Bromsgrove District Council

DRAFT Air Quality Action Plan

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

2025 - 2030

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Executive Summary

This Air Quality Action Plan (AQAP) has been produced as part of our statutory duties required by the Local Air Quality Management (LAQM) framework. It outlines the action we will take to improve air quality in the action the Council will take to improve air quality in the Bromsgrove District between 2025 and 2030.

Under the LAQM framework, an action plan is required to improve Air Quality Management Area(s) within their authority boundary.

Currently, there are three Air Quality Management Areas (AQMAs) declared within the Bromsgrove District, due to exceeding the annual objective for nitrogen dioxide (NO_2). The AQMAs are:

- Worcester Road, AQMA declared 24th October 2011
- Redditch Road, AQMA declared 17th February 2010
- Lickey End, AQMA declared 26th July 2001

Monitoring of local air pollution carried out across the Bromsgrove District indicate concentrations of nitrogen dioxide have generally decreased over the last 25 years, in common with national trends.

However, current trend analysis has been complicated in recent years due to low bias adjustment factors in 2019, and lockdowns and restrictions affecting travel patterns and behaviours associated with the COVID-19 pandemic in 2020-21.

LAQM Technical Guidance (LAQM.TG22) advises local authorities should only consider revocation of AQMAs following three consecutive years of annual mean NO_2 concentrations being lower than 36µg/m^3 (i.e. within 10% of the annual mean NO_2 objective) due to the inherent uncertainty associated with diffusion tube monitoring.

The last exceedance of NO_2 in Worcester Road AQMA was recorded in 2018 but measured concentrations were within 10% of the annual objective in 3 of the last 5 years (the other 2 years, 2020-21, being impacted by the COVID-19 pandemic).

Within the Redditch Road AQMA the last exceedance of NO_2 was recorded in 2016. The Lickey End AQMA last exceedance of NO_2 at relevant exposure, was recorded in 2014. Due to the number of years they have not exceeded the annual objective

Bromsgrove District Council will undertake the required work to revoke both of these AQMAs following completion of this AQAP.

Following discussions with the Defra LAQM team in May 2024 it was confirmed an AQAP is required for the Worcester Road, Bromsgrove AQMA only.

The AQMA has been declared due to exceedances of the annual mean objective (40 $\mu g/m^3$) for nitrogen dioxide (NO_2), attributable to road traffic, under terms of the Environment Act 1995. Therefore, measures contained within this plan focus on reducing emissions from sources of nitrogen dioxide pollution. However, it is anticipated that actions taken to reduce NO_2 concentrations across Bromsgrove District will likely result in a linked improvement in other pollutants such as particulate matter.

This Action Plan replaces the Bromsgrove District elements of the previous countywide plan: 'Worcestershire Air Quality Action Plan' (2013).

Significant projects delivered through past actions include:

Real-time Air Quality Monitoring Project – Following a successful bid to the Defra Air Quality Grant Scheme 2022/2023, 3 'low-cost Air Quality Monitors' have been installed in Bromsgrove district between January and May 2024. The monitors are part of an enhanced real-time air quality monitoring network across Worcestershire comprising 27 monitors in total. The monitors will provide real time information on pollutants including NO_2, PM_{10}, and $PM_{2.5}$ for a period of 3 years and is accessible via a public portal.

Ultra-Low Emission Taxi Infrastructure Scheme - The ULEV taxi scheme now has seen the installation of 9 live operational chargers and work is currently on going to deliver an additional 4 chargers across the district. The project is for a duration of 10 years.

Bromsgrove District Council and Redditch Borough Council Provision of Electric Vehicle Charging Infrastructure – About 120 new chargers are set to be placed at 33 locations in the area, after Redditch Borough Council teamed up with Bromsgrove District Council to agree a long-term contract with EV infrastructure provider Zest. A rollout plan is now being developed, and the first of the new chargers are expected to be installed by August 2024.

A38 Bromsgrove Route Enhancement Programme (BREP) Major Scheme - The A38 Bromsgrove Route Enhancement Programme (BREP) aims to provide additional highway capacity and promote walking and cycling as an alternative, through a range of improvements along the whole corridor. Phases 1 and 2 of the scheme have been completed. Phase 3 has moved into the construction stage with a future Phase 4 being planned.

Bromsgrove Transport Strategy This scheme is part of the Strategic Transport Assessment (STA) work which will identify infrastructure and services to support planned development growth. This is part of a collaborative process between Worcestershire County Council and Bromsgrove District Council.

Bromsgrove – Strategic Active Travel Network Investment Programme (Including Catshill, Marlbrook and Lickey End) - Improvements delivered during 2022 include a new active travel link from Harvington Road to Charford Road and access to South Bromsgrove High School with a signal-controlled crossing on Charford Road and New Road.

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].

In 2018, Public Health England (PHE) estimated that the total cost to the NHS and social care due to NO_2 for where there is robust evidence for an association, is estimated to be £60.8 million by 2025, and £230 million by 2035. This increases to

[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

£2.7billion and £9.2billion respectively when diseases with less robust evidence are included[3].

Vehicles are the largest contributor to NO_2 pollution at local roadsides, contributing 80% of the total (on average). This means higher levels of NO_2 are typically focused in high traffic areas within urban centres (such as Bromsgrove). Targeted local action, in addition to a national strategy, is therefore a key part of the solution to tackling NO_2 levels in the UK[4].

Bromsgrove District Council is committed to reducing the exposure of people in Bromsgrove to poor air quality in order to improve health.

Bromsgrove District Council, in collaboration with air quality partner(s) Worcestershire County Council (WCC), have developed actions that can be considered under eight broad topics:

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

Bromsgrove District Council's priorities are:

- Priority 1 - Reducing Emissions from Transport
- Priority 2 - Public Health and Well-being

[3] Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, 2018

[4] UK plan for tackling roadside nitrogen dioxide concentrations, 2017

- Priority 3 – Sustainable Travel and Transport
- Priority 4 – Planning for Future Development

Proposed actions are:

- Installation of public Electric Vehicle (EV) charging points
- Provision of Local Electric Vehicle Infrastructure (LEVI) for residential off-street parking
- Developing the Worcestershire EV Charging Strategy to support LEVI
- Improvements to the local bus fleet and services
- Funding of a Behavioural Change Officer post
- Encouraging awareness of air quality via public access to real time monitoring data
- Air quality improvements from New Development
- Developing and implementation of a Local Cycling and Walking Infrastructure Plan (LCWIP)
- Raising awareness of air pollution and positive actions through annual events
- Formation of a countywide Air Quality Strategy Communications Plan
- Encouraging awareness and behavioural change interventions linked to focussed real time monitoring data
- Promotion of sustainable travel choices
- Implementation of the A38 Bromsgrove Route Enhancement Programme (BREP) Phase 3 - active travel and bus infrastructure enhancements
- Encourage and support sustainable modes of transport to schools and ModeSHIFT star accreditation
- Increase availability of Demand Response Travel service
- Upgrade the Local Authority's Refuse Collection Vehicles (RCV) fleet
- Revitalising an ECO Driving Training Scheme for BDC fleet drivers

In this AQAP Bromsgrove District Council outline the plan to effectively tackle air quality issues within the council's control. However, it is recognised that there are a large number of air quality policy areas that are outside of the local authority's (LA) influence (such as vehicle emissions standards agreed in Europe), but for which the LA may have useful evidence, and so the council will continue to work with regional and central government on policies and issues beyond Bromsgrove District Council's direct influence.

Responsibilities and Commitment

This AQAP has been prepared by Worcestershire Regulatory Services (WRS) for Bromsgrove District Council. WRS is a shared service formed from the Environmental Health and Licensing departments of the six Worcestershire District Councils.

This AQAP was prepared with the support and agreement of the following officers and departments:

- Judith Willis (Chair), Head of Community & Housing Services, Bromsgrove District Council
- Emily Barker, Head of Planning and Transport Planning, (Directorate of Economy and Infrastructure), Worcestershire County Council
- Adrian Allman, Technical Pollution (Principal Officer), Worcestershire Regulatory Services
- Alison Grimmett, Principal Planning Officer, Bromsgrove District Council
- Benjamin Agbasi, Sustainability and Property Manager, Worcestershire Acute Hospitals NHS Trust
- Heydi Horton, Technical Services (Air Quality Behavioural Change), Worcestershire Regulatory Services
- Mark Cox, Technical Services (Manager), Worcestershire Regulatory Services
- Mark Kelly, Principal Transport Planner, Worcestershire County Council
- Matthew Austin, Environmental Services Manager, Bromsgrove District Council

- Matthew Eccles, Climate Change Manager, Bromsgrove District Council
- Mike Dunphy, Strategic Planning and Conservation Manager, Bromsgrove District Council
- Molly Hanks, Technical Pollution (Technical Officer), Worcestershire Regulatory Services
- Natasha Friend, Place Planning Team (Principal Planner), Worcestershire County Council
- Rachel Cockayne, Public Health (Practitioner), Worcestershire County Council
- Sam Robins, Planning Officer, Bromsgrove District Council
- Chris Poole, Technical Pollution (Specialist Lead Officer - Air Quality), Worcestershire Regulatory Services

This AQAP has been approved by:

- Bromsgrove District Council Cabinet

This AQAP <has/has not> been signed off by a Director of Public Health.

This AQAP will be subject to an annual review and appraisal of progress. Progress each year will be reported in the Annual Status Reports (ASRs) produced by Bromsgrove District Council, as part of our statutory Local Air Quality Management duties.

If you have any comments on this AQAP please send them to Technical Pollution, Worcestershire Regulatory Services at:

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1 Introduction

This report outlines the actions that Bromsgrove District Council along with air quality partners, Worcestershire County Council, will deliver between 2025 and 2030 to reduce concentrations of air pollutants and exposure to air pollution; thereby positively impacting on the health and quality of life of residents and visitors to the Bromsgrove District.

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

This Plan will be reviewed every five years at the latest and progress on measures set out within this Plan will be reported on annually within Bromsgrove District Council's Annual Status Report (ASR) on air quality.

The aims and objectives of the plan are to:

- Introduce measures to reduce measured concentrations of nitrogen dioxide (NO_2) to achieve compliance with national air quality objectives (AQO) (target <10%AQO in line with guidance and Defra LAQM team advice)
- Introduce measures to address sources of NO_2 emissions identified in source apportionment work.
- Raise awareness of impacts of air pollution and encourage behavioural change to improve the health and well-being of Bromsgrove District residents and the local environment.
- Meet the statutory requirements of the LAQM regime and the Environment Act 1995.

2 Summary of Current Air Quality in Bromsgrove District

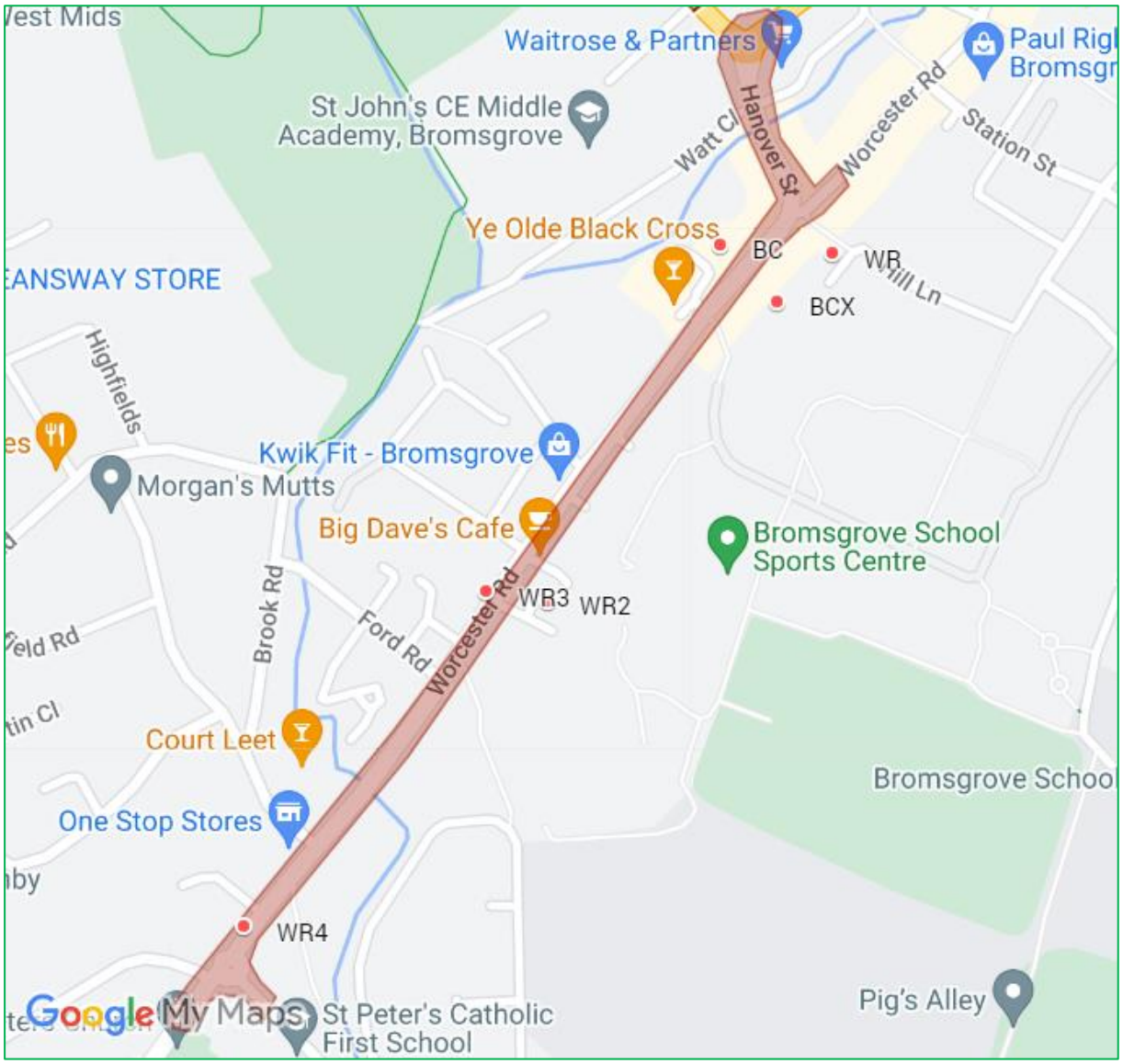
Review and assessment has established air quality over the majority of Bromsgrove District is generally good but there are a number of areas within the district that have elevated levels of nitrogen dioxide (NO_2) due to road traffic.

Currently, there are three Air Quality Management Areas (AQMAs) declared within the Bromsgrove District, due to exceeding the annual objective for nitrogen dioxide (NO_2). The AQMAs are:

- Worcester Road, AQMA declared 24th October 2011
- Redditch Road, AQMA declared 17th February 2010
- Lickey End, AQMA declared 26th July 2001

Further information on monitoring and assessment of air quality, and Air Quality Management Areas within Bromsgrove District are detailed within the latest Annual Status Report.

Figure 2.1 Map of Worcester Road, Bromsgrove AQMA and Monitoring Locations



Like many parts of the UK, poor air quality in the Bromsgrove District is linked to areas with high volumes of traffic, congestion or 'street canyon' landscapes (where height of the building is greater than width of road) or a combination of these factors.

Prior to 2024, monitoring of nitrogen dioxide (NO_2) has been undertaken via a network of passive diffusion tubes across the Bromsgrove District area. In 2023 there were a total of 45 monitoring locations across the Bromsgrove District.

In common with national trends, monitoring indicates concentrations of nitrogen dioxide have generally decreased over the last 25 years. However, current trend analysis has been complicated in recent years due to low bias adjustment factors in

2019, and lockdowns and restrictions affecting travel patterns and behaviours associated with the COVID-19 pandemic in 2020-21.

No exceedances of the annual mean objective for nitrogen dioxide have been recorded in the Bromsgrove District between 2020 and 2023 monitoring years.

The last exceedance of NO_2 in Worcester Road AQMA was recorded in 2018 but measured concentrations were within 10% of the annual objective in 3 of the last 5 years (the other 2 years, 2020-21, being impacted by the COVID-19 pandemic).

Data from County Council indicates traffic had returned to 98% of pre-pandemic levels by the beginning of 2022 and as such the annual concentrations of NO_2 in 2022 and 2023 are higher than observed in 2020 and 2021 due to the COVID-19 pandemic.

The highest concentration of NO_2 recorded across the monitoring network in 2023 was 36.6µg/m^3 at location WR, 14 Hanover Street, Bromsgrove. This concentration is 8.5% below the annual mean objective for NO_2. Results from monitoring locations within the AQMA are shown in Table 2.1 below.

Table 2.1 Monitoring locations within the AQMA between 2018 and 2023

2018 - 2023							
Site No	**Location***	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
WR4	188 Worcester Road	31.2	24.4	19.3	21.4	23.9	23.4
WR2	159 Worcester Road	36.7	31.0	22.4	25.6	27.8	28.4
WR3	138 Worcester Road	30.8	24.6	20.0	21.5	27.4	24.7
BC	Ye Olde Black Cross	**44.0**	38.0	27.7	31.5	37.4	35.4
BCX	16 Worcester Road	**44.0**	36.5	26.3	29.6	32.4	31.5
WR	14 Hanover Street	37.9	31.5	29.4	32.3	36.2	36.6
Objective		**40 µg/m^3**					

Although it has been below the objective for 5 years, the results during the COVID-19 pandemic 2020-2021 are not considered representative of normal trends. Furthermore, LAQM Technical Guidance (LAQM.TG22) advises local authorities should only consider revocation of AQMAs following three consecutive years of annual mean NO_2 concentrations being lower than 36µg/m^3 (i.e. within 10% of the

annual mean NO_2 objective) due to the inherent uncertainty associated with diffusion tube monitoring.

Additionally, it is unclear if some enforced behaviours during the pandemic that led to a decrease in the number of journeys made, such as virtual meetings replacing face to face and an increase in working from home, will continue to have the beneficial impact on reducing concentrations of NO_2 in future years. This is due to insufficient number of years of data post-pandemic available to enable confident trend analysis at this time.

Therefore, the measures outlined in this plan are required to achieve compliance with the LAQM regulatory framework as outlined in the guidance.

As outlined above, the AQMAs have been declared for exceedances of the annual mean AQO for NO_2, and therefore the measures contained within this plan focus on reducing emissions from sources of nitrogen dioxide pollution.

However, LAQM. Policy Guidance 2022 and the Air Quality Strategy 2023 outline the role local authorities have in delivering reductions in particulate matter and contributing to national targets for $PM_{2.5}$. Local authorities are required to report on any local data and actions to improve, or impacting on, $PM_{2.5}$ concentrations within Annual Status Reports. The most recent reports are available to view and download at Annual Status Report.

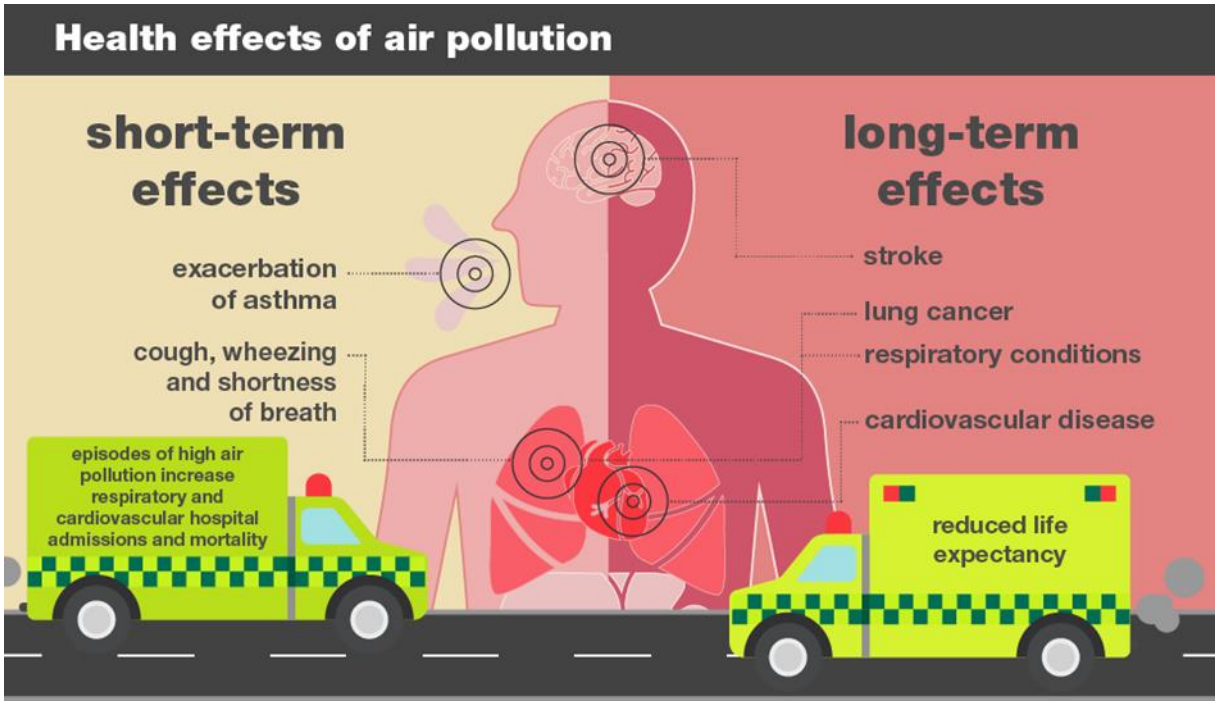
In February 2023, Defra confirmed that WRS had been successful in a bid to the Air Quality Grant Scheme 2022/23 to establish an enhanced real-time air quality monitoring network across Worcestershire. The scheme involves the installation of approximately 26 ‘low-cost Air Quality Monitors’ across the county which measure NO_2, PM_{10}, and $PM_{2.5}$. Three of the monitors were installed between January and May 2024 and are currently operating within the Bromsgrove District. The first calendar year’s annual monitoring results from these monitors will be reported on in the ASR 2025.

3 Bromsgrove District Council's Air Quality Priorities

3.1 Public Health Context

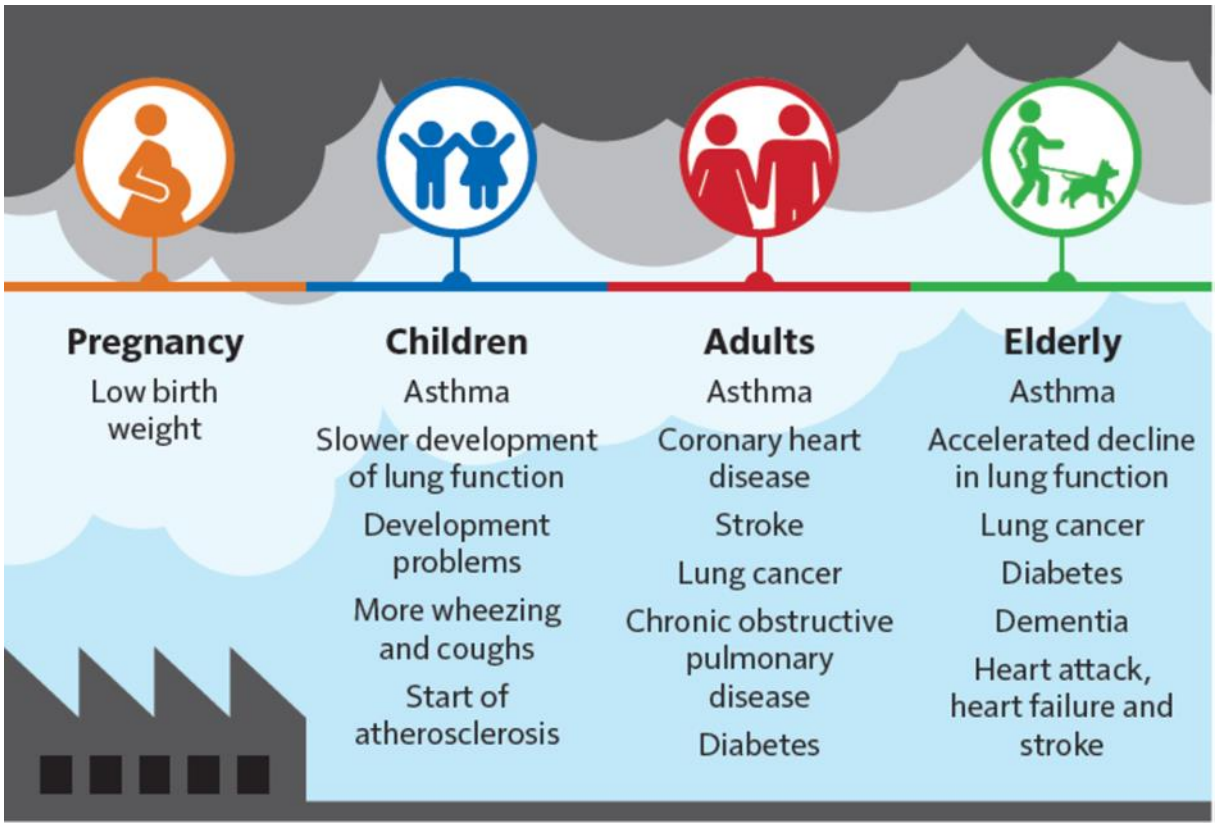
The Chief Medical Officer's (England) Annual report 2022 states 'Air pollution affects people's health throughout their lives, including before birth, in the very young, through to older adults. Exposure to air pollution, indoors and outdoors, over a long period of time, reduces people's life expectancy. There is clear evidence that air pollution contributes to the initiation and development of cardiovascular and respiratory diseases, and can cause lung cancer. The mortality burden of air pollution in England is estimated to be between 26,000 and 38,000 a year, but in addition many people suffer avoidable chronic ill health as a result of it. Improvements in air quality have been associated with improved health outcomes – for example, reductions in air pollution in London have led to reduced childhood asthma hospital admissions.'

Figure 3.1 Health effects of air pollution



Source: Public Health England (14 Nov 2018) Health matters: air pollution - GOV.UK (www.gov.uk)

Figure 3.2 Air pollution effects through lifetime



Source: Chief Medical Officers Report 2022

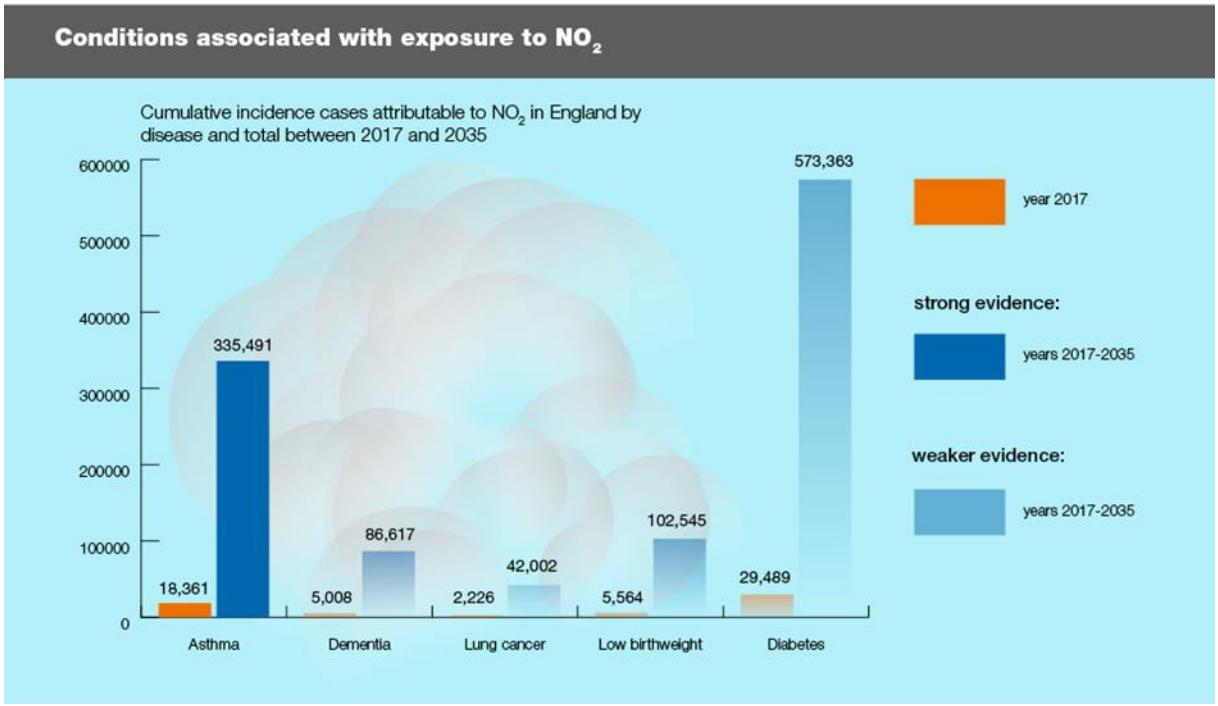
3.1.1 Health Impacts of nitrogen oxides

Nitrogen oxides (NOx) are a group of gases that are predominantly formed during combustion and emitted in the form of nitric oxide (NO). The main sources are power generation, industrial, combustion and road transport. When NO reacts with other gases present in the air, it can form nitrogen dioxide (NO_2), which is harmful to health.

