BROMSGROVE DISTRICT COUNCIL

Cabinet

7th January 2026

Particulate Monitoring

Relevant Portfolio Holder		Councillor Kit Taylor
Portfolio Holder Consulted		Yes
Relevant Assistant Director		Simon Wilkes, Director - Worcestershire Regulatory Services
Report Author	Chris Poole Job Title: Specialist Lead Officer (Air Quality), WRS Contact email: chris.poole@worcsregservices.gov.uk Contact Tel: 01562 738069	
Wards Affected		All
Ward Councillor(s) consulted		No
Relevant Council Priority		Infrastructure & Environment
Non-Key Decision		
If you have any questions about this report, please contact the report author in advance of the meeting.		

1. RECOMMENDATIONS

The Cabinet RECOMMEND that:-

1) **additional monitoring of Particulate Matter (air pollution) be delivered as set out in Option E; and**
2) **subject to funding being identified and allocated accordingly a further report be brought back to Cabinet once final costs had been identified.**

2. BACKGROUND

2.1 Worcestershire Regulatory Services (WRS) have been asked by Council to prepare an options paper for additional Particulate Matter Monitoring within Bromsgrove District Council (BDC) area.

2.2 **Particulate Matter (PM)**

2.3 Poor air quality is the largest environmental risk to public health in the UK. 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.

2.4 Particulate Matter (PM) is considered to be the most important air pollutant in terms of health impacts. Long-term exposure to PM

increases mortality and morbidity from cardiovascular and respiratory diseases and can cause cancer. Effects are amplified in vulnerable groups including young children, the elderly, and those suffering from breathing problems like asthma. It is also causally linked to dementia and decline in cognitive function. There is growing evidence for associations with adverse birth outcomes and diabetes.

2.5 PM is not a single air pollutant; the composition of particles is in practice very complex, comprising variable amounts of organic and inorganic chemicals derived from direct emissions or from atmospheric processing.

2.6 PM is classified according to aerodynamic size in microns (one-thousandth of a millimetre):

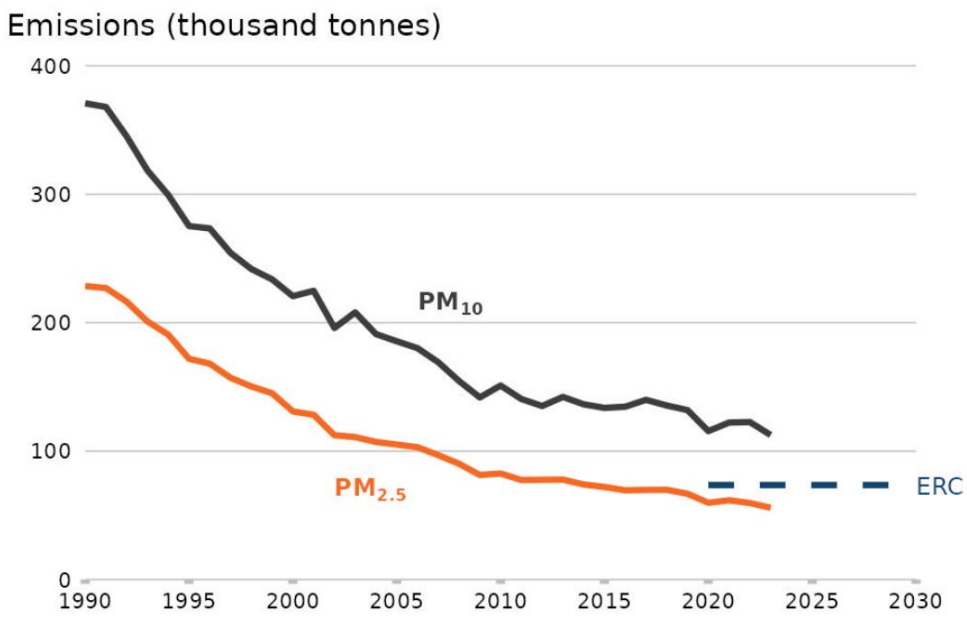
- coarse particles, PM_{10} (particles that are between 10 and 2.5 microns (μm) in diameter)
- fine particles, $PM_{2.5}$ (particles that are less than 2.5 μm in diameter)

2.7 Both PM and the gases that can form it are capable of being transported over large distances, so impacts may occur far from the original source.

