

Bath's Clean Air Zone

Annual report summary 2022



Bath & North East
Somerset Council

Improving People's Lives

This report can be made available in a range of languages, large print, on tape, electronic and other accessible formats from the Clean Air Zone Team.

Call 01225 396189

**(Option 3 - Monday to Thursday, 8:30 am - 5 pm;
Friday 8:30am – 4:30 pm)**

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Introduction

For years, several locations in Bath have suffered unacceptable levels of air pollution which has put people's health at risk, especially those with heart and lung conditions. The chief contributor is road traffic, responsible for up to 92% of the city's nitrogen oxide (NO_x) concentrations.

In 2017, the government directed the council to drive down NO₂ to within legal limits in the 'shortest possible time' and by the end of 2021 at the latest.

The Air Quality Standards Regulations 2010 require that the annual mean concentration of NO₂ must not exceed 40 micrograms per cubic metre of air (µg/m³). In Bath, however, we have witnessed annual mean NO₂ concentrations regularly exceeding 60 µg/m³ in some locations. Following the ministerial direction, we undertook significant technical work which showed that a charging clean air zone would be the only measure capable of driving the levels of behaviour change required to meet this target.

During 2018, we held several well-attended public consultations resulting in the council's decision to approve a class C charging clean air zone. We also secured sufficient funds from the government to install the zone and provide financial support to help local motorists replace their polluting vehicles. The zone was launched on 15 March 2021, charging all higher emission vehicles to drive in the city centre. This excludes private cars and motorbikes which do not have to pay in a class C zone. A higher emission vehicle has a pre-euro 6 diesel or pre-euro 4 petrol standard engine.



caused by
vehicle emissions



Government directs
council to act in
'shortest possible time'



Summary of findings

Data collected from air quality monitoring stations in 2022 indicate that the zone is continuing to improve air quality across the city.

Compared with 2019 (our pre-Covid baseline year) we note the following:

- A decreasing trend in NO₂ concentrations at all sites within Bath
- A 26% reduction in annual mean NO₂ concentrations within the zone
- A 27% reduction in annual mean NO₂ concentrations in the urban area outside of the zone
- 9 fewer sites exceeding the limit of 40 µg/m³ (as an annual mean)

Additional reductions in annual mean NO₂ concentrations have also been found in 2022 when compared to 2021. Concentrations within the CAZ have decreased a further 6% in 2022 when compared to 2021, with reductions also being seen in the CAZ_Boundary (7%).

In 2019, 12 sites in Bath exceeded the limit value for annual mean NO₂ concentrations, reducing to 1 site in 2022. This site was Walcot Parade 4 which averaged at 40.4 µg/m³ in 2022, however, it was installed in August 2022 in response to an exceedance in 2021. As this site only consists of 5-months of data the results were annualised, it is likely this annualisation may have overestimated the average for 2022.

Additionally, by the end of December 2022, we saw over 70% fewer chargeable, polluting vehicles driving in the zone than we saw during the first week of launch (March 2021).

The council's financial assistance scheme has contributed to this reduction, helping to replace around 900 polluting vehicles (regularly driven in the zone) with cleaner, compliant ones.

The impacts of Covid-19 and the partial closure of Cleveland Bridge (October 2021 – October 2022) have had significant impacts on the volume and direction of traffic through the city. However, despite this, and for success of the CAZ to be confirmed, we have submitted our official air quality data from 2021 to the Government's Joint Air Quality Unit (JAQU) in summer 2022.

Their findings are due to be published in a JAQU progress report later in 2023. This report will include updates on local authorities implementing measures as part of the NO₂ programme.

The progress report is likely to indicate the Bath Clean air zone is achieving success. We expect to be required to maintain successful levels of NO₂ concentrations, with the Clean Air Zone and related air quality improvement measures remaining in place.

The zone is one of many council initiatives across the Bath & North East Somerset area that will help improve air quality, promote sustainable transport and tackle the climate emergency.

Other cities around the UK have also introduced zones, including Birmingham (Class D), Portsmouth (Class B), Bristol (Class D) and Bradford (Class C).

Our findings are explained in more detail on page 13-16 and in our full [2022 Annual CAZ Report](#).