A notable source of NO_2 is road traffic – which has made it difficult to distinguish the effects seen in epidemiological studies for NO_2 from those of particulate matter. However, the evidence associating NO_2 with health effects continues to grow.[5]

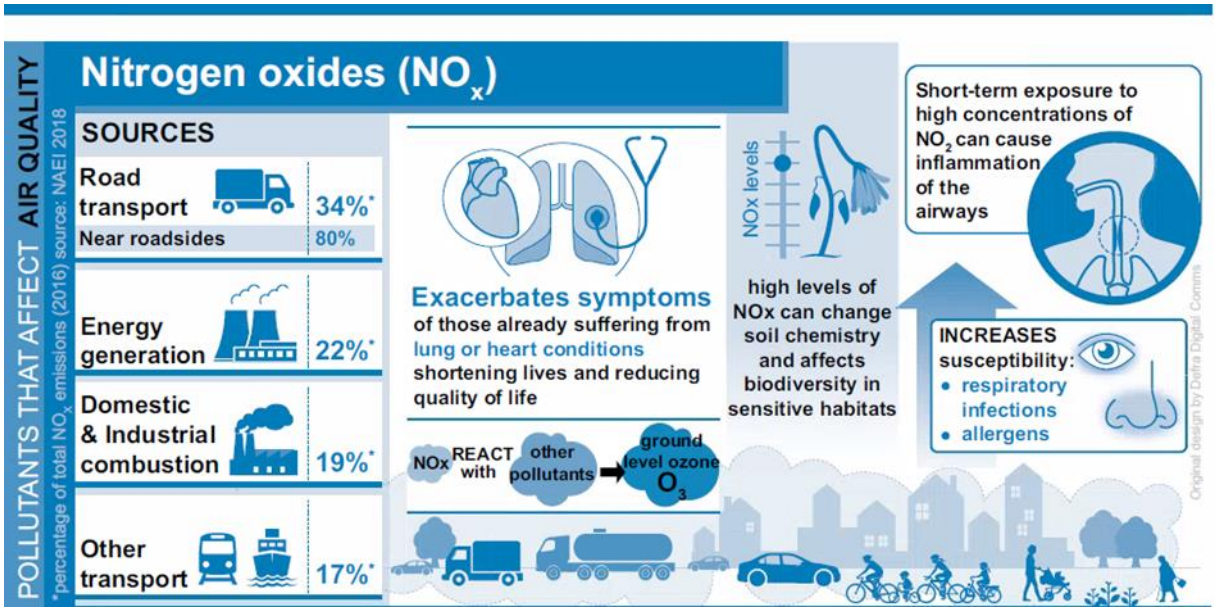
[5] Chief Medical Officer's Annual Report: Air Pollution, 2022

Figure 3.3 Conditions associated with exposure to NO_2



Source: Public Health England (14 Nov 2018) [Health matters: air pollution - GOV.UK (www.gov.uk)]

Figure 3.4 Sources and symptoms of nitrogen oxides



Source: Clean Air Strategy 2019

3.1.1 Economic Impact

In September 2020, CBI Economics produced 'Breathing Life into the UK Economy, a report that quantifies the economic benefit to the UK of meeting WHO Air Quality guidelines. The report commissioned by the Clean Air Fund states:

'Air pollution impacts human health and the productivity of the UK workforce, which in turn impacts the economy. Analysis conducted by CBI Economics in 2020 estimated that clean air in line with the World Health Organisation's (WHO) guidelines could deliver a £1.6bn boost to the UK economy each year. This would be on top of savings to NHS and social care budgets from treating fewer patients with health conditions associated with pollution.

Evidence shows a key link between NO_2 and health outcomes. Reducing NO_2 therefore, has a key role to play in realising this economic potential. NO_2 exposure leads to both short-term and long-term health impacts, exacerbating respiratory conditions such as asthma, possibly increasing the likelihood of lung cancer, stroke, and cardiovascular disease, and has been linked to adverse birth outcomes. This comes at a cost to the healthcare system.'[6]

In 2018, Public Health England (PHE) estimated that the total cost to the NHS and social care due to NO_2 for where there is robust evidence for an association, is estimated to be £60.8 million by 2025, and £230million by 2035. This increases to £2.7billion and £9.2billion respectively when diseases with less robust evidence are included.[3]'

3.2 Planning and Policy Context

The following supporting planning and policy documents contribute toward improvements in air quality in the Bromsgrove District:

Bromsgrove District Local Plan 2011-30: The Local Plan sets out the Council's long-term vision and strategic context for promoting, distributing and delivering

[6] Breathing Life into the UK Economy, 2020

sustainable development and growth within the district until 2030. Policies BDP1, 16, 19, 22 and 25 are relevant to reducing impact of development on local air quality.

Bus Service Improvement Plan (2021): Worcestershire County Council's strategy focusses on road and rail passenger transport services within the county, including Home to School, bus, taxi, Community Transport and other community-based bespoke transport initiatives.

Joint Health and Well-being Strategy (2022 – 2032): The strategy outlines Worcestershire Health and Wellbeing Board's commitment to improving mental health and wellbeing, supporting people to live well in good health for as long as possible, particularly those who have poorer health outcomes.

Local Transport Plan (2018-2030): Worcestershire County Council has responsibility for strategic transport issues in the county and published the fourth Local Transport Plan (LTP4) in 2017.

Technical Guidance Note for Planning: WRS have produced a technical guidance document for Local Planning Authorities, developers and consultants on approach and requirements in respect of environmental protection matters, including air quality, and planning applications.

Streetscape Design Guide: Worcestershire County Council's Streetscapes Design Guide sets out guidance for homeowners, developers and consultants, in formulating designs and making applications for planning permission. It includes standards for parking provision, Electric Vehicle Charging Points and secure cycling facilities.

3.3 Source Apportionment

The AQAP measures presented in this report are targeted towards the predominant sources of emissions within Bromsgrove District Council's area.

A source apportionment exercise has been carried out utilising 2023 monitoring data and commissioned traffic surveys in the same year. Appendix G, provided in the accompanying Technical Appendices, details the source apportionment exercise undertaken.

The percentage source contributions and overall concentrations within the AQMA's identified by the assessment are summarised in Table 3.1 and Figure 3.5 and Figure 3.6 below:

Table 3.1 Annual Mean NO_2 concentrations by source and percentage contributions

Annual Mean Concentration (µg/m³)									
Site ID	Regional Back-ground[1]	Local Back-ground[2]	Cars	LGVs	Taxis	HGVs	Buses	MCs	Total
Worcester Road, Bromsgrove (WR)	8.67	2.32	16.64	3.46	0.30	1.55	3.64	0.02	36.6
% Contribution to Total									
Site ID	Regional Back-ground	Local Back-ground	Cars	LGVs	Taxis	HGVs	Buses	MCs	Total
Worcester Road, Bromsgrove (WR)	23.70%	6.34%	45.48%	9.44%	0.81%	4.24%	9.94%	0.04%	100%

1 Regional background includes emissions from sources not in LA control e.g. Motorways outside of study area, Industrial sources, Domestic properties, Railways, Rural sources, Others

2 Local background includes emissions from sources LA have some influence over e.g. Primary A roads, Minor Roads and Point sources in and outside of study area

Figure 3.5 Annual Mean NO_2 concentrations by source - Worcester Rd, Bromsgrove

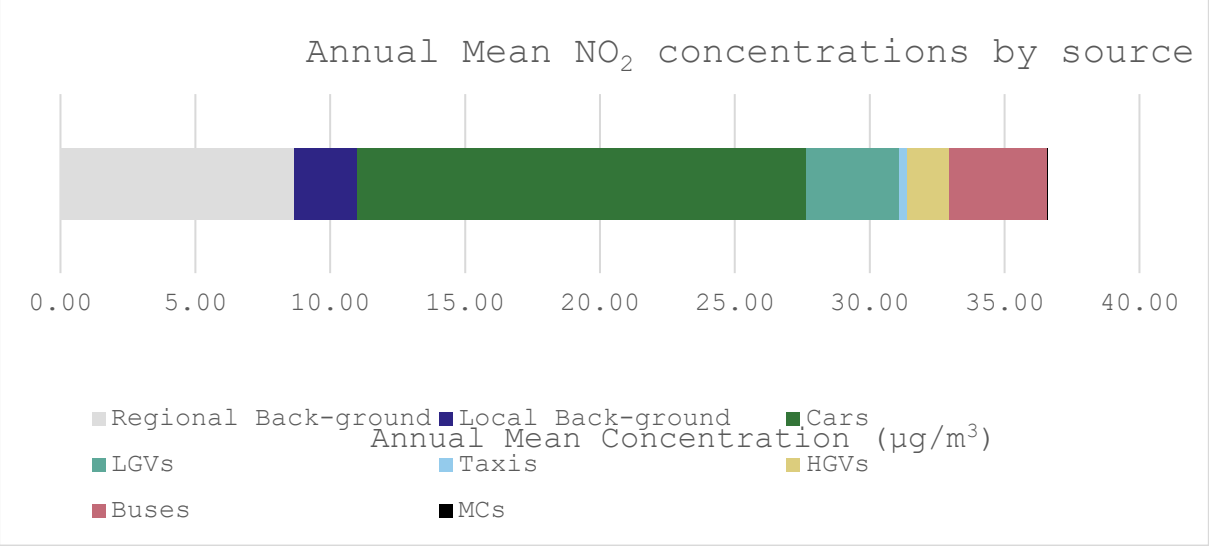
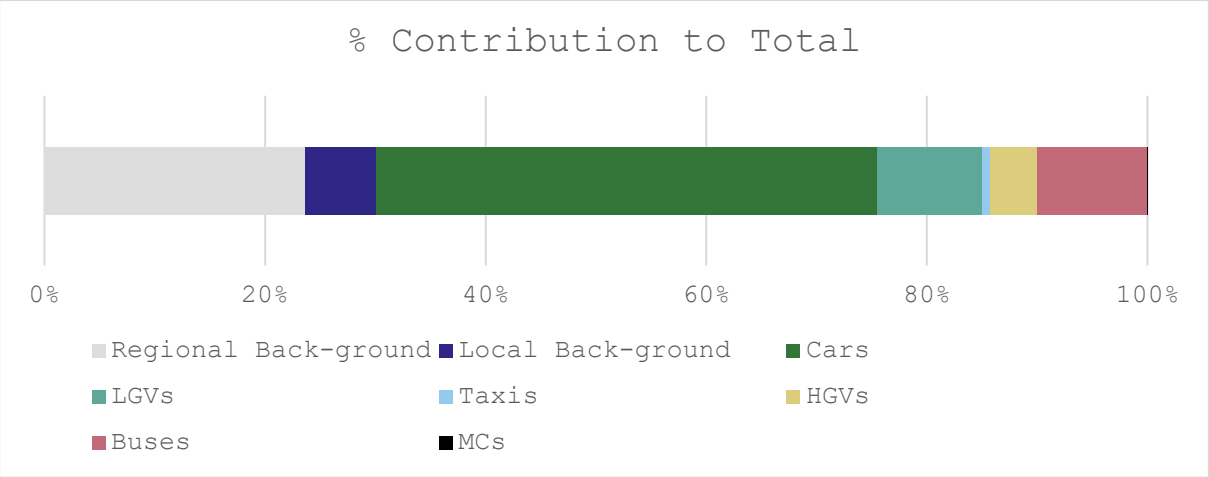


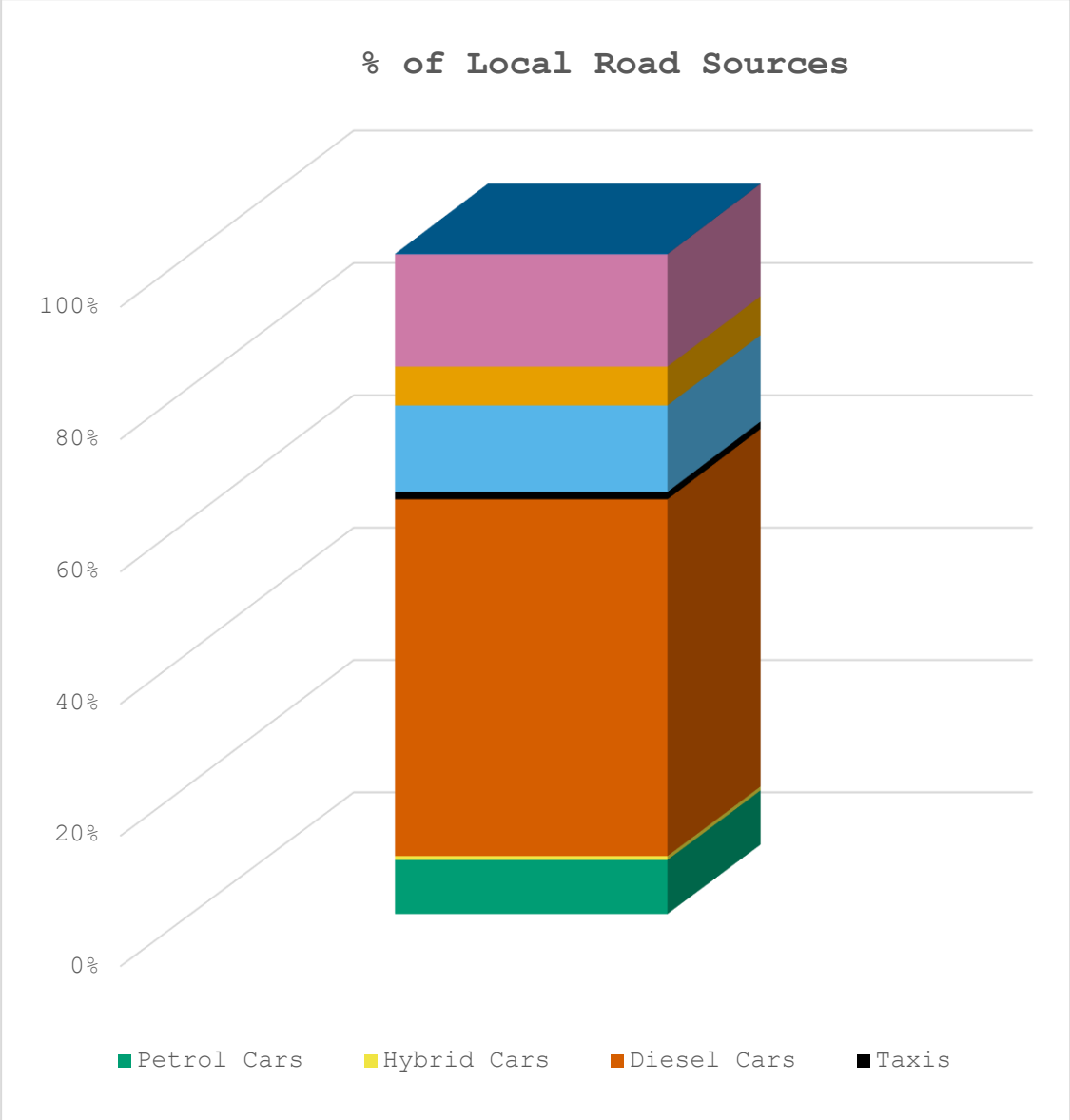
Figure 3.6 Percentage source contributions



The outcome of the source apportionment exercise demonstrates background concentrations contribute a significant proportion of the overall concentration of NO_2 measured within the Worcester Road AQMA, 30.04%. As the local authority is largely unable to influence regional background levels, and local background concentrations are predominately a result of traffic sources on other local roads, it is more useful to consider the source apportionment of the local traffic sources in isolation when developing actions for improving air quality.

Additionally, because of the non-linear relationship between NOx and NO_2 emissions it is more appropriate to consider total NOx (Nitrogen Oxides) emissions of the local traffic contribution for source apportionment, as shown in Figure 3.7 below.

Figure 3.7 Local Road NOx proportions by vehicle type in Worcester Road, Bromsgrove AQMA



Cars are shown to comprise the largest proportion of traffic volume, 86.71% in Worcester Road AQMA contributing to 65% of vehicle source emissions.

Buses comprise just 1.65% of vehicles in Worcester Road AQMA but contribute a much larger proportion,14.21%, of vehicle emissions.

Light Goods Vehicles (LGV) comprise 8.48% of the traffic volumes in Worcester Road AQMA but contribute 13.50% of vehicle emissions.

Heavy Good Vehicles (HGV) make up 1.32% of vehicles in Worcester Road AQMA and contribute 6.07% of vehicle source emissions.

3.4 Required Reduction in Emissions

The source apportionment assessment demonstrates a reduction of 3.05% of emissions within Worcester Road, Bromsgrove AQMA would be necessary across all vehicle types to achieve 10% below the annual average of nitrogen dioxide objective within the AQMAs.

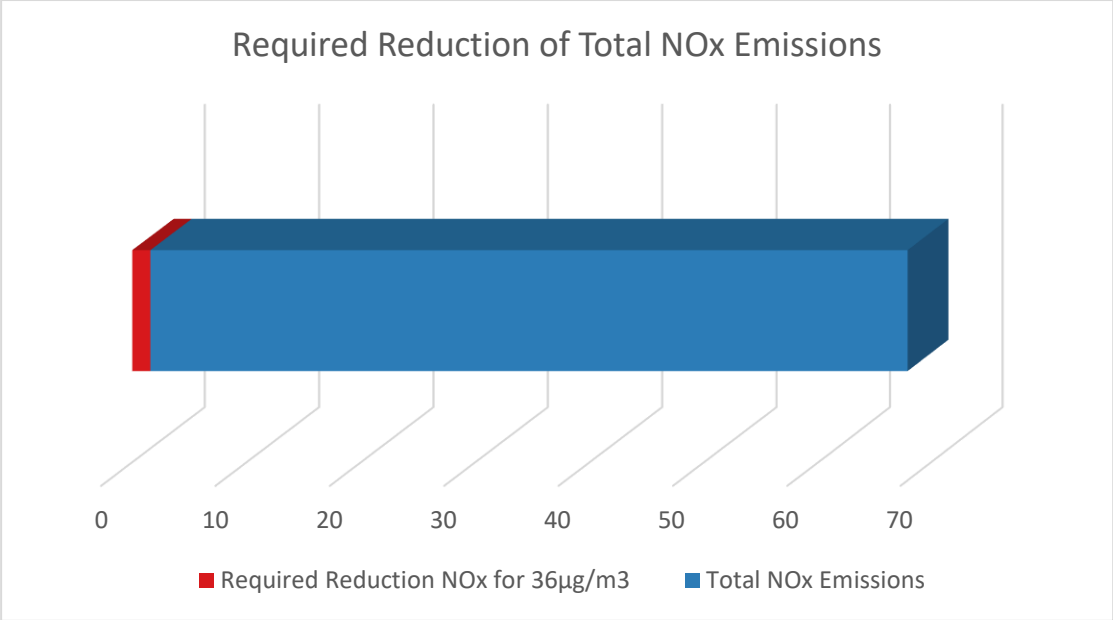
The assessment indicates a 5% reduction in emissions from cars or all vehicle types or a 25% targeted reduction in emissions from LGVs or buses would be sufficient to achieve compliance within the AQMA. Table 3.2 below summarises the reductions required.

Table 3.2 Emission reduction required

Location	Emission Reductions Required to Meet -10% Objective (NO_2)	All Vehicle Reduction to Meet -10% Objective (NOx)	Highest Roadside Contributor	2nd Roadside Contributor	Single Vehicle Reduction to Achieve Objective
Worcester Road, Bromsgrove	1.58	3.05%	Diesel Cars – 57.08%	LGV – 13.81%	Cars 5% or LGVs/Buses 25%

Error! Reference source not found. below shows the required reduction in NOx emissions to achieve compliance and total emissions in the Worcester Road, Bromsgrove AQMA.

Figure 3.8 Required reduction in NOx to achieve compliance in the AQMA



3.5 Key Priorities

Bromsgrove District Council has identified the following priorities for the development and implementation of the air quality action plan:

Priority 1 – Reducing Emissions from Transport

Considering the outcomes of the source apportionment assessment a key priority is to implement direct interventions which reduce emissions of NO_2 from vehicles. Measures proposed include improvements to council operated fleets and public transport fleets, and revitalising ECO Driving training for council fleet drivers.

Priority 2 - Public Health and Wellbeing

Air pollution impacts on human health and, therefore, a priority for Bromsgrove District Council are measures raising awareness, increasing community understanding and encouraging behavioural change to reduce individual's exposure to and impact on air quality.

Measures proposed, in conjunction with Public Health at Worcestershire County Council and WRS, include encouraging awareness through publicly available real time monitoring information, developing a communications plan, publicising via events such as annual Clean Air Day, working with local schools and supporting the behavioural change officer post at WRS.

Priority 3 – Sustainable Travel and Transport

Increased uptake of more sustainable travel and transport options has a significant impact on reducing emissions from the local vehicle fleet and improving air quality. Sustainable measures proposed within the action plan include installation of additional public EV charging points and a strategy for future charging, bus service improvements, travel planning and delivery of the Local Cycle Walking and Infrastructure Plan (LCWIP).

Priority 4 - Planning for Future Development

Planning for future development to limit its impact or improve existing air quality and protect the future site occupants through good design or mitigation measures is a key priority. Building on existing local policy and guidance Bromsgrove District Council, in collaboration with local developers, have secured mitigation measures and financial contributions to reduce impacts of significant new developments at Perryfields Road, Whitford Road and the Former Market Hall Site.

Measures include contributions towards junction improvements within the Worcester Road AQMA and connecting network, public transport services and infrastructure, active travel links and the A38 corridor.

4 Development and Implementation of Bromsgrove District Council AQAP

4.1 Consultation and Stakeholder Engagement

This section to be completed for final version following completion of statutory and public consultation.

In developing/updating this AQAP, we have worked with other local authorities, agencies, businesses and the local community to improve local air quality. Schedule 11 of the Environment Act 1995 requires local authorities to consult the bodies listed in Table 4.1. <insert text here, e.g. In addition, we have undertaken the following stakeholder engagement:

- Website
- Articles in local newspaper
- Questionnaires distributed directly to households along major roads
- Etc.>

The response to our consultation stakeholder engagement is given in Appendix A: Response to Consultation.

Table 4.1 – Consultation Undertaken

Consultee	Consultation Undertaken
The Secretary of State	<Yes/No>
The Environment Agency	<Yes/No>
The highways authority	<Yes/No>
All neighbouring local authorities	<Yes/No>
Other public authorities as appropriate, such as Public Health officials	<Yes/No>

Consultee	Consultation Undertaken
Bodies representing local business interests and other organisations as appropriate	<Yes/No>

4.2 Steering Group

A steering group was formed to progress a new AQAP in May 2024.

The group membership comprised officers from Bromsgrove District Council, Worcestershire County Council and WRS from public health, technical pollution (air quality), strategic planning, sustainability, highways and transport disciplines, and also representation from the NHS.

Group members:

- Judith Willis (Chair), Head of Community & Housing Services, Bromsgrove District Council
- Emily Barker, Head of Planning and Transport Planning, (Directorate of Economy and Infrastructure), Worcestershire County Council
- Adrian Allman, Technical Pollution (Principal Officer), Worcestershire Regulatory Services
- Alison Grimmett, Principal Planning Officer, Bromsgrove District Council
- Benjamin Agbasi, Sustainability and Property Manager, Worcestershire Acute Hospitals NHS Trust
- Heydi Horton, Technical Services (Air Quality Behavioural Change), Worcestershire Regulatory Services
- Mark Cox, Technical Services (Manager), Worcestershire Regulatory Services
- Mark Kelly, Principal Transport Planner, Worcestershire County Council
- Matthew Austin, Environmental Services Manager, Bromsgrove District Council
- Matthew Eccles, Climate Change Manager, Bromsgrove District Council

- Mike Dunphy, Strategic Planning and Conservation Manager, Bromsgrove District Council
- Molly Hanks, Technical Pollution (Technical Officer), Worcestershire Regulatory Services
- Natasha Friend, Place Planning Team (Principal Planner), Worcestershire County Council
- Rachel Cockayne, Public Health (Practitioner), Worcestershire County Council
- Sam Robins, Planning Officer, Bromsgrove District Council
- Chris Poole, Technical Pollution (Specialist Lead Officer - Air Quality), Worcestershire Regulatory Services

4.2.1 Steering Group Activity

The Steering Group has overseen the development of this AQAP following the guidelines set out in Chapter 2 of LAQM.TG22 and with reference to best practice examples provided by Defra online and through events.

The Steering Group has met monthly between 21st May to 9th September 2024.

Going forward, it is anticipated the Steering Group will continue to meet less frequently and as part of a countywide focussed group to regularly review progress and impact of air quality improving interventions.

A separate Air Quality Public Health working group was established in 2023 to progress interventions and begin work on a strategy for improving air quality and public health across Worcestershire, following the finalisation of this AQAP and required works in other parts of the County at the end of 2024.

At the time of writing, the future focus, contributors, and responsibilities of the working group is under review with air quality partners. It is anticipated this will be resolved in the coming months and the group will be reformed and continue work in early 2025.

4.2.2 Timeline of works

The timeline for the various stages and delivery of a revised countywide AQAP, and establishment of a new countywide Air Quality Strategy, were set out in the ASR

2023. However, following the introduction of new enforcement policy by Defra in June 2023, it has been necessary to amend the planned framework to prioritise production of separate AQAPs for each district in Worcestershire with an AQMA.

Following discussions with Defra LAQM Team in September 2023, Bromsgrove District Council were granted an extension to the timeline for delivery of a draft AQAP to November 2024 in light of committed priorities elsewhere in the county.

Table 4.2 shows the timeline of works undertaken by the Steering Group and timescale for publication of final plan.

Table 4.2 Timeline of Steering Group work and publication of plan

Timeline	Phase
Sept – Oct 2023	Discussions with Defra LAQM team and establishment of revised timeline for Bromsgrove District Council AQAP submission
May 2024	Steering Group formed, and inaugural workshop held
June – July 2024	Identification, filtering and shortlisting of potential measures and data gathering to enable modelling (quantifying impact) of measures
August 2024	Impact Assessment of focus measures (cost benefit analysis). Complete Table 5.1 - Determine funding sources & KPIs (monitoring and evaluation), delivery timelines.
Sept 2024	Drafting of AQAP report
Oct - Nov 2024	Submission of Draft AQAP to Corporate Management Team, Bromsgrove District Council Cabinet, Director of Public Health for approval and revisions and Defra
Dec 2024 – Feb 2025	2 month public and statutory consultation on Draft AQAP
Feb - Mar 2025	Revisions and submission of Final AQAP for review by Corporate Management Team and approval by Political Committees at Bromsgrove District Council, and DoPH
April 2025	Publication of Final AQAP and submission to Defra
Mar - May 2026	First annual review and update for Annual Status Report

4.2.3 Approach to shortlisting of measures and assessment of impact

All potential measures were subjected to an established measure selection process comprising two stages:

- Stage 1 Qualitative Assessment
- Stage 2 Impact Assessment/Cost Benefit Analysis

The process for both stages has been established with reference to LAQM guidance and review of available best practice AQAPs and is summarised in Figure 4.1 and Figure 4.2 below.

For the Stage 1 Qualitative Assessment the Steering Group member's professional expertise and knowledge were applied to potential measures to determine:

- an anticipated timeline for implementation,
- level of social and political support for measure,
- practicality of implementing within the AQMA,
- feasibility of delivery considering the above 3 categories
- potential reduction in NO_2 emissions

The assessment also included identification of available sources of data to assist quantifying impact of measures progressed to the next stage or the potential for data becoming available within the lifetime of the AQAP. Further detail on the Stage 1 process is provided in Appendix C: Qualitative Assessment of Measures (Shortlisting).

The group also considered two other factors at this stage:

- sources impacted (e.g., cars, vans, buses, HGVs),
- identify potential funding sources or opportunities.

Measures were ranked based utilising a RAG (Red, Amber, Green) scale, and 4 groups of measures were established:

1. **Focus Measures -** quantifiable or non-quantifiable shortlisted measures progressing to Stage 2 – Impact Assessment and shown in Table 5.1 and detailed in Section 5 AQAP Measures.

2. **Potential Future options -** measures with potential to be developed or delivered in future not shortlisted at this time due to timeline, lack of support, information or data, or practicality of delivery or combination of those. Further detail is provided in Appendix D.
3. **Measures not being pursued** - measures identified as non-deliverable due to social or political opposition, cost, lack of funding, practicality of delivery, or no or little AQ impact anticipated within the AQMA, or combination thereof. These are identified in Appendix B.
4. **In place** - actions identified as already being delivered and contributing to air quality improvements at the time, not considered further.

The outcome of the Qualitative Assessment is shown in Appendix D: Outcomes of Stage 1 Shortlisting Process.

