Sunderland

Demographic Analysis & Forecasts

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For the attention of:
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Acknowledgements

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1 Introduction

Requirements

1.1 Sunderland City Council has commissioned arc4 to produce an updated Strategic Housing Market Assessment (SHMA) for Sunderland City. Population and household forecasts, which give due consideration to a range of demographic, economic and policy factors, are a critical input to the derivation of the SHMA housing target.

1.2 Edge Analytics has been commissioned by arc4 to produce a suite of population, household and housing forecasts for Sunderland, underpinned by the latest demographic inputs and economic assumptions. This includes the latest official population and household projections from the Office for National Statistics (ONS) and the Department for Communities and Local Government (DCLG) respectively.

Approach

Official Guidelines

1.3 The development and presentation of demographic evidence to support local housing plans is subject to an increasing degree of public scrutiny. The National Planning Policy Framework (NPPF)[1] and Planning Practice Guidance (PPG)[2] provide guidance on the appropriate approach to the objective assessment of housing need.

1.4 The PPG states that the DCLG household projections should provide the *"starting point estimate of overall housing need"* (PPG paragraph 2a-015). Local circumstances, alternative assumptions

[1] http://planningguidance.planningportal.gov.uk/blog/policy/
[2] http://planningguidance.planningportal.gov.uk/blog/guidance/

and the most recent demographic evidence, including ONS population estimates, should also be considered (PPG paragraph 2a-017). Evidence that links demographic change to forecasts of economic growth should also be assessed (PPG paragraph 2a-018).

1.5 The use of demographic models, which enable a range of growth scenarios to be evaluated, is now a key component of the objective assessment process. The POPGROUP suite of demographic models, which is widely used by local authorities and planners across the UK, provides a robust and appropriate forecasting methodology (for information on POPGROUP, refer to Appendix A).

1.6 The choice of assumptions used within POPGROUP has an important bearing on scenario outcomes. This is particularly the case when trend-based projections are considered alongside population and household growth linked to jobs forecasts. The scrutiny of demographic assumptions is now a critical component of the public inspection process, providing much of the debate around the appropriateness of a particular objective assessment of housing need.

Edge Analytics' Approach

1.7 Edge Analytics has used POPGROUP v.4 technology to develop a range of demographic scenarios for Sunderland City. As the 'starting point' of this assessment, the most recent official population and household projections are considered. The 2012-based sub-national population projection (SNPP) for Sunderland is presented, together with an analysis of the 'components of change' underlying this projection. These statistics are compared to previous estimates and to the historical data on births, deaths and migration. The most recent 2012-based DCLG household projection model is also considered, with commentary provided on the differences between this and the earlier, 2008-based, household projection model.

1.8 In line with the PPG, Edge Analytics has developed a range of demographic scenarios for Sunderland using POPGROUP v.4 technology, for comparison with the official population and household projections. Alternative migration assumptions have been considered, as have alternative household growth assumptions. The future size and structure of Sunderland's labour force has also been analysed, together with the linkages between Sunderland's labour force characteristics and an employment forecast from Experian.

1.9 In line with the PPG, the household growth implications of each scenario have been assessed using assumptions from the latest 2012-based DCLG household projection model. For

comparison, each scenario has also been run using household-growth assumptions from the earlier, 2008-based, DCLG household projection model.

1.10 All scenarios have been run with historical data defined for the 2001–2014 period, with the forecast period extending to 2035. Scenario results are presented for Sunderland City Council's 2015–2035 plan period.

Report Structure

1.11 The report is structured as follows:

- In **Section 2**, a profile of Sunderland is presented. This includes an historical perspective on population change since the 2001 Census, analysis of the 'components of change' from the 2012-based SNPP and commentary on the 2012-based DCLG household projection model.
- In **Section 3**, a definition of each demographic scenario is presented and the outcomes of these scenarios are detailed.
- **Section 4** extends the scenario analysis, considering the link between demographic change and forecast jobs growth in the district.
- **Section 5** summarises the analysis and identifies a number of key issues for arc4 and Sunderland City Council to consider.
- **Appendix A** provides an overview of the POPGROUP methodology.
- **Appendix B** provides detail on the data inputs and assumptions used in the development of the scenarios.

2 Sunderland Area Profile

Geography

2.1 The City of Sunderland is located within the North East Local Enterprise Partnership (LEP), with the district of South Tyneside to the north, Gateshead to the north west and County Durham to the west and south (Figure 1). Sunderland is a predominantly urban district. Major road routes (including the A19 and part of the A1 Motorway) cross north-south and east-west and a rail route runs north-south.

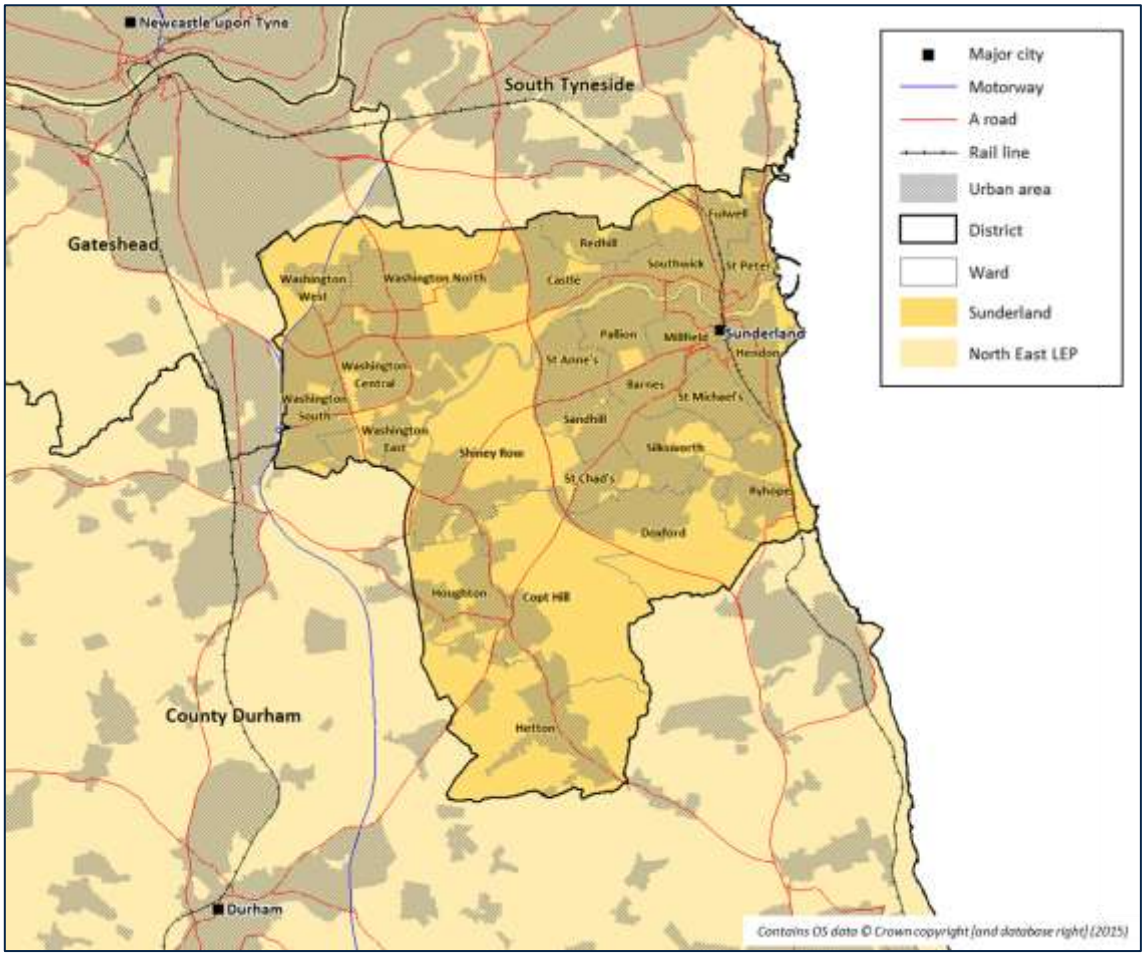


Figure 1: The City of Sunderland and its wider geographical context

Commuting Flows

2.2 In terms of travel-to-work commuting flows, the 2011 Census recorded 121,511 workers (ages 16–74) living in Sunderland (Table 1) and 126,157 workers (ages 16–74) traveling to jobs in Sunderland (Table 2).

2.3 The majority of workers who live in Sunderland (70.2%) have jobs within the district. Most of the remaining resident workers travel to jobs in the neighbouring districts of County Durham (7.7%), Gateshead (5.9%) and Newcastle upon Tyne (5.1%), whilst the remaining 11.1% of resident workers travel to jobs elsewhere (Table 1).

2.4 The majority of jobs in Sunderland (67.7%) are taken by the district's resident workers. Most of the remaining jobs are taken by workers who live in the neighbouring districts of County Durham (12.4%) and South Tyneside (6.9%), whilst the remaining 13.0% of jobs are taken by workers who live in other districts (Table 2).