2.8 Around **15% of UK PM** comes from naturally occurring sources, up to a **third** from other European countries and around **half from UK human-made sources** (Clean Air Strategy, 2019)

2.9 Appendix 1 demonstrates the various primary sources of PM in the UK (NAEI, 2025). NB this does not include secondary sources as a result of chemical mixing in the atmosphere.

Figure 3: Annual emissions of PM10 and PM2.5 in the UK: 1990 – 2023



Emissions of air pollutants in the UK – Particulate matter (PM10 and PM2.5) - GOV.UK

2.10 Reduction in burning of coal and improved emission standards for transport and industrial processes were major drivers for significant decreases of PM in the UK between 1990 and the early 2000's Since the late 2000s annual emissions of PM have continued to fall at a reduced rate.

2.11 Considerable decreases in emissions from some sources (e.g. road transport and energy industries) have been partly offset by increases in emissions from other activities, such as wood burning in domestic settings and the burning of biomass-based fuels in industry.

2.12 Emissions from road transport are expected to continue to decline with electrification of the vehicle fleet eliminating exhaust emissions which contribute 4% $PM_{2.5}$ and 2% PM_{10} of primary emissions (NAEI, 2025).

2.13 PM impacts from road sources are dominated by Non-Exhaust Emissions (Brake, Tyre and Road wear) 17% $PM_{2.5}$ and 16% PM_{10}. Brake wear (40%$PM_{2.5}$) is the largest source of NEE with 40% becoming airborne, tyre wear (70%$PM_{2.5}$) is second largest but only 1-5% becomes airborne.

2.14 Electrification will see brake emissions fall, albeit to a lesser degree than exhaust emissions, while tyre emission are expected to rise.

2.15 The upcoming Euro 7 regulations, starting in late 2026, will introduce limits on brake wear emissions, with tyre wear limits following in 2028.

2.16 **Local PM Monitoring and Data**

2.17 Following a successful bid to Defra's Air Quality Grant Scheme 2022-23, 26 low-cost Air Quality sensors were installed across Worcestershire for a period of 3 years between January and May 2024.

2.18 The sensors measure a range of pollutants including PM in real time and monitoring data is accessible via a public portal on WRS website.

2.19 Sensor locations have been chosen to maximise data capture within locations proximal to vulnerable communities, opportunities to encourage behavioural change and/or from a range of sources of air pollution including transport, solid fuel burning, industry and agriculture.

2.20 Three of the twenty-six sensors were installed in the Bromsgrove District, located at:

- Hanover Street, Bromsgrove
- Gunner Lane, Rubery
- Station Road, Hagley

2.21 Appendix 2 provides a graphical representation of PM data recorded by a selection of the sensors in 2024. The sensor data demonstrate similar peak profiles recorded across the County at all locations irrespective of proximity to strategic road or other local sources. This indicates that regional sources of PM from beyond the county borders are significant.

2.22 Appendix 3 provides a summary of averages of the data measured in Bromsgrove and across the county in the context of national air quality objectives and WHO guidelines. Summary:

- UK Annual Mean PM_{10} objective: 40µg/m^3
- Bromsgrove average: 10.86µg/m^3
- WHO Air Quality Guidelines PM_{10} Annual Mean is 15 µg/m^3

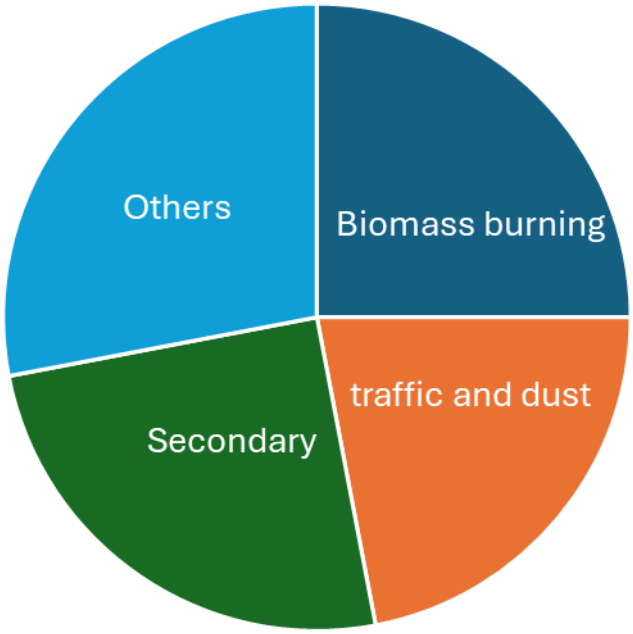
- UK Annual Mean $PM_{2.5}$ 2040 target: 10µg/m^3
- UK Annual Mean $PM_{2.5}$ 2028 target: 12µg/m^3
- Bromsgrove average: 6.99µg/m^3
- WHO Air Quality Guidelines $PM_{2.5}$ Annual Mean is 5 µg/m^3

