Barnsley

Demographic Forecasts

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For the attention of:

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Acknowledgements

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Context and Requirements

1.1 In 2014, Edge Analytics provided Barnsley Metropolitan Borough Council (BMBC)[1] with a range of demographic evidence to inform the Strategic Housing Market Assessment (SHMA)[2] update, published by arc4. This included the 2012-based sub-national population projections (SNPP) and mid-year estimates (MYE) for 2001–2013 from the Office for National Statistics (ONS), 2008-based and 2011-based household projections from the Department for Communities and Local Government (DCLG) and economic forecasts from the 2014 Regional Econometric Model (REM).

1.2 The release of the 2012-based household projection model from DCLG in 2015 led to a subsequent update of the demographic analysis, presented as an addendum[3] to the 2014 report.

1.3 In 2017, BMBC commissioned Edge Analytics[4] to provide an updated range of demographic scenarios, taking account of new evidence including; 2014-based population and household projection models from ONS and DCLG, MYEs to 2015, plus labour market analysis from the Office for Budget Responsibility (OBR). This evidence underpinned the objectively assessed housing need (OAHN) presented in the SHMA (2017)[5] of 967–1,389 dwellings per annum (dpa).

1.4 BMBC has submitted its Local Plan, following which, it has been recommended that updated economic evidence is considered to revise and clarify the objectively assessed housing need figure for the 2014–2033 plan period.

1.5 The new evidence presented in this report includes the following:

- 2016 MYE from ONS, providing an additional year of historical population, births, deaths and migration for consideration in the scenario analysis
- 2017 economic forecasts and underpinning assumptions from the Regional Econometric Model (REM)

[1] https://www.barnsley.gov.uk/media/5088/barnsley-demographicforecasts-edgeanalytics.pdf
[2] https://www.barnsley.gov.uk/media/3952/barnsleyshma2014updatefinalreport.pdf
[3] https://www.barnsley.gov.uk/media/5087/barnsley-demographicforecasts-dclg2012addendum-edgeanalytics.pdf
[4] https://www.barnsley.gov.uk/media/5489/barnsley-demographic-update-march-2017.pdf
[5] https://www.barnsley.gov.uk/media/5488/barnsley-2017-shma-addendum-report-1703-final-a.pdf

- 2017 labour market analysis from the OBR[6]

1.6 The analysis presented in this report provides a demographic profile of Barnsley; considers the 2012-based and 2014-based ONS population projections and DCLG household model alongside alternative trend-based scenarios; and aligns this demographic evidence with a range of economic forecasts and associated assumptions from the latest REM output.

[6] http://cdn.budgetresponsibility.org.uk/OBR-Fiscal-sustainability-report.pdf

2 Area Profile

Geography

2.1 Barnsley is part of both the Leeds and Sheffield City Local Enterprise Partnerships (LEPs) and is bordered by the neighbouring areas of Sheffield, Rotherham, Doncaster, Wakefield, Kirklees and Derbyshire (Figure 1).

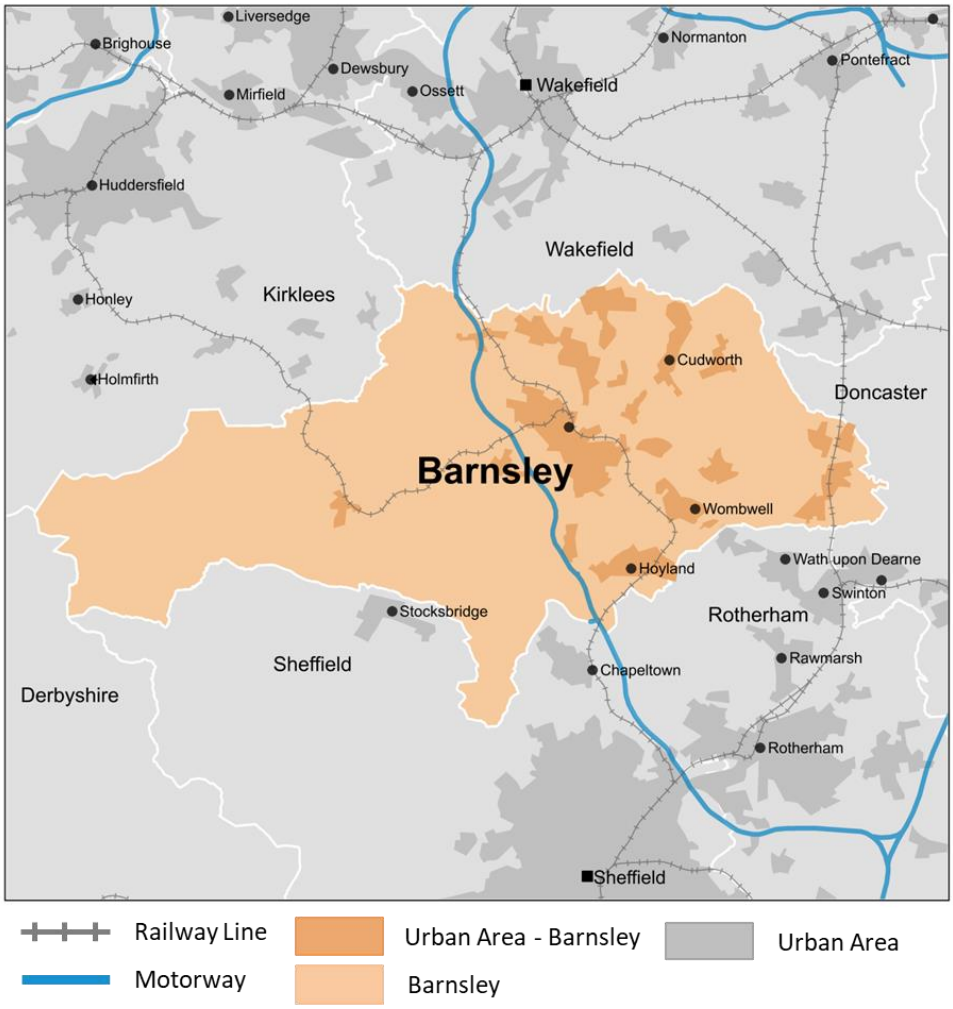


Figure 1: Barnsley Map

Population Growth Profile

2.2 The 2016 MYE for Barnsley suggests a population of 241,218, a 10.6% increase since 2001 (Table 1). The MYEs suggest that Barnsley's population is experiencing a higher rate of growth than the Yorkshire & Humber region (9.0%) but a lower rate than the rest of England (11.8%).

Table 1: Barnsley population change comparison (source: ONS)

Area	Population			
	2001	2016	Change	Change %
Barnsley	218,124	241,218	23,094	10.6%
Yorkshire & Humber	4,976,643	5,425,741	449,098	9.0%
England	49,449,746	55,268,067	5,818,321	11.8%

2.3 Following the 2011 Census, the 2002–2010 MYE were 'rebased' to align with the 2011 MYE. In the case of Barnsley, the impact of this adjustment was an uplift in its population, averaging +182 per year to 2011 (Figure 2). At the 2011 census, the population for Barnsley was 231,865, a 6.3% increase over the 2001–2011 decade. Since 2011, Barnsley's population has increased by 4.0%, at a higher annual rate than that experienced prior to the Census.

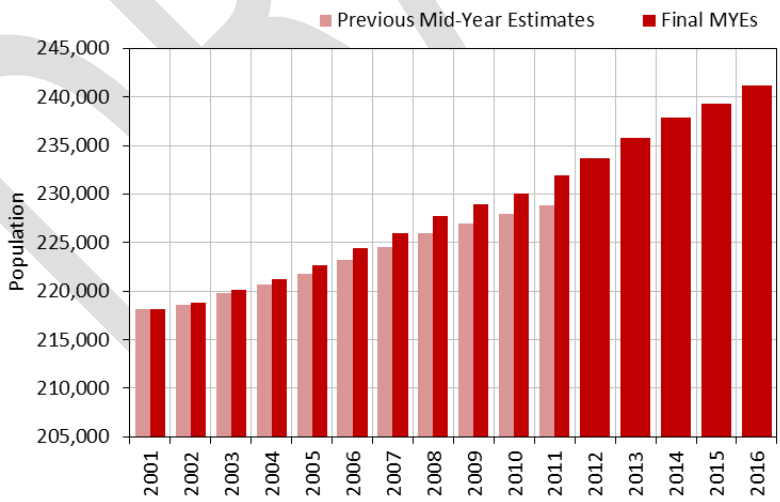


Figure 2: Barnsley Population change 2001–2016

2.4 Barnsley's annual population change has varied from +727 (0.3%) in 2001/02 to +2,086 (0.9%) in 2012/13 and 2013/14, with the latest MYE suggesting an increase of +1,899 (0.8%) from 2015 (Figure 3).

