Gloucestershire Housing Affordability Model

Introduction & Baseline Results Report

October 2011

For Gloucestershire County Council and the six Gloucestershire District Councils: -

STROUD DISTRICT COUNCIL www.stroud.gov.uk
Tewkesbury Borough Council
GLOUCESTER CITY COUNCIL
CHELTENHAM BOROUGH COUNCIL
Forest of Dean DISTRICT COUNCIL
UNITED WE SERVE
Gloucestershire COUNTY COUNCIL

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Introduction

1.1. The **Gloucestershire Housing Affordability Model (GAM)** is designed to provide supporting evidence for local policy planning and in particular local strategies for deciding how much housing should be provided. The model generates forecasts for a variety of aspects of the housing market, and various aspects of 'housing need', based upon anticipated and where possible, desirable changes in housing supply and economic activity over time.

1.2. Forecasting within the model applies a number of statistical tools that examine how different variables such as economic growth, house prices, employment and patterns of migration etc. interact with each other. Forecasting also incorporates the function of observed past and present trends and applies future assumptions where appropriate, based on economic theory and a wide source of technical evidence.

1.3. The GAM model currently covers the period from the present through to 2031, with much of the forecasting data provided on an annualised basis. There is potential to extend the timeframe at a later date if necessary.

Commissioning of the GAM Model

1.4. The project to develop a local housing affordability model was commissioned in January 2011 based on a tendering exercise held in November-December 2010. Gloucestershire County Council managed the project on behalf of the County and the District Councils and Heriot-Watt University was contracted to undertake the research and construct the Gloucestershire Housing Affordability (GAM) model.

1.5. The project has been produced in two phases:

- Interim phase – construction of an initial GAM model focused on the sub-region and district level. This version enabled inputting of a limited number of housing supply scenarios and was able to forecast some key impacts of these scenarios at the strategic and district level. The key purpose of this interim phase was to 'test' the workings of the model and to provide early guidance on future model methodology and use;

- Final phase & reporting – construction of the final GAM model with more detailed forecasting outputs on the basis of more detailed input scenarios. The final GAM model has a much broader geographic coverage, offering 'community-scale' sub-district forecasts.

Why has the Gloucestershire Housing Affordability Model been created?

1.6. In the past, local planning policy for how much housing to provide and where this housing should be developed had to comply with a 'strategic plan', prepared either at county level ('Structure Plans') or subsequently at regional level ('Regional Spatial Strategies'). Under the Coalition Government this will no longer be the case, and district councils will instead have to come to their own views – albeit with a 'duty to cooperate' with neighbouring authorities.

1.7. Deciding how much housing to provide and where it should be developed is an extremely important part of the plan making process and that is a defining element of any local development strategy – it sets the tone for future economic growth including jobs prospects, and clarifies the need issue surrounding the future provision of public infrastructure. However, it can be a major challenge in arriving at the 'right' supply and location of housing that best meets the needs of local communities now and in the future.

1.8. To help inform local decision making on housing, a clear evidence-base is required. This should consider how best to plan for a mix of housing that takes into account trends in the number of people who may be living in the locality in the future. It also needs to consider housing that works for families with children, working adults, older people and those with disabilities.

1.9. Evidence gathering for housing policy is a well established practice with a number of established approaches available to local district councils including: - the use of demographic projections; the preparation of Strategic Housing Market Assessments (SHMAs); and Strategic Housing Land Availability Assessments (SHLAAs).

1.10. The creation of an evidence-base on housing across Gloucestershire's districts has been underway for some time and has already been used to inform emerging local plan making. However, evidence needs to be continuously revised and updated, in whole or in part, as circumstances change.

1.11. The proposed reforms to the planning system represent a major change, which will have an impact on the future planning for housing and the evidence requirements to support it. In response, Gloucestershire's districts supported by the County Council have agreed to work together to update and improve the existing evidence-base in a consistent and logical matter that will provide up-to-date information that best reflects local circumstances. The Gloucestershire Housing Evidence Review (2011) is the culmination of this recent joint-working[1].

[1] Details of the Gloucestershire Housing Evidence Review 2011 can be viewed on each respective local authority web pages including Gloucestershire County Council, with the exception of the three Joint Core Strategy authorities – Gloucester City and Cheltenham and Tewkesbury Boroughs. Relevant information for these districts can be viewed via the GCT-JCS web pages.

1.12. The Gloucestershire Housing Evidence Review (2011) includes a detailed commission to investigate updating and providing new evidence on: - potential number of future households; a view of current housing need; and the extent to which housing need and affordability may prove to be an issue locally in the future. The evidence gathering exercise has resulted in the creation of the Gloucestershire Housing Affordability Model – GAM.

The Structure and operations of the GAM Model

1.13. The GAM model is an Excel-based econometric forecasting model of the housing market. It uses data on past, current and future anticipated changes across a number of socio-economic components including amongst others: -

- economic growth measured in gross value added (GVA);
- jobs - rates of unemployment, in and out commuting;
- household earnings and incomes;
- interest rates;
- the availability of credit;
- population structure – age, gender, births and deaths;
- international and UK internal migration;
- the formation of households;
- housing stock – vacancies, demolitions, conversions, new builds;
- the release of planning permissions;
- the need for housing;
- social housing lettings;
- house prices; and
- cost of renting.

1.14. The GAM model applies a variety of statistical tools to assess how the inter-relationships between the components referred to above, may generate changes in each component over time.

1.15. The forecast results from the model mostly cover the period from 2008 to 2031. However, where 'live', recorded data is present for the years after 2007 this has been incorporated into the model.

1.16. The GAM model primarily functions at the level of 102 geographical Housing Market Areas (HMAs) covering the whole of England. These HMAs are made up of groupings of local authority districts and unitary councils, and follow newly formed housing market areas borne out of relatively recent research published by CLG[2]. The county of Gloucestershire accounts for three HMA units – 'Cheltenham-Gloucester' that also includes Tewkesbury Borough; 'Forest of Dean'; and 'Swindon-Cotswold-Downland', which is made up of Stroud and Cotswold Districts along with Swindon Borough, west Oxfordshire and the former districts of northern Wiltshire.

1.17. The retention of the broad geographic coverage (i.e. the HMAs) within the GAM model was a specific design request of the original project. The purpose for this was to enable evidence to be generated on the potential impacts for Gloucestershire as a result of anticipated and / or proposed changes to the housing supply in neighbouring areas. This information could then be used in the future by either the County or District Councils to support their representations on neighbouring local authority plans. Recognition of the wider influences beyond the borders of Gloucestershire may also support the emerging statutory 'duty to cooperate' being considered for all public bodies under the Localism Bill.

1.18. Importantly, the GAM model can generate forecasts at several geographic scales including for each of the six district local authorities and also a further 35 smaller 'community scale' units, known as sub-areas. The introduction of these smaller sub-areas is a direct response to emerging planning reforms under the localism agenda and the need to better understand potential issues for neighbourhood planning purposes. A full list of the 35 'community scale' units applied to the GAM model is located in appendix A.

What can the GAM model do and not do?

1.19. The GAM model aims to offer a view or forecast of *'how the future might look'* focused on different aspects of the housing market such as affordability and need. It also looks at demographic parameters including potential changes in population, migration patterns and the formation of new households. An important aspect of the GAM model is that it will identify potential changes in trend over time.

[2] **Geography of housing market areas: Final report & summary (CLG | Nov 2010)**
http://www.communities.gov.uk/publications/housing/geographyhousingmarket

1.20. Whilst the GAM model will generate detailed annual forecasts, a degree of caution should be applied if these are used, particularly in isolation, such as to defend or justify a particular local policy option. It is inevitable that projections cannot ever be 100% accurate as the future cannot be predicted exactly. However, the model makes use of the best available data to resemble most closely the future scenario which is likely to occur. A full list of output results available through the GAM model is set out in Appendix C.

1.21. Furthermore, the GAM model does not provide 'answers' as to the number and type of new homes that should be built in a local area over a given period in time. It provides supporting evidence to assist policy makers in making decisions on future housing strategies, which will best suit the circumstances and aspirations of the local area they are responsible for.

Background to the GAM Model

1.22. The Gloucestershire Housing Affordability Model (GAM) has its origins in previously commissioned housing policy research for the Department of Communities & Local Government (CLG) and the former National Housing & Planning Advice Unit (NHPAU). Two well-established forecasting schemes – the 'Reading' Affordability Model[3] and 'Estimating Housing Need' Model[4] have heavily influenced the model's construction.

1.23. The GAM Model also fits fairly readily with the former Department of the Environment, Transport and the Regions (DETR) guidance on Housing Need Assessments, which has been substantially incorporated into CLG's Strategic Housing Market Assessment (SHMA) guidance published in 2007[5]. SHMA guidance is widely acknowledged as a credible approach to developing evidence on local housing markets.

[3] **A guide to the Reading-CLG Affordability Model (CLG-NHAPU | Sept 2009)**
http://www.communities.gov.uk/archived/general-content/nhpau/research/affordabilitymodelguide/

[4] **Estimating housing need (CLG | 2010)**
http://www.communities.gov.uk/publications/housing/estimatinghousingneed

[5] **Strategic Housing Market Assessments: Practice Guidance (CLG | 2007)**
http://www.communities.gov.uk/publications/planningandbuilding/strategichousingmarket

What is the difference between the GAM Model and traditional projections published by ONS, CLG or Gloucestershire County Council?

1.24. Trend-based projections such as those produced by the Office for National Statistics (ONS) and Gloucestershire County Council's research function (The Gloucestershire 'Local' Projection series)[6] have commonly been used in planning, particularly in assessing future housing requirements. The key function of a trend-based projection is that it extrapolates past trends and applies them directly to the future, in order to give a view of how certain matters such as the overall number of people, may change over a given period of time. However, a notable limitation of trend-based projections is that they do not take into account the impact of potential changes in policy or variations in the trend due to external influences – such as the economy.

1.25. The econometric approach adopted by the GAM Model, provides for more sophisticated outputs than those of a traditional trend-based projection. It **does** aim to take into account changes in circumstance that might occur, specifically covering the economy and the housing market. Also, a notable advantage of the GAM model is that it can be used to 'test' the impacts of differ degrees of change motivated by policy decisions and / or external influences, on a variety of forecasts including: – future populations; number of households; rates of migration; levels of unemployment etc. For example; the model could be used to forecast how many more or less households might be created as a consequence of increasing or decreasing levels of economic growth. It will also show the likely impact on future household numbers of different levels of new housing supply

[6] **Gloucestershire Local Projection 2010 (GCC | Sept 2010)**
http://www.gloucestershire.gov.uk/inform/index.cfm?articleid=94725

Guide to the remainder of this report

1.26. The remainder of this report seeks to illustrate the operations of the GAM model by describing the forecast results generated from an analytical baseline or 'local policy off' scenario. It provides a suite of forecasts (which have also been re-produced in full within appendix B) of how the housing market across Gloucestershire may evolve over the next 20 years. The key assumptions used to inform the analytical baseline are outlined at the beginning of the next section of the report.

1.27. The purpose of an analytical baseline is to generate a starting point from which further scenarios can be compared and analysed. From a GAM model perspective, alternative scenarios may include targeted local policy interventions / aspirations such as: -

- support for an increase or decrease in the supply of all housing across a particular local geography (e.g. urban vs rural); and
- support for increasing or decreasing the proportions of social housing.

1.28. Returning to this report, wherever possible forecast results have been broken down by district, although countywide figures are provided as an alternative if district data is unavailable. In light of the emerging structure of local core strategies, data for Cheltenham Borough, Gloucester City and Tewkesbury Borough data are shown together followed by Cotswold, Forest of Dean and Stroud Districts. For comparison purposes, results for all of England and the former South West region have been included, where appropriate.

1.29. A comparison of the GAM model's forecast results with recently published local and national trend-based household projections, has also been included in the report[7]. This exercise is considered useful in externally 'checking' that the forecasting components of the model have interacted with each other in a rational and reasonable manner. As explained previously, whilst traditional trend-based projections are limited in their use, they are still based upon a sound baseline of data, which is taken from past and current trends of real life interactions and relationships.

1.30. The forecast results for the analytical baseline are divided within the report under the following sub-headings: -

- Demographic outcomes – population and demographic profile change, household growth, migration and comparison with household projections;
- Housing affordability outcomes – median house prices, house price to earnings ratios and %'s to buy or rents;
- Housing need outcomes – housing need incorporating newly generated need and backlog need; and
- Economic outcomes – job numbers, unemployment and commuting.

1.31. An overview of the forecast results for each district has also been prepared. The aim of this overview is to help focus in on potential local issues for the future and to inform the emerging debate as to which policy interventions may be desirable and to what extent they may wish to be used. It is expected that any future modelling assessments that apply alternative scenarios, will to some extent, be motivated by a desire to improve upon the circumstances initial forecast through the analytical baseline.

[7] For the purposes of the comparison exercise, data was applied from the CLG 2008-based household projections to 2033, published in November 2010 and the Gloucestershire County Council Local (Household) Projection 2009-2031 published in May 2011.

2. Analytical Baseline Results

2.1. This section of the report describes the forecast results from the analytical baseline of the GAM model. Its aim is to illustrate the type of outputs available from the GAM model regarding the evolution of the local housing market across Gloucestershire over the next 20 years – to 2031.

