

# Provisional Air Quality Monitoring Report – December 2022-May 2023 Liveable Neighbourhoods Pilot Schemes

Relating to through-traffic restriction trials on  
Southlands (Weston), and Church Street  
(Widcombe) areas.

Monitoring Date: **December 2022-May 2023**

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# Background information

This report provides the baseline air pollution data for 2 Liveable Neighbourhoods (LN).

## Air pollution

Air pollution is the leading environmental health risk to the UK public, with an estimated 28,000 to 36,000 deaths annually attributed to it in the UK alone<sup>1</sup>.

Long-term exposure to air pollution is linked to premature death associated with lung, heart and circulatory conditions, while short-term exposure exacerbates asthma and increases hospital admissions.

There is evidence to suggest that despite strengthening environmental policies, the poorest in our society are being unfairly exposed to worse air pollution without seeing improvements<sup>2</sup>. Clean air is important for everyone and will alleviate stress on our health system, improve people's lives and make our society more equitable.

## Types and causes of air pollution

There are different causes and sources of air pollution. Historically, combustion of fossil fuels for energy, such as coal, produced smoke and sulphur dioxide (SO<sub>2</sub>).

Now road traffic is chiefly responsible for the poor air quality in the UK contributing to nitrogen dioxide (NO<sub>2</sub>) pollution and particulate matter (PM) pollution.

Particulate matter pollution, referred to as PM<sub>10</sub> (particulate matter less than 10 µm in diameter) or PM<sub>2.5</sub> (particulate matter less than 2.5 µm in diameter), is made up of tiny bits of material from all sorts of places including smoke from fires, exhaust fumes, smoking or the dust from brake pads on vehicles. These particles are too small to see, and we can breathe them in without noticing.

Nitrogen dioxide (NO<sub>2</sub>) comes from burning fuels or other materials, so levels are especially high around roads. But they are also produced from home gas boilers, bonfires, and other sources as well. You cannot see or smell nitrogen oxides, but they mix with the air we breathe and are absorbed into our bodies. Vehicle exhaust

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<sup>1</sup> Public Health England. Review of interventions to improve outdoor air quality and public health, 2019

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/938623/Review\\_of\\_interventions\\_to\\_improve\\_air\\_quality\\_March-2019-2018572.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938623/Review_of_interventions_to_improve_air_quality_March-2019-2018572.pdf)

<sup>2</sup> Air Quality Management Resource Centre, UWE. Emissions vs exposure: Increasing injustice from road traffic-related air pollution in the United Kingdom, 2019

<https://www.sciencedirect.com/science/article/pii/S1361920919300392>

emissions contribute 35 per cent of all UK nitrogen oxide emissions (NO<sub>x</sub>) which is the single greatest source<sup>3</sup>.

## How does air pollution affect our health?

Air pollution particles and gases enter our bodies and can damage our cells in different ways. They usually get into our lungs first and can then move into our blood to reach organs such as our heart and brain.

Any amount of pollution can be damaging to our health, but the more that you are exposed to, the bigger the risk and the larger the effect on you and your family. Some people are more vulnerable to the impacts of air pollution than others. Those more at risk from air pollution include children, pregnant and older people; and people with lung conditions such as asthma, chronic obstructive pulmonary disease (COPD) and lung cancer, and people with heart conditions such as coronary artery disease, heart failure and high blood pressure.

## Air pollution in Bath

Historically, nitrogen dioxide (NO<sub>2</sub>) levels in Bath have been unacceptably high. Since introducing Bath's clean air zone and through the natural replacement of polluting vehicles with cleaner ones over time, air quality is gradually improving, but there are still areas of concern. For example, annual average nitrogen dioxide (NO<sub>2</sub>) levels exceeded the legal limit of 40 µg/m<sup>3</sup> at one location within the city in 2022. In addition, there are also 4 other sites in Bath with annual average levels between 36-40 µg/m<sup>3</sup>. The high concentrations are mainly caused by vehicle emissions.