Figure 4.1 Stage 1: Qualitative Assessment of Measures

RAG	Timeline for implementation	Support for measure	Practical Application	Deliverability	Anticipated Air Pollutant reduction	Data to quantify impact	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in the future
Green	Within 5 years	Likely Social and political support	Feasible	Yes	Significant	Available	Yes/No (Green/Red)	Potentially Within lifetime of AQAP
Amber	Potentially within 5 years	Potential social and/or political support	Potentially feasible	Potentially	Low to Medium impact or insufficient info to make a determination	Not available at time of draft plan, anticipated within 5 years		Post lifetime of this AQAP, consideration for
Red	Greater than 5 years	Unlikely social and political support	Not feasible	No	Negligible or Negative	Not available or forthcoming in next 5 years		Unlikely to be progressed in the future

Figure 4.2 Stage 2: Impact Assessment

AQ Improvement / Cost		Negligible	small	medium	large	Very large
		1	2	3	4	5
Neutral	8	8	16	24	32	40
Low	7	7	14	21	28	35
Low - Medium	6	6	12	18	24	30
Medium	5	5	10	15	20	25
Medium - High	4	4	8	12	15	20
High	3	3	6	9	12	15
High – Very High	2	2	4	6	8	10
Very High	1	1	2	3	4	5

For the Stage 2 Impact Assessment, a cost benefit analysis was applied to the identified focus measures.

Costs were scored according to the bandings identified below, adopted from LAQM guidance. The amounts for each measure were determined either from known costs, where a measure is currently being implemented, or application of professional experience and knowledge for measures at an earlier stage of development.

A numerical score identified in Figure 4.2, above, corresponding to the banding below was applied to each measure for the overall cost and the cost to local authority of the action taken, to determine an average cost score.

Table 4.3 Description of cost bandings

Cost Bandings	Anticipated overall costs
Neutral	No additional cost or part of existing spend
Low	<£10k
Low - Medium	£10k – £50k
Medium	£50k - £100k
Medium - High	£100k - £500k
High	£500k - £1m
High – Very High	£1m - £10m
Very high	> £10m

The impact of measures were scored according to the bandings below. The bandings were determined from the source apportionment work and identified required reduction in NOx concentrations to achieve compliance within the AQMA.

Table 4.4 Description of Air Quality Impact bandings

AQ Impact	Proportion of Emissions Reduction	Approx equivalent concentration (NOx)
Negligible	<0.2%	<0.15 µg/m^3
Small	0.2 – 1.5%	0.15 – 1 µg/m^3
Medium	1.5 – 6%	1 – 4 µg/m^3
Large	6 - 10%	4 - 7 µg/m^3
Very Large	>10%	>7 µg/m^3

The impact of each measure was determined via modelling where sufficient and appropriate data was available to enable quantification. However, it is recognised, within guidance (LAQM.PG22), that it is easier to quantify some measures more than others. For example, a reduction in emissions can be calculated from improvements in combustion engines such as replacing a Euro Code (EC) IV fleet with EC VI vehicles. Other measures, such as those designed to encourage a change in travel behaviour, are more difficult to quantify as the likely number of removed vehicle journeys is unpredictable.

The approach taken has been to assume a negligible or small impact at best where it has not been possible to quantify the impact of a measure, and the application of professional experience and knowledge to determine which banding is most applicable. Further information on the approach to modelling is outlined within the next section.

An overall score for each measure was determined my multiplying the Cost score average by the Impact Score:

Cost Score Average (Overall cost + Cost to LA) x Impact Score = Overall Score

The measures are then ranked in order of overall score from highest to lowest which is reflected in Table 5.1. A summary of the assessment is provided in Appendix E: Outcomes of Stage 2 Impact Assessment.

4.2.4 Approach to modelling and quantification of measures

For modelling purposes, WRS has used the most recent available Emissions Factor Toolkit (EFT) v12.0.1 to calculate reduction in emissions of NOx (in g/km). This complies with LAQM guidance, and additionally is the approach used within the source apportionment studies.

For each quantifiable measure, WRS has used the EFT to calculate the reduction in emissions of NOx (in g/km) within the AQMA compared with the outcomes of the source apportionment studies. This complies with advice received from LAQM helpdesk operated by Bureau Veritas on behalf of Defra.

The EFT is published by Defra to assist local authorities in carrying out assessments of local air quality as part of LAQM duties under the Environmental Act 1995 as amended by the Environment Act 2021. The EFT allows users to calculate road vehicle pollutant emission rates for NO_x, and other pollutants, for a specified year, road type, vehicle speed and vehicle fleet composition. It utilises COPERT v5.6 NO_x and PM speed-based emissions factors as taken from the European Environmental Agency (EEA) emission calculation tool.

Output from the EFT is provided as total emissions of NOx in g/km (grammes per kilometres) broken down by vehicle type over specified link distance (length of AQMA) and period (year).

It should be noted that model outputs are based upon national fleet assumptions embedded within the Emissions Factor Toolkit (EFT). These may not be wholly representative of the local vehicle fleet composition. Therefore, where local data is available, such as bus fleet data, this has been used to update the corresponding assumptions within the EFT to provide outputs more representative of local fleet emissions.

Additionally, the results of the modelling approach should be considered as indicative only, rather than determined concentration reductions. Furthermore, the EFT does not include spatial impacts of street canyon effects, weather impacts or idling at junctions. Assessment of such impacts requires a more complex model, supporting data and resource which were not available during the production of this AQAP.

Common Modelling Parameters

The proportions of each vehicle type determined from the source apportionment studies for each AQMA has been used as a baseline for each modelling scenario.

A number of modelling scenarios using the latest toolkit (EFT 12.0.1) were ran with amendments to proportions of vehicle types from the source apportionment baseline determined from reductions to vehicle parcs projected by specific measure impacts with consideration for appropriate fleet growth factors in 2029-2030. Inputs and outputs of each modelled scenario are shown in Appendix K: Modelled Measures in the accompanying Technical Appendices document.

The' All Vehicle Type' option was selected for modelling impact of transition to EV, and the measures involving buses were run using 'Detailed Option 2' as required less detail for each vehicle type. All modelled scenarios were run providing outputs in emission rates of NOx (g/km) and additional breakdown by vehicle. Details of all model options are outlined within the EfT v12.0.1 User Guide.

A number of input parameters within the 'All Vehicle Type' option required additional detail determined from local fleet data or research of nationally available projections:

- Split between diesel and EV power trains for Rigid and Arctic HGVs from available DfT road traffic statistics and projections for 2023 – 2029.
- Petrol, Diesel and Low Emission Vehicle (LEV) splits for cars and LGVs were determined from the National EV Insight and Support (NEVIS) and DfT projections.
- Local taxi fleet data from 2023 was used as a baseline to determine proportions of diesel, hybrids and (Battery Electric Vehicles) BEV within fleet.
- Growth factors for 2029 have considered for all vehicle types except buses from NEVIS and DfT projections.

Modelled measures and parameters

Measures supporting Electric Vehicle (EV) uptake: Public EV Charging Points, EV Charging Strategy, Low Emission Vehicle Infrastructure (LEVI) Funding.

Reductions in emissions have been calculated utilising forecast data from NEVIS on EV uptake for car and LGV fleet in Bromsgrove District and Worcestershire.

Calculations have also taken into consideration vehicle growth in these fleets as forecast for 2029 within NEVIS, and from available Department for Transport (DfT) data[7]. The model scenario has been run assuming a Medium uptake of EV from NEVIS within the AQMA.

Bus fleet improvements.

Data was provided by WCC Highways of Diamond and First bus fleets as of June 2024, as the predominant service providers within the Bromsgrove District, which was used to determine a baseline source contribution.

The pre-defined Bus Fleet Euro Code Composition within the EFT was amended to reflect the local Eurocode compositions using the 'Bespoke Euro Fleet' option and model scenario run to determine the baseline as of 2023 for the source apportionment assessment.

The pre-defined Bus Fleet Euro Code Composition within the EFT for 2029 forecast was amended to reflect the projected fleet update to Eurocode VI using the 'Bespoke Euro Fleet' option and model run to determine reduced emissions within each AQMA.

The EFT outcomes for each measure and scenario in the AQMA were compared with the source apportionment emissions to forecast reduced emissions for the purposes of the Stage 2 Impact Assessment.

Local bus service improvements

A 25% increase in bus patronage on pre-pandemic levels has been determined as 0.9% uptake utilising available National Traffic Survey data (see section 5.1.9 for further information). This has been calculated to equate to a 0.57% reduction in car journeys in the AQMA (assuming the 0.9% uptake replaces journeys spread across a mix of modes of transport) has been assumed for modelling purposes.

[7] National Road Traffic Projections, 2022

4.2.5 Predicted Emissions Reduction

The forecast emissions reduction in NOx (g/km) in the AQMA for 2029-30 from all the quantifiable measures has been compared to the source apportionment outcomes and required emission reduction to achieve compliance.

Table 4.5 Predicted and required emissions reduction of NOx compared with total emissions from source apportionment in the AQMA.

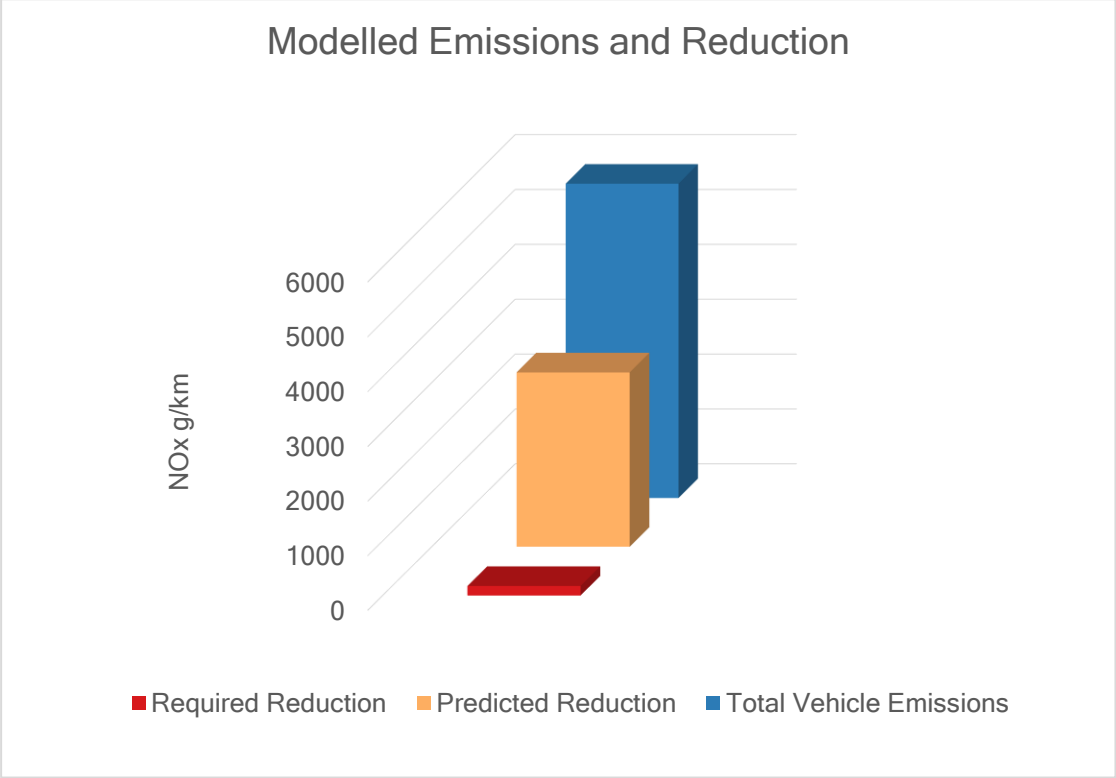
Source Name	All Vehicles Emissions NOx (g/km)[1]	Required Reduction NOx (g/km)[2]	2025 - 30 Modelled Reduction NOx (g/km)[3]	Reduction Achieved
Worcester Road	5729.597744	174.7527312	3186.244224	Yes

[1]All Vehicles Emission NOx (g/km) = Source Apportionment (2023) outputs
[2]Required Reduction NOx (g/km) calculated from Source Apportionment (2023) assessment
[3]Modelled Reduction NOx (g/km) calculated total of quantifiable measures (2029-30)

Further explanation on the modelling process, EFT outputs and modelled measures is provided is section 4.2.4 above. Inputs and outputs of each modelled scenario are shown in **Error! Reference source not found.** in the accompanying Technical Appendices document.

Error! Reference source not found. below shows the predicted modelled emissions reduction achieved (middle column) compared with total emissions within the AQMA determined from the source apportionment study (back) and the required emissions reduction to achieve target compliance of 36µg/m^3 (-10% AQO) (front).

Figure 4.3 Total emissions, predicted and required reduction of NOx emissions in the AQMA



In accordance with advice from LAQM helpdesk consideration has been given to the date at which compliance is expected to be achieved, both with and without the implementation of the AQAP measures

The impact assessment indicates the proposed measures are sufficient to achieve compliance and the target of less than 10% below the current AQO for annual average NO_2 of 40µg/m^3 in Worcester Road, Bromsgrove AQMA within the lifetime of this AQAP (2025-30).

It has not been possible to predict if compliance with the AQO or target of less than 10% below will be achieved without the measures in this AQAP due to the following factors:

- Limited available long term trend data (only 2 full calendar years 2022-23) since traffic levels returned to near pre-pandemic levels;
- Variability in climate – weather has significant impact on concentrations of air pollutants in any given period and varies from season to season, year to year;

- Unpredictable impact of EV uptake without supporting charging infrastructure and the measures contained within this AQAP;
- Unpredictable bus fleet upgrade without Bus Service Improvement Plan and Enhanced Partnership intervention;
- Unpredictable impacts of behavioural change aspects.

Table 2.1 demonstrates the variability in air pollution concentrations and unpredictable nature of air quality trends. The monitoring data shows nitrogen dioxide concentrations have marginally declined between 2019 – 2023 year on year at most monitoring locations within Worcester Road, Bromsgrove AQMA, when removing the pandemic impacted years of 2020-21 from the trend analysis. The exception being Site location WR which has increased by 16% in that time.

5 AQAP Measures

Table 5.1 shows the Bromsgrove District Council AQAP measures. It contains:

- a list of the actions that form part of the plan
- the responsible individual and departments/organisations who will deliver this action
- estimated cost of implementing each action (overall cost and cost to the local authority)
- expected benefit in terms of pollutant emission and/or concentration reduction
- the timescale for implementation
- how progress will be monitored

NB: Please see future ASRs for regular annual updates on implementation of these measures.

The following section provides more detail on the focus measures within this AQAP.

5.1 Focus Measures

5.1.1 Electric Vehicles – general

As part of the Net Zero agenda to reduce carbon emissions government propose to introduce a ban on the sale of new petrol and diesel vehicles in 2035.

The transition of the vehicle fleet from conventional internal combustion engine (ICE) powered vehicles to electric vehicles is predicted to deliver significant reductions in NOx emissions, nationally and locally.

In addition to reduced CO_2 and NOx emissions, the transition to a battery electric vehicle (BEV) fleet will contribute towards reduction in PM emissions from tailpipes and noise generated from road transport.

Local EV projections available from NEVIS have been utilised to model the predicted emissions reduction from the local car and van (LGV) fleet over the next 5 years (2024 – 2029). The NEVIS data predicts the local car fleet will comprise between

15.70% to 24.52% BEV by 2029. BEVs will also comprise 18.25% to 27.72% of the local LGV vehicle parc.

The results of modelling undertaken indicate the emissions reduction forecast from transition to BEV vehicle parc predictions will result in a 35.15% reduction in NOx emissions in Worcester Road, Bromsgrove AQMA by 2030.

This transition to high proportions of BEV within local vehicle parc requires supporting EV charging infrastructure (EVCI) to meet the growing demand.

A 2022 survey by Zap-Map highlighted that whilst 82% of EV drivers (nationally) have access to charging at home, 93% of EV drivers use public charging networks, most commonly motorway service areas and charge-points at supermarkets for opportunity charging. Workplace, public car parks and business sources such as hotels are also opportunity locations for charging. As the access to and reliability of public EVCI grows, the 26% of households in Bromsgrove without a private driveway for the installation of a chargepoint will be more likely to invest in an EV.

Local authority has a role to play in ensuring adequate levels of EVCI are available to support the transition to EV through the provision of charging in public car parks, on street charging or local hubs for those without ability to charge at home, and setting requirements of new residential and commercial development through planning policy.

Three shortlisted measures have been identified that will contribute towards greater provision of EVI and the emissions reduction forecast in the AQMAs:

- Public EV Charging Points (Bromsgrove District Council)
- EV Charging Strategy (Worcestershire County Council)
- Local Electric Vehicle Infrastructure (LEVI) Capital Funding

5.1.2 Public EV Charging Points

Bromsgrove District Council outline their approach and action plan to support EV uptake within the Council's Ultra-Low Emission Vehicles Strategy.

To support the transition of local vehicle parc to BEV, Bromsgrove District Council, in partnership with Redditch Borough Council, are progressing a scheme to create a comprehensive network of EV Chargers across both Local Authority areas. About

120 new chargers are set to be placed at 33 locations in the area, after the partnership councils agreed a long-term contract with EV infrastructure provider Zest.

Zest is backed by the government-sponsored Charging Infrastructure Investment Fund (CIIF) and will invest about £2.1m to provide the new infrastructure for the next 10 to 15 years after winning the contract. Zest will provide, operate, and maintain the chargers.

A rollout plan is now being developed, and the first of the new chargers are expected to be installed by early 2025 including 5 chargepoints in Bromsgrove Town Centre. In this initial phase the contract will mostly add more chargers to more council-owned car parks, while also bringing chargers to the councils' main workplaces.

- Emissions Reduction: 35% (part contribution)
- Sources impacted: Petrol and diesel cars, LGVs
- Cost: £1 million - £10 million
- Funding Sources: Privately funded by contractor and funding partners

5.1.3 Worcestershire EV Charging Strategy

The Local Electric Vehicle Infrastructure (LEVI) Fund supports local transport authorities to plan and procure charging infrastructure (EVCI) solutions primarily for residents without dedicated off-street parking.

LEVI Capability funding has assisted the development of the Worcestershire County Council's Electric Vehicle Charging (EVCI) Strategy to support delivery of LEVI. At the time of writing (September 2024) the draft of the strategy is currently being consulted on with WCC due to adopt and publicise it later in the year. The strategy sets out the approach to the delivery of EVCI across the County over the next 5 years which will be delivered through the LEVI funding.

- Emissions Reduction: 35% (part contribution)
- Sources impacted: Petrol and diesel cars, LGVs
- Cost: £50k - £100K
- Funding Sources: LEVI capability funding

5.1.4 LEVI Capital Funding

Following the publication of the Worcestershire EVCI strategy, LEVI capital funding will enable installation of on street charging to assist with transition to EVs for the 26% of Bromsgrove District households without off-street parking[8].

Capital funding of £3.5m has been allocated to Worcestershire County Council for the delivery of EVCI across the County.

The funding is subject to the successful submission of a three-stage business case and approval from the Office of Zero Emission Vehicles (OZEV).

- Emissions Reduction: 35% (part contribution)
- Sources impacted: Petrol and diesel cars, LGVs
- Cost: £1million - £10million
- Funding Sources: LEVI capital funding

5.1.5 Bus Fleet Improvements

Larger road vehicles, such as buses, contribute disproportionate amounts of NOx emissions compared to their numbers on local roads. Buses comprise 1.65% of vehicles contributing 14.21% of vehicle source emissions in Worcester Road, Bromsgrove AQMA.

Worcestershire County Council will work with bus operators to increase proportion of EC VI (Eurocode six) standard engine vehicles within the local fleet through the Bus Service Improvement Plan (BSIP) and an Enhanced Partnership (EP) agreement which was concluded in November 2023.

As of June 2024, 74% of the bus fleet operating within the AQMA are currently EC VI with EC V equipped with EGR (Exhaust gas recirculation) making up 20% and the remaining 5% consisting of EC IV buses or older.

[8] Worcestershire County Council Electric Vehicle Charging Infrastructure (EVCI) Strategy *Draft* (2024)

At present there are currently no plans to convert the fleet serving Bromsgrove to electric. Application to future Zero Emission Bus Regional Areas (ZEBRA) funding rounds maybe considered in the future.

Therefore, it is likely improvements to local fleet will occur via cascading of EC VI buses from other parts of the Midlands.

A projection for the 2030 fleet of 100% EC VI has been assumed for modelling purposes based on the ambition of the Worcestershire County Council BSIP to achieve all EC VI across the County by 2025.

The result of modelling undertaken indicates the emissions reduction in NOx forecast of 8.79% in Worcester Road, Bromsgrove AQMA by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions generated from road transport.

- Emissions Reduction: 8.79%
- Sources impacted: Buses
- Cost: £1million - £10million
- Funding Sources: Not yet identified

5.1.6 Behavioural Change Officer Post (Countywide Air Quality Strategy)

Actions to encourage behavioural change can deliver future and continuing benefits for air quality, carbon reduction and public health. WRS has funded a Behavioural Change Officer (BCO) post for up to 3 years from March 2024. The post is funded from s106 contributions from new planning developments to provide air quality improvements.

The BCO role will focus on working with schools and other community settings across the county, providing information and advice about local air quality, and encouraging sustainable behaviours, such as switching from short car journeys to active travel modes of transport. The BCO, working in close partnership with WCC Public Health, will utilise monitoring and survey data to inform future work programmes.

As a first step WCC Public Health, in collaboration with WRS, undertook an Air Quality Behaviour Change survey between February and May 2024 to establish

baseline behavioural patterns and understanding of air quality. A summary of the key findings from the survey are provided in Appendix F: Air Quality Survey Summary.

In addition to contributing towards this AQAP for the Bromsgrove District, this work also forms part of the evolving Air Quality Strategy for Worcestershire. The vision for this strategy is to improve the health and wellbeing of the local population and provide air quality improvements across the county. The strategy will contribute towards compliance with national air quality standards and policy but extend beyond the specific focus of district AQAP's. The strategy will be a continuing area of work undertaken by collaboration between the Worcestershire district authorities, WRS and Public Health. At this time the strategy is at an early stage and will be developed further work once priority work, such as this AQAP, have been completed in 2024-2025.

This measure aligns with other Behavioural Change encouraging focus measures, specifically those progressed as part of the developing Air Quality Strategy for Worcestershire, Travel Choices and Sustainable Modes of Travel to School .

It has not been possible to quantify impacts of this measure, at this time, due to the early stage of development and the unpredictable outcomes of behaviour change actions. It is considered the measure has the potential to deliver a small, <1.5%, emissions reduction by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport, reduce congestion, improve residents' health through increased activity and encourage long term sustainable and healthy travel behaviours within early age groups.

- Emissions Reduction: <1.5%
- Sources impacted: Petrol and diesel cars
- Cost: £100k - £500k
- Funding Sources: s106 funds

5.1.7 Encouraging Awareness via Public Portal of Real Time Monitoring Data (Countywide Air Quality Strategy)

In February 2023, WRS were successful in a bid to the Defra Air Quality Grant Scheme 2022/23 to establish an enhanced real-time air quality monitoring network across Worcestershire. The scope of the bid was to establish a real-time air quality monitoring network across the main areas of air quality concern in Worcestershire for purposes of providing enhanced monitoring data on a range of pollutants. Additionally, the proposal included informing the public and vulnerable groups of the status of air pollution in real time to encourage behaviour change.

The scheme involves the installation of 'low-cost Air Quality Monitors' across the county which measure NO_2, PM_{10}, and $PM_{2.5}$. Three of the twenty-six monitors across the county were installed in the Bromsgrove District between January and May 2024 and are funded to operate for 3 years. The sensors, known as 'Zephyrs' are provided, operated and serviced by Earthsense who also provide data access.

Earthsense and WRS have designed a publicly accessible portal to the real time monitoring data which launched in May 2024.

In addition to contributing towards this AQAP for Bromsgrove District Council, this work also forms part of the evolving Air Quality Strategy for Worcestershire – refer above for further information.

This measure aligns with other Behavioural Change encouraging focus measures, specifically those progressed as part of the developing Air Quality Strategy for Worcestershire, Travel Choices and Sustainable Modes of Travel to School .

It has not been possible to quantify impacts of this measure, at this time, due to the early stage of development and the unpredictable outcomes of behaviour change actions. It is considered the measure has the potential to deliver a small, <1.5%, emissions reduction by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport, reduce congestion, improve residents' health through increased activity and encourage long term sustainable and healthy travel behaviours within early age groups.

- Emissions Reduction: <1.5%

- Sources impacted: Petrol and diesel cars
- Cost: £100k - £500k
- Funding Sources: Defra Air Quality Grant (90%) and 6 Worcestershire District Authorities match funding (10%)

5.1.8 Air Quality Improvements from New Development

The Bromsgrove District Local Plan (2011 - 2030) sets out the Council's long-term vision and strategic context for promoting, distributing and delivering sustainable development and growth within the district until 2030.

The following strategic developments outlined within the Local Plan are identified as having the potential to impact on the Worcester Road, Bromsgrove AQMA:

- Perryfields Road – Comprising 1300 dwellings, 200 unit (up to) extra care facility, up to 5 hectares of local employment land, a local centre with retail and community facilities, a first school, open space, recreational areas and sports pitches

- Whitford Road, Bromsgrove - Comprising up to 505 dwellings, and associated community infrastructure, public open space with play facilities and small scale local retail

BDC has secured mitigation measures and financial contributions to reduce impacts of these significant new developments at Perryfields Road and Whitford Road.

Measures include contributions towards junction improvements within the Worcester Road AQMA and connecting network, public transport services and infrastructure, active travel links and the A38 corridor. Contribution requirements are phased periodically throughout the build-out time of these sites and not all contributions may be received or spent within the timeframe of this AQAP.

It has not been possible to quantify impacts of this measure, at this time, due to the early stage of the many varied schemes associated with the developments. It is considered the measure is likely to deliver a small impact, <1.5%, as a maximum within the timeframe of this AQAP.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport, and improve residents' health through increased activity.

- Emissions Reduction: <1.5%
- Sources impacted: Petrol and diesel cars, LGVs
- Cost: >£10million
- Funding Sources: s106

5.1.9 Local Bus Service Improvements

Worcestershire County Council's Bus Service Improvement Plan (BSIP) sets out the Local Transport Authority's ambition to promote the use of buses across the County. The BSIP outlines WCC's aspirations to improve Worcestershire's bus transport network, address congestion hotspots, increase frequency and reliability of services and review fare structures.

One of the headline targets within the BSIP is to increase bus patronage in Worcestershire by 25% of pre-pandemic levels by 2030.

Utilising National Traffic Survey[9] for data on Modes of Transport across region and in urban centres 2018-19 indicates Bus travel equates for 3.5% of travel on average between those two scenarios. A 0.57% reduction in car journeys in each AQMA has been assumed for modelling purposes as a result of 25% increase in bus patronage.

The result of modelling undertaken indicate the emissions reduction NOx forecast of 0.29% in Worcester Road, Bromsgrove AQMA by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions generated from road transport and noise generated from road transport, reduce congestion and improve residents' health through increased activity.

[9] Nts9903 - Average number of trips by main mode, region and rural-urban classification of residence (trips per person per year): England, 2002 onwards

- Emissions Reduction: <0.29%
- Sources impacted: Petrol and diesel cars
- Cost: £1million - £10million
- Funding Sources: BSIP funding

5.1.10 Bromsgrove Local Cycling and Walking Infrastructure Plan (LCWIP)

Government has set targets for half of all short urban journeys being walked, wheeled, or cycled by 2030 in their Cycling and Walking Investment Strategy (2017). To help to achieve this Worcestershire County Council are currently developing a Local Cycling and Walking Infrastructure Plan (LCWIP) for Bromsgrove District due for completion by March 2025.

The LCWIP, funded through Active Travel England, will set out cycling and walking improvement plans for the Bromsgrove District over a 10-year period and will form part of the Local Transport Plan (LTP5).,

It has not been possible to quantify impacts of this measure, at this time, due to the early stage of development and the unpredictable outcomes of behaviour change actions. It is considered the development stage of the measure is likely to deliver a negligible impact, <0.2%, emissions reduction by 2030 with the implementation stage predicted to deliver a small impact, <1.5%, as a minimum by completion of the programme.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport, reduce congestion, and improve residents' health through increased activity.

- Emissions Reduction: <0.2% (Development Stage, <1.5% (Delivery Stage)
- Sources impacted: Petrol and diesel cars
- Cost: £50k - £100k (Development stage), >£10m (Delivery Stage)
- Funding Sources: WCC, Active Travel England

5.1.11 Raising Awareness Events (Countywide Air Quality Strategy)

The aim of this measure is to promote behavioural change and raise awareness of air pollution and positive action that can be taken through a programme of annual action days. An Air Quality Public Health working group was established in 2023 to assist with formation of AQAP measures and the group's initial collaborative event to raise awareness was Clean Air Day in June 2023, followed by Clean Air Night in January 2024.

At this time of writing, the future focus, contributors, and responsibilities of the working group is under review. Following resolution with air quality partners it is anticipated a programme of annual events will be scheduled as part of work towards the evolving Air Quality Strategy for Worcestershire in 2025 – refer to section 5.1.6 above for further information.

This measure aligns with other Behavioural Change encouraging focus measures, specifically those progressed as part of the developing Air Quality Strategy for Worcestershire, Travel Choices and Sustainable Modes of Travel to School .