Table 1: Sunderland 2011 Census commuting flows: workers, ages 16–74 (source: ONS)

Where do people who live in Sunderland work?			
Live	Work	Flow	%
Sunderland	Sunderland	85,354	70.2%
Sunderland	County Durham	9,383	7.7%
Sunderland	Gateshead	7,127	5.9%
Sunderland	Newcastle upon Tyne	6,146	5.1%
Sunderland	Other	13,501	11.1%
	Total Workers	**121,511**	**100.0%**

Table 2: Sunderland 2011 Census commuting flows: jobs, ages 16–74 (source: ONS)

Where do people who work in Sunderland live?			
Live	Work	Flow	%
Sunderland	Sunderland	85,354	67.7%
County Durham	Sunderland	15,672	12.4%
South Tyneside	Sunderland	8,726	6.9%
Other	Sunderland	16,405	13.0%
	Total Jobs	**126,157**	**100.0%**

2.5 Data from successive censuses reveals that the number of workers living in Sunderland is exceeded by the number of jobs available, resulting in a net in-commute. This imbalance has increased slightly over the 2001–2011 decade, as the number of jobs available has increased at a faster rate than the number of resident workers (Table 3).

Table 3: Sunderland 2001 and 2011 travel-to-work commuting ratios, ages 16–74 (source: ONS)

Sunderland		2001 Census	2011 Census
Workers	*a*	114,095	121,511
Jobs	*b*	117,015	126,157
Commuting Ratio	*a/b*	**0.98**	**0.96**

Internal Migration Flows

2.6 In terms of more permanent migration linkages between Sunderland and surrounding areas, the largest positive average annual net exchange (higher inflow than outflow) has historically been with Redcar and Cleveland. In terms of a net outflow exchange, the largest concentration has been between Sunderland and neighbouring County Durham (Figure 2). All statistics are based upon an annual average for the 2001/02–2013/14 time-period

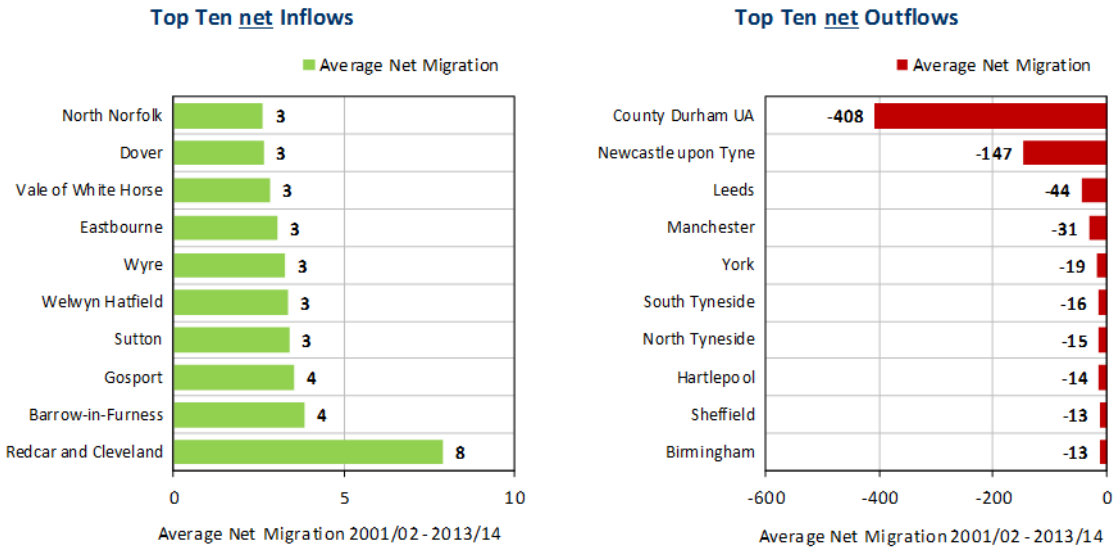
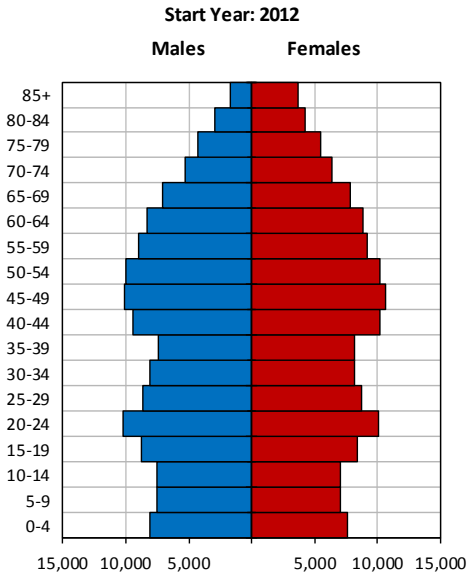


Figure 2: Sunderland top-10 internal migration net inflows and outflows (source: ONS)

Age-structure

2.7 Using the 2012 base year of the latest ONS sub-national population projections, Sunderland's age profile is compared to that of Tyne & Wear, the North East and England (Figure 3).



Indicator	Sunderland	Tyne & Wear (Met County)	North East (Region)	England
Aged 65+	18%	17%	18%	17%
Aged 80+	5%	5%	5%	5%
OAD Ratio	27	26	28	26
Median Age	42	40	42	40

OAD = Old Age Dependency Ratio
= Population Aged 65+ / Population Aged 15-64

Figure 3: Sunderland, population age structure (source: ONS)

2.8 Sunderland's resident population comprises a smaller proportion of young adults (ages 15–39), compared to a more substantial proportion of older labour force age-groups (ages 40–74). The old age profile of Sunderland is similar to that of Tyne & Wear, the wider North East and England, with 18% of the district's population aged 65+ and 5% of the district's population aged 80+. Sunderland's old age dependency (OAD) ratio and median age statistics are also comparable to those of the macro areas.

2.9 The annual net impact of internal and international migration will alter the age profile of Sunderland's population. This would affect both the composition of Sunderland's resident labour force and the scale of the district's housing requirement. Taking an average for the 2001/02–2013/14 time period, Sunderland has experienced net *internal* outflows in all age-groups, except the 15–19 age-group, which has seen a small net inflow. The most substantial net internal outflows have been experienced in the younger labour force age-groups (ages 20–39), whilst negligible flows have been experienced in the 65+ age-groups.

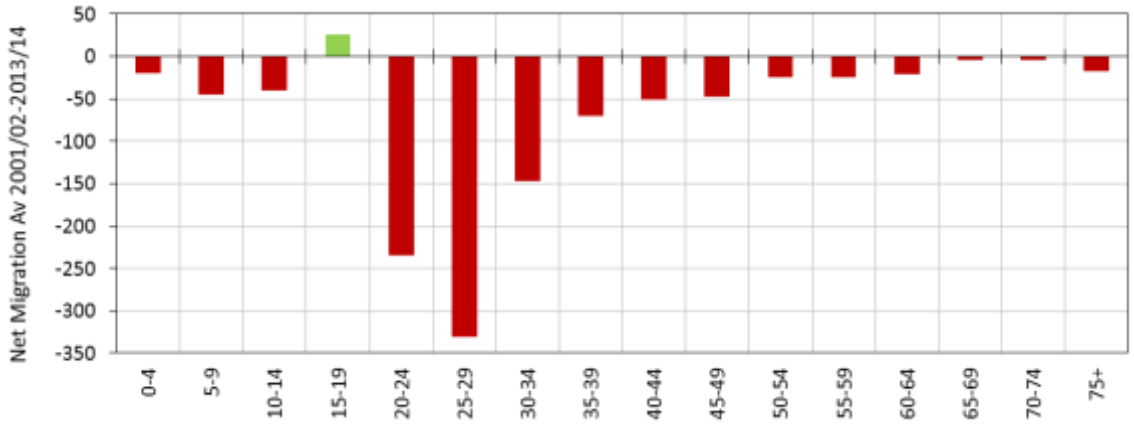


Figure 4: Sunderland, net internal migration flows by age-group, 2001/02–2013/14 (source: ONS)

2.10 A continuation of these trends, coupled with an ageing population, would reduce the size of Sunderland's resident labour force. Population change statistics suggest that the net loss through internal migration is being *countered* by a significant net inflow due to international migration.

Population Change 2001–2014

Mid-Year Population Estimates

2.11 Between successive Censuses, population estimation is necessary. These mid-year population estimates (MYEs) are derived by applying the 'components of change' (i.e. counts of births and deaths and estimates of internal and international migration) to the previous year's MYE.

2.12 Following the 2011 Census, the 2002–2010 MYEs were 'rebased' to align them with the 2011 MYE and to ensure the correct transition of the age profile of the population over the 2001–2011 decade. At the 2011 Census, the resident population of Sunderland was 275,506, a -1.9% decline over the 2001–2011 decade. The 2011 Census population total proved to be *lower* than that suggested by the trajectory of growth from the previous MYEs. For this reason, the revised final MYEs are *lower* than the previous MYEs (Figure 1).