2.23 No specific sources of PM or exceedances of national objectives have been identified in Worcestershire from 2024 sensor data requiring detailed assessment for Local Air Quality Management (LAQM) purposes at this time.

2.24 It should be noted that low-cost sensors, as well as other standard continuous monitors used in LAQM work, only measure total PM (mass) concentration and do not provide any chemical characterisation which is required to determine sources of PM.

2.25 **Source Apportionment of $PM_{2.5}$ opportunity**

2.26 A summary of a source apportionment of a $PM_{2.5}$ study undertaken by University of Birmingham (UoB) is provided in Appendix 4. This chemical characterisation includes primary and secondary sources of $PM_{2.5}$ pollution.



Contribution of different air pollution sources to $PM_{2.5}$ in Birmingham. Produced from data by Srivastava et al., 2015. This figure shows that biomass burning contributed to a quarter of the $PM_{2.5}$ mass, becoming the most important primary emitted $PM_{2.5}$.

2.27 The study utilised the Birmingham Air Quality Supersite (BAQS), monitoring equipment at another site in Birmingham and sophisticated lab analysis and expertise at the University to undertake the study.

2.28 The study has highlighted the increase of domestic wood burning and biomass burning as sources of PM over the last few decades.

2.29 UoB have recently embarked upon monitoring in Worcestershire to ascertain air quality upwind of Birmingham. A fixed supersite replicating the BAQS facility located at a Malvern Hills location for a period of 12 to 24 months from November 2025. This will be supported by a mobile supersite, mounted either within a van or temporary fixed sites each season over one year. This will provide invaluable insight into PM air pollution in Worcestershire culminating in a published paper in 2 - 3 years' time.

2.30 WRS have approached UoB to assist in the design and implementation of a local source apportionment study of PM in Worcestershire. The study will provide a characterisation of the sources of PM, similar to the UoB study outlined above, utilising the specialist monitoring equipment and expertise available from UoB at this time.

2.31 This is an exciting and unique opportunity unavailable to any other local authorities outside of Worcestershire now or at any other time.

2.32 We may anticipate higher levels of biomass and domestic wood burning, secondary aerosols driven by proximal agricultural sources and biogenic aerosols due to the more rural nature of Worcestershire, and regions upwind of the county, and a lower proportion of traffic related emissions than observed in the Birmingham study.

3. Additional Monitoring Options

3.1 **Low-cost sensors – increased units [Option A].** This option would include purchase and installation of between 1 and 5 additional low-cost sensors in locations to be determined by BDC.

- Costs: c.£11k (1 unit) to £44.5k (5 units)
- Timeline for delivery: 9 – 12 months following Council approval
- Data: PM_1, $PM_{2.5}$, PM_{10}, NO, NO_2 Monitoring Total only

3.2 **Low-cost sensors – extension [Option B]**. Current contract for 3 sensors expires in December 2026. This option would extend life of existing sensors for a further defined period, e.g. 1 – 3 years.

- Costs: c.£ 16.5k (3 units for 3 years, service and subscription) + 10% contingency for 2026 increase
- Timeline for delivery: January 2027 to provide continuous monitoring
- Data: PM_1, $PM_{2.5}$, PM_{10}, NO, NO_2 Monitoring Total only.

3.3 **Low-cost sensors – extension and relocation [Option C]**. As option B. but with additional costs and implementation time for relocation of units to new locations.

- Costs: c.£ 16.5k (3 units for 3 years, service and subscription) + £3k - £4k (relocate 1 – 3 units) + 10% contingency for 2026 increase
- Timeline for delivery: 6 – 9 months following expiry of existing contract or Council approval,
- Data: PM_1, $PM_{2.5}$, PM_{10}, NO, NO_2 Monitoring Total only.