2.2. For contextual purposes, the key assumption that have been applied to the analytical baseline scenario have been summarised below, in advance of the forecast results : -

Economic Assumptions

- Relatively cautious long-term (post 2014) economic growth equal to a national GVA rate of 2.3%. This is considerably lower than the 2.9% experienced during the boom period 1997-2007;

- Gradual short-term recovery from the 'credit crunch' recession settling at a stable position from 2014 onwards. The recession is recognised through a negative national GVA rate in 2008 of -0.07% followed by a further negative GVA rate in 2009 of -4.87%. For 2010, there is a return to positive, albeit depressed growth of 1.40%[8];

- Long-term local (Gloucestershire-wide) GVA rate to be the same as the national rate – 2.3%. A local GVA rate component equal to a 30% weighting of national rate has been used for other areas within the model. This local rate is based on previous local performance;

- Employment (job) growth running at around 1.8% below the national GVA rate;

- Low mortgage interest rates for the period 2008 – 2010. This is then followed by a gradual rise from 2011 onwards, before settling on 7.25% for the long-term from 2013;

[8] Assumptions of GVA are based on HM Treasury-published short/medium term forecasts (averages of independent forecasts) from mid-2011

- The impact of 'credit rationing' – the limiting of available mortgage credit arising from the banking crisis. In practice this has sought to restrict loans to home buyers through imposing relatively high deposit requirements. The GAM model has attempted to factor in this economic phenomenon through its influence upon house prices; the house price to earnings ratio; mortgage interest rates; and also its affect on related model components such as household formation; need for affordable housing etc..The central forecast assumes credit rationing to be at its peak influence in 2009 before gradually fading in influence to 2015;

Housing Supply and Housing Affordability Assumptions

- Initially local housing supply rates based on the recent three-year average completion trend observed for each district through to 2010/2011[9]. This equates to around 1,900 new units per annum across the county[10]. The supply assumption has not been disaggregated beyond the district-level and therefore does not reflect any potential spatial / 'community scale' sub-area differences. Annual forecasts in the supply of new housing **will** vary from the initial, assumed supply rates as other internal and external model influences begin to take hold;

- A consistent annual affordable housing quota of 35%[11], divided between social rents at 25% and low cost home ownership (LCHO) / intermediate rent at 10%;

- Affordable rents held at 70% of average market rent values;

- Low cost home ownership (LCHO) (e.g. the Homebuy scheme) to be based on 75% of the full equity, with no initial rent element and minimum deposits with no constraint;

[9] Data on local housing supply in Gloucestershire has been taken from CLG Live Table 253 – House building: permanent dwellings started & completed, by tenure and district (2010/2011 release)
http://www.communities.gov.uk/housing/housingresearch/housingstatistics/housingstatisticsby/housebuilding/livetables/

[10] For context, the initial local housing supply rate of the baseline scenario represents 68% of the proposed net annual dwelling requirement for Gloucestershire as set out within the emerging South West Regional Spatial Strategy (Proposed Modifications 2008). It is also just under 80% of the annual average dwellings rate anticipated through the Adopted Gloucestershire Structure Plan (2nd Review) 1991 – 2011.

[11] The 35% figure represents an assumed overall **'delivery'** rather than a future policy aspiration / target. It aims to account for under and over supply of affordable housing that might occur on individual sites in the future (e.g. the accumulation of those developments that are under any locally agreed affordable housing provision threshold, the exclusive development of 100% social housing, and also those sites for reasons of viability may not necessarily be able to deliver the local policy target). In the recent past (data from 2006 to 2009) the net delivery of affordable housing compared to net total supply was around 25%. Future scenarios may seek to revise this figure to support specific up-to-date local evidence and circumstance. The % breakdown of delivery between traditional social rents and low cost home ownership / intermediate housing can also be revised if necessary.

- A consistent annual mark-up allowance to the local housing stock numbers equal to 15% of the total forecast number of annual private completions. This allowance aims to take account of anticipated gains in housing stock generated from change of use conversions and sub-divisions of existing housing units; plus allowance for under-recording of completions.

Migration Assumptions

- International migration will reduce only slightly from the observed trend between 2001 and 2007. The reduction in gross in-migration will be equal to 5% for the period 2008-2012 and then 3% of previous trend, through to 2031;

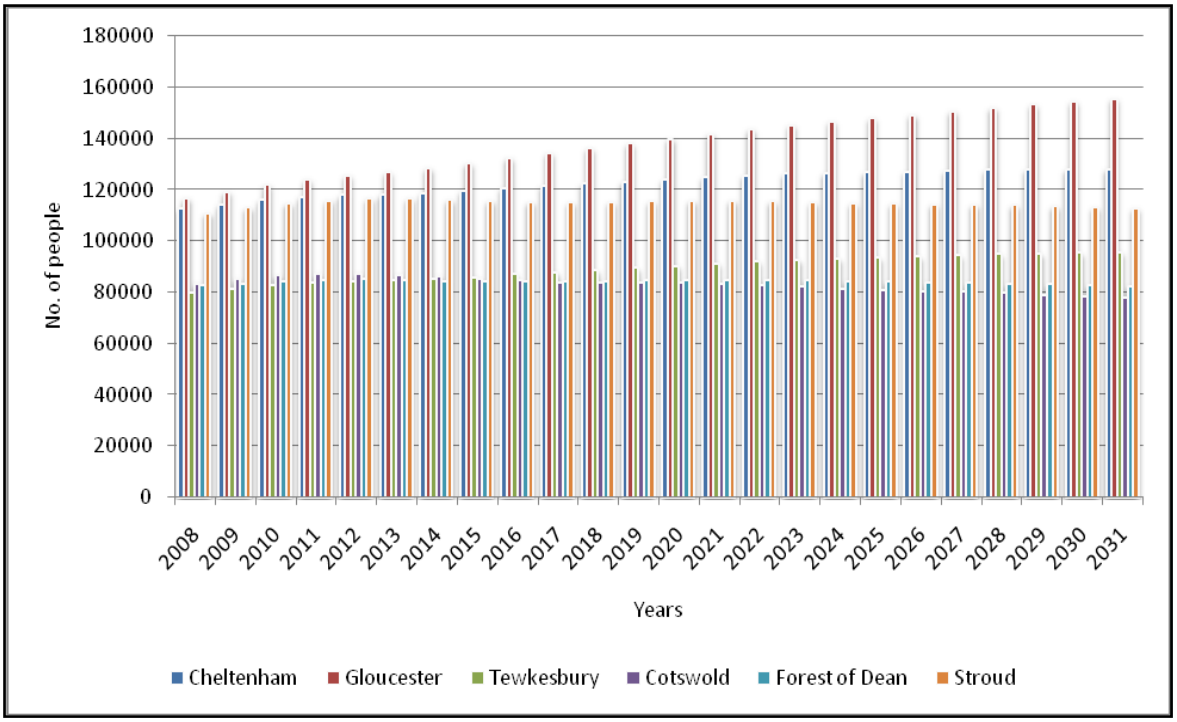
2.3. A key feature of the GAM Model is that the assumptions currently applied to the analytical baseline scenario can be revised to reflect continually updating data, revised national or local policy directions and / or for 'testing' different circumstances (i.e. *"what if…"* scenarios).

Demographic results

Population change

2.4. Figure 1 shows that overall population of Gloucestershire at 2031 is forecast to be just over 652,000. This represents an increase from 2008 of around 66,500 new residents. However, there is expected to be notable variations in the change in population over time across each local district. Gloucester City is anticipated to experience a consistent and steady increase, which will be the largest of all the districts in county, of just under 39,000 new residents. This is followed by Cheltenham and Tewkesbury Boroughs where increases of around 15,500 new residents are anticipated for each district. Stroud is also set to see uplift in its local population albeit at a very lower level, with just over 2,000 new residents. In contrast the remaining two districts are not expected to see overall population increases during the forecast period. Forest of Dean district will experience a relatively unchanged population; whilst Cotswold District will actually observe a fall of close to 5,500 new residents bringing its population to a similar level to that of the late 1990's[12].

Figure 1: Forecast annual population for each district of Gloucestershire | 2008 – 2031



[12] The GAM model forecast suggest a population for Cotswold District Council in 2031 of just fewer than 77,850. In 1997 the district's estimated population was just over 77,900 residents.

Demographic Profile

2.5. All of Gloucestershire's districts are forecast to see changes in the age profile of their local populations between 2008 and 2031. Without exception, the percentage of residents aged 60yrs + is expected to increase across Gloucestershire's districts by between 7% (Gloucester City) and 12% (Cotswold District) percentage points. In sharp contrast the percentage of work-age adults aged between 25-59yrs is forecast to drop across all districts throughout the period by between 6% (Forest of Dean) and 12% (Tewkesbury Borough).

2.6. In terms of children aged 0-14yrs, there does not appear to be a uniform Gloucestershire-wide trend across all the districts. Instead Gloucester City and Cheltenham Borough are set to see a slight proportional increases of between 1% and 3% respectively, whilst all other districts will see a slight fall of around 2%.

2.7. For the final age profile group assessed by GAM model – young people & young work-age adults (15 – 24yrs), there is also no observed county-wide trend. In Tewkesbury Borough the proportion of 15-24yr olds is forecast to remain unchanged from 2008 at around 10% of the local population, while in the Forest of Dean and Cotswold Districts the proportion of this age profile group is set to fall by as much as 3%. For both Gloucester City and Cheltenham Borough the forecast shows small fluctuations over the study period upwards and downwards of around 1% to 2%.

2.8. Figures 2 to 7, illustrate six 'snap shot' years of the forecast age profiles for each of the six district populations between 2008 and 2031. It includes the percentages of each of the assessed four age groups – 0-14yrs; 15-24yrs; 25-59yrs; and 60yrs +.

Figure 2: Cheltenham Borough age profile |forecast 'snap shot' years 2008 – 2031

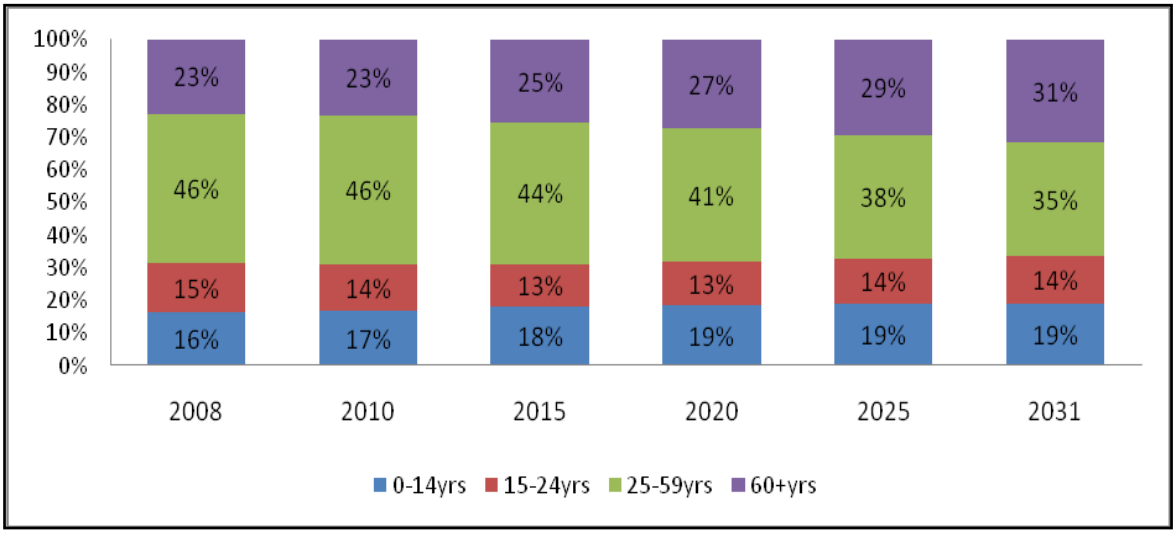


Figure 3: Gloucester City age profile | forecast 'snap shot' years 2008 – 2031

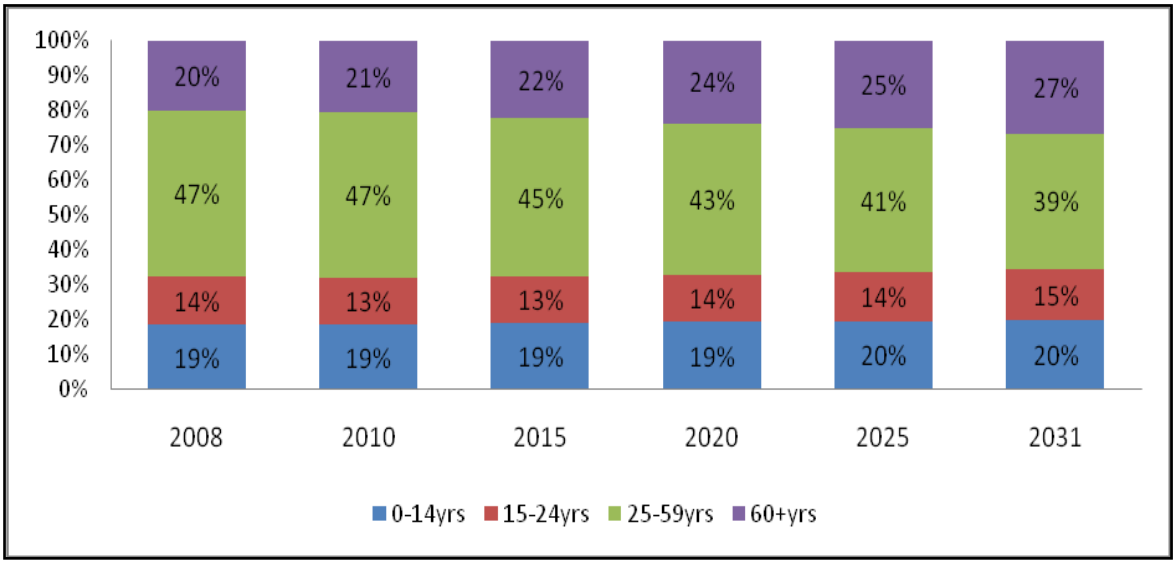


Figure 4: Tewkesbury Borough age profile | forecast 'snap shot' years 2008 – 2031