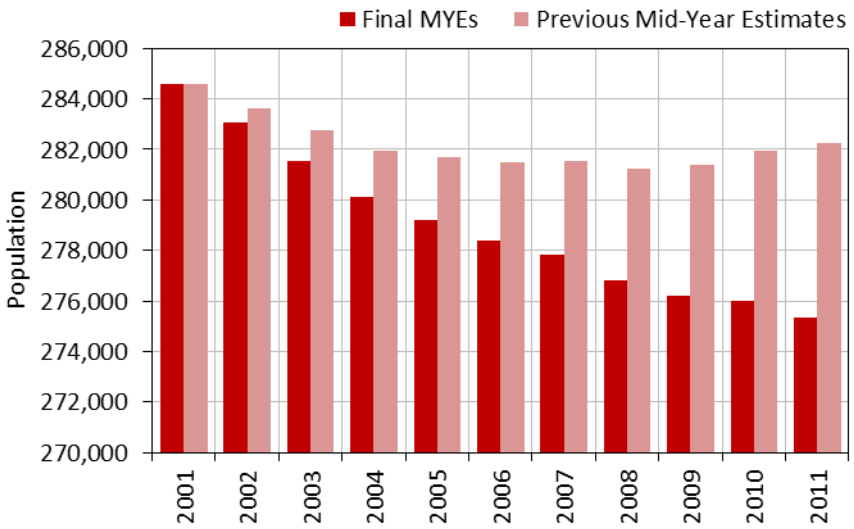


Figure 5: Sunderland mid-year population estimates, 2001–2011 (Source: ONS)

Components of Change

2.13 The rebasing of the MYEs involved the recalibration of the components of change for 2001/02–2010/11. Between Censuses, births and deaths are accurately recorded in vital statistics registers and provide a robust measure of 'natural change' (the difference between births and deaths) in a geographical area. Given that births and deaths are robustly recorded, and assuming that the 2001 Census provided a robust population count, the 'error' in the MYEs is due to the challenges associated with the estimation of migration.

2.14 Internal migration (i.e. migration flows to and from other areas in the UK) is adequately measured using data from the Patient Register (PR), the National Health Service Central Register (NHSCR) and Higher Education Statistics Agency (HESA), although data robustness may be lower where there is under-registration in certain age-groups (young males in particular). It is therefore most likely that the 'error' in the previous MYEs is associated with the mis-estimation of international migration, i.e. the balance between immigration and emigration flows to and from Sunderland.

2.15 However, ONS has not explicitly assigned the MYE adjustment to international migration. Instead it has identified an additional 'unattributable population change' (UPC) component, suggesting it has not been able to accurately identify the source of the 2001–2011 over-count (Figure 6). The effect of the UPC adjustment depends upon the scale of population recalibration that has been

required following the 2011 Census results. For Sunderland, the population estimates have been subject to a consistent annual *decrease* due to the *over*-count over the 2001–2011 decade.

2.16 For demographic analysis, the classification of UPC is unhelpful, but given the robustness of births, deaths and internal migration statistics compared to international migration estimates, it is assumed that it is most likely to be associated with the latter. With the assumption that the UPC element is assigned to international migration (for estimates up to 2011), and with the inclusion of statistics from the 2012–2014 MYEs from ONS, a thirteen-year profile of the 'components of change' is presented for Sunderland (Figure 7).

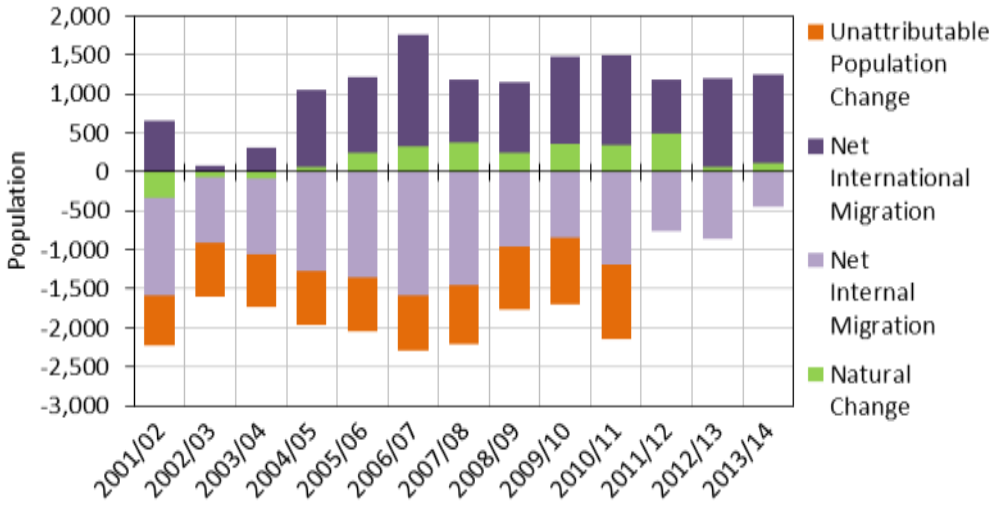


Figure 6: Sunderland components of change, 2001/02–2013/14 (Source: ONS)

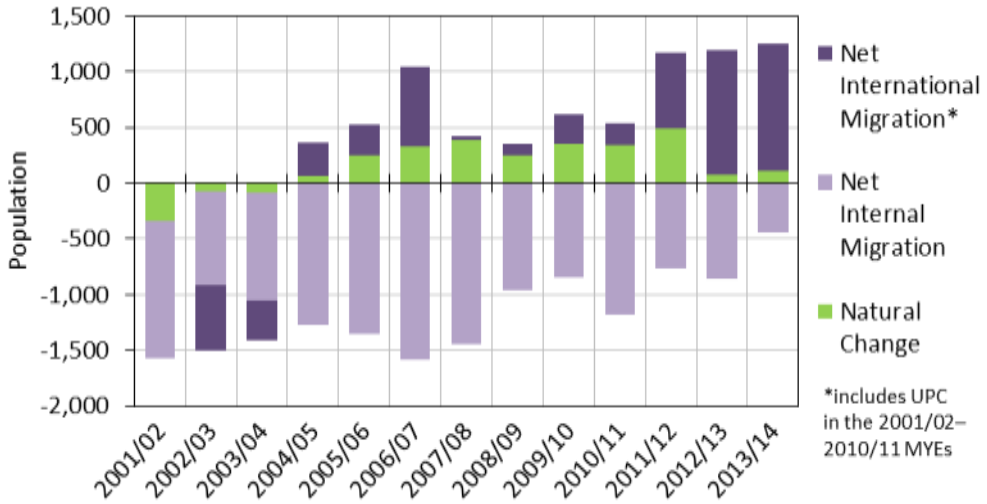


Figure 7: Sunderland components of change, 2001/02–2013/14, including the UPC component in the 2001/02–2010/11 international migration component. (Source: ONS).

2.17 For Sunderland, population change over the 2001/02–2013/14 period has been predominantly driven by net out-migration to elsewhere in the UK, with the number of internal out-migrants exceeding the number of internal in-migrants. With the exception of 2001/02–2003/04, natural change has had a small, positive impact upon population change in Sunderland, with the number of births exceeding the number of deaths. From 2004/05 onwards, net international migration has also had a positive impact on population change in Sunderland. International migration is estimated to have been the dominant driver of population growth in Sunderland since 2011.

Official Projections

Official Population Projections

2.18 In the development and analysis of population forecasts, it is important to benchmark any growth alternatives against the latest 'official' population projection. The most recent official subnational population projection is the ONS 2012-based SNPP, released in May 2014. These projections are based upon the 2012 MYE and use underlying demographic assumptions based on a 5-year historical period[3].

2.19 Figure 8 presents the most recent population projections for Sunderland. Under the latest, 2012-based SNPP, the population of Sunderland is expected to increase by +4,710 over the full 2012–2037 projection period, an increase of +1.7%. This is lower than projected under the earlier 2010-based SNPP, at +3.5% over the equivalent 2010–2035 projection period.

2.20 The 2012-based SNPP components of change are presented in Figure 9, with the historical components of change for 2001/02–2011/12 included for comparison. The average annual natural change, net migration (internal and international) and population change for the 2012-based SNPP are compared to the historical 5-year and 10-year averages in Table 4.