Inside of Bath's CAZ



Outside the zone
in Bath



Air pollution in Bath

Air pollution is a leading public health risk with an estimated 28,000 to 36,000 deaths annually attributed to it in the UK¹. A major source of poor air quality contributing to nitrogen dioxide (NO₂) pollution and particulate matter (PM) pollution, is road traffic.

Particulate matter pollution, referred to as PM₁₀ or PM_{2.5}, 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 (NO₂) comes from burning fuels or other materials, so concentrations are especially high around roads. But they are also produced from home gas boilers, bonfires, and other sources. You cannot see or smell nitrogen oxides, but they mix with the air we breathe and are absorbed into our bodies. Vehicle exhaust emissions contribute 35 per cent of all UK nitrogen oxide emissions (NO_x) which is the single greatest source².

Particulate matter pollution in Bath was not found to exceed legal limits and there has been a downward trend in levels in Bath since 2017. However, annual average nitrogen dioxide (NO₂)

concentrations have regularly exceeded the legal limit of 40 µg/m³ at several locations in the city, chiefly caused by vehicle emissions.

The problem is made worse 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. This means that in certain conditions vehicle emissions get trapped, causing high levels of NO₂ in certain locations. In general, areas outside of the city, even where traffic levels are high, do not experience such high levels of NO₂ because the pollution can disperse more quickly.

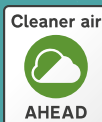
¹Public Health England, 2019. Review of interventions to improve outdoor air quality and public health. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938623/Review_of_interventions_to_improve_air_quality_March-2019-2018572.pdf

²Department for Environment, Food and Rural Affairs, 2019. Air quality: explaining air pollution- at a glance. Available at: <https://www.gov.uk/government/publications/air-quality-explaining-air-pollution/air-quality-explaining-air-pollution-at-a-glance>

You cannot see or smell nitrogen oxides, but they mix with the air we breathe and are absorbed into our bodies.



trap emissions



How air pollution affects our health

Air pollution particles and gases enter our bodies and can damage our cells in different ways. They usually get into our lungs 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, vulnerable, and older people, including those with lung and heart conditions (such as asthma, chronic obstructive pulmonary disease, lung cancer, coronary artery disease, heart failure and high blood pressure).

Long-term exposure to air pollution is linked to premature death associated with lung, heart, and circulatory conditions, while short-term exposure can cause asthma attacks and increase hospital admissions. Research shows that high levels of NO₂ can affect children's lung development and that children who grow up in highly polluted areas are more likely to develop asthma.

Clean air is important for everyone. It will alleviate stress on our health system, improve people's lives and make our society more equitable.



Worsens heart
and lung conditions



36,000
early deaths

in the UK per year

Why we need a charging zone

A charging clean air zone works by levying a charge on motorists with older polluting vehicles i.e., pre-euro 6 diesel or pre-euro 4 petrol vehicles. Both the inconvenience and the charge are designed to discourage motorists from driving in polluted areas (the zone) and speed up the natural replacement of polluting vehicles with cleaner, compliant ones that do not incur a charge.

Because excessive pollution in Bath is mostly caused by vehicle emissions, encouraging cleaner, less polluting vehicles is an effective way to quickly drive down pollution without restricting vehicle use in the city centre.

In Bath, the clean air zone was introduced alongside a financial assistance scheme which is helping local businesses and individuals to replace or upgrade polluting vehicles regularly driven in the zone.

The Euro 6/VI emission standard came into force in 2015 and has significantly reduced emissions, particularly for buses and coaches with larger diesel engines. A separate fund has supported bus companies to upgrade scheduled, higher emission buses to Euro VI standard.



Why we don't charge private cars

The two options capable of meeting the target set for us by the government were a Class D charging clean air zone (charging all higher emission vehicles including cars and motorbikes) or a Class C charging clean air zone (charging all higher emission vehicles, except private cars and motorbikes) alongside additional traffic management.