It has not been possible to quantify impacts of this measure, at this time, due to the continuous application and the unpredictable outcomes of behaviour change actions. It is considered the measure is likely to deliver a negligible impact, <0.2%, emissions reduction by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport, reduce congestion and improve residents' health through raised awareness, behavioural change and increased activity.

- Emissions Reduction: <0.2%
- Sources impacted: Petrol and diesel cars, LGVs
- Cost: £10k - £50k
- Funding Sources: Not yet identified

5.1.12 Communications Plan (Countywide Air Quality Strategy)

The formation of a countywide (county and district authorities) strategy for communicating messages, details of events and advice is considered a key

component of the evolving Air Quality Strategy for Worcestershire - refer to section 5.1.6 above for further information.

At this time this is at an early stage of development, though many of the other measures outlined within this AQAP will be developed and incorporated within the Communication Plan.

It has not been possible to quantify impacts of this measure, at this time, due to the early stage of development and the unpredictable outcomes of behaviour change actions. It is considered the measure is likely to deliver a negligible impact, <0.2%, emissions reduction by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport, reduce congestion, and improve residents' health through raised awareness and behavioural change or increased activity.

- Emissions Reduction: <0.2%
- Sources impacted: Petrol and diesel cars
- Cost: £10k - £50k
- Funding Sources: Not yet identified

5.1.13 Encouraging awareness and behavioural change interventions linked to focussed real time monitoring data (Countywide Air Quality Strategy)

The aim of this measure is to utilise available real time monitoring in locations within proximity of poor air quality in Bromsgrove to inform actions to protect most vulnerable communities.

WRS in collaboration with WCC Public Health will work with identified local schools, communities and organisations to implement positive interventions and action through raising awareness of air pollution and encouraging behavioural change.

This measure will also utilise the outcomes of the baseline Air Quality Behaviour Change survey which was undertaken in 2024 by WCC Public Health. A summary of the key findings from the survey are provided in Appendix F: Air Quality Survey Summary.

In addition to contributing towards this AQAP for Bromsgrove District Council, this work also forms part of the evolving Air Quality Strategy for Worcestershire – refer to section 5.1.6 above for further information.

This measure aligns with other Behavioural Change encouraging focus measures, specifically those progressed as part of the developing Air Quality Strategy for Worcestershire, Travel Choices and Sustainable Modes of Travel to School .

It has not been possible to quantify impacts of this measure, at this time, due to the early stage of development and the unpredictable outcomes of behaviour change actions. It is considered the measure has the potential to deliver a negligible, <0.2%, emissions reduction by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport, reduce congestion, and improve residents' health through raised awareness and behavioural change or increased activity.

- Emissions Reduction: <0.2%
- Sources impacted: Petrol and diesel cars
- Cost: £10k - £50k
- Funding Sources: Not yet identified

5.1.14 ECO Driving Training Scheme

Eco-driver training teaches fleet operatives to adopt a safer and more economic approach to driving. Emission reduction of local air pollutants is achieved through fuel management, and efficient vehicle use. It can also assist with meeting carbon reduction targets and reducing fuel (up to 6% estimated by Energy Saving Trust) and vehicle maintenance costs.

Training focuses on anticipating road conditions earlier, driving more smoothly, avoiding high revs and to obey speed limits. The negative impacts of vehicle idling, use of air conditioning and unnecessary drag/weight due to equipment like roof racks or carrying excessive amounts of equipment is also considered. Good vehicle maintenance such as maintaining the correct tyre pressures is also included.

Many employers, such as Bromsgrove District Council, use eco-driver training in conjunction with onboard vehicle telematics which continuously monitor driver performance. These systems can be used to reward good drivers and trigger re-training for under-performing drivers. Competition can be encouraged between drivers to achieve the best mpg figures or similar.

Eco-driver training at Bromsgrove District Council is contracted to a specialist third party to deliver the training. The current contract is due to expire shortly and BDC are presently assessing options for a new scheme allied with potential alternative fuel drive trains and depot infrastructure in the future.

It has not been possible to quantify impacts of this measure, at this time, due to the early stage of development. It is considered the measure has the potential to deliver a negligible, <0.2%, emissions reduction by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport.

- Emissions Reduction: <0.2%
- Sources impacted: Council owned Light Duty Vehicles (Vans and cars) and Heavy-Duty Vehicles (maintenance vehicles such as Refuse vehicles RCVs)
- Cost: £10k - £50k
- Funding Sources: Not yet identified

5.1.15 Travel choices

Worcestershire County Council propose to refresh measures to promote sustainable travel choices focussed on web and app-based journey planners to provide travel information and promote sustainable modes of transport (Public Transport/Active Travel modes).

Previous schemes have achieved notable changes in travel mode choice across the county between 2004 and 2008. Based on surveys with representative samples of more than 4,000 people before and after travel choice schemes were introduced, there was a relative:

- Reduction of 7 per cent in car-as-driver trips per person per year
- Reduction of 4 per cent in car-as-passenger trips

- Increase of 11 per cent in walking trips
- Increase of 19 per cent in bicycle trips
- Increase of 20 per cent in bus trips
- Estimated saving of around 3,900 tonnes of CO^2 per year from personal car use

This measure aligns with other Behavioural Change encouraging focus measures, particularly those progressed as part of the developing Air Quality Strategy for Worcestershire.

It has not been possible to quantify impacts of this measure, at this time, due to the early stage of development and the unpredictable outcomes of behaviour change actions. It is considered the measure has the potential to deliver a small, <1.5%, emissions reduction by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport, reduce congestion and improve residents' health through increased activity.

- Emissions Reduction: <1.5%
- Sources impacted: Petrol and diesel cars
- Cost: £500k - £1m
- Funding Sources: Not yet identified

5.1.16 A38 Bromsgrove Route Enhancement Programme (BREP)

The A38 Bromsgrove Route Enhancement Programme (BREP) aims to provide additional highway capacity and promote walking and cycling as an alternative, through a range of improvements along the whole corridor. Phases 1 and 2 of the programme were completed in 2021. Phase 3 is currently in progress with a future Phase 4 being planned.

The BREP scheme covers improvements along the length of the A38 between Lydiate Ash (M5, Junction 4) to Hanbury Turn (junction with B4091 Hanbury Road), running from the north of Bromsgrove, along the east and to south of the AQMA.

Full details of the scheme can be found on the County Council's website below:

A38 Bromsgrove Route Enhancement Programme (BREP) | Worcestershire County Council

It is considered the measure will have indirect benefits on the AQMA through active travel improvements and increased take up.

It has not been possible to quantify impacts of this measure, at this time, due to the unpredictable outcomes of behaviour change actions. It is considered the measure likely has the potential to deliver a negligible, <0.2%, emissions reduction within the AQMA by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport, reduce congestion, and improve residents' health through increased activity.

- Emissions Reduction: <0.2%
- Sources impacted: All vehicle types
- Cost: >£10m
- Funding Sources: Department For Transport

5.1.17 Sustainable Modes of Travel to School

It has been identified more support and resource is required to help schools within Bromsgrove develop Travel Plans and put into action.

Bromsgrove District Council with air quality partner Worcestershire County Council will encourage and support schools to become ModeSHIFT star accredited through the introduction and implementation of travel plans, cycling and create long-term change in travel habits for school aged children and their parents.

This measure aligns with other Behavioural Change encouraging focus measures, particularly those progressed as part of the developing Air Quality Strategy for Worcestershire, outlined above.

There are five schools located within, or in the vicinity, of Worcester Road, Bromsgrove AQMA Coventry Street with an estimated 3786 pupils in attendance as

of August 2024. Utilising data from the National Traffic Survey[10] indicates that 33% of pupils travel to school by car or van which equates to 1249 journeys twice a day within the AQMA on weekdays during school term time.

This measure is at an early stage of development and the outcomes of behaviour change actions are unpredictable. However for purposes of modelling impact of this measure a 10% reduction in school travel by car/van in participating schools is considered feasible and it is anticipated the measure will deliver a small impact as a maximum, <1.5%, emissions reduction by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport, reduce congestion, improve residents' health through increased activity and encourage long term sustainable and healthy travel behaviours within early age groups.

- Emissions Reduction: <1.5%
- Sources impacted: Petrol and diesel cars, LGVs
- Cost: £100k - £500k
- Funding Sources: Not yet identified

5.1.18 Bus stop infrastructure – bus shelter provision

Worcestershire County Council propose to improve and upgrade bus shelters to promote bus use and increase modal shift from cars to public transport. This measure would include display screens to provide up to date information such as service routes. Potentially this measure would be delivered as part of the Bus Service Improvement Plan (BSIP) and Enhanced Partnership (EP).

It is considered the measure is likely to deliver a negligible impact, <0.2%, emissions reduction by 2030.

[10] nts0613 National Traffic Survey - school modes of transport

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport, reduce congestion and improve residents' health through increased activity such as walking to bus stops.

- Emissions Reduction: <0.2%
- Sources impacted: Petrol and diesel cars
- Cost: £500k - £1m
- Funding Sources: Not yet identified

5.1.19 Demand Response Travel

Demand responsive transport (DRT) offers an alternative transport option to fixed route public transport services and to private vehicle use. It helps people make essential local journeys within a defined area, and offers residents and visitors transport within a zoned area and to specific places of interest outside of the zone.

The service can also provide journeys to connecting transport services, such as other local buses or to local train stations.

Passengers can request transport through an app for a specific time or to arrive at their destination at a specific time and this will give a selection of boarding times available. Transport will collect the passenger from a designated pick-up point and will drop off at the required location. Unlike fixed route bus services, the service is flexible depending on the destinations and collection points.

The Worcestershire on Demand (WoD) initiative is currently operating within parts of Bromsgrove District with plans to expand to the eastern areas of the district within the lifetime of this AQAP.

The initial outcomes of the pilot WoD was reported within the Bus Service Improvement Plan (BSIP) in July 2021: 600 journeys per week across Bromsgrove and Malvern, 6 days per week.

It has not been possible to quantify impacts of this measure, at this time, due to the early stage of development. However based upon above data it is considered the measure has the potential to deliver a negligible impact, <0.2%, emissions reduction by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions and noise generated from road transport, reduce congestion and improve residents' health through increased activity.

- Emissions Reduction: <0.2%
- Sources impacted: Petrol and diesel cars
- Cost: £500k - £1million
- Funding Sources: Not yet identified

5.1.20 Bromsgrove District Council Vehicle Fleet Upgrade - Refuse Collection Vehicles

Reducing the emissions from its own vehicle fleet is a priority for Bromsgrove District Council and to this end the council have a rolling programme of vehicle replacement.

The replacement of current Refuse Collection Vehicles (RCV) with newer EC VI (Eurocode 6) vehicles are planned within the lifetime of this AQAP. RCVs contribute to the emissions attributable to HGVs which make up 6.07% of local road source emissions in Worcester Road, Bromsgrove AQMA.

The council are exploring the potential to transition to an electric fleet and depot in the future, but it is at too early stage of development to determine impacts on the AQMA at this time.

Additionally, the council are also exploring the potential to transition to alternative fuel additives such as Hydrotreated Vegetable Oil (HVO) but there are no firm plans at this time.

Given the limited number of daily movements through the AQMA, on average less than 1 a day, it is considered the measure is likely to deliver a negligible impact, <0.2%, emissions reduction by 2030.

Additionally, this measure will contribute towards a reduction in $PM_{2.5}$ and carbon emissions generated from road transport.

- Emissions Reduction: <0.2%
- Sources impacted: HGVs
- Cost: £1million - £10million

- Funding Sources: Bromsgrove District Council

Table 5.1 – Air Quality Action Plan Measures

Measure No.	Measure	Category	Classification	Estimated Year Measure to be Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Target Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Potential Barriers to Implementation
1	EV Charging Strategy	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2025	2025	**WCC**, BDC	LEVI capability funding	N	Fully Funded	£50k - £100k	Implementation	**35%***	Publication of Strategy	Funding secured	public consultation summer 2024, adoption of final strategy late 2024/early 2025
2	Public EV Charging Points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2024	2025	WCC, **BDC**	Government sponsored Charging Infrastructure Investment Fund	N	Funded	£50k-£100k	Implementation	**35%***	Installation of chargepoints. Number of vehicles charging / number of new users	Installation of 5 additional public chargepoints in Bromsgrove Town due by spring 2025	Contract with supplier for 10+ years, potentially further charge points in lifetime of AQAP
3	LEVI Capacity Funding	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2025	2029	**WCC**, BDC	£3.4m local EV Infrastructure Fund	N	Fully Funded (subject to business case process)	£1 million - £10 million	Planning	**35%***	Number of EV chargers installed	Planning Phase	subject to 3- stage business case process
4	Bus fleet improvements (local bus services)	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2025	2026	**Bus Operators,** WCC, WRS	Not Yet Identified	N	To Be Confirmed	£1 million-£10million	Planning	9%	% of bus fleet Euro 6	Planning Phase	Funding availability, Operator Agreement
5	Countywide AQ Strategy - Behavioural Change Officer Post	Public Information	Via other mechanisms	2024	2026	**WRS**	S106	N	Funded	£100k - £500k	Implementation	<1.5%	Future Stakeholder engagement	post begun 25/02/24	
6	Countywide AQ Strategy - Encouraging awareness via Public Portal of real time	Public Information	Via the Internet	2024	2027	**WRS**, Earthsense, WCC, District Councils	Defra, Districts	Yes	Fully Funded	£100k - £500k	Completed	<1.5%	Number of website hits on public portal	Monitors deployed Jan 2024, Public Portal due April 2024	

Measure No.	Measure	Category	Classification	Estimated Year Measure to be Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Target Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Potential Barriers to Implementation
	monitoring data														
7	Air Quality Improvements from New Development	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2024	2035	WCC, BDC, Developers	s106 Funding	N	Funded	£1 million - £10 million	Planning	<1.5%	s106 agreements completed	2 Phased developments, Phase 1 of each dev being delivered, remaining are in planning stages	Subject to planning applications being approved for later phases. Big impacts delivered in later development phases
8	Local bus service improvements funded from Bus Service Improvement Plan (BSIP) and Enhanced Partnership (EP)	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2026	2030	WCC, Bus Operators	BSIP funding	N	To Be Confirmed	£1 million - £10 million	Planning	<0.3%	Bus patronage (passenger demand)	Planning Phase	
9	Bromsgrove Local Cycling and Walking Infrastructure Plan (Scheme Delivery)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2025	2035	**WCC** inc. Public Health, BDC, key stakeholders, Active Travel England	Active Travel England, Developer contributions	N	To Be Confirmed	>£10million	Planning	<1.5%	Scheme delivery monitoring (e.g. cycle counts)	Planning Phase	Funding Availability
10	Bromsgrove Local Cycling and Walking Infrastructure Plan (Development)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2024	2025	**WCC** inc. Public Health, BDC, key stakeholders, Active Travel England	WCC, Active Travel England	N	Fully funded	£50k-£100k	Planning	<0.2%	LCWIP completed by March 2025	Planning Phase	
11	Countywide AQ Strategy - Raising awareness events	Public Information	Other	2023	Ongoing	**WCC Public Health**, WRS	Not yet identified	N	To be confirmed	£10k-50k	Implementation	<0.2%	Support minimum of 3 national events. Number of events attended. Number of	Clean Air Day 06/2023, Clean Air Night 01/2024 promotion undertaken. Further events planned for 2024	

Measure No.	Measure	Category	Classification	Estimated Year Measure to be Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Target Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Potential Barriers to Implementation
													people engaged		
12	Countywide AQ Strategy - Communications Plan	Policy Guidance and Development Control	Other	2025	Ongoing	**WCC Public Health**, WRS	Not yet identified	N	To be confirmed	£10k-50k	Planning	<0.2%	Production of communication plan	Planning Phase	
13	Countywide AQ Strategy - Encouraging awareness and behavioural change interventions linked to focussed real time monitoring data	Public Information	Via other mechanisms	2024	2027	WRS, **WCC**, District Councils	Not Yet Identified	N	To Be Confirmed	£10k-50k	Planning	<1.5%	Number of responses to survey, hits on website, data captured. Changed behaviour identified from repeat survey in future	Baseline AQ Survey completed Feb - May 2024	
14	Eco Driving Training/ Scheme	Vehicle Fleet Efficiency	Driver training and ECO driving aids	2025	Ongoing	**BDC**	BDC	N	To Be Confirmed	£10k-50k	Planning	<0.2%	Number of operatives completing training	Planning Phase	
15	Travel Choices	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2025	2030	**WCC** inc. Public Health, BDC, key stakeholders - schools, UoW	Not Yet Identified	N	To Be Confirmed	£50k - £100k	Planning	<1.5%	Number of walking, cycling, scooting and number of participating organisations and activities delivered	Planning Phase	Funding availability
16	A38 BREP MRN Scheme - active travel and bus infrastructure enhancements	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle	2024	2026	**WCC**	DfT	N	Phase 3 Fully Funded	>£10million	Implementation	<0.2%	Completion of works	In Delivery	

Measure No.	Measure	Category	Classification	Estimated Year Measure to be Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Target Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Potential Barriers to Implementation
			occupancy lane												
17	Travel to school	Promoting Travel Alternatives	School Travel Plans	2025	2030	**WCC** inc. Public Health, BDC, Schools & Colleges	Not Yet Identified	N	To Be Confirmed	£100k-£500k	Planning	<1.5%	Number of walking, cycling, scooting, car, and park & stride trips; Number of participating schools and of activities delivered	Planning Phase	Funding availability
18	Bus stop infrastructure – bus shelter provision	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	2025	2030	**WCC,** Bus operators	Not Yet Identified	N	To Be Confirmed	£500k-£1million	Planning	<0.2%	Bus patronage (passenger demand)	Planning Phase	Funding availability
19	Demand Response Travel (DRT)	Alternatives to private vehicle use	Other	2024	2025	**WCC**, Bus Operators, BDC	WCC	N	To Be Confirmed	£1million-£10m	Implementation	<0.2%	Bus patronage (passenger demand)	Planning Phase	funding availability
20	BDC Vehicle Fleet Upgrade - Refuse Collection Vehicle and other Heavy and Light Commercial Vehicle Upgrades	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2024	2029	**BDC**	BDC	N	Funded	£1 million-£10million	Implementation	<0.2%	Replacement of vehicles	Rolling replacement programme	

*Part contribution

Appendix A: Response to Consultation

Table A.1 – Summary of Responses to Consultation and Stakeholder Engagement on the AQAP

Consultee	Category	Response
<Insert consultee e.g. Chamber of Commerce>	<Insert category e.g. Business>	<Insert text e.g. Disagree with plan to remove parking on High Street in favour of buses and cycles; consider it will harm business of members>

Appendix B: Reasons for Not Pursuing Action Plan Measures

Table B.1 – Action Plan Measures Not Pursued and the Reasons for that Decision

Action category	Action description	Reason action is not being pursued (including Stakeholder views)
Promoting Low Emission Transport	Clean Air Zone or Low Emission Zone	Bromsgrove District Council are not one of the LA mandated or supported by government to implement a Clean Air Zone or undertake a feasibility study to do so supported by Clean Air Funding in 2017. Research indicates significant resource: research, data, studies, costs and time are required in setting up a CAZ. No such resource is currently available. Additionally determined focus measures are anticipated to deliver required reductions without requirement for consideration of a CAZ.
Promoting Low Emission Transport	Procuring alternative refuelling infrastructure other than EV recharging such as Biofuels, Compressed Natural	Not feasible to focus on numerous alternative fuel technology infrastructure within lifetime of this AQAP. Focus on EV which has greatest impetus from national policies, manufacturing industry and

Action category	Action description	Reason action is not being pursued (including Stakeholder views)
	Gas (CNG) or Liquid Natural Gas (LNG), Hydrogen	public support at this time. Potential for hydrogen in future but in infancy locally at this time.
Promoting Low Emission Transport	Emission Based Parking or Permit Charges	Unlikely to be a cost-effective measure considering research, data, studies, costs and time required to deliver and emissions reduction required to achieve compliance within lifetime of AQAP.
Promoting Travel Alternatives	Promote use of inland waterways to move freight as a low emissions alternative	Considered unlikely to provide significant impact in reducing NOx in AQMAs.
Traffic Management	Low Traffic Neighbourhoods (LTNs)	Designed to reduce traffic in residential streets, rather than Strategic Road Network. Not feasible within characteristic of AQMA or primary bus routes
Traffic Management	Speed reduction to 20mph zone	Research indicates lack of real time studies available focussing on AQ impact. Additionally considered unfeasible on Strategic Road Network characteristic in the AQMAs.

Action category	Action description	Reason action is not being pursued (including Stakeholder views)
Traffic Management	Road User Charging/Congestion Charging	Similar to CAZ (above) significant resource required to implement. Unlikely to be actioned within lifetime of this AQAP, not supported and determined focus measures are anticipated to deliver compliance with current AQO without need for such a scheme.
Traffic Management	Anti Idling Enforcement (Fixed Penalty Notices issue for stationary idling when parked under The Road Traffic (Vehicle Emissions) (Fixed Penalty) (England) Regulations 2002	Insufficient data on impact of idling in AQMA and no clear evidence on AQ benefits. Additionally, unlikely support for measure and significant cost to operate, maximum FPN £20 only. Anti idling outside schools, or other environments, campaign may be considered separately as part of raising awareness and encouraging behavioural change actions.
Traffic Management	Vehicle priority and High Occupancy Vehicle (HOV) lanes	Not considered feasible or supported due to limited road space in AQMAs
Traffic Management	Testing Vehicle Emissions and issue of FPNs for non-compliance	Not supported at this time or likely to be delivered within lifetime of this AQAP.

Action category	Action description	Reason action is not being pursued (including Stakeholder views)
Traffic Management	Workplace Parking Levy (WPL) - a charge LA can impose on employers and education organisations based on the number of parking spaces provided	Unlikely to be a cost-effective measure considering research, data, studies, costs and time required to deliver and emissions reduction required to achieve compliance within lifetime of AQAP. Not supported at this time or likely to be delivered within lifetime of this AQAP.
Transport Planning and Infrastructure	Removing some bus stops to reduce dwell times and journey times	Concern this would discourage public transport users and is counter intuitive to encouraging behavioural change aspects of this plan and other local strategies.
Vehicle Fleet Efficiency	Vehicle Retrofitting programmes – fitting devices to reduce emissions such as Diesel Particulate Filters (DPF) to buses	Evidence that retrofitting programmes do not deliver required benefits over time. Costly and more efficient in long term to replace vehicle nearing end of life.

Appendix C: Qualitative Assessment of Measures (Shortlisting)

Table C.1 Stage 1 Qualitative Assessment of Measures

RAG	Timeline for implementation	Support for measure	Practical Application	Deliverability	Anticipated Air Pollutant reduction	Data to quantify impact	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in the future
Green	Within 5 years	Likely Social and political support	Feasible	Yes	Significant	Available	Yes/No (Green/Red)	Potentially Within lifetime of AQAP
Amber	Potentially within 5 years	Potential social and/or political support	Potentially feasible	Potentially	Low to Medium impact or insufficient info to make a determination	Not available at time of draft plan, anticipated within 5 years		Post lifetime of this AQAP, consideration for
Red	Greater than 5 years	Unlikely social and political support	Not feasible	No	Negligible or Negative	Not available or forthcoming in next 5 years		Unlikely to be progressed in the future

Stage 1 – a RAG qualitative stage using officer experience and professional opinion to filter out measures (specific to that AQMA(s)) for progressing to quantified Cost Benefit Analysis Stage 2 or including as a non-quantified focus measure. Filtering process considers timeline for deliverability, political and social support and practical application which combined determine deliverability within this AQAP and consideration as a focus measure. The first three categories are weighted in that if a measure has a red classification, it is not progressed to Stage 2 Impact Assessment at this time. The anticipated pollutant reduction and availability of data is then considered to determine if progress to quantification of the measure is appropriate. Measures are sorted according to deliverability and anticipated NO_2 reduction and shown in Appendix D in the groups outlined in section 4.2.3.

Key to categories in Stage 1 qualification of benefit of proposed and potential measures

Timeline for implementation – of measure such that is contributing to reduction in air pollution with consideration for lifetime of this AQAP.

Support for Measure – Political or social support for delivering action.

Practical Application - can the action be practically implemented within the AQMA(s).

Deliverability – summary of above 3 categories to determine feasibility for delivering within lifetime of this AQAP

Anticipated Air Pollutant Reduction – in the context of this AQAP this relates specifically to reduction in concentration of nitrogen dioxide within current AQMAs. Measures classified Green are anticipated to deliver a significant measurable reduction in pollutant concentration, red classified measures are anticipated to not deliver any measurable impact or potentially even a detrimental impact within the AQMA. Amber classification is somewhere in between two extremes and includes measures where there is insufficient information at time of AQAP to make a firm determination.

Data to quantify impact – Availability of data to enable quantification of amount of pollutant reduction to assist in Stage 2 analysis of impact.

Focus Measure – Top quantifiable and non- quantifiable measures that Bromsgrove District Council and Air Quality Partners have determined will form focus of delivering within AQAP.

Progress to Stage 2 – Progress to second stage of analysis of measures for formal quantification of impacts on pollutant concentration and cost of measure.

Potential progress in future – additional information on actions with potential for further progression as part of future works, policies or strategies for consideration within future updates to the AQAP. As the AQAP is a live document, the focussed actions will be updated with any additional measures with significant and cost benefit analysis during the lifetime of the plan.