[3] http://www.ons.gov.uk/ons/rel/snpp/sub-national-population-projections/2012-based-projections/stb-2012-based-snpp.html#tab-Introduction

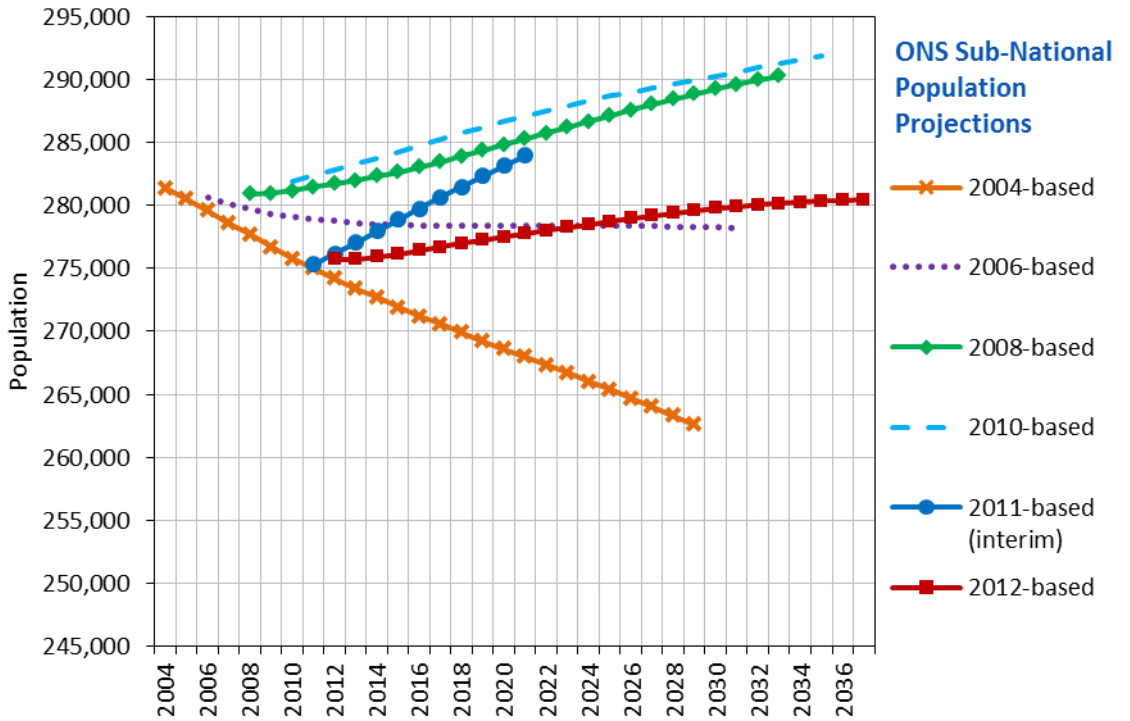


Figure 8: Sunderland official ONS population projections (source: ONS)[4]

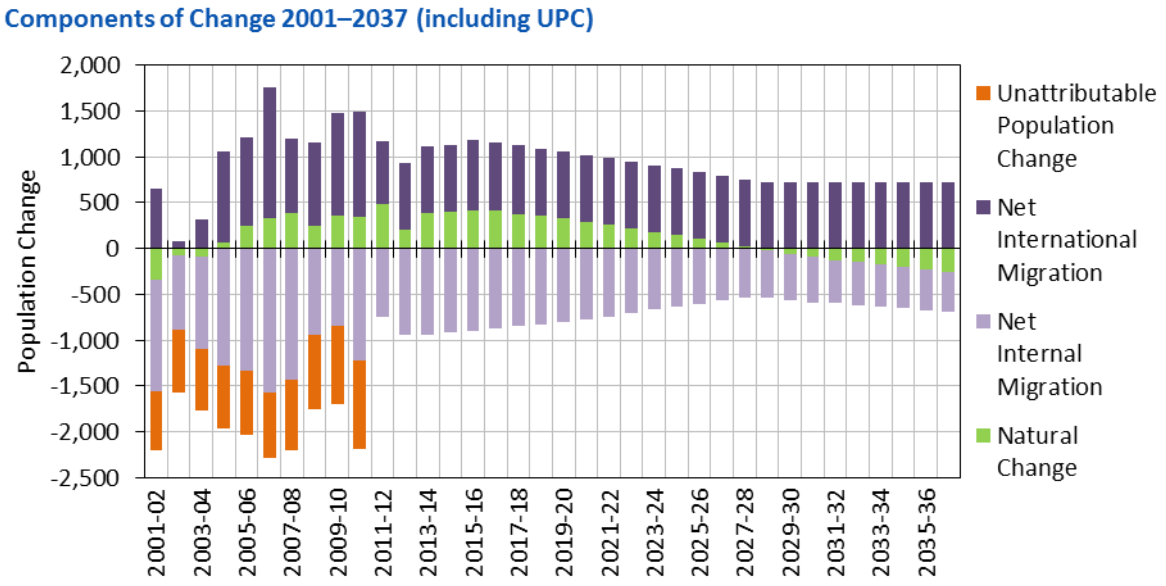


Figure 9: Sunderland historical (2001/02–2011/12) and 2012-based SNPP components of change (source: ONS)

[4] Note that the 2011-based SNPP is an 'interim' projection and therefore only extends from 2011 to 2021.

Table 4: Sunderland 2012-based SNPP components of change (source: ONS)

Component of Change	Historical		Projected
	5-year average (2007/08–2011/12)	10-year average (2002/03–2011/12)	2012-based SNPP average (2012/13–2036/37)
Natural Change	364	230	115
Net Internal Migration	-1,038	-1,119	-660
Net International Migration	935	847	733
Net Migration (Internal and International)	-103	-272	73
Unattributable Population Change (UPC)*	-678	-685	-

* UPC is only applicable to the years 2001/02—2010/11

2.21 Historically, over both the 5-year and 10-year periods, net internal out-migration was a dominant component of change. In the 2012-based SNPP, net internal out-migration is expected to continue to be an important driver of population change, but occurring at a lower rate than that suggested by the historical 5-year and 10-year average.

2.22 Natural change was positive over the historical 5-year and 10-year periods (i.e. the number of births exceeded the number of deaths). This is expected to continue in the 2012-based SNPP, but at a lower rate than the historical 5-year and 10-year averages.

2.23 Over both the historical 5-year and 10-year periods, net international migration was positive. The 2012-based SNPP projects a smaller annual net growth over the 2012–2037 period, but this continues to be the dominant driver of growth in the district.

Official Household Projections

2.24 In the evaluation of housing need, the PPG states that the DCLG household projections *"should provide the starting point estimate of overall housing need"* (PPG paragraph 2a-015). The 2012-based household projection model, which is underpinned by the 2012-based SNPP, was released by the DCLG in February/March 2015, superseding the 2011-based interim household projection model.

2.25 The methodological basis of the new 2012-based model is consistent with that employed in the previous 2011-based interim and 2008-based household projections. A 'two-stage' methodology has been used by DCLG. 'Stage One' produces the national and local projections for the total

number of households by age-group and relationship status group over the projection period. 'Stage Two' provides the detailed household type breakdown by age. Currently, only Stage One output is available for the 2012-based household projection model (refer to Appendix B for further detail).

2.26 Whilst methodologically similar to previous releases, the 2012-based household projections provide an important update on the 2011-based interim household projections with the inclusion of the following information:

- 2012-based SNPP by sex and age that extend to 2037 (rather than to 2021 as was the case in the 2011-based interim projections).
- Household population by sex, age and relationship-status consistent with the 2011 Census (rather than estimates for 2011, which were derived from 2001 Census data, projections and national trends, as used in the 2011-interim projections).
- Communal population statistics by age and sex consistent with the 2011 Census (rather than the previous estimate, which were calibrated to the total communal population from the 2011 Census).
- Further information on household representatives from the 2011 Census relating to aggregate household representative rates by relationship status and age.
- Aggregate household representative rates at local authority level, controlled to the national rate, based on the total number of households divided by the total adult household population (rather than the total number of households divided to the total household population).
- Adjustments to the projections of the household representative rates in 2012 based on the Labour Force Survey (LFS).

(Source: DCLG Methodology[5])

2.27 The official 2012-based DCLG household projection model for Sunderland, underpinned by the 2012-based SNPP, suggests that the number of households will increase by 11,189 over the 2012–2037 projection period, equivalent to an additional 448 households per year. The average household size is projected to decrease from 2.27 in 2012 to 2.10 by 2037. Under the earlier 2008-based model, the rate of household growth was *higher* than under the latest 2012-based model (Figure 10), at 660 households per year (2008–2033).