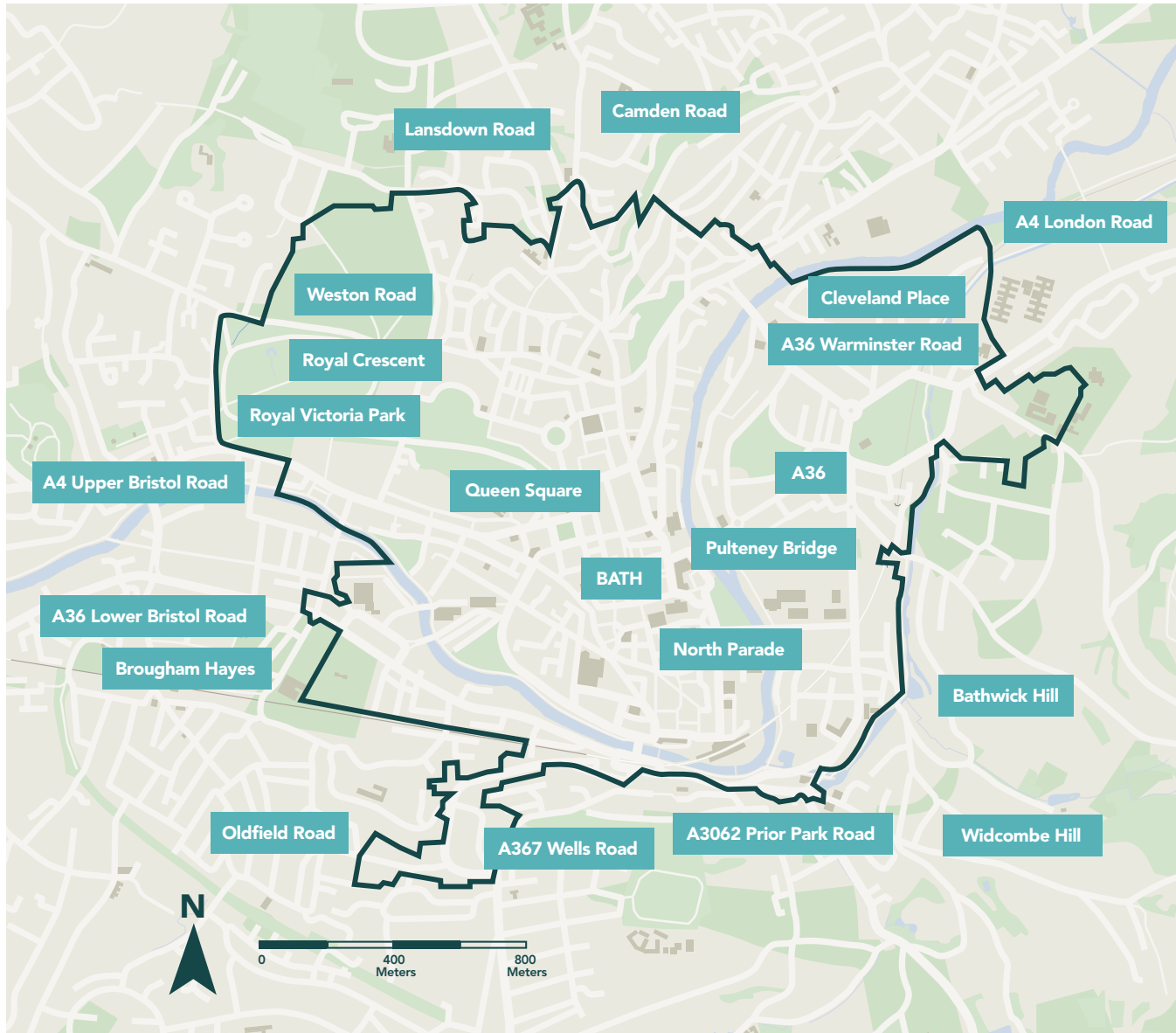
We engaged extensively with the public throughout 2018/19. The overwhelming opinion was that while we needed to tackle pollution, a class C CAZ would strike a better balance by tackling pollution while also protecting businesses and vulnerable residents that might be disproportionately affected by charging higher-emission cars.

Technical modelling suggested that we could achieve success with a Class C CAZ provided we also introduced traffic measures at Queen Square to address a particular NO₂ hotspot on Gay Street.

To further reduce emissions, the council was able to offer financial support to local businesses and individuals to help replace or upgrade many of the city's larger, more polluting vehicles.

The [full business case](#) for the CAZ was approved by central government in January 2020.

The zone boundary



The clean air zone is as small as possible to minimise the social and economic impact of the scheme.

It's also designed to capture as many non-compliant vehicles as possible driving in the wider area to help tackle pollution both inside and outside of the zone.



