



The Impact of Poor Air Quality on Health

EFFECTS OF AIR POLLUTION



Up to
900 DEATHS
per year linked to man-made air pollution



LINKED TO

Heart disease
Diabetes
Asthma
Obesity
Cancer
Dementia



LINKED TO

Still births
Infant deaths
Low birth weight
Organ damage
Premature deaths



CHILDREN IN HIGH POLLUTION AREAS

x4

more likely to have reduced lung function when they become adults



61% OF JOURNEYS TO WORK ARE BY CAR OR VAN

Exposed to **21%** higher levels of pollution



Affects the **VULNERABLE & DEPRIVED** areas most



BUS & TAXI DRIVERS

are exposed to

3x



more pollution than anyone else

#BrumBreathes

Numbers have been rounded. Evidence provided by Public Health Birmingham, May 2017: birminghampublichealth.co.uk

 **Birmingham City Council**

A report from Overview & Scrutiny





Contents

Preface	3
Summary of Recommendations	4
1 The Public Health Challenge	8
1.1 The impact of air pollution on health nationally	8
1.2 The impact of air pollution on health in Birmingham	9
2 Air Quality in Birmingham	10
2.1 Legislative Standards	10
2.2 Monitoring and Compliance	10
2.3 Sources of air pollution	11
2.4 How we compare to other cities	12
3 The Health Effects	14
3.1 Main air pollutants that damage health	14
3.2 Particulate Matter (PM)	14
3.3 Nitrogen dioxide (NO ₂)	15
3.4 Effect on vulnerable population groups	16
3.5 Effect on health of children	16
4 The Transport Challenge	19
4.1 Birmingham Local Road Transport	19
4.2 Regional Road Transport	19
4.3 Buses	20
4.4 Rail Transport– Birmingham New Street Station	21
5 Why do we need to act now?	23
5.1 Legal action against UK Government	23
5.2 2016 High Court Judgment	23
6 What can be done to improve air quality?	24



The Impact of Poor Air Quality on Health

6.1	Clean Air Zones	24
6.2	Clean Air Zone Additional Measures	25
6.3	Wider Actions to address air quality	27
6.4	Trees and green infrastructure	27
7	Support from Central Government	29
7.1	A Legal Duty	29
7.2	Additional government measures	29
8	Conclusion	32
Appendix: Contributors		33

Further information regarding this report can be obtained from:

Lead Review Officers: Name: Rose Kiely/Gail Sadler

tel: 0121 303 1730 / 0121 303 1901

e-mail: rose.kiely@birmingham.gov.uk/

gail.sadler@birmingham.gov.uk

Reports that have been submitted to Council can be downloaded from www.birmingham.gov.uk/scrutiny.



Preface

By Councillor John Cotton

Chair, Health and Social Care Overview & Scrutiny Committee



Every year, nearly 900 people in Birmingham suffer an early death because the air they breathe is polluted. Others, often some of the most vulnerable and deprived of our fellow citizens, face a lifetime of dealing with chronic health conditions directly attributable to the pollutants in our atmosphere. There is no questioning the evidence linking the quality of our air to poor health: it is unambiguous and incontestable. It should also be a spur to action.

In the nineteenth and twentieth centuries, our predecessors in this Council faced similar public health challenges. They responded with bold leadership, taking the steps to clean up our water, improve our sanitation and tackle the root causes of disease and illness. Today, we should draw inspiration from their example and show the same resolve in removing the causes of so many preventable deaths and illnesses in 2017.

Tackling air pollution is not the responsibility of one organisation alone. It will require a collective effort, mobilising all levels of government and all parts of our economy and society. Our report sets out a series of recommendations and policy options that reflect this shared duty. Locally, there is a vital role for the City Council, not just with regard to its Public Health services, but also as the body that has the power to shape our local environment and give collective leadership to the city as a whole. The Council is in a unique position to focus attention on this issue and encourage partners to join with us in tackling the root causes of pollution.

The newly-elected West Midlands Mayor, along with Transport for West Midlands (TfWM), also have important roles to play. The evidence we received from TfWM showed that they see air pollution as a priority and this has also been echoed in public comments by the Mayor following his election. A strong partnership between the Council and our Combined Authority partners is essential to ensuring that these positive early steps are the start of a sustained regional effort to address the problem.

It is of course the Government who have ultimate ownership of the Clean Air Strategy and the Clean Growth Plan. As such they have a responsibility to ensure that local authorities are properly resourced to deliver the policies envisaged in these national plans and also to make full use of the fiscal and other policy levers they have at their disposal. Some of the changes that are needed to significantly reduce air pollution can only be delivered by clear leadership at a national level.

This report has been long in the making, reflecting the fact that as we have been taking evidence, the national policy environment has been continuing to evolve and we have had to adjust our recommendations accordingly. I would like to thank the many Council officers and external partners who gave evidence to the inquiry, together with the members of both Committees for their time and



The Impact of Poor Air Quality on Health

contribution over several months. We were, as ever, ably supported by our excellent Scrutiny Office staff, to whom I would also like to extend our thanks.

I hope that this report provides the basis upon which we resolve to act as firmly as our predecessors did. This is a public health crisis. We have to act and act now.

Councillor John Cotton



Summary of Recommendations

	Recommendation	Responsibility	Completion Date
R01	There is now clear and compelling evidence that poor air quality has an impact on general population health and child development. The evidence also shows that diesel vehicle emissions are the most prevalent and impactful source of health-affecting air pollution in Birmingham. The City Council needs to demonstrate leadership and take ownership of this issue by developing a strategy to address this effectively, with particular emphasis on selected priority hotspot zones where the risk of public exposure is highest.	Cabinet Member for Health & Social Care (working in conjunction with Cabinet Member for Clean Streets, Recycling & Environment, Cabinet Member for Transport and Roads and Chair of Planning Committee)	March 2018
R02	That, based on the evidence about the health impacts of poor air quality, the Executive should develop a clear policy approach that will move Birmingham progressively towards becoming a low air pollution City.	Cabinet Member for Health & Social Care Cabinet Member for Clean Streets, Recycling & Environment	March 2018
R03	That there should be a requirement for enhanced air quality monitoring across Birmingham, consisting of a comprehensive citywide network of sites, at both ambient and high-exposure locations, monitoring the most health-impactful pollutants. This will entail an examination of the resource implications regarding the number and optimal location of air quality monitoring stations. This monitoring information about air quality levels across the city should be made available to the public in an accessible format, with local online alerts to GPs and the public on days when weather conditions conspire to forecast risk of excessive exposure.	Cabinet Member for Clean Streets, Recycling & the Environment Cabinet Member for Health & Social Care	December 2019
R04	That Birmingham hospitals and other substantial public buildings be encouraged to consider adopting a smoke free zone initiative similar to the one being implemented by Birmingham Children's Hospital to protect vulnerable population groups, especially children, who are at higher risk of adverse health outcomes from exposure to air pollution.	Cabinet Member for Health & Social Care	March 2018



The Impact of Poor Air Quality on Health

R05	That the City Council should engage with schools, colleges and Higher Educational Institutions to develop an education programme to raise awareness about air quality and to explore the use of existing and new technology to monitor air quality around schools and colleges.	Cabinet Member for Children, Families & Schools Cabinet Member for Health & Social Care	March 2019
R06	That, in order to facilitate better traffic management at a local level, authority should be sought from government to enable the West Midlands Combined Authority to enforce legislation enacted in Part 6 of the Traffic Management Act 2004 in relation to moving traffic infringements.	Cabinet Member for Transport & Roads	March 2018
R07	That the Cabinet Member should liaise with the West Midlands Combined Authority to seek to accelerate the introduction of buses with a minimum emissions requirement of Euro VI or Ultra Low Emission Vehicles for all buses going into the city centre and to work with bus operators to accelerate the implementation of future plans for the introduction of greener vehicles in the city.	Cabinet Member for Clean Streets, Recycling & Environment Cabinet Member for Transport & Roads	March 2018
R08	That when planning for future transport infrastructure consideration should be given to the wider and longer-term benefits of keeping mature trees, especially in roadside locations where a buffering effect on air pollution is provided; and that appropriate protection for mature trees should be incorporated into any planning permission granted.	Chair of Planning Committee	December 2019
R09	That planning for new developments should incorporate the planting of trees of a suitable species in the right place with careful selection of the species to be planted, density of placement of the trees and with provision for appropriate maintenance for a period after planting, as a condition of planning for new developments.	Chair of Planning Committee	December 2019



