MANCHESTER JOINT STRATEGIC NEEDS ASSESSMENT
ADULTS AND OLDER PEOPLE

CHAPTER: Wider Determinants of Health

TOPIC: Air Quality

WHY IS THIS TOPIC IMPORTANT?

Air pollution is the biggest environmental threat to public health in England and any improvement in air quality will have positive health consequences. Long-term exposure to air pollution causes the most health problems but some population groups are more susceptible to short-term exposure than others. The Lancet Commission on pollution and health found that pollution is the largest environmental cause of disease and death in the world today, responsible for nine million deaths worldwide in 2015. Air pollution has the biggest proportional impact, accounting for two-thirds of deaths from pollution. Most of these deaths were caused by non-infectious diseases linked to pollution, such as heart disease, stroke and lung cancer.

Evidence of the local mortality burdens associated with particulate air pollution collated by Defra, Public Health England and the Local Government Association (LGA) shows that short-term exposure to high levels of air pollution can cause a range of adverse health effects including exacerbation of asthma, effects on lung function, increases in hospital admissions and mortality. A review of the evidence on health aspects of air pollution by the World Health Organization (WHO) concluded that long-term exposure to air pollution reduces life expectancy by increasing deaths from lung, heart and circulatory conditions.

The website of the British Lung Foundation website contains a user-friendly summary of air pollution - what it is, where it comes from, who's at risk and what people can do about it.

EU and UK regulations set limit values on concentrations in *outdoor air* of major pollutants that impact public health such as particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2). NO_2 pollution comes primarily from the combustion of fossil fuels, including domestic and commercial boilers but particularly in fuel for motor vehicles, and especially diesel powered vehicles. As a result, NO_2 pollution particularly affects people living in major towns and cities where there are high concentrations of vehicles and other sources of pollution. The correlation between NO_2 pollution and road transport is most clearly illustrated by reference to the current Greater Manchester Air Quality Management Area (AQMA), which shows areas of exceedance and is focused on the busiest parts of the road network, particularly motorways and radial routes, and areas where these converge, such as the City Centre (see Appendix 1).

Research on UK pollution published by the Royal College of Physicians (RCP) and Lancet Countdown collaboration shows that 44 UK cities are in breach of recommended World Health Organization (WHO) guidelines for air quality.

Whilst NO_2 is the only pollutant that the UK currently exceeds the legal limits for (and therefore the WHO guideline safe exposure levels), other harmful pollutants, particularly PM_{10} and $PM_{2.5}$ particulate matter are also linked to the combustion of fossil fuels, as well as from the wear and tear of machinery associated with their use, such as vehicle engines or brake discs, and dust from construction work. Many of the sources of NO_2 are also sources of particulate matter and measures to address NO_2, such as the use of electric

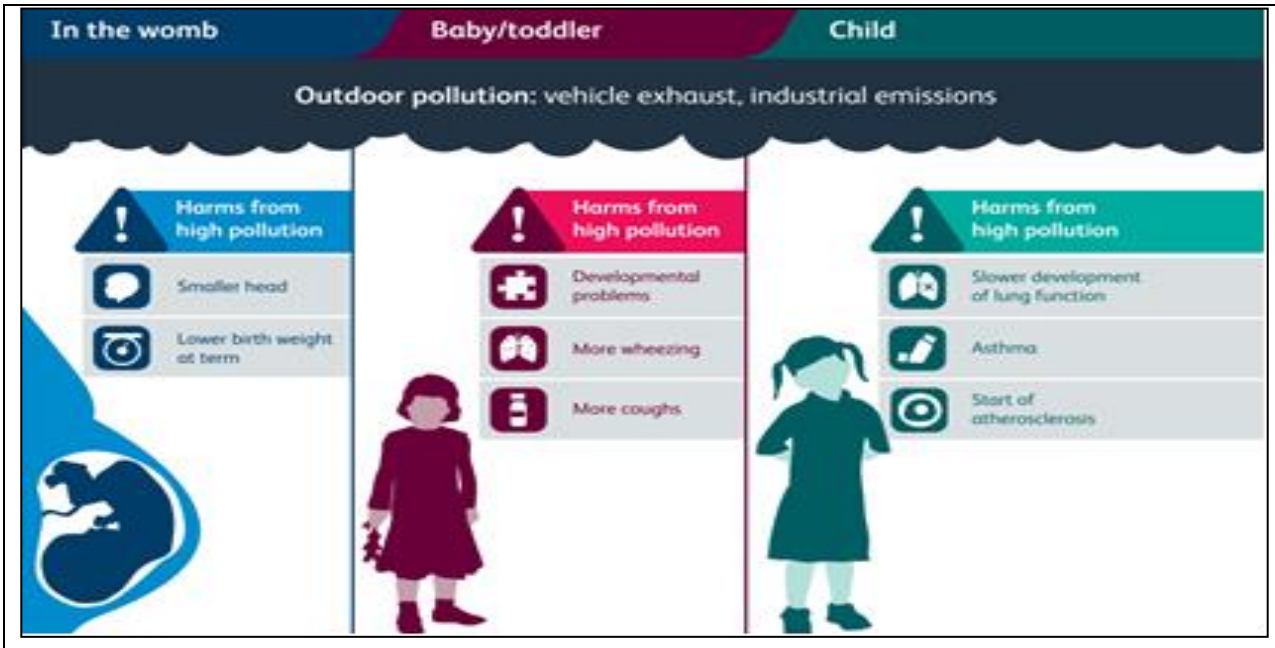
vehicles, would, therefore, have some impact on particulate matter levels, but would not remove them entirely. Meeting the legal limits for particulate matter (especially $PM_{2.5}$) still means that an estimated 29,000 people die prematurely in the UK each year.

Environmental Tobacco Smoke (ETS), which is usually released from the tip of a burning cigarette, is major cause of *indoor air pollution*. Evidence shows that over a quarter of people are exposed to second-hand smoke, with over half of 16 to 24 year olds reporting exposure. Exposure to secondary and tertiary tobacco smoke may also have a particular impact on vulnerable or at risk populations, such as people living in nursing and residential care establishments, mental health inpatient accommodation and prisons. The Health Act 2006 introduced legislation intended to protect people from the harms of second-hand smoke in public places, public transport and work vehicles. These laws have proven to be highly effective resulting in an immediate reduction in the number of children being admitted to hospital for asthma. To further protect children, the government extended legislation to cover private vehicles carrying children from October 2015.

In 2015, the Committee on the Medical Effects of Air Pollutants (COMEAP) estimated an effect on mortality equivalent to 23,500 deaths annually in the UK on the basis of NO_2 concentrations. The impact of exposure to small particulate matter pollution ($PM_{2.5}$) is estimated to have an effect on mortality equivalent to nearly 29,000 deaths in the UK. There may be overlap between these two estimates of mortality, but the combined impact of these two pollutants is a significant challenge to public health.

