InformGloucestershire

Strategic Needs Analysis Team

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Environment

The environment that surrounds us impacts on every aspect of our lives. Both the built and natural environments can affect our health and well being, aspirations and attainment, productivity, employment opportunities and our ability to thrive. The stewardship of Gloucestershire's beautiful natural environment is important for the sake of the environment itself and for the wellbeing of future generations. Creating a sustainable built environment within this, enables all people to live well, within environmental limits. The built environment should inspire us, enhancing creativity and productivity and make us feel proud of our local areas and diverse heritage. Our built environment also needs to be flexible and adaptable to future uses and be resilient to cope with local effects of climate change. Evidence suggests the type of home, community and neighbourhood we live in can lead to inequalities. To reflect the differing benefits and impacts of the natural and built environments this document has been split into two sections; the first looking at the natural environment and the second the built environment and their affects on the population.

Contents

1. Natural environment

This section looks at the relationship between the natural environment and the people who live in the county, including; landscapes, heritage and historic assets, biodiversity, access to the countryside, rural urban classification, education in the environment, farming and rural industries, pollution, waste, energy production and climate change.

Gloucestershire has an abundance of green space and countryside allowing for a wide and varied choice of cultural and leisure activities in the natural environment; including Sites of Specific Scientific Interest (SSSIs), Areas of Outstanding Natural Beauty (AONB), country parks and open spaces that all contribute to the economy of Gloucestershire and the health and wellbeing of residents. However, the two most urban districts of Gloucester and Cheltenham who have the highest populations are significantly less green than the other more rural districts.

Landscape types, heritage and historic assets

Landscape types are a generic classification for landscape character and may occur anywhere in the country where the similar combinations of geology, landform, drainage patterns, vegetation, and historical land use are found. Different landscapes have unique human responses to geophysical features and settlement patterns.

The landscape plays a role in the identity of the people who live there and different landscape types are often used to differentiate one region from another. Gloucestershire has 38 landscape character types from Limestone Hills to Urban; Wooded valleys to Drained Riverine; Farmland and Grazed Salt Marsh. This is an unusually large number for one county and is shaped by the great diversity in the underlying geography and the pattern of social, economic responses to this diversity. These character types contribute to the planning of development and decision making about land use[1]. Given the diversity of the county's landscape types it is unsurprising that the county is home to a number of strategic nature areas, these are outlined in Figure 1.

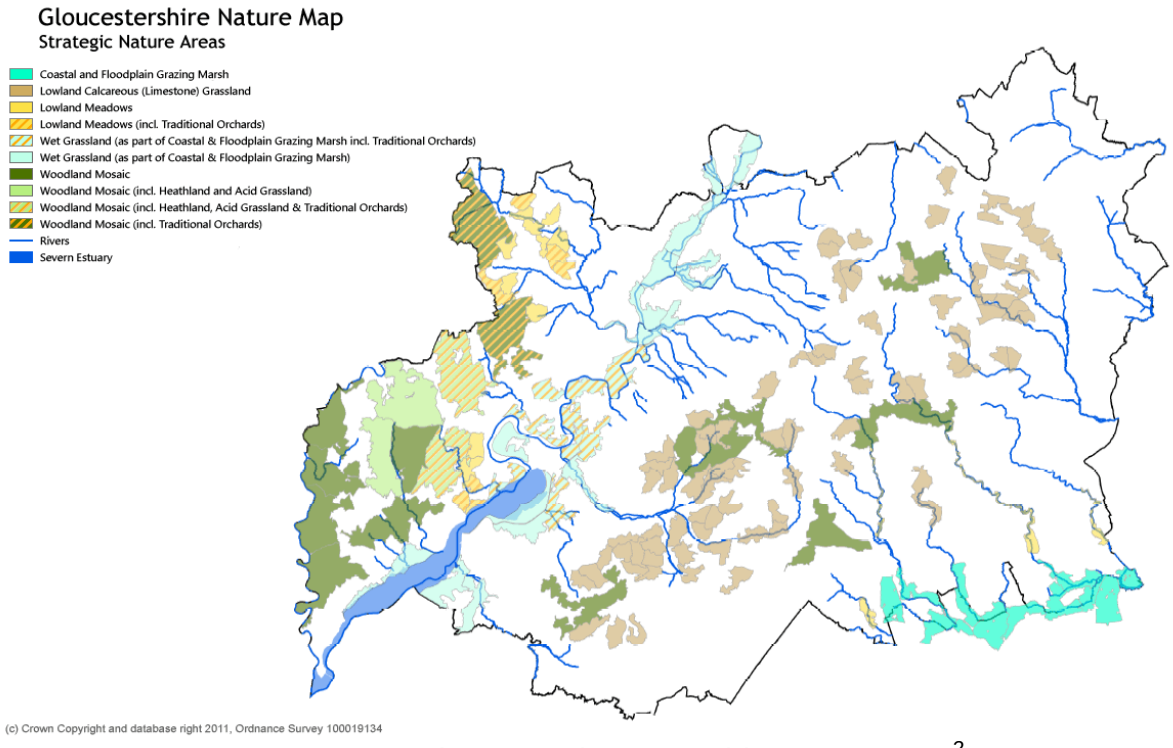

Figure 1: Gloucestershire Nature Map[2]

[1] Gloucestershire County Council http://www.gloucestershire.gov.uk/extra/article/109519/Landscape

[2] http://www.gloucestershirewildlifetrust.co.uk/sites/default/files/NatureMap-Dec2011.png

In addition there are:

- 143 Sites of Special Scientific Interest (SSSI) covering 178.54 km^2
- Four National Nature Reserves (NNRs) designated as being among the best examples of a particular habitat
- 11 Local Nature Reserves
- approximately 800 Key Wildlife Sites
- 164 Regionally Important Geology and Geomorphology Sites (RIGS)
- 3 AONB (that fall at least partly within in its boundaries); Cotswolds, Wye Valley and Malvern Hills, cover 1,364km^2 of the county meaning Gloucestershire has a higher percentage of area designated an AONB than any other authority in England (51.4%). The Cotswolds is also the largest of England's 33 AONBs.
- 5 Countryside Parks now managed by the Gloucestershire Wildlife Trust[3]
- 38km^2 of countryside managed by the National Trust[4]
- 469 Scheduled Monuments
- 12,862 Listed Buildings
- 56 Registered Parks, 7 public Gardens
- 248 Conservation Areas
- 2 historic Battlefields
- 426 registered pieces of common land

All of these recognised and protected areas add to the fabric, character and quality of the Gloucestershire landscapes and provide valuable spaces for all ages to enjoy the natural environment. They also provide jobs both directly and indirectly through tourism, conservation, farming and education. The European Landscape Convention recognises the importance of all landscape, not just the 'best' or 'most valued'[5], Gloucestershire is not only rich in recognised and protected landscapes but is also, due to the rurality of the county, high in green spaces and non designated landscapes. Figure 2 shows the extent of the Areas of Outstanding Natural Beauty in Gloucestershire. The Cotswold AONB stretches from the northern tip to the southern reaches of the county and covers over half of the county.

[3] Gloucestershire Wildlife Trust http://www.gloucestershirewildlifetrust.co.uk/countysites%20
[4] National Trust, Heelis Office
[5] AECOM Strategic Environmental Assessment of Gloucestershire's Local Transport Plan 2015 - 2031 - Context review and baseline data http://www.gloucestershire.gov.uk/CHttpHandler.ashx?id=63595&p=0

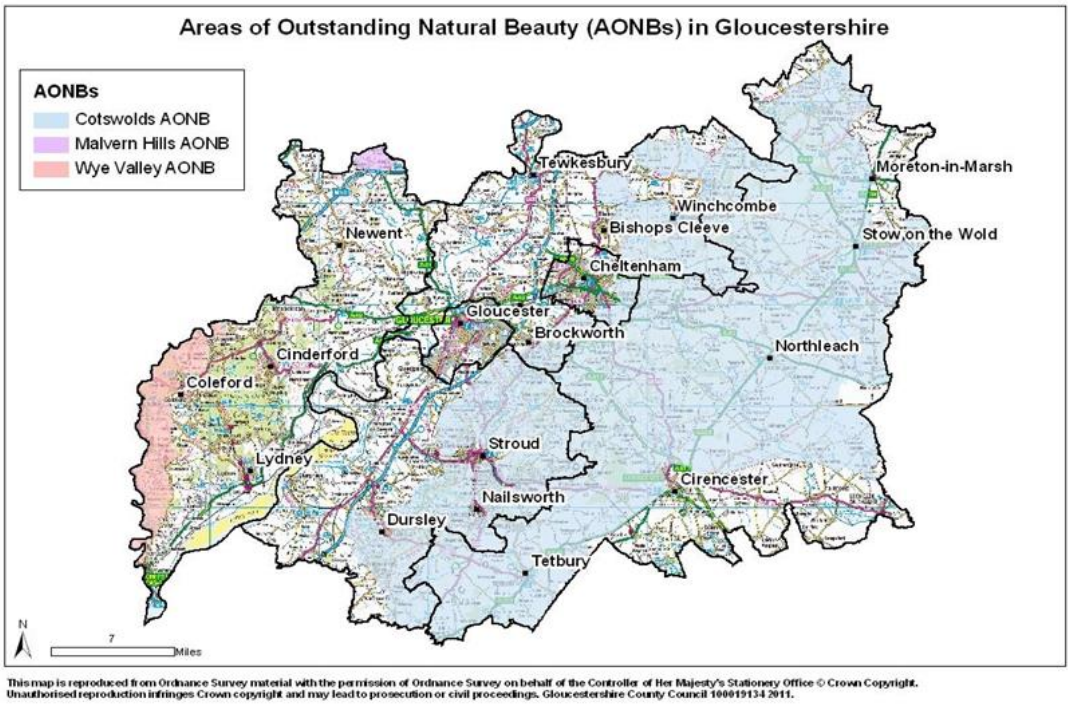

Figure 2: Areas of Outstanding Natural Beauty in Gloucestershire

Biodiversity

Biodiversity is short for *biological diversity* and means the variety of all life on earth. Biodiversity includes every living thing; plants, animals, fungi, algae, bacteria, even viruses. It includes rare species and common ones, and you can look at the biodiversity of a whole continent, or a small location like a single field. Biodiversity can provide significant benefits to our health by supporting; food security, dietary health and livelihood sustainability; by providing important resources for medical research, resources for traditional and modern medicine and in the regulation and control of infectious diseases. Biodiversity also has importance in communities' social, cultural and spiritual health; disconnection of populations from open spaces and the wider countryside have been linked to negative implications on physical and mental well-being, a loss of sense of place and an increased prevalence of so called 'diseases of affluence' (diabetes, obesity and cardio-pulmonary illness). Biodiversity can help reduce disaster risks and is essential for climate change adaptation. The biodiversity of Gloucestershire also contributes to the economy by attracting business and tourists.

Gloucestershire is a highly diverse county and is particularly special for its ancient woodland, unimproved limestone grassland, extensive wetlands, old orchards and species-rich hedgerows. It supports a range of protected and priority species some of which are becoming increasingly rare such as certain kinds of bats, amphibians, reptiles, invertebrates and rare plants.

The county's biodiversity is a precious resource that needs protecting and enhancing for the future. One of the most significant threats to biodiversity is change in land use and the isolating or separation of habitats. Highways & Biodiversity Guidance for Gloucestershire[6] sets out a series of detailed recommendations to conserve and boost the biodiversity of the environment adjacent to and affected by the building and maintenance of highways. It also highlights the importance of 'green networks' which allow safe movement for species between habitats. The emerging Local Plans of districts in Gloucestershire have identified 12 strategic scale housing and employment developments that could potentially adversely affect biodiversity, such as the Hunts Grove extension, South

[6] Gloucestershire County Council, Highways & Biodiversity Guidance for Gloucestershire 2015 http://www.gloucestershire.gov.uk/CHttpHandler.ashx?id=51669&p=0

Cheltenham, Stroud Valleys and Sharpness proposals[7]. Internationally and nationally designated sites in the vicinity of these areas are particularly vulnerable from development such as Sites of Special Scientific Interest (SSSIs) and Biodiversity Action Plan (BAP) Priority Habitats.

The Gloucestershire Wildlife Trust is working to restore, recreate and reconnect wildlife rich spaces in Gloucestershire by adopting a Living Landscape approach to conservation. This should provide a mosaic of reserves, farmland, amenity land and built up areas for wildlife to thrive. These projects are also engaging local communities and schools by providing volunteering and training opportunities and promoting awareness of the environment through shows, walks and events[8].

Rural Urban classification

The natural environment in Gloucestershire contributes to the make-up of the population. The Office for National Statistics (ONS) has classified Gloucestershire as a 'Predominantly Rural County'. This means that between 26% and 50% of the County's population lives in rural settlements and large market towns, the actual figure is 42.3%. ONS classifies the county and districts using a methodology where 'rural' and 'rural related'[9] are added to give an overall rural score. Using this method Cotswold and Forest of Dean are classified as 'Mainly Rural' with 100% and 95% of residents respectively living in rural settlements. Tewkesbury is classified as 'Largely Rural' with 53% of residents living in rural settlements (but has overspill sub-urban settlements from both Gloucester and Cheltenham). Stroud is classified as 'Urban with Significant Rural' as 42% of the population live in rural settlements. Cheltenham and Gloucester are both classified as 'Urban with city and town' with only 0.3% and 0% respectively living in rural settlements[10].

However by looking at the rural urban classification by census output area a more detailed picture of the rural urban split of Gloucestershire can be seen. Figure 3 shows the rural urban classification of Gloucestershire at a lower level. At this level the split is different than above, Cotswold has 80% of the population living in rural settlements, and Forest of Dean 66%, at this level only Cotswold would meet the criteria of 80%> of residents living in rural settlements and therefore be classified as 'Predominantly rural'. Stroud remains 'Urban with significant rural' with 29% of the population in rural settlements and Tewkesbury becomes 'Urban with significant rural' with 31% of the population in rural settlements. Cheltenham and Gloucester, shaded predominantly brown on the map, are still classified as 'Urban with city and town'.

[7] AECOM Strategic Environmental Assessment of Gloucestershire's Local Transport Plan 2015 - 2031 - Scoping report http://www.gloucestershire.gov.uk/mobile/CHttpHandler.ashx?id=62558&p=0

[8] Gloucestershire Wildlife Trust, http://www.gloucestershirewildlifetrust.co.uk/livinglandscapes

[9] 'Rural related' refers to a hub town with a usual resident population of between 10,000 and 30,000 that meets the service requirements of the surrounding rural community and where the rural share of the service use is higher than the urban share

[10] Rural Urban classification is defined as: Urban with city and town(less than 26% inhabitants living in rural settlements) Urban with significant rural (26-49% inhabitants living in rural settlements) Largely rural (50-79% inhabitants living in rural settlements) Mainly rural (80% or more inhabitants living in rural settlements). Department for Environment, Food and Rural Affairs, Rural urban classification https://www.gov.uk/government/statistics/2011-rural-urban-classification-of-local-authority-and-other-higher-level-geographies-for-statistical-purposes

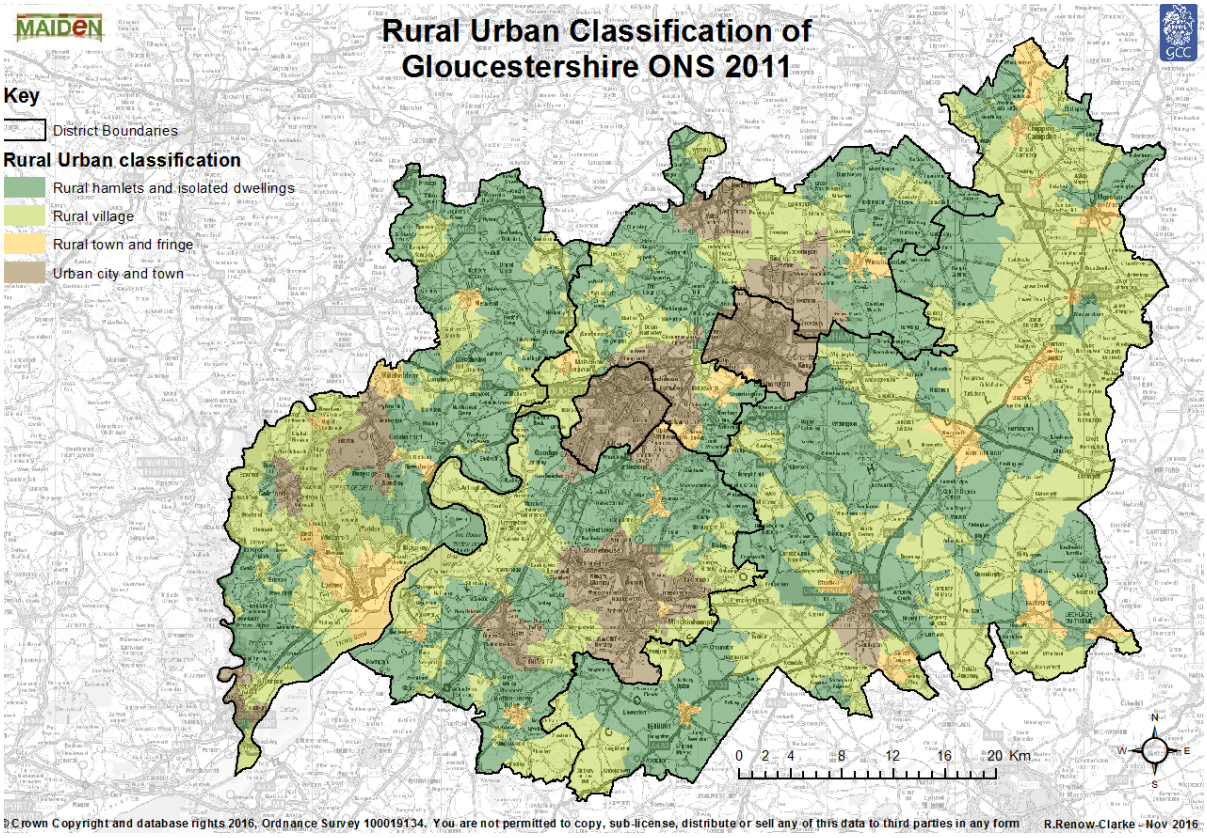

Figure 3: Rural Urban classification of Gloucestershire

In 2014 over 50% of England's rural population were over 45 compared to around 40% in urban areas[11]. Gloucestershire follows this rate with 50% of the rural population over 45, although this rises to 55% in Cotswold and 53% in Forest of Dean, compared to 42.5% in urban areas[12]. The level of older people living in more rural and often more isolated locations in the county can lead to difficulties in accessing important health resources and services. Work done on accessibility shows in Cotswold it is difficult for people to access key services (GPs, pharmacies and A&E's) using public transport[13].

Nationally investment in employees by business' in rural areas is significantly lower than in urban areas[14]. This could result in lower wages and employment satisfaction in rural areas, which in turn can affect the health of the working population. Prominent industries and occupations within districts, which have often developed due to environmental factors, vary from area to area and give a distinctive character to both the built and natural environment and the population.

Farming and rural industries

Gloucestershire's natural assets are an important component of the rural economy, particularly for sectors such as Agriculture, Food and Drink and Leisure and Tourism, as well as for new 'green' businesses such as those working in environmental technology and alternative energy.2,242 Km^2 (71%) of Gloucestershire's land area is farmed under a

[11] Department for Environment, Food and Rural Affairs, Rural urban classification https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/554917/Rural_population_and_migration_2015.pdf

[12] Mid 2015 population estimates http://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/censusoutputareaestimatesinthesouthwestregionofengland

[13] Accessibility Toolkit.

[14] https://www.gov.uk/government/statistics/rural-investment

commercial farm holding, of that 60% is managed grassland, often used for grazing cattle for beef and dairy products in the Severn vale and sheep in the Cotswold hills[15]. The level of farming land in the county has shaped its landscapes over many hundreds of years and continues to contribute to its natural rural beauty.

The agricultural sector in Gloucestershire is evolving and continues to thrive due to investment in agri-tech projects and sustainable development. Farmers and land owners also play a key role in conservation and sustainability of the landscape. It is estimated that in 2011/12 expenditure in environmental stewardship schemes in Gloucestershire led to an output contribution of approximately £9.1 million into the local economy[16] .

Agricultural workers can be susceptible to industry specific diseases and conditions. Zoonoses, relates to infections between animals and humans and occurs in industries with high contact with animals such as agricultural workers; however most causes of zoonosis are via contamination in the food chain. Agricultural practices and slaughter procedures can reduce zoonoses cases if measures are taken pre-slaughter. Infections include HPAI (Bird flu), Bat rabies, Bovine tuberculosis, Salmonellosis and Campylobacteriosis which was the most commonly reported zoonosis. In the UK campylobacteriosis causes approximately 280,000 cases of food poisoning and 100 deaths a year with a cost approximately £900 million to the UK economy. Most campylobacteriosis in the UK is linked to contaminated poultry. In 2014 152 (or a rate of 0.25 per 1000) incidents of food poisoning were reported in Gloucestershire, Figure 4 shows a disproportionate number of these were in the Cotswold district[17].

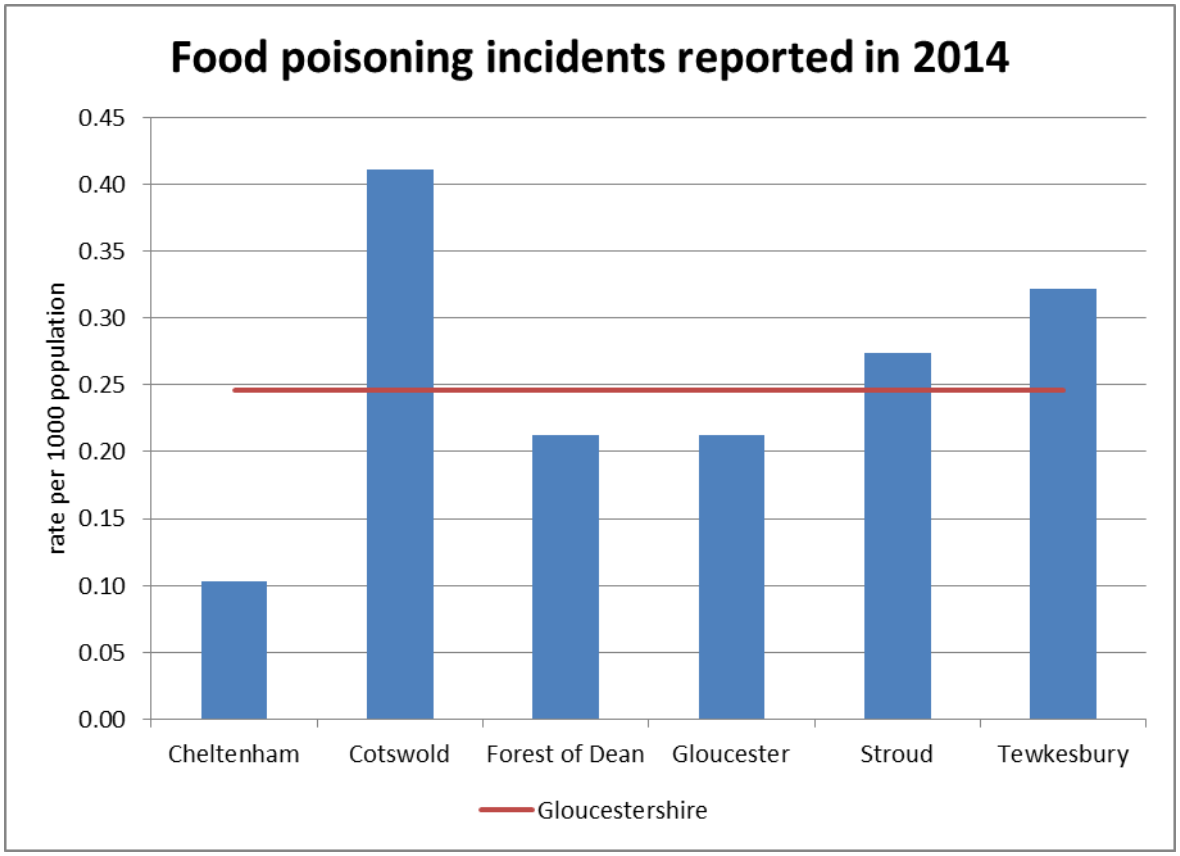

Figure 4: Food poisoning incidents reported in 2014 per 1000 by district

[15] National Farmers Union https://www.nfuonline.com/assets/9490?u=0fUt7twr4y9rERZpQTMa5Q
[16] *Ibid.*
[17] Public Health England https://www.gov.uk/government/collections/notifications-of-infectious-diseases-noids

Gloucestershire has an important crushed rock aggregates industry in the Forest of Dean and in the Cotswolds where limestone is mined. Gloucestershire's sales of crushed rock over the 10 year period 2003-2012 averaged 1.6 million tonnes per year. Production of sand and gravel averaged 0.83 million tonnes per year over the same period[18] .

