



2019 Air Quality Annual Status Report (ASR)

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

June 2019

North Somerset Council

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Executive Summary: Air Quality in Our Area

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 billion³.

The Council has a duty to review and assess air quality within its district under Part IV of the Environment Act 1995 and this Annual Status Report has been prepared to fulfil this requirement.

Air pollutants can arise from a variety of sources, including transport and industry. Pollutant levels are assessed against health based national air quality objectives. Where the objectives are not met, Air Quality Management Areas (AQMAs) must be declared and an Action Plan put in place to improve air quality in these areas.

Air Quality in North Somerset

North Somerset is a unitary council in the West of England, bounded by the River Avon in the north and the Mendip hills to the south. It covers an area of approximately 145 square miles and has a population of 213,900⁴

North Somerset is strategically placed, close to the major cities of Bristol and Cardiff and with excellent transport links, including Bristol Airport, the M5 motorway, five railway stations on the main line to the south west and the Royal Portbury Dock, which has the largest entrance lock of any UK port. It is also a beautiful area with lovely countryside and 25 miles of coast attracting over 8m visitors a year. A large part of North Somerset is classified as either green belt or an Area of Outstanding Natural Beauty.

North Somerset is classified as 'urban with significant rural' with almost 40% of residents living in rural communities or 'rural hub towns'. The largest settlement is

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

² Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

⁴ <https://www.nomisweb.co.uk/reports/lmp/la/1946157351/report.aspx#tabrespop>

Weston-super-Mare, which with a population of 76,143⁵ is already the third largest settlement in the West of England and with a significant expansion planned, is likely to overtake Bath in the next decade.

There are three other towns; Portishead, Clevedon and Nailsea and many villages of varied size and character.

The main pollutant of concern locally is nitrogen dioxide (NO₂), which originates primarily from road traffic emissions.

North Somerset Council carried out monitoring for nitrogen dioxide at 22 sites across the district in 2018. The results of the monitoring for 2018, as with previous years shows that the levels of NO₂ across the district are all below the annual air quality objective of 40µg/m³. As such no air quality management areas have been declared in North Somerset. In light of this North Somerset Council has not had to introduce an Action Plan to improve air quality in the area.

Pollutant Sources

The following pollutant sources were considered as part of the review of air quality for this report, as detailed in the DEFRA LAQM Technical Guidance (LAQM.TG16)⁶

- Road Traffic Sources
- Non-road Traffic Sources
- Industrial Sources
- Commercial and Domestic Sources
- Fugitive and Uncontrolled Sources

No new major sources of emissions were identified.

Actions to Improve Air Quality

As noted above, North Somerset Council has not declared any air quality management areas within the district, therefore no formal air quality action plan is in place. However, the measures outlined in the Joint Local Transport Plan 3⁷, will continue to ensure levels of nitrogen dioxide remain below the air quality objectives.

⁵ <https://www.citypopulation.de/php/uk-parishes-southwestengland.php?adm2id=E04012104>

⁶ <https://laqm.defra.gov.uk/technical-guidance/>

⁷ <https://s3-eu-west-1.amazonaws.com/travelwest/wp-content/uploads/2015/05/joint-local-transport-plan.pdf>

In addition, North Somerset Council is participating in a scheme in conjunction with Bristol City Council, South Gloucestershire Council and Bath and North East Council to replace its fleet of passenger and light goods vehicles with electric versions ([Go Ultra Low West](#)). Highlights of this scheme include:

- Match funded grant from the Office of Low Emission Vehicles (OLEV) of £130,000, with the aim to replace 20% of the council's fleet with electric vehicles by 2021. However, greater progress has been made with the 20% target already achieved (35 Vehicles). The aim is now to convert all the fleet by 2021.
- Improvements to the public charging network. At present there are 200 charging points in the West of England area, with 11 of those in North Somerset. The aim is to double the amount of charging points in the West of England by 2021.
- A grant of £350,000 from OLEV for North Somerset Council to design and build the first K:Port, which is a four vehicle demonstration charging hub, offering rapid 50 kW EV charging, which takes around 20-30 minutes to fully top up a car battery. It is hoped that this will be up and running by the end of 2019.
- Influencing change through policy incentives such as allowing bus lanes and high occupancy vehicle lanes to be used by electric cars and providing free on street parking where electric cars can charge.
- The Weston-super-Mare Town Centre Regeneration Supplementary Planning Document⁸ requires at least 10% of the total parking spaces at new builds to include superfast charging points with a minimum of 1 space. In addition, to future-proof car parking areas passive provision is to be included to support the provision of charging points for 40% of spaces in the longer term.
- Encouragement and promotion to our licensed private hire taxis and Hackney Carriages to convert to electric vehicles. At present there is no formal requirement within the taxi policy for the use of electric vehicles. However, we will work jointly with the licensing team to both encourage the use of electric vehicles through the taxi policy 2018 to 2023.
- North Somerset Council Public Health have been reviewing North Somerset against the recently published NICE guidance on air quality (Air pollution: outdoor

⁸ <https://www.n-somerset.gov.uk/wp-content/uploads/2015/12/Weston-super-Mare-Town-Centre-Regeneration-Supplementary-Planning-Document.pdf>

air quality and health, 2019. A significant new piece of work around climate change which incorporates air quality is being considered by the wider council and this will result in an action plan to be agreed in 2019.

Conclusions and Priorities

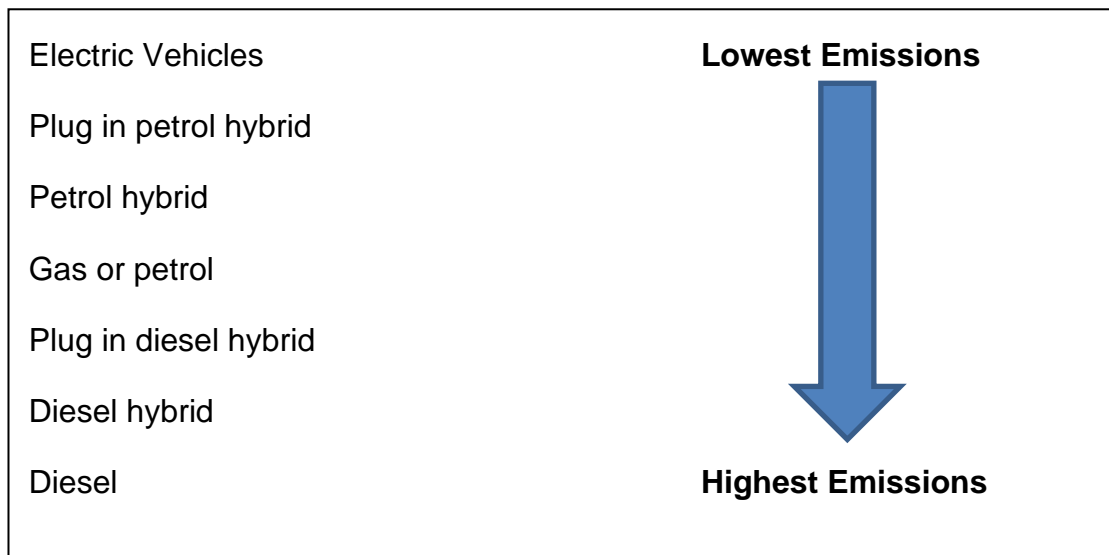
The results of nitrogen dioxide monitoring in 2018, as with previous years show that levels of NO₂ across the district are all below the annual mean air quality objective of 40 µg/m³. As such no air quality management areas have been declared in the district and no air quality action plan has been put in place.

Notwithstanding this, North Somerset Council will continue to promote measures to improving air quality in the district through the Joint Local Transport Plan 3. In addition we will continue to work with colleagues in Public Health to ensure measures such as schemes to make people more active (<https://www.n-somerset.gov.uk/my-services/leisure/sport/getting-active/go4life/>) are implemented to ensure levels of nitrogen dioxide remain below the air quality objective.

Local Engagement and How to get Involved

Everyone can help to improve air quality in North Somerset and beyond. By making informed personal choices, particularly with regard to travel, we can help to improve air quality and improve our own health in the process.

- Substituting car use, if and when possible, with a bus or a train journey, or preferably by walking or cycling, not only reduces air pollution but improves your health and wellbeing.
- If possible, sharing lifts with colleagues to work will save you money as well as reducing the number of cars on the road. (<https://liftshare.com/uk>)
- Choose to travel outside peak hours if possible or work from home if that is an option.
- When looking to change your vehicle, take air pollution in to consideration and opt for the cleanest vehicle you feasibly can. Low emission electric and/or hybrid vehicles are becoming more affordable and government funding and grants are available. As a general rule, the hierarchy below can be followed to identify which types of vehicles have the lowest emissions of pollutants which are harmful to health:



- However, some vehicle manufacturers and models perform better than others in terms of pollutant emissions. Measurements of the level of pollution emitted under real-world driving conditions have shown large discrepancies with the required Euro emission standards for vehicles. To check the emissions of your vehicle or the performance of a vehicle that you are considering purchasing, there is an [online vehicle checker](#)⁹ that has been launched by the Mayor of London to enable consumers to get the latest data on real world vehicle emissions, compiled through robust independent emissions from tests by Emissions Analytics and the International Council on Clean Transportation.
- The [Travel West](#)¹⁰ website provides live information on public transport for journey planning as well as route information for walkers and cyclists. It also provides traffic reports, information on electric vehicle charging infrastructure and other information that simplifies travel choices.

