Bath & North East Somerset Council

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Bath Air Quality Action Plan – Consultation Draft (final)

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

August 2017

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Executive Summary

This Draft Air Quality Action Plan (AQAP) has been produced as part of our statutory duties required by the Local Air Quality Management framework. It follows the publication of the Government's 'UK plan for tackling roadside nitrogen dioxide concentrations – Detailed Plan, July 2017'[1]. It outlines the actions we propose to improve air quality in Bath, between 2017-2022. In developing this document we have worked with a number of community groups who have input to this draft.

Health effects

The Royal College of Physicians' 2016 Report 'Every Breath We Take' states: *'Each year in the UK, around 40,000 deaths are attributable to exposure to outdoor air pollution, with more linked also to exposure to indoor pollutants.'*[2] Air pollution is associated with a number of adverse health impacts, particularly respiratory illnesses. It is also recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[3,4].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[5]. Bath & North East Somerset is committed to reducing the exposure of people in Bath to poor air quality in order to improve health.

Monitoring

Figure 1 below shows annual average levels of nitrogen dioxide in 2016 at a selection of sites across the Air Quality Management Area (AQMA). All of these sites exceed the 40 micrograms per cubic metre national air quality objective level for annual average nitrogen dioxide concentrations.

[1] UK plan for tackling roadside nitrogen dioxide concentrations. Detailed plan, DEFRA and DfT, July 2017.
[2] Every Breath You Take – The Lifelong Impact of Air Pollution, Royal College of Physicians, February 2016.
[3] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[4] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[5] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

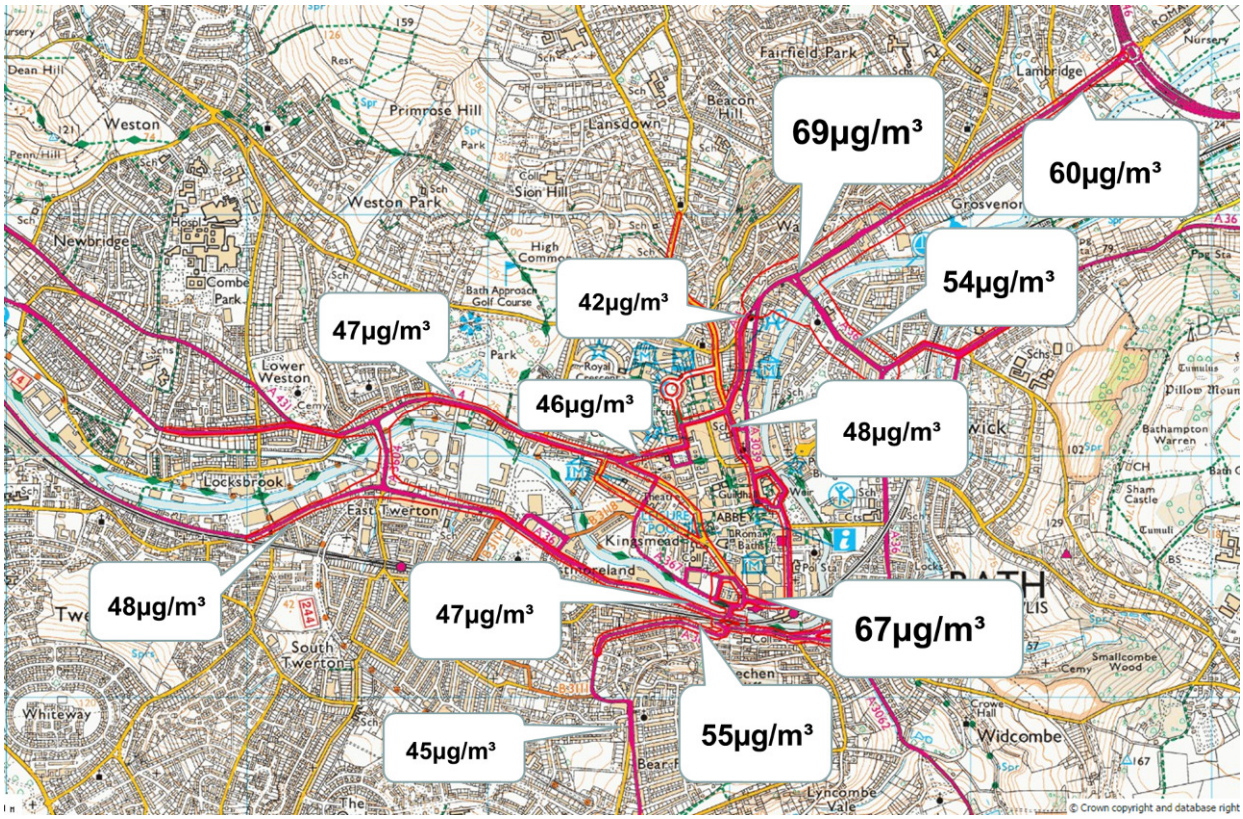

Figure 1: Annual average measurements of nitrogen dioxide in 2016 (microgrammes per cubic metre).

Source of the pollution

Figure 2 below shows the percentage oxides of nitrogen (including NO_2) from each vehicle type at selected sites based on the assumption of 10kph average traffic speeds:

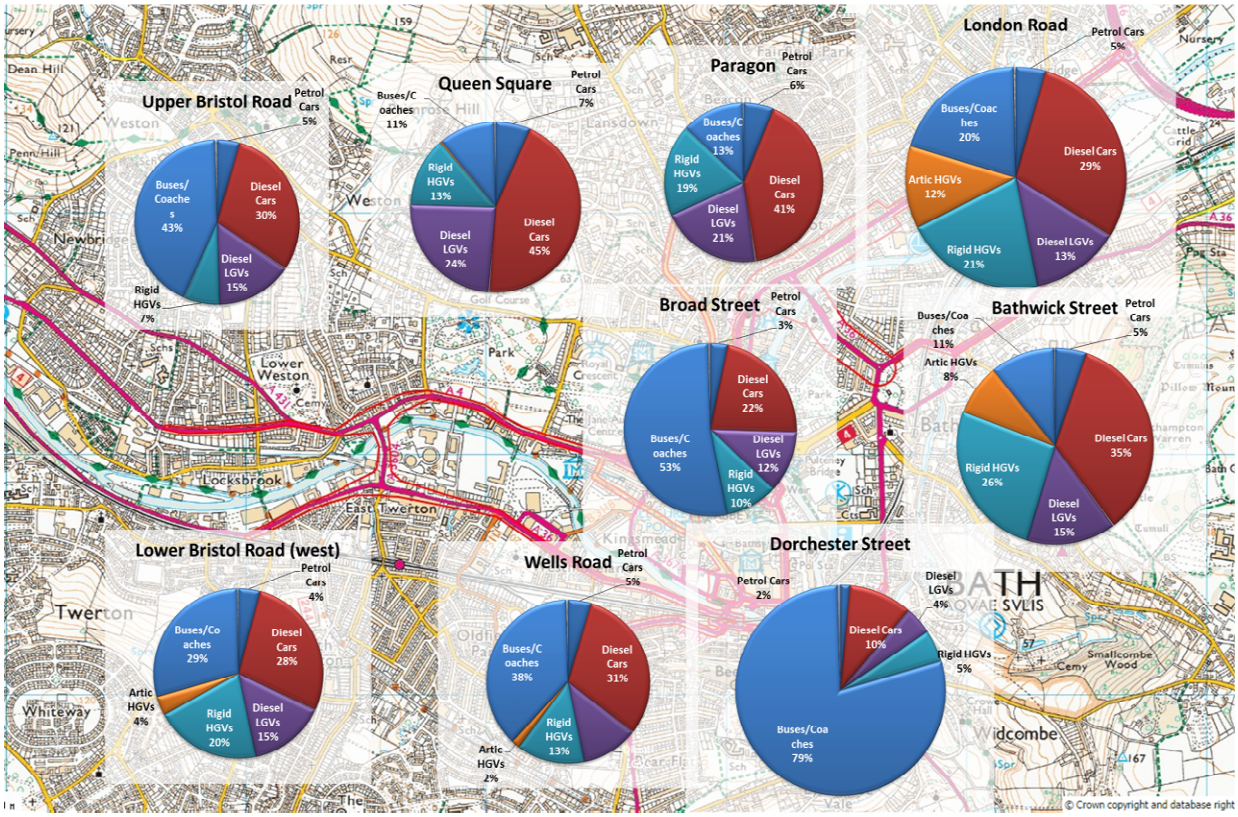

Figure 2: oxides of nitrogen emissions by vehicle type at selected locations in 2016 (assuming 10kph average speed).

The proportion of pollution from each vehicle type varies with location due to the differing make up of traffic. Diesel cars contribute the most oxides of nitrogen (NOx) in many locations, with buses and coaches contributing most where there are many bus routes, particularly in the vicinity of Dorchester Street, Broad Street and Wells Road. HGVs (rigid and articulated) contribute the largest proportion on London Road and approximately the same as diesel cars on Bathwick Street.

The new UK plan

The Department for Environment, Food and Rural Affairs and Department for Transport published their 'UK plan for tackling roadside nitrogen dioxide concentrations' on 26th July 2017. The content of this plan takes into account that for the first time, Bath and North East Somerset is listed as an authority upon which the Government has placed legal duties on to 'develop and implement a plan designed to deliver compliance in the shortest time possible'. This plan may include a Clean Air Zone (CAZ) or other measures if they can deliver compliance as quickly as a CAZ.

The Bath Air Quality Action Plan will be developed and implemented in co-ordination with the UK Plan[1]. The consultation on the actions identified in this draft document will inform what other measures (such as an A36/46 link road, local freight consolidation by cargo bikes, staggered business and school hours or Metrobus/Light Rapid Transit system) could be modelled in order to identify potential reductions in concentrations of nitrogen dioxide.

Other national advice

The Royal College of Physicians document 'Every Breath We Take'[1] includes the following recommendations for actions:

- Act now – government must empower local authorities and incentivise industry to plan long term;
- Educate health professionals, policymakers and the public about the health effects;
- Promote alternatives to petrol and diesel cars;
- Put the onus on the polluters;
- Act to protect the public health when air pollution levels are high;
- Tackle inequality. Our most deprived communities are exposed to some of the worst outdoor and indoor air quality;
- Protect those most at risk. Children, older people, and people with chronic health problems are among the most vulnerable to air pollution.
- Lead by example in the NHS

The National Institute for Health and Care Excellence guideline air pollution document[6] list a number of recommendations including:

- Include air pollution in 'plan making' by all tiers of local government
- Including air quality outcomes in travel plans
- Supporting car clubs

[6] National Institute for Health and Care Excellence – 'Air Pollution: outdoor air quality and health', June 2017.

- Supporting active travel
- Siting living accommodation away from roadsides
- Providing charging facilities for electric vehicles
- Managing street vegetation to reduce the risk of restricting street ventilation
- Introduction of a Clean Air Zone
- Driver training to increase fuel efficiency and reduce emissions
- Advice for vulnerable groups

We have developed actions that can be considered under nine broad topics:

- Policy guidance and development control (eg 'Produce developer guidance or Supplementary Planning Guidance relating to air quality');
- Alternatives to private vehicle use (eg 'Provide additional cycle parking across the city centre');
- Freight and delivery management (eg 'Promote use of low emission vehicles for freight, refuse, recycling & postal services, where possible');
- Promoting low emission transport (eg 'Retrofit Council fleet to low emission vehicles, where practical to do so, and only purchase such vehicles, where available');
- Promoting travel alternatives (eg 'Improve the awareness of public transport information websites and apps.')
- Public information (eg 'Involve the public and educational establishments with practical air quality monitoring');
- Transport planning and infrastructure (eg 'Procure a thorough transportation and movement study to better understand through traffic movements in Bath');
- Traffic management (eg 'Implement a Bath Clean Air Zone'); and
- Vehicle fleet efficiency (eg 'Procure fleet of low emission fleet of pool cars to shift Council business travel from personal petrol and diesel vehicles to pool cars').

Local policy

The air quality issue (action plans and AQMAs) carries a high strategic profile in Bath and North East Somerset Council. The Core Strategy includes reference to the Air Quality Action Plan for Bath: '*air quality…will be managed in accordance with the NPPF'* (paragraph 6.101).

The Joint Local Transport Plan 3 (JLTP3): 2011-2026, states that 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.

The Corporate Strategy's 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 Getting Around Bath Transport Strategy (GABTS 2014)[7], states as one of its objectives: *'Improving air quality and health, reducing vehicle carbon emissions'*. Air quality is also listed as one of the Key Performance Indicators. Policy GABP4 and associated actions are set out below:

Traffic Management and Air Quality

Policy GABP4: Vehicle movement should be better managed to reduce traffic impact and emissions, particularly in the city centre where there is less space available.

Action GABA10: Develop options for a Low Emission Zone to improve air quality in the city and press Government for appropriate enforcement powers to make such a zone effective if implemented.

Action GABA11: Continue to support car clubs and other measures to encourage alternatives to car use particularly in the city centre.

Action GABA12: Develop a programme to remove traffic from the central areas of the City and reduce its impact in other areas e.g. Queen Square, Manvers Street, Dorchester Street.

[7] Getting Around Bath – A Transport Strategy for Bath, 2014 (http://www.bathnes.gov.uk/sites/default/files/sitedocuments/getting_around_bath_transport_strategy_-_final_issue_web_version.pdf)

The Transport Strategy is broadly reflected in the document 'Our plan to get Bath moving'[8] which includes improving air quality as one of its central themes.

Section 1 of the Public Realm and Movement Strategy: Creating a Canvas for Public Life in Bath 2010[9] includes a commitment to developing schemes that improve air quality.

The Bath Parking Strategy is due to be published in 2017 and the draft version includes as one of its objectives: *'Sustain and enhance the vitality and viability of settlements within B&NES, including the City of Bath, through parking policies which support the prosperity of the city and towns whilst reducing the growth of traffic in the most congested areas and improving the air quality'*.

Progress from the previous action plan

This action plan will replace the previous action plan which covered 2011-2016. A progress report was produced in 2016. Projects delivered through the past action plan include:

- The **Bath Transportation Package** has resulted in 890 additional park and ride (P&R) spaces spread across three existing park and ride sites (facilitating a 16% increase in P&R patronage between 2008/09-2016/17); real-time bus passenger information; roadside variable message signs; Stall Street & Lower Borough Walls access restrictions (10am-6pm every day, in one of the city's main shopping streets); reduction in city centre car parking (closure of Sawclose car park); High Street public realm improvements; and Seven Dials cyclist and pedestrian improvements;
- A **Low Emission Zone** (LEZ) feasibility study identified best performing options for an LEZ, including stipulating Euro 5 engine standards for a number of scenarios.
- **Low Carbon Buses Trial** of a hybrid diesel-electric double bus commenced in August 2010 and has been extended indefinitely. The

[8] Our Plan To Get Bath moving (Our Transport Plan), July 2017.
[9] Bath Public Realm and Movement Strategy 'Creating the canvas for public life in Bath, 2010' (http://www.bathnes.gov.uk/sites/default/files/sitedocuments/Planning-and-Building-Control/MajorProjects/BathPRandMS_Hi-Res.pdf)

success of this trial led to the award of the new Park and Ride contract with 8 new hybrid diesel-electric buses, climate control, as well as a 7 day a week service. The £2.5m fleet was introduced by First Group under contract to Bath & North East Somerset Council on Bath's three park and ride routes in 2012.

- The **Freight Consolidation Scheme** has been in operation in Bath since January 2011. It provides electric vehicles to undertake deliveries from a transhipment site at Avonmouth, Bristol with the aim of reducing goods vehicle trips into the city centre. Following a review of the economic viability of the operation, the Council cancelled its contract and ongoing subsidy for the operation, effective from 1st April 2017. DHL, the current operator of the scheme is currently reviewing their commercial viability for the service and are continuing the service until such time as they decide it is no longer a viable enterprise.

  The scheme currently serves 41 retail outlets in Bath and monthly reductions in oxides of nitrogen emissions amount to 23.77kg on average per month (Jan 2011-March 2017). There is a 77% reduction in number of deliveries to outlets using the service (in Bath and Bristol).