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

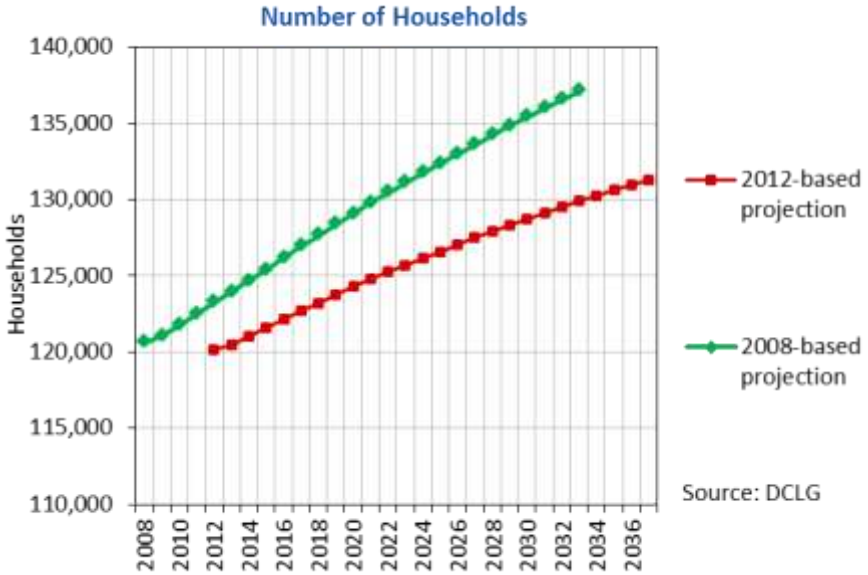


Figure 10: Sunderland household growth under the 2012-based and 2008-based DCLG household projections (source: DCLG)

Starting Point Estimate

2.28 As outlined in the PPG, the official DCLG household projections provide the 'starting point' in the assessment of housing need (PPG paragraph 2a-015).

2.29 Over the 2015–2035 plan period, the 2012-based household projection model suggests an increase of 9,070 households, approximately 454 per year. Over the same time period, the 2012-based SNPP (which underpins the household projection model) projects 2% growth in the population, equivalent to an additional 4,216 people (Table 5).

Table 5: Sunderland 'starting point' estimates (source: ONS and DCLG)

	Variable	2015	2035	Difference	% Difference	Average Annual Change
2012-based SNPP	Population	276,133	280,349	4,216	2%	211
2012-based DCLG Model	Households	121,547	130,617	9,070	7%	454
	Household population	272,409	275,530	3,121	1%	156
	Average household size	2.24	2.11	-0.13	-6%	-0.01

2.30 As outlined in the PPG, it is appropriate to consider "*alternative assumptions in relation to the underlying demographic projections and household formation rates*" of the local area (PPG Paragraph 2a-017). Therefore, in the following sections, these 'official' projections are compared to a range of alternative demographic scenarios.

3 Scenario Development

Introduction

3.1 There is no single definitive view on the likely level of population and household growth expected in the City of Sunderland. Ultimately, a combination of economic, demographic and national/local policy issues will determine the speed and scale of change. Whilst the official 2012-based population and household projections form the 'starting point' of the assessment of housing need, it is necessary to evaluate a range of growth alternatives to establish the most 'appropriate' basis for determining future housing provision.

3.2 In line with the PPG, Edge Analytics has developed a range of alternative demographic scenarios for Sunderland, using POPGROUP v.4 technology (for detail on the POPGROUP methodology, refer to Appendix A).

3.3 The 2012-based SNPP is presented as the official 'benchmark' scenario, with household growth assessed using headship rate assumptions from the 2012-based DCLG household projection model. For comparison with this official benchmark, a range of 'alternative trend' scenarios has been developed, in which varying migration assumptions have been applied. Alternative headship rates have also been applied in a 'headship rate sensitivity', to evaluate the impact of the earlier 2008-based headship rates on the scenario household and dwelling growth outcomes.

3.4 The PPG states that the likely change in the number of jobs in an area should be considered, as should the size and structure of the labour force (PPG paragraph 2a-018). Therefore, the labour force and job growth implications of these demographic scenarios have also been evaluated, through the application of economic activity rates, unemployment rates and a commuting ratio. These scenario outcomes are discussed in the context of anticipated jobs growth in Sunderland, as forecast by Experian.

Demographic Scenario Definitions

3.5 In the following sections, the alternative trend scenarios are defined. In each scenario, household growth has been assessed using the household headship rates and communal establishment assumptions from the latest, 2012-based, household projection model. The dwelling growth implications of each scenario have been evaluated through the application of a Sunderland-specific vacancy rate[6].

Official Projections

3.6 The **SNPP-2012** scenario replicates the 2012-based SNPP from ONS. Through the application of the household growth assumptions from the 2012-based DCLG household projection model, the 'starting point estimate' for Sunderland is provided.

Alternative Trend Scenarios

3.7 The PPG recommends, as part of the assessment of housing need, that the most recent demographic statistics from ONS and alternative demographic projections should be considered (PPG Paragraph 2a-017).

3.8 The 2012-based SNPP from ONS is a trend-based projection that draws demographic assumptions from a 5-year historical period to 2012[7]. Given the unprecedented economic changes that have occurred since 2008, and the differences between the projected 2012-based SNPP data and the historical data (see paragraph 2.21), it is appropriate to consider alternative time periods in the derivation of migration assumptions.

3.9 For these reasons, the following alternative trend scenarios have been developed:

- **PG-5yr**: internal migration rates and international migration flow assumptions are based on the last five years of historical evidence (2009/10–2013/14).
- **PG-10yr**: internal migration rates and international migration flow assumptions are based on the last 10 years of historical evidence (2004/05–2013/14).

[6] The communal population refers to the population 'not-in-households', and includes residential care homes and students halls of residence. A dwelling vacancy rate of 2.9% has been applied, fixed throughout the forecast period. Refer to Appendix B for detail on the data inputs and assumptions used.

[7] http://www.ons.gov.uk/ons/rel/snpp/sub-national-population-projections/2012-based-projections/stb-2012-based-snpp.html#tab-Introduction

3.10 Note that these scenarios include two additional years of historical data when compared to the 2012-based SNPP (i.e. the 2013 and 2014 MYEs). Furthermore, in both of these scenarios the UPC adjustment is *included* within the international migration assumptions.

3.11 An additional trend scenario, in which zero migration occurs, has also been developed. In this **Natural Change** scenario, internal and international migration rates are set to zero from 2014/15 onwards. This scenario is hypothetical, but provides an indication of the degree to which dwelling growth is driven by migration to/from Sunderland.

Demographic Scenario Sensitivities

3.12 In consultation with Sunderland City Council, additional sensitivities have been investigated, specifically to evaluate the impact of improved retention of young adult cohorts, including students. These scenarios have been run as variants on the core SNPP-2012 scenario, as follows:

- **SNPP-2012 SENS 20-29**: this sensitivity is based on the **SNPP-2012** scenario, but with adjustments made to reduce the annual 'loss' of internal out-migrants aged 20–29 during the 2015–2035 plan period (Table 6).

- **SNPP-2012 SENS 25-29**: this sensitivity is based on the **SNPP-2012** scenario, but with adjustments made to reduce the annual loss of internal out-migrants aged 25–29 during the 2015–2035 plan period (Table 6).

Table 6: Proportion of internal out-migrants 'retained' in the **SNPP-2012** sensitivities

Year of 2015–2035 Plan Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
Proportion of internal out-migrants retained	25%	25%	25%	25%	25%	35%	35%	35%	35%	35%	50%	50%	50%	50%	50%	60%	60%	60%	60%	60%

Note that in the **SNPP-2012** sensitivities, the adjustments are applied to the relevant ages (**20–29** or **25–29**) by sex and 5-year age-group.

3.13 In consultation with Sunderland City Council, an additional **PG** sensitivity, **PG-10yr SENS**, has been developed, which considers a 25% reduction in the annual net migration loss to County Durham, specifically

3.14 During the most recent 10-year historical period (2004/05–2013/14), the average annual net loss of population from Sunderland to County Durham has been approximately 421 per year (Table 7).

Table 7: Migration flows between Sunderland and County Durham (2004/05–2013/14) (source: ONS)

Internal Migration	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	10-year Average
Inflow *From County Durham to Sunderland*	1,250	1,070	1,230	1,310	1,450	1,270	1,390	1,725	1,559	1,670	1,392
Outflow *From Sunderland to County Durham*	1,700	1,740	1,960	1,960	1,710	1,720	1,830	1,854	1,826	1,834	1,813
Net flow *To Sunderland*	-450	-670	-730	-650	-260	-450	-440	-129	-267	-164	-421

3.15 In the **PG-10yr SENS** sensitivity the net loss of population from Sunderland to County Durham is reduced by 25% in each year of the forecast period:

- **PG-10yr SENS**: internal migration rates and international migration flow assumptions are based on the last 10 years of historical evidence (2004/05–2013/14), with net internal out-migration reduced by 105 in each year of the forecast period.

3.16 Note that a 10-year historical period has been considered to provide a longer-term perspective on migration flows between Sunderland and County Durham.

Demographic Scenario Results

3.17 Each of the demographic scenarios (and sensitivities) has been run with the historical MYEs defined for the 2001–2014 period. Results are presented in Figure 11 and Table 8 for the 2015–2035 plan period.

3.18 Under the benchmark **SNPP-2012** scenario, the population of Sunderland increases by +4,216 over the 2015–2035 plan period, equivalent to +1.5% growth. The number of households increases by +9,063, equivalent to +7.5% growth, resulting in an average annual dwelling requirement of +467.