Gloucestershire's rural towns, distinctly beautiful landscapes and the wealth of rural heritage, combined with good accessibility from the rest of the country means tourism is also important to the county. The scale and distribution of tourism across Gloucestershire varies and accommodating it has implications on; changes to land use, environment, traffic flow and the transport systems.

Access

Research has indicated that access to quality outdoor environments affects; activity attitudes and behaviours, mental health and indirectly improves levels of satisfaction with home and work life, and with life in general[19]. For example research has shown walking in natural environments reduces symptoms of stress more effectively than walking in an urban environment[20]. Natural England has developed an Accessible Greenspace Standard (ANGSt) which recommends all people should have accessible natural green space no more than 300m away from their home[21]. Inactive lifestyles have long been known to result in obesity and other significant health problems; the cost of this physical inactivity to the economy in England is calculated to be £8.2 billion per year[22]. In a European study, residents in areas with the highest level of greenery were 3 times more likely to be physically active and 40% less likely to be overweight or obese than those living in the least green settings[23]. Open spaces make important contributions to communities the positive link between green spaces and increased moderate exercise was found to be more apparent among the elderly, stay-at-home parents and people from lower socio-economic groups.

Public access to the countryside is extensive across Gloucestershire; the county is bisected by 3 National Trails (Cotswold Way, Thames Path and Offa's Dyke Path)[24] and has 9,500 other public rights of way covering 5,550 km[25]. It is estimated 30.4% of Gloucestershire's population utilise open space for exercise or health reasons in any given week. This is higher than the England level of 17.9% and the South West level of 25.4%[26].

People considering walking to task destinations (shops, work, and amenities) were shown to perceive routes with fewer trees to be longer than they actually were and were therefore less likely to walk[27]. Part of Gloucestershire's response to the Local Transport Plan is to investigate promotion of enhancements to green infrastructure networks, this could lead to more task destination based exercise, as people would be more likely to walk or cycle[28] .

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[18] SEA scoping report http://www.gloucestershire.gov.uk/mobile/CHttpHandler.ashx?id=62558&p=0

[19] RSPB, Every Child Outdoors: Children need nature, nature needs children 2010 https://www.rspb.org.uk/Images/everychildoutdoors_tcm9-259689.pdf

[20] RSPB, Natural thinking, June 2007 https://www.rspb.org.uk/Images/naturalthinking_tcm9-161856.pdf

[21] Public Health England, Local action on health inequalities: Improving access to green spaces 2014 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/357411/Review8_Green_spaces_health_inequalities.pdf

[22] J Epidemiol Community Health v.61(4); 2007 Apr http://www.ncbi.nlm.nih.gov/pubmed/26453194

[23] Arborist News 'City trees, nature and physical' February 2008 http://www.naturewithin.info/CivicEco/ArbNews_PhysActvty.pdf.

[24] Gloucestershire County Council https://gloucestershire.firmstep.com/default.aspx/RenderForm/?F.Name=B75apJt4Qgo&HideToolbar=1

[25] Gloucestershire County Council, Public Rights of Way information Pack http://www.gloucestershire.gov.uk/media/adobe_acrobat/0/a/Public%20Rights%20of%20Way%20information%20pack.pdf

[26] Public Health England, public health outcomes http://www.phoutcomes.info/public-health-outcomes-framework#page/3/gid/1000041/pat/6/par/E12000009/ati/102/are/E10000013/iid/11601/age/164/sex/4

[27] *Ibid.*

[28] Gloucestershire County Council, Strategic Environmental Assessment of the Gloucestershire

Education in the natural environment

Access and connection to the outdoors and environment have an important benefit for children; their education, health and well-being. Children increase their physical activity levels when outdoors and are attracted to nature which is an important learning tool[29]. In a study project commissioned by Natural England in 2015, it was concluded "For the first time, the Natural Connections project provides strong evidence that learning outdoors has multiple benefits for school children. 92% of teachers surveyed said that pupils were more engaged with learning when outdoors and 85% saw a positive impact on their behaviour." Well planned and implemented learning outside the classroom contributed significantly to raising standards, combatting under achievement and could make an important contribution to pupils' future economic wellbeing. Research has shown children with ADHD and other behavioural issues may benefit from more time in contact with nature. 92% of pupils involved in the project said they enjoyed their lessons more when outdoors, with 90% feeling happier and healthier as a result[30] Contact with nature has also been linked with development of positive self image, confidence, enhanced social skills and experience of dealing with uncertainty in all children[31]. This is important as rates of anxiety in children and young adults has risen in recent years; evidence suggests approximately 1 in 6 children suffer from anxiety related conditions nationally; this rises significantly in vulnerable groups, yet only approximately 8% of school children regularly get out of the classroom to be taught in green open space.

Technology brings many benefits for children, and now forms a key part of growing up, developing an identity and connecting with friends. Changes in how children relax and communicate in recent years have shifted children's free time from being spent predominantly outside to predominantly inside. Research by web security firm AVG claims that more small children can play a computer game or use a smartphone application than ride a bike, tie their own shoelaces or swim unaided[32]. It has been suggested only 10% of children regularly play outside today compared to 40% in 1970[33]. Parents' and children's concern about road traffic injury is a major contributor to physical inactivity, as parents can be reluctant to allow children out of the home without constant adult supervision. Green urban environments like parks and gardens are important places children can experience the environment and play safely outdoors in addition to the open countryside. Spending less time generally outdoors has also been strongly linked to development of Myopia or short-sightedness. Rates of children developing myopia in the primary years have increased dramatically around the world in the last decade and research has shown this is correlated with lack of time spent outdoors[34]. A recent UK study which monitored changes in children's eyes shows that nearly one in five teenagers are myopic. This is more than double the proportion of similar-aged children affected in the 1960s – an increase from 7 per cent to 16 per cent[35].

There are approximately 8 dedicated forest schools in Gloucestershire and many schools in the county are providing outdoor classrooms and learning environments on site. In addition to this many of Gloucestershire's conservation and tourist destinations, such as Slimbridge Wetland Centre, have a dedicated education officer to provide outdoor leaning and engage with all learners especially children.

Local Transport Plan 3 Review http://www.gloucestershire.gov.uk/mobile/CHttpHandler.ashx?id=62558&p=0

[29] RSPB, Every Child Outdoors: children need nature, nature needs children 2010 https://www.rspb.org.uk/Images/everychildoutdoors_tcm9-259689.pdf

[30]Natural England, July 2016 https://www.gov.uk/government/news/englands-largest-outdoor-learning-project-reveals-children-more-motivated-to-learn-when-outside

[31] *Ibid.*

[32] Telegraph, http://www.telegraph.co.uk/technology/news/10529785/How-technology-is-changing-childhood.html

[33]Gloucestershire Wildlife Trust, October 2013 http://www.gloucestershirewildlifetrust.co.uk/news/2013/10/16/major-study-reveals-children-are-out-touch-nature

[34] Nature.com, http://www.nature.com/news/the-myopia-boom-1.17120

[35] Edinburgh News, http://www.edinburghnews.scotsman.com/news/health/experts-warn-children-s-eyesight-ruined-by-life-indoors-1-4121909

External air pollution

Air pollution both inside and outside the home causes at least 40,000 deaths a year in the UK, according to a report; which estimates the cost of the damage at £20bn[36]. Air pollution can exacerbate many chronic conditions and can be the cause of both short and life long effects on health, particularly vulnerable are children and people with heart or lung conditions or those with breathing problems. The volume and speed of motorised traffic can also reduce opportunities for positive contacts with other residents in a neighbourhood and, for many people, can contribute to increased social isolation. A study of three streets in Bristol, for example, found that people living in a street with heavy traffic had significantly fewer friends and acquaintances on the street than those living in a quiet one[37].

Nationally there was a downward trend in NO_2 pollution between 2000 and 2009 although this decline has not been as much as previously expected[38]. This may be a result in the increase in the number of diesel cars (in 2000 only 14% of new cars sold in the UK were diesel but by 2010 this proportion had risen to 46%), as these have higher NO_2 emissions than petrol vehicles. Figures show that motor vehicle traffic reached a record high in 2016, with 320 billion vehicle miles travelled on Great Britain's roads - a 1.4% increase on the previous year[39].

The Gloucestershire Health Inequalities Action Plan highlights that the three leading diseases contributing to the life expectancy gap in both males and females in Gloucestershire are circulatory conditions, cancer and respiratory diseases[40], all of which have been linked to air pollution. Air pollution has also been linked to adverse affects in development of foetuses and there is compelling evidence it is associated with onset of asthma, diabetes, dementia and lung cancer[41].

Outdoor air quality across the county is generally good however there are Air Quality Management Areas (AQMA) in place in all districts with the exception of Stroud due to exceedances in the allowed annual mean NO_2 level (at 40µg/m^3). The AQMAs are located in major urban areas or in the case of Cotswold at a major road junction (the Air Balloon junction, Birdlip) due to high vehicle emissions[42]. In Cheltenham, Forest of Dean and Gloucester several 'hotspots' within these AQMA coincide with neighbourhoods within the 10% most deprived in the county and the 10-20% most deprived in terms of health deprivation in the county. Public Health England estimate 4.8% of deaths in Gloucestershire of those over 30 are attributable to particulate air pollution[43]. This is higher than the regional value of 4.5% but lower than the England value of 5.3%.

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[36] The Guardian https://www.theguardian.com/environment/2016/feb/22/indoor-and-outdoor-air-pollution-claiming-at-least-40000-uk-lives-a-year

[37] Working Together to Promote Active Travel https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/523460/Working_Together_to_Promote_Active_Travel_A_briefing_for_local_authorities.pdf

[38] Department for Environment, Food and Rural Affairs, Air Quality Plans for the achievement of EU air quality limit values for nitrogen dioxide (NO2) in the UK 2011 https://uk-air.defra.gov.uk/assets/documents/no2ten/110921_UK_overview_document.pdf

[39] BBC news http://www.bbc.co.uk/news/health-38156778

[40] Gloucestershire County Council, Gloucestershire Health Inequalities Action Plan 2016 – 2019 http://glostext.gloucestershire.gov.uk/documents/s27481/Appendix%204%20Gloucestershire%20Health%20Inequalities%20Action%20Plan%20DRAFT.pdf

[41] Royal College of Physicians, Ensuring future generations have healthy lungs for life 2016 https://www.rcplondon.ac.uk/news/ensuring-future-generations-have-healthy-lungs-life-0

[42] Department for Environment, Food and Rural Affairs AQMA tool https://uk-air.defra.gov.uk/aqma/list?la=C&country=england&pollutant=all

[43] Public Health England, Public health outcomes tool http://www.phoutcomes.info/public-health-outcomes-framework#page/3/gid/1000043/pat/6/par/E12000009/ati/102/are/E10000013/iid/30101/age/230/sex/4

Noise pollution

For many people, a sense of tranquillity contributes to their satisfaction of living conditions and their enjoyment of the natural environment. Noise pollution can give rise to significant adverse impacts on health and quality of life. Complaints about noise pollution are used as an indicator of the affect of this on the population. Gloucestershire had a rate of 3 complaints per 1,000 population in 2014/15; this is below both the regional and national rates of 5.3 and 7.1 respectively[44]. Gloucestershire has low levels of population exposed to road, rail and air transport noise pollution both during the day (3.3% of the population) and at night (5.5% of the population). These are broadly inline with regional percentage and below the national figure[45]. There is a small scale risk of increased light and noise pollution in the county in the vicinity of proposed development areas.

Indoor air pollution

Indoor air pollution is a cause for concern that is only starting to be understood. "Sources of indoor air pollution include smoking, faulty boilers, gas cookers and heaters, as well as irritant chemicals from new furniture, air fresheners and household cleaning products. House-dust mites, mould and dander from pets can also damage health". Most people spend a large part of their everyday lives inside a building and as such a poor internal environment can cause significant damage to health. It has been suggested that the drive to build houses with tighter ventilation may also be increasing levels of indoor air pollution[46]. Awareness and prevention of indoor air pollution will reduce the inhalation of toxins such as those in table 1.

Table 1: Chemical sources of internal air pollution and potential conditions they affect[47]

Chemical	Linked to/causes	Sources
Benzene	Genotoxic carcinogen	Smoking, using solvents for hobbies or cleaning, building materials that off-gas
Carbon monoxide	Reduces exercise ability in healthy young individuals, angina, cardio-vascular disease	Faulty appliances
Formaldehyde	Irritation to eyes, carcinogenic	Building materials, tobacco smoke, combustion emissions
Naphthalene	Respiratory tract lesions, tumours, haemolytic anaemia	Mothballs
Nitrogen dioxide	Respiratory difficulties	Gas stoves
Polycyclic aromatic hydrocarbons	Lung cancer	Attached to particles – open coke fires
Radon	Lung cancer accelerates in smokers and ex-smokers	Ground radiation, building materials
Other chemicals including Trichloroethylene and tetachloroethylene	Carcinogenic, Parkinsons, depression	Dry cleaning, paint strippers, woodstains, varnishes

[44] Public Health England, Public health outcomes tool http://www.phoutcomes.info/public-health-outcomes-framework#page/3/gid/1000041/pat/6/par/E12000009/ati/102/are/E10000013/iid/11401/age/1/sex/4

[45] Public Health England, Public health outcomes tool http://www.phoutcomes.info/public-health-outcomes-framework#page/3/gid/1000041/pat/6/par/E12000009/ati/102/are/E10000013/iid/90357/age/1/sex/4

[46] The Guardian https://www.theguardian.com/environment/2016/feb/22/indoor-and-outdoor-air-pollution-claiming-at-least-40000-uk-lives-a-year

[47] World Health Organisation, WHO Guidelines for indoor air pollution, selected pollutants http://www.euro.who.int/__data/assets/pdf_file/0009/128169/e94535.pdf

The International Agency for Research on Cancer and the World Health Organisation have concluded that 80% of all cancers are attributed to environmental rather than genetic factors, including exposure to carcinogenic chemicals, many of which are found in household cleaning products[48]. Women and young children can be particularly affected by pollution caused by cleaning fluids and gas cooking as they spend a higher proportion of time in these activities and young children are often carried by mothers from room to room. In 2011 there were approximately 11,518 families where at least one adult classified their occupation as 'Looking after home or family' in Gloucestershire[49], 92% of these were women[50]. Research suggests even in households where both adults work outside the home, women still do up to 40% more household chores than men[51].

Smoking increases indoor air pollution as cigarettes contain dangerous chemicals, including nicotine, carbon monoxide, and tar. In Gloucestershire approximately 14.6% of the adult population smoke (England rate 16.9%) and 5% of 15 year olds which is in line with the England rate.

Industrial pollution

Industrial pollution incidents where chemicals are released both intentionally, following receipt of a licence to do so or accidentally into the ground, water system or air, are recorded by the Environment Agency[52]. Figure 5 shows there have been a low number of major industrial pollution incidents in Gloucestershire in the last 10 years (8), but a higher level of 'significant' pollution incidents particularly in areas of the county with concentrations of industry; Gloucester, Cheltenham and the Severn Vale (M5 corridor). There are no causes of concern from other air pollution sources such as industrial sites in the county[53].

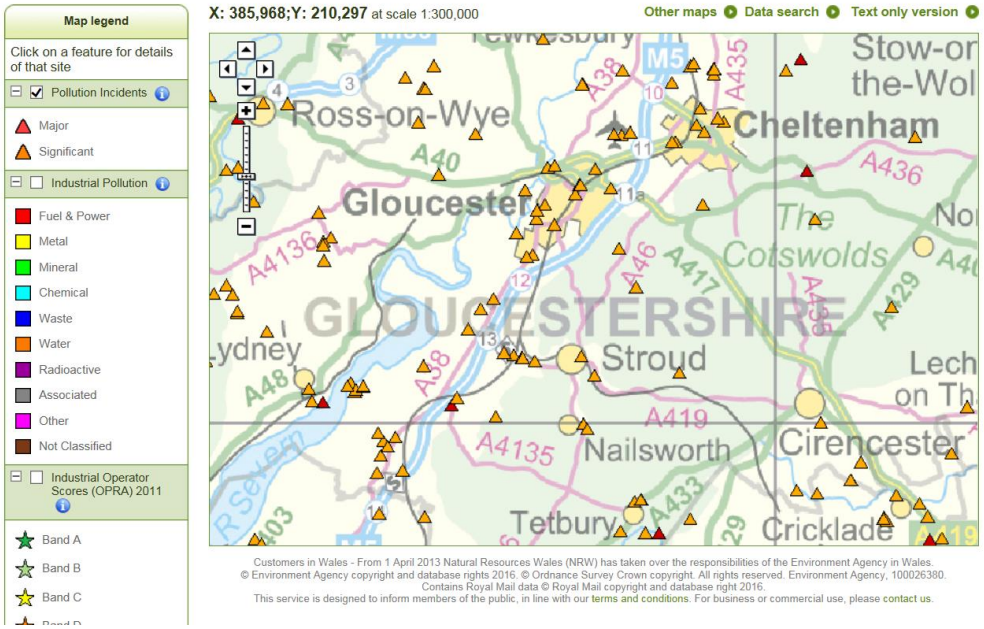
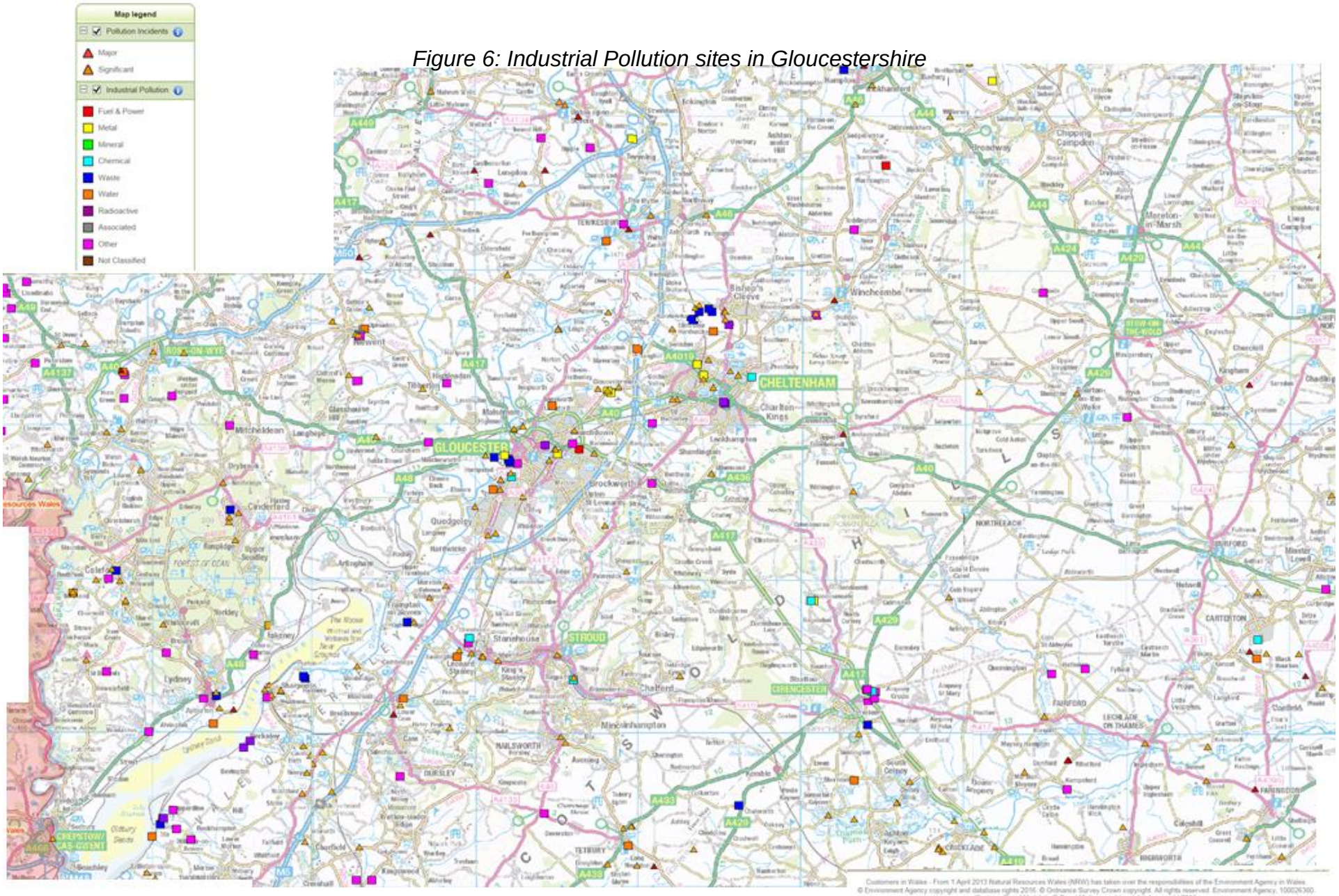


Figure 5: Major and Significant pollution incidents in Gloucestershire[54]

[48] Dr Axe, Indoor air pollution worse than outdoor https://draxe.com/indoor-air-pollution-worse-than-outdoor/
[49] Nomis https://www.nomisweb.co.uk/query/construct/submit.asp?menuopt=201&subcomp=
[50] *Ibid*.=
[51] BBC news http://www.bbc.co.uk/news/uk-37941191
[52] Environment Agency http://maps.environment-agency.gov.uk/
[53] Department for Environment Food and Rural Affairs, Effects of air pollution https://uk-air.defra.gov.uk/air-pollution/effects
[54] http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683&y=355134&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&topic=pollution#x=385968&y=210297&lg=5,10,&scale=5

Figure 6: Industrial Pollution sites in Gloucestershire



The importance of protecting the land and soil quality has been highlighted in the EUs Soil Thematic Strategy[55], which aims to minimise soil degradation and limit the detrimental affects this has on water quality, health, climate change and biodiversity. It highlights the need to; protect and enhance soils, prevent new or existing development from 'adversely affecting' the land by soil pollution or land instability; be willing to remediate and mitigate 'despoiled, degraded, derelict, contaminated and unstable land and encourage the effective reuse of land which has been previously developed.

Water quality

A safe, reliable, affordable, and easily accessible water supply is essential for good health. Virtually all types of water pollution are harmful to the health of humans and animals. Pollution from salts makes fresh water unusable for drinking and irrigation purposes[56]. Nutrient and thermal pollutants (from farming and power production) can also lead to an increase in aerobic algae which depletes oxygen levels, suspended particle pollution will not only reduce the quality of the water but could lead to sunlight being less able to penetrate to aquatic plants.

Gloucestershire has approximately 690km of rivers and is drained predominantly by the lower Severn estuary as shown in Figure 7, although the south east of the county drains into the Thames Head basin and the western edge of the Forest of Dean into the River Wye basin.