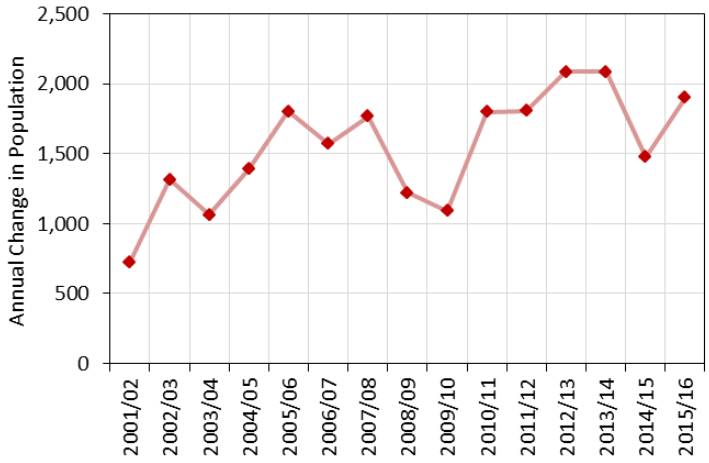


Figure 3: MYE annual change in population 2001/02–2015/16

Components of Change

2.5 Barnsley's population change has been driven by a combination of natural change (i.e. the difference between births and deaths), internal and international migration (Figure 4). Historically, net internal migration (i.e. the exchange of migrants between Barnsley and other parts of the UK) has been the dominant driver of the districts' population growth, averaging at +736 people per year since 2001/02.

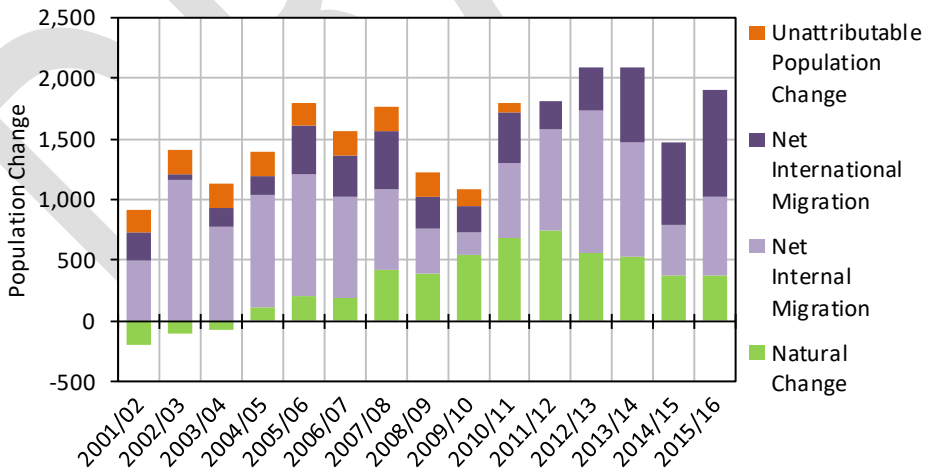


Figure 4: Barnsley – components of change 2001/02–2015/16

2.6 Net international migration has had a consistently positive impact upon Barnsley's population growth, averaging +363 (2001/02–2015/16). The inclusion of the 'unattributable population change' (UPC) adjustment within the international migration component would increase its annual impact to +484 per year since 2001/02.

2.7 Excluding the first three years of the historical period, natural change has had a positive annual impact on population growth (an excess of births over deaths), averaging at +430 per year (2004/05–2015/16).

Internal Migration

2.8 Internal migration statistics measure the inflow and outflow of population to and from Barnsley and the rest of the UK (Figure 5). Since 2004/05, outflows have steadily increased, however inflows have remained at a higher level, resulting in an annual net inflow. It was a sharp reduction in inflows in 2009/10 that resulted in a drop in net migration, followed by a sharp rise in subsequent years.

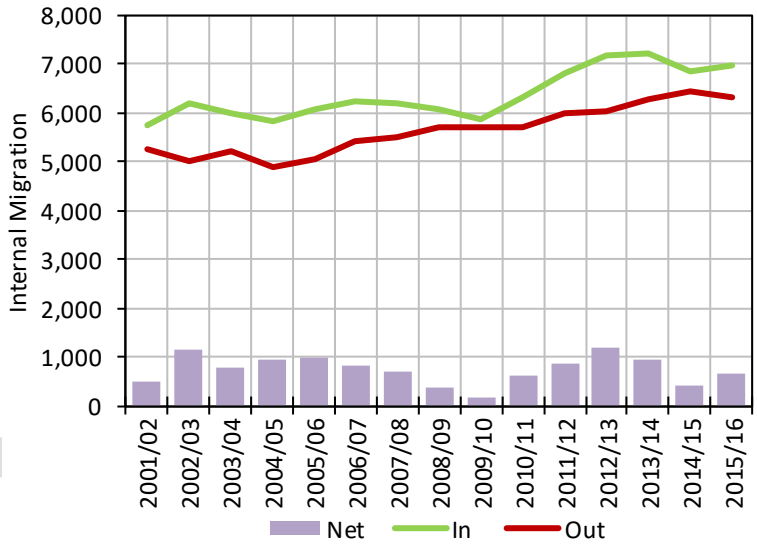


Figure 5: Barnsley's internal migration profile (2001/02–2015/16)

2.9 In terms of migration linkages between Barnsley and surrounding areas, the largest *positive* net exchanges (i.e. a higher inflow than outflow) have been with Sheffield and Wakefield (Figure 6). Since 2009/10, inflows from Sheffield have seen an increase from +840 to +1,204 people per year in 2015/16. This increase, alongside a relatively stable outflow, has resulted in a greater net flow of people migrating from Sheffield to Barnsley in the last 6 years.

2.10 With regards to the net outflow exchange, the largest flows have been between Barnsley and Scarborough, East Riding of Yorkshire and East Lindsey.

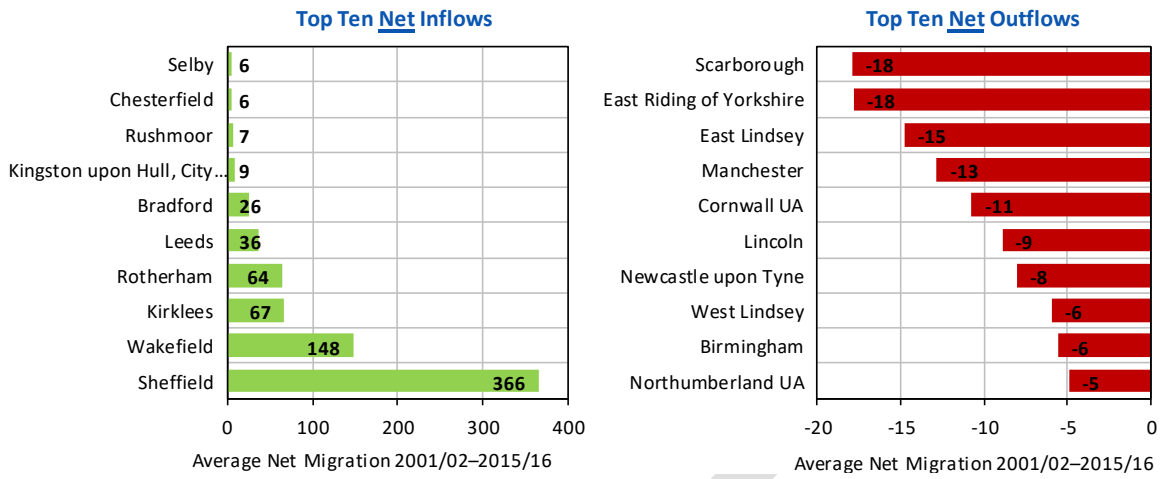


Figure 6: Top-10 internal migration average net inflows and outflows

2.11 The age profile of migration shows a net inflow in all age groups, with the exception of 15–19 year olds (Figure 7). The large net outflow of 15–19 year olds is associated with the student population moving to university, with a return flow evident in the 20–24 age groups.

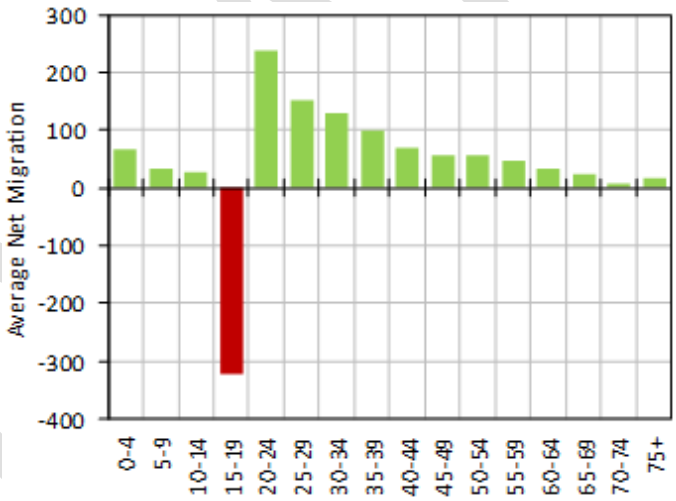


Figure 7: Barnsley internal migration age profile, 2001/02–2015/16

Age Structure

2.12 When considering future housing needs and the size and shape of the resident labour force, the age structure of Barnsley's population is a key factor. Table 2 compares Barnsley's age profile to the region and England, using the latest 2016 mid-year population estimates from ONS.

2.13 In 2016, Barnsley had a slightly older age profile than the region and England, with 19% in the 65+ age range and a median age of 43. This compares with 18% in the 65+ age range for the Yorkshire and Humber region and 16% for England, with a median age of 4 and 39 respectively. Barnsley has an OAD ratio of 30; the size of Barnsley's population aged 65+ is equivalent to 30% of its 15–64 age-group in 2016. This is closely aligned to the regional OAD of 29 but higher than England's of 25.