3.19 Of the three alternative trend scenarios (**PG-5yr**, **PG-10yr** and **Natural Change**), population growth (over the 2015–2035 plan period) is highest under the **PG-5yr** scenario, at +2.6% and lowest under the hypothetical **Natural Change** scenario, at +0.3%. The alternative **PG-10yr** trend scenario suggests lower population and household growth than the **PG-5yr** scenario, resulting in a lower average annual dwelling requirement: +442 (**PG-10yr**), compared to +504 (**PG-5yr**). This is a reflection of *lower* levels of net international in-migration and *higher* levels of net internal out-migration that occurred in Sunderland over the extended 10-year historical period (Figure 7).

3.20 Modifications to the young adult migration flows from Sunderland have a substantial impact upon growth outcomes. With a reduction in the loss of internal migrants aged 25–29 during the plan period, population growth is higher under the **SNPP-2012 SENS 25-29** sensitivity (+12.3%) compared to the **SNPP-2012** scenario. With the (additional) retention of internal migrants aged 20–24, the **SNPP-2012 SENS 20-29** sensitivity suggests higher population growth (+16.6%). The two sensitivities suggest a higher average annual dwelling requirement than the **SNPP-2012** scenario: +1,417 (**SNPP-2012 SENS 25-29**) and +1,691 (**SNPP-2012 SENS 20-29**).

3.21 More specific adjustments to the migration flow between Sunderland and Durham has a more limited impact upon population growth. With a reduced net internal migration outflow to County Durham, population growth is higher under the **PG-10yr SENS** sensitivity (+1.8%), compared to the **PG-10yr** scenario (+0.9%).

3.22 The **Natural Change** scenario indicates a dwelling requirement of +487 per year, in the absence of migration and driven solely by changes in the population due to births, deaths and ageing.

Sunderland Demographic Scenario Outcomes

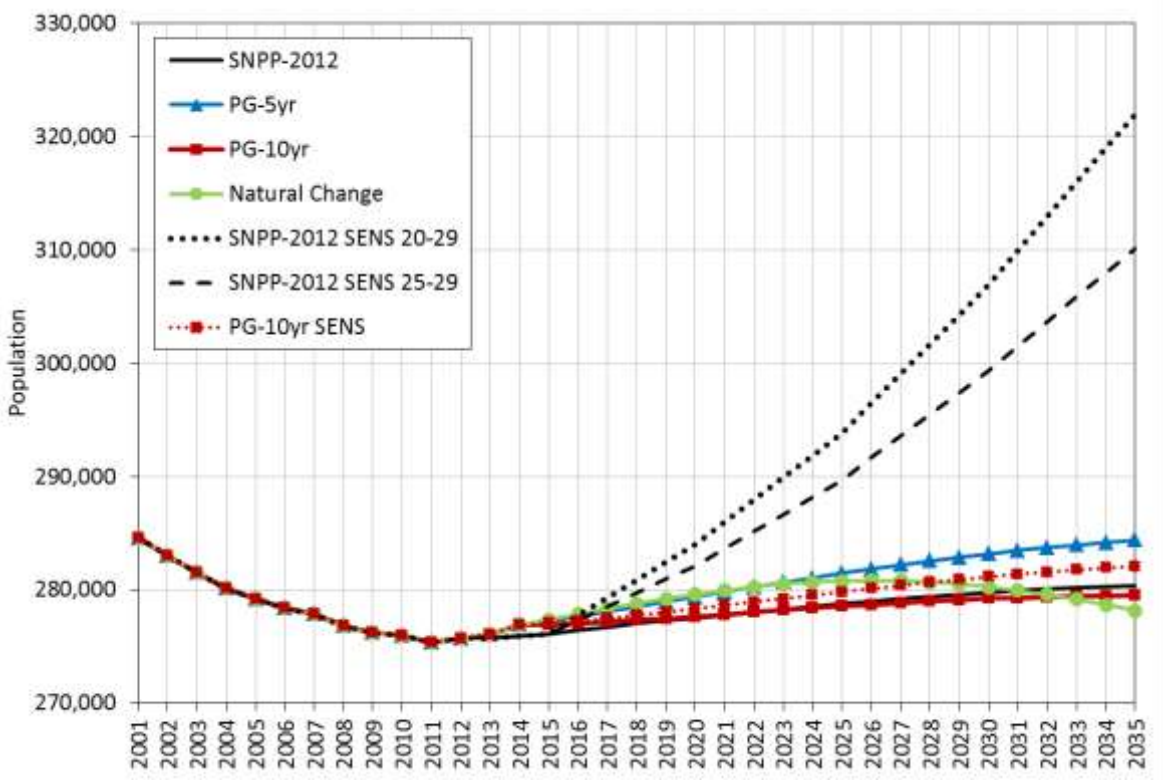


Figure 11: Sunderland demographic scenario outcomes: population growth 2001–2035

Table 8: Sunderland demographic scenario outcomes 2015–2035

Scenario	Change 2015 - 2035				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
SNPP-2012 SENS 20-29	45,863	16.6%	32,833	27.0%	2,175	1,691
SNPP-2012 SENS 25-29	33,977	12.3%	27,520	22.6%	1,580	1,417
PG-5yr	7,119	2.6%	9,778	8.0%	142	504
PG-10yr SENS	5,040	1.8%	9,609	7.9%	76	495
SNPP-2012	4,216	1.5%	9,063	7.5%	92	467
PG-10yr	2,560	0.9%	8,586	7.1%	-29	442
Natural Change	811	0.3%	9,457	7.7%	0	487

Note that household growth has been assessed using the 2012-based headship rates and the dwelling growth figures using a fixed 2.9% vacancy rate.

Headship Rate Sensitivity

3.23 In the demographic scenarios (and sensitivities) presented above, household growth has been assessed using headship rate and communal population assumptions from the 2012-based household projection model. For comparison, each of the scenarios (and sensitivities) has also been run using the headship rate assumptions from the earlier, 2008-based, DCLG household projection model (Table 9).

3.24 The application of the 2008-based headship rates generally suggests higher household growth, reflective of the different market conditions during the period from which the household model assumptions have been calibrated.

3.25 For the **SNPP-2012** scenario, the application of the 2008-based headship rates results in an average annual dwelling requirement of +508, compared to +467 with the application of the 2012-based headship rates.

Table 9: Sunderland demographic scenario dwelling growth outcomes using varying headship rates

Scenario	Average annual dwelling requirement (2015–2035)	
	HH-08	HH-12
SNPP-2012	508	467
PG-5yr	563	504
PG-10yr	493	442
Natural Change	546	487
SNPP-2012 SENS 20-29	1,694	1,691
SNPP-2012 SENS 25-29	1,416	1,417
PG-10yr SENS	546	495

HH-08: the 2008-based DCLG headship rates are applied, scaled to be consistent with the 2011 DCLG household total but following the original trend thereafter. **HH-12:** the 2012-based DCLG headship rates are applied. In each variant, the communal population assumptions from the 2012-based household projection model have been applied and a consistent, Sunderland-specific dwelling vacancy rate used. Only the household and dwelling growth outcomes differ between the **HH-08** and **HH-12** variants. Population growth and net migration figures are consistent with those presented in Table 8.

4 Demographic & Economic Change

Labour Force & Jobs Growth

4.1 The PPG states that, as part of the assessment of housing need, the likely change in the number of jobs in an area should be considered, as should the size and structure of the labour force (PPG paragraph 2a-018).

4.2 In POGPROUP, it is possible to derive the size and structure of the resident labour force and the number of jobs that an implied level of population growth could support. This is achieved through the application of the following three key economic assumptions:

1. The **economic activity rates** determine the proportion of the working-age population that is economically active, i.e. the labour force. The labour force includes those who are in work (i.e. 'workers') and also those who are unemployed.
2. The **unemployment rate** determines the proportion of the labour force that is in employment (i.e. the number of workers).
3. The **commuting ratio** determines the balance between the resident number of 'workers' (i.e. employed labour force) and the number of jobs in an area. A commuting ratio greater than 1.0 indicates a net *out*-commute (the number of workers resident in an area is greater than the number of jobs). A commuting ratio less than 1.0 indicates a net *in*-commute (i.e. the number of jobs is greater than the number of resident workers).

4.3 In a trend-based scenario, the size of the resident labour force and the number of jobs that can be supported are therefore sensitive to adjustments to these key factors. The following set of assumptions has been applied to the demographic scenarios (and sensitivities):

- **Economic activity rates** for Sunderland from the 2011 Census, by sex and 5-year age-group (ages 16-74), have been applied in 2011, with adjustments applied, to 2020, to account for changes to the state pension age (SPA)[8]. After 2020, the rates are fixed.
- The 2014 **unemployment rate** for Sunderland (9.0%), has been applied, reducing to a pre-recession (2004–2007) average of 6.5% by 2020 and remaining fixed thereafter. These unemployment rates have been sourced from the ONS model-based estimates of unemployment for Sunderland.
- A fixed **commuting ratio** of 0.96, from the 2011 Census Travel to Work data for Sunderland, has been applied in each year of the forecast period.