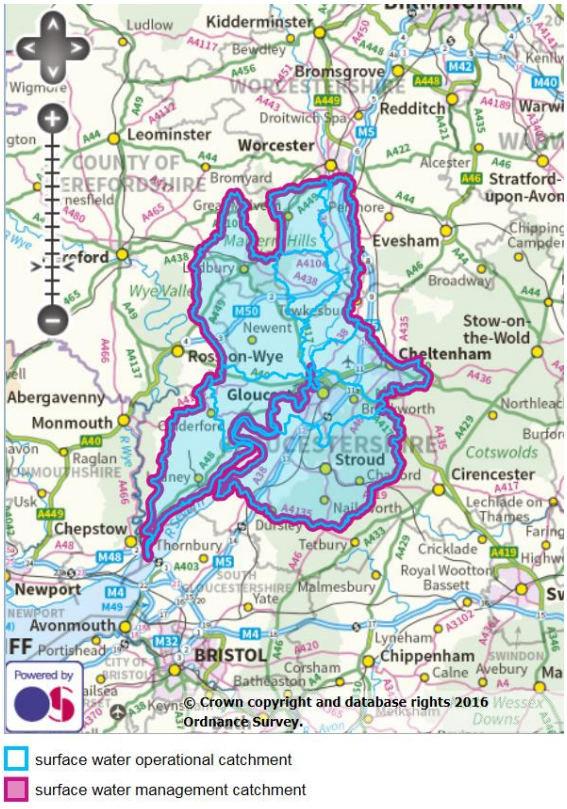


Figure 7: Area that drains into the Severn basin[57]

[55] European Commission http://ec.europa.eu/environment/soil/index_en.htm
[56] Water pollution guide http://water-pollution.org.uk
[57] Environment Agency, Catchment Data Explorer http://environment.data.gov.uk/catchment-planning/ManagementCatchment/3077

Most of the county is covered by nitrate vulnerable zones (NVZ) which are areas designated as being at risk from agricultural nitrate pollution or groundwater source protection zones (SPZ) which show risk of contamination to sources of drinking water. Water quality is likely to continue to be affected by pollution incidents in the area and the presence of non-native species. Of 8,445 water tests at testing sites in Gloucestershire, 62 tests at 8 sites were classified as a fail between 2010 and 2014[58]. This was due to increased chemicals such as Lead or benzoperelyne or priority and hazardous substances in the water.

Flooding

Flooding has had devastating affects in Gloucestershire in recent years, most notably the 2007 floods when approximately 5,000 residential properties and 500 non-residential properties were flooded, 135,000 people were also left without water for 2 weeks[59] and to a lesser extent the 2012 and 2013 floods.

Since the 2007 floods Gloucestershire County Council has invested over £2 million each year in flood risk management and it was estimated that in the winter (November/December) of 2012 500 homes would have been flooded had various schemes not been in place. However, flooding still poses a significant risk, the Severn Estuary floodplains cover 500km^2, provide a home for ¼ million residents and contain £14 billion of important infrastructure[60]. Tidal flood risk affects the whole estuary and accounts for 42% of the county's floodplain. Fluvial flooding though is the predominant risk across the county (58% of the flood plain), although surface water flooding is also a risk in the most built up areas of Cheltenham, Gloucester and Stroud. Defences along the Severn estuary have mitigated risks of the Severn coming overbank but localised rivers in each district provide higher risk of flooding.

Figure 8 shows the fluvial and tidal floodplains in Gloucestershire. It shows areas along the Severn estuary are prone to tidal flooding and the upper Severn and its tributary rivers in the north west of the county are prone to fluvial flooding. Fluvial flooding affects major towns and cities in the county including Tewkesbury, Cheltenham and Gloucester.

[58] Environment Agency, Catchment Data Explorer http://environment.data.gov.uk/catchment-planning/RiverBasinDistrict/9

[59] Gloucestershire County Council, Local Flood Risk Management Strategy 2012 http://www.gloucestershire.gov.uk/CHttpHandler.ashx?id=61257&p=0

[60] Environment Agency, Managing Flood risk on the Severn Estuary: Gloucestershire http://severnriverstrust.com/Managing%20Flood%20Risk%20on%20the%20Severn%20Estuary%20-%20Gloucestershire%20(Jan%2011).pdf

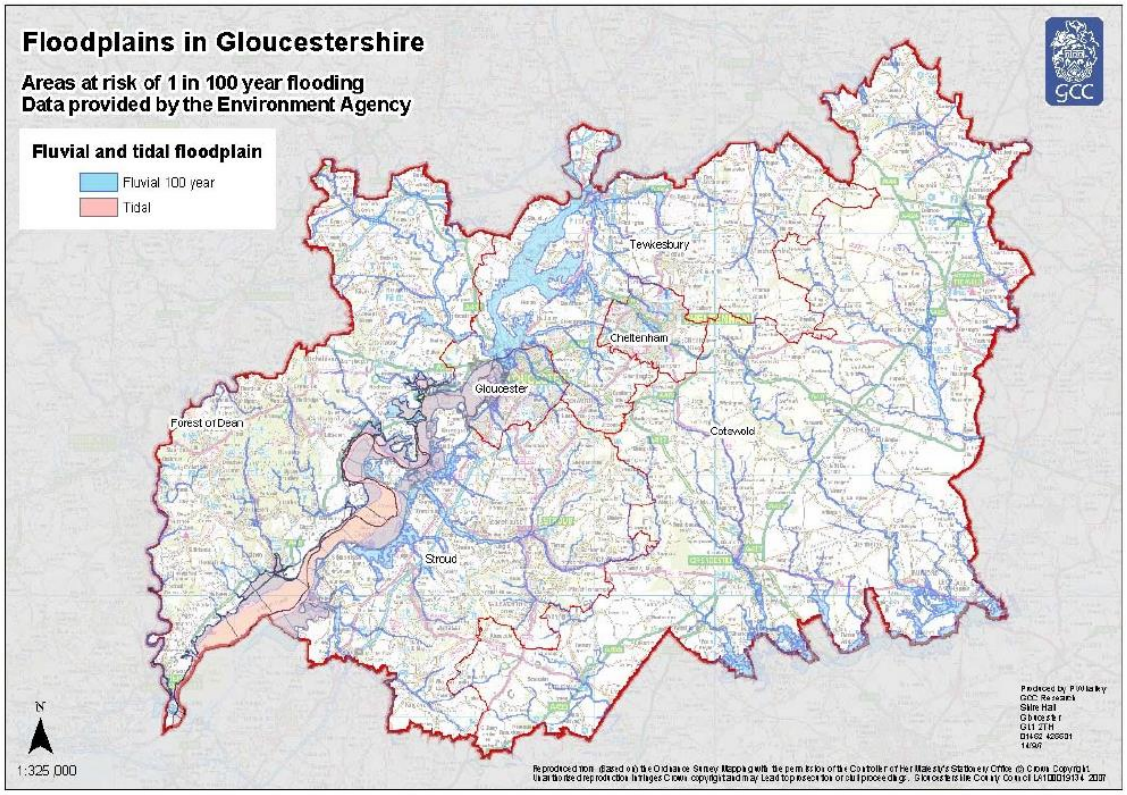


Figure 8: Floodplains in Gloucestershire

Whether damage associated with flooding is intangible (e.g. stress, anxiety, depression and/or non-material losses) or tangible (e.g. loss of material possessions and money), there is no doubt that flooding significantly impacts the health and quality of lives of individuals, businesses and wider communities[61]. The more adverse impacts of flooding are often felt strongest by the most vulnerable populations. For example, individuals with chronic physical and/or mental illness have been found to experience an increase in symptoms following flooding and also when fearing future flooding. Furthermore; ethnic minority groups and individuals with low incomes, without insurance and/or living in poor housing conditions, are also likely to be more susceptible to the negative psychological and physical health impacts of flooding[62].

Climate change is likely to exacerbate flooding in Gloucestershire, particularly in the relatively low-lying Central Severn Vale area and pressure to provide more new housing means new housing developments are being built on land vulnerable to flooding. In 2013-15 7% of new residential properties created in the Cotswold district were built in National Flood Zone 3, this is similar to the England proportion but higher than the other districts who range from only 1% in Cheltenham to 4%

[61] The Independent, 2014. "*UK weather: Contaminated floodwaters could lead to norovirus spike*" http://www.independent.co.uk/environment/nature/uk-weather-contaminated-floodwaters-could-lead-to-norovirus-spike-9124549.html

[62]Reducing adverse health impacts from flooding and flood risk: A review of the literature and development of questions for further research *Pendlebury & Bates* http://www.nationalfloodforum.org.uk/wp-content/uploads/Flooding-and-health-final-13072015.pdf

in Gloucester[63]. The National Planning Policy Framework 2012 (NPPF) recommended that development should be directed away from areas highest at risk from flooding and where it is necessary it should be made safe without increasing levels of risk elsewhere[64].

Climate change mitigation

Predictions suggest climate change will mean the UK will experience hotter, drier summers and warmer, wetter winters alongside more extreme weather events with floods, storms and heat waves of greater severity and frequency. Extreme high air temperatures contribute to deaths from cardiovascular and respiratory disease, particularly among elderly people. Climate change may exacerbate health risks and inequalities associated with building overheating, indoor air pollution, flood damage, and water and biological contamination in the indoor environment. Climate change is also likely to increase the risk of food-borne diseases. Disruptions in daily life related to climate change can mean lost work and school days and harm trade, transportation, agriculture, fisheries, energy production, and tourism. Severe rainfall events and snowstorms can delay planting and harvesting, cause power outages, cause travel disruption, and otherwise make it difficult for people to go about their daily business, all of which will have an effect on the economy.

Carbon dioxide emissions have been shown to be the strongest influencing manmade emissions to climate change. Higher carbon dioxide in the atmosphere leads to more heat being trapped and increases global temperatures. Carbon dioxide is also particularly worrying as it remains in the atmosphere longer than any other greenhouse gas (estimates are that it will take 800 years for carbon dioxide released today to leave the atmosphere). In December 2015 the Paris Agreement, signed by 195 countries sets out a global commitment to limiting climate change a large part of which is reducing carbon emissions. Subsequently there are several revised government policies relating to reducing carbon emissions. Per capita carbon dioxide emissions in the county fell from 8.6 tonnes to 6.5 tonnes between 2005 and 2014. Emissions of CO_2 varies across the county, in 2014 Gloucester had the lowest tonnes per capita level of 4.2 and Tewkesbury the highest at 8.9 tonnes per capita[65]. However the forecast of 52,000 new homes in Gloucestershire by 2031 coupled with employment growth may cause emissions to increase in the county.

Carbon emissions from Gloucestershire homes are highest in Forest of Dean, as seen in Figure 9; but are also higher than the England emissions level in Cotswold and Stroud[66]. Household carbon emission rates are strongly linked to income; the richest decile emitting three times that of the poorest decile. However policy to reduce carbon emissions usually results in higher energy bills that

[63] Department for Communities and Local government, Land change statistics https://www.gov.uk/government/statistical-data-sets/live-tables-on-land-use-change-statistics
[64] Department for Communities and Local government, National Planning Policy Framework https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf
[65] Department of Energy & Climate Change, https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2014
[66] Department for Communities and Local Government, Energy performance and building certificates https://www.gov.uk/government/statistical-data-sets/live-tables-on-energy-performance-of-buildings-certificates

disproportionately affect the poorest households as they spend more of their overall income on energy[67].

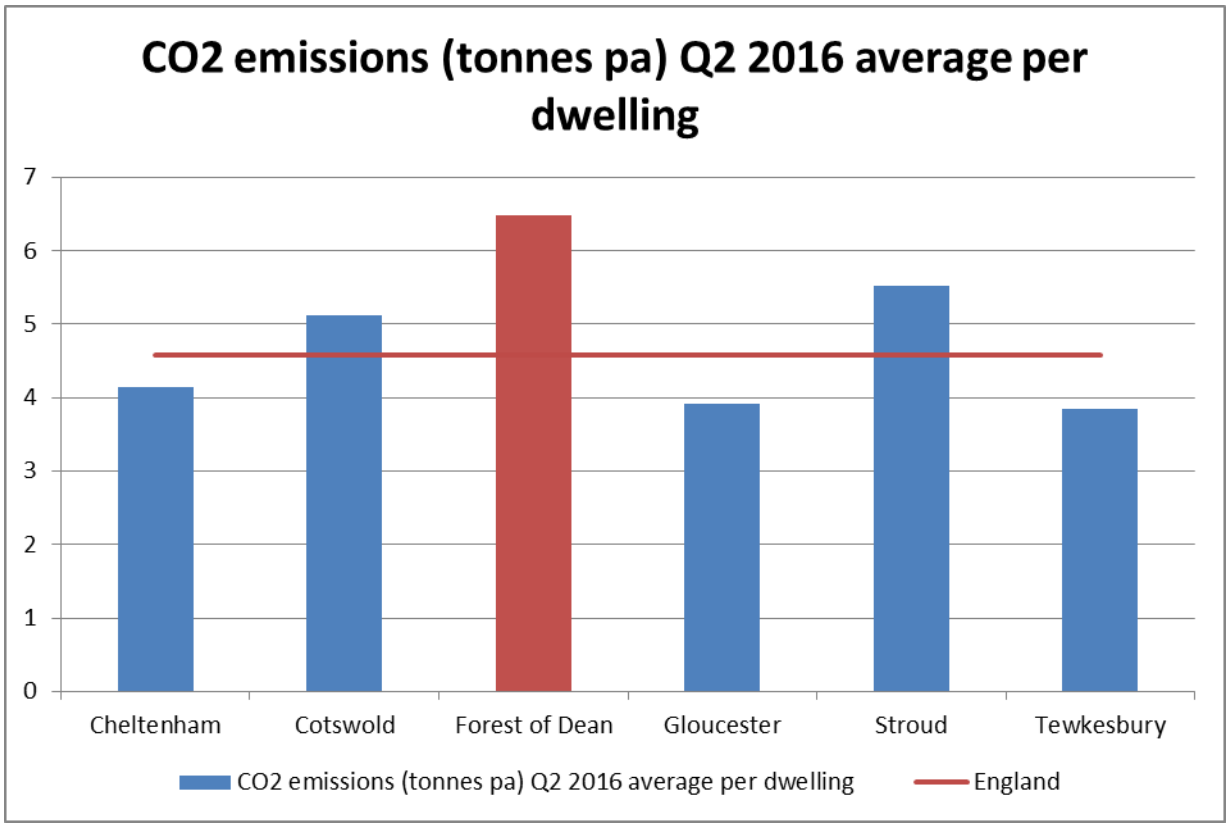


Figure 9: CO2 Emissions (tonnes pa) Q2 2016 average per dwelling

[67] Joseph Rowntree Foundation, Distribution of carbon emissions in the UK: Implications for domestic energy policy https://www.jrf.org.uk/report/distribution-carbon-emissions-uk-implications-domestic-energy-policy

2. Built environment

Built environment refers to the man-made surroundings that provide the setting for human activity, ranging in scale from buildings and parks or green space to neighbourhoods and cities and often includes their supporting infrastructure, such as water supply or energy networks. Resource scarcity, climate change and increases in population will put pressure on the built environment. Going forwards built environments need to be more sustainable, adapt to growing and changing populations and promote and support community well-being and cohesion.

This section looks at the relationship between the built environment and the people who live in Gloucestershire, including; neighbourhoods and infrastructure, housing supply and type, house prices and affordability, housing conditions, fuel poverty and energy use, housing for those with additional needs and homelessness.

Neighbourhoods and infrastructure

The government's Planning Practice Guidance[68] states; a healthy community is a good place to grow up and grow old in. It is one which supports healthy behaviours and reductions in health inequalities. It should enhance the physical and mental health of the community and support social interaction. The importance of healthy communities is becoming ever more important in Gloucestershire as the population of the county continues to age. Factors that can affect older people's physical activity include pedestrian infrastructure, safety, access to amenities and services, aesthetics and environmental conditions[69].

Neighbourhoods that facilitate more active lifestyles and reduce barriers to physical activity are desirable because of the positive relationship between physical activity and health. In 2014 Gloucestershire County Council launched the Active Together project allowing local community and charitable groups to apply for funding through their local councilor to encourage sport and physical activity projects in the local area from community walks to alternative sport classes, outdoor gyms through to skateboard parks. In 2016 approximately 345 projects were funded across Gloucestershire.[70]

Active lifestyles can also be facilitated by encouraging people to switch more journeys to active travel, this will improve health, quality of life, the environment, and local productivity; while at the same time reducing costs to the public purse. Cycling can be a viable, convenient and healthier travel option for many who commute less than 5km from services, education or employment centres. The percentage of cycle to work trips in Gloucestershire (4.5%) is above the national average (2%)[71].

[68] Planning Practice Guidance http://planningguidance.communities.gov.uk/blog/guidance/health-and-wellbeing/what-is-the-role-of-health-and-wellbeing-in-planning/#paragraph_004

[69] Working Together to Promote Active Travel https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/523460/Working_Together_to_Promote_Active_Travel_A_briefing_for_local_authorities.pdf

[70] Gloucestershire County Council http://www.gloucestershire.gov.uk/gloucestershire-county-council/business-property-and-economy/finance-funding-and-grants/active-together-grants/

[71] Gloucestershire County Council , Gloucestershire's Local Transport Plan 2015-2031 http://www.gloucestershire.gov.uk/CHttpHandler.ashx?id=66809&p=0

The health of a community can also be determined by a number of other factors including; accessibility particularly in relation to healthcare, safe communities (both in relation to road safety and violent crimes), density of fast food outlets and cleanliness of neighbourhoods. Gloucestershire has a well developed strategic road network, the dominant feature is the M5 motorway which runs north –south through the county providing good links to Birmingham and the North, Bristol and the South West and to the M4 corridor to London and South Wales, providing businesses with good connectivity to their markets. However, there are accessibility issues particularly in rural areas in the county which show a strong dependency on car transport, this may make it difficult for residents to access essential services including healthcare, more details can be found in the Accessibility Transport and Internet theme[72]. In general, motorised road transport tends to better serve those who are already more advantaged. The richest 10% of the population effectively receive almost four times as much public spending on their transport needs as the poorest 10% (due to their higher overall level of travelling and their greater use of cars and train services rather than buses)[73].

A safe environment includes one where all users can travel around it without danger; one measure of this is the number of road traffic accidents. Cotswold has the highest rate of deaths or serious injuries on the roads in the county[74]. Deaths or serious injuries on the roads caused by road traffic accidents (including where a pedestrian is struck by a vehicle) across Gloucestershire are highest in people aged 16-24, however there is also a spike between the ages of 85-89. This may be due to problems associated with ageing such as increased slips when walking, poorer depth perception and an increase in mistakes in both cognitive and physical behaviour. Furthermore, age can bring risks of more serious injuries. So accidents that might only injure a younger person can result in more serious injuries or death for older people. Many factors such as rurality of roads, traffic volume and major routes affect the rate of deaths or serious injuries on the roads across the districts. It is interesting to note however that rate of deaths or serious injury also links to the age structure of residents. Cotswold which has the highest level of deaths or serious injuries on the roads also has the highest percentage of residents aged over 65 in the county. Districts with lower percentages of households with over 65s (Gloucester, Cheltenham and Stroud) have the lowest rates of deaths or serious injury on the roads.

Communities where people feel safe can lead to greater community cohesion and investment from businesses and employers. They also allow more residents to exercise, women and older people in particular are less likely to walk or run for exercise in areas they feel unsafe. The violent crime rate can be an indicator to measure how safe the streets in communities are. Violent crime in Gloucestershire is 10.1 per 1000, lower than the regional (15.0) and England rate (17.2); however

[72] Accessibility Transport and Internet, https://inform.gloucestershire.gov.uk/viewpage.aspx?c=page&page=-Accessibility

[73] Sustainable Development Commission (2011) Fairness in a car-dependent society http://www.sd-commission.org.uk/publications.php?id=1184

[74] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/438040/reported-road-casualties-in-great-britain-main-results-2014-release.pdf

urban areas such as Gloucester (17.7) and Cheltenham (11.8) are higher[75]. More information can be found in the Community Safety theme[76].

Restaurants, cafés and fast food outlets are closely identified with the choice, variety and attraction of the urban environment and can contribute to the vitality and viability of town and city centres. In addition, restaurants, cafés and fast food outlets can provide important economic development and employment opportunities for significant numbers of people, and provide a service to shoppers, office workers and tourists alike. However the rate of fast food outlets per 100,000 populations has been linked to higher obesity rates. Figure 10 shows that although rates of fast food outlets are relatively low in Forest of Dean, excess weight in adults is high. The fast food outlet rates in Cheltenham and Cotswold are very different but the percentage of adults with excess weight is the same in both districts. This illustrates that many variables affect obesity.

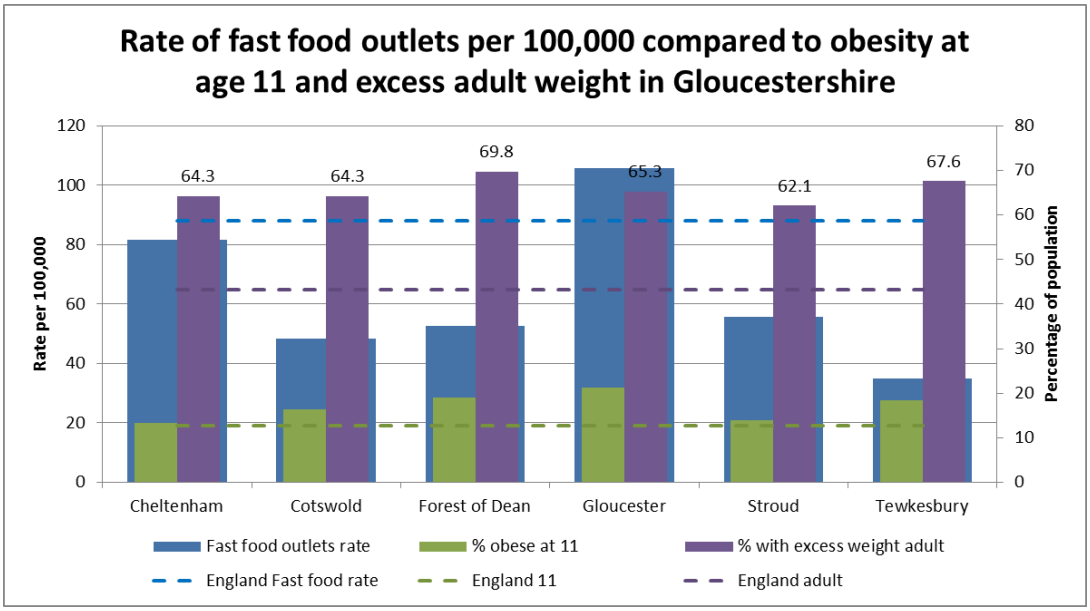


Figure 10: Rate of fast food outlets per 100,000 compared to obesity at age 11 and excess weight in adults in Gloucestershire

Areas with high rates of fast food outlets can also be prone to excess littering and higher levels of anti-social behaviour incidents[77]. Gloucestershire Constabulary launched a project in 2011 to address low-level anti social behaviour in young people and reward volunteering and community work with a time bank to be redeemed in social and fun experiences[78]. Clean and well kept neighbourhoods help make communities feel safe and can improve overall life satisfaction. Unkempt and rundown areas can reduce property prices and cause problems between neighbours. A 2010 survey found 1 in 10

[75] PHE fingertips https://fingertips.phe.org.uk/profile/health-profiles/data#page/1/gid/3007000/pat/6/par/E12000009/ati/102/are/E07000083/iid/11202/age/1/sex/4
[76] Community Safety https://inform.gloucestershire.gov.uk/viewpage.aspx?c=page&page=CommunitySafety
[77] Home Office, Perceptions and experience of anti-social behaviour: Findings from the 2004/05 British Crime Survey https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/116228/rdsolr2106.pdf
[78] Gloucestershire Constabulary https://www.gloucestershire.police.uk/more-on-us/the-aston-project/

people moved house because of issues with neighbours, the most cited issues included, aggressive behaviour, noise pollution, messy gardens and neighbours who let their properties get into dis-repair[79]. People who feel uncomfortable with their neighbours can suffer higher rates of mental illness including stress and depression[80]. The chronic stress and strain of living in a neighbourhood that is dangerous, chaotic, and rundown can seep through in parenting styles, which can in turn affect children[81]. Littering and fly tipping is an issue particularly in urban areas of the county. Barton and Tredworth, has been identified as Gloucester's 'fly tipping hotspot,' and saw 1,519 incidents of illegal rubbish dumping in 2015[82] more than half of Gloucestershire's 2,139 registered fly tipping incidents in that year. A survey by Inclusive Design for Getting Outdoors (I'DGO) of over 65s found those who said they did not feel very safe when they were out also tended to say that their neighbourhoods were not very attractive and that the housing and outside areas were not in very good condition.[83]

Waste

The disposal of waste is an important environmental issue due to the pressures created by the use of transport to move waste and landfill sites to dispose of it, which includes the emission of carbon dioxide and other greenhouse gases. Poor waste management can lead to surface water contamination which in turn negatively effects the chemical composition of local water bodies. Hazardous chemicals that get into the soil can harm plants when they take up nutrients and subsequently the animals and humans that eat them. Poor waste management practices can lead to air and land pollution. It can also have an effect on the economy; an area with poor sanitation and uncollected waste is less attractive to tourists, residents and businesses. Recycling facilities can provide more than the obvious environmental benefits; there are opportunities to generate revenue from recycling and to create job opportunities - recycling and processing plants bring employment to areas from their construction, maintenance and in businesses connected to the collection and transportation of waste.