Appendix D: Outcomes of Stage 1 Shortlisting Process

Table D.1 Outcomes of Shortlisting

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
EV Charging Strategy	EV strategy developed in 2024	Within 5 years	Supported	Feasible	Yes	Significant	Available	Yes	N/A	Focus Measure
Public EV Charging Points	Installation of public/residential EV charging points/hubs to support transition of local vehicle parc to BEV	Within 5 years	Supported	Feasible	Yes	Significant	Yes	Yes	N/A	Focus Measure
Bus fleet improvements (local bus services)	Work with bus operators to aid their procurement of EuroCode 6 or above. Provide cleaner local bus fleet.	Within 5 years	Likely support	Feasible	Yes	Potentially Significant	Available	Yes	N/A	Focus Measure
Countywide AQ Strategy - Behavioural Change Officer Post	Funded Behavioural Change officer post for period of 2 years to focus on working with schools and communities across the County, utilising monitoring data to inform programmes	Within 5 Years	Likely support	Feasible	Yes	Potential Measurable Benefit in future	Potentially in lifetime of AQAP	Yes	N/A	Focus Measure

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
Countywide AQ Strategy - Encouraging awareness and behavioural change interventions linked to focussed real time monitoring data	Use of real time monitoring data in locations near schools and/or areas of deprivation to inform actions and work with local schools/ communities/ organisations to implement interventions through awareness and behaviour change	Within 5 Years	Likely support	Feasible	Yes	Insufficient info at this time	Potentially in lifetime of AQAP	Yes	N/A	Focus Measure
Travel to School	Encourage and support schools to become ModeSHIFT star accredited through the introduction and implementation of travel plans. Support schools in implementing cycling and walking buses. Create long-term change in travel habits for school aged children and their parents.	Within 5 years	Supported	Feasible	Yes	Potential Measurable Benefit	Potentially within lifetime of AQAP	Yes	N/A	Focus Measure

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
Countywide AQ Strategy - Encouraging awareness via Public Portal of real time monitoring data	Publicly available real time monitoring data from 26 low-cost sensors (Zephyrs) installed around the County, monitoring range of pollutants and sources. To encourage public awareness and behavioural change.	Within 5 Years	Likely support	Feasible	Yes	Insufficient info at this time	Not available	Yes	N/A	Focus Measure
Countywide AQ Strategy - Raising awareness events	Promoting behavioural change and awareness through programme of annual action days such as Clean Air Day, Clean Air Night, International Clean Air for Blue Skies Day	ongoing in lifetime of AQAP	Likely support	Feasible	Yes	Negligible	Not available	Yes	N/A	Focus Measure
Countywide AQ Strategy - Communication Plan	Countywide (County and partners authorities) joined up communication for events/messaging/ website advice	Within 5 Years	Likely support	Feasible	Yes	Negligible	Not available	Yes	N/A	Focus Measure

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
A38 BREP MRN Scheme - active travel and bus infrastructure enhancements	As well as highway junction improvements, A38 BREP includes a range of improvements to cycling and walking routes alongside and across the A38; A38 BREP to include traffic signal enhancements which will help buses cross the A38 corridor and new bus shelters with RTI systems	Within 5 years	Likely support	Feasible	Yes	Negligible	Not available	Yes	N/A	Focus Measure
Bus stop infrastructure – bus shelter provision	Improvements and upgrades to bus shelters that would include display screens to provide update info on routes etc.to promote modal shift to public transport. Potentially as part of Bus Service Improvement Plan / Enhanced Partnership.	Within 5 years	Likely support	Feasible	Yes	Negligible	Not available	Yes	N/A	Focus Measure

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
Bromsgrove Vehicle Fleet Upgrade - Refuse Collection Vehicle	Fleet upgrades (Euro Code 6)	Within 5 years	Supported	Feasible	Yes	Negligible	Available	Yes	N/A	Focus Measure
LEVI Capacity Funding	Implementation of EV charging strategy	Potentially within 5 years but Up to 10 years	Supported	Feasible	Potentially	Significant	Yes	Yes	N/A	Focus Measure
Local bus service improvements funded from Bus Service Improvement Plan (BSIP) and Enhanced Partnership (EP)	DfT has provided Worcestershire with indicative LTA BSIP funding for 2024/25 to enhance local bus services including the expansion of DRT services	Potentially within 5 years but up to 10 years	Likely support	Feasible	Potentially	Insufficient info at this time	Potentially Available	Yes	N/A	Focus Measure

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
Bromsgrove Local Cycling and Walking Infrastructure Plan	Report setting out cycling, walking and wheeling plans over 10 year period. LCWIPs to form part of refreshed Local Transport Plan (LTP5). Sustrans developing Bromsgrove LCWIP on behalf of County during 2024/25	Potentially within 5 years but Up to 10 years	Likely support	Feasible	Potentially	Insufficient info at this time	Potentially within lifetime of AQAP	Yes	N/A	Focus Measure
Travel Choices	To refresh 'soft' measures to promote sustainable travel choice focussed on web and app-based journey planners - to provide travel information and promote sustainable modes (Public Transport/Active Travel)	Within 5 years	Likely support	Feasible	Potentially	Insufficient info at this time	Potentially within lifetime of AQAP	Yes	N/A	Focus Measure
Demand Response Travel (DRT)	Potential expansion of existing DRT (Bromsgrove On Demand) to eastern areas of district.	Within 5 years	Potential social and/or political support	Potentially Feasible	Potentially	Insufficient info at this time	Potentially Available	No	N/A	Focus Measure

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
Driver training and ECO driving aids	ECO driving/driver skills development (for LA fleets) - Eco-driver training teaches fleet operatives to adopt a safer and more economic approach to driving. It can help to reduce fuel costs for the employer (estimated at up to 6% in the long term for fleets by the Energy Saving Trust) and reduces emissions of local air pollutants.	Insufficient info at this time to determine	Potential social and/or political support	Potentially Feasible	Insufficient info at this time to determine	Negligible	Potentially Available	No	N/A	Focus Measure
Air Quality Improvements from New Development	s106 Agreements identified for large developments - Perryfields & Whitford Rd	Potentially some impact within 5 years but up to 12 years	Likely support	Feasible	Potentially	Negligible	Not available	Yes	N/A	Focus Measure
Public Health vision for Worcestershire AQ Strategy	Aim and Vision as part of the Countywide Strategy for improving air quality and reducing impacts on health	Within 5 Years	Likely support	Feasible	Yes	Negligible	Not available	No	To be developed further as part of countywide AQ Strategy	Potential Future option

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
Accelerate transition to EVs - businesses	Plan and install an ultra-rapid charging hub with no height barrier, to encourage the use of EVs by delivery and business vehicles, and taxis	Insufficient info at this time to determine	Insufficient info at this time to determine	Insufficient info at this time to determine	Insufficient info at this time to determine	Potential Measurable Benefit	Potentially available	No	Insufficient info at this time to determine	Potential Future option
Accelerate transition to EVs - businesses	Charging facilities aimed at larger vehicles such as lorries and coaches, to encourage their use locally	Insufficient info at this time to determine	Insufficient info at this time to determine	Insufficient info at this time to determine	Insufficient info at this time to determine	Potential Measurable Benefit	Potentially available	No	Insufficient info at this time to determine	Potential Future option
Active travel – clean air route finder	Development of a walking / cycling tool such as Clean Air Route Finder (cleanairroutes.london)	Insufficient info at this time to determine	Likely support	Feasible	Potentially	Insufficient info at this time to determine	Not available	No	Insufficient info at this time to determine	Potential Future option
Accelerate transition to EVs – salary sacrifice	Encourage local businesses to introduce a salary sacrifice scheme for EVs	Insufficient info at this time to determine	Potential social and/or political support	Insufficient info at this time to determine	Insufficient info at this time to determine	Insufficient info at this time to determine	Not available	No	Insufficient info at this time to determine	Potential Future option

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
Accelerate transition to EVs - businesses	Campaign including roadshows, information, trial opportunities, partnerships with dealerships etc to encourage businesses to transition to EVs	Insufficient info at this time to determine	Insufficient info at this time to determine	Insufficient info at this time to determine	Insufficient info at this time to determine	Insufficient info at this time to determine	Not available	No	Insufficient info at this time to determine	Potential Future option
Council fleet route optimisation	Route optimisation to avoid AQMAs where possible by council fleet (RCVs in particular)	Insufficient info at this time to determine	Potential social and/or political support	Potentially Feasible	Potentially	Negligible	Potentially available	No	Insufficient info at this time to determine	Potential Future option
Countywide AQ Strategy: Link to workplace health schemes	Communication: Health based campaigns - 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.	Within 5 years	Likely support	Potentially Feasible	Potentially	Negligible	Not available	No	To be developed further as part of countywide AQ Strategy	Potential Future option
Countywide AQ Strategy: Anti-idling schools campaign	Anti-idling initiatives in educational settings - for awareness-raising, campaign work and signage in the vicinity of schools can be an effective mechanism for reducing idling emissions from vehicles during	Within 5 years	Potential social and/or political support	Potentially Feasible	Potentially	Negligible	Not available	No	To be developed further as part of countywide AQ Strategy	Potential Future option

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
	school drop-offs and pick-ups.									
Active travel - bikeability	Roll out of adult / family bikeability training on a district wide basis, based from the community centres and other hubs	Insufficient info at this time to determine	Likely support	Feasible	Potentially	Negligible	Not available	No	Insufficient info at this time to determine	Potential Future option
Accelerate transition to EVs – salary sacrifice	Introduce a salary sacrifice scheme for Council employees to purchase an EV in a tax efficient manner	Insufficient info at this time to determine	Potential social and/or political support	Feasible	Potentially	Negligible	Not available	No	Unlikely	Potential Future option
Freight Partnerships for town centre deliveries	Freight Quality Partnerships - Freight Quality Partnerships (FQPs) are groups and/or forums between the freight industry, local authorities, local businesses, the local community, environmental groups and others who may	Greater Than 5 Years	Not supported	Potentially Feasible	No	Potentially Significant	Not available	No	Likely as part of future Freight Strategy	Potential Future option

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
	have an interest in freight.									
LA fleet improvements	LA fleet including gritters and minibuses, move to Euro 6 engines	Greater Than 5 Years	Likely support	Feasible	No	Potential Measurable Benefit from school buses	Potentially Available	No	Likely beyond lifetime of AQAP	Potential Future option
Emission control equipment for small and medium sized stationary combustion sources / replacement	NRMM - Non-Road Mobile Machinery (NRMM) means any mobile machine, transportable equipment or vehicle with or without bodywork or wheels which isn't intended for carrying passengers or goods on the road and which incorporates a combustion engine.	Likely beyond 5 years	Not supported	Feasible	No	Insufficient info at this time	Potentially Available	No	Likely beyond lifetime of AQAP	Potential Future option

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
Fleet efficiency and recognition schemes (FORS)	Fleet Recognition Schemes Fleet Recognition Schemes are voluntary accreditation schemes which measure fleet performance and aim to drive up standards across areas such as fuel efficiency, vehicle emissions and safety.	Likely beyond 5 years	Not supported	Potentially Feasible	No	Insufficient info at this time	Potentially Available	No	Likely beyond lifetime of AQAP	Potential Future option
Freight Strategy	Freight Strategy to form part of refresh of LTP - review HGV routing	Likely beyond 5 years	Potential social and/or political support	Potentially Feasible	No	Insufficient info at this time	Likely not available until end of this AQAP	No	Will form part of LTP5	Potential Future option
Mobility hubs	Mobility hubs bring together shared transport with public transport and active travel in spaces designed to improve the public realm for all.	Likely beyond 5 years	Potential social and/or political support	Potentially Feasible	No	Insufficient info at this time	Likely not available until end of this AQAP	No	Will be considered as part of LTP5	Potential Future option

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
LA Fleet Upgrade - Refuse Collection Vehicle and other Heavy and Light Commercial Vehicle Upgrades	Replace HCV and LCV fleet with BEV in future	Likely beyond 5 years	Potential social and/or political support	Potentially Feasible	No	Negligible	Potentially Available	No	Likely beyond lifetime of AQAP	Potential Future option
LA Fleet Upgrade - Refuse Collection Vehicle and other Heavy and Light Commercial Vehicle Upgrades	Convert newly purchased HCV and LCV fleet to Hydrotreated Vehicle Oil (HVO) fuel source in future	Potentially within 5 years	Not supported	Feasible	No	Negligible	Potentially Available	No	Unlikely	Potential Future option

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
Emissions charging/Clean Air Zones /Low Emission Zones (LEZ)	If your vehicle exceeds emission standards, you may have to pay a charge if you drive in a clean air zone	Greater Than 5 Years	Not supported	Potentially Feasible	No	Significant	Not available	No	Unlikely	Not being pursued
HGV delivery access management - Bromsgrove Town centre	Routing/delivery planning - Efficient routing and delivery planning can help to reduce the number of journeys associated with deliveries, working with freight companies and other stakeholders.	Likely beyond 5 years	Not supported	Potentially Feasible	No	Insufficient info at this time	Insufficient info at this time to determine	No	Unlikely	Not being pursued
Vehicle Retrofitting programmes	Retrofits/upgrades - Retrofitting a full Diesel Particulate Filer (DPF) can reduce particulate emissions by 85-99%. A partial DPF, can reduce particulate emissions by 30-50%.	Greater Than 5 Years	Not supported	Not Feasible	No	Insufficient info at this time	Insufficient info at this time	No	Unlikely	Not being pursued

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles other than EV charging	Fuel Additives - chemical treatments for engines that reduce exhaust emissions. Biofuels - Biodiesel is known to reduce emissions of particulate matter and hydrocarbons, but due to having a higher oxygen content it can result in higher NOx emissions. Gas refuelling - Compressed Natural Gas (CNG) or Liquid Natural Gas (LNG) are widely reported to significantly reduce CO2, PM and NOx emissions. Hydrogen vehicles- Hydrogen vehicles use hydrogen as a fuel for motive power.	Greater than 5 years or N/A	Not supported	Not feasible to focus on numerous options	No	Potential Measurable Benefit	Not available	No	Likely beyond lifetime of AQAP	Not being pursued
Speed Reduction	Speed reduction to 20 mph zones.	Potentially within 5 years but up to 10 years	Not supported	Not Feasible	No	Insufficient info at this time	Not Available	No	Likely beyond lifetime of AQAP	Not being pursued

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
Road User Charging (RUC)/ Congestion charging	Congestion charging - Congestion charges relate to a charge being made for a vehicle to drive within a certain area or on a certain road with the primary reason for the charge being to reduce congestion i.e. implemented specifically to create a disincentive to travel by private transport.	Greater Than 5 Years	Not supported	Potentially Feasible	No	Potential Measurable Benefit/ Insufficient info at this time	Not available	No	Unlikely	Not being pursued
Anti-idling enforcement	Leaving engines running when parked (stationary idling) causes unnecessary emissions, wastes fuel and adds to noise levels. The Road Traffic (Vehicle Emissions) (Fixed Penalty) (England) Regulations 2002 and the Road Traffic (Vehicle Emissions) (Fixed Penalty)(Scotland) Regulations 2003 give discretionary powers to authorised persons acting on behalf of the local authority to issue Fixed Penalty Notices	Greater Than 5 Years	Not supported	Potentially Feasible	No	Potential Measurable Benefit/ Insufficient info at this time	Not available	No	Unlikely	Not being pursued

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
	(FPNs) to drivers who allow their vehicle engines to run unnecessarily whilst the vehicle is stationary on the public highway.									
Workplace Parking Levy, Parking Enforcement on highway	Workplace Parking Levy (WPL) - A Workplace Parking Levy (WPL) is a charge local authorities can make to employers and education organisations in their areas based on the number of parking spaces they provide that are regularly used by employees and students	Greater Than 5 Years	Not supported	Not Feasible	No	Insufficient info at this time	Not available	No	Unlikely	Not being pursued

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
UTC, Congestion management, traffic reduction	Vehicle priority and High Occupancy Vehicle (HOV) lanes - Re-prioritising road space involves shifting road space away from one type of user to facilitate uptake by a different type of user. In the UK, vehicle priority schemes are usually aimed at providing more space for buses, taxis, bicycles and pedestrians. Urban Traffic Management Control (UTMC) systems allow different components within an area-wide traffic management systems to communicate and share information with each other.	Greater Than 5 Years	Not supported	Not Feasible	No	Negligible	Insufficient info at this time	No	Unlikely	Not being pursued
Testing Vehicle Emissions	If a local authority has designated an Air Quality Management Area., then the council can test vehicles at the roadside and issue fixed penalties to drivers whose vehicles fail.	Greater Than 5 Years	Not supported	Potentially Feasible	No	Negligible	Insufficient info at this time	No	Unlikely	Not being pursued

Measure	Further detail	Timeline for implement-ation	Strategic support	Practical appli-cation	Deliver-ability	Antici-pated NO_2 reduction in AQMA	Data to quantify	Progress to Stage 2 Impact Assessment	Potential to progress to Stage 2 in future	Outcome
Low Traffic Neighbourhood (LTNs)	A Low Traffic Neighbourhood – is a scheme introduced by the Government to try and reduce traffic in residential areas through a series of different measures. The aim is to lower the number of vehicles on the roads, increase the number of people walking or cycling, and reduce crime. Local residents and businesses can still use cars within LTNs, as well as receive visitors and deliveries, but non local traffic cannot drive through the area.	Greater Than 5 Years	Not supported	Not Feasible	No	Negligible	Not Available	No	Unlikely	Not being pursued
Bus stop rationalisation	Removing some bus stops to reduce dwell times and journey times	Greater Than 5 Years	Not supported	Not Feasible	No	Negligible	Not available	No	Unlikely	Not being pursued

Appendix E: Outcomes of Stage 2 Impact Assessment

Table E.1 Outcomes of Impact Assessment

Measure	Overall Cost	Cost Score	Funded	Cost to LA	Cost Score	Cost Score avg	Impact	Impact Score	Overall Score	Ranking
EV Charging Strategy	£50k - £100k	5	Y	£0	8	6.5	35%*	5	32.5	1
Public EV Charging Points	£100k- £500k	4	N	£0	8	6	35%*	5	30	1
LEVI Deliverability Funding	£1million- £10million	2	Y	£0	8	5	35%*	5	25	1
Bus fleet improvements (local bus services)	£1 million- £10million	2	N	£50k - £100k	5	3.5	8.80%	5	17.5	2
Countywide AQ Strategy - Behavioural Change Officer Post	£100k - £500k	4	Y	£0	8	6	<1.5%	2	12	3
Countywide AQ Strategy - Encouraging awareness via Public Portal of real time monitoring data	£100k - £500k	4	Y	<£10k	7	5.5	<1.5%	2	11	4
Air Quality Improvements from New Development	£1million- £10million	2	Y	£0	8	5	<1.5%	2	10	5

Measure	Overall Cost	Cost Score	Funded	Cost to LA	Cost Score	Cost Score avg	Impact	Impact Score	Overall Score	Ranking
Local bus service improvements funded from Bus Service Improvement Plan (BSIP) and Enhanced Partnership (EP)	£1 million-£10million	2	Y	£0	8	5	< 0.3%	2	10	5
Bromsgrove Local Cycling and Walking Infrastructure Plan (LCWIP) - Scheme Delivery	>£10 million	1	Y	£0	8	4.5	<1.5%	2	9	6
Bromsgrove Local Cycling and Walking Infrastructure Plan (LCWIP) - Development	£50k-£100k	5	Y	£0	8	6.5	< 0.2%	1	6.5	7
Countywide AQ Strategy - Raising awareness events	£10k-50k	6	N	£10k-50k	6	6	< 0.2%	1	6	8
Countywide AQ Strategy - Communications Plan	£10k-50k	6	N	£10k-50k	6	6	< 0.2%	1	6	8
Countywide AQ Strategy - Encouraging awareness and behavioural change interventions linked to focussed real time monitoring data	£10k-50k	6	N	£10k-50k	6	6	< 0.2%	1	6	8
Eco Driving Training/Scheme	£10k-£50k	6	N	£10k-50k	6	6	< 0.2%	1	6	8

Measure	Overall Cost	Cost Score	Funded	Cost to LA	Cost Score	Cost Score avg	Impact	Impact Score	Overall Score	Ranking
Travel Choices	£50k-£100k	5	N	£50k-£100k	5	5	< 0.2%	1	5	9
A38 BREP MRN Scheme - active travel and bus infrastructure enhancements	>£10 million	1	Y	£0	8	4.5	< 0.2%	1	4.5	10
Travel to school	£100k-£500k	4	N	£100k-£500k	4	4	< 0.2%	1	4	11
Bus stop infrastructure – bus shelter provision	£500k-£1million	3	N	£500k-£1million	3	3	< 0.2%	1	3	12
Demand Response Travel (DRT)	£1 million-£10million	2	N	£1 million-£10million	2	2	< 0.2%	1	2	13
BDC Vehicle Fleet Upgrade - Refuse Collection Vehicle and other Heavy and Light Commercial Vehicle Upgrades	£1 million-£10million	2	Y	£1 million-£10million	2	2	< 0.2%	1	2	13

Appendix F: Air Quality Survey Summary

The survey, conducted over three months (February to May 2024), gathered responses from 1326 participants, primarily adults aged 31 to 60, (50% of the respondents). Key findings include:

Health Impact Awareness: 35-43% of respondents expressed concern about air pollution's effects on health, while 56% understood that air pollution affects all ages but especially vulnerable groups like such as children, the elderly, and those with heart and lung conditions. Half of the respondents were aware that inhaled pollutants can reach the bloodstream and organs.

Sources of Pollution: 88% of respondents identified road traffic as the main source of outdoor air pollution, followed by home domestic burning (30%), industrial activities (28%), and construction (27%). For indoor air pollution, 60% linked it to outdoor sources, such as vehicle emissions, with cleaning products (42%) and solid fuel burning (39%) also significant. A small percentage cited alternative sources (something else), like such as garden fires and poor ventilation.

Travel Habits: Over half of the respondents (54%) travel less than 4 miles to work, and 58% primarily use cars. Short journeys (<2 miles) are also dominated by car use (44%).

Air Quality Improvement: Walking more (67%) was the most common suggestion for improving air quality, while 69% of respondents do not use log burners or open fires at home.

Behavioural Change: Respondents voiced concerns about public health, the environment, urban planning, and quality of life. These insights will inform strategies to raise awareness, reduce air pollution exposure, and promote air quality information. However, further targeted surveys to obtain more additional input from younger populations (students) is recommended for a comprehensive understanding

Appendix G: Source Apportionment Assessment

This ‘Source Apportionment Assessment’ fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in the Environment Act (2021), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents.

Policy guidance (LAQM.PG22) requires a Local Authority to prepare an Air Quality Action Plan (AQAP) to ensure air quality standards or objectives are achieved in Air Quality Management Areas (AQMA). In order to develop an appropriate plan it is necessary to identify the sources contributing to the objective exceedances within the AQMA.

Source Apportionment Approach

Emissions Factor Toolkit

The source apportionment assessment has been undertaken generally following the process outlined in technical guidance. LAQM.TG22 (paragraph 7.111) advises that ‘source apportionment may be undertaken using a simple spreadsheet approach. For example, where road traffic emissions are the principal concern, the percentage contribution to total NOx emissions may be calculated using the appropriate emission factors.’ This approach has been adopted for the source apportionment assessment utilising Defra’s Emissions Factor Toolkit (EFT) v12.0.1.

Copies of the EFT input and outputs are provided below in Appendix J: Emissions Factor Toolkit – Source Apportionment.

Traffic and Speed Data

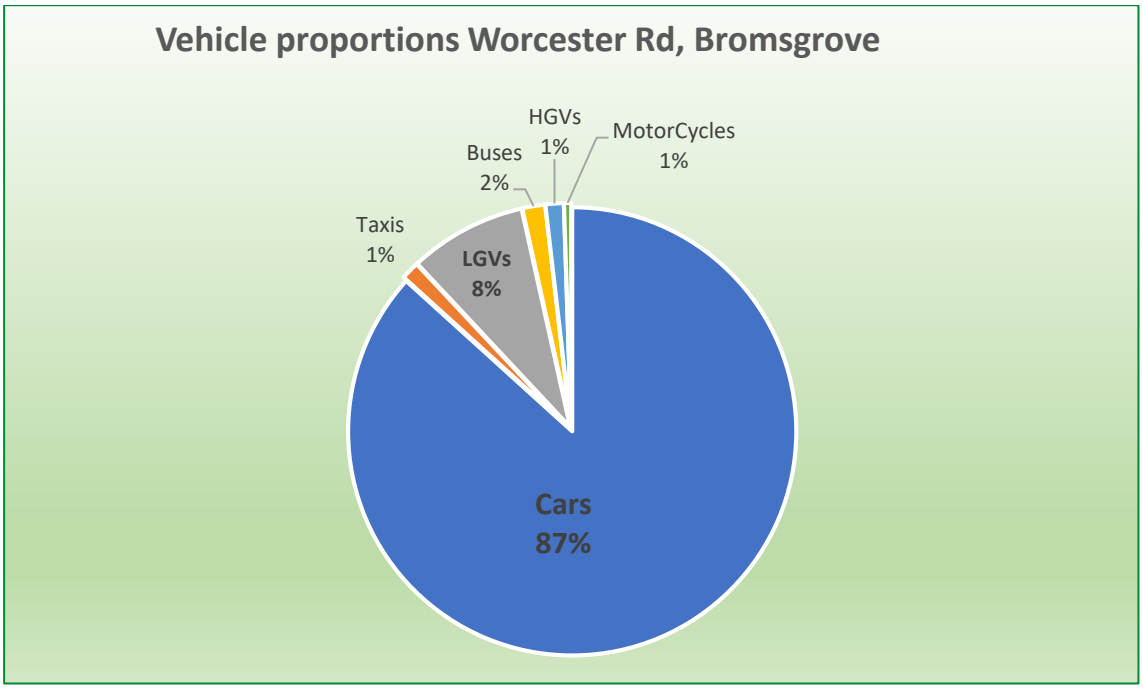
Total Traffic Surveys Ltd (TTS) were commissioned to undertake traffic counts and speed averages within the AQMA for the purposes of this source apportionment assessment.

TTS undertook 24-hour road traffic counts at a single location within the AQMA in March 2023. NB PC (peddle cycles) have not been included in the assessment as do not contribute towards emissions of air pollution.

Speed data was also recorded in March 2023 over a weekly period to provide a mean average for Northbound and Southbound traffic within the AQMA. The average speed data on each link (length of AQMA) has been incorporated into Emissions Factor Toolkit v12.0.1 to determine the percentage contribution from vehicles.

Appendix H: Traffic Data and Appendix I: Speed Data shows the traffic data and speed data recorded and utilised within this source apportionment assessment.

Figure G. 1 Summary of vehicle proportions – Worcester Road, Bromsgrove



Bus Fleet Data

Worcestershire County Council provided WRS with local bus fleet composition for Diamond Bus Group and First Bus Group who are the predominant service providers across the district. Additional research was undertaken to determine composition fleet services in the AQMA. The national Euro code compositions assumed in the EFT were amended accordingly to reflect the local circumstances providing a more

accurate EFT output. A copy of current fleet composition within the AQMA is provided below.

Table G.1 Local Bus Fleet

Eurocode	Numbers in combined fleet in AQMA	Proportion of Fleet
1Pre-Euro I (Euro 1)		0%
2Euro I (Euro1)		0%
3Euro II (Coaches) (Euro 2)		0%
4Euro III (Euro 3)		0%
5Euro IV (Euro 4)		0%
6Euro V_EGR (Euro 5)	15	32%
7Euro V_SCR (Euro 5)		0%
8Euro VI (Euro 6)	32	68%
9Euro II SCRRF (Euro 2)		0%
10Euro III SCRRF (Euro 3)		0%
11Euro IV SCRRF (Euro 4)		0%

Monitoring Data

In 2023, Bromsgrove District Council monitored annual mean nitrogen dioxide concentrations using passive diffusion tubes located across the district. Six diffusion tubes sites are located within the boundary of the Worcester Road, Bromsgrove AQMA. Plans showing the positions of diffusion tube monitoring locations is included in Figure 2.1 of the main report.

Table G.2 below shows the bias adjusted annual averages for nitrogen dioxide at the worst-case scenario monitoring location within the AQMA. This location has been used for the purposes of the source apportionment exercise.

Table G.2 Highest Annual Mean NO_2 Monitoring Results in the AQMA in 2023

Site ID	Site Name	X OS Grid Ref	Y OS Grid Ref	Distance to Relevant Exposure (m)	NO_2 Annual Mean Concentration ($\mu g/m^3$) in 2023
WR	14 Hanover Street	395702	270423	0.0	36.6

Background and Local Contributions

Technical guidance advises that determining '…the apportionment for NO_2 is not straightforward due to the non-linear relationship between the emissions of NO_2 and nitrous oxides (NOx). This is additionally complicated by the different proportions of NO_2 in the NOx emission for different sources, for example, petrol cars or diesel cars. The following advice therefore applies to NO_2 source apportionment:

Background contributions: the national maps will give the total background NO_2 concentration. This should be apportioned to regional and local background using the ratio of the background NOx concentrations attributable to these two sources, which are also available in the national maps; and

Local contributions: the local contribution to NO_2 is the difference between the total (measured or modelled) NO_2 and the total background NO_2. This is then apportioned to the local sources, for example, buses, HGVs, taxis, cars, using the relative contributions of these sources to the local NOx concentration.'

Regional and Total Background contributions of NOx and NO_2 for 2023, available from Defra website, have been used to calculate the contribution of local nitrogen dioxide for each relevant receptor (monitoring location) in the AQMA following the procedure laid out in LAQM.TG22 Box 7-5. The local contribution has then been apportioned to each vehicle class according to the results of the EFT. Calculations are presented below in Table F.3 and Table F.4 and the results summarised in Figure F.3 to Figure F.6 below.

Source Apportionment Results – Worcester Road, Bromsgrove

Table G.3 The local contribution apportioned to each vehicle class calculated for monitoring location WR in accordance with LAQM.TG22 Box 7-5

Box 7-5 calculation - Location: WR	Local Sources %	NO_2 µg/m^3	Total Emissions %
T-NO_2 (Total (Monitored) nitrogen dioxide)		**36.6**	
TB-NO_2 (Total Background nitrogen dioxide[1])		10.99456	
TB-NOx (Total Background nitrous oxides[1])		14.50689	
RB-NOx (Regional Background nitrous oxides[1])		11.445104	

Box 7-5 calculation - Location: WR	Local Sources %	NO_2 µg/m^3	Total Emissions %
Step 1: **LB-NOx**[2] = TB-NOx – RB-NOx		3.061786	
Step2: **RB-NO_2**[3] = TB-NO_2 × (RB-NOx / TB-NOx)		**8.67407712**	23.70%
Step2: **LB-NO_2**[4] = TB-NO_2 × (LB-NOx / TB-NOx)		**2.32048288**	6.34%
Step3: **L-NO_2**[5] **=** T-NO_2 – TB-NO_2		**25.60544**	
Step4: % of vehicles from EFT			
Petrol Cars (%)	8.56%	2.19	
Petrol Hybrid Petrol Cars (%)	0.21%	0.05	
Plug in Hybrid Petrol Cars (%)	0.05%	0.01	
Diesel Cars (%)	55.83%	14.30	
Diesel Hybrid Diesel Cars (%)	0.36%	0.09	
Total cars	**65.00%**	**16.64**	45.48%
Petrol Taxis	0.00%	0.00	
Petrol hybrid Taxis	0.02%	0.01	
Diesel Taxis	1.14%	0.29	
Taxis	**1.16%**	**0.30**	0.81%
Petrol LGVs (%)	0.05%	0.01	
Diesel LGVs (%)	13.45%	3.44	
Total LGVs	**13.50%**	**3.46**	9.44%
Rigid HGVs (%)	5.46%	1.40	
Artic HGVs (%)	0.60%	0.15	
Total HGVs	**6.07%**	**1.55**	4.24%
Buses (%)	9.38%	2.40	
Hybrid Buses (%)	0.14%	0.04	
Biogas Buses (%)	0.00%	0.00	
Coaches (%)	4.59%	1.17	
Hybrid Coaches (%)	0.09%	0.02	
Biogas Coaches (%)	0.00%	0.00	
Total Buses	**14.21%**	**3.64**	9.94%
Motorcycles (%)	**0.06%**	**0.02**	0.04%
	100.00%	25.61	100.00%

1) Data from Defra 2018 Background Maps for model year of 2023 for relevant local coordinates
2) Local Background nitrous oxides
3) Regional Background nitrogen dioxide contribution
4) Local Background nitrogen dioxide contribution
5) Local sources nitrogen dioxide contribution

Figure G.2 Total NO2 sources in Worcester Road, Bromsgrove AQMA

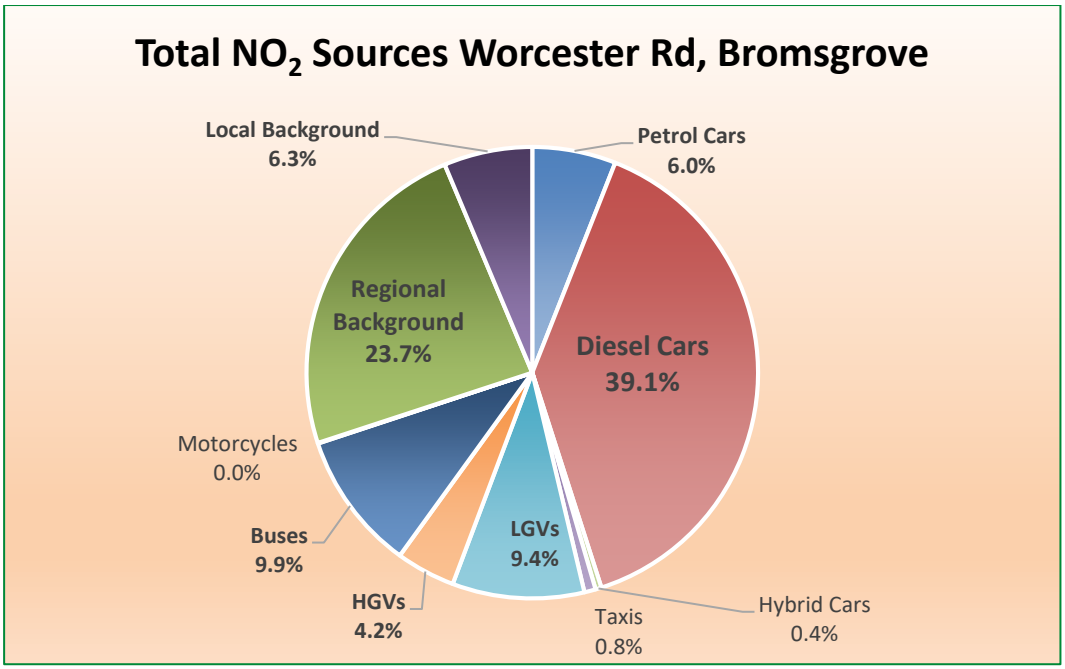


Table G.3 and Figure G.2 above demonstrate that the main contributors of total emissions within the Worcester Road, Bromsgrove AQMA are Cars with 45.48% of emissions followed by Regional and Local Background emissions totalling 30.04%. Buses and LGVS are the next biggest contributors with similar amounts 9.94% and 9.44% respectively.