- **Improved Enforcement of Traffic Regulation Orders** was undertaken with temporary HGV detection equipment installed on A4 through Bath (which has a 7.5t environmental weight limit). DVLA contacted for owner details and operators questioned if their vehicles were using the restricted route.

- **Bicycle Hire including Electric Bikes** were installed including four docking stations with 58 racks and 35 bicycles were installed in 2011. This was replaced by a new scheme in 2014 with 100 cycles at 9 locations. This has since been increased to 13 locations.

- **Electric Vehicle Recharging Points** including public charge points have been installed at one city centre car park, all three P&R sites and the University of Bath, funded through the Local Sustainable Transport Fund. Additional charging units have been provided at employment sites. The Council was awarded Go Ultra Low City funding in 2016 with the other

West of England authorities to further incentivise the uptake of Ultra-Low Emission Vehicles (ULEVs).

- A **Review of Council and Emergency Service Vehicle Fleet** was undertaken by the Energy Saving Trust as part of the successful Go Ultra Low City Scheme bid. As a result, the Council has pledged to change 25% of its light duty fleet to ULEVs by 2021. Four ULEVs have already been purchased and are in operation. The Council is also using the funding to purchase electric two wheelers for parking officers.
- **Monitoring of Bus Fleet Quality** and **Alternative Exhaust Emissions Abatement** measures resulted in Clean Vehicle Technology Fund award which enabled retrofitting of thermal energy regulation technology on 38 buses.
- The £2.1m **Rossiter Road Traffic Management Scheme** was completed in 2015 and transformed Widcombe Parade into a more pleasant environment for shoppers, pedestrians and cyclists as it removes A36 through traffic, including HGVs. NO_2 concentrations on Widcombe Parade have decreased by approximately 15 µg/m^3 and are now below the air quality objective of 40 µg/m^3.
- DEFRA Grant was awarded in 2011-12 for work on the Council's **Promotional Website** which resulted in near-live data from the automatic monitors in Bath becoming available online. The live air quality dials were developed in partnership with Bath Hacked, following an Air Quality Hack event http://www.bathnes.gov.uk/services/environment/pollution/airquality .
- The Council **Corporate Travel Plan** commenced in 2012 and received a Silver award in December 2013 from the West of England Business Travel Plans accreditation scheme. Measures implemented include: dedicated staff electric charge points installed; electric pool bikes for staff; two electric pool cars and two low emission petrol pool cars; cycle mileage for business @ 40p per mile; discounted bus tickets for the main business mileage corridor between Bath and Keynsham; new secure cycle parking facilities and improvements to existing facilities; lift-sharing database for commuting & in work trips; promotional campaign for cyclewise salary sacrifice scheme; staff travel road shows in all office locations; 'Dr Bike' sessions

(free bike maintenance for staff); I.T. based solutions to reduce the need for travel to work and between office locations (Citrix home working technology, portable devices & virtual conferencing facilities); and 10 % bio fuel is added to all depot held diesel and Ad Blue is also added to fleet lorry diesel.

In this AQAP we outline how we plan to effectively tackle air quality issues within our control. However, we recognise that there are a large number of air quality policy areas that are outside of our influence (such as vehicle emissions standards agreed in Europe), but for which we may have useful evidence, and so we will continue to work with regional and central government on policies and issues beyond Bath & North East Somerset's direct influence. It is clear that the Council cannot deliver on the measures alone and we will need to work in partnership with other agencies and communities to deliver outcomes which benefit the whole population. Part of the consultation process will be to further this dialogue and to look for delivery partners who can support us in this work.

The final AQAP will be approved by the Cabinet Member for Development. The West of England Combined Authority will be consulted to ensure the plan is aligned with regional policy. This AQAP will be subject to an annual review and appraisal of progress. Progress each year will be reported in the Annual Status Reports (ASRs) produced by Bath & North East Somerset, as part of our statutory Local Air Quality Management duties.

If you have any comments on this AQAP please email Environmental_Monitoring@bathnes.gov.uk or send them to:

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1.Introduction

This report outlines the actions that Bath & North East Somerset plan to deliver between 2017-2021 in order to reduce concentrations of air pollutants and exposure to air pollution; thereby positively impacting on the health and quality of life of residents and visitors to Bath.

It has been developed in recognition of the legal requirement on the local authority to work towards Air Quality Strategy (AQS) objectives under Part IV of the Environment Act 1995 and relevant regulations made under that part and to meet the requirements of the Local Air Quality Management (LAQM) statutory process.

Progress on measures set out within this Plan will be reported on annually within Bath & North East Somerset's Air Quality Status Report (ASR).

2. Summary of Current Air Quality in Bath & North East Somerset

Introduction

In 2016, monitoring of NO_2 was carried out at over 50 locations in Bath using diffusion tube monitors and 4 continuous analysers. Full details of the monitoring carried out by Bath & North East Somerset Council are published in the Air Quality Annual Status Report (ASR). The reports are available at: http://www.bathnes.gov.uk/services/environment/pollution/air-quality/reports. The 2016 ASR will be available in September 2017.

In Bath, the monitoring exceeds the annual average NO2 concentrations at a number of locations and an Air Quality Management Area (AQMA) has been declared. Figure 2-1: Bath Air Quality Management Area indicates the current extent of the Bath Air Quality Management Area.

The diffusion tube and automatic monitoring locations are provided in Appendix B.

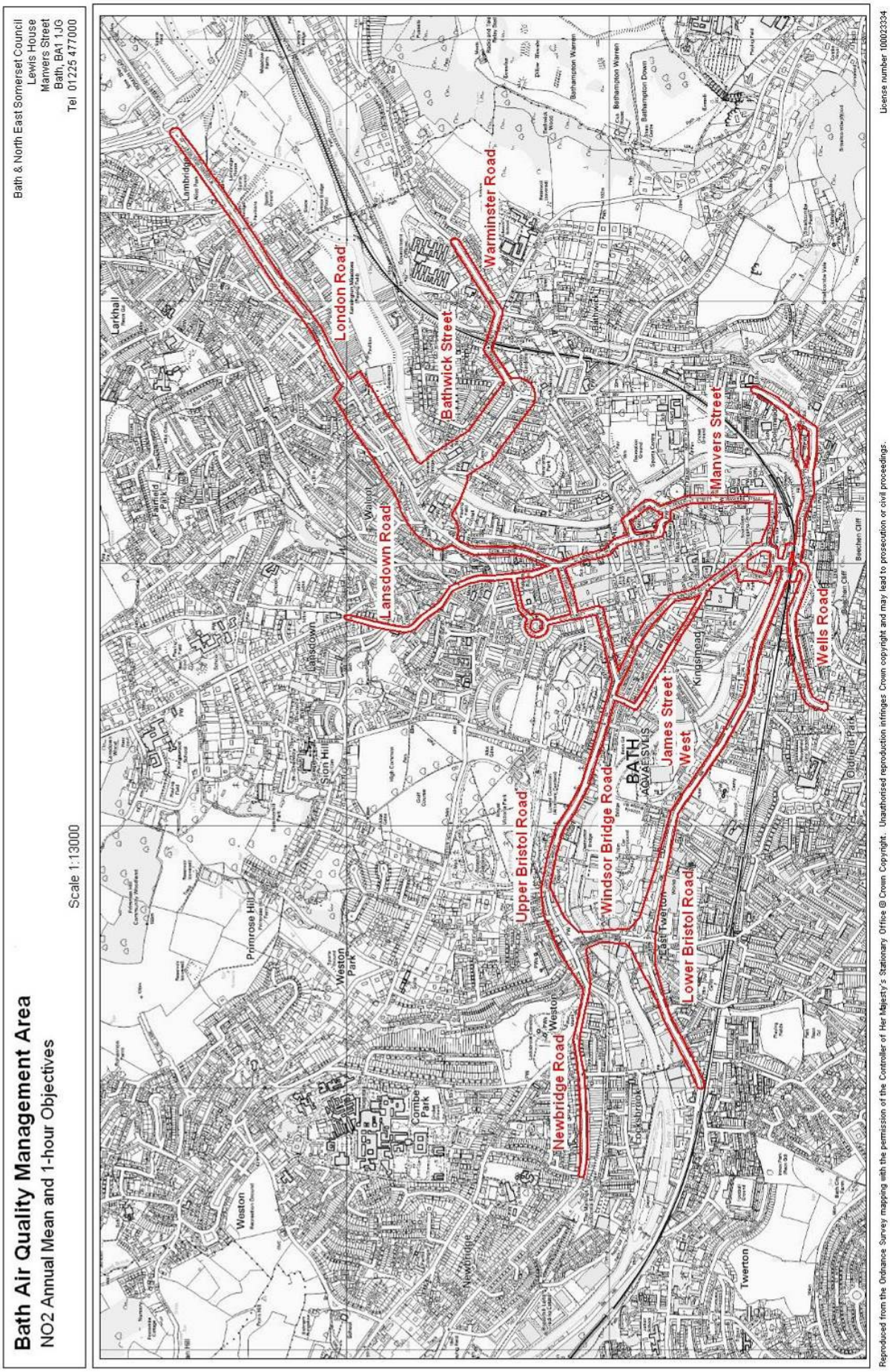

Figure 2-1: Bath Air Quality Management Area

Automatic Monitoring

Automatic monitoring of NOx (nitric oxide (NO) and NO_2) was carried out using continuous chemi-luminesence analysers located at four locations across the AQAP area:

- A4 London Road;
- The Guildhall (A3039 High Street);
- Windsor Bridge (A36 Lower Bristol Road/A3604 Windsor Bridge Road junction); and
- Chelsea House (A4, London Road)

Figure 2-2 summarises the annual average NO_2 concentrations at each continuous site between 2006 and 2016, in micrograms per cubic metre (µg/m3).

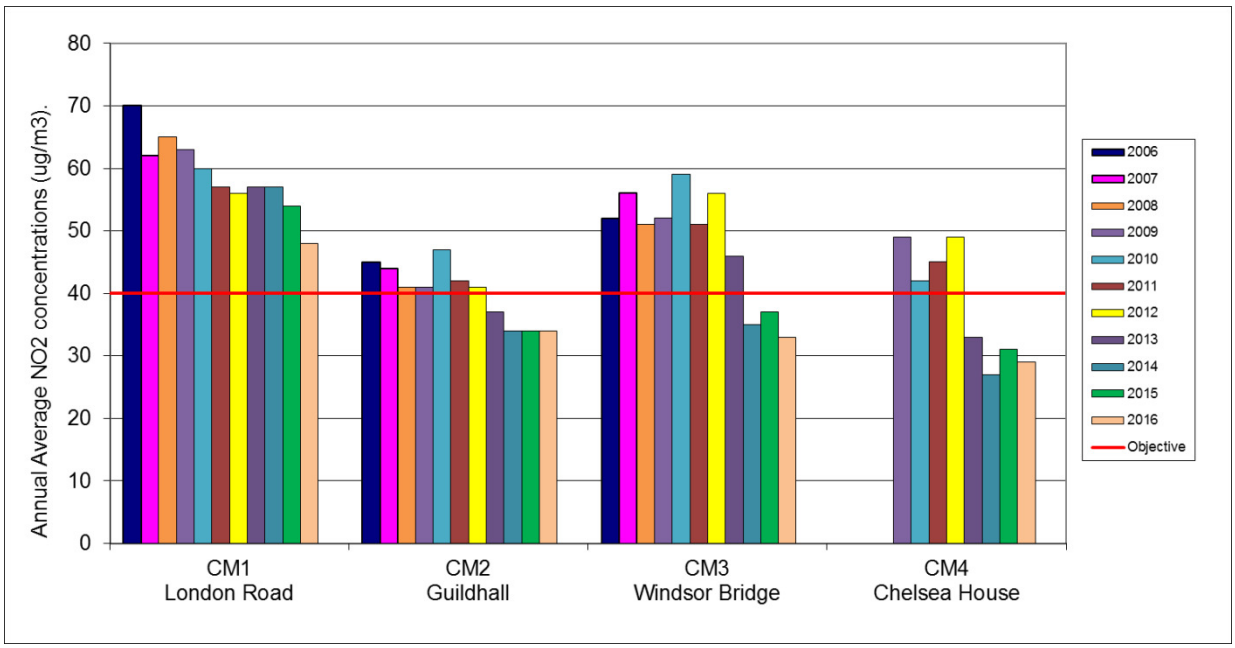

Figure 2-2: NO2 concentration at continuous monitoring sites

Non-Automatic Monitoring

Non-automatic monitoring is undertaken with diffusion tubes. These are pen-size tubes that contain an absorbent gel. They are placed on lamp-posts and road-signs at between 2 and 3 metres above road height on the kerbside. They are collected monthly and the

gel is tested for NO_2 concentration, giving an average reading for the period. Diffusion tube monitoring has been carried out at over 50 sites in Bath during 2016.

Figures 2-3 to 2-8 summarise the results of diffusion tube monitoring undertaken in and around the air quality management area. The results are presented as annual average NO_2 concentrations, in micrograms per cubic metre (µg/m3).