3.4 **Source apportionment study with UoB – mobile supersite [Option D].** This option would utilise state of the art air quality monitoring equipment at a fixed location for one month in summer and one in winter providing a comprehensive set of PM observations. Data analysis and written report provided by experienced academic researcher.

- Costs (rough): c.£ 115,000 + 10% contingency
- Timeline for delivery: approximately 18 months
- Data: Chemical analyses and source apportionment of PM

3.5 **Combination [Option E]**. Option B (or C) and D combined.

- Costs: depending on final solutions
- Timeline for delivery: 6 – 9 months following expiry of existing contract or Council approval for option b (or c) aspect, timeline for option d approximately 18 months.
- Data: Continued automatic monitoring of a range of pollutants for a further period of 3 years and chemical analyses providing source apportionment assessment of PM

3.6 NB all timelines are indicative with consideration for required BDC procurement requirements: source suppliers and quotes, bid process, awarding contracts, and obtaining permissions from Worcestershire County Council for streetlight mounting, structural assessments of streetlights, civil engineering works and licenses as required, installation and power connections, availability of academic researcher and equipment, plus WRS officer time for project.

3.7 **Discussion of options**

3.8 Option A) provides least benefit in respect of PM data obtained of all the options and is the most expensive of the low-cost sensor options. From the data gathered in 2024, as seen in Appendix 2, and noted in section 2.22 above, similar profiles in PM data are recorded at all

locations across the County indicating regional sources of PM from beyond the county borders are significant. At this time, it is anticipated additional monitors will follow the same profile as recorded PM at existing locations and therefore provide minimal value in additional measured data. NB both options A and B will require implementation to increase the current network beyond 2026.

3.9 Option B) is the most beneficial of the low-cost sensor options from perspective of PM data obtained and the least expensive. This option provides data collection at existing locations for a longer period of time enabling continued assessment of concentrations in fixed locations and tracking of reductions or increases in ambient PM over time. Additionally, two of the current sensors are located near schools enabling opportunities to undertake behavioural change activities and the third is located in the one remaining Air Quality Management Area within the Bromsgrove district. Discounted service costs are anticipated through renewal and extension of the existing contract. Please note costings above could increase in 2026.

3.10 Option C) is considered to be the next best cost-effective sensor solution as it utilises existing units and it is anticipated will also benefit from discounted service costs through renewal of the contract. However, some additional costs would occur to relocate any of the units and there could be a period of no data collection between ending of current contract and actual installation at new location. Secondly, relocation of any units would end continued assessment capabilities as described in Option B) above. The benefits are the opportunity to obtain data at a new location, identified source and/or sensitive receptor.

3.11 Option D) provides a unique opportunity not available to any other local authority at any other time to gain insight into sources of PM in Worcestershire. This has greatest benefits in enhancing understanding of pollutant sources and utilising the data gathered and academic expertise available to inform future local, and potentially regional or national, strategies to address PM and other pollution. The mobile air quality supersite will be located at a single urban background location (such as a school) during two seasons (this could be extended to four seasons but doubles researcher staff costs). A constant power supply is required for the supersite and site needs to be secure. Locating at a school also provides an educational opportunity. Considering the EV range of the mobile supersite which is based at UoB campus, Bromsgrove district is an ideal location in the county for such a study.

3.12 Option E) provides ultimate benefit of combination of option B, maintaining current sensors and extending monitoring life for a further

period of time, and option D) providing unique insight into PM profile in Worcestershire utilising state of the art air quality monitoring equipment and supported by academic expertise.

3.13 **WRS recommendation is Option E comprising a combination of Option B and D**.

3.14 **Low-cost sensors – extension [Option B]**. This option would extend life of existing sensors for a further defined period, e.g. 1 – 3 years beyond expiration of current service and maintenance contract due December 2026.

- Costs: c.£ 16.5k (3 units for 3 years, service and subscription) + 10% contingency for 2026 price increases
- Timeline for delivery: January 2027 to provide continuous monitoring
- Data: PM_1, $PM_{2.5}$, PM_{10}, NO, NO_2 Monitoring Total only.

3.15 **Source apportionment study with UoB – mobile supersite [Option D].** This option would utilise state of the art air quality monitoring equipment at a fixed location for one month in summer and one in winter providing a comprehensive set of PM observations. Data analysis and written report provided by experienced academic researcher.