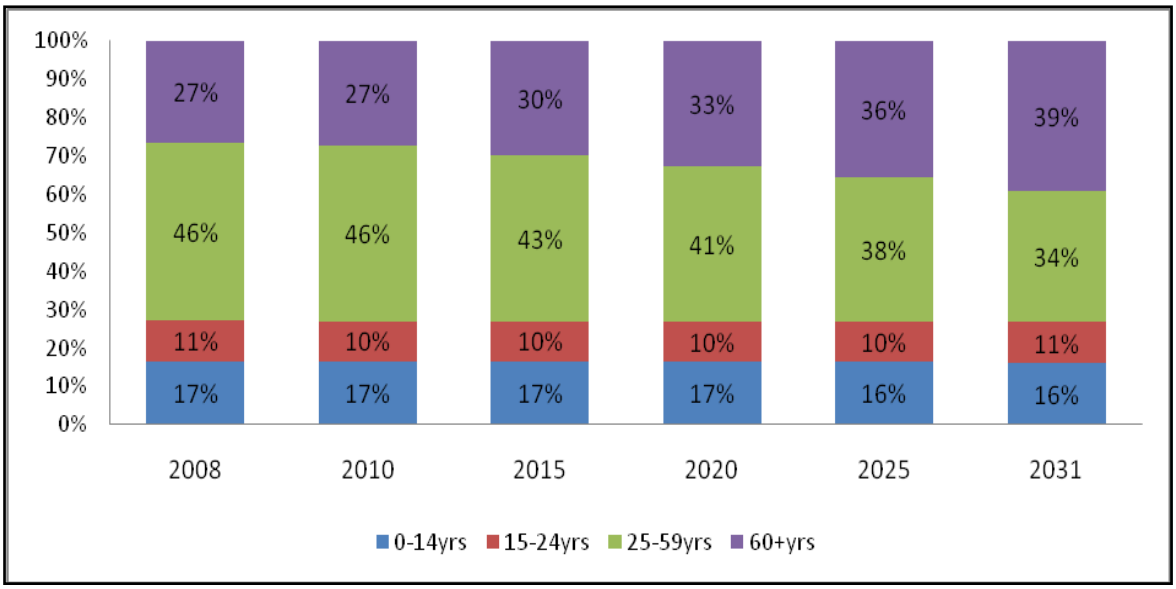


Figure 5: Cotswold District age profile | forecast 'snap shot' years 2008 – 2031

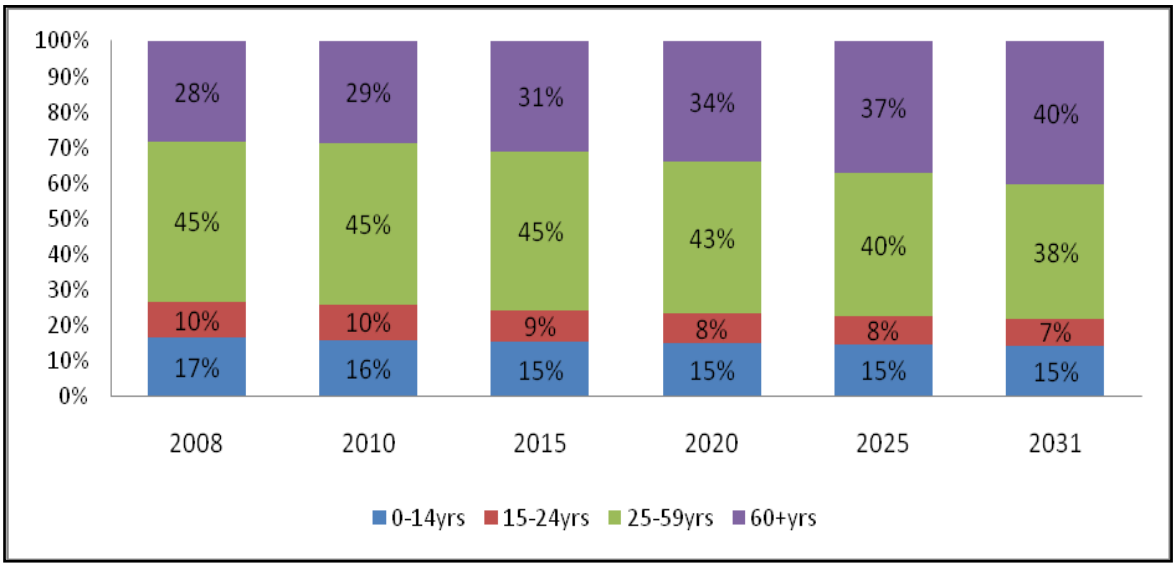


Figure 6: Forest of Dean District age profile | forecast 'snap shot' years 2008 – 2031

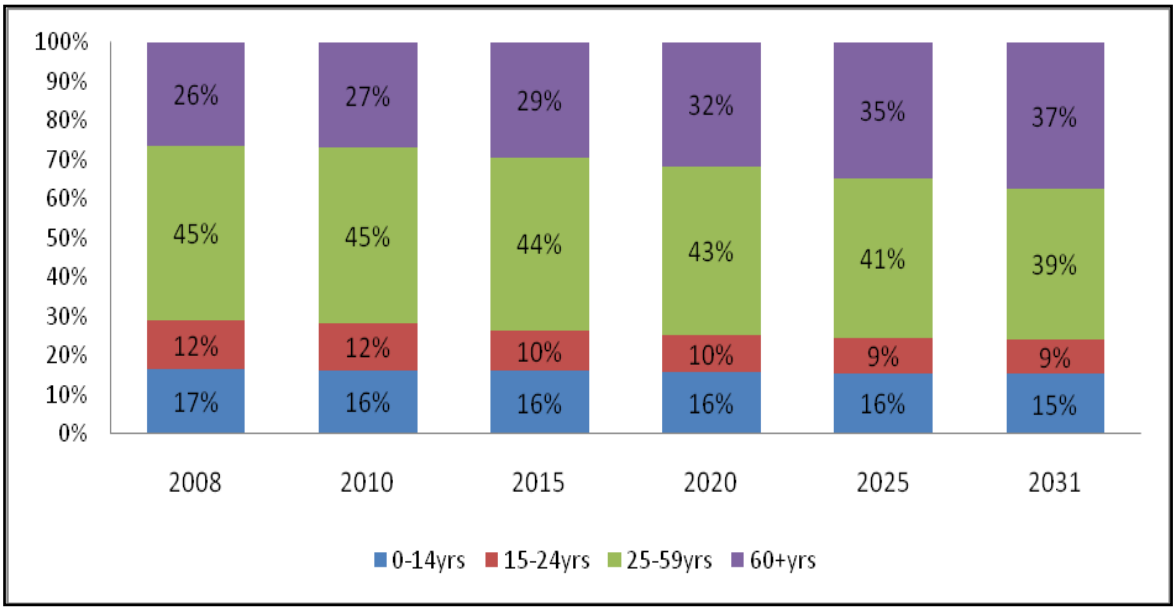
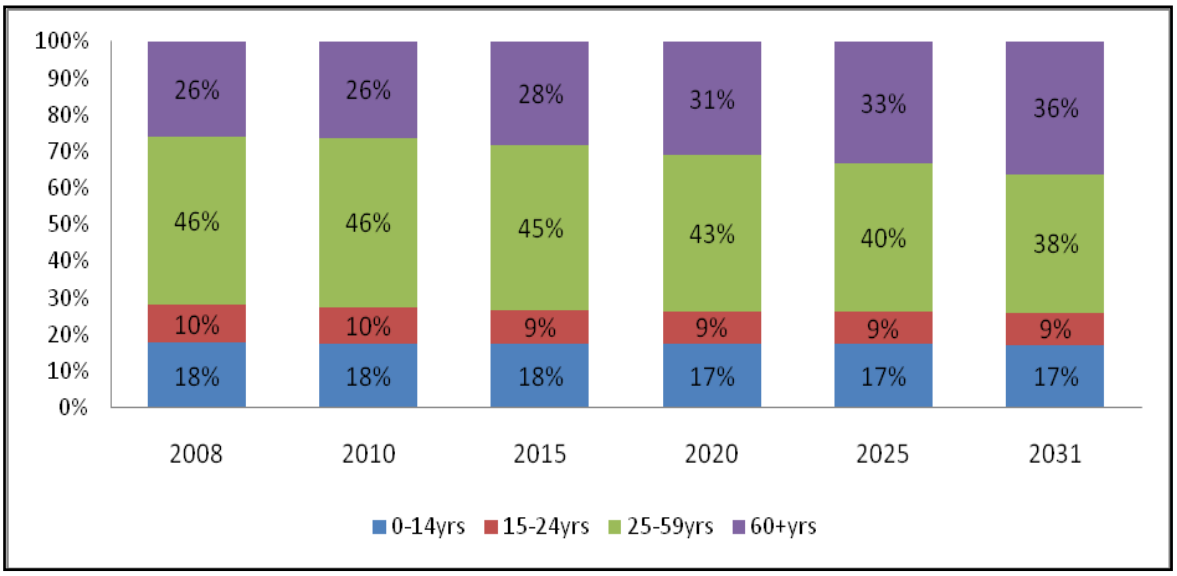


Figure 7: Stroud District age profile | forecast 'snap shot' years 2008 – 2031



Household growth

2.9. At 2031 there is forecast to be just fewer than 311,000 households in Gloucestershire. This is an overall rise from 2008 of around 57,500 new households. All districts are expected to experience household growth of varying levels over the study period, with Gloucester City set to see the highest increase in the county, of just under 21,000 additional households. Tewkesbury and Cheltenham Boroughs will also see household growth numbers in excess of 10,000 followed by Forest of Dean and Stroud Districts, albeit notably lower, at around 6,000 new households each. Cotswold District is forecast to experience the smallest rise in the county with an additional 2,500 households.

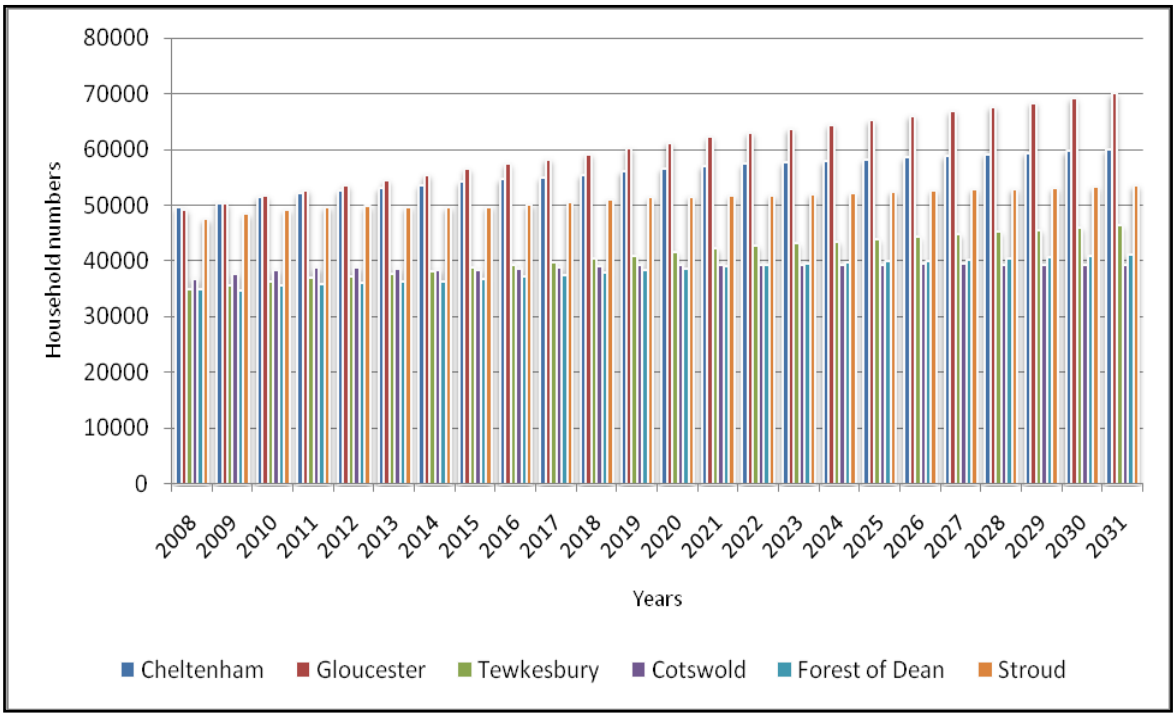
2.10. Figure 8 sets out forecast annual household growth for each district of Gloucestershire between 2008 and 2031.

2.11. Table 1 shows household growth percentages for Gloucestershire's districts between 2008 and 2031. The forecast indicates that average annual growth will be at around 1% per year or 23% over the full time period. This is similar to England, where the forecast equates to 26% growth between 2008 and 2031. Gloucester City and Tewkesbury Borough are set to see the highest percentages of household growth in county with 42% and 33% respectively. In comparison, Cotswold District is expected to see the lowest percentage of growth – only 7% from 2008 through to 2031.

Table 1: Forecast household growth percentages for each district of Gloucestershire | 2008 – 2031

Administrative Area	2008	2031	% growth (2008-2031)
Cheltenham	49,582	59,983	21%
Gloucester City	49,155	69,997	42%
Tewkesbury	34,790	46,365	33%
Cotswold	36,785	39,345	7%
Forest of Dean	34,765	41,021	18%
Stroud	47,437	53,487	13%
Gloucestershire	252,514	310,199	23%
England	21,256,174	26,693,506	26%

Figure 8: Forecast household growth for each district of Gloucestershire | 2008 – 2031



Patterns of migration

2.12. Forecast migration patterns are set to varying significantly across Gloucestershire's districts, with periods of increased and decreased local populations as consequence of in and out migration from within the UK[13] and from abroad.

2.13. For Cheltenham Borough, the figure for 2008 suggests a continuation of a short previously observed trend (from 2006) of net out migration (i.e. more people leaving) from the district. However, as of 2009 Cheltenham Borough is anticipated to experience a reversal in this trend towards net in migration (i.e. more people moving in), albeit gradually declining in number on an annual basis over the next 12 years from a high in 2010. From 2021 a further change in the migration balance is recorded, with a progressive annual increase in the number of people leaving Cheltenham Borough compared to moving in. This is expected to continue right through to 2031.

2.14. A similar pattern is forecast for Cotswold District with notable short-term net out migration followed by net in migration through to 2015. At 2020 the forecast shows a reversal in trend with net out migration for the remainder of the study period to 2031, albeit at a low level compared to the forecast observations for Cheltenham Borough.

2.15. The remaining districts of Gloucester City, Forest of Dean, Tewkesbury Borough and Stroud are all forecast to see sustained long term net in-migration (i.e. more people moving in). Although this will generally decline in absolute numbers of in-migrants on an annual basis. However, the forecast also indicates a degree of divergence between these districts, towards the end of the study period. From 2030, Gloucester City and Tewkesbury Borough are expected to see net in-migration replaced by net out-migration. Whilst for Stroud and Forest of Dean there will still be net in-migration, albeit on a downward trend and not to the same extent as seen with Gloucester City and Tewkesbury Borough.