In 2015/16 approximately 300,000 tonnes of waste was produced in Gloucestershire. This comprises municipal, industrial, commercial (non-inert), construction and demolition (inert) and hazardous waste[84]. The projected increase to population in Gloucestershire and the continued economic development of the county will both lead to an increase in waste. Most of the waste in the county is currently produced by the urban areas of Cheltenham and Gloucester.

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[79] Problem Neighbours http://www.problemneighbours.co.uk/how-big-problem-are-problem-neighbours.html

[80] Mind http://www.mind.org.uk/information-support/guides-to-support-and-services/housing/common-problems/#.WHYW7P5XVdc

[81] How Housing Matters – MacArthur Foundation https://www.macfound.org/media/files/HHM_-_Neighborhoods_Affect_Health_Well-being_Young_Peoples_Futures.pdf

[82] Gloucestershire Live http://www.gloucestershirelive.co.uk/enforcement-to-tackle-cancer-of-fly-tipping-in-gloucester/story-29769273-detail/story.html#VHl8LStmCD820HeD.99

[83] Inclusive Design for Getting Outdoors http://www.idgo.ac.uk/older_people_outdoors/experiences_of_outdoor_environments.htm

[84] Department for Environment, Food & Rural Affairs, Waste and recycling statistics https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables

In 2015/16 the majority of the county's waste (52.12%) was sent to landfill, this is much higher than the regional (29.9%) and national (19.6%) averages. 47.45% of Gloucestershire's waste, was recycled or composted which is close to the regional (47.4%) and national (42.4%) averages[85]. Incineration of waste at an 'Energy from Waste' facility was minimal at a county level accounting for only 0.42% of waste; this is significantly lower than the regional (20.3%) and national (34.7%) averages[86]. The development of the Javelin Park facility due to be completed in 2019, will dramatically increase the amount of incineration, with estimates suggesting in the future 30% of Gloucestershire's waste will be processed in this way. The Government is advised by Public Health England (PHE) on the impact on health of emissions to air from energy from waste plants. It notes that "modern, well managed incinerators make only a small contribution to local concentrations of air pollutants and as such the effects on health, if they exist, are likely to be very small and not detectable"[87].

Figure 11 shows the total household waste collected by each district and proportion of each districts' household waste which goes on to be recycled or composted.

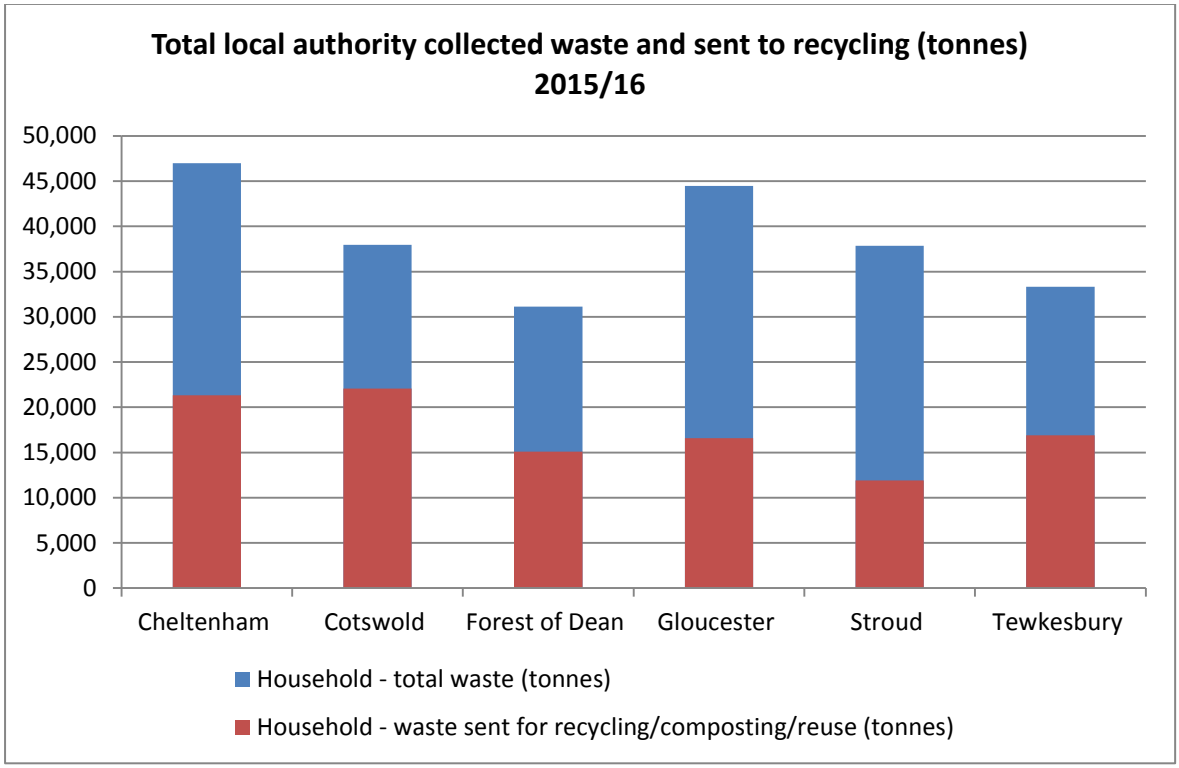

Figure 11: Total local authority collected household waste sent to recycling (tonnes) 2015/16

Figure 12 shows Cotswold was the district with the highest rate of recycling in Gloucestershire recycling 58% of household waste in 2015/16. The highest recycling rate in the country by a local

[85] *Ibid.*
[86] *Ibid.*
[87] Energy from Waste: a guide to the debate https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/284612/pb14130-energy-waste-201402.pdf

authority in 2015/16 was 66.6%. Residents in Cotswold district also produced the least household waste sent to landfill in 2015-16[88]. Gloucestershire is planning to increase recycling rates to 70% across the county[89].

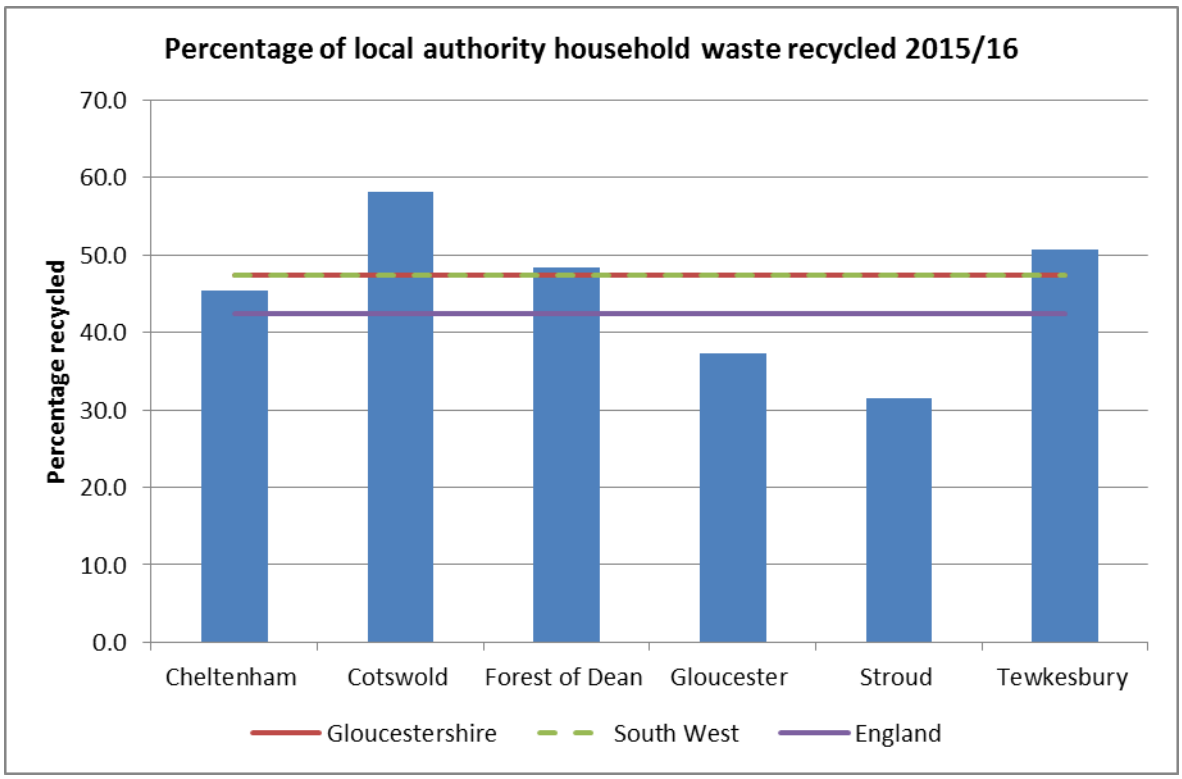

Figure 12: Percentage of local authority household waste recycled

Figure 13 shows the levels of residual household waste collected by each district per household. Although Stroud district collected less waste than Cheltenham and Gloucester in total tonnage (Figure 11), it collected the most rubbish per household in 2015/16 closely followed by Gloucester. Cotswold district collected the least residual waste per household in 2015/16.

[88] Department for Environment, Food & Rural Affairs, Waste and recycling statistics https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables

[89] Gloucestershire County Council, Gloucestershire Waste Core Strategy 2012 http://www.gloucestershire.gov.uk/extra/CHttpHandler.ashx?id=53886&p=0

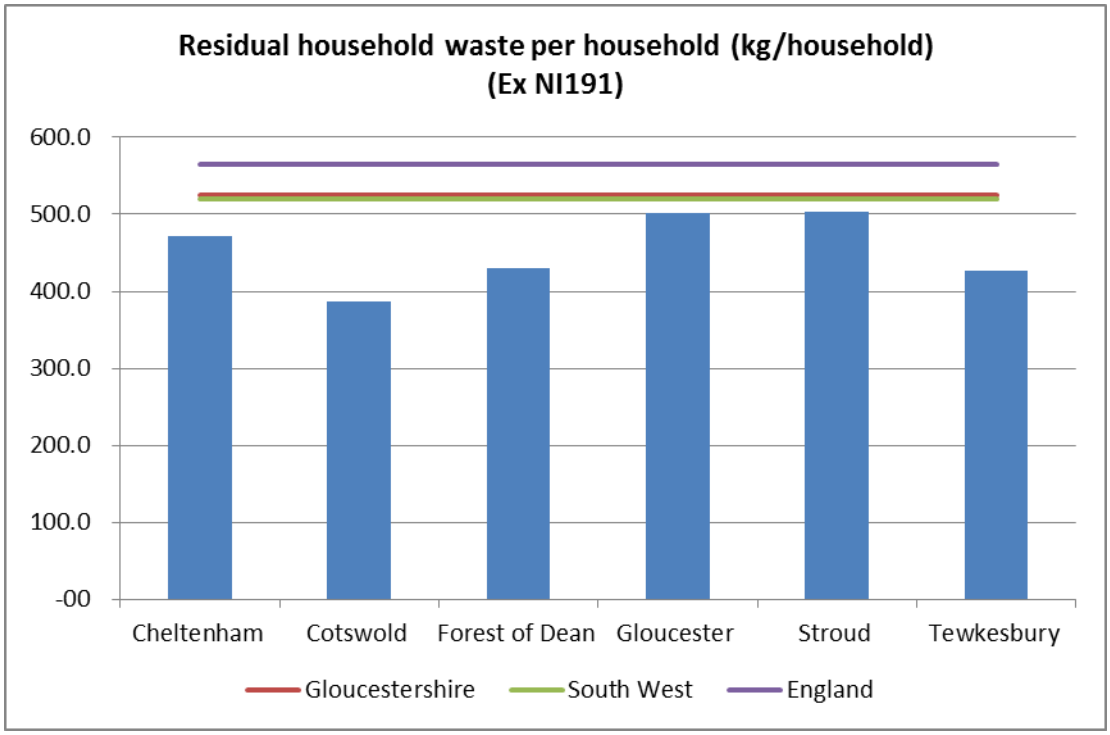

Figure 13 : Residual household waste per household (kg/household) by district 2015/16

Energy production

The need for electricity generation to be clean and safe has never been greater as evidence of human activity on climate change becomes clearer and worldwide resources of carbon fuels deplete. Environmental and health consequences of electricity generation are important issues, alongside the affordability of the power which is produced.

There are currently no large electricity power stations in Gloucestershire, although there are proposals to create a new sustainable nuclear power station at Oldbury on the South Gloucestershire/Gloucestershire border which is likely to bring employment to the county (this isn't projected to start until the mid-2020s[90]). Licences for the ability to pursue fracking for gas in Gloucestershire were issued in 2015, however in 2016 South West Energy decided not to use them in favour of other sites out of the county[91]. Energy production in the county is on a smaller scale and centres on renewable energy. The opening of Gloucestershire Renewable Energy, Engineering & Nuclear skills centre at the decommissioned Berkeley Power Station will further support this[92].There are two wind turbines in the county (Lynch Knoll in Stroud district generates 1.08 million units of green electricity per year the equivalent to powering 262 homes[93] and St Briavel's in FOD, a

[90]Horizon Nuclear Power http://www.horizonnuclearpower.com/oldbury
[91]BBC News http://www.bbc.co.uk/news/uk-england-37376392
[92] South West Business News http://www.southwestbusiness.co.uk/sectors/engineering-and-aerospace/businesses-gather-for-opening-of-gloucestershire-renewable-energy--engineering---nuclear-skills-centre-01122016164720/
[93] Ecotricity https://www.ecotricity.co.uk/our-green-energy/our-green-electricity/from-the-wind/wind-parks-gallery

community wind turbine that generates enough electricity to power 317 homes[94]) a planning application for a turbine near Sharpness has also been approved by Stroud District Council.

The central Feed in Tariff (FIT) register records domestic green energy production, the large majority of FIT units in the South West are solar photovoltaic units[95]. There are approximately 10,500 FIT [96]units in Gloucestershire producing around 54mW, the equivalent to powering 8,850 homes and currently 25 solar farms producing 186mW the equivalent of powering approximately 30,504 homes[97]. There are currently 4 additional solar farms either under construction or going through planning in Gloucestershire. In addition Gloucestershire's new 'Energy from Waste' (EfW) facility (Javelin Park) is projected to produce energy for 25,000 homes; it is expected to be opened in 2019.

Much of the food waste in the county is processed at Wingmoor Farm, Bishops Cleeve turning the waste into fertiliser and anaerobic energy[98]. Wingmoor Farm is expected to produce 5.7 million m^3 of bio-methane the equivalent of providing gas for 4,200 homes.[99] Renewable power technologies can have significant environmental benefits. Unlike coal and natural gas, they can generate electricity and fuels without releasing significant quantities of CO^2 and other greenhouse gases that contribute to climate change and particulate air pollution which contributes to ill-health.

Housing supply, type and need

An appropriate quantity and quality of housing is important for health, economic welfare and prosperity, social cohesion and the realisation of environmental goals. However, the supply of both private and public housing has fallen short of the level needed to match increasing demand, and it has been particularly unresponsive to increases in house prices. The housing sector was among those worst affected by the recent financial crisis and the recession. The immediate impact led to a sharp fall in housing starts and completions. But there are also likely to be longer term problems, such as higher risk aversion by developers.

In 2011 there were 254,615 households in Gloucestershire; this represents an increase of 7% or 16,749 households since 2001. The number of households in Gloucestershire is projected to increase by 13,000 between 2016 and 2021 (4.9%) and by 55,000 between 2016 and 2037 (20.5%). Table 2 shows the number of households across the district at the time of the 2011 census. Cheltenham has the highest number of individual households and Forest of Dean has the lowest. This can be linked to the predominant types of housing in each district.

[94]Resilient Energy (Categorized by postcode, which leads to inconsistencies as not all households in Gloucestershire have GL postcodes and some GL postcodes span into neighbouring authorities.) http://www.theresiliencecentre.co.uk/great_dunkilns.html

[95] Ofgem, FIT statistics https://www.ofgem.gov.uk/environmental-programmes/fit/contacts-guidance-and-resources/public-reports-and-data-fit/feed-tariffs-quarterly-statistics

[96] http://www.renewables-map.co.uk/Solar.asp?Status=4

[97] Solar Energy Industries Association http://www.seia.org/about/solar-energy/solar-faq/how-many-homes-can-be-powered-1-megawatt-solar-energy

[98] Gloucestershire County Council http://www.gloucestershire.gov.uk/article/117902/New-facility-will-produce-green-energy-from-Gloucestershire-food-waste

[99] Waste Management World https://waste-management-world.com/a/anaerobic-digestion-plant-opened-in-gloucestershire-with-increased-biogas-capacity

	Number of households
Gloucestershire	**254,615**
Cheltenham	50,929
Cotswold	36,236
Forest of Dean	34,167
Gloucester	50,363
Stroud	47,794
Tewkesbury	35,126

Table 2: Number of households in Gloucestershire and in each district, 2011 census

Figure 14 shows at the time of the 2011 Census, semi-detached housing accounted for the largest proportion of housing in Gloucestershire. The housing profile differs throughout the districts, Cheltenham has significantly less detached houses and significantly more flats, maisonettes or apartments whereas Forest of Dean has a higher proportion of detached houses and far fewer flats. The English housing survey observed people living in terraced houses had higher life satisfaction than those living in semi-detached houses or flats.

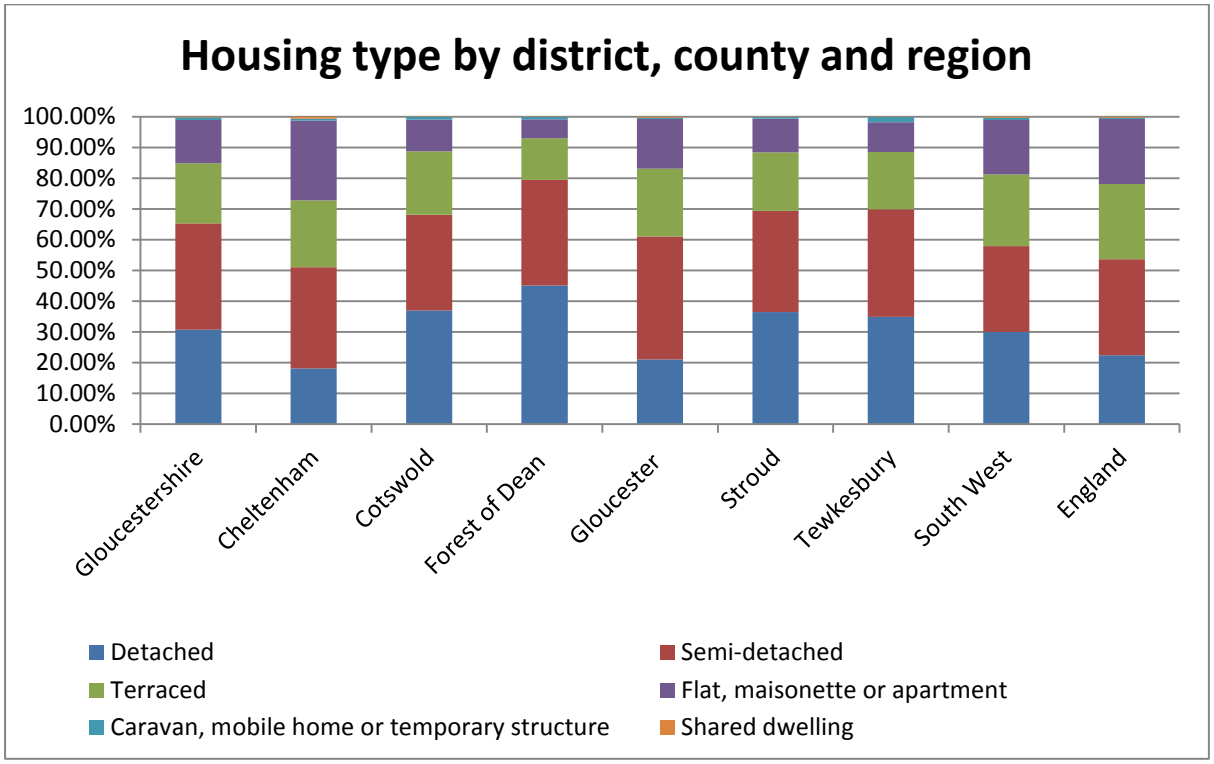

Figure 14: Housing type by district, county and region

In 2011 the majority of households in Gloucestershire were owner occupied, Figure 15, shows they accounted for 69% of all households, this is slightly higher than the regional (67%) and national averages (63%). It also shows across the districts there are differing trends of household tenure; Forest of Dean has the highest level of owner occupied housing, (74.3%) and Cheltenham has the highest level of privately rented housing (21.5%). Nationally in 2011, 16.8% of households were privately rented.

Over the last 10 years the proportion of owner occupied housing in Gloucestershire declined from 73.7% in 2001 to 69.4% in 2011[100]. During the same period the proportion of privately rented increased from 9.6% to 15.4%. However levels of private renting in Gloucestershire were still lower than in the South West (17.1%) and England (16.8%). This reflects difficulties facing first time buyers and the increase of the buy to let market. Generally properties in the rental sector are of a lower standard than those owned by the occupier.[101]

Social rented housing levels across the county also fluctuate, as seen in Figure 15 13% of residents in Gloucestershire live in social rented housing, which is in line with the regional percentage (13.3%) but below the national figure (17.7%). The level of residents living in social housing is highest in Cotswold (14.9%) while Tewkesbury has the lowest level of social rented housing (11.9%).

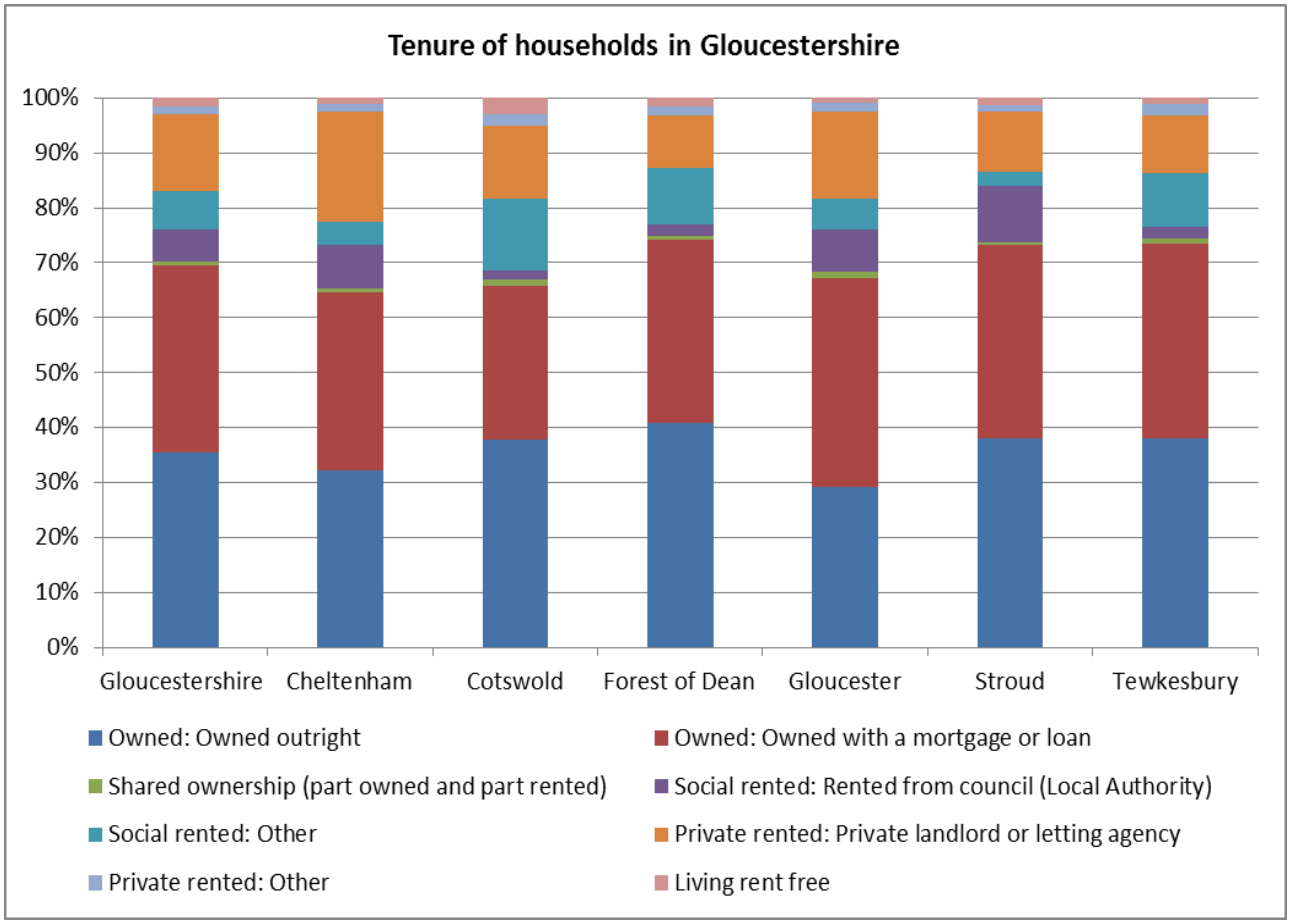

Figure 15: Tenure of households in Gloucestershire 2011

Social rented housing is let at low rents on a secure basis to those who are most at need or struggling with their household costs. It includes properties rented from the local authority, housing associations and socially registered landlords.