- Costs (rough): c.£ 115,000 + 10% contingency
- Timeline for delivery: approximately 18 months
- Data: Chemical analyses and source apportionment of PM

4. OPERATIONAL ISSUES

4.1 Please outline the reasons for the recommendations or resolutions listed in your report. Outlined above

4.2 Please discuss any operational implications with your Assistant Director. No further operational issues identified

4.3 Please refer to any system upgrades in this section, including for new IT software. No IT systems implications anticipated, will be provided by 3rd parties and incorporated into existing MyAir software (low cost sensors portal) depending on preferred option.

5. FINANCIAL IMPLICATIONS

5.1 The table below shows the estimated costs by each of the options outlined within this report:

	One-off
Option A	£11 – 44.4k
Option B	£16.5 - 18.1k
Option C	£16.5 - 23k
Option D	£115 - 126.5k
Option E	£131.5 – 149.5k

5.2 With any option, it is proposed that expenditure would in year 2026/27.

5.3 There is currently no assigned budget available for this project. Any agreement to the proposal would need to be considered alongside other competing bids for funding from reserves.

6. LEGAL IMPLICATIONS

6.1 Part IV of the Environment Act 1995, the Local Air Quality Management process (LAQM) and subsequent Policy Guidance (LAQM.PG22) and Technical Guidance (LAQM.TG22) documents set out the duty of local authorities to review and assess local air quality within their areas against a set of health-based objectives and work to improving poor air quality identified. Local Authorities in England are expected to report on nitrogen dioxide (NO_2), PM_{10} and sulphur dioxide (SO_2) as standard within their Annual Status Reports. Under the Environment Act 2021, the UK government have set 2 legally-binding long-term targets to reduce concentrations of fine particulate matter, $PM_{2.5}$. Whilst the responsibility for meeting the $PM_{2.5}$ targets sits with national government; local authorities have a role to play in delivering reductions in $PM_{2.5}$. and are also required to report on actions taken within their ASR. The proposal supports the council's obligations to assess local air quality within its boundaries in accordance with LAQM regulations.

6.2 Poor air quality in general can affect peoples' health, playing a role in many chronic conditions such as cancer, asthma, heart disease and neurological changes linked to dementia. Air pollution is estimated to contribute to between 26,000 to 38,000 deaths per year in England (Chief Medical Officer's Report, 2022). Particulate Matter is considered to be the most important air pollutant in terms of health impacts. PM can have short-term health impacts over a single day when concentrations are elevated. Long-term exposure to PM increases mortality and morbidity from cardiovascular and respiratory diseases and can cause cancer. Effects are amplified in vulnerable groups including young children, the elderly, and those suffering from

breathing problems like asthma. It is also causally linked to dementia and decline in cognitive function. There is growing evidence for associations with adverse birth outcomes and diabetes. The World Health Organization (WHO) advises there is no safe exposure level to PM.

7. OTHER - IMPLICATIONS

7.1 Local Government Reorganisation

7.2 No impacts on LGR because it is anticipated the proposed schemes will be implemented before 1st May 2028.

7.3 Climate Change Implications

7.4 No impacts on climate change.

7.5 Equalities and Diversity Implications

7.6 No equality and diversification implications.

8. RISK MANAGEMENT

8.1 Risk from not taking proposed action is limiting understanding of $PM_{2.5}$ within the district's boundaries. Risks from implementing proposed action is that additional monitoring may identify an exceedance of an objective that is a national issue and the local authority is limited in powers to resolve.

9. APPENDICES and BACKGROUND PAPERS

Appendix 1. PM sources (National Atmospheric Emissions Inventory)
Appendix 2. Low-cost sensor PM graphs 2024
Appendix 3. Low-cost sensor PM averages & National AQ Objectives
Appendix 4. WM-Air PM2.5 sources briefing note

9. REPORT SIGN OFF

Department	Name and Job Title	Date
Portfolio Holder	Councillor Kit Taylor.	Advised by email 09.12.2025
Lead Director / Assistant Director	Simon Wilkes	10.12.2025
Financial Services	Debra Goodall	09.12.2025
Legal Services	Nicola Cummings	11.12.2025
Policy Team (if equalities implications apply)	N/A	N/A
Climate Change Team (if climate change implications apply)	N/A	N/A