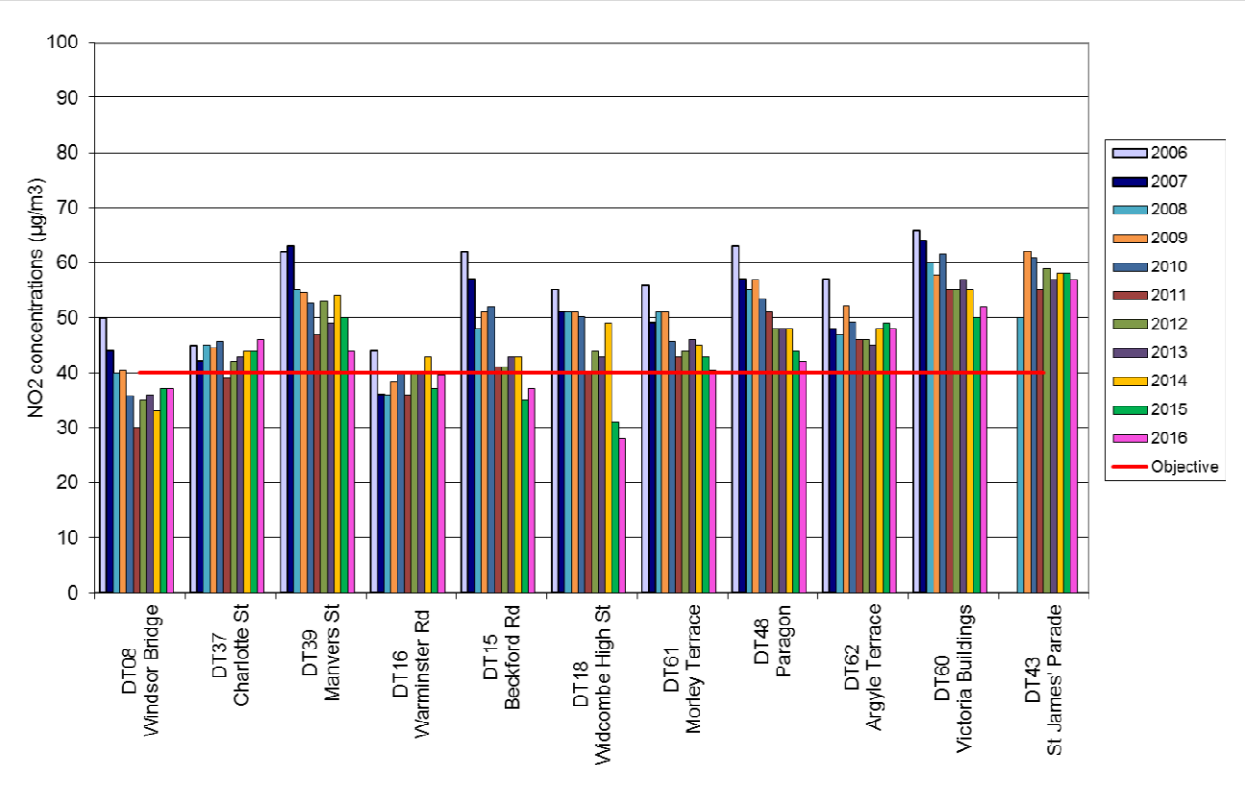

Figure 2-3: Annual Average NO2 Concentration; Round 1 Sites

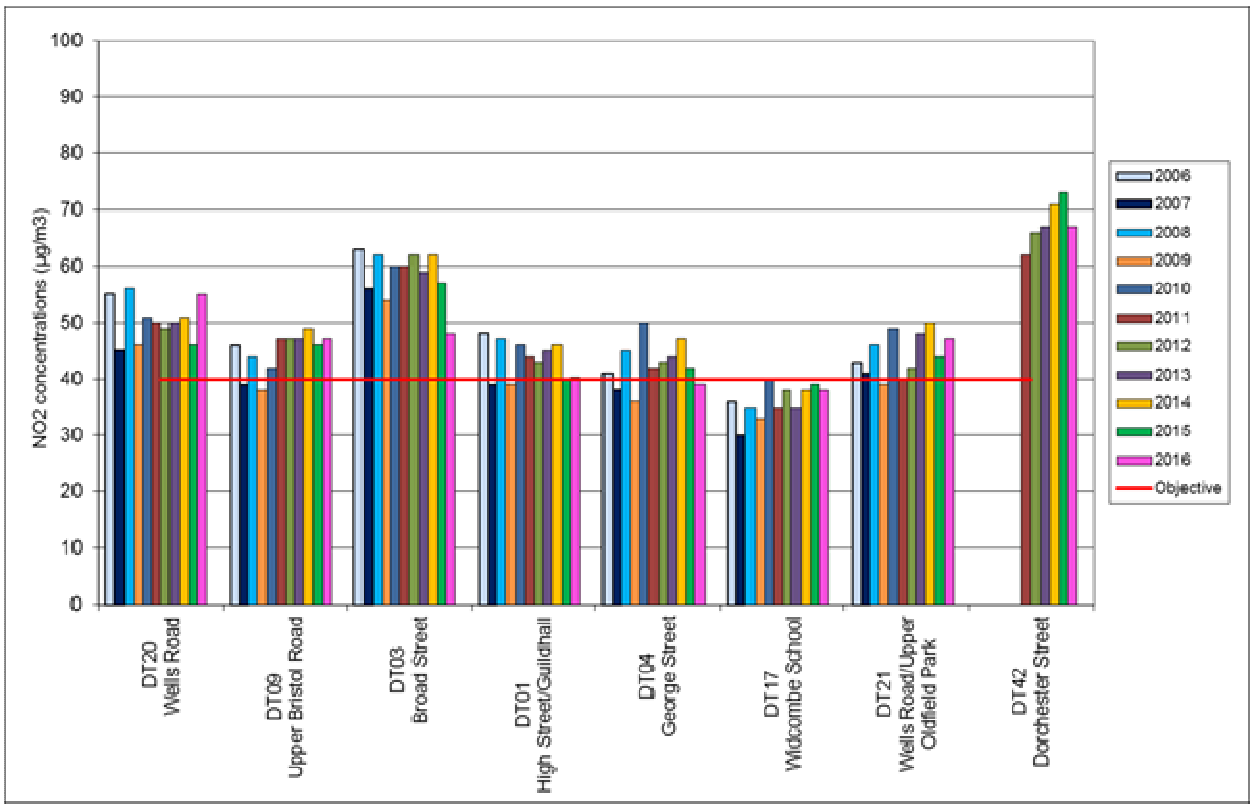

Figure 2-4: Annual Average NO2 Concentration; Round 2 Sites

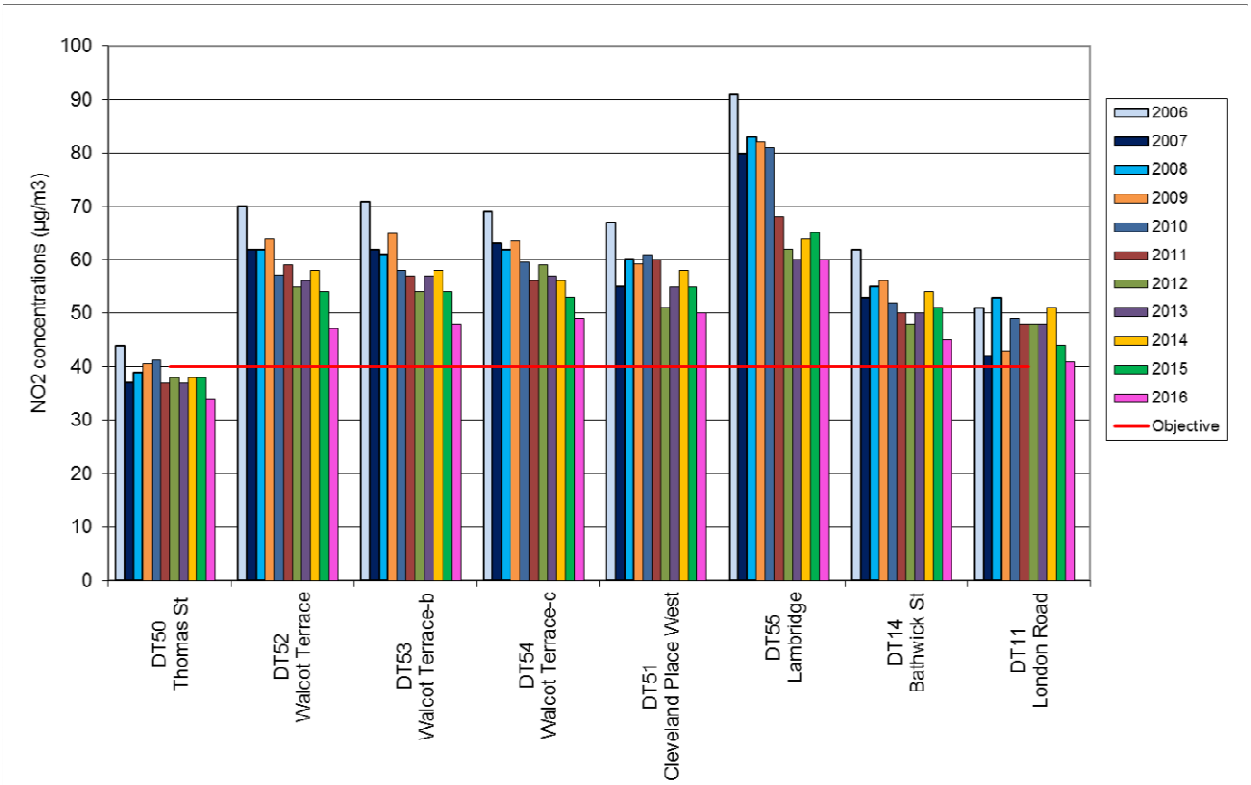

Figure 2-5: Annual Average NO2 Concentration; London Road Sites

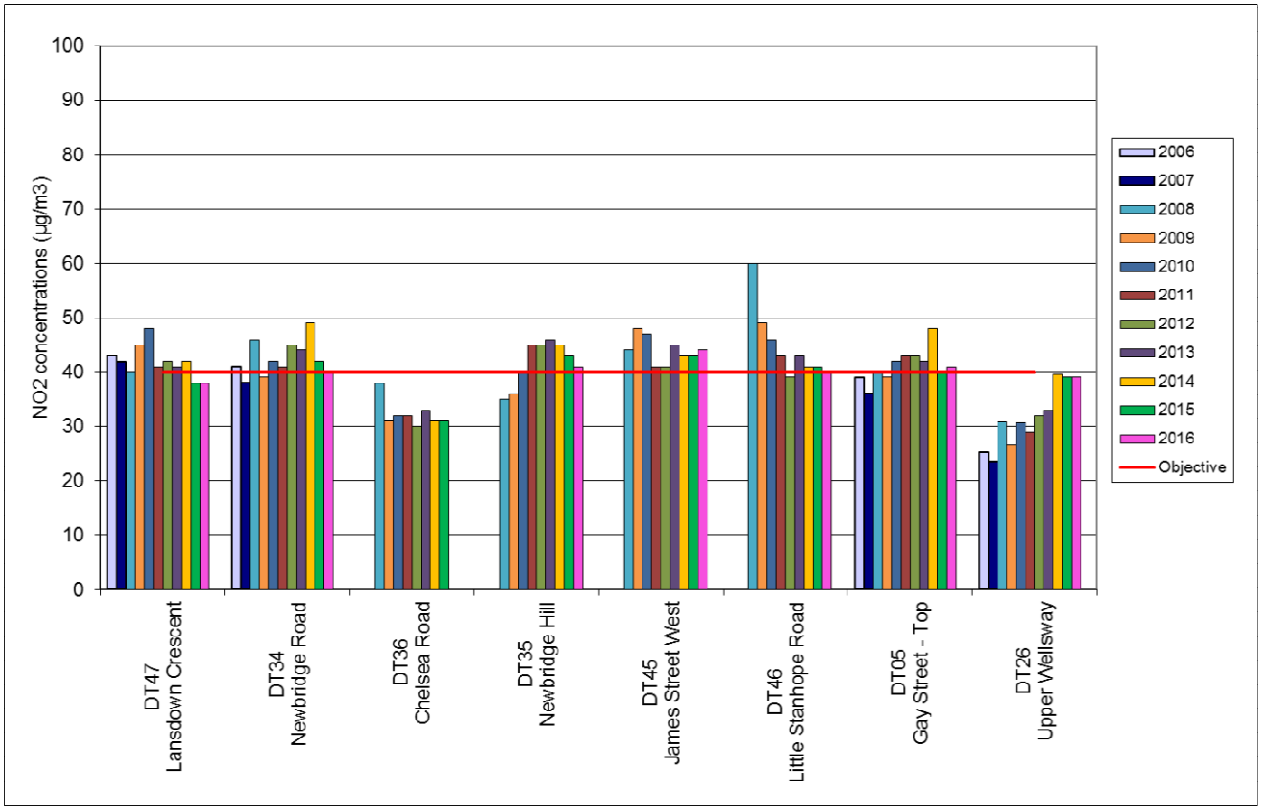

Figure 2-6: Annual Average NO2 Concentration: Roadside Sites (1)

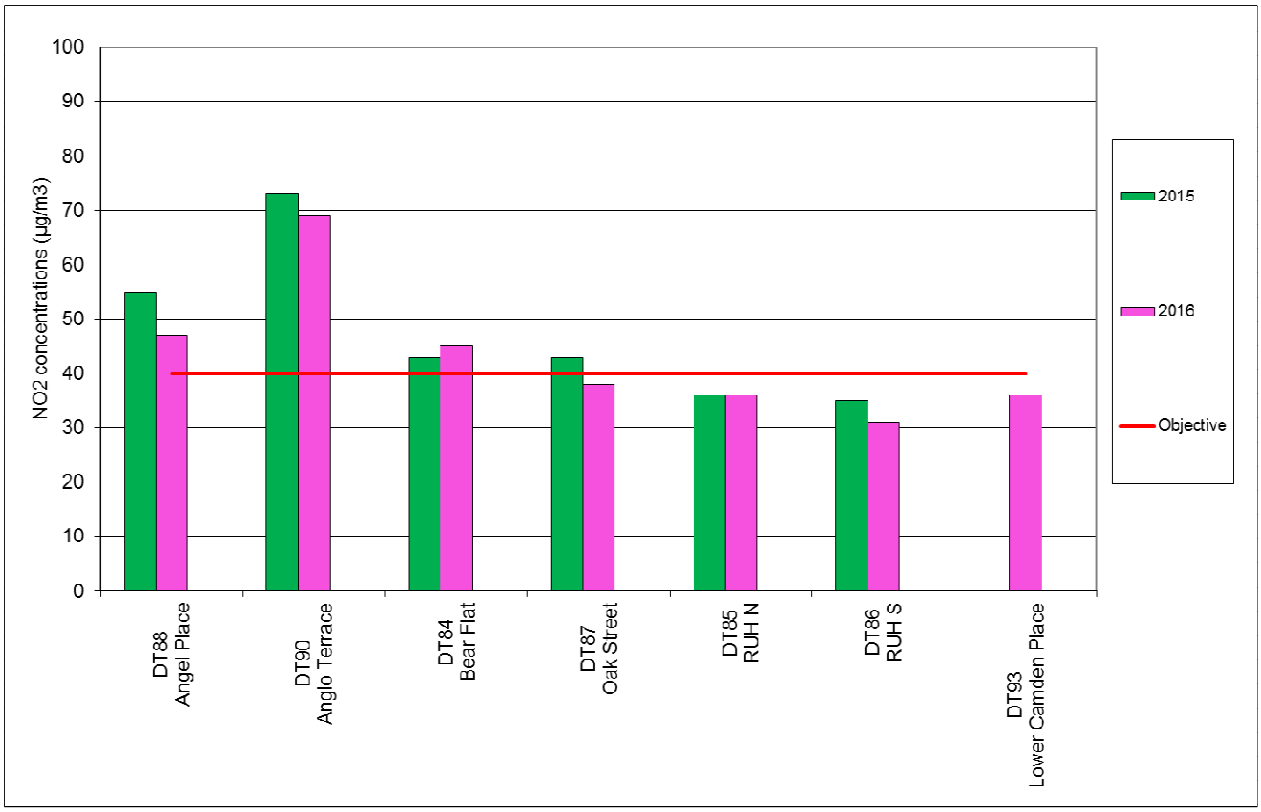

Figure 2-7: Annual Average NO2 Concentration; Roadside Sites (2)

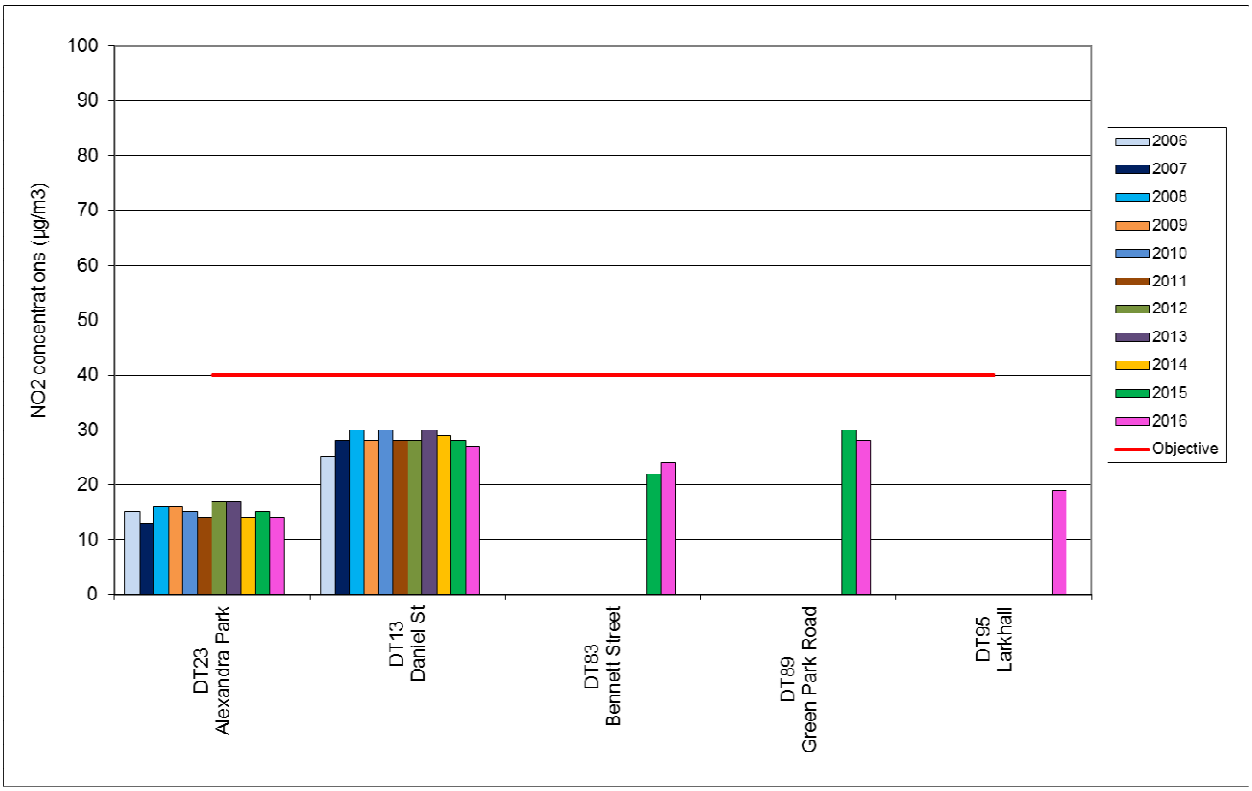

Figure 2-8: Annual Average NO2 Concentrations; Background Sites and Unclassified Roads

The national annual average objective for NO_2 of 40 µg/m^3 was exceeded at 26 locations within the Bath AQMA in 2016 at the monitors, reducing to 13 locations when calculated to the nearest residential façade. The highest annual average diffusion tube concentrations were monitored in Dorchester Street (67 µg/m^3) and Anglo Terrace (69 µg/m^3). The full results are contained in the Annual Status Report (ASR) that is awaiting approval from DEFRA. The 2016 ASR is available via this link: http://www.bathnes.gov.uk/sites/default/files/sitedocuments/Environment/Pollution/bnes_asr_2016_final_v2.pdf.