How Bath's CAZ works

Bath's CAZ is a Class C charging clean air zone, which means that daily charges apply 24 hours a day, 7 days a week, 365 days a year to the following higher emission vehicles driving in the zone:

- Taxis, private hire vehicles (PHVs), vans (including pick-ups and N1 campervans), minibuses, and light goods vehicles (LGVs) - £9 per day
- Buses, coaches and heavy goods vehicles (HGVs) and private heavy goods vehicles (PHGVs) - £100 per day
- A discounted charge of £9 per day is also available for PHGVs, such as larger motorhomes and horse transporters, once registered with the Council.

Cars and motorbikes are not charged in a Class C CAZ, regardless of their emissions standard (except for taxis and PHVs). A higher emission vehicle is any vehicle that does not comply with Euro 6/VI diesel or Euro 4/IV petrol emissions standards, and which is neither a compliant hybrid nor a fully electric vehicle (ultralow emission vehicle).

Motorists can use their registration number to check whether charges apply in any UK clean air zone by going to www.gov.uk/clean-air-zones

Exemptions

National exemptions apply permanently for ultralow emission vehicles, hybrid and alternatively fuelled vehicles, disabled passenger tax class vehicles, disabled tax class vehicles, military vehicles, historic vehicles, and vehicles with retrofit technology accredited by the Clean Vehicle Retrofit Accreditation Scheme (CVRAS).

Local exemptions applied temporarily for two and four years (and for shorter periods) for certain vulnerable groups, hard-to-replace vehicles, and to encourage applications to the financial assistance scheme to upgrade or replace non-compliant vehicles.

For more information on local exemptions see www.bathnes.gov.uk/CAZexemptions



• **£0** Private cars and motorbikes



• **£9** Higher emission taxi, minibus, van



• **£100** Higher emission HGV, coach, bus



Financial assistance to upgrade or replace vehicles

£9.4 million of government funding was allocated to upgrade or replace polluting vehicles through the council's financial assistance scheme.

Eligible businesses and individuals could apply to the council's approved finance providers for interest-free finance (with a maximum repayment period of 60 months), plus grants of up to 35% of the net upgrade/replacement cost of the vehicle. They could also call on the support of a council advisor to assist them through the process.

To be eligible for the scheme, a local businesses or individual had to travel at least two days a week in the zone in a non-compliant chargeable vehicle and provide evidence of this using data from a telematic tracking device, fitted in the vehicle for 60 days.

The scheme launched in November 2020 and by the end of 2022 it had helped replace 900 polluting vehicles with cleaner compliant ones.

Supply chain issues have resulted in delays, so we are supporting drivers who have replacement vehicles on order with short-term exemptions. Vulnerable businesses and individuals with Euro 4 or 5 diesel vehicles who applied for and were eligible for finance, but failed the credit checks, were also eligible for an exemption.



“ Our CAZ compliant fleet has raised our environmental profile – helping us win new work. ”

BPM Contracting Services

“ Retrofitting our coaches through the scheme was a really cost effective way of increasing our fleet compliance - we are pleased our coaches can be used and not made redundant. ”

Berkeley Coaches

How revenue from the zone is spent

Charges in the zone are designed to change behaviours rather than generate income for the council. The council's priority has been to inform people about the charge, deter polluting vehicles from entering the zone, and encourage those with chargeable, non-compliant vehicles regularly entering the zone to upgrade their vehicles with financial support.

Revenue from charges and fines is used to pay for the running of the scheme. Any money made over and above this must be reinvested in sustainable transport projects or schemes which compliment air quality improvements.

In its second year of operation the zone generated a net income of £3.3 million. We are committed to reinvesting residual clean air zone derived income into projects or schemes which promote air quality improvements, either directly or by improved transportation infrastructure.

In Spring 2022, we allocated £2.5 million of surplus revenue, to be delivered over the next two years to the West of England's Combined Authority (WECA) fund; a part of our local contribution to support delivery of sustainable transport improvements across the West of England region and within wider WECA transport programmes.

We further went on to fund and support the council's bereavement services with the operating costs of an onsite pollutant capture device which reduces the release of harmful airborne pollutants associated with crematoria.