Table 2: 2016 MYE population age structure: Barnsley, YH & England

Indicator	Barnsley	Yorkshire and The Humber	England
Percentage 65+	19%	18%	16%
Percentage 80+	5%	5%	5%
OAD Ratio	30	29	25
Median Age	43	40	39

**OAD = Old Age Dependency Ratio (Population Aged 65+/Population Aged 15–64)*

3 Demographic Forecasts

ONS Population Projections

3.1 Every two years, the Office for National Statistics (ONS) publishes its national population projections, setting key assumptions on the long-term effects of fertility, mortality and international migration to estimate population growth outcomes for England, Wales, Scotland and Northern Ireland.

3.2 The national population projection informs the sub-national population projection (SNPPs) for English local authorities, also published on a bi-yearly cycle. The latest 2014-based SNPPs use a combination of national and local assumptions on births, deaths and migration to formulate a 25-year projection (2014–2039) for each local authority.

3.3 Under the 2014-based SNPP for Barnsley, the population is estimated to increase by 11.7% over Barnsley's 2014–2033 plan period. Net internal migration is projected to be the dominant component of population change, reflecting historical trends. Net international migration is projected to have a small but positive impact on population change over the 2014–2033 period. Natural change is expected to have a positive but reducing impact on population change, as Barnsley's population ages.

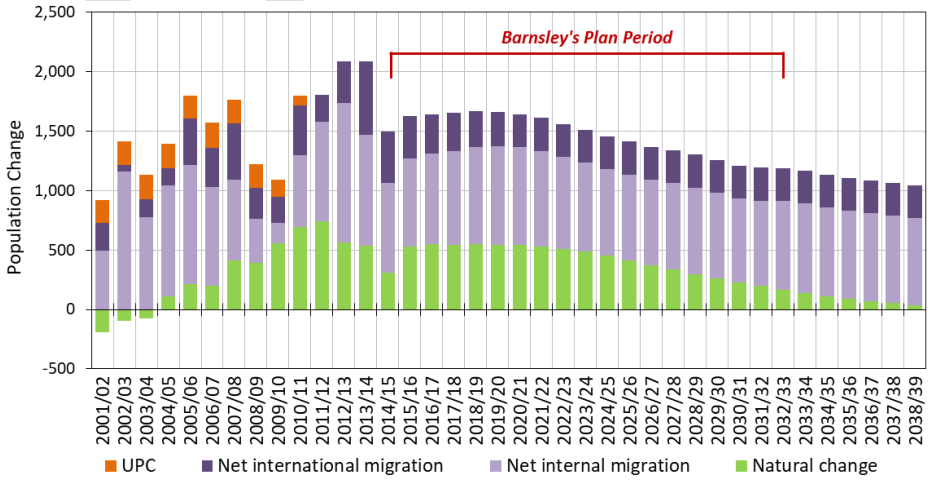


Figure 8: Barnsley historical and 2014-based SNPP components of change (Source: ONS)

Planning Guidance

3.4 At present, the Planning Practice Guidance (PPG) states that the DCLG household projections should provide the *"starting point estimate of overall housing need"* (PPG paragraph 2a-015). The 2014-based model is the latest set of household projections from the DCLG, underpinned by the 2014-based sub-national population projection (SNPP).

3.5 Under the 2014-based DCLG household projection model, the number of households in Barnsley is estimated to increase by 16,046 over the 2014–2033 plan period. This results in an annual growth of 845 *households* per year.

3.6 In September 2017, DCLG published its Housing White Paper detailing a draft methodology for a more standardised approach to OAN calculation across English local authorities. A three-step approach is proposed to calculating a housing need estimate:

- **Step 1:** The 'starting-point' household total is based on DCLG's 2014-based projection.
- **Step 2:** An adjustment is applied based on a local affordability ratio.
- **Step 3:** A 40% 'cap' on the level of adjustment is applicable to those local authorities that have adopted Local Plans in the last 5 years or do not currently have a Local Plan.

3.7 The DCLG methodology has presented an OAHN estimate for each local authority for a 2016–2026 plan period (at present there are no guidelines published for Council's with an extended Local Plan period or a base date prior to 2016).

3.8 The published OAHN figure for Barnsley is **898** *households* per year (2016–2026)[7]. Taking into account vacant properties and second homes in the OAN calculation[8], the estimated household growth results in an equivalent housing OAN of 936 *dwellings* per annum (2016–2026).

[7] Note that this figure refers only to the 2016–2026 period. The household growth figure in paragraph 3.5 refers to the full 2014–2033 plan period.
[8] 2011 Census vacancy rate is 4.0% for Barnsley

Demographic Scenarios

3.9 The demographic evidence presented in the previous section provides context for the development of alternative trend-based scenarios which consider variant migration histories. Three trend scenarios are presented as follows:

- **SNPP-2014**: This is the 2014-based SNPP for Barnsley and is presented as the 'benchmark' scenario
- **SNPP-2012:** This is the 2012-based SNPP for Barnsley and is presented as a comparison to the latest population projection.
- **PG 5yr**[9]: Internal migration rates and international migration flow assumptions based on a five-year historical period (2011/12–2015/16).
- **PG 10yr**: Internal migration rates and international migration flow assumptions are based on a ten-year historical period (2006/07–2015/16).

3.10 In line with the PPG, the latest 2014-based household growth assumptions have been applied to each scenario, in combination with a 2011 Census dwelling vacancy rate for Barnsley of 4.0%.

3.11 The population growth under each of the scenarios is presented in the form of a chart (Figure 9), with population change, net migration, natural change and associated household and dwelling growth presented for the 2014–2033 plan period in Table 3.

3.12 The **SNPP-2012** results in the lowest population growth of 10.4% over the 2014–2033 plan period, resulting in an annual dwelling growth of +808 per year. Under the **SNPP-2014** 'benchmark' scenarios, population growth is slightly higher (11.7%) over the plan period, resulting in an annual dwelling growth of +880 per year.

3.13 The alternative **'PG'** trend scenarios result in higher population growth than the **SNPP-2014** ranging from 12.4% under the **PG 10yr** scenario to 13.3% under the **PG 5yr** scenario. The slightly lower growth under the **PG 10yr** scenario is driven by the reduced net migration flows in 2008/09 and 2009/10, whilst the higher growth under the **PG 5yr** scenario captures the significant increases in net international migration since 2012/13. Under the **PG** scenarios, the annual dwelling growth ranges from 963–980 over the 2014–2033 plan period.

[9] Note that PG stands for POPGROUP, the demographic forecasting model in which these scenarios have been generated.

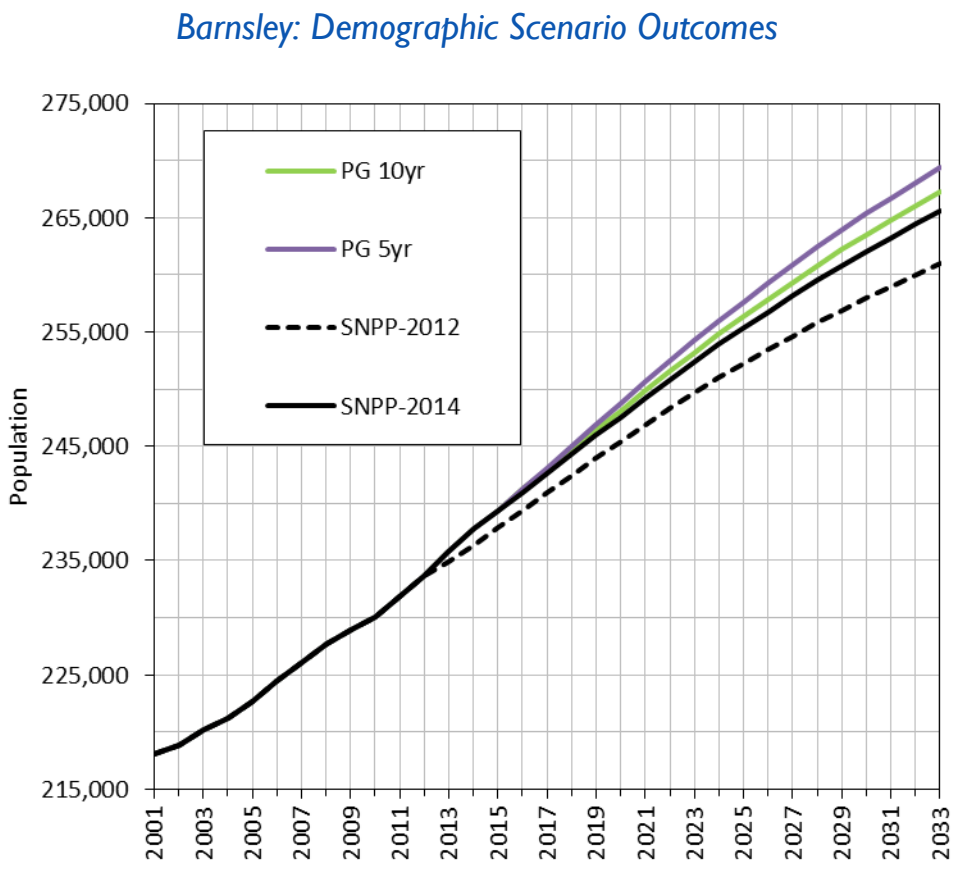


Figure 9: Population change demographic scenarios (2001–2033)

Table 3: Demographic scenario outcomes 2014–2033

Scenario	Change 2014–2033				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
PG 5yr	31,564	13.3%	17,875	17.2%	1,280	980
PG 10yr	29,470	12.4%	17,563	16.9%	1,156	963
SNPP-2014	27,789	11.7%	16,047	15.4%	1,051	880
SNPP-2012	24,602	10.4%	14,729	14.2%	803	808

Note: PG scenarios include two years of historical data

Household Formation

3.14 Across the UK, younger adult age groups have seen the most significant change in household formation over the last ten years, due to a combination of housing undersupply and affordability issues. In formulating an OAN, PPG recommends that *"alternative assumptions in relation to…household formation rates"* are considered (PPG Paragraph 2a-017) to evaluate a potential 'reversal' of this trend.