2.16. Overall the migration balance of Gloucestershire between 2008 and 2031 is trending towards in-migration, with four of the six districts forecast to see more people moving in than moving out over the study period.

2.17. Table 2 details the annual migration balance (difference between in-migration and out-migration) for each district of Gloucestershire over a number of 'snap shot' years between 2008 and 2031.

[13] In and out migration within the UK includes **all** moves that occur between local authority area across the country and **all** moves that occur locally between the six districts of Gloucestershire. Consequently, the district data presented in this report cannot be totalled to create a Gloucestershire-wide picture of in and out migration. To do so would generate a degree of double counting resulting from 'local' district moves.

Table 2: Annual migration balance for each district of Gloucestershire | forecast 'snap shot' years 2008 – 2031

District	2008	2010	2015	2020	2025	2030	2031
Cheltenham	-1043	453	286	63	-294	-750	-822
Gloucester City	-388	957	861	713	402	-33	-107
Tewkesbury	-333	778	702	568	312	-30	-86
Cotswold	-590	247	70	-11	-14	-12	-1
Forest of Dean	-212	913	930	667	478	327	282
Stroud	-227	707	522	439	422	414	423

Comparison of the GAM model household forecast with national and local trend-based household projections

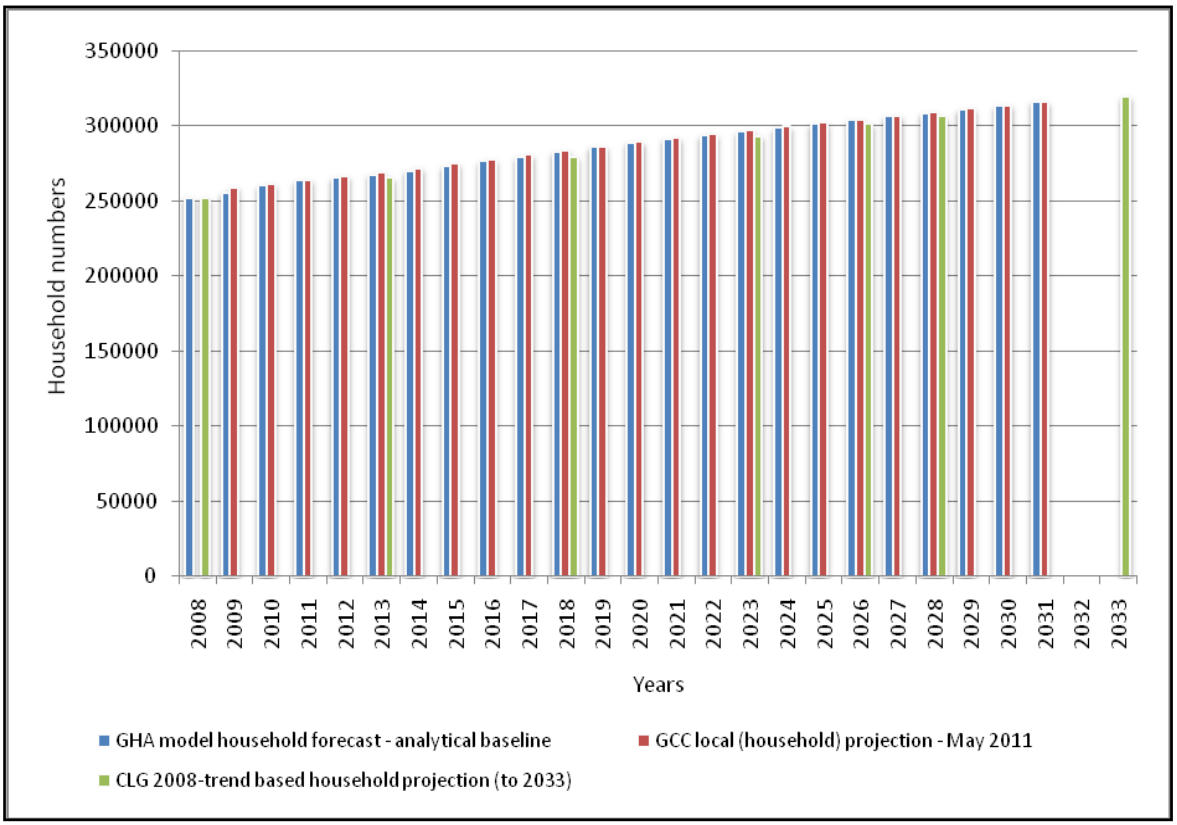
2.18. Figure 9 shows forecast household growth under the analytical baseline compared with the 2008-trend based CLG national household projections and the most recently published Gloucestershire County Council local (household) projection 2011. For clarification, the most recent national projection does not cover the same time period as either the GAM model or the local projection. Instead, the national projection runs to 2033.

2.19. Overall the three methodologies generate very similar outcomes with a clear trend towards household growth in Gloucestershire between 2008 and 2031. The annual rate of household growth is fairly consistent across all methodologies at around 1 – 2% each year.

2.20. Across the study period, comparable annualised for all three methodologies differ by an average of 2,500 future households per year, although do not vary in a single year by more than 5,500 households. The largest difference occurs at the end of this period at 2031 and in context, this represents only 2% of the total number of households observed for that study year.

2.21. The specific comparison between the GAM model and the two projections show a varying trend over the study period - with the biggest differences occurring during the early and late stages up to 2013 and from 2022 onwards. The average difference between the GAM model and local projection is just under 2,000 future households per year, whilst with the national projection; it is just over 2,000.

Figure 9: Forecast household growth compared with national and local projections | 2008 – 2033



Housing Affordability Results

Median house prices

2.22. Figure 10 shows the trend in real median house prices for each district of Gloucestershire between 2008 and 2031. Table 3 also sets out the respective annual forecast prices for each district along with the average for England, over several 'snap shot' years.

2.23. Overall the median real house prices are forecast to rise between 2008 and 2031. For Gloucestershire, the average at 2031 will be just under £251,500 an increase on 2008 of around £50,000. This is higher than the forecast average rise for England up to 2031, which is just lower than £40,000. At the district level, Cotswold is expected to see the highest median price rise, by as much as £84,000 by 2031. The lowest rise is anticipated for the Forest of Dean – £30,779.

2.24. Although overall median real house prices are forecast to rise across the county by 2031, there is a clear, observable variation in the trend over time. During the short-term (2008 – 2011) all district prices at actually set to see a significant fall, by as much as just under £38,000 (Forest of Dean). For England the average fall over the same period is a little higher – just under £43,500. It is not until 2012 that median real house prices are forecast to begin rising again.

2.25. For Gloucestershire the annual rate rise from 2012 is forecast at just fewer than 2.7% right through to the 2031. In comparison, the forecast average annual rise for England over the same period is a little higher at 3%.

Figure 10: Forecast median real house prices (in £) for each district of Gloucestershire | 2008 – 2031

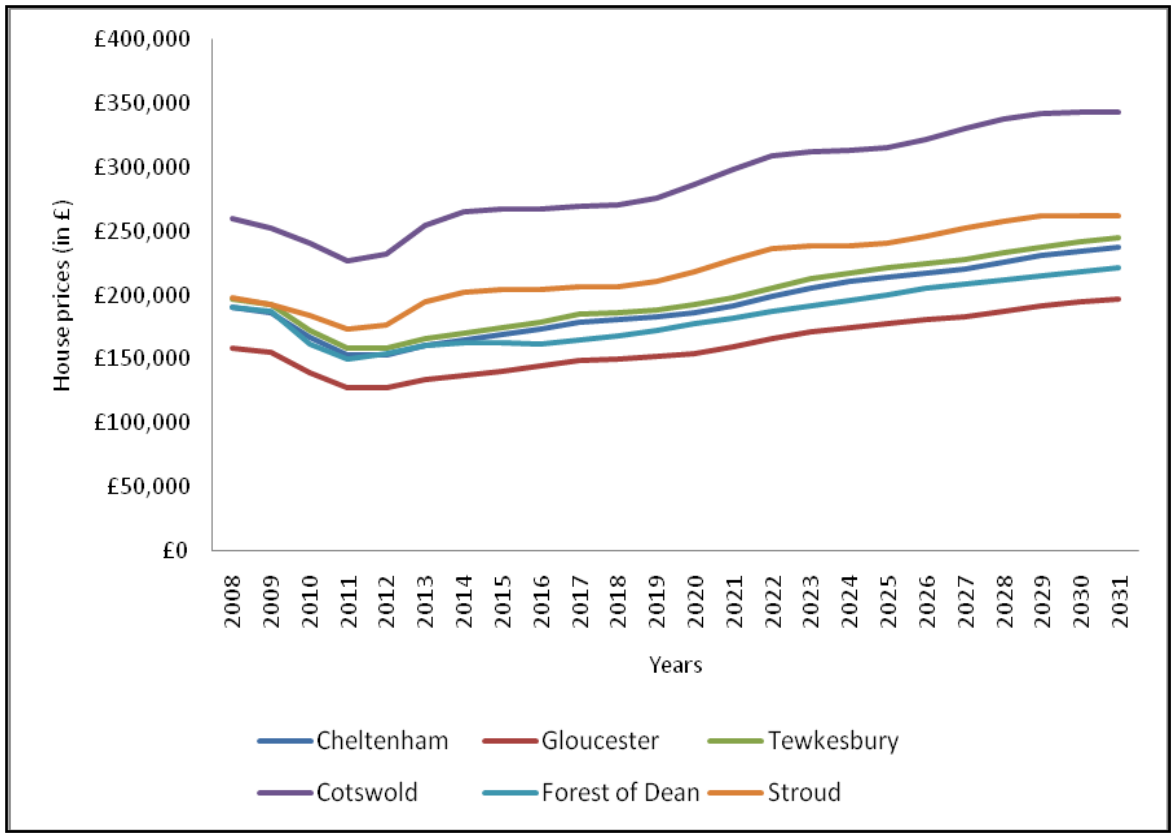


Table 3: Median real house prices (in £) for each district of Gloucestershire | forecast 'snap shot' years 2008 – 2031

District	2008	2010	2015	2020	2025	2031
Cheltenham	£191,063	£186,824	£169,605	£186,451	£214,602	£237,989
Gloucester City	£158,386	£154,871	£140,597	£154,562	£177,898	£197,285
Tewkesbury	£197,102	£192,728	£174,965	£192,344	£221,384	£245,511
Cotswold	£259,843	£252,991	£268,244	£286,727	£315,622	£343,738
Forest of Dean	£191,202	£188,090	£162,661	£177,651	£200,878	£221,981
Stroud	£198,409	£193,177	£204,823	£218,936	£241,000	£262,468
Gloucestershire	£191,325	£170,220	£178,822	£194,266	£219,298	£241,427
England	£188,613	£159,501	£169,402	£188,800	£206,820	£228,138

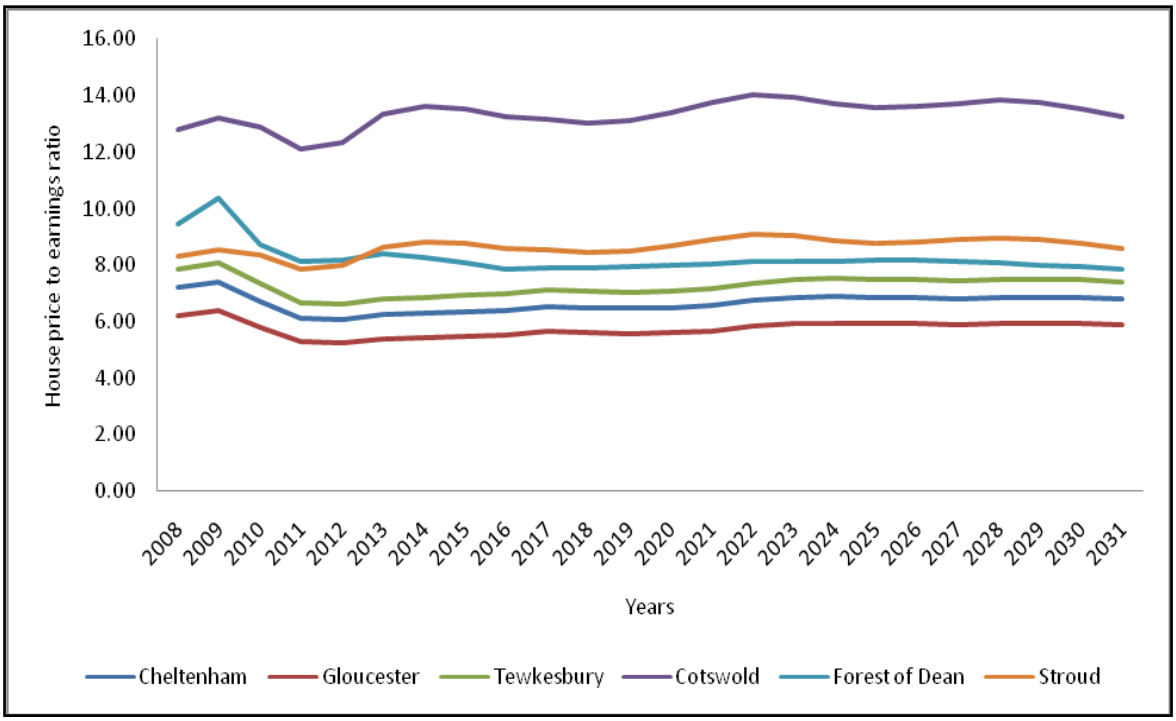
House price to earnings ratio

2.26. The change in house price to earnings ratio is forecast to vary between Gloucestershire's districts from 2008 through to 2031. In Forest of Dean, the ratio is set to fall quite markedly by as much as 16% of the 2008 base year. A fall is also forecast for Cheltenham Borough, Gloucester City and Tewkesbury Borough, although by considerably less – just less than 6%. In contrast Stroud and Cotswold will see an overall rise at 2031 of around 3.5%.