R10	That the City Council should continue to collaborate with other cities to lobby central government to ensure that the proposed Clean Air Strategy and Clean Growth Plan provide an appropriate national policy framework for tackling air quality issues.	Leader to Central Government	December 2018
R11	That the City Council will respond with demonstrable proposals to the forthcoming government consultation on diesel scrappage schemes.	Leader to Central Government	December 2018
R12	That the City Council can evidence that it is accessing appropriate funding as set out in the 'UK plan for tackling roadside nitrogen dioxide concentrations'.	Cabinet Member for Health & Social Care	December 2018
R13	That the City Council can show that any additional measures, which may include charging owners of non-compliant vehicles, are based on evidence provided through a local feasibility study.	Cabinet Member for Transport & Roads	December 2018
R14	That the City Council should continue to collaborate with the West Midlands Mayor to build on the vision set out in the Birmingham Connected Transport Strategy to get clarity and commitment about the measures needed to support sustainable and inclusive growth and achieve compliance with air quality limits across the region.	Leader to West Midlands Mayor	March 2018
R15	Progress towards achievement of these recommendations should be reported to the Health & Social Care O&S Committee no later than March 2018. Subsequent progress reports will be scheduled by the Committee thereafter, until all recommendations are implemented.	Cabinet Member for Health & Social Care	March 2018



1 The Public Health Challenge

1.1 The impact of air pollution on health nationally

- 1.1.1 Significant progress has been made in improving air quality in recent decades. In spite of this and in spite of the fact that current concentrations of many recognised harmful pollutants are now at the lowest they have been in the UK since measurements began, medical evidence shows that many thousands of people still die prematurely every year because of the effects of air pollution.
- 1.1.2 The evidence from Public Health England was that within the UK, air pollution is the largest environmental risk linked to deaths every year.¹ The Committee was told that both long and short-term exposure to air pollution are known to adversely affect health. Short-term exposure (over hours or days) to elevated levels of air pollution can cause a range of effects including exacerbation of asthma, effects on lung function, increases in hospital admissions and mortality. Epidemiological studies have shown that long-term exposure (over several years) reduces life-expectancy, mainly due to increased risk of mortality from cardiovascular and respiratory causes and from lung cancer.
- 1.1.3 It has also now been firmly established that air pollution (particulate matter, nitrogen dioxide, sulphur dioxide and ozone) contributes to thousands of hospital admissions per year.² While other components of air pollution damage health, particularly at high levels of exposure, there is strong evidence of harm from lower levels of pollution caused by long-term population wide exposure to nitrogen dioxide and particulate matter.
- 1.1.4 Recently evidence on the health impact of exposure to nitrogen dioxide (NO₂) has strengthened significantly.³ It is well established that exposure to high concentrations of NO₂ causes inflammation of the airways, decreased lung function and respiratory symptoms but there is now evidence directly linking NO₂ exposure to mortality. When this evidence is applied to the exposure levels across the UK it suggests that exposure to NO₂ is increasing mortality by the equivalent of 23,500 deaths per year. Additionally the impact of exposure to particulate matter pollution (PM_{2.5}) is estimated to have an effect on mortality equivalent to nearly 29,000 deaths in the UK.² There

¹ PHE (2015) Understanding the impact of particulate air pollution, Public Health Matters, PHE blog. Available at <https://publichealthmatters.blog.gov.uk/wp-content/uploads/sites/33/2015/11/sunset4.pgn>

² Committee on the Medical Effects of Exposure to Air Pollutants (1998) 'Quantification of the Effects of Air Pollution on Health in the United Kingdom'. Available (Archived) at http://webarchive.nationalarchives.gov.uk/20130107105354/http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@ab/documents/digitalassets/dh_118120.pdf

³ Committee on the Medical Effects of Air Pollutants (COMEAP) (2015) 'Statement on the Evidence for the Effects of Nitrogen Dioxide on Health'. Available at <https://www.gov.uk/government/publications/nitrogen-dioxide-health-effects-of-exposure>



may be overlaps between these two estimates of mortality, but the combined impact of these two pollutants is a significant challenge to public health.

- 1.1.5 The quality of the air in our cities is vital to people's health and to the environment. The submission by Public Health England made it clear that air pollution is now associated with a much greater public health risk than was understood even a decade ago, and more associated adverse health effects are emerging. There is evidence that both nitrogen dioxide and particulate matter pollution can affect health even below current air quality guidelines and there is no safe level of either pollutant that does not harm health. The evidence referred to above shows that, even allowing for possible overlaps and using conservative estimates, every year in Britain in the region of 40,000 people die prematurely as a result of air pollution.

1.2 The impact of air pollution on health in Birmingham

- 1.2.1 The evidence from Birmingham Public Health was that man-made outdoor air pollution in Birmingham causes just under 900 premature deaths per year. That is over half the number of deaths attributed to tobacco use and has a harm profile remarkably similar to that caused by tobacco smoke. Most deaths are due to stroke and coronary heart disease.
- 1.2.2 Birmingham performs poorly on air quality related health measures according to indicators in the Public Health Outcome Framework and pollution undoubtedly affects respiratory health which is an area in which all Birmingham Clinical Commissioning Groups have poor outcomes.
- 1.2.3 For Birmingham, an estimated 5.7% of all-cause mortality is attributable to air pollution.



2 Air Quality in Birmingham

2.1 Legislative Standards

- 2.1.1 Birmingham Environmental Health provided evidence to the inquiry about the legislative standards and set out the pollutants for which local authorities have a statutory responsibility to report. They provided data on the network of air quality monitoring stations, data on the concentrations of main pollutants, emission sources, levels and sources of air pollution in Birmingham and also in specific pollution hotspots. They provided information about compliance with air quality objectives in Birmingham and how these rates compare to other major cities.
- 2.1.2 It was explained that the City Council has a duty to report air quality data and to comply with certain objective levels of emission limits on seven specified pollutants as identified in the Local Air Quality Management Policy Guidance produced by Defra. Local authorities have a responsibility to report on these under the Local Air Quality Management (LAQM) regime. These are Nitrogen Dioxide (NO₂), Particulate matter (PM₁₀), Sulphur Dioxide (SO₂), Benzene, 1,3-Butadiene, Carbon Monoxide and Lead.
- 2.1.3 Particulate matter is made up of a wide range of materials arising from a variety of sources and is generally categorised on the basis of the size of the particles. Although there is a requirement for the City Council to report on and comply with certain levels for larger particles (PM₁₀), there is no requirement for the City Council to comply with any emission limits for fine particles (PM_{2.5}). A limit value for PM_{2.5} does exist but the duty lies with the Government. Monitoring for PM_{2.5} is done at two sites in Birmingham which show levels significantly below the limit value. However, it was stressed that there is no safe limit for PM_{2.5} exposure and fine particles have a well-recognised health impact and therefore it is important to seek reductions in such pollution to promote and safeguard public health.