3. Bath & North East Somerset's Air Quality Priorities

Air Quality is high on the political agenda in Bath and North East Somerset and this is demonstrated in the planning and policy context given below.

3.1 Public Health Context

Air pollution is harmful to everyone. However, some people suffer more than others because they:

- live in deprived areas, which often have higher levels of air pollution
- live, learn or work near busy roads
- are more vulnerable because of their age or existing medical conditions

The Royal College of Physicians' 2016 Report 'Every Breath We Take' states: *'Each year in the UK, around 40,000 deaths are attributable to exposure to outdoor air pollution, with more linked also to exposure to indoor pollutants.'*[10] Air pollution is associated with a number of adverse health impacts, particularly respiratory illnesses. It is also recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[11,12].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[13]. Bath & North East Somerset is committed to reducing the exposure of people in Bath to poor air quality in order to improve health.

The Public Health England 'Public Health Outcomes Framework' indicator '3.01 Fraction of mortality attributable to particulate air pollution (particulates under 2.5 micrometers in diameter as opposed to nitrogen dioxide)' for Bath and North East Somerset Council in

[10] Every Breath You Take – The Lifelong Impact of Air Pollution, Royal College of Physicians, February 2016.
[11] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[12] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[13] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

2015 (the most recent year available) is 4.1% (compared to 4.8% in 2013). This is lower than the values across the South West region of 4.3% and 4.7% nationally.

The Public Health Outcomes Framework values are not based on local monitoring data, but in 2015 Bath & North East Somerset Council started to monitor $PM_{2.5}$ at Chelsea House, London Road, Bath (CM4). This is a roadside site set 9 m back from the carriageway. In 2016 $PM_{2.5}$ concentrations were 11 µg/m^3.

The Council's Public Health Commissioning Team are represented on the Air Quality Action Group which helped develop the Bath Action Plan and Air Quality Officers periodically present at the Health Protection Board to update them on air quality monitoring and issues. Supporting the review of the Bath Air Quality Action Plan and support of the implementation of the action in the Saltford & Keynsham Air Quality Action Plans has been identified as priority 4 for 2016-17 in the Health Protection Board Annual Report 2015/16 [14].

3.2 Local Planning and Policy Context

The air quality issue (action plans and AQMAs) carries a high strategic profile in Bath and North East Somerset Council. On 11th July 2017, the Council unanimously resolved a motion at a Full Council meeting that included recognition of the air pollution problem in Bath and to approach Central Government *'to seek to secure a Clean Air Zone for the city and other locations subject to excessive pollutants as part of the revised national air quality plan…'* and to *'commit to continuing work through the West of England on a package of transport improvements such as Clean Air Zones, traffic management measures, bus and rail improvements and key infrastructure projects identified within the Joint Transport Study that could make a particular contribution to reducing traffic and improving air quality on transport corridors where air quality is known to be subject to excessive pollutants.'*

The Council's commitment to improving air quality is also reflected in the following strategic documents:

[14] BATH AND NORTH EAST SOMERSET HEALTH PROTECTION BOARD ANNUAL REPORT 2015/2016 (https://democracy.bathnes.gov.uk/mgConvert2PDF.aspx?ID=43824)

Core Strategy

The Core Strategy (adopted July 2014) [15] lists the AQMAs as part of the Key Strategies and Plans. The implementation of an Air Quality Action Plan for Bath is included in Policy B1 as part of the Infrastructure and Delivery section of the Bath Spatial Strategy. Paragraph 6.101 states that: *'the reduction of the adverse effects of transport on climate change and air quality, particularly in Air Quality Management Areas (AQMA) 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 3 (JLTP3): 2011-2026

The JLTP3[16], produced by the four authorities (Bath and North East Somerset, Bristol City, North Somerset and South Gloucestershire), states that 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 2016-2020

The Corporate Strategy's 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'.

Environmental Sustainability Partnership

The Council has an Environmental Sustainability Partnership, which is a cross-party councillor and officer board to whom the air quality issue has recently been presented

[15] Bath and North East Somerset Core Strategy, 2014 (http://www.bathnes.gov.uk/services/planning-and-building-control/planning-policy/core-strategy)
[16] The West of England Joint Local Transport Plan 3 (https://s3-eu-west-1.amazonaws.com/travelwest/wp-content/uploads/2015/05/joint-local-transport-plan.pdf)

which oversees work across the district relating to environmental sustainability and climate strategy.

Getting Around Bath

The Getting Around Bath Transport Strategy (GABTS)[17], adopted by the Council in November 2014, emphasises the need to reduce the number of car journeys and support a shift from car to more sustainable modes. The first paragraph of Chapter 1 states:

> Transport is fundamental to the successful economy and wellbeing of the city, its residents and visitors. It also contributes to the unique environment of the city but the volume and impacts of vehicles are undermining the fabric of buildings and air quality. Consequently, the historic core of Bath and key arterial routes are suffering from the intrusion of cars and the quality of life throughout the city is being adversely affected.

One of the objectives states: 'Improving air quality and health, reducing vehicle carbon emissions'. Air quality is also listed as one of the Key Performance Indicators

Actions to improve air quality are included in section 3.5 'Traffic Management & Air Quality. Policy GABP4 and associated actions are set out below:

Traffic Management and Air Quality

Policy GABP4: Vehicle movement should be better managed to reduce traffic impact and emissions, particularly in the city centre where there is less space available.

Action GABA10: Develop options for a Low Emission Zone to improve air quality in the city and press Government for appropriate enforcement powers to make such a zone effective if implemented.

Action GABA11: Continue to support car clubs and other measures to encourage alternatives to car use particularly in the city centre.

Action GABA12: Develop a programme to remove traffic from the central areas of the City and reduce its impact in other areas e.g. Queen Square, Manvers Street, Dorchester Street.

Cycling

[17] Getting Around Bath – A Transport Strategy for Bath, 2014 (http://www.bathnes.gov.uk/sites/default/files/sitedocuments/getting_around_bath_transport_strategy_-_final_issue_web_version.pdf)

The strategy includes a commitment to promote cycling through a range of infrastructure proposals. The contribution to improved air quality is acknowledged where cycling is substituted for existing car journeys. Section 3.6 states:

> Cycling is having a huge resurgence across the country. There is a network of routes around the city which need to be coordinated to form a coherent network, ironing out conflicts with vehicular traffic and attracting new cyclists. The topography of parts of the city is a deterrent to some would-be cyclists but many corridors are more conducive to regular cycling. It is also a healthy means of travel which also contributes to improved air quality if cycling can substitute for car journeys. A riverside route through the Enterprise Area would be very suitable for cycling.

The Transport Strategy is broadly reflected in the document 'Our plan to get Bath moving'[7] which includes improving air quality as one of its central themes.

Bath Public Realm and Movement Strategy

The Public Realm and Movement Strategy: Creating a Canvas for Public Life in Bath 2010[18] provides a framework for improving the walking experienced in the city centre and highlights the importance of streets and spaces to the vibrancy of the city

Section 1 includes a commitment to developing schemes that improve air quality.

[18] Bath Public Realm and Movement Strategy 'Creating the canvas for public life in Bath, 2010' (http://www.bathnes.gov.uk/sites/default/files/sitedocuments/Planning-and-Building-Control/MajorProjects/BathPRandMS_Hi-Res.pdf)

Safety, security and health

1. Strategy to develop and implement proposals to reduce air pollution on all of the main routes through the city which are now designated as Air Quality Management Areas (AQMA), as many of them suffer from pollution levels that are higher than legal limits. The designation of an AQMA requires the local authority to devise an Action Plan to reduce levels of pollution. The introduction of cleaner emission vehicles is occurring as a result of national or European legislation and improvements in engine technology. Further local transport improvement measures relating to emissions are also under consideration as part of the Air Quality Plan for Bath. The plan is being drafted in close collaboration with the EC CIVITAS project and Bath Transport Package

Bath Parking Strategy

The Bath Parking Strategy is due to be published in 2017.

The aim of the strategy will be to help improve the quality of life of the people of Bath & North East Somerset by establishing a balance between the social, economic, cultural and environmental needs of the whole community. The draft objectives are to:

- Manage travel demand in new developments by introducing restraint-based car parking standards, to avoid the over provision of car parking spaces, whilst meeting the needs of essential users;
- Sustain and enhance the vitality and viability of settlements within B&NES, including the City of Bath, through parking policies which support the prosperity of the city and towns whilst reducing the growth of traffic in the most congested areas and improving the air quality; and
- Effectively manage the total parking supply, which includes all types of parking, and consider priorities, regulation, charges and enforcement.

The draft parking strategy therefore places emphasis on managing demand to support prosperity whilst improving air quality.

3.3 National Policy and Guidance

The new UK plan

The Department for Environment, Food and Rural Affairs and Department for Transport published their 'UK plan for tackling roadside nitrogen dioxide concentrations'[1] on 26th July 2017. The content of this plan takes into account that for the first time, Bath and North East Somerset is listed as an authority upon which the Government has placed legal duties on to *'develop and implement a plan designed to deliver compliance in the shortest time possible'*.

'The UK government will require local authorities to set out initial plans 8 months from now, by the end of March 2018. These will be followed by final plans by the end of December 2018. To assist them in meeting these timescales, the UK government will ensure local authorities can immediately draw on its implementation fund, as well as central government expertise.'

It states that *'while local authorities are encouraged to consider alternative approaches* (to Clean Air Zones)*, any alternative will need to deliver compliance as quickly as a Clean Air Zone if it is to be preferred for inclusion in the plan.'*

The Council are in discussion with the Government's Joint Air Quality Unit (DEFRA and DfT). Further guidance and confirmation of the funding level will be issued in the autumn of 2017.

It is possible that the feasibility work will recommend that a Clean Air Zone is implemented. There are various types of Clean Air Zone as identified in the Joint Air Quality Unit (DEFRA and the DfT) guidance 'Clean Air Zone Framework', 2017[19]

The following tables from the new UK plan[1] show the different categories of CAZ and engine standards:

[19] Clean Air Zone Framework – Principles for setting up Clean Air Zones in England, May 2017 (DEFRA and DfT)

Charging Clean Air Zone class	Vehicles potentially included[44]
A	Buses, coaches, taxis and private hire vehicles
B	Buses, coaches, heavy goods vehicles (HGVs) taxis and private hire vehicles
C	Buses, coaches, HGVs, large vans, minibuses, small vans/ light commercials, taxis and private hire vehicles
D	Buses, coaches, HGVs, large vans, minibuses, small vans/ light commercials, taxis and private hire vehicles, cars, motorcycles and mopeds

Table 3-1: Excerpt from the new UK plan 'Charging Clean Air Zone classes which local authorities may choose to deploy.

Vehicle type	Clean Air Zone minimum emission standards
Buses and coaches	Euro VI
Heavy goods vehicles	Euro VI
Vans	Euro 6 (diesel) or Euro 4 (Petrol)
Cars	Euro 6 (diesel) or Euro 4 (Petrol)
Motorcycles and mopeds (optional)	Euro 3

Table 3-2: Excerpt from the new UK plan 'Charging Clean Air Zone minimum emission standards.

The Bath Air Quality Action Plan will be developed and implemented in co-ordination with the UK Plan[1]. The consultation on the actions identified in this draft document will inform what other measures (such as an A36/46 link road, local freight consolidation by cargo bikes, staggered business and school hours or Metrobus/Light Rapid Transit system) could be modelled in order to identify potential reductions in concentrations of nitrogen dioxide.

Other national guidance

The Royal College of Physicians document 'Every Breath We Take'[1] includes the following recommendations for actions:

- Act now – government must empower local authorities and incentivise industry to plan long term;
- Educate health professionals, policymakers and the public about the health effects;
- Promote alternatives to petrol and diesel cars;
- Put the onus on the polluters;
- Act to protect the public health when air pollution levels are high;
- Tackle inequality. Our most deprived communities are exposed to some of the worst outdoor and indoor air quality;
- Protect those most at risk. Children, older people, and people with chronic health problems are among the most vulnerable to air pollution.
- Lead by example in the NHS

The National Institute for Health and Care Excellence (NICE) guideline air pollution document[20] list a number of recommendations including:

- Include air pollution in 'plan making' by all tiers of local government
- Including air quality outcomes in travel plans
- Supporting car clubs
- Supporting active travel
- Siting living accommodation away from roadsides
- Providing charging facilities for electric vehicles
- Managing street vegetation to reduce the risk of restricting street ventilation
- Introduction of a Clean Air Zone

[20] National Institute for Health and Care Excellence – 'Air Pollution: outdoor air quality and health', June 2017.

- Driver training to increase fuel efficiency and reduce emissions
- Advice for vulnerable groups

We have developed actions that can be considered under nine broad topics:

- Policy guidance and development control;
- Alternatives to private vehicle use;
- Freight and delivery management;
- Promoting low emission transport;
- Promoting travel alternatives;
- Public information;
- Transport planning and infrastructure;
- Traffic management; and
- Vehicle fleet efficiency.

3.4 Source Apportionment

The AQAP measures presented in this report are intended to be targeted towards the predominant sources of emissions within Bath & North East Somerset's area.