2.27. In terms of the trend, the house price to earnings ratio is forecast to demonstrate notable fluctuations across all the districts, particularly over the short to medium term; 2008 to 2015. Following a ratio rise for all districts between 2008 and 2009 (continuing a previous long term trend from the late 1990's) there is expected to be, a notable fall through to 2012. This ratio fall is most significant for the Forest of Dean. However, around 2013 – 2014, annual ratios are set to become more stable across all districts and remain relatively unchanged through to 2031.

2.28. Figure 11 illustrates the trend over time in the forecast house price to earnings ratio for each of Gloucestershire districts between 2008 and 2031.

Figure 11: Forecast house price to earnings ratio for each district of Gloucestershire | 2008 – 2031



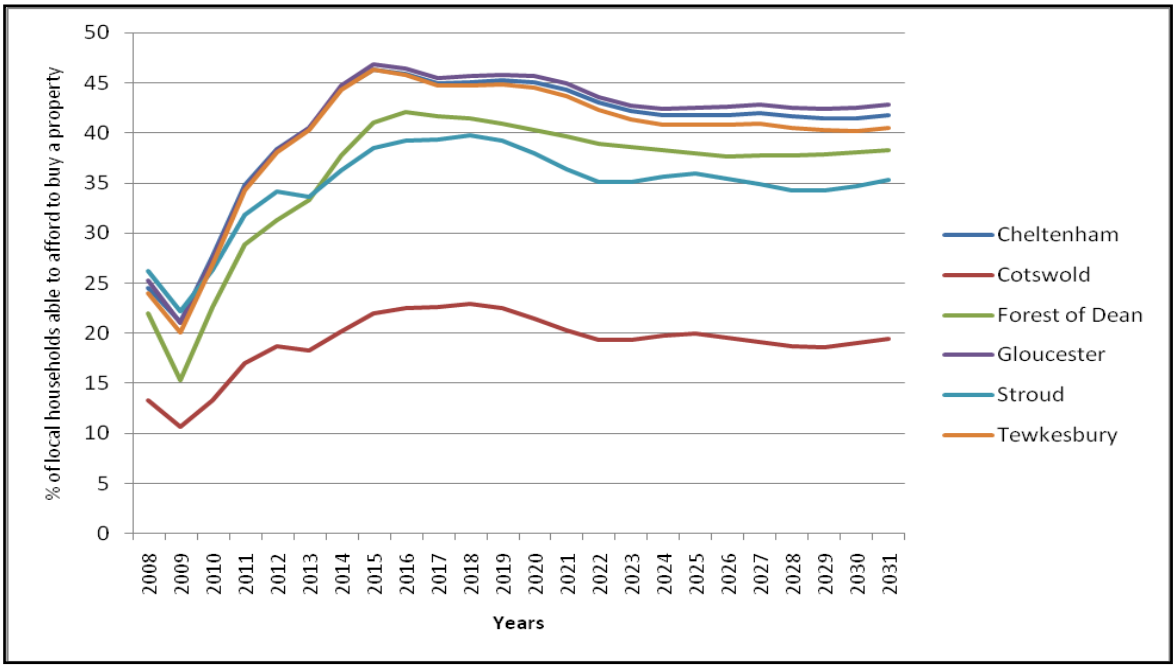
Affordability to Buy | All local households and by each district

2.29. The likelihood of local households able to afford to buy a property in Gloucestershire is forecast to improve between 2008 and 2031 by as much as 14 percentage points. At the district level, Gloucester City and Cheltenham Borough will see the largest rise by as much as 18 and 17 percentage points respectively. Forest of Dean and Tewkesbury Borough will experience the next largest rise – 16 percentage points for both, followed by Stroud (9% points) and Cotswold (6% points).

2.30. The trend in the percentage of local households able to afford to buy a property is expected to fluctuate over the study period, particularly over the short to medium term between 2008 and 2015. The observed changes include a sharp worsening in the affordability percentage for all districts from 2008 to 2009, followed by a general strong improvement through to a peak around 2015. For the medium to long term (post 2015) all districts are forecast to experience far less dramatic change with a gradual worsening in the affordability to buy before this begins to stabilise in relative terms from 2022 – 2023 onwards.

2.31. Figure 12 presents the trend over time in the forecast percentage of local households able to afford to buy a property in Gloucestershire between 2008 and 2031.

Figure 12: Forecast % of local households able to afford to buy a property in each district of Gloucestershire | 2008 – 2031



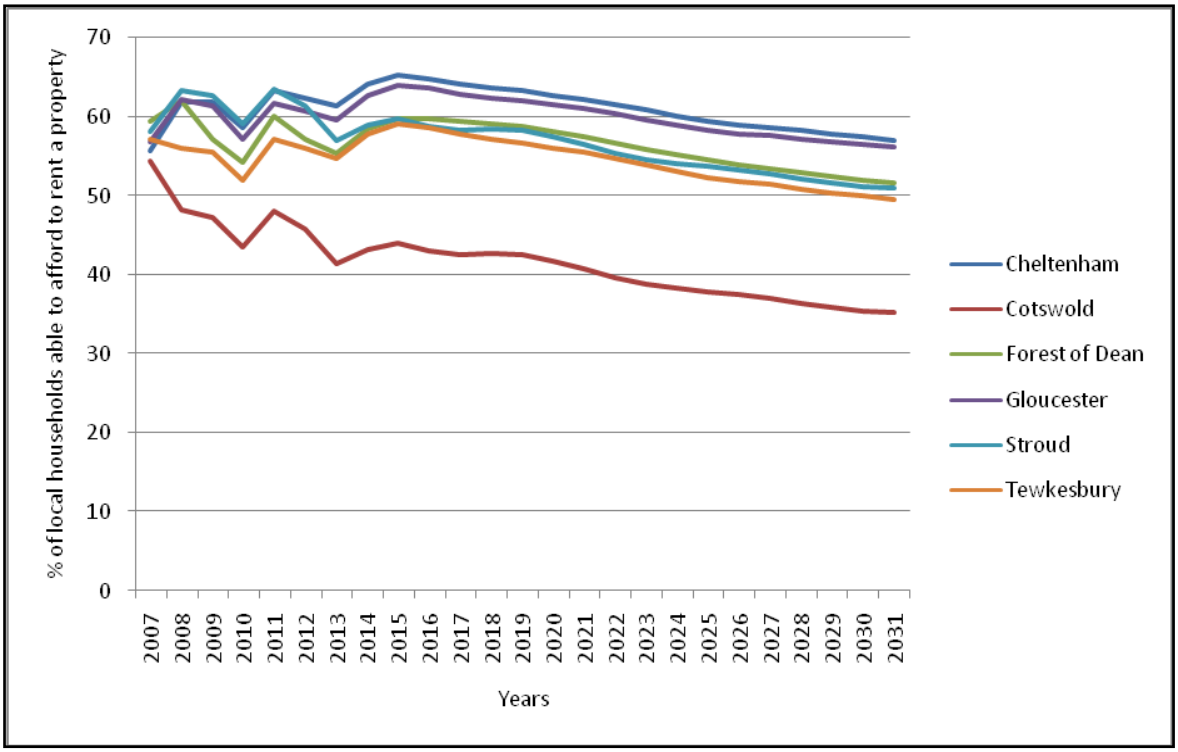
Affordability to Rent | All local households and by each district

2.32. The ability of local households to afford to rent a property in Gloucestershire is forecast to worsen by an average of 9 percentage points from 59% in 2008 to 50% in 2031. Cotswold, Forest of Dean and Stroud districts are set to see the largest overall fall by between 11 and 13 percentage points. At 2031, Cotswold District is set to experiencing the lowest percentage of affordability at 35%. Gloucester City and Cheltenham and Tewkesbury Boroughs are also forecast to experience a decrease in the affordability to rent, but at much lower level – a decrease of between 5 and 7 percentage points from 2008 to 2031.

2.33. The forecast annual change in the affordability to rent in Gloucestershire to 2031 shows considerable fluctuations over the short to medium term (from 2008 to 2015), before settling on a continual decreasing annual trend, albeit at a low level through to 2031.

2.34. Figure 13 presents the trend over time in the forecast percentage of local households able to afford to rent a property in Gloucestershire between 2008 and 2031.

Figure 13: Forecast % of local households able to afford to rent a property in each district Gloucestershire | 2008 – 2031

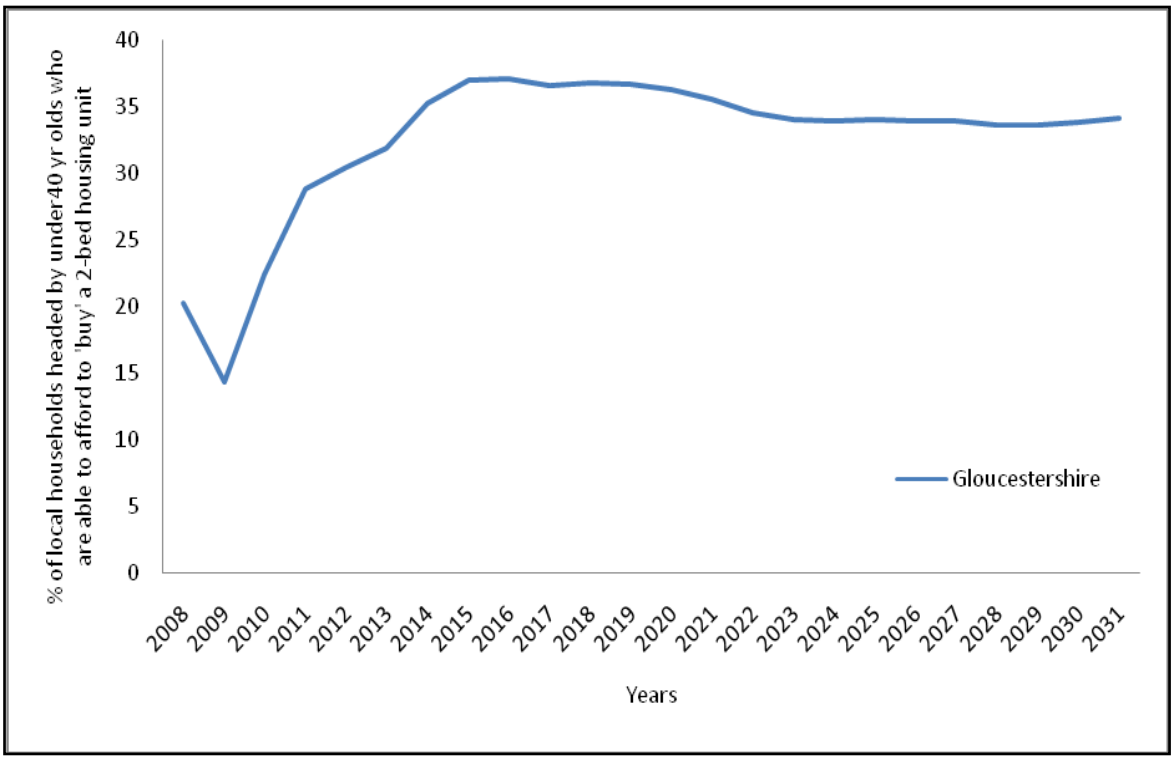


Affordability to Buy | Households headed by under 40-yr olds and two-bed properties

2.35. The ability of local households headed by under 40yr olds able to afford to buy a two-bed property in Gloucestershire, is forecast to improve overall from 20% in 2008 to 34% by 2031. However, the trend over time for this indicator includes a notably short-to-medium term fluctuation, centred on the early years of the study from 2008 through to around 2015. Following an initial sharp fall between 2008 and 2009 to a study period low of 14%, affordability is forecast to markedly improve, before stabilising at around 35% from 2015 onwards.

2.36. Figure 14 shows the annual trend in the forecast percentage of local households headed by under 40 yr olds who are able to afford to buy a two-bed property in Gloucestershire between 2008 and 2031.

Figure 14: Forecast % of local households headed by under 40yr olds able to afford to buy a two-bed property in Gloucestershire | 2008 – 2031

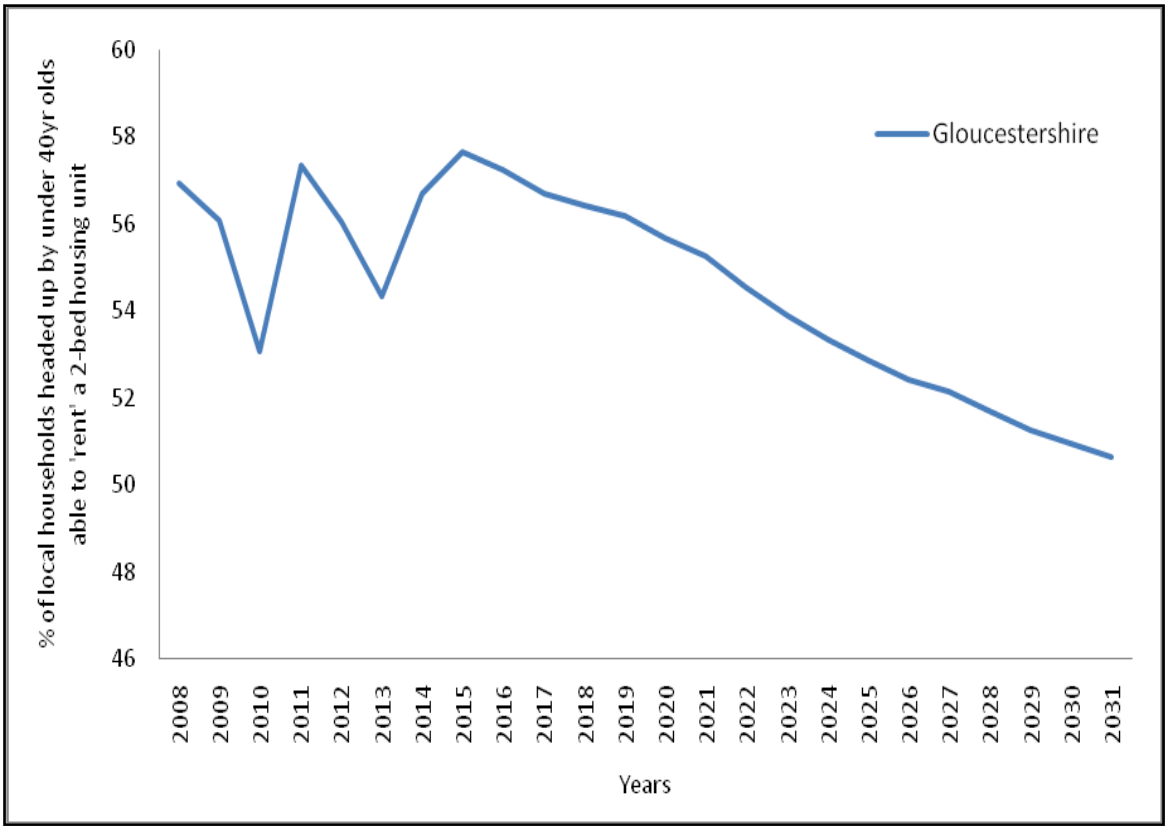


Affordability to Rent | Households headed by under 40-yr olds and two-bed properties

2.37. The ability of local households headed by under 40 yr olds able to rent a two-bed property in Gloucestershire is forecast to worsen overall by 6 percentage points from 57% in 2008 to 51% in 2031. Nevertheless, during the earlier years of the study period, there is forecast to be a degree of volatility in the rental ability of under 40yr olds across the county. Between 2008 and 2014 there will be several major falls and rises differing by as much as 4% points in one annual period.