2.2 Monitoring and Compliance

- 2.2.1 Birmingham Environmental Health provided detailed evidence about the network of air quality monitoring stations maintained by them. These incorporate both real time monitoring stations (RTMS) which sample air in real time and provide outputs over a short period e.g. five minute averages and also passive stations which sample over a longer period to provide an average concentration e.g. monthly. The RTMS are mostly established and maintained at the same location for a number of years to give more accurate trends, whereas the passive sites, which mostly monitor for nitrogen dioxide (NO₂), are more flexibly used. Members were given information about the locations of the real time automatic monitoring sites, data for all the pollutants monitored at each of the stations over a number of years which is reported to Defra on an annual basis, together with data on exceedances. The Committee queried the adequacy of the coverage and



location of the RTMS across the city and whether there should be a requirement for enhanced air quality monitoring to be more widely distributed across the city.

- 2.2.2 In relation to this point, the Committee received written evidence from ClientEarth which included their response to the Defra consultation on the implementation of Clean Air Zones (CAZs) in England. Their response to Question 2, about whether there are additional measures which should be highlighted under each theme, was as follows:

Yes. We welcome the focus on using CAZs to raise awareness. Signage will support this. However, there should also be a requirement for enhanced air quality monitoring and public information in CAZs. Ensuring that a minimum number of monitoring stations are in place within a CAZ, and that data from those stations is made publicly available both online and on electronic displays, will greatly enhance public understanding and allow local authorities to more accurately assess the effectiveness of CAZs. A national awareness raising campaign should also be introduced, using social media, television and billboards, explaining why CAZs are being introduced and highlighting the multiple health and environmental benefits which they will bring.

- 2.2.3 In terms of compliance with air quality objectives, Members were told that from the perspective of fulfilling statutory air quality reporting requirements, which is different to a public health perspective, the only pollutant of concern in Birmingham was, and remains, nitrogen dioxide (NO₂). The whole city was designated an Air Quality Management Area (AQMA) for NO₂ in January 2003 on the basis of observed and predicted continued exceedance of the annual mean level for NO₂ within the Air Quality Objective. Apart from a declaration for particles which was subsequently revoked on the basis that there had been no exceedance nor was there any future exceedance predicted, no other pollutant has been identified as warranting a declaration. For this reason, Environmental Health maintain a network of passive diffusion tubes, which are relatively cheap and easy to deploy and provide a reasonably accurate output, to monitor this pollutant. Members were provided with information about the locations of these sites and with indicative results for 2016 which had not been finalised at the time that evidence was given.

- 2.2.4 Subsequent to the evidence gathering, the Inquiry was provided with the results of a first round of air pollution monitoring done by Ecosutton using passive diffusion tubes over a period of two weeks between 7th July and 21st July 2017 in the vicinity of a number of schools in Sutton Coldfield. The results, which it must be stressed only represent a snapshot of the air pollution levels for the place and time monitored and are not comparable to annual data, did however show that levels at 2 out of the 18 sites monitored, were above the European Union legal mean annual limit for nitrogen dioxide.

2.3 Sources of air pollution

- 2.3.1 There are limits on emissions of harmful pollutants from many sectors but this is outside of the scope of this inquiry. Harmful pollutants are produced from a variety of sources including industrial and agricultural emissions from a wide range of sources ranging from intensive pig and poultry



The Impact of Poor Air Quality on Health

farms to chemical manufacturing sites and power stations. However, for the purposes of this inquiry, the data in Birmingham from the RTMS and the network of passive diffusion tubes show that the main emissions of relevance in Birmingham are nitrogen dioxide (NO₂) and particulate matter (PM).

- 2.3.2 In the UK the biggest human-made sources of particulate matter are stationary fuel combustion and transport. Road transport gives rise to primary particles from engine emissions, tyre and brake wear and other non-exhaust emissions. All combustion processes in air produce oxides of nitrogen (NO_x). Nitrogen dioxide (NO₂) and nitric oxide (NO) are both oxides of nitrogen and together are referred to as NO_x. Road transport is the main source followed by the electricity supply industry and other industrial and commercial sectors.⁴
- 2.3.3 It was explained to members that although it is known that the primary source of NO₂ is from road traffic, how this actually translates into local emissions is known as 'source apportionment'. Evidence was presented modelling NO_x concentration on the A38 fronting the Mailbox. The largest source of emissions was from local sources (118.4 compared to 66.9 from regional and urban background combined). The largest contributor to the local sources are diesel cars followed by diesel light goods vehicles. Evidence of source apportionment from the Low Emissions Towns & Cities Programme Low Emission Zone Technical Feasibility Study also showed that in relation to the daily traffic on the A38 near to the Children's Hospital the greatest proportion of NO₂ emissions is from diesel cars and diesel light goods vehicles.

2.4 How we compare to other cities

- 2.4.1 The UK, as an EU Member State, has to report air quality data on an annual basis under the EU Directive on ambient air quality and cleaner air for Europe (2008/50/EC). This covers a range of pollutants but of particular relevance are the limit values for NO₂. The UK has remained in breach of the EU limit values for NO₂ since failing to meet the deadline for compliance in 2010.
- 2.4.2 For the purposes of air quality monitoring, the Government has created 43 discrete areas within the UK and assessed each area for compliance against EU limit values. Birmingham sits within the West Midlands Urban Area (WMUA) and the government has predicted that the WMUA would have the second largest amount of non-compliance, second only to London. The model shows that the WMUA would still be non-compliant by 2020 but by 2025 would be compliant.
- 2.4.3 Of the 43 areas, the Government predicted that only six cities are projected to exceed the limit values in 2020 – London, Birmingham, Leeds, Nottingham, Derby and Southampton. For the five cities outside London, the Government requires the introduction of Clean Air Zones, along with additional measures in Leeds and Birmingham. In London the Mayor has already agreed to introduce a range of measures including the introduction of the Ultra-Low Emission Zone. The

⁴ Source: [https://uk-air.defra.gov.uk/assets/documents/What are the causes of Air Pollution.pdf](https://uk-air.defra.gov.uk/assets/documents/What%20are%20the%20causes%20of%20Air%20Pollution.pdf)



Government has directed Birmingham to deliver compliance as soon as possible and by 2020 at the latest. In the WMUA area it was only two areas within Birmingham city centre that were predicted to be in exceedance and hence the decision to mandate the CAZ.



3 The Health Effects

3.1 Main air pollutants that damage health

- 3.1.1 The Committee heard evidence from both Birmingham Public Health and from Public Health England about the main air pollutants and about their impact on public health. The evidence shows that both nitrogen oxides, principally NO₂, which is the basis of the Clean Air Zone, and particles including PM_{2.5} are linked to mortality in the Public Health Outcomes Framework. Both of these pollutants are mainly created from the internal combustion engine, especially those powered by diesel fuels. Vehicular road traffic is the major source of both NO₂ and PM_{2.5} and both are linked to a range of health effects.
- 3.1.2 Members were told that there is evidence that both of these pollutants can affect health even below current air quality guidelines. Reference was made to the UK expert panel (Committee on the Medical Effects of Air Pollutants or COMEAP)⁵ investigating the health impact which has declared that there are no safe limits for PM_{2.5} and NO₂.