The Royal College of Physicians (RCP) and the Royal College of Paediatrics and Child Health (RCPCH) have noted that air pollution has been linked to cancer, asthma, stroke and heart disease, diabetes, obesity, and changes linked to dementia. As illustrated in the diagram below, this damage occurs across a lifetime, from a baby's first weeks in the womb all the way through to the years of older age. There is also some, as yet unproven, evidence of the impact of air pollution on dementia.

Gestation, infancy and early childhood are particularly vulnerable times because the young body is growing and developing rapidly. The heart, brain, hormone systems and immunity can all be harmed by air pollution. Research is also beginning to point towards effects on growth, intelligence, and development of the brain and coordination. Harm to babies and children will have an impact that lasts far into the future. For the same reason, any air quality improvements we make now will have long-lasting benefits.



Older people and adults with long-term conditions are also more vulnerable to the effects of air pollution because of their age or existing medical conditions. These vulnerabilities are heightened among those living in the most deprived communities due to poor housing and indoor air quality, the stress of living on a low income and limited access to healthy food and/or green spaces.

The RCP and RCPCH have also highlighted the role of air pollution as a stressor that interacts with many other stressors, such as diet, socio-economic deprivation and climatic conditions, to create reduced health and increased susceptibility to disease, particularly among those who are already more vulnerable to the effects of air pollution because of their age or existing medical conditions. Data shows that people living in Manchester suffer disproportionately from many of these stressors.

The greatest burden of air pollution often falls on the most deprived communities and the most vulnerable individuals. It is often (though not always) the most deprived communities that live closest to the busiest roads, therefore increasing their exposure to air pollution. The Marmot Review highlighted the role that action to tackle air pollution can play in addressing health inequalities and noted that individuals in deprived areas experience more adverse health effects at the same level of exposure compared to those from less deprived areas.

Events which include bonfires and firework displays, such as bonfire night and Diwali, can result in temporary increases in particulate pollution. Some people are also exposed to air pollution through their jobs. For example, ambulance drivers, taxi and other professional road users will inhale significantly higher amounts of pollution compared to those working outside but away from a busy road.

The health problems resulting from exposure to air pollution have a high cost to society and business, the health services and people who suffer from illness and premature death. In the UK, these costs add up to more than £20 billion every year (Royal College of Physicians, 2016). In 2013, a report from the King's Fund concluded that the cost-benefit evidence for investing in air quality is substantial. A review undertaken for the London Borough of Kensington and Chelsea identified a series of options for reducing air pollution that were "cost-beneficial, with potential for significant revenue generation, and spill over benefits including noise reduction. The overall benefit-to-cost return was £620 in benefits for every £100 spent." Cost-effective options for reducing air pollution include measures to encourage people to make more journeys by bike or on foot (source: Defra 2015).

Seasonal differences in exposure to air pollution may lead to increased demands on health and care services at certain points in time. For example, higher levels of NO_2 in the winter months and peaks of larger particulate matter in the spring may lead to an exacerbation of symptoms in very vulnerable groups, such as children and older people, or among people with certain long term conditions, such as asthma and COPD, which may, in turn, lead to increased demand for primary and secondary care, particularly A&E.

Although this topic is included within the Adults and Older People's JSNA, much of the information is equally relevant to children and young people and therefore it should be considered alongside the other topics included in the Children and Young People's JSNA.

THE MANCHESTER PICTURE

The Manchester picture: data

Manchester City Council maintains continuous monitoring sites for NO_2 at Manchester Piccadilly, Oxford Road and in the south of the city (close to Manchester Airport). The most recent data from the Council's Annual Status Report to Defra shows that, in 2016, the annual mean air quality objective for NO_2 of 40 micrograms/cubic metre (40µg/m^3) was met at the South Manchester site. The Manchester Piccadilly site just breached the 40µg/m^3 threshold after falling below it in 2015 and previously showing an overall downward trend in concentrations since the early 1990s. The annual objective was also exceeded at the Oxford Road site, as was the hourly objective, although the latter exceedance has been attributed to multiple roadworks/closures in the area which have now been completed.

It has not been possible to identify directly comparable air pollution information for equivalent cities in Europe. However, data from the European Environment Agency (http://www.eea.europa.eu/themes/air/air-quality/map/airbase/air-quality-statistics-at-reporting-stations) shows that in 2013, many cities across the continent, including Manchester, experienced harmful levels of NO_2 pollution.

This information shows that, in relative terms, Manchester's position within the UK and across Europe is not particularly bad for a large urban area. However, the city does contain large numbers of people from population groups who might be particularly susceptible to the negative health impacts of air pollution such as children and people living in more deprived circumstances.

There is also evidence that small particulate matter from traffic also contribute to indoor air pollution and this can have an impact on office workers and other people who spend much of their time indoors will receive most of their exposure to air pollutants through this route. Where the smoking of tobacco takes place in those indoor spaces, the effect of indoor air pollution, including environmental tobacco smoke, will be significantly higher. Children, people suffering from asthma or other respiratory diseases and older people will be particularly affected by the effects of environmental tobacco smoke.

Public Health England (PHE) has included an indicator of the mortality burden associated with long-term exposure to anthropogenic particulate air pollution at current levels in the Public Health Outcomes Framework (PHOF) for 2016-2019. This indicator measures the percentage of all deaths in people aged 30 and over in a single year that is attributable to long-term exposure to current levels of anthropogenic particulate air pollution, measured as fine particulate matter (also known as $PM_{2.5}$).[1] Concentrations of man-made (rather than total) $PM_{2.5}$ are used as the basis of this indicator because estimates based on total $PM_{2.5}$ could give a misleading impression of the extent to which potential policy interventions could have an impact on this measure. Further information relating to this indicator can be found in the PHOF Technical Specification document.[2]

In 2016, around 5.2% of all deaths in people aged 30 and over in Manchester could be attributed to long-term exposure to the current levels of man-made particulate air pollution. The figure for Manchester is similar to the England average (5.3%) and equates to an estimated 179 deaths in Manchester that are in some way associated with air pollution.

Looking at the underlying trend over time shows that there was a gradual decline in the mortality burden associated with long-term exposure to anthropogenic particulate air pollution during the period 2010 to 2015, with a particularly steep fall between 2014 and 2015 (see Table 1 below). The fraction of mortality attributable to particulate air pollution in Manchester fell from 5.9% in 2010 to 4.3% in 2015, although the proportion has risen to 5.2% in 2016. The trends seen in Manchester are broadly similar to those seen across England as a whole.