2.38. Figure 15 shows the annual trend in the forecast percentage of local households headed by under 40 yr olds who are able to rent a two-bed property in Gloucestershire between 2008 and 2031.

Figure 15: Forecast % of local households headed by under 40yr olds able to afford to rent a two-bed property in Gloucestershire | 2008 – 2031



Housing Need Results

Local households in housing need

2.39. The forecasting of local net housing need involves a combination of *'newly arising annual need'* with an annual quota of the *'backlog of existing households still in housing need at the start of each study year'*. Newly arising annual need is defined as newly forming households and net migrants who are unable to afford to buy or rent in the open market, less the existing supply of social lettings. Backlog housing need includes a quota equal to 10% of total backlog need for the respective previous forecast year.

2.40. Overall net local housing need is expected to worsen across Gloucestershire with around 1,800 additional local households forecast to be in need between the five-year periods 2007-11 and 2027-31. At the district level Gloucester City is expected to experience the largest overall rise – accounting for just over 20% of net additional local households in need. Forest of Dean District and Tewkesbury Borough will see the smallest overall rise (12%) – close to 235 and just over 215 additional local households in need respectively. Throughout the study period Cheltenham Borough is forecast to experience the highest net number of local households in need peaking at a 5-year average of just over 830 between 2027 and 2031.

2.41. The countywide and district-level trend in local housing need is more complex than the headline figures over the full study period. For example, in Cotswold District net housing need numbers will rise initially from 2007-2011 through to a 5-year average high between 2022 and 2026 of nearly 600, before falling back slightly during the final 5-year period – 2027 to 2031. In contrast Gloucester City is forecast to see a rise in need during the early stages of the study period from 2007-2011 to 2012-2016, before receding slightly during the 5-year period of 2017 to 2021 and then rising again through to 2026 – 2031.

2.42. Figure 16 and Table 4 shows the forecast average net number of local households in housing need by district over five 5-year periods between 2007 and 2031.

Figure 16: Forecast average net number of local households in housing need within district of Gloucestershire over five 5-year periods | 2007-2011; 2012-2016; 2017-2021; 2022-2026 and 2027-2031

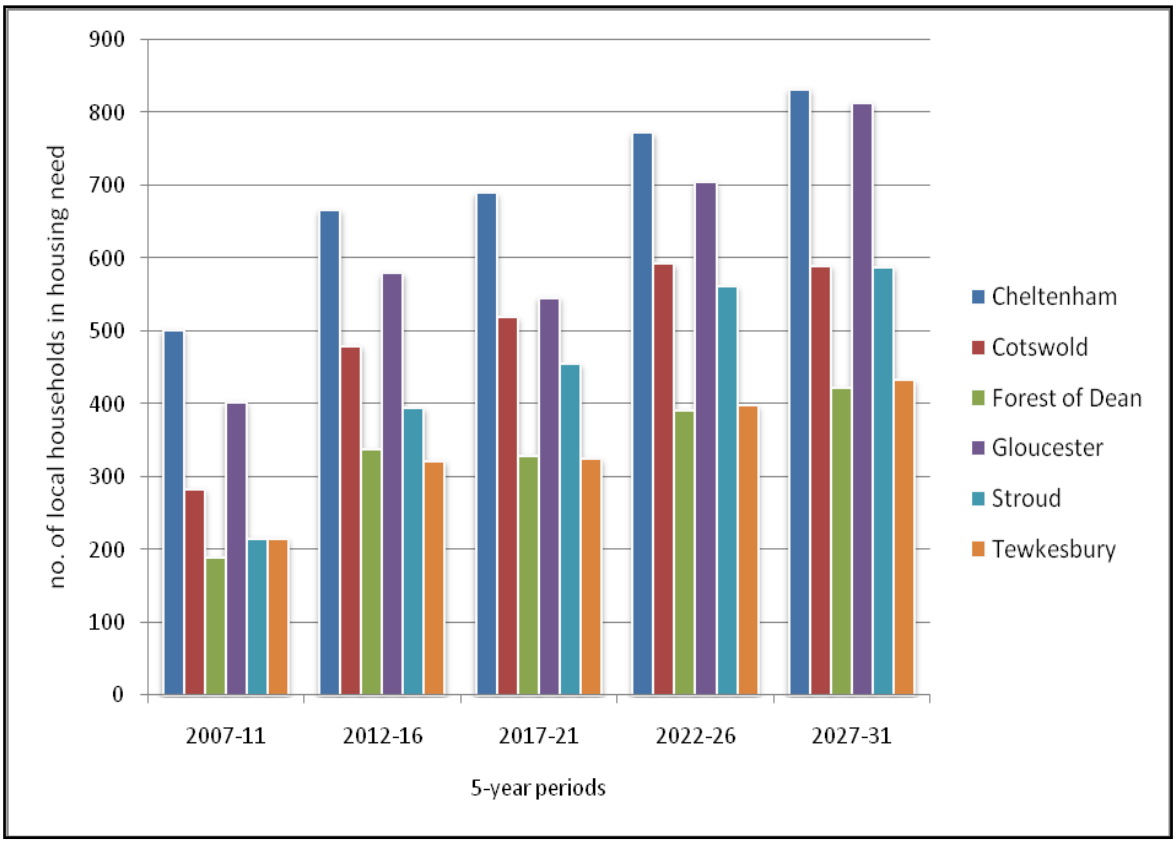


Table 4: Forecast average net number of local households in housing need within each district of Gloucestershire over five 5-year periods |2007-2011; 2012-2016; 2017-2021; 2022-2026 and 2027-2031

District	2007-2011	2012-2016	2017-2021	2022-2026	2027-2031
Cheltenham	502	667	690	773	833
Gloucester City	403	580	546	705	814
Tewkesbury	215	322	325	398	433
Cotswold	283	480	519	593	590
Forest of Dean	189	338	329	391	423
Stroud	216	394	455	562	588

Economic outcomes Results

Jobs and Employment

2.43. The overall number of Gloucestershire-based jobs (i.e. both employed and self-employed) is forecast to rise from 493,000 in 2008 to just fewer than 504,900 at 2031; an increase of around 12,000 jobs. However, over the short-term, particularly the period up to 2012, there is expected to be considerable job contraction, a reflection of the challenging local economic conditions caused by the global recession of late 2008 and 2009. This forecast contraction will see an overall fall in jobs numbers of around 36,500 from between 2008 and 2011. Nevertheless, from 2012 job growth is expected to return and will continue to occur at a sustained rate through to 2031. Consequently, the increase in jobs from between 2012 and 2031 will be considerably more than forecast over the entire study period, equal to just over 47,000.

2.44. A forecast countywide ILO[14] unemployment rate through to 2031 is also generated by the model. Unsurprisingly the rate indicates a short-term (2008 to 2012) worsening of unemployment by nearly 3 percentage points from 3.8% in 2008 to a forecast high of 6.51% at 2012. For the remaining period, the ILO unemployment rate is set to fall consistently, and will eventually return to a similar level to that experienced in 2008, at around 2029 to 2031.

2.45. Tables 5 and 6 sets out the forecast job numbers and ILO unemployment rate for Gloucestershire over 'snap shot' years between 2008 and 2031.

Table 5: Gloucestershire job (employed and self-employed) numbers | forecast 'snap shot' years 2008 – 2031

Administrative Area	2008	2010	2015	2020	2025	2031
Gloucestershire	493,059	458,316	466,143	477,914	489,982	504,866

Table 6: Gloucestershire job ILO unemployment rate | forecast 'snap shot' years 2008 – 2031

Administrative Area	2008	2010	2015	2020	2025	2031
Gloucestershire	3.80%	6.38%	5.96%	5.33%	4.60%	3.62%

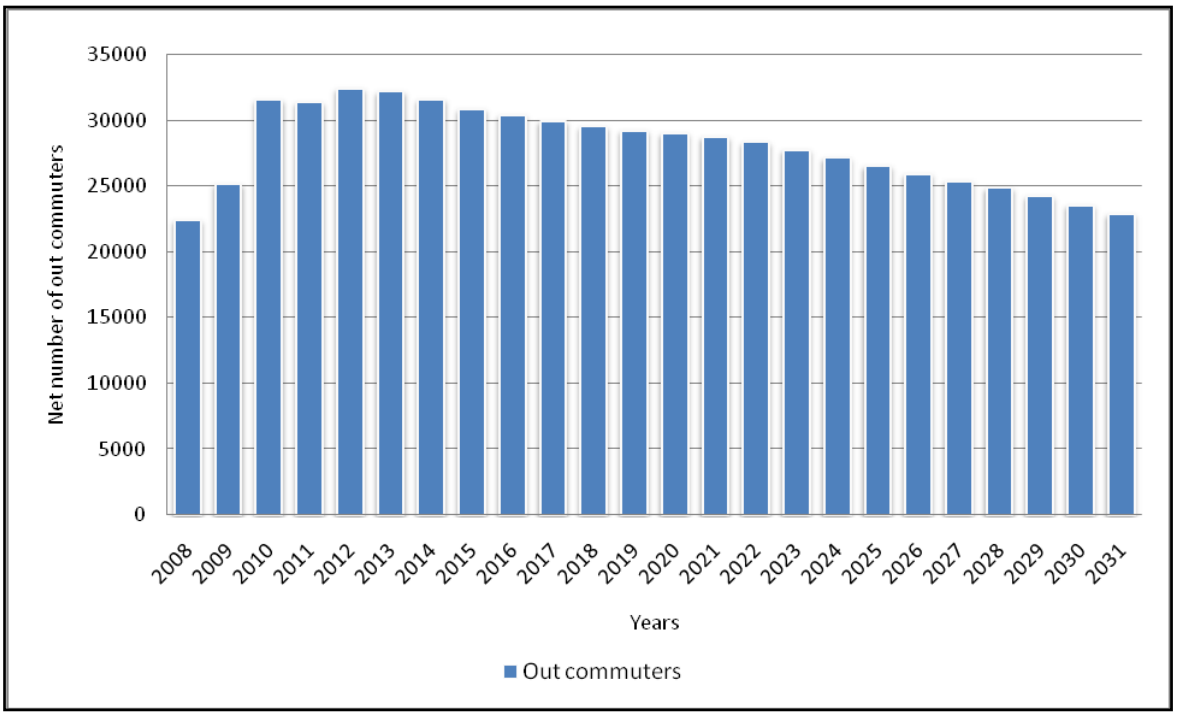
[14] ILO (International Labour Organisation) unemployment rate refers to the percentage of economically active people who are unemployed by ILO standard. Under the ILO approach, those who are considered as unemployed are either:-
1.) Out of work but are actively looking for a job or;
2.) Out of work and are waiting to start a new job in the next two weeks.

Commuting in and out of Gloucestershire

2.46. Figure 17 sets out forecast net out commuting per working day from Gloucestershire between 2008 and 2031. Over the study period, the county experiences net annual out commuting (i.e. more people travel out than travel in to the county to work) of between 22,500 and 32,500 workers over a working day.

2.47. Out commuting is expected to rise quickly over the short term peaking at around 2012. It is then forecast to fall back steadily to a similar level to that observed during 2008. The longer-term pattern of movement over the study period appears to support an increase in the occurrence of safe containment – more people working locally within the county; and / or a degree of increased in-commuting from neighbouring areas. However, to confirm which of these two circumstances is more likely to be significant in reducing the forecast out-commuting rate, further statistical analysis of the data is needed.

Figure 17: Forecast net out-commuting per working day across Gloucestershire | 2008 – 2031



3. Conclusion

3.1. The partnership between Gloucestershire County Council and the six district local planning authorities has successfully procured an econometric model – known as the Gloucestershire Housing Affordability Model (GAM).

3.2. The GAM model is designed to support the local evidence base on planning policy, but in particular for housing, by generating a suite of forecast results on how the housing market and other related issues (e.g. household formation, population) may evolve over the coming 20yrs. The forecasts can be used in conjunction with other evidence to inform the production of emerging policies for inclusion in local and neighbourhood plans.

3.3. A key function of the GAM model is that it can provide a consistent approach to assessing different housing policy options across Gloucestershire at a range of geographic scale – strategic housing market areas; local planning authorities; and 'community scale' sub-areas. This approach should help to demonstrate that Gloucestershire's local plans have been prepared within a strategic context and will contribute to satisfying (at least in part) the emerging 'Duty-to-Cooperate'.