As the Local Authority is unable to influence Regional Background concentrations and Local Background concentrations are predominately a result of traffic sources on other local roads, it is more useful to consider the source apportionment of the local traffic sources in isolation for future improvement actions. Figure F.4 below demonstrates the local traffic contribution (i.e. minus the Background contributions) broken down further into petrol and diesel classifications in the EFT.

Figure G.3 Local NO2 sources in Worcester Road, Bromsgrove AQMA

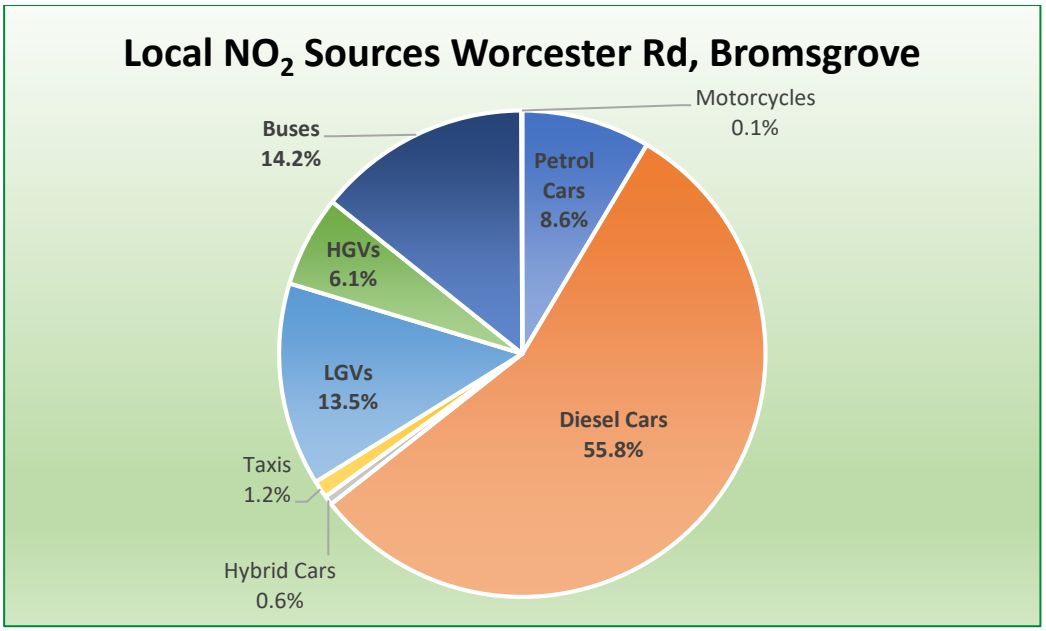


Table G.3 and Figure G.3 above demonstrate that the main contributors of emissions from local sources within the Worcester Road, Bromsgrove AQMA are diesel cars with 55.8% of emissions followed by Buses at 14.2% and LGVs with 13.5%. Petrol Cars 8.6% and HGVs 6.1% also make up sizeable contributions.

Air Quality Improvements Required

The degree of improvement required in order for the annual mean objective for nitrogen dioxide to be achieved is the difference between the highest measured or predicted concentration and the objective level.

LAQM.TG22 advises: 'Where NO_2 monitoring is completed using diffusion tubes, to account for the inherent uncertainty associated with the monitoring method, it is recommended that revocation of an AQMA should be considered following three consecutive years of annual mean NO_2 concentrations being lower than 36µg/m^3 (i.e. within 10% of the annual mean NO_2 objective).'

Therefore air quality improvements to achieve sustained compliance below current air quality objectives have been calculated to achieve 36µg/m^3 in the AQMA. The highest nitrogen dioxide concentration at a representative location in Worcester Road Bromsgrove, AQMA in 2023 is 36.6µg/m^3 at monitoring location WR, requiring a reduction of 0.6µg/m^3 for -10%AQO to be achieved.

However technical guidance advises that in terms of the reduction in emissions required it is more useful to consider nitrogen oxides (NOx). Therefore the road NOx reduction required for compliance with -10%AQO in the AQMA has been calculated in accordance with LAQM.TG22 Box 7-6 utilising Defra's NOx to NO_2 Conversion Spreadsheet v8.1. Calculations are shown below.

Figure G.4 Defra's NOx to NO2 Conversion Spreadsheet v8.1 for LAQM.TG22 Box 7-6 calculation at representative monitoring location

Local Authority:		Bromsgrove District		
Site ID	Diffusion tube NO_2, µg m^{-3} µg m^{-3}	Background	µg m^{-3}	Road NO_x, µg m^{-3}
		NO_x	NO_2	
WR	36.6	14.50689		52.83

Year:	2023
Traffic Mix:	All other urban UK traffic
User defined local traffic mix fraction emitted as NO_2 (fNO_2)	Notes

Table G.4 Box 7-6 Calculation for Worcester Road, Bromsgrove AQMA

Box 7.6 Calculation – WG(B)	NOx or NO_2 µg/m^3	Reduction required %
Step1 Total NOx	66.33	
Step2 TB-NOx (Total Background nitrous oxides[1])	14.51	
Step3 Total Road NOx (Local Sources)	51.82	
Step4 NOx equivalent for NO_2 36µg/m^3	**50.24**	
Step5 NOx reduction required for 36µg/m^3	**1.58**	**3.05%**
Local NO_2 reduction required for 36µg/m^3	**0.78**	

Table G.5 Emission reduction required

Location	Emission Reductions Required to Meet -10% Objective (NO_2)	All Vehicle Reduction to Meet -10% Objective (NOx)	Highest Roadside Contributor	2nd Roadside Contributor	Single Vehicle Reduction to Achieve Objective
Worcester Road Bromsgrove	0.78	3.05%	Diesel Cars – 55.80%	Buses – 14.20%	Cars 5% or Buses/LGV 25%

The assessment indicates:

- Reducing total vehicle emissions from all vehicle types by 5% or targeting a 5% reduction in cars or 25% of Buses or LGVs would be potentially effective measures for achieving -10%AQO in Worcester Road, Bromsgrove AQMA.

Appendix H: Traffic Data

TOTAL TRAFFIC SURVEYS LTD
DATA COLLECTION

Job Title:	Worcestershire Counts
Job Number:	TTS-1529-Mar
Survey Date:	Tuesday 21st March 2023
Survey Type:	Manual Classified Counts

Site: 8

Location: A4091 Worcester Rd, Bromsgrove

	Northbound									Southbound								
Time	PC	MC	Car	Taxi	LGV	OGV1	OGV2	PSV	Total	PC	MC	Car	Taxi	LGV	OGV1	OGV2	PSV	Total
00:00	0	0	3	0	1	0	0	0	4	0	0	5	0	0	0	0	0	5
00:15	0	0	8	0	0	0	0	0	8	0	0	2	0	1	0	0	0	3
00:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00:45	0	0	1	0	0	0	0	0	1	0	0	3	0	0	0	0	0	3
H/Tot	0	0	12	0	1	0	0	0	13	0	0	10	0	1	0	0	0	11
01:00	0	0	2	0	1	0	0	0	3	0	0	1	0	1	0	0	0	2
01:15	0	0	2	0	0	0	0	0	2	0	0	1	0	0	0	0	0	1
01:30	0	0	1	0	1	0	0	0	2	0	0	3	0	0	0	0	0	3
01:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/Tot	0	0	5	0	2	0	0	0	7	0	0	5	0	1	0	0	0	6
02:00	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
02:15	0	0	2	0	0	0	0	0	2	0	0	2	0	0	1	0	0	3
02:30	0	0	0	0	1	0	0	0	1	0	0	2	0	0	0	0	0	2
02:45	0	0	1	0	0	0	0	0	1	0	0	1	0	1	0	0	0	2
H/Tot	0	0	3	0	2	0	0	0	5	0	0	5	0	1	1	0	0	7
03:00	0	0	3	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
03:15	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
03:30	0	0	1	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
03:45	0	0	2	0	2	0	0	0	4	0	0	1	0	0	0	0	0	1
H/Tot	0	0	7	0	3	0	0	0	10	0	0	2	0	0	0	0	0	2
04:00	0	0	1	0	1	0	0	0	2	0	0	4	0	0	0	0	0	4
04:15	0	0	3	0	1	0	0	0	4	0	0	1	0	1	0	0	0	2
04:30	0	0	6	0	0	0	1	0	7	0	0	3	0	0	0	0	0	3
04:45	1	0	9	0	1	0	0	0	11	1	0	9	0	2	2	0	0	14
H/Tot	1	0	19	0	3	0	1	0	24	1	0	17	0	3	2	0	0	23
05:00	0	0	10	0	1	0	0	0	11	0	1	6	0	2	0	0	0	9
05:15	0	0	8	0	2	0	0	0	10	0	0	9	0	1	1	0	0	11
05:30	0	0	26	0	5	0	0	0	31	0	0	15	0	2	1	0	1	19
05:45	0	0	19	0	0	0	1	0	20	0	0	27	0	5	1	0	0	33
H/Tot	0	0	63	0	8	0	1	0	72	0	1	57	0	10	3	0	1	72
06:00	0	0	21	0	0	1	0	0	22	1	0	17	0	6	0	0	0	24
06:15	0	0	36	0	8	1	0	2	47	0	0	36	0	6	0	0	0	42
06:30	0	1	42	0	7	2	0	2	54	0	1	52	0	7	2	0	2	64
06:45	1	0	55	1	8	1	0	2	68	1	1	76	0	8	4	1	1	92
H/Tot	1	1	154	1	23	5	0	6	191	2	2	181	0	27	6	1	3	222
07:00	0	0	70	1	4	2	1	1	79	0	1	60	2	10	2	0	2	77
07:15	0	1	83	1	13	5	0	5	108	0	1	96	2	13	1	0	2	115
07:30	0	1	116	1	12	2	2	2	136	0	1	149	2	12	2	0	5	171
07:45	1	0	144	0	18	3	1	5	172	2	0	195	1	16	2	1	2	219
H/Tot	1	2	413	3	47	12	4	13	495	2	3	500	7	51	7	1	11	582
08:00	0	2	130	1	12	6	1	2	154	0	0	175	6	13	3	0	8	205
08:15	0	1	143	1	15	0	1	3	164	0	2	217	5	16	6	0	4	250
08:30	1	0	148	7	14	0	0	3	173	2	1	162	1	18	2	0	4	190
08:45	0	0	200	1	17	2	0	0	220	0	0	127	2	14	3	0	5	151
H/Tot	1	3	621	10	58	8	2	8	711	2	3	681	14	61	14	0	21	796
09:00	0	1	130	1	22	2	0	3	159	0	0	113	1	13	3	0	1	131
09:15	2	0	92	3	13	2	0	4	116	0	0	110	0	17	1	1	2	131
09:30	0	0	81	1	17	4	0	0	103	0	0	112	1	21	2	0	3	139
09:45	0	1	128	0	11	1	0	3	144	0	0	97	1	11	1	2	1	113
H/Tot	2	2	431	5	63	9	0	10	522	0	0	432	3	62	7	3	7	514
10:00	0	0	97	0	13	4	1	4	119	0	0	106	0	11	1	0	3	121
10:15	0	1	98	1	10	4	0	2	116	2	0	91	1	12	1	1	4	112
10:30	1	0	95	1	13	2	0	2	114	0	1	93	4	9	2	0	4	113
10:45	1	0	92	2	17	1	2	2	117	0	1	107	4	12	2	0	2	128
H/Tot	2	1	382	4	53	11	3	10	466	2	2	397	9	44	6	1	13	474
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11:15	1	1	103	4	12	0	0	3	124	0	0	119	2	14	5	0	1	141
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11:45	0	1	122	5	7	3	0	2	140	1	0	116	1	18	4	0	2	142
H/Tot	1	2	431	12	45	11	0	10	512	3	3	447	12	52	15	2	8	542

12:00	0	0	112	5	10	3	0	2	132	1	2	135	6	8	1	1	2	156
12:15	0	1	93	3	13	1	0	2	113	1	1	108	3	18	2	0	4	137
12:30	2	1	109	2	9	1	3	3	130	1	2	112	4	19	5	0	3	146
12:45	0	0	118	3	11	5	0	3	140	0	2	111	6	14	2	0	5	140
H/Tot	2	2	432	13	43	10	3	10	515	3	7	466	19	59	10	1	14	579
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13:45	1	0	100	1	19	3	0	3	127	0	0	108	5	22	4	0	5	144
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15:15	0	0	137	2	11	0	0	6	156	0	1	119	3	17	0	0	3	143
15:30	1	1	155	4	11	1	0	2	175	1	1	148	4	16	4	0	3	177
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H/Tot	1	2	526	7	49	6	0	12	603	2	5	545	13	56	6	0	8	635
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16:15	0	3	158	4	17	0	0	5	187	1	0	127	1	12	1	0	2	144
16:30	0	0	148	1	18	0	0	1	168	0	0	167	0	18	1	0	1	187
16:45	0	1	138	4	17	0	0	3	163	0	1	176	8	10	0	0	1	196
H/Tot	0	4	592	10	63	3	0	11	683	1	1	609	11	58	2	0	7	689
17:00	0	0	153	5	12	0	0	1	171	0	1	179	2	18	0	0	2	202
17:15	1	0	140	1	8	0	0	2	152	0	0	186	2	11	2	0	4	205
17:30	0	1	161	4	9	0	0	7	182	0	3	164	1	10	1	0	9	188
17:45	0	3	150	1	10	0	0	3	167	0	3	142	4	10	1	0	1	161
H/Tot	1	4	604	11	39	0	0	13	672	0	7	671	9	49	4	0	16	756
18:00	0	0	139	4	11	0	0	1	155	0	2	163	2	6	0	0	0	173
18:15	0	1	111	1	9	0	0	2	124	0	3	148	2	6	0	0	1	160
18:30	5	0	97	0	7	0	0	2	111	0	0	123	1	4	0	0	1	129
18:45	1	1	115	0	7	0	0	1	125	0	0	139	0	11	0	0	0	150
H/Tot	6	2	462	5	34	0	0	6	515	0	5	573	5	27	0	0	2	612
19:00	0	1	122	2	2	0	0	0	127	0	1	124	1	3	0	0	0	129
19:15	0	1	128	0	7	0	0	1	137	1	0	125	1	6	0	0	0	133
19:30	1	0	98	0	3	0	0	1	103	1	2	108	0	7	0	0	1	119
19:45	0	1	60	0	6	0	0	0	67	0	0	95	3	4	0	0	0	102
H/Tot	1	3	408	2	18	0	0	2	434	2	3	452	5	20	0	0	1	483
20:00	0	1	87	0	7	0	0	0	95	0	1	70	1	4	0	0	1	77
20:15	1	0	82	1	3	0	0	1	88	0	0	78	0	2	0	0	0	80
20:30	0	1	61	0	2	1	0	0	65	0	0	40	0	6	0	0	1	47
20:45	1	0	34	1	1	0	0	0	37	0	0	51	0	2	0	0	0	53
H/Tot	2	2	264	2	13	1	0	1	285	0	1	239	1	14	0	0	2	257
21:00	0	0	68	0	4	0	0	0	72	0	1	48	0	0	0	0	0	49
21:15	0	1	57	0	5	0	0	0	63	0	0	49	0	1	0	0	0	50
21:30	0	0	40	0	1	0	0	0	41	0	0	49	0	0	0	0	0	49
21:45	0	1	22	0	4	0	0	1	28	0	0	53	0	4	0	0	0	57
H/Tot	0	2	187	0	14	0	0	1	204	0	1	199	0	5	0	0	0	205
22:00	0	0	40	0	2	0	0	1	43	0	0	34	0	2	0	0	1	37
22:15	0	0	41	0	0	0	0	0	41	0	1	34	0	0	0	0	0	35
22:30	0	0	21	0	1	0	0	0	22	0	0	26	0	1	0	0	0	27
22:45	0	0	16	0	1	0	0	0	17	0	0	14	0	1	0	0	0	15
H/Tot	0	0	118	0	4	0	0	1	123	0	1	108	0	4	0	0	1	114
23:00	0	0	9	0	0	0	0	0	9	0	0	10	0	0	0	0	0	10
23:15	0	1	10	0	1	0	0	0	12	0	0	10	0	0	0	0	0	10
23:30	0	0	7	0	0	0	0	0	7	0	0	14	0	0	0	0	0	14
23:45	0	1	5	0	1	0	0	0	7	0	0	4	0	0	0	0	0	4
H/Tot	0	2	31	0	2	0	0	0	35	0	0	38	0	0	0	0	0	38
Total	**26**	**40**	**7081**	**97**	**701**	**88**	**17**	**136**	**8186**	**24**	**48**	**7552**	**125**	**730**	**103**	**15**	**142**	**8739**

Appendix I: Speed Data

Figure I.1 Location of Automatic Traffic Counter

Table I.1 Worcester Road, Bromsgrove - Northbound Summary

* Virtual Week (1)																																						
Time	Total	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Mean	Vpp	>PSL	>PSL%	>SL1	>SL1%	>SL2	>SL2%	Mean	Vpp
<--		1	2	3	4	5	6	7	8	9	10	11		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75			85	30	30	30	30	30	30		85
														10	15	20	25	30	35	40	45	50	55	60	65	70	75	80											
Mon	7633	7	30	4665	2721	150	4	3	23	0	6	24		550	1048	1767	3174	979	101	11	2	0	0	0	0	0	0	0	0	0	19.7	24.9	115	1.507	115	1.507	115	1.507	19.7	24.9
Tue	7992	10	34	4585	3101	190	8	2	31	1	7	23		414	1113	2116	3194	1035	102	11	0	0	4	0	0	0	0	0	0	0	19.9	24.9	120	1.502	120	1.502	120	1.502	19.9	24.9
Wed	7984	8	32	4640	3050	187	11	3	25	0	10	18		751	1338	1805	3058	893	119	8	2	1	1	5	2	0	0	0	0	0	19.1	24.6	139	1.741	139	1.741	139	1.741	19.1	24.6
Thu	7859	7	28	4778	2761	196	20	3	25	0	7	34		802	1366	1792	2878	907	98	12	3	0	0	0	1	0	0	0	0	0	18.8	24.7	114	1.451	114	1.451	114	1.451	18.8	24.7
Fri	8486	12	35	5399	2798	171	9	5	28	1	7	21		846	1348	2112	3132	942	92	11	2	0	0	1	0	0	0	0	0	0	18.8	24.5	106	1.249	106	1.249	106	1.249	18.8	24.5
Sat	7649	2	28	4627	2860	80	4	0	28	0	3	17		487	1051	1908	3178	905	106	11	1	1	0	0	0	0	1	0	0	0	19.7	24.7	120	1.569	120	1.569	120	1.569	19.7	24.7
Sun	6044	11	37	3554	2376	36	6	2	11	0	3	8		113	425	1002	3088	1274	122	17	0	0	1	0	0	0	0	0	0	0	22	26.1	142	2.349	142	2.349	142	2.349	22	26.1
--	**53647**	**57**	**224**	**32248**	**19667**	**1010**	**62**	**18**	**171**	**2**	**43**	**145**		**3963**	**7689**	**12502**	**21702**	**6935**	**740**	**81**	**10**	**2**	**6**	**6**	**3**	**1**	**0**	**0**	**0**	**0**	**19.6**	**24.9**	**856**	**1.596**	**856**	**1.596**	**856**	**1.596**	**19.6**	**24.9**
Vehicles = 53647																																						
Posted speed limit = 30 mph, Exceeding = 856 (1.596%), Mean Exceeding = 33.18 mph																																						
Maximum = 99.2 mph, Minimum = 5.0 mph, Mean = 19.6 mph																																						
85% Speed = 24.94 mph, 95% Speed = 27.40 mph, Median = 20.69 mph																																						
10 mph Pace = 16 - 26, Number in Pace = 35093 (65.41%)																																						
Variance = 32.65, Standard Deviation = 5.71 mph																																						
* Grand Total																																						
Time	Total	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Mean	Vpp	>PSL	>PSL%	>SL1	>SL1%	>SL2	>SL2%	Mean	Vpp
<--		1	2	3	4	5	6	7	8	9	10	11		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75			85	30	30	30	30	30	30		85
														10	15	20	25	30	35	40	45	50	55	60	65	70	75	80											
--	**53647**	**57**	**224**	**32248**	**19667**	**1010**	**62**	**18**	**171**	**2**	**43**	**145**		**3963**	**7689**	**12502**	**21702**	**6935**	**740**	**81**	**10**	**2**	**6**	**6**	**3**	**1**	**0**	**0**	**0**	**0**	**19.6**	**24.9**	**856**	**1.596**	**856**	**1.596**	**856**	**1.596**	**19.6**	**24.9**
Vehicles = 53647																															31.5kph								

Table I.2 Worcester Road, Bromsgrove - Southbound Summary

* Virtual Week (1)																																						
Time	Total	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Mean	Vpp	>PSL	>PSL%	>SL1	>SL1%	>SL2	>SL2%	Mean	Vpp
<--		1	2	3	4	5	6	7	8	9	10	11		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75			85	30	30	30	30	30	30		85
														10	15	20	25	30	35	40	45	50	55	60	65	70	75	80											
Mon	8305	13	32	4668	3328	198	8	3	7	0	16	32		216	489	1671	3968	1751	190	18	0	1	0	0	0	0	0	0	0	0	21.8	26.2	210	2.529	210	2.529	210	2.529	21.8	26.2
Tue	8515	15	40	4562	3638	212	11	1	7	1	5	23		194	428	1911	4097	1662	194	20	4	2	1	0	0	0	0	0	0	0	21.8	26.1	223	2.619	223	2.619	223	2.619	21.8	26.1
Wed	8565	19	34	4758	3476	217	13	2	10	1	7	28		156	505	1987	4061	1639	190	20	2	1	2	0	1	0	0	0	0	0	21.7	25.9	217	2.534	217	2.534	217	2.534	21.7	25.9
Thu	8434	8	40	4814	3299	210	20	1	12	0	8	22		138	504	1977	3994	1619	179	17	6	0	0	0	0	0	0	0	0	0	21.7	26.1	202	2.395	202	2.395	202	2.395	21.7	26.1
Fri	9411	15	42	5358	3738	198	15	1	9	0	11	24		122	493	2292	4632	1644	197	22	8	0	0	1	0	0	0	0	0	0	21.7	25.8	228	2.423	228	2.423	228	2.423	21.7	25.8
Sat	8290	11	30	4442	3680	78	6	3	5	0	7	28		70	283	1941	4149	1637	170	30	7	2	0	0	0	1	0	0	0	0	22.1	26.1	210	2.533	210	2.533	210	2.533	22.1	26.1
Sun	6192	14	41	3279	2811	26	3	2	4	0	2	10		17	80	737	3074	1990	258	28	6	0	1	0	0	0	0	0	0	0	23.9	27.4	294	4.748	294	4.748	294	4.748	23.9	27.4
--	**57712**	**95**	**259**	**31881**	**23970**	**1139**	**76**	**13**	**54**	**2**	**56**	**167**		**913**	**2782**	**12516**	**27975**	**11942**	**1378**	**155**	**33**	**6**	**4**	**1**	**1**	**1**	**0**	**0**	**22**	**26.3**	**1584**	**2.745**	**1584**	**2.745**	**1584**	**2.745**	**22**	**26.3**
Vehicles = 57712																																						
Posted speed limit = 30 mph, Exceeding = 1584 (2.745%), Mean Exceeding = 32.64 mph																																						
Maximum = 99.2 mph, Minimum = 5.0 mph, Mean = 22.0 mph																																						
85% Speed = 26.28 mph, 95% Speed = 28.74 mph, Median = 22.26 mph																																						
10 mph Pace = 18 - 28, Number in Pace = 45190 (78.30%)																																						
Variance = 20.59, Standard Deviation = 4.54 mph																																						
* Grand Total																																						
Time	Total	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Cls	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Vbin	Mean	Vpp	>PSL	>PSL%	>SL1	>SL1%	>SL2	>SL2%	Mean	Vpp
<--		1	2	3	4	5	6	7	8	9	10	11		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75			85	30	30	30	30	30	30		85
														10	15	20	25	30	35	40	45	50	55	60	65	70	75	80											
--	**57712**	**95**	**259**	**31881**	**23970**	**1139**	**76**	**13**	**54**	**2**	**56**	**167**		**913**	**2782**	**12516**	**27975**	**11942**	**1378**	**155**	**33**	**6**	**4**	**1**	**1**	**1**	**0**	**0**	**22**	**26.3**	**1584**	**2.745**	**1584**	**2.745**	**1584**	**2.745**	**22**	**26.3**
Vehicles = 57712																															35.4kph								

Appendix J: Emissions Factor Toolkit – Source Apportionment

Figure J.1 EFT Input – Source Apportionment

Primary Inputs		Pollutants	Selected	Standard Outputs	Selected	Additonal Outputs	Selected
Area	England (not London)	NO_x	Y	Air Quality Modelling (g/km/s)		Breakdown by Vehicle	Y
Year	2023	PM_{10}		Emissions Rates (g/km)	Y	Source Apportionment	Y
Traffic Format	Detailed Option 2	$PM_{2.5}$		Annual Link Emissions		PM by Source	
All must be selected		CO_2				Primary NO_2 Fraction	
						Export Outputs	

SourceID	Road Type	Traffic Flow	% Car	% Taxi (black cab)	% LGV	% Rigid HGV	% Artic HGV
Worcester Road Nor	Urban (not London)	8160	86.77696078	1.18872549	8.590686275	1.078431373	0.208333333
Worcester Road Sou	Urban (not London)	8715	86.6551922	1.434308663	8.376362593	1.181870338	0.17211704
Worcester Rd Comb	Urban (not London)	16875	86.71407407	1.315555556	8.48	1.131851852	0.18962963

Advanced Options	Selected
Bespoke Base Fleets	
Bespoke Euro Fleet	Y
Fleet Projection Tool	

Click the button to:

Run EFT

Clear Input Data

% Bus and Coach	% Motorcycle	Speed(kph)	No of Hours	Link Length (km)	% Gradient	Flow Direction	% Load
1.666666667	0.490196078	19.6	24				
1.629374641	0.550774527	22	24				
1.647407407	0.521481481	20.8	24				

Figure J.2 Bespoke Euro Fleet – Source Apportionment

Populate with Defaults | OK

Default Euro Proportions 2023 - England (not London)

Cars	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6 a/b/c	Euro 6 d-temp	Euro 6 d
Conventional Petrol	-	-	-	0.02	0.10	0.23	0.31	0.16	0.19
Hybrid Petrol				0.00	0.02	0.11	0.23	0.21	0.43
Plugin Hybrid Petrol					0.00	0.02	0.16	0.14	0.68
Conventional Diesel	-	-	-	0.01	0.10	0.34	0.37	0.09	0.08
Hybrid Diesel				0.00	0.00	0.01	0.10	0.23	0.65