Table 1: Trends in fraction of mortality attributable to particulate air pollution in Manchester, 2010-2016

Year	Manchester	England

[1] $PM_{2.5}$ refers to the mass (in micrograms) per cubic metre of air of particles with an aerodynamic diameter generally less than 2.5 micrometres.
[2] https://www.gov.uk/government/publications/public-health-outcomes-framework-2016-to-2019

2010	5.9	5.6
2011	5.4	5.4
2012	5.1	5.1
2013	5.2	5.3
2014	5.1	5.1
2015	4.3	4.7
2016	5.2	5.3

However, some caution is needed when considering apparent trends over time. Trend data should not be over-interpreted because concentrations of PM2.5 can vary from year to year due to the weather and because the methods and data inputs for the pollution modelling are continually updated and improved. For example, changes were made to the methods used to map emissions from domestic wood burning in the modelling of 2016 concentrations. In addition, a new method was used to measure components of the secondary inorganic aerosol.

Expressing the mortality effect associated with long-term exposure to current levels of air pollution in this way allows comparisons to be made between different areas. Figure 1 below shows that, in 2016, Manchester, Salford and Tameside had the worst attributable fraction of mortality attributable to particulate air pollution.

Figure 1: Fraction of mortality attributable to particulate air pollution in Greater Manchester local authorities, 2016

3.01 - Fraction of mortality attributable to particulate air pollution 2016 — Proportion - %

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	–	-	5.3	-	-
CA-Greater Manchester	–	-	-	-	-
Manchester	–	-	5.2	-	-
Salford	–	-	5.1	-	-
Tameside	–	-	5.1	-	-
Bolton	–	-	5.0	-	-
Oldham	–	-	5.0	-	-
Trafford	–	-	4.9	-	-
Stockport	–	-	4.9	-	-
Bury	–	-	4.9	-	-
Rochdale	–	-	4.8	-	-
Wigan	–	-	4.7	-	-

Source: Background annual average $PM_{2.5}$ concentrations for the year of interest are modelled on a 1km x 1km grid using an air dispersion model, and calibrated using measured concentrations taken from background sites in Defra's Automatic Urban and Rural Network (http://uk-air.defra.gov.uk/interactive-map.) Data on primary emissions from different sources and a combination of measurement data for secondary inorganic aerosol and models for sources not included in the emission inventory (including re-suspension of dusts) are used to estimate the anthropogenic (human-made) component of these concentrations. By approximating LA boundaries to the 1km by 1km grid, and using census population data, population weighted background $PM_{2.5}$ concentrations for each lower tier LA are calculated. This work is completed under contract to Defra, as a small extension of its obligations under the Ambient Air Quality Directive (2008/50/EC). Concentrations of anthropogenic, rather than total, $PM_{2.5}$ are used as the basis for this indicator, as burden estimates based on total $PM_{2.5}$ might give a misleading impression of the scale of the potential influence of policy interventions (COMEAP, 2012).

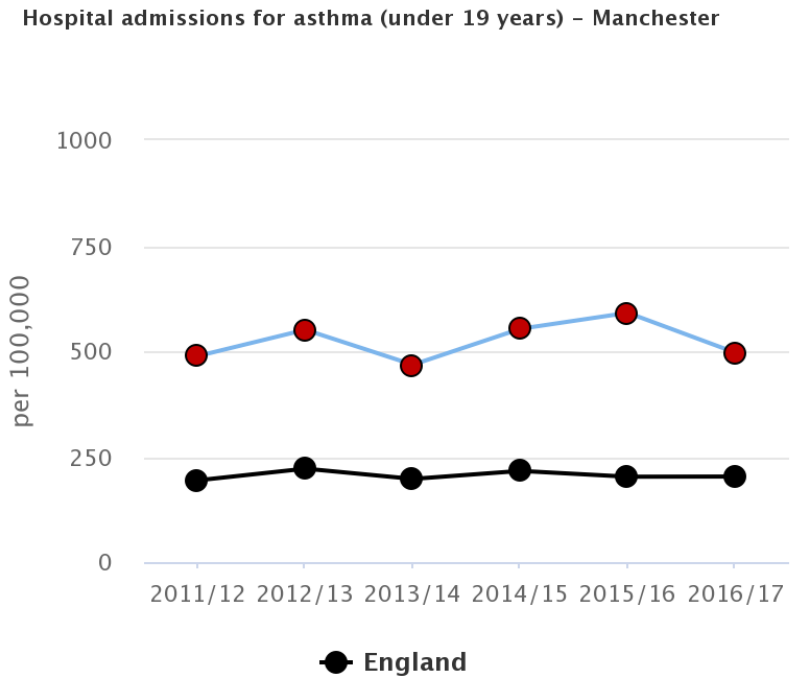
Compared with other similarly deprived local authorities, Manchester has a relatively low value for this measure and the current figure of 5.2% is lower than the average for the most deprived decile of local authorities (5.7%). In similarly deprived parts of London (e.g. Barking and Dagenham and Hackney), the fraction of mortality attributable to particulate air pollution is around 6.7%. Please note that there significant margins of error associated with this data and therefore the figures should be used with some caution.

COMEAP's statement on the health effects of NO_2 concluded that evidence associating

NO_2 with health effects has strengthened substantially in recent years.[3] COMEAP is currently considering how to quantify the mortality effects associated with long-term average concentrations of NO_2.

Currently, there is no agreed indicator for the levels of illness (morbidity) associated with air quality. However, exposure to air pollution is known to exacerbate symptoms for those suffering from asthma and one possible indicator is child admissions for asthma, although this is influenced by a range of other factors. Figure 2 below shows recent trends in the rate of emergency hospital admissions with a primary diagnosis of asthma in children aged under 19 years in Manchester.[4]

Figure 2: Emergency admissions with a primary diagnosis of asthma in children aged under 19 years in Manchester, 2011/12 to 2016/17

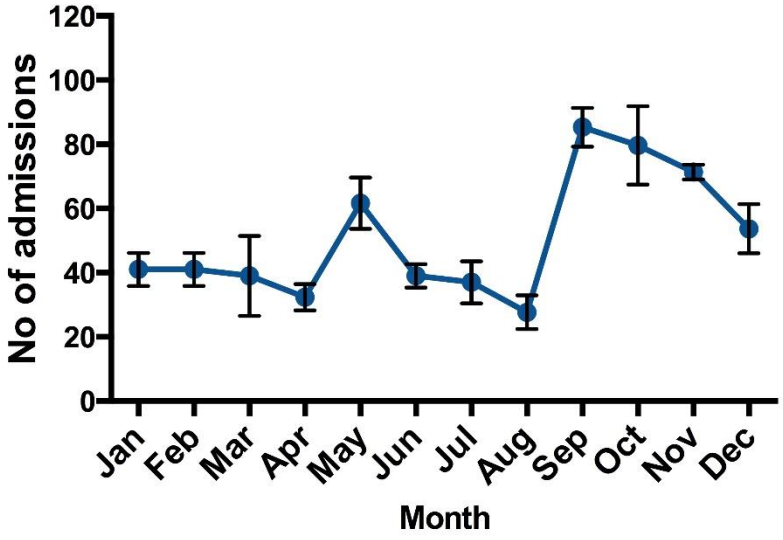


In 2016/17, there were 630 emergency admissions with a primary diagnosis of asthma among children aged under 19 years living in Manchester - a rate of 496.5 per 100,000 children aged 0-19 years. Trend data shows that the rate of emergency admissions for asthma in children in Manchester increased between 2013/14 and 2015/16, although the rate fell sharply between 2015/16 and 2016/17. However, the rate in Manchester remains higher (i.e. worse) than the England average.