Whilst most air pollution in North Somerset is caused by road traffic, domestic heating in particular wood-burning, is another source of pollution, especially particulates (PM₁₀ and PM_{2.5}). Measures that could be considered to reduce pollution from domestic heating include:

- Upgrading domestic boilers to newest and most fuel efficient condensing boilers with lowest NO_x (and carbon) emissions.

⁹ https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/cleaning-londons-vehicles/cleaner-vehicle-checker?make=All&model=All&model_year_selective=All&nox_rating_combined_selective=All&fuel_selective=All&transmission_selective=All&body_style_selective=All&engine_size_litres_selective=All

¹⁰ <https://travelwest.info/>

North Somerset Council

- “Clean” renewable energy generation, for example solar photovoltaics, air source heat pumps etc.
- Using DEFRA approved appliances and smokeless fuels suitable for use in a smoke control area, whether you are in a smoke control area or not ¹¹
- Use of appropriate fuels in wood burners/open fires. More information can be found here [Ready to Burn¹²](#) and here : [A Guide to Buying, Storing and Seasoning Wood¹³](#)

¹¹ <https://smokecontrol.defra.gov.uk/appliances.php?country=england>

¹² https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1901291307_Ready_to_Burn_Web.pdf

¹³ https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1903131256_Seasoning_Wood_Web_Feb_2019_V5.pdf

Table of Contents

Executive Summary: Air Quality in Our Area	i
Air Quality in North Somerset.....	i
Actions to Improve Air Quality.....	ii
Conclusions and Priorities.....	iv
Local Engagement and How to get Involved.....	iv
1 Local Air Quality Management	9
2 Actions to Improve Air Quality	10
2.1 Air Quality Management Areas.....	10
2.2 Progress and Impact of Measures to address Air Quality in North Somerset Council.....	10
2.3 PM _{2.5} – Local Authority Approach to Reducing Emissions and/or Concentrations.....	16
3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance	20
3.1 Summary of Monitoring Undertaken.....	20
3.1.1 Automatic Monitoring Sites.....	20
3.1.2 Non-Automatic Monitoring Sites.....	20
3.2 Individual Pollutants.....	21
3.2.1 Nitrogen Dioxide (NO ₂).....	21
3.2.2 Particulate Matter (PM ₁₀).....	22
3.2.3 Particulate Matter (PM _{2.5}).....	22
3.2.4 Sulphur Dioxide (SO ₂).....	22
Appendix A: Monitoring Results	24
Appendix B: Full Monthly Diffusion Tube Results for 2018	29
Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC	31
Appendix D: Map(s) of Monitoring Locations and AQMAs	36
Appendix E: Summary of Air Quality Objectives in England	47
Glossary of Terms	48
References	49

List of Tables

Table A.1	Details of Non-Automatic Monitoring Sites
Table A.2	Annual Mean NO ₂ Monitoring Results
Table B.1	NO ₂ Monthly Diffusion Tube Results – 2018
Table C.1	Distance to façade correction.

Table E.1 Air Quality Objectives in England

List of Figures

Figure 1	PHOF Indicator 3.01 Health Protection: Fraction of mortality attributable to particulate air pollution.
Figure 2	Results of Bristol Airport NO ₂ Diffusion Tube Monitoring
Figure 3	Continuous Monitoring Results for Bristol Airport
Figure A.1	Trends in Annual Mean NO ₂ Concentrations
Figure D.1	Map of North Somerset Area
Figure D.2	Weston-super-Mare, Drove Road
Figure D.3	Weston-super-Mare, Herluin Way
Figure D.4	Weston-super-Mare, Mendip Green Primary School
Figure D.5	Weston-super-Mare, Willow Close
Figure D.6	St Annes School
Figure D.7	Congresbury, Station Road
Figure D.8	Yatton, High Street
Figure D.9	Clevedon, Coxway
Figure D.10	Portishead, Wyndham Way
Figure D.11	Easton-in-Gordano, Beachwood Road
Figure D.12	Pill (Railway Line)
Figure D.13	Pill (A369)
Figure D.14	Long Ashton, Northleaze C of E Primary School
Figure D.15	Flax Bourton (A370)
Figure D.16	Backwell, (A370)
Figure D.17	Downside Road, (Homelea)
Figure D.18	Downside Road, (Top 8)
Figure D.19	Sandford School (A368)
Figure D.20	Banwell Monitoring Locations
Figure D21.	Bristol Airport Monitoring Locations

1 Local Air Quality Management

This report provides an overview of air quality in North Somerset during 2018. 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 North 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 E.1](#) in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

North Somerset Council currently does not have any AQMAs. For reference, maps of North Somerset Council's monitoring locations are available in [Appendix D](#)

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

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

The report is well structured, concise, and provides the information specified in the Guidance, following the latest reporting template. The following comments are provided.

1. 2017 data confirms continued compliance with national air quality objectives at all monitoring sites, with the exception of Felton Primary School, with a reported concentration of 40.7 $\mu\text{g}/\text{m}^3$.
2. However, it is unclear whether this site is representative of relevant exposure or not, as the 2016 ASR identifies the site as being located 9m from the nearest receptor, but the 2017 ASR says that distance to relevant exposure is "N/a" for Felton Primary School. In the 2016 report, the Local Authority has corrected the (also) 40.7 $\mu\text{g}/\text{m}^3$ annual mean to 30.4 $\mu\text{g}/\text{m}^3$ - well below objective levels. *(Although the monitoring site is labelled as Felton Primary School, the school closed down a number of years ago. The site no longer represents relevant exposure).*
3. It is disappointing to see that this has not been addressed in the commentary, and it is difficult to make a recommendation in regards to this potential exceedance, given the lack of explanation provided *(this is explained in point 2 above and section 3.1.2).*

4. The Council has reviewed and amended their monitoring strategy, ceasing monitoring at eight sites, and establishing eight new monitoring sites. It is encouraging to see the Local Authority responding to feedback in previous ASR appraisals, and taking an active approach to reviewing their monitoring programme. It is recommended that the Local Authority continue to review their monitoring on a regular basis going forward, to ensure that monitoring takes place at any potential sites of exceedance with relevant exposure in the future (*noted*).
5. QA/QC procedures have been applied in full for bias adjustment and distance correction. The Council has provided example calculations for corrections which is useful and encouraged.
6. However, it appears there may be miscalculation in the distance corrections, as the figures detailed in Table C.1. for “receptor distance to kerb”, are the same as the figures detailed in Table A.1 for “distance [of monitoring site] to relevant exposure”. This is a common miscalculation, but the Local Authority should ensure that figures and calculations are correct in future reporting (*noted*).
7. While the report does not explicitly draw links between PM_{2.5} and the Public Health Outcomes Framework, it demonstrates the Councils efforts towards mitigating this pollutant, in partnership with Public Health, which is supported.

On the basis of the evidence provided by the Local Authority, the conclusions reached are acceptable for all sources and pollutants.

Following the completion of this report, North Somerset Council should submit an Annual Status Report in 2019.

As discussed in Section 2.1 above, North Somerset Council does not have any air quality management areas and as such has not had to derive an air quality action plan. However, there are a number of strategies and plans in place, which will have a beneficial impact on air quality and are discussed further below.

2.2.1 Local Air Quality Strategy

An air quality strategy was published for the four “West of England” Local Authorities (Bristol, South Gloucestershire, Bath and North East Somerset and North Somerset) in 2003 and reviewed in 2005. Ideally, this strategy should be reviewed to ensure it remains up to date.

In summary, the objectives of the air quality strategy were to identify how North Somerset Council could assist in securing air quality improvements across the district.

The specific aims and objectives for North Somerset were as follows:

- To meet the national air quality objectives;
- To present the deterioration of air quality where it is already satisfactory;
- To ensure North Somerset makes a contribution to the reduction of carbon dioxide emissions in line with national targets;
- To support policies such as the Local Transport Plan and North Somerset’s Core Strategy; and
- To protect and enhance the environment so that plants, animals and people are free from the consequences of air pollution.

2.2.2 Joint Local Transport Plan 3

The West of England Joint Local Transport Plan 3 (JLTP3) was published in March 2011, and was written to deliver transport improvements to the four councils of Bath and North East Somerset, Bristol, South Gloucestershire and North Somerset. The [JLTP3](#)¹⁴ covers the period 2001 to 2026.

Consultation on the draft [JLTP4](#) closed at the end of March 2019 with the final version due to be published later in 2019.

Chapter 8.3 of the JLTP3 covers air quality and health. The JLTP3 predominantly looks to incorporate the air quality action plans for the AQMA’s produced for Bristol, Bath and North East Somerset and South Gloucestershire.

Chapter 8.4 details the air quality strategy. The strategy focusses on the following:

¹⁴ <https://travelwest.info/projects/joint-local-transport-plan>

Information, promotion awareness and alternatives

- Raising awareness of air quality issues;
- Providing information about air quality for residents and visitors, including those sensitive to high levels of pollution, such as elderly people or asthma sufferers;
- Reducing vehicle use by promoting more sustainable modes of transport;
- Encouraging use of lower emissions;
- Promotion of “eco-driving” training with focus on high mileage business users to encourage more fuel efficient driving;
- Encouraging behavioral change.