LGVs	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6_1	Euro 6_2	Euro 6_3
Petrol LGV	-	-	-	0.03	0.08	0.12	0.07	0.21	0.50
Diesel LGV	-	-	-	0.01	0.06	0.19	0.12	0.26	0.36
Petrol Taxi	-	-	-	0.03	0.08	0.12	0.07	0.21	0.50
Diesel Taxi	-	-	-	0.01	0.06	0.19	0.12	0.26	0.36

Heavy Duty Vehicles	Pre-Euro I	Euro I	Euro II	Euro III	Euro IV	Euro V_EGR	Euro V_SCR	Euro VI	Euro II SCRRF	Euro III SCRRF	Euro IV SCRRF	Euro V SCRRF to EGR
Rigid HGVs	-	-	0.01	0.03	0.02	0.03	0.08	0.84	-	-	-	-
Artic HGVs	-	-	0.00	0.00	0.00	0.01	0.03	0.96	-	-	-	-
Conventional Buses	-	-	0.01	0.03	0.04	0.05	0.15	0.72	-	-	-	-
Hybrid Buses					-	0.20	0.59	0.21				
Conventional Coaches	-	-	0.01	0.03	0.04	0.05	0.15	0.72	-	-	-	-
Hybrid Coaches					-	0.20	0.59	0.21				

User Euro Proportions 2023 - England (not London)

Cars	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6 a/b/c	Euro 6 d-temp	Euro 6 d	
Conventional Petrol	-	-	-	0.02	0.10	0.23	0.31	0.16	0.19	OK
Hybrid Petrol				0.00	0.02	0.11	0.23	0.21	0.43	OK
Plugin Hybrid Petrol					0.00	0.02	0.16	0.14	0.68	OK
Conventional Diesel	-	-	-	0.01	0.10	0.34	0.37	0.09	0.08	OK
Hybrid Diesel				0.00	0.00	0.01	0.10	0.23	0.65	OK

LGVs	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6_1	Euro 6_2	Euro 6_3	
Petrol LGV	-	-	-	0.03	0.08	0.12	0.07	0.21	0.50	OK
Diesel LGV	-	-	-	0.01	0.06	0.19	0.12	0.26	0.36	OK
Petrol Taxi	-	-	-	0.03	0.08	0.12	0.07	0.21	0.50	OK
Diesel Taxi	-	-	-	0.01	0.06	0.19	0.12	0.26	0.36	OK

Heavy Duty Vehicles	Pre-Euro I	Euro I	Euro II	Euro III	Euro IV	Euro V_EGR	Euro V_SCR	Euro VI	Euro II SCRRF	Euro III SCRRF	Euro IV SCRRF	Euro V SCRRF to EGR	
Rigid HGVs	-	-	0.01	0.03	0.02	0.03	0.08	0.84	-	-	-	-	OK
Artic HGVs	-	-	0.00	0.00	0.00	0.01	0.03	0.96	-	-	-	-	OK
Conventional Buses	-	-	-	-	-	0.32	-	0.68	-	-	-	-	OK
Hybrid Buses					-	0.20	0.59	0.21					OK
Conventional Coaches	-	-	0.01	0.03	0.04	0.05	0.15	0.72	-	-	-	-	OK
Hybrid Coaches					-	0.20	0.59	0.21					OK

Default Vehicle Size Classes 2023 - England (not London)

	<1400	1400-2000	>2000
Petrol Car	0.59	0.32	0.09
Diesel Car	0.11	0.60	0.28
	N1 (I)	N1 (II)	N1 (III)
Petrol LGV	0.17	0.21	0.62
Diesel LGV	0.06	0.26	0.68

	3.5-7.5 t	7.5-12 t	12-14 t	14-20 t	20-26 t	26-28 t	28-32 t	>32 t
Rigid HGV	0.23	0.05	0.02	0.12	0.18	0.11	0.23	0.06

	14-20 t	20-28 t	28-34 t	34-40 t	40-50 t
Artic HGV	0.01	0.02	0.01	0.10	0.86

	Midi <=15 t	Standard 15 - 18 t	Articulated >18 t
Buses	0.31	0.69	-

	Standard <=18 t	Articulated >18 t
Coaches	0.50	0.50

User Vehicle Size Class 2023 - England (not London)

	<1400	1400-2000	>2000	
Petrol Car	0.59	0.32	0.09	OK
Diesel Car	0.11	0.60	0.28	OK
	N1 (I)	N1 (II)	N1 (III)	
Petrol LGV	0.17	0.21	0.62	OK
Diesel LGV	0.06	0.26	0.68	OK

	3.5-7.5 t	7.5-12 t	12-14 t	14-20 t	20-26 t	26-28 t	28-32 t	>32 t	
Rigid HGV	0.23	0.05	0.02	0.12	0.18	0.11	0.23	0.06	OK

	14-20 t	20-28 t	28-34 t	34-40 t	40-50 t	
Artic HGV	0.01	0.02	0.01	0.10	0.86	OK

	Midi <=15 t	Standard 15 - 18 t	Articulated >18 t	
Buses	0.31	0.69	-	OK

	Standard <=18 t	Articulated >18 t	
Coaches	0.50	0.50	OK

Figure J.3 EFT Output – Source Apportionment

Source Name	Pollutant Name	All Vehicles (g/km)	All LDVs (g/km)	All HDVs (g/km)	Petrol Cars (g/km)	Petrol Hybrid Cars (g/km)	Petrol Plugin Hybrid Cars (g/km)	Diesel Cars (g/km)	Diesel Hybrid Cars (g/km)	Electric Cars (g/km)	Petrol Taxis (g/km)
Worcester Road Northbound	NOx	2,847.07143	2,255.64796	591.42347	240.53625	5.79293	1.33586	1,581.94116	10.17032	-	0.00739
Worcester Road Southbound	NOx	2,883.29063	2,311.98092	571.30970	250.04226	6.01808	1.38670	1,616.42638	10.39526	-	0.00917
Worcester Rd Combined	NOx	5,729.59774	4,567.80834	1,161.78940	490.62290	11.81167	2.72269	3,198.72758	20.56716	-	0.01659

Petrol Hybrid Taxis (g/km)	Diesel Taxis (g/km)	Electric Taxi (g/km)	Petrol LGVs (g/km)	Petrol Hybrid LGVs (g/km)	Petrol Plugin Hybrid LGVs (g/km)	Diesel LGVs (g/km)	Electric LGVs (g/km)	Rigid HGVs (g/km)	Rigid Electric HGVs (g/km)	Artic HGVs (g/km)	Artic Electric HGVs (g/km)
0.58583	28.89710	-	1.40110	-	-	383.40570	-	151.62060	-	19.39754	-
0.72480	36.16465	-	1.43831	-	-	387.56987	-	161.08693	-	15.39706	-
1.31333	65.13524	-	2.83912	-	-	770.65765	-	313.06953	-	34.58385	-

Conventional Buses (g/km)	Hybrid Buses (g/km)	Electric Buses (g/km)	Biogas Buses (g/km)	Conventional Coaches (g/km)	Hybrid Coaches (g/km)	Electric Coaches (g/km)	Biogas Coaches (g/km)	TfL Conventional Buses (g/km)	TfL Hybrid Buses (g/km)	TfL Electric Buses (g/km)	TfL Biogas Buses (g/km)	Motorcycles (g/km)
277.83020	4.13534	-	0.11472	135.58660	2.69385	-	0.04461	-	-	-	-	1.57433
260.46698	3.93265	-	0.11978	127.73548	2.52424	-	0.04658	-	-	-	-	1.80543
537.70934	8.05721	-	0.23450	262.83636	5.20743	-	0.09119	-	-	-	-	3.39440

Appendix K: Modelled Measures

Measures supporting transition to Electric Vehicle Parc

Figure K.1 Summary Forecast Data from NEVIS

	Petrol Cars (g/km)	Diesel Cars (g/km)	Taxis (g/km)	Petrol LGVs (g/km)	Diesel LGVs (g/km)	Rigid HGVs (g/km)	Artic HGVs (g/km)	Buses/Coaches (g/km)	Motorcycles (g/km)	Full Hybrid Petrol Cars (g/km)	Plug-In Hybrid Petrol Cars (g/km)
2023 Q1 Bromsgrove	58.57%	33.10%	0.00%	3.12%	95.52%	0.00%	0.00%	0.00%	0.00%	0.00%	1.58%
2023 Q1 County	57.88%	34.97%	0.00%	3.66%	95.09%	0.00%	0.00%	0.00%	0.00%	0.00%	1.31%
2023 Avg	**58.22%**	**34.03%**	**0.00%**	**3.39%**	**95.30%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**1.44%**
2029 Low	48.96%	28.63%	0.00%	2.99%	75.06%	0.00%	0.00%	0.00%	0.00%	0.00%	2.36%
2029 Medium	43.70%	25.50%	0.00%	2.77%	69.39%	0.00%	0.00%	0.00%	0.00%	0.00%	3.01%
2029 High	39.49%	23.08%	0.00%	2.57%	64.32%	0.00%	0.00%	0.00%	0.00%	0.00%	8.15%

Full Hybrid Diesel Cars (g/km)	Battery EV Cars (g/km)	FCEV Cars (g/km)	E85 Bioethanol Cars (g/km)	LPG Cars (g/km)	Full Hybrid Petrol LGVs (g/km)	Plug-In Hybrid Petrol LGVs (g/km)	Battery EV LGVs (g/km)	FCEV LGVs (g/km)	E85 Bioethanol LGVs (g/km)	LPG LGVs (g/km)
0.00%	2.53%	0.00%	0.00%	4.23%	0.00%	0.07%	1.18%	0.00%	0.00%	0.12%
0.00%	2.18%	0.00%	0.00%	3.66%	0.00%	0.06%	1.05%	0.00%	0.00%	0.14%
0.00%	**2.35%**	**0.00%**	**0.00%**	**3.95%**	**0.00%**	**0.06%**	**1.11%**	**0.00%**	**0.00%**	**0.13%**
0.00%	17.42%	0.00%	0.00%	2.64%	0.00%	3.33%	18.24%	0.00%	0.00%	0.38%
0.00%	25.44%	0.00%	0.00%	2.35%	0.00%	0.00%	27.49%	0.00%	0.00%	0.35%
0.00%	27.15%	0.00%	0.00%	2.13%	0.00%	5.06%	27.74%	0.00%	0.00%	0.32%

Figure K.2 Vehicle Growth Factors, HGV Fleet Forecast, Local Taxi data

						Low	Medium	High		DfT avg increase in miles
Vehicle Growth	**2023**	**2029_L**	**2029_M**	**2029_H**		**Δ2023-2029**	**Δ2023-2029**	**Δ2023-2029**		**Δ2023-2029**
Cars Bromsgrove	61,990	60,360	60,460	60,270		-2.63%	-2.47%	-2.77%		4.03%
LGVs Bromsgrove	9,014	10,164	10,162	10,165		12.76%	12.74%	12.77%		21.46%
Cars County	365,708	369,090	369,910	369,160		0.92%	1.15%	0.94%		**Avg DfT vs Med Nevis**
LGVs County	54,975	57,459	57,388	57,339		4.52%	4.39%	4.30%		
					Avg Cars	-1.70%	-1.32%	-1.83%		1.36%
					Avg LGVs	8.64%	8.56%	8.53%		15.01%

			Taxis 2023 - Bromsgrove		Totals	%			Totals	%	Combined	
HGV EV 12/2023%	0.95%		HCVEH	DIESEL	66	82.5%	PHVEH	DIESEL	9	75.0%	75	81.5%
HGV Diesel 12/2023%	99.05%		HCVEH	ELECTR	3	3.8%	PHVEH	ELECTR	1	8.3%	4	4.3%
HGV EV 2029%	4.11%		HCVEH	HYBRID	10	12.5%	PHVEH	HYBRID	1	8.3%	11	12.0%
HGV Diesel 2029%	95.89%		HCVEH	LPG	1	1.3%					1	1.1%
			HCVEH	PETROL	0	0.0%	PHVEH	PETROL	1	8.3%	1	1.1%
					80				12		92	

Figure K.3 Proportion of Vehicle Types for EFT (All Vehicles) including fleet growth by 2029 – Worcester Road, Bromsgrove

Source Apportionment Volumes			Growth scenario 1			Growth scenario 2						For EFT All Vehicles			
Area	Worcs Road		Δ2023-2029 Medium NEVIS			Δ2023-2029 DfT avg increase in miles			Avg DfT vs Med Nevis				Nevis Med	DfT	Total vehicle types NEVIS	DFT
AADT	16875		**AADT**	16804.5		**AADT**	17780.75		**AADT**	17291.1605		% Petrol Car	6310.210113	6652.263983		
Year	2023											% Petrol Hybrid Car	0			
No. vehicles			**No. vehicles**			**No. vehicles**			**No. vehicles**			% Petrol Plugin Hybrid Car	434.313331	457.8558998	6744.523444	7110.12
Cars	14633		Cars	14439.97		Cars	15222.71		Cars	14831.3404		% Diesel Car	3682.579028	3882.198436		
Taxis	222		Taxis	222		Taxis	230.9466		Taxis	225.009059		% Diesel Hybrid Car	0	0		
LGVs	1431		LGVs	1553.529		LGVs	1738.093		LGVs	1645.81103		% Electric Car	3673.407142	3872.529375		
HGVs - Rigids (OGV1)	191		HGVs	191		HGVs	191		HGVs	191		% Petrol Taxi (black cab)	2.413043478	2.51028913		
HGVs - Artics (OGV2)	32		Arctic	32		Arctic	32		Arctic	32		% Petrol Hybrid Taxi (black	26.54347826	27.61318043		
Buses	278		Buses	278		Buses	278		Buses	278		% Diesel Taxi (black cab)	180.9782609	188.2716848		
Motorcylces	88		Motorcylc	88		Motorcylc	88		Motorcylces	88		% Electric Taxi (black cab)	9.652173913	10.04115652	219.5869565	228.4363
% vehicles			**% vehicles**			**% vehicles**			**% vehicles**			% Petrol LGV	43.06070808	48.17642656		
Cars	0.867140741		**Cars**	0.859292		**Cars**	0.856134		**Cars**	0.85774118		% Petrol Hybrid LGV	0	0		
Taxis	0.013155556		**Taxis**	0.013211		**Taxis**	0.012989		**Taxis**	0.01301295		% Petrol Plugin Hybrid LGV	0	0		
LGVs	0.0848		**LGVs**	0.092447		**LGVs**	0.097751		**LGVs**	0.09518222		% Diesel LGV	1077.945184	1206.007734		
HGVs - Rigids (OGV1)	0.011318519		HGVs - Rig	0.011366		HGVs - Rig	0.010742		HGVs - Rigid	0.01104611		% Electric LGV	427.1205048	477.8634758	1548.126397	1732.048
HGVs - Artics (OGV2)	0.001896296		HGVs - Art	0.001904		HGVs - Art	0.0018		HGVs - Artic	0.00185066		% Rigid HGV (Diesel)	183.1548183	183.1548183		
Buses	0.016474074		**Buses**	0.016543		**Buses**	0.015635		**Buses**	0.01607758		% Rigid HGV Electric	7.845181675	7.845181675	191	191
Motorcylces	0.005214815		**Motorcylc**	0.005237		**Motorcylc**	0.004949		**Motorcylces**	0.00508931		% Artic HGV (Diesel)	30.68562401	30.68562401		
												% Artic HGV Electric	1.314375987	1.314375987	32	32
												% Conventional Bus	278	278		
												% Motorcycle	88	88		
												% LPG Car	341.8742732	360.3724952		
												% LPG LGV	5.403065971	6.044963554		

Figure K.4 EFT Input – Measures supporting transition to Electric Vehicle Parc

Primary Inputs		Pollutants	Selected	Standard Outputs	Selected	Additonal Outputs	Selected	Advanced Options	Selected
Area	England (not London)	NO_x	Y	Air Quality Modelling (g/km/s)		Breakdown by Vehicle	Y	Bespoke Base Fleets	
Year	2029	PM_{10}		Emissions Rates (g/km)	Y	Source Apportionment	Y	Bespoke Euro Fleet	N
Traffic Format	All Vehicle Types	$PM_{2.5}$		Annual Link Emissions	Y	PM by Source		Fleet Projection Tool	
All must be selected		CO_2				Primary NO_2 Fraction	Y		
						Export Outputs			

SourceID	Road Type	Traffic Flow	% Petrol Car	% Petrol Hybrid Car	% Petrol Plugin Hybrid Car	% Diesel Car	% Diesel Hybrid Car	% Electric Car	% Petrol Taxi (black cab)
Worcs Rd NEVIS Me	Urban (not London)	16804.50031	37.55071557	0	2.584506074	21.91424298	0	21.85966304	0.014359507
Worcs Rd DfT	Urban (not London)	17780.7491	37.41273186	0	2.575009058	21.83371698	0	21.77933761	0.014118017

Click the button to:

Run EFT

Clear Input Data

% Electric Taxi (black cab)	% Petrol LGV	% Petrol Hybrid LGV	% Petrol Plugin Hybrid LGV	% Diesel LGV	% Electric LGV	% Rigid HGV (Diesel)	% Rigid HGV Electric	% Artic HGV (Diesel)	% Artic HGV Electric
0.05743803	0.2562451	0	0	6.41462206	2.541703098	1.08991529	0.046685	0.182603609	0.007821571
0.056472067	0.27094711	0	0	6.782659872	2.687532865	1.03007369	0.04412177	0.172577791	0.007392129

% Conventional Bus	% Hybrid Bus	% Electric Bus	% Biogas Bus	% Conventional Coach	% Hybrid Coach	% Electric Coach	% Biogas Coach	% Motorcycle
1.654318753	0	0	0	0	0	0	0	0.523669246
1.563488683	0	0	0	0	0	0	0	0.494917281

% Petrol Hybrid Taxi (black cab)	% Diesel Taxi (black cab)
0.157954582	1.076963061
0.155298184	1.058851254

% Biomethane Car	% LPG Car	% Biomethane LGV	% LPG LGV	% Biodiesel Rigid HGV	% Biodiesel Artic HGV	% Biodiesel Bus	% Biomethane Bus	% Biodiesel Coach	Speed(kph)	No of Hours	Link Length (km)	% Gradient	Flow Direction	% Load
0	2.03442094	0	0.032152494	0	0	0	0	0	20.8	24	0.77			
0	2.02675654	0	0.033997238	0	0	0	0	0	20.8	24	0.77			

Figure K.5 EFT Output - Measures supporting transition to Electric Vehicle Parc

Source Name	Pollutant Name	All Vehicles (g/km)	All LDVs (g/km)	All HDVs (g/km)	Petrol Cars (g/km)	Petrol Hybrid Cars (g/km)	Petrol Plugin Hybrid Cars (g/km)	Diesel Cars (g/km)	Diesel Hybrid Cars (g/km)	Electric Cars (g/km)	Petrol Taxis (g/km)	Petrol Hybrid Taxis (g/km)	Diesel Taxis (g/km)	Electric Taxi (g/km)	Petrol LGVs (g/km)
Worcs Rd NEVIS Med	NOx	2,360.26382	1,962.20648	398.05735	368.70035	-	2.50844	1,274.80285	-	-	0.06082	0.33376	42.39934	-	2.20505
Worcs Rd DfT	NOx	2,482.76334	2,084.70600	398.05735	388.68627	-	2.64441	1,343.90534	-	-	0.06327	0.34721	44.10803	-	2.46701

Petrol Hybrid LGVs (g/km)	Petrol Plugin Hybrid LGVs (g/km)	Diesel LGVs (g/km)	Electric LGVs (g/km)	Rigid HGVs (g/km)	Rigid Electric HGVs (g/km)	Artic HGVs (g/km)	Artic Electric HGVs (g/km)	Conventional Buses (g/km)	Hybrid Buses (g/km)	Electric Buses (g/km)	Biogas Buses (g/km)	Conventional Coaches (g/km)	Hybrid Coaches (g/km)
-	-	258.40841	-	154.52903	-	22.70065	-	220.82766	-	-	-	-	-
-	-	289.10796	-	154.52903	-	22.70065	-	220.82766	-	-	-	-	-

Electric Coaches (g/km)	Biogas Coaches (g/km)	TfL Conventional Buses (g/km)	TfL Hybrid Buses (g/km)	TfL Electric Buses (g/km)	TfL Biogas Buses (g/km)	Motorcycles (g/km)	Bioethanol Cars (g/km)	LPG Cars (g/km)	Bioethanol LGVs (g/km)	LPG LGVs (g/km)	Biodiesel Rigid HGVs (g/km)	Biodiesel Artic HGVs (g/km)	Biodiesel Buses (g/km)	Biomethane Buses (g/km)	Biodiesel Coaches (g/km)
-	-	-	-	-	-	2.05169	-	10.61025	-	0.12554	-	-	-	-	-
-	-	-	-	-	-	2.05169	-	11.18435	-	0.14045	-	-	-	-	-

Figure K.6 Calculating Impact - Measures supporting transition to Electric Vehicle Parc

Source apportionment 2023									
Source Name	**All Vehicles (g/km)**	**All LDVs (g/km)**	**All HDVs (g/km)**	**Total Cars**	**Total Petrol**	**Total diesel Cars**	**Total LGVs**	**Total Taxis**	**Total HGVs**
Worcester Rd Combined	5,602.42638	4,567.80834	1,034.61804	3,724.45200	505.15726	3,219.29474	773.49677	66.46517	347.65337

Ev Eft 2029									
Source Name	**All Vehicles (g/km)**	**All LDVs (g/km)**	**All HDVs (g/km)**	**Total Cars**	**Total Petrol**	**Total diesel Cars**	**Total LGVs**	**Total Taxis**	**Total HGVs**
Worcs Rd NEVIS Med	2,360.26382	1,962.20648	398.05735	1,656.62188	371.20879	1,274.80285	260.73899	42.79392	177.22969
Worcs Rd DfT	2,482.76334	2,084.70600	398.05735	1,746.42037	391.33068	1,343.90534	291.71543	44.51851	177.22969

% change 2023-2029									
Source Name	**All Vehicles (g/km)**	**All LDVs (g/km)**	**All HDVs (g/km)**	**Total Cars**	**Total Petrol**	**Total diesel Cars**	**Total LGVs**	**Total Taxis**	**Total HGVs**
Worcs Rd NEVIS Med	-57.87%	-57.04%	-61.53%	-55.52%	-26.52%	-60.40%	-66.29%	-35.61%	-49.02%
Worcs Rd DfT	-55.68%	-54.36%	-61.53%	-53.11%	-22.53%	-58.25%	-62.29%	-33.02%	-49.02%
Average	**-56.78%**	**-55.70%**	**-61.53%**	**-54.31%**	**-24.52%**	**-59.33%**	**-64.29%**	**-34.32%**	**-49.02%**

Absolute Difference									
Source Name	**All Vehicles (g/km)**	**All LDVs (g/km)**	**All HDVs (g/km)**	**Total Cars**	**Total Petrol**	**Total diesel Cars**	**Total LGVs**	**Total Taxis**	**Total HGVs**
Worcs Rd NEVIS Med	-3242.16256	-2605.60187	-636.56069	-2067.83012	-133.94848	-1944.49189	-512.75778	-23.67125	-170.42368
Worcs Rd DfT	-3119.66303	-2483.10234	-636.56069	-1978.03163	-113.82658	-1875.38940	-481.78135	-21.94666	-170.42368
Average	**-3180.91280**	**-2544.35210**	**-636.56069**	**-2022.93087**	**-123.88753**	**-1909.94064**	**-497.26956**	**-22.80895**	**-170.42368**

Source apportionment 2023										
Petrol Cars (g/km)	Petrol Hybrid Cars (g/km)	Petrol Plugin Hybrid Cars (g/km)	Diesel Cars (g/km)	Diesel Hybrid Cars (g/km)	Electric Cars (g/km)		Petrol Taxis (g/km)	Petrol Hybrid Taxis (g/km)	Diesel Taxis (g/km)	Electric Taxi (g/km)
490.62290	11.81167	2.72269	3,198.72758	20.56716	-		0.01659	1.31333	65.13524	-
Ev Eft 2029										
Petrol Cars (g/km)	Petrol Hybrid Cars (g/km)	Petrol Plugin Hybrid Cars (g/km)	Diesel Cars (g/km)	Diesel Hybrid Cars (g/km)	Electric Cars (g/km)	LPG Cars (g/km)	Petrol Taxis (g/km)	Petrol Hybrid Taxis (g/km)	Diesel Taxis (g/km)	Electric Taxi (g/km)
368.70035	-	2.50844	1,274.80285	-	-	10.61025	0.06082	0.33376	42.39934	-
388.68627	-	2.64441	1,343.90534	-	-	11.18435	0.06327	0.34721	44.10803	-
% change 2023-2029										
Petrol Cars (g/km)	Petrol Hybrid Cars (g/km)	Petrol Plugin Hybrid Cars (g/km)	Diesel Cars (g/km)	Diesel Hybrid Cars (g/km)	Electric Cars (g/km)	LPG Cars (g/km)	Petrol Taxis (g/km)	Petrol Hybrid Taxis (g/km)	Diesel Taxis (g/km)	Electric Taxi (g/km)
-24.85%	-100.00%	-7.87%	-60.15%				266.54%	-74.59%	-34.91%	
-20.78%	-100.00%	-2.88%	-57.99%				281.32%	-73.56%	-32.28%	
-22.81%	**-100.00%**	**-5.37%**	**-59.07%**				**273.93%**	**-74.07%**	**-33.59%**	
Absolute Difference										
Petrol Cars (g/km)	Petrol Hybrid Cars (g/km)	Petrol Plugin Hybrid Cars (g/km)	Diesel Cars (g/km)	Diesel Hybrid Cars (g/km)	Electric Cars (g/km)	LPG Cars (g/km)	Petrol Taxis (g/km)	Petrol Hybrid Taxis (g/km)	Diesel Taxis (g/km)	Electric Taxi (g/km)
-121.92255	-11.81167	-0.21425	-1923.92473	-20.56716	0.00000	10.61025	0.04423	-0.97957	-22.73591	0.00000
-101.93663	-11.81167	-0.07828	-1854.82224	-20.56716	0.00000	11.18435	0.04668	-0.96612	-21.02722	0.00000
-111.92959	**-11.81167**	**-0.14627**	**-1889.37348**	**-20.56716**	**0.00000**	**10.89730**	**0.04545**	**-0.97284**	**-21.88156**	**0.00000**

Source apportionment 2023													
Petrol LGVs (g/km)	Petrol Hybrid LGVs (g/km)	Petrol Plugin Hybrid LGVs (g/km)	Diesel LGVs (g/km)	Electric LGVs (g/km)		Rigid HGVs (g/km)	Rigid Electric HGVs (g/km)	Artic HGVs (g/km)	Artic Electric HGVs (g/km)	Conventional Buses (g/km)	Hybrid Buses (g/km)	Electric Buses (g/km)	Biogas Buses (g/km)
2.83912	-	-	770.65765	-		313.06953	-	34.58385	-	410.53798	8.05721	-	0.23450
Ev Eft 2029													
Petrol LGVs (g/km)	Petrol Hybrid LGVs (g/km)	Petrol Plugin Hybrid LGVs (g/km)	Diesel LGVs (g/km)	Electric LGVs (g/km)	LPG LGVs (g/km)	Rigid HGVs (g/km)	Rigid Electric HGVs (g/km)	Artic HGVs (g/km)	Artic Electric HGVs (g/km)	Conventional Buses (g/km)	Hybrid Buses (g/km)	Electric Buses (g/km)	Biogas Buses (g/km)
2.20505	-	-	258.40841	-	0.12554	154.52903	-	22.70065	-	220.82766	-	-	-
2.46701	-	-	289.10796	-	0.14045	154.52903	-	22.70065	-	220.82766	-	-	-
% change 2023-2029													
Petrol LGVs (g/km)	Petrol Hybrid LGVs (g/km)	Petrol Plugin Hybrid LGVs (g/km)	Diesel LGVs (g/km)	Electric LGVs (g/km)	LPG LGVs (g/km)	Rigid HGVs (g/km)	Rigid Electric HGVs (g/km)	Artic HGVs (g/km)	Artic Electric HGVs (g/km)	Conventional Buses (g/km)	Hybrid Buses (g/km)	Electric Buses (g/km)	Biogas Buses (g/km)
-22.33%			-66.47%			-50.64%		-34.36%		-46.21%			
-13.11%			-62.49%			-50.64%		-34.36%		-46.21%			
-17.72%			**-64.48%**			**-50.64%**		**-34.36%**		**-46.21%**			
Absolute Difference													
Petrol LGVs (g/km)	Petrol Hybrid LGVs (g/km)	Petrol Plugin Hybrid LGVs (g/km)	Diesel LGVs (g/km)	Electric LGVs (g/km)	LPG LGVs (g/km)	Rigid HGVs (g/km)	Rigid Electric HGVs (g/km)	Artic HGVs (g/km)	Artic Electric HGVs (g/km)	Conventional Buses (g/km)	Hybrid Buses (g/km)	Electric Buses (g/km)	Biogas Buses (g/km)
-0.63407	0.00000	0.00000	-512.24925	0.00000	0.12554	-158.54049	0.00000	-11.88319	0.00000	-189.71032	-8.05721	0.00000	-0.23450
-0.37211	0.00000	0.00000	-481.54969	0.00000	0.14045	-158.54049	0.00000	-11.88319	0.00000	-189.71032	-8.05721	0.00000	-0.23450
-0.50309	**0.00000**	**0.00000**	**-496.89947**	**0.00000**	**0.13299**	**-158.54049**	**0.00000**	**-11.88319**	**0.00000**	**-189.71032**	**-8.05721**	**0.00000**	**-0.23450**