3.2 Particulate Matter (PM)

- 3.2.1 Particulate air pollution is a complex mixture of many chemical components which form particles of different sizes with PM_{2.5} and PM₁₀ being the regulated size fractions. These particles are emitted directly from a range of human-made sources, such as road traffic, solid fuel combustion and natural sources such as desert dust and sea salt, or are formed by chemical reactions in the atmosphere.⁶
- 3.2.2 The evidence submitted by Public Health England said that the most consistent and convincing evidence suggests an important role for fine particulate matter (PM_{2.5}) in causing the observed adverse health effects, although other outdoor air pollutants such as nitrogen dioxide (NO₂) and ground-level ozone are also known to cause adverse health effects. There is strong evidence for the impact of short and long-term exposure to PM_{2.5} on cardiovascular health, lung cancer, reduced life expectancy, reduced lung function and heightened severity of symptoms in individuals with asthma, chronic lung disease, ischaemic heart disease and stroke^{7, 8}. It is estimated that long-term

⁵ COMEAP "The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom" Committee on the Medical Effects of Air Pollutants 2010

⁶ Fine Particulate Matter (PM_{2.5}) in the UK. Air Quality Expert Group, UK. Available at https://uk-air.defra.gov.uk/assets/documents/reports/cat11/1212141150_AQEG_Fine_Partuculate_Matter_in_the_UK.pdf

⁷ J.C.F Frank, J Kelly "Air pollution and public health: emerging hazards and improved understanding of risk" Environ Geochem Health, vol 37 p631-649 2016

⁸ RCP "Every breath we take: the lifelong impact of air pollution. Report of a working party," Royal College of Physicians, 2016



exposure to particulate air pollution (PM_{2.5}) has an effect equivalent to around 29,000 deaths a year in the UK.²

- 3.2.3 Members were also told about emerging evidence which suggests an effect of PM_{2.5} on children if their mothers were exposed to higher levels during pregnancy with links to adverse birth outcomes (low birth weight, preterm birth, infant mortality, neurodevelopmental harm, small for gestational age), airway inflammation and increased susceptibility to respiratory infection.^{5,6}
- 3.2.4 There is also evidence that children living in more polluted environments based on measures of PM_{2.5} are more likely to experience asthma symptoms, low lung function and increased vulnerability to Chronic Obstructive Pulmonary Disorder (COPD) in adulthood^{5,6}. Long term exposure to PM_{2.5} throughout life has also been associated with increased risk of obesity, Type 2 diabetes, changes in cognitive function including dementia and social isolation.⁶

3.3 Nitrogen dioxide (NO₂)

- 3.3.1 Evidence from Public Health England showed that on average around 80% of oxide of nitrogen (NO_x) emissions in areas where the UK is exceeding NO₂ limit values is due to transport, although urban and regional background non-transport sources are still considerable.⁹ The largest source is emissions from diesel light duty vehicles (cars and vans) where the emissions standards have had least impact and there has been significant growth in vehicle numbers over the last ten years in the UK.
- 3.3.2 Members were told that up until now, although studies had shown associations of NO₂ in outdoor air with adverse health effects, it had been unclear whether these effects were caused by NO₂ itself or by other pollutants emitted by the same sources, such as road traffic. However, evidence associating NO₂ with health effects has strengthened substantially in recent years and it is now thought that, on the balance of probability, NO₂ itself is responsible for some of the health impact found to be associated with it in the studies. However members were told that attributing health outcomes from exposure to individual constituent pollutants in emissions is not simple which supports the need to tackle emissions in general and not necessarily to focus on individual pollutants.¹⁰
- 3.3.3 It is known that NO₂ particularly at high concentrations, is a respiratory irritant that can cause inflammation of the airways. Studies have also shown associations of NO₂ in outdoor air with reduced lung development and respiratory infections in early childhood and effects on lung function in adulthood.

⁹ Defra (2015) Improving air quality in the UK: Tackling nitrogen dioxide in our towns and cities. Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/486636/aq-plan-2015-overview-document.pdf

¹⁰ HPA (2009) Smallbone K. Direct delivery of predicted air pollution information to people with respiratory illness: an evaluation, Health Protection Agency (HPA): Chemical Hazards and Poisons Report, Issue 15.



The Impact of Poor Air Quality on Health

3.4 Effect on vulnerable population groups

- 3.4.1 Air pollution is harmful to everyone. However there are some occupational groups who are more exposed to outdoor air pollution, including those who work outside close to traffic pollution such as street cleaners, freight drivers and taxi and bus drivers. There is some evidence that taxi and bus drivers are exposed to three times the levels of outdoor air pollution in their vehicles.^{6,11,12}
- 3.4.2 There are also some groups who, although they may not necessarily have increased exposure to outdoor air pollution compared to the general population, may be at a higher risk of adverse health outcomes due to air pollution. These would include people living in areas of deprivation who may experience a magnified effect as a result of living on a low income with limited access to healthy food and/or green spaces, in poor housing conditions with poor indoor air quality and who may experience higher levels of chronic stress which reduces the body's resilience to toxicants present in polluted air.
- 3.4.3 Other groups at higher risk include pregnant women and the unborn child, children in high pollution areas who are four times more likely to have reduced lung function when they become adults, older adults whose risk of death from PM₁₀ exposure is twice that of younger populations and adults with pre-existing medical conditions who are at increased risk of serious adverse health events such as an asthma attack, stroke or heart attack.^{6,13}

3.5 Effect on health of children

Harmful exposures can start in the mother's womb and increase the risk of premature birth. Additionally, when infants and pre-schoolers are exposed to indoor and outdoor air pollution and second-hand smoke they have an increased risk of pneumonia in childhood, and a lifelong increased risk of chronic respiratory diseases, such as asthma. Exposure to air pollution may also increase their lifelong risk of heart disease, stroke and cancer.¹⁴

- 3.5.1 The Committee heard evidence from Birmingham Children's Hospital about the impact of air quality on the health of Birmingham's children and about the learning from the Trust's recent smoke-free zone outside the hospital. Members were told that the Trust routinely receives feedback from family members of patients about smoking outside the hospital and that the hospital carried out an eight week on-line consultation to understand how strongly people felt about the hospital pursuing establishment of the zone.

¹¹ J Wargo "Children's Exposure to Diesel Exhaust on School Buses," Environment & Human Health, 2002

¹² T. Johns "How much diesel pollution am I breathing in?" BBC, 2016. Available <http://www.bbc.co.uk/news/magazine-35717927>

¹³ AEA Technology "Air Quality and Social Deprivation in the UK: an environmental inequalities analysis," Department of Environment, Food & Rural Affairs, 2006

¹⁴ Dr Margaret Chan, World Health Organisation Director-General, News Release, 6 March 2017 Geneva The cost of a polluted environment: 1.7 million child deaths a year, says WHO.



Smoke free zone

- 3.5.2 The majority of people who responded supported action to stop people from smoking outside of the hospital and agreed that a smoke-free zone was the right way to do this. Support was very strong amongst staff and family members of patients. The zone is currently voluntary but the hospital was, at the time of writing, in consultation with the City Council about implementation. There is no consistent evidence base around harm from environmental tobacco smoke inhaled by passing bystanders but it was explained that the Trust's primary motivation for pursuing the zone is the experience and reaction of children, young people and families. Smoking is perceived as harmful behaviour and people expect to be able to arrive at an NHS site without walking through exhaled tobacco smoke. It was suggested that it would be helpful if all hospitals and other public buildings could be encouraged to consider adopting a similar smoke free zone initiative.
- 3.5.3 One point which emerged from the discussion with all members was that there needs to be a strong and consistent public health message about the importance of good air quality and how we value the health of our citizens and especially our children. This needs to be taken up and relevant information about the impact of poor air quality on health disseminated more widely in order to raise awareness amongst the public, to strengthen public understanding and help people to make informed choices about their behaviour and lifestyle.
- 3.5.4 Members heard that there is clear evidence of harm to children from poor air quality and about the growing body of literature that indicates there should be concern about the impact of air quality on the health of children in Birmingham. This gave rise to a discussion about the variety of local SMS messaging services already available such as airAlert¹⁵ and airTEXT¹⁶ which can be used to alert vulnerable people to advice about air quality and the fact that it would be useful for schools to be alerted and aware of the systems available but that there is currently no consistency in schools. It would be useful for the City Council to liaise with schools to explore what can be done to develop an education programme to raise awareness about air quality and to look at where existing and new technology can be used to assist with monitoring of air quality around schools.

Birth outcomes

- 3.5.5 Evidence was submitted from Birmingham Children's Hospital about several studies examining potential ways that air pollutants can have an impact on birth outcomes. The best evidence from one review was that increased exposures to Sulphur Dioxide (SO₂) during pregnancy made pre-term births more likely and that increased exposure to PM_{2.5} during pregnancy made low birth weight births more likely.¹⁷ Children who are low birth weight are more likely to have poorer growth in childhood. The impact of this is a higher incidence of adult diseases such as type 2 diabetes, hypertension and circulatory disease.