3.4. An initial analytical baseline or 'policy-off' scenario has now been run through the GAM model. This baseline suggests that without exception, all of Gloucestershire's districts face a significant challenge in terms of improving levels of housing affordability in the future. It is clear that the continuation of a relatively low supply of housing, as observed in the recent past, will not yield favourable affordability outcomes including substantively reducing the demand of residents currently and likely to be in housing need in the future. Whilst the forecast results indicate a continuation in the performance of certain indicators, rather than any notable decline or worsening circumstances, this may still come at a price; for example – a more rapid change in the demographic profile of local populations. In turn this may result in adverse impacts upon a range of indirect, but equally important local matters, including local economic competitiveness – the availability of the right skilled workforce; social cohesion caused by an imbalance in communities; and focused pressures on particular parts of local service sector (e.g. healthcare).

3.5. Consequently to reverse current performance within many of the observed forecast trends, a combination of national and local policy interventions will likely be needed. Policy intervention in this context could include support for an increase in the supply of local housing. The task that lies ahead for Gloucestershire's districts is to consider what level of housing supply would best meets the holistic needs of their area, taking into account many of the forecast results generated by the GAM model. Progress is already being made across the districts in preparing potential model scenarios that reflect the local policy options currently being considered. Over the coming months it is anticipated that the districts will apply the GAM model to 'test' their emerging options so as to provide local communities, interested parties and decision makers with a better understanding of the potential implications of a particular local policy being promoted in an emerging local plan.

Appendices

Appendix A

Gloucestershire Housing Affordability Model (GAM)

'Community-Scale' Sub-Areas

Cheltenham Borough:

Map Reference	Sub-Area Title
HMA 30	**Cheltenham West**
HMA 31	**Cheltenham North**
HMA 32	**Cheltenham East**
HMA 33	**Cheltenham South**
HMA 34	**Cheltenham Central**

Gloucester City:

Map Reference	Sub-Area Title
HMA 14	**Gloucester North-East**
HMA 15	**Gloucester West**
HMA 16	**Gloucester Central**
HMA 17	**Gloucester South Central**
HMA 18	**Gloucester South West**

Tewkesbury Borough:

Map Reference	Sub-Area Title
HMA 22	**Tewkesbury Town and Twyning**
HMA 23	**Ashchurch and North-East Borough**
HMA 24	**Bishops Cleeve-Winchcombe**
HMA 25	**Staverton-Shurdington (West & South of Cheltenham)**
HMA 26	**Brockworth (East of Gloucester)**
HMA 27	**Churchdown (North of Gloucester)**
HMA 28	**Severn Vale**
HMA 29	**Elmstone Hardwicke-Uckington (North West Cheltenham)**

Cotswold District:

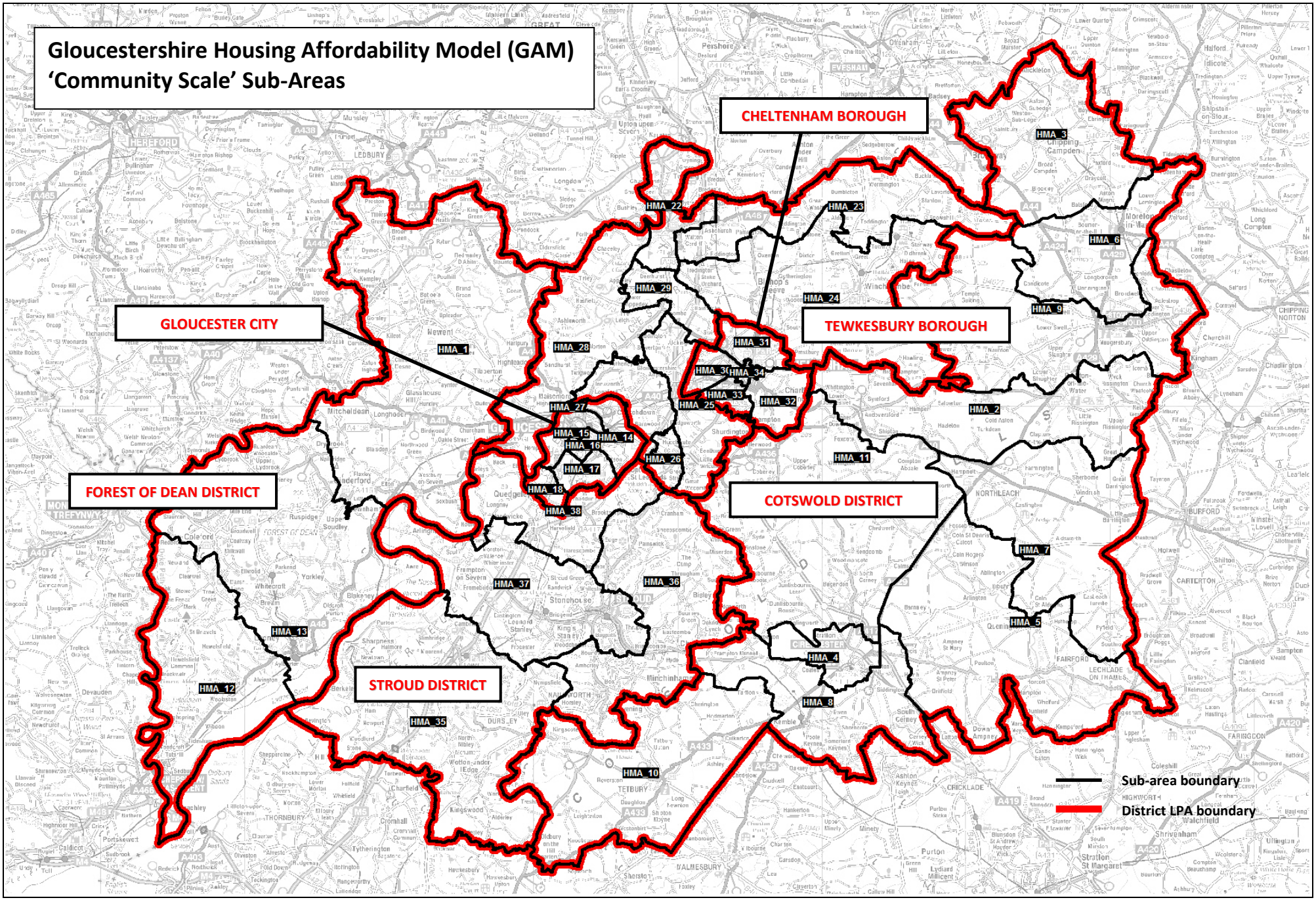
Map Reference	Sub-Area Title
HMA 2	**Bourton-on-the-Water**
HMA 3	**Chipping Campden**
HMA 4	**Cirencester**
HMA 5	**Fairford-Lechlade**
HMA 6	**Moreton-in-Marsh**
HMA 7	**Northleach**
HMA 8	**South Cerney-Kemble**
HMA 9	**Stow-on-the-Wold**
HMA 10	**Tetbury**
HMA 11	**Chedworth-Coberley**

Forest of Dean District:

Map Reference	Sub-Area Title
HMA 1	**Forest North (Cinderford-Mitcheldean-Newent)**
HMA 12	**Forest South (Sedbury-Hewlesfield-Clearwell)**
HMA 13	**Forest Central (Lydney-Blakeney-Coleford)**

Stroud District:

Map Reference	Sub-Area Title
HMA 35	**South Vale (Cam-Dursley)**
HMA 36	**Stroud East**
HMA 37	**Stroud West**
HMA 38	**Gloucester Urban Fringe**


Gloucestershire Housing Affordability Model (GAM)
'Community Scale' Sub-Areas
CHELTENHAM BOROUGH
GLOUCESTER CITY
TEWKESBURY BOROUGH
FOREST OF DEAN DISTRICT
COTSWOLD DISTRICT
STROUD DISTRICT
HMA_1
HMA_2
HMA_3
HMA_4
HMA_5
HMA_6
HMA_7
HMA_8
HMA_9
HMA_10
HMA_11
HMA_12
HMA_13
HMA_14
HMA_15
HMA_16
HMA_17
HMA_18
HMA_22
HMA_23
HMA_24
HMA_25
HMA_26
HMA_27
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HMA_29
HMA_30
HMA_31
HMA_32
HMA_33
HMA_34
HMA_35
HMA_36
HMA_37
HMA_38
Sub-area boundary
District LPA boundary

Appendix B

Gloucestershire Housing Affordability Model (GAM)

Report Full Forecast Dataset

Demographic Results:

Forecast population for each district of Gloucestershire | 2008 – 2031

LPA	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cheltenham	112600	114291	116076	117331	117951	118113	118594	119549	120684	121591	122330	123186	124064
Gloucester	116700	119288	121901	124069	125692	126908	128397	130329	132452	134379	136153	138036	139946
Tewkesbury	79800	81203	82639	83689	84282	84537	85038	85921	86961	87842	88610	89485	90389
Cotswold	83400	85173	86478	87174	87394	86952	86162	85352	84591	84005	83746	83746	83671
Forest of Dean	82600	83281	84292	84937	85002	84566	84232	84068	84105	84168	84324	84576	84764
Stroud	110800	113024	114777	115910	116555	116513	116099	115650	115258	115044	115151	115508	115776
Gloucestershire	**585900**	**596260**	**606163**	**613110**	**616875**	**617589**	**618522**	**620869**	**624051**	**627029**	**630313**	**634536**	**638611**

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
124925	125689	126248	126617	126852	127117	127476	127790	127949	128045	128135
141849	143655	145259	146678	147964	149276	150678	152037	153245	154389	155528
91274	92076	92712	93190	93552	93937	94399	94826	95125	95369	95613
83335	82759	82094	81482	80972	80558	80158	79645	79010	78381	77847
84830	84776	84638	84448	84214	83974	83747	83470	83135	82805	82510
115769	115499	115121	114781	114538	114387	114243	113969	113557	113138	112809
641982	**644455**	**646072**	**647196**	**648093**	**649250**	**650702**	**651738**	**652021**	**652127**	**652442**

Forecast population age-profile for each district of Gloucestershire | 2008 – 2031

LPA (0-14yrs)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cheltenham	18300	18831	19378	19897	20323	20660	21020	21409	21808	22150	22435	22721	22999
Cotswold	13800	13839	13861	13827	13741	13571	13374	13184	13019	12880	12771	12686	12595
Forest of Dean	13700	13711	13802	13848	13809	13693	13602	13528	13488	13451	13421	13401	13377
Gloucester	21800	22342	22891	23408	23845	24215	24621	25070	25539	25973	26371	26788	27209
Stroud	19700	19918	20121	20275	20367	20357	20302	20245	20207	20190	20198	20223	20235
Tewkesbury	13300	13484	13684	13869	13989	14054	14157	14303	14469	14602	14697	14805	14915

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
23274	23526	23730	23895	24029	24158	24287	24390	24450	24488	24507
12488	12362	12228	12099	11984	11883	11786	11674	11547	11421	11302
13344	13301	13247	13188	13127	13066	13007	12937	12857	12779	12703
27638	28055	28437	28794	29130	29469	29811	30130	30414	30683	30941
20219	20174	20110	20043	19985	19940	19894	19822	19725	19624	19527
15030	15134	15206	15254	15283	15313	15349	15369	15360	15336	15303

LPA (15-24yrs)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cheltenham	16900	16605	16575	16464	16222	15940	15814	15851	15952	16042	16152	16321	16514
Cotswold	8600	8571	8577	8531	8405	8173	7900	7641	7400	7205	7082	7004	6920
Forest of Dean	10300	10088	10021	9876	9617	9293	9019	8793	8606	8438	8315	8223	8132
Gloucester	16000	16132	16437	16678	16810	16892	17071	17363	17698	18015	18339	18707	19089
Stroud	11600	11583	11609	11590	11499	11308	11080	10867	10671	10520	10445	10417	10381
Tewkesbury	8500	8528	8640	8705	8706	8677	8696	8771	8864	8947	9033	9137	9247

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
16733	16969	17189	17376	17539	17722	17933	18129	18286	18429	18568
6811	6682	6552	6435	6338	6260	6189	6104	6005	5909	5825
8036	7940	7844	7747	7650	7562	7481	7394	7301	7212	7130
19490	19905	20302	20667	21010	21369	21753	22125	22461	22783	23102
10319	10233	10146	10069	10011	9971	9937	9884	9813	9740	9680
9363	9484	9596	9691	9774	9861	9957	10045	10115	10176	10234

LPA (25-59yrs)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cheltenham	51900	52702	53218	53354	53142	52651	52259	52082	51988	51746	51370	51014	50667
Cotswold	37400	38541	39279	39592	39612	39244	38642	38006	37406	36876	36469	36150	35781
Forest of Dean	36800	37290	37766	38064	38046	37732	37403	37133	36958	36777	36606	36452	36252
Gloucester	55400	56605	57572	58204	58514	58562	58719	59113	59610	59966	60183	60416	60655
Stroud	50900	52185	53021	53389	53433	53054	52417	51745	51116	50572	50169	49867	49512
Tewkesbury	36800	37390	37800	37955	37869	37591	37392	37359	37393	37320	37144	36974	36803

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
50303	49871	49339	48737	48097	47488	46944	46420	45867	45314	44791
35279	34649	33969	33319	32723	32174	31639	31068	30456	29856	29307
35977	35621	35213	34788	34354	33925	33512	33091	32659	32244	31861
60871	61003	61009	60919	60768	60635	60565	60503	60392	60265	60158
49009	48360	47654	46981	46370	45812	45269	44684	44049	43425	42860
36610	36355	36012	35601	35150	34711	34311	33916	33489	33053	32632

LPA (60yrs +)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cheltenham	25500	26154	26905	27616	28264	28862	29502	30207	30936	31652	32373	33130	33884
Cotswold	23600	24222	24760	25223	25635	25963	26247	26519	26767	27044	27424	27906	28375
Forest of Dean	21800	22191	22703	23148	23529	23848	24208	24614	25053	25501	25982	26500	27004
Gloucester	23500	24208	25000	25778	26523	27240	27986	28783	29605	30426	31260	32125	32993
Stroud	28600	29339	30025	30657	31255	31795	32300	32793	33264	33761	34340	35000	35648
Tewkesbury	21200	21801	22515	23160	23717	24215	24794	25489	26234	26974	27736	28569	29424