[100] ONS, nomis https://www.nomisweb.co.uk/census/2011/ks402ew
[101] Department for Communities and Local Government, English housing survey 2014-15 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/539089/Well-being_and_housing_2014-15.pdf

Most of the socially rented properties in Gloucestershire are let through Gloucestershire Homeseeker the county's choice based letting scheme. Data from 2016 shows in Gloucestershire there were 14,443 active applications for social housing using the Homeseeker scheme[102]. Figure 16 gives the rate of applications per 1,000 households by district, it shows Gloucester had the highest rate of active applications and Stroud had the lowest. Gloucester and Tewkesbury both had higher rates of applications per 1,000 households than Gloucestershire as a whole.

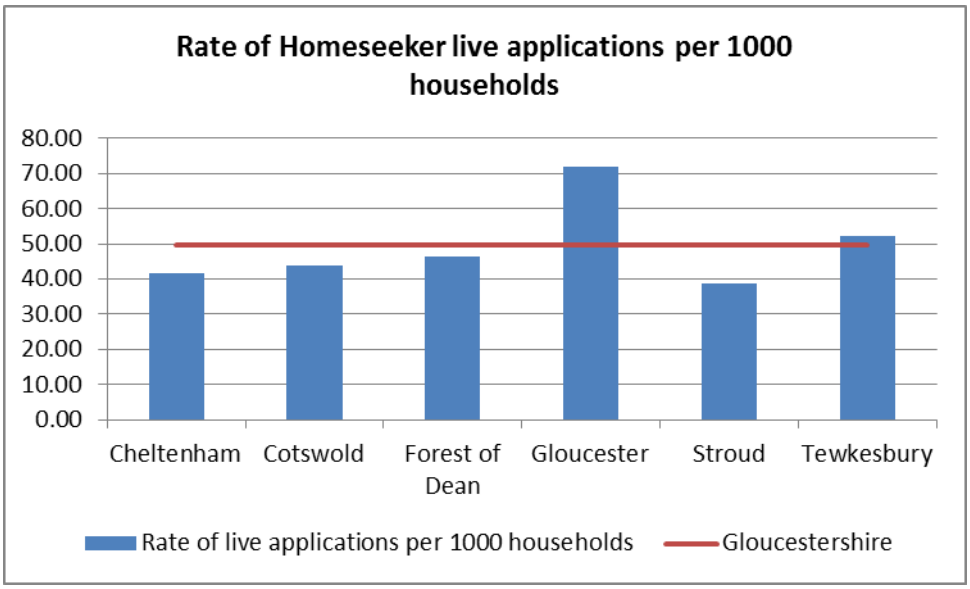

Figure 16: Rate of Homeseeker live applicants by district - snapshot October 2016

Applicants are awarded priority for housing based on their level of housing need, taking into account criteria such as overcrowding, homelessness, or medical or welfare needs. Figure 17 provides a breakdown of active applications by priority need; it shows the majority of applications (64.6%) were classified as bronze need, which is the lowest level of need, while 2.49% of applicants had the highest level of need, emergency need.

[102] Stroud District Council - collated figures from all districts

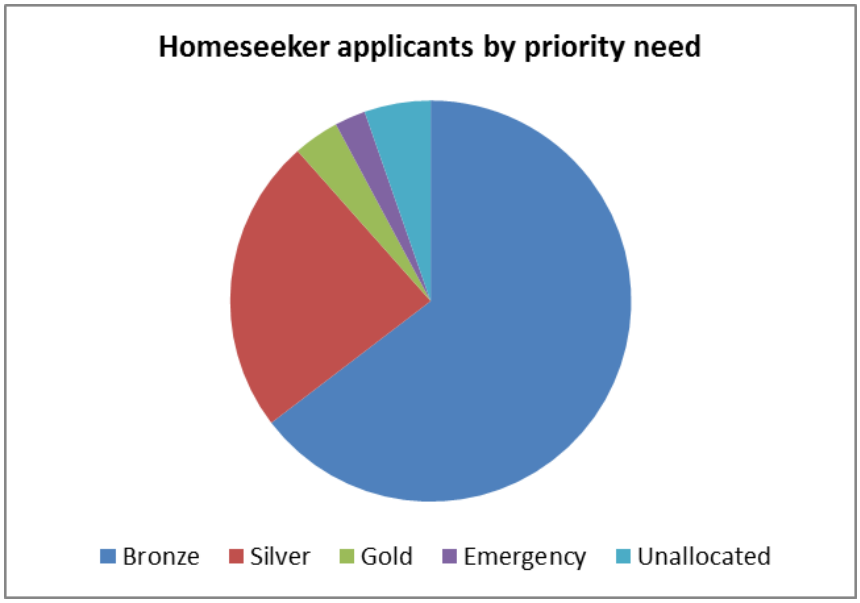

Figure 17: Homeseeker applicants by priority need, Gloucestershire - snapshot October 2016[103]

In order to allocate home seekers to a priority band, applicants are asked about their circumstances; including whether they believe their current housing conditions make health conditions or social problems worse. This information is based on self-definition by applicants; this is later checked before homes are allocated. Figure 18 shows that the majority of active applicants to Gloucestershire Homeseeker do not believe their current housing conditions make health conditions or social/welfare problems worse. The most common condition thought to be made worse by current housing situation is medical issues, affecting 1,704 or 13% of applicants, closely followed by mental health problems, affecting 12% applicants.

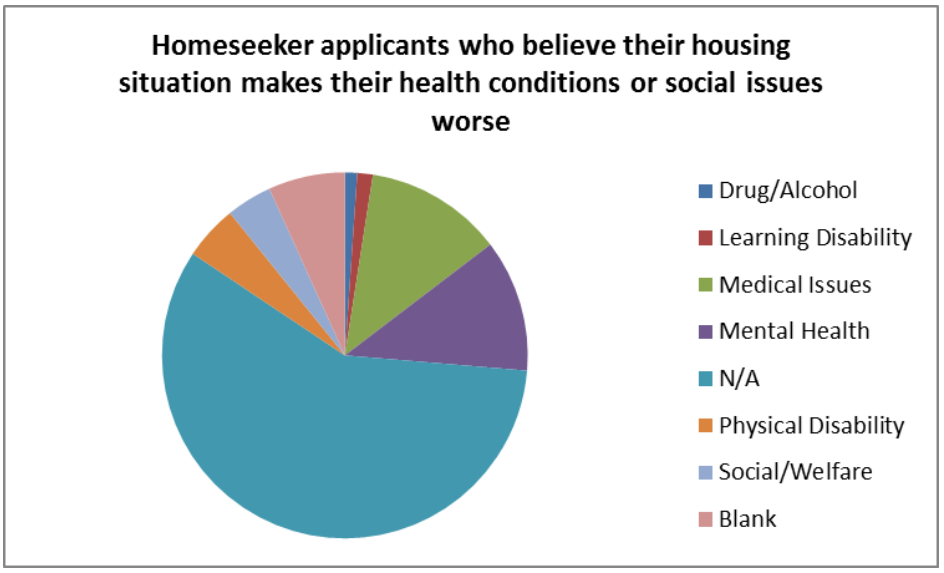

Figure 18: Homeseeker applicants who believe their housing situation makes their health conditions or social issues worse[104]

[103] *Ibid.*

Homeseeker applicants in Cheltenham reported a much higher level of housing situation affecting their mental health than in other districts as seen below in Figure 19.

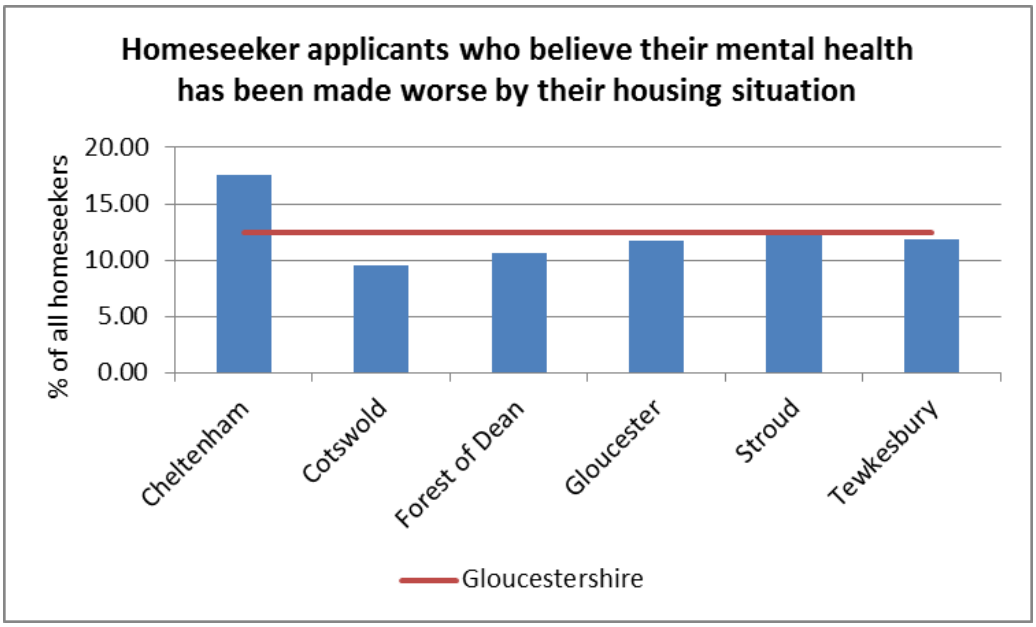

Figure 19: Homeseeker applicants who believe their mental health has been made worse by their housing situation

House prices and affordability

The cost of housing can have a significant impact on an individual's health and wellbeing, with a report by Shelter stating nearly one quarter of households in Great Britain are suffering from stress or depression due to their housing costs[105]. The 2014 English Housing Survey revealed being in arrears increased an individual's anxiety by 0.6 points and reduced an individual's life satisfaction by 0.6 points[106].

In November 2016 the mean household price in Gloucestershire was £242,805 Figure 20 shows this was higher than the national average. Cheltenham, Cotswold, Stroud and Tewkesbury have mean household price above both the county and national average.

[104] Ibid.
[105] Shelter, Breaking point How unaffordable housing is pushing us to the limit https://england.shelter.org.uk/__data/assets/pdf_file/0009/86787/Breaking_Point.pdf
[106] Department for Communities and Local government, English housing survey 2014-15 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/539089/Well-being_and_housing_2014-15.pdf

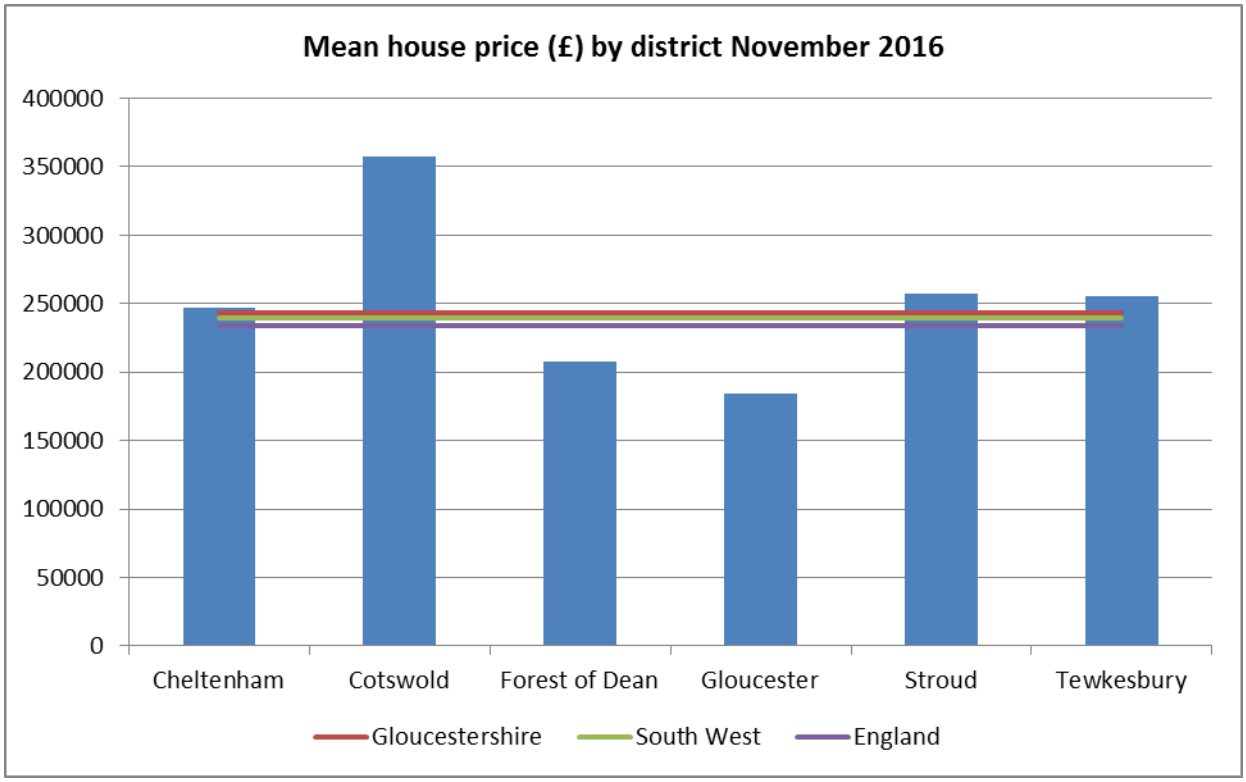

Figure 20: Mean house price (£) November 2016 by district

Affordability of suitable housing and the maintenance of it have become more pronounced in recent years with rising house prices and fuel costs forcing occupants to live in unsuitable accommodation. In areas where house prices are high, housing affordability is often an issue. The most common indicator of housing affordability is the ratio between lower quartile incomes and lower quartile house prices. This allows an assessment of whether people with the lowest incomes can afford the cheapest housing. Figure 21 shows that in 2015, someone earning a lower quartile sum in England required 7.02 times their earnings to purchase a lower quartile priced property. All of the districts in Gloucestershire have a higher ratio of house prices to earnings than the England rate except Gloucester (6.20). Cotswold had the highest ratio between lower quartile earnings and lower quartile property prices at 11.54[107].

[107]Department for Communities and Local government, Housing Market https://www.gov.uk/government/statistical-data-sets/live-tables-on-housing-market-and-house-prices

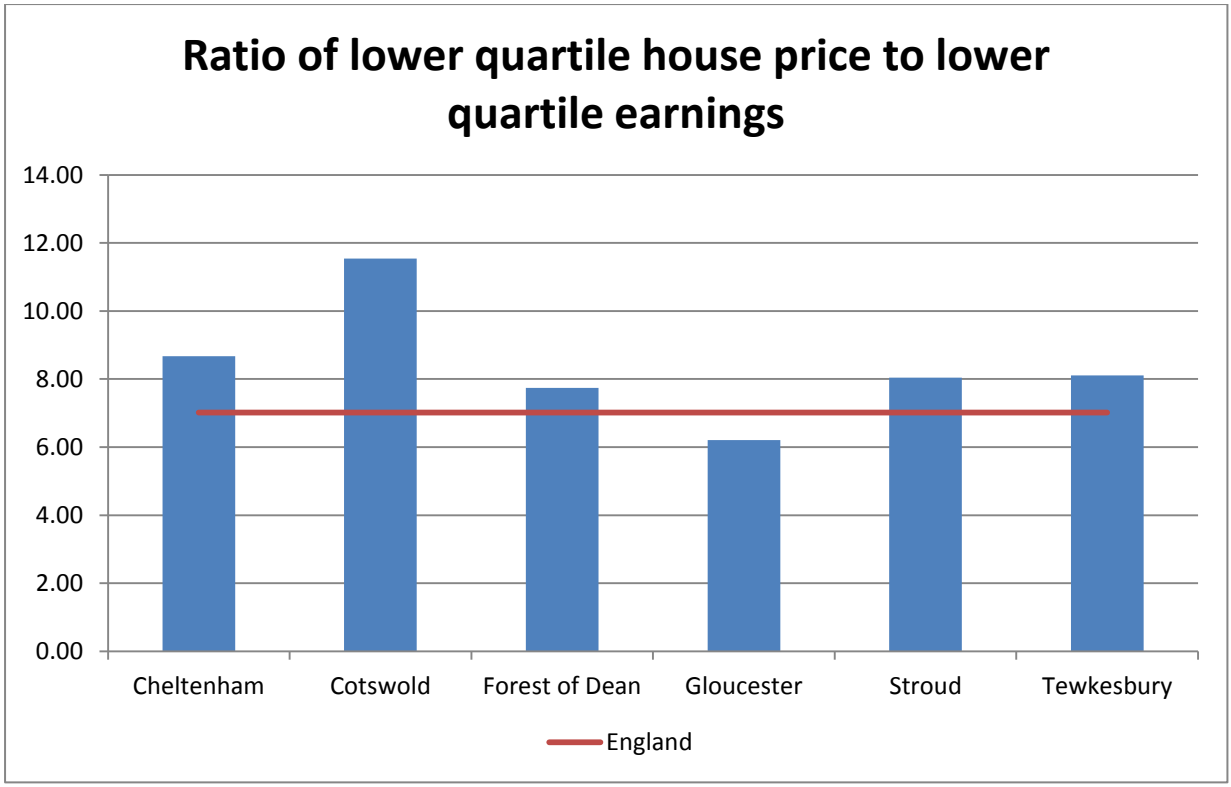

Figure 21: Ratio of lower quartile house price to lower quartile earnings

In 2014 the Bank of England[108] placed restrictions on mortgages that are more than 4.5 times an individual's salary, and some lenders are being even more cautious, in March 2016 Nat West lowered it's loan-to-income ratio to 4.45 times annual income[109]. This may make it difficult for first time buyers to get on the property market as Gloucestershire's income to house price ratio is higher than this in every district. This could result in the out migration of young people or alternatively encourage people to commute into Gloucestershire for work, while living in areas where housing is cheaper. The August 2016 Halifax Index suggests house values nationally are up by 6.9%[110] on the previous year however ONS wage growth data found that in July 2016 wage growth was lower at 2.5%[111].

Rising house prices and the reluctance of banks and building societies to lend higher loan-to-income rates has led to many young people privately renting[112]. The average monthly rental cost in Gloucestershire 2015-16 was £628; this is comparable with the regional and national averages which

[108] Bank of England, Amendments to the PRA's rule on loan to income ratios in mortgage lending February 2016 http://www.bankofengland.co.uk/pra/Documents/publications/cp/2016/cp616.pdf
[109] Lee Boyce for Thisismoney.co.uk March 2016 http://www.thisismoney.co.uk/money/mortgageshome/article-3485466/NatWest-adjusts-loan-income-ratio-mortgage-offers.html
[110] Halifax, House price index September 2016 http://static.halifax.co.uk/assets/pdf/mortgages/pdf/August-2016-Halifax-House-Price-index.pdf
[111] ONS, Average weekly wage growth rate https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/timeseries/kac3/lms
[112] BBC News, September 2016 http://www.bbc.co.uk/news/business-37508968

were both £650 per month. As Figure 22 shows Cotswold district has a substantially higher average rental cost (£850) than the county, region and England averages. High rental costs were also seen in Cheltenham and Tewkesbury. Average rents in Gloucester are the lowest in the county (£550).[113].

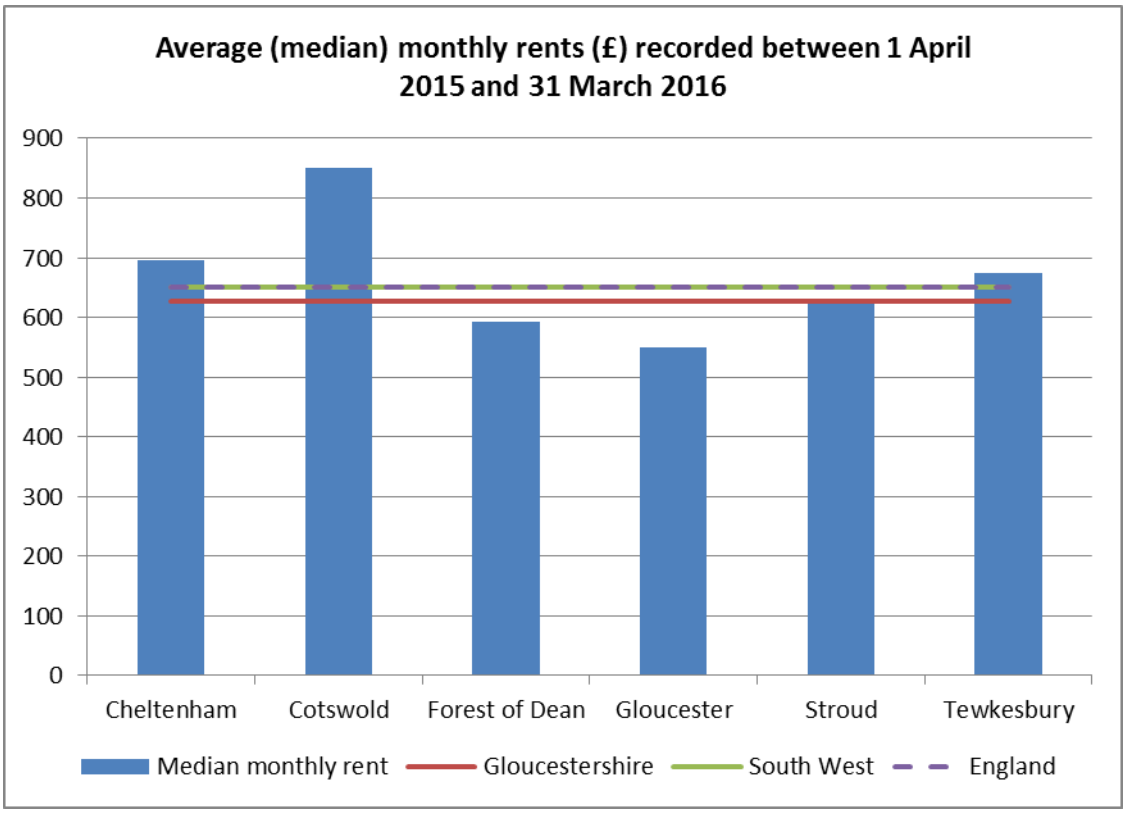

Figure 22: Average (median) monthly rental costs (£) 2015-16[114]

Higher rental prices often lead to more people living in challenging circumstances. A release from the Joseph Rowntree Foundation found the number of private renters in poverty has doubled to 4.4 million since 2002/03, as seen in Figure 23 below[115].