Management

- Urban Traffic Management and Control (UTMC) to help reduce emissions associated with stop-start driving and prioritise more efficient modes of transport such as buses;
- Relocating traffic queues away from areas where the air quality impact is likely to be detrimental;
- Work with Highways England through the Memorandum of Understanding on potential air quality improvements on the motorway and trunk road networks;
- Targets parking enforcement on key radial routes to reduce delays and congestion during peak periods;
- Using real time information to provide early warning of road works and other incidents to enable drivers to find alternative routes and help avoid local air pollution hot spots.

Signing

- Better signing to direct traffic, predominantly Heavy Goods Vehicles, onto the most appropriate routes and away from sensitive areas;
- Use of variable message and other enhanced signing for parking to reduce congestion caused by circulating traffic searching for parking spaces.

Partnership Working

- Partnership working with operators to achieve further upgrading of the bus fleet in the West of England;
- Increase the proportion of vehicles meeting the latest Euro Standards;
- Use developer contributions where appropriate and other sources of funding elements of Air Quality Action Plans;

Freight

- Work with the freight industry on ways and means of addressing the problem of Heavy Goods Vehicles emissions;
- Extend freight consolidation from Bristol to Bath to reduce the number of city centre deliveries;
- Work with the health sector on possible expansion of the consolidation centre for health deliveries;
- Undertake a Low Emission Zone feasibility study for the Bath AQMA linked to freight consolidation;
- Reduce emissions from council vehicle fleets.

Major ~Transport Schemes

- Rapid transit and enhanced bus and rail services, accompanied by improvements for pedestrians and cyclists, will provide attractive alternatives to the car, helping to reduce AQMA traffic levels.
- Progress on the Joint Transport Plan can be found in the JLTP3 Progress Report 2016 (<https://travelwest.info/projects/joint-local-transport-plan>).

2.2.3 Climate Change Strategy

In 2013, North Somerset Council signed a Climate Local Agreement¹⁵. In signing the agreement, North Somerset Council made a commitment to:

¹⁵ (<http://www.n-somerset.gov.uk/my-services/planning-building-control/planningpolicy/supplementary-planning-advice/guidance/climate-change/>)

- Set locally owned and determined commitments and actions to reduce carbon emissions and to manage climate impacts. These will be specific, measurable and challenging;
- Publish our commitments, actions and progress, enabling local communities to hold us to account;
- Share the learning from our experiences and achievements with other Councils; and
- Regularly refresh our commitments and actions to ensure they are current and continue to reflect local priorities.

In 2018, the Council refreshed its [Climate Local Agreement](#)¹⁶.

In February 2019, North Somerset Council passed a motion declaring a climate change emergency. It resolved that this council:

1. Recognises the serious global Climate Challenge Emergency
2. Asks officers to prepare a report on the actions North Somerset Council could take with the aim of achieving carbon neutrality by 2030 with an idea of costings, aiming to bring back a report to Council around June and;
3. Asks the Chief Executive to write to the Government minister on our achievements and asks for resources when we know what the detailed proposals might be.

A

2.2.4 Local Planning Policy

The Core Strategy for North Somerset was adopted in January 2017 and has a number of policies to guide development, with the principal relevant policy to air quality being CS3, Environmental Impacts and Flood Risk Assessment.

Further information is available at: <http://www.n-somerset.gov.uk/wp-content/uploads/2015/11/Core-Strategy-adopted-version.pdf>.

¹⁶ <http://www.n-somerset.gov.uk/wp-content/uploads/2018/05/Climate-Local-Commitment-refresh-2018.pdf>.

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

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of PM_{2.5} (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM_{2.5} has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The introduction of this role into local air quality management supports efforts to reduce exposure at national level and also links strongly to the public health agenda, in particular the Public Health Outcome Framework (PHOF)¹⁷ which includes the following indicator:

- PHOF Indicator 3.01 Health Protection: Fraction of mortality attributable to particulate air pollution.

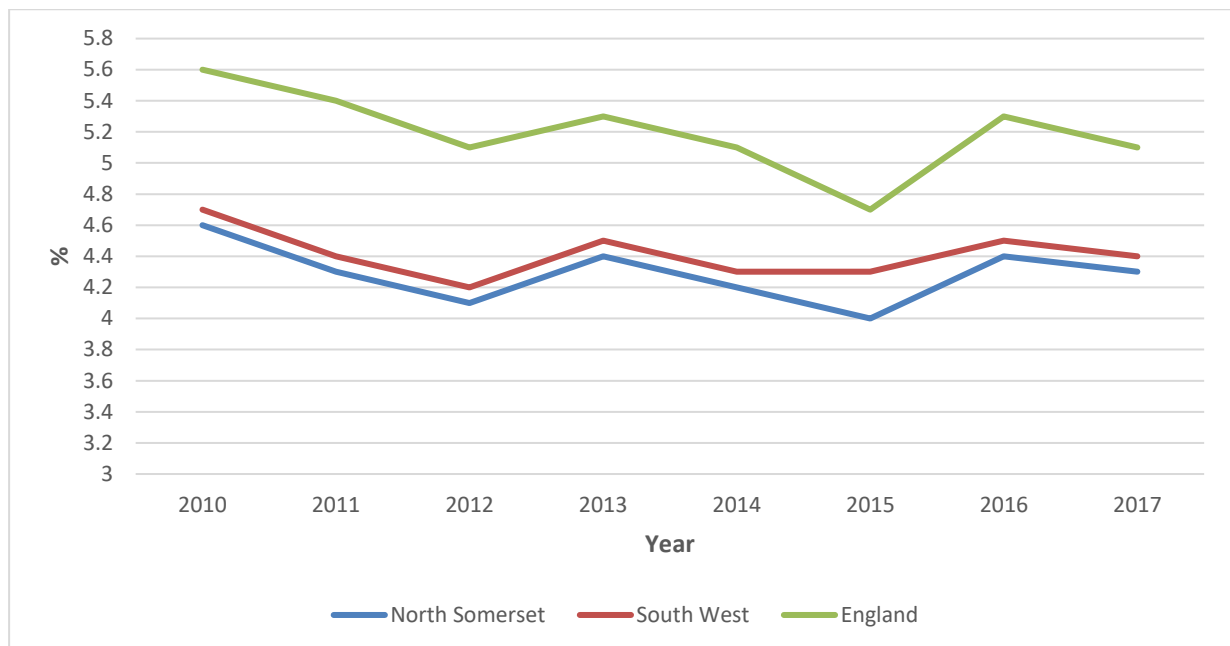
Estimates of mortality burden are based on modelled annual average concentrations of fine particulate matter (PM_{2.5}) originating from human activities in each local authority area. Local data on the adult population and adult mortality rates is also used. The estimates of the fraction of mortality attributable to long-term exposure to human made particulate air pollution range from approximately 3% in some local authority areas to 6-7% in some London boroughs.

In 2017, the most recent year for which data is available, the estimated fraction of mortality in North Somerset was 4.3%. This is below the average for England as a whole (5.1%). It is also comparable for the southwest region average of 4.4% but below the other West of England unitary authorities; South Gloucestershire (5.1%), Bristol (5.1%) and Bath and North East Somerset (4.7%). The estimated fractions of mortality have decreased when compared to the previously reported 2016 data when, for example, the estimated fraction for North Somerset was 4.4%.

Figure 1 below shows the trend in the estimated fraction of mortality since 2010.

¹⁷ <https://fingertips.phe.org.uk/profile/public-health-outcomes-framework>

Figure 1: PHOF Indicator 3.1 Fraction of mortality attributable to particulate air pollution



The Council's Joint Strategic Needs Assessment (JSNA)¹⁸ also contains information on air quality impacts on the North Somerset population.

North Somerset Council continues to recognise that local authorities are expected to work towards reducing emissions and concentrations of PM_{2.5} in their area.

In terms of the current situation with regards to PM_{2.5} concentrations locally, while there is no regulatory standard applied to the PM_{2.5} role for local authorities, the EU Ambient Air Quality Directive¹⁹ does however set out air quality standards for PM_{2.5}, which can act as a guide:

- Annual average EU limit value of 25µg/m³ by 2020
- EU target value of 15% reduction in concentrations at urban background locations between 2010 and 2020.

North Somerset Council does not locally monitor for PM_{2.5}, but the background maps published by DEFRA indicate that the annual average background levels of PM_{2.5} in North Somerset for 2018 are 7.6µg/m³, significantly below the EU limit value.

North Somerset Council is taking the following measures to address PM_{2.5}:

¹⁸ <https://www.n-somerset.gov.uk/my-council/statistics-data/jsna/transport-economy-environment/>

¹⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1486474738782&uri=CELEX:02008L0050-20150918>

- Identifying measures that are already in place that can help reduce levels of PM_{2.5} through the implementation of the Joint Local Transport Plan, such as raising awareness of air quality issues, reducing vehicle use by more sustainable modes of transport and encouraging the use of lower emission vehicles.
- Continue to work with the director of Public Health to promote measures to improve air quality, including promotion of active transport, implementation of measures to increase healthy, active lifestyles and ensures measures are implemented through improved urban planning e.g. improved cycle highways.
- Ensure that air quality continues to be considered as part of the Joint Strategic Needs Assessment (JSNA).
- Dust Management Plans (DMPs), which are usually incorporated into Construction Environmental Management Plans (CEMPs), are routinely conditioned on major development planning permissions to control and minimise the risk of construction dust impacts, and therefore PM_{2.5}, to nearby receptors.
- Regular inspections of industrial processes permitted by the Council where combustion and non-combustion processes lead to anthropogenic emissions of PM_{2.5}.
- The Council will also promote initiatives such as the “Ready to Burn” scheme. Understanding the right fuels and the right way to use them is explained within the “Open fires and wood burning stoves” guidance leaflet²⁰ issued by DEFRA. The measures outlined for reducing emissions include:
 - Choosing the right stove
 - Considering burning less
 - Buying ‘Ready to Burn’ fuel
 - Season freshly chopped wood before use
 - Do not burn treated waste wood (e.g. old furniture) or household rubbish
 - Regularly service and maintain your stove (annually)

²⁰ https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1901291307_Ready_to_Burn_Web.pdf

- Get your chimney swept regularly (up to twice a year).

