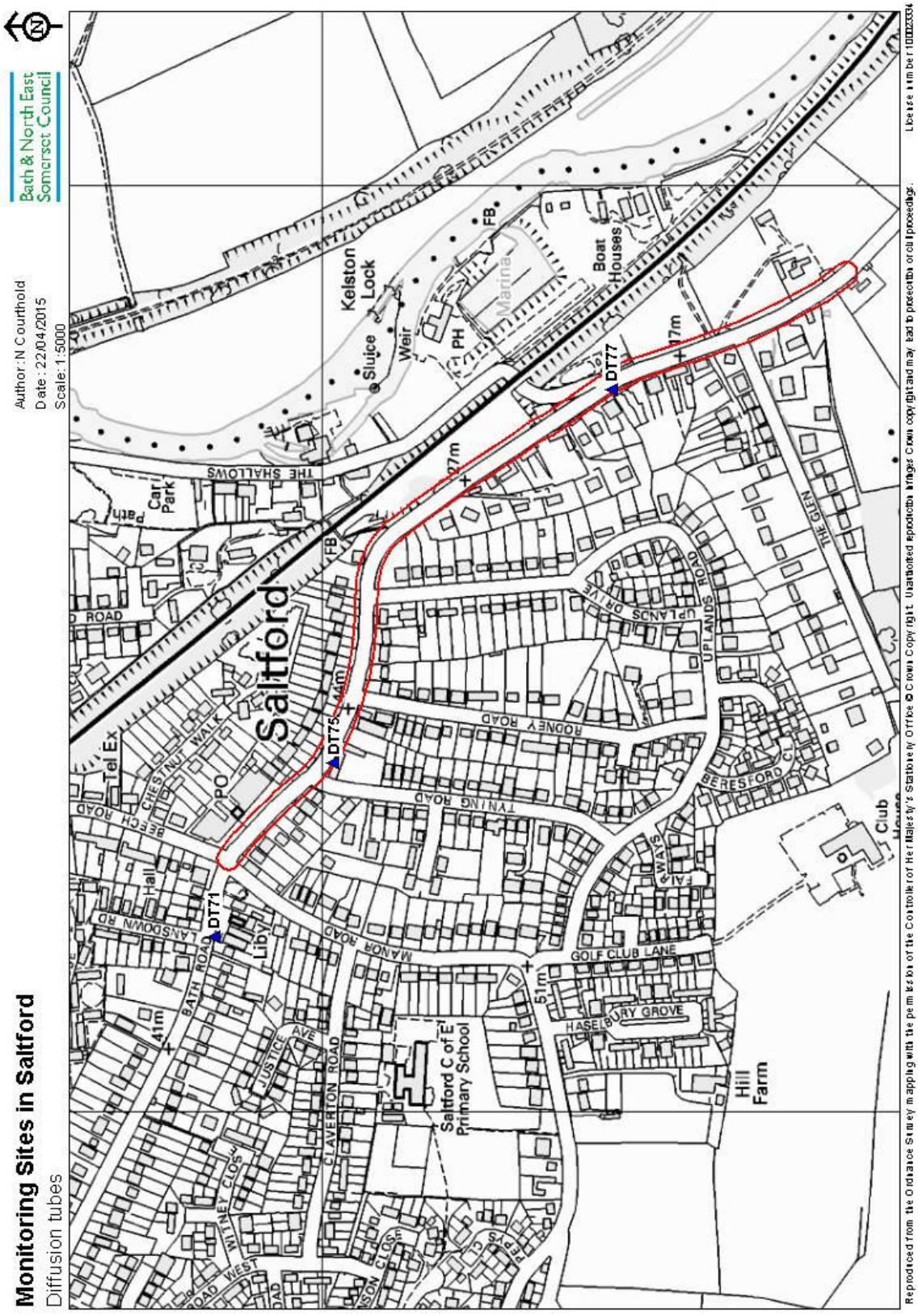


Figure F.6 Map showing monitoring sites in Saltford

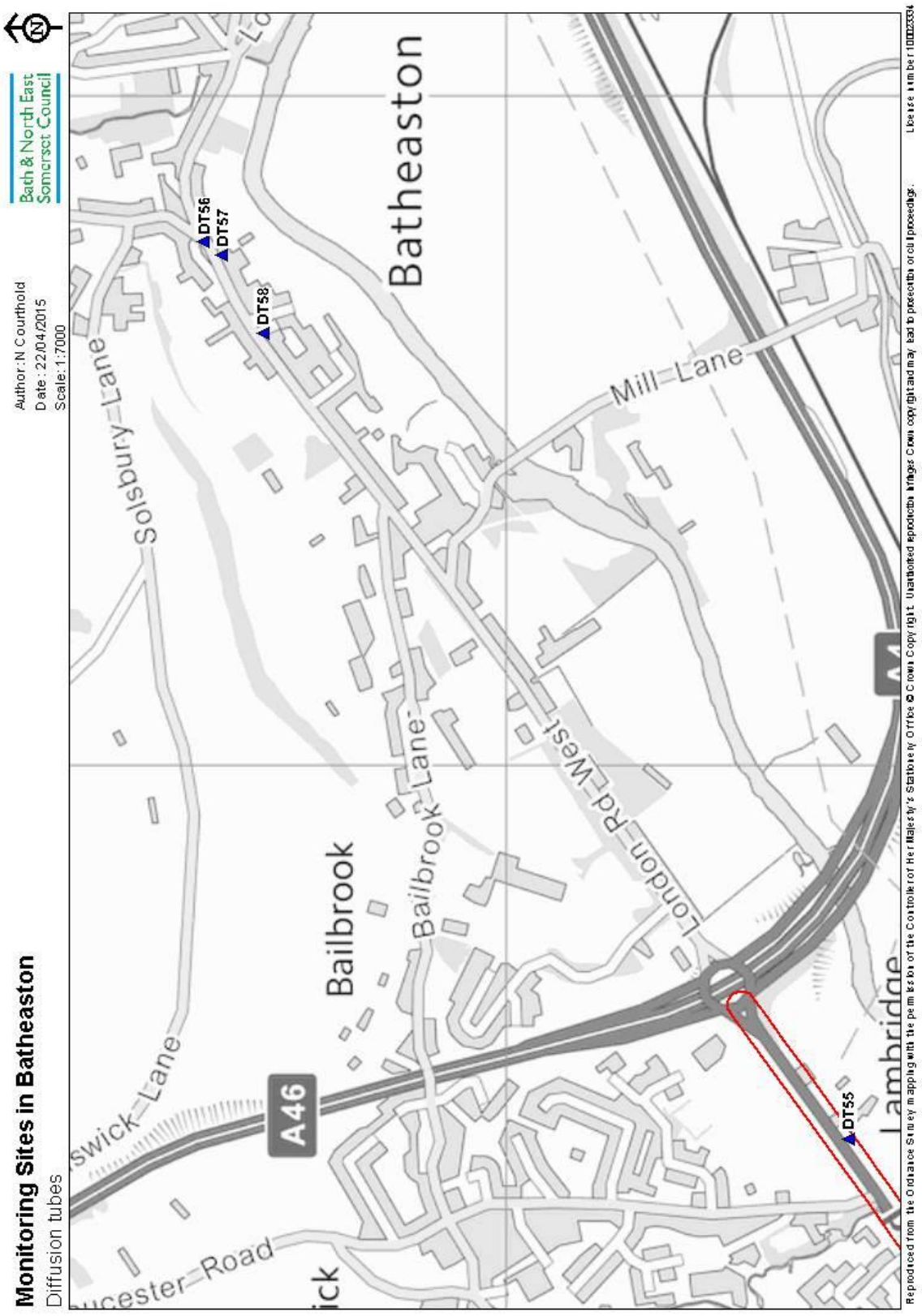


Figure F.7 Map showing monitoring sites in Batheaston

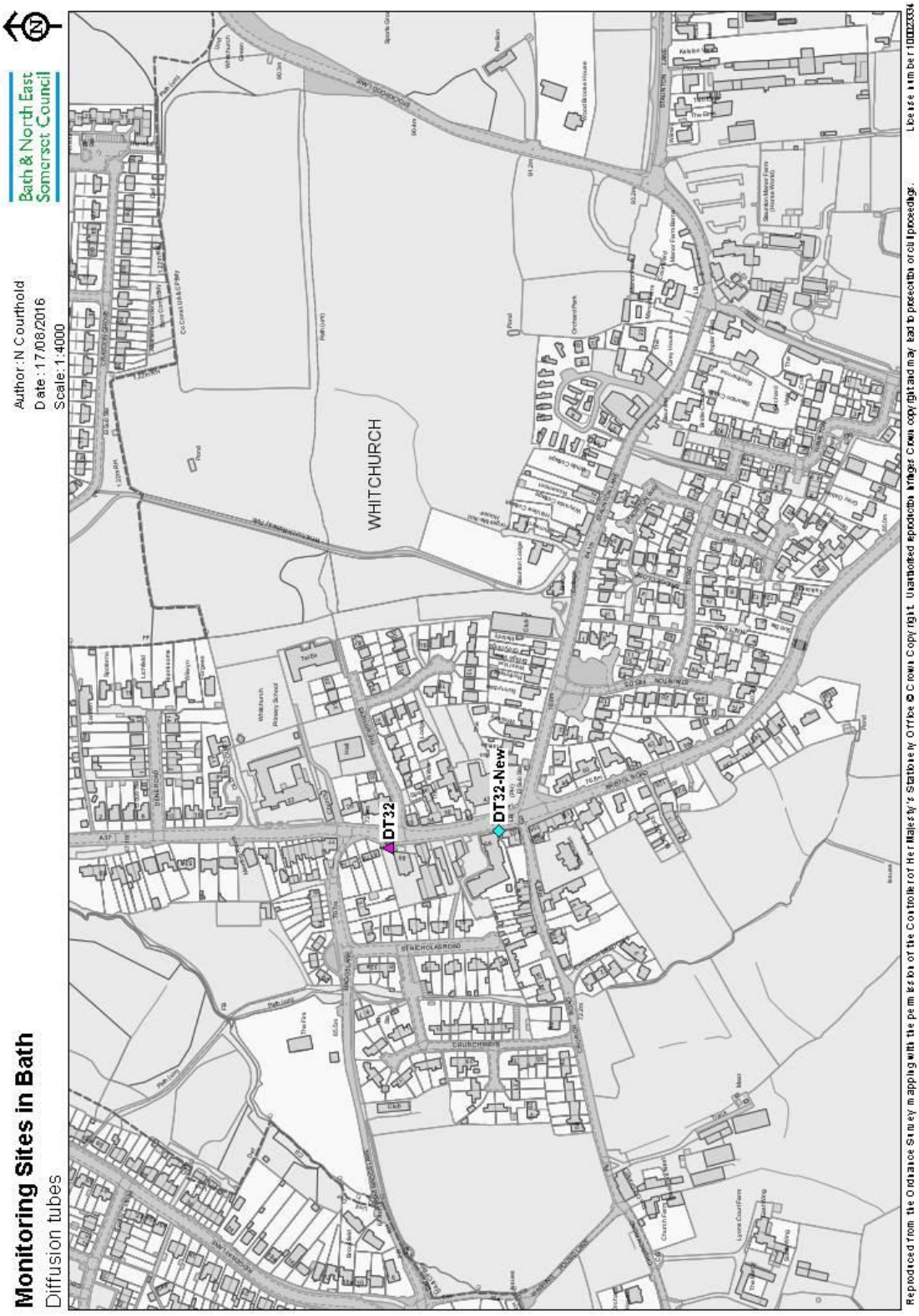


Figure F.8 Map showing monitoring sites in Whitchurch

Appendix G: Maps of Air Quality Management Areas

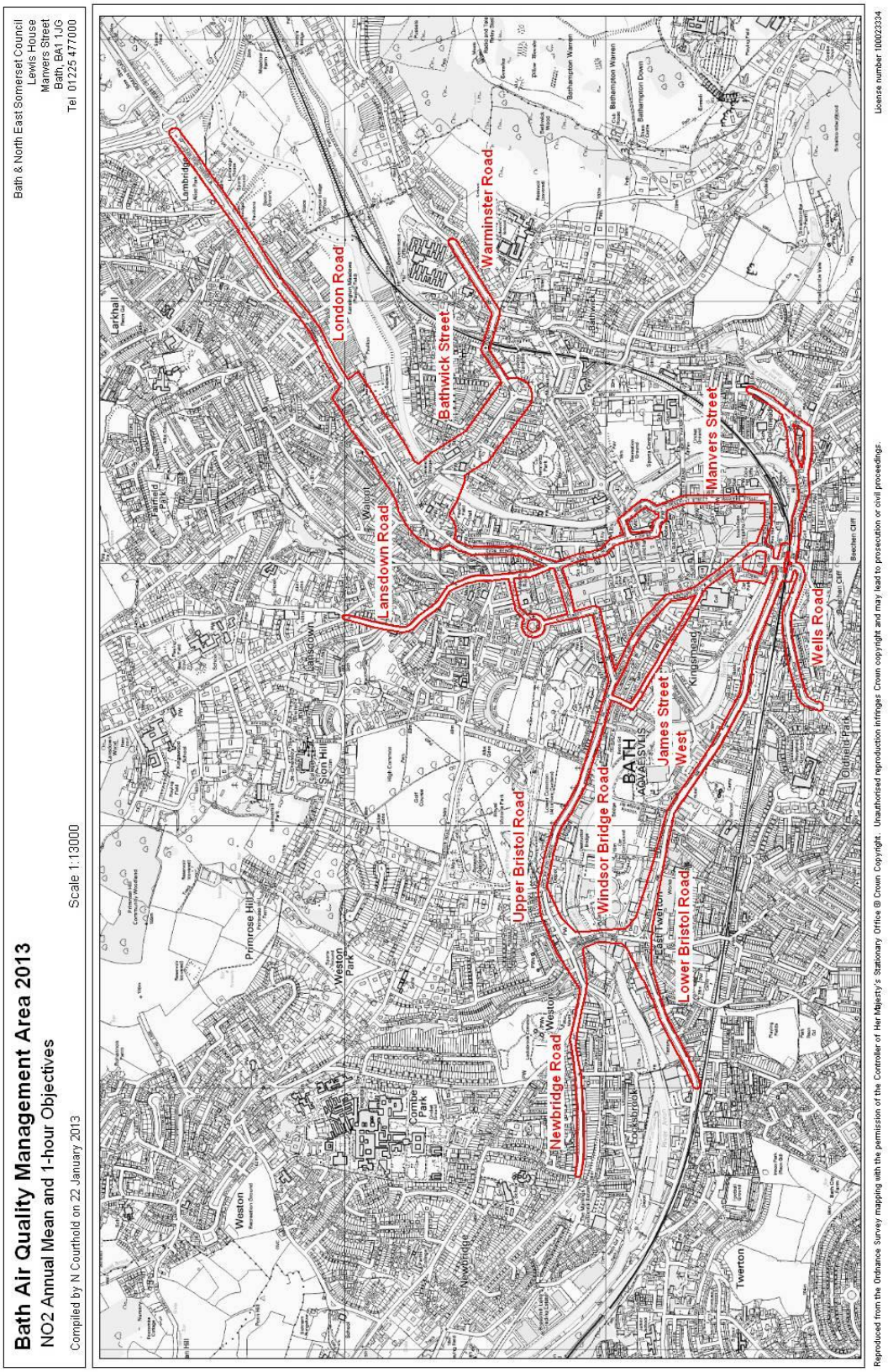


Figure G.1 Map showing current AQMA in Bath, valid from July 2013

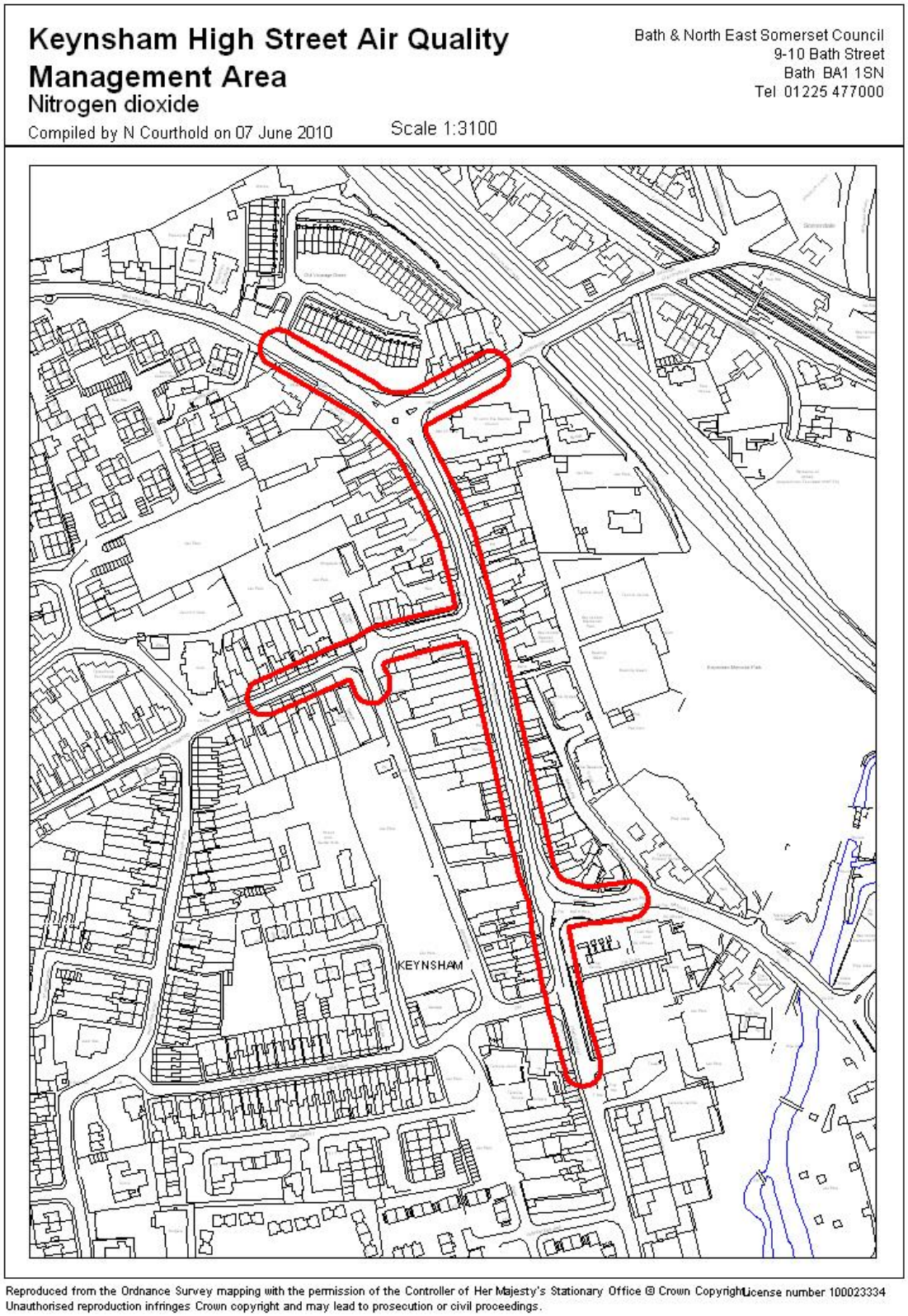


Figure G.2 Map showing AQMA for Keynsham, valid from July 2010

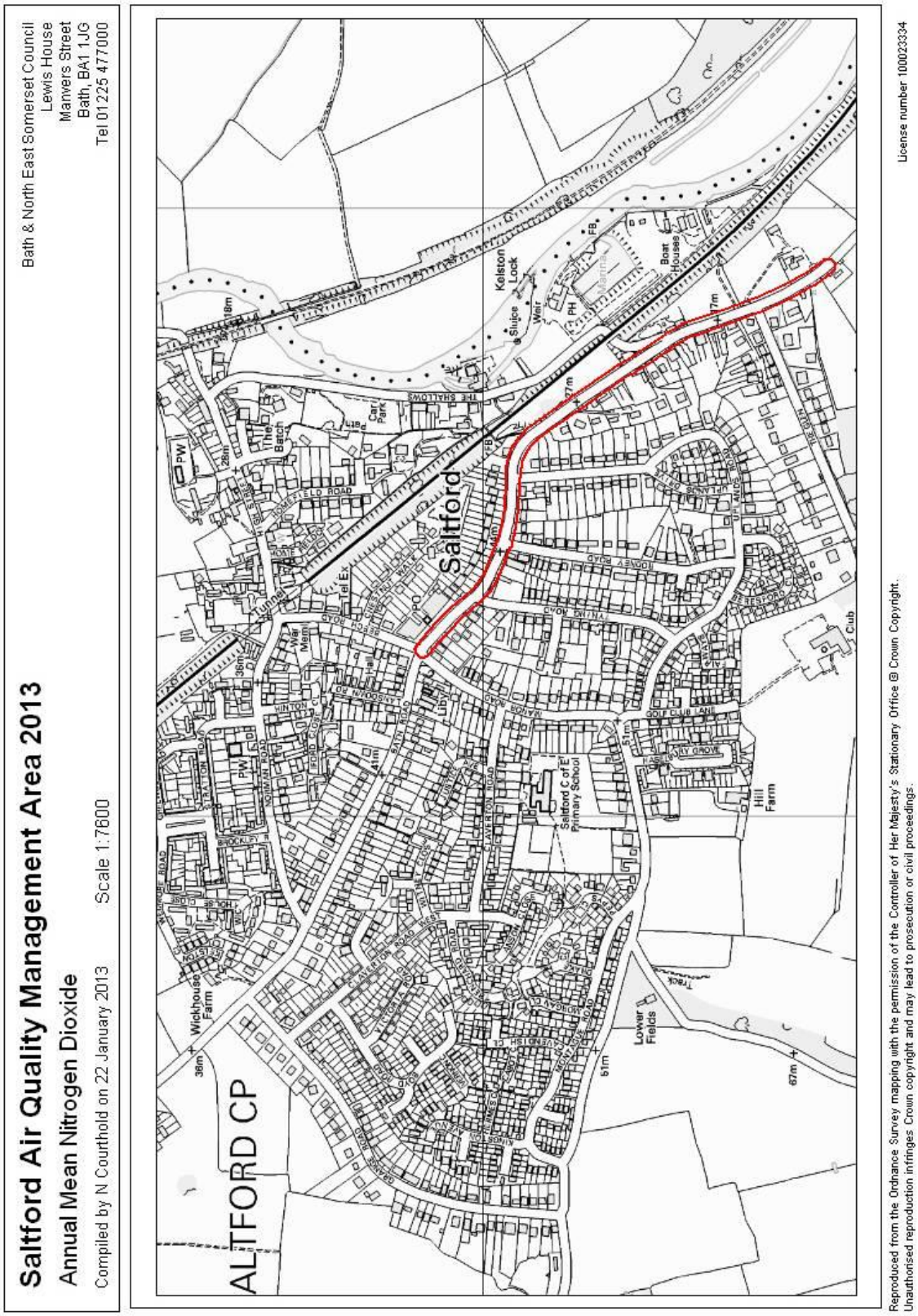


Figure G.3 Map showing AQMA for Saltford, valid from July 2013