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
34615	35322	35989	36610	37187	37750	38312	38851	39346	39814	40269
28757	29066	29345	29628	29927	30240	30544	30799	31002	31196	31412
27472	27914	28334	28725	29083	29421	29747	30048	30317	30570	30816
33850	34693	35511	36298	37056	37803	38549	39279	39978	40658	41328
36221	36731	37211	37689	38173	38664	39143	39580	39970	40349	40743
30270	31103	31898	32643	33346	34052	34781	35496	36161	36803	37444

Forecast household growth for each district of Gloucestershire | 2008 – 2031

LPA	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cheltenham	49582	50416	51475	52158	52585	53017	53553	54151	54645	55004	55442	56004	56581
Gloucester	49155	50241	51606	52671	53528	54419	55410	56458	57399	58212	59120	60158	61216
Tewkesbury	34790	35463	36291	36883	37286	37690	38189	38778	39337	39813	40340	40968	41615
Cotswold	36785	37668	38308	38695	38758	38571	38418	38405	38534	38722	38956	39182	39298
Forest of Dean	34765	34747	35605	35850	36055	36171	36354	36694	37120	37513	37924	38321	38665
Stroud	47437	48383	49142	49643	49755	49606	49561	49724	50094	50529	50968	51340	51567
Gloucestershire	**252514**	**256918**	**262426**	**265901**	**267968**	**269475**	**271484**	**274210**	**277129**	**279794**	**282751**	**285973**	**288942**

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
57048	57358	57600	57855	58149	58479	58829	59121	59370	59644	59983
62160	62936	63647	64381	65170	65999	66840	67622	68365	69141	69997
42193	42669	43084	43483	43886	44315	44774	45192	45565	45944	46365
39283	39214	39202	39262	39338	39379	39381	39330	39276	39278	39345
38944	39177	39411	39646	39858	40048	40244	40424	40601	40799	41021
51665	51738	51910	52173	52444	52648	52793	52887	53005	53208	53487
291293	**293092**	**294854**	**296800**	**298846**	**300867**	**302861**	**304575**	**306181**	**308014**	**310199**

Comparison of household growth with national (CLG) and local (GCC) local projections | 2008 – 2033

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
GHA model household forecast - analytical baseline	252514	256918	262426	265901	267968	269475	271484	274210	277129	279794	282751	285973
GCC local (household) projection - May 2011		258900	261400	263900	266300	268900	271700	274500	277500	280300	283200	286,200
CLG 2008-trend based household projection (to 2033)	252000					265000					279000	

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
288942	291293	293092	294854	296800	298846	300867	302861	304575	306181	308014	310199		
288900	291600	294100	296700	299200	301700	304100	306600	308800	311200	313400	315500		
			293000			301000		306000					319000

Housing Affordability Results:

Forecast median real house prices for each district of Gloucestershire | 2008 – 2031

LPA	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cheltenham	£191,063	£186,824	£167,202	£153,505	£153,944	£161,186	£165,343	£169,605	£173,714	£179,339	£181,110	£183,083	£186,451
Gloucester	£158,386	£154,871	£138,605	£127,251	£127,614	£133,618	£137,064	£140,597	£144,004	£148,667	£150,134	£151,770	£154,562
Tewkesbury	£197,102	£192,728	£172,486	£158,357	£158,809	£166,280	£170,569	£174,965	£179,205	£185,007	£186,834	£188,869	£192,344
Cotswold	£259,843	£252,991	£240,642	£226,996	£231,870	£254,505	£265,168	£268,244	£267,780	£270,365	£271,098	£276,595	£286,727
Forest of Dean	£191,202	£188,090	£162,052	£150,286	£154,495	£161,401	£163,158	£162,661	£161,706	£165,628	£168,535	£172,787	£177,651
Stroud	£198,409	£193,177	£183,748	£173,328	£177,050	£194,333	£202,475	£204,823	£204,469	£206,443	£207,003	£211,200	£218,936
Gloucestershire *(ave)*	**£199,334**	**£194,780**	**£177,456**	**£164,954**	**£167,297**	**£178,554**	**£183,963**	**£186,816**	**£188,480**	**£192,575**	**£194,119**	**£197,384**	**£202,779**

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
£191,858	£199,796	£206,405	£211,250	£214,602	£218,013	£221,052	£226,349	£231,121	£235,047	£237,989
£159,044	£165,625	£171,103	£175,120	£177,898	£180,726	£183,246	£187,637	£191,592	£194,847	£197,285
£197,922	£206,111	£212,929	£217,927	£221,384	£224,903	£228,039	£233,503	£238,426	£242,476	£245,511
£298,533	£309,506	£313,166	£313,469	£315,622	£322,830	£330,513	£338,826	£343,186	£343,832	£343,738
£182,224	£187,797	£192,058	£196,247	£200,878	£205,875	£208,988	£212,791	£215,954	£218,929	£221,981
£227,951	£236,330	£239,125	£239,356	£241,000	£246,504	£252,370	£258,718	£262,047	£262,541	£262,468
£209,589	**£217,527**	**£222,464**	**£225,561**	**£228,564**	**£233,142**	**£237,368**	**£242,971**	**£247,054**	**£249,612**	**£251,495**

Forecast house price to earnings ratio for each district of Gloucestershire | 2008 – 2031

LPA	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cheltenham	7.22	7.41	6.73	6.13	6.08	6.25	6.29	6.35	6.42	6.54	6.50	6.47	6.49
Gloucester	6.21	6.38	5.79	5.27	5.23	5.38	5.41	5.47	5.53	5.62	5.59	5.57	5.59
Tewkesbury	7.87	8.07	7.33	6.68	6.63	6.81	6.85	6.92	7.00	7.12	7.08	7.05	7.08
Cotswold	12.81	13.18	12.88	12.13	12.34	13.33	13.63	13.52	13.26	13.16	13.00	13.10	13.41
Forest of Dean	9.45	10.38	8.70	8.12	8.17	8.37	8.24	8.04	7.83	7.87	7.86	7.91	7.99
Stroud	8.29	8.53	8.34	7.85	7.98	8.63	8.82	8.75	8.58	8.52	8.41	8.48	8.67

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
6.58	6.75	6.86	6.89	6.87	6.85	6.82	6.86	6.87	6.85	6.80
5.66	5.81	5.90	5.93	5.92	5.90	5.87	5.90	5.91	5.90	5.85
7.17	7.35	7.47	7.51	7.49	7.47	7.44	7.47	7.49	7.47	7.41
13.75	14.02	13.93	13.69	13.55	13.63	13.72	13.83	13.75	13.52	13.27
8.04	8.12	8.13	8.13	8.14	8.15	8.10	8.06	7.99	7.92	7.85
8.90	9.07	9.01	8.86	8.76	8.82	8.88	8.95	8.90	8.75	8.59

Forecast % of local households able to afford to buy a property within each district of Gloucestershire | 2008 – 2031

LPA	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cheltenham	25	21	28	35	38	41	44	46	46	45	45	45	45
Cotswold	13	11	13	17	19	18	20	22	23	23	23	23	22
Forest of Dean	22	15	23	29	31	33	38	41	42	42	41	41	40
Gloucester	25	21	27	34	38	40	45	47	46	45	46	46	46
Stroud	26	22	26	32	34	34	36	39	39	39	40	39	38
Tewkesbury	24	20	27	34	38	40	44	46	46	45	45	45	44
Gloucestershire *(ave)*	**23**	**18**	**24**	**30**	**33**	**34**	**38**	**40**	**40**	**40**	**40**	**40**	**39**

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
44	43	42	42	42	42	42	42	41	41	42
20	19	19	20	20	20	19	19	19	19	19
40	39	39	38	38	38	38	38	38	38	38
45	44	43	42	42	43	43	42	42	42	43
36	35	35	36	36	35	35	34	34	35	35
44	42	41	41	41	41	41	40	40	40	40
38	37	**37**	**36**	**36**	**36**	**36**	**36**	**36**	**36**	**36**

Forecast % of local households able to afford to rent a property within each district of Gloucestershire | 2007 – 2031

LPA	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cheltenham	56	62	62	59	63	62	61	64	65	65	64	64	63	63
Cotswold	54	48	47	43	48	46	41	43	44	43	43	43	43	42
Forest of Dean	60	62	57	54	60	57	55	59	60	60	59	59	59	58
Gloucester	57	62	61	57	62	61	60	63	64	64	63	62	62	62
Stroud	58	63	63	59	63	61	57	59	60	59	58	58	58	58
Tewkesbury	57	56	56	52	57	56	55	58	59	59	58	57	57	56
Gloucestershire *(ave)*	**57**	**59**	**58**	**54**	**59**	**57**	**55**	**58**	**59**	**58**	**57**	**57**	**57**	**56**

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
62	62	61	60	60	59	59	58	58	57	57
41	40	39	38	38	37	37	36	36	35	35
57	57	56	55	55	54	53	53	52	52	52
61	60	60	59	58	58	58	57	57	57	56
57	55	55	54	54	53	53	52	52	51	51
55	55	54	53	52	52	51	51	50	50	49
56	**55**	**54**	**53**	**53**	**52**	**52**	**51**	**51**	**50**	**50**

Forecast % of local households headed by under 40yr olds able to afford to buy a two-bed property in Gloucestershire | 2008 – 2031

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
20	14	22	29	31	32	35	37	37	37	37	37	36	36	35	34	34	34

2026	2027	2028	2029	2030	2031
34	34	34	34	34	34

Forecast % of local households headed by under 40yr olds able to afford to rent a two-bed property in Gloucestershire | 2008 – 2031

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
57	56	53	57	56	54	57	58	57	57	56	56	56	55	55	54	53	53

2026	2027	2028	2029	2030	2031
52	52	52	51	51	51

Housing Need Results:

Forecast average number of local households in housing need over five five-year periods | 2007 – 2031

LPA	2007-2011	2012-2016	2017-2021	2022-2026	2027-2031
Cheltenham	416	505	486	525	570
Gloucester	475	620	632	716	809
Tewkesbury	298	395	400	411	432
Cotswold	292	327	346	400	391
Forest of Dean	282	374	355	380	398
Stroud	335	367	404	486	497
Gloucestershire	**2097**	**2588**	**2622**	**2918**	**3098**

Forecast entries on the Gloucestershire Housing Register (Homeseekers) by each district of Gloucestershire| 2008 – 2031

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cheltenham	3384	2330	3137	2618	3551	3946	4015	3574	3567	3730	3813	3804	3786	3808
Cotswold	4186	3314	2224	1609	1796	1984	2133	1959	1889	1879	1833	1785	1784	1822
Forest of Dean	1981	2042	2021	1751	1593	2157	2196	1780	1711	1780	1835	1839	1879	1953
Gloucester	4839	4206	4683	4509	4287	4634	4650	4238	4216	4370	4508	4554	4577	4622
Stroud	1926	1931	2559	1966	2023	2339	2554	2259	2173	2204	2170	2114	2115	2167
Tewkesbury	1793	1560	1367	1498	1967	2118	2148	1974	1974	2047	2082	2077	2070	2084

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
3824	3886	3915	3912	3889	3849	3799	3792	3770	3727	3682
1854	1868	1835	1784	1744	1727	1718	1715	1690	1639	1585
1987	2027	2015	1997	1996	1997	1981	1976	1950	1906	1874
4683	4819	4923	4977	4980	4952	4929	4941	4941	4909	4850
2208	2234	2197	2140	2101	2088	2082	2087	2065	2009	1953
2102	2143	2161	2159	2146	2126	2111	2111	2103	2081	2056

Economic Results:

Forecast Gloucestershire-based jobs (employed and self-employed) | 2008 – 2031

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
493,059	460,148	458,316	456,483	457,853	460600	463,824	466,143	468,474	470,816	473,170	475,536	477,914

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
480,303	482,705	485,118	487,544	489,982	492432	494,894	497,368	499,855	502,354	504,866

Forecast ILO Unemployment rate | 2008 – 2031

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
3.80	5.27	6.38	6.39	6.51	6.36	6.15	5.96	5.83	5.70	5.57	5.44	5.33

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
5.21	5.08	4.93	4.77	4.60	4.43	4.28	4.12	3.96	3.79	3.62

Appendix C

Gloucestershire Housing Affordability Model (GAM)

Full list of Available Forecast Results

Population Forecasts to 2031:
Population (total)
Population (0-14yrs age group)
Population (15-24yrs age group)
Population (25-59yrs age group)
Population (60+yrs age group)
Births (total)
Deaths (total)

Migration Forecasts to 2031:
In and out migration (UK) numbers and annual rate as a % (total)
In and out migration (UK) numbers and annual rate as a % (0-14yrs age group)
In and out migration (UK) numbers and annual rate as a % (15-24yrs age group)
In and out migration (UK) numbers and annual rate as a % (25-59yrs age group)
In and out migration (UK) numbers and annual rate as a % (60+yrs age group)
International in and out migration (total)

Household Forecasts to 2031:
Households (total)
Household representative rate (15-24yrs age group)
Household representative rate (25-59yrs age group)
Household representative rate (60+yrs age group)
Households that are overcrowded as a %
Households that are sharing and concealed as a %
Households that are residing in unsuitable housing as a %

Housing stock-related Forecasts to 2031:
Dwelling numbers (total)
Real median house price
Housing vacancy rate as a %
Buy-to-let lending as a % of open market renting
Household-to-dwelling ratio
Housing (open market) completions number and rate as a %
Housing (social) completions number and as rate as a %
Demolitions (total)
Flow of new planning permissions as a % of households

Housing Affordability Forecasts to 2031:
House price-to-income ratio
House price-to-earnings ratio
Ability to afford to buy
Ability to afford to (open market) rent
Ability to afford low cost housing ownership (i.e. HomeBuy)
Ability to afford 'affordable rents'
Ability of households headed by under-40yr olds to afford to buy a two-bed property
Ability of households headed by under-40yr olds to afford to rent a two-bed property

Housing Need Forecasts to 2031:
Gross new households unable to buy
Gross new households unable to (open market) rent
Backlog of households in need
Housing register entries

Economic Forecasts to 2031:
Employed and self-employed (total)
Employment rate as a % of working age adults
ILO unemployment rate as a %
Real GVA £ per capita
Real GVA per employee
Real median earnings £ per annum
Real household income £ per annum
Out commuting (total)