[113] Valuation Office Agency, Private rental market statistics https://www.gov.uk/government/statistics/private-rental-market-statistics-may-2016
[114] Ibid.
[115] Joseph Rowntree Foundation, Numbers in poverty by housing tenure, June 2016 http://www.jrf.org.uk/data/numbers-poverty-housing-tenure

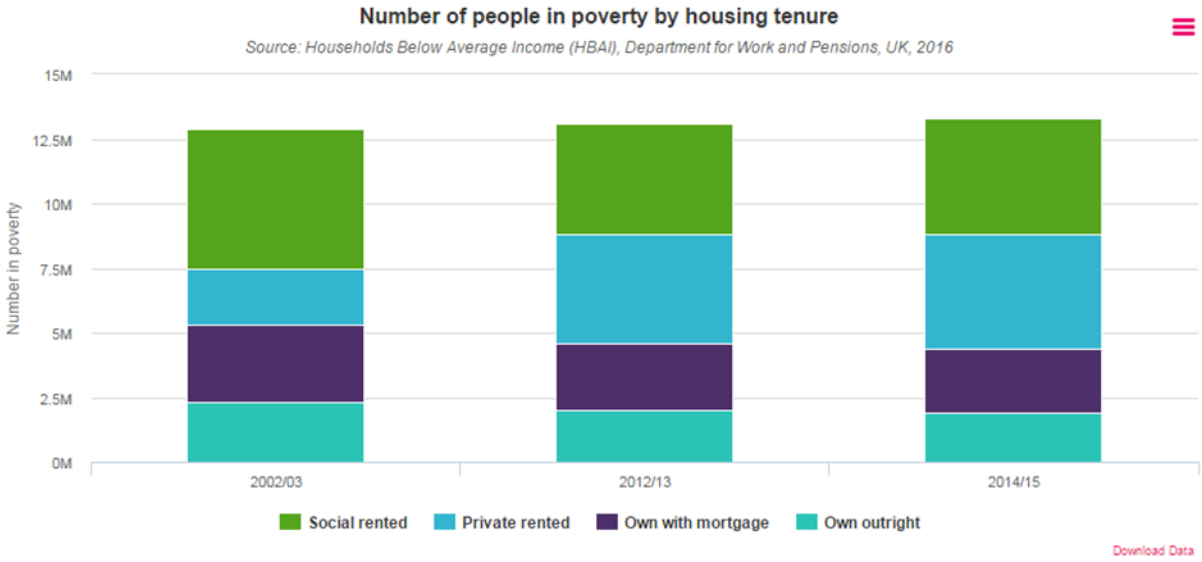

Figure 23: Number of people in poverty by housing tenure UK, 2016

Recent research suggests housing inequality and lack of affordable housing affects people under 40 disproportionately.[116] This has been attributed to a combination of lower home-ownership rates, less access to final salary-type pensions and stagnant wages in this cohort.

Housing conditions

The relationship between poor housing and ill health is a complicated one which involves many different factors. Evidence suggests that living in poor housing can lead to an increased risk of cardiovascular and respiratory disease as well as to anxiety and depression. Problems such as overcrowding and temporary accommodation, damp, mould, excess cold and structural defects which increase the risk of an accident also present hazards to health.

In 2014 around 4% of homes in England had problems with damp[117]. Damp problems are more prevalent in privately rented accommodation (9%), compared to (3%) of owner occupied.[118] Dampness contributes to a home not being classed as 'decent'. In 2014, a fifth of dwellings in England (20% or 4.6 million homes) failed to meet the Decent Homes standard, a reduction of 3.1 million homes since 2006, when 35% of homes failed to meet the standard[119]. The highest

[116] BBC News http://www.bbc.co.uk/news/business-37508968
[117] Department for Communities and Local Government, English Housing Survey 2014-15 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/501065/EHS_Headline_report_2014-15.pdf
[118] *Ibid.*
[119] Department for Communities and Local Government, English Housing Survey 2014-15 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/501065/EHS_Headline_report_2014-15.pdf

percentage of these was in the private rented sector (29%). In 2014/15 £693,800 was spent by districts making homes in Gloucestershire decent[120].

The age of the housing stock can have a detrimental affect on health as older properties are more likely to have damp issues; poor heating and insulation; to have been built to lower building regulations or contain hazardous substances (asbestos etc.) and be more prone to need repairs. As Figure 24 shows, in Gloucestershire 21.6% of the housing stock was built pre 1919, in Forest of Dean, Stroud and Cotswold this rose to between a quarter and a third of each districts dwelling stock. Tewkesbury had the most house construction post war[121].

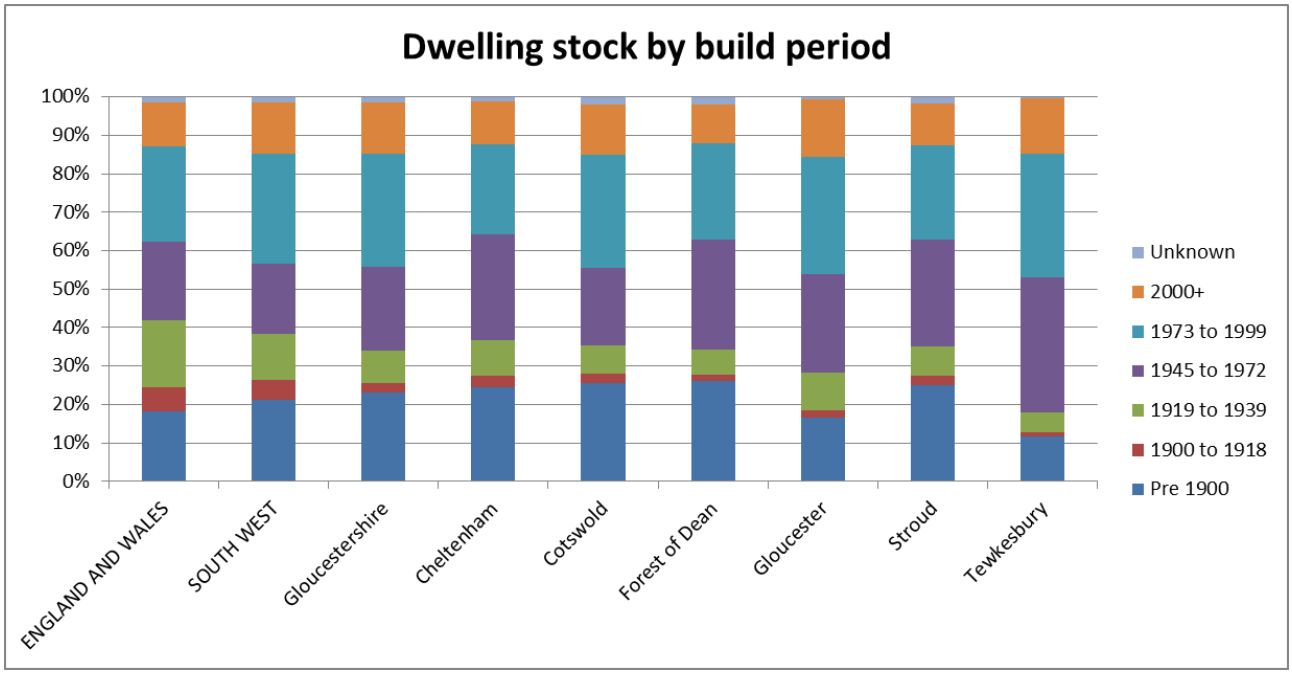

Figure 24: Dwelling stock by build period by district, county, region and country[122]

Cotswold has the highest number of building conservation areas of any council in the country (144)[123] and almost the entire centre of Cheltenham, some 599 ha, is a building conservation area[124]. Building conservation areas are put in place to secure the future of the architectural heritage of an area although they can lead to improvements and maintenance of buildings taking longer or being more costly due to protection legislation.

[120] Department for Communities and Local Government, Local Authority housing data https://www.gov.uk/government/statistical-data-sets/local-authority-housing-statistics-data-returns-for-2014-to-2015

[121] Valuation Office Agency, Council Tax Statistics https://www.gov.uk/government/statistics/council-tax-stock-of-properties-2015

[122] Valuation Office Agency, Council Tax Statistics https://www.gov.uk/government/statistics/council-tax-stock-of-properties-2015

[123] Cotswold District Council, Conservation Areas http://www.cotswold.gov.uk/residents/planning-building/historic-buildings-conservation-areas/conservation-areas/

[124] Cheltenham Borough Council, Built Heritage and Landscape Conservation interactive map http://maps.glosdistricts.org/map/Aurora.svc/run?script=\Aurora\CBC+Conservation+Designations.AuroraScript%24&nocache=2072641887&resize=always

In comparison new housing is often built more sustainably, has better insulation and can be more suitable for different types of people; for example developments for residents over 50 often include modifications. There are currently 290 age exclusive retirement and sheltered housing developments in Gloucestershire[125].

In 2015-16 2,320 new dwellings were completed in Gloucestershire, Figure 25 shows the largest proportion of these was in Tewkesbury district.

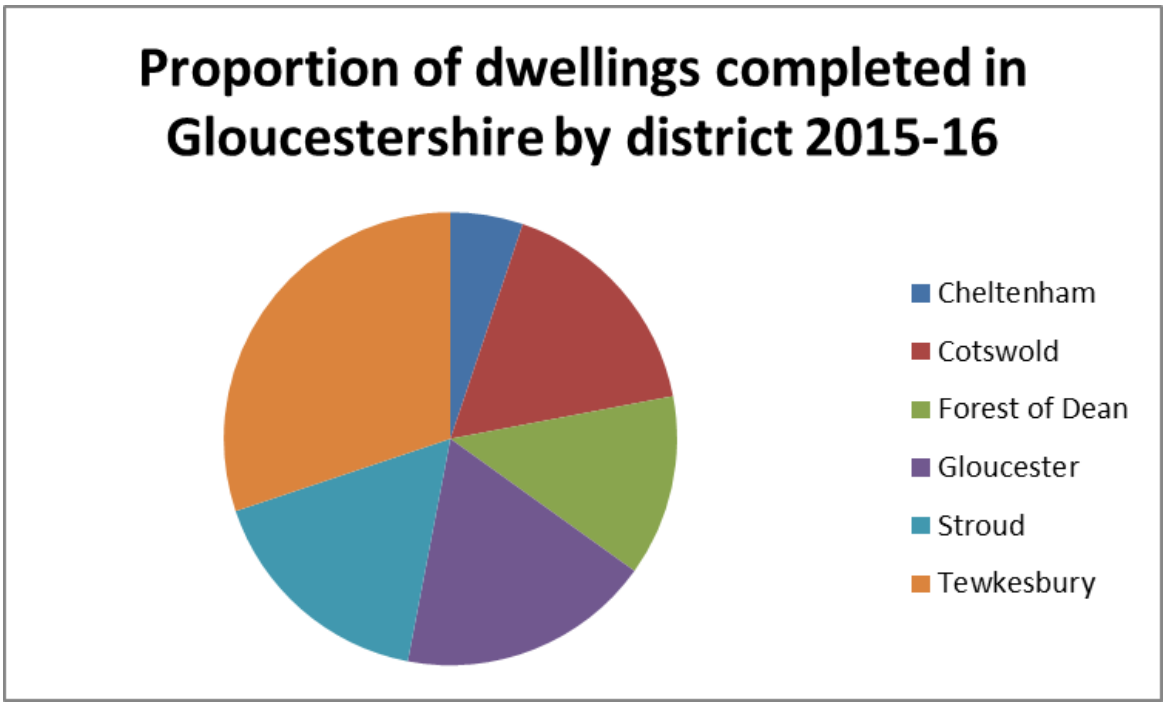

Figure 25: Proportion of dwellings completed in Gloucestershire 2015-16 by district

Across the county the number and type of dwellings being completed varies. Figure 26 shows Cheltenham saw no social housing dwellings completed in 2015-16 and the fewest dwellings built for private enterprise, conversely Tewkesbury had the most social housing and private enterprise dwellings completed in the year[126].

[125] Housing Care http://www.housingcare.org/housing-care/results.aspx?ath=1%2c2&lst=re&ct=England&cn=Gloucestershire&ca

[126] Department for Communities and Local Government, House building statistics https://www.gov.uk/government/statistical-data-sets/live-tables-on-house-building

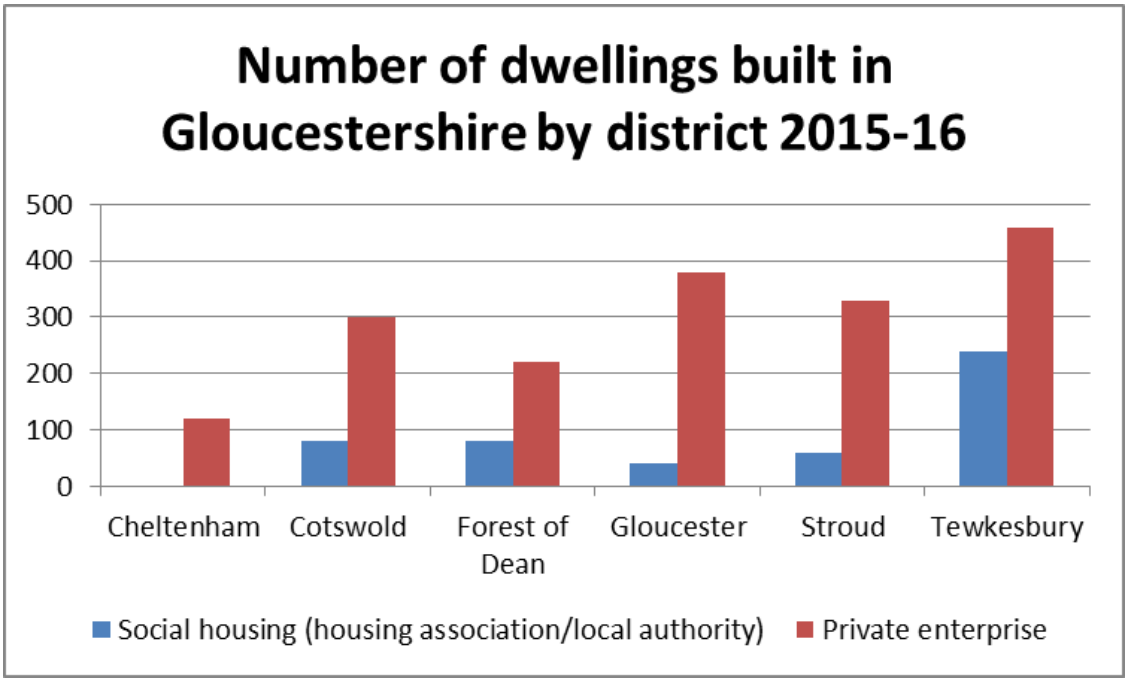

Figure 26: Number of dwellings built in Gloucestershire by social housing and private enterprise 2015-16

In 2014 the mean usable floor area in dwellings in England was 94m^2 [127]. Homes in the social sector tended to be smaller (67m^2) than homes in the privately rented sector (77m^2). Owner occupied homes (106m^2) were larger then both social and private rented homes[128]. The usable living space of dwellings can have an effect on residents' health, particularly children. Smaller homes with a low usable living space can cause overcrowding. Living in overcrowded housing has implications for both mental and physical health, it is estimated that children growing up in difficult housing conditions are 25% more likely to suffer severe ill health and disability during childhood and early adulthood[129]. Overcrowding can also impact negatively on a child's educational and emotional development, a lack of space to study, for example, can lead to academic underachievement and strained family relations which can lead to isolation and unhappiness.

The census provides a measure of whether a household's accommodation is overcrowded or under occupied, based on a number of rooms/bedrooms in a household's accommodation, the ages of the household members and their relationships to each other. Figure 27 shows at the time of the 2011 census 5.5% of households in Gloucestershire (14,035 households) had fewer rooms than the standard requirement and are therefore overcrowded, this is lower than the national average. Cheltenham had the highest level of overcrowding and Cotswold had the lowest. There was a 1.0 percentage point increase in households that were overcrowded in terms of rooms since 2001

[127] *Ibid.*
[128] *Ibid.*
[129] Shelter, Chance of a Lifetime: The impact of bad housing on children's lives https://england.shelter.org.uk/__data/assets/pdf_file/0007/66364/Lifechancereport.pdf

(3,217 households). The percentage of households that were overcrowded in terms of bedrooms in 2011 was considerably lower at 2.6%[130].

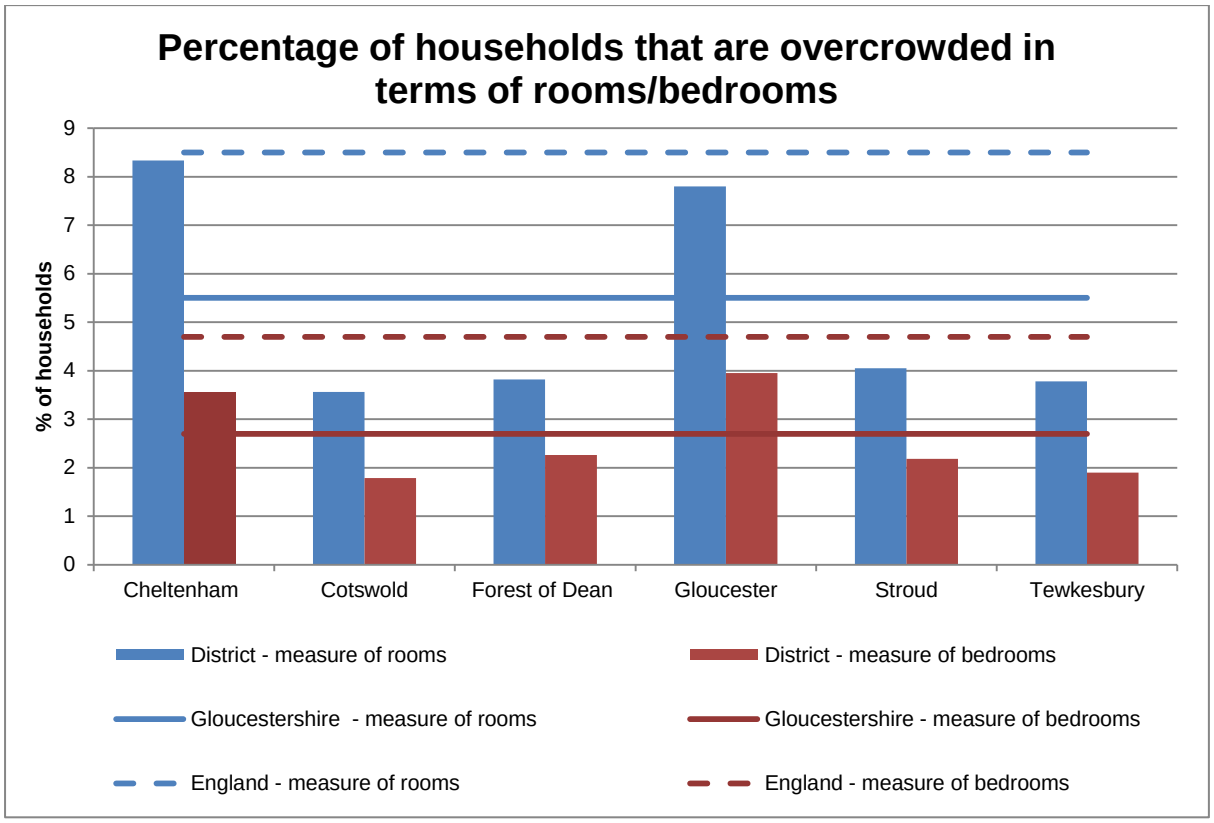

Figure 27: Percentage of households that are overcrowded in terms of rooms/bedrooms

Fuel poverty and energy usage

Fuel poverty is a complex issue which arises from a combination of factors including housing in poor condition; low household income; poor energy efficiency performance in the property; and high fuel costs. Fuel poverty often results in cold damp homes, which contribute to ill health and increases excess winter deaths. A household is considered to be in fuel poverty if their income is below the official poverty line and their fuel bills are higher than that of the national medium.

In 2014 an estimated 30,860 households in Gloucestershire were in fuel poverty representing 11.5% of all households this compares with 10.6% nationally[131]. The Government's Standard Assessment Procedure (SAP) is used to monitor the energy efficiency of homes. The energy efficiency of the English housing stock has continued to improve and in 2014 the average SAP rating of English dwellings was 61 points, up from 45 points in 1996[132].

[130] Ibid.
[131] Department for Business, Energy and Industrial Strategy, Fuel poverty statistics https://www.gov.uk/government/statistics/fuel-poverty-detailed-tables-2014
[132] Department for Communities and Local Government, English Housing Survey 2014-15 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/501065/EHS_Headline_report_2014-15.pdf

The energy use of dwellings across the county varies considerably in each district as shown in Figure 28. The average energy use is below the England average in all districts except Stroud and Forest of Dean[133].

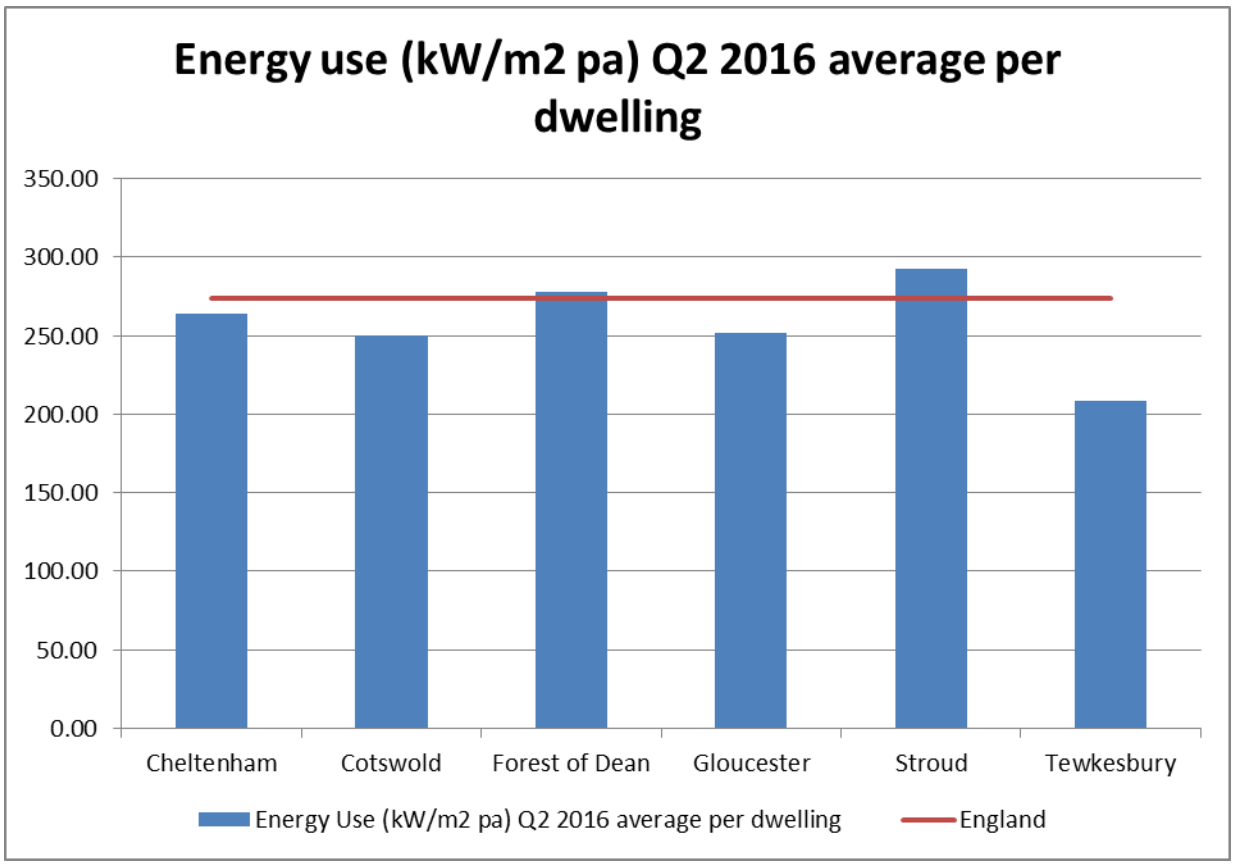

Figure 28: Energy use (kW/m2 pa) Q2 2016 average per dwelling (the district with the highest costs has been highlighted red)

Domestic energy use levels are often intrinsically linked to heating the dwelling; they can vary due to a variety of factors including age of house, type of fuel readily available, occupancy levels and most notably age and wellness of the occupiers. A government study in 2012 found that even in similar properties in similar locations across England there was variation in energy use, households with young children or the elderly were kept warmer (2-4 degrees warmer); the same was seen with occupants with chronic health conditions[134]. Households where occupants were in the house during the day had the heating and lighting on for longer and those that had lived in their houses longer tended to have older less energy efficient heating in place. Dwellings that had high energy use had lower energy efficiency ratings than those with lower use. These differences in energy use can give a

[133] Department for Communities and Local Government, Energy performance and building certificates https://www.gov.uk/government/statistical-data-sets/live-tables-on-energy-performance-of-buildings-certificates

[134] Department of Energy and Climate Change, Domestic energy use study: to understand why comparable households use different amounts of energy https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65599/6919-domestic-energy-use-study.pdf

variation of average bill between high and low energy users of £250-£860 per year[135]. The stark contrast in cost of heating homes to a 'comfortable' level leads to fuel poverty and more vulnerable people living in cold houses. Figure 29 shows that just as overall energy use in Stroud and Forest of Dean are high so is the average costs of heating a dwelling, both of these districts also have high percentages of detached dwellings.