The problem is exacerbated by Bath's topography. The city sits in the bottom of a valley surrounded by hills, and its central roads are flanked by tall buildings, which means that in certain conditions, vehicle emissions can get trapped in the atmosphere causing high levels of NO<sub>2</sub> in certain locations.

Particulate matter in Bath was not found to exceed legal limits for either PM<sub>10</sub> or PM<sub>2.5</sub>, except at times when there were meteorological or other events that caused spikes in these pollutants, nationally.

## How we monitor air quality

We have measured air quality in Bath and North East Somerset since the mid-1990s. Currently we measure nitrogen dioxide (NO<sub>2</sub>) and Particulate Matter (PM<sub>2.5</sub> and PM<sub>10</sub>) concentrations in two ways: automatic analysers and diffusion tubes.

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<sup>3</sup> DEFRA. Air quality: explaining air pollution – at a glance, 2019.  
<https://www.gov.uk/government/publications/air-quality-explaining-air-pollution/air-quality-explainingair-pollution-at-a-glance>

Automatic analysers measure NO<sub>2</sub> and PM in four permanent roadside locations in Bath. They take hourly readings of air pollution concentrations and provide more accurate readings than diffusion tubes. One of these monitoring stations is linked to the UK Automatic Urban and Rural Network (AURN) which provides national coverage of a range of pollutants.

Diffusion tubes are light, mobile and can be placed in many locations around the area, usually 1 to 15 metres from the road or at the kerbside (less than 1 metre from the road) and around 2-3 metres above ground level. The ambient air reacts with a chemical reagent in the tube so that NO<sub>2</sub> concentrations can be measured. The tubes are exposed to the air for one month before they are collected and sent to a laboratory for analysis. There are currently over 150 diffusion tube locations across Bath & North East Somerset including 48 key sites with higher levels of pollution where three diffusion tubes are located at each location to improve data confidence.

To find out more information about air quality across B&NES go to:

<https://www.bathnes.gov.uk/services/environment/pollution/air-quality>

As part of our obligations under the Local Air Quality Management (LAQM) legislation (part IV of Environment Act 1995) as amended by the Environment Act (2021) we have issued an Annual Status Reports (ASR) alongside this report. These set out and comment on air quality data from across the wider authority. These are found at: <https://www.bathnes.gov.uk/services/environment/pollution/air-quality/reports>

You can also view an interactive map of historical NO<sub>2</sub> data collected from monitoring locations around the area, here:

<https://www.bathnes.gov.uk/services/environment/pollution-noise-nuisance/air-quality/air-quality-data-long-term>

## How we monitor air quality for Liveable Neighbourhood pilot schemes

As part of the Liveable Neighbourhoods project additional monitoring has been carried out at 3 locations close to the pilot areas for through traffic restrictions at Southlands (Weston) area, Church Street and Prior Park Road (Widcombe) area and Tennyson Road and Cork Street area using diffusion tubes since July 2022. Maps showing the monitoring locations are below (Figures 1-3). This report details the initial baseline monitoring between July 2022 and November 2022 prior to the through traffic restriction trials being installed in Southlands and Church Street.

Note: We did not monitor the air quality around the through-traffic restriction trial installed on Queen Charlton Lane, Whitchurch because the area lies outside of Bath and is not in an area with high levels of pollution.

In Weston, 3 additional air quality monitoring sites were added on Southlands (DT301), Penn Hill Road (DT300) and Anchor Road (DT302) to supplement the existing site on Weston High Street (DT167) (Figure 1). For Church Street and Prior Park Road, an additional site was added at the junction of Prior Park Road and Church Street (DT303) to supplement the existing sites around Widcombe (Figure 2). In Tennyson Road and Cork Street additional sites were added on Tennyson Road (DT298) and Upper Bristol Road (DT299) to supplement the existing sites on Upper Bristol Road and Park Street (Figure 3) but please note that the through-traffic restriction trial on this road did not go ahead following public consultation. Full details of site locations can be found in the Air Quality Annual Status Report (<https://www.bathnes.gov.uk/services/environment/pollution/air-quality/reports>).