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 objectives. Local authorities no longer have to report on the following pollutants; 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. National monitoring results are available on the [DEFRA UK-Air \(Air Information Resource\) website](#)²¹

3.1.1 Automatic Monitoring Sites

North Somerset Council does not undertake any automatic (continuous) monitoring.

3.1.2 Non-Automatic Monitoring Sites

North Somerset Council undertook non- automatic (passive) monitoring of NO₂ at 22 sites during 2018. [Table A.1](#) in Appendix A shows the details of the sites.

Triplicate monitoring (using three diffusion tubes) is undertaken at one monitoring location (Banwell, Bowling Club) to ensure robust monitoring datasets

Maps showing the location of the monitoring sites are provided in [Appendix D](#). Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in [Appendix C](#).

In 2018, four new diffusion tube monitoring sites were set up, Beachwood Road, Easton-in-Gordano, Northleaze Primary School, Long Ashton, Flax Bourton (A370) and Sandford Primary School, Sandford. These new sites have focussed on areas within the district, which have not previously been monitored as well as outside schools adjacent to busy roads.

The following nine diffusion tube sites ceased operation in 2017;

- Weston-super-Mare, Bedford Road because monitored concentrations have been consistently well below the annual mean objective since monitoring commenced in 2002.

²¹ <https://uk-air.defra.gov.uk/>

- Congresbury, The Plough because monitored concentrations have been consistently well below the annual mean objective since monitoring commenced in 2007.
- Congresbury, The Cross, because monitored concentrations have been consistently well below the annual mean objective since monitoring commenced in 2002.
- Felton Primary because, although Felton Primary School has recoded values of NO₂ close to the air quality objective over a number of years, the school closed down a number of years ago. As such the monitoring site no longer represents relative exposure.
- Banwell, Wolvershill Road, because monitored concentrations have been consistently well below the annual mean objective since monitoring commenced in 2008.
- Banwell, East Street, because monitored concentrations have been consistently well below the annual mean objective since monitoring commenced in 2008.
- Portbury, Priory Road, because monitored concentrations have been consistently well below the annual mean objective since monitoring commenced in 2002.
- Bristol Airport, (A38), because monitored concentrations have been consistently well below the annual mean objective since monitoring commenced in 2002. The site also does not represent relevant exposure.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, “annualisation” and distance correction. Further details on adjustments are provided in [Appendix C](#).

3.2.1 Nitrogen Dioxide (NO₂)

[Table A.2](#) in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³. Although some of the monitoring sites have been discontinued, they have been

included in Table A.2 to show trends in NO₂ annual mean concentration over the previous years.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in [Appendix B](#).

There have been no exceedances of the annual mean for NO₂ in 2018. [Figure A.1](#): in Appendix A shows the trend of NO₂ over the last five years.

3.2.2 Particulate Matter (PM₁₀)

North Somerset Council does not undertake any monitoring for PM₁₀.

3.2.3 Particulate Matter (PM_{2.5})

North Somerset Council does not undertake any monitoring for PM_{2.5}

3.2.4 Sulphur Dioxide (SO₂)

North Somerset Council does not undertake any monitoring for SO₂.

3.2.5 Other Monitoring

3.2.5.1 Bristol Airport

Bristol Airport was granted planning permission in 2011 for the expansion of the airport to accommodate 10 million passengers per annum. As part of the planning permission, a Section 106 agreement was put in place, which amongst other things required the airport to undertake air quality monitoring in the vicinity of the airport.

In 2012, the airport installed a continuous air quality monitoring station, monitoring NO₂ and PM₁₀. The airport has also installed nine NO₂ diffusion tube monitoring locations around the airport.

Figures 2 and 3 below show the monitoring results for Bristol Airport from 2012 to 2018. The monitoring locations are shown in D.21 in Appendix D. The results show that the concentrations for all pollutants are below the air quality objectives.

Figure 2 Results of Bristol Airport NO₂ Diffusion Tube Monitoring

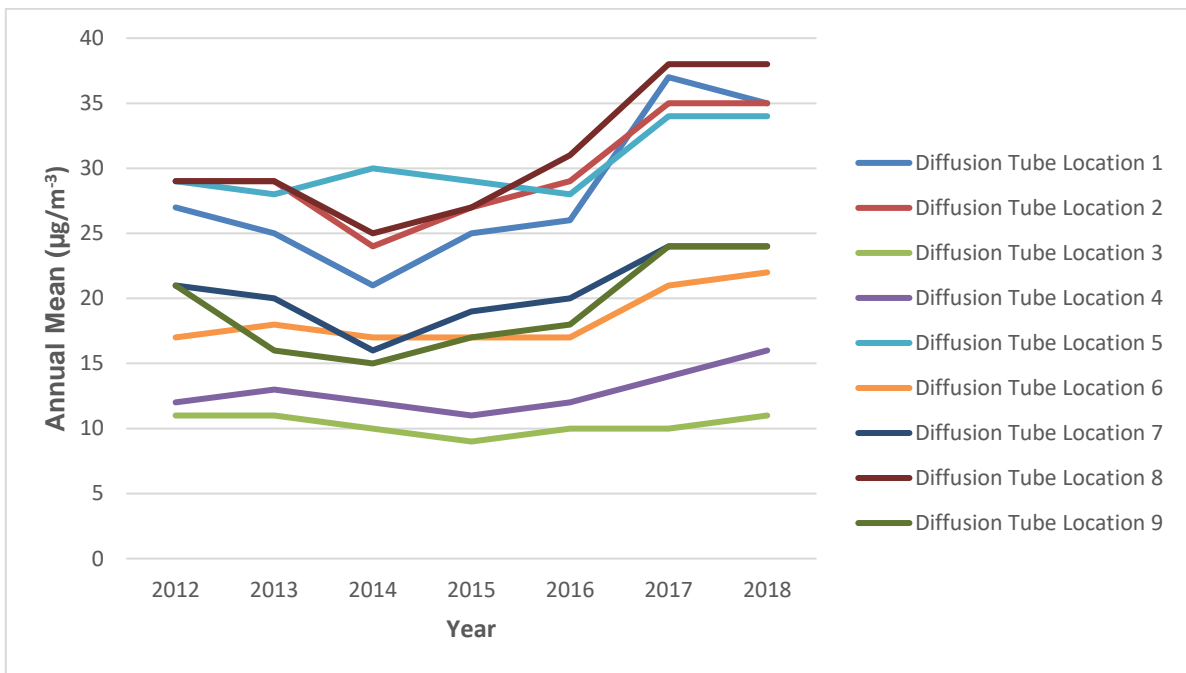
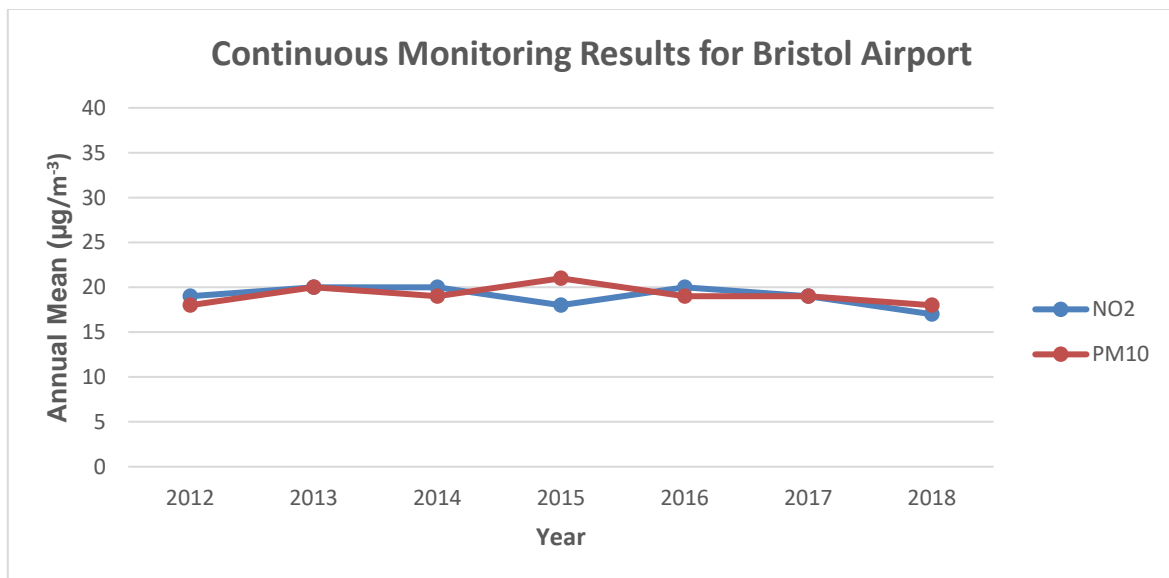