3.15 In the demographic forecasts above, the DCLG 2014-based household headship rates (also known as household representative rates) determine the level and profile of household growth by age group and household category. The charts in Appendix B compare Barnsley's headship rate trends for the DCLG's 2014-based and 2008-based household projection models. The young adult, 25–44 male and 25–34 female age group suggest a lower rate of growth in the 2014-based model compared to the 2008-based equivalent.

3.16 To evaluate the effect of changes to young adult household formation over time, 'Partial Return' rates have been generated for Barnsley, in which the 2014-based headship rates for the 25–44 male and 25–34 female age groups return to a mid-point between the 2014- and 2008-based rates by 2033.

Table 4: Demographic scenarios average annual dwelling growth 2014–2033

Scenario	Population Change %	Average Annual Dwelling Growth 2014–2033	
		2014-based	2014-based Partial Return
PG 5yr	13.3%	980	1,056
PG 10yr	12.4%	963	1,038
SNPP-2014	11.7%	880	955
SNPP-2012	10.4%	808	881

3.17 The application of the *'Partial Return'* headship rates to each of the demographic scenarios increases the dwelling growth over the plan period by **73-76** dpa (an average of 8.2%). This increases the *maximum* dpa under the scenarios from **980** using the unadjusted headship rates, to **1,056** applying the *Partial Return* headship rates.

4 Economic Growth

Economic Forecasts

4.1 In the assessment of housing need, the PPG states that *"plan makers should make an assessment of the likely change in job numbers based on past trends and/or economic forecasts as appropriate and also having regard to the growth of the working age population in the housing market area"* (PPG paragraph 2a-018).

4.2 In previous demographic analysis undertaken for Barnsley Council, the REM provided economic forecasts for Barnsley; 'Policy On', 'Mid' and 'Policy Off' trajectories of FTE jobs growth. No additional information was provided on key underpinning assumptions associated with these economic growth outcomes. Alternative assumptions on commuting ratio and economic activity rates were also considered on the 'Policy On' jobs growth trajectory.

4.3 The alignment of demographic and economic model evidence is challenging due to different methodologies, data inputs and assumptions. The key underpinning assumptions that link population and economic change are: (1) economic activity rates; (2) unemployment rates; (3) a commuting ratio.

4.4 Future economic activity rates are a key consideration in seeking to align demographic and economic growth. Economic activity rates determine the size of the resident labour force. The unemployment rate and commuting ratio determine the balance between the labour force and associated level of employment. The unemployment rate, determines the proportion of the labour force that is unemployed and as a result, the proportion that is employed. The commuting ratio determines the balance between the resident labour force and the number of jobs available in an area.

4.5 In the absence of these assumptions in the previous REM evidence, the Barnsley analysis included a series of 'jobs-led' scenarios, in which the link between economic and demographic

change was evaluated using a series of derived assumptions. This choice of assumptions enabled an estimate of dwelling growth, linked to economic change to be presented.

4.6 For the updated analysis presented here, new REM forecasts have been made available. These have provided a measure of both FTE jobs growth and the change in 'workplace-based employment'. Availability of the latter is important as, with the additional provision of the underpinning assumptions on economic activity rates, unemployment rate and commuting ratio, an improved alignment of the forecast to the demographic evidence has been possible.

4.7 Three alternative REM economic forecasts have been provided for Barnsley, with variant levels of employment growth achieved over the 2016/17–2032/33 forecast horizon (Figure 10). In each case employment growth is measured as 'workplace-based employment':

- **Baseline REM:** Average employment growth of *+440* per year
- **Policy On REM:** Average employment growth of *+1,425* per year
- **Policy On-Netted REM:** Average employment growth of *+1,192* per year

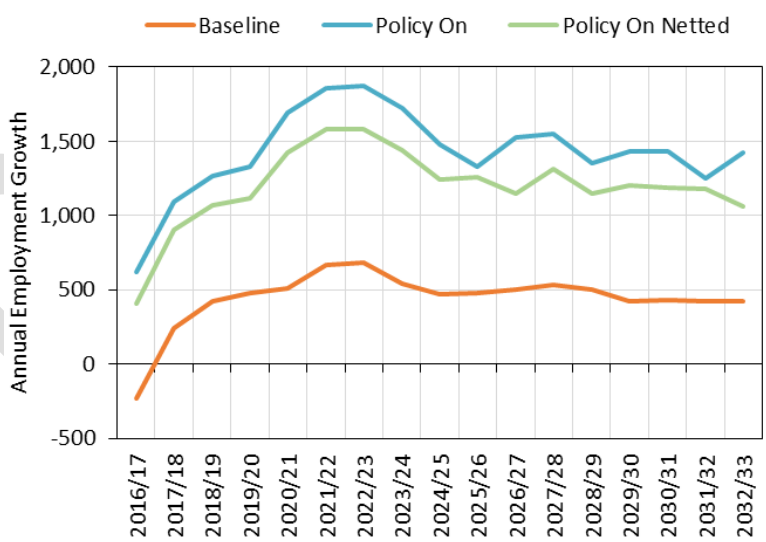


Figure 10: Annual employment growth for each REM scenario (2016/17–2032/33)

4.8 The key assumptions on economic activity rate, unemployment rate and commuting ratio have been provided with the three REM forecasts (Figure 11). The charts illustrate that whilst the unemployment rate variations are similar between forecasts, there are differences between the

underpinning economic activity rate and commuting ratio assumptions that inform the **Baseline** outcome compared to the **Policy On** and **Policy On Netted** forecasts.

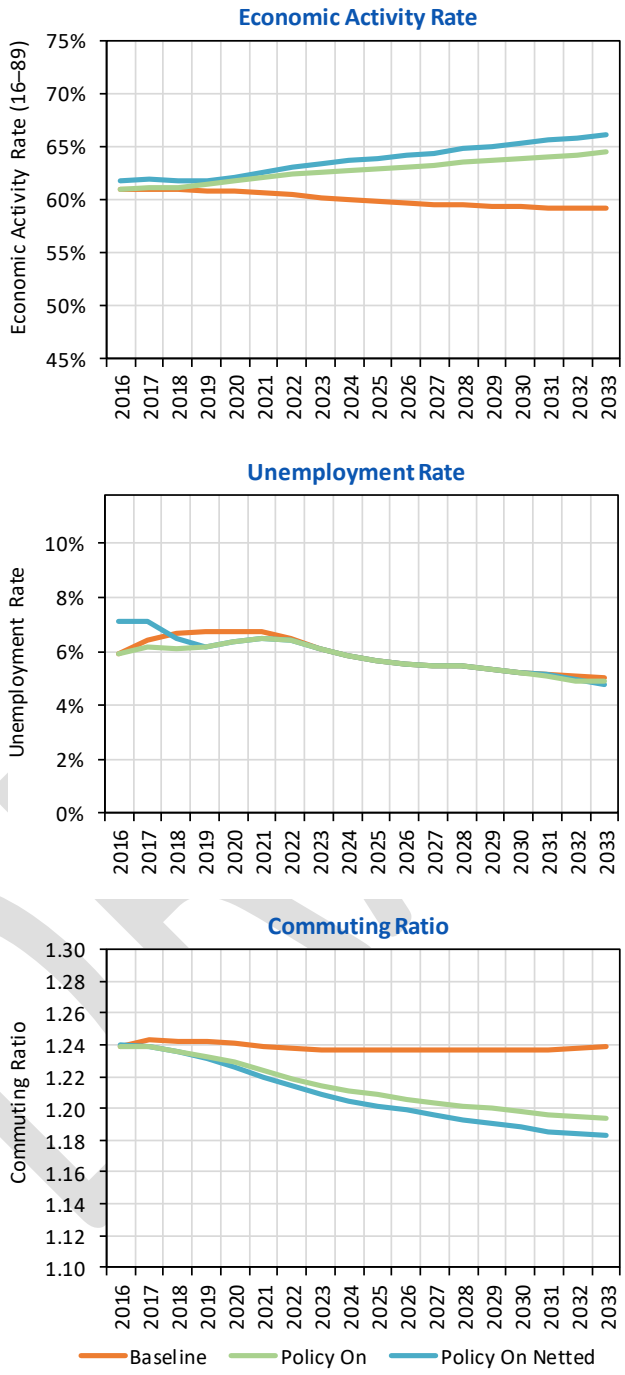


Figure 11: REM Economic Forecasts – Key Assumptions (2016–2033)

4.9 Economic activity rates determine the portion of the working-age population (aged 16–89) that are economically active (i.e. the labour force). The labour force includes those who are in work (i.e. workers) and those who are unemployed. At the start of the forecast period, Barnsley's

aggregate economic activity rate for the 16–89 age range was approximately 61%, compared to a national figure of 64% for England.

4.10 Under the **Baseline** scenario, the aggregate 16–89 economic activity rate reduces to 59.2% by 2033. With a more substantial growth in employment, the **Policy On** and **Policy On Netted** forecasts assume an increase in the aggregate (16–89) economic activity rate over the forecast period, to 66.2% under **Policy On** and 64.5% under **Policy On Netted**.