A more detailed analysis of emergency childhood asthma admissions in Manchester shows that there has been a year-on-year increase in the number of admissions over the period from 2013/14 to 2015/16. The highest number of admissions are for children of nursery school age (3-5 years old). The number of admissions varies throughout the year, with a 'spike' in the number of admissions in May and a second, and more prolonged, increase in the period from September through to December (see Figure 3 below).

[3] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/411762/COMEAP_The_evidence_for_differential_health_effects_of_particulate_matter_according_to_source_or_components.pdf
[4] https://fingertips.phe.org.uk/profile-group/child-health/profile/child-health-overview/data#page/3/gid/1938132992/pat/103/par/E45000008/ati/102/are/E08000001/iid/90810/age/220/sex/4

Figure 3: Three year average number of asthma related emergency hospital admissions by month in Manchester, 2013-2016.



Children of Black ethnicity represent 30% of admissions, despite only making up approximately 10% of Manchester's population. In 2016, the highest number of admissions were to children living in the wards of Moss Side, Cheetham and Gorton North. This is consistent with a positive correlation between deprivation and admission rate.

In 2016, a report by the Royal College of Physicians highlighted the fact that children living in heavily polluted areas have more coughs and wheezes and are more likely to have impaired lung function in adulthood. Exposure at a young age may also affect mental development and increase the risk of developing lung cancer in later life.

Greenpeace has undertaken a piece of work to map the locations of schools, colleges and Ofsted-registered childcare providers against the latest available government estimates for NO_2 levels on the major roads network. This work suggests that there are around 20 schools and nurseries in Manchester that are located within 150m of a road with a recorded NO_2 level over 40 - the legal upper limit. Please note that the results of this work have not been verified by Public Health England and that the findings only represents a crude proxy for actual exposure.

A similar piece of work carried out by Transport for Greater Manchester found that nearly half of all primary schools across Greater Manchester were located within 400m of the current Air Quality Management Area. This is based on a slightly lower NO_2 level of 35.

The Manchester picture: lived experience

As part of their campaign for cleaner air, the British Lung Foundation (BLF) has collected some information and personal stories from people affected by air pollution.

> *"…air pollution has an effect on my life. It makes my condition so much worse. I notice far more coughing when I've been travelling [in parts of London]…As a pedestrian, walking on main roads has become increasingly unpleasant because of traffic fumes."*

"When I drop the children at school we walk. And when my husband drops them at school the boys take their bikes. As they go to school, my children are breathing in dangerously dirty air all the time. The depressing reality is that when we walk along busy roads to school, my children are breathing in dangerous levels of air pollution…It gets a lot worse when pollution is high. And my youngest son is exposed to a higher level of fumes as his pushchair is at the same height as the car exhausts."

The Our Manchester resident survey is an online survey which gathers the views of Manchester residents on their health and wellbeing, home life, social and community life, work life, volunteering, the area they live in and local services. Responses to the survey provide an insight into people's views on air pollution and the impact it has on their lives.

In particular, the survey asked people what they would consider doing differently about their health and wellbeing and what support could help them you do it. Responses to this included:

"Travel and get out of Manchester more frequently as the noise and pollution do take a toll."

"Living in an area with less air pollution caused by traffic"

"A plan to tackle air pollution in Manchester."

"Free public transport would reduce hundreds of car users traveling to work in huge people carriers and other large fuel guzzling vehicles…I have an asthma problem which is worsened when I breathe in traffic fumes in the rush hour waiting for my bus to work."

Peoples' views about what could be better about where they live also included frequent references to air quality and the high levels of air pollution from cars, buses and aircraft.

WHAT WOULD WE LIKE TO ACHIEVE?

The framework for managing and improving air quality in the United Kingdom is primarily driven by European (EU) legislation. The 2008 ambient air quality directive (2008/50/EC) sets legally binding limits for concentrations in outdoor air of major air pollutants that impact public health such as PM_{10} and $PM_{2.5}$ and NO_2. These concentrations have been developed with regards to the World Health Organisation (WHO) guideline safe exposure limits. As well as having direct effects, these pollutants can combine in the atmosphere to form ozone, a harmful air pollutant (and potent greenhouse gas) which can be transported great distances by weather systems. The 2008 directive replaced nearly all the previous EU air quality legislation and was made law in England through the Air Quality Standards Regulations 2010.

The UK currently meets the required air quality standards for all pollutants, with the exception of NO_2. For NO_2, 37 of the 43 zones for which the country is divided into for air quality monitoring purposes currently exceed the allowed annual mean concentration levels of NO_2 (40µg/m^3). The Greater Manchester Urban Area (which includes parts of Rossendale and Cheshire East) is one of the areas of the country which currently exceeds the allowed annual mean concentration levels of NO_2. A High Court ruling in November 2016 that found the government's plans to tackle NO_2 pollution had failed to comply with the ruling of the Supreme Court in April 2015 and that it must therefore produce revised plans. In response, the government has published a detailed air quality plan for nitrogen dioxide (NO_2) in UK (Defra, 2017)

The table in Appendix 2 is taken from Annex K of this plan and sets out the best available forecast of UK local authorities with one or more roads with concentrations of NO_2 above statutory limits and how long these exceedances would last for if no additional measures were taken (i.e. the current and forecast future exceedances without additional actions). Based on this, Manchester is one of a number of local authorities which are required to produce local action plans by March 2018 to address air quality on a number of its roads.

Alongside this, the government is developing a number of further measures to improve air quality, including a Clean Growth Plan (currently scheduled to be brought forward by the Department for Business, Energy and Industrial Strategy in the autumn of 2017), a further strategy on the pathway to zero emission transport for all road vehicles to be published by March 2018 and a wider Clean Air Strategy in 2018 setting out how the government will meet its international commitments to significantly reduce emissions of five damaging air pollutants by 2020, and 2030.

The Health Act 2006 offers significant protection from Environmental Tobacco Smoke in public indoor spaces such as restaurants and bars and in work places but it does not provide and safeguards against exposure to secondary and tertiary tobacco smoke in private homes or vehicles. To that end, it is important that Manchester continues to work closely with Public Health England tobacco leads to inform the actions taken as part of the Tobacco Control Plan with regard to smoke free spaces, including assessing the feasibility of rolling out smoke-free outdoor spaces in the city.

WHAT DO WE NEED TO DO TO ACHIEVE THIS?