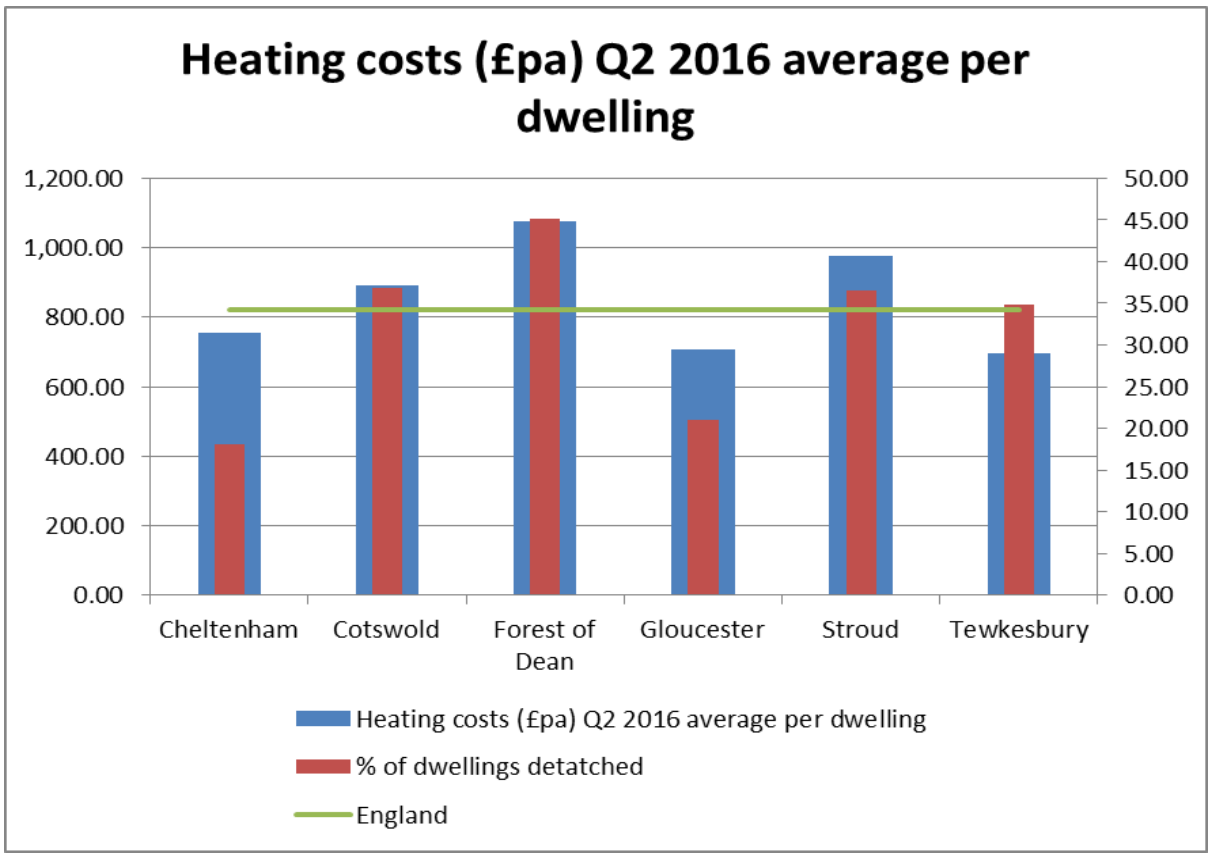

Figure 29: Heating costs (£pa) Q2 2016 average per dwelling

Natural gas is the most widely-used heating fuel in the UK it is also the cheapest option available to consumers[136]. However, not all homes are on the gas network. Approximately 14% of households in Gloucestershire were not on the gas network in 2016[137]. This varies dramatically across the districts; in Gloucester a negligible number of dwellings were not connected to the gas network however this rises to 37% and 32% of dwellings in Forest of Dean and Cotswold respectively meaning consumers in these areas may struggle with higher fuel bills as they don't have access to the cheapest fuel source available. The median gas consumption per dwelling was highest in Cotswold followed by Stroud and Forest of Dean, this suggests although fewer consumers have gas available to them those

[135] *Ibid.*

[136] The green age, Is it cheaper to heat my home by gas or electricity? http://www.thegreenage.co.uk/cheaper-heat-home-gas-electricity/

[137] Department of Energy and Climate Change, Sub-national gas consumption data https://www.gov.uk/government/statistical-data-sets/gas-sales-and-numbers-of-customers-by-region-and-local-authority

who do use more than those in more urban districts, this is probably attributable to the higher proportion of older residents and the size and type of housing in these areas[138].

Lack of central heating can also contribute to heating costs, damp and consequently to ill health. In 2011 approximately 6,908 (2.7%) households in Gloucestershire had no central heating. Lack of central heating was highest in Gloucester where 3.3% of households did not have central heating[139].

Electricity consumption is more linked to size (type) of dwelling than characteristics of occupants. A detached house is estimated to use between 3.57 and 5.17 kWh per month, a semi-detached between 3.44 and 4.59 kWh and a terraced house between 2.5 and 3.9 kWh[140]. Districts with higher numbers of detached housing would therefore expect to see higher electrical costs and subsequently higher lighting costs as seen in Figure 30.

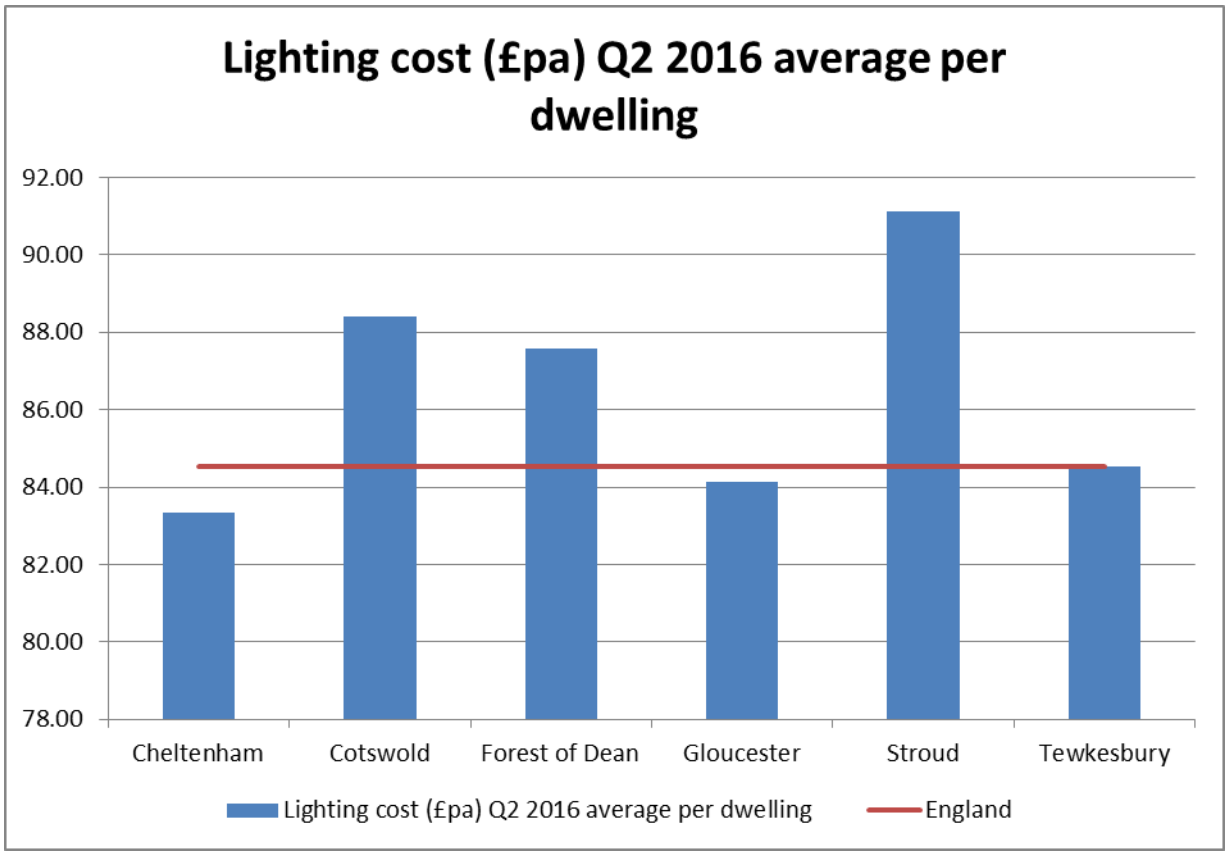

Figure 30: Lighting cost (£pa) Q2 2016 average per dwelling (the district with the highest cost has been highlighted in red)

[138] Ibid.
[139] Nomis https://www.nomisweb.co.uk/query/construct/submit.asp?forward=yes&menuopt=201&subcomp=
[140] Research gate, Real-life energy use in the UK: How occupancy and dwelling characteristics affect domestic electricity use https://www.researchgate.net/publication/236877350_Real-life_energy_use_in_the_UK_How_occupancy_and_dwelling_characteristics_affect_domestic_electricity_use

Energy prices have risen sharply in recent years. Relative to other prices, electricity and gas have gone up by 60% and 110% respectively in the last decade[141]. Overall spending on energy is estimated to make up 8.1% of a household spend, however in the poorest decile it amounted to 16% of their spend compared to the richest decile where it amounted to 3% of their spending even though in cash terms they often spent more on energy as they lived in larger homes[142]. The average cost of lighting and heating was lowest in Gloucester. Stroud, Forest of Dean and Cotswold had higher average costs than the England average.

Gloucestershire's Warm and Well scheme aims to improve energy efficiency in the home and reduce the risk of fuel poverty by; raising public awareness; providing advice to householders and making referrals for grants and discounts. Between 2011/12 and 2015/16 1,537 measures were installed in properties in Gloucestershire to improve energy efficiency[143].

Figure 31 breaks down the measures installed in the latest period (2015/16) by type[144]. It shows that the most common type of measure installed in most areas in the county was Cavity Wall Insulation. However loft insulation was the most common measure installed in Stroud.

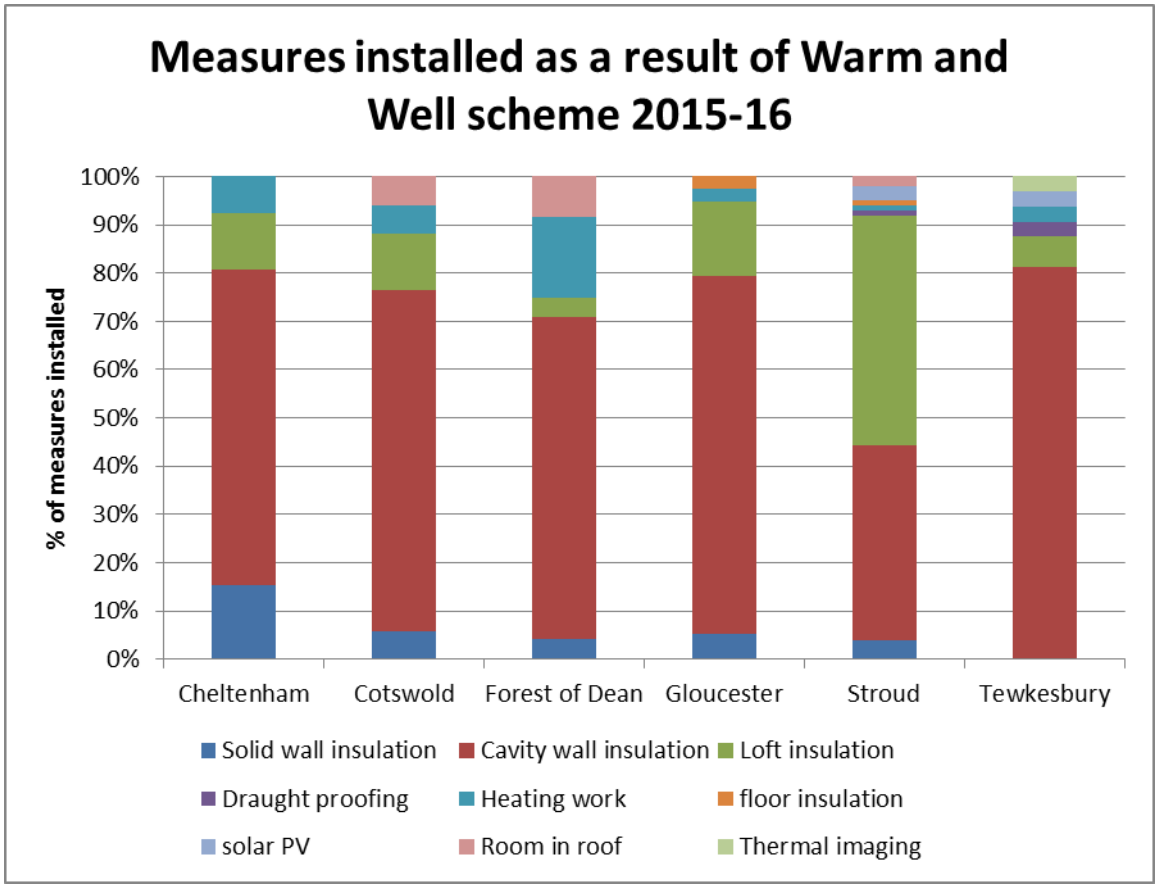

Figure 31: Measures installed as a result of Warm and Well scheme 2015-16

[141] Institute for Fiscal Studies, Household Energy Use in Britain: A Distributional Analysis http://www.ifs.org.uk/comms/r85.pdf
[142] Ibid.
[143] Data sourced from District Councils, by Stroud District Council
[144] Ibid.

In Q2 2016 Cotswold, Forest of Dean and Stroud had higher average CO_2 emissions than the England average[145].The measures installed as a result of the Warm and Well Scheme are expected to result in a reduction in the CO_2 emissions produced by residential properties. It is estimated the schemes installed in 2015/16 will lead to a total annual saving of 133.6t CO_2/a for Gloucestershire or 4,986t over a lifetime[146]. Figure 32 shows the CO_2 saved through measures installed by Warm and Well 2015/16 across the districts.

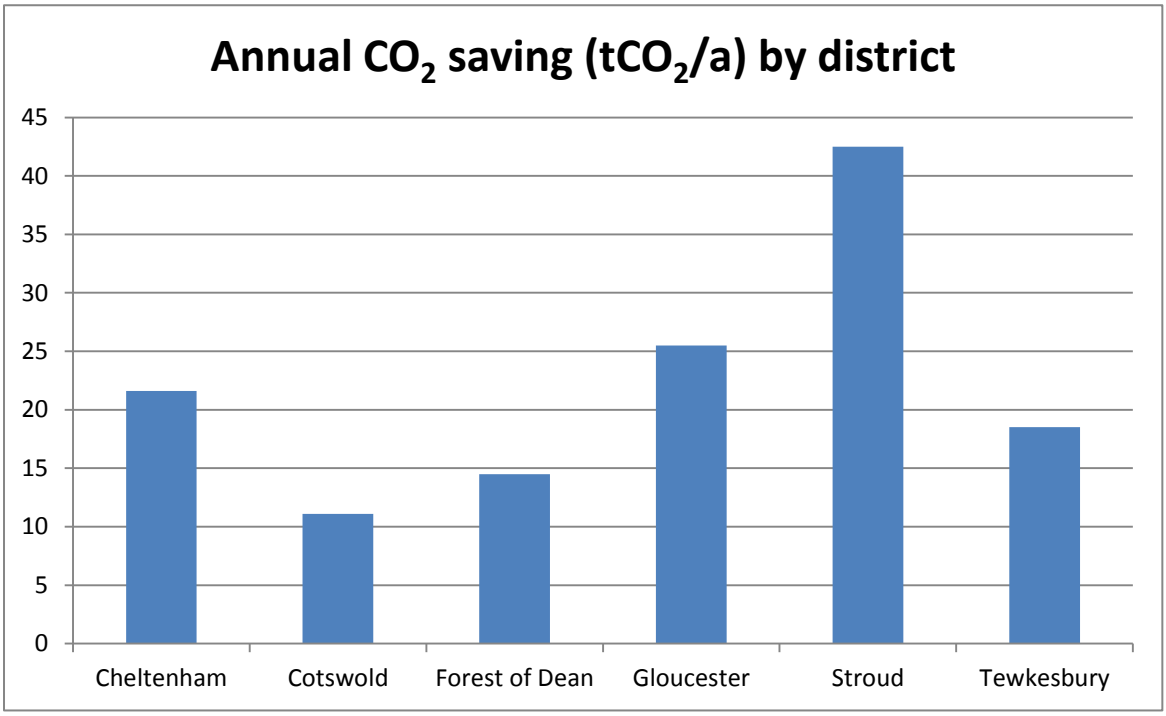

Figure 32: Annual CO2 saving (tCO2/a) by district

Housing safety

The Housing Health and Safety Rating System (HHSRS) is a system for assessing the overall health and safety risks in dwellings and was introduced under the Housing Act 2004. This system enables a differentiation between minor hazards and Category 1 hazards where the most serious harm outcome is identified, for example, death, permanent paralysis, permanent loss of consciousness and loss of a limb or serious fractures.

Local authority districts have a duty to periodically review housing conditions by carrying out surveys or studies. The surveys generate a range of information about housing, including an estimate of the number of Category 1 hazards. In 2011, there were an estimated 45,945 private sector dwellings in Gloucestershire exhibiting Category 1 hazards, this represents 18% of all private sector dwellings. Rates of Category 1 hazards were below the national average of 22%[147].

[145] *Ibid.*
[146] *Ibid.*
[147] Cheltenham Borough Council, Private Sector House Condition Survey, 2011.

Figure 33 shows the type of Category 1 hazards estimated to be present in properties in Gloucestershire, the most common Category 1 hazards are excess cold followed by falls on stairs.

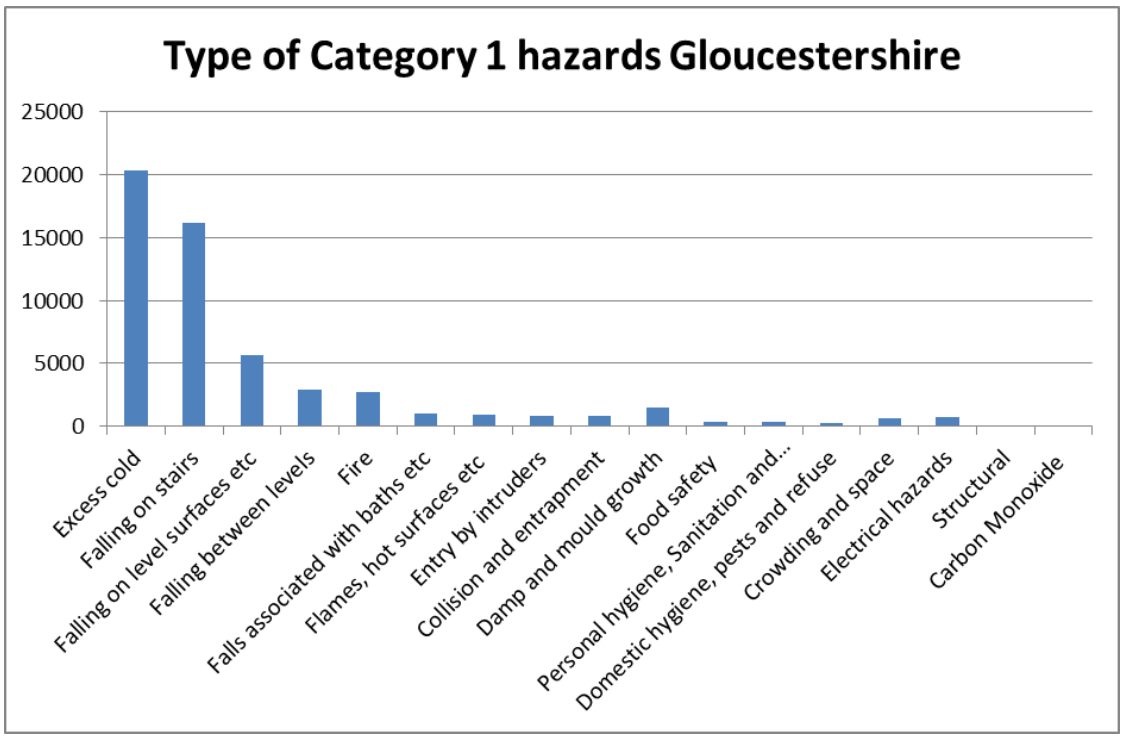

Figure 33: Type of Category 1 hazards, 2011 [148]

As part of a strategy to improve the health, safety and wellbeing of residents in private sector housing, Gloucestershire's district councils have developed a consistent approach to model the extent of the public health costs arising from five of the most common Category 1 hazards. The following table shows that if the hazards identified in Gloucestershire were addressed it would result in an annual saving to the NHS of £4,646,485.

Table 3: Cost to the NHS of the most common Category 1 hazards, Gloucestershire[149]

	Hazards for Gloucestershire		
	No. of Hazards	**Cost to NHS (£)**	**Savings to NHS (£)**
Excess Cold	20,344	1,930,645	1,737,377
Damp & Mould	1,478	361,962	360,750
Falls on level	5,664	828,473	745,552
Falls on stairs	15,547	1,694,933	1,577,709
Falls between levels	2912	226,349	225,097
TOTAL	**45,945**	**£5,042,362**	**£4,646,485**

[148] *Ibid*.

[149] Gloucestershire Local Authority Districts , Improving Homes and Improving Health and supporting evidence

Table 4 below shows the numbers of category 1 hazards removed by district. Cheltenham removed the highest number of hazards in 2014/15 and across the whole period 2011/12 – 2014/15. The number of hazards removed each year across the whole county has reduced significantly since peaking in 2012/13.

Table 4: Category 1 hazards removed from Gloucestershire Homes[150]

	2011/12	2012/13	2013/14	2014/15	2011/12-2014/15
Cheltenham	214	276	191	153	834
Cotswold	132	84	121	54	391
Forest of Dean	137	174	52	27	390
Gloucester	114	175	245	52	586
Stroud	193	204	57	54	508
Tewkesbury	123	95	46	23	287
Gloucestershire	**913**	**1008**	**712**	**363**	**2,859**

Additional needs

Housing needs change for people as their circumstances change, especially as people age or become more vulnerable.

The Safe at Home Scheme helps older people and people with disabilities carry on living in their own homes safely with repairs and improvements to their homes, so that they can continue to live in greater comfort and security. The service is available to people referred to Safe at Home by social care and health services, or by people who want to make changes for themselves[151].

The Local Housing Authority has a mandatory duty to provide Disabled Facilities Grants[152] for housing adaptations to help disabled people to live independently. When delivered early, alongside other preventative measures, they may contribute to preventing admissions to hospital and residential care. With an increasing elderly population, and more disabled children surviving their early years through to adulthood, the need for adapted housing is projected to continue to increase, but most new-build homes are still not designed to meet the needs of disabled people, meaning the grants play an important role in ensuring housing is suitable for those who have additional needs[153].

[150] Data sourced from District Councils, by Stroud District Council

[151] Gloucestershire County Council Gloucestershire Health Inequalities Action Plan 2016 – 2019 http://glostext.gloucestershire.gov.uk/documents/s27481/Appendix%204%20Gloucestershire%20Health%20Inequalities%20Action%20Plan%20DRAFT.pdf

[152] Disabled Facilities Grants eligible works are major works which are currently defined as adaptations costing over £1,000, with the maximum grant which can be paid being £30,000. The works for which Disabled Facilities Grants is to be given are detailed within statutory guidance but relate mainly to major works of adaptation to a disabled persons home to enable access and personal care needs. The applicant of the grant is subject to a statutory means test however, there is no means test for adaptations for children.
Disabled persons meeting the legislative criteria are entitled to apply for DFG funding regardless of the type of tenancy they occupy be it owner occupation, private letting or social housing.