4.11 The unemployment rate determines the proportion of the labour force that is unemployed (and as a result, the proportion that is employed). Under each of the three employment growth trajectories the unemployment rate reduces to approximately 5.0%–5.3% by 2033, with variation in the unemployment rate assumptions in earlier years of the forecast.

4.12 The commuting ratio determines the balance between the resident number of 'workers' (i.e. the employed labour force) and the number of jobs in the area. At the start of the REM forecast period, Barnsley has a commuting ratio of 1.24, which implies a large net outflow from the district. The **Baseline** forecast assumes only minor changes to Barnsley's commuting ratio over the forecast period. In contrast, the commuting ratios under the **Policy On** and **Policy On Netted** scenarios assume a decrease from 1.24 in 2016 to 1.18 and 1.19 in 2033 respectively, reverting to a commuting balance that is similar to that recorded at the 2001 Census. This reduction in the commuting ratio retains a net outflow from Barnsley but at a reduced level.

Employment-led Scenarios

4.13 Using an 'employment-led' formulation of the POPGROUP model, it is possible to estimate the population and dwelling growth implications of a REM economic forecast. This enables direct comparison with the demographic forecasts presented earlier.

4.14 An **Employment-led Baseline** is presented alongside the demographic forecasts (Figure 12 and Table 5). Using the **Baseline** employment trajectory as the key determinant of growth, the **Employment-led Baseline** scenario uses economic activity rate, unemployment rate and commuting ratio assumptions direct from the REM (Table 5) to estimate its likely population and dwelling growth impact.

Demographic & Employment-led Scenario Outcomes

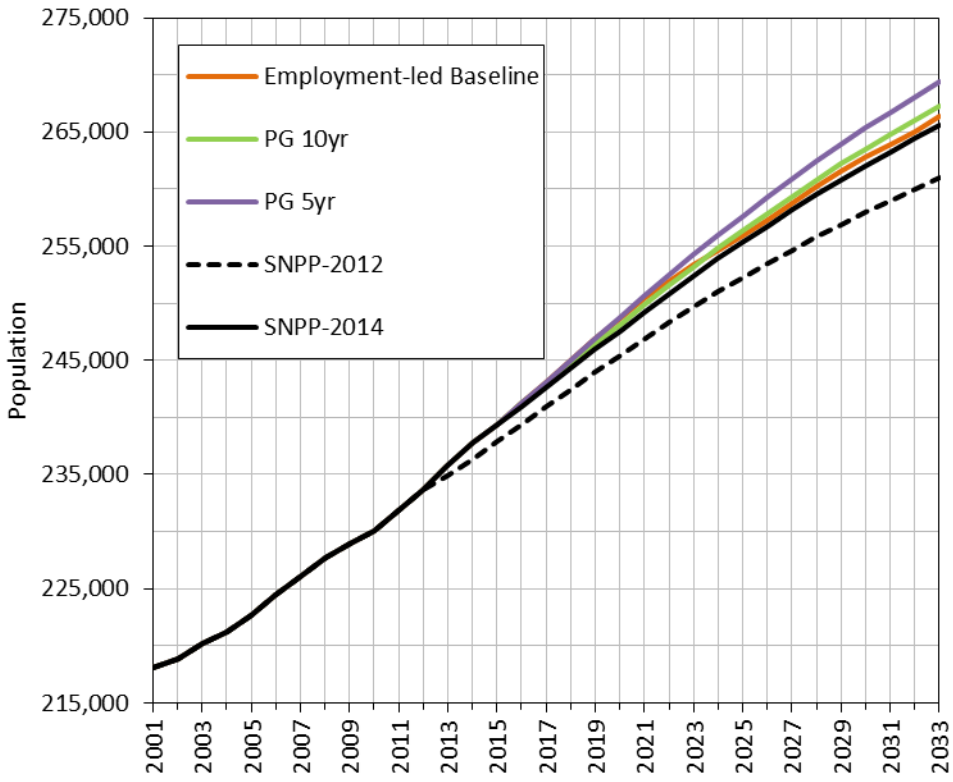


Figure 12: Population change demographic & employment-led scenarios (2001–2033)

Table 5: Demographic & Employment-led scenario outcomes 2014–2033

Scenario	Change 2014–2033				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
PG 5yr	31,564	13.3%	17,875	17.2%	1,280	980
PG 10yr	29,470	12.4%	17,563	16.9%	1,156	963
Employment-led Baseline	28,474	12.0%	16,339	15.7%	1,092	896
SNPP-2014	27,789	11.7%	16,047	15.4%	1,051	880
SNPP-2012	24,602	10.4%	14,729	14.2%	803	808

Note: PG and Employment-led scenarios include two years of historical data

4.15 Under the **Employment-led Baseline** scenario, the population is estimated to grow by approximately 12% over the 2014–2033 plan period, resulting in a dwelling requirement of 896 dpa. This figure exceeds the **SNPP-2014** dpa outcome but is lower than both the **PG-5yr** and **PG-10yr** dpa figures.

4.16 Whilst the **Policy On** and **Policy On Netted** forecasts record higher annual employment growth, a similar configuration of employment-led scenarios which also use their respective REM assumptions on economic activity rate, unemployment rate and commuting ratio, results in a similar level of population and dwelling growth to the **Employment-led Baseline** scenario. The higher economic rates and the modified commuting ratios of the **Policy On** and **Policy On-Netted** scenarios enable the same level of population and dwelling growth to align with higher employment growth.

4.17 Higher economic activity rates result in a greater proportion of Barnsley's population being economically active, and therefore a larger local labour force is maintained over the forecast period. A lower commuting ratio results in a smaller net out-commute from Barnsley. Both factors contribute to less dependence on higher in-migration to meet employment growth in Barnsley.

Assumptions Testing

4.18 In recognition that the economic activity rate and commuting ratio assumptions are a key component of the **Policy On** and **Policy On Netted** scenarios, it is appropriate to consider how population and dwelling growth outcomes may vary under different conditions. This is achieved under a series of employment-led scenarios, applying variant assumptions in each case.

4.19 A first test examines the population and dwelling growth outcomes of **Policy On** and **Policy On Netted** scenarios which maintain the relatively stable commuting ratio that evident under the **Baseline** forecast (Table 6).

4.20 With a more stable commuting over the forecast period, the scenario model assumes that a higher level of net in-migration is required to meet the annual change in employment growth under the **Policy On** and **Policy On Netted** REM forecasts. A greater proportion of the resident labour force is subject to a net out-commute, so higher net in-migration is required to maintain the size of the labour force under these conditions.

Table 6: Employment-led 'CR SENS' scenario outcomes 2014–2033

Employment-led CR SENS Scenarios	Change 2014–2033				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
Policy On	39,626	16.7%	20,670	19.9%	1,617	1,134
Policy On-Netted	37,381	15.7%	19,836	19.1%	1,496	1,088
Baseline	28,474	12.0%	16,339	15.7%	1,092	896

Note: The Employment-led Baseline scenario is identical to that presented in the core scenarios analysis.

4.21 The estimated dwelling growth requirement increases to 1,088 dpa and 1,134 dpa under the **Policy On Netted** and **Policy On** scenarios respectively.

4.22 A second test examines the population and dwelling growth outcomes of each of the **Baseline**, **Policy On** and **Policy On Netted** scenarios which retain their original commuting ratio changes but which assume changes to underpinning economic activity rates that are consistent with the latest OBR evidence (Table 7). The OBR provides 'national-level' forecasts of labour force changes, so these are used as a benchmark for comparison with the Barnsley REM output. The OBR does not incorporate the local employment growth factors that the REM has considered in its forecasts.

Table 7: Employment-led 'OBR SENS' scenario outcomes 2014–2033

Employment-led OBR SENS Scenario	Change 2014–2033				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
Policy On	54,912	23.1%	26,598	25.6%	2,337	1,459
Policy On-Netted	51,276	21.6%	25,206	24.2%	2,158	1,383
Baseline	30,571	12.9%	17,134	16.5%	1,200	940

4.23 Application of OBR assumptions to Barnsley's age-specific economic activity rates, results in a reduction in its overall rate for the 16–89 age-range to 59% in 2033. In each case, the lower economic activity rates result in a smaller labour force being maintained in Barnsley, with higher net in-migration applied by the scenario model to achieve the necessary balance between population and the employment growth targets.

4.24 The estimated dwelling growth requirement under the **Baseline** scenario increases from 896 to 940 dpa under the variant economic activity rate conditions. Under the **Policy On-Netted** and **Policy On** scenarios, dwelling growth is estimated at 1,383 and 1,459 respectively.

5 Summary

Approach

5.1 Barnsley's SHMA has identified an OAN range of 967–1,389 dwellings per annum (dpa) over the 2014–2033 plan period. The lower dwelling growth of the OAN range was informed by a population growth scenario that derived its assumptions from a ten-year period (2005/06–2014/15), whilst the upper OAN range was informed by an economic-led scenario with adjustments made to both commuting ratio and economic activity rates.

5.2 Since the completion of the SHMA, DCLG has published its Housing White Paper detailing a draft methodology[10] for a more standardised approach to OAN calculation across English local authorities. This methodology implies a **936** dpa figure for Barnsley over the ten-year period 2016–2026, or **909** dpa for the 2014-2033 plan-period.

5.3 In addition to the new DCLG evidence, the 2016 MYEs have been published, providing an additional year of historical data for Barnsley; the OBR has published its new labour market analysis; and revised economic forecasts have been produced from the REM.

