
LEICESTERSHIRE JOINT STRATEGIC NEEDS ASSESSMENT 2018-2021

AIR QUALITY AND HEALTH CHAPTER

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FOREWORD

The purpose of the Joint Strategic Needs Assessment (JSNA) is to:

- To improve the health and wellbeing of the local community and reduce inequalities for all ages.
- To determine what actions the local authority, the local NHS and other partners need to take to meet health and social care needs, and to address the wider determinants that impact on health and wellbeing.
- To provide a source of relevant reference to the Local Authority, Clinical Commissioning Groups (CCGs) and NHS England for the commissioning of any future services.

The Local Authority and CCGs have equal and joint statutory responsibility to prepare a Joint Strategic Needs Assessment (JSNA) for Leicestershire, through the Health and Wellbeing Board. The Health and Social Care Act 2012 amended the Local Government and Public Involvement in Health Act 2007 to introduce duties and powers for Health and Wellbeing Boards in relation to JSNAs. The JSNA offers an opportunity for the Local Authority, CCGs and NHS England's plans for commissioning services to be informed by up to date information on the population that use their services. Where commissioning plans are not in line with the JSNA, the Local Authority, CCGs and NHS England must be able to explain why.

The Health and Wellbeing Board has agreed that the JSNA will be published in subject-specific chapters throughout a three-year time. Chapters will be developed in line with CCG and local authority commissioning cycles. As many of the relationships required for the JSNA in Leicestershire are wide ranging, involving representation from NHS England, CCGs, Leicestershire Partnership Trust, University Hospitals of Leicester, District Councils and the voluntary sector, a JSNA Reference Group has been established. This Reference Group supports the JSNA work across the Health and Wellbeing Board. To examine the detail of the chapters, Task and Finish groups have been established to bring together local professionals, where they can share their expert knowledge on the work area being examined.

The outputs of the JSNA will include:

1. Subject-specific chapters providing an assessment of current and future health and social care needs
2. An online infographic summary of each chapter available on the internet

This JSNA chapter has reviewed the population health needs of the people of Leicestershire in relation to air quality. This has involved looking at the determinants of poor air quality, the health needs of the population in Leicestershire related to air quality, the policy and guidance supporting improvements in air quality, existing services and the breadth of services that are currently provided. The unmet needs and recommendations that have arisen from this needs assessment are discussed.

Please note, most indicators presented in this needs assessment are from national sources so are subject to a time lag due to the time required for data collection, data analysis and publication. Where possible, comparisons have been made to national averages and local context has been included. The term significance is used throughout the report and refers to statistical significance. This examines if the result presented is different to the national result, due to something other than chance. Most often, this is calculated using 95% confidence intervals.

EXECUTIVE SUMMARY

Strategic direction

Leicestershire's Director of Public Health (DPH) recognised that air pollution is an 'emerging national risk to health' in his 2017 Annual report¹. Data, and related analysis, was used to illustrate the scale of the problem across the County. In the DPH 2018 Annual report² it was reported that a partnership action plan for air quality in Leicestershire will focus on better data and intelligence, active travel promotion in identified hot spots, and a communications campaign to educate the wider public on both the acute and longer-term effects of poor air quality so that they can better protect themselves and their families.

Time for change

There is currently both national and local policy and guidance demanding a call to action on air quality and its negative health impacts. This means that the publication of this chapter is timely and necessary. The impact of poor air quality to the health and social care system in Leicestershire is millions of pounds and is expected to rise if no action is taken.

Overview of place

In 2018, there were 14 declared Air Quality Management Areas (AQMAs) in Leicestershire. Melton Borough Council, Hinckley and Bosworth Borough Council and Oadby and Wigston Borough Council have currently no declared AQMAs. The majority of AQMAs appear to fall, roughly, along or around the central North / South spine of Leicestershire. It is estimated that 0.6% (over 4000 residents) of the Leicestershire population live in an AQMA area. It is important to note that this value is likely to under-represent the true figure as two additional AQMAs were declared in Leicestershire (in the Blaby and Harborough Districts) after the release of the 2017 Air Quality headline indicator. Additionally, background levels of Particulate Matter 2.5 (PM_{2.5}) are found to be higher in North West Leicestershire, Loughborough and Kegworth, with quarries and the airport considered as the cause. There are also higher levels of PM_{2.5}, PM₁₀, Nitrous Oxide (NO₂) around the main road routes in the county. These include the M69, A42, A46, A6 and the M1.

Leicestershire has higher population densities in urban centres. There are pockets of high deprivation, measured using the Index of Multiple Deprivation (IMD) 2015, in areas of

Loughborough, North West Leicestershire and Hinckley & Bosworth. Additionally, there is deprivation around outdoor environment, measured using the specific IMD 2015 indicator, in Loughborough as well as the fringes of Leicester in Oadby and Wigston. The Loughborough Bell Foundry area falls into the lowest quintile nationally for both IMD 2015 as well as outdoor environment indicator. The Access Healthy Assets and Hazards tool demonstrates that Leicestershire is less conducive to health than the England average.

Understanding the needs of people and communities at risk of health issues due to poor air quality

There are a number of risk factors and health conditions that are known to have a relationship with exposure to poor air quality. These are explained in detail in sections two and three of this assessment. Headline findings are:

- Areas in Oadby & Wigston have higher proportions of babies born with a low birth weight than the England average.
- In Charnwood there was found to be lower GP reported prevalence of hypertension. This was at odds with findings that cardiovascular disease rates are significantly higher in Leicestershire in comparison to England.
- Whilst Leicestershire was found to have high GP reported rates of asthma and COPD but lower levels of respiratory infections than the England average, this finding was not observed for Charnwood. This gives rise to concern about gaps in the figures reported. This view is further confounded by significantly higher admission rates for COPD in urban centres, including within Loughborough.
- Preventable mortality attributable to PM_{2.5} is, on average, the 3rd leading cause of death across the county with variation (5.3-5.9% of deaths) observed across districts.
- 10% of Leicestershire's working population is at risk from higher levels of air pollutants due to occupational exposure.
- Leicestershire was found to have significantly lower walking and cycling rates for travel in comparison to England rates.

Review of current actions and assessment of gaps

Whilst existing, formalised partnerships on air quality exist, there is opportunity for further

joined up work, promoting the consideration of health and other issues as core components of this partnership approach. There appears to be variation in the number and types of measures being employed across District Councils in Leicestershire to improve air quality. There is not currently a clear method for engaging regularly with the public or organisations on air quality and health issues.

There are opportunities to provide clear and consistent messages about air quality and health across a range of communication channels. There are a plethora of services and information, aimed at different ages on the life course, to support individuals to be active but these do not routinely reference air quality considerations or align with active or sustainable travel. Additionally, information about the daily air quality status (DAQI) across Leicestershire could be widely shared through existing platforms and websites. There are opportunities to expand and enhance the Leicestershire Healthy Schools programme. This may lead to better understanding and knowledge which in turn could lead to reductions in emissions/ exposure.

Work has started to integrate sustainability and health into local planning and design frameworks but the level of commitment to embed and adopt this remains unclear. It is apparent that the benefits of physical (re)design to calm traffic for air quality and deliver health benefits need to be clearly communicated to the public and key stakeholders. It is unclear how effectively green spaces are being used to reduce people's exposure to poor air quality or optimised to encourage active and sustainable travel: learning from the Access Fund aspects of the Choose How You Move programme could inform further action on active and sustainable travel planning and uptake.

There is lack of knowledge about the prevalence of multi fuel stoves across Leicestershire. Information packs about installing or using wood burning or multi fuel stoves do not currently include details about the negative impacts on air quality impacts and detrimental health effects. There is potentially a need for air quality alerting systems in areas with higher levels of air pollutants; however further work is required to determine the opportunities and potential unintended consequences of this type of service.

Recommendations

By its nature, air quality cannot be controlled by geographical boundaries or by a single individual alone. Instead collective, systematic efforts are required to reduce air pollution and its harmful effects on health. The key recommendation from this comprehensive JSNA is that the Leicestershire Air Quality and Health Partnership Steering Group should agree a plan to deliver joint actions to tackle poor air quality and related health issues. All key partners and stakeholders should commit to deliver this plan over the next three years. Six objectives, and associated recommendations, are set out. These could form the basis of the partnership action plan.

Objective 1: Clear leadership, vision and strategic direction

- LCC, district councils, and CCGs should commit, through integration in annual action plans, to making Leicestershire a healthy place to live, work and travel by dedicating resources (as appropriate) to reduce harmful emissions and mitigate against the negative impacts to public health and the environment of poor air quality.
- LCC should lead by example by delivering against the Environmental Strategy and aim to achieve carbon neutrality by 2030.
- LCC, district councils, and CCGs should map and engage with the various fora that exist to understand and engage meaningfully with local businesses, voluntary sector agencies or Leicestershire residents on environmental/ air quality and health issues.

Objective 2: Collaborative partnership working

- The partnership should support local authorities to continue to work together and seek public health advice when tackling air quality and health issues through promotion of the work of the LLR Air Quality forum and East Midlands Air Quality network.
- Public health specialists, as members of the LLR Air Quality Forum, should support consideration of wider issues related to air quality and, as appropriate, invite key partners (e.g. health and social care colleagues).
- The partnership steering group should review and refresh the terms of reference

based on the agreed priorities and, as appropriate, widen the membership, sharing information with the Leicestershire Environmental Health management group to ensure alignment with other work in this area.

- LCC Public Health department should provide further resource to support whole School Approaches to adopt Air Quality and Active travel as part of the Healthy Schools programme.

Objective 3: Consideration of air quality and health in planning and development

- LCC Public Health department should consider formalising its commitment, through dedicated resource, to routinely deliver specialist support for strategic spatial planning, local area plan development (including capability building) and work on major developments to reduce sources and public exposure to air pollution.
- LCC and district councils should commit to integration of air quality into planning policy as well as policies that influence strategic and local development plans. A health in all policies approach could be adopted to achieve this.
- LCC Public Health department should support and develop members and local planners, through training and mentoring, to consider the health impacts of planning proposals and urban re-development. Dissemination of opportunities will include utilising the distribution list of the LLR Air Quality forum.

Objective 4: Aligning air quality and health with environment and transport decisions

- Planning and Highways Authorities should seek to implement a hierarchy of sustainable travel which prioritises walking and cycling above other forms of transport. This includes prioritising investment in walking and cycling infrastructure, especially where this would encourage and facilitate active travel to schools and workplaces in areas of high urban density.
- LCC Environment and Transport department, working in collaboration with district councils, should consider providing further resource to expand the work being delivered to support business, schools and developers to make and deliver comprehensive travel plans. This methodology should be used to deliver travel mode shift for business, schools as well as new places in Leicestershire.

Objective 5: General communication with the public and organisations about air quality and health

- LCC, district councils, and CCGs should provide air quality and health information to residents, local businesses, health organisations, local early year's settings, schools colleges and universities; explaining how people and organisations can minimise emissions of pollutants and exposure to poor air quality.
- LCC, district councils, and CCGs should deliver key messages on air quality and health, and links to DAQI, through updating existing online portals as well as through leaflets, face to face contact and other formats that meet their needs. Partners should align and join up public health messages around being active with those about reducing emissions and exposure to air quality through active and sustainable travel choices.
- LCC, district councils, and CCGs should train and mentor front line staff to deliver messages around air quality and health as part of their daily role.

Objective 6: Targeted communication and campaigns with priority groups and key organisations about air quality and health

- LCC Communications Department, working in collaboration with local communication networks, should lead on a programme of work to design, deliver and evaluate campaigns to reduce emissions of air pollutants. This may include promoting anti-idling, reducing multi fuel stove use and/ or making active and sustainable travel choices.
- LCC Communications department, working in collaboration with local communication networks, should lead on a programme of work to design, deliver and evaluate campaigns to reduce individuals' and communities' exposure to air pollutants. These may be focused in AQMA, urban centres or directed at priority groups (for example, children, individuals at risk of ill health due to multi-morbidity or key workforce groups). Further work is required to investigate need as well as unintended consequences of adopting an air quality alerting system aimed at those who are particularly susceptible to negative health effects from poor air quality.

Next steps

This JSNA chapter details a comprehensive look at the air quality and related health issues pertinent to Leicestershire and its constituent District Councils. A cross organisational steering group is in the process of producing the follow-on Air Quality and Health Partnership Action Plan that is expected to deliver against these recommendations.

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1. Introduction

This JSNA chapter aims to quantify the health impacts (and associated health needs) of poor air quality for the population of Leicestershire. This assessment includes an appraisal of the vulnerability, based on both biological and environmental susceptibility, of different individuals or community groups to the effects of air pollution. The scope of this chapter is outdoor, as opposed to indoor, air quality. As a result, some air pollutants, such as Carbon Monoxide (CO) and Non-Methane Volatile Organic Compounds (NMVOCs), which have the greatest health effects in indoor settings, are not discussed in detail. However, a brief overview of these pollutants is included.

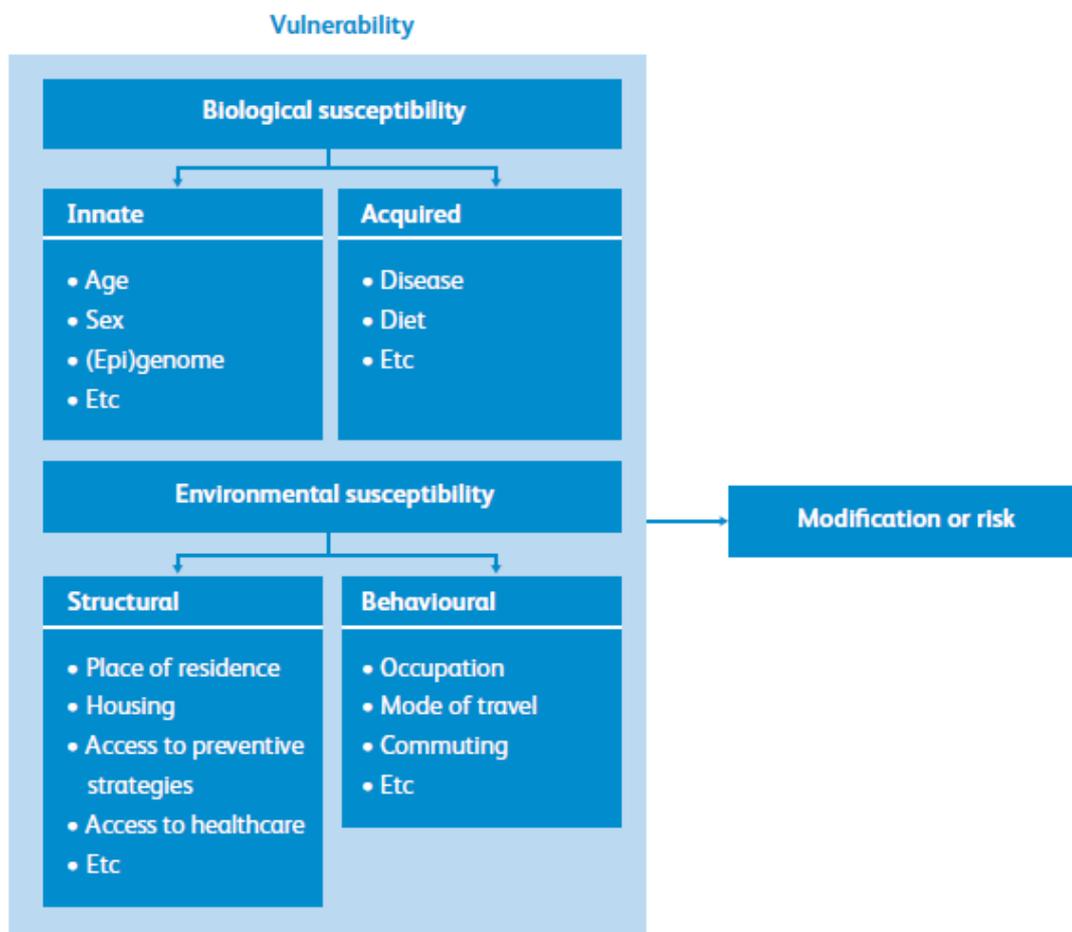
This JSNA chapter provides a comprehensive overview of the current activities, service provision or assets that are being utilised to improve air quality across Leicestershire and reduce or mitigate against harmful health impacts. This will enable us to highlight areas of high or unmet health needs and make recommendations about areas of further work or action across the County Council and its constituent Districts.

2. Who is at risk?

Air pollution has a significant impact on public health and wellbeing, and poor air quality is the largest environmental risk to public health in the UK.³

At risk or vulnerable groups to air pollutants may also be classed as ‘susceptible’ or ‘sensitive’ groups. The report *Every Breath you take*⁴ uses the term ‘vulnerability’ to express the broad range of determinants whereby the health impacts of pollution are unequal. It includes a person’s biological susceptibility as well as environmental, social and behavioural factors that may make a person susceptible to adverse effects of air pollution.

Figure 1: Concepts of vulnerability to the effects of air pollution.⁴



The damage from pollution occurs across the life course - from conception to older age. Some people are more affected than others because they live in a polluted area, are exposed to higher levels of air pollution in their day-to-day lives, or are more susceptible to health problems caused by air pollution.³ The most vulnerable are often from more deprived communities that face greater disadvantage.

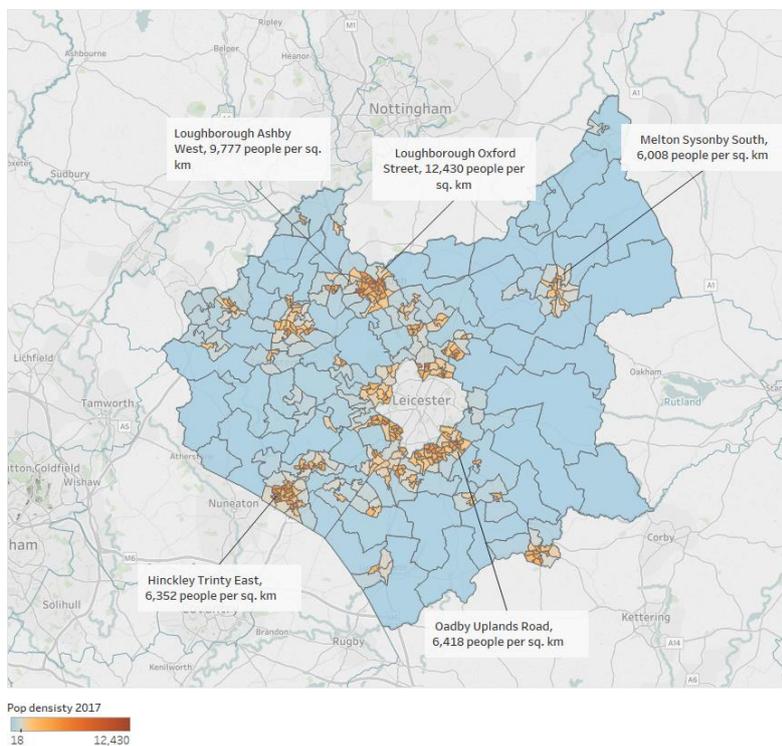
Population groups that are more affected by air pollution include:

- Deprived communities
- Pregnant women, babies and children
- Older people (65 and older)
- People who are obese
- Individuals with existing cardiovascular or respiratory disease
- Individuals with specific occupational risks

2.1. Where do people live in Leicestershire?

Figure 2 shows the population density of Leicestershire by lower super output area (LSOA). The darkest red LSOAs have the highest counts of people per square kilometre while blue areas have the lowest. LSOAs are built around population size with an average population of 1,500. Areas with higher population densities tend to be smaller and located in more urban settings, while areas with lower densities are found in more rural settings. The areas with highest population density shown by the darker red areas are in and around the main towns of Loughborough, Coalville, Hinckley, Melton, Market Harborough, Oadby and Wigston. Additionally, the areas that border Leicester City; Glen Parva, Braunstone Town, Glenfield and Birstall also have higher population densities. Loughborough Oxford Street LSOA has the highest population density in Leicestershire, with a population of 12,430 people per km², followed by Loughborough Ashby West LSOA with almost 9,777 people per km². Both LSOAs are outliers in terms of their population density. Greater Wymondham in Melton Borough has the lowest population density in the county, with just 18 people per km². This variation in population density is important to consider as we assess the level of air pollutants in different areas of Leicestershire and their impact on public health.

Figure 2: Population Density map of Leicestershire by lower super output area.



Source: Mid-2017 population estimates, ONS

2.2. Deprived Communities

There is clear evidence that people with a low income are affected by air pollution in several different ways.³ This is because there is a relationship between low income and:

- Increased likelihood of existing long-term medical conditions.
- Living in areas with poorer outdoor and indoor environments, including the quality of air (for example, near to industry or busy roads).
- Reduced access to high-quality jobs, healthy food, decent housing and green spaces, which all are protective factors for health.

The disadvantages experienced due to low income are cumulative, putting deprived populations who are more likely to be in poorer health at a greater risk from air pollution and its adverse health impacts. These disadvantages can affect people throughout their lives, from the prenatal stage through to old age, particularly as deprived communities often have limited opportunities to improve their environment.⁵

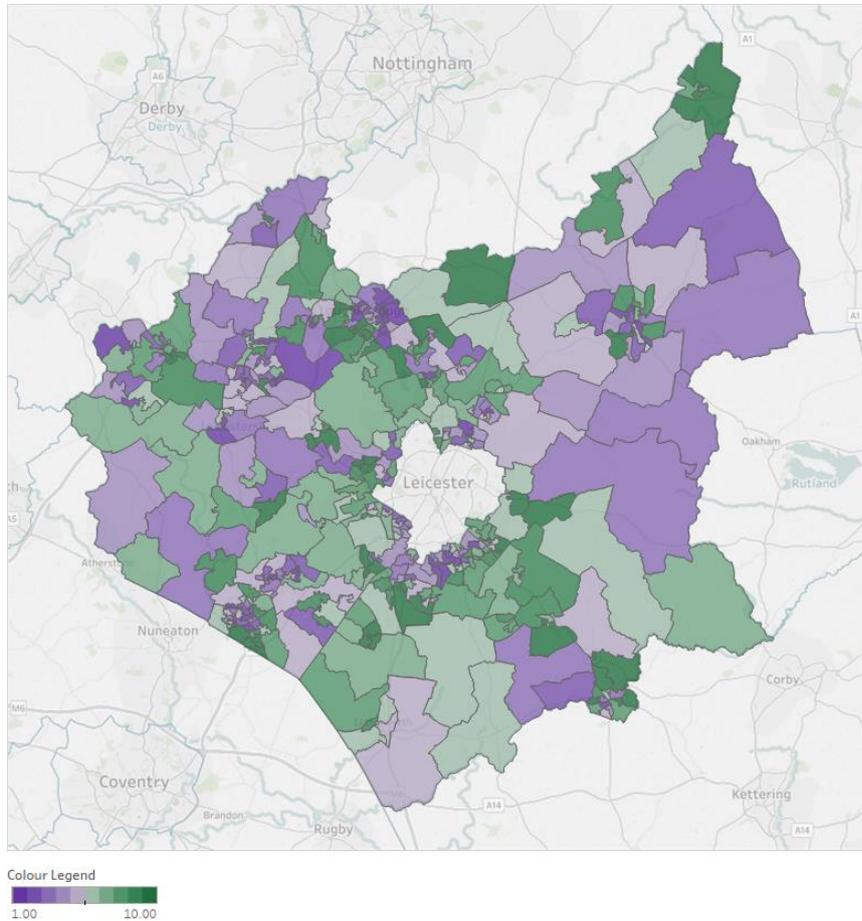
2.2.1. Deprived Communities in Leicestershire

The Index of Multiple Deprivation, commonly known as the IMD, is the official measure of relative deprivation for small areas in England. It is the most widely used of The English Indices of Deprivation 2015 (IMD2015)⁶. The IMD 2015 is based on 37 separate indicators, organised across seven distinct domains of deprivation which are combined to calculate an overall measure of multiple deprivation- experienced by people living in a specific area. It is calculated for every Lower Layer Super Output Area (LSOA), or neighbourhood, in England. In Leicestershire there are 396 LSOAs.

In Leicestershire eight neighbourhoods (of 396) are in the 20% most deprived IMD areas in England. Five of these areas fall in Charnwood (Loughborough Bell Foundry, Loughborough Warwick Way, Loughborough Canal South, Loughborough Central Station and Loughborough Midland Station). Two areas are in North West Leicestershire District (Greenhill North East and Greenhill Centre). There is one area in Hinckley (Hinckley Westfield).

Figure 3 examines the local variation of IMD in Leicestershire at Lower Super Output Area (LSOA). Areas in purple are the most deprived in the county while areas in green are the least deprived in the county. Areas in the most deprived 20% are mostly in town centres. The exception is a rural area in Melton Borough (Croxton Kerrial, Eaton and Belvoir)

Figure 3: Indices of Multiple Deprivation (IMD) 2015 by County decile, Leicestershire



Source: *Indices of Deprivation 2015, Ministry of Housing, Communities & Local Government, MHCLG, 2015*

2.2.2. Outdoor environment

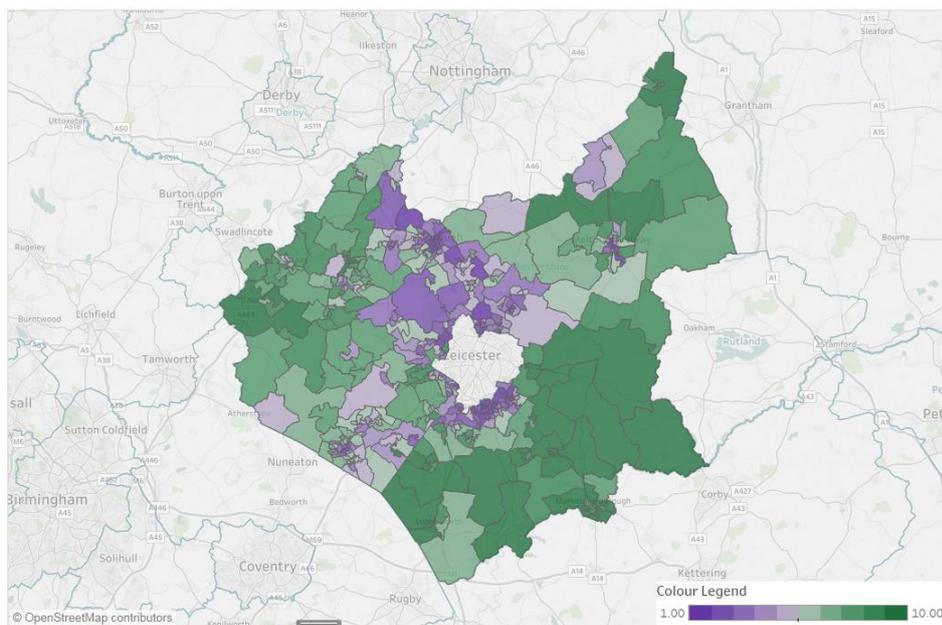
The quality of the local outdoor environment can be measured using the ‘outdoors living environment’ sub-domain which is part of the English Indices of Deprivation 2015 (ID2015).⁶ The indicators fall into two sub-domains. The ‘indoors’ living environment measures the quality of housing; while the ‘outdoors’ living environment contains measures of air quality and road traffic accidents. It is derived from the following indicators:

- Air quality: A measure of air quality based on emissions rates for four pollutants (nitrogen dioxide, benzene, sulphur dioxide and particulates)
- Road traffic accidents involving injury to pedestrians and cyclists.

In Leicestershire seven LSOAs (of 396) are in the 20% most deprived areas in England based on the outdoor living environment domain from the Indices of Deprivation⁶. Three of these areas fall in Charnwood in Loughborough (Loughborough Bell Foundry, Loughborough Toothill Road and Wanlip). Four areas fall in the Oadby and Wigston Borough (Wigston Centre, Guthlaxton College and Wigston Police Station, Wigston WaterLeys and Wigston Rolleston Road). Loughborough Bell Foundry is the only area that is in the most 20% deprived areas nationally for both multiple deprivation and the outdoor living environment.

Figure 4 shows the local variation in outdoor environment deprivation in Leicestershire at LSOA level. Areas in purple are the most deprived in the county while areas in green are the least deprived in the county. The map shows that the areas in the north near Loughborough, town centres and urban/suburban areas near Leicester City are more deprived in relation to the outdoor living environment.

Figure 4: IMD2015 Outdoor Environment Sub-Domain by County decile, Leicestershire⁶



Source: Indices of Deprivation 2015, MHCLG, 2015

For further information on the population and deprivation that exists throughout Leicestershire, please visit the Demographics JSNA chapter, available here: <http://www.lsr-online.org/leicestershire-2018-2021-jsna.html>

The Access to Healthy Assets & Hazards (AHAH)⁷ tool calculates the percentage of the population who live in LSOAs which score in the poorest performing 20% on the AHAH index. It is designed to allow decision makers to understand which areas have poor environments for health, and to help move away from treating features of the environment in isolation. The AHAH index comprises three domains:

- Access to retail services (fast food outlets, gambling outlets, pubs/bars/nightclubs, off licences, tobacconists),
- Access to health services (GP surgeries, A&E hospitals, pharmacies, dentists and leisure centres),
- The physical environment (access to green spaces, and three air pollutants: Nitrogen dioxide (NO₂ level), Particulate Matter of less than 10 millionths of a metre (10 micrometres or 10 um) in diameter (PM₁₀ level), Sulphur dioxide (SO₂ level).

The AHAH index provides a summary of an area's relative performance on these indicators. The first indicator (access to retail) is perceived as health demoting while the second and third domains are conceptualised as health promoting. This index provides information on how conducive an area is, relative to others, for the specific indicators of health. The latest value for Leicestershire in 2016 is 31.6% of the population lives in an environment which is suboptimal for health, this is higher (no significance test applied) than the England (21.2%) and regional averages (28.8%). This data is only available at County level, which may mask the local variations (as per those observed in the previous figures).

2.3. Pregnancy, infancy and early childhood

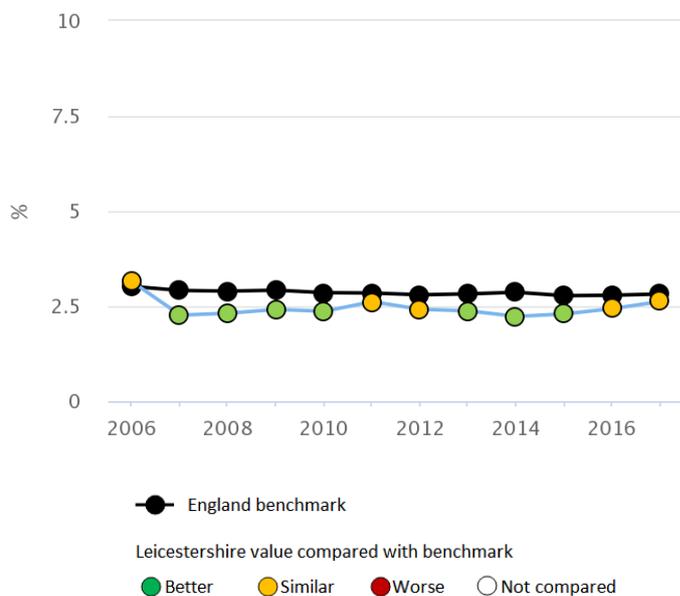
Pregnancy and early childhood are critical times for the formation and maturation of all the

important body systems and a period when rapid early development takes place. There is clear evidence that early exposure to air pollution to babies and infants can damage the lungs and increase the risk of lung infections that may be life limiting or altering. Early exposure to air pollution is also known to have an effect on heart health in adult life. Additionally, emerging evidence is beginning to point towards effects on growth, intelligence, asthma, and development of the brain and coordination⁴.

The strongest evidence from epidemiological studies of pregnancy outcomes is that air pollution affects foetal growth and birth weight.⁸ It is estimated that traffic-related air pollution exposure of pregnant women accounts for more than one-fifth of all cases of low birth weight at term. There is consistent evidence that exposure to particulates during pregnancy increases the risk of low birth weight.⁹

In Leicestershire 2.62% of babies were born with a low birth weight (recorded birth weight under 2500g and a gestational age of at least 37 complete weeks) in 2017. This is similar to the England value of 2.82%. Figure 5 shows the trend in proportion of low birth weight births in Leicestershire has shown no significant change over the last 12 time periods.

Figure 5: Trend in low birth weight of term babies in Leicestershire 2006 -2017¹⁰



Source: Public Health England, *Fingertips Child and Maternal Health Profiles, 2019*

In 2017, all Leicestershire districts had a similar proportion of low birth weight babies in comparison to the England average. In the previous year, all districts performed similar to the national rate, bar Oadby and Wigston which had a significantly worse (higher) rate than nationally and Blaby which performed significantly better (lower) than nationally.¹⁰ Due to data not being available at more granular levels of geography local variations may be masked.

2.4. Older people (65 and older)

There is consistent evidence that older people are particularly vulnerable to the adverse effects of air pollution.⁴ A systematic review of studies that examined deaths in association with exposure to particulate matter for example, indicated a risk in older people of approximately twice that observed in younger persons. Similar findings are reported for hospitalisations.¹¹ There are cumulative associations between air pollution and lung function (in line with multi-system decline) and exacerbations of biological susceptibility due to existing comorbidities. The Office of National Statistics 2016-based Population Projections show older adults aged 65 years and above make up 21% of the population in Leicestershire compared to 18% for England in 2018. This is predicted to rise to 27% in Leicestershire by 2041.¹² The predicted population for adults aged 65 and over is 24% for England in 2041.

2.5. People who are obese

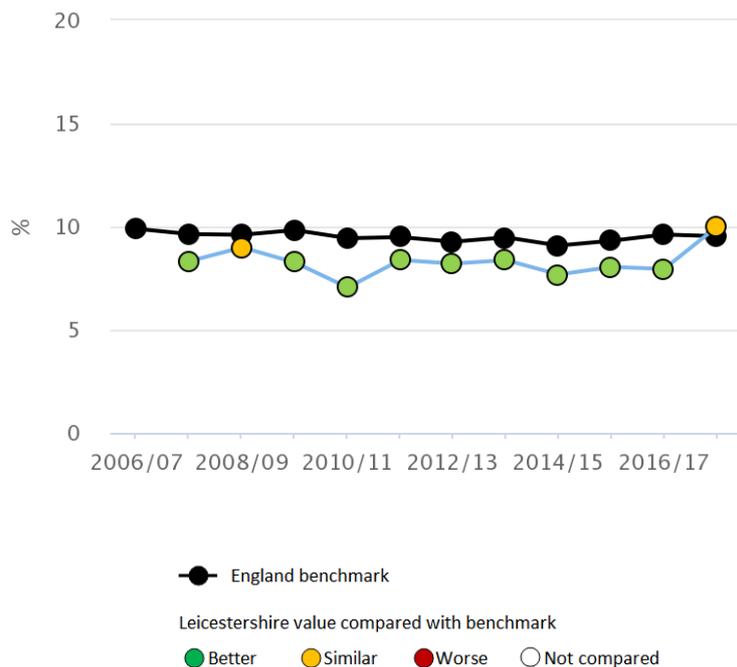
Being obese can modify the associations between air pollution and markers of systemic inflammation, and between childhood asthma and respiratory symptoms. Recent research has suggested that obese young children may be more likely than non-obese children to develop asthma in association with exposure to some components of air pollution.¹³

Research has also suggested that some components of air pollution may be implicated in the development of obesity; prenatal exposure to endocrine-disrupting chemicals, for example, has been reported to increase children's risk of obesity.⁴

The prevalence of obesity among children in Reception (age 4-5) in Leicestershire was 7.9% in 2016/17. This is significantly better (lower) than the England value (9.6%) but still (in this period) represents 579 reception children in the county classified as obese. In the period from

2009/10 to 2016/17, the proportion of obese pupils has remained significantly better in Leicestershire than England. Data quality issues have been raised for the latest data, reported in 2017/18, and so county level data has not been described here.

Figure 6: Prevalence of obesity in reception children in Leicestershire, 2006/07 - 2017/18¹⁴



Source: Public Health England, Public Health Outcomes Framework 2019

In 2017/18, all districts bar Charnwood and Harborough had similar obesity prevalence for reception children in comparison to the national average. Charnwood and Harborough perform significantly better (lower) than the national prevalence. There is no data for Hinckley and Bosworth due to the aforementioned data quality issues.

2.6. Individuals with existing cardiovascular or respiratory disease

There is strong evidence that individuals with existing cardiovascular disease or respiratory disease are more likely to be affected by air pollution.³ Research shows that air pollution can affect the heart and circulation by; damaging the inside walls of blood vessels, restricting the movement of blood vessels, which can increase your blood pressure and add to the strain on your heart, making blood more likely to clot, and affecting the normal electrical functioning

of the heart.¹⁵ These problems can either cause new cardiovascular conditions or worsen existing conditions.

Table 1 shows the GP recorded disease prevalence and registered counts of cardiovascular and respiratory diseases for the GP registered population in Leicestershire in 2017/18. This was reported as part of the Quality Outcomes Framework.¹⁶ There are eight cardiovascular diseases listed. The Leicestershire and district prevalence for each disease is compared to the national GP recorded disease prevalence.

In 2017/18, in comparison to the national GP recorded disease the prevalence of GP recorded cardiovascular diseases across Leicestershire was significantly higher for all the diseases listed, except for Coronary Heart Disease (CHD) and Peripheral Artery Disease (PAD).

Hypertension is a risk factor for a variety of long-term cardiovascular diseases.¹⁷ In Leicestershire the prevalence of GP recorded hypertension was 15.0%. This was reported to be significantly higher than the England average of 13.9%. In the county, over 100,000 registered patients to a GP practice in Leicestershire were treated for hypertension in 2017/18. All districts in Leicestershire had a significantly higher prevalence in comparison to the England average- except in Charnwood which had a significantly lower prevalence of 13.3%.

It is important to note that the data presented is based on populations registered with a GP who have attended a primary care setting for a health assessment and healthcare interventions. It is unclear whether the lower prevalence in some areas is due to data reporting issues, GP access issues for certain population groups, underdiagnoses of hypertension in the primary care setting or a lower incidence of CVD in that district's population.

Table 1: Quality Outcomes Framework Disease Prevalence (%) for cardiovascular diseases in Leicestershire compared to England prevalence in 2017/18¹⁶

Disease Register		England	Leicestershire	Blaby	Charnwood	Harborough	Hinckley and Bosworth	Melton	North West Leicestershire	Oadby and Wigston	
Cardiovascular	Atrial Fibrillation (All Ages)	Prevalence	1.9%	2.2%	2.1%	1.9%	2.4%	2.3%	2.6%	2.3%	2.5%
		Register	1113553	15161	2058	3666	2135	2430	1105	2331	1436
	Coronary Heart Disease (All Ages)	Prevalence	3.1%	3.0%	3.0%	2.8%	2.9%	3.1%	3.2%	3.3%	3.5%
		Register	1827352	20808	2983	5292	2560	3341	1348	3241	2043
	CVD - Primary Prevention (Ages 30-74)	Prevalence	1.1%	1.3%	1.2%	1.2%	1.3%	1.2%	1.5%	1.3%	1.4%
		Register	373063	4897	689	1232	658	740	361	768	449
	Heart Failure (All Ages)	Prevalence	0.8%	1.0%	0.8%	1.0%	0.7%	1.3%	1.4%	1.1%	1.3%
		Register	485561	7172	820	1912	660	1374	575	1100	731
	Heart Failure due to LVSD (All Ages)	Prevalence	0.3%	0.4%	0.3%	0.4%	0.2%	0.7%	0.4%	0.4%	0.3%
		Register	177322	2593	261	708	152	731	154	429	158
Hypertension (All Ages)	Prevalence	13.9%	15.0%	15.3%	13.3%	14.7%	15.8%	16.1%	15.6%	16.7%	
	Register	8141488	102590	15143	25542	13136	16813	6788	15459	9709	
Peripheral Artery Disease (All Ages)	Prevalence	0.6%	0.5%	0.4%	0.5%	0.5%	0.6%	0.7%	0.6%	0.6%	
	Register	344243	3650	393	1003	408	641	295	567	343	
Stroke and TIA (All Ages)	Prevalence	1.8%	1.8%	1.8%	1.6%	1.9%	1.9%	1.7%	1.8%	2.1%	
	Register	1030869	12465	1802	3141	1670	2040	736	1835	1241	

- England Average
- Higher than England Average
- Lower than England Average
- Similar to England

Source: Quality Outcomes Framework 2017/18, NHS Digital. Local authority figures computed by the Strategic Business Intelligence Team at Leicestershire County Council

Asthma is a condition of chronic airway inflammation which may mean that airways are hypersensitive to inhaled irritants, such as the constituents of ambient air pollution. Therefore, individuals with asthma often report more symptoms from pollution than those without asthma or are more likely to have an ‘attack’ of asthma when ambient outdoor air pollution levels are high than when they are not.¹⁸ Individuals with more severe asthma and

those whose asthma is poorly managed are especially vulnerable to the health effects of air pollution.

Chronic Obstructive Pulmonary Disease (COPD) is an umbrella term used to describe a range of progressive lung diseases. The disease is more prevalent in older populations and those with a smoking history are at increased risk of developing this condition. Physiologically, individuals with COPD have a diminished capacity to clear inhaled material from their lungs. As a result, these individuals incur a higher-than-normal 'dose' at any level of air pollution. In response to elevated levels of pollution, individuals with COPD experience a greater fall in lung function and a higher risk of admission to hospital than healthy persons of the same age.

Table 2 shows the GP recorded disease prevalence and registered counts of respiratory diseases (Asthma and COPD) for the GP registered population in Leicestershire in 2017/18. This was reported as part of the Quality Outcomes Framework.¹⁹ The Leicestershire and district prevalence for each disease is compared to the national GP recorded disease prevalence.

The prevalence of asthma across Leicestershire was 6.2%, which was significantly higher than the England average of 5.9%. Harborough, Hinckley and Bosworth, Melton and North West Leicestershire also have significantly higher prevalence rates than the England average. All other districts are reported to have a similar prevalence to the national average.

In 2017/18, the prevalence of COPD in Leicestershire was 1.8%. This was significantly lower than the England average of 1.9%. At a district level, North West Leicestershire had a significantly higher prevalence (2.3%) and Hinckley and Bosworth had a similar value (2.0%) in comparison to the England average. All other districts had a significantly lower prevalence in comparison to the national average.

It is important to note that the data presented is based on populations registered with a GP who have attended a primary care setting for a health assessment and healthcare interventions. It is unclear whether the lower prevalence in some areas is due to data reporting issues, GP access issues for certain population groups, underdiagnoses of asthma

and COPD in the primary care setting or a lower incidence of respiratory conditions in that district's population.

Table 2: Quality Outcomes Framework Disease Prevalence (%) for respiratory diseases in Leicestershire compared to England prevalence in 2017/18¹⁶

Disease Register		England	Leicestershire	Blaby	Charnwood	Harborough	Hinckley and Bosworth	Melton	North West Leicestershire	Oadby and Wigston
Respiratory	Asthma (All Ages)	Prevalence	5.9%	6.2%	5.8%	5.8%	6.3%	6.6%	6.2%	6.8%
		Register	3463893	42537	5796	11204	5627	7028	2638	6741
	COPD (All Ages)	Prevalence	1.9%	1.8%	1.7%	1.7%	1.6%	2.0%	1.8%	2.3%
		Register	1113417	12523	1704	3231	1456	2101	739	2255

- England Average
- Higher than England Average
- Lower than England Average
- Similar to England

Source: Quality Outcomes Framework 2017/18, NHS Digital. Local authority figures computed by the Strategic Business Intelligence Team at Leicestershire County Council

2.7. Individuals with specific occupational risk

The highly localised distribution of air pollution leads to unequal patterns of exposure for different individuals or population groups due to variations in their day-to-day activities. Quarries, mining and construction industries can generate high concentrations of particulate matter putting workers in these industries at a higher risk for exposure to air pollution and the negative effects on health. Those who drive for a living can be at a similarly high risk for negative health effects of air pollution health in comparison to those workers who live and work near busy roads. This is because air pollution levels are typically as high within vehicles as just outside. For example, ambulance drivers, taxi drivers and other professional road users will inhale significantly higher amounts of pollution compared to those working outside but away from a busy road.²⁰ The Health and Safety Executive²¹ states that respiratory disease is

a major occupational health risk for those working in agriculture, with an incidence of occupational asthma several times higher than the national average. The most common cause of asthma amongst agricultural workers is because of exposure to agricultural dusts.

The Business Register and Employment Survey (BRES) is the official source of employee and employment estimates by detailed geography and industry.²²

Table 3 shows the number of employees by industry in Leicestershire. Industries that have employees that are more likely to be exposed to higher levels of air pollution are within categories A: Agriculture, forestry and fishing, B: Mining and Quarrying, F: Construction, H: Transportation and storage. In the transportation and storage sector it is likely that 13,200 employees in Leicestershire work in jobs that are likely to result in exposure to higher air pollution levels. These include; 6000 postal and courier activities, 5000 employees working in freight transport by road, 1150 employees in the land transport area (buses, coaches & railway transport), 900 in air transportation and 150 taxi drivers. From using the data in this survey, we can estimate that the total number of employees who are likely to be affected by higher air pollution levels through occupational exposure is 33,200. This equates to 10.7% of the total Leicestershire working population.

It is worth noting that this number is likely to be an underestimate as other industries have a proportion of workers whose main job is driving or working in areas with higher air pollution levels. This includes a proportion of those showing in category G: wholesale and retail and category C manufacturing.

Table 3: Number of Employees by industry in Leicestershire from the Business Register and Employment Survey 2017.²²

Industry	Number of employees	Percentage of working population (employees)	Employees at risk of higher levels of air pollution	Percentage of working population at risk of higher levels of air pollution
A: Agriculture, forestry and fishing	3000	1.0%	3000	1.0%
B: Mining and quarrying	2000	0.6%	2000	0.6%
C: Manufacturing	43000	13.8%		
D: Electricity, gas, steam and air conditioning supply	8000	2.6%		
E: Water supply; sewerage, waste management and remediation activities	1750	0.6%		
F: Construction	15000	4.8%	15000	4.8%
G: Wholesale and retail trade; repair of motor vehicles and motorcycles	49000	15.8%		
H: Transportation and storage	24000	7.7%	13200	4.2%
I: Accommodation and food service activities	22000	7.1%		
J: Information and communication	8000	2.6%		
K: Financial and insurance activities	6000	1.9%		
L: Real estate activities	3500	1.1%		
M: Professional, scientific and technical activities	33000	10.6%		
N: Administrative and support service activities	24000	7.7%		
O: Public administration and defence; compulsory social security	10000	3.2%		
P: Education	24000	7.7%		
Q: Human health and social work activities	25000	8.0%		
R: Arts, entertainment and recreation	6000	1.9%		
S: Other service activities	5000	1.6%		
T: Activities of households as employers; undifferentiated goods-and services-producing activities of households for own use	0	0.0%		
U: Activities of extraterritorial organisations and bodies	0	0.0%		
Total	311000	100.0%	33200	10.7%

Source: Business Register Employment Survey, ONS, 2018. Crown Copyright Reserved

3. Level of need in Leicestershire

Poor air quality can affect everyone. In all areas of the UK, ambient air contains a proportion of man-made air pollutants. Air pollution is a complex mix of particles and gases of both natural and human origin that are introduced into the atmosphere and can be harmful to humans, animals and plants.³ Sources of air pollution include transport, industrial processes, farming, energy generation and domestic heating. The key air pollutants are Particulate Matter (PM) and Nitrogen Dioxide (NO₂). Other pollutants include Sulphur Dioxide (SO₂), Non-Methane Volatile Organic Compounds (NMVOCs), Ammonia (NH₃) and Ozone (O₃). The Environment Bill and associated Air Quality limits set out target values with which the UK must comply with²³.

3.1. Air Quality Management Areas (AQMAs)

Part IV of the Environment Act, 1995, places a statutory duty on local authorities to periodically review and assess the air quality within their area.²⁴ In two-tier authority areas, the duties placed on local government associated with air quality management are the responsibility of districts. This includes identification of AQMAs, monitoring and reporting on air quality, producing and delivering action plans, and assessing the impact of development on air quality through the planning process.

However, there are obligations on both the county and district councils within Part IV of the Environment Act 1995 in relation to air quality. The Secretary of State expects lower and upper-tier councils to work together to develop their content and, with respect to action plans, ensure that all necessary measures to address air pollution in their local area are included.

Should a district provide evidence which attributes air pollution within an AQMA to the local road network, the County Council as the Local Highway Authority (LHA) has a role to play in working with them to identify and to seek funding sources for mitigation measures on the local road network .

The UK Air Quality Strategy²⁵ has a framework for air quality objectives. For each air quality objective in the Regulations, local authorities have to consider whether the objective is likely to be achieved. Where it appears likely that the air quality objectives are not being met, the authority must declare an Air Quality Management Area (AQMA). Following the declaration of an AQMA, the authority must develop an Air Quality Action Plan (AQAP) which sets out the local measures to be implemented in pursuit of the air quality objectives. Table 4 shows a summary of air quality objectives in England. Each lower tier local authority publishes its AQAP and Annual Status Report. Links to all AQAPs and Annual Status Reports in Leicestershire can be found on each local authority's website in Appendix 1. These will be discussed in more detail in Section 5 and 6.

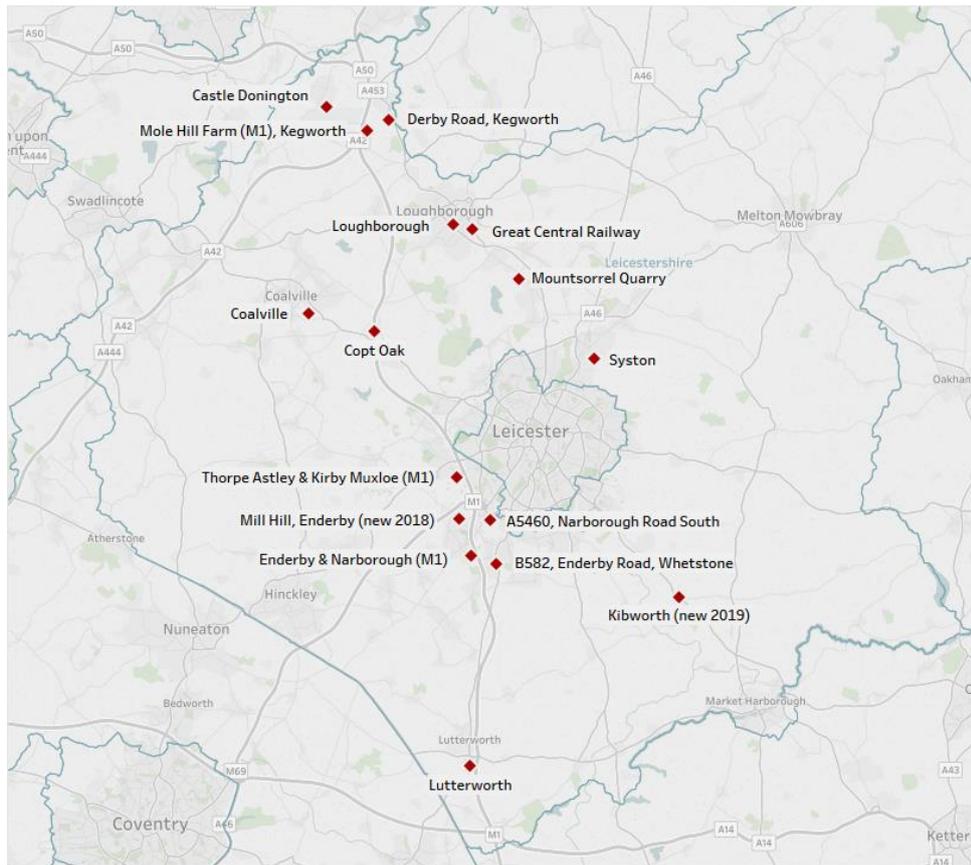
Table 4: Air Quality Objectives in England

Pollutant	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg.m ⁻³ not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO ₂)	40 µg.m ⁻³	Annual mean
Particulate Matter (PM ₁₀)	50 µg.m ⁻³ , not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM ₁₀)	40 µg.m ⁻³	Annual mean
Sulphur Dioxide (SO ₂)	125 µg.m ⁻³ , not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO ₂)	266 µg.m ⁻³ , not to be exceeded more than 35 times a year	15-min mean

Source: UK Air Quality Objectives, DEFRA, 2007

In 2018, there are 14 AQMAs currently declared in Leicestershire. Figure 7 shows the locations of these areas. More information on individual AQMAs can be found on the Department for Environment, Food & Rural Affairs (DEFRA) website, available here: <https://uk-air.defra.gov.uk/aqma/list>.²⁶ Melton Borough Council, Hinckley and Bosworth Borough Council and Oadby and Wigston Borough Council have currently no declared AQMAs. The 14 AQMAs appear to fall, roughly, along or around the central North/ South spine of Leicestershire.

Figure 7: Locations of Air Quality Management Areas in Leicestershire, 2017²⁶



Source: Air Quality Management Areas (AQMAs), DEFRA, 2019

An interim Air Quality headline indicator was developed in 2017 for the Public Health Dashboard – Longer Lives by Public Health England. It calculates the proportion of the population living within AQMAs. In Leicestershire the proportion living within an AQMA is 0.6%; this is equivalent to 4045 persons across the county.²⁷ This has been calculated as similar to the England average of 0.2%.

It is important to note that this value is likely to under-represent as two additional AQMAs have been declared in Leicestershire after the release of this dashboard. These are:

- Mill Hill, Enderby AQMA in the Blaby District (declared in September 2018), and
- Kibworth AQMA in the Harborough district (declared in November 2017).

3.2. Key air pollutants for Leicestershire

3.2.1. Particulate Matter

Particulate Matter (PM) is a generic term used to describe a complex mixture of solid and liquid particles of varying size, shape, and composition. Some particles are emitted directly (primary PM); others are formed in the atmosphere through complex chemical reactions (secondary PM). The composition of PM varies greatly and depends on many factors, such as geographical location, emission sources and weather.

The main sources of man-made PM are the combustion of fuels (by vehicles, industry and domestic properties) and other physical processes such as tyres and brake wear. Natural sources include wind-blown soil and dust, sea spray particles, and fires involving burning vegetation.

Particulate matter is often classified according to aerodynamic size and referred to as:

- coarse particles (PM₁₀; particles that are less than 10 microns (µm) in diameter)
- fine particles (PM_{2.5}; particles that are less than 2.5 µm in diameter)
- ultrafine particles (PM_{0.1}; particles that are less than 0.1 µm in diameter)

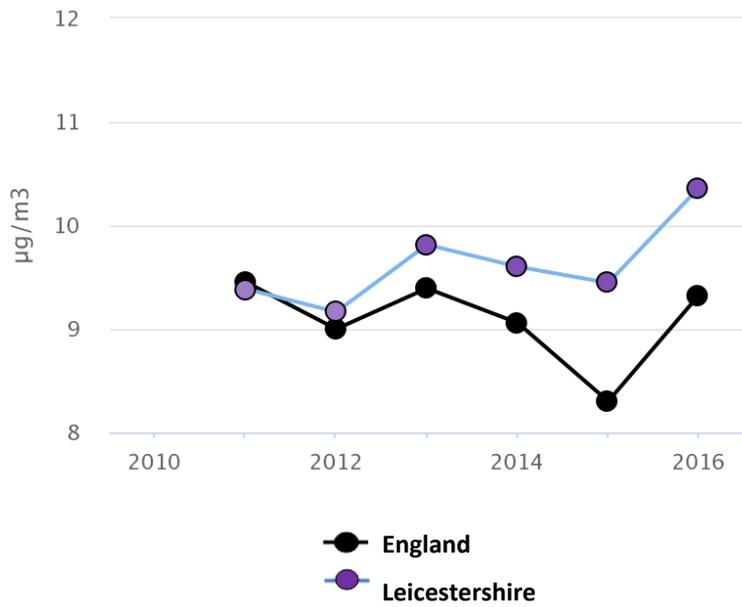
3.2.2. Modelled concentrations of levels of Particulate Matter

The annual concentration of human made fine particulate matter at Leicestershire level in 2016 was 10.4 micrograms per cubic metre (µg.m⁻³).⁷ This was in the second highest quintile in England and higher (but not significantly so) than the England average of 9.3 µg.m⁻³. Levels have fluctuated each year since 2011 and were highest in 2016 for both England and Leicestershire (

Figure 8). It is noted that calculations of PM_{2.5} is not an exact science and this information is based on modelled data.

For further information on the methodology please visit <https://uk->

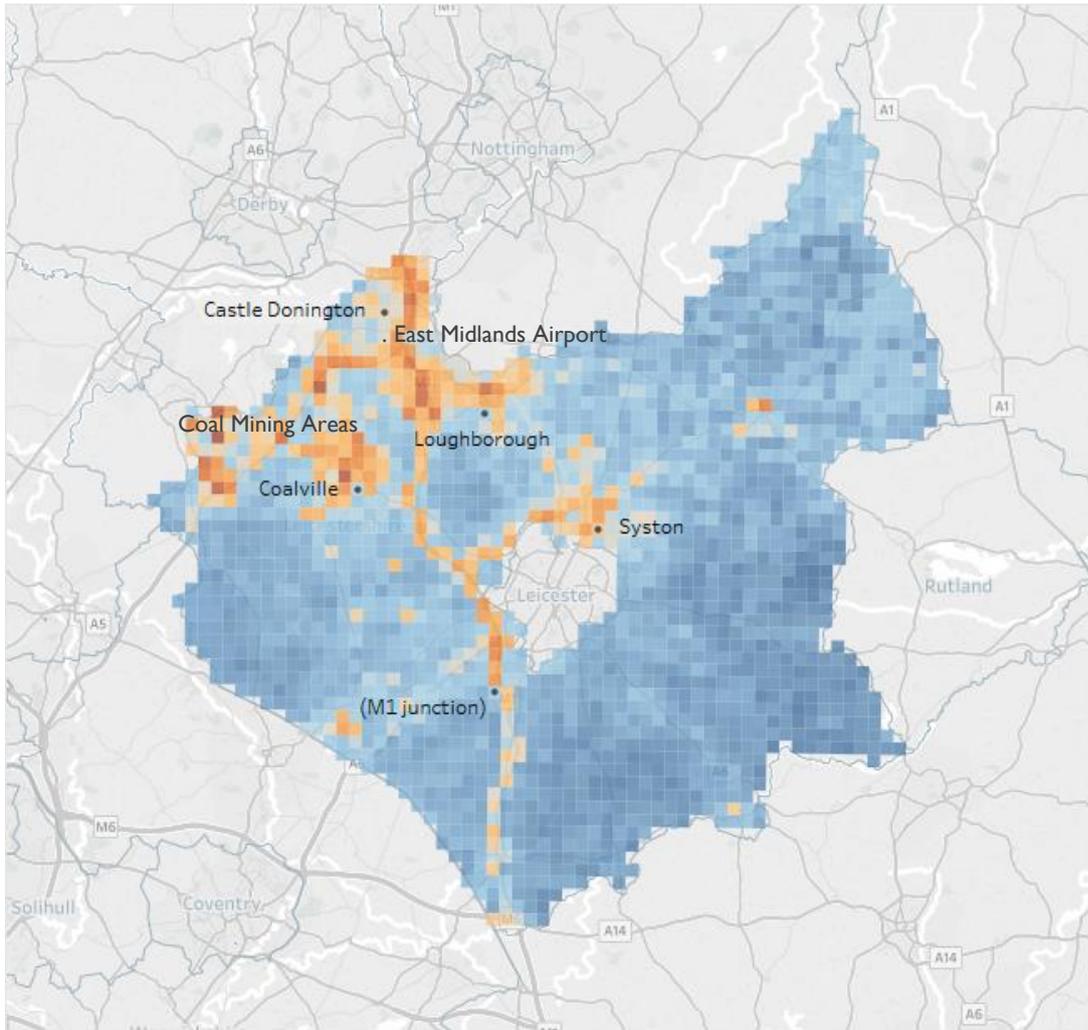
Figure 8: Air pollution levels for fine particulate matter in Leicestershire 2011-2016⁷



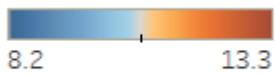
Source: Public Health England, *Fingertips Wider Determinants of Health profile*, 2019

The department for Environment Food and Rural Affairs (DEFRA) provides 1 x 1 km background maps of NO_x, NO₂, PM₁₀ and PM_{2.5} for the years 2008- 2020 (projected from a base year of 2008) by local authority. These are outputs from the Pollution Climate Mapping (PCM) model run by Ricardo Energy & Environment.²⁸ Figure 9 and Figure 10 examines the levels of human-made particulate air pollution measured as PM_{2.5} and PM₁₀ throughout Leicestershire for 2015. Both maps show background levels are higher in the North West of Leicestershire around Castle Donnington, Loughborough and Kegworth. East Midlands airport coupled with the M1 are the most likely sources for these higher concentrations. Areas in North West Leicestershire have a history of mining which may account for higher concentrations near Coalville. Whilst all the deep coal mines have closed, some open cast mining continues. Mountsorrell Quarry is likely to be the source of higher concentrations of PM in Syston. Higher concentrations of all particulate matter in Blaby along the M1 are potentially due to the Junction of the M1. The quarry at Croft in Blaby District is also a potential source of PM.

Figure 9: Background Concentrations of PM_{2.5} in Leicestershire, 2015.²⁸

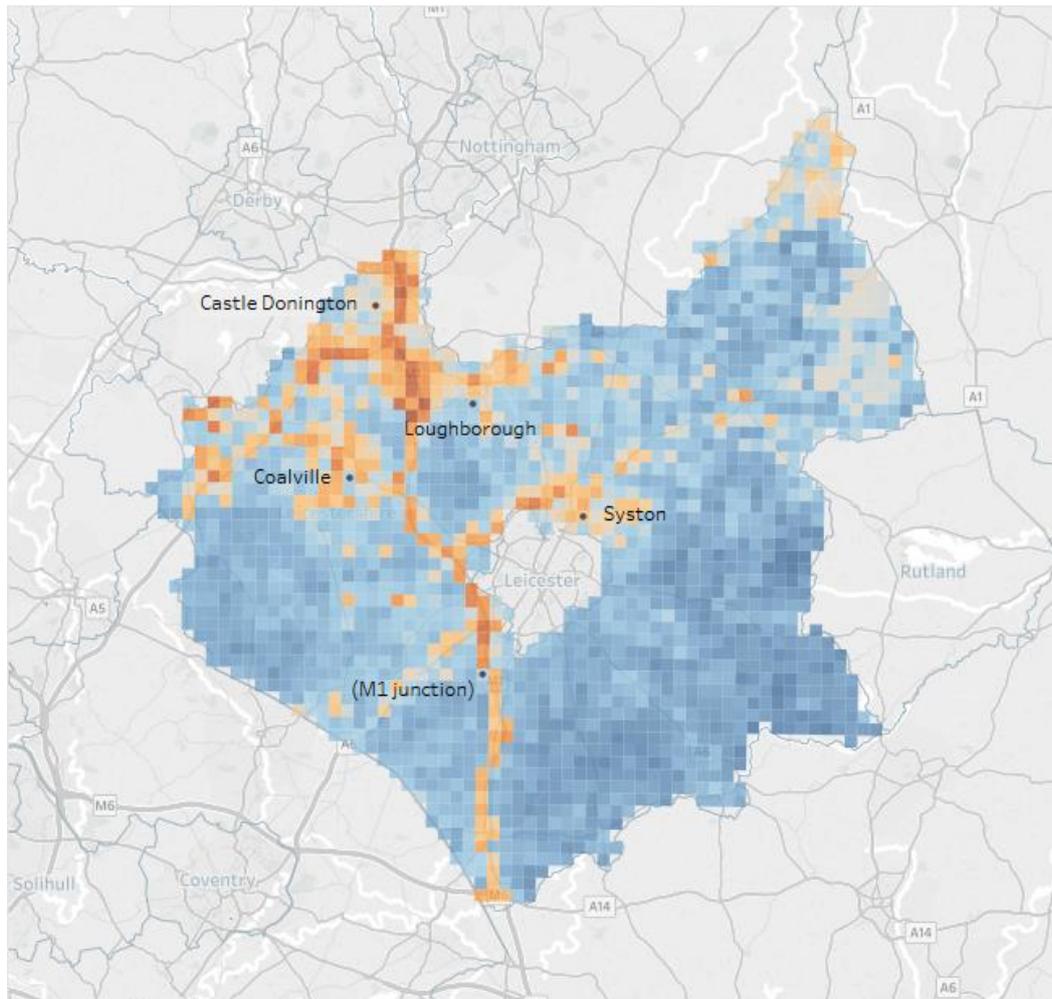


Range of PM_{2.5} values throughout Leicestershire

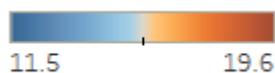


Source: *Modelled 1x1 km background pollutant data for PM_{2.5}, DEFRA, 2015.* ²⁸

Figure 10: Background concentrations of PM₁₀ in Leicestershire, 2015²⁸



Range of PM₁₀ values throughout Leicestershire

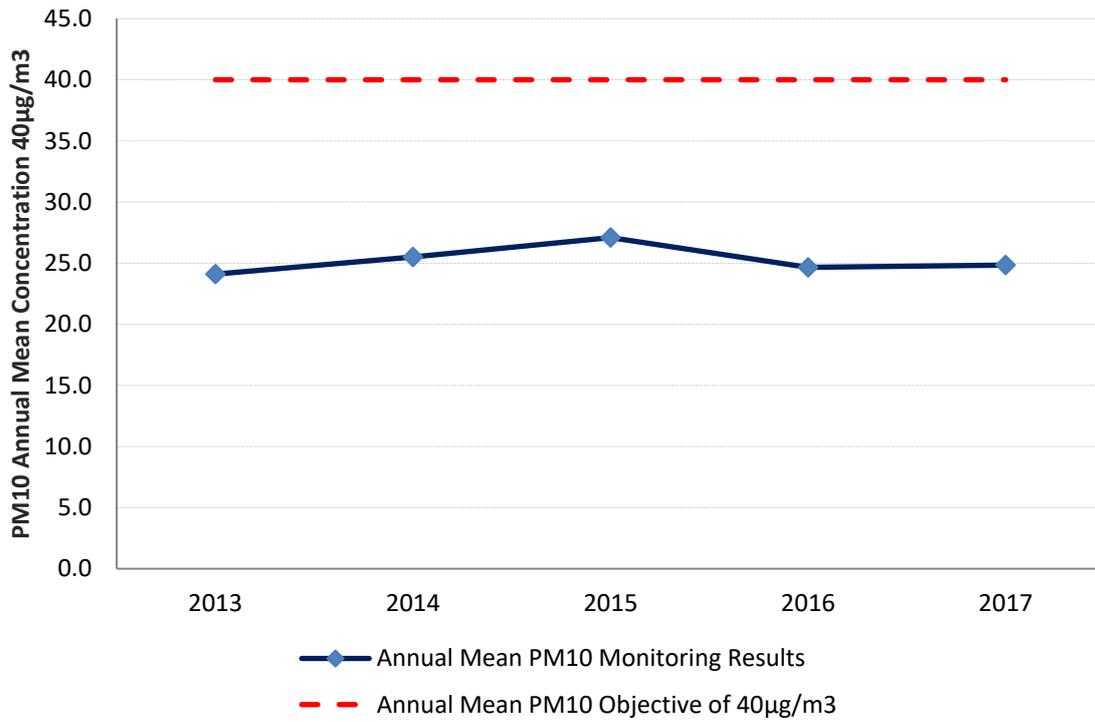


Source: Modelled 1x1 km background pollutant data for PM₁₀, DEFRA, 2015. ²⁸

3.2.2.1. Local monitoring of levels of Particulate Matter

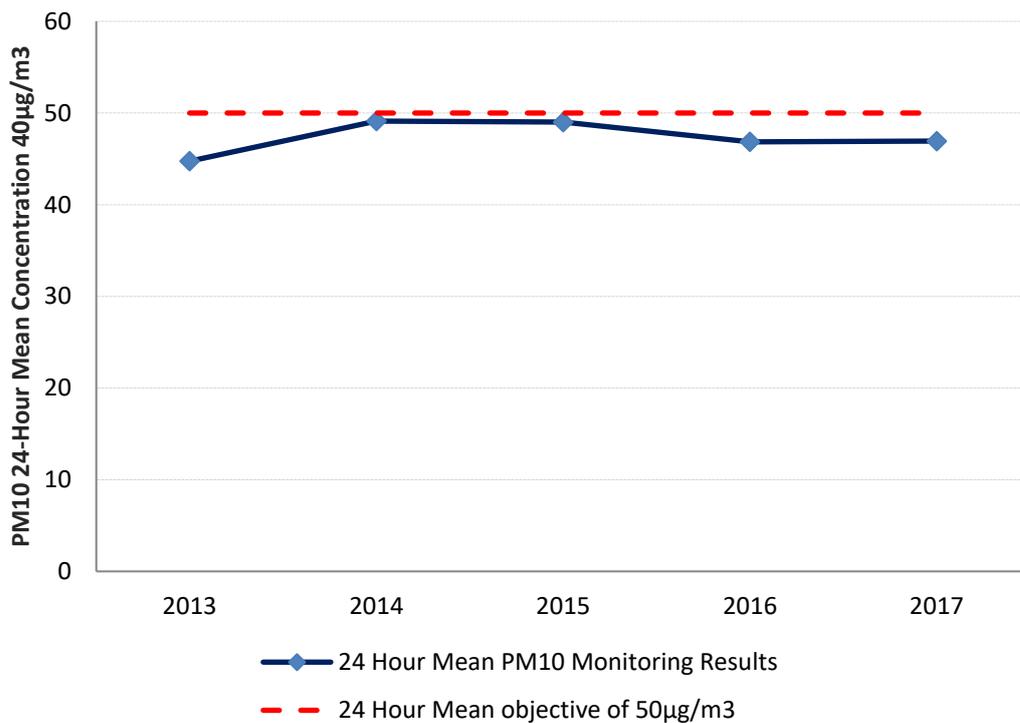
In Leicestershire there is one area that has been declared as an Air Quality Management Area for PM₁₀, this is in Charnwood and was declared in 2001.²⁹ This is an area encompassing residential properties near Mountsorrel Quarry. Charnwood Borough Council monitors PM₁₀ levels in the vicinity of Mountsorrel Quarry and both Figure 11 and Figure 12 illustrate that the recent levels of this pollutant- monitored from 2013 to 2017- are in compliance with the air quality objectives.

Figure 11: Annual Mean PM₁₀ Monitoring Results in Mountsorrel AQMA



Source: Charnwood Borough Council PM₁₀ monitoring results, 2013-2017

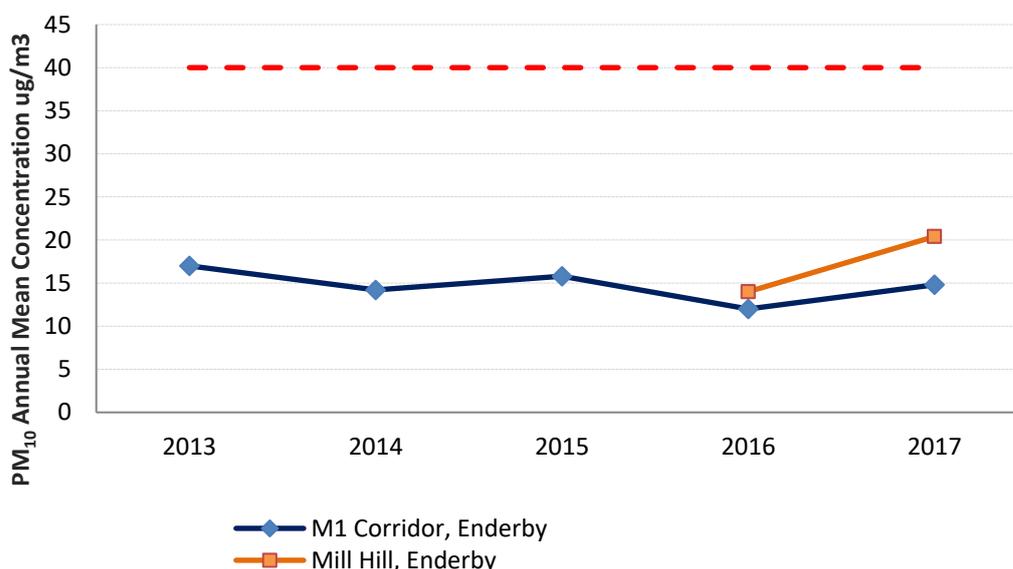
Figure 12: 24-Hour Mean PM₁₀ Monitoring Results in Mountsorrel



Source: Charnwood Borough Council PM₁₀ monitoring results

In 2017 there were three other areas in Leicestershire where monitoring of PM occurred. Blaby District Council had, and still has, two continuous monitors that record concentrations of PM. One is located within AQMA 2: M1 corridor in Enderby and Narborough, and one was moved to Mill Hill, Enderby in February 2016.³⁰ Both monitoring sites enable collection of quantitative and continuous data about levels PM₁₀. A correction factor can be used to give an approximate expected PM_{2.5} measurement.

Figure 13 Annual Mean PM10 Monitoring Results M1 corridor in Enderby and Narborough³⁰



Source: Blaby District Council PM₁₀ monitoring results, 2013-2017

Figure 13 above shows there have been no exceedances of PM₁₀ air quality objectives at the monitoring locations. Both have consistently shown levels which are below the annual mean objective of 40 µg.m⁻³. Mill Hill in Enderby remains an area of concern to Blaby District Council due to high levels of traffic, therefore continuous monitoring of particulates will continue at this location.

Blaby District Council undertook a four-month survey in and around the Croft Quarry site to determine if there was a significant issue in regard to PM pollution. The survey commenced in February 2017. The results show no exceedances but are only indicative due to the short monitoring period. Croft Quarry is believed to be the main source of PM_{2.5} in the local area and therefore Blaby District Council have decided to continue to actively monitor this site through the Environmental Permitting regime.

As detailed in Local Air Quality Management (LAQM) Policy Guidance²⁵ local authorities are

expected to work towards reducing emissions and/or concentrations of PM_{2.5}. In Leicestershire there are several industrial sites which require an Environmental Permit to operate. This includes brickworks, quarries, mobile crushers/screeners, cement processes, petrol stations, some incinerators, dry cleaners and paint-shops amongst other facilities. Local authorities are the regulatory authority for Part A2 and B industrial installations under the Environmental Permitting (England and Wales) Regulations 2016.³¹ Each installation is inspected by Environmental Health (Pollution) to monitor compliance with the Environmental Permit for the site and ensure that emissions to atmosphere are adequately controlled. The frequency of inspections is determined by a risk rating system. As Best Available Techniques (BAT) improve with new technological advances improvements to air quality are gained through this regime.

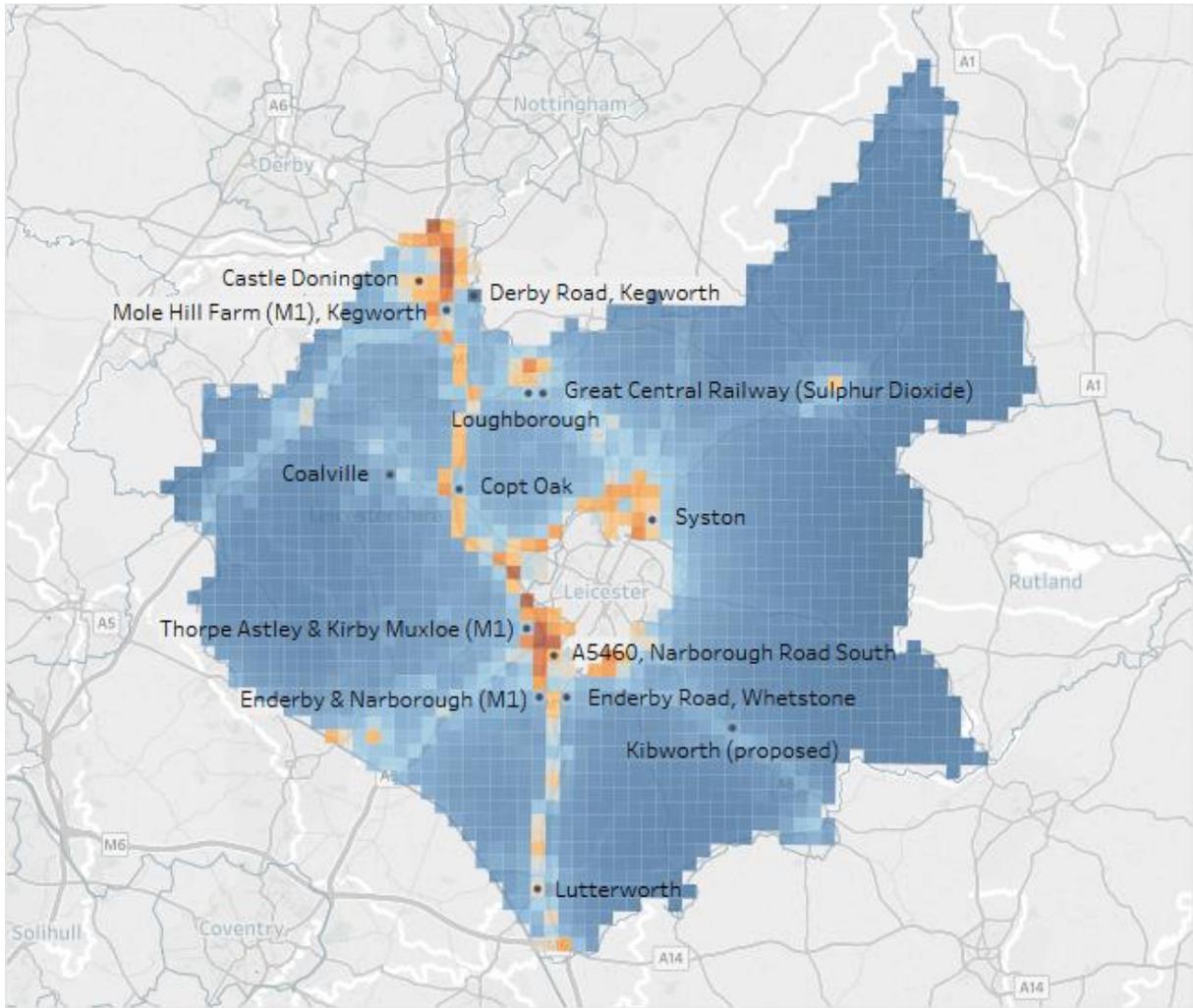
3.2.3. Nitrogen Dioxide NO₂

NO₂ is a gas that is produced along with nitric oxide (NO) by combustion processes. Together they are often referred to as oxides of nitrogen (NO_x). DEFRA estimates that 80% of NO_x emissions in areas where the UK is exceeding NO₂ limits are due to transport, with the largest source being emissions from diesel light duty vehicles (cars and vans). Other sources include power generation, industrial processes, and domestic heating.³²

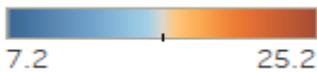
3.2.4. Modelled concentrations of levels of NO₂

Looking at background distribution of nitrogen oxide in Leicestershire (Figure 14), the highest concentrations locally (light blue to orange) of air pollution can be noted on major roads (M69, A42, A46 and A6) and especially the M1 north-side of Leicester City. Higher concentrations can also be seen on the north-west side of the ring road that borders Leicester City centre, around East Midlands airport and the Loughborough area.²⁸

Figure 14: Background Concentrations of NO₂ in Leicestershire, 2015²⁸



Range of NO₂ values throughout Leicestershire



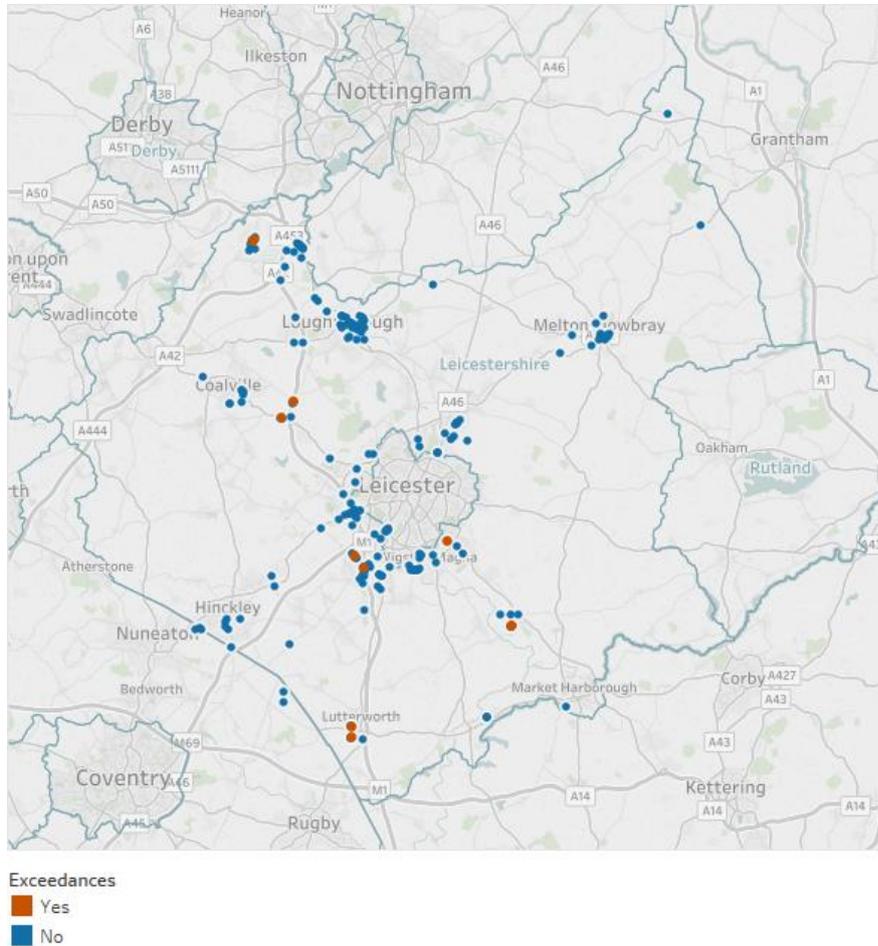
Source: *Modelled 1x1 km background pollutant data for NO₂, DEFRA, 2015*

3.2.5. Local monitoring of NO₂

All AQMAs declared in Leicestershire are due to levels of NO₂ (except two in Charnwood, located in Mountsorrel for Particulate Matter and Great Central Railway due to levels of SO₂). The relevant local authorities in Leicestershire undertake monitoring of NO₂ within their AQMAs plus additional monitoring in potentially concerning areas. These could include areas of increased traffic pressure from a new or proposed development or due to a local public concern.

During 2017 there were 4 continuous monitoring stations and 207 passive monitoring sites for NO₂ across Leicestershire. In 2017, of these sites- 11 recorded exceedances for NO₂ annual mean concentration above the objective of 40µg.m⁻³. Locations of these exceedances are shown in Figure 15.

Figure 15: Locations of NO₂ monitoring in Leicestershire



Source: Leicestershire local authority NO₂ monitoring results

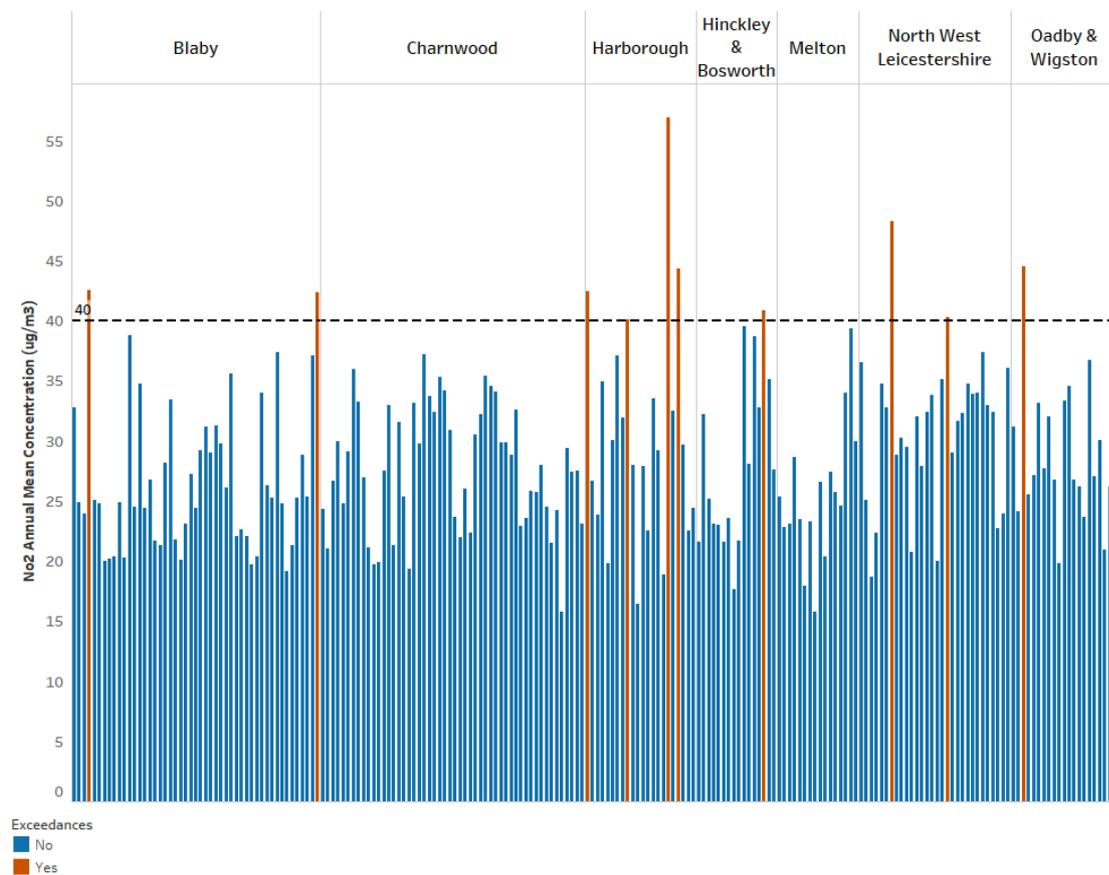
Figure 16 shows the NO₂ annual mean concentrations (µg.m⁻³) results of all monitoring sites within Leicestershire for 2017. There were two exceedances recorded in Blaby.³⁰ These were both in the newly declared AQMA 6 at Mill Hill Enderby. A level of 42.4 µg.m⁻³ was recorded on Mill Hill and 42.61µg.m⁻³ recorded at Hall Walk, Moores Lane.

There were four exceedances recorded in Harborough.³³ Two were in Lutterworth AQMA at the former Lutterworth service shop and on Rugby Road. The other two exceedances were in the recently declared Kibworth AQMA. There were two exceedances recorded in North West Leicestershire.³⁴ The first location was in Castle Donnington AQMA in Bondgate - which

recorded an exceedance of 48.31 $\mu\text{g}\cdot\text{m}^{-3}$. The second location was on Castle Street Donnington (40.26 $\mu\text{g}\cdot\text{m}^{-3}$). It is noted that all other locations monitored in this AQMA were substantially lower than the levels set out in the air quality objectives. There was one exceedance recorded by Hinckley and Bosworth District in Markfield (40.9 $\mu\text{g}\cdot\text{m}^{-3}$) and one exceedance in Oadby and Wigston (44.58 $\mu\text{g}\cdot\text{m}^{-3}$).

At all these sites there were no mean concentrations greater than 60 $\mu\text{g}\cdot\text{m}^{-3}$, indicating that there was not likely to be in exceedance of the 1-hour mean objective. No other monitoring sites have recorded exceedances for air quality objectives in respect of nitrogen dioxide.

Figure 16: NO₂ Annual Mean Concentrations ($\mu\text{g}\cdot\text{m}^{-3}$) results of all monitoring sites within Leicestershire in 2017



Source: Leicestershire local authorities NO₂ monitoring results

3.2.6. Sulphur Dioxide

Sulphur Dioxide (SO₂) is produced when sulphur-containing fuels, such as coal, are burned. It is an invisible gas with a sharp smell and can dissolve in water. Chemical reactions of SO₂ can

also produce sulphates, which remain in the air as secondary particles, contributing to the PM mix. Due to the increased use of gas and electricity, coal-burning is now relatively uncommon, and levels of SO₂ have steadily declined over the last 50 years. Most SO₂ in the UK now comes from industrial sources, such as coal and oil-burning power stations, as well as domestic sources such as boilers and stoves. Sulphur Dioxide is a respiratory irritant that can cause constriction of the airways. People with asthma are considered to be particularly sensitive. Health effects can occur very rapidly, making short-term exposure to peak concentrations important.³⁵

3.2.7. Local monitoring of Sulphur Dioxide

Within Leicestershire there is one area, within Charnwood Borough, that has been declared an AQMA for SO₂.²⁹ This is an area encompassing residential properties near The Great Central Railway. Monitoring commenced in July 2016 although initial ‘teething’ issues were experienced with the equipment which prevented any meaningful data becoming available until January 2017. Initial results suggest that concentrations are within the required SO₂ monitoring objective levels. Charnwood Borough Council is continuing to monitor levels to build a longer-term picture of concentrations in this location.

3.2.8. Ammonia (NH₃)

Ammonia (NH₃) is a gas released into the atmosphere from natural and man-made sources. Once emitted into the atmosphere, the subsequent deposition of NH₃ can be a major source of pollution, causing nitrogen (N) enrichment (eutrophication) and acidification of soil and water sources. Atmospheric NH₃ also reacts with acid gases, such as sulphuric and nitric acid, to form secondary PM_{2.5}. The agriculture sector accounts for 88% of UK emissions of ammonia. DEFRA have provided a national.³⁶ Code of Good Agricultural Practice (COGAP) to reduce ammonia emissions. The main health impacts of NH₃ arise through its role in secondary PM_{2.5} formation and health effects associated with exposure to PM. Agricultural emissions of NH₃ have been reported to be key contributor to some short-term episodes of high PM pollution in recent years.³

3.2.9. Ozone (O₃)

Ozone (O₃) is a gas and occurs both in the earth's upper atmosphere and at ground level. Ground level, or tropospheric O₃, is not emitted directly into the air but is created by photochemical reactions involving the precursor pollutants Nitrogen Oxides and Volatile Organic Compounds (VOCs). Several epidemiological studies have reported adverse associations between short-term exposure to O₃ and human health.³

The effects of exposure to O₃ are predominantly respiratory, but adverse effects on the cardiovascular system have also been reported. Less convincing evidence exists for an association between long-term exposure to O₃ and impacts on human health. Ozone levels are currently not measured as values are relatively low. Increases in temperature may affect the formation of ozone in the future.³

3.2.10. Carbon monoxide (CO)

Carbon Monoxide (CO) is a colourless, odourless and tasteless gas, produced when fuels such as gas, oil, coal and wood burn without enough oxygen. These are sources of fuel used in many household appliances, including boilers, central heating systems, gas fires, water heaters, cookers and open fires. Burning charcoal, running cars and the smoke from cigarettes also produce CO gas. Exposure to high indoor levels can be fatal, while exposure to lower levels can result in symptoms that resemble flu, viral infections or food poisoning.³

As mentioned in the introduction, quantifying the public health impact (across Leicestershire) of carbon monoxide is outside the remit of this chapter.

3.2.11. Non-Methane Volatile Organic Compounds (NMVOCs)

Non-Methane Volatile Organic Compounds (NMVOCs) consist of a large variety of chemically different compounds and in the environment come from both natural and anthropogenic sources. The total anthropogenic NMVOC emissions in the UK have decreased by 68% between 1970 and 2016. The rate of decline was most pronounced in the 1990s, largely reflecting the decline in coal mining, and has slowed in recent years. NMVOCs are emitted from a wide variety of products and processes including industrial processes and agriculture,

and they also form a significant component of indoor air pollution emitted from household products. In the outside atmosphere, NMVOCs react with NO_x in the presence of sunlight to form tropospheric O₃, known to be harmful to health and the environment.³ Indoors, VOCs emitted from consumer products are not thought to be a significant public health issue when homes are well ventilated and when the products are used according to the manufacturers' instructions. But some sensitive people may suffer irritation of the eyes, nose and throat, headaches and dizziness if they are exposed.³

As mentioned in the introduction, quantifying the public health impact (across Leicestershire) of NMVOCs is outside the remit of this chapter.

4. How does this impact?

4.1. Health impacts of air pollution

The following table outlines the health effects of key air pollutants. The information has been collated by PHE³⁷:

1. Particulate matter (PM) There is an extensive body of evidence that long-term exposure to PM increases mortality and morbidity from cardiovascular and respiratory diseases. Outdoor air pollution, particularly PM, has also been classified by the International Agency for Research on Cancer (IARC) as carcinogenic to humans (a Group 1 carcinogen) and causing lung cancer. There is some experimental evidence, however, that ultrafine particles may also pass through the lungs into the bloodstream.

2. Nitrogen dioxide (NO₂) The Committee on the Medical Effects of Air Pollutants (COMEAP) has established that short-term exposure to NO₂, particularly at high concentrations, is a respiratory irritant that can cause inflammation of the airways leading to - for example - cough, production of mucus and shortness of breath. Studies have shown associations of NO₂ in outdoor air with reduced lung development, and respiratory infections in early childhood and effects on lung function in adulthood.

Epidemiological studies have also shown associations of outdoor NO₂ with adverse effects on health, including reduced life expectancy. It has been unclear whether these effects are caused by NO₂ itself, or by other pollutants emitted at the same time by sources such as road traffic.

3. Other pollutants

3.1 Sulphur dioxide (SO₂) SO₂ has an irritant effect on the lining of the nose, throat and airways, and the effects are often felt very quickly. Due to the increased use of gas and electricity, coal-burning is now relatively uncommon, and levels of SO₂ have steadily declined over the last 50 years. Most SO₂ in the UK now comes from industrial sources, such as coal and oil-burning power stations, as well as domestic sources such as boilers and stoves.

3.2 Ammonia (NH₃) The main health impacts of NH₃ arise through its role in secondary PM_{2.5} formation and health effects associated with exposure to PM, as described above.

3.3 Ozone (O₃) The effects of exposure to O₃ are predominantly respiratory, but adverse effects on the cardiovascular system have also been reported. Less convincing evidence exists for an association between long-term exposure to O₃ and impacts on human health.

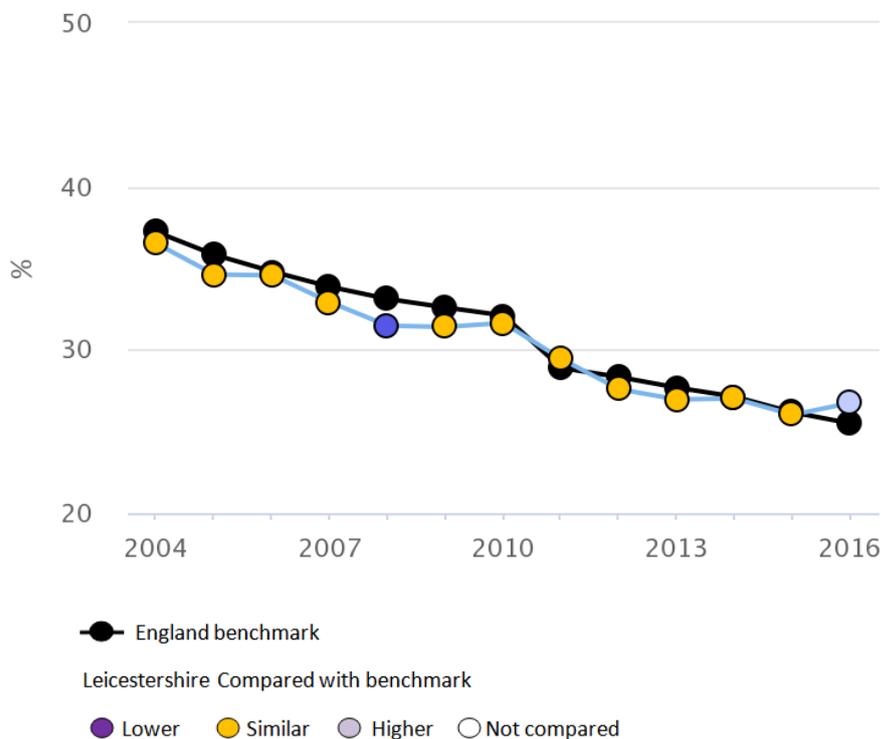
3.4 Carbon monoxide (CO) Exposure to high indoor levels can be fatal, while exposure to lower levels can result in symptoms that resemble flu, viral infections or food poisoning.

3.5 Non-Methane Volatile Organic Compounds (NMVOCs) In the outside atmosphere, NMVOCs react with NO_x in the presence of sunlight to form tropospheric O₃, known to be harmful to health and the environment. Indoors, VOCs emitted from consumer products are not thought to be a significant public health issue when homes are well ventilated and when the products are used according to the manufacturers' instructions. But some sensitive people may suffer irritation of the eyes, nose and throat, headaches and dizziness if they are exposed.

4.1.1. Cardiovascular disease

In Leicestershire 2016, 26.7% of all deaths, for all ages, were from an underlying cause of circulatory disease.³⁸ This is significantly higher than the England average of 25.5%. The trend over time show deaths from circulatory diseases have been significantly decreasing nationally and for Leicestershire over the last 5 years (see Figure 17). Since 2009, the proportion of deaths in Leicestershire remained similar to the national average; 2016 was the first year in which the proportion of circulatory disease deaths in Leicestershire was significantly higher than the national average.

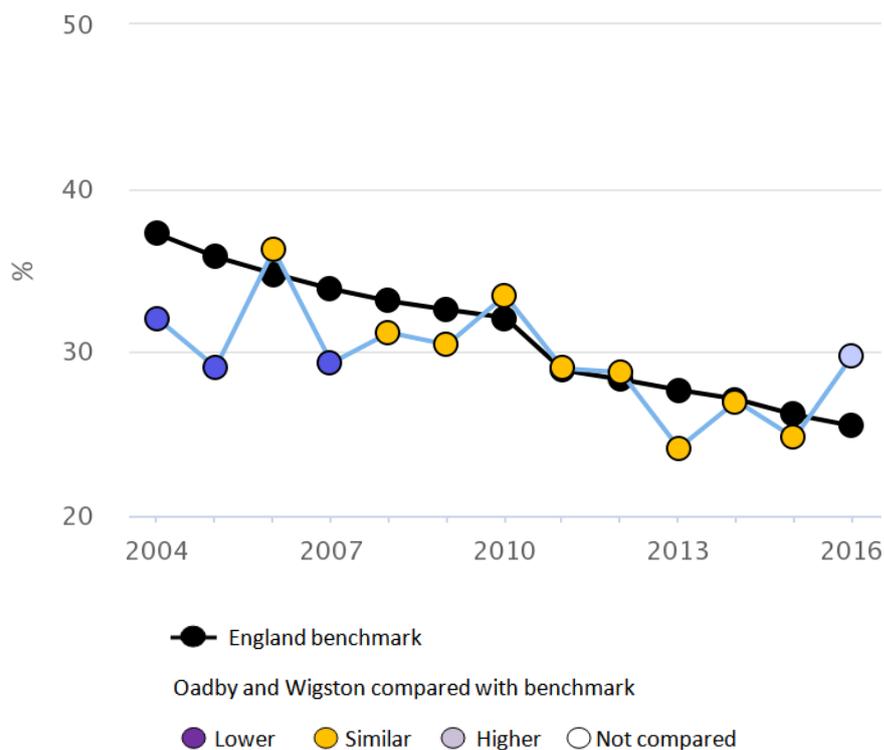
Figure 17: Trend in circulatory disease deaths, all ages, in Leicestershire 2004 – 2016³⁸



Source: Public Health England, Fingertips End of Life Profiles, 2019

Examining the latest district data for 2016 all areas had a similar proportion of circulatory disease deaths to England except Oadby and Wigston which has a significantly higher proportion of deaths (29.4%). Previous years (2008-2015) show the proportion of deaths in Oadby and Wigston similar to the England proportion (see Figure 18).

Figure 18: Trend in circulatory disease deaths, all ages, in Oadby and Wigston 2004 – 2016³⁸

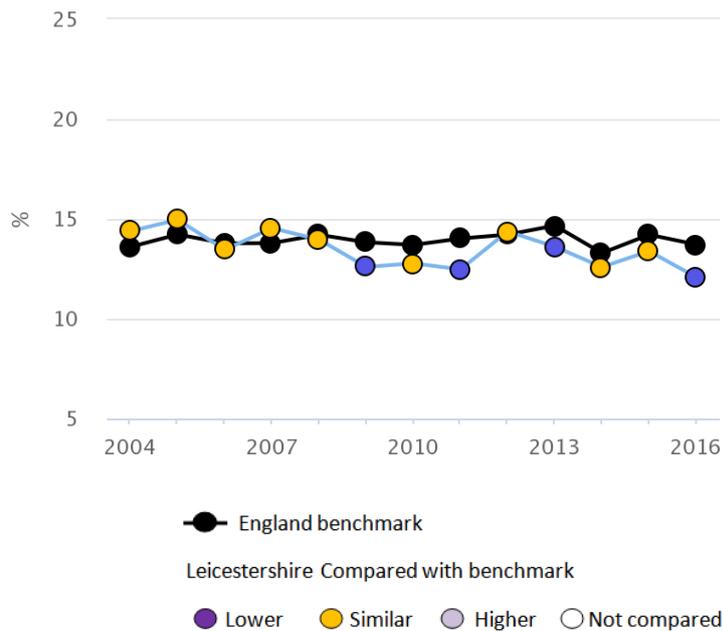


Source: Public Health England, *Fingertips End of Life Profiles, 2019*

4.1.2. Respiratory disease

The proportion of Leicestershire resident deaths in 2016 that had an underlying cause of respiratory disease was, for all ages, 12.1%.³⁸ This is significantly lower than the England proportion of 13.7%. The local trend has significantly declined over the last five time periods (see Figure 19).

Figure 19: Trend in Respiratory disease deaths (%), 2004-2016³⁸



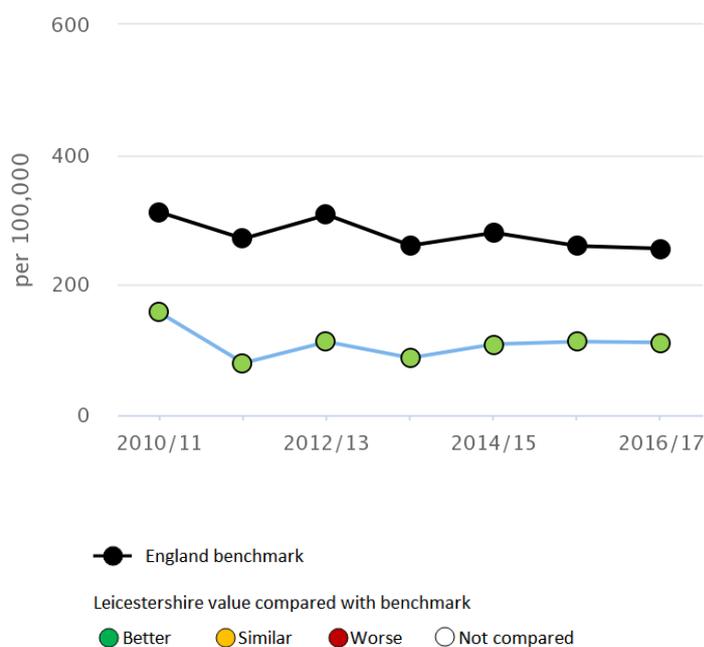
Source: Public Health England, *Fingertips End of Life Profiles, 2019*

Examining the 2016 data at a district level shows that Harborough (10.7%) and Oadby and Wigston (10.0%) have a significantly lower proportion of deaths due to respiratory disease in comparison to the national average (13.7%). These districts also show a significant decrease across the last five time periods. All other districts in Leicestershire have a similar proportion to the England average for deaths due to respiratory disease and the local trends in these areas have shown no significant change over the last five time periods.

4.1.3. Asthma in children aged 0-9 years

Across Leicestershire there were 111.5 hospital admissions for asthma per 100,000 children aged 0-9 years in 2016/17.³⁹ This is significantly better (lower) than the England rate of 255.8 per 100,000 children aged 0-9 years. Figure 20 shows the local rate has been significantly better than the England average since 2010/11.

Figure 20: Trend in admission rate for asthma children aged 0-9 2010/11 – 2016/17³⁹

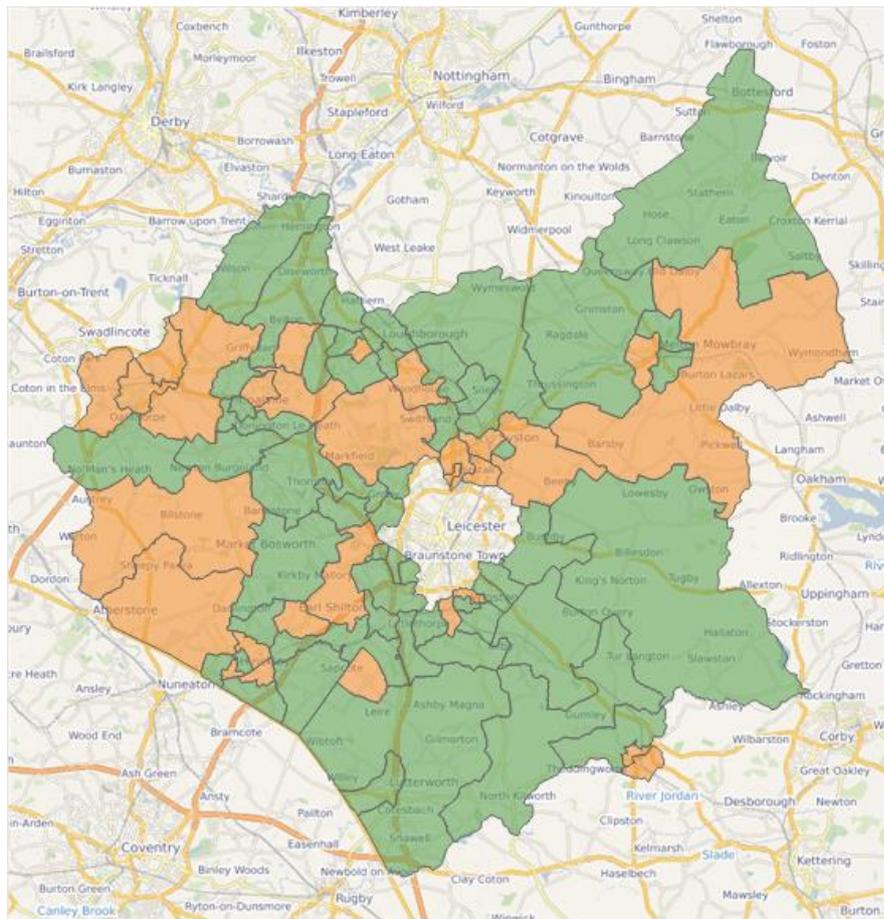


Source: Public Health England Fingertips, Child and maternal Health profiles, 2019

Figure 21 illustrates the Standardised Admission Ratio (SAR) across Leicestershire for asthma related admissions in individuals aged 0-9 years. The data is reported for 2012/3 to 2016/17 at MSOA level- of which there are 83 in Leicestershire. The majority of MSOAs (54) have significantly better (lower) SAR than the England average whereas 29 MSOAs that have a similar SAR. There are no areas in Leicestershire with a significantly higher SAR in compared to England. The areas which have a similar SAR appear to be dotted throughout all districts in the county.

It is important to note that we cannot ascertain from either of these data sources whether the significantly lower admission rates are due to early intervention and preventative services in the community or a lower incidence of childhood asthma across Leicestershire or in specific districts.

Figure 21: Emergency admissions for asthma by MSOA in Leicestershire for children aged 0-9 years, Standardised Admission Ratio, 2012/13- 2016/17³⁹



Statistical Significance compared to England

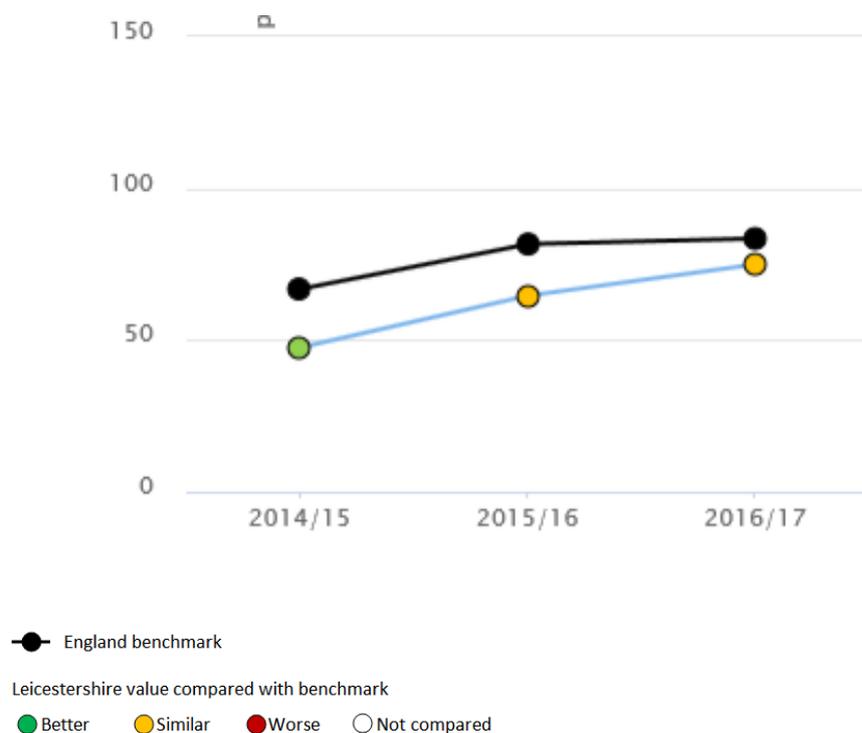
- Lower
- Similar

Source: HES and ONS population estimates

4.1.4. Respiratory tract infections in infants

In 2016/17, there were 54 admissions for respiratory tract infections in infants aged 1 year in Leicestershire. This equates to a rate of 75.0 per 10,000 population aged 1 year which is similar to the national rate of 83.5 per 10,000 population aged 1 year. However, it is important to note that between 2014/15 and 2016/17 the local rate has increased year on year (Figure 22).³⁹

Figure 22: Trend in admission rate for respiratory tract infections in infants aged 1 year³⁹

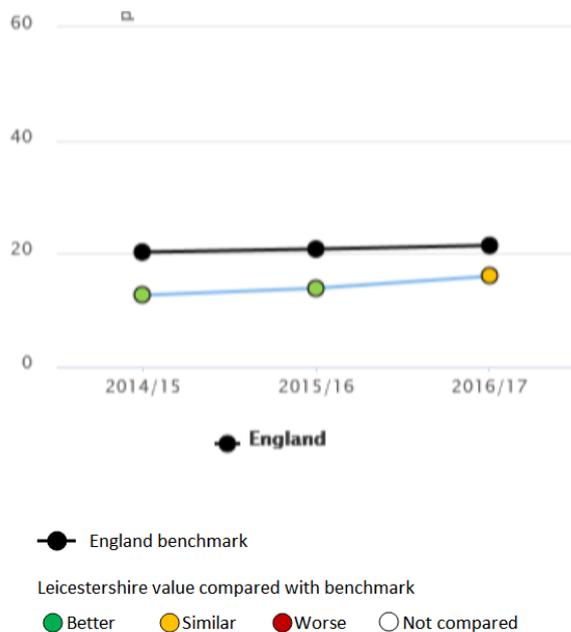


Source: Public Health England, Fingertips Child and Maternal Health Profiles 2019

Both nationally and locally, the admission rate for respiratory tract infections in children aged 2 to 4 years is lower than in infants aged 1 year. Both nationally and locally, the admission rate for respiratory tract infections in children aged 2, 3 and 4 years has increased year on year between 2014/15 and 2016/17. In 2016/17, the local admission rate was 16.0 per 10,000 population for children in this age group. This is similar to the national rate of 21.4 per 10,000 population.³⁹

Again, it is important to note that we cannot ascertain from this data whether the rising admission rates are due to changes in community care provision or a change in the incidence of respiratory tract infections in children across Leicestershire or in specific districts.

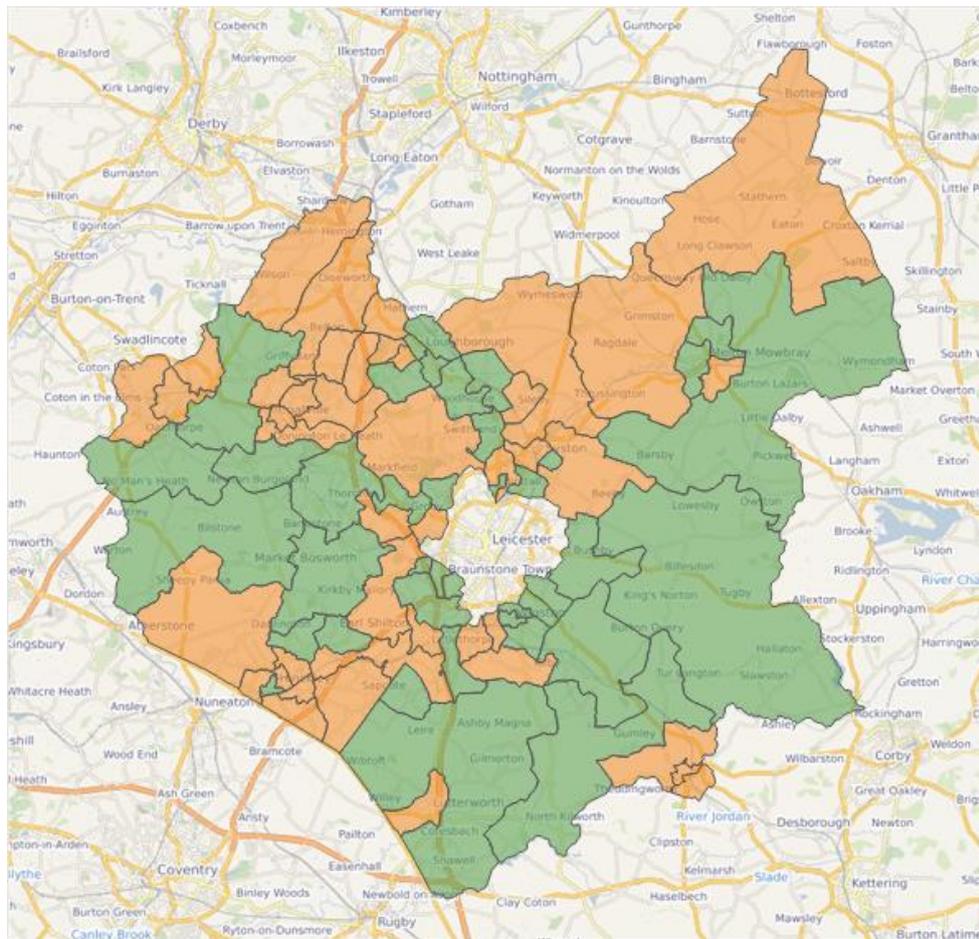
Figure 23: Trend in admission rate for respiratory tract infections in infants aged 2, 3 and 4 in Leicestershire. ³⁹



Source: Public Health England, Fingertips Child and Maternal Health Profiles 2019

Figure 24 illustrates the Standardised Admission Ratio (SAR) across Leicestershire for respiratory tract infections admissions in infants and children aged 0 to 4 years. The data is reported for 2012/3 to 2016/17 at MSOA level- of which there are 83 in Leicestershire. The majority of MSOAs (43) have a similar SAR than the England average whereas 40 areas have a significantly better (lower) SAR. There are no areas in Leicestershire with a significantly higher SAR compared to England. The areas which have a similar ratio appear to be dotted throughout all districts in the county.

Figure 24: Emergency admissions for respiratory tract infections by MSOA in Leicestershire for infants aged 0-4 years, Standardised Admission Ratio, 2012/13- 2016/17³⁹



Statistical Significance compared to England
■ Lower
■ Similar

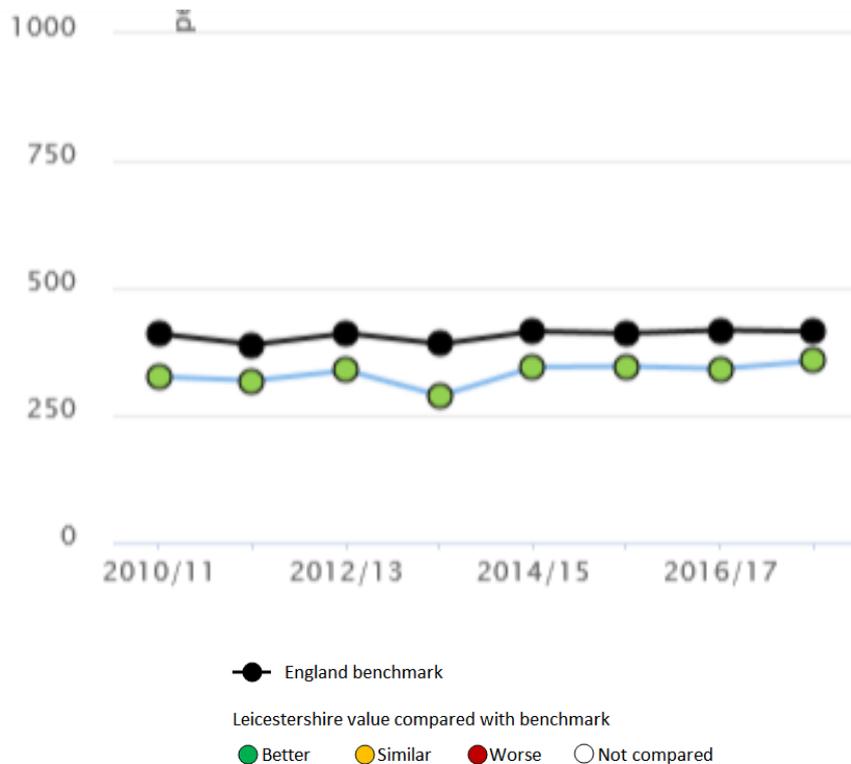
Source: HES and ONS population estimates.

4.1.5.Chronic Obstructive Pulmonary Disease in adults aged 35 years and above

In 2017/18 there were 356 emergency hospital admissions for COPD for Leicestershire residents per 100,000 population.⁴⁰ This is significantly better (lower) than the England rate of 415 per 100,000 population (see Figure 25). Since 2010/11 the local rate has remained better (lower) than the England average. In 2017/18, Harborough, Hinckley and Bosworth and Melton districts have all shown significantly better (lower) rates than the England average. All other districts have seen an admission rate similar to the national average. Both Blaby and Charnwood’s rate of emergency hospital admissions for COPD has changed from being significantly better than the national average in 2016/17 to being similar to the national average in 2017/18.

It is important to note that we cannot ascertain, from this data, the causes of this observed change.

Figure 25: Trend in emergency hospital admissions for COPD in Leicestershire⁴⁰



Source: Public Health England, Fingertips Productive Healthy Ageing profile 2019

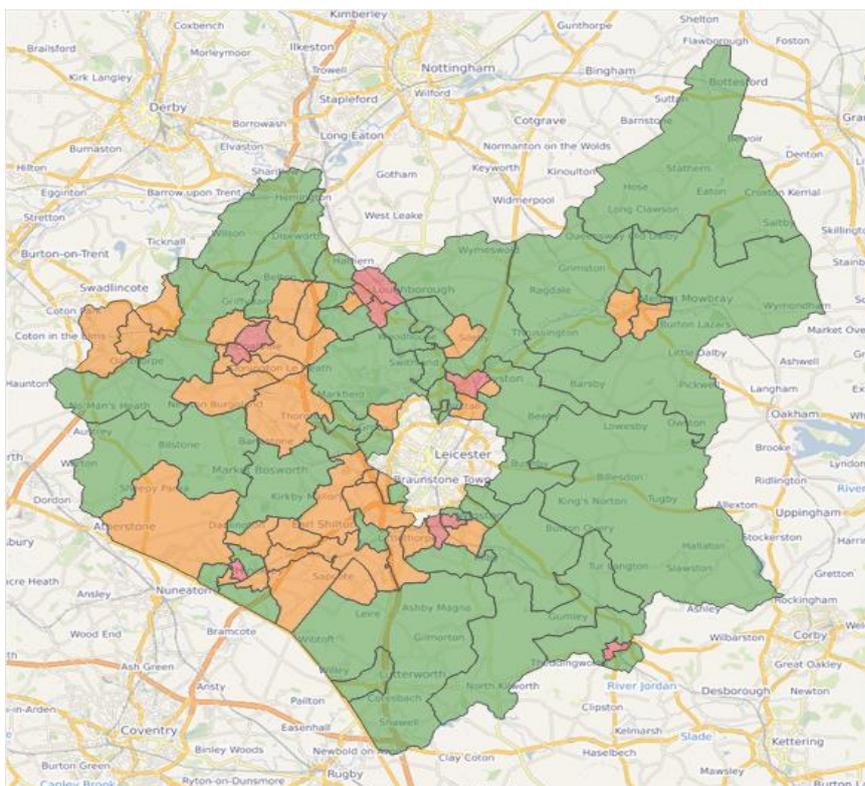
Figure 26 illustrates the Standardised Admission Ratio (SAR) across Leicestershire for COPD

admissions in adults aged 35 years and above. The data is reported for 2012/3 to 2016/17 at MSOA level- of which there are 83 in Leicestershire¹⁰. There are 10 areas that have a significantly higher admission rate than the England average. These areas are in the main town centres; Loughborough, Coalville, Hinckley, Market Harborough and Wigston. The Barkby Brook area in Charnwood also has a significant higher rate compared to England.

The majority of MSOAs (41) have a significantly better (lower) SAR to the England average with these areas mainly located in East Leicestershire and rural areas of West Leicestershire. There are 32 areas that have a similar SAR to the England average. These are mainly located in Blaby, Charnwood, Hinckley and Bosworth and North West Leicestershire.

Again, it is important to note that we cannot ascertain from this data whether the difference in admission rates are due to changes in community care provision or a difference in the prevalence of COPD in adults aged over 35 years in different districts.

Figure 26: Emergency admissions for COPD by MSOA in Leicestershire for Adults aged 35+, Standardised Admission ratio, 2012/13- 2016/17⁴⁰



Statistical Significance compared to England

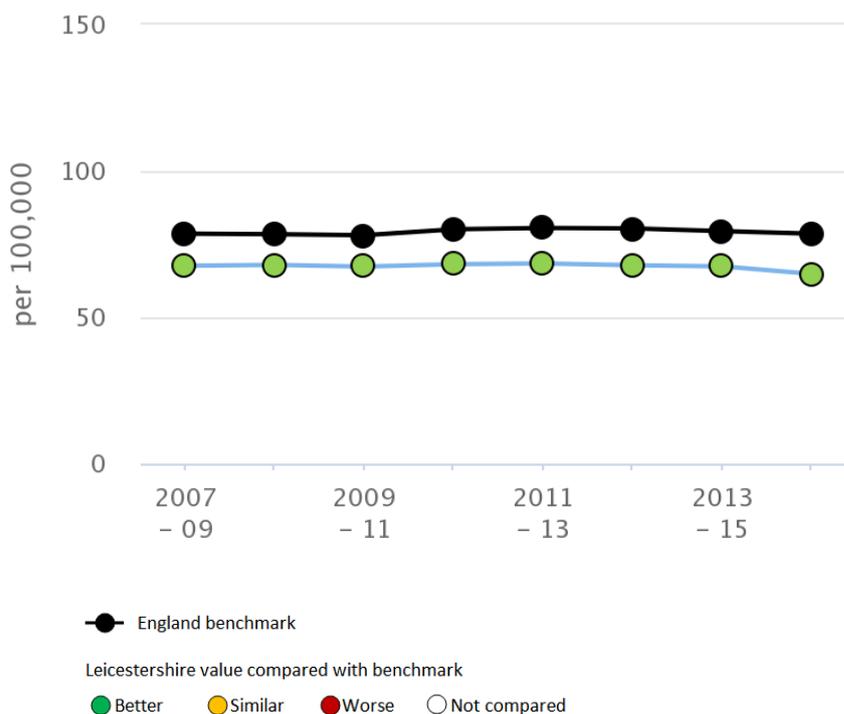
- Higher
- Lower
- Similar

Source: HES and ONS population estimates

4.1.6. Lung Cancer

Outdoor air pollution, particularly PM, has been classified by the International Agency for Research on Cancer (IARC) as carcinogenic to humans (a Group 1 carcinogen) and a cause of lung cancer.³ From 2014 to 2016 there were 1,266 new lung cancer registrations in Leicestershire.⁴⁰ This equates to an age-standardised registration rate of 64.8 per 100,000 population. This is a significantly better (lower) rate in comparison to that of England; 78.6 per 100,000 population. As shown in Figure 27, Leicestershire has consistently had a better (lower) rate than the England average for lung cancer registrations since recordings began (in 2007-09).

Figure 27: Trend in Lung Cancer Registrations per 100,000 population⁴⁰



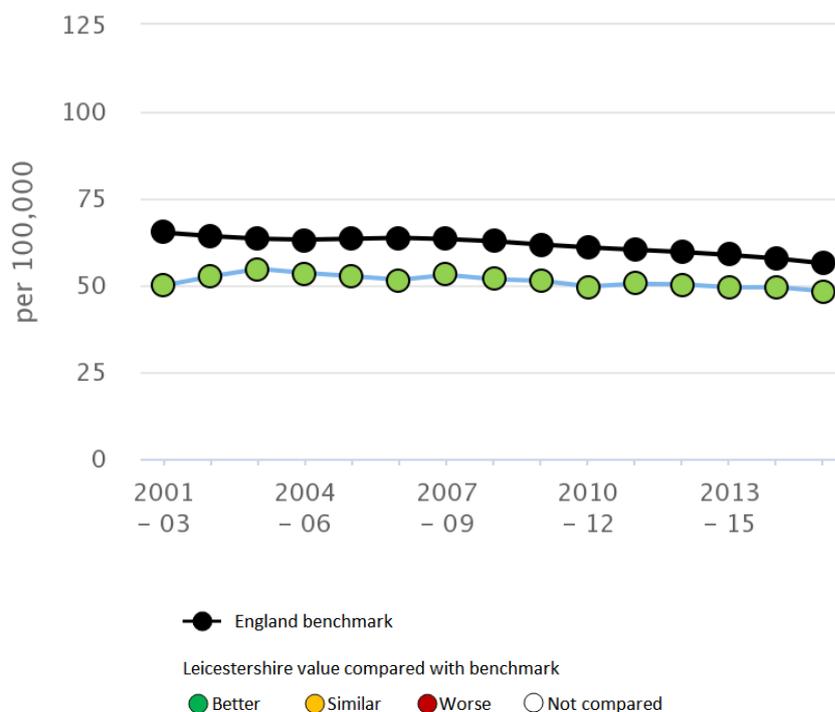
Source: Public Health England, Local tobacco control profiles, 2019

The data from 2014 to 16 shows that for all Leicestershire districts, bar Oadby and Wigston, there was a significantly better (lower) rate than the England average for lung cancer registrations. Oadby and Wigston has had a similar rate to the England average for the last five time-periods.

Between 2015-17, there were 989 deaths due to lung cancer in Leicestershire.⁴⁰ The age-standardised mortality rate from lung cancer in this period was 48.3 per 100,000 population; this is significantly lower than the England value of 56.3 per 100,000 population.

Figure 28 shows Leicestershire has consistently had a better (lower) rate than the England average since 2001-03.

Figure 28: Deaths from Lung Cancer per 100,000. 2001-03 to 2015-17⁴⁰



Source: Public Health England, Local tobacco control profiles, 2019

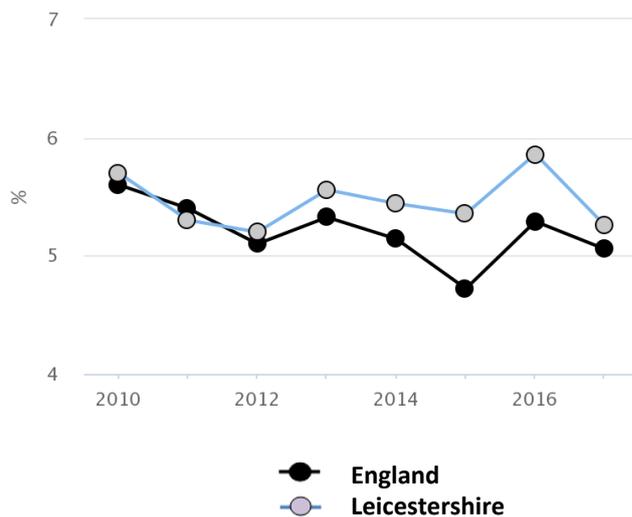
The latest data for Leicestershire districts shows that Blaby, North West Leicestershire and

Oadby and Wigston all have a similar mortality rate from lung cancer to the England average. All other districts have a significantly better (lower) rate than national.

4.1.7. Mortality attributable to air pollution

The COMEAP recommends PM_{2.5} as the most satisfactory metric for quantitative assessments of the impact on mortality of long-term exposure to air pollution.⁴¹ The fraction of all-cause adult mortality attributable to anthropogenic particulate air pollution (measured as fine particulate matter, PM_{2.5}) across Leicestershire for 2017 is 5.3%. This is not significantly higher than either the East Midlands or England proportion of 5.1%. This percentage has decreased from 5.9% in 2016 to 5.3% in 2017. Figure 29 shows the trend for Leicestershire from 2010 to 2017. Whilst this appears to be a downward trend it is too early to determine whether this is a true change as it is likely to fluctuate due to changes in weather conditions.

Figure 29: Fraction of mortality attributable to air pollution 2010 - 2017¹⁰



Source: Public Health England, Public Health Outcomes Framework 2019

As recommended in the DEFRA guidance for Directors of Public Health,⁵ the Public Health Outcomes Framework (PHOF)¹⁰ has been used to rank the local mortality attributed to air pollution (PM) against local mortality due to other sources of disease (

Table 5). A crude conversion of the proportion of mortality attributable to PM_{2.5} into mortality rate per 100,000 population has been calculated for the Leicestershire as well as for each constituent District Council. Through this assessment, the burden of air pollution can be understood in the context of other mortality indicators. The three leading causes of preventable mortality in the County and each District Council are highlighted in the table in shades of red, with the leading cause is in the darkest red.

It is important to note that the figures for air pollution are estimates of mortality attributable to a risk factor. Deaths are not individually attributed to air pollution, rather, air pollution is a contributory factor in many deaths, including other causes, such as respiratory disease or cardiovascular disease.

Table 5: Rankings of PHOF Mortality Indicators¹⁰

Indicator in PHOF	Mortality rate per 100,000							
	Leicester-shire (5.3%)	Blaby (5.4%)	Charnwood (5.4%)	Harborough (5.0%)	Hinckley & Bosworth (5.2%)	Melton (5.0%)	NW Leicester-shire (5.2%)	Oadby & Wigston (5.3%)
Preventable mortality (2015-17) (indicator 4.03)	151.8	152.4	148.2	135.5	153.7	157.7	161.5	165.8
Preventable cancer <75yrs (2015-17)	66.9	72.9	66.4	58.9	68.6	67.2	66.8	69
Preventable CVD <75yrs (2015-17)	38.6	35.6	39.8	30.4	40.4	35.6	41.3	48.3
Mortality attributable to PM2.5 <75yrs (2017)	15.0	14.6	15.5	12.4	14.9	14.2	16.1	16.3
Preventable Liver disease <75yrs (2015-17)	12.3	13.7	12.1	9.9	9.5	12.1	17.3	11.8
Preventable respiratory disease <75yrs (2015-2017)	13.1	12	12.2	10.4	13.8	15.7	14.8	15.2
IMD rank (2015)		288th	237th	311th	248th	236th	214th	249th
Communicable diseases	5.3	4	4.4	6.8	7.1	*	6.1	6.5
Suicide (2015-17)	7.9	9	5.4	11.7	5.5	9.5	8.9	11
ONS midyear pop estimate (2017)	690212	98977	180387	91461	111370	50873	100109	57035
Estimate of total number of preventable deaths attributable to PM2.5 <75yrs (2017)	103.5	14.4	28.0	11.3	16.6	7.2	16.1	9.3

Preventable mortality (defined as deaths under the age of 75 years) attributable to PM_{2.5} is the third leading cause of preventable deaths in Leicestershire, falling above mortality from preventable liver disease (in individuals under 75 years), preventable respiratory disease (in individuals under 75 years), communicable diseases and suicide. It is also the third leading cause in all districts except North West Leicestershire where, in 2015-2017, it was exceeded by preventable liver disease (in individuals under 75 years).

The estimated mortality attributable to PM_{2.5} across districts in Leicestershire in 2017 ranged

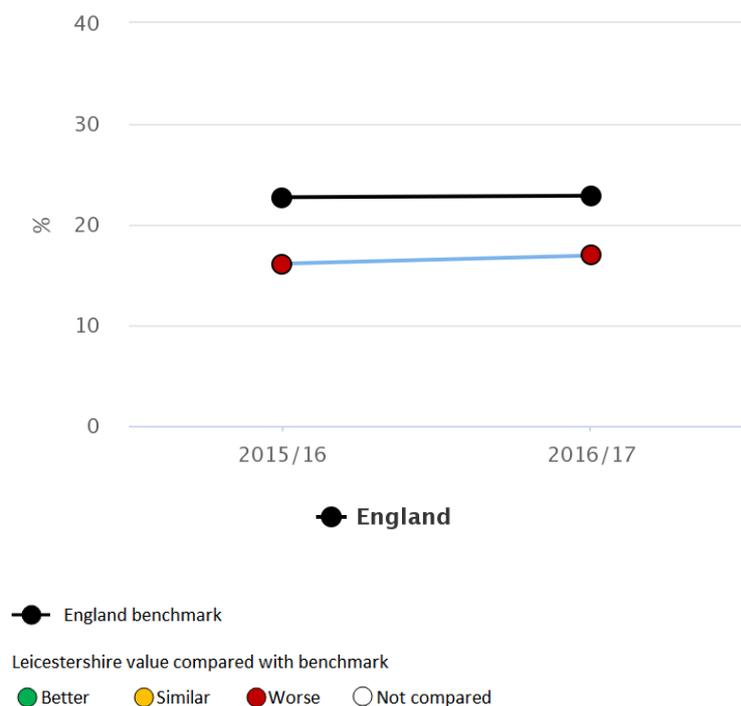
from 12.4 (Harborough) to 17.3 (North West Leicestershire) per 100,000 population.

It is important to note that this analysis only considers the preventable mortality from one of the leading sources of air pollution and therefore the overall impact of air quality on estimates of total number of preventable deaths across the county is likely to be under reported here.

4.1.8.Active Travel

Encouraging and enabling a modal shift in cycling and walking for short journeys will deliver a reduction in traffic congestion and emissions from road transport, as well as health benefits from more active lifestyles.⁴² The Active Lives survey asked respondents aged 16 and over if they had walked for travel in bouts of 10 minutes or more on at least twelve days in the previous 28 days. This was expressed as a percentage of the total number of respondents aged 16 and over who provided valid responses. In Leicestershire the percentage of adults walking for travel at least three days per week was 16.9% in 2016/17, this is significantly worse than the national percentage of 22.9% (see Figure 30). The previous year's data for Leicestershire also demonstrated significantly worse (16.1%) than the national percentage (22.7%).⁷ The overall sample size of the survey is around 190,000 people each year. The Active Lives survey provides around 500 interviews in most of the Local Authorities in England. Other sources of information about active travel uptake have not been reviewed in depth.

Figure 30: Trend of percentage of adults walking for travel at least three days per week⁷

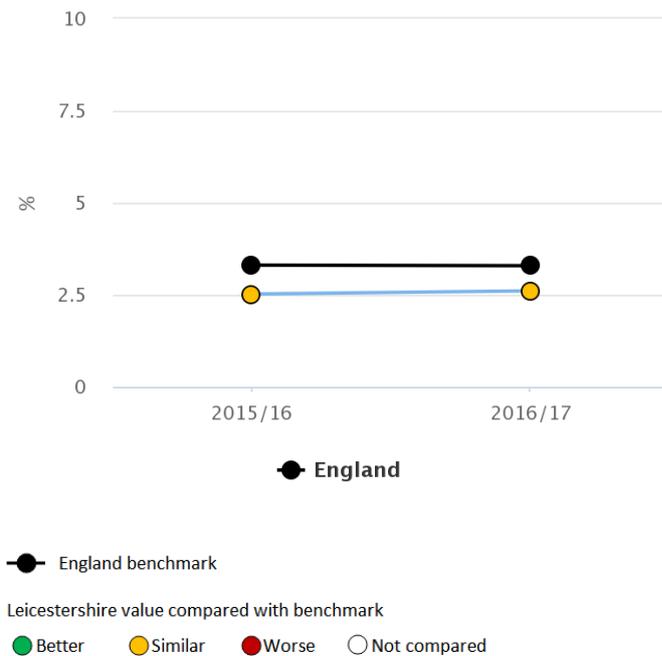


Source: Public Health England, Fingertips Physical Activity Profile, 2019

Appraisal of the data at Leicestershire district level showed Harborough, Melton, and Oadby and Wigston had similar proportions of “walking for travel” to the England average. In 2016/17, all other districts performed significantly worse than the England average.

The Active Lives survey also asked respondents aged 16 and over if they cycled for travel on at least twelve days in the previous 28 days. The finding was expressed as a percentage of the total number of respondents aged 16 and over who provided valid responses. In Leicestershire the percentage of adults that cycle for travel at least three days per week was 2.6% in 2016/17.⁷ This is similar to the England average of 3.3% (see Figure 31). The previous year’s data for Leicestershire demonstrated similar (2.5%) findings to the England proportion (3.3%).

Figure 31: Trend of percentage of adults cycling for travel at least three days per week⁷



Source: Public Health England, *Fingertips Physical Activity Profile, 2019*

Appraisal of the data at Leicestershire district level showed all districts bar Melton, had significantly similar proportions of “cycling for travel” to the England average. Melton has a significantly worse proportion of adults cycling for travel indicator for the past two years (in comparison to the England average).

4.2. Mortality and Morbidity

Air pollution is a serious public health issue. In the UK, the mortality burden of exposure to human-made air pollution is estimated as an annual effect equivalent to between 28,000 and 36,000 deaths a year, with an associated loss of life of between 328,000 and 416,000 years.⁴³

4.3. Financial costs

The health problems resulting from exposure to air pollution also have a high cost to society and business, our 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.⁴⁴

4.4. Health and social care costs

In 2017, the total NHS and social care cost due to PM_{2.5} and NO₂ combined was estimated to be £42.88 million (based on data where there is robust evidence on an association between pollutants and health and social care impact), increasing to £157 million when diseases are included where there is currently less robust or emerging evidence for an association.⁴⁴

Between 2017 and 2025, the cumulative total cost to the NHS and social care of air pollution (robust evidence for an association), is estimated to be £1.60 billion for PM_{2.5} and NO₂ combined increasing to £5.56 billion if we include other diseases for which there is currently less robust evidence for an association.⁴⁴

An Air Pollution Tool has been developed for use by local authorities to test the impact of changes in PM_{2.5} and NO₂ on the future prevalence of air-pollution related diseases and related health and social care costs.⁴⁴ The tool estimates costs for a scenario where the whole population is shifted to an area of low pollution exposure; where NO₂ is < 20.5 µg/m³ and PM_{2.5} is < 12.3 µg/m³. The difference between costs estimated at current pollution levels and the scenario levels gives an indication of savings.

Examining the costs for districts in Leicestershire, the combined costs to the NHS and social care attributable to NO₂ and PM_{2.5} ranges from 0.25 to 0.63 million per 100,000 population for 2019.

Table 6 shows the estimated costs in 2019 for medication, primary care, secondary care and social care attributable to PM_{2.5} and NO₂.

Table 6: Estimates of NHS and Social care costs millions per 100,000 population attributable to PM_{2.5} and NO₂ for Leicestershire districts in 2019.

2019 - Estimated costs (millions per 100,000 population)

	Combined Costs (millions per 100,000 population)	Medication Costs (millions per 100,000 population)	Primary Care Costs (millions per 100,000 population)	Secondary Care Costs (millions per 100,000 population)	Social Care Costs (millions per 100,000 population)
Blaby	0.41	0.10	0.05	0.20	0.06
Charnwood	0.32	0.08	0.04	0.15	0.05
Harborough	0.28	0.07	0.04	0.14	0.04
Hinckley and Bosworth	0.30	0.07	0.04	0.14	0.05
Melton	0.25	0.06	0.03	0.12	0.03
North West Leicestershire	0.37	0.09	0.05	0.18	0.05
Oadby and Wigston	0.63	0.15	0.08	0.30	0.09

Source: Public Health England, Air Pollution Tool

Table 7 shows savings estimates of between 16 and 35 million per 100,000 population in Leicestershire for cumulative combined costs over the period 2017 to 2035 if a modal shift in air pollution exposure was achieved. Estimated cost savings by district for medication, primary care, secondary care and social care for the period 2017 to 2035 are also shown.

Table 7: Estimates of NHS and Social care cumulative cost savings over the period 2017-2035 (millions per 100,000 population) for a scenario where the whole population is exposed to low levels of pollution for Leicestershire districts.

2017-2035 - Estimated costs (millions per 100,000 population)

	Cumulative Combined Costs (millions per 100,000 pop)	Cumulative Medication Costs (millions per 100,000 pop)	Cumulative Primary Care Costs (millions per 100,000 pop)	Cumulative Secondary Care Costs (millions per 100,000 pop)	Cumulative Social Care Costs (millions per 100,000 pop)
Blaby	22.57	5.57	2.89	10.73	3.39
Charnwood	18.27	4.50	2.32	8.72	2.72
Harborough	17.20	4.27	2.17	8.25	2.51
Hinckley and Bosworth	19.03	4.66	2.45	8.99	2.93
Melton	16.14	4.00	2.05	7.70	2.40
North West Leicestershire	23.16	5.71	2.96	11.06	3.43
Oadby and Wigston	35.24	8.65	4.54	16.81	5.24

Source: Public Health England, Air Pollution Tool

4.5. Attributable disease prevalence

Across England, an estimated 1,327,424 new cases of disease are predicted to be attributable to PM_{2.5} by 2035 and an estimated 1,140,018 new cases of disease are predicted to be attributable to NO₂ by 2035 if current air pollution levels persist. 44 Table 8 and Table 9 below show results from the air pollution tool 44 that predict estimated rates of disease, attributable to exposure to PM_{2.5}, per 100,000 population for 2019 and 2035. As illustrated in Table 8, in 2035, Oadby and Wigston is predicted to bear the highest burden of new cases of disease, attributable to exposure to PM_{2.5}, for all disease categories except asthma.

Table 8: Estimates of attributable prevalence cases per 100,000 population due to PM_{2.5} for Leicestershire districts in 2019.

2019 - Deaths and Disease prevalence per 100,000

	Asthma prevalence per 100,000 population	Diabetes prevalence per 100,000 population	Lung cancer prevalence per 100,000 population	COPD prevalence per 100,000 population	Coronary heart disease prevalence per 100,000 population	Stroke prevalence per 100,000 population	Deaths per 100,000 population
Blaby	2	73	7	42	83	21	11
Charnwood	0	62	5	41	62	10	0
Harborough	1	52	5	31	52	21	11
Hinckley and Bosworth	0	62	6	31	52	21	0
Melton	0	42	5	31	52	10	0
North West Leicestershire	2	62	6	52	72	21	11
Oadby and Wigston	2	114	10	73	124	31	11

Source: Public Health England, Air Pollution Tool

Table 9: Estimates of attributable prevalence cases per 100,000 population due to PM_{2.5} for Leicestershire districts in 2035.

2035 - Deaths and Disease prevalence per 100,000

	Asthma prevalence per 100,000 population	Diabetes prevalence per 100,000 population	Lung cancer prevalence per 100,000 population	COPD prevalence per 100,000 population	Coronary heart disease prevalence per 100,000 population	Stroke prevalence per 100,000 population	Deaths per 100,000 population
Blaby	91	495	8	219	486	126	751
Charnwood	67	316	7	176	406	102	515
Harborough	68	346	7	177	377	97	580
Hinckley and Bosworth	90	364	8	185	422	128	763
Melton	46	323	6	154	344	92	386
North West Leicestershire	-46	492	10	237	522	139	736
Oadby and Wigston	0	681	13	374	740	177	1,157

Source: Public Health England, Air Pollution Tool

Table 10 and Table 11 below show results from the air pollution tool 44 for 2019 and 2035 for predicted estimated rates of disease, attributable to exposure to NO₂, per 100,000 population. Charnwood and North West Leicestershire show estimates of over one hundred cases of asthma per 100,000 population while other districts in Leicestershire have no asthma cases attributable to NO₂.

Table 10: Estimates of attributable prevalence cases per 100,000 population due to NO₂ for Leicestershire districts for 2019.

2019 - Deaths and Disease prevalence per 100,000

	Asthma prevalence per 100,000 population	Diabetes prevalence per 100,000 population	Lung cancer prevalence per 100,000 population	Deaths per 100,000 population
Blaby	0	30	0	0
Charnwood	0	31	1	0
Harborough	0	21	0	0
Hinckley and Bosworth	0	31	1	0
Melton	0	10	1	0
North West Leicestershire	0	20	1	0
Oadby and Wigston	0	31	1	0

Source: Public Health England, Air Pollution Tool

Table 11: Estimates of attributable prevalence cases per 100,000 population due to NO₂ for Leicestershire districts for 2035.

2035 - Deaths and Disease prevalence per 100,000

	Asthma prevalence per 100,000 population	Diabetes prevalence per 100,000 population	Lung cancer prevalence per 100,000 population	Deaths per 100,000 population
Blaby	0	267	2	0
Charnwood	128	256	1	0
Harborough	0	135	0	0
Hinckley and Bosworth	0	269	2	0
Melton	0	135	0	0
North West Leicestershire	133	133	1	0
Oadby and Wigston	0	270	1	0

Source: Public Health England, Air Pollution Tool

5. Policy and guidance

Air quality is high on the policy agenda, both nationally and locally. As well as reviewing key documents and guidance, we look at evidence of what works to reduce emissions of air pollutants and exposure to poor air quality.

5.1. National

5.1.1. Clean Air Strategy 2019⁴²

Within this strategy there is a call to better understand air quality issues; through investment in modelling as well as data and analytical tools to give a more precise picture of current air quality and the impact of policies on it in the future. There is an appreciation that increased transparency, by bringing local and national monitoring data together into a single accessible portal, is also required.

There is recognition that to achieve stepped improvements there needs to be leadership at every level. To achieve this a commitment is made to update the legislative framework for tackling air quality issues at both national and local levels- tying this into development of the Environment Bill⁴⁵- as well as strengthening the collaboration between Defra and BEIS. There is an appreciation that collaboratively these organisations need to fairly and objectively articulate the trade-offs between energy and public health when developing strategies. There is a commitment to work with LAs and DPHs to equip and enable them to lead and inform local decision-making to improve air quality. The following table shows the commitments made against specific aspects relating to air quality:

Table 12: Commitments made in the Clean Air Strategy 2019

Aspect	Strategic commitments in the Clean Air Strategy
Protecting the nation's health	<p>Develop powers to enable targeted local action in areas with air quality problems</p> <p>Develop guidance material for doctors and other Health Care Professionals (HCPs)- embed air quality into education and training</p> <p>Help individuals/ organisations understand how to reduce contributions to poor air quality</p> <p>Work with media to improve access to the air quality forecast</p> <p>Provide personal air quality messaging system -particularly for those vulnerable to poor air quality</p> <p>Update appraisal tools and guidance so health impacts of air quality considered in every relevant policy decision</p> <p>[Publish evidence in 2019 to examine action needed to meet the WHO annual mean guideline limit of 10 µg.m-3]</p>
Protecting the environment	<p>Develop target for the reduction of damaging deposition of nitrogen- review longer-term targets</p> <p>Provide guidance for LAs explaining cumulative impacts of nitrogen deposition on natural habitats and mitigation/ assessment through the planning system</p> <p>Monitor impacts of air quality on natural habitats and report annually</p>
Securing clean growth and driving innovation	<p>Consult on making coal to biomass conversions ineligible for future allocation rounds</p> <p>Phase out coal-fired power stations</p> <p>Minimise air quality impacts of the Renewable Heat Incentive Scheme and tackle non-compliance</p> <p>Support development, manufacture and use of technologies, systems and services that improve air quality -research programme to promote the development of cleaner technologies</p> <p>Improve energy efficiency to enable shift to cleaner power sources</p>
Reducing emissions for transport	<p>End sale of new conventional petrol and diesel cars and vans by 2040</p> <p>New legislation so manufacturers recall vehicles for failures in emissions control system</p> <p>Work with Treasury to review uses of red diesel- ensure lower cost is not discouraging transition to cleaner alternatives</p>

	<p>Utilise permitting approaches to reduce emissions from non-road machinery</p> <p>Develop, manufacture and use zero exhaust emissions vehicles</p> <p>Encourage use of cleanest modes of transport for freight and passengers, including active travel</p> <p>Aviation 2050 recently published</p> <p>Maritime 2050 strategy due - ports required to produce air quality strategies by end of 2019</p> <p>In 2019 rail industry to produce route map to phase out diesel-only trains by 2040</p> <p>[Develop standards for tyres and brakes to address toxic non-exhaust particulate emissions]</p>
<p>Reducing emissions at home</p>	<p>Legislate to prohibit sale of most polluting fuels</p> <p>Changes to Building Regulations standards for ventilation</p> <p>Ensure only cleanest stoves on sale by 2022</p> <p>Changes to make enforcement of smoke control legislation easier</p> <p>Promote development of lower VOC content products</p> <p>Explore opportunities to align air quality work with clean growth and fuel poverty in future policy design</p> <p>Better inform consumers about the VOC content of everyday products e.g. voluntary labelling</p> <p>Improve awareness of NMVOC build-up in the home and importance of ventilation</p> <p>Campaign users of domestic burners, to improve awareness of impacts</p> <p>[Identify an appropriate test standard for new solid fuels]</p>
<p>Reducing emissions by farming</p>	<p>Regulate to reduce ammonia emissions by requiring adoption of low emissions techniques</p> <p>Regulate to minimise pollution from fertiliser use</p> <p>Extend environmental permitting to the dairy and intensive beef sectors</p> <p>Ensure ammonia inventory reflects farming practice</p> <p>Support farmers to invest in farm infrastructure to reduce emissions</p> <p>Environmental land management system to fund protection of habitats impacted by ammonia</p> <p>Develop national code of good agricultural practice to reduce ammonia emissions</p>

	<p>[Ensure ammonia inventory based on latest evidence on emissions]</p> <p>[Advice from expert group on policy approach to reduce pollution from fertiliser use]</p>
Reducing emissions by industry	<p>Consider closing regulatory gap between Eco-design and medium combustion plant regulations</p> <p>Develop series of ambitious sector roadmaps to make UK industry world leaders in clean technology</p> <p>Maintain policy of continuous improvement in relation to industrial emissions</p>

We will reflect on these commitments, specifically the ones related to protecting health, when we review the current activities, service provision and assets that are being utilised across Leicestershire to reduce emissions or mitigate harmful health impacts. This will directly inform the recommendations from this detailed appraisal of air quality and health.

5.1.2. Every Breath we take: The lifelong impact of air pollution⁴

This 2016 Report of a Working Party highlights that each year in the UK, around 40,000 deaths are attributable to exposure to outdoor air pollution, with more attributable to exposure to indoor pollutants. The Report details the effects across a lifetime of exposure to air pollutants and the fact that the most vulnerable suffer the most harm. It includes the costs of air pollution – the annual mortality burden and high cost to society, business, the health service and the monetary cost. The paper also highlights the key role that air pollution plays in climate change. It provides several recommendations including:

- Act now, think long-term
- Educate professionals and the public
- Promote alternatives to cars fuelled by petrol and diesel
- Put the onus on polluters
- Monitor air pollution effectively
- Act to protect the public health when air pollution levels are high
- Tackle inequality
- Protect those most at risk

- Lead by example in the NHS
- Define the economic impact of air pollution
- Quantify the relationship between indoor air pollution and health
- Determine how global trends are affecting air quality
- Develop new technologies to improve air pollution monitoring
- Study the effects of air pollution on health

We have already utilised this guidance to outline the impact of air pollution on health in this JSNA chapter.

5.1.3. Air Quality: A Briefing for Directors of Public Health⁴⁶

This paper presents the evidence and techniques for understanding the impact of air pollution in a local area, how to engage local decision makers about air pollution, communicating with the public during air pollution episodes, communicating with the public on the long-term impact of air pollution, and it also provides a briefing for elected members.

We have already utilised this guidance to assess the impact of poor air quality on preventable mortality across Leicestershire and its constituent districts.

5.1.4. NICE Guidance (2017) Air Pollution: Outdoor Air Quality & Health (NG70)⁴⁷

This guideline covers road-traffic-related air pollution and its links to ill health. It provides recommendations in relation to:

- Planning- ‘Plan’ making ‘for all tiers of local government in line with the National Planning Policy Framework (NPPF) and air pollution should also be considered in other local plans such as the Core Strategy and Transport Plans.
- Development Management- such as taking action to reduce motorised trips
- Clear Air Zones- the introduction of clear air zones
- Reducing emissions from public sector transport services and fleet vehicles
- Smooth driving and speed reduction
- Walking and cycling – support for active travel
- Awareness raising
- Vulnerable groups

We will consider this guidance when we review the current activities, service provision and assets that are being utilised across Leicestershire to reduce emissions or mitigate harmful health impacts.

5.1.5. Defra & DfT UK Plan for Tackling Roadside Nitrogen Oxide concentrations (2017)⁴⁸

This paper aims to explain how the UK can tackle nitrogen dioxide levels to bring them within statutory limits in the shortest possible time. It explains how the Government is planning on investing £2.7 billion in improving air quality and cleaner transport. It highlights the impact of air pollution, sources of nitrogen dioxide air pollution, the joint and individual responsibility of national government, local government, vehicle manufacturers, public transport providers, businesses, industry and the public.

The authors advocate for the introduction of strict vehicle emissions regulations. The paper also summarises additional actions that are needed including national actions and actions in England plus guidance on awareness raising and monitoring and evaluation.

We will consider this guidance when we review the current activities, service provision and assets that are being utilised across Leicestershire to reduce emissions or mitigate harmful health impacts.

5.1.6. Public Health England (2019) Review of interventions to improve outdoor air quality and public health⁴⁹

Public Health England (PHE) was commissioned by the Department for Health and Social Care (DHSC) to review the evidence for practical interventions to reduce harm from outdoor air pollution, stratified by their health and economic impact.

The focus of the review was on those actions available to local authorities and, where appropriate, the national actions needed to support them.

PHE commissioned 5 rapid evidence assessments that focused on vehicles and fuels, spatial planning, industry, agriculture, and people's behaviour and sought evaluations that made

direct links between actions and consequent health and health economic outcomes.

The broad findings and recommendations from this comprehensive review are presented below:

Principles to guide action on air quality:

- The different air pollutants should be considered and tackled together.
- Local authorities need to work together.
- Effective strategies require a coherent approach.
- Everyone has a role to play. From individuals through to employers, private and public-sector organisations; all should engage with local initiatives and play their part.
- It is better to reduce air pollution at source than to mitigate the consequences.
- Improving air quality can go hand in hand with economic growth.
- As action is taken some groups may need particular support. Some evidence-based actions may disproportionately affect some groups of people. For example, those whose livelihoods depend on driving but who do not have access to or the resources for cleaner vehicles.

Interventions and approaches that apply to all 5 areas studied:

- Introducing targeted interventions to address specific local sources or issues identified through local authority annual reviews and assessments. For example, anti-idling interventions can improve air quality in pollution hotspots or close to vulnerable receptors, such as schools or hospitals.
- Prioritising interventions that prevent or reduce emissions over those that address pollution once it has occurred.
- Reducing the use of pollution sources in populated areas.
- Systematically evaluating all interventions.

Interventions from the rapid evidence assessments on traffic-related pollution:

- Reducing emissions from existing vehicles: planning for active travel and public transport.
- Promoting the uptake of low emission vehicles and reducing demand for more

polluting forms of transport.

- Using spatial planning to reduce sources and exposure to pollution.

Interventions from the rapid evidence assessments on non-traffic sources of pollution:

- Reducing exposure to pollution from local airports, ports and the railway sector.
- Reducing exposure to pollution from local industry and agriculture.

Interventions from the rapid evidence assessments on public behaviour:

- Raising awareness of air pollution and health.
- Providing information and advice to businesses and the public explaining how people can minimise their contribution to air pollution.
- Providing information and advice to the public explaining how people can minimise their exposure to air pollution.

Overall, the authors suggest focusing on “Clean by design” principles and, given their vulnerability to air pollution, children. They call for a “clean air generation” and suggest that local authorities, as part of their local air quality management assessments, consider a range of interventions including working with children and their parents to implement no-idling zones outside schools, make it easy for children to walk or cycle to school and increase public awareness in relation to air pollution and children.

We will reflect on the principles and evidence informed interventions set out in this guidance as we draw this JSNA chapter together in our recommendations section.

5.2. Local

5.2.1. Leicestershire County Strategic Direction

Leicestershire County Council (LCC) set out its objectives for the 2018- 2022 period in the strategic plan: “Working together for the benefit of everyone”⁵⁰. Five strategic outcomes describe the council’s vision for people living in the county: Strong Economy, Wellbeing and Opportunity, Keeping People Safe, Great Communities, Affordable and Quality Homes. It was recognised that successfully achieving these outcomes will require close and effective partnership working with individuals, business, other organisations, communities and

national government.

This JSNA chapter (and the subsequent Leicestershire Air Quality and Health Partnership Action Plan) has an important part to play in the achievement of all these five strategic outcomes. Both are examples of partnership approaches, necessary to support improvements to the local environment and health outcomes.

5.2.2. Leicester and Leicestershire's Strategic Growth Plan⁵¹

This overarching plan sets out the aspirations for delivering growth in Leicester and Leicestershire. The plan has been prepared by the ten partner organisations in Leicester and Leicestershire and aims to provide a long-term vision that will address local challenges and opportunities: it is non-statutory but sets out our agreed strategy for the period to 2050. It is envisaged that the strategy will be delivered through Local Plans.

The vision is that “by 2050, Leicester & Leicestershire will have established itself as a driver of the UK economy, exploiting opportunities for linkages across its diverse economic base, supporting its urban and rural centres, and taking advantage of its exceptional location. Growth will contribute to people’s health, happiness and well-being through the timely delivery of well-designed and high-quality development, raising the bar in terms of environmental standards, quality of life and local distinctiveness.”

Four priorities have been identified. These are:

- Creating conditions for investment and growth - balancing the need for new housing and jobs with protection of our environment and built heritage.
- Achieving a step change in the way that growth is delivered – focusing more development in strategic locations and less on nonstrategic sites.
- Securing essential infrastructure that is needed to make this happen – taking advantage of proposals to improve national and regional networks (as set out in the Midlands Connect Strategy) and maximising the benefits from them.
- Maintaining the essential qualities of Leicester & Leicestershire and delivering high-quality development.

Although air quality and reducing emissions that contribute towards it are not explicitly mentioned, protecting environmental, historic and other assets is regarded as a key building block. Any work to improve air quality across Leicestershire and mitigate its detrimental impacts to health should capitalise on the partnership agreement achieved through the publication of this plan.

5.2.3. Leicestershire County Council Environment Strategy 2018-30

The Council have a commitment to work with partners to protect and enhance the Leicestershire environment and help to deliver sustainable development by recognising and fostering the links between the environment, people and the economy. Leicestershire County Council has recently published the 2018- 2030 Environment Strategy⁵². This document explains that the county Council have a responsibility to carry out statutory and non-statutory duties to “enable effective management of certain environmental impacts arising from the activities of Leicestershire residents and businesses, such as air pollution from local transport and the reduction, recycling and disposal of household waste”. The strategy provides a framework for action focusing on what the Council can do within their own operations and where the Council have control and influence across the County. The Strategy focuses on six key areas: Carbon and Climate Change Impacts; Resource Use and Low/Zero Carbon Energy; Travel and Transport; Biodiversity, Habitats and Local Environment; Community and Wellbeing; and Local Economy.

The Environment Strategy as published in 2018 includes a target to reduce the council’s carbon emissions by 38% by 2030, which is in line with the current national target of an 80% reduction by 2050. In May 2019 the council declared a climate emergency and agreed a new target of net zero carbon emissions by 2030. Work is under way to map out how this new target will be achieved. This may mean that some actions, which also support improved air quality, will need to be accelerated.

This JSNA chapter (and the subsequent Leicestershire Air Quality and Health Partnership Action Plan) can support the ambitions of the Environment Strategy. Improved understanding

and actions to reduce air pollutants and prevent ill health will most likely primarily contribute to “Community and Wellbeing” aims – although they are also closely related to aims in most of the other areas, most obviously Travel and Transport. We recognise that it is essential that air quality improvements are made under the umbrella of broader strategies and considerations to prevent unintended environmental consequences.

5.2.4. Leicestershire’s Joint Health and Wellbeing Strategy

Leicestershire’s Joint Health and Wellbeing Strategy 2017 – 2026 sets out the vision to “improve health outcomes for the local population, manage future demand on services and create a strong and sustainable health and care system by making the best use of the available resources”⁵³.

Five key outcomes have been agreed, these are

1. The people of Leicestershire are enabled to take control of their own health and wellbeing;
2. The gap between health outcomes for different people and places has reduced;
3. Children and young people in Leicestershire are safe and living in families where they can achieve their full potential and have good health and wellbeing;
4. People plan ahead to stay healthy and age well and older people feel they have a good quality of life;
5. People give equal priority to their mental health and wellbeing and can access the right support throughout their life course.

It is expected that, through greater discourse about air pollution and its impact on health as well as an embedded partnership approach, this JSNA chapter (and the subsequent Leicestershire Air Quality and Health Partnership Action Plan) can support achievement of these ambitions.

5.2.5. Leicestershire County Council’s strategic direction on air quality and health

A report on air quality was presented to the Health and Well-being Board on 16 November 2017 by the Director of Public Health¹. The report which was endorsed by the Board proposed

the following:

In line with the recommendations in the Air Quality: A Briefing for Directors of Public Health, Defra, PHE, and LGA. March 2017, work is taking place with partners to improve air quality in Leicestershire:

1. Understanding Air Pollution in Leicestershire

LCC is not one of the Local Authorities required by Government to develop 'innovative local plans' that will achieve statutory NO₂ limit values within the shortest possible time. However, some constituent parts of Blaby and Charnwood are. Given the estimated impact on health and wellbeing, and that there is no safe limit identified for air pollution, we are working with district councils to develop a better understanding of air pollution across the county. In 2018, Blaby District Council was one of the local authorities directed to undertake a Feasibility Study into such innovative local plans. There were 2 road links that were predicted to exceed the European Limit Value – a section of the Outer Ring approaching Junction 21 of the M1, and Narborough Road South, Braunstone Town. The Council worked closely with LCC throughout the Study. The conclusion was that there were no measures that would bring forward the predicted compliance year (2019). This conclusion was accepted by the Ministers and the Council has not been required to undertake any further Feasibility work. However, Blaby District Council have delivered a programme of behavioural change activity, which is ongoing, to address the NO₂ levels.

2. Engaging local decision makers about air pollution

The recommendations from the DEFRA guidance include:

- i. developing a strong strategic focus for tackling air pollution, for example, through inclusion in the Annual Report of the Director of Public Health
- ii. championing action for all stakeholders – for example, by supporting the development of active travel plans for large organisations, and supporting investment in infrastructure that promotes the use of active travel and electric vehicles; and supporting where appropriate clean air zones
- iii. Scrutinising strategies and plans that may have an impact on air quality – for example, by using Health Impact Assessments for major developments, and using a

Health in All Policies approach to influence wider policies and plans

iv. Recognising air quality co-benefits. In particular the benefits of active travel (walking and cycling) and preservation and development of green spaces.

v. Communicating with the public on the short and long-term impacts of air pollution.

As well as providing information and mitigating immediate risks, this should be done to help empower local people to take individual action to reduce the production of air pollutants (active travel, good driving habits, using cleaner vehicles etc.)

This report formed the basis for this subsequent focus of work on air quality and health. This JSNA chapter (and the subsequent Leicestershire Air Quality and Health Partnership Action Plan) aims to enable better understanding and local decision maker buy in to key air quality and health priorities.

5.2.6. Blaby District Council Air Quality Strategy July 2018 - July 2021⁵⁴

Blaby District Council has published their first Air Quality Strategy. It marks an important milestone in demonstrating the commitment of the Council and its partners to addressing the air quality concerns in the West Leicester(shire) area. The Strategy is formed around 5 key themes. The following table outlines the agreed actions, specific to Blaby District, in each area:

Table 13: Agreed actions on air quality by Blaby District Council

Theme	Area	Actions
1	Transport	<p>1. Continue to work closely with LCC and Leicester City Council to mitigate the air quality impacts of the local road network with the District</p> <p>2. Continue to work closely with Highways England to mitigate the air quality impacts of their roads within the District</p> <p>3. Work with partners to increase tree planting along road corridors where this is feasible, including replanting when</p>

		trees are removed.
2	Planning	<ol style="list-style-type: none"> 1. Ensure that Air Quality continues to be embedded within the Local Plan 2. Integrate the emerging guidance being produced by the East Midlands Air Quality Network into planning related documents as appropriate 3. Consider the Air Quality implications of planning applications and ensure that impacts of proposed schemes are mitigated as far as possible 4. Support the implementation of the Tourism Blueprint relating to the promotion of alternatives to car use
3	Health	<ol style="list-style-type: none"> 1. Be an active member of the Air Quality Public Health Partnership developed by LCC Public Health 2. Implement a project of working with schools and businesses in the District to reduce the impact of the traffic associated with them using the awarded Defra funding. The Health and Leisure Team is delivering the school related element. 3. Develop an approach to addressing PM2.5, which builds on that stated in the 2018 Annual Status Report 4. Work with Development Services Team to establish a protocol for developers with regards to dust control.
4	Junction 21 Area	<ol style="list-style-type: none"> 1. Complete the Feasibility Study required by Ministerial Direction by the 31st July 2018 of measures that would bring forward compliance with the Limit Value in the Ambient Air Quality Directive. Undertake any actions that result from this. 2. Continue to recognise the importance of this area including traffic and air quality issues and work with others to effectively address them 3. Actively work with LCC to improve the congestion issues

		in the Fosse Park Area, focusing on the Castle Acres development. This includes partnership working relating to an increased role for the existing Park and Ride Site
5	Monitoring	<ol style="list-style-type: none"> 1. Continue to operate an air quality monitoring network of diffusion tubes and automatic monitoring stations, with a review of monitoring on at least an annual basis and revise locations to maximise use of resources. 2. If practicable monitor PM2.5 at a location in the District 3. Ensure that the developers of New Lubbesthorpe Sustainable Urban Extension (SUE) meet their air quality obligations. 4. Continue to seek section 106 contributions to air quality monitoring, where this is sustainable and appropriate. 5. Continue to operate an air quality monitoring station for LCC.

5.2.7. Leicestershire and Rutland Sport

Leicestershire and Rutland Sport (LRS) is a partnership of the local authorities of Leicestershire, Leicester and Rutland (LLR). The authorities work together with schools, National Governing Bodies of Sport, clubs, coaches and volunteers and have set out a framework for action by partners to increase physical activity and sport in their 2017-2021 strategy⁵⁵. The vision is that LLR (becomes) the most physically active and sporting place in England and there are four related ambitions to... Get (Everyone) Active, (Develop) Active Places, (Support people to) Stay Active and (Promote LLR as an) Active Economy. There is an appreciation that achieving the vision cannot be achieved alone, instead whole systems approaches are necessary to embed different ways of working at scale and deliver the outcomes of ... “better health”, “more people active” and “stronger communities”.

This JSNA chapter (and the subsequent Leicestershire Air Quality and Health Partnership Action Plan) supports all four ambitions of the LRS strategy. It is well evidenced that walking

and cycling (amongst other activities) are good for physical and mental health. Switching more journeys to active travel will improve health, quality of life and the environment, and local productivity, while at the same time reducing costs to the public purse⁴⁹.

5.3. What targets and performance measures do we need to consider?

5.3.1. Annual review and assessment of air quality

Under the Environment Act 1995, Local Authorities must undertake an annual review and assessment of air quality within their geographical areas. This is overseen by the Department for Environment Food & Rural Affairs (DEFRA)⁵⁶ which produces guidance and further information on the tools and data used in the assessment. The National Air Quality Strategy - published in 1997 - outlined recommended maximum levels of eight pollutants: Benzene, 1,3 Butadiene, Carbon Monoxide, Sulphur Dioxide, Lead, Particulates, Nitrogen Dioxide and Ozone. The maximum levels have been devised by the Expert Panel on Air Quality Standards (EPAQS) based on medical and scientific evidence. Each Council has to assess the present and future air quality of their area in relation to the requirements of the National Air Quality Strategy and identify the main sources of the pollutants affecting air quality. Status Reports are published yearly. Within section 2.2 “Key air pollutants for Leicestershire”, we detail progress to achieve these targets.

5.3.2. Environmental permitting

Additionally, across Leicestershire there are a number of industrial sites which require an Environmental Permit to operate. This includes brickworks, quarries, petrol stations, some incinerators, dry cleaners and paint-shops amongst other facilities. Local authorities are the regulatory authority for Part A2 and B industrial installations under the Environmental Permitting (England and Wales) Regulations 2016. Further detail is available, via District Council teams, on the prevalence of permits and compliance with emissions standards. These are important to consider when considering air quality and health impacts of future planning requests.

5.3.3.Regulation of vehicle standards

With regards to emissions, European Commission Directives and regulations on motor vehicles, their trailers, systems and components updated in 2019 and 2018⁵⁷ include:

- Commission Regulation (EU) 2019/318 of 19 February 2019 amending Regulation (EU) 2017/2400 and Directive 2007/46/EC of the European Parliament and of the Council as regards the determination of the CO₂ emissions and fuel consumption of heavy-duty vehicles.
- Commission Regulation (EU) 2018/1832 of 5 November 2018 amending Directive 2007/46/EC of the European Parliament and of the Council, Commission Regulation (EC) No 692/2008 and Commission Regulation (EU) 2017/1151 for the purpose of improving the emission type approval tests and procedures for light passenger and commercial vehicles, including those for in-service conformity and real-driving emissions and introducing devices for monitoring the consumption of fuel and electric energy.
- Commission Regulation (EU) 2018/932 of 29 June 2018 amending Regulation (EU) No 582/2011 as regards the provisions on testing by means of portable emission measurement systems (PEMS) and the requirements for universal fuel range type-approval.

UK legislation includes:

- Cleaner Road Transport Vehicle Regulations 2011. These require the inclusion of energy and emissions considerations when contracting authorities (public bodies), some utilities and public service operators purchase or lease road transport vehicles.

5.3.4.Leicester Air Quality Directive

Leicester City Council (and its partners) has been mandated to introduce an air quality plan to reduce exceedances in nitrogen oxide across the city. The “Leicester Air Quality Directive” is expected to include key transport routes that are within Leicestershire boundaries and builds on previous air quality action plans⁵⁸. An Outline Business Case must be published by 31st October 2019.

5.4. What's on the horizon?

A wider Environment Bill⁵⁹ is expected to be published by the UK government imminently. This Bill aims to pull environmental drive and accountability to the very heart of the government. It seeks to provide clear long-term certainty by establishing a robust new system of green governance and specific measures to tackle today's crucial environmental issues, one of which includes air quality. The Environment Bill is also expected to include measures on nature recovery, waste and resource efficiency, water management as well as air quality.

The current draft Environment Bill commits the government to publishing a policy statement outlining how the environmental principles should be interpreted and applied when making, developing and revising policies.

The key proposal in the draft Bill is the introduction of an independent body - Office for Environmental Protection (OEP) to scrutinise the environmental law and the government's environmental improvement plan, investigate complaints and take enforcement action on environmental law. The draft specifically mentions there may be enforcement proceedings against Local Authorities for serious breaches of air pollution limit values.

The draft also outlines how the government will maintain environmental standards as we leave the EU and builds on the vision of the 25 Year Environment Plan. The Environment Bill, introduction of the OEP and the 25-year Environment Plan overarches several government strategies to enhance natural capital and its benefits for better human health, the environment and the economy at a national level.

6. Current Services

Within this section we consider the current activities, service provision and assets that are being used to contribute to reducing or mitigating against the impacts of poor air quality across Leicestershire. We reflect on the adoption of interventions recommended by PHE⁴⁹ to improve outdoor air quality and public health.

6.1. Activities by District Councils

6.1.1. Local air quality initiatives

The following table provides an overview of the ongoing local measures to improve air quality (in addition to monitoring and management of AQMAs) reported in the most recent (2018) air quality annual status report for each constituent District/Borough Council in Leicestershire. This appraisal of these readily available reports demonstrates variation in documented range of measures currently being adopted by different councils to tackle air pollution and improve air quality in their local area. Please note, these reports do not necessarily include all County Council activities.

Table 14: Overview of ongoing measures to improve air quality in each District Council of Leicestershire

District	Relevant Plans	Measures to Improve Air Quality
Blaby	2014 Air Quality Action Plan, with update included in 2018 Air Quality Annual Status Report (ASR) June 2018[i]	<p>Smart Motorways</p> <p>Variable message signage and plate signage</p> <p>Active Travel Programme</p> <p>Integration of Air Quality into planning policy</p> <p>Traffic management measures</p> <p>Eco driving</p> <p>Noise Barriers</p>
Charnwood	2006 Air Quality Action Plan, with update included in 2018 Air Quality Annual Status Report (ASR) June 2018[ii]	<p>Charnwood Local Plan 2011 to 2028 Core Strategy-</p> <p>Shift from travel by private car to walking, cycling and public transport</p> <p>Staff car sharing scheme</p> <p>CO2 banding for staff car parking allowance / permits</p> <p>Taxi Testing to comply with VOSA requirements</p> <p>Civil Parking Enforcement</p> <p>Home Working</p> <p>Workplace Challenge Scheme</p> <p>Evaluation of fewer parking spaces or higher charges to restrain car access to work or shops</p> <p>Investment in cycle route network to reach all parts of Loughborough</p> <p>Increasing bus travel through work on Quality Bus Partnership (QBP)</p> <p>Increasing travel by train with bus connections to town centre and key destinations</p> <p>Personalised Travel Planning and Accessibility Team set up to promote sustainable travel choices</p> <p>Network management for roadworks, incidents, and planned events</p> <p>School Travel Planning</p> <p>Providing more consistent and reliable journey times</p>

District	Relevant Plans	Measures to Improve Air Quality
Harborough	2013 Air Quality Action Plan, with update included in 2018 Air Quality Annual Status Report (ASR) September 2018[iii]	Nil reported
Hinckley & Bosworth	2015 Air Quality Action Plan, with update included in 2018 Air quality annual status report (ASR) June 2018[iv]	<p>Prevent and/or reduce environmental impacts from domestic and commercial emissions. Control of dust and smoke Bonfires</p> <p>Environmental Permits</p> <p>Active Travel Hinckley</p> <p>Planning Policy- Site Allocations and Development Management Policies Development Plan</p> <p>Choose how You Move campaign: Improving use of local infrastructure</p> <p>Hinckley Area Project Zone 3—in Barwell, NE Hinckley</p> <p>Hinckley Area Project Zone 4- Hinckley town centre and A47 corridor</p>
Melton	2018 Air quality annual status report (ASR) August 2018[v]	Melton town distributor road (By-pass)

District	Relevant Plans	Measures to Improve Air Quality
North West Leicestershire	2005 Air Quality Action Plan, with update included in 2018 Air Quality Annual Status Report (ASR) May 2019[vi]	Working with LCC Highways department in drafting a new air quality action plan Construction of the Kegworth Bypass
Oadby & Wigston	2018 Air Quality Annual Status Report (ASR) June 2018[vii]	Roll out of Citrix keys for Home working and reduction of travel to work. Rail travel and promotion of alternative travel plans Cycle to work schemes continue to be rolled out Seek more low emission vehicle charging points across the borough Council vehicles to be sourced which meet the highest air quality standards

6.2. Services provided, supported or commissioned by Leicestershire County Council

6.2.1. To reduce emissions of air pollutants

6.2.1.1. Supporting people to be active

For all

Information about where to walk and cycle in Leicestershire is provided on the county council website⁶⁰. The council delivers adult cycle courses to anyone over the age of 16 years, regardless of skill level, and these are stated to help boost skills and confidence in cycling and encourage people to cycle more often.

The “Active Together Leicestershire”⁶¹ is a county wide programme, delivered by Leicestershire and Rutland Sport that provides opportunities for individuals and communities to become more active by participating in a variety of different forms of exercise. The programme has the aim of improving health and wellbeing. Physical Activity Development Officers in each district across Leicestershire have each created a bespoke programme of activities to help individuals become more active- Active Together Leicestershire offers a wide

range of activities including walking, running, cycling, dance to Pilates, buggy fit and bowls. First Contact Plus⁶² is an online (and over the phone) tool to enable adults and professionals in Leicestershire find information about a range of services all in one place. Information includes advice on maintaining an active lifestyle and lists different activities being delivered within Boroughs/ Districts in Leicestershire.

For children and their families

In 2018, the Council was awarded over £400,000 of funding from Sport England to help low-income families get active with their children⁶³. Working in partnership with the Leicestershire Home-Start charities, the district councils and Leicester-Shire & Rutland Sport were one of the first to receive investment from this National Lottery fund. The scheme, which in its first year is being piloted in Harborough and North West Leicestershire, will include:

- Working directly with families to assess physical activity needs, and co-produce a bespoke activity plan with achievable, time related goals;
- Weekly visits from volunteers who will review their physical activity plans and help with difficulties they've faced and attend activity sessions with families to boost their confidence and help them develop a manageable routine;
- Tailored, affordable family activities run by the district council's physical activity development officers;
- Free or low-cost physical activity opportunities featuring outdoor gyms, parks, bike routes and use of leisure centres.

It is expected that following the pilot phase the project will roll out across the county. It is too early to determine the effect of this type of initiative on changing behaviours and indirect benefits to air quality improvements.

For teens

LCC promotes the "health for teens" website⁶⁴ which has various pages including health and lifestyle focused ones. "Exercise" is included as one of these pages and information and a case study about the benefits of being physically active are included. No information is included on active travel or the health effects of exposure to poor air quality.

For adults

Since 2016, Leicester-shire and Rutland sport have delivered the Exercise Referral Scheme to over 7,700 individuals⁶⁵. The aim of this service is to increase physical activity levels, improve physical and mental wellbeing and enable individuals to have better management of their medical condition(s). The scheme offers individuals aged 16+ who are currently inactive (doing less than 30 minutes of physical activity per week) and living with a medium or high-risk medical condition 12 sessions of community or leisure centre-based activity at discounted rates.

Each individual is provided with a specific programme tailored to their condition and is supervised by a minimum of a Level 3 Exercise Referral qualified instructor (medium risk patients) or a Level 4 condition specific instructor (high risk patients). All constituent boroughs/ districts of LCC have a local scheme coordinator. It is unclear from readily available data what the effect of this initiative has been on long-term behaviour change. No information is included on the website about embedding active travel principles or the health effects of exposure to poor air quality as part of this.

6.2.1.2. Encouraging people to use active, public and sustainable travel

Access Fund projects and Choose How You Move (CHYM) programme

In 2016, Leicester and Leicestershire were awarded a £3.2m Sustainable Transport Access Fund from the Department for Transport (DfT)⁶⁶. This fund has been used to encourage more people, within the West Leicester/shire Access Fund catchment area, to walk or cycle to work, schools and colleges. This programme has been delivered under the CHYM brand. This is the joint City/ County travel branding. Both authorities were integral to securing the funding and have worked together to determine and decide how to best utilise funds on various sustainable travel initiatives.

Resources that have been produced include a comprehensive CHYM travel website⁶⁷, travel planning tools for individuals, schools and businesses, links to news, events and updates as well as a rewards programme. The “Better Points” scheme⁶⁸ allows CHYM website users to

earn points by tracking their walking, cycling or use of public transport. These points can be redeemed as high street vouchers or donated to the individual's favourite charity.

At the outset, the objectives of the Access Fund bid and the CHYM programme were:

- Objective 1: Support the local economy by supporting access to new and existing employment, education and training.
- Objective 2: To actively promote increased levels of physical activity through walking and cycling, specifically: Increase cycling activity, Reverse the decline in walking, Reduce the rate of cyclists killed and seriously injured, Increase the percentage of children aged 5 – 10 that usually walk to school.
- Objective 3: Demonstrate an understanding around how transport contributes to carbon emissions and air quality levels: it was recognised that by continuing to reduce the level of car use, all of the initiatives in the Choose How You Move programme would support the actions contained within Leicester's Air Quality Action Plan (2015-2026) and the County Council's LTP3 goal to reduce the carbon footprint of Leicestershire. Additionally, the Choose How You Move programme was anticipated to contribute towards Leicester's Sustainability Action Plan (Consultation Draft) (2015-19) and Parking Improvement Action Plan 2016 – 2019. Ultimately, the interventions in our Choose How You Move bid will help to revoke the need for Air Quality Management Areas and consequently reduce the impact of carbon emissions.
- Objective 4: Reduce traffic congestion through providing people travel choices

As we come to the end of the 3-year Access Fund programme, evaluation of the effectiveness will be essential learning as we design and deliver additional active and sustainable travel initiatives. A comprehensive evaluation is planned.

The CHYM programme of work will continue beyond the life of the Access Fund project, though possibly in a different format. The online platform is in the process of being recommissioned. This potentially provides an opportunity to change some of the messaging to include air quality information. At present, information about air quality and health is not presented on the platform.

Leicestershire Healthy Schools

Leicestershire Healthy Schools programme⁶⁹, part of LCC's Public Health department, aims to support schools throughout Leicestershire to raise attainment and achievement by improving health and wellbeing for pupils, staff, parents and carers in the wider school community. Information and resources are provided to support local schools to maintain healthy weight, deliver sexual health, ensure emotional health and wellbeing, prevent substance misuse, improve air quality and encourage active travel to and from school. A “Whole School Approach” is advocated and guidance provided under each of the key nine strands:

- 1) Leadership and management and managing change
- 2) Policy development
- 3) Curriculum planning and resourcing (including working with external agencies teaching and learning)
- 4) School culture, ethos and environment
- 5) Giving pupils a voice
- 6) Provision of pupil support services
- 7) Staff professional development needs, health and welfare
- 8) Partnership with parents, carers and local communities
- 9) Assessing, recording and reporting pupil's achievement

For the “active travel to and from school” theme⁷⁰, specific initiatives include:

- Living Streets walk to school initiative
- Bikeability; cycling training for children, delivered to 2600 year 5 and 6 pupils per annum in Leicestershire.
- Modeshift STARS; national awards scheme, supported by the DfT, established to recognise schools which have demonstrated excellence in supporting walking, cycling and other forms of sustainable travel for the journey to and from school. Measures adopted include the implementation of no waiting zone(s), revised pick up and drop off times, and nearby ‘park and stride’ sites. These have been found to help relieve traffic congestion, increased active travel and improve safety on roads.

Earlier in 2019, two primary schools in Leicestershire were honoured for their commitment to sustainable travel⁷¹. Elizabeth Woodville, in Groby, was named county

as well as Midlands and North West primary school of the year at the Modeshift STARS school travel awards. Millfield LEAD Academy in Braunstone was also nominated in the Leicestershire category.

- Park and stride approaches

A Leicestershire Safe & Sustainable Travel Officer is working with the following schools on an intensive Active Travel to School Project:

- North West Leicestershire – Broom Leys Primary School
- Charnwood – Latimer Primary School
- Hinckley & Bosworth– Hinckley Parks Primary
- Oadby & Wigston – Parklands Primary
- Blaby – Ravenhurst Primary
- Melton – Old Dalby Primary
- Harborough – Market Harborough C of E Primary

This includes supporting the adoption of a wide range of interventions to encourage and embed changed behaviour around travel to and from the school site.

LCC's Environment and Transport department operate school crossing patrol services across the county⁷². As well as ensuring safe crossing, this service also encourages children and their families or carers to walk to and from school.

Findings from evaluating the effectiveness of the various initiatives listed above will be essential learning as we develop further approaches to support active and sustainable travel approaches.

6.2.1.3. Regulation of vehicle standards and related developments in infrastructure

Regulations

As outlined in section 4.3, in 2018 and 2019 new European Commission directives on vehicles standards (related to emissions) have been agreed. The impact of these changes on

Leicestershire residents and businesses is unknown. The directives are mainly focused on vehicle production, although existing regulations also affect vehicle procurement.

Fleet reviews

As part of actions agreed as part of the delivery of the LCC Environmental Strategy⁷³, work has started on a Fleet Management Review, including developing a council-wide vehicle replacement plan. This includes ensuring environmental criteria and requirements are considered. A Green Fleet Review commenced in April 2019 which includes both operational fleet and the grey fleet (vehicles that do not belong to a company, but which are used for business travel). The findings and future plan of action are expected later this year. Further details of both reviews are given in section 5.2.1.

Electric vehicles

There are two main types of electric vehicles: Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEV). BEVs are vehicles that run solely on battery power and can travel between 100 and 300 miles on a single charge. PHEVs are vehicles that have a conventional petrol or diesel engine in combination with an electric motor. They have a relatively short range on electric power (30 – 40 miles) however; the use of both drive systems can improve efficiency and reduce the emission levels (in comparison to traditional petrol or diesel vehicles).

Whilst LCC is supportive of increasing local Electric Vehicle (EV) charging infrastructure, and workplace charging points at County Hall have recently gone live, the decision has been made not to currently pursue implementation of on-street charging points. This has been communicated to the public via the CHYM website. The council is supportive of uptake of The Office for Low Emission Vehicles ⁷⁴incentives (and other grants) to promote and increase the uptake of electric vehicles.

Low emission zones

Low Emission Zones (LEZs) are areas where the most polluting vehicles are regulated⁷⁵. Usually this means that vehicles with higher emissions cannot enter the specific area. In some LEZs the more polluting vehicles have to pay more if they enter the low emission zone.

Leicestershire does not have any LEZs.

In Leicester City, a LEZ (a Clean Air Zone for buses) is being introduced which will affect all public buses⁷⁶. This is being enforced through agreement between Leicester City Council and the local bus operators, Arriva, Centre Bus, First, Kinchbus and Stagecoach. A levy will be introduced from January 2021 for any bus that does not meet the Euro VI standard. This may have some positive knock on impacts for the emission levels in Leicestershire, produced from bus travel.

6.2.1.4. Congestion charging

A congestion charge is a daily levy imposed on drivers choosing to drive within a specific area, typically a city centre that suffers heavy traffic. There are no congestion charging areas in Leicestershire at present.

6.2.1.5. Traffic calming measures

Traffic calming uses physical design and other measures to improve safety for motorists, pedestrians and cyclists. It aims to encourage safer, more responsible driving and potentially reduce traffic flow. When used to also improve air quality, consideration has to be given to potentially negative, unintended consequences of changing driving behaviours e.g. speeding up between speed humps etc., on emissions.

In 2018, new average speed cameras were installed in Sharnford (B4114 Coventry Road and Leicester Road), Walcote (A4303 Lutterworth Road), Oadby (A6 Harborough Road and Glen Road), Groby (A50 Leicester Road, Markfield Road, Bradgate Hill), Measham (Burton Road), Woodhouse Eaves (Beacon Road) and Wyfordby (B676 Saxby Road) as part of a year-long trial to discourage motorists from speeding and alleviate safety concerns across the county⁷⁷. These cameras cover four villages and three key main and rural routes. Although the driver for choosing these sites was not air quality, changing driver behaviour through reducing and moderating speeding, enforced through cameras, can have a positive impact on levels of air pollutants.

At the end of 2018, plans for traffic calming schemes for two Leicestershire villages were discussed by the county council⁷⁸. The developers of the New Lubbethorpe SUE have a planning agreement to deliver a traffic calming scheme to help prevent additional vehicles from New Lubbethorpe from passing through Leicester Forest East and Kirby Muxloe. Although the driver for this work was not air quality, the scheme proposed that speed tables and cushions be installed in Warren Lane, Barry Drive and Maytree Drive. Depending on the outcome of further design work and consultation, this may have a secondary benefit for air quality in this area.

6.2.1.6. Anti-idling campaigns

PHE guidance advocates for no-idling zones (turning off engines) outside schools as well as other pollution hotspots. As explained in the above “encouraging people to use active travel” section, anti-idling campaigns are encouraged as part of a Whole School Approach to improving air quality⁷⁹. Anti-idling campaigns, and associated active travel promotion, aimed at users of schools or other public and private sector premises have not been systematically adopted across Leicestershire. There is minimal local data on the use of this approach to reduce emissions in priority areas.

6.2.1.7. Reducing domestic sources of pollution including solid fuel burning

The installation of wood burning or multi fuel stoves is work that is controlled under the Building Regulations, and may require, amongst other things, the re-lining or installation of flues and chimneys associated with the appliances⁸⁰. Residents are advised to contact their local building control team to discuss obtaining building regulations consent. The incidence of installation of new stoves and prevalence of stove use across Leicestershire is unknown (from readily available information). Some areas of the district are designated “Smoke Control Areas” (under the Clean Air Act 1993). In these areas, it is an offence to produce smoke from a chimney of a building, including domestic chimneys, from a burner, stove or any fixed boiler. There is an associated list of exempt appliances and authorised fuels, administered by DEFRA. Bonfires and barbeques are allowed in smoke control areas but consideration to neighbours must be made and smoke is expected to be colourless⁸¹. The controls regarding of Statutory Nuisance under the Environmental Protection Act 1990 apply.

A rapid review of District Council websites suggests that information provided about installing and using a wood burning stove or log burner does not alert readers to evidence on the negative air quality and health effects of stove use; both for individuals and the wider public.

6.2.1.8. Action on Leicestershire County Council's own emissions

LCC Green Fleet Review

As mentioned above, the County Council is currently conducting two related reviews of the vehicles it operates or uses for business mileage, which will help to address the council's own contribution to air quality impacts. LCC directly operates a fleet of over 300 vehicles, and in addition staffs undertake business travel in over 2000 private vehicles (the so-called "grey fleet").

The use of these vehicles to provide services (including highways maintenance, social work, library services and enforcement of trading standards) has impacts on air quality through vehicle emissions.

Starting in April 2019, a Fleet Management Review (FMR) is looking at the procurement and operation of council vehicles, including environmental compliance and vehicle efficiency.

In addition, a Green Fleet Review (GFR) by the Energy Saving Trust will specifically examine options for increasing the environmental performance of the fleet (including grey fleet). The GFR will report in August 2019, while the FMR runs until early 2020, although new vehicle specifications should be in place by mid-2019.

Electric vehicle and charging points

The County Council's Environment and Transport department has purchased an electric car (Nissan Leaf) for use as a pool vehicle. This is being monitored as a pilot project and it is hoped that the scheme will be expanded in future.

In addition, the council has installed a total of 20 electric charging points at its main buildings for use by staff, plus 2 visitor spaces with charging points at County Hall. The majority were

installed in 2018/19.

Environmental Management and Performance Monitoring

The County Council has an environmental management system which (among other things) requires the monitoring of fuel use and/or mileage driven by council vehicles, as well as business mileage driven in staff-owned vehicles. Corporate and departmental targets are in place and progress is monitored quarterly and annually, and reported back to departments, including the Highways and Transportation Branch Management Team (responsible for most of the council's fleet).

As of Q3 2018/19, fuel use by Highways Vehicles and Plant was below (better than) target and generally improving, apart from a worsening trend (more fuel used) for Passenger Transportation. Total business mileage for the whole organisation was also below (better than) target and improving. There is no direct measurement of air pollution contributions.

Heating of LCC buildings

County council buildings are heated mainly by gas supplies and some local electric heating, but there is a large biomass boiler at County Hall (and one at a school). All boilers are tested at regular intervals to ensure they are burning fuel efficiently and complying with pollution limits. Biomass boilers in principle help to reduce CO₂ emissions, but nevertheless contribute to local air pollution by emitting particulate matter. At council sites this is minimised by ensuring that the fuel (wood chip) is sufficiently dry before burning, and through statutory maintenance and testing regimes. The wood chip supplied must meet the G30 Austrian ONORM Standard, which sets the water content minimum at 15% and max at 40%, with an ash content of <1% of the fuel weight.

County farms

The council's Environment Strategy 2018-30 includes an objective (G3) to seek to "demonstrate and support environmentally sustainable farming practices on its farms". As noted in section 2, the vast majority of ammonia emissions arise from agriculture. The council owns a substantial portfolio of farms, which act as a source of income from tenant farmers. The council also has a relationship with parts of the farming community through biodiversity

protection projects. The Environment Policy and Strategy team will explore with Property Services the options for encouraging farming methods that minimise ammonia emissions, as part of implementing objective G3.

6.2.2.To reduce exposure to poor air quality

Whilst it is recognised that interventions that prevent or reduce emissions should be prioritised over those that address pollution once it has occurred, the County Council has a statutory duty to take appropriate steps to improve the health of people living in Leicestershire. This includes the provision of health improvement information, advice and support services aimed at preventing illness and tackling risk factors for poor health. Therefore, it is important to examine the services we provide to warn, inform and support individuals to reduce their exposure to poor air quality as well as to professionals to be aware of the risks and provide appropriate support to their service users- whoever they may be.

6.2.2.1. Mobile phone alerting systems

In some areas in England alerting systems are used to send registered users a free message if air pollution in their area is forecast to be moderate, high or very high^{82 83}. This type of system is anticipated to be of particular benefit to people with medical conditions that may be affected by pollution, such as asthma, bronchitis and emphysema or those whose breathing worsens when air pollution increases. This form of early warning service allows individuals and their families make informed decisions and take action if necessary to minimise the effects of pollution episodes. This service is not currently commissioned in any areas of Leicestershire.

6.2.2.2. Daily Air Quality Index (DAQI)

A DAQI⁸⁴ is a tool to communicate the levels of air pollution and provide recommended actions and health advice. The index is numbered 1-10 and divided into four bands, low (1) to very high (10), to provide detail about air pollution levels in a simple way, similar to the sun index or pollen index.

DEFRA⁸⁵ produces visual maps of pollution forecasts in Leicestershire using monitoring data.

This provides current and projected air quality status maps based on the levels of five key pollutants: ozone, nitrogen dioxide, sulphur dioxide, PM_{2.5} and PM₁₀ particles. These can all have an impact on your health. It is unclear how well known and used these resources are by Leicestershire residents.

6.2.2.3. Urban greening and tree planting

It is well evidenced that trees can remove air pollutants from the atmosphere.⁸⁶ However some species are better than others, depending on whether they are in leaf all year round, have a large canopy area and wrinkled leaf surface (p.12). Additionally, PHE⁸⁷ advocates that “interventions that separate people from pollution and introduce barriers can reduce people’s exposure to pollutants... including ... well-designed urban greening schemes and providing active travel routes through green spaces” can reduce sources and exposure to pollution.

LCC maintains 17 country parks across the county.⁸⁸ All the country parks are open every day, and admission is free. Furthermore, an extra 11 country Parks are available in the area for use but managed by other organisations; these include Leicester City Council and the District Councils. LCC has responsibility to manage the trees in the country parks they maintain as well as on highways land, schools, and through landscaping as part of highways and development projects. Trees on LCC land (highways, schools etc. - excluding Country Parks) are estimated to remove 9.25 tonnes of (air) pollutants every year; this equates to removal of sulphur dioxide from 9,560 cars/25 homes and nitrogen dioxide from 298 cars/134 homes per annum with additional benefits of CO₂ removal and oxygen generation.⁸⁹

Whilst there are currently no plans for widespread urban greening programmes across Leicestershire, there is the opportunity to raise awareness to planners of the importance of tree planning and planting for air quality and health benefits.

6.2.2.4. Walking route planners and optimising use of green spaces

The World Health Organisation (WHO)⁹⁰ recognise that urban green spaces, such as parks, playgrounds, and residential greenery, can promote mental and physical health, and reduce

morbidity and mortality in urban residents by providing psychological relaxation and stress alleviation, stimulating social cohesion, supporting physical activity, and reducing exposure to air pollutants, noise and excessive heat. As detailed in the previous section, the CHYM⁹¹ programme has delivered a comprehensive online portal to help Leicester and Leicestershire based individuals, communities, schools and businesses choose the best way to get from A to B. It provides information about walking, cycling, public transport, park & ride, driving, school & college travel and community travel. This includes details of Winter Walks, Public right of way networks, public footpaths to encourage green walks and leisure walks.

6.2.2.5. Use of planning regulations

Members of the Public Health department of LCC and District Council planning leads, working alongside planning leads based in the Environment and Transport department of LCC, are involved in scrutinising strategies and plans that may have an impact on air quality and health. This includes, for example, using Health Impact Assessment frameworks for major developments, and using a Health in All Policies approach to influence wider policies and plans. The sustainable travel team take an active role in encourage conditions for developers to promote travel planning and vet new plans to ensure they are fit for purpose and focus on modal shift.

Current work includes providing strategic guidance on the proposed new Lutterworth development. This programme of activity, delivered at a senior, strategic level, is ad hoc and the level of Public Health involvement depends on competing workloads. There are plans in place to support and train District Council planning officers to consider the health implications of different planning applications. This capability building approach is at an early stage of planning.

6.2.2.6. Health awareness raising

Information delivered by Leicestershire County Council

The LCC website hosts Health and wellbeing pages⁹². This provides general health advice and information; specifically focusing on mental health and wellbeing, getting active, healthy weight, health checks and advice, sexual health, eating well, smoking, alcohol and drugs and seasonal health. The aim of the advice is to help individuals and their families make healthier

choices. This information is also delivered in various other formats, including: during face to face contact between members of the Public Health improvement team and Leicestershire residents, via leaflets etc.

Additionally, users are signposted to access advice via the NHS choices⁹³ and First Contact Plus website⁹⁴. First Contact Plus is an online tool (also available over the phone) which helps adults in Leicestershire find information about a range of services all in one place. Information and resources on housing, health, living independently, money advice, work, security and other topics that assist the county's residents can be found on the pages of this website. First Contact Plus is delivered by LCC in partnership with GPs, the police, health organisations, voluntary groups and social care departments, district & borough councils who are helping adults across the county by working together to make access to services much easier. The information includes advice on maintain an active lifestyle and lists different activities being undertaken in Districts in Leicestershire.

Despite comprehensive online information aimed at promoting and improving the health of Leicestershire residents, no information about the health impacts of poor air quality and actions to reduce exposure is provided on either of these websites.

Information delivered by Leicestershire healthy schools programme

As detailed above, Leicestershire Healthy Schools programme aims to support schools throughout Leicestershire to raise attainment and achievement by improving health and wellbeing for pupils, staff, parents and carers in the wider school community. For the improving air quality theme, information about specific health risks and education tools are provided via the website⁷⁹. They were launched earlier in 2019 and downloadable. We do not have any data on the impact that this has had on school practices.

6.3. Existing partnership working

Authorities across Leicester, Leicestershire and Rutland collectively contribute to the Air Quality Forum, which was formed in the late 1990s. This provides the mechanism to collectively discuss and investigate potential initiatives to improve air quality as well as

collaborate on areas of difficulty and is seen a good model of partnership working. This forum meets at least quarterly and is chaired by a Senior Environmental Health Officer from Blaby District Council. In recent years the active membership of the Forum has broadened to include PHE, the County Council's Public Health Department, and Academics. A planning officer from one of the Borough Councils has started to attend the meetings.

In addition, the East Midlands Air Quality Network meets twice a year and seeks to improve understanding and consistency of approach across the Region.

7. Unmet needs/Gaps

6.4. Strategic direction

Leicestershire's Director of Public Health (DPH) recognised that air pollution is an 'emerging national risk to health' in his 2017 Annual report¹. Data, and related analysis, was used to illustrate the scale of the problem across the County. In the DPH 2018 Annual report it was reported that a partnership action plan for air quality in Leicestershire will focus on better data and intelligence, active travel promotion in identified hot spots, and a communications campaign to educate the wider public on both the acute and longer-term effects of poor air quality so that they can better protect themselves and their families.

To understand unmet needs and gaps in provision to tackle need, it is helpful at this point to recap on the key findings from this assessment so far.

6.5. Time for change

There is currently both national and local policy and guidance demanding a call to action on air quality and its negative health impacts. This means that the publication of this chapter is timely and necessary. As detailed earlier, the impact of poor air quality to the health and social care system in Leicestershire is estimated to be millions of pounds. It is expected that this figure will continue to rise if no action is taken to improve air quality through reducing damaging emissions.

6.6. Overview of place

In 2018, there were 14 declared Air Quality Management Areas (AQMAs) in Leicestershire. Melton Borough Council, Hinckley and Bosworth Borough Council and Oadby and Wigston Borough Council have currently no declared AQMAs. The majority of AQMAs appear to fall, roughly, along or around the central North / South spine of Leicestershire. It is estimated that 0.6% (n=4000+) of the Leicestershire population live in an AQMA area. It is important to note that this value is likely to under-represent the scale of the problem as two additional AQMAs were declared in Leicestershire (in the Blaby and Harborough Districts) after the release of the 2017 Air Quality headline indicator. Additionally, background levels of Particulate Matter

2.5 (PM_{2.5}) are found to be higher in North West Leicestershire, Loughborough, Kegworth with quarries and the airport considered as the cause. There are also higher levels of PM_{2.5}, PM₁₀, NO₂ around the main road routes in the county. These include the M69, A42, A46, A6 and the M1.

Leicestershire has higher population densities in urban centres. There are pockets of high deprivation, measured using the Index of Multiple Deprivation (IMD) 2015, in areas of Loughborough, North West Leicestershire and Hinckley & Bosworth. Additionally, there is deprivation around outdoor environment, measured using the specific IMD 2015 indicator, in Loughborough as well as the fringes of Leicester in Oadby and Wigston. The Loughborough Bell Foundry area falls into the lowest quintile nationally for both IMD 2015 as well as outdoor environment. The Access Healthy Assets and Hazards tool demonstrates that Leicestershire is less conducive to health than the England average.

6.7. Understanding air quality related health needs of local people

There are a number of risk factors and health conditions that are known to have a relationship with exposure to poor air quality. These are explained in detail in sections one and two of this assessment. Headline findings are:

- Areas in Oadby & Wigston have higher levels of babies born with a low birth weight than the England average.
- In Charnwood there was found to be lower GP reported prevalence of hypertension. This was at odds with findings that cardiovascular disease rates are significantly higher in Leicestershire in comparison to England.
- Whilst Leicestershire was found to have high GP reported rates of asthma and COPD but lower levels of respiratory infections than the England average, this finding was not observed for Charnwood. This gives rise to concern about gaps in the figures reported. This view is further confounded by significantly higher admission rates for COPD in urban centres, including within Loughborough.
- Preventable mortality attributable to PM_{2.5} is, on average, the 3rd leading cause of death across the county with variation (5.3-5.9% of deaths) observed across districts.
- 10% of Leicestershire's working population is at risk from higher levels of air pollutants

due to occupational exposure.

- Leicestershire was found to have significantly lower walking and cycling rates for travel in comparison to England rates.

6.8. Review of current actions to address air quality and its negative impacts on health plus assessment of gaps

1. There appears to be variation in the number and types of measures being employed to improve air quality across District Councils in Leicestershire. One local area does not have any listed activities whereas others have multiple. The number and type of measure do not appear to correlate with the number of AQMAs or risk factors for poor health related to air quality within a given geographical area.

2. There are a plethora of services and information, aimed at different ages on the life course, to support individuals to be active. There is a dedicated active and sustainable travel online portal and reward system to encourage individuals to make active and sustainable travel choices.

3. Leicestershire Healthy Schools have focused attention on both active travel to and from school and more recently on improving air quality. It is not clear on the levels of adoption of the principles that are advocated. Further resource is needed if these Whole School Approaches are to be fully adopted. There are obvious opportunities to join up these two themes so that the co-benefits of active travel and air quality and health can be better understood by pupils, their families and staff.

4. LCC is leading the way in its delivery of the Environmental Strategy. In relation to air quality, it is positive to see that a fleet review of green and grey vehicles is being undertaken. Additionally, there is support for the use of electric vehicles. The results of the recently closed staff travel survey will provide further intelligence on perceived needs of LCC staff. Similar work has been completed previously by several District/Borough Councils.

5. Traffic calming measures using physical design, could be used to manage air quality hotspots. Considering how to optimise physical design and redesign will be essential if structural transport changes are to be made to improve air quality and health across Leicestershire. A key aspect of this work will be communicating the impact of making changes for air quality and health benefits.

6. Anti-idling campaigns are not routinely being delivered across Leicestershire. Evidence recommends focusing this type of campaign in locations where there is increased likelihood of idling vehicle users and people particularly vulnerable or susceptible to negative health effects. There is an opportunity to collectively identify and design appropriate behaviour changes campaigns that could have positive impacts on reducing emissions and protecting people from exposure. It would be important to consider the links with priority areas identified through this assessment (e.g. urban centres, AQMAs etc.) and priority groups (e.g. aligning with the healthy schools' programme, occupational risk groups etc.)

7. Information packs about installing or using wood burning or multi fuel stoves do not currently include information about the evidence-based negative air quality impacts and detrimental health effects. There is a lack of data about the incidence of new stoves being installed and prevalence of use across Leicestershire. There is likely to be seasonal effects on air quality from use of these stoves.

8. Alerting systems, used to send registered users a free message if air pollution in their area is forecast to be moderate, high or very high, are not commissioned or routinely used across Leicestershire. There is possible need for this type of system in areas with higher levels of air pollutants (e.g. residents in AQMAs) or targeted at those who are particularly vulnerable or susceptible to negative health effects.

9. Information about the daily air quality status (DAQI) of areas in Leicestershire is presented on the DEFRA pollution forecast website. This resource is freely accessible, and this presents an opportunity to link or embed this tool into our own local websites and information sharing.

10. LCC, and its partners', maintains over 20 country parks for public use. Also, LCC has responsibility to manage trees in the country parks they maintain as well as on highways land, schools, and through landscaping as part of highways and development projects. It is unclear from this assessment how effectively trees and these green spaces are being used to improve air quality and reduce people's exposure to air pollution, or optimised to encourage active and sustainable travel. There are currently no plans for widespread urban greening in Leicestershire but there is the opportunity to raise awareness to planners of the importance of tree planning and planting for air quality and health benefits.

11. The access area funding aspect of the CHYM programme is in its final year. We are yet to learn of the effectiveness of this programme on changing individuals, communities, schools and businesses approach to making active and sustainable travel choices. A comprehensive

evaluation is needed to determine how to capitalise on the learning and how to achieve modal shift in travel choices. This work is planned.

12. Current LCC public health activity includes assessing the sustainability and health considerations of a range of key strategies (e.g. transport, regeneration, housing etc.). Health impact assessments are undertaken, as requested, but this programme of activity is ad hoc. There are plans underway to support and train District Council planning officers to consider the health implications of different planning applications. It is worth noting that two of seven District Councils have highlighted “Integration of Air Quality into planning policy” as a priority action in their 2018 Air Quality Status report. Work to fully integrate sustainability and health into Local Planning and Design frameworks (where appropriate) should include air quality considerations.

13. Despite comprehensive information online and in print, aimed at improving and promoting the health of Leicestershire residents, no information about the health impacts of poor air quality and actions to reduce emissions or exposure is provided. There is the opportunity to provide clear and consistent messages about air quality and health across all LCC hosted websites/ pages as well as signpost users to other key sources of information e.g. DEFRA hosted websites/ pages. To do this meaningfully, there would first need to be an assessment of current levels of public engagement with air quality and health.

14. There are existing partnerships currently being enacted across departments of LCC, collaboratively between District Councils and regionally with local authority counterparts. There are two key forums to foster these relationships. There is a gap in presence (maybe due to lack of invite or competing interests) from health and social care colleagues; including those working in the two CCGs that cover Leicestershire at the Air Quality Forum.

15. The partnership enacted across departments of LCC on air quality and health is fairly informal at present. There is an opportunity for further joined up work, through the design and delivery of the partnership action plan on air quality and health, to capitalise on a health in all policies approach.

16. There is not currently a clear method for engaging regularly and meaningfully with local businesses, voluntary sector agencies or Leicestershire residents on air quality and health issues.

8. Recommendations

By its nature, air quality cannot be controlled by geographical boundaries or by a single individual or organisation alone. Instead, collective and systematic efforts to reduce air pollution and its harmful effects on health are required. As well as mitigating against risks of poor health, actions, interventions and communication to reduce the level of air pollutants and improve air quality can also deliver wider public health and societal co-benefits. We advocate for prioritising structural and strategic level changes that will have the greatest impact on population level behaviour change and public health.

Therefore, the key recommendation from this comprehensive JSNA is that Leicestershire Air Quality and Health partnership steering group should agree a plan to deliver joint actions to tackle poor air quality and related health issues. All key partners and stakeholders should commit to deliver this plan over the next three years. The following six objectives, and associated recommendations, could form the basis of the partnership action plan:

Objective 1: Clear leadership, vision and strategic direction

- LCC, district councils, and CCGs should commit, through integration in annual action plans, to making Leicestershire a healthy place to live, work and travel by dedicating resources (as appropriate) to reduce harmful emissions and mitigate against the negative impacts to public health and the environment of poor air quality.
- LCC should lead by example by delivering against the Environmental Strategy and aiming to achieve net zero carbon emissions, as well as actions aimed at reducing its direct contribution to air pollution, by 2030.
- LCC, district councils, and CCGs should map and engage with the various fora that exist to understand and engage meaningfully with local businesses, voluntary sector agencies or Leicestershire residents on environmental/ air quality and health issues.

Objective 2: Collaborative partnership working

- The partnership should support local authorities to continue to work together and seek public health advice when tackling air quality and health issues through promotion of the work of the LLR Air Quality forum and East Midlands Air Quality

network.

- Public health specialists, as members of the LLR Air Quality Forum, should support consideration of wider issues related to air quality and, as appropriate, invite key partners (e.g. health and social care colleagues).
- The partnership steering group should review and refresh the terms of reference based on the agreed priorities and, as appropriate, widen the membership, sharing information with the Leicestershire Environmental Health management group to ensure alignment with other work in this area.
- LCC Public Health department should provide further resource to support whole School Approaches to adopt Air Quality and Active travel as part of the Healthy Schools programme.

Objective 3: Consideration of air quality and health in planning and development

- LCC Public Health department should consider formalising its commitment, through dedicated resource, to routinely deliver specialist support for strategic spatial planning, local area plan development (including capability building) and work on major developments to reduce sources and public exposure to air pollution.
- LCC and district councils should commit to integration of air quality into planning policy as well as policies that influence strategic and local development plans. A health in all policies approach could be adopted to achieve this.
- LCC Public Health department should support and develop members and local planners, through training and mentoring, to consider the health impacts of planning proposals and urban re-development. Dissemination of opportunities will include utilising the distribution list of the LLR Air Quality forum.

Objective 4: Aligning air quality and health with environment and transport decisions

- Planning and Highways Authorities should seek to implement a hierarchy of sustainable travel which prioritises walking and cycling above other forms of transport. This includes prioritising investment in walking and cycling infrastructure, especially where this would encourage and facilitate active travel to schools and workplaces in areas of high urban density.
- LCC Environment and Transport department, working in collaboration with district

councils, should consider providing further resource to expand the work being delivered to support business, schools and developers to make and deliver comprehensive travel plans. This methodology should be used to deliver travel mode shift for business, schools as well as new places in Leicestershire.

Objective 5: General communication with the public and organisations about air quality and health

- LCC, district councils, and CCGs should provide air quality and health information to residents, local businesses, health organisations, local early years settings, schools colleges and universities; explaining how people and organisations can minimise emissions of pollutants and exposure to poor air quality.
- LCC, district councils, and CCGs should deliver key messages on air quality and health, and links to DAQI, through updating existing online portals as well as through leaflets, face to face contact and other formats that meet their needs. Partners should align and join up public health messages around being active with those about reducing emissions and exposure to air quality through active and sustainable travel choices.
- LCC, district councils, and CCGs should train and mentor front line staff to deliver messages around air quality and health as part of their daily role.

Objective 6: Targeted communication and campaigns with priority groups and key organisations about air quality and health

- LCC Communications Department, working in collaboration with local communication networks, should lead on a programme of work to design, deliver and evaluate campaigns to reduce emissions of air pollutants. This may include promoting anti-idling, reducing multi fuel stove use and/ or making active and sustainable travel choices.
- LCC Communications department, working in collaboration with local communication networks, should lead on a programme of work to design, deliver and evaluate campaigns to reduce individuals' and communities' exposure to air pollutants. These may be focused in AQMA, urban centres or directed at priority groups (for example, children, individuals at risk of ill health due to multi-morbidity or key workforce

groups). Further work is required to investigate need as well as unintended consequences of adopting an air quality alerting system aimed at those who are particularly susceptible to negative health effects from poor air quality.

9 Next Steps

This JSNA chapter details a comprehensive look at the air quality and related health issues pertinent to Leicestershire and its constituent District/ Borough Councils. Interventions that improve local air quality for everyone, not just at pollution hotspots, will have the greatest impact on improving people's health. For this reason, partnership working is essential to achieve these stepped improvements in how we understand air pollution, reduce our contribution to it and mitigate against its risks to health. A cross organisational steering group is in the process of producing the follow-on Air Quality and Health Partnership Action Plan that is expected to deliver against these recommendations. This plan will make clear which organisations are responsible for achieving each action and associated timeframes.

Appendix 1

Blaby District Council (2018) 2018 Annual Status Report (ASR). Available at:

<https://www.blaby.gov.uk/environmental-issue/waste-and-environment/air-quality/>

Charnwood Borough Council (2018) 2018 Annual Status Report (ASR). Available at:

<https://www.charnwood.gov.uk/pages/airpollution>

Harborough District Council (2018) 2018 Annual Status Report (ASR). Available at:

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Hinckley and Bosworth Borough Council (2018) 2018 Annual Status Report (ASR). Available at:

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Melton Borough Council (2018) 2018 Annual Status Report (ASR). Available at:

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North West Leicestershire District Council (2018) 2018 Annual Status Report (ASR). Available at:

https://www.nwleics.gov.uk/pages/local_air_quality_review_and_assessment

Oadby and Wigston Borough Council (2018) 2018 Annual Status Report (ASR). Available at:

https://www.oadby-wigston.gov.uk/pages/air_quality

GLOSSARY OF TERMS

AHAH	Access to Healthy Assets & Hazards
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
BRES	Business Register and Employment Survey
CCG	Clinical Commissioning Group
CO	Carbon Monoxide
COGAP	Code of Good Agricultural Practice
COMEAP	Committee on the Medical Effects of Air Pollutants
COPD	Chronic Obstructive Pulmonary Disease
DEFRA	Department for Environment, Food and Rural Affairs
DH	Department of Health
EC	European Commission
ELRCCG	East Leicestershire and Rutland Clinical Commissioning Group
GP	General Practitioner
HWB	Health and Wellbeing Board
IDACI	Income Deprivation Affecting Children
IDAOP	Income Deprivation Affecting Older People
IMD	Index of Multiple Deprivation
JHWS	Joint Health and Wellbeing Strategy
JSNA	Joint Strategic Needs Assessment
LAQM	Local Air Quality Management
LLR	Leicester, Leicestershire and Rutland
LPT	Leicestershire Partnership Trust
LSOA	Lower Super Output Area
MSOA	Middle Super Output Area
NO	Nitric oxide
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen (the mixture of NO and NO ₂ in the atmosphere)
NH ₃	Ammonia
NHS	National Health Service

O ₃	Ozone
ONS	Office of National Statistics
PAH	Polycyclic aromatic hydrocarbons
PHE	Public Health England
PHOF	Public Health Outcomes Framework
PM ₁₀	Particulate Matter (< 10 microns (µm) in diameter)
PM _{2.5}	Particulate Matter (< 2.5 microns (µm) in diameter)
SO ₂	Sulphur Dioxide
SUE	Sustainable Urban Extension
VOC's	Volatile Organic Compounds
µg/m ³ or	Micrograms (10 ⁻⁶ grams) per cubic metre of air, a common unit for
µg.m ⁻³	measuring the concentration of pollutants in air
WLCCG	West Leicestershire Clinical Commissioning Group

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