¹⁵ airAlert www.airalert.info

¹⁶ airTEXT www.airtext.info

¹⁷ Shah PS, Balkhair T, Knowledge Synthesis Group on Determinants of Preterm/LBW births. Air pollution and birth outcomes: a systematic review. Environment international. 2011 Feb 28;37(2):498-516



The Impact of Poor Air Quality on Health

Congenital anomalies

3.5.6 There was also evidence from Birmingham Children's Hospital that air pollution may contribute towards congenital anomalies. In particular both NO₂ and SO₂ were related to increased numbers of children born with significant defects in the structural arrangement of the new-born heart.

Infant mortality

3.5.7 Members were told that long term exposure to particulate matter has been linked with overall child mortality and that increased risk was found for post-neonatal infant deaths (between one month and one year) and for deaths from Sudden Infant Death Syndrome.

Asthma

3.5.8 COMEAP has issued statements agreeing that evidence supports the view that ambient air pollution causes irritation and inflammatory responses of the airways and exacerbates symptoms of asthma. COMEAP concluded in 2010 that the evidence is consistent with the possibility that outdoor air pollution might play a role in causing asthma amongst susceptible individuals.¹⁸

Childhood leukaemia

3.5.9 Evidence was highlighted showing that exposure to residential traffic after birth increases the risk of childhood leukaemia. There was no increased leukaemia risk from prenatal exposure.

¹⁸ COMEAP. Does Outdoor Air Pollution Cause Asthma? 2010



4 The Transport Challenge

4.1 Birmingham Local Road Transport

- 4.1.1 Transport is the primary source of emissions. Evidence was presented from Birmingham Transport and Connectivity about local road transport, sources of emissions which impact on local air quality and the transport challenge this presents for Birmingham. This reinforced the previous evidence from Environmental Health and Public Health that local road transport is the greatest source of emissions which impact on local air quality and create problems of exposure to concentrations of pollutants at harmful levels.
- 4.1.2 The scale of the transport challenge for Birmingham needs to be understood in the context of the projected growth in population and employment as described in the Birmingham Development Plan (BDP) which was set out in the evidence presented to the members. By 2031 the population of the city is expected to grow by some 150,000 people and it is estimated that the total demand for travel on our transport system both from Birmingham residents and people living outside Birmingham could rise to 4 million trips by 2031. The BDP forecasts 51,000 new jobs and 13,000 new homes in the city centre by 2031, with 75,000 people living in the city centre which is an increase of 30,000. This is estimated to create an additional 140,000 daily trips which is a 30% increase from 480,000 trips currently to and within the city centre, or 56,000 extra vehicles.
- 4.1.3 Using current car ownership levels and travel habits, Birmingham's growth could result in an additional 80,000 cars in the city, 200,000 more daily car trips, 100,000 more residents on public transport and 18,000 more public transport passengers arriving in the city centre in the morning peak period.
- 4.1.4 It is clear that a significant reduction in transport emissions will be needed if air quality in Birmingham is to be improved. Bringing about this change will be difficult and will require the promotion of a more sustainable approach to transport in order to reduce emissions and improve air quality.

4.2 Regional Road Transport

- 4.2.1 In relation to transport's contribution to air quality, evidence was presented about the number of licenced vehicles (fleet composition) in 2015 and about some of the work already underway beginning with the revision of City Council policies in relation to the transport system with a view to keeping vehicles moving and with a view to making the transition to a cleaner fleet.
- 4.2.2 There is a close working relationship between the City Council and Transport for West Midlands (TfWM) which is the transport arm of the West Midlands Combined Authority. This includes much



The Impact of Poor Air Quality on Health

work being done with TfWM on lower emission vehicles and other new technologies and on the immediate priority of pursuing a number of sites in relation to a Park and Ride Scheme.

- 4.2.3 Work has also started on developing a framework across the West Midlands Combined Authority (WMCA) area. Members were told that The M6 Toll could be better utilised and that TfWM are working with other West Midlands local authorities on various projects including traffic optimisation. Members were told that TfWM are actively lobbying government for the WMCA to be granted permission to manage traffic better at a local level. This would require the WMCA to be given the power to enforce the legislation enacted in Part 6 of the Traffic Management Act 2004 in relation to moving traffic infringements, which would significantly aid traffic management locally. This power has already been granted in London where Transport for London have already been empowered to issue fines for moving traffic violations.
- 4.2.4 TfWM have compiled an analysis of Defra's air quality assessments of the UK's zones that required an air quality action plan to reduce nitrogen dioxide in 2015. The relevant zone for Birmingham is the West Midlands Urban Area which also contains other surrounding areas including the Black Country. The analysis provided some useful comparisons.
- 4.2.5 The evidence provided by TfWM showed that the West Midlands Urban Area ranked:
- Second for total road length exceeding the national air quality objective for nitrogen dioxide. Only the Greater London Urban Area had more road length exceeding the air quality objective.
 - Second for the total road length per square kilometre exceeding the national air quality objective for nitrogen dioxide. Only the greater London Urban Area had more road length per square kilometre exceeding the air quality objective.
 - Fourth for proportion of assessed roads exceeding the national air quality objective for nitrogen dioxide, exceeded only by the Greater London Urban Area, Kingston-Upon-Hull and Coventry and Bedworth zones.
 - Equal fourth for the maximum modelled annual mean (which occurred on the A4400 near to the Mailbox) exceeded only by Greater London Urban Area, West Yorkshire Urban Area, North West and Merseyside and the Eastern Zones.

4.3 Buses

- 4.3.1 The written evidence provided to the Committee on behalf of the West Midlands Campaign for Better Transport referred to the fact that much progress has been made in recent years in improving the quality of bus services within the West Midlands and the fact that much of this progress is due to the fact that a "bus alliance" has been established. This is a partnership between the majority of bus operators in the area including the two largest, National Express West Midlands and Diamond, the West Midlands Combined Authority, the Local Enterprise Partnerships,



local authority highways/transportation departments and Transport Focus. The key objective of the alliance is to improve the quality of bus services in the West Midlands in terms of passenger experience and by providing a more modern fleet.

- 4.3.2 A statutory Quality Bus Partnership Scheme has been established in Birmingham city centre which includes a requirement that the majority of buses going into the city centre should have a minimum emissions requirement of Euro V or newer. This has removed the older, more polluting vehicles from key routes into Birmingham. However, many of these vehicles have now been displaced onto routes in the outer suburbs. One of the aims of the bus alliance is for all bus services in the West Midlands (Birmingham, Sandwell, Solihull, Walsall, Wolverhampton, Dudley and Coventry) to be operated by Euro V or newer vehicles by 2020.¹⁹ Given the air quality issues in Birmingham which have already been evidenced and given the overriding importance of delivering the 2020 target, it would seem desirable for the City Council and the WMCA to seek to accelerate this for routes within the city.
- 4.3.3 Given that the vast majority of routes in Birmingham are still operated by diesel powered buses, the City Council should also seek to work with bus operators to discuss plans to seek to accelerate the introduction of greener vehicles in the city.

4.4 Rail Transport– Birmingham New Street Station

- 4.4.1 In the course of the evidence gathering the issue of the air quality at Birmingham New Street Station was raised and Network Rail attended the March meeting to provide evidence about the air quality monitoring at New Street Station. As part of the recent station redevelopment a new impulse fan ventilation system has been installed which monitors carbon dioxide (CO₂) levels and automatically activates fans which work in conjunction with the wind direction and dependent on the sensor readings. The system allows for different train types as the extraction points are not fixed as they had previously been with the old system.
- 4.4.2 Members were told about the research project which Network Rail have been undertaking with the University of Birmingham to carry out a comprehensive assessment of air quality at Birmingham New Street. The project uses diffusion tubes to measure average CO₂ concentrations on the platforms and station concourse. Personal monitoring was also done with Network Rail staff for one week in January 2017 measuring for black carbon and PM_{2.5}. Data on background city emissions, train operations and weather data was also captured. At the time of giving evidence members were told that the data was being checked and processed with corrections made for calibration and missing data and that the data would be analysed and a report produced by the University of Birmingham over the following few months.