To support local sustainable travel by resident's, residual income has also been used to fund a series of bike hangars which have provided lockable and secure storage for residents living in Great Stanhope Street, New King Street and Sydney Buildings, Bath who don't have access to private cycle parking, such as a shed or garage. <https://newsroom.bathnes.gov.uk/news/new-bike-hangars-be-installed-bath>"

£3.3m
net income
generated
in 2022

£2.5m
surplus contributed to
regional sustainable
transport

**Further
surplus**
allocated to
support clean
air initiatives



Findings

The following sections highlight the main findings of the Annual Report looking at the zone's impact on air quality, traffic flow and vehicle compliance.

Covid-19 had an unprecedented impact on travel behaviour in 2020, so we draw on baseline data from 2019 to measure the effectiveness of the zone on air quality. We also use baseline data from 2017/18 to help us understand the impact of the zone on traffic flows. This is the latest year with sufficient comparable traffic count data.

For more information on how we measure and present the data please see the full report.

How we monitor air quality

We have measured NO₂, PM₁₀ and PM_{2.5} in Bath and North East Somerset since the mid-1990s. Four automatic analysers measure NO₂ and particulate matter in permanent roadside locations in Bath. Lighter, mobile diffusion tubes measuring only NO₂ concentrations are placed at 160 kerbside locations.

71 diffusion tubes are in the clean air zone, 67 in the city's urban area outside of the zone, and a further 33 in the wider district. 48 key sites with higher levels of pollution have three diffusion tubes at each location to improve data confidence.

For more information about air quality across the area go to: <https://www.bathnes.gov.uk/services/environment/pollution/air-quality>

The impact of Covid-19 and Cleveland Bridge

The impact of the Covid pandemic is far-reaching. We've seen significant changes to traffic composition, including reduced peak-time traffic in the mornings, a greater spread of traffic throughout the city across the day, and a sharp increase in e-commerce and home deliveries, with more vans driving in our neighbourhood streets.

From June 2021, Cleveland Bridge was closed to traffic for structural repairs, reopening to cars and smaller vans in October 2021. The bridge remained partially closed, with an 18-tonne weight restriction, until October 2022 where the weight restriction remains in place. The bridge normally carries around 17,000 vehicles per day that were diverted through the centre of Bath or, for heavier vehicles, onto the A36 Warminster Road and A4 Bath Road. Air quality has been affected across the city.



Air quality results

There are clear indications that the clean air zone is working to improve air quality across the area, not just within the zone.

- All monitoring sites within and outside the zone saw an overall decreasing trend, with annual average NO₂ concentrations lower than in 2019
- Overall, the annual mean NO₂ concentrations for 2022 in the zone are 26% lower than in 2019. This is an average reduction of 8.5 µg/m³.
- The annual mean NO₂ concentration for 2022 in the urban area outside the zone is 27% lower than in 2019. This is an average reduction of 7.1 µg/m³.
- Additionally, NO₂ concentrations have continued to decrease when compared to 2021. Concentrations within the CAZ have decreased a further 6% in 2022 when compared to 2021, with reductions also being seen in the CAZ_Boundary (7%).
- The number of sites in the zone exceeding the legal limit of 40 µg/m³ as an annual average fell from 10 sites in 2019 to 1 site in 2022.
- This site was Walcot Parade 4 which averaged at 40.4 µg/m³ in 2022, however, it was installed in August 2022 in response to an exceedance in 2021. As this site only consists of 5-months of data the results were annualised, it is likely this

annualisation may have overestimated the average for 2022.

- Whilst Walcot Parade 4 does exceed the limit value of 40 µg/m³, Defra's approach when reporting compliance to the European Commission (as confirmed by JAQU in 2019), is to round any concentration to the nearest integer. Therefore, any concentration up to 40.49 µg/m³ would not be reported as exceeding³.
- In 2022, no monitoring sites in the urban area outside of the zone recorded an annual mean NO₂ concentrations above the limit value of 40 µg/m³.

Some sites showed higher NO₂ concentrations as a quarterly average, but not as an annual average. Meteorological conditions (the weather) and local transport issues, such as diversions, influence pollution concentrations. Therefore, to determine trends and measure improvement, we always use annual mean average concentrations.