Figure 3 Continuous Monitoring Results for Bristol Airport



Appendix A: Monitoring Results

Table A.1 – 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)
1	Weston-super-Mare, Drove Road	Roadside	332653	160764	NO2	NO	3	1	NO	2.5
2	Weston-super-Mare, Herluin Way	Kerbside	334418	161261	NO2	NO	40	2	NO	2.5
3	Weston-super-Mare, Mendip Green Primary School	Roadside	335489	162435	NO2	NO	5	1	NO	2.5
4	Weston-super-Mare, Willow Close	Roadside	337828	162769	NO2	NO	8	1.5	NO	2.5
5	St Annes School	Roadside	339747	164198	NO2	NO	10	2	NO	2.5
6	Congesbury (Station Road)	Kerbside	343630	163877	NO2	NO	6	1	NO	2.5
7	Yatton, High Street	Kerbside	343195	165520	NO2	NO	3	0.5	NO	2.5
8	Clevedon (Coxway)	Roadside	341578	170575	NO2	NO	4	76	NO	2.5
9	Portishead, Wyndham Way	Roadside	347667	175712	NO2	NO	60	6	NO	2.5
10	Easton-in-Gordano, Beachwood Road	Roadside	349766	175441	NO2	NO	7	4	NO	2.5
11	Pill (Railway Line)	Other	352084	176273	NO2	NO	N/A	N/A	NO	2.5
12	Pill (A369)	Roadside	353159	174544	NO2	NO	15	2	NO	2.5
13	Long Ashton, Northleaze, C Of E Primary School	Kerbside	354881	170354	NO2	NO	9	5	NO	2.5
14	Flax Borton, A370	Kerbside	350767	169331	NO2	NO	7	1	NO	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)
15	Backwell (A370)	Roadside	348845	168750	NO2	NO	27	1	NO	2.5
16	Downside Road (Homelea)	Other	350920	165745	NO2	NO	N/A	N/A	NO	2
17	Downside Road (Top 8)	Kerbside	351054	165665	NO2	NO	4	3	NO	2
18	Sandford School (A368)	Kerbside	342603	159682	NO2	NO	18	2	NO	2.5
19	Banwell, Primary School	Roadside	339695	159173	NO2	NO	8	1	NO	2.5
20	Banwell, Pedestrian Crossing	Roadside	339695	159185	NO2	NO	16	1	NO	3
21	Banwell, Centre	Kerbside	339802	159151	NO2	NO	3	1	NO	3
22	Banwell, Bowling Green	Other	339838	159166	NO2	NO	N/A	16	NO	2.5

Notes:

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

(2) N/A if not applicable.

Table A.2 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2014	2015	2016	2017	2018
Weston-super-Mare, Drove Road	Roadside	Diffusion Tube	-	100	-	-	-	23.6	22.4
Weston-super-Mare, Herluin Way	Kerbside	Diffusion Tube	-	100	35.8	36.7	43.0	36.8	33.1
Weston-super-Mare, Mendip Green Primary School	Roadside	Diffusion Tube	-	100	-	-	-	20.2	18.5
Weston-super-Mare, Willow Close	Roadside	Diffusion Tube	-	92	23.3	23.7	25.9	23.3	22.5
St Annes School	Roadside	Diffusion Tube	-	100	25.3	24.5	26.1	22.1	20.6
Congesbury (Station Road)	Kerbside	Diffusion Tube	-	100	-	-	-	30.7	26.7
Yatton, High Street	Kerbside	Diffusion Tube	-	100	20.1	19.0	20.0	22.6	22.2
Clevedon (Coxway)	Roadside	Diffusion Tube	-	100	-	-	-	18.4	18.2
Portishead, Wyndham Way	Roadside	Diffusion Tube	-	100	-	-	-	24.7	21.5
Easton-in-Gordano, Beachwood Road	Roadside	Diffusion Tube	-	100	-	-	-	-	19.6
Pill (Railway Line)	Other	Diffusion Tube	-	100	16.8	15.5	17.9	16.1	14.9
Pill (A369)	Roadside	Diffusion Tube	-	100	-	-	-	28.0	24.3
Long Ashton, Northleaze, C Of E Primary School	Kerbside	Diffusion Tube	-	100	-	-	-	-	13.1
Flax Borton, A370	Kerbside	Diffusion Tube	-	100	-	-	-	-	24.6
Backwell (A370)	Roadside	Diffusion Tube	-	100	-	-	-	22.7	19.9
Downside Road (Homelea)	Other	Diffusion Tube	-	100	13.8	12.3	13.2	12.1	11.4
Downside Road (Top 8)	Kerbside	Diffusion Tube	-	100	25.8	25.7	29.1	23.9	23.1
Sandford School (A368)	Kerbside	Diffusion Tube	-	100	-	-	-	-	16
Banwell, Primary School	Roadside	Diffusion Tube	-	100	23.1	24.1	24.0	22.1	22.1
Banwell, Pedestrian Crossing	Roadside	Diffusion Tube	-	100	24.9	25.4	26.6	22.5	23.2

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2018 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2014	2015	2016	2017	2018
Banwell, Centre	Kerbside	Diffusion Tube	-	100	-	-	-	28.1	24.8
Banwell, Bowling Green	Other	Diffusion Tube	-	100	13.0	12.5	14.0	12.0	11.2
Banwell, Bowling Green	Other	Diffusion Tube	-	100	13.1	12.8	13.6	12.0	11.3
Banwell, Bowling Green	Other	Diffusion Tube	-	100	12.7	12.7	13.8	11.9	11.9

Diffusion tube data has been bias corrected

Annualisation has been conducted where data capture is <75%

Notes:

Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

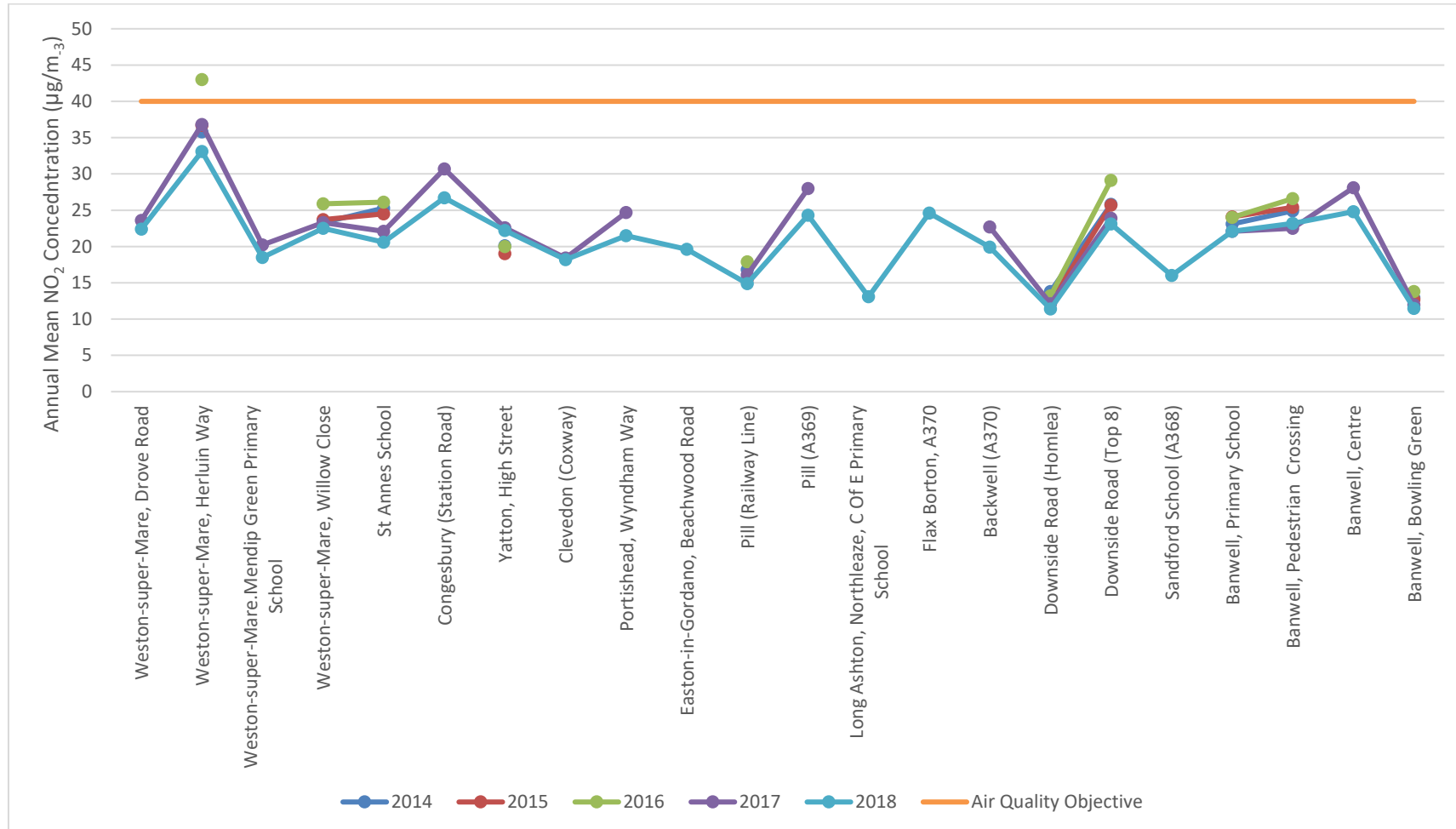
NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