4.4 With these economic activity rate, unemployment rate and commuting ratio assumptions, the derived labour force and jobs statistics are summarised in Table 10. Further detail on the assumptions is provided in Appendix B.

Table 10: Sunderland labour force and jobs change, 2015–2035

Scenario	Change (2015—2035)			Average Annual Jobs Growth (2015—2035)
	Labour Force (16—74)	Employed People	Unemployed People	
SNPP-2012	-10,336	-6,878	-3,457	-357
PG-5yr	-9,548	-6,126	-3,422	-318
PG-10yr	-11,372	-7,834	-3,538	-407
Natural Change	-12,734	-9,103	-3,632	-473
SNPP-2012 SENS 20-29	22,582	23,900	-1,318	1,241
SNPP-2012 SENS 25-29	12,819	14,772	-1,952	767
PG-10yr SENS	-10,050	-6,596	-3,453	-342

4.5 In all cases, except for the two **SNPP-2012** sensitivities, the labour force (aged 16–74) reduces in size over the 2015–2035 plan period, despite overall population growth (Table 8). This reduction, is a result of the continued effect of net out-migration, gradual ageing of Sunderland's population profile, plus relatively prudent assumptions about future rates of economic activity.

[8] Edge Analytics has applied relatively prudent assumptions to changing economic activity rates in the older age-groups, using previous ONS labour force projections to estimate how changes to the State Pension Age (SPA) might influence participation in the labour force. This involved the following alterations to the age/sex-specific economic activity rates between 2011–2020:

Males 60–64: 5%
Males 65–69: 10%
Females 60–64: 40%
Females 65–69: 20%

4.6 The **SNPP-2012** sensitivities have the effect of maintaining a larger labour force through the annual retention of the young adult population.

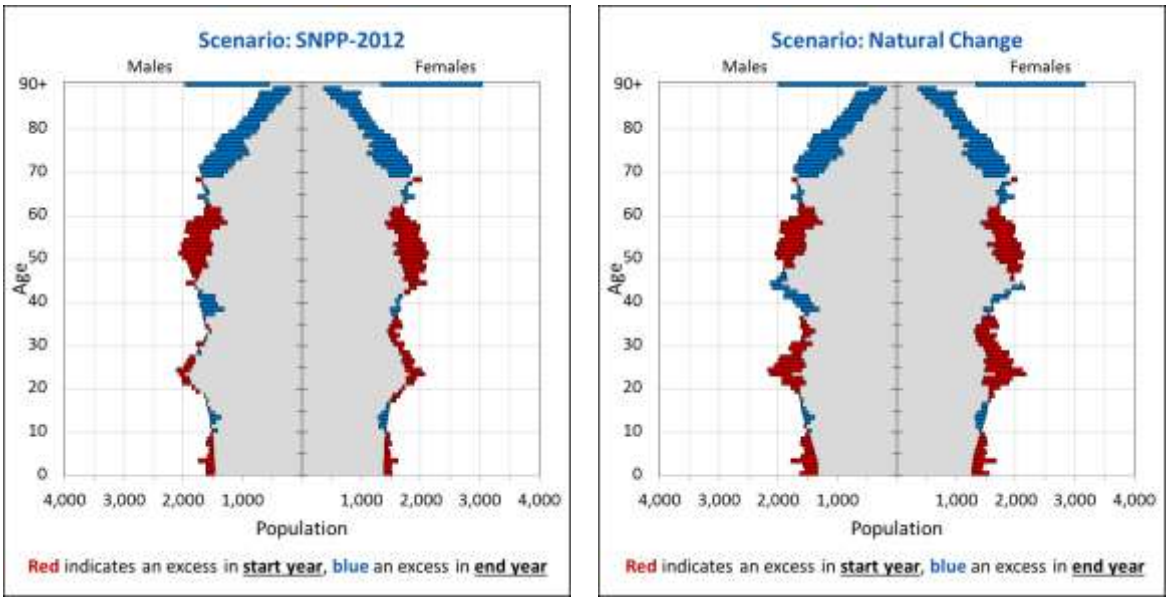


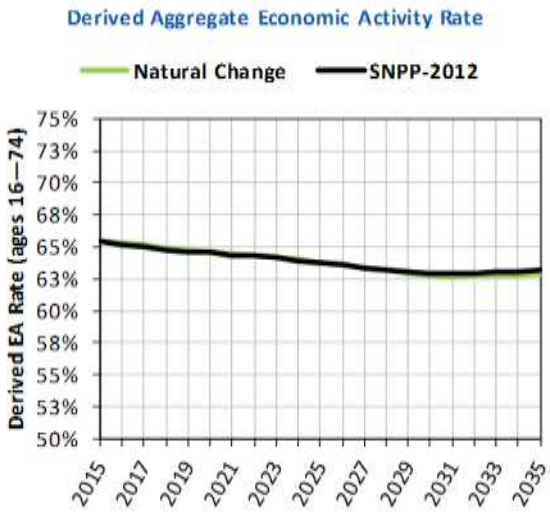
Figure 12: Sunderland population structure under the **SNPP-2012** and **Natural Change** scenarios. Red indicates an excess in 2015, blue an excess in 2035.

4.7 Sunderland's ageing population is illustrated using population pyramids for the **SNPP-2012** and **Natural Change** scenarios (Figure 12). Under the **SNPP-2012** scenario, the population aged 40–60 decreases between 2015–2035, with increases seen in all ages 70+. This ageing is more pronounced in the **Natural Change** scenario, with greater increases seen in the 70+ age-groups and population decline seen in the younger 20–35 age-groups. This highlights the importance of migration in maintaining Sunderland's working age population; in the **Natural Change** scenario migration is set at zero for each year in the forecast period.

4.8 Even with positive net migration over the forecast period, as suggested by the **SNPP-2012** scenario (Table 8), population ageing still results in a *reduction* in the overall size of the labour force when the economic activity rate assumptions (as described in paragraph 4.3) are applied.

4.9 Even with adjustments to account for SPA changes, the *aggregate* economic activity rate[9] for the 16–74 labour force age-range *decreases* under the **SNPP-2012** and **Natural Change** scenarios over the 2015–2035 plan period due to the changing age structure of the population (Figure 13).

[9] The aggregate economic activity rate is calculated by dividing the total labour force by the total population aged 16–74.



Scenario	Aggregate Economic Activity Rate (16—74)		
	2015	2035	Change
Natural Change	65.4%	62.8%	-2.6%
SNPP-2012	65.3%	63.2%	-2.2%

Figure 13: Sunderland, derived aggregate economic activity rates (ages 16–74)

4.10 As a result of population ageing, the projected level of population growth suggested by the **SNPP-2012** and **Natural Change** scenarios is unable to support jobs growth over the 2015–2035 plan period. This is in spite of the unemployment rate assumptions that have been applied, which reduce the proportion of the labour force that is unemployed to 2020 (see Table 10). As a result of population ageing, the number of jobs that the population is able to support *decreases*, resulting in *negative* annual average jobs growth across the 2015–2035 plan period (Table 10).

4.11 On average, it is estimated that -357 *fewer* jobs per year could be supported by the level of population growth projected under the **SNPP-2012**, given the chosen assumptions on economic activity, unemployment and commuting.

4.12 In each of the two **SNPP-2012** sensitivities, the retention of the younger 20–29 and 25–29 age-groups results in a relatively youthful population profile and associated growth in the size of the labour force and the number of jobs that could be supported.

Aligning Jobs Growth & Population Growth

4.13 The labour force and job growth implications of the population growth trajectory under each of the demographic scenarios (and sensitivities) have been derived using three key economic assumptions: economic activity rates, an unemployment rate and a commuting ratio.

4.14 With uplifts to the economic activity rates, a reducing unemployment rate and a fixed commuting ratio, the level of jobs growth that could be supported by the population growth trajectory of the **SNPP-2012** is estimated at -357 jobs per year over the 2015–2035 plan period.