5.4 In seeking to review its OAN and consider the latest demographic and economic evidence, a revised suite of growth forecasts has been presented for Barnsley. These have included the latest evidence and, with the release of more detailed data from the REM, have sought to achieve an improved alignment of demographic and economic modelling. The potential impact of higher rates of household formation amongst Barnsley's young adult population has also been considered.

[10] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/644955/Planning_for_Homes_consultation_document.pdf

Results

5.5 A summary of the dwelling growth outcomes associated with the demographic and **Baseline** employment-led scenario indicates a range of **808–980** dpa, increasing by approximately +75 dpa if a headship rate adjustment is included (Figure 13). The DCLG recommendation for the equivalent 2014–2033 plan period sits within this range at **909** dpa[11].

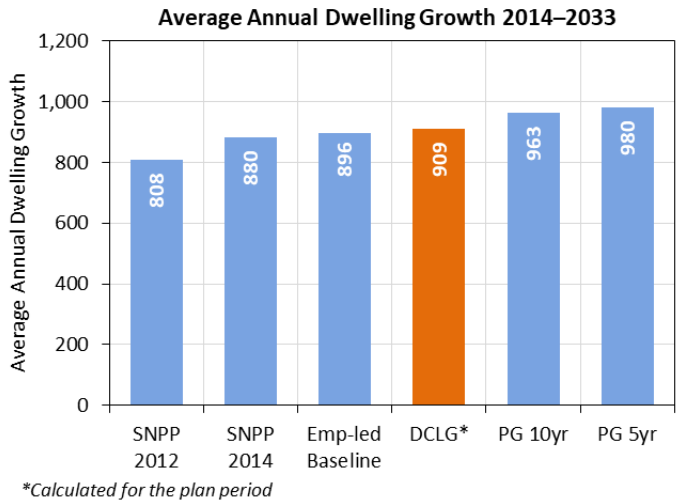


Figure 13: Dwelling growth (dpa) 2014–2033

5.6 **Baseline**, **Policy On** and **Policy On Netted** employment forecasts have been provided from the REM, together with underpinning assumptions on economic activity rates, unemployment rate and commuting ratios. This has enabled improved alignment of the economic forecasts to the associated demographic evidence. Each of these scenarios generates a similar population and dwelling growth when all assumptions are incorporated to their respective employment-led scenarios. Higher economic rates and a reduced net commuting outflow enable higher employment growth to be supported by the **Policy On Netted** and **Policy On** scenarios under the same level of population change.

5.7 In recognition of the importance of commuting ratio and economic activity rate assumptions in driving the **Policy On Netted** and **Policy On** forecasts, two sensitivities have been undertaken. The first assumes a relatively stable commuting ratio, as identified under the **Baseline** assumptions. The second considers economic activity rate adjustments in line with the OBR's 'national' labour force forecasts; a benchmark for comparison with the Barnsley REM output but

[11] Note that this has been calculated using the DCLG methodology applied to the full 2014–2033 plan period and the 2011 Census dwelling vacancy rate for Barnsley applied.

which does not incorporate the local employment growth factors that the REM has considered in its forecasts (Figure 14).

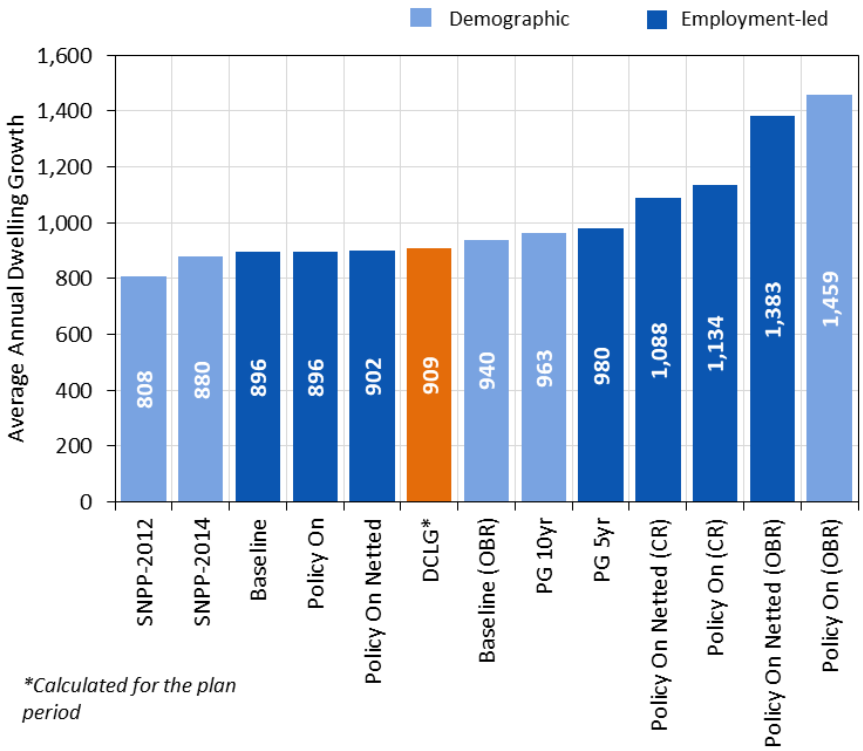


Figure 14: Dwelling growth (dpa) under demographic and employment-led scenarios (2014–2033)

5.8 Under the **Policy On Netted** and **Policy On** employment-led sensitivity scenarios, the estimated dwelling growth increases to 1,088–1,134 dpa when a more stable commuting ratio is considered alongside their respective employment-growth trajectories.

5.9 Alternatively, retaining the reducing commuting ratio but reverting to economic activity rate changes that are more in line with the national OBR benchmark, results in a higher dwelling growth range of 1,383 – 1,459 dpa for the **Policy On Netted** and **Policy On** scenarios. In addition, under the **Baseline** scenario, the inclusion of the OBR assumptions increases the estimated dwelling growth to 940 dpa.

Appendix A

POPGROUP Methodology

Forecasting Methodology

A.1 Evidence is often challenged on the basis of the appropriateness of the methodology that has been employed to develop growth forecasts. The use of a recognised forecasting product which incorporates an industry-standard methodology (a cohort component model) removes this obstacle and enables a focus on assumptions and output, rather than methods.

A.2 Demographic forecasts have been developed using the POPGROUP suite of products. POPGROUP is a family of demographic models that enables forecasts to be derived for population, households and the labour force, for areas and social groups. The main POPGROUP model (Figure 15) is a cohort component model, which enables the development of population forecasts based on births, deaths and migration inputs and assumptions.

A.3 The Derived Forecast (DF) model (Figure 16) sits alongside the population model, providing a headship rate model for household projections and an economic activity rate model for labour-force projections.

A.4 For further information on POPGROUP, please refer to the Edge Analytics website (http://www.edgeanalytics.co.uk/).