¹⁹“Introduction to the West Midlands Bus Alliance”. West Midlands Combined Authority 2016



The Impact of Poor Air Quality on Health

- 4.4.3 The Committee was told that currently the station is served by a mix of rolling stock, of which 694 train services per day (45%) are diesel powered. Future opportunities around orders for the purchase of hybrid trains and opportunities for further electrification were mentioned. There are currently proposals for a Rugeley - Walsall electrification programme which should be fully completed by the end of 2018 which will reduce emissions by 10% which is a substantial reduction. The creation of both West Midlands Rail, a partnership between WMCA, the West Midlands shire counties and the DfT, and Midlands Connect will provide more local influence over decisions on rail services including new rolling stock and infrastructure enhancements.



5 Why do we need to act now?

5.1 Legal action against UK Government

- 5.1.1 ClientEarth brought proceedings against the UK government in the High Court, Court of Appeal, UK Supreme Court and Court of Justice of the European Union over illegal levels of nitrogen dioxide pollution. In 2015 the UK Supreme Court said that in view of ongoing breaches of NO₂ legal limits, which were not projected to stop until in some cases after 2030, the UK Government had to prepare new air quality plans in accordance with Article 23 of the Ambient Air Quality Directive (the Directive), by the end of December 2015. The Directive requires that where limit values (i.e. legal limits) of air pollutants are breached, air quality plans must be prepared containing “appropriate measures so as to keep the exceedance period as short as possible”.
- 5.1.2 As required by the Supreme Court order, the UK Government published a new Air Quality Plan (AQP) in December 2015. However, ClientEarth was not satisfied that the measures included in the AQP were sufficient to meet legal limits in the shortest time possible and so in March 2016 ClientEarth brought new legal proceedings to challenge the AQP in the High Court.

5.2 2016 High Court Judgment

- 5.2.1 In November 2016 the High Court ruled in favour of ClientEarth, declaring that the AQP did not comply with the Directive and ordering that it be quashed.
- 5.2.2 The Court held that the Government must aim to achieve compliance with limit values by the soonest possible date. The Government must take steps to ensure that meeting the value limits “is not just possible but likely”.²⁰ This means that though the Secretary of State can determine the measures to adopt, the measures selected must be both scientifically feasible and effective in achieving compliance.
- 5.2.3 The Court ordered that the 2015 AQP be modified to achieve nitrogen dioxide limits as soon as possible. The modified plans were published in draft in April 2017 for public consultation, along with relevant technical information. The UK air quality plan for bringing nitrogen dioxide air pollution within statutory limits entitled the “UK plan for tackling roadside nitrogen dioxide concentrations” was published in July 2017. The plan requires local authorities to set out initial action plans to achieve statutory NO₂ limits within the shortest possible time, by the end of March 2018. These will be followed by final plans by the end of December 2018.

²⁰ R (ClientEarth) v Secretary of State for the Environment, Food, and Rural Affairs (No2) [2016] EWHC 2740 (Admin), Paragraph 95



6 What can be done to improve air quality?

6.1 Clean Air Zones

- 6.1.1 Mandated Clean Air Zones (CAZs) are areas where targeted types of vehicles are charged to enter an area unless they meet certain emission standards. These were identified as the most effective measure to improve air quality in the 2015 AQP. Five cities, Birmingham, Derby, Leeds, Nottingham and Southampton, were required to implement CAZs by 2020 and there was a requirement for the existing CAZ in London to be improved.
- 6.1.2 Birmingham will be mandated by Government to introduce a CAZ. It is unclear at the moment whether Birmingham will be mandated to introduce a specific category of CAZ and, if so, which category that will be, but the evidence to date has suggested that Birmingham would need to introduce a Category C CAZ with additional measures. As previously set out in paragraph 2.4.3, the Government is requiring the introduction of CAZs where only the cleanest vehicles are encouraged through the use of a charge related to vehicle emissions for the five cities outside London with modelled air quality predicted to exceed the limit values beyond 2020.
- 6.1.3 Members were told that analysis by Defra for the 2015 UK Air Quality Action Plan suggested that in order to achieve compliance with NO₂ limits before 2020 Birmingham would need to introduce a Class C CAZ with additional measures. It is anticipated that these additional measures could include a combination of improved signage and rerouting, switching to different forms of transport such as Park and Ride, road improvements and infrastructure for alternative fuels such as electric vehicle charging points and support for the use of compressed natural gas. A Class C CAZ would not include private cars.
- 6.1.4 The Council is currently preparing a feasibility study to provide an evidence base for the design and development of the CAZ that the Council will ultimately implement. The design process will need to include a thorough assessment of the wider impacts of the CAZ on the city and the final design will need to ensure, as a minimum, that levels of nitrogen dioxide in the city are reduced below the regulatory limit as soon as possible. This will require a combination of transport focused incentives and disincentives to ensure better decisions about the way that people and goods are transported. The study will inform major decisions that will need to be made about the area the CAZ will cover, whether larger static combustion plants which produce a background level of pollution should be included, as was suggested by Birmingham Friends of the Earth in their evidence, what vehicles should be included and how it will be enforced. The importance of taking a city-wide approach to clean air in order to prevent the diversion of traffic and relocation of the problem to areas outside the city centre was emphasised by Birmingham Friends of the Earth in



their evidence to Committee and also by ClientEarth who emphasised that a certain “critical mass” is necessary in relation to the size and location of a CAZ to encourage vehicle upgrade rather than simply exacerbating pollution on the perimeter of the CAZ.

- 6.1.5 The written evidence from ClientEarth suggested that more realistic modelling required following the High Court ruling in November 2016 against the Government's 2015 air quality plan is likely to require CAZs to be mandated in other cities and to include more classes of vehicles. They indicated that in those cities where CAZs have already been mandated, it is likely that they will have to apply to more classes of vehicles in order to achieve compliance as soon as possible.
- 6.1.6 The source apportionment evidence presented by Birmingham Environmental Health and summarised previously in paragraph 2.3.3 shows that the greatest contributors to local NO₂ emission sources are diesel cars followed by diesel light goods vehicles (LGVs). The evidence is that their proportion of the vehicle fleet is growing. There are numerous difficult issues that need to be considered before any decision is made about the design of the CAZ and these will be informed by the evidence from the feasibility study that is currently in progress. However, given the evidence that diesel emissions are a major source of air pollution in Birmingham and given the clear and compelling evidence of the impact that poor air quality has on health, the City Council needs to demonstrate leadership and take ownership of this issue by developing a strategy to address this effectively.

6.2 Clean Air Zone Additional Measures

- 6.2.1 Based on the assumption that Birmingham would be introducing a CAZ which did not include private cars, Defra have initially indicated that the CAZ in Birmingham in isolation is unlikely to be sufficient to achieve compliance and that a number of additional complementary measures will be required in order to achieve compliance by 2020. Defra's initial assessment suggested that these additional measures could be a combination of improved signage and rerouting, switching to different forms of transport (e.g. use of Park and Ride), road improvements, and infrastructure for alternative fuels (e.g. support for the use of compressed natural gas).
- 6.2.2 As part of the feasibility study, an assessment of potential additional measures will be produced to identify the most appropriate package of interventions to support the implementation of the CAZ and to achieve compliance before 2020.
- 6.2.3 TfWM provided evidence to the Committee about a number of additional initiatives that will complement the implementation and success of the CAZ.