A source apportionment exercise was carried out by Bath & North East Somerset in 2016. Traffic flows were taken from the Department for Transport's traffic flow estimates for 2016 and NOx emissions were calculated using the Emission Factor Toolkit (EFT), for sites across the AQMA (represented graphically in Appendix D). Figure 3-1 below is an excerpt from the preliminary consultation with stakeholder groups and shows the percentage NOx source contributions at selected sites based on the assumption of 10kph average traffic speeds:

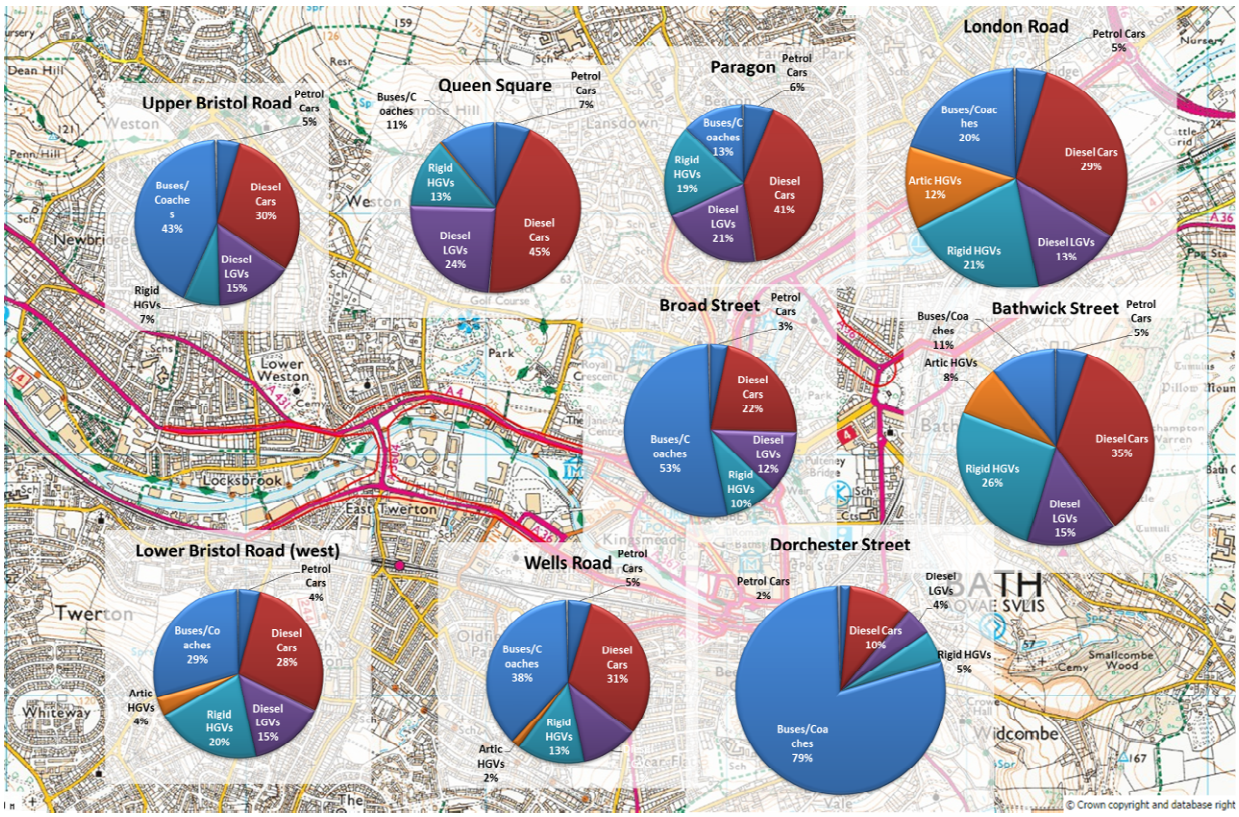

Figure 3-1: Source apportionment for oxides of nitrogen at selected locations in 2016 (assuming 10kph average speed) (full table provided in Appendix C)

The proportion that each vehicle type pollutes varies with location due to the differing make up of traffic. Diesel cars contribute the most NOx in many locations, with buses and coaches contributing the most where there are many bus routes, particularly in the vicinity of Dorchester Street, Broad Street and Wells Road for example. HGVs (rigid and articulated) contribute the largest proportion on London Road and approximately the same as diesel cars on Bathwick Street.

Diesel cars and increased NO_2

The high contribution of diesel cars to NOx emissions and the resulting concentrations of NO_2 are something that has been widely acknowledged and are an unwanted consequence of a greater uptake of diesel cars due, in part, to government incentives in order to reduce emissions of carbon dioxide.

Although NO_x emissions overall have been declining as a result of improved engine technology, primary NO_2 emissions have increased due to technology designed to lower the emissions of particles. This is explained in the scientific article 'Emission reduction

versus NO_2 air quality concentrations, a trade-off?' by Peter J Sturm and Stefan Hausberger of Graz University of Technology, Austria. (https://online.tugraz.at/tug_online/voe_main2.getVollText?pDocumentNr=145519&pCurrPk=52228):

> *'The reasons for increasing NO_2 shares are mainly a catalytic exhaust gas after treatment such as diesel oxidation catalysts and coated diesel particulate filter (DPF) and the increasing exhaust gas recirculation rates for modern vehicles. High NO_2 levels at the raw exhaust gas are desired for the passive regeneration of the DPF at lower exhaust gas temperatures. Thus the exhaust gas after treatment to reduce fine particle emissions is at least partly responsible for the actual NO_2 situation.'*

New engine emission standards should thus include stipulations for reducing NO_2 emissions.

3.5 Required Reduction in Emissions

This section deals with the calculation of the level of reduction in emissions that is required for concentrations of NO_2 to fall to below the national objective annual average of 40 µg/m^3.

Table 3-3: Required reduction in nitrogen dioxide concentrations at selected sites (full table provided in Appendix D)

details how much NO_x emissions will need to be reduced to meet the national air quality objective for NO_2 at selected locations currently exceeding the objectives in the Air Quality Management Area. This has been done using the method in DEFRA guidance TG16. The full list of locations and values is provided in Appendix D.

Location	Annual mean concentrations (µg/m^3) Adjusted for bias 2016	Reduction in NO_2 concentration required (µg/m^3)
Broad Street north of Saracen Street	**47.5**	7.5
Anglo Terrace (London Road)	**69.5**	29.5
Upper Bristol Road	**46.8**	6.8
Charlotte Street	**45.5**	5.5
Dorchester Street	**66.7**	26.7

Table 3-3: Required reduction in nitrogen dioxide concentrations at selected sites (full table provided in Appendix D)

The monitored concentrations at roadside locations have been projected forward using the method and factors given in DEFRA Technical Guidance 16 (TG16)[21]. This estimates when the objectives will be met if no actions are taken. This assumes a reduction in emissions per vehicle due to an improvement in engine and fuel technology. This mainly occurs through a renewal of commercial vehicle fleets and the purchasing of new private cars.

Table 3-4: Estimated achievement data of targets according to DEFRA at selected sites (full table provided in Appendix D)

shows the estimate of the year when the objective will be met at selected locations. This is based on a formula provided in the DEFRA guidance TG16.

[21] Local Air Quality Management – Technical Guidance (TG16), Defra, April 2016

Location	**Annual mean concentrations (µg/m3) Adjusted for bias 2016**	**Year Objective will be met**
Broad Street north of Saracen Street	**47.5**	2019
Anglo Terrace (London Road)	**69.5**	After 2030
Upper Bristol Road	**46.8**	2019
Charlotte Street	**45.5**	2019
Dorchester Street	**66.7**	2029

Table 3-4: Estimated achievement data of targets according to DEFRA at selected sites (full table provided in Appendix D)

The estimated year of the objective being met in Bath according to DEFRA projections is between 2017 and beyond 2030. This formula assumes no changes in traffic flow and does not take into account the effect of changes in road layouts, car parks or local developments.

4. Development and Implementation of Bath AQAP

4.1 Consultation and Stakeholder Engagement

In developing/updating this consultation paper we worked with agencies and the local community to improve local air quality. We have undertaken stakeholder engagement events involving the following participants:

- City Centre Action Group;
- Federation of Bath Residents Association;
- Widcombe Association & Widcombe West;
- Transition Bath;
- London Road Partnership;
- Bath Preservation Trust; and
- B&NES Health Protection Board.

The response to our consultation stakeholder engagement is summarised in the draft action list in Appendix A. Upon completion of this consultation a final action plan will be prepared and submitted to Cabinet for adoption.

4.2 Steering Group

The Air Quality Action Group is run by officers working on air quality and includes representatives from the following teams within the Council:

- Transportation Planning;
- Public Transport;
- Public Health;
- Planning and Transport Development;
- Sustainability;
- Corporate Travel;
- Local Partnerships;
- Local Development Framework Team;
- Highways;
- Taxi Licensing; and
- Environmental Monitoring.

The group is chaired by the Environmental Monitoring Team and meets quarterly. The consultation process involved preliminary 'options generation' workshops with the public stakeholder groups and the potential measures that came out of this were scrutinised by the officer working group. This ensured that all potential measures for the action plan were tabled prior to full public consultation in order to enable community engagement in the process, prevent duplication or contradiction of existing measures that may improve air quality.

5. AQAP Measures

Appendix A sets out the potential actions that may be contained in the Bath & North East Somerset AQAP. It provides two tables (Table A1 and Table A2) which categorise the measures into those that are already contained within the Council's strategies and plans (Table A1) and aspirations measures that are not currently contained in such strategies (Tables A2). Each table contains:

- a list of the draft actions that may form part of the plan and we are consulting upon;
- whether the cost of implementing each action is high (>£25,000) medium (£50,000-£250,000) or low (<£50,000) ;
- expected benefit in terms of pollutant emission and/or concentration reduction in terms of high, medium and low. The ratings given are not based on a detailed assessment and are therefore somewhat subjective. However, they are intended to provide an indication of the likely effect, relative to the other measures proposed;

We have developed actions that can be considered under nine broad topics:

- Policy guidance and development control (eg 'Produce developer guidance or Supplementary Planning Guidance relating to air quality');
- Alternatives to private vehicle use (eg 'Provide additional cycle parking across the city centre');
- Freight and delivery management (eg 'Promote use of low emission vehicles for freight, refuse, recycling & postal services, where possible');
- Promoting low emission transport (eg 'Retrofit Council fleet to low emission vehicles, where practical to do so, and only purchase such vehicles, where available');
- Promoting travel alternatives (eg 'Improve the awareness of public transport information websites and apps.')
- Public information (eg 'Involve the public and educational establishments with practical air quality monitoring');
- Transport planning and infrastructure (eg 'Procure a thorough transportation and movement study to better understand through traffic movements in Bath');

- Traffic management (eg 'Implement a Bath Clean Air Zone'); and
- Vehicle fleet efficiency (eg 'Procure fleet of low emission fleet of pool cars to shift Council business travel from personal petrol and diesel vehicles to pool cars').

The draft actions include suggestions put forward during the preliminary stakeholder engagement events and actions that have been taken from both national guidance and local strategies. If these actions are retained within the final plan, grant funding may be available for implementation and the agreed final measures would be the basis for future grant applications.

NB: Please see future ASRs for regular annual updates on implementation of these measures if they are contained in the final 2017 Bath AQAP.

Appendix A: Bath AQAP Measures

Ref.	Measure	**Feasibility:** High (most feasible); Medium; Low (least feasible)	**Cost:** 1=>£250k 2=£50k-£250k 3=<£50k	**Air pollution effect:** High (greatest effect); Medium; Low (least effect)	Any disadvantages?	Strategy or Plan contained within:
A	**Policy Guidance & Development Management**					
1	Ensure that air quality improvement measures are given sufficient prominence in the West of England Joint Spatial Plan and replacement Joint Local Transport Plan.	High	0	High		West of England Joint Spatial Plan. Joint Local Transport Plan.
2	Produce developer guidance or Supplementary Planning Guidance relating to Air Quality.	High	0	High		Core Strategy
3	Review parking standards for new development to promote low emission/electric vehicles.	Medium	3	Medium		Parking Strategy
B	**Alternatives to Private Vehicle Use: Active Travel**					
1	Provide additional cycle parking across the city centre.	High	2	Medium		Parking Strategy
2	Develop and implement a package of Safe Routes to School measures within the Air Quality Management Area.	High	1	Medium		Joint Local Transport Plan 3

3	Develop and implement a package of walking & cycling priority schemes.	High	1	High		Getting Around Bath Transport Strategy (GABA9)
C	**Alternatives to private car use: Public Transport**					
1	Encourage employers to promote sustainable transport. Employers are currently engaged in sustainable transport best practice though the Employers Travel Forum. This measure sets out to promote membership of this forum and publicise its activities to a wider audience.	High	1	Medium		Getting Around Bath Transport Strategy (GABA23)
2	Expand existing Bath's Park & Ride provision.	High	1	Low		Getting Around Bath Transport Strategy (GABA18)
3	Encourage private investment into the provision of sustainable transport infrastructure. E.g. Curo had consulted on a proposal to construct a cable car to access the Mulberry Park development.	High	1	High		Getting Around Bath Transport Strategy (GABA13)
4	Metro-West rail project; Bath to Bristol: providing direct half hourly service at local stations between Bath and Severn Beach line, via Bristol (including Oldfield Park and Keynsham stations).	High	1	High		Joint Local Transport Plan 3; and Getting Around Bath Transport Strategy (GAB30)
D	**Promoting Low Emission Transport**					

1	Parking: Review residents' parking scheme. Undertake a review of existing residents' parking scheme zoning structure and hours of operation to determine whether an alternative operation would result in more efficient use of on-street spaces. Review operation of central area zones to reduce parking for non-residents.	High	3	Low		Parking Strategy
2	Continue installation of electric car charging points in off street car parks and extend to on street.	High	3	Low		Parking Strategy
3	Promote use and expansion of Car Clubs. Households with car club members are known to have lower car ownership and make greater use of sustainable transport. Encourage car club operator to introduce electric cars (including family-sized EVs).	High	1	Medium		Parking Strategy
4	Consolidate public off-street car parking stock into fewer facilities.	High	1	Medium		Getting Around Bath Transport Strategy (GABP7)
5	Retrofit Council fleet to low emission vehicles, where practical to do so, and only purchase such vehicles, where available.	High	2	Medium		Corporate Sustainability Strategy
6	Roll out superfast broadband to promote home working.	High	2	Medium		Working with Connecting Devon and Somerset.
7	Extend real time bus passenger information system. Extend scope of system and promote use of mobile app.	High	1	Low		Getting Around Bath Transport Strategy (GABA20)
E	**Promoting Travel Alternatives**					

1	Actively promote walking and cycling as modes of transport. Convert short car trips to walking/cycling. Replace some car parking spaces with cycle parking.	High	2	High		Getting Around Bath Transport Strategy (GABA8)
2	Promote the adoption of Travel Plans by employers.	High	3	Medium		Getting Around Bath Transport Strategy (GABA23-27)
3	Develop pilot school project using personal air pollution dose meters. Work in collaboration with schools and community groups to monitor personal air pollution exposure and promote awareness of air pollution issues.	High	3	Low		Public Health
4	Promote smart ticketing and existing Bath Rider multi operator ticket	Medium	3	High		Getting Around Bath Transport Strategy (GABP9)
5	Improve the awareness of public transport information websites and apps.	High	2	Medium		Getting Around Bath Transport Strategy (GABA19)
F	**Transport Planning & Infrastructure**					
1	Undertake modelling and a feasibility study in order to work with Highways England and adjoining local authorities to secure DfT funding forA36/A46 link in the 2020-25 Road Investment Strategy.	Medium	1	High	Landscape and other environmental impacts.	Getting Around Bath Transport Strategy (GABA37)
G	**Green Infrastructure**					
1	Expand green infrastructure: tree planting, green space, Sustainable Urban Drainage etc. to reduce air pollution.	High	2	Low		Green Infrastructure Strategy (p35)

H	**Traffic Management**					
1	Undertake feasibility study of each of the types of Clean Air Zone: type A buses, coaches and taxis; type B buses, coaches, taxis and lorries; type C buses, coaches, taxis, minibuses, vans; type D everything buses, coaches, taxis, minibuses, vans, cars, motorcycles and mopeds.	High	2	High	May shift non-compliant vehicles elsewhere	UK Plan for tackling roadside nitrogen dioxide emissions (2017).
2	Develop city centre traffic reduction plan including a masterplan for Manvers Street area that reduces through traffic and car dependency, plus measures to reduce traffic in Dorchester Street & Queen Square.	High	2	High	Likely to decant some traffic to other routes.	Getting Around Bath Transport Strategy (GABA12)
3	Encourage trials of traffic free streets. This measure would demonstrate how we could reduce our dependence on car use by encouraging active travel.	High	3	Medium	Increasing level of management required as size of area increases.	Getting Around Bath Transport Strategy (GABA12)
4	Continue to use traffic signals to reduce emissions by smoothing traffic flows.	High	3	High		Urban Traffic Management and Control (UTMC) system already in place
5	Review delivery hours for businesses in Bath city centre and implement restricted hours where beneficial & viable.	High	3	Low		Getting Around Bath Transport Strategy (GABA38)
I	**Vehicle Fleet Efficiency**					

1	Expand proportion of council fleet (including pool cars and bicycles) that are low emission to shift Council business travel from traditional to low emission vehicles.	High	2	Medium		Corporate Sustainability Strategy and Go Ultra Low City fund.
J	**Logistics: Freight Delivery & Management**					
1	Develop a Bath freight consolidation centre, providing storage (for stock replenishment) and delivery depot for local businesses, ideally to be operated by cargo bikes or Ultra-Low Emission Vehicles.	High	2	Medium		Getting Around Bath Transport Strategy (GABA39)

Table A-1: Bath AQAP measures already contained within existing strategies and plans