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

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

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

Figure A.1 – Trends in Annual Mean NO₂ Concentrations



Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1– NO₂ Monthly Diffusion Tube Results - 2018

Site ID	NO ₂ Mean Concentrations (µg/m ³)												Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (0.93) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
Weston-super-Mare, Drove Road	24.2	26.2	24.8	21.6	24.6	24.8	21.8	17.7	23.2	27.4	26.5	25.7	24.0	22.4	18.2
Weston-super-Mare, Herluin Way	34.1	33.4	36.7	26.2	32.0	33.4	41.6	23.7	42.3	38.1	40.4	45.2	35.6	33.1	19.7
Weston-super-Mare, Mendip Green Primary School	21.7	23.2	22.9	18.4	17.1	16.6	18.1	14.6	17.7	21.3	21.8	24.9	19.9	18.5	13.6
Weston-super-Mare, Willow Close	25.8	23.3	29.5	22.8	25.1	25.1	21	17	23.6	ns	25.7	27.6	24.2	22.5	20.0
St Annes School	23.1	26.8	19	22	15.8	19.6	26	20.5	25.3	16.7	25.9	25.6	22.2	20.6	14.7
Congesbury (Station Road)	27.9	29.3	32.1	28.5	28.7	27.2	19.2	28.5	26	37	29.9	30.4	28.7	26.7	18.9
Yatton, High Street	26.8	24.1	26.3	22.7	22.9	21.1	25.6	19.3	25.6	25.7	21.3	25	23.9	22.2	15.0
Clevedon (Coxway)	20.8	20.6	22.7	21.2	17.4	17.4	16.9	13.5	17.4	16.7	25.8	24.6	19.6	18.2	17.7
Portishead, Wyndham Way	28.6	26.6	24.9	24	19.2	12.9	20.9	21.1	22	25.3	24	27.5	23.1	21.5	15.7
Easton-in-Gordano, Beachwood Road	24.41	25.4	19.3	20.5	22.6	15.2	19.9	19.6	22.4	20.4	19.3	23.8	21.0	19.6	19.2
Pill (Railway Line)	19.6	19.7	20.4	13.4	17	12	13.3	10.5	14.7	17.4	15.1	19.2	16.0	14.9	-
Pill (A369)	28	25.7	26.4	28.2	24.3	16.4	29.9	25.2	27.6	25.1	27.1	29.3	26.1	24.3	16.9
Long Ashton, Northleaze, C of E Primary School	16.0	18.1	17	13.3	12.3	11.1	10.8	9.1	11.4	15.1	15.8	18.9	14.1	13.1	11.5

Site ID	NO ₂ Mean Concentrations (µg/m ³)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.93) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
Flax Borton, A370	29.7	28.3	23.6	24.9	20.4	17	25.1	25.6	31.1	31.8	28.8	31.5	26.5	24.6	17.2
Backwell (A370)	23.2	21.3	21.7	20.6	20.8	18.5	20.9	17.9	22.1	26.6	16.6	26.5	21.4	19.9	12.6
Downside Road (Homelea)	16.1	14	14.8	11.3	10.3	9.4	10.8	10.1	12.8	13.4	10.2	14.3	12.3	11.4	-
Downside Road (Top 8)	25.1	26.1	26.3	20	22.3	20.6	21.7	21.1	28.7	27.1	33.4	25.7	24.8	23.1	16.6
Sandford School (A368)	21.4	18.4	20.0	14.8	16.0	14.2	14.7	11.2	14.8	19.3	20.0	21.2	17.2	16.0	11.9
Banwell, Primary School	25.0	27.5	26.4	23.7	27.4	19.4	24.1	16.2	22.8	23.2	26.9	23.0	23.8	22.1	14.1
Banwell, Pedestrian Crossing	27.7	25.8	28.5	19.1	22.4	24.2	24.9	19.9	24.5	28.6	28.8	24.6	24.9	23.2	17.6
Banwell, Centre	28.9	25.4	26.7	21.3	28.2	22.1	27.6	25.6	32.2	26.9	26.4	28.5	26.6	24.8	20.5
Banwell, Bowling Green	16.5	16.0	12.1	10.9	9.9	7.7	9.2	9.1	11.4	13.4	14.6	13.8	12.0	11.2	-
Banwell, Bowling Green	17.6	15.0	14.2	9.1	10.3	7.3	8.5	8.8	11.5	13.4	14.8	15.8	12.2	11.3	-
Banwell, Bowling Green	15.9	16.0	16.3	11	10.2	7.7	9.1	8.8	11.8	14.4	14.7	14.0	12.5	11.6	-

- Local bias adjustment factor used
- National bias adjustment factor used
- Annualisation has been conducted where data capture is <75%
- Where applicable, data has been distance corrected for relevant exposure

Notes:
 Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.
 NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.
 (1) See Appendix C for details on bias adjustment and annualisation.
 (2) Distance corrected to nearest relevant public exposure.

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

In 2018 diffusion tubes were prepared and analysed by Gradko. The tubes are prepared by the laboratory using the 20% triethanolamine (TEA) in water preparation. Gradko are UKAS accredited for diffusion tube analysis and the laboratory participates in the AIR NO₂ Proficiency Testing (PT) Scheme. For nitrogen dioxide diffusion tubes, this involves the analysis of four different tubes spiked with a known amount of nitrite every three months and comparison of the results of the participating laboratories. The results for the four AIR NO₂ PT rounds (AR024, AR025, AR027 and AR028) for Gradko during 2018 were 100% satisfactory²².

Data Ratification and Bias Adjustment

The diffusion tube results are examined on a monthly basis to identify any spurious data and any suspect data is investigated further. Trends in monitored levels across the diffusion tube sites are compared to take into account seasonal factors, such as changing weather patterns and increased traffic flows, and to detect any local changes at the sites, such as road works. The monthly raw data is then averaged for the calendar year to give an annual mean.

While diffusion tubes provide a simple cost-effective way of monitoring a wide range of locations, the accuracy of the tubes can be variable depending on the laboratory, preparation, handling and analysis. To overcome this, a Bias Adjustment Factor is applied to the raw mean for the relevant monitoring period. This factor is calculated from monitoring sites where triplicate diffusion tube sites are co-located with an automatic NO_x analyser by comparing results of the two measured methods.

Diffusion Tube Bias Adjustment

National Bias Adjustment Factor

Combined bias adjustment factors from local authority co-location studies are calculated for each laboratory that analyse diffusion tubes.²³

The 2018 national bias adjustment factor for Gradko obtained at the time the data was compiled for this report was 0.93 (spreadsheet version 03/19).

²² <https://laqm.defra.gov.uk/assets/laqmno2performancedatauptofebruary2019v1.pdf>

²³ <https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

The Summary of Precision Results for NO₂ Diffusion Tube Location Studies by Laboratory²⁴ show Gradko to have good tube precision (the ability for a measurement to be completely reproduced) in 2018.

Factor from Local Co-location Study

North Somerset Council does not carry out any co-location studies.

Discussion of Choice of Factor to use.

As North Somerset Council does not carry out any co-location studies, nor are there any close by, the National Bias Adjustment Factor was considered to be the most appropriate to use.

Distance Adjustment to Façade

In 2018 there were no measured exceedances of the nitrogen dioxide objective. However, where the monitoring sites are set back from the relevant exposure positions, the monitoring results have been adjusted to the façade of the nearest relevant receptor using the nitrogen dioxide adjustment calculator²⁵. Rather than represent the calculations for each site, the data and results from the calculator are presented in Table C.1.

²⁴ <https://laqm.defra.gov.uk/assets/tubeprecision2019version0319finalreduced.pdf>

²⁵ <https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html>

Table C.1 Distance to façade correction.

Site Name	Monitor distance to Kerb (m)	Receptor Distance to Kerb (m)	Background NO ₂ 2018 (µg/m ³)	Annual mean concentrations 2018 (µg/m ³) adjusted for bias	Annual Mean adjusted to façade (µg/m ³)
Weston-super-Mare, Drove Road	1	6	10.7	22.4	18.2
Weston-super-Mare, Herluin Way	2	30	12.0	33.1	19.7
Weston-super-Mare, Mendip Green Primary School	1	25	10.9	18.5	13.6
Weston-super-Mare, Willow Close	1.5	10	16.5	22.5	20.0
St Annes School,	2	30	11.3	20.6	14.7
Congresbury, Station Road	1	8	8.0	26.7	18.9
Yatton, High Street	0.5	10	8.6	22.2	15.0
Coxway, Clevedon	1	5	16.7	18.2	17.7

Site Name	Monitor distance to Kerb (m)	Receptor Distance to Kerb (m)	Background NO ₂ 2018 (µg/m ³)	Annual mean concentrations 2018 (µg/m ³) adjusted for bias	Annual Mean adjusted to façade (µg/m ³)
Portishead, Wyndham Way	6	50	11.2	21.5	15.7
Easton-in- Gordano, Beachwood Road	0.5	25	19.0	19.6	19.2
Pill (A369)	1	16	11.0	24.3	16.9
Long Ashton, Northleaze Primary School	1	9	9.4	13.1	11.5
Flax Bourton (A370)	0.5	8	9.5	24.6	17.2
Backwell (A370)	1	29	9.1	19.9	12.6
Downside Road, Top 8	1	12	10.1	23.1	16.6
Sandford Primary School	1	18	9.0	16.0	11.9
Banwell, Primary School	1	16	7.7	22.1	14.1
Banwell, Pedestrian Crossing	1	6	7.7	23.2	17.6