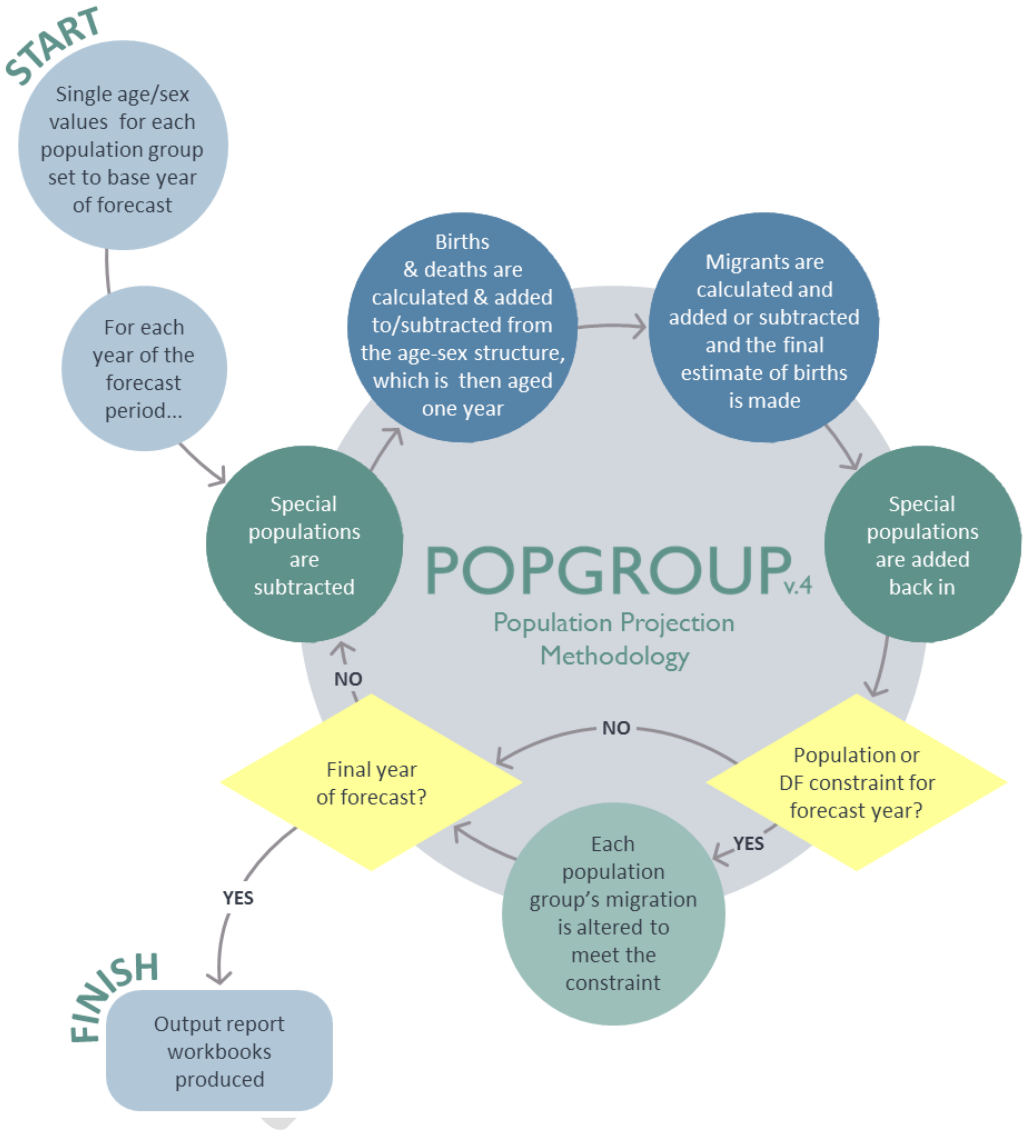
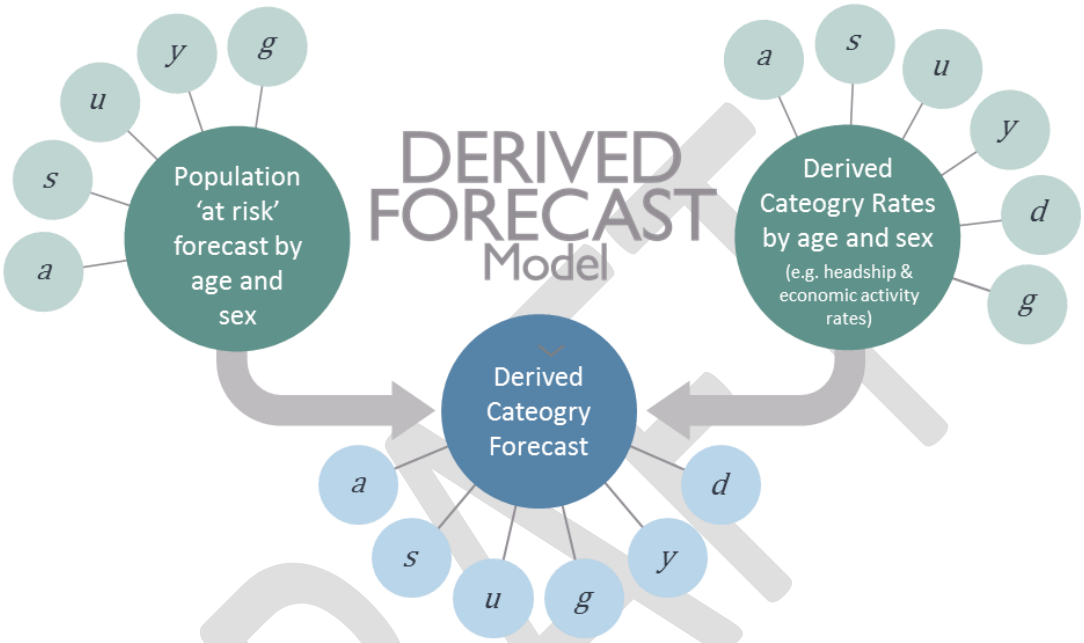


Figure 15: POPGROUP population projection methodology



$$D_{a,s,u,y,d,g} = \frac{P_{a,s,u,y,g}\ R_{a,s,u,y,d,g}}{100}$$

D	Derived Category Forecast	y	Year
P	Population 'at risk' Forecast	d	Derived category
R	Derived Category Rates	g	Group (usually an area, but can be an ethnic group or social group)
a	Age-group		
s	Sex		
u	Sub-population		

Figure 16: Derived Forecast (DF) methodology

Appendix B

Data Inputs & Assumptions

Introduction

B.1 Edge Analytics has developed a suite of demographic scenarios for Barnsley using POPGROUP v.4 and the Derived Forecast model. The POPGROUP suite of demographic models draw data from a number of sources, building an historical picture of population, households, fertility, mortality and migration on which to base its scenario forecasts. Using historical data evidence for 2001–2016, in conjunction with information from ONS sub-national population projections (SNPPs) and DCLG household projections, a series of assumptions have been derived which drive the scenario forecasts.

B.2 The following scenarios have been produced:

- SNPP-2014
- SNPP-2012
- PG 5yr
- PG 10yr
- Employment-led Baseline
- Employment-led Policy On
- Employment-led Policy On Netted
- Employment-led Policy On (CR SENS)
- Employment-led Policy On Netted (CR SENS)
- Employment-led Baseline (OBR SENS)
- Employment-led Policy On (OBR SENS)
- Employment-led Policy On Netted (OBR SENS)

B.3 In the following sections, a narrative on the data inputs and assumptions underpinning the scenarios is presented.

Population, Births & Deaths

Population

B.4 In each scenario, historical population statistics are provided by the mid-year population estimates (MYEs), with all data recorded by single-year of age and sex. These data include the revised MYEs for 2002–2010, which were released by the ONS in May 2013. The revised MYEs provide consistency in the measurement of the components of change (i.e. births, deaths, internal migration and international migration) between the 2001 and 2011 Censuses.

B.5 In the **SNPP-2012** scenario, the historical MYEs are used up to 2012. From 2012, future population counts are provided by single-year of age and sex to ensure consistency with the trajectory of the ONS 2012-based SNPP.

B.6 In the **SNPP-2014** scenario, the historical MYEs are used up to 2014. From 2014, future population counts are provided by single-year of age and sex to ensure consistency with the trajectory of the ONS 2014-based SNPP.

B.7 In the other scenarios, the historical MYEs are used up to 2016.

Births & Fertility

B.8 In each scenario, historical mid-year to mid-year counts of births by sex have been sourced from the ONS MYEs.

B.9 In the **SNPP-2012** scenario, historical births are used from 2001/02 to 2011/12. From 2012/13, future counts of births are specified, to ensure consistency with the 2012-based official projection.

B.10 In the **SNPP-2014** scenario, historical births are used from 2001/02 to 2013/14. From 2014/15, future counts of births are specified, to ensure consistency with the 2014-based official projection.

B.11 In all other scenarios, historical births are used from 2001/02 to 2015/16. From 2016/17, an area-specific age-specific rate (ASFR) schedule, derived from the ONS 2014-based SNPP, is included in

the POPGROUP model assumptions. Long-term assumptions on changes in age-specific fertility rates are taken from the ONS 2014-based SNPP.

B.12 In combination with the 'population-at-risk' (i.e. all women between the ages of 15–49), the area-specific ASFR and future fertility rate assumptions provide the basis for the calculation of births in each year of the forecast period (i.e. from 2016 onwards).

Deaths & Mortality

B.13 In each scenario, historical mid-year to mid-year counts of deaths by 5-year age group and sex have been sourced from the ONS MYEs.

B.14 In the **SNPP-2012** scenario, historical deaths are used from 2001/02 to 2011/12. From 2012/13, future counts of deaths are specified, to ensure consistency with the 2012-based official projection.

B.15 In the **SNPP-2014** scenario, historical deaths are used from 2001/02 to 2013/14. From 2014/15, future counts of deaths are specified, to ensure consistency with the 2014-based official projection.

B.16 In all other scenarios, historical deaths are used from 2001/02 to 2015/16. From 2016/17, an area-specific age-specific mortality rate (ASMR) schedule, derived from the ONS 2014-based SNPP, is included in the POPGROUP model assumptions. Long-term assumptions on changes in age-specific mortality rates are taken from the ONS 2014-based SNPP.

B.17 In combination with the 'population-at-risk' (i.e. the whole population), the area-specific ASMR and future mortality rate assumptions provide the basis for the calculation of deaths in each year of the forecast period (i.e. from 2016 onwards).

Migration

Internal Migration

B.18 In each scenario, historical mid-year to mid-year estimates of internal in- and out-migration by 5-year age group and sex have been sourced from the 'components of population change' files that

underpin the ONS MYEs. These internal migration flows are estimated using data from the Patient Register (PR), the National Health Service Central Register (NHSCR) and the Higher Education Statistics Agency (HESA).

B.19 In the **SNPP-2012** scenario, historical counts of internal in and out-migrants are used from 2001/02 to 2011/12. From 2012/13, future counts of migrants are specified, to ensure consistency with the 2012-based official projection.

B.20 In the **SNPP-2014** scenario, historical counts of internal in and out-migrants are used from 2001/02 to 2013/14. From 2014/15, future counts of migrants are specified, to ensure consistency with the 2014-based official projection.

B.21 In the **PG** scenarios, historical counts of internal in and out-migrants are used from 2001/02 to 2015/16. From 2016/17, future internal migration flows are based on the area-specific historical migration data. In the **PG 5yr** scenario, a *five* year internal migration history is used (2011/12 to 2015/16). In the **PG 10yr** scenario, a *ten* year history is used (2006/07 to 2015/16).

B.22 In the **PG** alternative trend scenarios, the relevant historical time period is used to derive the age-specific migration rate (ASMigR) schedules, which are then used to determine the future number of in- and out-migrants.

B.23 In the case of internal in-migration, the ASMigR schedules are applied to an external 'reference' population (i.e. the population 'at-risk' of migrating into the area). This is different to the other components (i.e. births, deaths, internal out-migration), where the schedule of rates is applied to the area-specific population (i.e. the population 'at-risk' of migrating out of the area). The reference population is defined by considering the areas which have historically contributed the majority of migrants into the area. In the case of Barnsley, it comprises all districts which cumulatively contributed 70% of migrants into the Leeds City Region LEPs over the 2008/09–2015/16 period.