Ref.	Measure	**Feasibility:** High (most feasible); Medium; Low (least feasible)	**Cost:** 1=>£250k 2=£50k-£250k 3=<£50k	**Air pollution effect:** High (greatest effect); Medium; Low (least effect)	**Any Disadvantages?**
A	**Policy Guidance & Development Management**				
1	Produce menu of emission reduction measures for new development to be funded though Community Infrastructure Levy and/or S106. Neighbourhood Plans are advantageous to have as a 'trigger' to draw down on CIL.	High	3	High	
2	Encourage on-campus student accommodation to reduce travel.	Low	3	Low	
C	**Alternatives to private car use: Public Transport**				
1	Work with bus operators to improve on-bus cycle storage.	Medium	2	Medium	
2	Investigate operating additional services between P&R sites and the Royal United Hospital.	Medium	2	Medium	Likely to require ongoing revenue support.
3	Lobby for railway electrification through Bath.	Low	1	High	
4	Encourage West of England Mayor to introduce advanced Bus Quality Partnerships and Direct Franchising.	Medium	1	High	Commercial bus operators respond to public demand. Intervention is costly in revenue terms.
5	Promote the West of England's TravelWest transport brand.	High	2	Low	

6	Provide lockers to store shopping for sustainable travel users (Inc. bus and P&R users).	Medium	1	Low	
7	Undertake feasibility study for Metrobus/Light Rapid Transit for Bath e.g. Trams.	Low	1	Medium	Similar scheme failed due to local opposition.
8	Extend and improve the school bus network.	Low	1	Medium	Very high ongoing revenue commitment.
D	**Promoting Low Emission Transport**				
1	Parking: Investigate the introduction of differential car parking charges based on vehicle fuel type. Westminster City Council is currently trialling a 50% surcharge. Investigate the introduction of Smart parking systems. Promote electric and low emission vehicles in Council car parks and on street. Investigate reduced residents' parking permits for low emission vehicles. Encourage car sharing by providing priority parking areas for those sharing their ride.	High	2	Medium	
2	Promote low emission vehicles for taxi work, through taxi licensing process.	Medium	3	High	
3	Investigate ridesharing for smartphone applications.	High	3	Low	
4	Install street mounted bicycle pumps.	High	3	Low	Can be prone to vandalism
5	Promote use of telematics for Council vehicles, bus and taxi fleet to maximise driver efficiency.	High	1	Low	
6	Encourage contractors operating fleets on Council business to use low emission vehicles, where possible. Use tendering process to request details of fuel to be used for contractors vehicles and give weight to proposals that include use of low emission vehicles.	Medium	3	Low	

E	Promoting Travel Alternatives				
1	Reduce traffic congestion by staggering business and school hours.	Low	2	Medium	Significant difficulty to coordinate and implement, except for schemes such as extending school day by 1hr to include school clubs, including later departure of school buses.
2	Deliver Bath air quality publicity campaign: Let Bath Breathe Work in partnership with local partners, such as BID and Visit Bath, to produce video to promote sustainable travel to and within Bath. Create other visual communications that can be used on social media/twitter. Promote individual responsibility for reducing emissions and reducing our individual exposure to them. Including impact of personal travel and vehicle choice campaign. Your next car campaign. See if electric or hybrid is right for you. Promote national campaign, if operated, or develop local campaign to encourage take up of low emission vehicles. Link to national diesel scrappage scheme, is implemented. Promote greater understanding of electric and other low emission vehicle technologies. Electric vehicle show/parade.	High	2	Medium	
3	Investigate use of variable message signs to promote air quality improvement messages. Including: anti-idling; alternative mode awareness; pollution levels; and personal contribution to pollution. Link to a smart phone app. Issue warnings when levels are at or approaching harmful concentrations and take action to reduce.	High	2	Medium	Signing regulations limit the type and wording of messages that can be display on roadside VMS.
4	Investigate possibility for the mobile air pollution monitors to include LED display to show results at temporary sites.	Medium	2	Low	
5	Investigate benefits of joining air quality data sharing websites E.g. Breathe Life: http://breathelife2030.org/breathelife-cities/become-a-breathelife-city/ Enables sharing of air quality data, make use of resources, help indicate priority solution areas and more. Plume app - https://plumelabs.com/en/ An international Air Quality app.	High	3	Low	

6	Add widget so that others can embed air quality data onto their page or develop a Bath Hacked Community AQ tool.	High	3	Low	
7	Targeted air quality information campaign for the most vulnerable groups, and Improve the awareness within specific settings e.g. schools, care homes and childcare settings.	High	3	Medium	
F	**Transport Planning & Infrastructure**				
1	Procure a thorough transportation and movement study to better understand through traffic movements in Bath. This is likely to be delivered through the feasibility study for the Clean Air Zone.	High	3	Low	
H	**Traffic Management**				
1	Investigate opportunities for removing traffic signals to improve traffic flow.	Medium	3	Medium	Traffic signals do provide safe pedestrian crossing facilities but 'shared space' measures may be equally effective on some routes.
2	Investigate air quality effects during North Parade closure to see if a permanent restriction is possible.	Low	3	Medium	This route is essential for buses.
3	Investigate car share lanes/use of existing bus lanes by fully occupied vehicles.	Low	3	Low	Very difficult to monitor and enforce. Undermines benefit of bus lanes.
4	Implement advisory or mandatory engine switch off/anti-idling zones	High	3	Low	
5	Investigate workplace parking levy	Low	2	Low	Recent study indicated limited effect unless change is >£5 per day (Access to Bath from the East; Consideration of Workplace Parking Levy, Mott MacDonald, Oct. 2016).

I	**Vehicle Fleet Efficiency**				
1	Introduce/promote Taxi efficient driving course/test	Medium	3	High	
J	**Logistics: Freight Delivery & Management**				
1	Promote use of low emission vehicles for freight, refuse, recycling & delivery services, where possible.	Low	2	High	Lack of vehicles types available with proven reliability for refuse/recycling collections.
2	Promote membership of fleet operators recognition scheme to encourage best practice for commercial vehicle operators.	High	3	Low	
3	Encourage operators to offer lower delivery charges if already visiting area.	High	3	Low	
4	Encourage use of low emission vehicles by local businesses and home delivery operations.	Medium	2	Medium	
5	Promote greater use of low emission delivery services and 'Last mile' freight/post schemes.	High	3	Medium	Delivery to home and work addresses in Bath using diesel vehicles creates additional NO2.

Table A-2: Draft Bath AQAP aspirational measures not contained within existing strategies and plans

Appendix B: Monitoring locations

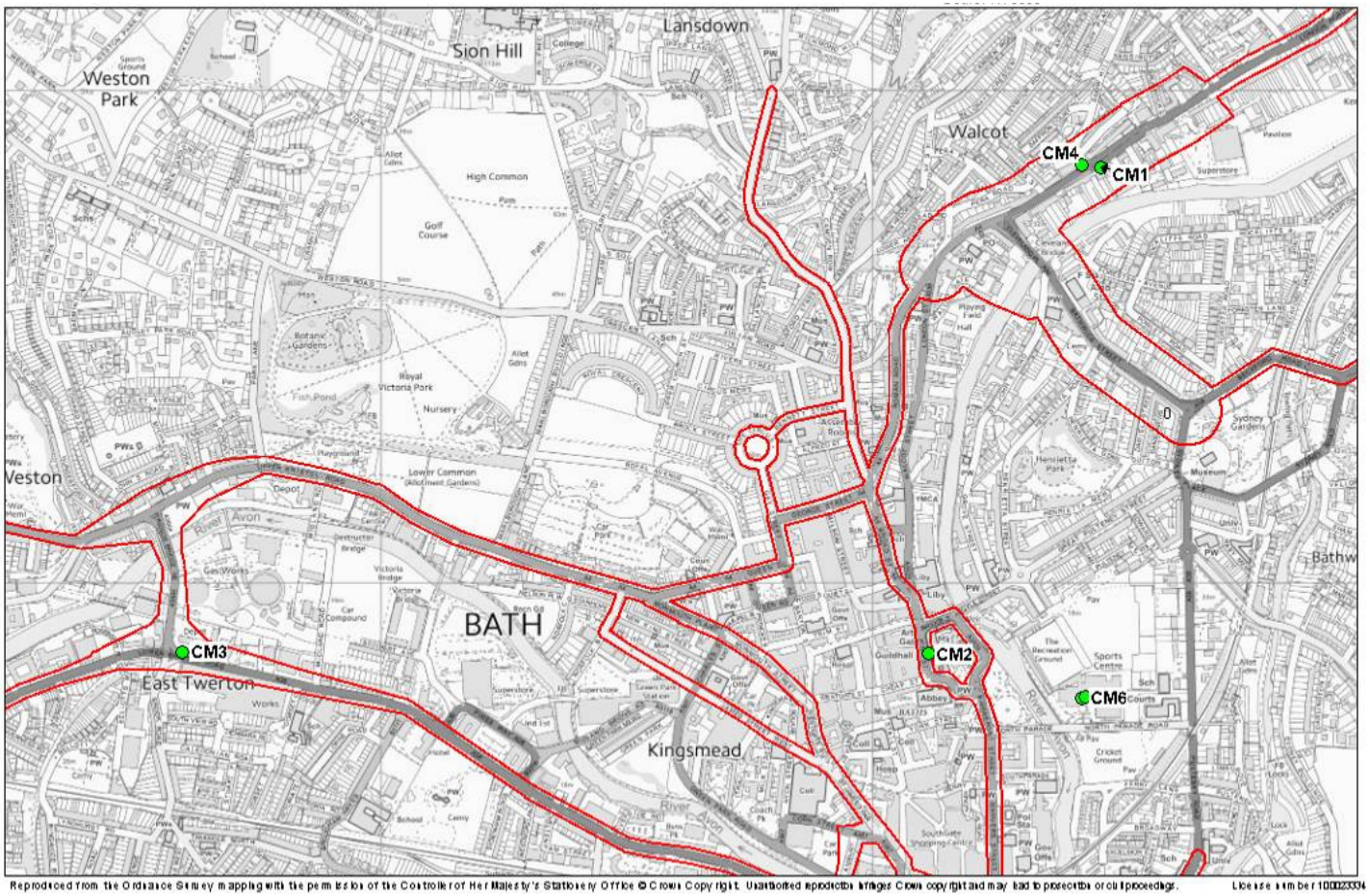

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Figure B-1: Continuous Air Quality Monitoring Sites (including met station/pollen site: CM6)

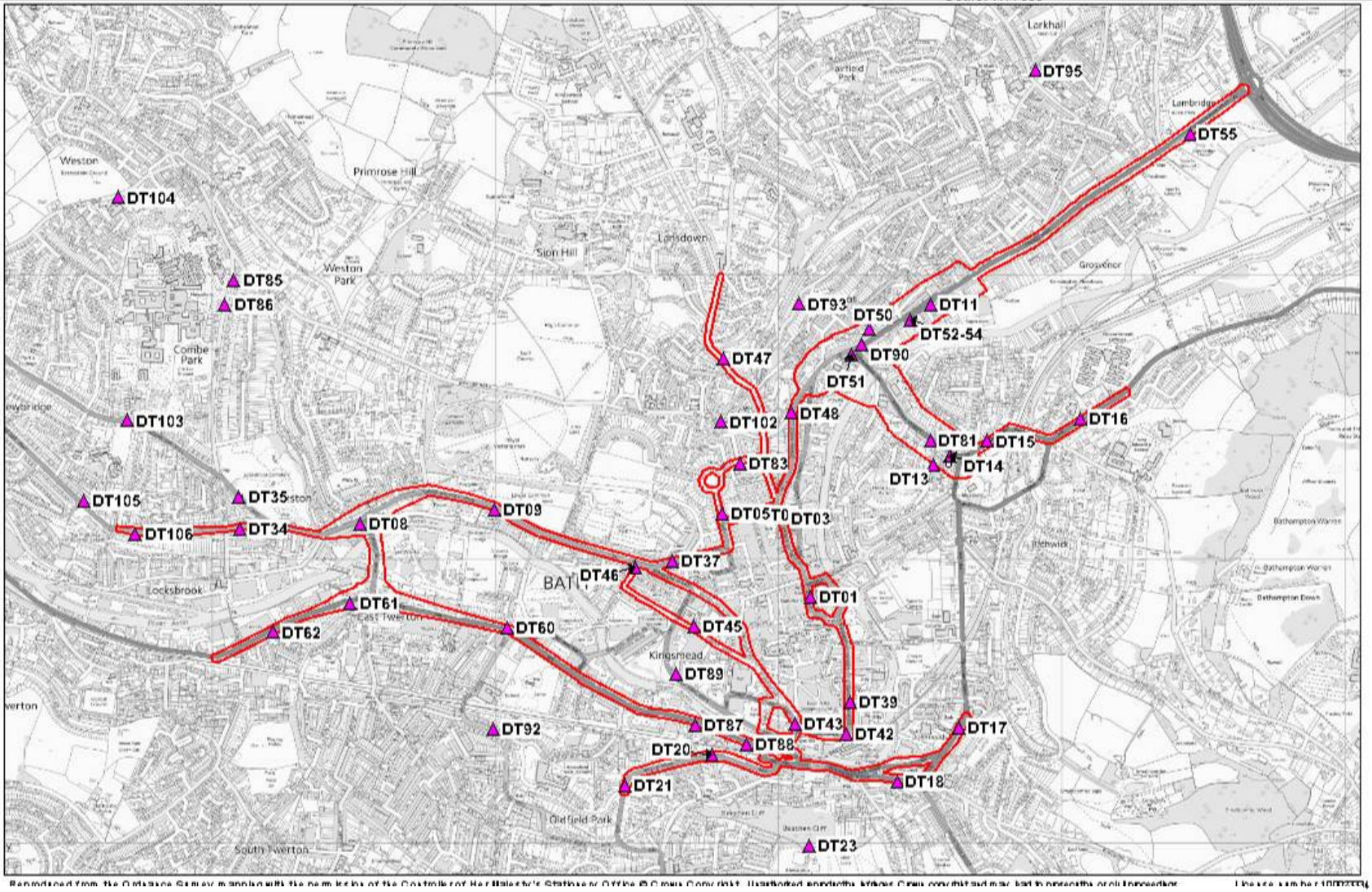

Figure B-2: Diffusion Tube Monitoring Sites (north)

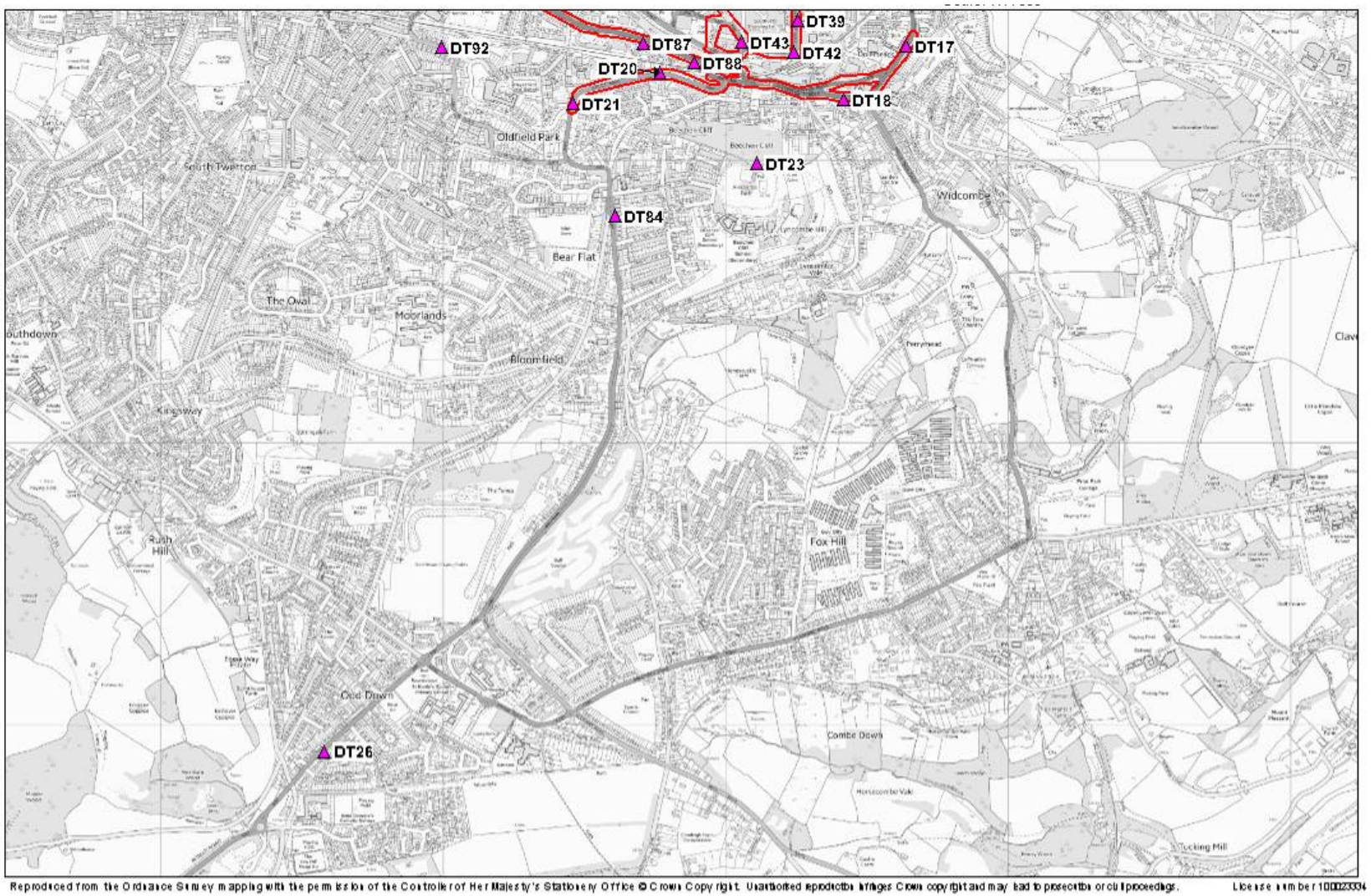

Figure B-3: Diffusion Tube Monitoring Sites (South)