Site Name	Monitor distance to Kerb (m)	Receptor Distance to Kerb (m)	Background NO ₂ 2018 (µg/m ³)	Annual mean concentrations 2018 (µg/m ³) adjusted for bias	Annual Mean adjusted to façade (µg/m ³)
Banwell Centre	1	3.5	7.7	24.8	20.5

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



Figure D.1 Map of North Somerset Area



Figure D.2 Weston-super-Mare, Drove Road



Figure D.3 Weston-super-Mare, Herluin Way



Figure D.4 Weston-super-Mare, Mendip Green Primary School



Figure D.5 Weston-super-Mare, Willow Close

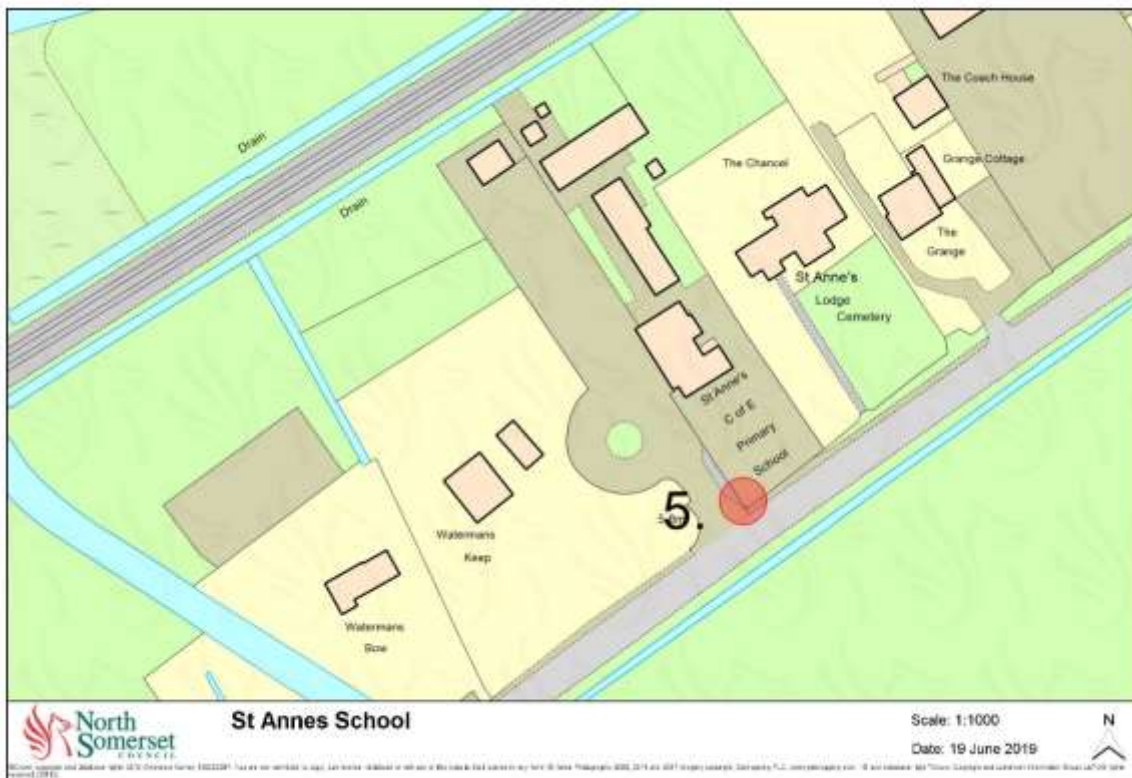


Figure D.6 St Annes School

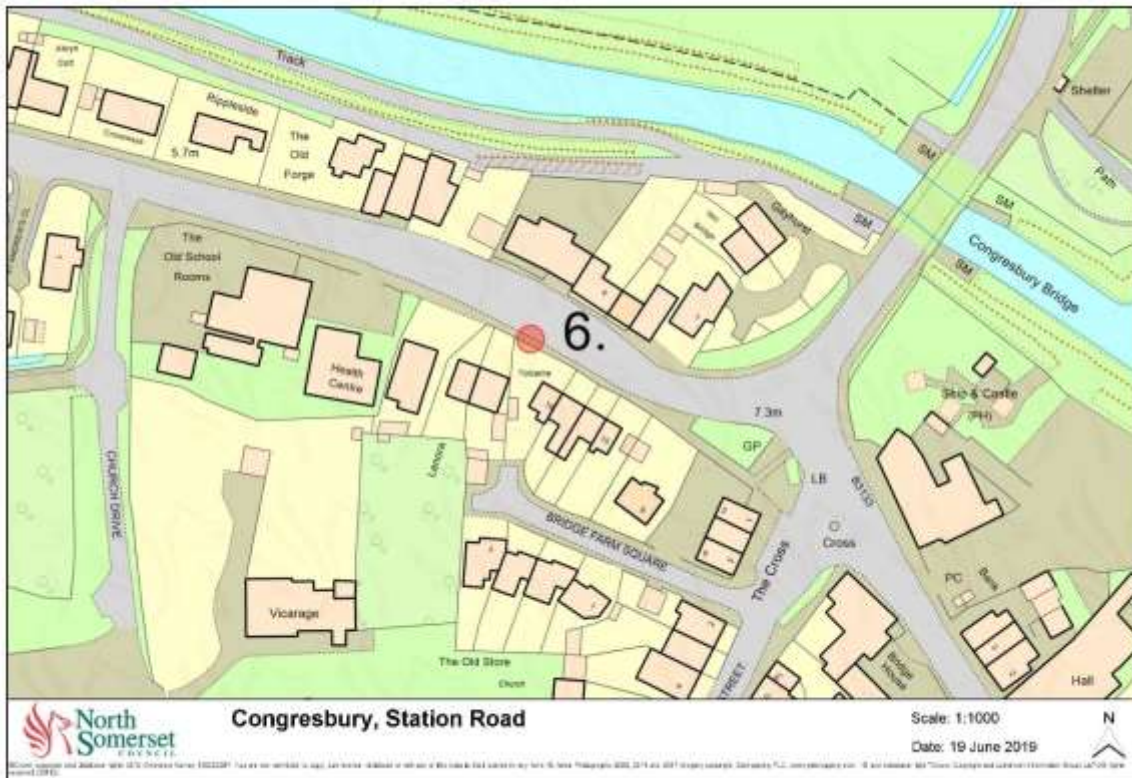


Figure D.7 Congresbury, Station Road

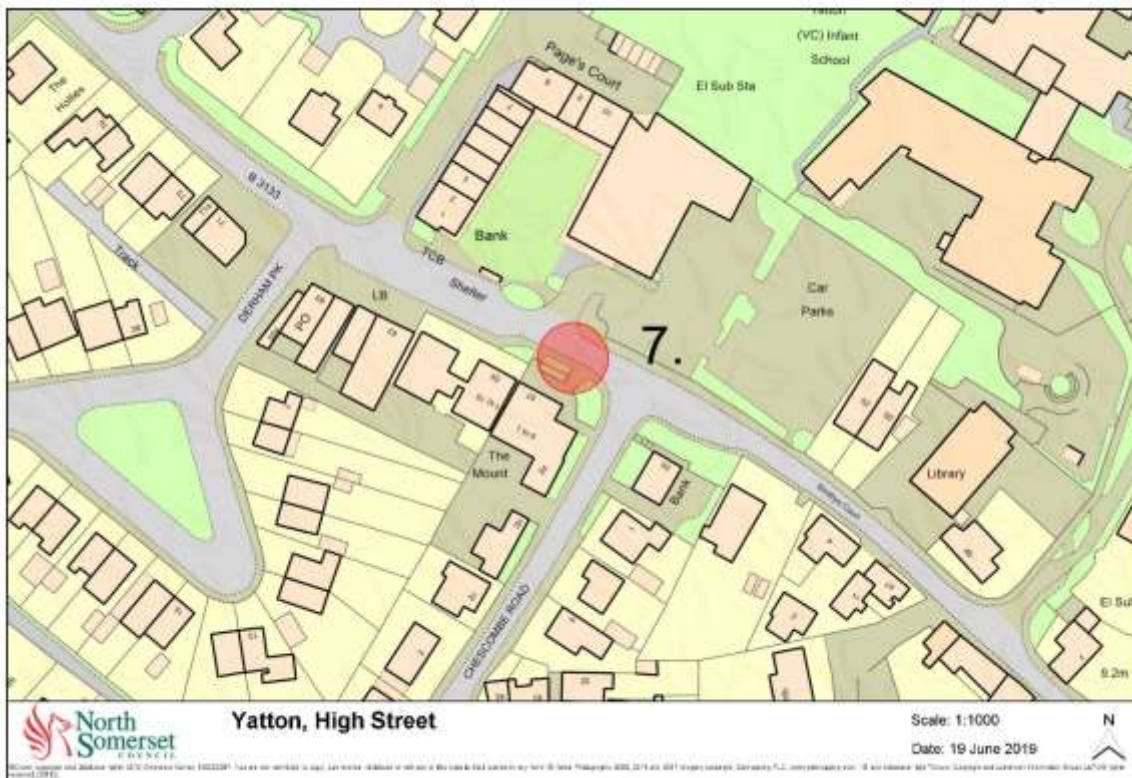


Figure D.8 Yatton, High Street



Figure D.9 Clevedon, Coxway



Figure D.10 Portishead, Wyndham Way