Figure 1: Air quality monitoring locations near Southlands Area (Weston) LN

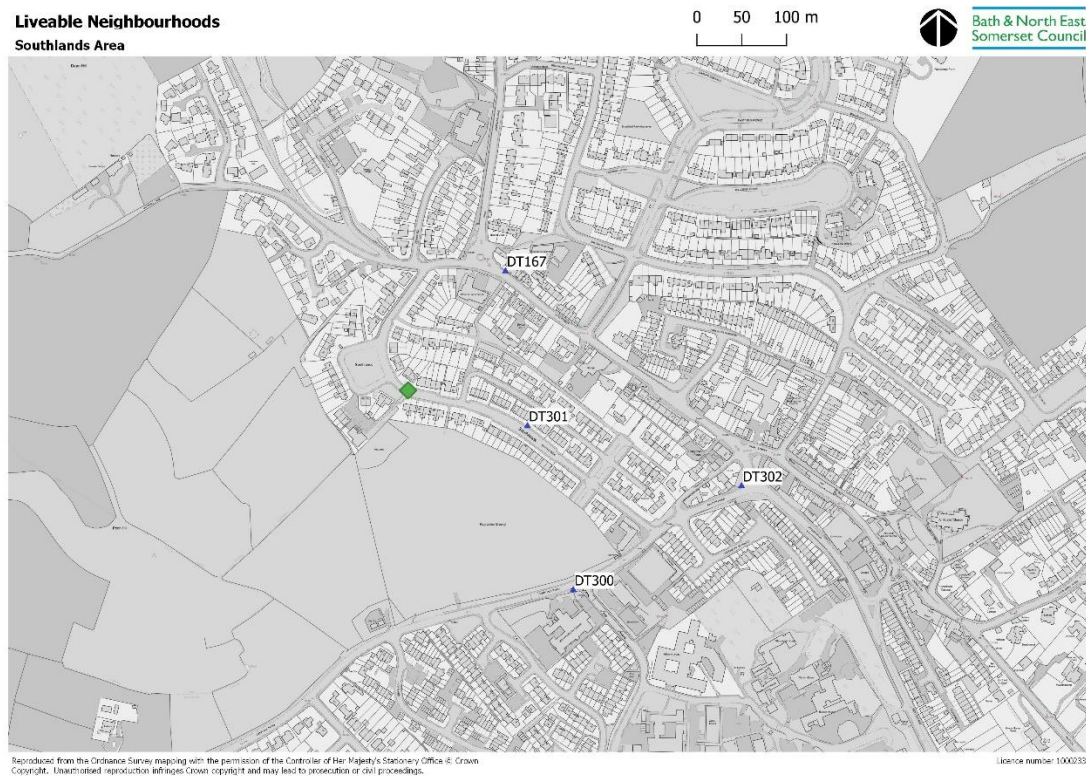


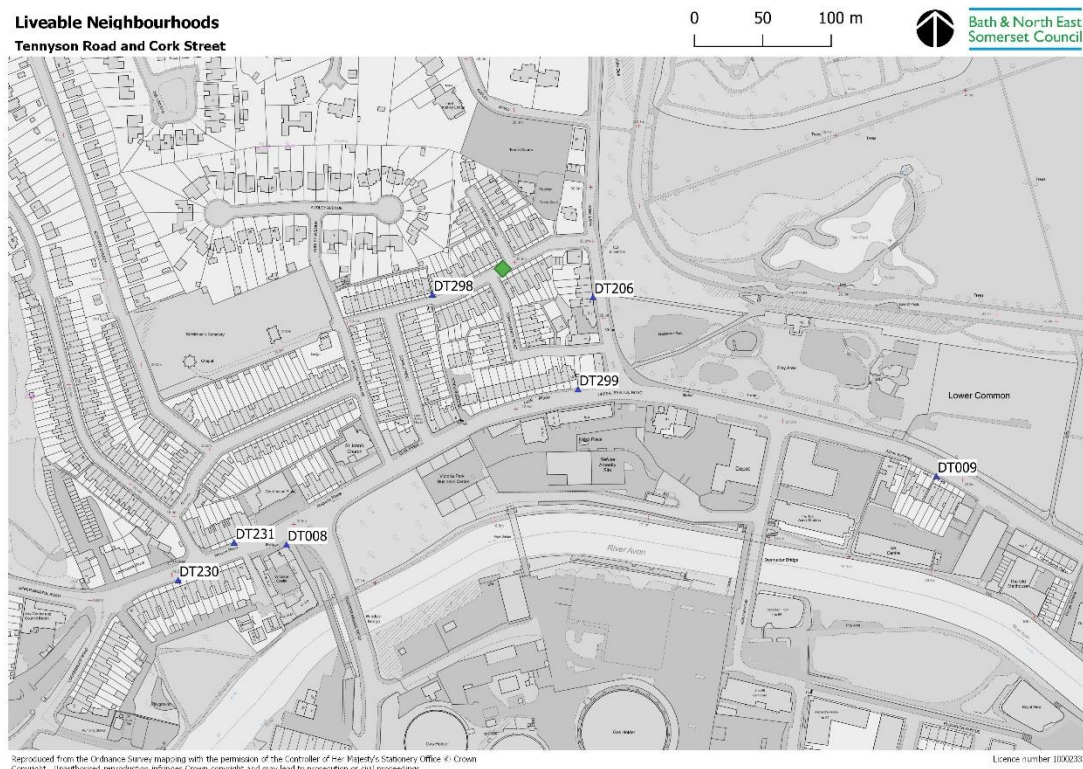


Figure 2: Air quality monitoring locations near Church Street and Prior Park Road (Widcombe) LN





Figure 3: Air quality monitoring locations near Tennyson Road and Cork Street (Lower Lansdown and The Circus LN)



## Data Analysis – Provisional Data

The data shown below is provisional and is currently being finalised. Final results will be available when the Annual Status Report (ASR) has been peer reviewed. The report compares monitoring from December 2022 to May 2023 (first 6 months with the through traffic restriction trials) with results from January 2022 to November 2022 (where the sites were existing) or July 2022-November 2022 (where the sites were new) (Baseline monitoring). All data has been bias corrected using the local bias of 0.84 and annualised where there is less than 9 months data. This process is detailed in the ASR (<https://www.bathnes.gov.uk/services/environment/pollution/air-quality/reports>). For the data from 2023 where a full calendar year is not available the process outlined in Local Air Quality Management Technical Guidance (TG22) has been followed to calculate the annual average for 2022 (this is done by projecting the 2023 concentrations to 2022 concentrations and then annualising using the diffusion tube processing tool).

The results for the monitoring carried out for Southlands, Church Street and Prior Park Road and for Tennyson Road and Cork Street Area are shown in Tables 1-3 respectively. Data for the Tennyson Road area has been provided for information,

but as no through traffic restriction filter was installed following the consultation, data collection has now ceased at the additional monitoring sites in this area.

**The results of the monitoring show that the NO<sub>2</sub> concentrations at all locations are below 40 µg/m<sup>3</sup> and that the annual average air quality objective has not been exceeded.**

The results show that there have been very small increases at some locations in both the areas with the through traffic restriction trials and also in Tennyson Road without such a restriction. The results are comparable with data from across Bath where the average change between the baseline period (Jan to Nov 2022) and the first 6 months of the trials (Dec 2022 to May 2023) was -5%, with 28 sites increasing slightly (e.g. site DT023 - Alexandra Park had an increase of 5%) and 95 sites decreasing (e.g. site DT172 – London Road 2 decreased by 7%). Monitoring will continue to understand what impact, if any, the through traffic restriction trials are having on air quality.