Appendix C: Source Apportionment

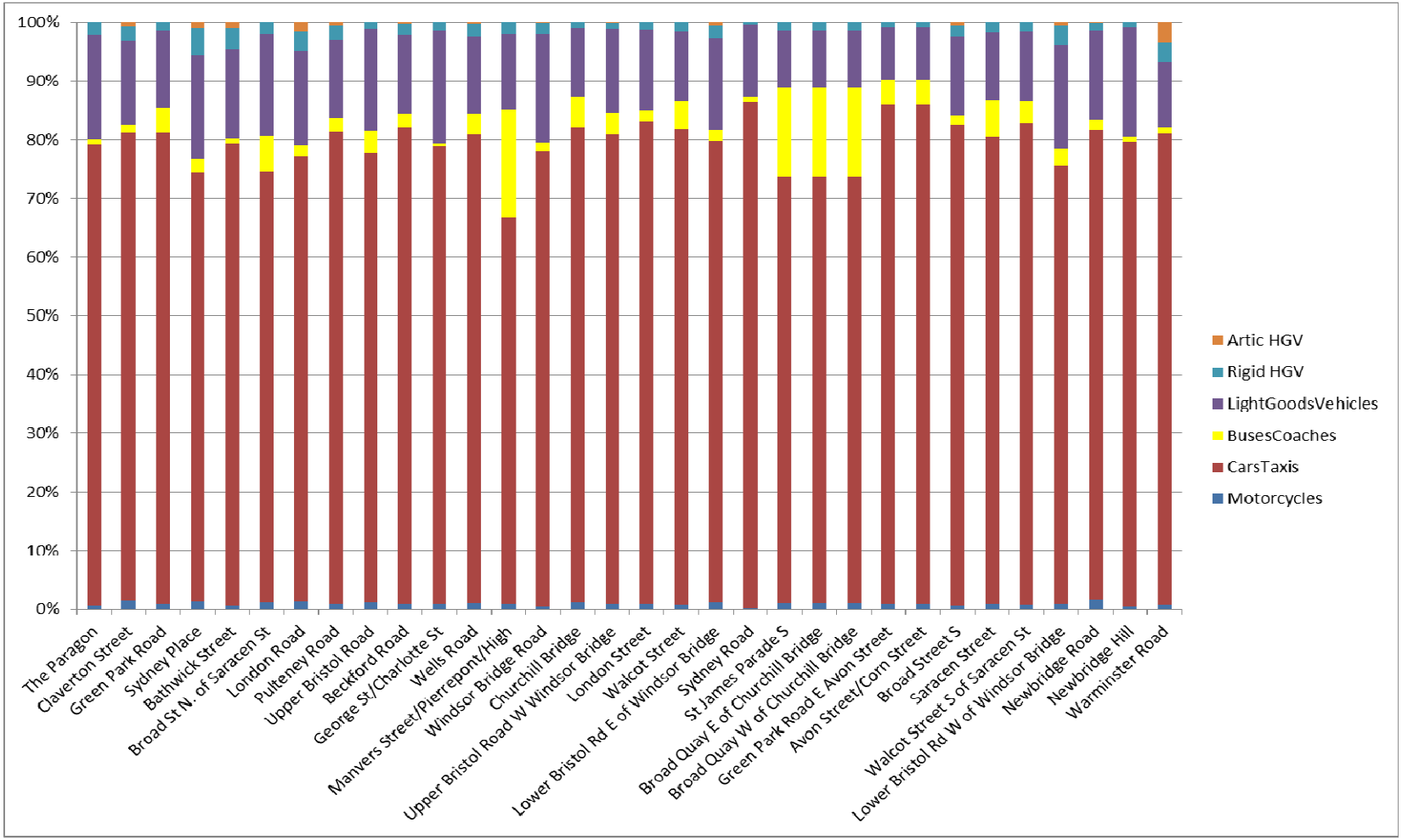

Figure C-1: Vehicle composition at DfT 2016 traffic count sites within Bath

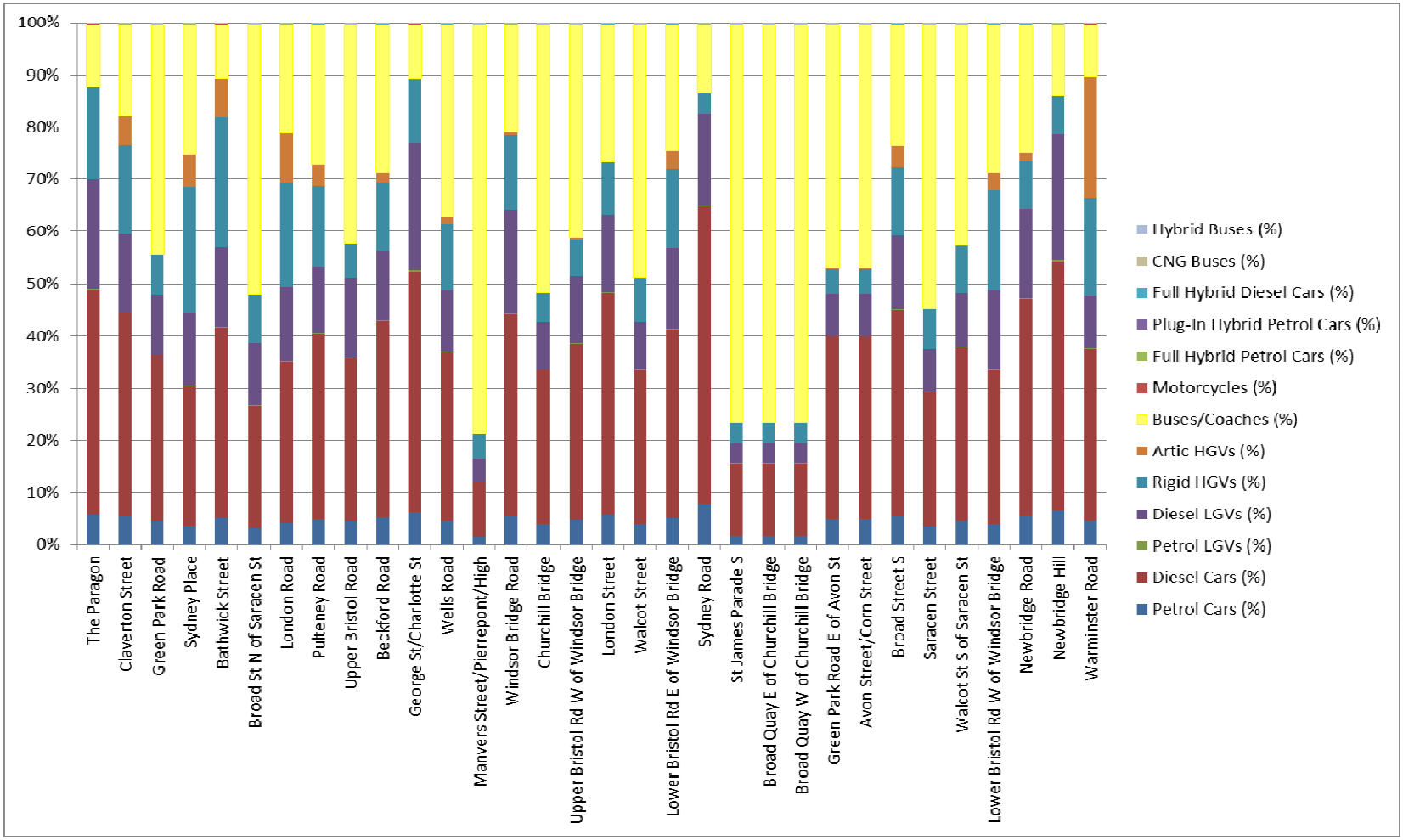

Figure C-2: Contribution of traffic related to NOx by vehicle type at 10k/h

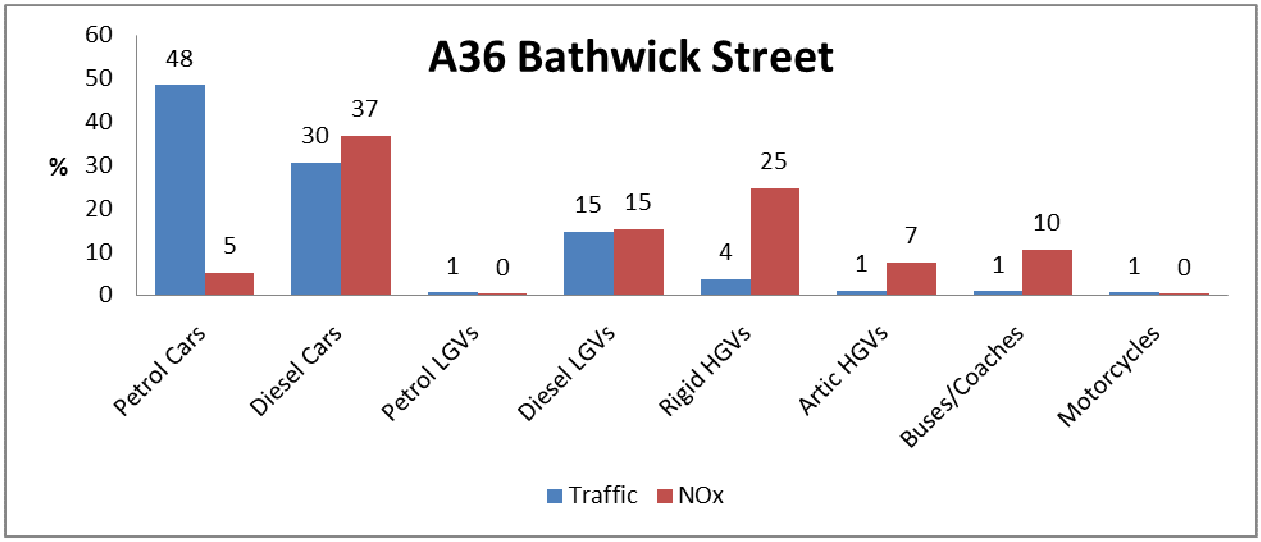

Figure C-3: A36 Bathwick St: traffic composition and NOx source apportionment

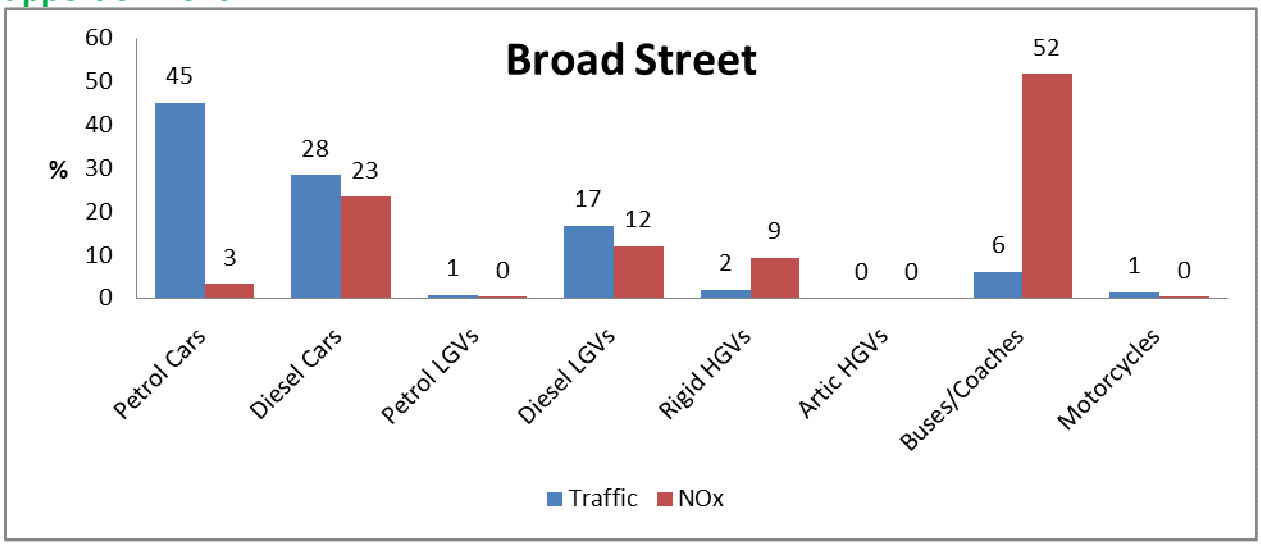

Figure C-4: Broad St traffic composition and NOx source apportionment

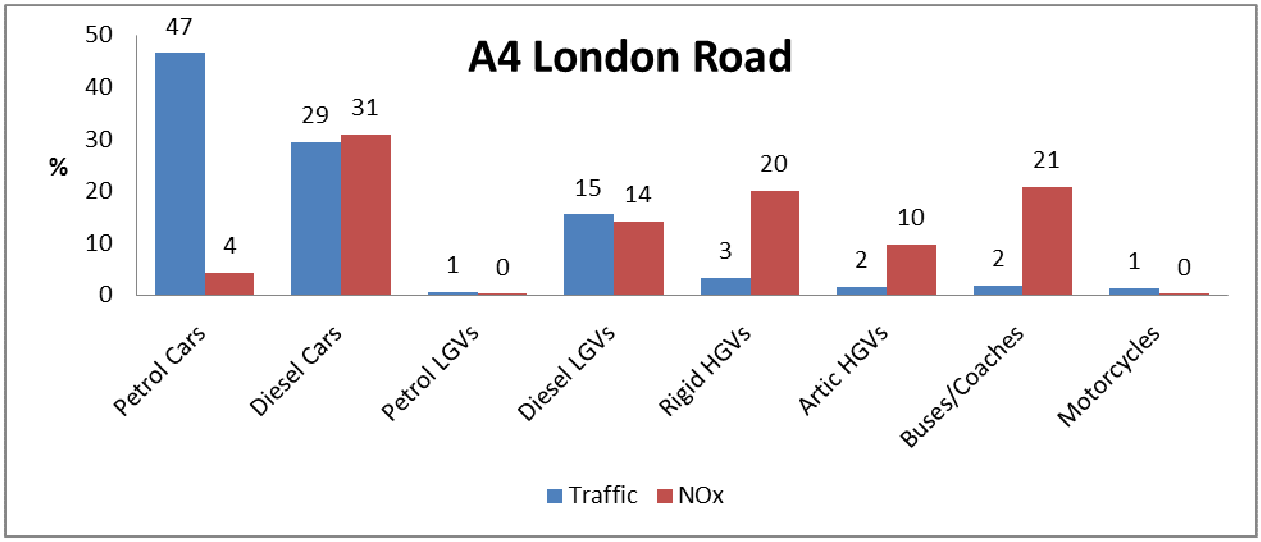

Figure C-5: A4 London Rd traffic composition and NOx source apportionment

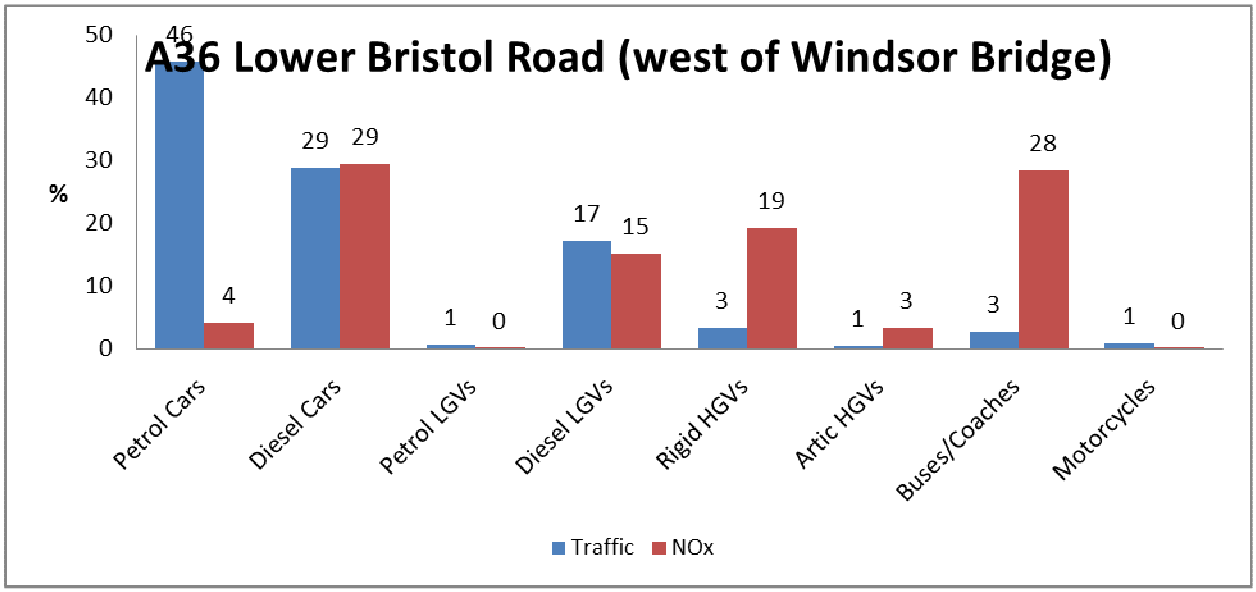

Figure C-6: A36 Lower Bristol Rd traffic composition and NOx source apportionment

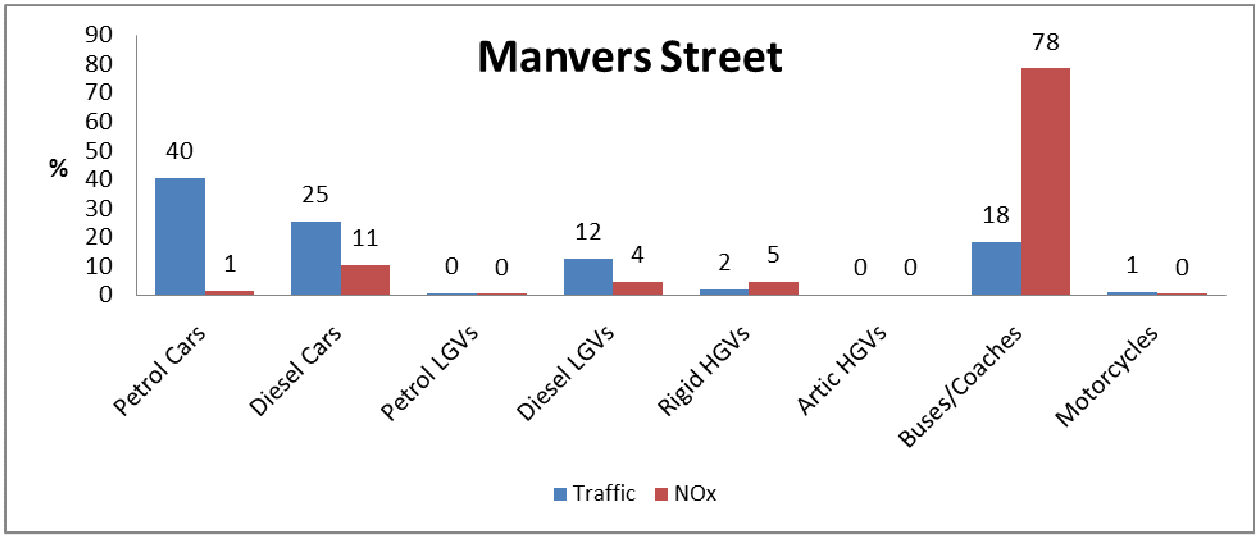

Figure C-7: Manvers Street traffic composition and NOx source apportionment

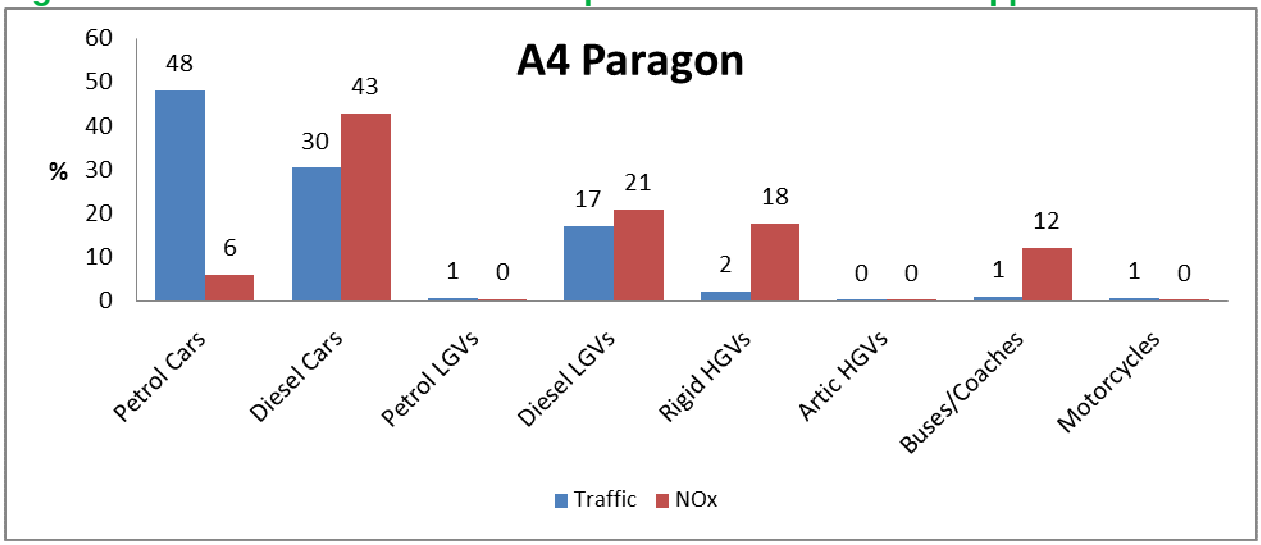

Figure C-8: A4 Paragon traffic composition and NOx source apportionment

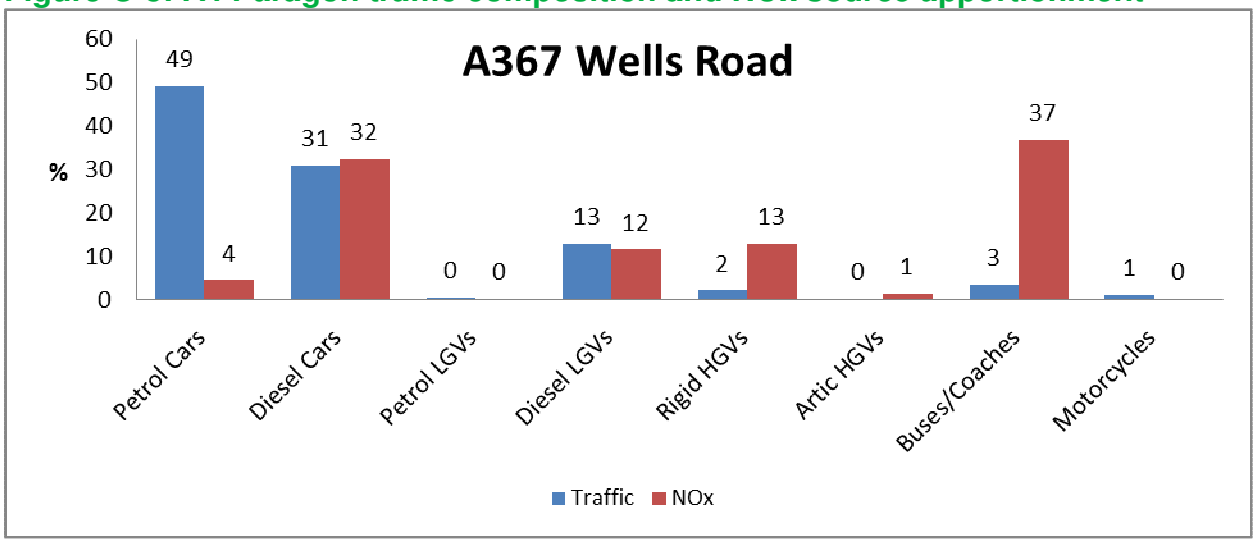

Figure C-9: A367 Wells Rd traffic composition and NOx source apportionment

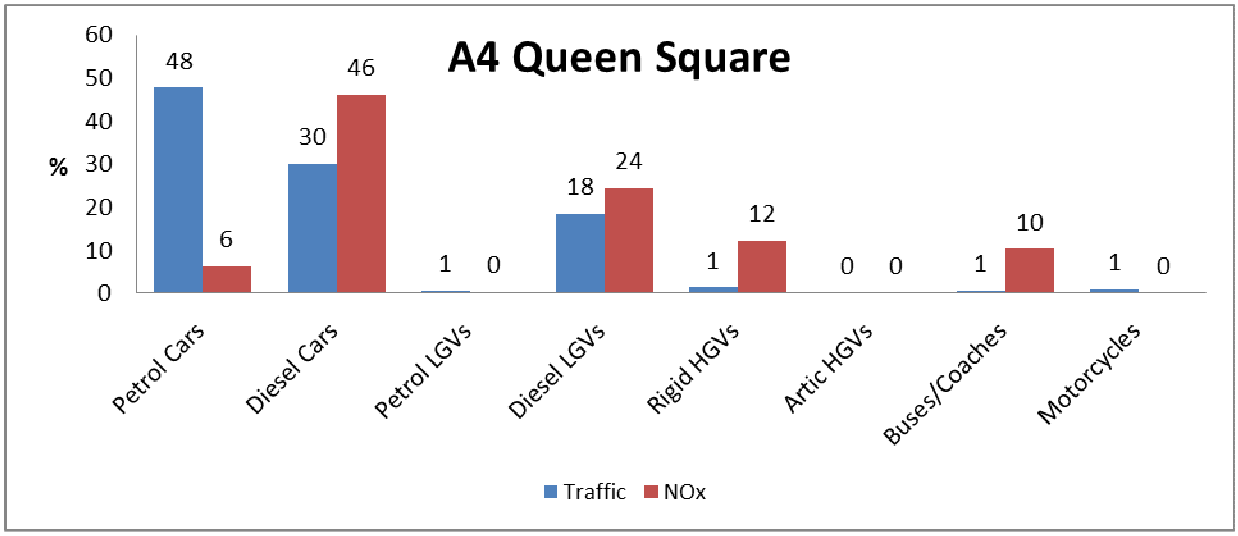

Figure C-10: A4 Queen Square traffic composition and NOx source apportionment

Appendix D: Required reduction and predicted year objective will be met

Location	Annual mean concentrations (µg/m3) Adjusted for bias 2016	Reduction in NO_2 concentration required (µg/m3)	Reduction in Road NOx concentration required (µg/m^3)	Reduction in Road NOx concentration required (%)	Predicted year when objective will be met
Angel Place	**47.3**	7.3	17.9	28.4	2019
Anglo Terrace	**69.5**	29.5	81.6	61.7	After 2030
Argyle Terrace	**47.8**	7.8	19.6	27.0	2019
Bathwick Street	**45.3**	5.3	13.0	20.5	2019
Bear Flat	**44.6**	4.6	11.5	16.5	2018
Broad Street	**47.5**	7.5	18.7	26.9	2019
Charlotte Street	**45.5**	5.5	13.4	22.8	2019
Cleveland Place West	**50.0**	10	25.2	33.2	2020
Dorchester Street	**66.7**	26.7	72.3	60.9	2029
Gay Street – Top	**40.7**	0.7	1.7	3.0	2017
High Street/ Guildhall	**40.4**	0.4	1.0	2.0	2017
James Street West	**43.7**	3.7	8.9	16.5	2018
Lambridge	**59.7**	19.7	52.8	48.3	2024
London Road	**40.9**	0.9	2.2	4.1	2017
London Road Continuous	**48.0**	8	20.0	28.2	2017
Manvers Street	**44.4**	4.4	10.7	18.7	2018
Morley Terrace	**40.4**	0.4	1.0	1.8	2017
Newbridge Hill	**40.7**	0.7	1.7	2.9	2017
Newbridge Road	**40.2**	0.2	0.5	0.9	2017
Paragon	**41.9**	1.9	4.6	8.3	2017