In June 2017, the National Institute for Health and Care Excellence (NICE) and PHE published joint guidelines on outdoor air quality and health. This covers road-traffic-related air pollution and its links to ill health, and aims to improve air quality and so prevent a range of health conditions and deaths. The guidelines recommend taking a number of actions in combination, because multiple interventions, each producing a small benefit, are likely to act cumulatively to produce significant change. It includes recommendations on a range of areas including:

- planning
- development management
- clean air zones
- reducing emissions from public sector transport services and vehicle fleets
- smooth driving and speed reduction

- walking and cycling
- awareness raising

The specific recommendations listed include the implementation of No Idle Zones including clean air zones with charges for polluting cars; congestion charges; promoting smooth driving by removing speed bumps and setting more 20mph (32km/h) speed limits; promoting electric cars and more charging points; training bus drivers in fuel-efficient driving; making it easy for people to walk and cycle; changing town planning to prevent homes and schools being built in areas of high pollution.

An evidence review published in the Journal of Environmental Science and Policy suggests that the wider public health workforce can make a significant contribution to reducing air pollution risks, for example, by promoting active travel and encouraging walking and cycling over car use as a means of developing a healthier lifestyle and improving population health and resilience.[5]

In July 2017, the Government published its air quality plan for tackling roadside nitrogen dioxide (NO_2) concentrations in the UK. Local Authorities in areas where air pollution is above legal limits are required to set out their plans to improve air quality by the end of March 2018, followed by final plans by the end of December 2018. PHE has been tasked with providing close support to these local authorities. The Government has additionally asked PHE to review the evidence for effective interventions and to provide practical recommendations, stratified by health and economic impact, for any actions that are not currently included in the Air Quality Plan.

Defra together with PHE have published a toolkit which provides details on how local authorities can use the Public Health Outcomes Indicator to specify appropriate mitigation measures to reduce the impact of both short term and long term exposure of air pollution. The guide emphasises the importance of communication and engagement amongst all relevant local stakeholders on air quality issues and notes the crucial role played by Directors of Public Health in shaping and influencing how local approaches can help clean up air in their area most effectively.

Although exposure to Environmental Tobacco Smoke indoors remains an issue, there is a growing movement to make certain outdoor spaces “smoke-free” in order to reduce the impact of secondary smoking outdoors on people’s exposure to Environmental Tobacco Smoke. It is therefore still important to raise awareness of the risks of exposure to second-hand smoke, especially for those who may be smoking around children. The new Tobacco Control Plan for England (“Towards a smoke-free generation”) contains a commitment to assessing the evidence base around smoke-free outdoor spaces. The Plan sets out the government’s ambition to achieve a completely smoke-free NHS estate by 2020 by supporting the implementation of smoke-free policies across all hospitals. Around 80% of the prison population are estimated to smoke and the level of exposure to second-hand smoke in many prisons is significant, For that reason, the Plan also includes a commitment to implementing smoke-free policies across all prisons in England. The Plan also highlights the importance of raising awareness of the risks of exposure to second-hand smoke, especially among those who may be smoking around children.

[5] Brunt, H., Barnes, J., Longhurst, J.W.S., Scally, G., Hayes, E. Local Air Quality Management policy and practice in the UK: The case for greater Public Health integration and engagement. Environmental Science & Policy (Volume 58), April 2016, P 52–60

WHAT ARE WE CURRENTLY DOING?

The current AQMA was declared by the Greater Manchester Combined Authority (GMCA) in May 2016, and replaced the 10 district AQMAs for NO_2. The 2016 AQMA in relation to the City of Manchester is shown in Appendix 1, at the end of this report. The 2016 AQMA covers a much smaller area than the 10 individual AQMAs that it succeeded, although all 10 districts continue to be included and the AQMA continues to be set at a precautionary 35µg/m3 level for NO_2. The decision to set the level below the legal limit of 40µg/m3 was made on a precautionary basis due to modelling uncertainties.

The Environment Act (1995) requires Local Authorities to undertake a periodic review of air quality in their area and produce assessment reports, which set out whether the legal standards for air quality are being met. If these reviews identify areas where the required air quality standards are not being met, then an AQMA should be declared and an Air Quality Action Plan (AQAP) produced setting out measures for achieving compliance with the air quality standards.

The first Greater Manchester AQAP was produced in 2004 by the 10 local authorities, and has experienced a number of subsequent iterations and revisions. The AQAPs contained a wide range of different actions designed to operate at both a strategic and local scale with the aim of reducing NO_2 pollution. However, for various reasons they have not achieved the necessary level of reduction. The latest version of the AQAP, produced alongside a Low Emission Strategy (LES) to manage greenhouse gas emissions alongside other air pollutants, was subject to public consultation in March / April 2016; comments made were assessed and used to refine the documents, which were subsequently approved by the GMCA in July 2016.

The approved GM LES/AQAP was published on 19th December 2016 and identifies a range of actions to encourage the uptake of low emission vehicles, encourage behavioural change and drive technological innovation. Some of the actions will deliver greater emissions reductions but may be more challenging to achieve.

The plan is structured around 3 broad themes: Reducing Traffic (by encouraging alternative travel modes); Increasing Efficiency (by making the most appropriate use of roads and vehicles for different tasks); and, Improving Vehicles (by encouraging less polluting vehicles to be used). Multiple overlapping and reinforcing actions are listed under the following headings:

- Actions for Managing New Development e.g. construction and planning guidance, developing a Cumulative Development Database, and exploring the feasibility of a CAZ.
- Actions for Freight and Goods Vehicles e.g. Consideration of Urban Distribution and Consolidation centres and guidance for businesses.
- Actions for Buses e.g. Bus priority programmes, vehicle improvements and trials of low-emission vehicles
- Actions for Cycling e.g. Measures to improve conditions for cyclists and encourage cycling

- Actions for Travel Choices e.g. Car club assessments, information messaging services
- Actions for Cars e.g. Electric Vehicle charging points, local authority parking charges
- Actions for Information and Resources e.g. Great Air Manchester website, Transport for Greater Manchester (TfGM) Air Quality Team, traffic flow data.

Public Health England (PHE), together with public health specialists from local authorities across the conurbation, has been working with Transport for Greater Manchester (TfGM) to co-ordinate public health related activity around air quality on behalf of the combined authority. Key actions within the AQAP that specifically involve public health include:

- A Health Impact Assessment (HIA) of the Clean Air Zone (Defra funded through the Air Quality Grant)
- Work to assess the burden of disease associated with poor air quality in Greater Manchester
- A contingency response plan for periods of high pollution episodes
- Awareness Raising (including National Clean Air Day 2017)
- Scoping of Pollution Alert system
- Improved communication, including the development of a web presence

An AQAP Implementation Plan has been drafted and will be delivered through the Greater Manchester Air Quality Working Group.

Within Manchester City Council, an Air Quality Steering Group has been established with representation from the Manchester Health and Care Commissioning Population Health and Wellbeing Team. The Air Quality Steering Group are currently co-ordinating work to identify Manchester schools within the Air Quality Management Area and explore mitigation measures, including green screening, to reduce exposure to pollutants. Opportunities to fund trials exist through TfGM. The Highways Department are also exploring pilot projects to discourage parking around four school sites, and air quality has been raised as a factor in deciding the locations of the schools chosen.

In early 2017, Manchester City Council established an Air Quality Task and Finish Group with a remit to understand the health implications of poor air quality and the initiatives to improve this, learn from good practice adopted by other UK and European Cities to initiate local improvements in air quality, examine the impact of transport on air quality and measures to address this, understand any potential implications for existing UK environmental legislation and standards arising from the EU referendum decision to leave the European Union and influence local planning policy to ensure that future developments key to the city's sustainable growth are contributing to improved air quality. The group also considered how public health can influence change to promote the issue of air quality at both a local and national level. The Task and Finish Group heard from a number of stakeholders and invited witnesses and has drafted a series of recommendations based on the evidence it received over the course of its enquiry.

The work being carried out to address the impact of poor air quality on health in Manchester cannot be considered in isolation from that which is being carried in other parts of Greater Manchester and across the conurbation as a whole. This work is described in the Greater Manchester Population Health Plan for 2017-2021, which sets

out the Greater Manchester Health and Social Care Partnership's approach to delivering a radical upgrade in population health over the next 5 years and beyond. Public Health England North West has also identified air quality as a key workstream in its business plan for 2017-2018.

TfGM, public health specialists from local authorities and PHE are discussing with the World Health Organisation (WHO) whether Greater Manchester should apply for BreatheLife city status. BreatheLife is a global campaign led by the WHO in collaboration with the Climate and Clean Air Coalition (CCAC) to mobilise cities and individuals to protect health and our planet from the effects of air pollution. Becoming a BreatheLife city would provide Greater Manchester with access to a range of resources as well as providing a platform to share best practice with other cities and demonstrate progress in their journey to meeting WHO air quality targets by 2030.

The consultation on the draft Greater Manchester Spatial Framework (GMSF) has recently ended. Chapter 20 of this framework addresses air quality and proposes the introduction of measures to reduce emissions. However, the first draft did not substantially address the exposure of people to air pollution, both currently and in proposed developments. The Greater Manchester Directors of Public Health have responded to this consultation.

The Manchester Population Health and Wellbeing Team is working in conjunction with the enforcement and public protection teams within Manchester City Council in order to support the work to enforce the Health Act 2006 with respect to exposure to Environmental Tobacco Smoke. The feasibility of rolling out smoke-free outdoor spaces across Manchester is currently being assessed as part of the Manchester Tobacco Control strategy. Various types of Smoking Cessation services are also planned and/or coming on line across Manchester and Greater Manchester from Autumn 2017.

OPPORTUNITIES FOR ACTION

Locally, air pollution management is commonly considered an environmental health protection issue. However, tackling the health impacts of air quality requires action from across the local authority, including public protection, planning, transport and public health. A collaborative approach that brings together technical advice on the impact of interventions with health improvement and public engagement activities will enhance and add value to actions taken through the Local Air Quality Management regime.

In order to properly understand the health and associated economic effects of poor air quality in Manchester, a detailed Health Impact Assessment (HIA) should be undertaken. This can build on the work being undertaken by Public Health England in partnership with NHS Trusts within Greater Manchester to determine the direct and indirect effects of air quality across the whole of the Greater Manchester region. This will be used to quantify the direct health effects and also the economic impacts resultant from direct healthcare requirements and the lost work days or productivity.

The Greater Manchester AQAP Implementation Plan contains a number of actions that commissioners and providers of health and care services in Manchester will need to

contribute to as part of a wider partnership with a range of agencies across Greater Manchester. These include:

- Helping to effect a shift in the mode of travel (e.g. through encouraging patients who are able to do so to travel to hospital on public transport rather than by car)
- Providing targeted health advice to vulnerable groups (e.g. patients with respiratory or pulmonary health issues) who may be affected by air pollution events
- Publishing a contingency response plan, integrated with public messaging systems, to ensure that the health and care system in Manchester is prepared for increased activity during periods of high pollution episodes
- Undertaking Health Impact Assessments to understand the effects of redeveloping and/or redesigning health and care estates on air quality
- Supporting air quality awareness programmes to increase the level of awareness and understanding that individuals have about air pollution levels, air pollutants and the sources of air pollution and encourage people to take action against air pollution, e.g. by empowering drivers to cut emissions or empowering communities to protect themselves from air pollution.

The annual reviews that all patients with asthma and COPD in Manchester receive provide an opportunity for GPs to support patients to better manage their own condition by raising awareness of the potential impacts of poor air quality on their health and the changes they can make in order to reduce the risk of air pollution having an significant impact on their health and quality of life.

The redesigned wellbeing service for Manchester residents ('Buzz') is a key vehicle for public engagement to reduce air pollution and residents' exposure to pollution through an 'every contact matters' approach to reducing air pollution risks. The service provides one-to-one support for individuals and helps to promote healthy lifestyles (e.g. smoking cessation and increased physical activity) as well as developing and strengthening community assets to support health and wellbeing.

The new One Team Prevention Programme will allow us to build on this work (initially in the north of the city) by putting an infrastructure in place to support sustainable, coherent and effective community based approaches to prevention across the city and work with people to help them adopt healthy lifestyle choices, such as physical activity, nutrition, smoking cessation and emotional wellbeing, across the life course.

Individuals with cardiovascular disease or respiratory conditions, such as chronic obstructive pulmonary disease (COPD), can be helped to manage the impact of air pollution on their health in a number of ways. Air pollution information services and Defra's daily air quality forecasts enable such individuals to take mitigating action, such as increasing the use of their reliever inhaler medication (if appropriate) or reducing exercise, on days when pollution is particularly high, while walking maps can enable exercise to be taken away from or minimise exposure to pollution hotspots.

The development of the Manchester Tobacco Control Plan provides an opportunity for different agencies across the city to work together to address the health impacts of Environmental Tobacco Smoke by supporting the implementation of smoke-free policies across and prisons in Manchester, rolling out smoke free outdoor spaces and continuing

to work with the enforcement and public protection teams within Manchester City Council in order to ensure that any breaches or misunderstandings about the application of the Health Act 2006 are dealt with on an ongoing basis, e.g. Shisha cafes.

The Manchester City Council Air Quality Task and Finish Group has produced a series of recommendations that will be presented to the Neighbourhoods and Environment Scrutiny Committee. The recommendations that are agreed should then be considered by Manchester Health and Care Commissioning and its partners as part of its approach to tackling the health impacts of air quality in the city.

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OTHER RELATED JSNA TOPICS

Manchester JSNA
http://www.manchester.gov.uk/info/500230/joint_strategic_needs_assessment

Adults and Older People

- Respiratory Diseases
- Tobacco Control (in development)

Children and Young People

- Wider Determinants of Health

- Smoking in Pregnancy
- Smoking and Substance Misuse amongst young people

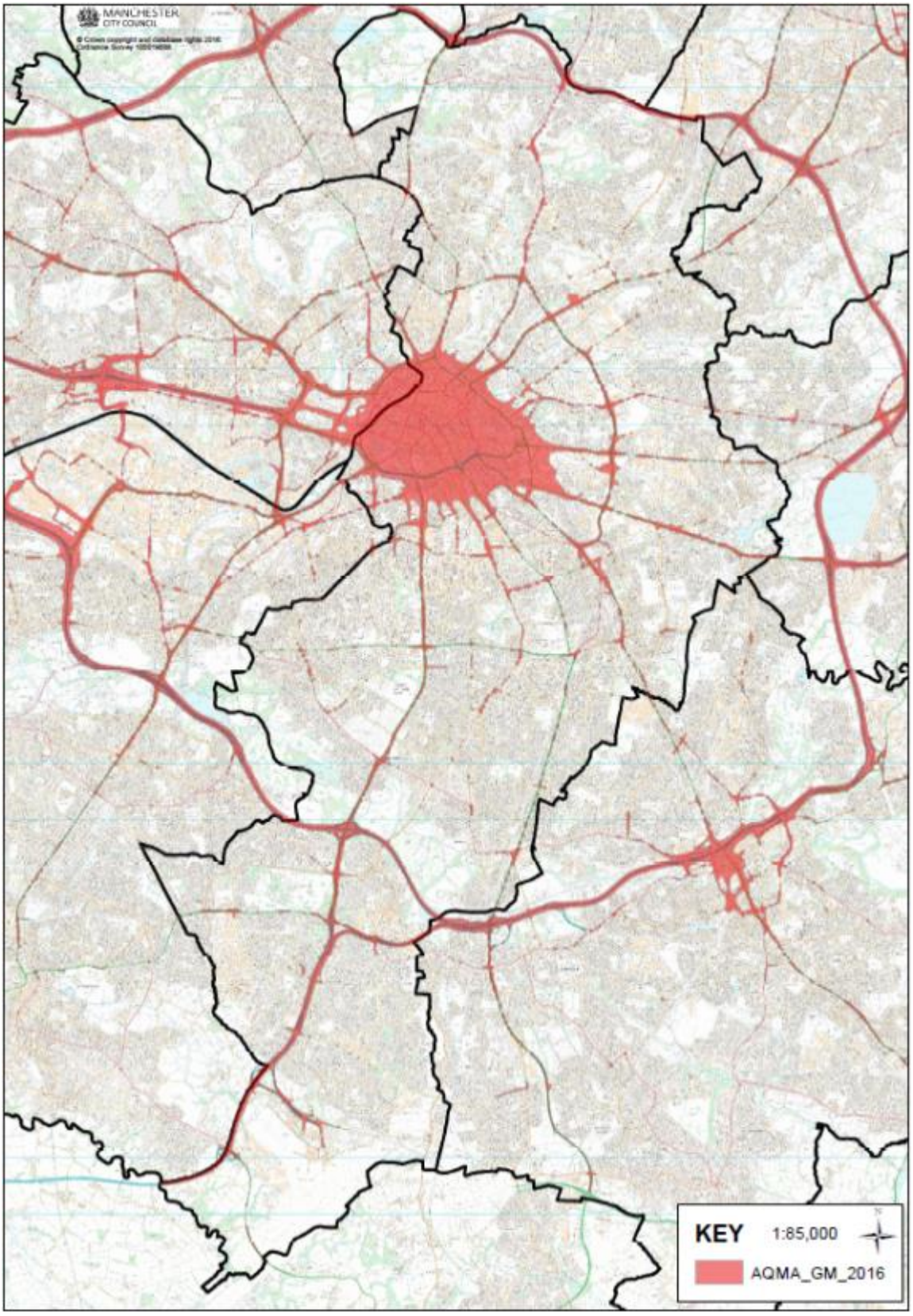
Date: November 2017

It is hoped that you have found this topic paper useful. If you have any comments, suggestions or have found the contents particularly helpful in your work, it would be great to hear from you.

Responses can be sent to jsna@manchester.gov.uk

Appendix 1

Greater Manchester Air Quality Management Area (AQMA) in and around the City of Manchester (red shaded areas indicate annual mean NO_2 levels of 35µg/m or higher)



Appendix 2

Local authorities with roads with concentrations of NO2 forecast above legal limits and assuming no additional measures

	Name	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
2015 Plan assumed a Clean Air Zone is required	**Greater London Authority**	97	84	76	66	61	56	53	49	47	45	42	40	38	37
	Birmingham City Council	58	56	53	51	48	45	43	41	39	37	35	34	33	32
	Derby City Council	57	55	52	49	46	44	41	39	37	35	34	32	31	30
	Leeds City Council	58	55	52	49	46	44	41	39	37	36	34	33	31	30
	Nottingham City Council	57	54	52	49	46	43	41	39	37	35	33	32	31	30
	Southampton City Council	58	55	52	49	46	44	41	40	38	37	36	35	34	33
Single stretch of road in exceedance, modelled as part of the Southampton CAZ	New Forest District Council	53	50	48	45	42	40	38	36	34	32	31	29	28	27
Required to produce local action plans by March 2018 on the basis of modelling which indicates a number of roads need a solution.	Middlesbrough Borough Council	62	59	56	52	49	45	43	40	38	36	35	33	32	31
	Sheffield City Council	53	51	49	46	44	41	39	37	36	34	33	31	30	29
	Rotherham Metropolitan Borough Council	53	51	48	46	43	40	38	36	34	33	31	30	29	28
	Gateshead Metropolitan Borough Council	53	51	48	46	43	40	38	36	34	32	30	29	28	27
	Newcastle City Council	53	51	48	46	43	40	38	36	34	32	31	29	28	27
	North Tyneside Council	50	48	46	44	41	38	36	34	32	31	29	28	27	26
	Bristol City Council	52	49	47	45	42	40	38	36	34	33	31	30	29	28
	Coventry City Council	51	49	47	45	42	40	38	36	34	33	31	30	29	28
	Manchester City Council	51	49	47	44	42	39	37	35	33	32	30	29	28	27
	Stockport Metropolitan Borough Council	49	47	45	43	41	38	36	34	33	31	29	28	27	26
	Tameside Metropolitan Borough Council	53	50	48	45	42	40	38	36	34	32	31	30	29	28
	Salford Metropolitan Borough Council	48	46	44	41	39	36	34	33	31	30	28	27	26	25
	Trafford Metropolitan Borough Council	46	45	43	41	38	36	34	33	31	29	28	27	25	25
	Bolton Metropolitan Borough Council	50	48	46	43	41	38	36	34	33	31	30	29	28	27
	Bury Metropolitan Borough Council	50	48	47	44	41	39	37	35	33	32	30	29	28	27
Required to produce local action plans by March 2018 on the basis of a single stretch of road needing a solution.	Basildon District Council	53	51	48	46	43	40	38	36	34	33	31	30	28	27
Required to produce local action plans by March 2018 on the basis of a single stretch of road needing a solution. across 3 local authority areas	Rushmoor Borough Council	53	50	48	46	43	41	38	37	35	33	31	30	29	28
	Guildford Borough Council	52	50	47	45	42	40	38	36	34	32	31	29	28	27
	Surrey Heath District Council	50	48	46	43	41	38	37	35	33	32	30	29	28	27
Required to produce local action plans by March 2018 on the basis of a single stretch of road	Rochford District Council	52	49	47	45	42	40	38	36	34	32	31	29	28	27

needing a solution.															
Required to produce local action plans by March 2018 on the basis of a single stretch of road needing a solution. (rounded down to 40)	Bath & North East Somerset Council	50	48	45	43	40	37	35	33	32	30	28	27	26	25
Required to produce local action plans by March 2018 on the basis of a single stretch of road needing a solution. (rounded down to 40)	Fareham Borough Council	48	46	45	42	40	38	36	34	33	31	30	28	27	26
Exceedance will be resolved by Mersey Gateway Bridge. No feasibility study	Halton Borough Council	59	55	52	49	45	42	40	38	36	34	33	31	30	29
Not required to conduct a feasibility study	Portsmouth City Council	47	45	44	42	40	38	36	34	33	32	30	29	28	27
	Wakefield Metropolitan District Council	49	46	44	42	40	37	35	34	32	30	29	28	27	26
	Bournemouth Borough Council	46	45	43	41	39	37	35	33	31	30	28	27	26	25
	Bradford City Council	47	45	43	41	39	37	35	33	32	30	29	28	27	26
	Plymouth City Council	47	45	43	41	39	36	35	33	31	29	28	27	25	25
	Solihull Metropolitan Borough Council	50	47	45	42	39	37	34	33	31	29	28	27	26	25
	Wolverhampton City Council	49	46	43	41	39	37	35	33	32	30	29	28	27	27
	Bolsover District Council	48	45	43	40	38	35	33	32	30	29	27	26	25	25
	Leicester City Council	45	44	42	40	38	36	35	33	32	31	30	29	28	28
	Liverpool City Council	46	44	42	40	38	36	34	32	30	29	28	26	26	25
	Newcastle-under-Lyme Borough Council	46	44	42	40	38	36	34	32	30	29	28	26	25	24
	Oldham Metropolitan Borough Council	47	45	43	41	38	36	34	33	31	30	28	27	26	25
	Sandwell Metropolitan Borough Council	47	44	42	40	38	35	34	32	31	29	28	27	26	26
	Stoke-on-Trent City Council	47	45	43	41	38	36	34	33	31	30	28	27	26	25
	Walsall Metropolitan Borough Council	50	47	44	41	38	36	34	33	31	30	29	28	27	26
	Poole Borough Council	45	43	41	39	37	35	34	32	31	30	28	27	26	25
	Burnley Borough Council	45	43	41	39	37	35	33	31	30	28	27	26	25	24
	Peterborough Council	44	42	41	39	37	35	33	32	30	29	27	26	25	24
	Reading Borough Council	44	43	41	39	37	35	34	32	31	30	29	28	27	26
	Sefton Metropolitan Borough Council	46	43	42	39	37	35	33	31	29	28	26	26	25	24
	South Gloucestershire District Council	45	43	41	39	37	35	33	31	30	28	27	26	25	24
	Basingstoke and Deane Borough Council	45	43	41	39	36	34	33	31	29	28	27	26	25	24
	Blaby District Council	44	42	40	38	36	34	32	30	29	28	26	25	24	23
	Calderdale Metropolitan Borough Council	45	43	40	38	36	34	32	30	29	27	26	25	24	23
	Cheltenham Borough Council	43	41	40	38	36	34	32	31	29	28	26	25	24	23
	Dudley Metropolitan Borough Council	45	43	41	38	36	34	32	31	29	28	27	26	25	24
	Kirklees Metropolitan Council	44	42	40	38	36	33	32	30	29	27	26	25	24	24
	South Tyneside Metropolitan Borough Council	43	41	40	38	36	33	32	30	28	27	26	25	24	23
	Southend Borough Council	44	42	40	38	36	34	32	31	29	28	27	26	25	24
	Ashfield District Council	44	42	40	37	35	33	31	30	28	27	26	24	24	23
	Broxbourne Borough Council	44	41	39	37	35	33	31	30	28	27	25	24	23	23
	Chelmsford Borough Council	42	40	39	37	35	33	32	30	29	27	26	25	24	23
	Doncaster Metropolitan Borough Council	42	40	38	36	35	33	31	30	28	27	26	25	24	23
	Havant Borough Council	42	40	39	37	35	33	31	30	28	27	26	25	24	23

	North East Lincolnshire Council	**41**	40	38	36	35	33	32	30	29	28	27	27	26	25
	Sunderland City Council	**43**	**41**	40	37	35	33	31	30	28	27	25	24	23	23
	Warrington Borough Council	**42**	40	39	37	35	33	32	30	29	28	27	26	25	24
	Broxtowe Borough Council	**41**	39	38	36	34	32	31	29	28	27	26	25	24	23
	Luton Borough Council	**42**	40	38	36	34	32	30	29	27	26	25	24	23	23
	Oxford City Council	**44**	**42**	39	36	34	32	30	29	28	26	25	24	23	22
	South Ribble Borough Council	**42**	40	38	36	34	32	31	29	27	26	25	24	23	22
	Knowsley Metropolitan Borough Council	**41**	39	37	35	33	31	30	28	27	25	24	23	22	22
	Northampton Borough Council	**41**	39	38	36	33	32	30	29	27	26	25	25	24	23
	Rochdale Metropolitan Borough Council	**41**	39	37	35	33	31	30	28	27	25	24	23	22	21
	Dartford Borough Council	**41**	38	37	34	32	30	28	27	26	24	23	22	22	21
Devolved Administrations have policy responsibility	Aberdeen City Council	46	44	42	40	38	36	34	33	32	31	30	29	29	28
	Edinburgh City Council	46	44	42	40	37	35	33	31	30	28	27	26	24	24
	Glasgow City Council	58	55	52	50	46	43	41	39	37	35	33	32	31	30
	South Lanarkshire Council	42	40	39	37	34	32	30	29	27	25	24	23	22	21
	Caerphilly County Borough Council	65	62	59	56	53	50	47	44	42	40	38	36	35	33
	Cardiff County Council	56	54	51	49	45	43	40	38	36	34	32	31	29	28