Appendix H: Supporting Technical Information – Additional Information

H.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.

H.2 $PM_{2.5}$

Table H.1 below compares the monitored concentrations at Chelsea House (CM4) with the nearest AURN $PM_{2.5}$ analyser at Bristol St Paul's. The values are the same in 2015. The table also shows levels of $PM_{2.5}$ at Bristol St Paul's have been decreasing since 2011.

Table H.1 $PM_{2.5}$ concentrations at Bristol St Paul's and Bath Chelsea House

Year	Bristol St Paul's	Bath Chelsea House
2010	14	-
2011	15	-
2012	15	-
2013	13	-
2014	13	-
2015	10	10

Appendix I: Summary of Air Quality Objectives in England

Table I.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective*	
	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

*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
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
EV	Electric Vehicle
EU	European Union
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
ULEV	Ultra-Low Emission Vehicles

References

1. Environmental equity, air quality, socioeconomic status and respiratory health, 2010.

2. Department for Environment, Food and Rural Affairs (2006) Air quality and social deprivation in the UK: an environmental inequalities analysis.

3. Department for Environment, Food and Rural Affairs (May 2013) Abatement cost guidance for valuing changes in air quality.

4. Bath and North East Somerset Council (2014) Getting Around Bath: Supporting Document - A Transport Strategy for Bath. Mott Macdonald.

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

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

7. Bath and North East Somerset Core Strategy (2014) (Part 1 of the Local Plan).

8. West of England Joint Local Transport Plan 3 (2011). West of England Partnership.

9. Bath and North East Somerset Corporate Strategy 2016-2020. http://www.bathnes.gov.uk/sites/default/files/bnes_corporate_strategy_2016-2020.pdf

10. Getting Around Bath: A Transport Strategy for Bath (2014). Mott Macdonald.

11. Bath and North East Somerset Council (2016) Keynsham Transport Strategy. Mott Macdonald.

12. Bath & North East Somerset Council Placemaking Plan. http://www.bathnes.gov.uk/sites/default/files/sitedocuments/Planning-and-Building-Control/Planning-Policy/Placemaking-Plan/draft_pmp_vol_3_keynsham.pdf

13. Public Health Outcomes Framework overarching indicators http://www.phoutcomes.info/ .

14. 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.

15. Data Archive: https://uk-air.defra.gov.uk/data/

16. Department for Environment, Food and Rural Affairs (2016a) Part IV of the Environment Act 1995, Local Air Quality Management, Technical Guidance LAQM.TG(16). DEFRA, London.

17. DEFRA LAQM support – Review and Assessment Helpdesk, QA/QC framework: http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html

18. Air PT Scheme http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html

19. Royal College of Physicians and Royal College of Paediatrics and Child Health (February 2016) Every breath we take: the lifelong impact of air pollution. Report of a working party. https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution

20. DEFRA LAQM support – Review and Assessment Helpdesk, Distance fall off calculator http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html

21. DEFRA LAQM support – Review and Assessment Helpdesk http://laqm.defra.gov.uk/

22. DEFRA LAQM support – Personal Communication