³Jacobs, 2019. Local Air Quality Modelling Methodology Report. Available at: <https://democracy.bristol.gov.uk/documents/s42646/Appendix%20Di%20-%20BCC%20CAZ%20OBC%2018%20-%20Modelling%20Methodology%20Report%20AQ2.pdf>



all monitoring sites

show a decreasing trend



Traffic volume and flow results

Looking at traffic trends helps us understand the impact of the zone on traffic displacement and air quality.

The zone inevitably creates some traffic displacement because motorists with more polluting vehicles will seek to avoid it until they can upgrade or replace their vehicle. However, we monitor areas of concern to ensure that any displacement does not contribute to deteriorating air quality, safety, or amenity.

The partial closure of Cleveland Bridge and the impact of the Covid-pandemic on traffic flow means that we cannot draw clear conclusions on the impact of the zone on traffic displacement in 2022.

We use data from 2016/17/18 for comparing traffic flows, because there is insufficient data for periods in 2019. You can find out more about the locations we are monitoring in our [full report](#).

- Nationally, overall road figures have been closest to pre-covid usage with figures consistently above 90%, however, recovery across public transport was slower⁴.
- Average 2022 traffic flows within Bath were generally below pre-pandemic levels, however, have increased slightly from 2021.
- Traffic flows from the permanent automatic traffic count (ATC) network within the CAZ during the last 6-months of 2022 were unavailable. During this period, the Council's ATC network was being upgraded with newer, more reliable technology. As a result, 2 temporary surveys from a 7-day period were used to give an indicative view of traffic flows within the CAZ. The details and findings of these surveys are explained in 'Traffic flows within the CAZ'.

- On average, data analysed from the permanent ATC network within the CAZ Boundary, found a 9% reduction in traffic flows when compared to the baseline period. Similarly, data analysed within the Wider_B&NES area, found a 10% reduction in 7-day average traffic flows when compared to the baseline
- The work-from-home culture developed during the pandemic means traffic patterns have changed. There remains a morning and evening peak, but the evening peak has reduced in intensity and is spread over more hours.
- The partial closure of Cleveland bridge significantly affected both the levels and direction of traffic from October 2021 through to October 2022.
- Lighter vehicles could divert through the centre of town and past known NO2 hotspots, and heavier vehicles along the A4 and A36.

⁴Department for Transport, 2023. Domestic Transport Usage by mode. Available at: <https://www.gov.uk/government/statistics/transport-use-during-the-coronavirus-covid-19-pandemic/domestic-transport-usage-by-mode>

An increase in e-commerce and home deliveries means we're seeing more vans on neighbourhood streets that are unlikely to be related to clean-air-zone avoidance.



We continue to monitor air quality and traffic flow



Vehicle compliance results

Charging clean air zones are designed to encourage people to replace older, polluting vehicles more quickly than they might otherwise.

To support motorists affected by charges and to further improve air quality, we introduced a generous financial assistance scheme worth £9.4 million to help local businesses and individuals replace polluting vehicles with cleaner, compliant ones.

Cars and motorbikes are not charged, regardless of emissions, and compliance rates are expected to improve naturally over the next few years.

A bus retrofit scheme, worth £1.4 million, was also introduced to encourage the upgrade of all scheduled buses in Bath to Euro 6/VI standard.

Compliance, or a compliant vehicle, means a vehicle that meets the minimum emission standards for the zone, which is Euro 6 diesel, a Euro 4 plus petrol vehicle, a compliant hybrid, or an ultra-low emission vehicle.



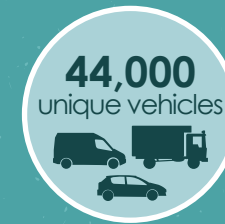
for financial support to upgrade vehicles



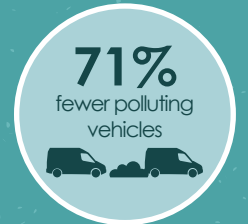
Replaced by the end of 2022

Key findings for fleet compliance as an impact of the zone and our mitigation/support are as follows:

- On average, 1,742 vehicles driven in the zone each day during the launch week of the CAZ were non-compliant. By December 2022, this had decreased 71% to 497 vehicles.
- Owners of over 1,500 vehicles applied for financial support to upgrade or retrofit their vehicle. 900 polluting vehicles were replaced by the end of 2022.
- 746 polluting vans have now been replaced with cleaner, compliant ones via the council's financial assistance scheme (with further replacements expected in the coming months).
- 101 polluting taxis/private hire vehicles have now been replaced with cleaner, compliant ones via the council's scheme.
- 2 polluting minibuses have now been replaced with cleaner, compliant ones via the council's scheme.
- 22 non-scheduled, polluting buses and coaches have now been replaced via the council's scheme.
- Out of a total fleet of 226 scheduled buses, 88 were non-compliant when the bus retrofit programme started. By the end of December 2022, this programme had been complete with the full fleet successfully retrofitted to Euro VI standard.
- 29 non-compliant, chargeable HGVs have now been replaced via the Council's scheme (HGV compliance was already high at up to 93% compliance at the launch of the zone).

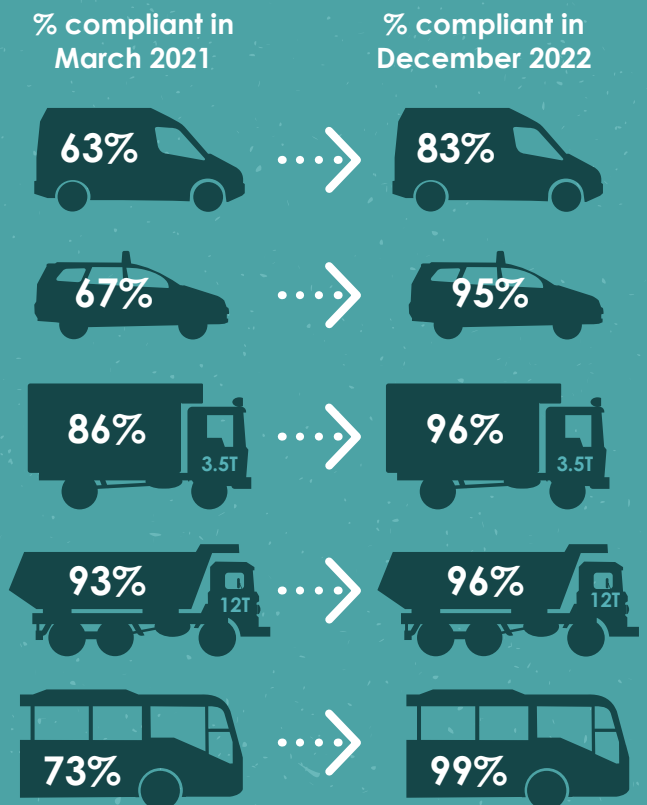


Driving in the zone each day



Driving in the zone by Dec 2022

% improvement in compliance by vehicle type



Next steps

We are heartened to see air quality improving across the area and we would like to thank the public for its support, but we recognise that there is still more to do to drive down pollution at all locations in Bath.

- We await the government's review of our 2021 Air Quality data to confirm whether we have achieved success.
- We will continue to operate and enforce a charging Class C Clean air zone and monitor air quality, traffic flow and vehicle compliance.
- We'll pay particular attention to sites that continue to exceed legal limits and consider specific initiatives to help.
- We will continue to promote long-term, sustainable habits around transport and private car use in line with the council's Journey to Net Zero policy.

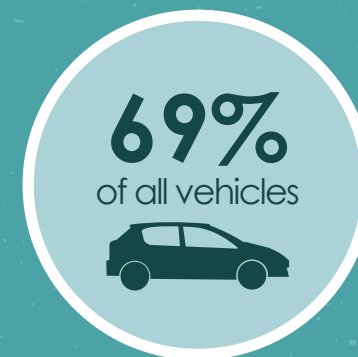
How you can help

There's lots you can do to help us drive down pollution in Bath.

- Walk or cycle your short journeys in the city
- Consider taking public transport or using the park and ride
- When you replace your vehicle, consider a new or second-hand Euro 6 diesel vehicle, a compliant petrol vehicle, or an ultra-low emission vehicle
- Consider car-clubs and car-shares.

Further reading

- The annual Report (in full) is [available here](#).
- Read more information on the zone and how it works at www.bathnes.gov.uk/BathCAZ
- Read our tips and resources for [travelling more sustainably](#).
- Read more about our [Journey to Net Zero](#)



Travelling each day
in the zone are cars



walk, wheel, carpool
or take public
transport