Source apportionment 2023													
Conventional Coaches (g/km)	Hybrid Coaches (g/km)	Electric Coaches (g/km)	Biogas Coaches (g/km)	Motorcycles (g/km)									
262.83636	5.20743	-	0.09119	3.39440									
Ev Eft 2029													
Conventional Coaches (g/km)	Hybrid Coaches (g/km)	Electric Coaches (g/km)	Biogas Coaches (g/km)	Motorcycles (g/km)	Bioethanol Cars (g/km)		Bioethanol LGVs (g/km)		Biodiesel Rigid HGVs (g/km)	Biodiesel Artic HGVs (g/km)	Biodiesel Buses (g/km)	Biomethane Buses (g/km)	Biodiesel Coaches (g/km)
-	-	-	-	2.05169	-		-		-	-	-	-	-
-	-	-	-	2.05169	-		-		-	-	-	-	-
% change 2023-2029													
Conventional Coaches (g/km)	Hybrid Coaches (g/km)	Electric Coaches (g/km)	Biogas Coaches (g/km)	Motorcycles (g/km)	Bioethanol Cars (g/km)		Bioethanol LGVs (g/km)		Biodiesel Rigid HGVs (g/km)	Biodiesel Artic HGVs (g/km)	Biodiesel Buses (g/km)	Biomethane Buses (g/km)	Biodiesel Coaches (g/km)
				-39.56%									
				-39.56%									
				-39.56%									
Absolute Difference													
Conventional Coaches (g/km)	Hybrid Coaches (g/km)	Electric Coaches (g/km)	Biogas Coaches (g/km)	Motorcycles (g/km)	Bioethanol Cars (g/km)		Bioethanol LGVs (g/km)		Biodiesel Rigid HGVs (g/km)	Biodiesel Artic HGVs (g/km)	Biodiesel Buses (g/km)	Biomethane Buses (g/km)	Biodiesel Coaches (g/km)
-262.83636	-5.20743	0.00000	-0.09119	-1.34271									
-262.83636	-5.20743	0.00000	-0.09119	-1.34271									
-262.83636	**-5.20743**	**0.00000**	**-0.09119**	**-1.34271**									

Table K.1 Summary of Impact - Measures supporting transition to Electric Vehicle Parc

Total EV Δ	Total Reduction	% Change 2023-29 Road Emissions		
Worcester Road, Bromsgrove	-2520.20044	-44.98%		
	Total/Road NOx Ratio	**% Change 2023-29 Total NOx**	**Banding**	**Compliant**
Total EV Δ Worcester Road	78%	-35.15%	**Very Large**	**Y**

Bus Fleet Improvements

Figure K.7 EFT Input – Bus Fleet Improvements

Primary Inputs		Pollutants	Selected	Standard Outputs	Selected	Additonal Outputs	Selected
Area	England (not London)	NO_x	Y	Air Quality Modelling (g/km/s)		Breakdown by Vehicle	Y
Year	2029	PM_{10}		Emissions Rates (g/km)	Y	Source Apportionment	Y
Traffic Format	Detailed Option 2	$PM_{2.5}$		Annual Link Emissions		PM by Source	
All must be selected		CO_2				Primary NO_2 Fraction	
						Export Outputs	

SourceID	Road Type	Traffic Flow	% Car	% Taxi (black cab)	% LGV	% Rigid HGV	% Artic HGV
Worcester Road Nor	Urban (not London)	8160	86.77696078	1.18872549	8.590686275	1.078431373	0.208333333
Worcester Road Sou	Urban (not London)	8715	86.6551922	1.434308663	8.376362593	1.181870338	0.17211704
Worcester Rd Comb	Urban (not London)	16875	86.71407407	1.315555556	8.48	1.131851852	0.18962963

Advanced Options	Selected
Bespoke Base Fleets	
Bespoke Euro Fleet	Y
Fleet Projection Tool	

Click the button to:

Run EFT

Clear Input Data

% Bus and Coach	% Motorcycle	Speed(kph)	No of Hours	Link Length (km)	% Gradient	Flow Direction	% Load
1.666666667	0.490196078	19.6	24				
1.629374641	0.550774527	22	24				
1.647407407	0.521481481	20.8	24				

Figure K.8 Bespoke Euro Fleet – Bus Fleet Improvements

Populate with Defaults | OK

Default Euro Proportions 2029 - England (not London)

Cars	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6 a/b/c	Euro 6 d-temp	Euro 6 d
Conventional Petrol	-	-	-	-	0.00	0.06	0.20	0.12	0.62
Hybrid Petrol				-	0.00	0.02	0.09	0.10	0.79
Plugin Hybrid Petrol					0.00	0.00	0.04	0.05	0.91
Conventional Diesel	-	-	-	-	0.01	0.13	0.32	0.10	0.44
Hybrid Diesel				-	0.00	0.00	0.05	0.14	0.80

LGVs	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6_1	Euro 6_2	Euro 6_3
Petrol LGV	-	-	-	-	0.00	0.01	0.01	0.03	0.94
Diesel LGV	-	-	-	-	0.00	0.05	0.05	0.11	0.79
Petrol Taxi	-	-	-	-	0.00	0.01	0.01	0.03	0.94
Diesel Taxi	-	-	-	-	0.00	0.05	0.05	0.11	0.79

Heavy Duty Vehicles	Pre-Euro I	Euro I	Euro II	Euro III	Euro IV	Euro V_EGR	Euro V_SCR	Euro VI	Euro II SCRRF	Euro III SCRRF	Euro IV SCRRF	Euro V SCRRF to EGR
Rigid HGVs	-	-	-	0.00	0.01	0.00	0.01	0.97	-	-	-	-
Artic HGVs	-	-	-	0.00	0.00	0.00	0.00	1.00	-	-	-	-
Conventional Buses	-	-	-	0.00	0.01	0.01	0.03	0.95	-	-	-	-
Hybrid Buses					-	0.18	0.54	0.27				
Conventional Coaches	-	-	-	0.00	0.01	0.01	0.03	0.95	-	-	-	-
Hybrid Coaches					-	0.18	0.54	0.27				

User Euro Proportions 2029 - England (not London)

Cars	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6 a/b/c	Euro 6 d-temp	Euro 6 d	
Conventional Petrol	-	-	-	-	0.00	0.06	0.20	0.12	0.62	OK
Hybrid Petrol				-	0.00	0.02	0.09	0.10	0.79	OK
Plugin Hybrid Petrol					0.00	0.00	0.04	0.05	0.91	OK
Conventional Diesel	-	-	-	-	0.01	0.13	0.32	0.10	0.44	OK
Hybrid Diesel				-	0.00	0.00	0.05	0.14	0.80	OK

LGVs	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6_1	Euro 6_2	Euro 6_3	
Petrol LGV	-	-	-	-	0.00	0.01	0.01	0.03	0.94	OK
Diesel LGV	-	-	-	-	0.00	0.05	0.05	0.11	0.79	OK
Petrol Taxi	-	-	-	-	0.00	0.01	0.01	0.03	0.94	OK
Diesel Taxi	-	-	-	-	0.00	0.05	0.05	0.11	0.79	OK

Heavy Duty Vehicles	Pre-Euro I	Euro I	Euro II	Euro III	Euro IV	Euro V_EGR	Euro V_SCR	Euro VI	Euro II SCRRF	Euro III SCRRF	Euro IV SCRRF	Euro V SCRRF to EGR	
Rigid HGVs	-	-	-	0.00	0.01	0.00	0.01	0.97	-	-	-	-	OK
Artic HGVs	-	-	-	0.00	0.00	0.00	0.00	1.00	-	-	-	-	OK
Conventional Buses	-	-	-	-	-	-	-	1.00	-	-	-	-	OK
Hybrid Buses					-	0.18	0.54	0.27					OK
Conventional Coaches	-	-	-	0.00	0.01	0.01	0.03	0.95	-	-	-	-	OK
Hybrid Coaches					-	0.18	0.54	0.27					OK

Default Vehicle Size Classes 2029 - England (not London)

	<1400	1400-2000	>2000
Petrol Car	0.59	0.32	0.09
Diesel Car	0.11	0.60	0.28
	N1 (I)	N1 (II)	N1 (III)
Petrol LGV	0.17	0.21	0.62
Diesel LGV	0.06	0.26	0.68

	3.5-7.5 t	7.5-12 t	12-14 t	14-20 t	20-26 t	26-28 t	28-32 t	>32 t
Rigid HGV	0.23	0.05	0.02	0.12	0.18	0.11	0.23	0.06

	14-20 t	20-28 t	28-34 t	34-40 t	40-50 t
Artic HGV	0.01	0.02	0.01	0.10	0.86

	Midi <=15 t	Standard 15 - 18 t	Articulated >18 t
Buses	0.31	0.69	-

	Standard <=18 t	Articulated >18 t
Coaches	0.50	0.50

User Vehicle Size Class 2029 - England (not London)

	<1400	1400-2000	>2000	
Petrol Car	0.59	0.32	0.09	OK
Diesel Car	0.11	0.60	0.28	OK
	N1 (I)	N1 (II)	N1 (III)	
Petrol LGV	0.17	0.21	0.62	OK
Diesel LGV	0.06	0.26	0.68	OK

	3.5-7.5 t	7.5-12 t	12-14 t	14-20 t	20-26 t	26-28 t	28-32 t	>32 t	
Rigid HGV	0.23	0.05	0.02	0.12	0.18	0.11	0.23	0.06	OK

	14-20 t	20-28 t	28-34 t	34-40 t	40-50 t	
Artic HGV	0.01	0.02	0.01	0.10	0.86	OK

	Midi <=15 t	Standard 15 - 18 t	Articulated >18 t	
Buses	0.31	0.69	-	OK

	Standard <=18 t	Articulated >18 t	
Coaches	0.50	0.50	OK

Figure K.9 EFT Output – Bus Fleet Improvements

Source Name	Pollutant Name	All Vehicles (g/km)	All LDVs (g/km)	All HDVs (g/km)	Petrol Cars (g/km)	Petrol Hybrid Cars (g/km)	Petrol Plugin Hybrid Cars (g/km)	Diesel Cars (g/km)	Diesel Hybrid Cars (g/km)	Electric Cars (g/km)
Worcester Road Northbound	NOx	1,204.09327	1,024.71389	179.37938	199.79388	9.04127	3.22558	635.85271	10.68653	-
Worcester Road Southbound	NOx	1,225.51656	1,050.58707	174.92949	207.73181	9.39949	3.35269	649.89624	10.92289	-
Worcester Rd Combined	NOx	2,429.43118	2,075.28848	354.14270	407.54099	18.44145	6.57852	1,285.85453	21.61108	-

Petrol Taxis (g/km)	Petrol Hybrid Taxis (g/km)	Diesel Taxis (g/km)	Electric Taxi (g/km)	Petrol LGVs (g/km)	Petrol Hybrid LGVs (g/km)	Petrol Plugin Hybrid LGVs (g/km)	Diesel LGVs (g/km)	Electric LGVs (g/km)	Rigid HGVs (g/km)	Rigid Electric HGVs (g/km)	Artic HGVs (g/km)	Artic Electric HGVs (g/km)
0.00043	0.75304	3.82073	-	1.18720	-	-	159.39936	-	78.88824	-	13.34237	-
0.00053	0.93168	4.78535	-	1.21988	-	-	161.25315	-	82.05686	-	10.48858	-
0.00097	1.68819	8.61487	-	2.40674	-	-	320.49945	-	161.14807	-	23.67301	-

Conventional Buses (g/km)	Hybrid Buses (g/km)	Electric Buses (g/km)	Biogas Buses (g/km)	Conventional Coaches (g/km)	Hybrid Coaches (g/km)	Electric Coaches (g/km)	Biogas Coaches (g/km)	TfL Conventional Buses (g/km)	TfL Hybrid Buses (g/km)	TfL Electric Buses (g/km)	TfL Biogas Buses (g/km)	Motorcycles (g/km)
39.86321	1.49658	-	0.05424	44.73670	0.97694	-	0.02109	-	-	-	-	0.95317
37.73954	1.42317	-	0.05663	42.22717	0.91553	-	0.02202	-	-	-	-	1.09336
77.54291	2.91586	-	0.11086	86.82026	1.88861	-	0.04311	-	-	-	-	2.05169

Figure K.10 Calculating Impact – Bus Fleet Improvements

Source apportionment														
Source Name	**All Vehicles (g/km)**	**All LDVs (g/km)**	**All HDVs (g/km)**	**Total Buses**	**Petrol Cars (g/km)**	**Petrol Hybrid Cars (g**	**Petrol Plugin Hybric**							
Worcester Rd Combined	5,729.59774	4,567.80834	1,161.78940	814.13603	490.62290	11.81167	2.72269							
Buses Eft 2029														
Worcs Rd EC VI 2029	2,429.43118	2,075.28848	354.14270	169.32162	407.54099	18.44145	6.57852							
% change 2023-2029														
Worcs Rd combined 2029	-58%	-55%	-70%	-79%	-17%	56%	142%							
Absolute Difference														
Worcs Rd combined 2029	-3300.166569	-2492.519862	-807.646707	-644.8144109	-83.08190764	6.629775744	3.855828854							

Source apportionment														
Diesel Cars (g/km)	**Diesel Hybrid Cars**	**Electric Cars (g/**	**Petrol Taxis**	**Petrol Hyb**	**Diesel Tax**	**Electric Ta**	**Petrol LGV**	**Petrol Hyb**	**Petrol Plu**	**Diesel LGV:**	**Electric LG**	**Rigid HGVs**	**Rigid Elect**	
3,198.72758	20.56716	-	0.01659	1.31333	65.13524	-	2.83912	-	-	770.65765	-	313.06953	-	
Buses Eft 2029														
1,285.85453	21.61108	-	0.00097	1.68819	8.61487	-	2.40674	-	-	320.49945	-	161.14807	-	
% change 2023-2029														
-60%	5%		-94%	29%	-87%		-15%			-58%		-49%		
Absolute Difference														
-1912.873051	1.04392454	0	-0.0156258	0.374858	-56.52037	0	-0.432379	0	0	-450.1582	0	-151.9215	0	

Source apportionment														
Artic HGV	**Artic Elect**	**Conventiona**	**Hybrid Bu**	**Electric Bu**	**Biogas Bus**	**Conventional C**	**Hybrid Co**	**Electric Cc**	**Biogas Co**	**TfL Conve**	**TfL Hybrid**	**TfL Electri**	**TfL Biogas**	**Motorcycles (g/km)**
34.58385	-	537.70934	8.05721	-	0.23450	262.83636	5.20743	-	0.09119	-	-	-	-	3.39440
Buses Eft 2029														
23.67301	-	77.54291	2.91586	-	0.11086	86.82026	1.88861	-	0.04311	-	-	-	-	2.05169
% change 2023-2029														
-32%		-86%	-64%		-53%	-67%	-64%		-53%	0%	0%	0%	0%	-40%
Absolute Difference														
-10.9108	0	-460.166436	-5.14134	0	-0.12363	-176.0161011	-3.31882	0	-0.04808	0	0	0	0	-1.34271

Table K.2 Summary of Impact – Bus Fleet Improvements

Total Bus Δ	Total Reduction	% Change 2023-29 Road Emissions		
Worcester Road, Bromsgrove	-644.81441	-11.25%		
	Total/Road NOx Ratio	**% Change 2023-29 Total NOx**	**Banding**	**Compliant**
Total Bus Δ Worcester Road	78%	-8.79%	**Large**	**Y**

Bus Service Improvement Plan

Figure K.11 EFT Input - Bus Service Improvement Plan

Primary Inputs		Pollutants	Selected	Standard Outputs	Selected	Additonal Outputs	Selected
Area	England (not London)	NO_x	Y	Air Quality Modelling (g/km/s)		Breakdown by Vehicle	Y
Year	2023	PM_{10}		Emissions Rates (g/km)	Y	Source Apportionment	
Traffic Format	Detailed Option 2	$PM_{2.5}$		Annual Link Emissions		PM by Source	
All must be selected		CO_2				Primary NO_2 Fraction	
						Export Outputs	

SourceID	Road Type	Traffic Flow	% Car	% Taxi (black cab)	% LGV	% Rigid HGV	% Artic HGV
Worcs Rd combined	Urban (not London)	16791.5919	86.64807951	1.322090254	8.522122313	1.137474047	0.190571568

Advanced Options	Selected
Bespoke Base Fleets	
Bespoke Euro Fleet	Y
Fleet Projection Tool	

Click the button to:

Run EFT

Clear Input Data

% Bus and Coach	% Motorcycle	Speed(kph)	No of Hours	Link Length (km)	% Gradient	Flow Direction	% Load
1.655590498	0.524071812	20.8	24				

Figure K.12 Bespoke Euro Fleet – BSIP

Default Euro Proportions 2023 - England (not London)

Cars	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6 a/b/c	Euro 6 d-temp	Euro 6 d
Conventional Petrol	-	-	-	0.02	0.10	0.23	0.31	0.16	0.19
Hybrid Petrol				0.00	0.02	0.11	0.23	0.21	0.43
Plugin Hybrid Petrol					0.00	0.02	0.16	0.14	0.68
Conventional Diesel	-	-	-	0.01	0.10	0.34	0.37	0.09	0.08
Hybrid Diesel				0.00	0.00	0.01	0.10	0.23	0.65

LGVs	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6_1	Euro 6_2	Euro 6_3
Petrol LGV	-	-	-	0.03	0.08	0.12	0.07	0.21	0.50
Diesel LGV	-	-	-	0.01	0.06	0.19	0.12	0.26	0.36
Petrol Taxi	-	-	-	0.03	0.08	0.12	0.07	0.21	0.50
Diesel Taxi	-	-	-	0.01	0.06	0.19	0.12	0.26	0.36

Heavy Duty Vehicles	Pre-Euro I	Euro I	Euro II	Euro III	Euro IV	Euro V_EGR	Euro V_SCR	Euro VI	Euro II SCRRF	Euro III SCRRF	Euro IV SCRRF	Euro V SCRRF to EGR
Rigid HGVs	-	-	0.01	0.03	0.02	0.03	0.08	0.84	-	-	-	-
Artic HGVs	-	-	0.00	0.00	0.00	0.01	0.03	0.96	-	-	-	-
Conventional Buses	-	-	0.01	0.03	0.04	0.05	0.15	0.72	-	-	-	-
Hybrid Buses					-	0.20	0.59	0.21				
Conventional Coaches	-	-	0.01	0.03	0.04	0.05	0.15	0.72	-	-	-	-
Hybrid Coaches					-	0.20	0.59	0.21				

User Euro Proportions 2023 - England (not London)

Cars	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6 a/b/c	Euro 6 d-temp	Euro 6 d	
Conventional Petrol	-	-	-	0.02	0.10	0.23	0.31	0.16	0.19	OK
Hybrid Petrol				0.00	0.02	0.11	0.23	0.21	0.43	OK
Plugin Hybrid Petrol					0.00	0.02	0.16	0.14	0.68	OK
Conventional Diesel	-	-	-	0.01	0.10	0.34	0.37	0.09	0.08	OK
Hybrid Diesel				0.00	0.00	0.01	0.10	0.23	0.65	OK

LGVs	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6_1	Euro 6_2	Euro 6_3	
Petrol LGV	-	-	-	0.03	0.08	0.12	0.07	0.21	0.50	OK
Diesel LGV	-	-	-	0.01	0.06	0.19	0.12	0.26	0.36	OK
Petrol Taxi	-	-	-	0.03	0.08	0.12	0.07	0.21	0.50	OK
Diesel Taxi	-	-	-	0.01	0.06	0.19	0.12	0.26	0.36	OK

Heavy Duty Vehicles	Pre-Euro I	Euro I	Euro II	Euro III	Euro IV	Euro V_EGR	Euro V_SCR	Euro VI	Euro II SCRRF	Euro III SCRRF	Euro IV SCRRF	Euro V SCRRF to EGR	
Rigid HGVs	-	-	0.01	0.03	0.02	0.03	0.08	0.84	-	-	-	-	OK
Artic HGVs	-	-	0.00	0.00	0.00	0.01	0.03	0.96	-	-	-	-	OK
Conventional Buses	-	-	0.01	0.03	0.04	0.05	0.15	0.72	-	-	-	-	OK
Hybrid Buses					-	0.20	0.59	0.21					OK
Conventional Coaches	-	-	0.01	0.03	0.04	0.05	0.15	0.72	-	-	-	-	OK
Hybrid Coaches					-	0.20	0.59	0.21					OK

Default Vehicle Size Classes 2023 - England (not London)

	<1400	1400-2000	>2000
Petrol Car	0.59	0.32	0.09
Diesel Car	0.11	0.60	0.28
	N1 (I)	N1 (II)	N1 (III)
Petrol LGV	0.17	0.21	0.62
Diesel LGV	0.06	0.26	0.68

	3.5-7.5 t	7.5-12 t	12-14 t	14-20 t	20-26 t	26-28 t	28-32 t	>32 t
Rigid HGV	0.23	0.05	0.02	0.12	0.18	0.11	0.23	0.06

	14-20 t	20-28 t	28-34 t	34-40 t	40-50 t
Artic HGV	0.01	0.02	0.01	0.10	0.86

	Midi <=15 t	Standard 15 - 18 t	Articulated >18 t
Buses	0.31	0.69	-

	Standard <=18 t	Articulated >18 t
Coaches	0.50	0.50

User Vehicle Size Class 2023 - England (not London)

	<1400	1400-2000	>2000	
Petrol Car	0.59	0.32	0.09	OK
Diesel Car	0.11	0.60	0.28	OK
	N1 (I)	N1 (II)	N1 (III)	
Petrol LGV	0.17	0.21	0.62	OK
Diesel LGV	0.06	0.26	0.68	OK

	3.5-7.5 t	7.5-12 t	12-14 t	14-20 t	20-26 t	26-28 t	28-32 t	>32 t	
Rigid HGV	0.23	0.05	0.02	0.12	0.18	0.11	0.23	0.06	OK

	14-20 t	20-28 t	28-34 t	34-40 t	40-50 t	
Artic HGV	0.01	0.02	0.01	0.10	0.86	OK

	Midi <=15 t	Standard 15 - 18 t	Articulated >18 t	
Buses	0.31	0.69	-	OK

	Standard <=18 t	Articulated >18 t		
Coaches	0.50	0.50		OK

Figure K.13 EFT Output – BSIP

Source Name	Pollutant Name	All Vehicles (g/km)	All LDVs (g/km)	All HDVs (g/km)	Petrol Cars (g/km)	Petrol Hybrid Cars (g/km)	Petrol Plugin Hybrid Cars (g/km)	Diesel Cars (g/km)	Diesel Hybrid Cars (g/km)	Electric Cars (g/km)
Worcs Rd combined	NOx	5,708.36837	4,546.57896	1,161.78940	487.82635	11.74434	2.70717	3,180.49483	20.44993	-

Petrol Taxis (g/km)	Petrol Hybrid Taxis (g/km)	Diesel Taxis (g/km)	Electric Taxi (g/km)	Petrol LGVs (g/km)	Petrol Hybrid LGVs (g/km)	Petrol Plugin Hybrid LGVs (g/km)	Diesel LGVs (g/km)	Electric LGVs (g/km)	Rigid HGVs (g/km)	Rigid Electric HGVs (g/km)	Artic HGVs (g/km)	Artic Electric HGVs (g/km)
0.01659	1.31333	65.13524	-	2.83912	-	-	770.65765	-	313.06953	-	34.58385	-

Conventional Buses (g/km)	Hybrid Buses (g/km)	Electric Buses (g/km)	Biogas Buses (g/km)	Conventional Coaches (g/km)	Hybrid Coaches (g/km)	Electric Coaches (g/km)	Biogas Coaches (g/km)	TfL Conventional Buses (g/km)	TfL Hybrid Buses (g/km)	TfL Electric Buses (g/km)	TfL Biogas Buses (g/km)	Motorcycles (g/km)
537.70934	8.05721	-	0.23450	262.83636	5.20743	-	0.09119	-	-	-	-	3.39440

Figure K.14 Calculating Impact – BSIP

Source apportionment									
Source Name	**Pollutant Name**	**All Vehicles (g/km)**	**All LDVs (g/km)**	**All HDVs (g/km)**	**Total Cars**	**Petrol Cars (g/km)**	**Petrol Hybrid Cars (g**	**Petrol Plugin Hybric**	
Worcester Rd Combined	NOx	5,729.59774	4,567.80834	1,161.78940	3,724.45200	490.62290	11.81167	2.72269	
BSIP Eft 2029									
Worcs Rd EfT Less cars (BSIP)	NOx	5,708.36837	4,546.57896	1,161.78940	3,703.22262	487.82635	11.74434	2.70717	
% change 2023-2029									
Worcs Rd Less cars (BSIP)		-0.37%	-0.46%	0.00%	-0.57%	-0.57%	-0.57%	-0.57%	
Absolute Difference									
Worcs Rd Less cars (BSIP)		-21.2293764	-21.2293764	9.09495E-13	-21.2293764	-2.796550529	-0.067326521	-0.015519349	

Source apportionment													
Diesel Cars (g/km)	**Diesel Hybrid Cars**	**Electric Cars (g/**	**Petrol Taxis**	**Petrol Hyb**	**Diesel Tax**	**Electric Ta**	**Petrol LGV**	**Petrol Hyb**	**Petrol Plu**	**Diesel LGV**	**Electric LG**	**Rigid HGVs**	**Rigid Elect**
3,198.72758	20.56716	-	0.01659	1.31333	65.13524	-	2.83912	-	-	770.65765	-	313.06953	-
BSIP Eft 2029													
3,180.49483	20.44993	-	0.01659	1.31333	65.13524	-	2.83912	-	-	770.65765	-	313.06953	-
% change 2023-2029													
-0.57%	-0.57%	-	0.00%	0.00%	0.00%	-	0.00%	-	-	0.00%	-	0.00%	-
Absolute Difference													
-18.23274719	-0.117232813	0	-5.551E-17	-4.22E-15	-2.27E-13	0	-8.88E-16	0	0	0	0	1.648E-12	0

Source apportionment														
Artic HGV	**Artic Elect**	**Conventiona**	**Hybrid Bu**	**Electric Bu**	**Biogas Bus**	**Conventional C**	**Hybrid Co**	**Electric Cc**	**Biogas Co**	**TfL Conve**	**TfL Hybrid**	**TfL Electri**	**TfL Biogas**	**Motorcycles (g/km)**
34.58385	-	537.70934	8.05721	-	0.23450	262.83636	5.20743	-	0.09119	-	-	-	-	3.39440
BSIP Eft 2029														
34.58385	-	537.70934	8.05721	-	0.23450	262.83636	5.20743	-	0.09119	-	-	-	-	3.39440
% change 2023-2029														
0.00%	-	0.00%	0.00%	-	0.00%	0.00%	0.00%	-	0.00%	-	-	-	-	0.00%
Absolute Difference														
-1.3E-13	0	-3.4106E-13	-7.1E-15	0	-2.2E-16	-2.27374E-13	-3.6E-15	0	-6.9E-17	0	0	0	0	8.88E-16

Table K.3 Summary of Impact – BSIP

Total BSIP Δ	Total Reduction	% Change 2023-29 Road Emissions		
Worcester Road, Bromsgrove	-21.22938	-0.37%		
	Total/Road NOx Ratio	**% Change 2023-29 Total NOx**	**Banding**	**Compliant**
Total BSIP Δ Worcester Road	78%	-0.29%	**Small**	**N**

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
AQO	Air Quality Objective
AQS	Air Quality Strategy
ASR	Air quality Annual Status Report
BDC	Bromsgrove District Council
BEV	Battery Electric Vehicles
CO_2	Carbon Dioxide
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EC	Euro Code. European vehicle emission standards for pollution.
EEA	European Environmental Agency
EFT	Emissions Factor Toolkit
EV	Electric Vehicles

HGV	Heavy Goods Vehicles
ICE	Internal Combustion Engine
LAQM	Local Air Quality Management
LCWIP	Local Cycling and Walking Infrastructure Plan
LEV	Low Emission Vehicle
LEVI	Local Electric Vehicle Infrastructure
LGV	Light Goods Vehicles
NEVIS	National Electric Vehicle Insight and Support
NHS	National Health Service
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PHE	Public Health England
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
RCV	Refuse Collection Vehicles
WCC	Worcestershire County Council
WHO	World Health Organisation
WRS	Worcestershire Regulatory Services

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