It should be noted that there are a number of factors which can affect nitrogen dioxide concentrations these include but are not limited to weather, local pollution sources and seasonality. Further information is needed to see the ongoing trend at these sites. Monitoring will continue in the two areas with the through traffic restriction trials to ensure there are no ongoing adverse effects on air quality until a decision is made to either make them permanent or remove them.

**Table 1 – NO<sub>2</sub> Monitoring Results: Diffusion Tube – Southlands LN**

Site ID	Site Name	NO <sub>2</sub> Average Concentration 2022 (µg/m <sup>3</sup> )	NO <sub>2</sub> average concentration with modal filter Dec 2022-May 2023 (µg/m <sup>3</sup> )	% change in concentration
DT167	Weston High Street	16	17*	6%
DT300	Penn Hill Road	15*	12*	-20%
DT301	Southlands	10*	9*	-10%
DT302	Anchor Road	24*	19*	-21%

\*Data has been annualised

**Table 2 – NO<sub>2</sub> Monitoring Results: Diffusion Tube – Church Street and Prior Park Road LN**

Site ID	Site Name	NO <sub>2</sub> Average Concentration 2022 (µg/m <sup>3</sup> )	NO <sub>2</sub> average concentration with modal filter Dec 2022-May 2023 (µg/m <sup>3</sup> )	% change in concentration
DT018	Widcombe High Street	16	15*	-6%
DT142	Prior Park Road	22	20*	-9%
DT151	Widcombe Hill	17	16*	-6%
DT190	Church Street	9	10*	11%
DT303	Prior Park Road 2	16*	13*	-19%

\*Data has been annualised

**Table 3 – NO<sub>2</sub> Monitoring Results: Diffusion Tube – Tennyson Road and Cork Street**

Site ID	Site Name	NO <sub>2</sub> Average Concentration 2022 (µg/m <sup>3</sup> )	NO <sub>2</sub> average concentration Dec 2022-May 2023 (µg/m <sup>3</sup> )	% change in concentration
DT008	Windsor Bridge	20	17*	-15%
DT009	Upper Bristol Road	23	21*	-9%
DT206	Park Lane	23	21*	-9%
DT230	Upper Bristol Road 4	31	30*	-3%
DT231	Upper Bristol Road 5	29	27*	-7%
DT298	Tennyson Road	10*	10*	0%
DT299	Upper Bristol Road 6	34*	24*	-29%

\*Data has been annualised

## Conclusion

Baseline NO<sub>2</sub> monitoring has been carried out in the 2 areas where through-traffic restrictions trials have been installed under the Liveable Neighbourhood programme. The results of the baseline monitoring show that the NO<sub>2</sub> concentrations at all locations are well below 40 µg/m<sup>3</sup> and that the annual average air quality objective has not been exceeded.

In summary:

In the Southlands area, Weston High Street, Penn Hill Road, Southlands and Anchor Road were monitored. Only Weston High Street saw a small increase in NO<sub>2</sub> concentrations from 16 to 17 µg/m<sup>3</sup> as an annual average. This is well below the legal limit of 40 µg/m<sup>3</sup>).

In the Church Street area, Widcombe High Street, Prior Park Road, Widcombe Hill, Church Street and Prior Park Road were monitored. Only Church Street itself saw a small increase in NO<sub>2</sub> levels from 9 to 10 µg/m<sup>3</sup> (as an annual average). This is well below the legal limit of 40 µg/m<sup>3</sup>.

The results show similar trends to other locations across Bath. Monitoring will continue to determine the impact of the through traffic restriction until a decision is made to either make them permanent or remove them. Should they become permanent, a decision will also be taken on longer term monitoring of air quality on these roads.

## Further information

- As part of our obligations under the Local Air Quality Management (LAQM) legislation (part IV of Environment Act 1995) as amended by the Environment Act (2021) we have issued an Annual Status Reports (ASR) alongside this report. These set out and comment on air quality data from across the wider authority. These are found at <https://www.bathnes.gov.uk/services/environment/pollution/air-quality/reports>
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- TG22 - Local Air Quality Management Technical Guidance LAQM.TG22. August 2022. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland. <https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf>