England's Economic Heartland

HEALTH IMPACT ASSESSMENT

Appendix D to the ISA

JUNE 2020

PUBLIC

England's Economic Heartland

HEALTH IMPACT ASSESSMENT

Appendix D to the ISA

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 70068182

DATE: JUNE 2020

WSP

The Forum
Barnfield Road
Exeter, Devon
EX1 1QR

Phone: +44 1392 229 700

Fax: +44 1392 229 701

WSP.com

QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft for client review	Final Review	Final for Consultation	
Date	May 2020	May 2020	June 2020	
Prepared by	Rebecca Dipoti		Rebecca Dipoti	
Signature				
Checked by	Claire Beard	Claire Beard	Claire Beard	
Signature				
Authorised by	Sally Newbold	Sally Newbold	Sally Newbold	
Signature				
Project number	70068182	70068182	70068182	
Report number	01	02	03	
File reference				

CONTENTS

TABLES

FIGURES

APPENDICES

1

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

1.1.1. A Health Impact Assessment (HIA) of the proposed transport principles and policies within the England's Economic Heartland (EEH) region was undertaken in support of the Integrated Sustainability Appraisal (ISA) alongside the preparation of a Transport Strategy to encourage sustainable development.

1.1.2. Health issues considered included both direct and indirect effects for the general policies upon the EEH region, including its population and economy.

1.1.3. Community baseline data was applied to establish the demographic, social and health profiles for the population within the geographical scope of the HIA. Several baseline data sources were used ranging from Public Health England Key Indicators to 2011 Census Data. Where appropriate and available, the baseline information was updated with more recent published data.

1.1.4. An assessment of health, population, environment and deprivation was undertaken for the proposed transport principles and policies listed in section 2 of the ISA, ranging from decarbonisation, new infrastructure, improvements to existing infrastructure, and behavioural change. These principles and policies were assessed against the following determinants of health: air quality, noise, physical activity, road safety, economy and employment, and access and accessibility.

1.1.5. The assessment has identified that the proposed transport principles and policies related to highways, including new roads and online improvements, are likely to result in negative health outcomes, particularly for air quality. However, decarbonisation of the transport system and improvements to public transport are likely to result in positive health outcomes, particularly for air and noise pollution. In addition, prioritising and improving pedestrian and cyclist facilities will also lead to positive health outcomes, particularly in relation to physical activity. Overall, the Transport Strategy is expected to contribute to improved connectivity and accessibility to jobs.

1 INTRODUCTION

1.1.1. England's Economic Heartland (EEH) is the Sub-National Transport Body representing 11 Local Authorities (LAs) and six Local Enterprise Partnerships (LEPs) (referred to hereafter as EEH Partners),from Swindon across to Cambridgeshire, and from Northamptonshire down to Hertfordshire.

1.1.2. An Integrated Sustainability Appraisal (ISA) has been undertaken alongside the preparation of the Transport Strategy. The role of the ISA is to promote sustainable development by assessing any potential environmental, social and economic impacts, as well as mitigating any potential adverse effects that the Transport Strategy might otherwise have.

1.1.3. One of the topics assessed within the ISA is human health, and the impacts that the proposed Transport Strategy is likely to have on the health of people within the EEH region.

1.1.4. In considering the effects on human health, a Health Impact Assessment (HIA) has been undertaken to further consider the relationship between health and transport in the EEH region, and the likely significant effects of the Transport Strategy on human health.

1.1.5. The outcomes of this HIA have informed the ISA.

2 SCOPE AND METHODOLOGY

2.1 INTRODUCTION

2.1.1. A rapid desktop HIA was undertaken in April 2020. The key tasks for this HIA were to:

- Develop a summary health and wellbeing baseline and profile of the EEH region;
- Identify relevant evidence from literature;
- Assess the potential health and wellbeing impacts of the Transport Strategy, and the nature and likelihood of such impacts;
- Develop recommendations for minimising potential negative, and maximising potential positive, health and wellbeing impacts; and
- Suggest health and wellbeing indicators that can be used to monitor the Transport Strategy.

2.2 SCOPE

STUDY AREA

2.2.1. This is a rapid, desk-based HIA of the direct and indirect effects on local communities resulting from the proposed principles and policies of the EEH Transport Strategy. The geographic scope of this HIA is therefore the EEH region.

STUDY POPULATION

2.2.2. The population scope of this HIA includes the EEH resident population.

2.2.3. The main vulnerable groups within the population that have been considered are:

- Children and young people;
- Older people;
- People with disabilities and mobility impairment;
- People with existing health conditions;
- Unemployed and low-income groups; and
- Socially excluded or isolated groups.

DETERMINANTS OF HEALTH

2.2.4. The key determinants of health and wellbeing that have been considered are:

- Air quality;
- Noise;
- Physical activity;
- Road safety;
- Economy and employment; and
- Access and accessibility.

BASELINE AND HEALTH PROFILE

2.2.5. The baseline and health profile have been compiled using existing, publicly available data including:

- Public Health England (PHE) Local Authority Health Profiles;
- Office for National Statistics Labour Market Profiles (Nomis); and
- PHE “Local Health” datasets.

APPRAISAL

2.2.6. The proposed transport policies were assessed against each of the determinants of health, looking first at the baseline conditions of the determinant category within the study area, evidence of how each determinant impacts human health, and then the effect that the general principles and policies are likely to have on the health of the study area population as presented in **Table 5-10**.

RECOMMENDATIONS

2.2.7. A set of mitigation and enhancement measures have been identified to reduce the potential negative, and enhance the potential positive, health and wellbeing impacts of the Transport Strategy.

2.3 ASSUMPTIONS AND LIMITATIONS

2.3.1. At this stage it is difficult to assess the specific localised populations (e.g. at Ward level) who are more or less likely to be impacted by the proposed transport policies and principles. It has been assumed that specific projects that arise as a result of this Transport Strategy will be appropriately assessed to identify project-specific impacts on local populations.

2.3.2. Specific mitigation measures relating to health for each general transport policy have been made within the ISA and were informed by this HIA. Indicators to monitor the Transport Strategy are reported in the ISA Report.

2.3.3. It is acknowledged that the 2011 Census data used in this assessment is currently out of date, with an update to the Census expected in 2021. At the time of writing this was the best available data and no significant changes or limitations in these datasets have been identified that would affect the robustness of the HIA.

3 HEALTH IMPACT ASSESSMENT

3.1.1. HIA is a systematic approach to identifying the differential health and wellbeing impacts, both positive and negative, of projects, plans or strategies.

3.1.2. HIA uses both qualitative and quantitative evidence, including public and other stakeholders' perceptions and experiences, as well as public health knowledge. It is particularly concerned with the distribution of effects within a population, as different groups are likely to be affected in different ways, and therefore looks at how health and social inequalities might be reduced or increased by a proposed project or plan.

3.1.3. The aim of a HIA is to support and add value to the decision-making process by providing a systematic analysis of the potential impacts, as well as recommending opportunities, where appropriate, to enhance positive impacts, mitigate negative impacts and reduce health inequalities.

3.1.4. HIA has been defined as:

"…a combination of procedures, methods and tools by which a policy, programme or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population"[1].

3.1.5. In this context, 'health' is defined by the World Health Organisation as:

"…a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity"[2].

3.1.6. Health determinants are the personal, social, cultural, economic and environmental factors that influence the health of individuals or populations. These include a range of factors such as income, employment, education and social support.

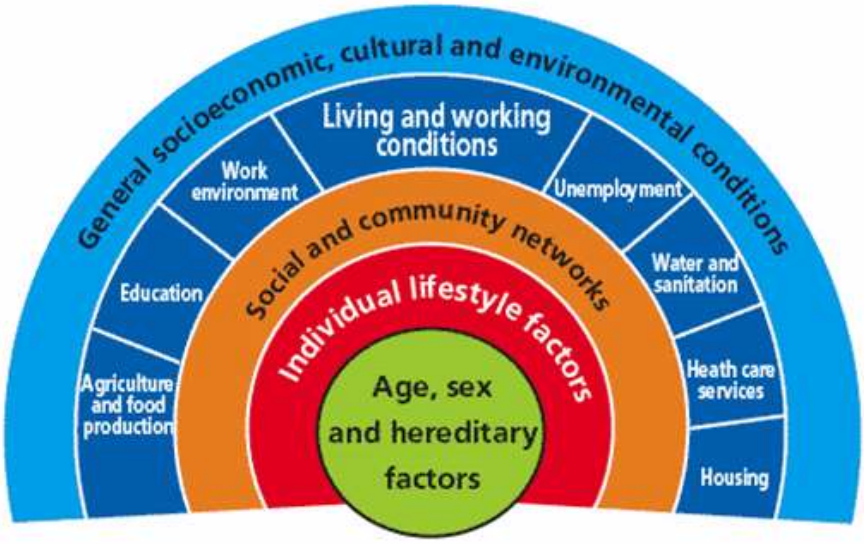
3.1.7. Health inequality can be defined as the difference in either health status, or the distribution of health determinants, between different population groups. Some health inequalities are unavoidable, others are not so and may well be unjust and unfair.

3.1.8. HIA's apply the below model of health and wellbeing (**Figure 3-1**). The Socio-Environmental Model of Wellbeing considers that health and wellbeing are a result of external influences, where an individual or population experiences a combination of adverse external factors which could result in health inequality.

[1] World Health Organisation, (n/a). Definition of health assessment (HIA). Available online at: http://www.euro.who.int/en/health-topics/environment-and-health/health-impact-assessment/definition-of-health-impact-assessment-hia

[2] World Health Organisation (n/a). Constitution. Available online at: https://www.who.int/about/who-we-are/constitution

Figure 3-1 – Socio-Environmental Model of Health and Wellbeing[3]



3.1.9. The overall aim of this HIA will be to identify the aspects of the proposed transport principles and policies which have the potential to affect people's health, both directly and indirectly. Some effects may be positive, others could be negative. This HIA will include recommendations which will remove or mitigate as far as possible any potential negative impacts on people's health. It will also identify opportunities to maximise the potential benefits to people's health.

[3] Dahlgren, G. and Whitehead, M. (1991) *Policies and Strategies to Promote Social Equity in Health*. Stockholm, Sweden: Institute for Futures Studies.

4 COMMUNITY PROFILE

4.1.1. Amongst the communities living in, and directly affected by, any changes brought about by the principles or policies of the Transport Strategy, the proportion and profile of vulnerable groups, identified in section 3.2 above, have been described below using publicly available data.

4.1.2. Community profile data has been used to express the status of vulnerable groups with respect to their vulnerable health status and/or deprivation. In some cases, Health Profile Indicators are implicit rather than explicit, where direct Health Profile Indicators were not available.

Table 4-1 – Public Health Profile for the EEH region

Health Indicator	Baseline Evidence
Lifestyle	The estimated average proportion of the adult population that are physically fit in the EEH region (66.2%) is in line with the national average (66.3%). Luton had the lowest proportion of physically fit adults (58.7%) with Oxfordshire having the highest proportion (72.5%)[4]. The percentage of adults classified as overweight or obese in the EEH region (62.1%) is in line with the national average (62%). Buckinghamshire has the lowest proportion of obese adults (53.8%) and Peterborough had the highest proportion (68.3%)[5]. Admission rates for alcohol related conditions in the EEH region (642 per 100,000) is better than the national average (663.7 per 100,000)[6]. Smoking prevalence in adults for the EEH region (14.3%) which is in line with the national average (14.4%)[7]. Between 2018 to 2019 there were 530 hospital admissions for episodes of drug related misuse in the EEH region compared to 7,376 for England[8]. Violent crime offences in the EEH region (39%) is lower than the national average (44.9%)[9].
Unemployment/Economy	According to the 2011 Census, the average unemployment rate within the EEH region was 3.9% for those aged 16-64 years, with Luton having the highest unemployment rate (5.7%) and Oxfordshire having the lowest unemployment rate (2.7%). In the same period the average employment

[4] Public Health England (2019). Local Authority Health Profiles – 16 Percentage of physically active adults.

[5] Public Health England (2019). Local Authority Health Profiles – 17 Percentage of adults classified as overweight or obese.

[6] Public Health England (2019). Local Authority Health Profiles – 14 Hospital admission rate for alcohol-related conditions.

[7] Public Health England (2019). Local Authority Health Profiles – 15 Smoking prevalence in adults.

[8] NHS (2019). Drug Related Hospital Admissions: data tables. Available at: https://digital.nhs.uk/data-and-information/publications/statistical/statistics-on-drug-misuse/2019/drug-admissions-data-tables

[9] Public Health England (2019). Local Authority Health Profiles – 29 Violent crime – hospital admission rate for violence (including sexual violence)

Health Indicator	Baseline Evidence
	rate for the EEH region was 73.7% which is higher than the national average of 69.9%[10].
Health	Census data shows that on average 48.8% of the population of the EEH region consider themselves in 'Very Good' health, 35.2% in 'Good' health, 11.8% in 'Fair' health, 3.3% in 'Bad' health and 0.9% in 'Very Bad' health. This varies compared to the statistics for national where 47.2% of the population consider themselves in 'Very Good' health, 34.2% in 'Good' health, 13.1% in 'Fair' health, 4.2% in 'Bad' health and 1.2% in 'Very Bad' health[11]. 6.6% of the population of the EEH region stated in the 2011 Census that their day to day activities were limited a lot by a long-term health condition or disability, 8.3% had their day to day activities were limited a little and 85.1% of the population's day to day activities were not limited. The national average is higher than the EEH region with an average of 8.3% of the population experiencing day a lot of limitations with daily activities and 9.3% limited a little[11].
Income	In 2017 the average Gross Disposable Household Income across the EEH region was £20,199 per head which is higher than the national average of £19,998[12].
Education	In 2011, an average of 20.1% of the EEH region population (aged 16-74) had no academic or professional qualifications, which was lower than the national average (22.5%) at the time[13]. Between 2018 to 2019, average attainment 8 scores (scores of pupils at the end of key stage 4 (GCSE)) were the same as the national average of 49.9[14].
Deprivation	Overall the EEH region is relatively prosperous, with five local authorities within the 20% least deprived category. Although these five local authorities are very prosperous, they contain pockets of very deprived areas, for example, Cambridgeshire is overall very affluent, however it contains the district of Fenland which is the most deprived district in the EEH region. A further four local authorities are within the least 50% deprived. Two local authorities, namely Peterborough and Luton, being two

[10] NOMIS (2011). 2011 Census – Economic Activity.

[11] NOMIS (2011). 2011 Census – Health and provision of unpaid care.

[12] ONS (2019). Regional gross disposable household income. Available at: https://www.ons.gov.uk/economy/regionalaccounts/grossdisposablehouseholdincome/datasets/regionalgrossdisposablehouseholdincomegdhi 0

[13] NOMIS (2011). 2011 Census – Qualifications and students.

[14] Public Health England (2019). Local Authority Health Profiles – 26 Average GCSE attainment (average attainment 8 score).

Health Indicator	Baseline Evidence
	of the 30% most deprived local authorities[15]. See Appendix A-1 of this HIA report for further details. In 2016, an average of 13.6% of the EEH regions' children were in low income families, which is lower than the national average of 17%[16]. Between 2017 and 2018 statutory homelessness across the EEH region (0.83%) was slightly higher than the national average (0.79%). The percentage of the population categorised as homeless in Luton was significantly higher than the national average (4.11%)[17].
Transport/Accessibility	The EEH region contains a series of key infrastructure including several airports, strategically important roads (including roads on the Highways England Strategic Road Network and the Major Road Network) and rail links. Despite these travel links, economic growth across the region has highlighted the increased pressure on current infrastructure and how incidents quickly result in disruption, demonstrating the unreliability and a lack of resilience of the current infrastructure[18].
Collisions	Between 2016 to 2018, an average of 41.7 people per 100,000 were killed or seriously injured on roads in the EEH region; this is slightly lower than the national average (42.6 per 100,000)[19].

[15] Ministry of Housing, Communities & Local Government (2019). English indices of deprivation 2019 – File 11: upper-tier local authority summaries. Available at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019

[16] Public Health England (2019). Local Authority Health Profiles – 25 Percentage of children in low income families.

[17] Public Health England (2019). Local Authority Health Profiles – 28 Statutory homelessness rate – eligible homeless people not in priority need.

[18] England's Economic Heartland (2019). Outline Transport Strategy Framework for Engagement. Available at: http://www.englandseconomicheartland.com/Documents/Outline%20Transport%20Strategy%20Framework%20for%20Engagement.pdf

[19] Public Health England (2019). Local Authority Health Profiles – 7 Killed and seriously injured (KSI) rate on England's roads.

5 ASSESSMENT OF EFFECTS

5.1 INTRODUCTION

5.1.1. The analysis of health impact has focussed on the determinants identified above in section 3.2 which fall into the following categories:

- Air Quality;
- Noise;
- Physical Activity;
- Road safety;
- Economy and employment; and
- Access and accessibility.

5.1.2. The policies and principles of the Transport Strategy have each been assessed against the above, looking first at the baseline conditions of the determinant category within the study areas, evidence of how each determinant affects health, and then the effect that the policy has on the health of the study area population via the determinant category.

5.2 AIR QUALITY

EVIDENCE

5.2.1. The association between health effects and exposure to air pollutants is now well established, with distinct health risks associated with exposure to particulates available at a local level[20, 21.]

5.2.2. The impact of long-term human exposure to particulate matter (PM) pollution is estimated to have an effect on mortality equivalent to nearly 29,000 deaths in the UK[20]. There is no known threshold concentration below which NO_2 or PM_{10} have no effect on human health.

5.2.3. Many of the sources of PM are also sources of NO_2. Links between the occurrence of NO_2 and health effects have strengthened substantially in recent years, though some of these are co-incidental with PM, as noted by the Committee on the Medical Effects of Air Pollutants[22]; some could be attributed to other co-existing pollutants such as Poly Aromatic Hydrocarbons (PAH) and Volatile Organic Compounds (VOC).

5.2.4. Defra have estimated that the effect of NO_2 on mortality is equivalent to 23,500 deaths in the UK annually, though this estimate has not been endorsed by COMEAP[23]. Any increases in mortality are

[20] COMEAP (2010) The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom. A report prepared by the Committee on the Medical Effects of Air Pollutants. Available at: http//www.comeap.org.uk/

[21] COMEAP (2012) Statement on Estimating the Mortality Burden of Particulate Air pollution at a Local Level. Available at: http//www.comeap.org.uk/

[22] COMEAP (2015) Statement of the Evidence of the Effects of Nitrogen Dioxide on Health

[23] Defra analysis using interim recommendations from COMEAP's working group on NO_2

likely to be either because of cardiovascular and/or respiratory mortality, particularly with regards to an elevated short-term exposure to NO_2 [24].

5.2.5. Due to the correlation between differing airborne pollutants and similar health effects, one pollutant can often mask the effects of another, and it is not always possible to discreetly isolate the health effects of a single pollutant. The causal mechanism, primarily cardiovascular and respiratory, leading to increased mortality with increased exposure to particulate matter is well-founded, though process behind NO_2 contributing to cardiovascular damage, respiratory diseases or cancer are less understood.

5.2.6. Studies have reported statistically significant associations between long-term exposure to NO_2 and lung function in children, respiratory infections in early childhood and effects on adult lung function. However, mortality, lung cancer and cardiovascular and cerebrovascular effects in adults are predominantly weighted towards PM mass and not NO_2 (studies cited in COMEAP/2014/06 Annex B[25]). Similar rates of mortality per 10 µg/m^3 of $PM_{2.5}$ and NO_2 have been found in some studies[26]. A greater effect of NO_2 (6%) than $PM_{2.5}$ (3%) was found on total mortality when the broader range of NO_2 concentrations were considered. The US Environmental Protection Agency (EPA) found that there was consistent evidence in single-city studies in diverse locations but inconsistent evidence among other large cohorts of multiple US locations.

5.2.7. A meta-analysis of available long-term studies on NO_2 concluded that the magnitude of effect of the long term exposure to NO_2 on mortality is at least important as that of $PM_{2.5}$.

BASELINE

5.2.8. Air pollution has been estimated to affect local health, with statistics in 2018 being similar or higher than the national average. Between 2017 and 2018 the fraction of deaths attributed to particulate air pollution has risen for four local authorities (Peterborough, Milton Keynes, Oxfordshire and Swindon). However, five local authorities saw a decrease in the number of deaths attributed to particulate matter pollution (Bedford Borough, Central Bedfordshire, Luton, Hertfordshire and Buckinghamshire)[27].

[24] Mills *et* al. (2015) Quantitative systematic review of the associations between short-term exposure to nitrogen dioxide and mortality and hospital admissions. *BMJ Open 2015;5: e006946. doi: 10.1136/bmjopen-2014-006946*

[25] COMEAP (2014) Evidence for the effects of NO_2 on health. Available at: https://www.gov.uk/government/groups/committee-on-the-medical-effects-of-air-pollutants-comeap

[26] Environmental Protection Agency (2013) Integrated Science Assessment for Oxides of Nitrogen – Health Criteria (First External Review Draft). http://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=259167

[27] Public Health England (2019). Public Health Outcomes Framework: Fraction of mortality attributable to particulate air pollution. Available at: https://fingertips.phe.org.uk/search/air%20pollution#page/0/gid/1/pat/6/par/E12000006/ati/101/are/E07000066/cid/4/tbm/1/page-options/cin-ci-4_ovw-tdo-1

Table 5-1 – Percentage of mortality attributable to particulate air pollution[27]

Area	2016	2017	2018
National	**5.4**	**5.1**	**5.2**
Cambridgeshire	5.5	5.4	5.4
Peterborough	5.5	5.3	5.5
Northamptonshire	5.5	5.3	5.3
Bedford Borough	5.5	5.6	5.5
Central Bedfordshire	5.4	5.6	5.5
Luton	5.9	6.2	6.1
Hertfordshire	5.5	5.8	5.6
Milton Keynes	5.9	5.8	5.9
Buckinghamshire	5.6	5.7	5.6
Oxfordshire	5.7	5.4	5.5
Swindon	5.9	5.4	5.5

5.2.9. Admissions for Chronic Obstructive Pulmonary Disease (COPD) is varied across the EEH region when compared to the national average. Four of the local authorities are above the national average (Northamptonshire, Luton, Milton Keynes and Swindon) with the remaining seven below the national average. However, the majority of the local authorities within the EEH region are seeing an increasing trend.

Table 5-2 – Total COPD hospital admissions between 2015 and 2017 for the EEH region and England[28]

Area	Total COPD admissions per 1,000 of the population	Recent Trend
National	**52.4**	**Increasing**
Cambridgeshire and Peterborough	46.4	Increasing

[28] Public Health England (2019). The 2nd Atlas of variation in risk factors and healthcare for respiratory disease in England, 2019. Available at: http://tools.england.nhs.uk/images/RespiratoryAtlas/atlas.html

Area	Total COPD admissions per 1,000 of the population	Recent Trend
Northamptonshire	55	Increasing
Bedfordshire (including Bedford Borough and Central Bedfordshire)	46.9	Increasing
Luton	55.5	Increasing
Hertfordshire	47.6	Stable
Milton Keynes	56.6	Decreasing
Buckinghamshire	38.8	Increasing
Oxfordshire	38.4	Decreasing
Swindon	55.5	Decreasing

5.2.10. Between 2017 and 2018, admissions to hospital for children (aged under 19) with asthma was higher across the entire EEH region compared to England. However, the majority of local authorities within the EEH region were seeing a decreasing trend, with the exception of Milton Keynes and Buckinghamshire.

Table 5-3 – Hospital Admissions for asthma in children 2017-2018[29]

Area	Hospital admissions for asthma in children (under 19 years) per 100,00 of the population	Recent Trend
National	**107.2**	**Decreasing**
Cambridgeshire and Peterborough	150.6	Decreasing
Northamptonshire	131.5	Decreasing
Bedfordshire (including Bedford Borough and Central Bedfordshire)	122.6	Decreasing
Luton	237.7	Increasing

[29] Public Health England (2019). Hospital admissions for asthma (under 19 years) indicator. Available at https://fingertips.phe.org.uk/search/asthma/page-options/ovw-do-0#page/0/gid/1/pat/6/par/E12000008/ati/202/are/E06000036/cid/4/tbm/1/page-options/ovw-do-0

Area	Hospital admissions for asthma in children (under 19 years) per 100,00 of the population	Recent Trend
Hertfordshire	112.4	Decreasing
Milton Keynes	235.9	Increasing
Buckinghamshire	146.7	Increasing
Oxfordshire	162.7	Stable
Swindon	158.5	Decreasing

5.3 NOISE

EVIDENCE

5.3.1. The health impacts of environmental noise are widely acknowledged, and transport policies that affect noise levels can have resulting consequences for health and wellbeing[30]. Several reviews of impacts have been published (for example, WHO 2011[31]) which highlight potential impacts on cardio-vascular disease, cognitive impairment and sleep disturbance and annoyance.

5.3.2. The World Health Organisation (WHO) consider the health burden of environmental noise in terms of Disability-Adjusted Life Years (DALYs). One DALY can be thought of as one lost year of "healthy" life. The sum of these DALYs across the population, or the burden of disease, can be thought of as a measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability.

5.3.3. Therefore, any noise impacts resulting in one DALY lost can be thought of as one lost year of 'healthy life'. DALYs considers life expectancy and the incidence of disease, weighted by the severity of the disease (from zero to 1, where 0 is perfect health and 1 is year of life lost).

5.3.4. WHO estimate that, in EU Member States and other western European countries, DALYs lost are 61,000 years for ischaemic heart disease, 45,000 years for cognitive impairment of children, 903,000 years for sleep disturbance, and 654,000 years for annoyance.

5.3.5. Swift[32] provided a review of impacts (specifically relating to airports) focussing on sleep disturbance and stress as pathways leading to poor cardiovascular health and the potential mis-attribution of

[30] Cooper, E et al. (2019) *Transport, health, and wellbeing: An evidence review for the Department for Transport*. Accessed online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/847884/Transport__health_and_wellbeing.pdf

[31] WHO (2011) Burden of disease from environmental noise: Quantification of healthy life years lost in Europe. Accessed online: http://www.euro.who.int/__data/assets/pdf_file/0008/136466/e94888.pdf

[32] *A Review of the Literature Related to Potential Health Effects of Aircraft Noise*, Hales Swift, Purdue University, 2010.

certain conditions, e.g. obesity and diabetes, as confounding factors whereas these conditions themselves may have resulted from sleep disturbance. From a review of effects of transport policy on wellbeing, Reardon and Abdallah[33] identified that traffic noise can cause annoyance and/or stress as well as hypertension, cardiovascular disease and sleep disturbance. Annoyance and sleep disturbance emerge as key themes in other research on wellbeing impacts from traffic noise[34,35,36].

5.3.6. Children are vulnerable to a range of health outcomes associated with environmental noise, including road traffic noise[37]. This includes demonstrating annoyance responses to noise as well as stress, along with increased levels of adrenaline and noradrenaline. Though noise does not cause more serious mental health problems, there is growing evidence for an association with increased hyperactivity symptoms. Increased levels of noise have been associated with changes in cardiovascular functioning, as well as an effect on low birth weight[38,39]. Clear evidence exists on the links between the effect of school noise exposure on children's cognitive skills such as reading and memory[40,41,42] as well as test scores[43,44].

5.3.7. Long term noise exposure is believed to have an influence on psychological health, although, except for annoyance, there is not as strong a link as for other health outcomes.

[33] Reardon, L., & Abdallah, S. (2013). *Wellbeing and transport: Taking stock and looking forward*. Transport Reviews, 33(6), 634-657.

[34] Mindell, J. S., Cohen, J. M., Watkins, S., & Tyler, N. (2011). Synergies between low-carbon and healthy transport policies. In Proceedings of the Institution of Civil Engineers-Transport (Vol. 164, No. 3, pp. 127-139). Thomas Telford Ltd.

[35] Mindell, J., Rutter, H., & Watkins, S. (2011). Urban transportation and human health.

[36] Cohen, J. M., Boniface, S., & Watkins, S. (2014). Health implications of transport planning, development and operations. Journal of Transport & Health, 1(1), 63-72.

[37] van Kamp I, Davies H. Noise and health invulnerable groups: a review. Noise Health. 2013; 15:153–9.

[38] Ristovska G, Laszlo HE, Hansell AL. Reproductive outcomes associated with noise exposure—a systematic review of the literature. Int J Environ Res Public Health. 2014;11(8):7931–52.

[39] Hohmann C, Grabenhenrich L, de Kluizenaar Y, et al. Health effects of chronic noise exposure in pregnancy and childhood: a systematic review initiated by ENRIECO. Int J Hyg Environ Health.2013;216:217–29.

[40] Evans GW, Hyge S, Bullinger M. Chronic noise and psychological stress. Psychol Sci. 1995; 6:333–8

[41] Evans GW, Bullinger M, Hygge S. Chronic noise exposure and physiological response: a prospective study of children living under environmental stress. Psychol Sci. 1998; 9:75–7

[42] Hygge S, Evans GW, Bullinger M. A prospective study of some effects of aircraft noise on cognitive performance in schoolchildren. Psychol Sci. 2002; 13:469–74

[43] Stansfeld, S., Clark, C. 'Health Effects of Noise Exposure in Children'. Curr Envir Health Rpt (2015) 2:171–178

[44] Kuh D, Ben-Shlomo Y. A lifecourse approach to chronic disease epidemiology. Oxford: Oxford University Press; 2004

5.3.8. Studies from adults suggest that repeated elevation of blood pressure in relation to noise exposure might have pathological effects on health in the long term.[45] Dzhambov and Dimitriva[46] carried out a review of the association between hypertension and road traffic noise, and found a linear exposure-response relationship between residential road traffic noise and the risk of hypertension on adult urban residents, as well an exposure-response relationship between noise and coronary heart disease. However, findings from other research have been inconsistent and there is a need for further research to establish the impacts of noise on the cardiovascular and metabolic system[30].

BASELINE

5.3.9. The noise effects of motorised traffic may be particularly acute in proximity to the major transport networks within the EEH region. This includes populations surrounding the Strategic Road Network such as Northampton, Cambridge, Bedford Borough and Milton Keynes and those in close proximity to the M1, M11 and M40. Areas within proximity to and beneath the flight paths of Cambridge, Luton and Oxford Airports will experience increased levels of noise. Although London Heathrow and Stanstead airports fall outside the EEH region, the noise associated with the flight paths to and from these airports will affect receptors within the EEH region. In addition to noise resulting from major roads and aviation, other sources in the region include rail services operated by the Great Western Railway, Chiltern Railways, London Midland, Great Northern, East Midlands Train, Virgin Trains and Thameslink with routes in and out of London and Abellio Greater Anglia services from Ipswich to Peterborough.

5.3.10. **Table 5-4** shows that in 2016, on average 3.7% of the EEH region population were exposed to daytime noise levels of 65dB resulting from transport, which is lower than the national average. At night-time 6.3% of the EEH region population were exposed to night-time noise levels over 55dB from transport, which again is lower than the national average.

Table 5-4 – Percentage of the population exposed to road, rail and air transport noise during the day and night[47]

Area	Percentage of the population exposed to road, rail and air transport noise of 65dB (A) or more, during the daytime	Percentage of the population exposed to road, rail and air transport noise of 55dB (A) or more, during the night-time
National	**5.5**	**8.5**

[45] Munzel T, Gori T, Babisch W, et al. Cardiovascular effects of environmental noise exposure. Eur Heart J. 2014; 356:829–36.

[46] Dzhambov, A. M., & Dimitrova, D. D. (2018). *Residential road traffic noise as a risk factor for hypertension in adults: Systematic review and meta-analysis of analytic studies published in the period 2011–2017*. Environmental Pollution, 240, 306-318

[47] Public Health England (2019). Public Health Outcomes Framework. Available at: https://fingertips.phe.org.uk/search/noise#page/0/gid/1/pat/6/par/E12000004/ati/202/are/E06000015/cid/4/page-options/ovw-tdo-0

Area	Percentage of the population exposed to road, rail and air transport noise of 65dB (A) or more, during the daytime	Percentage of the population exposed to road, rail and air transport noise of 55dB (A) or more, during the night-time
Cambridgeshire	2.9	4.6
Peterborough	3.1	5.2
Northamptonshire	3.5	5.4
Bedford Borough	5.1	7.3
Central Bedfordshire	3.5	5.4
Luton	3.7	8.1
Hertfordshire	5.1	9.2
Milton Keynes	1.3	3.6
Buckinghamshire	5.4	9.9
Oxfordshire	3.8	5.7
Swindon	3.2	5.5
EEH region average	3.7	6.3

5.4 PHYSICAL ACTIVITY

EVIDENCE

5.4.1. Being physically active plays an essential role in ensuring health and wellbeing. It is known that physical activity benefits many parts of the body: the heart, skeletal muscles, bones, blood (for example, cholesterol levels), the immune system and the nervous system. Exercise and physical activity can reduce some of the risk factors for non-communicable diseases (NCDs), including reducing blood pressure, improving blood cholesterol levels, and lowering body mass index (BMI)[48].

[48] 'Global Health Risks: Selected figures and tables' www.who.int/entity/healthinfo/global_burden_disease/global_health_risks_report_figures.ppt'

Table 5-6 - Relationships between physical activity and health[49]

Health Topic	Evidence of the effect of Physical Activity
Overall death rate	Approximately 30% risk reduction for the most active compared with the least active
Cardiovascular health	20% to 35% lower risk of cardiovascular disease, coronary heart disease and stroke
Metabolic health	30% to 40% lower risk of type 2 diabetes in at least moderately active people compared with those who are sedentary
Musculo-skeletal Health	36% to 68% risk reduction of hip fracture at the highest level of physical activity
Falls	Older adults who participate in regular physical activity have an approximately 30% lower risk of falls
Cancer	Approximately 30% lower risk of colon cancer and 20% lower risk of breast cancer for adults participating in daily physical activity
Mental Health	Approximately 20% to 30% lower risk for depression and dementia for adults participating in daily physical activity.

5.4.2. Physical activity plays an important part in several diseases, such as type 2 diabetes, heart disease and some cancers. The WHO estimates that physical inactivity is the fourth leading risk factor for global mortality[50] and physical inactivity is responsible for 6% of deaths globally – around 3.2 million deaths per year, including 2.6 million in low and middle-income countries, and 670,000 of these deaths are premature[51]. Symptoms of depression in adolescents have also been linked to higher BMI and low levels of physical activity[52], particularly among young women[53].

5.4.3. It has been stated that the impact of physical inactivity on mortality could even rival tobacco use as a cause of death[54].

[49] Start active, Stay Active: A report on physical activity for health from the four home countries' Chief Medical Officers. Accessed online: http://www.ssehsactive.org.uk/userfiles/Documents/startactivestayactive.pdf

[50] 'Global Health Risks: Selected figures and tables' www.who.int/entity/healthinfo/global_burden_disease/global_health_risks_report_figures.ppt

[51] World Health Organization, Global Recommendations on Physical Activity for Health (WHO, 2011): http://whqlibdoc.who.int/publications/2010/9789241599979_eng.pdf

[52] Hill AJ, Draper E, Stack J. A weight on children's minds: body shape dissatisfactions at 9-years old. International Journal of Obesity 1994; 18:383-389.

[53] Ball K, Burton NW, Brown WJ. A prospective study of overweight, physical activity, and depressive symptoms in young women. Obesity 2009; 1791:66-71.

[54] I.-M. Lee et al., 'Effect of physical activity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy', The Lancet (2012) 380: 219: http://press.thelancet.com/physicalactivity.pdf , p. 227.

5.4.4. Walkable environments assist a population to achieve their physical activity targets, compared with residents in less walkable areas. Populations meet physical activity targets where safe places to walk exist within ten minutes of home. The presence or absence of walkable streets is related to longevity, even after adjustment for demographic and socioeconomic factors and baseline health status[55].

5.4.5. Physical activity levels track from childhood and adolescence to adulthood[56] highlighting the importance of providing opportunities, such as walking and cycling, for young people.

5.4.6. Switching journeys from cars to walking, cycling and public transport not only has a large beneficial impact on the individual's health, but a wider benefit to the population health as there are corresponding decreases in overall air pollution levels.

5.4.7. Increasing levels of cycling and walking can reduce the risk of diseases such as cardiovascular disease, diabetes and dementia. Those that are most inactive will benefit the most.

5.4.8. Countries with the highest levels of active travel generally have the lowest obesity rates.

BASELINE

5.4.9. As shown in the Public Health Profile Indicators (**Table 4-1**), the proportion of adults who were physically active across the EEH region (66.2%) was in line with the national average (66.3%).

5.4.10. **Table 5-5** below shows the proportion of adults undertaking specific activities in the EEH region compared to the national average. The EEH region on average has a higher percentage of adults who cycle at least three days per week compared to the national average; however, the percentage is lower for adults who walk three days a week compared to the national average.

Table 5-5 – Physical Activity levels Across the EEH region compared to the National Average between 2017 and 2018[57]

Area	Percentage of adults cycling for travel at least three days per week	Percentage of adults walking for travel at least three days per week
National	**3.2**	**23.1**
Cambridgeshire	12	19.7
Peterborough	5.1	21.7

[55] Takano T, Nakamura H, Watanabe N. Urban residential environments and senior citizens' longevity in megacity areas: the importance of walkable green spaces. J Epidem Community Health. 2002;56(12):913–918. doi: 10.1136/jech.56.12.913.

[56] Telama, R., 2009. Tracking of physical activity from childhood to adulthood: a review. Obesity facts, 2(3), pp.187-195.

[57] Public Health England (2019). Physical Activity Key Indicators. Available at: https://fingertips.phe.org.uk/search/cycle#page/0/gid/1/pat/6/par/E12000004/ati/202/are/E06000015/cid/4/page-options/ovw-tdo-0

Area	Percentage of adults cycling for travel at least three days per week	Percentage of adults walking for travel at least three days per week
Northamptonshire	2	15.9
Bedford Borough	5.7	21
Central Bedfordshire	1.1	20.8
Luton	0.9	18.3
Hertfordshire	2.3	22.8
Milton Keynes	2.6	18.4
Buckinghamshire	2.2	18.6
Oxfordshire	8.6	26.5
Swindon	5.2	18.3
EEH region average	4.3	20.2

5.5 ROAD SAFETY

EVIDENCE

5.5.1. Traffic collision casualty rates tend to decline as public transit travel increases in an area. Residents of public transport-oriented communities have only about a fifth of the per capita traffic fatality rate as residents of sprawled, private car-dependent communities[58].

5.5.2. British roads are now among the safest in the world, but cyclists and pedestrians remain particularly vulnerable road users. Aside from the effect that casualties have on individuals and their families, pedestrian and cyclist casualties are a significant burden on local health services. Furthermore, safety concerns are often cited as a reason why people do not cycle or, for example, allow children to walk to school meaning that they are missing the opportunity to do more physical activity and improve their health[59].

[58] American Public Transportation Association (2016). The Hidden Traffic Safety Solution: Public Transportation. Available at: https://www.apta.com/wp-content/uploads/Resources/resources/reportsandpublications/Documents/APTA-Hidden-Traffic-Safety-Solution-Public-Transportation.pdf

[59] Cambridgeshire County Council (2015). Transport and Health JSNA – Active Travel. Accessed online: https://cambridgeshireinsight.org.uk/wp-content/uploads/2017/08/Transport-and-Health-JSNA-2015-Active-Transport.pdf

5.5.3. Whether children actively commute to school may be determined by parents' perception of safety of the mode of transport, lack of time in the morning and social factors such as no other children to walk with[60].

5.5.4. The most common cause of death for children aged 5-14 years is being hit by a vehicle, and 35% of all pedestrian fatalities are people over the age of 70[61].

BASELINE

5.5.5. As shown in the Public Health Profile Indicators (**Table 4-1**), the average percentage of people killed or seriously injured on roads across the EEH region is 41.7 per 100,000, which is slightly lower than the national average of 42.6 per 100,000.

5.5.6. As shown below in, the average number of pedestrians and cyclists that were killed or seriously injured in road traffic collisions between 2014 to 2018 across the EEH region was lower than the national average. However, the average number of motorcyclists killed or seriously injured across the EEH region was higher than the national average.

Table 5-6 – Number of pedestrians, cyclists and motorcyclists killed or seriously injured in road traffic collisions between 2014 - 2018[62]

Area	Pedestrians killed or seriously injured in road traffic collisions aged 0 – 24 (per 100,000)	Cyclists killed or seriously injured in road traffic collisions aged 0 – 24 (per 100,000)	Motorcyclists killed or seriously injured in road traffic collisions aged 15 – 24 (per 100,000)
National	**11**	**4.3**	**23.9**
Cambridgeshire	6	8.6	20
Peterborough	12	4.4	20
Northamptonshire	9	3.6	22
Bedford Borough	10.6	3.5	34
Central Bedfordshire	8	2.5	30.4
Luton	13	4	18.9

[60] J Salmon, Salmon L., Crawford D., Hume C., and A Timperio, 2007. Associations Among Individual, Social, and Environmental Barriers and Children's Walking or Cycling to School. American Journal of Health Promotion, November/December 2007, Vol. 22, No. 2, pp. 107-113.

[61] Sustainable Development Commission (2011). Fairness in a Car Dependant Society. Accessed online: http://www.sd-commission.org.uk/data/files/publications/fairness_car_dependant.pdf

[62] Public Health England (2018). Road Traffic Accident Key Indicators. Available at: https://fingertips.phe.org.uk/search/killed%20or%20seriously%20injured#page/0/gid/1/pat/6/par/E12000009/ati/202/are/E06000022/cid/4/page-options/ovw-tdo-0

Area	Pedestrians killed or seriously injured in road traffic collisions aged 0 – 24 (per 100,000)	Cyclists killed or seriously injured in road traffic collisions aged 0 – 24 (per 100,000)	Motorcyclists killed or seriously injured in road traffic collisions aged 15 – 24 (per 100,000)
Hertfordshire	9	3.4	21.6
Milton Keynes	9	2.6	26.5
Buckinghamshire	6	2.6	20.7
Oxfordshire	8	6.5	25.9
Swindon	9	3.4	25.4
EEH region average	9.1	4.1	24.1

5.6 ECONOMY AND EMPLOYMENT

EVIDENCE

5.6.1. In general, motorised road transport better serves those who are already more advantaged, with the richest 10% of the population receiving almost four times as much public spending on their transport needs as the poorest 10%, due to their overall higher level of travelling and greater use of cars and trains instead of buses[63].

5.6.2. Residents in deprived communities tend to travel less, but feel the impacts from travel, such as poorer air quality, higher noise levels and higher collision rates, due to having a higher density of main roads in their area[64].

5.6.3. Employment is an important determinant of health; having a job or an occupation provides a vital link between an individual and society and enables people to contribute to society and achieve personal fulfilment[65,66].

[63] Sustainable Development Commission, 2011. Fairness in a Car Dependant Society. Accessed online: http://www.sd-commission.org.uk/data/files/publications/fairness_car_dependant.pdf.

[64] Faculty of Public Health Transport and Health Briefing Statement. Accessed online: https://www.fph.org.uk/uploads/Position%20statement%20Transport%20and%20health.pdf

[65] Doyle C, Kavanagh P, Metcalfe O, and T Lavin. 2005. Health Impacts of Employment: A Review. The Institute of Public Health in Ireland. Accessed online: http://www.publichealth.ie/sites/default/files/documents/files/IPH_Employment_Health_24pp.pdf

[66] Sustainable Development Commission, 2011. Fairness in a Car Dependant Society. Accessed online: http://www.sd-commission.org.uk/data/files/publications/fairness_car_dependant.pdf

5.6.4. The WHO identifies several ways in which employment benefits mental health[67]. These include the provision of structured time, social contact and satisfaction arising from involvement in a collective effort. Therefore, the loss of a job or the threat of losing a job is considered detrimental to health[68].

5.6.5. Income is a key factor through which employment status affects health and wellbeing. The Department of Work and Pensions study found that:

"employment is generally the most important means of obtaining adequate economic resources, which are essential for material wellbeing and full participation in today's society … employment and socio-economic status are the main drivers of social gradients in physical and mental health and mortality".[69]

5.6.6. Children, particularly from low-income families, are more sensitive than adults to air pollution, noise and other environmental factors. Pregnant women in poverty and deprivation can lead to adverse health effects on unborn babies[70].

5.6.7. The Marmot Review was commissioned by the Department of Health to consider health inequalities in England. The Review identifies six policy objectives for reducing health inequalities, one of which is to '*Create fair employment and good work for all*'. The Review identifies the importance of work for health: '*being in good employment is protective of health. Conversely, unemployment contributes to poor health*'[71].

5.6.8. The London Health Commission's report Health in London: Review of the London Health Strategy High Level Indicators describes unemployment as: '*a significant risk factor for poor physical and mental health and a major determinant of health inequalities. It is associated with morbidity, injuries and premature mortality, especially through increased risk of coronary heart disease. It is also related to depression, anxiety, self-harm and suicide*'[72].

5.6.9. The type of job a person has and the working conditions he or she is exposed to will also affect health. It is also important to consider the impact that employment has on other aspects of people's lives that are important for health, for example: family life, social life and caring responsibilities for family members.

---

[67] World Health Organisation. Mental Health. Available at: http://www.who.int/mentalhealth/en

[68] Marmot M, Wilkinson R, editors. The solid facts. 2nd ed. Geneva: World Health Organisation; 2003

[69] Waddell, G., Burton, A. K., 2007. Is work good for your health and wellbeing? The Stationery Office.

[70] Xu Xiaohui; Sharma Ravi K.; Talbott Evelyn O.; et al. (2011) PM_{10} air pollution exposure during pregnancy and term low birth weight in Allegheny County, PA, 1994-2000 INTERNATIONAL ARCHIVES OF OCCUPATIONAL AND ENVIRONMENTAL HEALTH Volume: 84 Issue: 3 Pages: 251-257

[71] Marmot, M., Allen, J., Goldblatt, P., Boyce, T., McNeish D., Grady, M. and Geddes, I., 2010, Fair society, healthy lives: Strategic review of health inequalities in England post-2010, The Marmot Review. Page 26, para 1.

[72] Greater London Authority, 2005, Health in London: Review of the London Health Strategy High Level Indicators, London Health Commission

BASELINE

5.6.10. **Table 5-7** below shows the average percentage of the EEH region population economically inactive is lower when compared to the national average. Subsequently, the percentage of the population economically active is higher than the national average.

Table 5-7 – Percentage of the Population Economically Active and Inactive[73]

Area	Economically Inactive (%)	Economically Active (%)
National	**21.1**	**78.9**
Cambridgeshire	16.6	83.4
Peterborough	19.7	80.3
Northamptonshire	18	82
Bedford Borough	19.4	80.6
Central Bedfordshire	14.6	85.4
Luton	25	75
Hertfordshire	18.9	81.1
Milton Keynes	22	78
Buckinghamshire	17.5	82.5
Oxfordshire	15.9	84.1
Swindon	17.4	82.6
Average	18.6	81.6

5.6.11. As shown below in **Table 5-8**, the economically active percentage of the population, the EEH region has a higher percentage of: managers, directors and senior officials; process plan and machine operatives; those in professional occupations; and those in elementary occupations when compared to the national average. Subsequently, the proportion of the population in the EEH region in: skilled trades; caring, leisure and other service occupations and sales and customer service occupations is lower than the national average. The percentage of the population employed in administrative and secretarial occupations; associate professional and technical occupations is in line with the national average.

[73] NOMIS (2019). Key Statistics: Economic inactivity rate

Table 5-8 – Percentage of the Population by Occupation[74]

	Managers, directors and senior officials (%)	Professional occupations (%)	Associate professional and technical occupations (%)	Administrative and secretarial occupations (%)	Skilled trades occupations (%)	Caring, leisure and other service occupations (%)	Sales and customer service occupations (%)	Process plan and machine operatives (%)	Elementary occupations (%)
National	**11.4**	**21.4**	**14.6**	**9.6**	**10.1**	**10.1**	**7.2**	**6.2**	**10.3**
Cambridgeshire	12	27.1	12.7	8.8	9.6	7	7.1	5.4	10
Peterborough	9.2	18.1	11.8	10.5	7.8	7.7	8.9	10.9	15.1
Northamptonshire	10.7	17	12.2	10.9	11.5	9	6.4	9.7	12.5
Bedford Borough	11.8	23.1	16.5	8.5	8	8.6	6.9	4.5	10.8
Central Bedfordshire	13.1	21.7	21.6	8.2	8.7	8.5	5.2	5.5	6.9
Luton	7.9	16.4	10.7	10.7	9.7	7.8	7.9	13.8	14.6
Hertfordshire	14.3	24.9	15	9	9.5	7.8	5.3	5.4	8.4
Milton Keynes	12	24.8	15.6	8.8	7.7	7.9	7.2	5.8	10.3
Buckinghamshire	19.1	21.7	13.9	10.8	8.2	6.8	7.5	3.8	7.7
Oxfordshire	13.1	27.7	16.1	8.9	9	8.3	6.8	3	7.1
Swindon	8.7	20.6	14.2	10.4	7.5	7.4	7.6	9.4	13.8
Average	12.0	22.1	14.6	9.6	8.8	7.9	7.0	7.0	10.7

5.7 ACCESS AND ACCESSIBILITY

EVIDENCE

5.7.1. Transportation and access are known to promote social inclusion, as social exclusion can occur because of a community not being able to easily access transport options, amongst other things.

5.7.2. The Social Exclusion Unit states that "*participation in social, cultural and leisure activities is very important to people's quality of life and can play a major part in meeting policy goals like improving health, reducing crime and building cohesive communities*". Problems with transport and the location

[74] NOMIS (2019) Key Statistics: Occupation

and delivery of services contribute to social exclusion by preventing people from participating in work or learning and from accessing healthcare, food shopping and other local activities[75].

5.7.3. According to the Department for Transport, "*over the course of a year over 1.4 million people miss, turn down or simply choose not to seek healthcare because of transport problems*"[76]. Capacity to reach healthcare services is affected by the accessibility of transport modes, availability of financial support for those on low incomes and the location of healthcare services[77]. Groups impacted by disability and of certain ages may experience even greater barriers to health and social care services[78].

5.7.4. Community severance is separation of different areas within a community by the flow of traffic[79]. Social networks are susceptible to severance by physical barriers, such as roads and traffic, which can create both real and perceived barriers to social contact. For example, children may not be allowed to visit friends unaccompanied because of parental concern over road traffic collisions.

5.7.5. A study illustrating the effect of traffic on social contacts in three streets was performed in San Francisco[80]. It was found that people living on the street with lightest traffic had twice as many acquaintances and three times as many friends as those people who lived on the street with the heaviest traffic.

5.7.6. Social capital was measured across different neighbourhoods and it was found that people in "car-dependent" localities were less likely to know and trust their neighbours and to participate in local organizations than people who lived in "walkable", pedestrian orientated localities with less traffic and congestion[81].

5.7.7. A similar study in Bristol also demonstrated that the volume and speed of motorised traffic can reduce opportunities for positive interactions between residents in a neighbourhood and can contribute to increased social isolation[82].

[75] Social Exclusion Unit, 2003. Making the connections: Final report of Transport and Social Exclusion.

[76] Social Exclusion Unit, 2003. Making the connections: Final report of Transport and Social Exclusion.

[77] Randall, C., 2012, Measuring National Wellbeing - Where We Live – 2012, Office for National Statistics

[78] Hamer, L., 2004, Improving patient access to health services: a national review and case studies of current approaches, Health Development Agency

[79] McCarthy M. Transport and health. In: Marmot M, Wilkinson RG, editors. Social determinants of health. Oxford; New York: Oxford University Press; 1999.

[80] Appleyard D, Lintell M. The environmental quality of city streets: the resident's viewpoint. Am Instit Planners J 1972; 38:84-101

[81] Leyden KM. Social capital and the built environment: the importance of walkable neighbourhoods. Am J Public Health 2003; 93:1546-51.

[82] Hart, J & Parkhurst, G (2011) Driven to excess: Impacts of motor vehicles on the quality of life of residents of three streets in Bristol UK. World Transport Policy & Practice, 17 (2). pp 12-30.

BASELINE

5.7.8. **Table 6-9** shows the proportion of households with no access to a car or van is significantly lower than the national average. However, the proportion of households in the EEH region with access to two or more cars is considerably higher than the national average.

Table 5-9 – Percentage of household with access to a car or van[83]

Area	No cars or vans in household	1 car or van in household	2 cars or vans in household	3 cars or vans in household	4 or more cars or vans in household
National	**25.8**	**42.2**	**24.7**	**5.5**	**1.9**
Cambridgeshire	17.3	42.3	30.6	7.1	2.6
Peterborough	24.9	45.1	23.9	4.7	1.5
Northamptonshire	18.9	41	30.6	7	2.5
Bedford Borough	26.8	44.2	22.8	4.6	1.6
Central Bedfordshire	13.2	40.1	34.7	8.7	3.3
Luton	27.4	44.3	22.2	4.6	1.4
Hertfordshire	16.9	42.2	30.9	7.2	2.8
Milton Keynes	18.9	43.2	29.8	6.1	1.9
Buckinghamshire	12.6	37.5	36.6	9.4	3.9
Oxfordshire	17.5	41.5	30.7	7.4	2.9
Swindon	21.6	44.2	27.3	5.2	1.6
Average	19.6	42.3	29.1	6.5	2.4

5.7.9. As shown in the Public Health Profile Indicators (**Table 4-1**), 6.5% of the population in the EEH region stated that that their day to day activities were limited a lot by a long-term health condition or disability, 8.3% had their day to day activities were limited a little and 85.1% of the population's day to day activities were not limited. The percentage of the population with daily activities limited a lot and limited a little is lower than the national average of 8.3% and 9.3% respectively.

5.8 ASSESSMENT

The findings of the assessment are presented in **Table 5-10** below.

[83] NOMIS (2011). Local Area Report – Car or van availability

Table 5-10 – General Transport Policies and Health Effects

Symbol	Health Effect
✓	Likely positive health outcome
×	Likely negative health outcome
?	Uncertain effect
0	No effect

Transport Strategy Policy Themes	Impact						Reasons	Mitigation measures / recommendations
	Air Quality	Noise	Physical Activity	Road Safety	Economy and Employment	Access and Accessibility		
Decarbonisation of our Transport System: Policies T1, T2 and T3	✓	✓	✓	✓	✓	✓	Through the decarbonisation of rail networks and the road fleet across the EEH region, this would have a positive health outcome as both air and noise pollution would be improved. New railway lines may increase the impacts of noise and air quality on nearby receptors; however, the railway lines would be electrified resulting in lower air and noise pollution compared to conventional diesel railway. An increase in new rail infrastructure combined with the decarbonisation of the railway network within the EEH region could make travel by rail more attractive for passengers. Any shift from road to rail transport may assist in the reduction in the number of vehicles on roads, reducing congestion which could benefit road safety, and sources of air pollution. There is evidence that shows improvements to public transport may lead to an increase in its use, particularly for those who live nearby. Some studies also suggest that public transport interventions increase the total physical activity levels of study participants[84] . Although new railway lines will increase accessibility to employment, there is potential for ticket prices to increase which would disproportionally impact those on low income. Measures to prioritise those who contribute to a reduction in single occupancy car journeys will encourage multiple occupancy vehicles, or the use of public transport. This shift would reduce the number of vehicles on roads which would reduce air and noise pollution and could have a beneficial effect on road safety.	Affordable decarbonised transport options should be made available to ensure this benefit can be accessed by all, particularly for those who have low income.
Mobility for the future: Policies T4, T5 and T6	✓	✓	✓	✓	✓	✓	Supporting proposals which achieve net zero carbon targets, including more efficient transport systems such as rail and new cycleways and walkways, will encourage active and healthier lifestyles. An increase in pedestrians, cyclists and rail passengers is likely to reduce the number of vehicles on roads across the EEH region. In addition, modal shifts	Walkways and cycleways should be improved, and designed, to enable access for all users, including those with reduced mobility or disability.

[84] National Institute for Health and Care Excellence (2018) NICE Guideline: Physical activity and the environment

Transport Strategy Policy Themes	Impact						Reasons	Mitigation measures / recommendations
	Air Quality	Noise	Physical Activity	Road Safety	Economy and Employment	Access and Accessibility		
							to more active transport may have benefits to air quality and noise pollution in the EEH region, particularly around major urban centres and transport hubs. The prioritisation of pedestrians and cyclists above public transport and private vehicles would encourage active travel and could improve safety for pedestrians and cyclists. This may also result in a reduction in road congestion by providing attractive and reliable active travel options. In addition, modal shifts to more active transport may have benefits to noise and air quality across the EEH region, particularly around the major urban centres and transport hubs. Furthermore, improvements to existing walking and cycling routes has the potential to improve accessibility between rural settlements and urban centres which would improve connectivity through the EEH region and would improve accessibility to jobs and in the opposite direction, to the countryside. Measures to prioritise those who contribute to a reduction in single occupancy car journeys will encourage multiple occupancy vehicles, or the use of public transport. This shift would reduce the number of vehicles on roads which would reduce air and noise pollution and could have a beneficial effect on road safety. Traffic management measures to reduce congestion, and technological advancements in traffic data such as informing network users of collisions and delays, could reduce congestion and driver stress levels. This could result in an improved driver experience and has the potential to improve road safety and overall driver wellbeing. Investment into the development of electric cars and bikes would have some beneficial impacts on human health, in particular through the reduction in air and noise pollution, though wouldn't necessarily encourage physical activity. The implementation of these 'living laboratories' would create jobs for people across the EEH region. In addition, technological advancements to the transport network would improve the connectivity and efficiency, allowing better travel between main employment and economic hubs.	Shared pedestrian and cycle spaces should be designed so that all users feel safe, including those with poor mobility, sight or hearing. The incorporation of natural features such as tree planting, hedgerows and floral arrangements along walk/cycleways to enhance connections to nature and reduced stress levels, contributing to mental health and wellbeing benefits. The implementation of traffic management measures should be prioritised on routes that are heavily used by vehicles. Walkways and cycleways should be improved and designed to enable access for all users, including those with reduced mobility or disability. The use of digital infrastructure may not benefit everyone, in particular the elderly and/or those in low income groups who may not have access to, knowledge of, or the confidence to use, smart devices. Therefore, consideration will have to be given to these groups.
The East West Main Line: Policies T7, T8, T9, T10 and T11	×	×	✓	✓	✓	✓	New railway lines may result in increased noise and air pollution for receptors close to the routes, however the overall effect of rail on air quality and public health is considerably lower than roads. Based on 2017 figures, rail transport accounted for 2% of the UK's Greenhouse Gas emissions compared to 91% for road transport[85]. In addition, electrified railway lines would also be quieter than conventional railway lines. There is evidence that shows improvements to public transport may increase its use, particularly for those who live nearby. Some studies have also suggested that public transport interventions increase the total physical activity levels of study participants [84] which may have benefits to health, access and physical activity. An increase in uptake of rail services within the EEH region has the potential to reduce the number of vehicles on roads which may have a positive effect on road safety depending on the uptake of rail transport.	Consideration of the use of electric trains or trains supplied by emission free renewable energy sources should be investigated to reduce potential impacts on air quality and noise levels.

[85] Department for Transport (2017) Table ENV0201 Greenhouse gas emissions by transport mode, United Kingdom: 1990 to 2017.

Transport Strategy Policy Themes	Impact						Reasons	Mitigation measures / recommendations
	Air Quality	Noise	Physical Activity	Road Safety	Economy and Employment	Access and Accessibility		
							New rail lines and stations will increase accessibility and access between key urban centres within the EEH region and will also benefit the economy, providing greater access to employment as well as educational opportunities.	
Other East-West Arcs: Policies T12 and T13	×	×	✓	✓	✓	✓	Additional East-West arcs will increase connectivity further across the EEH region resulting in increased accessibility to jobs, education and other services in the region. New railway lines may result in increased noise and air pollution for receptors close to the routes, however the overall effect of rail on air quality and public health is considerably lower than roads. Based on 2017 figures, rail transport accounted for 2% of the UK's Greenhouse Gas Emissions compared to 91% for road transport[84]. In addition, electrified railway lines would also be quieter than conventional railway lines. There is evidence that shows improvements to public transport may increase its use, particularly for those who live nearby. Some studies have also suggested that public transport interventions increase the total physical activity levels of study participants [84] which may have benefits to health, access to services and physical activity. An increase in uptake of rail services within the EEH region has the potential to reduce the number of vehicles on roads which may have a positive effect on road safety depending on the uptake of rail transport. New rail lines and stations will increase accessibility and access between areas within the EEH region and will also benefit the economy, providing greater access to employment.	Connectivity to rural communities should be considered to improve connectivity to open spaces. Consideration of the use of electric trains or trains supplied by emission free renewable energy sources should be investigated to reduce potential impacts on air quality and noise levels.
Improving North-South Connectivity: Policies T14, T15, T16, T17 and T18	×	×	?	✓	✓	✓	New roads would likely increase capacity and number of vehicles moving through areas which may increase air quality and noise impacts on health for nearby receptors. New roads are likely to afford benefits to road safety as they will be designed to modern standards. Improvements to public transport has the potential to increase the attractiveness and reliability of travelling by public transport for passengers. Any increase in public transport usage could have beneficial effects on air quality and noise as well as road safety, with a potential reduction in the number of vehicles on roads in the EEH region. Although new railways (such as HS2) have the potential to reduce the number of private vehicles on roads, the new railway lines could result in an increase in noise pollution to the detriment of nearby receptors. Traffic management measures to reduce congestions and technological advancements in traffic data such as informing network users of collisions and delays could reduce congestion and stress levels. This would result in less distractions to the driver which has the potential to improve road safety and overall wellbeing. Improved connectivity will increase accessibility to employment, education, health services and/or social or leisure activities for people outside their local area.	New road schemes should aim to incorporate and expand footpath and cycleway infrastructure wherever possible to promote more active means of transport and to cycle-proof the strategic road network, reducing any severance from new road schemes by enhancing access for all users, including pedestrians, horse riders, and people with disabilities or health conditions[86]. Investment into the development of electric cars and bikes would have beneficial impacts on human health, in particular through the reduction in air and noise pollution.

[86] Department for Transport (2017) Cycling and Walking Investment Strategy

Transport Strategy Policy Themes	Impact						Reasons	Mitigation measures / recommendations
	Air Quality	Noise	Physical Activity	Road Safety	Economy and Employment	Access and Accessibility		
Transforming Intra and Inter Regional Journeys: Policies T19, T20, T21 and T22	×	×	?	✓	✓	✓	New roads would likely increase capacity and number of vehicles moving through areas which may increase air quality and noise impacts on health for nearby receptors. New roads are likely to afford benefits to road safety as they will be designed to modern standards. Improvements to public transport has the potential to increase the attractiveness and reliability of travelling by public transport for passengers. Any increase in public transport usage could have beneficial effects on air quality and noise as well as road safety, with a potential reduction in the number of vehicles on roads in the EEH region. Traffic management measures to reduce congestions and technological advancements in traffic data such as informing network users of collisions and delays could reduce congestion and stress levels. This would result in less distractions to the driver which has the potential to improve road safety and overall wellbeing.	New road schemes should aim to incorporate and expand footpath and cycleway infrastructure wherever possible to promote more active means of transport and to cycle-proof the strategic road network, reducing any severance from new road schemes by enhancing access for all users, including pedestrians, horse riders, and people with disabilities or health conditions[87].
Transport Oriented Development: Policies T23 and T24	✓	✓	✓	✓	✓	✓	Improvements to transport infrastructure will improve connectivity will increase accessibility to employment, education, health services and/or social or leisure activities for people outside their local area. The prioritisation of pedestrians and cyclists above public transport and private vehicles would encourage active travel and could improve safety for pedestrians and cyclists. This may also result in a reduction in road congestion by providing attractive and reliable active travel options. In addition, modal shifts to more active transport may have benefits to noise and air quality across the EEH region, particularly around the major urban centres and transport hubs. Furthermore, improvements to existing walking and cycling routes has the potential to improve accessibility between rural settlements and urban centres which would improve connectivity through the EEH region and would improve accessibility to jobs and in the opposite direction, to the countryside.	Investment into the development of electric cars and bikes would have beneficial impacts on human health, in particular through the reduction in air and noise pollution.
Improving Local Connectivity: Policies T25 and T26	✓	?	✓	✓	✓	✓	The impacts from noise are currently uncertain; improvements to public transport, associated stations, services and signalling have the potential to lead to an increased number of rail and bus services, or the speed of services which could impact on noise levels experienced by nearby receptors. The improved reliability of public transport options may increase their attractiveness and could encourage more people to use public transport options over private vehicles. Any shift from private vehicles to public transport may assist in reducing air and noise pollution and also indirectly lead to a reduction in congestion which could benefit road safety.	Opportunities should be sought to integrate public transport with other active travel modes. This could include the provision of rail and bus timetables, secure cycle storage, signposted pedestrian and cyclist routes in the local area, and cycle hire hubs.
Rural Connectivity: Policies T27	?	?	✓	?	✓	✓	Improving connectivity between rural communities and urban centres will increase job accessibility and access to services and open space in the countryside. This would have beneficial impacts on health and wellbeing and has the potential to reduce deprivation in urban areas.	Connectivity through walkways, cycleways and public transport should be prioritised to promote and encourage active travel.

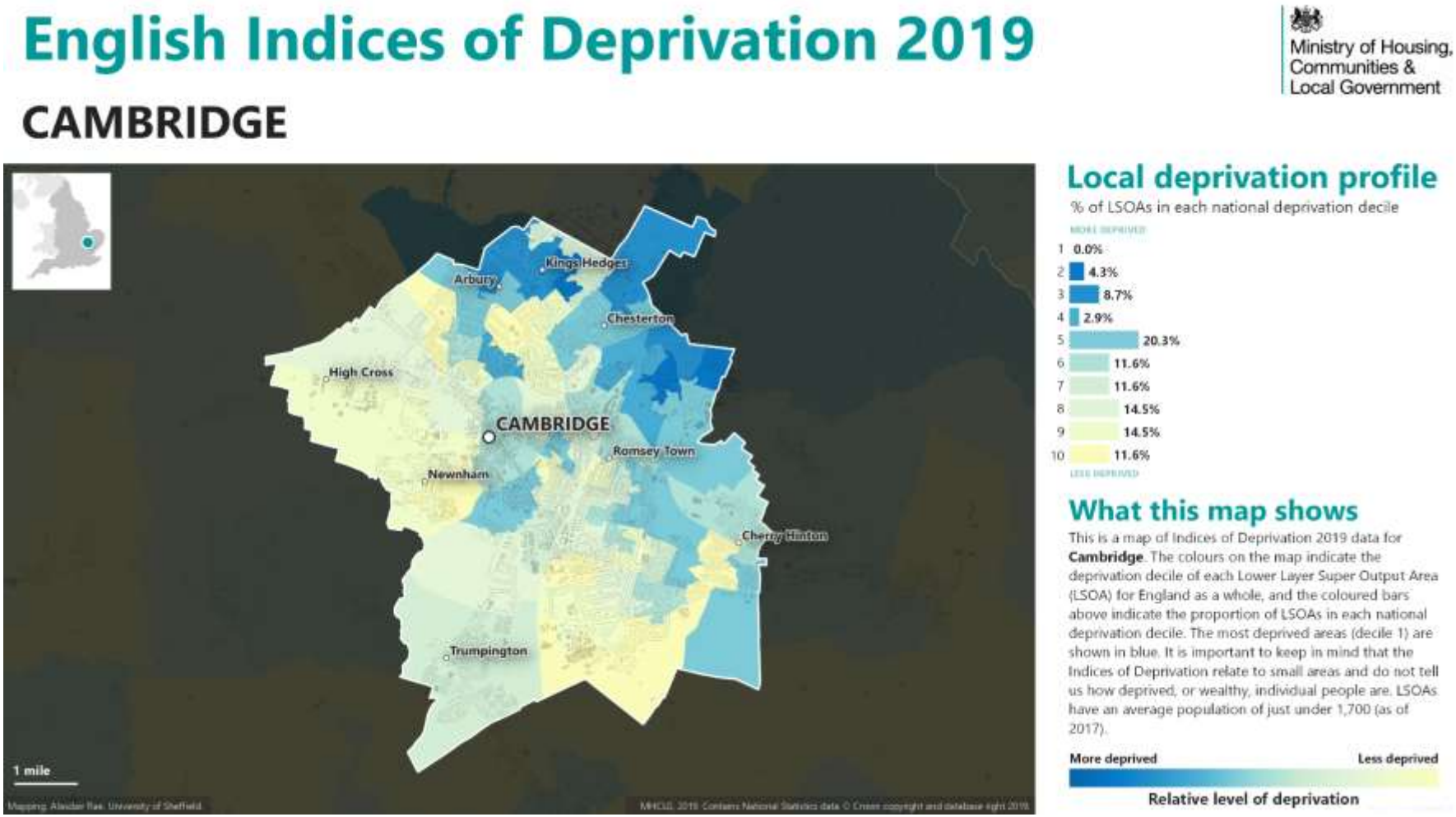
[87] Department for Transport (2017) Cycling and Walking Investment Strategy

Transport Strategy Policy Themes	Impact						Reasons	Mitigation measures / recommendations
	Air Quality	Noise	Physical Activity	Road Safety	Economy and Employment	Access and Accessibility		
Connecting to Global Markets: Policies T28 and T29	×	×	✓	✓	✓	✓	Improvements to public transport has the potential to increase the attractiveness and reliability of travelling by public transport for passengers. Any increase in public transport usage could have beneficial effects on air quality and noise as well as road safety, with a potential reduction in the number of vehicles on roads in the EEH region. There is evidence that shows improvements to public transport may increase its use, particularly for those who live nearby. Some studies have also suggested that public transport interventions increase the total physical activity levels of study participants [84] which may have benefits to health, access to services and physical activity. However, improving connectivity to international airports has the potential for significant effects on human health. A potential increase in flight number to accommodate increased capacity and the need for new routes could increase noise and air pollution and could result in low flying aircraft during antisocial hours affecting sleep quality and stress and anxiety levels.	Measures should be in place to ensure facilities are accessible to everyone, including those with disabilities or mobility issues If additional flights are required to accommodate extra capacity, low frying aircrafts during antisocial hours should be minimised.
Realising the Potential for Rail Freight: Policies T30 and T31	✓	✓	0	✓	✓	✓	Improvements to rail interchanges has the potential to increase the attractiveness and reliability of using rail to transport freight. Any increase in rail for freight transport could have beneficial effects on air quality and noise as well as road safety, with a potential reduction in the number of vehicles on roads in the EEH region. Increased connectivity, and improved freight infrastructure, has the potential to stimulate economic growth in the EEH region, which could increase access to jobs.	The use of electric freight trains should be considered.
Strategic Rail Freight Interchanges: Policies T32	×	×	0	✓	✓	✓	The development of rail freight interchanges and the potential relocation of distribution centres has the potential to increase access to employment opportunities across the EEH region. However, these developments and relocations could also move sources of noise and air pollution closer to sensitive receptors i.e. residential areas. This has the potential to lead to increase noise during antisocial hours affecting sleep quality and stress and anxiety levels.	The use of electric freight trains should be considered. Movement during antisocial hours should be minimised, particularly if located near sensitive receptors.
Supporting Road Freight: Policies T33, T34, T35 and T36	×	×	0	?	✓	✓	Online improvements to highways would help ease congestion, but could also lead to an increase in capacity, enabling more traffic and increased impacts on air quality and noise. However, the impacts of road freight on human health could be reduced through the introduction of electric freight vehicles where possible, the use of cleaner alternative fuels and through changing driver behaviour i.e. sticking to the speed limit and reducing idling. These changes have the potential to reduce impacts on air and noise pollution. Ensuring the strategic corridors are fit for purpose would improve reliable movement through improved journey time and could afford benefits to road safety as a result of upgrades to modern standards. However, improved routes could lead to an increase in road freight vehicles, which could reduce road safety.	Provide infrastructure to support alternative fuels, such as electric vehicle plug-in points.

Appendix A-1

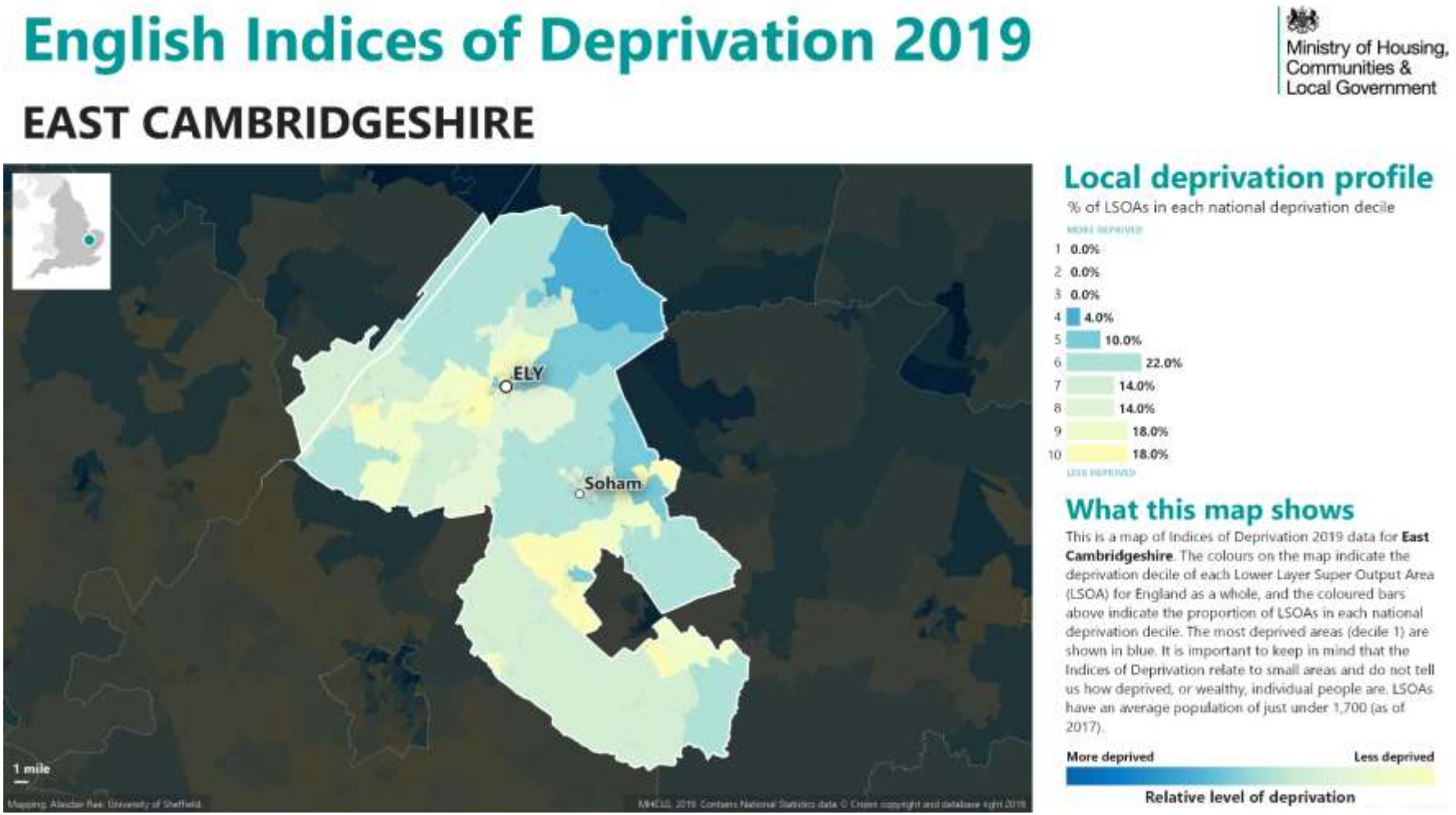
DEPRIVATION MAPS

Figure A-1 - Cambridge Deprivation Profile (Cambridgeshire), 2019[1]



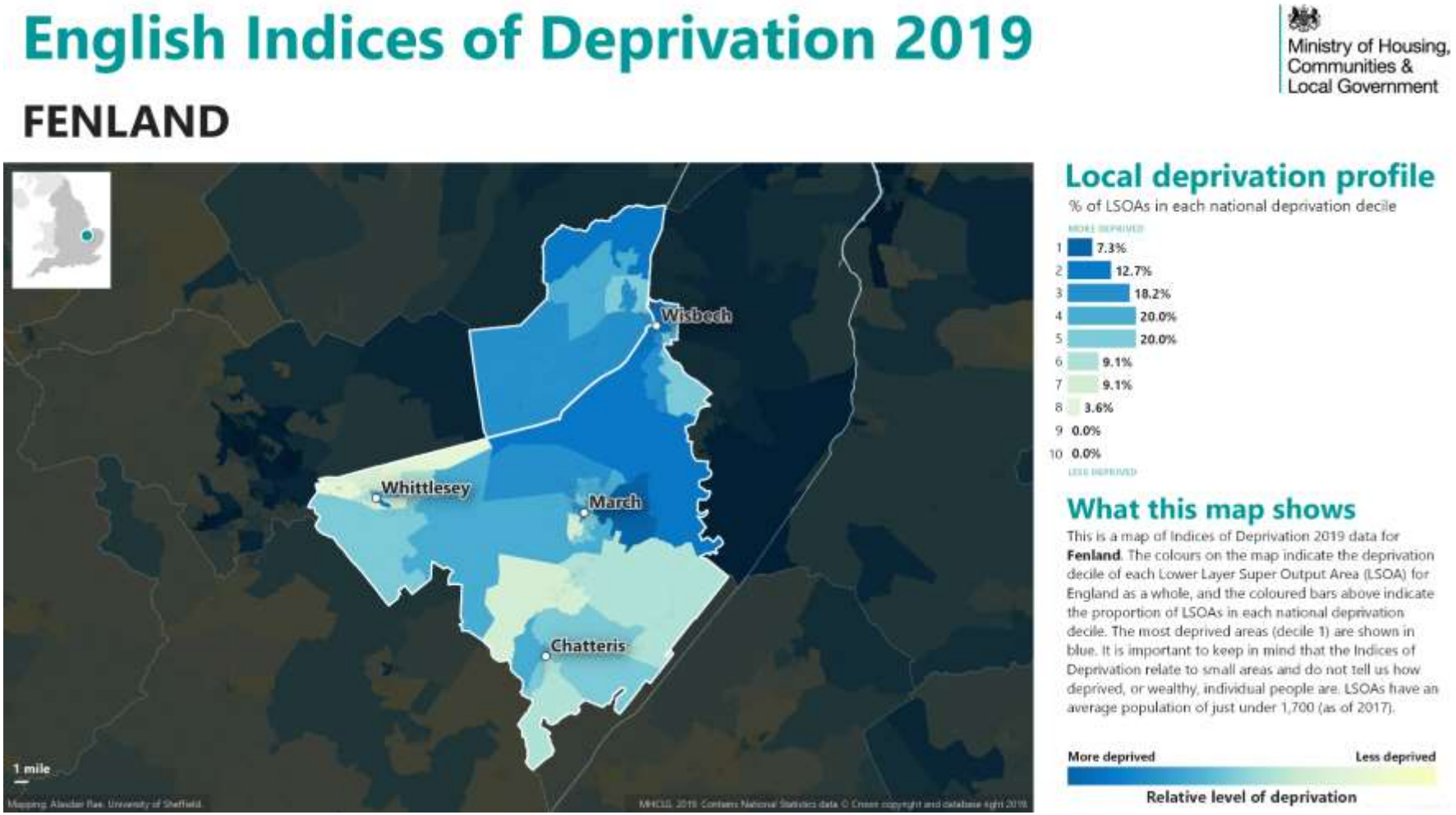
[1] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Cambridge. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-2 - East Cambridge Deprivation Profile (Cambridgshire), 2019[2]



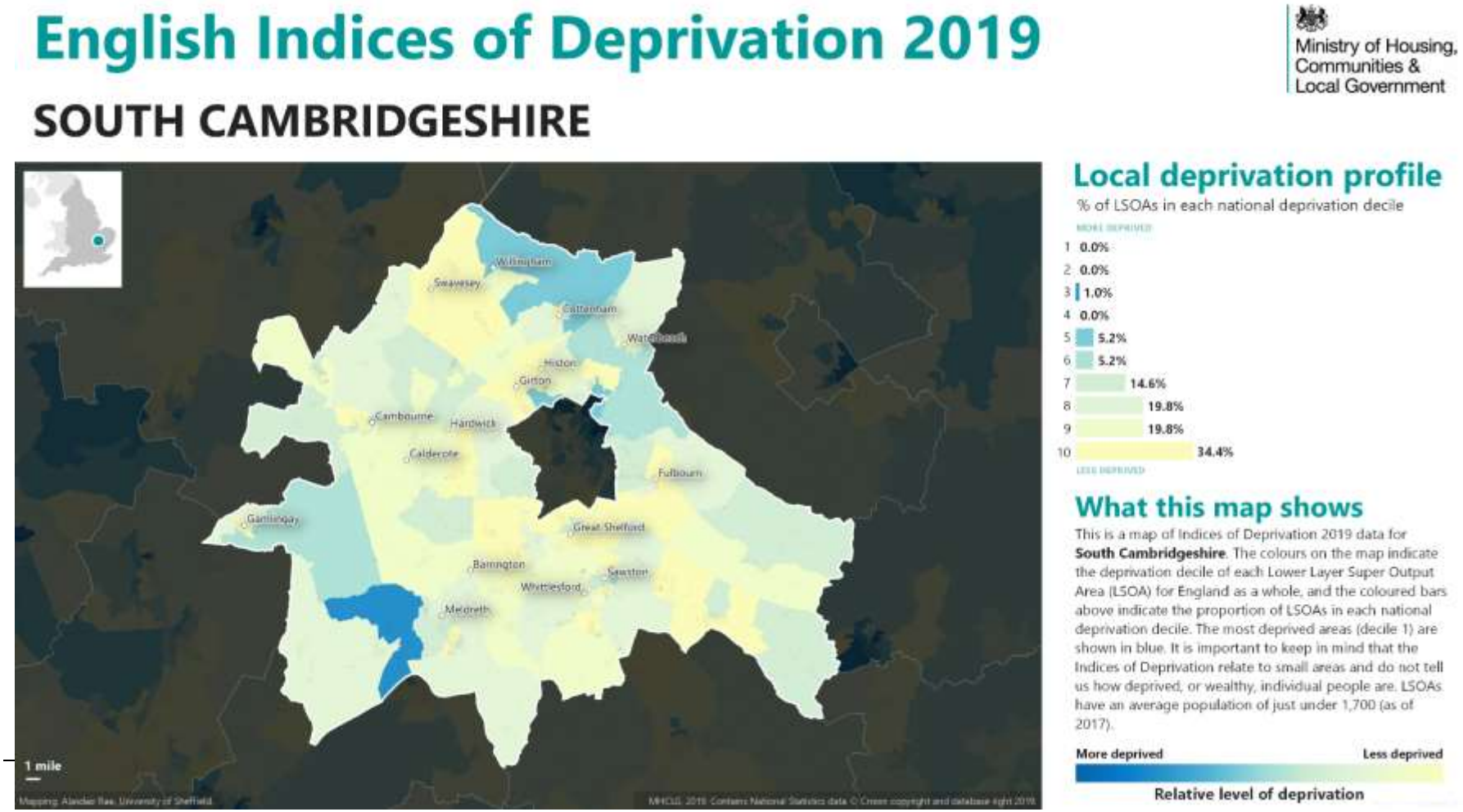
[2] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). East Cambridge. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-3 - Fenland Deprivation Profile (Cambridgshire), 2019[3]



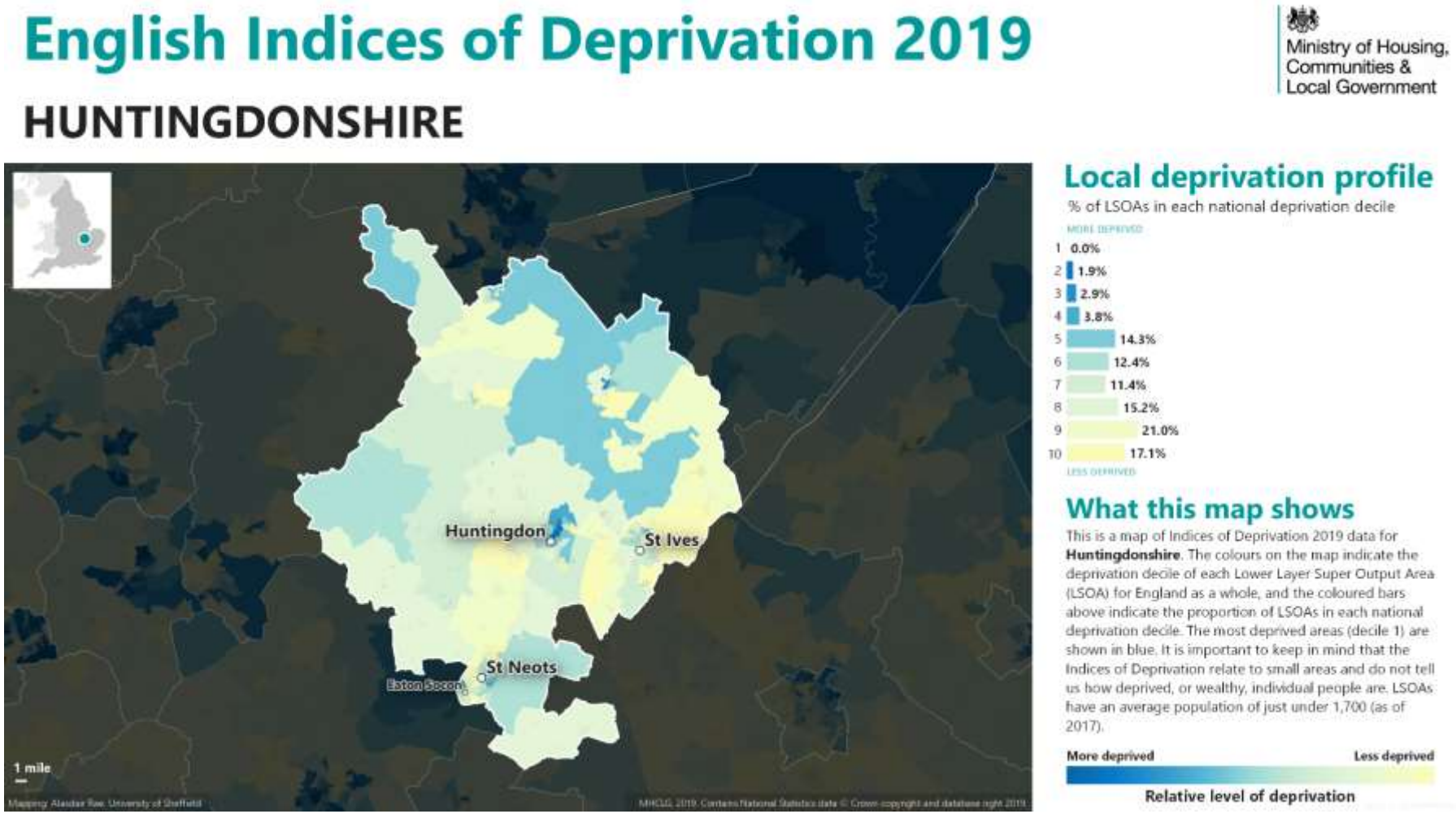
[3] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Fenland. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-4 - South Cambridge Deprivation Profile (Cambridgeshire), 2019[4]



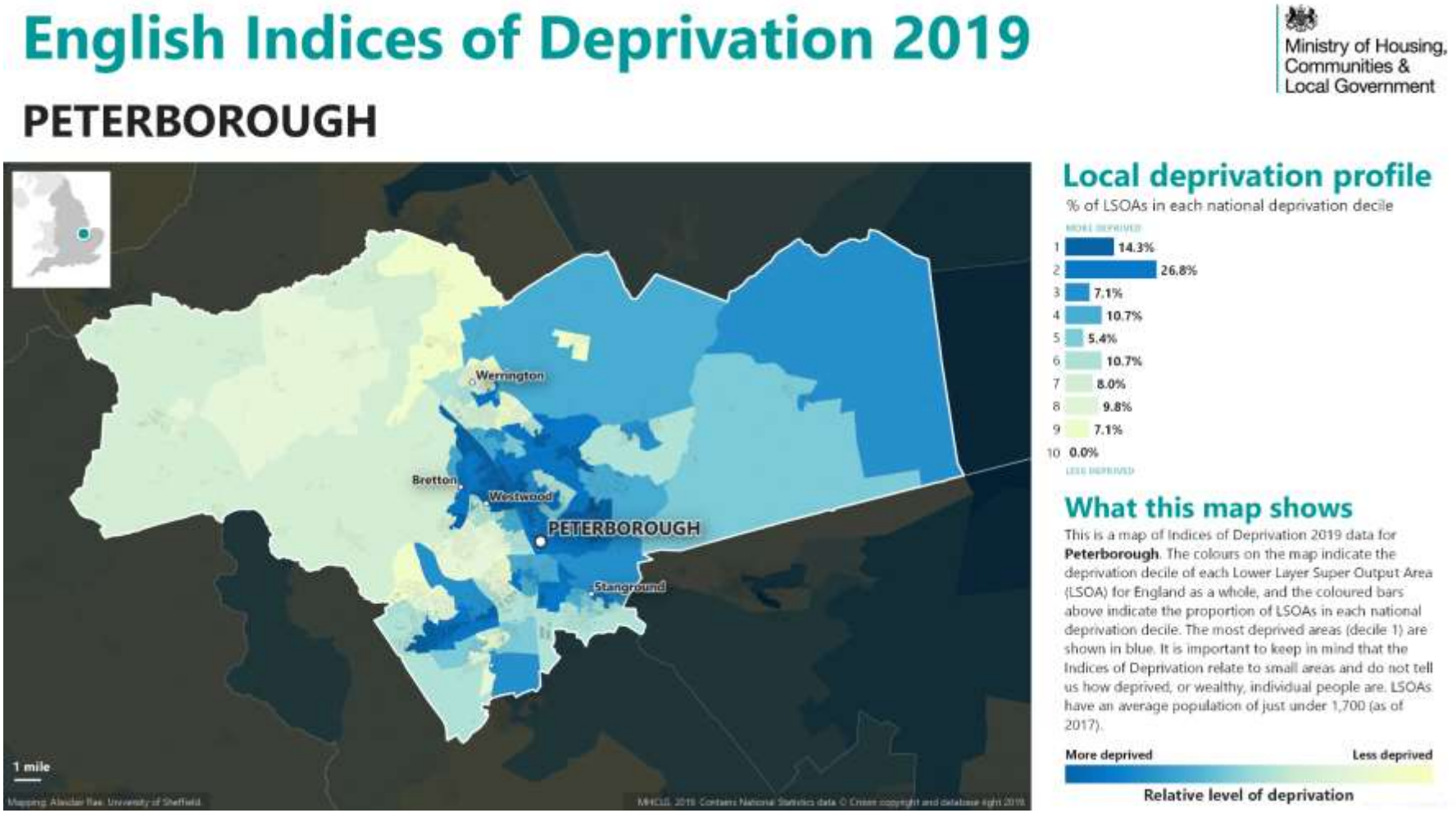
[4] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). South Cambridge. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-5 - Huntingdonshire Deprivation Profile (Cambridgeshire), 2019[5]



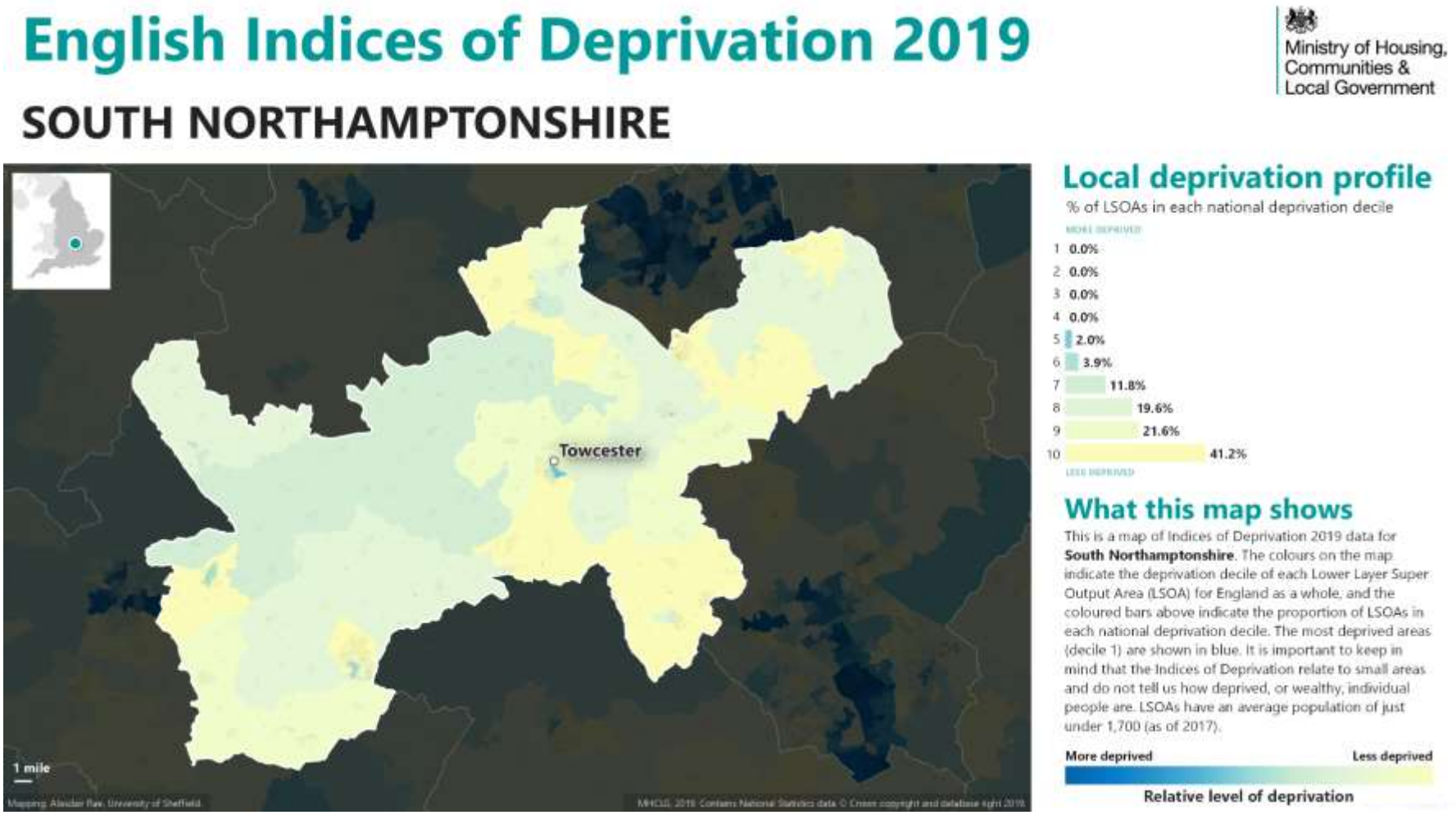
[5] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Huntingdonshire. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-6 - Peterborough Deprivation Profile, 2019[6]



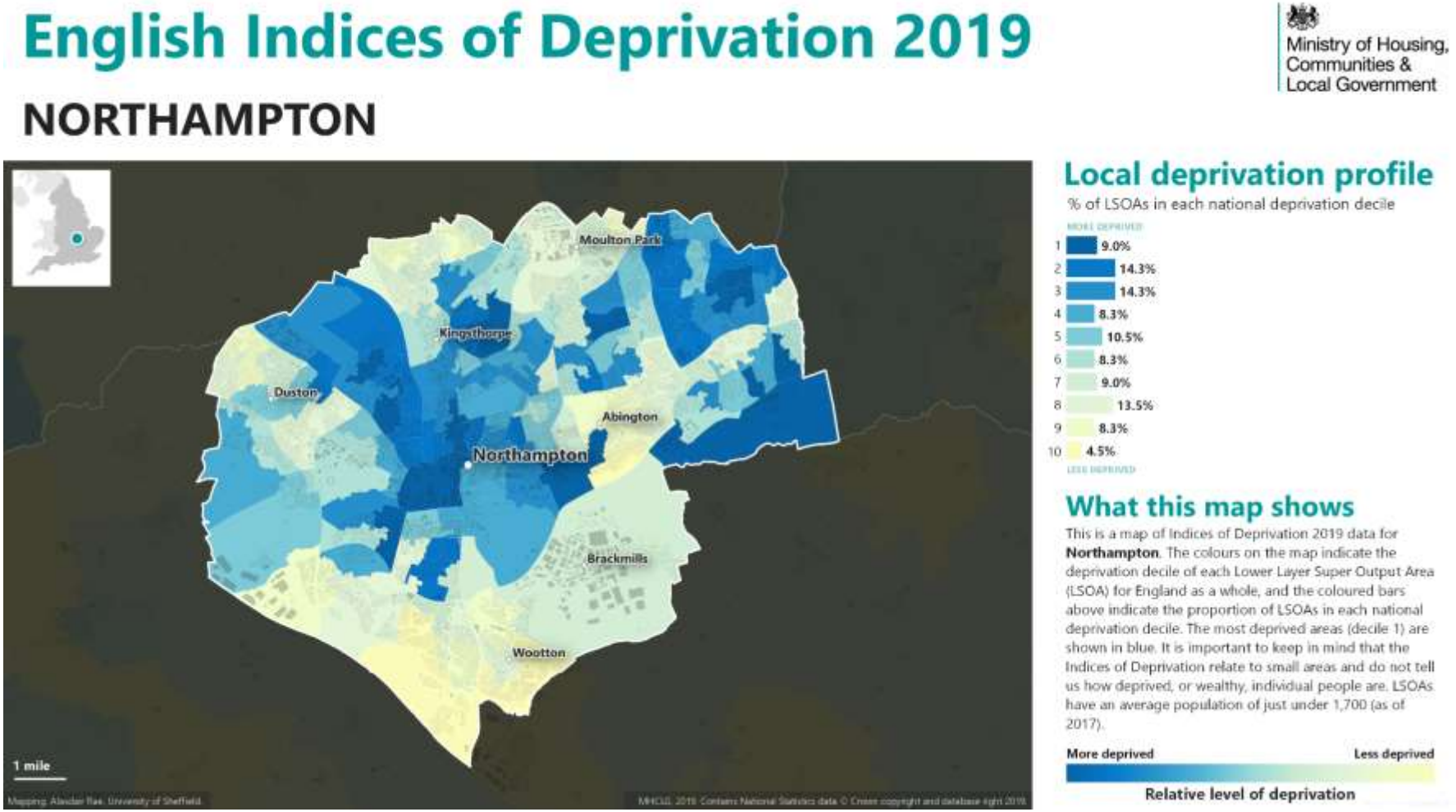
[6] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Peterborough. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-7 - South Northamptonshire Deprivation Profile (Northamptonshire), 2019[7]



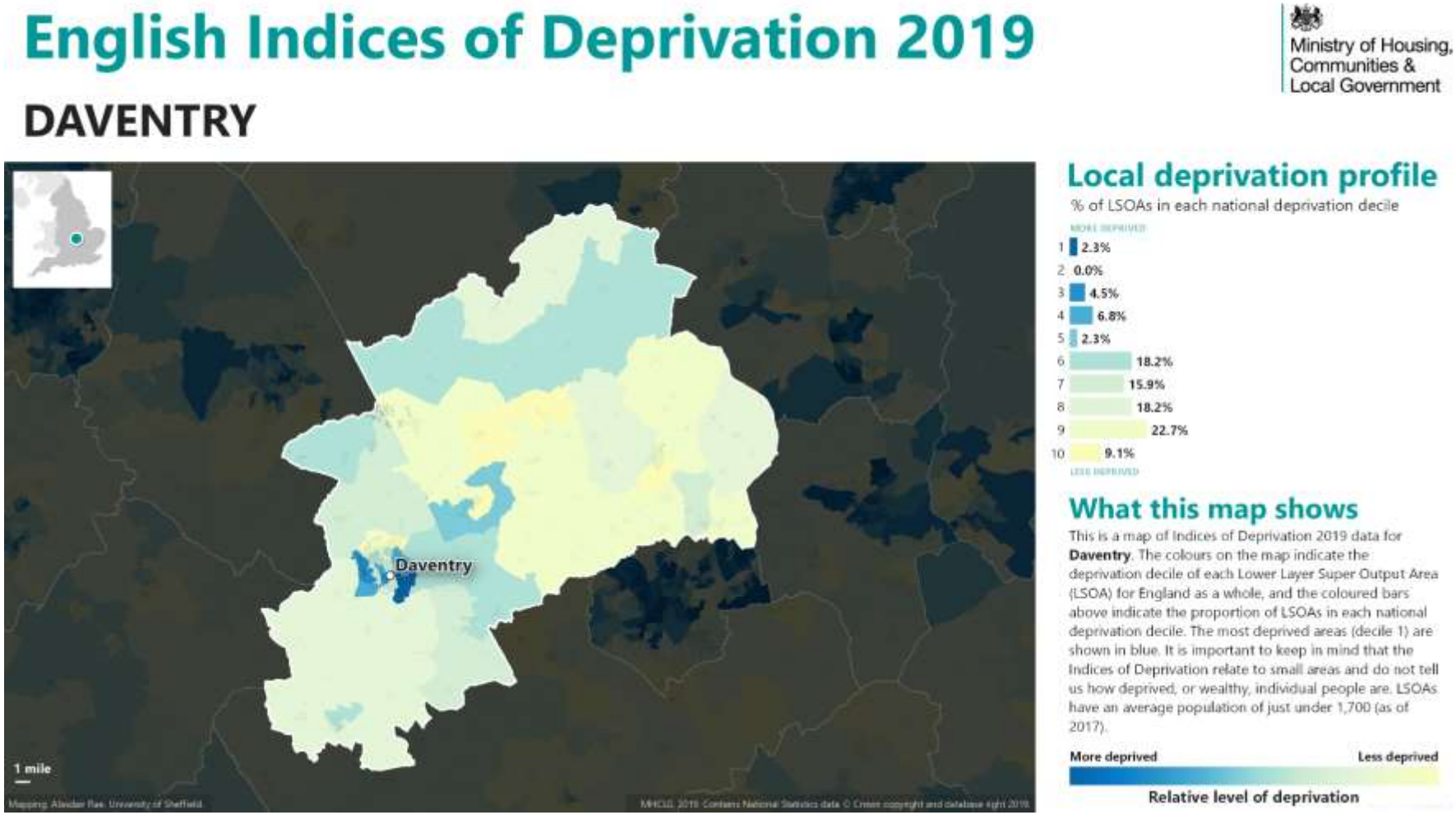
[7] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). South Northamptonshire. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-8 - Northampton Deprivation Profile (Northamptonshire), 2019[8]



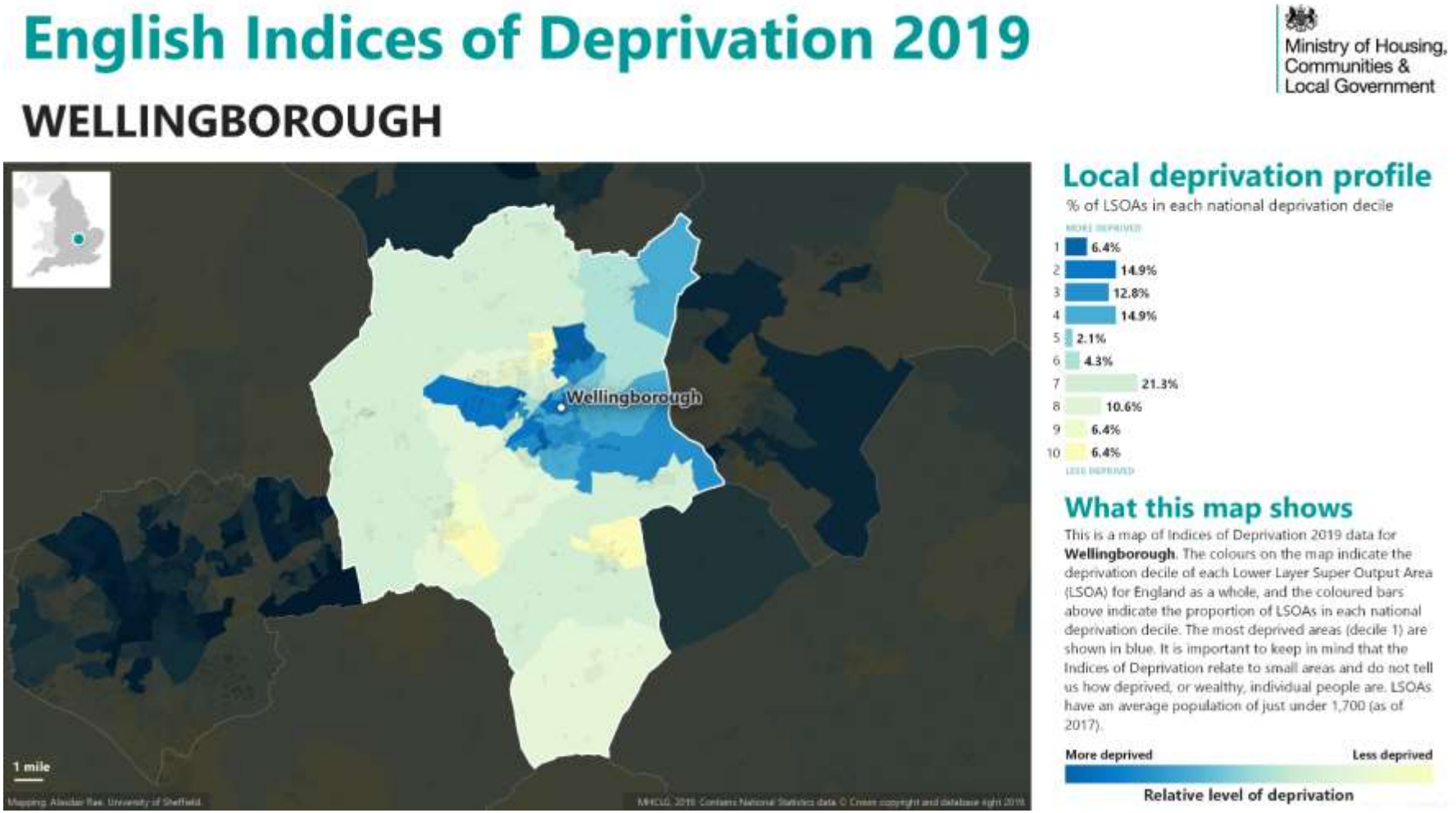
[8] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Northampton. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-9 - Daventry Deprivation Profile (Northamptonshire), 2019[9]



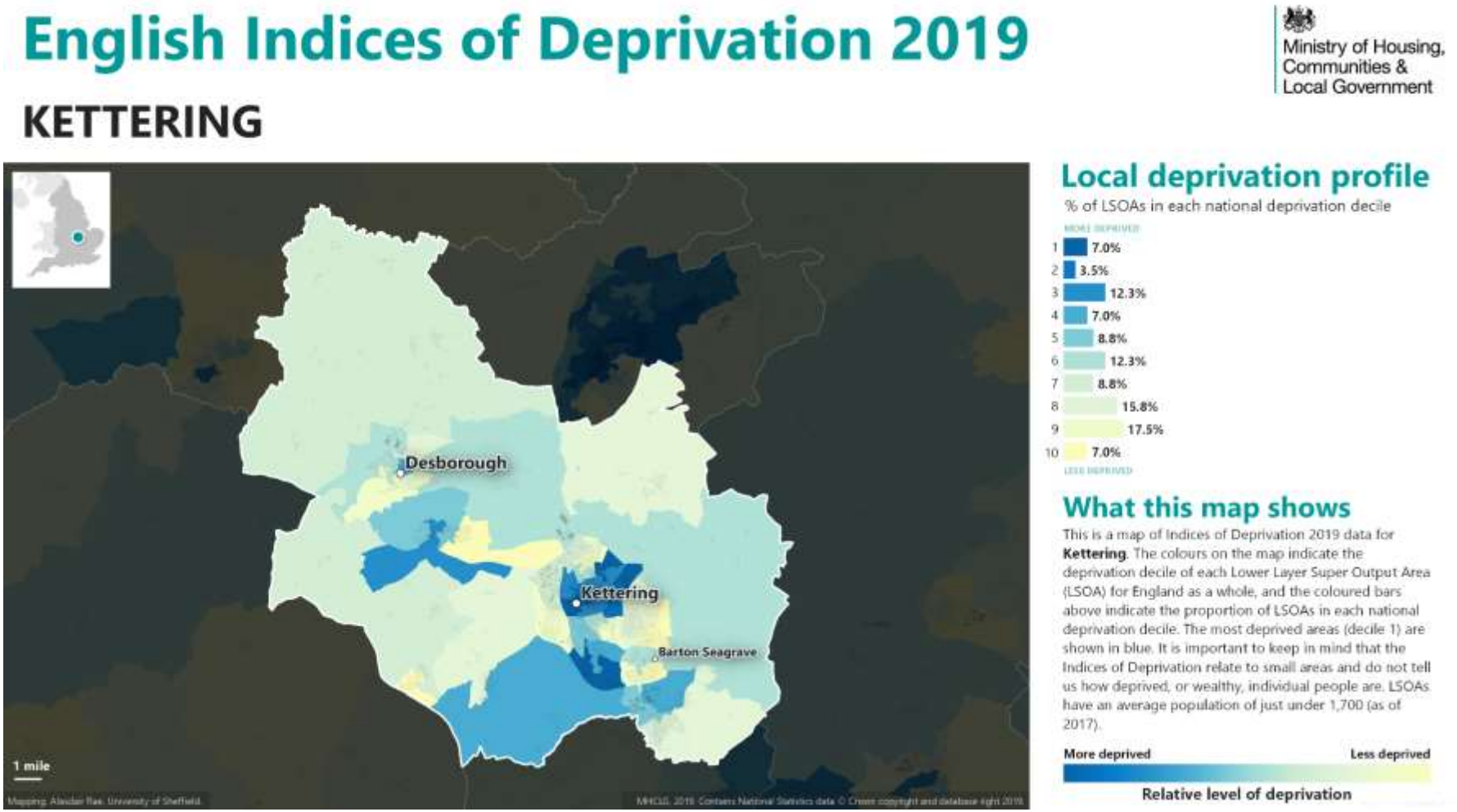
[9] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Daventry. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-10 - Wellingborough Deprivation Profile (Northamptonshire), 2019[10]



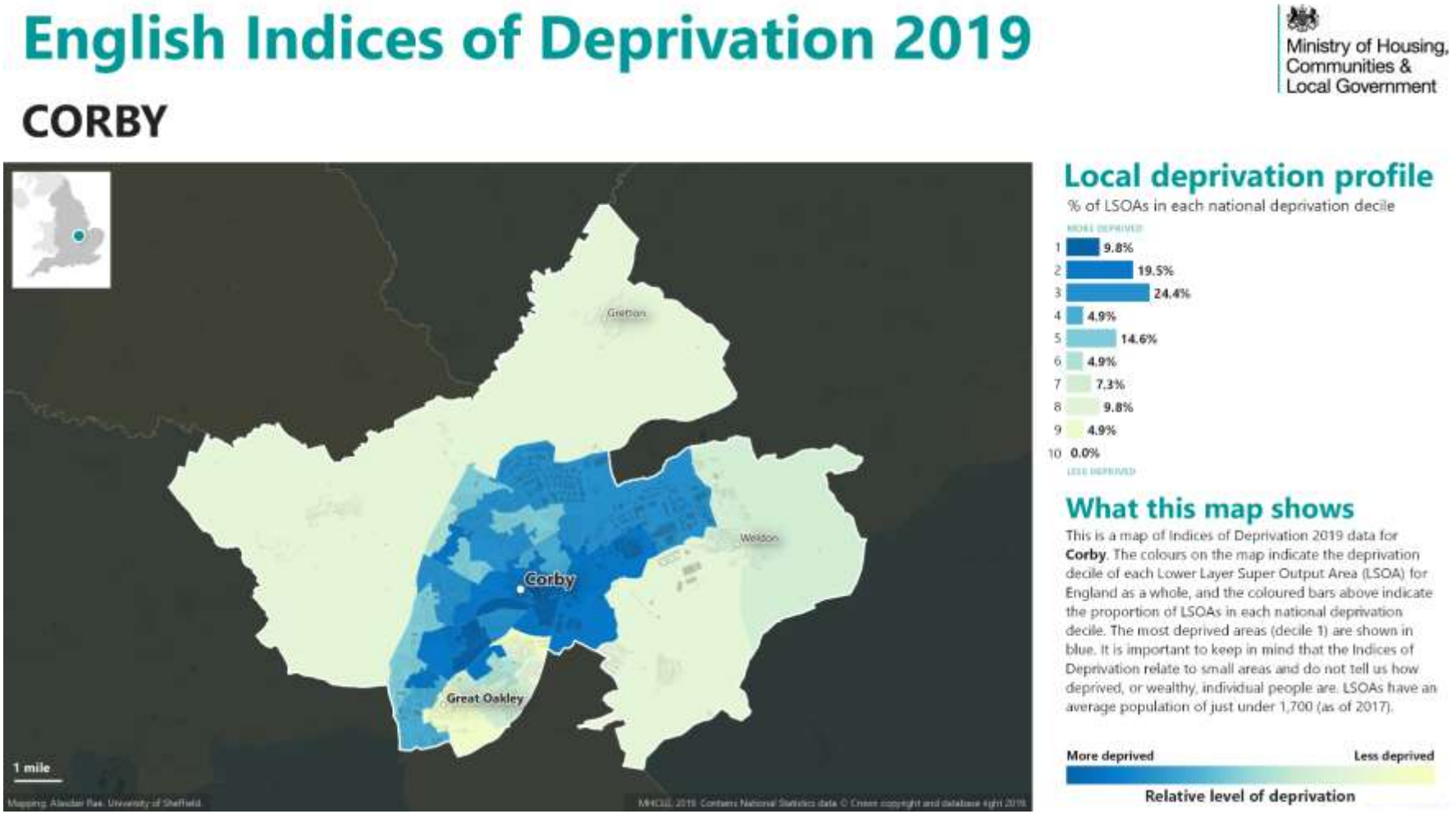
[10] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Wellingborough. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-11 - Kettering Deprivation Profile (Northamptonshire), 2019[11]



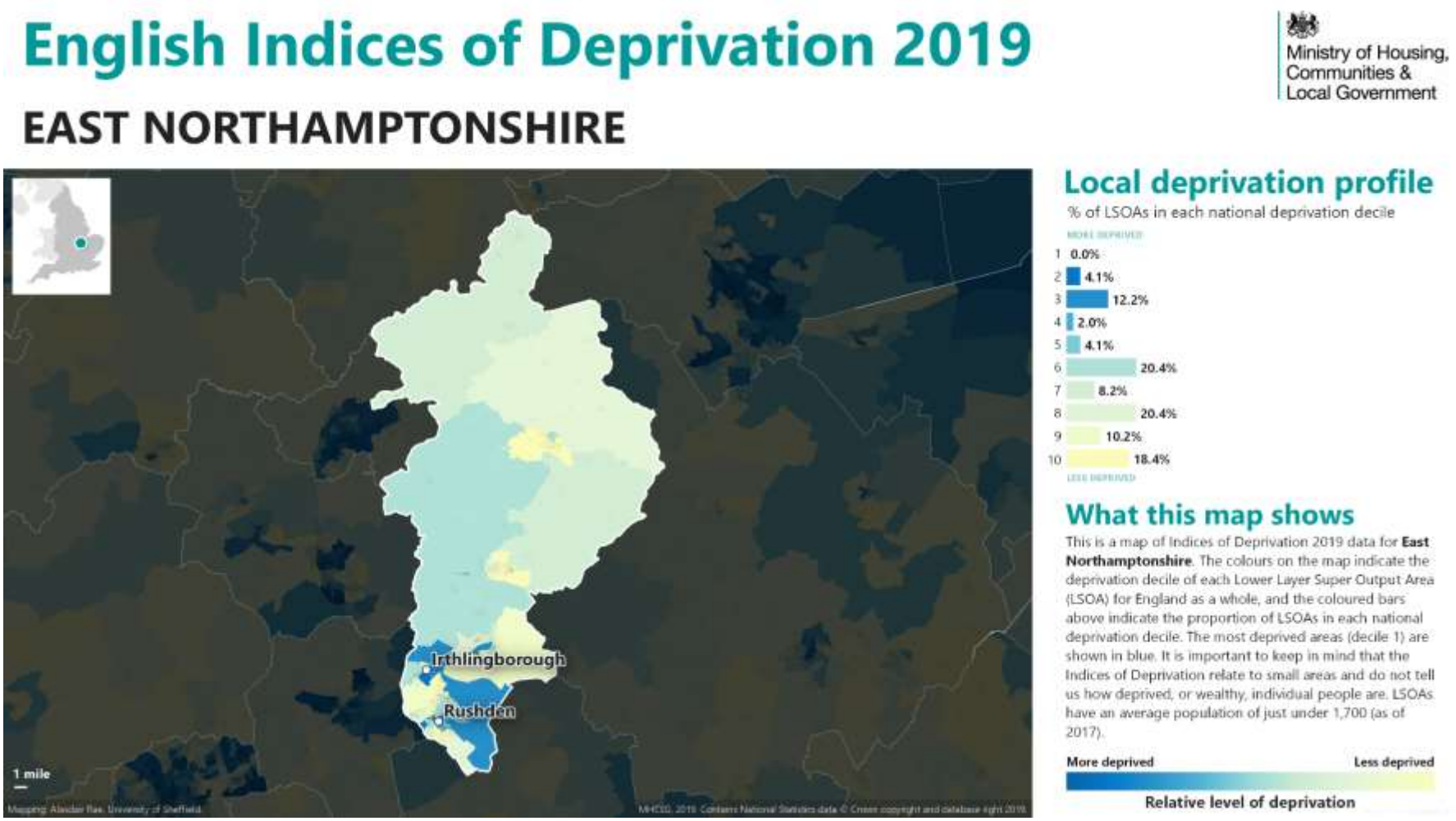
[11] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Kettering. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-12 - Corby Deprivation Profile (Northamptonshire), 2019[12]



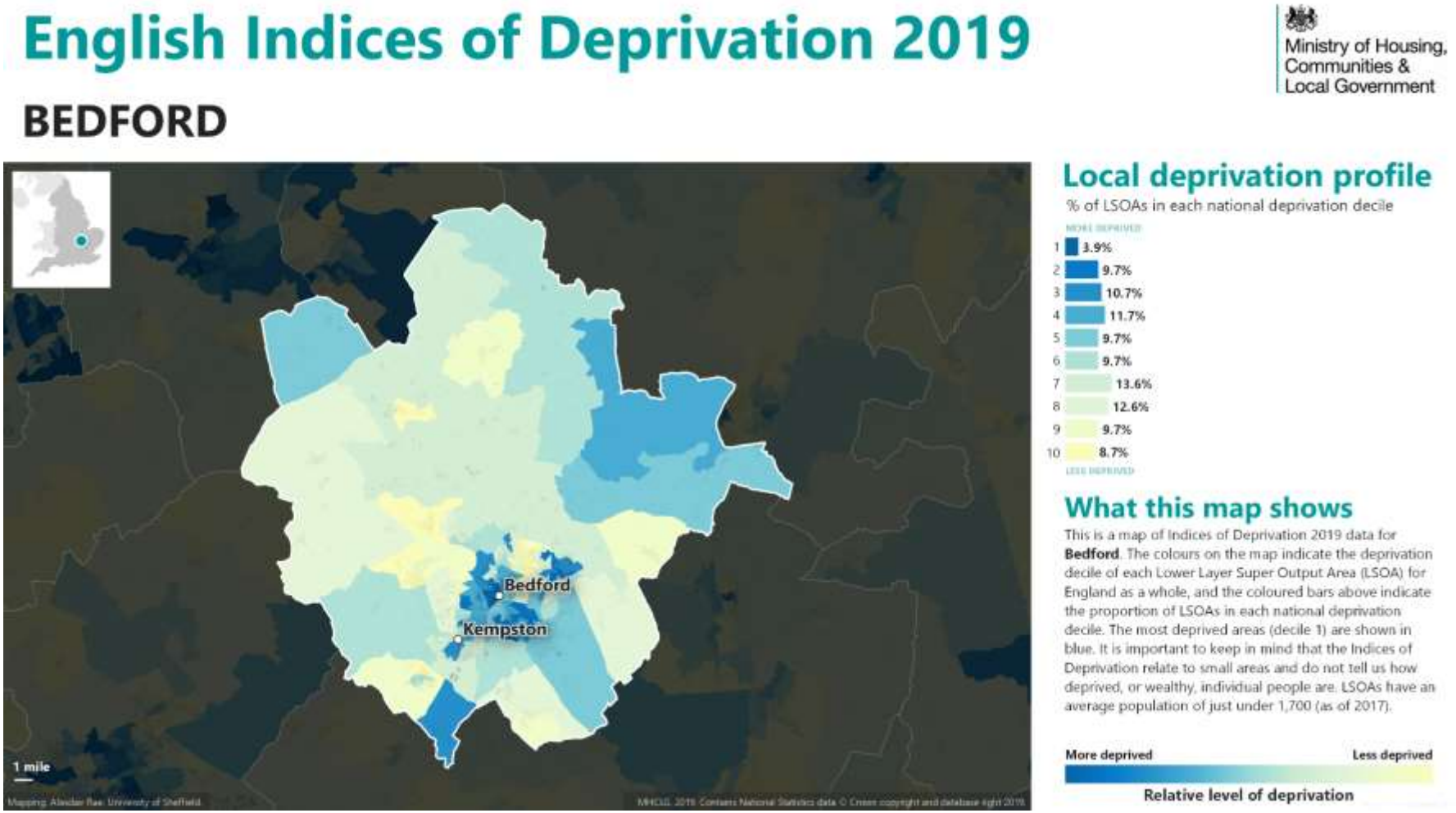
[12] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Corby. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-13 - East Northamptonshire Deprivation Profile (Northamptonshire), 2019[13]



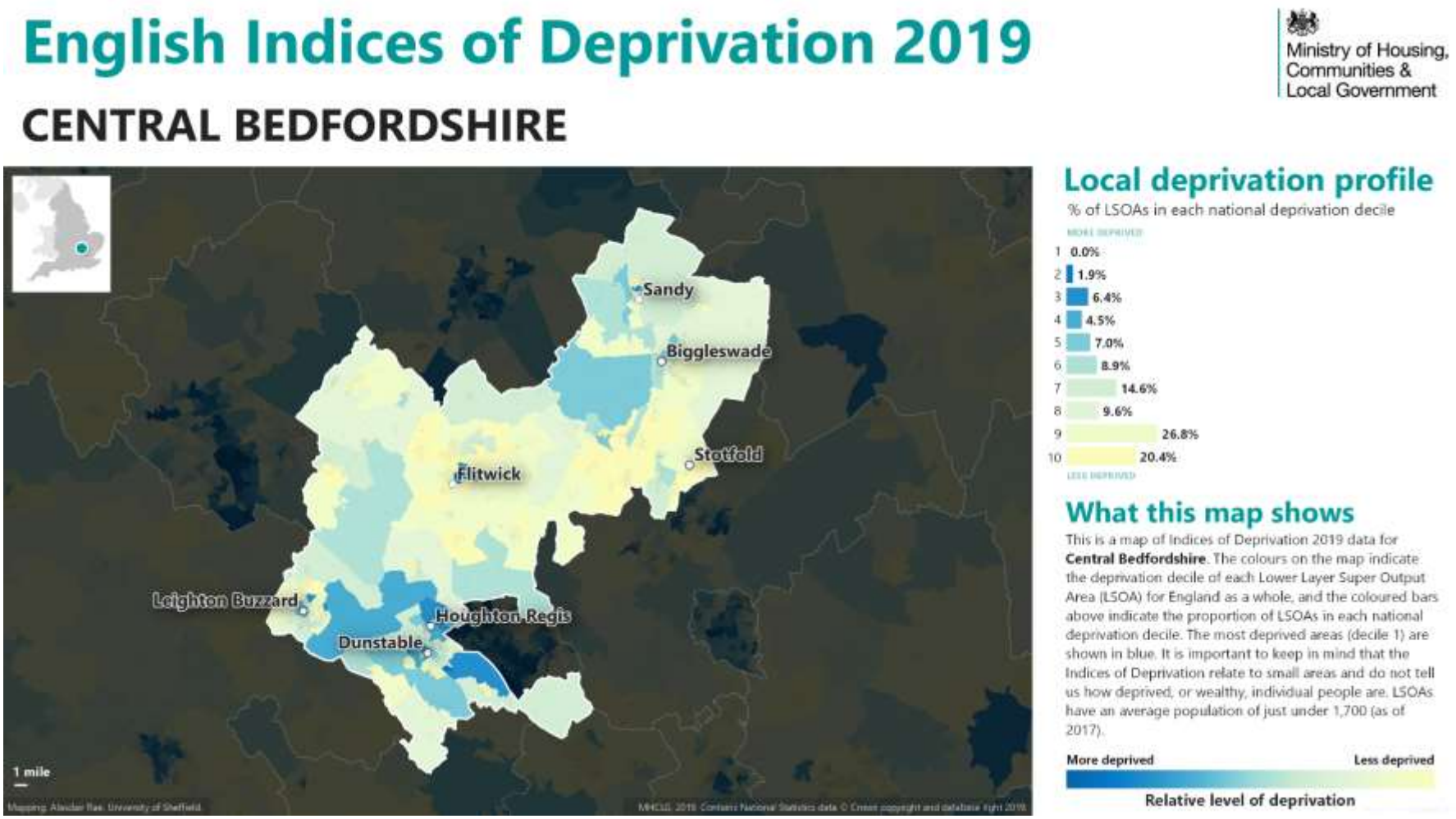
[13] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). East Northamptonshire. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-14 - Bedford Deprivation Profile, 2019[14]



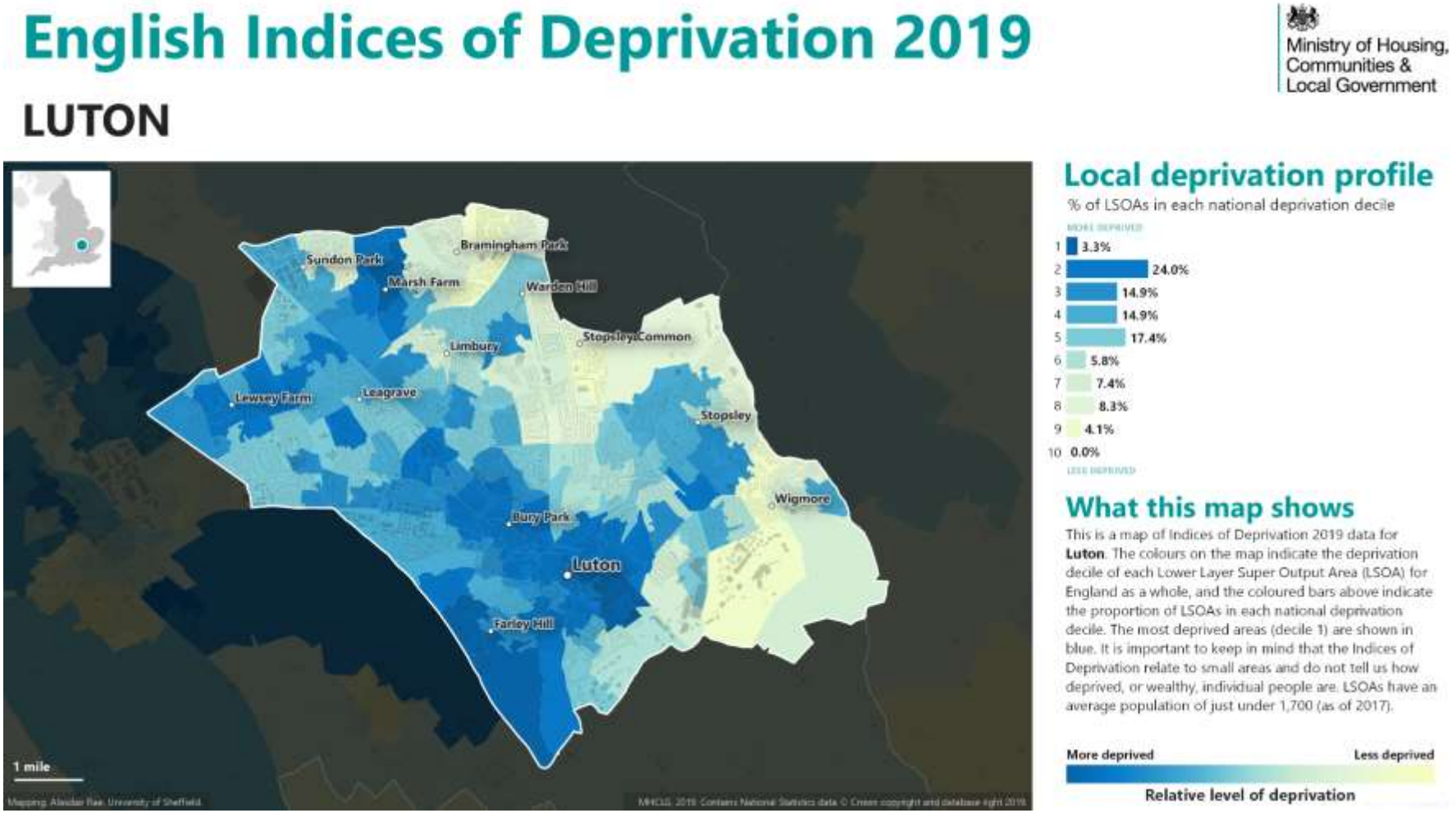
vernment), English Indices of Deprivation (2019). Bedford. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-15 - Central Bedfordshire Deprivation Profile, 2019[15]



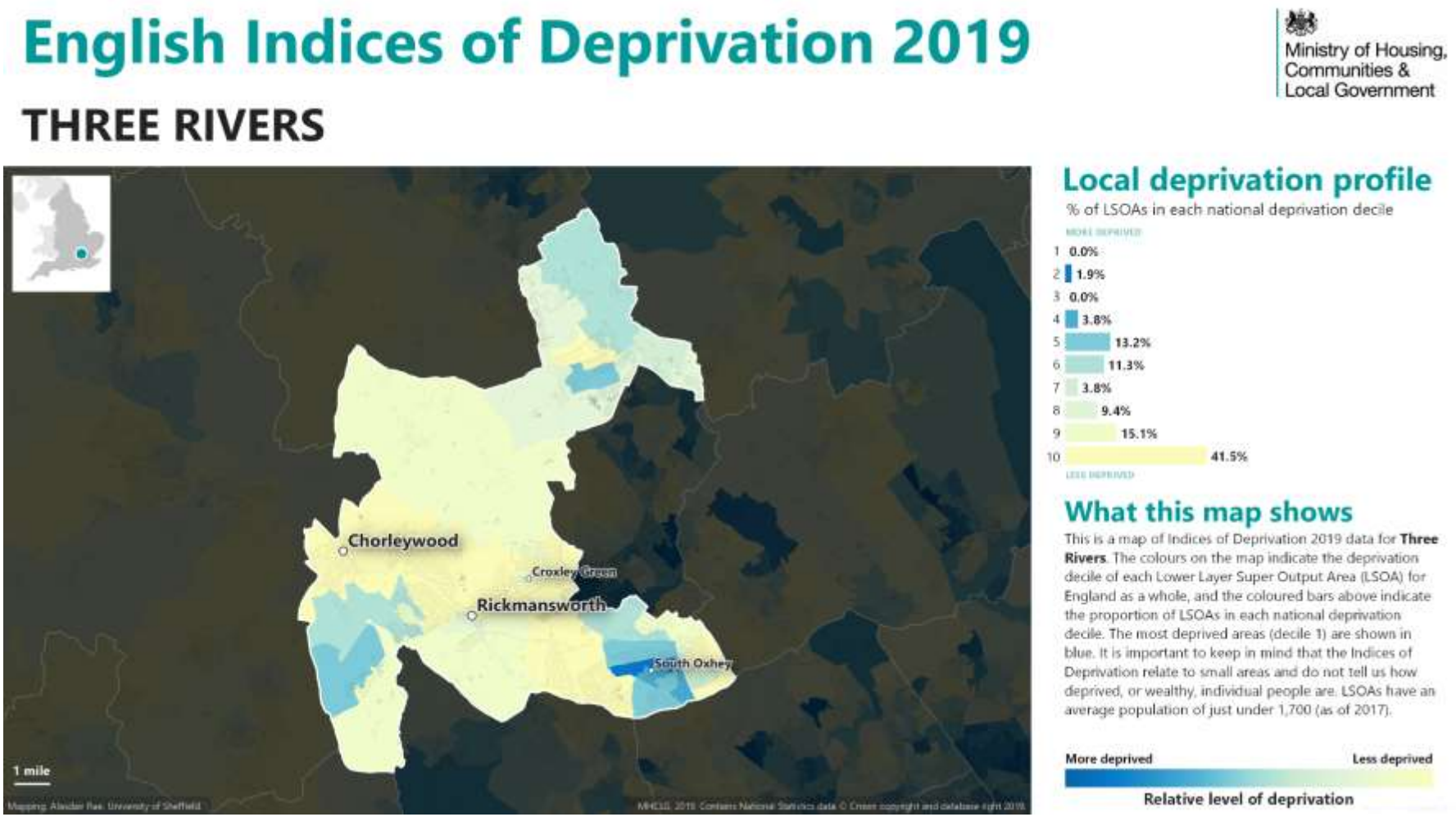
[15] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Central Bedfordshire. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-16 - Luton Deprivation Profile, 2019[16]



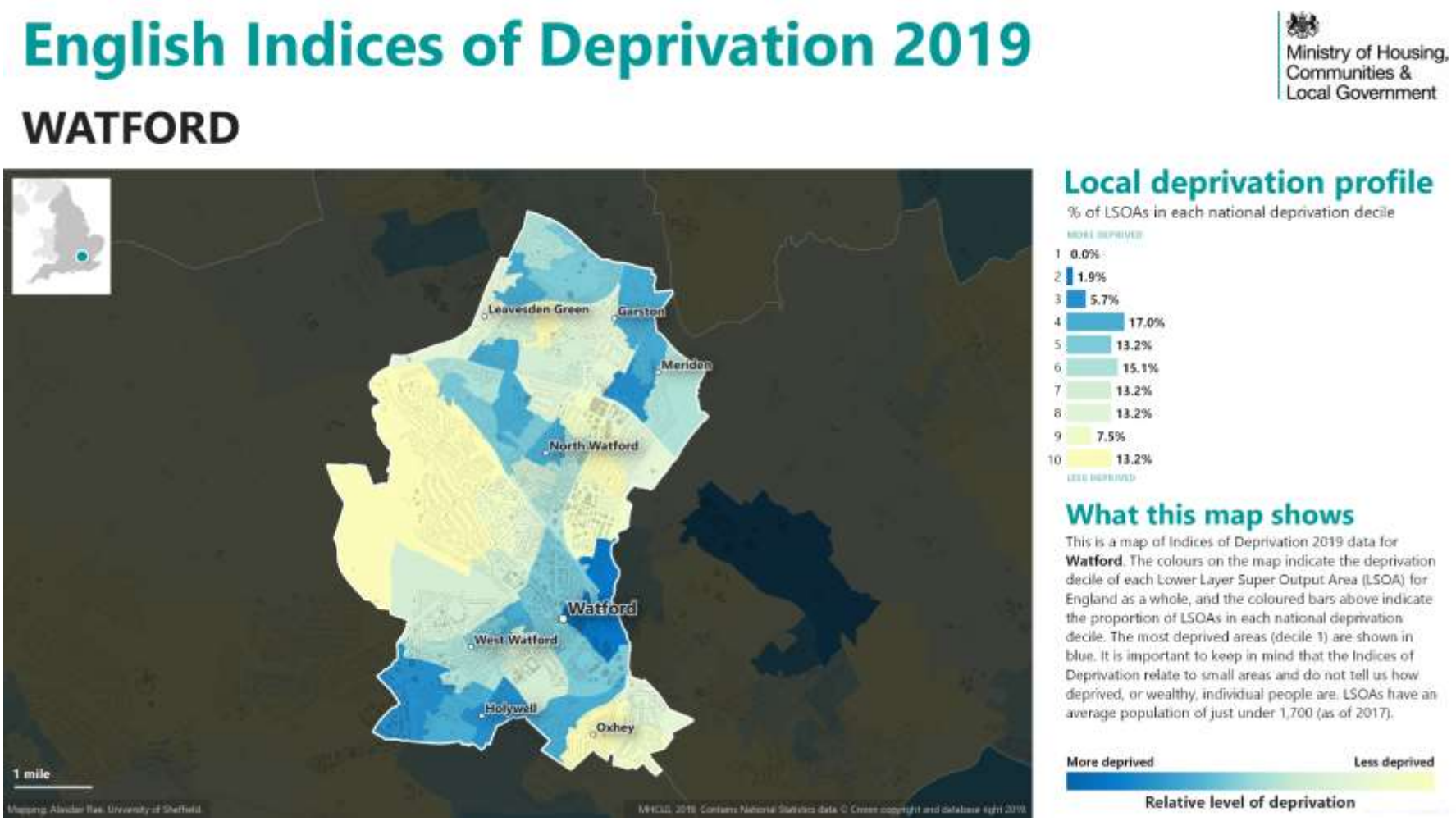
[16] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Luton. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-17 - Three Rivers Deprivation Profile (Hertfordshire), 2019[17]



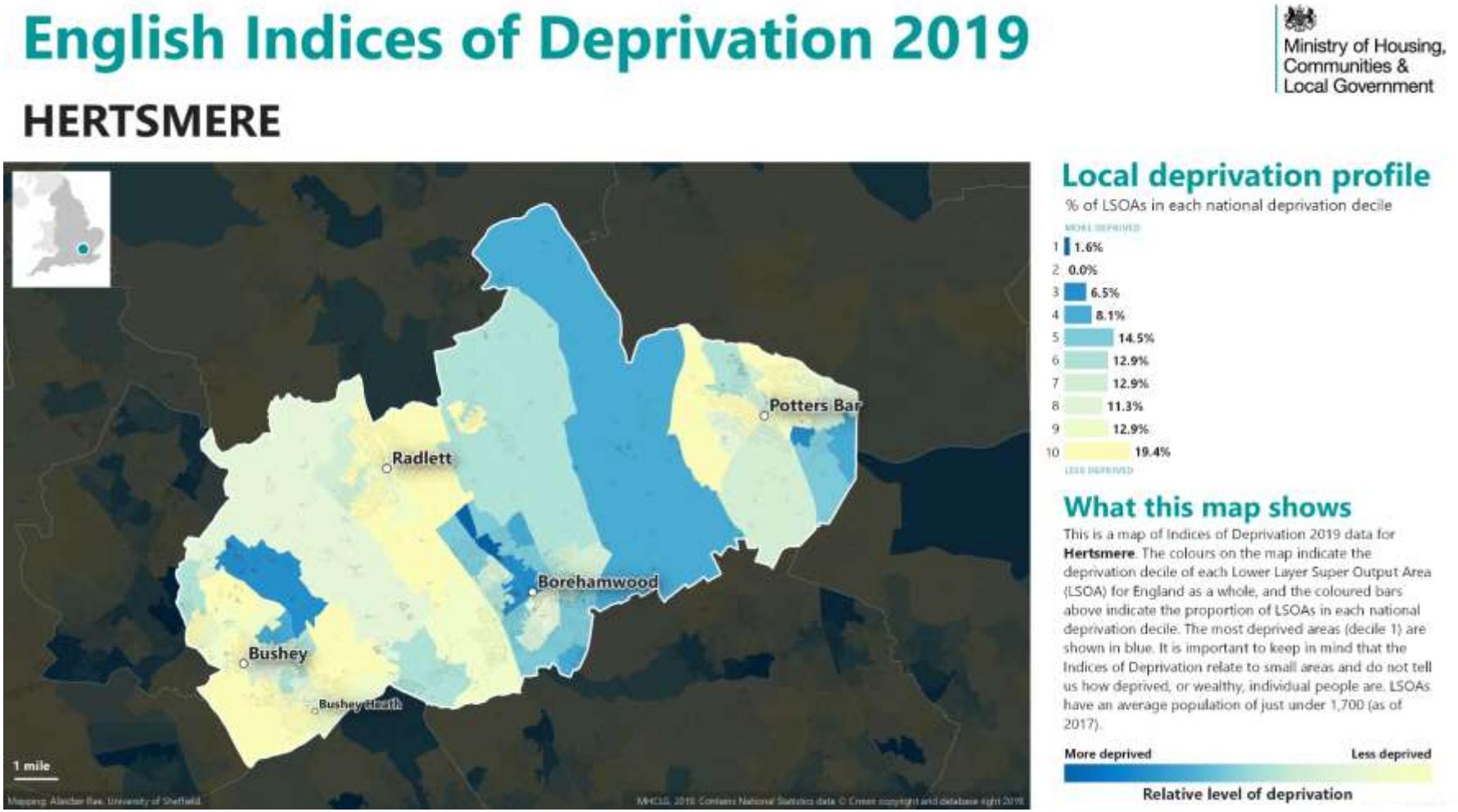
[17] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Three Rivers. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-18 - Watford Deprivation Profile (Hertfordshire), 2019[18]



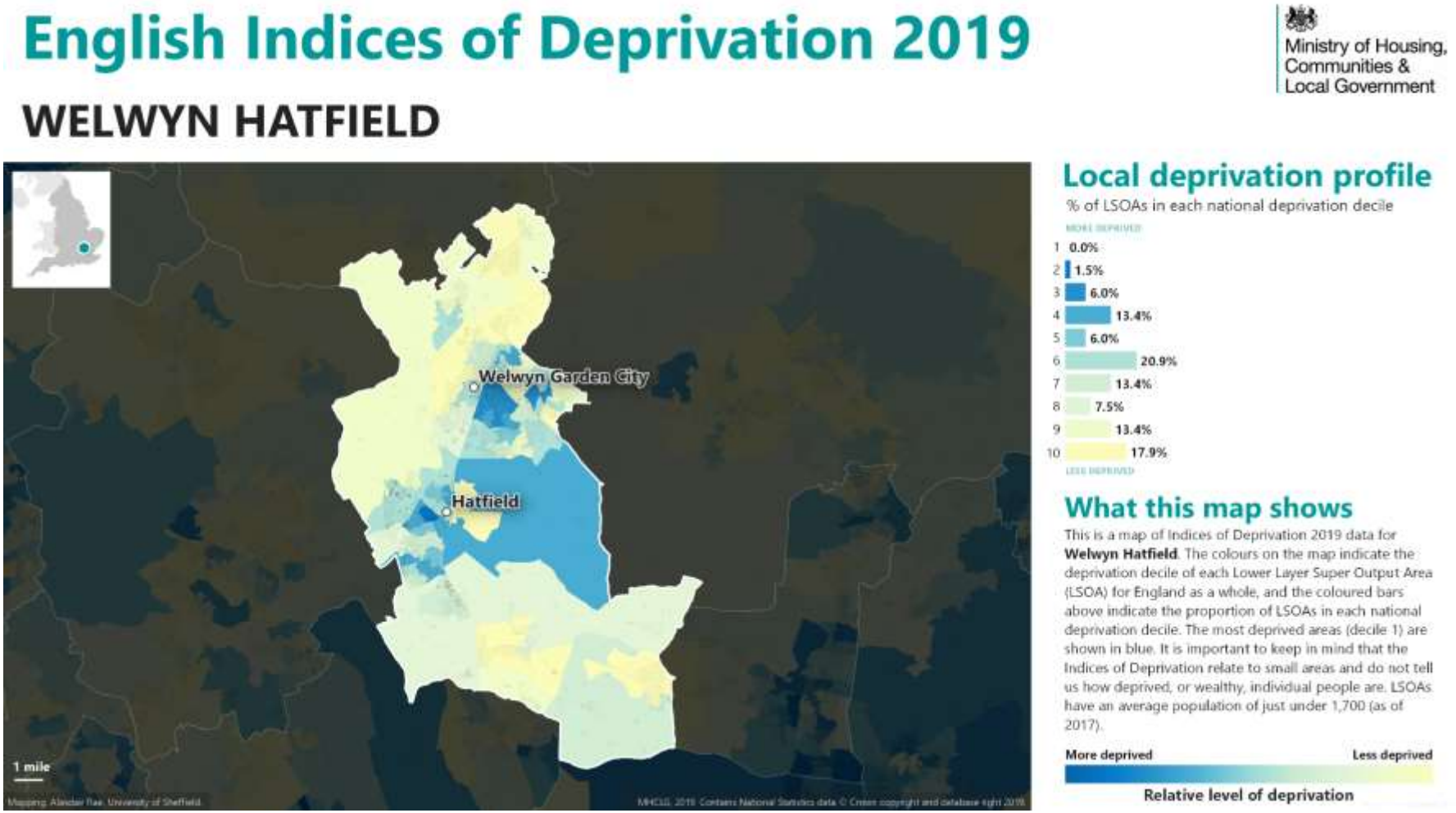
[18] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Watford. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-19 - Hertsmere Deprivation Profile (Hertfordshire), 2019[19]



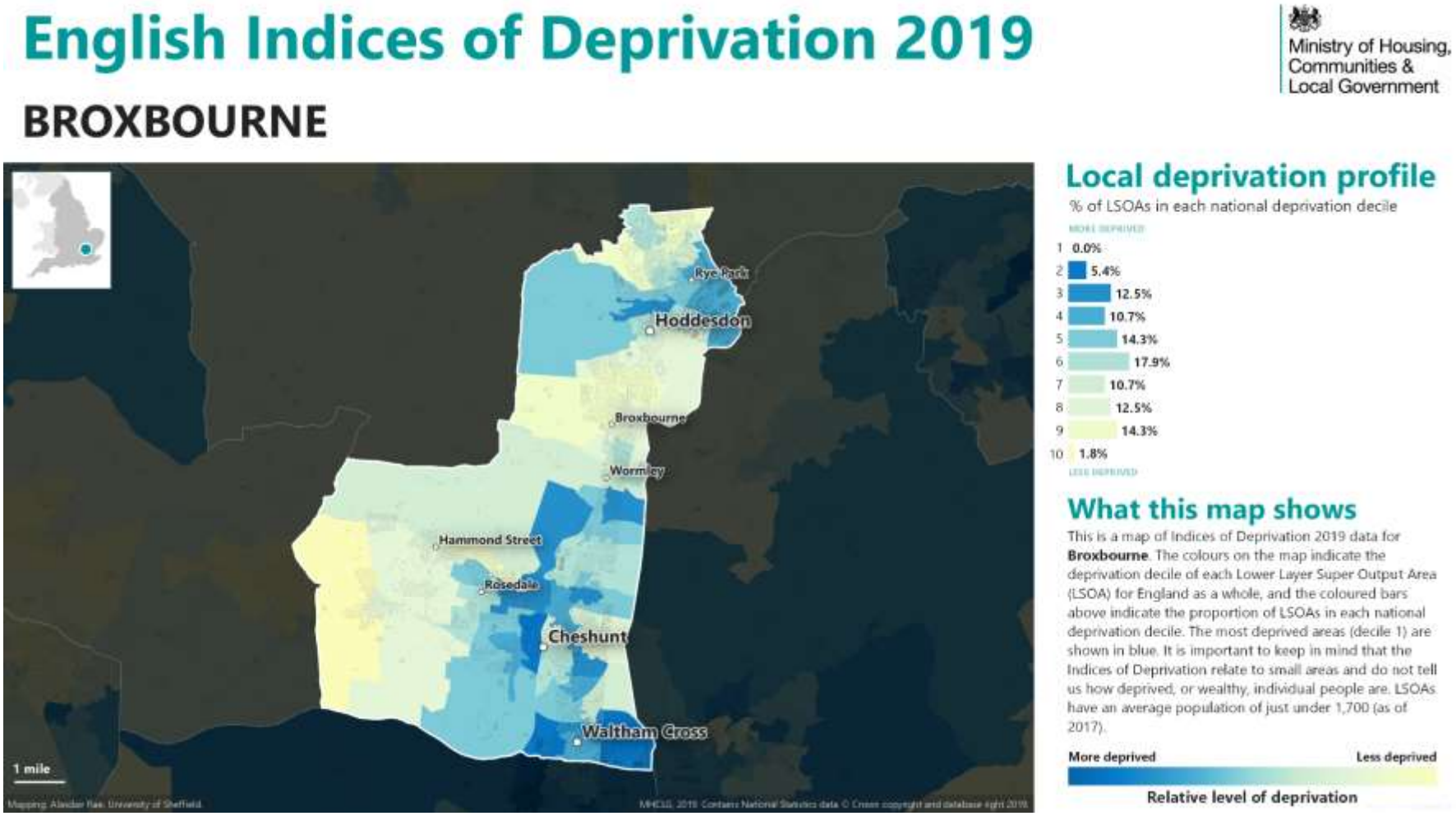
[19] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Hertsmere. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-20 - Welwyn Hatfield Deprivation Profile (Hertfordshire), 2019[20]



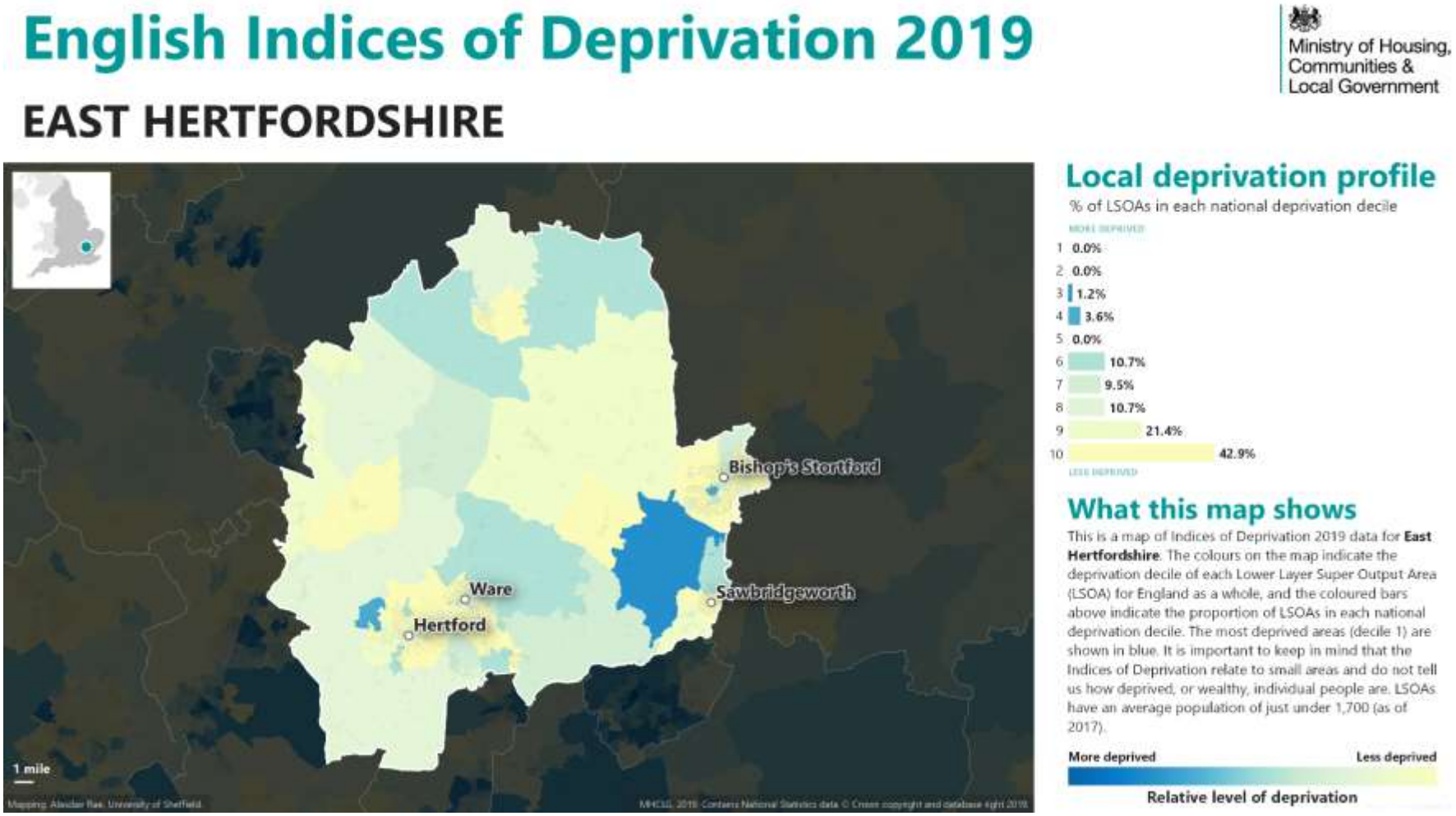
[20] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Welwyn Hatfield. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-21 - Broxbourne Deprivation Profile (Hertfordshire), 2019[21]



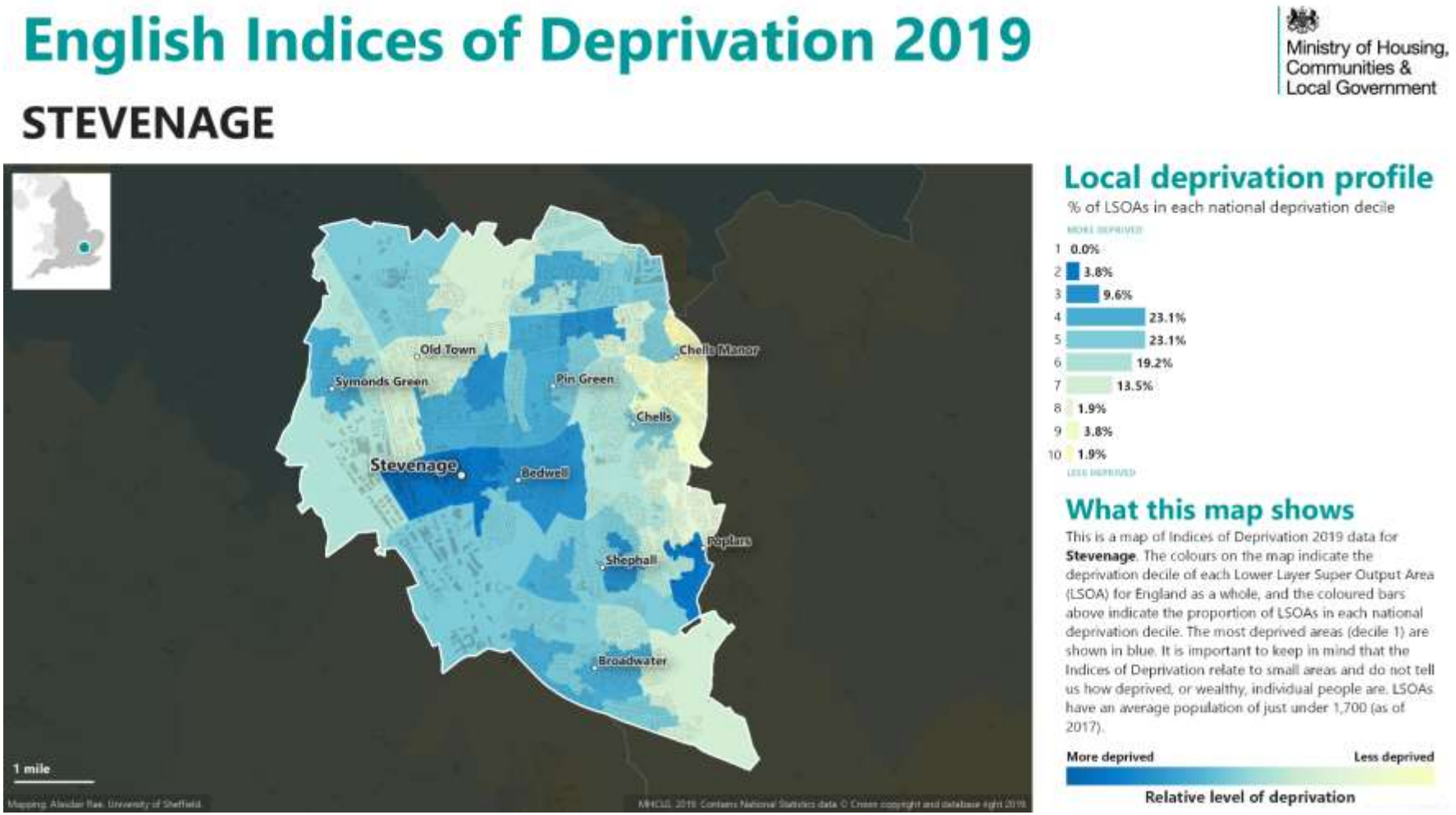
[21] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Broxbourne. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-22 - East Hertfordshire Deprivation Profile (Hertfordshire), 2019[22]



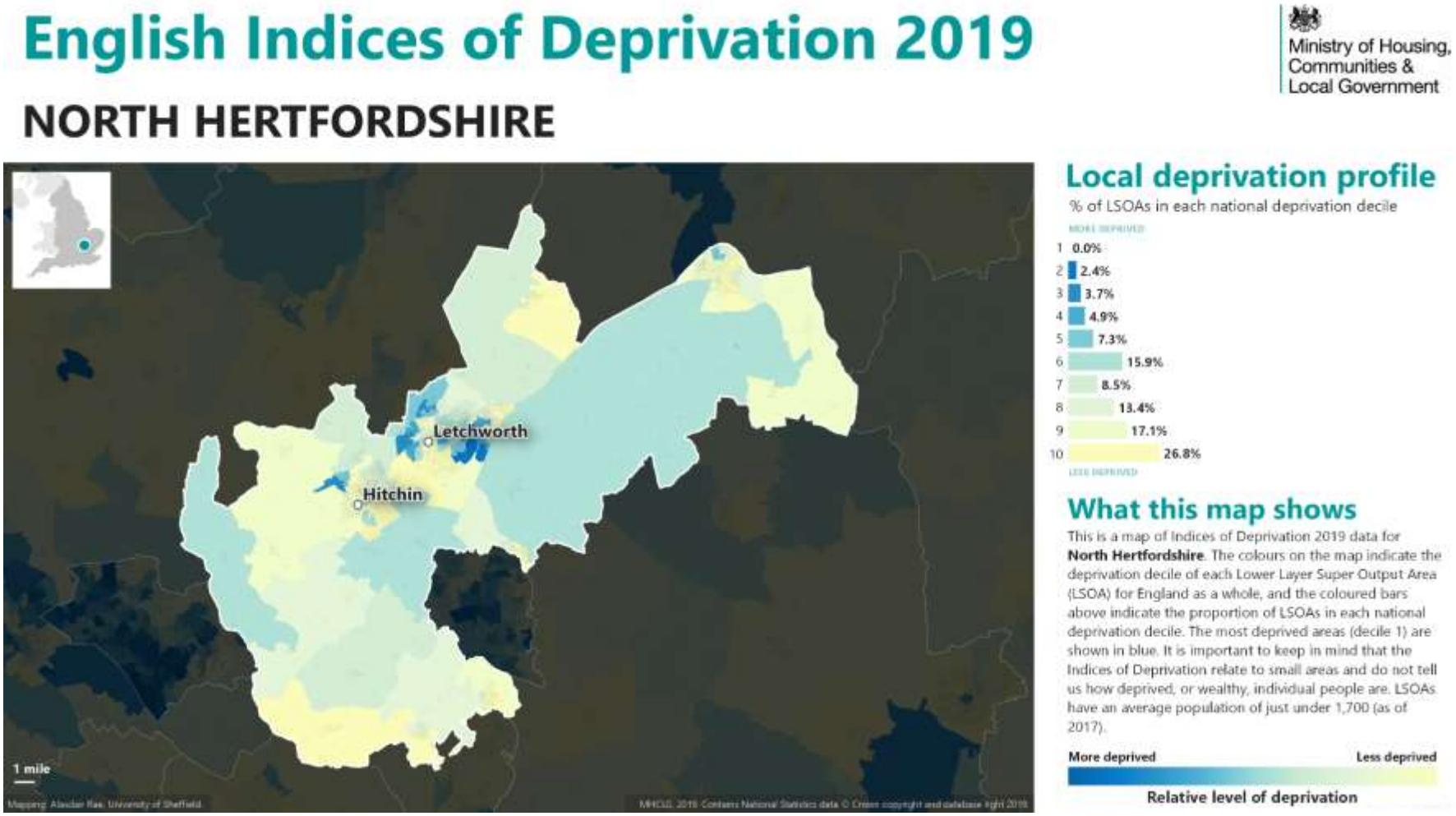
[22] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). East Hertfordshire. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-23 - Stevenage Deprivation Profile (Hertfordshire), 2019[23]



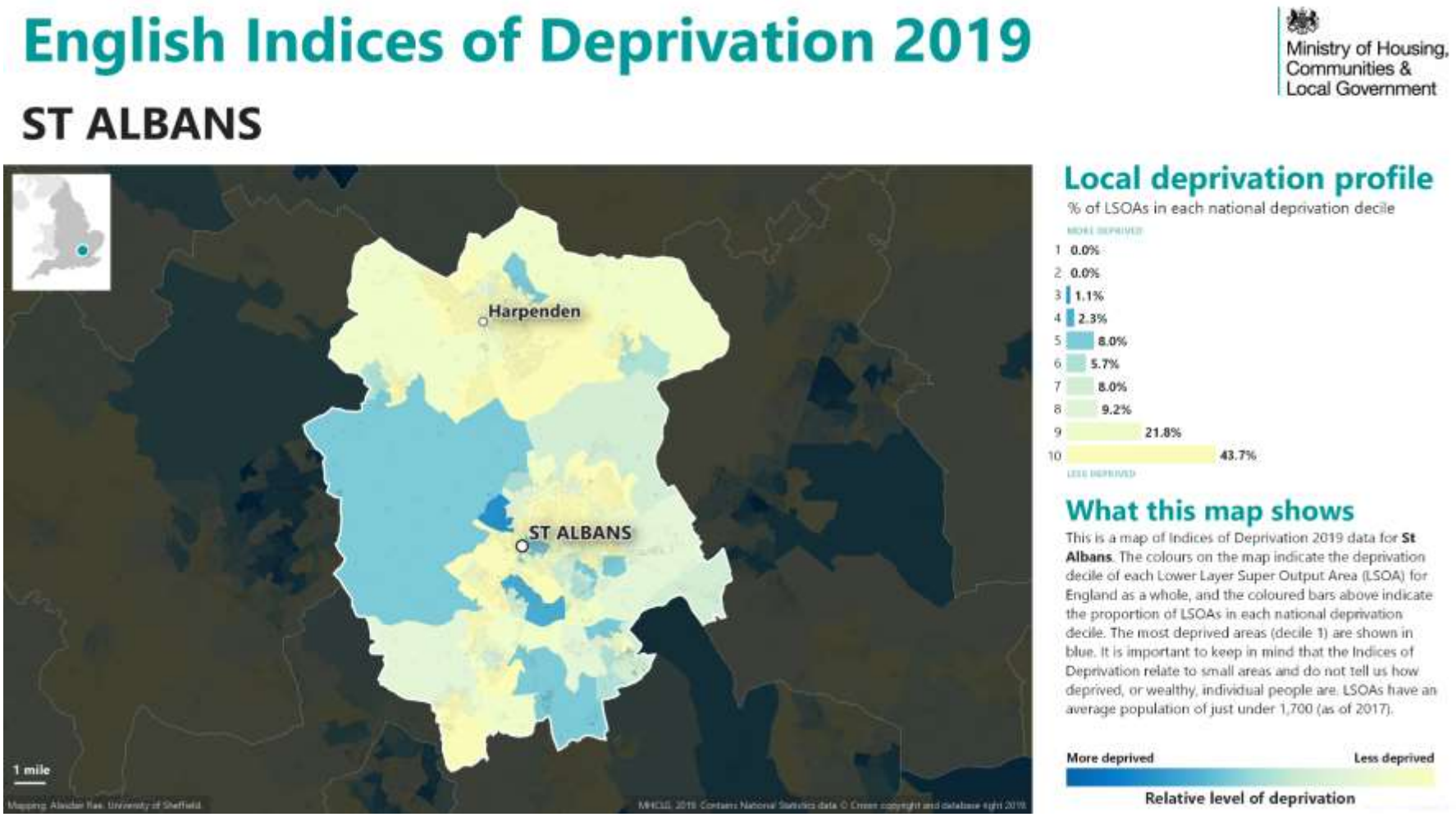
[23] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Stevenage. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-24 - North Hertfordshire Deprivation Profile (Hertfordshire), 2019[24]



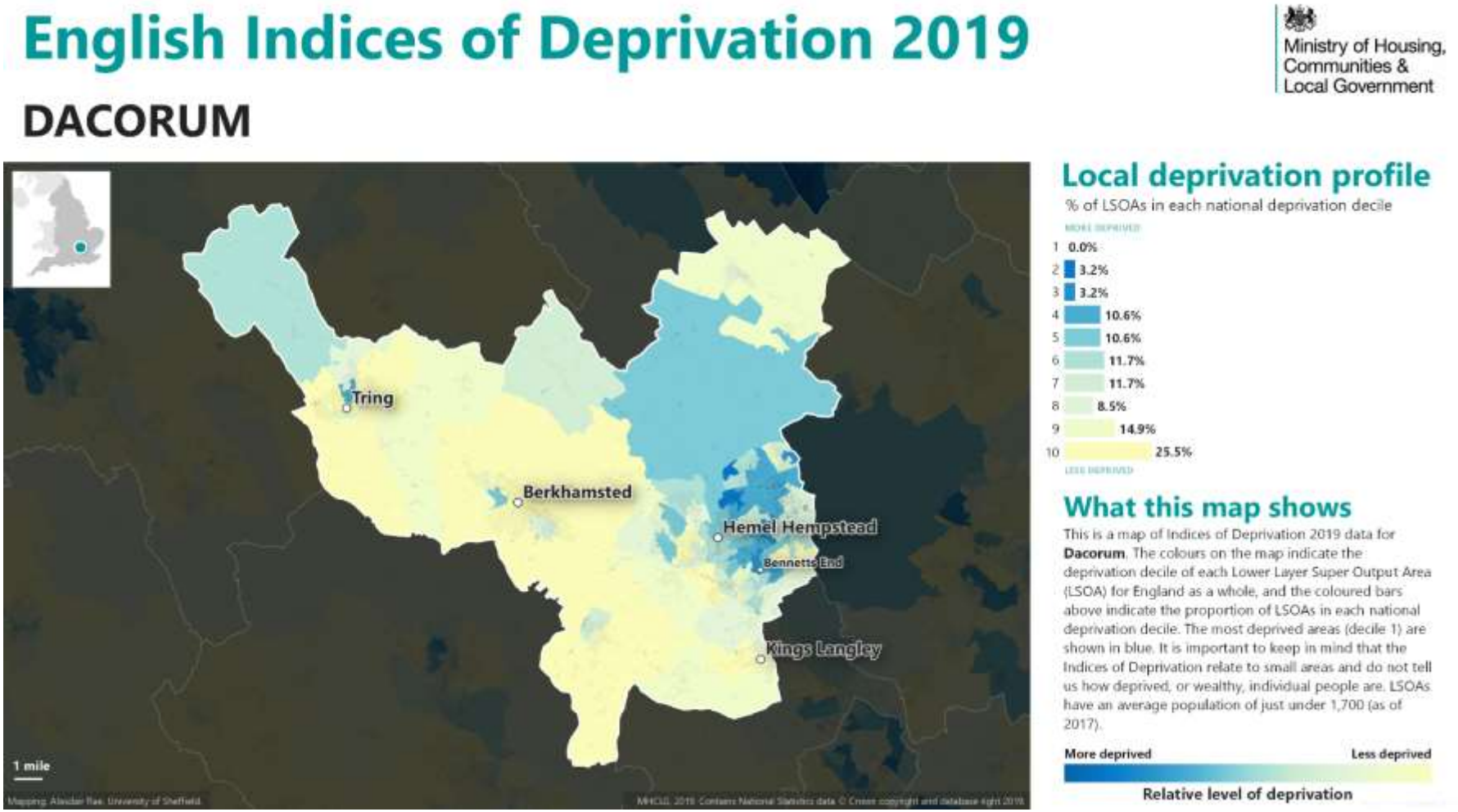
[24] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). North Hertfordshire. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-25 - St Albans Deprivation Profile (Hertfordshire), 2019[25]



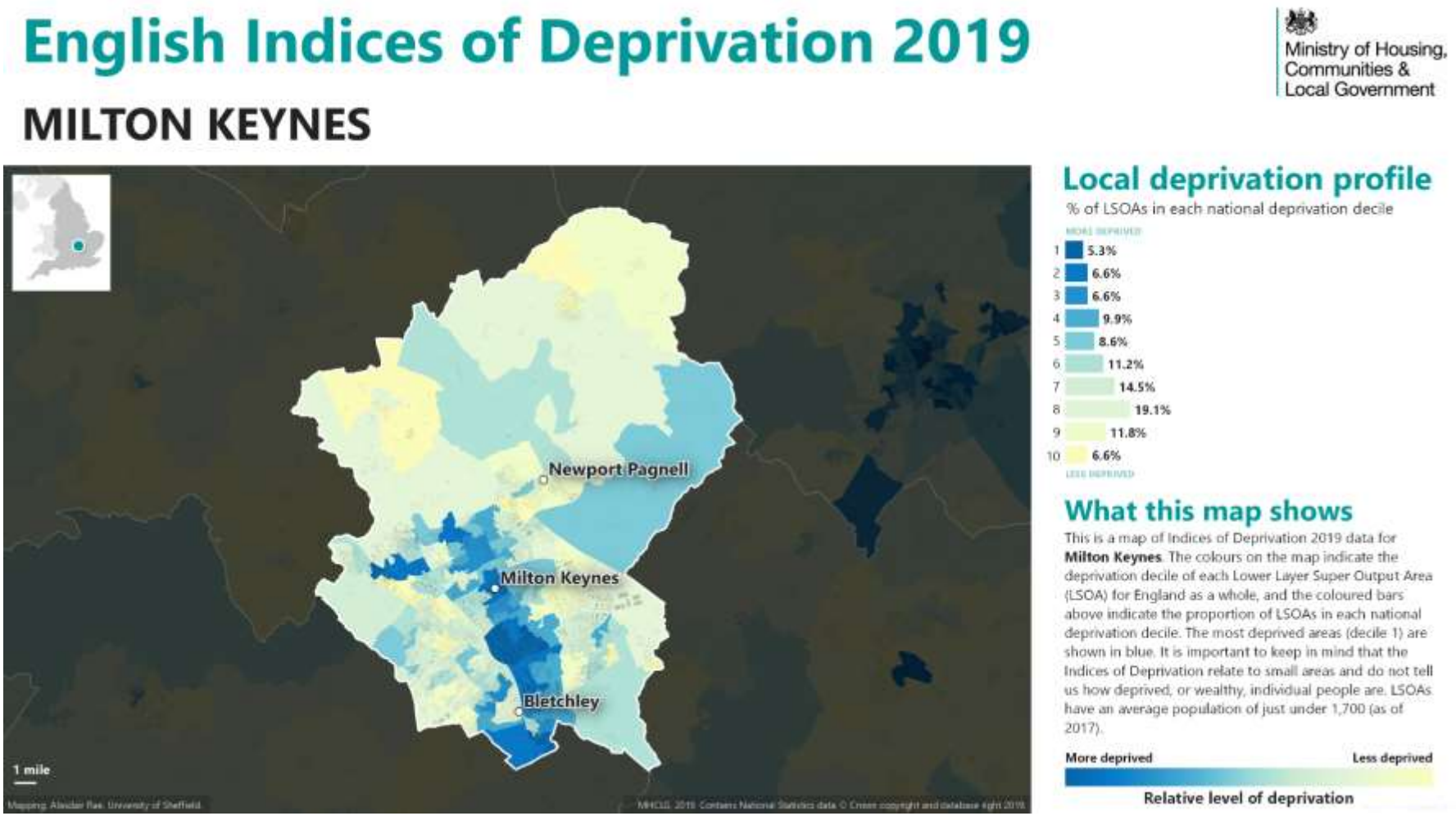
[25] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). St Albans. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-26 - Dacorum Deprivation Profile (Hertfordshire), 2019[26]



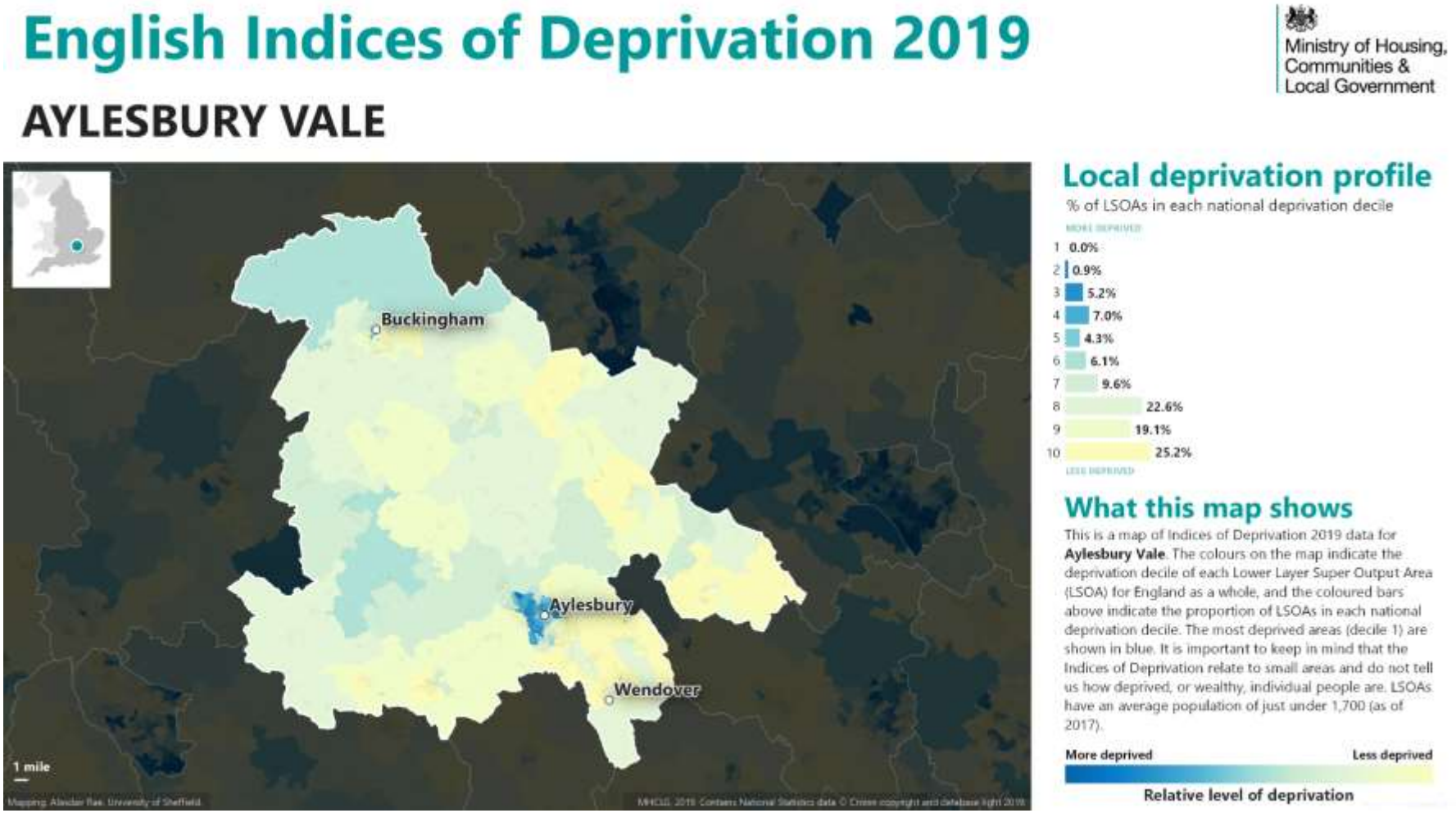
[26] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Dacorum. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-27 - Milton Keynes Deprivation Profile, 2019[27]



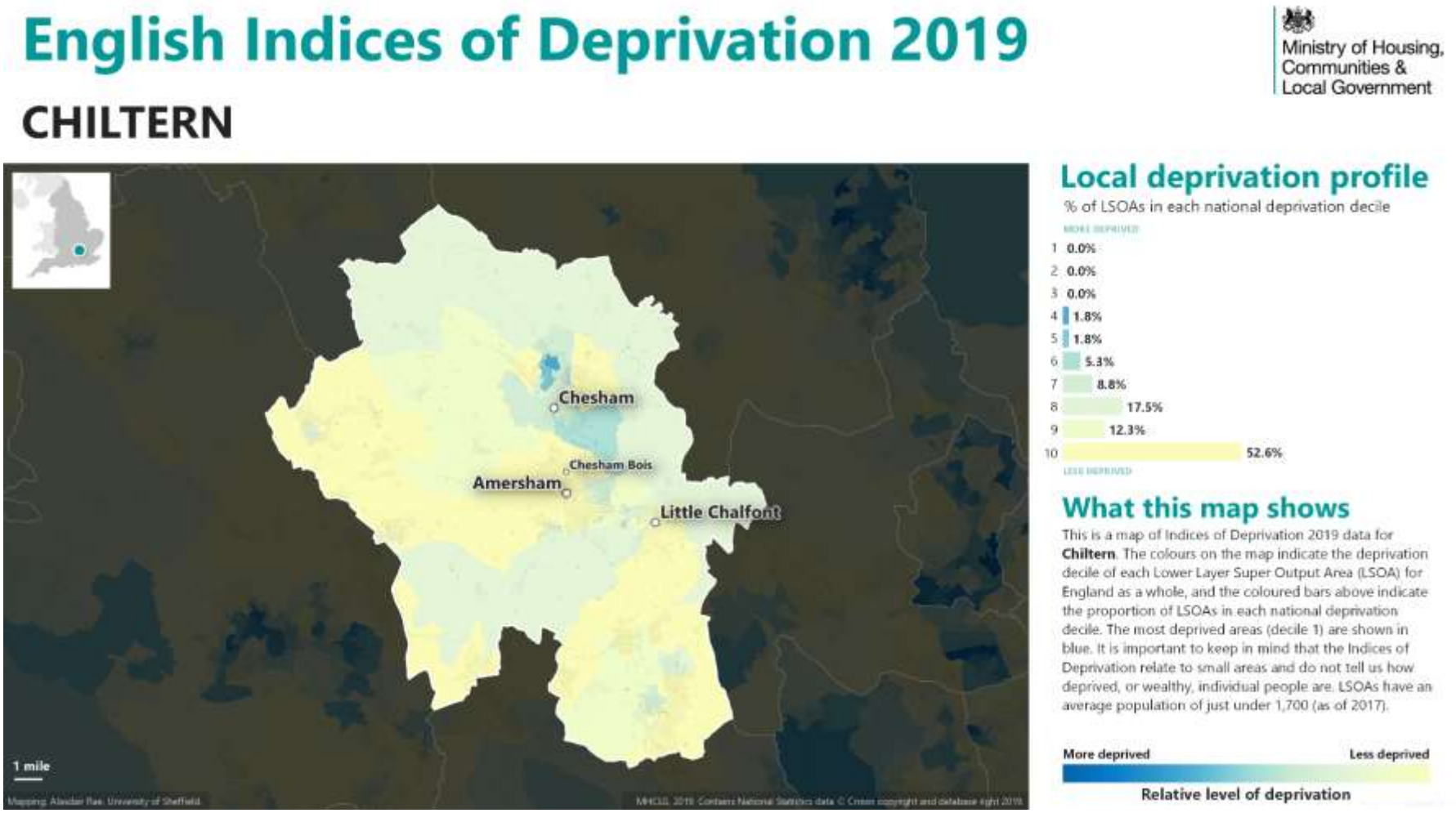
[27] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Milton Keynes. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-28 - Aylesbury Vale Deprivation Profile (Buckinghamshire), 2019[28]



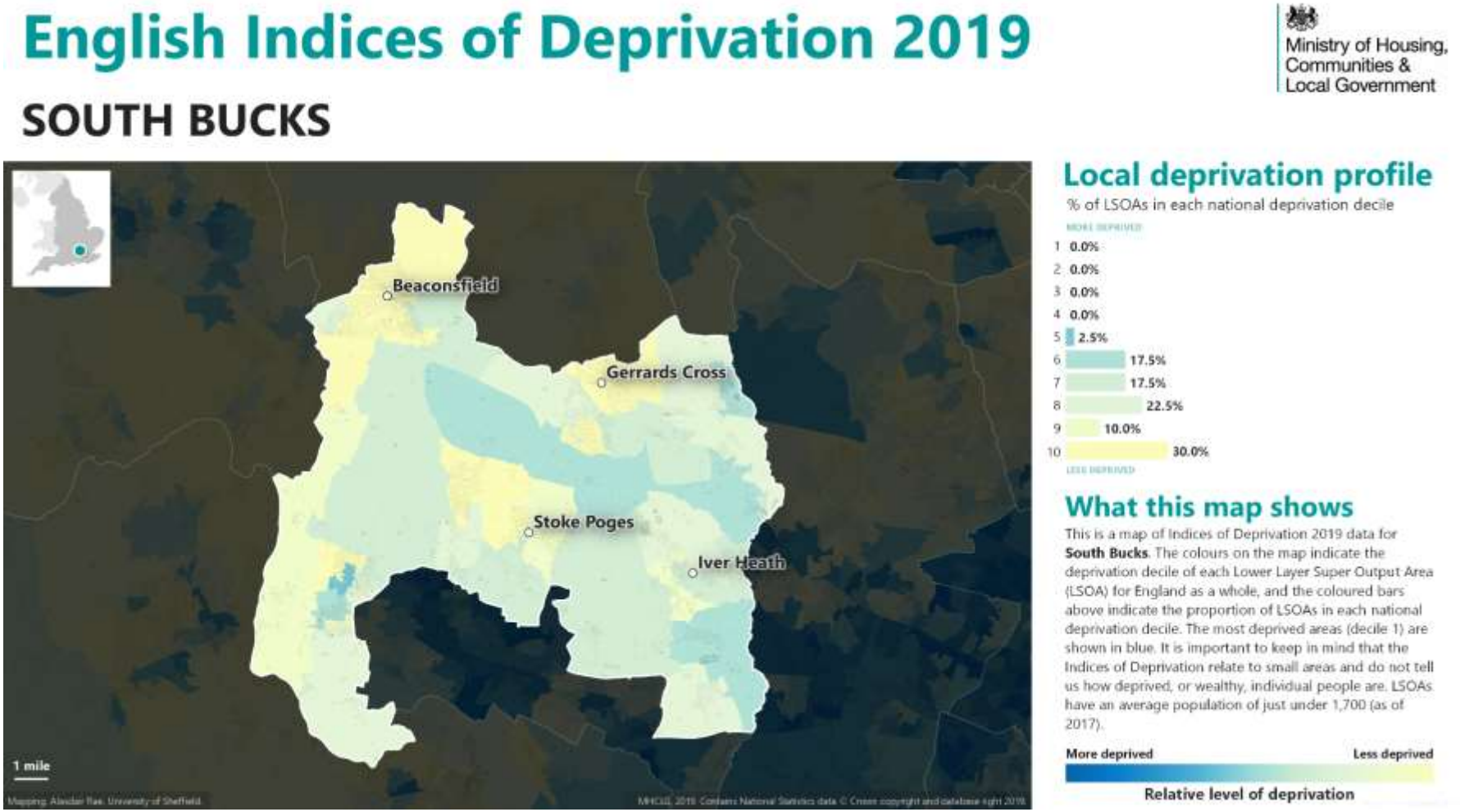
[28] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Aylesbury Vale. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-29 - Chiltern Deprivation profile (Buckinghamshire), 2019[29]



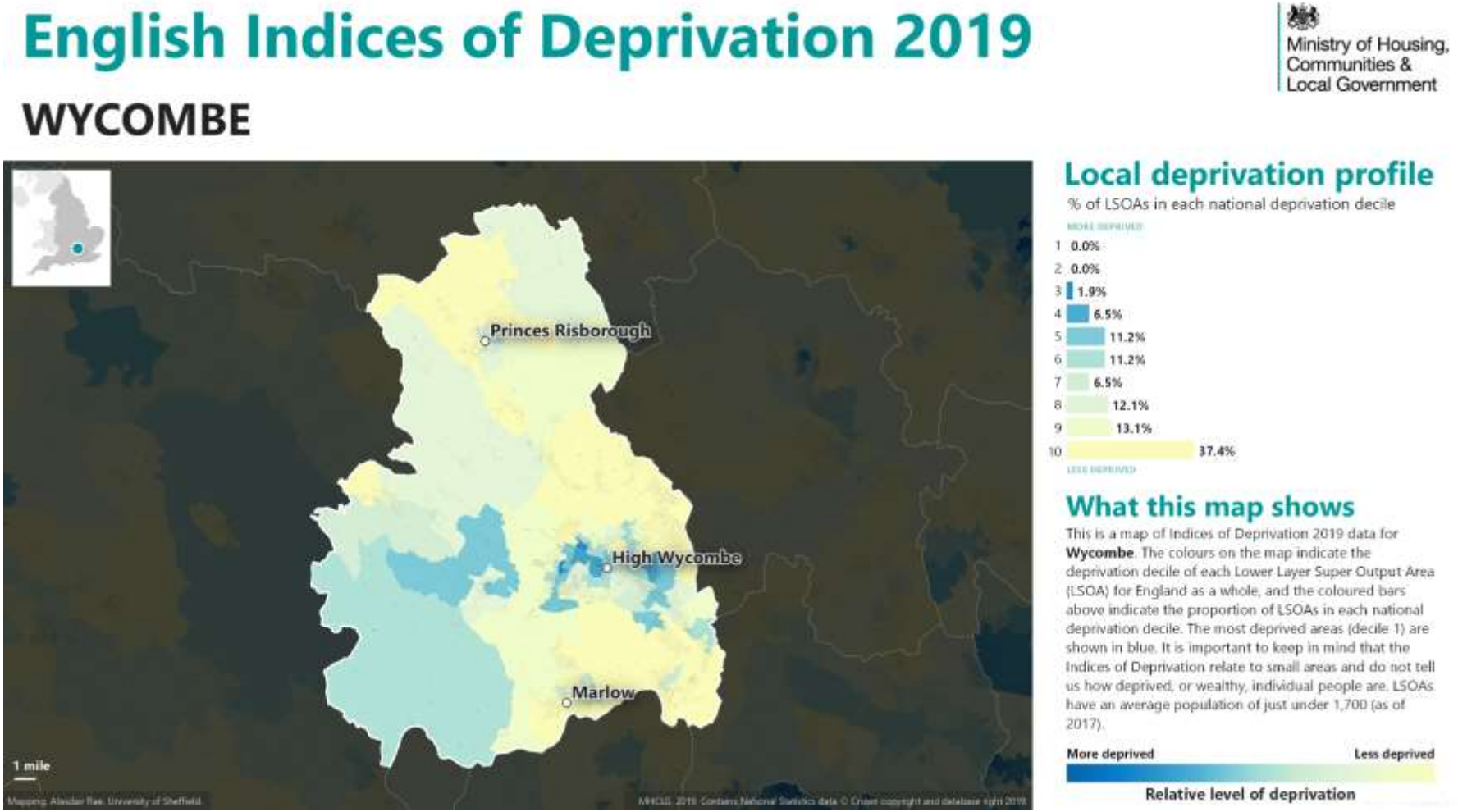
[29] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Chiltern. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-30 - South Bucks Deprivation Profile (Buckinghamshire), 2019[30]



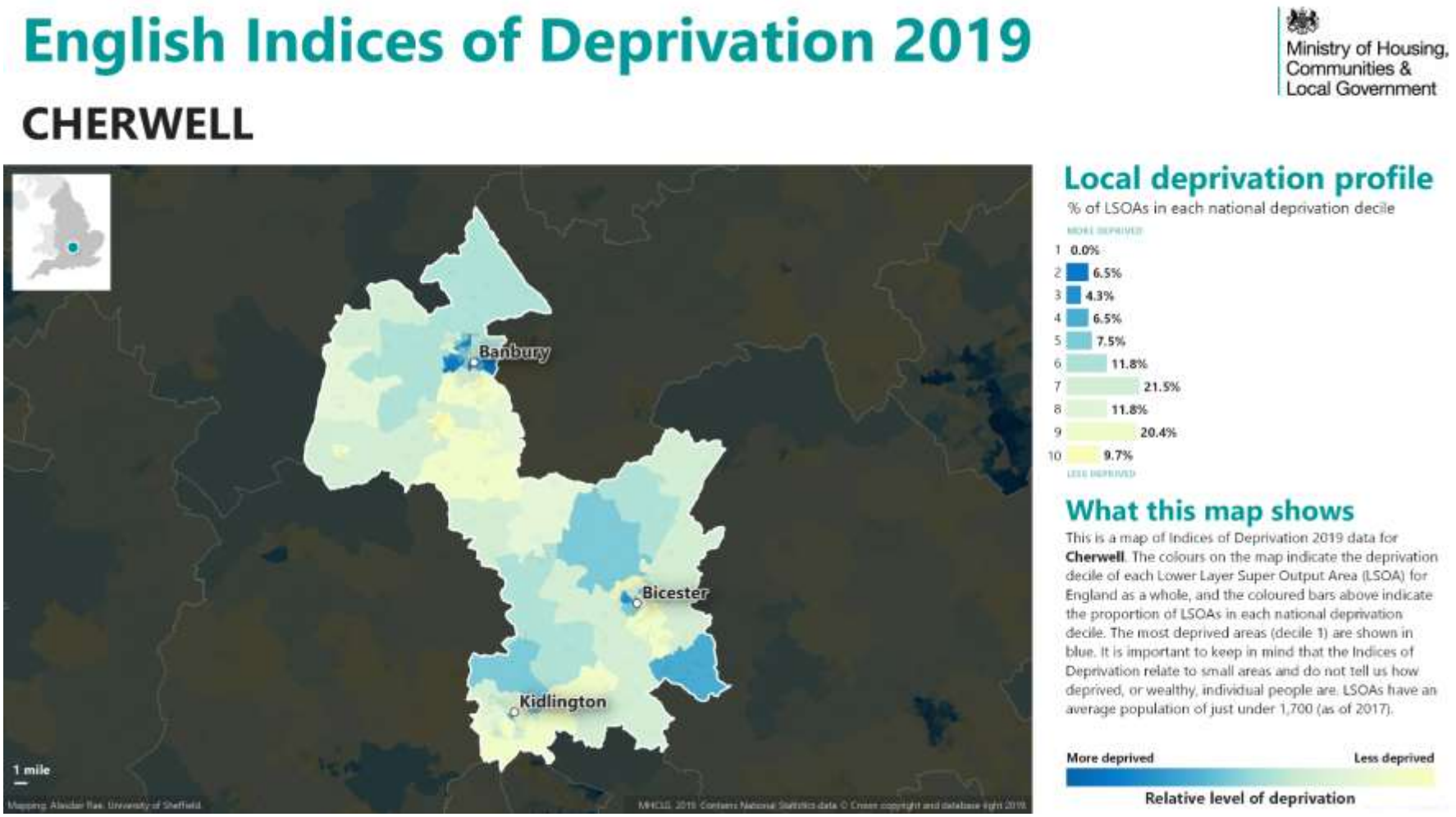
[30] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). South Bucks. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-31 - Wycombe Deprivation Profile (Buckinghamshire), 2019[31]



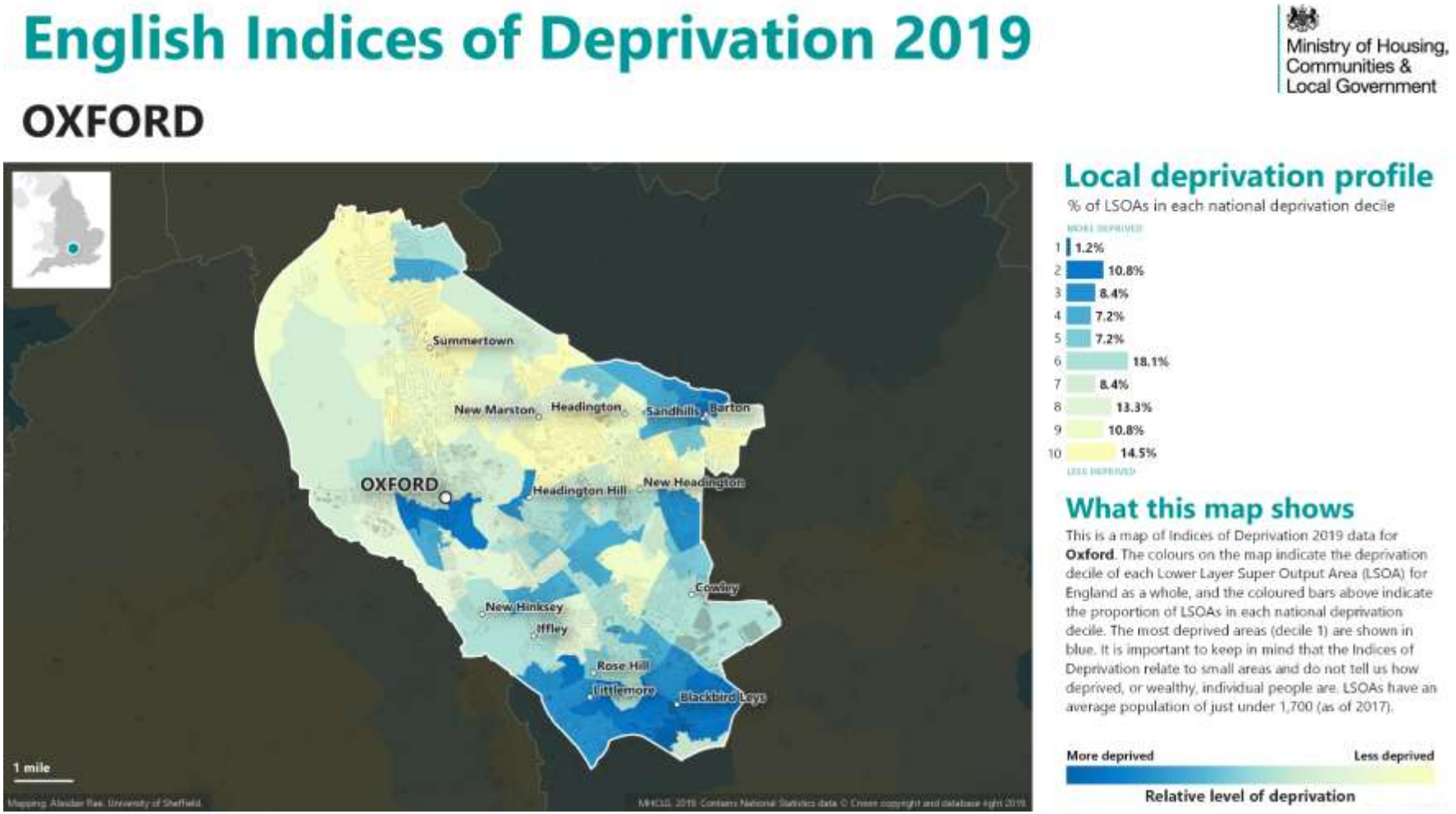
[31] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Wycombe. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-32 - Cherwell Deprivation Profile (Oxfordshire), 2019[32]



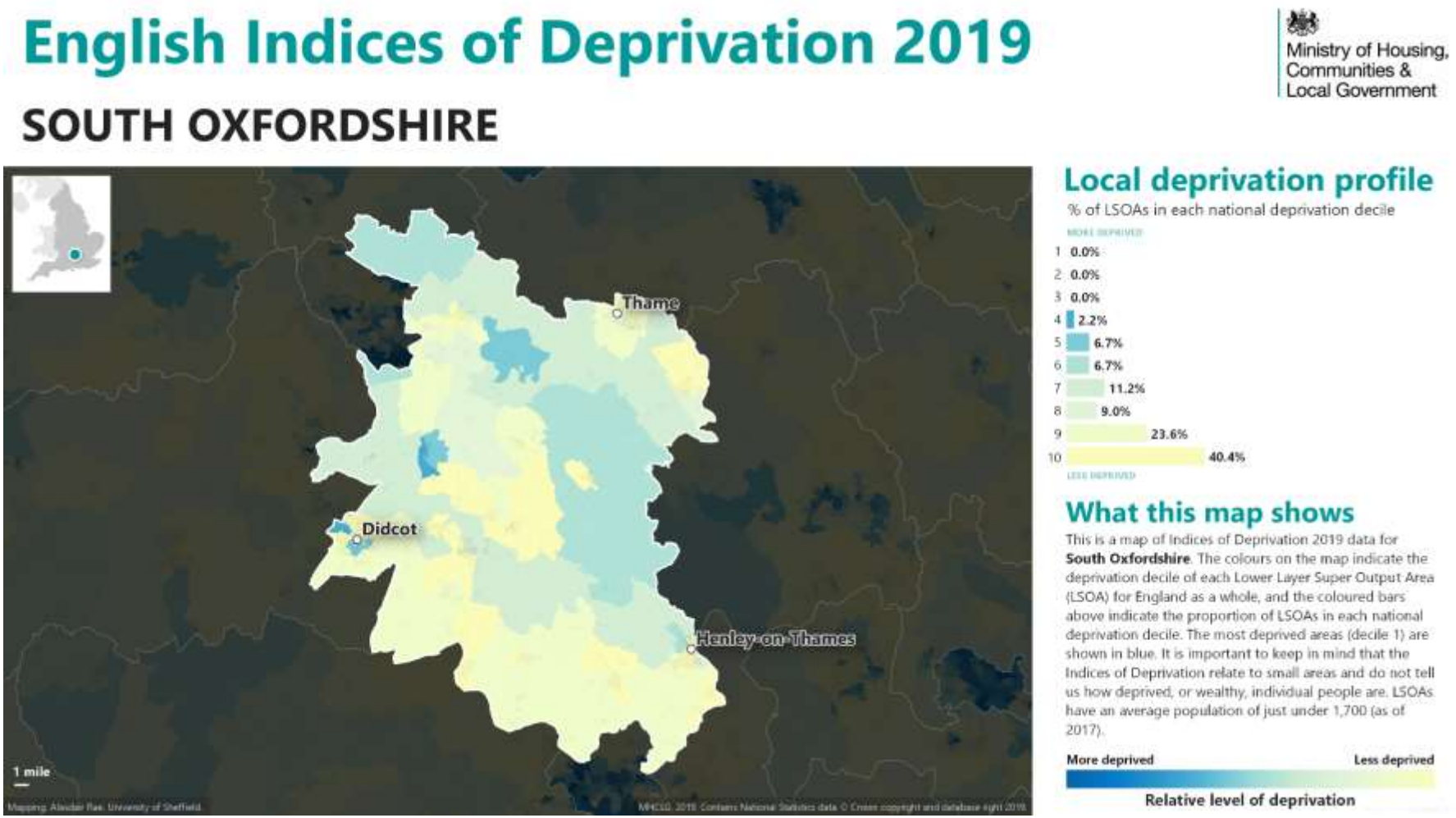
[32] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Cherwell. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-33 - Oxford Dperivation Profile (Oxfordshire), 2019[33]



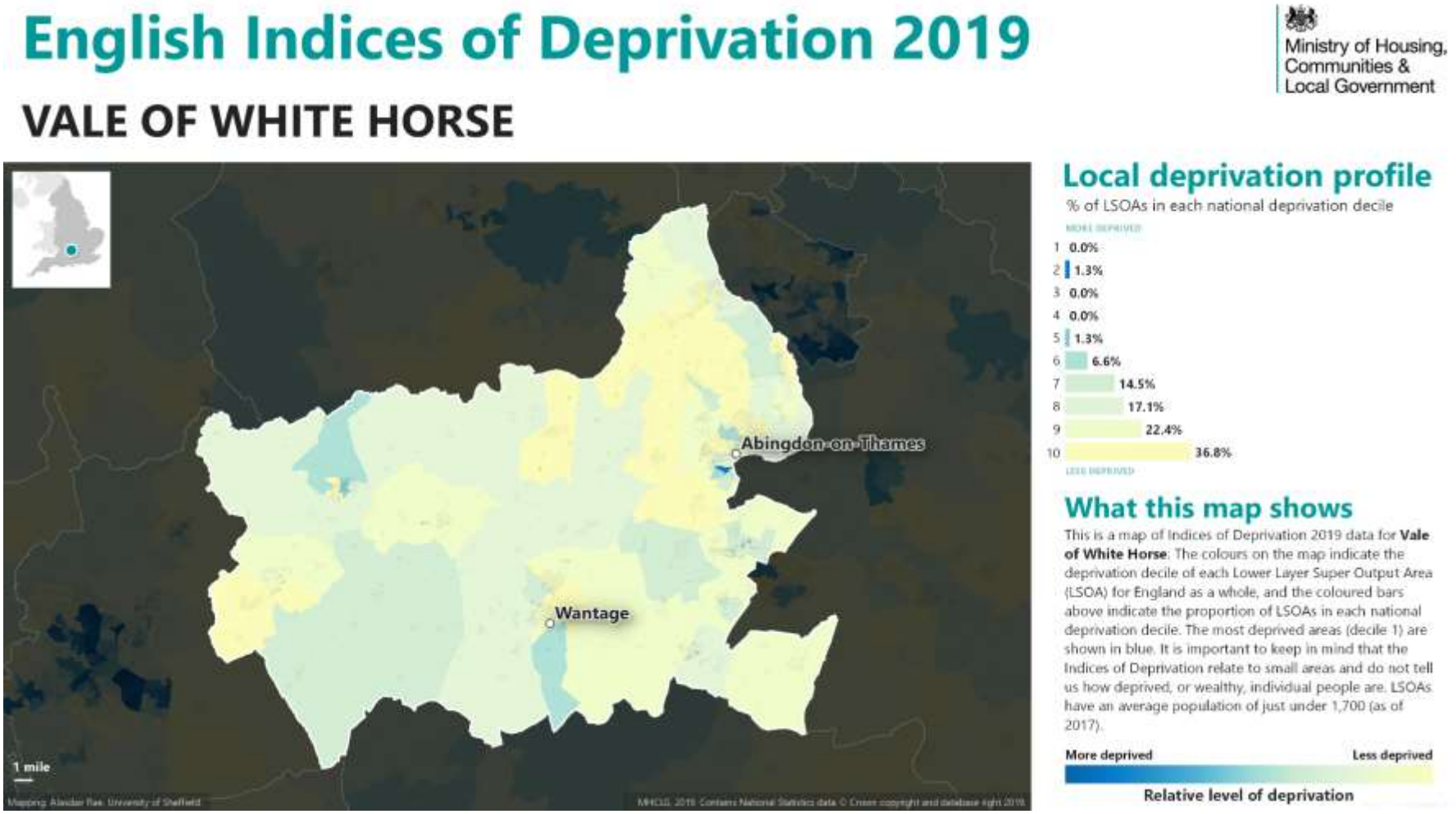
[33] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Oxford. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-34 - South Oxfordshire Deprivation Profile (Oxfordshire), 2019[34]



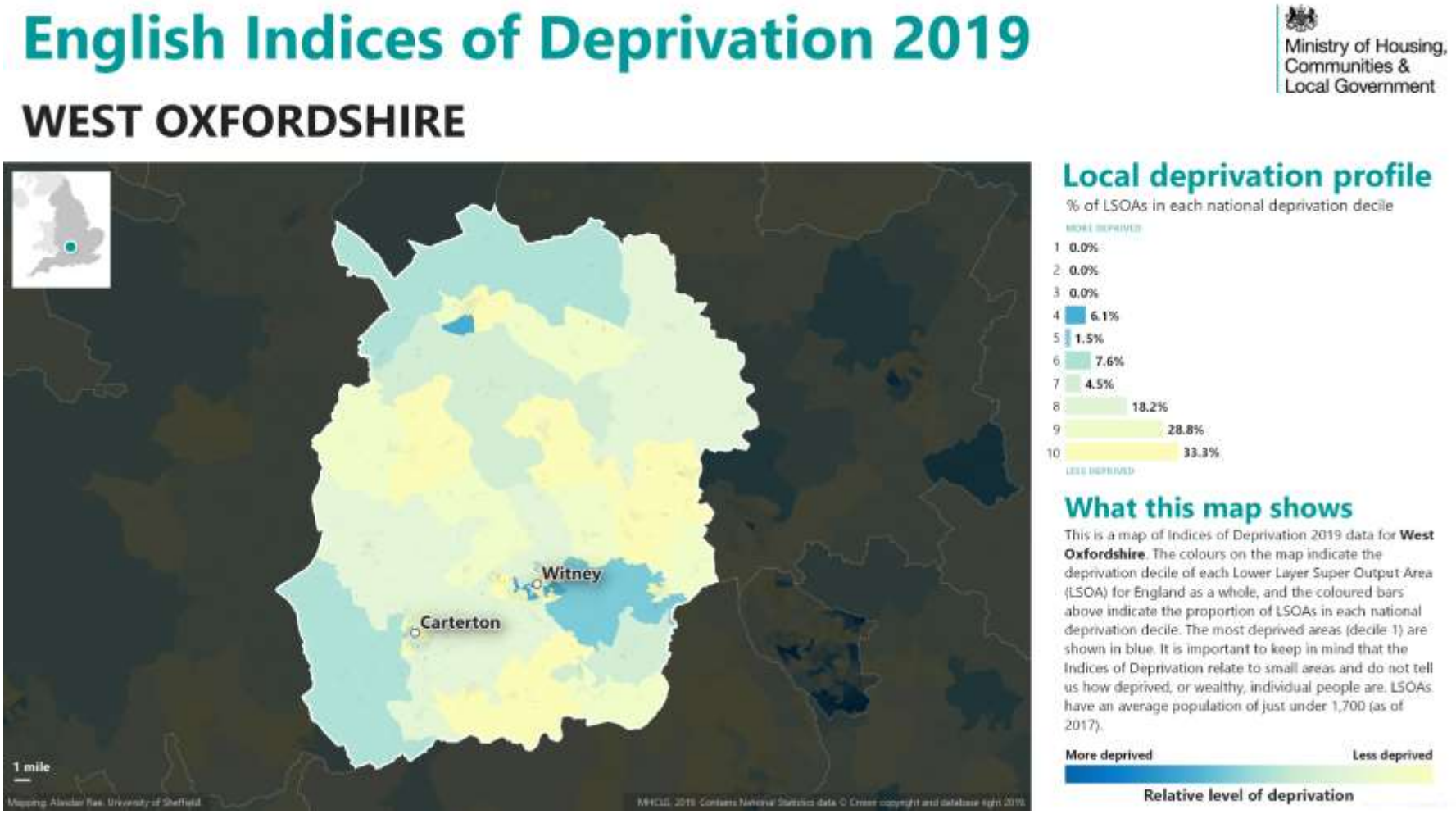
[343434] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). South Oxfordshire. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-35 - Vale Of White Horse Deprivation Profile (Oxfordshire), 2019[35]



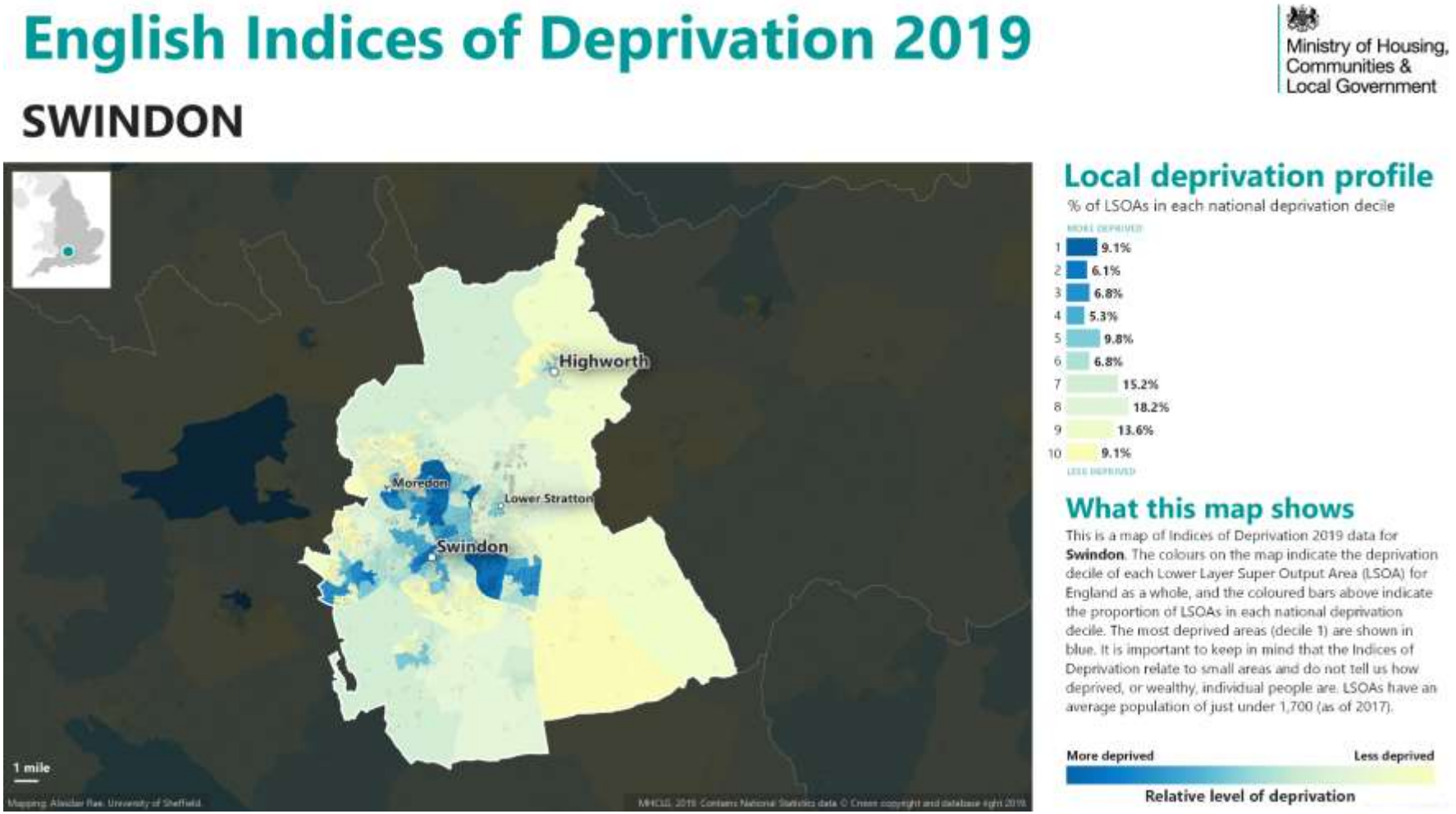
[35] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Vale of White Horse. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-36 - West Oxfordshire Deprivation Profile (Oxfordshire), 2019[36]



[36] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). West Oxfordshire. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

Figure A-37 - Swindon Deprivation Profile, 2019[37]



[37] University of Sheffield (in collaboration with the Ministry of Housing, Communities & Local Government), English Indices of Deprivation (2019). Swindon. Available at: https://imd2019.group.shef.ac.uk/ Accessed 12 May 2020

The Forum
Barnfield Road
Exeter, Devon
EX1 1QR

wsp.com