Movement for Growth

- 6.2.4 The West Midlands Strategic Transport Plan “Movement for Growth” sets out the long term ambitions for transport in this area. The Plan has been adopted and is now being developed and delivered by TfWM. Making progress to provide clean air and tackling poor air quality are key



The Impact of Poor Air Quality on Health

objectives and promoting clean air and improving public health are at the heart of the vision as stated in “Movement for Growth”:

“We will make great progress for a Midlands economic ‘Engine for Growth’, clean air, improved health and quality of life for the people of the West Midlands.”

6.2.5 There are key policy objectives included to tackle poor air quality:

- Policy 9 – To significantly improve the quality of the local environment.
- Policy 10 – To help tackle climate change by ensuring a large decrease in greenhouse gases from the West Midlands Metropolitan Area’s transport system; and
- Policy 11 – To significantly reduce diabetes, obesity, respiratory and cardiovascular problems through reduced transport emissions and increased active travel.

HS2 Connectivity Package

6.2.6 Although the delivery of much of the HS2 Connectivity Package is scheduled beyond the implementation of the CAZ in Birmingham, the intention is that once it is delivered, the impact of transport on the environment will be reduced which will help to improve air quality in Birmingham.

The West Midlands Low Emission Bus Delivery Plan

6.2.7 The West Midlands Low Emission Bus Delivery Plan was published in July 2016 and articulates an ambition for delivering low emission buses to help address the region’s significant air quality problems. The Plan highlights areas where deployment of low emission buses should be prioritised and sets out a timeline for achieving a reduction in nitrogen oxides emissions by over 90% by 2035.

West Midlands Freight Strategy

6.2.8 Efficient logistics is recognised as a key issue for TfWM. The West Midlands Freight Strategy and Implementation plan helps to give TfWM the tools to work with businesses to provide improved access to the West Midlands by road and rail, new ways of managing deliveries, a range of techniques to reduce emissions, noise and congestion caused by goods vehicles, support for the introduction of very low emissions or zero emissions delivery systems and commitment to deliver these improvements through a partnership with businesses and government.

West Midlands Low Emissions Framework

6.2.9 It has been agreed at WMCA level to progress a number of measures to reduce emissions and TfWM are working with the Low Emissions Towns and Cities Programme (LETCP) which is a partnership of the seven West Midlands local authorities working together to improve air quality and reduce emissions from road transport.

6.2.10 The partnership will explore a wide variety of measures. The aim is to work towards developing and adopting agreed metropolitan wide policies and targets to accelerate the uptake and adoption of Ultra Low Emissions Vehicles (ULEVs) and associated infrastructure which includes increasing hydrogen and gas refuelling opportunities. The work also encompasses looking at Low Emission Zones or Clean Air Zones and the range of issues associated with these. This would include where



appropriate using accelerated timescales to clean up buses, measures aimed at improving traffic management and coordination through a West Midlands Key Route Network, policies and targets for the cleaning of public and commercial fleets, encouraging the wider roll out of Car Clubs and active travel measures, developing the metropolitan Strategic Cycle Network, targeted policies towards zero emission taxi and private hire fleets and exploring Green Travel Districts.

6.3 Wider Actions to address air quality

- 6.3.1 However, improving air quality isn't just about transport policy and infrastructure. Air quality is affected by decisions in many policy areas and improving air quality is a shared responsibility across many Council functions including public health, economic strategy, planning strategy, development control, environmental protection, licensing and public protection, sustainability, energy and procurement.
- 6.3.2 A wider programme of activities and initiatives with partners, stakeholders, businesses and communities will be necessary to bring about the improvements in air quality needed. These could include a range of measures such as awareness raising, implementing recommendations from a review of the Council fleet to promote the rapid phasing out of diesel vehicles, promoting alternative modes of travel with the public such as cycling and walking and promoting the use of and making enhancements to the public transport fleet and working with schools and community organisations.

6.4 Trees and green infrastructure

- 6.4.1 While trees are not a replacement for other strategies to improve air quality, tree planting can be a valuable and cost effective part of an overall package of measures to alleviate air pollution and to mitigate against rising temperatures in cities. Planting, maintaining and replacing of urban trees can absorb air pollution and release oxygen through photosynthesis and improve air quality. A considerable wealth of evidence was presented by Birmingham Trees for Life from studies around the world proving that tree leaves can filter out harmful particulate matter from smoke, pollen and dust and many other pollutants from the atmosphere. For example:

Researchers from Lancaster University placed a screen of 30 trees in planters in front of houses and then looked at the effect on the concentrations of fine particulate air pollutants inside the homes. They reported that, compared to houses without trees, the screened houses showed only half the indoor concentrations of particulate matter, ranging in size from 1 to 10 micrometers (PM_{10} , $PM_{2.5}$ and PM_{10}). Analysis of the trees leaves showed that the surfaces of their leaves were trapping particles similar to those found inside the houses.²¹

²¹ <https://www.accessscience.com/content/urban-tree-leaves-remove-fine-particulate-air-pollution/BR0116141>
<http://pubs.acs.org/doi/abs/10.1021/es404363m>



The Impact of Poor Air Quality on Health

- 6.4.2 The point was emphasised that the retention of mature trees is also crucial to the ability of the tree canopy to contribute to this and that the removal of healthy mature trees and replacement with young trees reduces the ability of the overall tree canopy to trap particulates and absorb NO₂. When considering the approach to the future planning for transport infrastructure, this should include consideration of the wider and longer-term benefits of keeping mature trees and to incorporate appropriate protection for mature trees into any planning permission when giving permission for transport infrastructure. The evidence also referred to other scientific studies showing that the shade cast by trees, in addition to the transpiration of water during photosynthesis, can help to reduce air temperatures.
- 6.4.3 Evidence was also referred to about the many wider benefits to general health and wellbeing of trees, green infrastructure and the wider urban nature network which go beyond alleviating air pollution. These include studies showing that public housing residents with nearby trees and grass were more effective in coping with major life issues compared to those with homes surrounded by concrete, and to studies in Japan of forest walking which have found the effects of improved immune system response, lowered stress indicators, reduced depression and lower glucose levels in diabetics.
- 6.4.4 In the light of the undoubted benefits to people and the environment it was suggested that trees should be included as a part of development opportunities in the city. The broad approach to planning for new developments should incorporate the planting of trees of a suitable species in the right place with careful selection of the spaces to be planted, density of placement of the trees, with provision for appropriate maintenance for a period after planting as a condition of planning for new developments.



7 Support from Central Government

7.1 A Legal Duty

7.1.1 The Government is under an obligation to reduce NO₂ concentrations throughout the country to the legal limits set under Article 23 of the European Ambient Air Quality Directive. The duty is an absolute, unqualified one which was enacted to safeguard human health.

7.1.2 Whilst there is rightly much emphasis placed on action at a local level and there are many local initiatives to tackle air pollution being carried out in our major cities, there are also many issues which are beyond the influence or control of local authorities. This means that our cities need greater leadership and support from Government to tackle the issue effectively. Air pollution is not a problem that local authorities can solve alone.

7.1.3 This was reflected by ClientEarth in their response to the Defra consultation on the implementation of CAZs in England. Their response to Question 3 asking whether there are other positive measures that local or central government could introduce to encourage and support clean air in our cities was:

Yes. This consultation places too much emphasis on the role of local authorities, with little or no additional resources or support from Central Government. Action at the local level needs to be complemented by action by central government, which holds most of the policy levers capable of delivering the necessary step-change.

7.1.4 This view was also supported by Transport for West Midlands in their written response to a question about the potential barriers to CAZs being implemented widely in the city to which the response was:

TfWM believe that Defra's "Implementing Clean Air Zones in England" consultation are [sic] a real missed opportunity to fully promote clean air, as indicted [sic] in the recent consultation response. Greater national action from Government is required in order to help improve air quality.