[153] Astral Advisory, Disabled Facilities Grants in England: A research report, 2013

Table 5 shows the number of Disabled Facilities Grants completed between 2013/14 and 2015/16. In 2015/16 there were 419 grants completed in Gloucestershire to the value of £2,485,935. The cost of grants completed in Gloucestershire decreased between 2013/14 and 2014/15, but has increased in 2015/16 the number of grants increased year on year for the county as a whole.

Table 5: Disabled Facilities Grants Completed in Financial Year in Gloucestershire[154]

	2013/14		2014/15		2015/16	
	No. grants Completed	**Total Cost Completed Grants**	**No. grants Completed**	**Total Cost Completed Grants**	**No. grants Completed**	**Total Cost Completed Grants**
Cheltenham	76	£595,564	64	£514,230	77	£371,380
Cotswold	150	£775,250	93	£605,191	101	£588,912
Forest of Dean	103	£584,470	125	£502,624	71	£320,890
Gloucester	81	£665,260	66	£408,680	42	£397,966
Stroud[155]	31	£199,983	32	£212,029	22	£263,436
Tewkesbury	117	£676,577	132	£772,409	106	£543,351
Gloucestershire	**332**	**£2,126,290**	**355**	**£1,895,742**	**419**	**£2,485,935**

Homelessness

Homelessness is a complex problem. It is both the cause and consequence of many other problems, such as family and relationship breakdown, domestic violence, mental health, substance misuse, the loss of employment and debt.

The impact of homelessness on health can be stark; with Crisis reporting the difference in life expectancy for a homeless person compared to someone who is not homeless is 30 years, with an expected age of mortality of 47 for a rough sleeping homeless person[156].

Homeless people can be categorized into three main groups:

- Single homelessness: This group include rough sleepers and those living in hostels, shelters and temporary supported accommodation
- Hidden homelessness/ at risk of homelessness: This group is difficult to quantify. Many hidden homeless are 'sofa-surfers', residing temporarily with family or friends
- Statutory homelessness: This group refers to people who meet specific criteria set out in legislation. Broadly speaking, somebody is statutorily homeless if they are unintentionally homeless, fall within a specified priority need group and do not have accommodation that they have a legal right to occupy, which is accessible and physically available to them and which it would be reasonable for them to continue to live in. It

[154] Data sourced from District Councils, by Stroud District Council

[155] Stroud District Council is the only district council in Gloucestershire who still own and manage their own stock. Adaptations to Council stock are carried out by SDC and not through the DFG process and are not therefore included in the DFG figures above

[156] Crisis, Homelessness kills: An analysis of the mortality of homeless people in early twenty-first century England http://www.crisis.org.uk/publications-search.php?fullitem=371 Accessed 06/11/2015

would not be reasonable for someone to continue to live in their home, for example, if that was likely to lead to violence against them (or a member of their family).

Local authorities have a duty to secure suitable accommodation for the statutory homeless; this is referred to as acceptances[157].

In 2015/16 358 people were accepted as eligible and statutory homeless in Gloucestershire[158]. This equates to a rate of 0.59 per 1000 population which was lower than the national rate of 2.52. The rate of statutory homelessness in Gloucestershire increased from 2014/15 when it stood at 0.52, this reflects a national trend which also increased from 2.4 in 2014/15. All the districts have statutory homeless rates per 1000 of the population under the England rate of 2.5 except Gloucester[159] as shown in Figure 34.

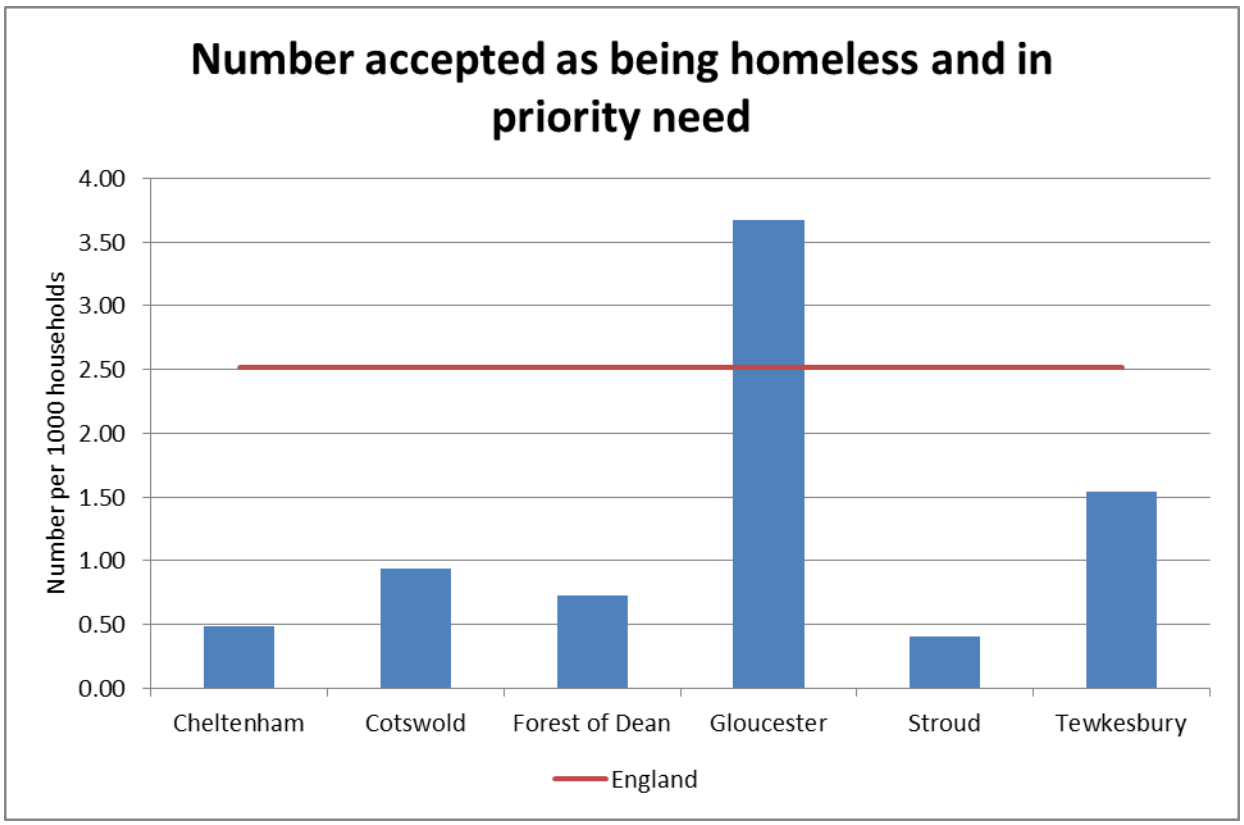

Figure 34: Number accepted as being homeless and in priority need per 1,000 households, 2015/16

Figure 35 shows that generally over the last 10 years the number of acceptances per 1,000 households in each district in Gloucestershire has fallen from 2005/06 to 2015/16, this reflects the national trend. However five of the six districts have seen an increase in the rate in the last year which is also in line with the national trend[160].

[157]. Department for Communities and Local Government, Homelessness statistics https://www.gov.uk/government/statistical-data-sets/live-tables-on-homelessness#live-tables
[158] *Ibid,*
[159] *Ibid.*
[160] *Ibid.*

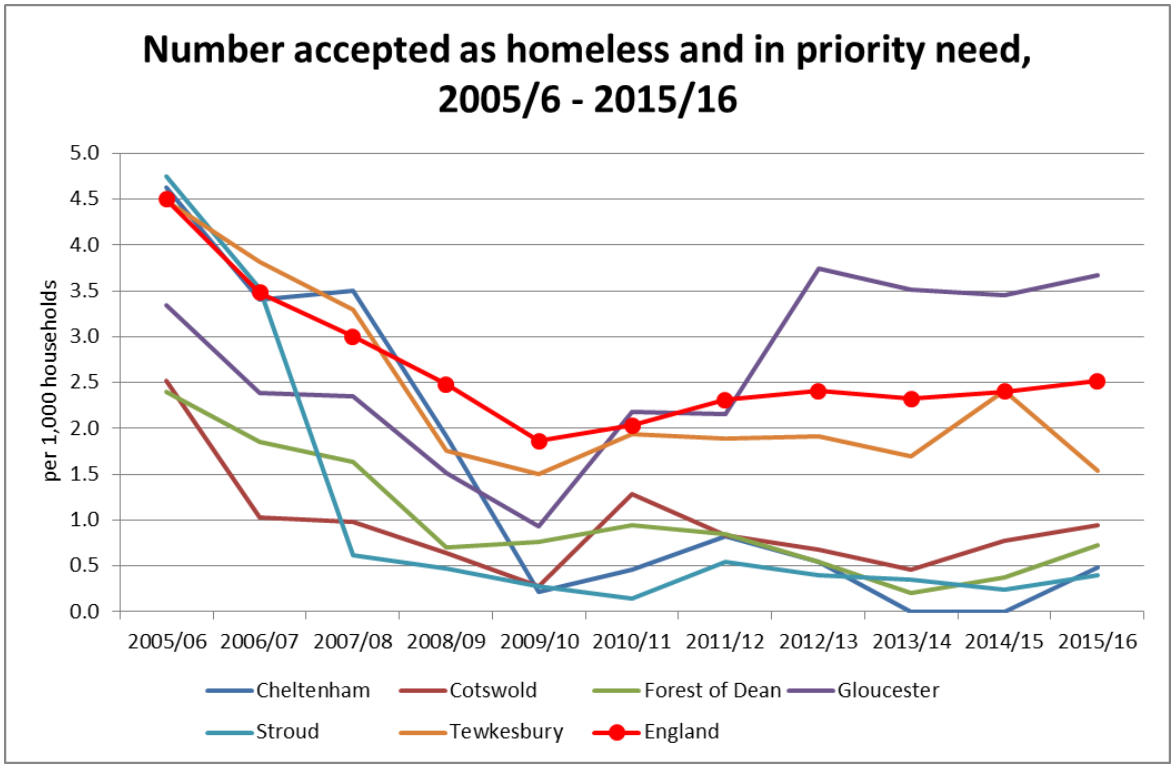

Figure 35: Number accepted as being homeless and in priority need per 1,000 households, 2005/6 – 2015/16

In Gloucestershire, data from April-June 2016 shows that the most common reason for statutory homelessness was because private rented Assured Shorthold Tenancies had been brought to an end (22% of acceptances), the next most common reason was because of a violent breakdown of a relationship involving a partner (14% of acceptances, higher than the England level of 11% of acceptances) and other relatives or friends no longer willing to accommodate (11% of acceptances)[161]. Nationally the most common reason for acceptances was because their private rented Assured Shorthold Tenancies had been brought to an end (31% of acceptances in 2015/16) followed by parents no longer willing to accommodate (15% of acceptances).

Not every household who approaches the local authority as homeless is accepted as homeless. Some may get advice and assistance which means they can avoid becoming homeless; others simply do not meet the statutory definition of homelessness.

Table 6 shows that in 2015/16, there were 673 approaches to district councils across Gloucestershire by people that were eligible but not homeless[162].

[161] *Ibid.*
[162] *Ibid*.

Table 6: Number of households that have approached local authorities as homeless, but have not been accepted, 2015-2016

	Eligible, homeless and in priority need, but intentionally	Eligible, homeless but not in priority need	Eligible, but not homeless
Cheltenham	-	-	229
Cotswold	9	47	50
Forest of Dean	-	-	12
Gloucester	54	23	171
Stroud	-	-	35
Tewkesbury	-	-	43
England	9,550	19,570	27,920

Under the Homelessness Act 2002, local housing authorities must have a strategy for preventing homelessness in their district. The strategy must apply to everyone at risk of homelessness, including cases where someone is found to be homeless but not in priority need and cases where someone is found to be intentionally homeless. Under the strategy local housing authorities must provide:

- homelessness prevention, which involves providing people with the ways and means to address their housing and other needs to avoid homelessness. This is done by either assisting them to obtain alternative accommodation or enabling them to remain in their existing home.
- homelessness relief occurs when an authority has been unable to prevent homelessness but helps someone to secure accommodation, even though the authority is under no statutory obligation to do so.

In 2015/16 there were 1,801 instances of homelessness prevention and relief in Gloucestershire, this equates to rates of between 2.03 and 11.32 per 1,000 households across the six districts, which Figure 36 shows for four of the districts their rate was lower than the national rate of 9.29 and county rate of 6.80[163].

[163] *Ibid*.

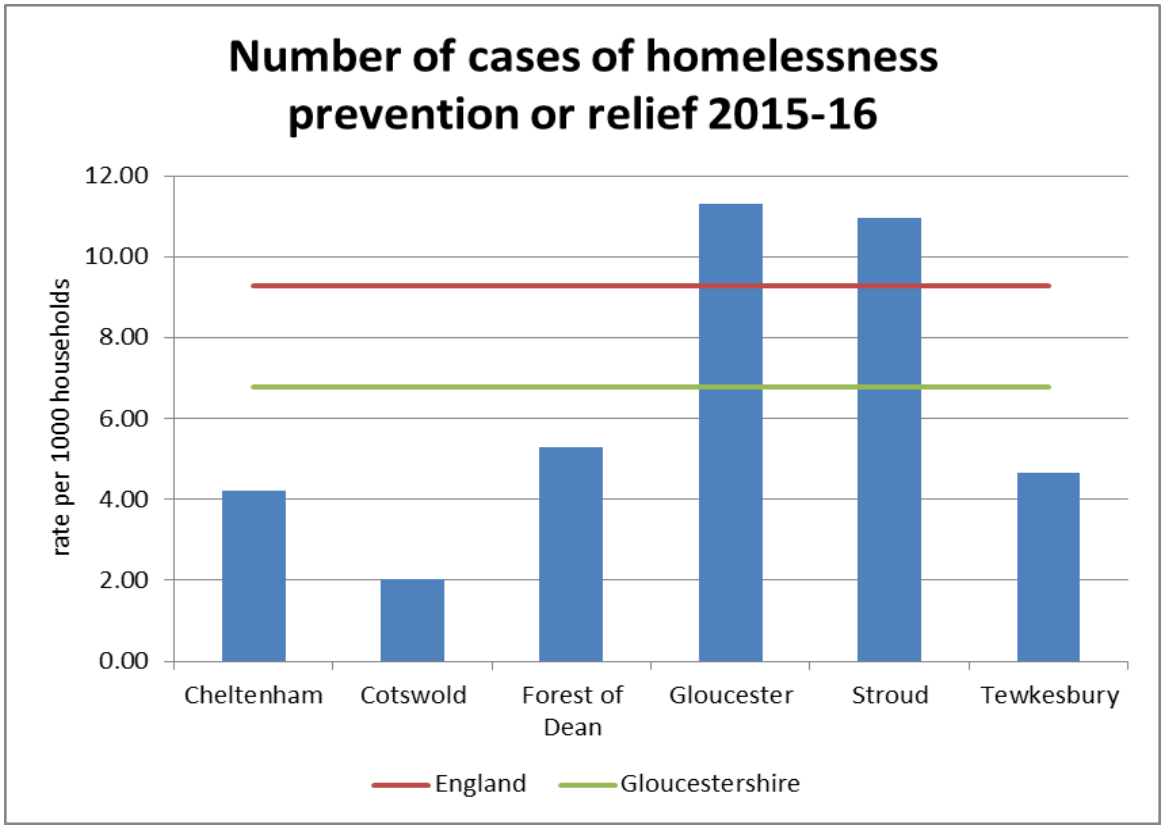

Figure 36: Number of cases of homelessness prevention or relief, per 1,000 households, 2015/16

In Gloucestershire the largest proportion of homelessness prevention and relief (38.2%) focused on assisting people to find alternative accommodation. This reflects the picture seen in all districts except Stroud, where no households were assisted in finding alternative accommodation, but were either enabled to stay in their own home or given other relief. Nationally the most common type (55.9%) of homelessness prevention and relief entailed helping people remain in their existing homes[164].

[164] *Ibid.*

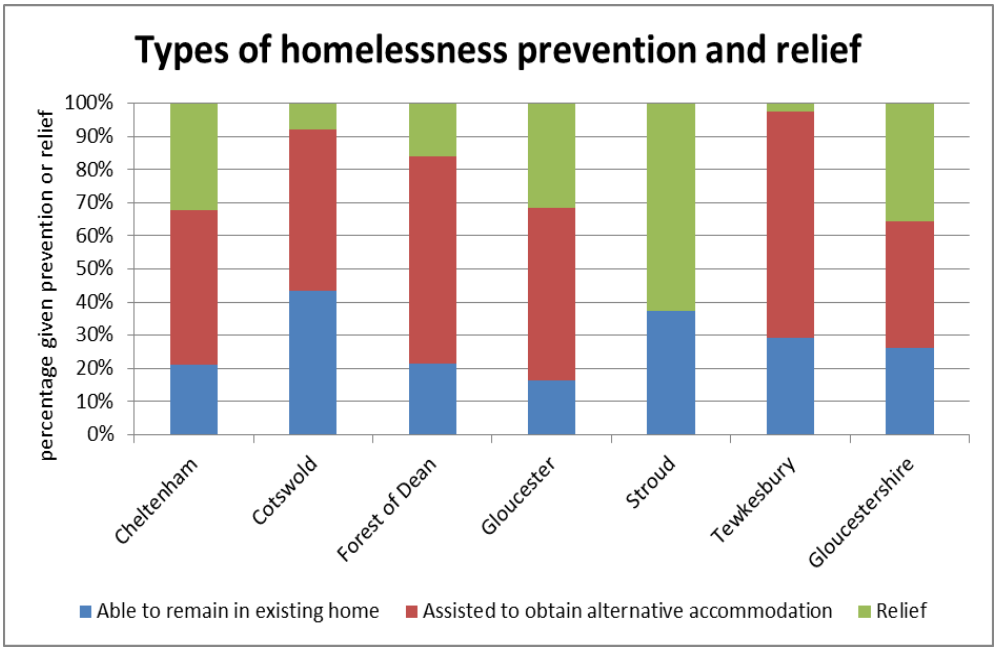

Figure 37: Types of homelessness prevention and relief, 2015/16[165]

As previously stated Statutory homelessness is only one part of homelessness. Rough sleepers are the most visible homeless people but they are often not eligible for relief under statutory homeless criteria. In 2016 it was estimated that there were 42 rough sleepers in Gloucestershire. Figure 38 shows these were clustered in the most urban areas of the county. Tewkesbury and Forest of Dean counted no rough sleepers in their districts.

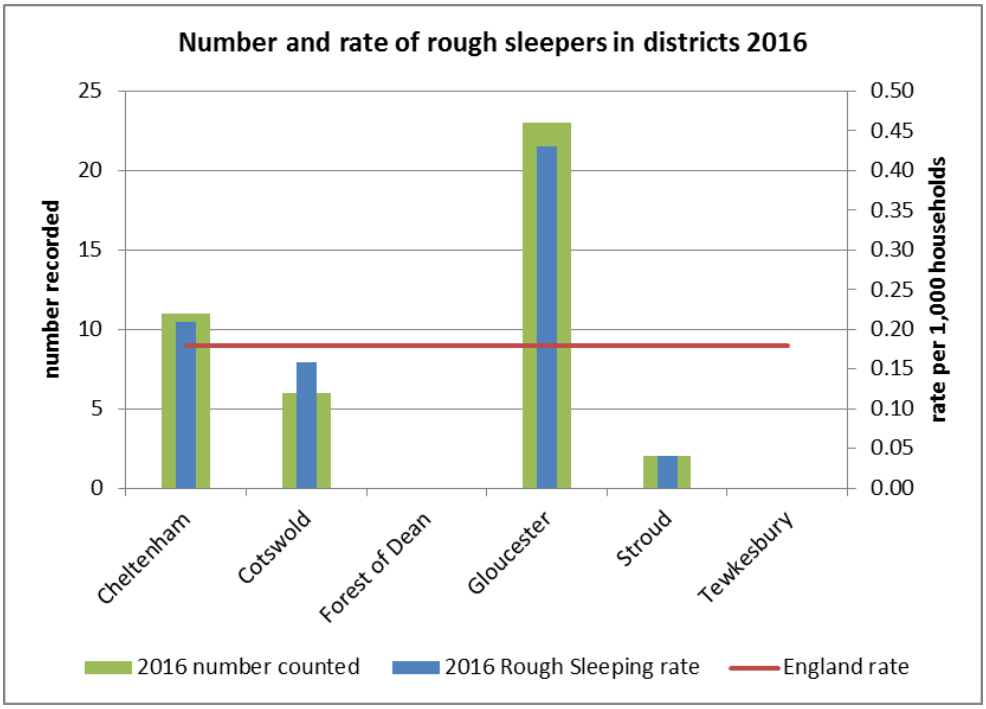

Figure 38: Number and rate of rough sleepers in districts 2016

[165] *Ibid.*

Figure 39 illustrates the numbers recorded in Gloucestershire had been declining between 2010 (30) and 2015 (21) however there has been a sharp increase in 2016 when 42 people were recorded in the estimated Rough Sleeper Count. The England picture shows a different story of an increasing number year on year since 2010 that has accelerated sharper in the last 2 years. Nationally figures show rough sleeping has more than doubled since 2010, when 1,768 people were recorded.[166]

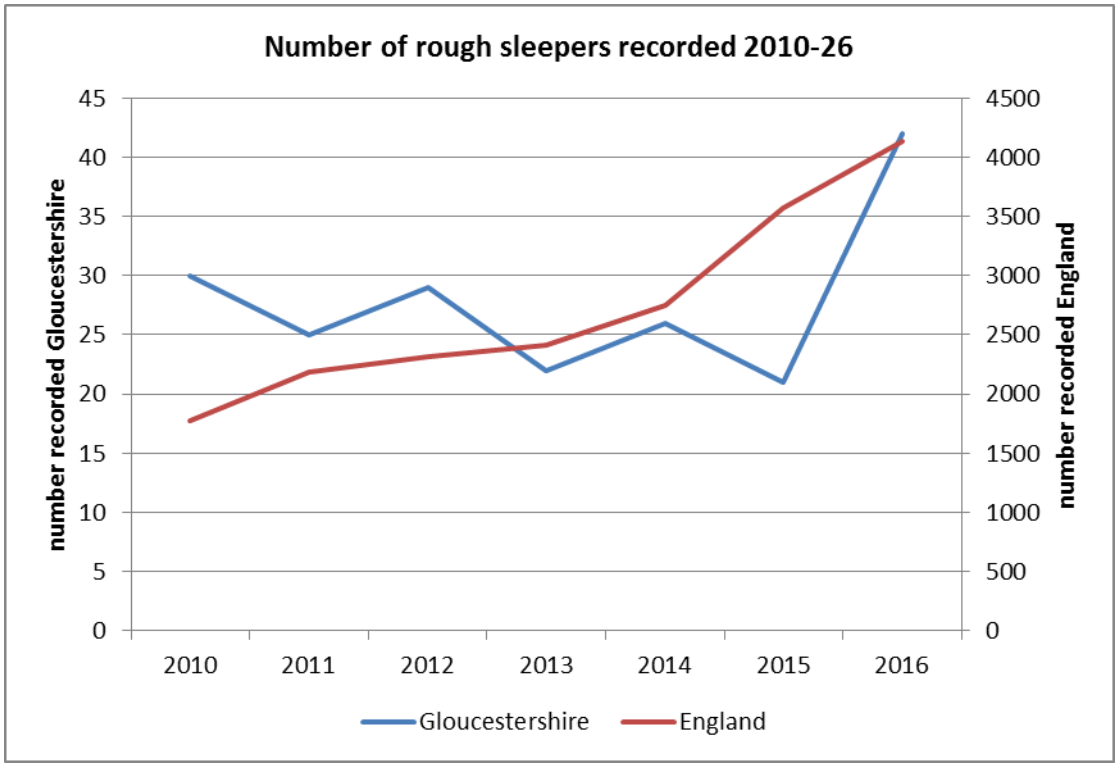

Figure 39: Number of rough sleepers recorded 2010-16

Rough sleeping can leave people vulnerable to violence and abuse, and negatively impact mental and physical health. The homeless charity Crisis states recent research has shown rough sleepers are 17 times more likely to be victims of violence.[167]

[166]Department of Communities and Local Government
https://www.gov.uk/government/statistics/rough-sleeping-in-england-autumn-2016
[167] BBC News http://www.bbc.co.uk/news/uk-england-38719087