Figure D.11 Easton-in-Gordano, Beachwood Road

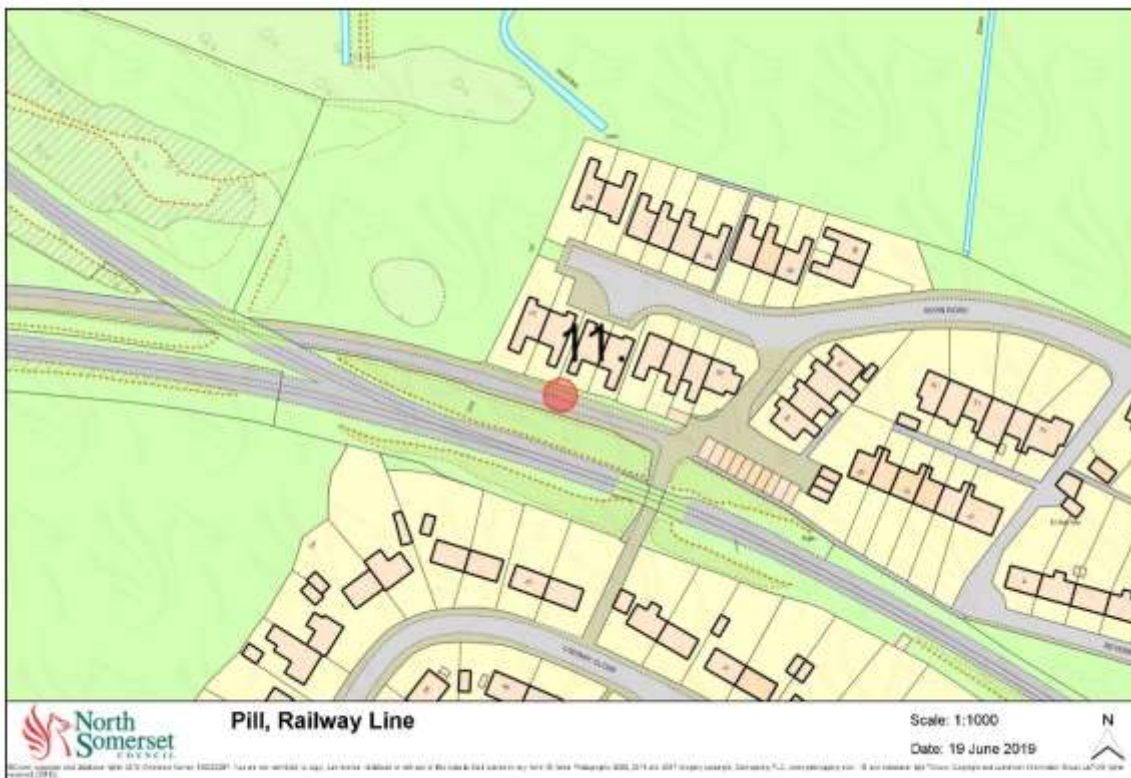


Figure D.12 Pill (Railway Line)



Figure D.13 Pill (A369)



Figure D.14 Long Ashton, Northleaze C of E Primary School



Figure D.15 Flax Bourton (A370)



Figure D.16 Backwell (A370)



Figure D.17 Downside Road (Homelea)



Figure D.18 Downside Road (Top 8)

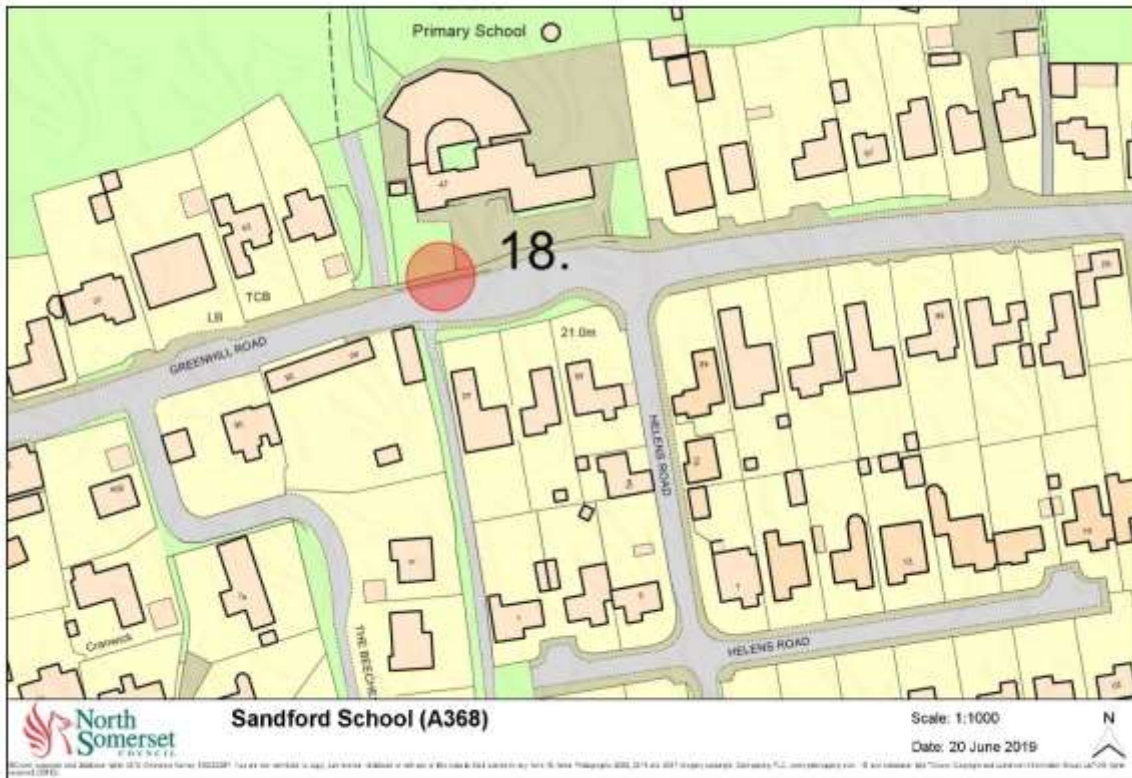


Figure D.19 Sandford School (A368)

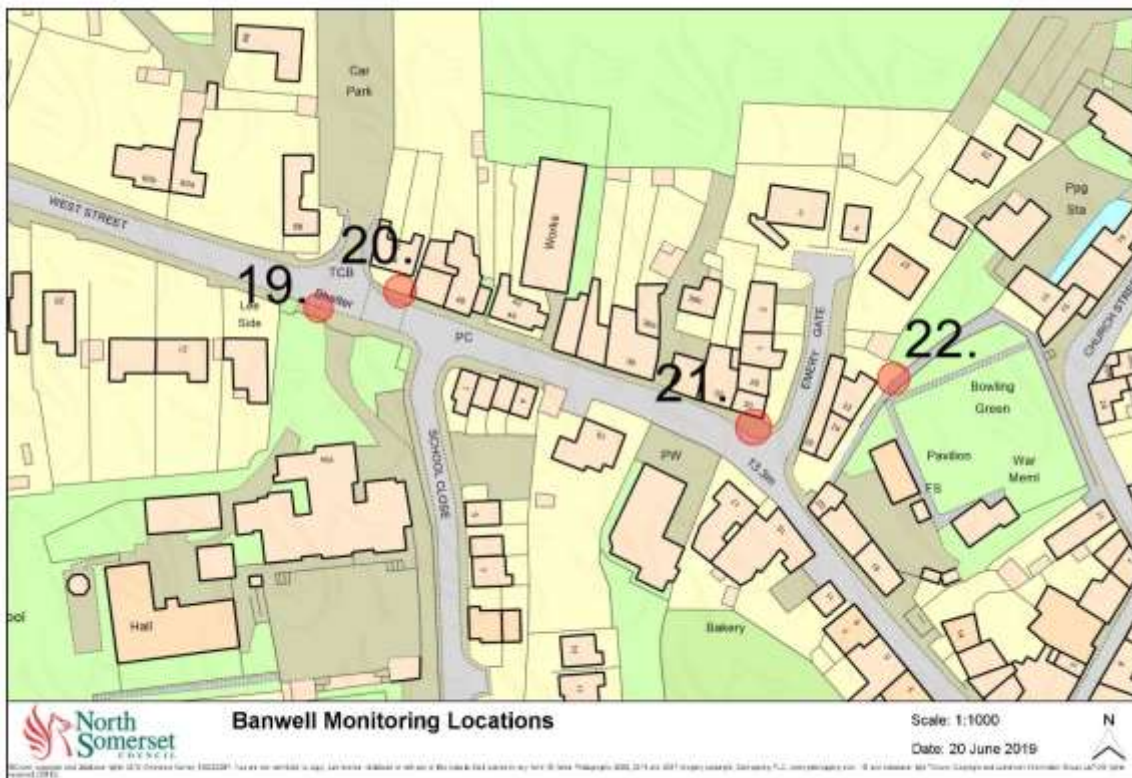


Figure D.20 Banwell Monitoring Locations



Figure D.21 Bristol Airport Monitoring Locations

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ²⁶	
	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

²⁶ The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide

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