7.2 Additional government measures

Greater action to reduce the use of diesel vehicles

7.2.1 As was pointed out by ClientEarth in their response to the consultation on the implementation of CAZs in England, action at local level needs to be complemented by action by central government which holds most of the policy levers capable of delivering the scale of change that will be necessary. The Government needs to make greater use of these levers which they control such as reforming fiscal policies like Vehicle Excise Duty and Company Car Tax to provide dis-incentives to purchasing diesel cars to encourage a reduction in the use of diesel vehicles which do not meet the Euro 6 emission standard under real driving conditions. This should include further incentives



The Impact of Poor Air Quality on Health

to encourage the uptake of ultra-low emission vehicles and the City needs to continue to collaborate with other cities to lobby the Government to introduce a Clean Air Strategy with a Clean Growth Plan which provides an appropriate national policy framework for tackling air quality issues.

Encouraging Ultra Low Emission Vehicle (ULEV) take-up.

- 7.2.2 Whilst the additional funding commitments to encourage ULEV take-up made in the 2016 Autumn Statement and the recent funding to support the development of electric vehicle charging infrastructure were welcomed, it is clear that further incentives will need to be provided by Government to encourage ULEV take-up. An improved national Industrial Strategy to build ULEV markets and additional funding to encourage ULEV take-up will be needed. It was suggested that the Government should consider prioritising investment in ULEV technology in cities and city regions, such as the West Midlands, where it can be demonstrated that the investment would help to solve the problem. It was also suggested that the forthcoming national Industrial Strategy should be strengthened to help to transform the UK's vehicle manufacturing industry from producing diesel vehicles to ULEVs quickly to support local requirements in cities where air quality improvements are needed.
- 7.2.3 Both ClientEarth as part of their response to the Defra Consultation on the implementation of CAZs in England and Birmingham Friends of the Earth in their evidence to Committee made the case for the creation of a carefully designed, targeted diesel scrappage scheme to encourage people to exchange their old diesel vehicles. ClientEarth suggested in their consultation response that this could potentially be focused on drivers who are on low incomes and/or who have no alternative to driving their vehicle in a CAZ so that the scheme does not penalise those motorists least able to afford to change to less polluting vehicles. The City Council needs to respond with demonstrable proposals to the forthcoming government consultation on diesel scrappage schemes.

Funding for local action

- 7.2.4 Whilst local action is needed and there is a significant role for local authorities in tackling air quality locally, these additional demands are being placed on local authorities at a time of diminishing local authority financial resources. Implementing, operating, enforcing and monitoring a CAZ present a considerable financial cost to local authorities. This is coupled with wider resource and skills shortages given the challenge facing cities with air quality and the scale of action which is likely to be needed. This needs to be taken into account and factored into any plans with Government and local government working collaboratively to ensure resources are targeted effectively and that any action taken offers value for money. In their evidence to the House of Commons Environment, Food and Rural Affairs Committee Report on Air Quality, which was published in April 2016, ClientEarth calculated that Clean Air Zones would cost councils £24 million to establish while government grants only represented a small fraction of that.
- 7.2.5 Councils will be permitted to set charges for CAZs so as to recoup costs but not to raise additional revenue, but no assessment is available at this stage about the possible level of charge that would fully cover the costs of operating the scheme or be acceptable to local communities. In order for



local programmes to cut pollution to be successfully implemented, Councils need to be given support to implement these programmes and should be recompensed for the costs of implementing CAZs which they can't recover from imposing reasonable charges on drivers. Additional funding is being made available from central government for local authorities to cover the implementation costs and any other ongoing operational costs of CAZs. The City needs to be able to demonstrate that it is accessing appropriate funding as set out in the "UK plan for tackling roadside nitrogen dioxide concentrations" and also to demonstrate that any additional measures taken, which may include charging owners of non-compliant vehicles, are based on evidence provided through a local feasibility study.

- 7.2.6 The use of national frameworks wherever possible could also provide support for local authorities and help to improve the effectiveness of CAZs. One example suggested by ClientEarth was a "clean car" label that identifies whether or not cars actually meet emissions standards when driving on the road which would help to guide consumer choice and could also improve the effectiveness of CAZs. The development of standardised signage and other equipment which could be used by local authorities in any CAZ would also help to reduce costs for local authorities and would also ensure more coherence, consistency and public understanding.

National Strategic Highway Network

- 7.2.7 The West Midlands motorways in general are a main source of exceedances for the WMCA area and the M6 is a major source of air quality emissions with the vast majority of traffic undertaking non-local trips. The M6 motorway has sections which carry 130,000 vehicles per day and estimates are that as many as 60% of all these trips are undertaking strategic journeys which either pass through the West Midlands or have a destination outside the West Midlands. Local Highway Authorities have very limited influence to be able to mitigate these emissions and Highways England and the Department for Transport needs to play a stronger role in relation to air quality exceedances on the strategic highway network.



8 Conclusion

- 8.1.1 The impact of poor air quality on health and the need to take action urgently to tackle the problem is becoming increasingly clear. The evidence demonstrates that poor air quality is a major public health issue. In Birmingham, Public Health estimate that poor air quality causes approximately 900 premature deaths a year. It is rapidly becoming clear that exposure to air pollution is associated with a much greater public health risk than had previously been understood and evidence about associated adverse health effects is emerging all the time.
- 8.1.2 There is also growing recognition that air quality is a major cross-cutting issue. It has a wide impact and any effective response to the issue will require a joined-up approach across a number of Council areas of responsibility. It will also necessitate joint working together with communities, businesses and other partners across the city and across the wider West Midlands region with the West Midlands Combined Authority and the West Midlands Mayor.

Birmingham needs to respond to the challenge of improving air quality and achieving compliance with air quality limits as soon as possible. But local action alone will not be sufficient to produce a successful solution to reducing emissions. Responding to the problem successfully, achieving compliance and bringing about the scale of behaviour change needed will require a very clear and consistent message to be communicated about the health implications of poor air quality. The City Council needs to continue to collaborate with the West Midlands Mayor to build on the vision set out in the Birmingham Connected Transport Strategy and to take a lead to get clarity and commitment about the measures needed to both support sustainable and inclusive growth and to achieve compliance with air quality limits across the region.

Motion

That the recommendations R01 to R15 be approved, and that the Executive be requested to pursue their implementation.



Appendix: Contributors

The Committee would like to thank all those who have taken the time to contribute to this inquiry.

Contributor	Organisation
Kevin Blacktop	Senior Research and Development Specialist, Network Rail
Kevin Chapman	Chair, West Midlands Campaign for Better Transport
Dr Chris Chiswell	Consultant in Public Health Medicine, Birmingham Children's Hospital NHS Foundation Trust
Nigel Cripps	Member of the public
Alec Dobney	Unit Head, Environmental Hazards & Emergencies Dept., CRCE, Public Health England
Karen Exley	Senior Environmental Public Health Specialist, Air Pollution & Climate Change Unit, CRCE, Public Health England
Jane Harding	Project Manager, Birmingham Trees for Life
David Harris	Transport Policy Manager, Birmingham City Council
Libby Harris	Birmingham Friends of the Earth
Adam Harrison	Senior Policy Officer, Transport for West Midlands
Dr Wayne Harrison	Assistant Director of Public Health, Birmingham City Council
Kris Jeffrey	Occupational Health, Network Rail
Andrea Lee	Healthy Air Campaigner, ClientEarth
Simon Needle	Birmingham Trees for Life
John Newson	Birmingham Friends of the Earth
Paul O'Day	Street Services Manager, Birmingham City Council
Patrick Power	Station Manager, New Street Station, Network Rail
Cllr Victoria Quinn	Birmingham City Council
Anne Shaw	Assistant Director, Transportation & Connectivity, Birmingham City Council
Kath Taylor	Ecosutton
Cllr Lisa Trickett	Lead Cabinet Member for Reducing Air Pollution, Birmingham City Council
Mike Waters	Head of Policy & Strategy, Transport for West Midlands
Cllr Fiona Williams	Birmingham City Council
Mark Wolstencroft	Air Quality Lead in Environmental Protection, Birmingham City Council