B.24 In the **Employment-led** scenarios (Baseline, Policy On and Policy On Netted), historical counts of internal in and out-migrants are used from 2001/02 to 2015/16. From 2016/17, these scenarios then calculate their own internal migration assumptions to ensure an appropriate balance between the population and the targeted increase in employment that is defined in each year of the forecast period. A higher level of net internal migration will occur if there is insufficient population and resident labour force to meet the forecast level of employment. In the

Employment-led scenarios, the profile of internal migrants is defined by an ASMigR schedule, derived from the ONS 2014-based SNPP.

International Migration

B.25 Historical mid-year to mid-year counts of immigration and emigration by 5-year age group and sex have been sourced from the 'components of population change' files that underpin the ONS MYEs. Any 'adjustments' made to the MYEs to account for asylum cases are included in the international migration balance.

B.26 In all scenarios, future international migrant counts are specified.

B.27 In the **SNPP-2012** scenario, historical counts of migrants are used from 2001/02 to 2011/12. From 2012/13, the international in- and out-migration counts are drawn directly from the 2012-based official projection.

B.28 In the **SNPP-2014** scenario, historical counts of migrants are used from 2001/02 to 2013/14. From 2014/15, the international in- and out-migration counts are drawn directly from the 2014-based official projection.

B.29 In the **PG** scenarios, historical counts of international in and out-migrants are used from 2001/02 to 2015/16. From 2016/17, future international migration counts are based on the area-specific historical migration data. In the **PG 5yr** scenario, a five year international migration history is used (2011/12 to 2015/16). In the **PG 10yr** scenario, a ten year history is used (2006/07 to 2015/16). In all **PG** scenarios, an ASMigR schedule of rates is derived from the relevant migration history and is used to distribute future counts by single year of age.

B.30 Implied within the international migration component of change in the **PG 5yr** and **PG 10yr** scenarios is an 'unattributable population change' (UPC) figure, which ONS identified within its latest mid-year estimate revisions. The POPGROUP model has assigned the UPC to international migration as it is the component with the greatest uncertainty associated with its estimation.

B.31 In the **Employment-led** scenarios, historical counts of international in and out-migrants are used from 2001/02 to 2015/16. From 2016/17, international migration counts are taken from the ONS 2014-based SNPP (i.e. counts are consistent with the **SNPP-2014** scenario). An ASMigR schedule of rates from the ONS 2014-based SNPP is used to distribute future counts by single year of age.

Households & Dwellings

B.32 The 2011 Census defines a household as:

> *"one person living alone, or a group of people (not necessarily related) living at the same address who share cooking facilities and share a living room or sitting room or dining area."*

B.33 In POPGROUP, a dwelling is defined as a unit of accommodation which can either be occupied by one household or vacant.

B.34 In all scenarios, the household and dwelling implications of the population growth trajectory have been evaluated through the application of headship rate statistics, communal population statistics and a dwelling vacancy rate. These data assumptions have been sourced from the 2001 and 2011 Censuses and the 2014-based household projection model from the DCLG. The 2014-based model was released by the DCLG in July 2016, and is underpinned by the 2014-based SNPP from ONS.

Household Headship Rates

B.35 A household headship rate (also known as household representative rate) is the *"probability of anyone in a particular demographic group being classified as being a household representative"*[12].

B.36 The household headship rates used in the POPGROUP modelling have been taken from the latest DCLG 2014-based household projection model, which is underpinned by the ONS 2014-based SNPP. The DCLG household projections are derived through the application of projected headship rates to a projection of the private household population. The methodology used by DCLG in its household projection models consists of two distinct stages:

- **Stage One** produces the national and local authority projections for the total number of households by sex, age-group and relationship-status group over the projection period.
- **Stage Two** provides the detailed 'household-type' projection by age-group, controlled to the previous Stage One totals.

[12] Household Projections 2014-based: Methodological Report. Department for Communities and Local Government (February 2015). https://www.gov.uk/government/statistics/2012-based-household-projections-methodology

B.37 In POPGROUP, the Stage One headship rates have been applied by 5-year age group. Two sets of headship rates have been applied to each scenario (Figure 17):

- **2014-based:** DCLG 2014-based headship rates

- **2014-based Partial Return:** From 2014, the DCLG 2014-based headship rates for the 25–44 male age groups and 25–39 female age groups return to a 'mid-point' between the 2008-based and 2014-based rate by 2033. No adjustments have been made to the other age groups.

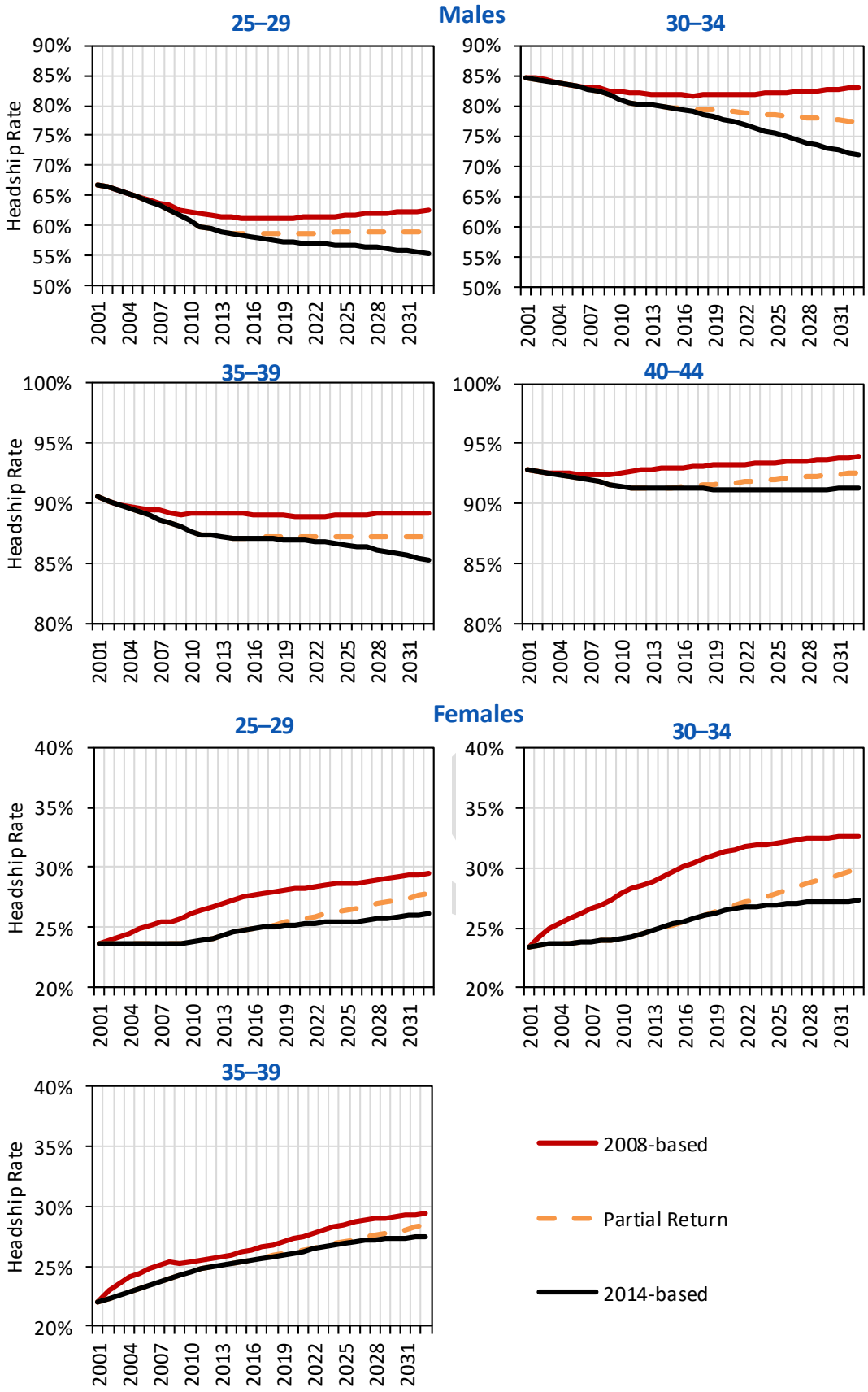


Figure 17: Headship rate sensitivities

Communal Population Statistics

5.10 Household projections in POPGROUP exclude the population 'not-in-households' (i.e. the communal/institutional population). These data are drawn from the DCLG 2014-based household projections, which use statistics from the 2011 Census. Examples of communal establishments include prisons, residential care homes and student halls of residence.

5.11 For ages 0–74, the number of people in each age group not-in-households is fixed throughout the forecast period. For ages 75–85+, the proportion of the population not-in-households is recorded. Therefore, the population not-in-households for ages 75–85+ varies across the forecast period depending on the size of the population.

Vacancy Rate

5.12 The relationship between households and dwellings is modelled using a 'vacancy rate', sourced from the 2011 Census[13]. The vacancy rate is calculated using statistics on households (occupied household spaces) and dwellings (shared and unshared).

5.13 Under all scenarios, a rate of **4.0%** for Barnsley has been applied, fixed throughout the forecast period. Using the vacancy rate, the 'dwelling requirement' of each household growth trajectory has been evaluated.

[13] Census Table KS401EW: Dwellings, household spaces and accommodation type