St James' Parade	**56.8**	16.8	43.4	48.3	2023
Upper Bristol Road	**46.8**	6.8	17.1	23.3	2019
Victoria Buildings	**52.3**	12.3	31.0	40.7	2021
Walcot Terrace (3 tubes)	**48.1**	8.1	20.2	28.5	2020
Wells Road	**54.8**	14.8	37.7	45.5	2022
Wells Road/Upper Oldfield Park	**46.9**	6.9	16.9	27.2	2019

Table D-1: Required reduction and year objective will be met

Appendix E: Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
AQS	Air Quality Strategy
ASR	Air quality Annual Status Report
CAZ	Clean Air Zone (formerly Low Emission Zone)
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
ULEV	Ultra-Low Emission Vehicle (emits no more than 50g/km CO_2)

Appendix F: References

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2 Every Breath You Take – The Lifelong Impact of Air Pollution, Royal College of Physicians, February 2016.

3 Environmental equity, air quality, socioeconomic status and respiratory health, 2010

4 Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

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6 National Institute for Health and Care Excellence – 'Air Pollution: outdoor air quality and health', June 2017.

7 Getting Around Bath – A Transport Strategy for Bath, 2014 (http://www.bathnes.gov.uk/sites/default/files/sitedocuments/getting_around_bath_transport_strategy_-_final_issue_web_version.pdf)

8 Our Plan To Get Bath moving (Our Transport Plan), July 2017.

9 Bath Public Realm and Movement Strategy 'Creating the canvas for public life in Bath, 2010' (http://www.bathnes.gov.uk/sites/default/files/sitedocuments/Planning-and-Building-Control/MajorProjects/BathPRandMS_Hi-Res.pdf)

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14 Bath and North East Somerset Health Protection Board Annual Report 2015/2016 (https://democracy.bathnes.gov.uk/mgConvert2PDF.aspx?ID=43824)

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16 The West of England Joint Local Transport Plan 3 (https://s3-eu-west-1.amazonaws.com/travelwest/wp-content/uploads/2015/05/joint-local-transport-plan.pdf)

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19 Clean Air Zone Framework – Principles for setting up Clean Air Zones in England, May 2017 (DEFRA and DfT)

20 National Institute for Health and Care Excellence – 'Air Pollution: outdoor air quality and health', June 2017.

21 Local Air Quality Management – Technical Guidance (TG16), Defra, April 2016