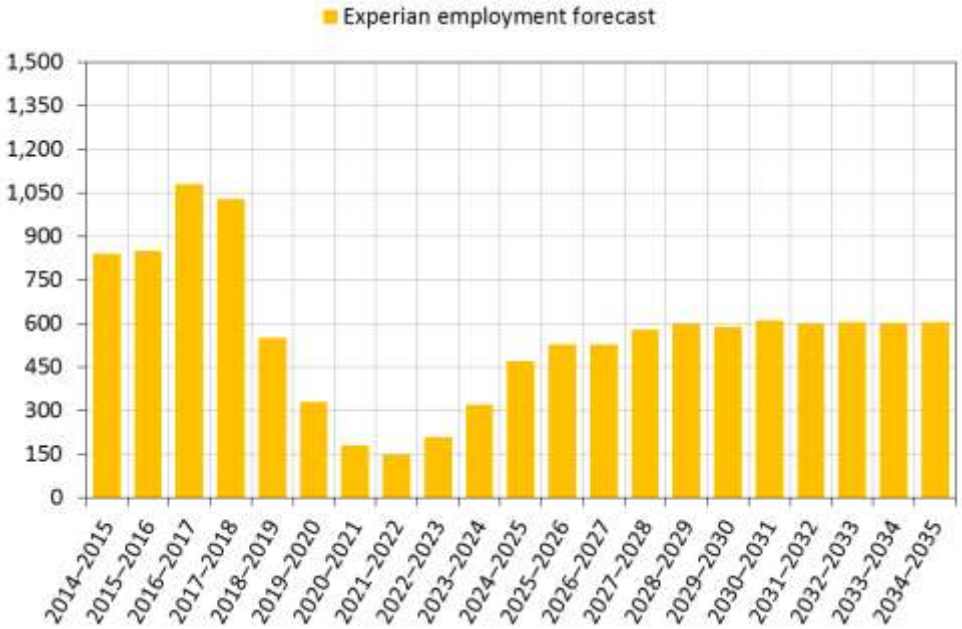
4.15 In the assessment of housing need, the PPG states that the likely future change in the number of jobs in an area should be considered. It is stated that: *"Where the supply of working age population that is economically active (labour force supply) is less than the projected job growth, this could result in unsustainable commuting patterns … and could reduce the resilience of local businesses"* (PPG paragraph 2a-018).

4.16 In the following section, the level of jobs growth implied by an employment forecast for Sunderland is considered. This forecast, developed by Experian, is linked to the demographic scenarios (and sensitivities) through sensitivity testing around the three key economic assumptions.

Experian Employment Forecast

A jobs growth forecast for Sunderland has been supplied by Experian, providing a 'baseline' trajectory of jobs growth for the forecast period, measured as annual change in the number of 'full time equivalent' (FTE) jobs[10] (Figure 14). This equates to between +150 and +1,080 additional FTE jobs per year (Figure 15), which in *most* cases is *higher* than the annual jobs growth figures derived from the demographic scenarios (and sensitivities) using the economic activity rate, unemployment rate and commuting ratio assumptions specified above (Figure 15). With the retention of younger migrants aged 20–29 and 25–29, only the two **SNPP-2012** sensitivities exceed the level of jobs growth suggested by Experian.

[10] Note that the Experian data only runs to 2031. The number of jobs in 2032–2035 has been projected by applying an average of annual change for the preceding two years.



Note that the Experian data only runs to 2031. The number of jobs in 2032–2035 has been projected by applying an average of annual change for the preceding two years.

Figure 14: Sunderland jobs growth forecast (FTEs) (Source: Experian, May 2015)

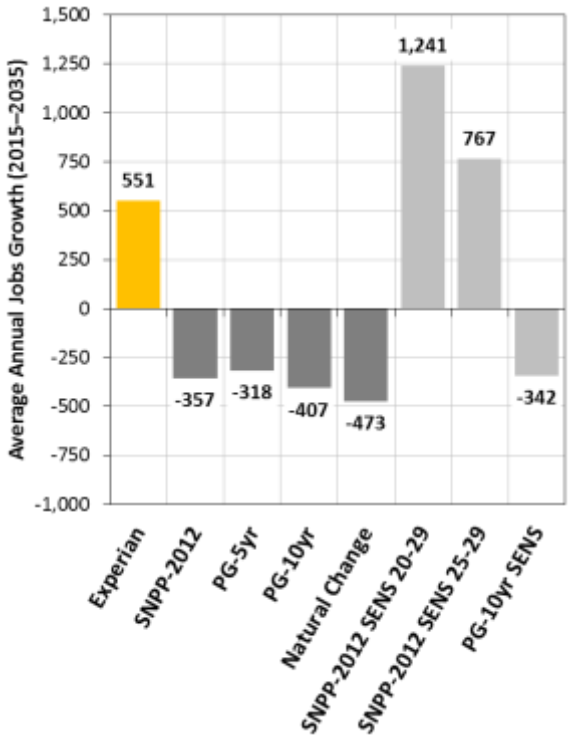


Figure 15: Comparison of average annual jobs growth (2015–2035) from the Experian employment forecast (highlighted in yellow) and the Edge Analytics demographic scenarios (and sensitivities)

Linking the Jobs Forecast & Demographic Scenario Outcomes

4.17 With the exception of the two **SNPP-2012** sensitivities, which retain migrants in the younger age-groups, the level of jobs growth that is supported under each of the demographic scenarios (2015–2035) is *negative*, whilst the forecast level of jobs growth in the Experian employment forecast is *positive* (Figure 15).

4.18 With the assumptions that have been made in relation to economic activity, unemployment and commuting (paragraph 4.3), the level of population growth required to support the levels of jobs growth implied by the Experian employment forecast would be considerably higher than that implied by the official **SNPP-2012** scenario.

4.19 In POPGROUP, the population, household and dwelling growth implications of the Experian employment forecast can be evaluated using a 'jobs-led' formulation of the POPGROUP forecasting model. In a jobs-led scenario, population growth is linked directly to the change in the number of jobs available within an area.

4.20 POPGROUP evaluates the impact of a jobs growth trajectory by measuring the relationship between the number of jobs in an area, the size of the resident labour force and the size of the resident population. Internal migration is used to balance the relationship between the size of the labour force and the forecast number of jobs. A higher level of net in-migration will occur if there is insufficient resident population and labour force to meet the forecast number of jobs. A higher level of net out-migration will occur if the population is too high relative to the number of jobs.

4.21 Key to determining the level of population growth required to meet a defined jobs growth trajectory are the three assumptions on economic activity, unemployment and commuting. With an ageing population (together with a fixed commuting ratio), higher levels of net in-migration would be needed to support the level of jobs growth in the Experian employment forecast. However, if any of the key economic assumptions were to alter, for example, if levels of economic activity were to increase, the required level of population growth needed to support this level of jobs growth would be reduced.

Jobs-led Scenario & Sensitivity Testing

4.22 To evaluate the level of population growth required to meet the Experian employment forecast, a jobs-led scenario has been developed in POPGROUP, using the Experian jobs growth trajectory presented in Figure 14:

- **Jobs-led Experian**: total jobs growth of 11,021 (2015–2035)

4.23 The 'core' set of economic assumptions applied in the demographic scenarios have been applied in this jobs-led scenario (see paragraph 4.3). Additionally, alternative economic activity rate and commuting ratio assumptions have been applied in a series of sensitivities. These are outlined in Table 11 and Appendix B

4.24 As the benchmark scenario, the **SNPP-2012** scenario has also been run with these alternative economic activity rate and commuting ratio assumptions.

Economic Activity Rate Assumptions

4.25 In the demographic scenarios (and sensitivities) presented above, the 2011 Census economic activity rates, by sex and 5-year age-group (ages 16-74), have been applied in 2011, with adjustments applied, to 2020, to account for SPA changes. After 2020, the rates are fixed. In the case of the **SNPP-2012** scenario, these relatively prudent adjustments result in a *decrease* in the *overall* rate of economic activity for the aggregate 16-74 labour force age range (Figure 13), a consequence of Sunderland's ageing population (Figure 12). The older age-groups account for an increasingly large proportion of the population.

4.26 To at least maintain the current overall level of economic activity, higher participation rates are required across all ages, but most importantly in the older age-groups. Therefore, the three scenarios, **SENS A, E** and **I** sensitivities, consider fixed *aggregate* economic activity rates for males and females (aged 16–74). For females aged 16–74, a fixed rate of 61.6% has been applied, for males, a rate of 70.4% has been applied, remaining constant throughout the forecast period.

4.27 Additional scenarios, the **SENS B**, **C**, **F**, **G**, **J** and **K** sensitivities, consider alternative changes to the *age-specific* economic activity rates for males and females. The Office for Budget Responsibility (OBR) has undertaken its own analysis of labour market trends in its 2014 Fiscal Sustainability

Report[11]. Included within the OBR analysis is a long-term forecast of changing employment rates for males and females in the 60–74 year-old age-groups, extending to a 2066 forecast horizon. The employment rate changes estimated by the OBR imply the following growth in the rates of economic activity in the older age-groups over the 2011–2031 period (from 2031, the rates are held constant):

Males	Females
• **60–64:** 17%	• **60–64:** 71%
• **65–69:** 39%	• **65–69:** 93%
• **70–74:** 20%	• **70–74:** 83%

4.28 In sensitivities **B**, **F** and **J**, the 2011 Census economic activity rates for Sunderland by sex and 5-year age-group (ages 16-74) have been applied, with the above OBR adjustments applied to males and females aged 60–74 to 2031, then fixed.

4.29 These assumptions are also applied in sensitivities **C**, **G** and **K**, together with additional uplifts of 5%, which are applied to the economic activity rates for females aged 30–59, to evaluate OBR's assumptions of higher participation trends for these female cohorts.

Commuting Ratio Assumptions

4.30 In the demographic scenarios (and sensitivities) presented above, a fixed commuting ratio of 0.96, from the 2011 Census Travel to Work data for Sunderland, has been applied in each year of the forecast period, indicating a net in-commute.

4.31 To test the implications of more workers travelling to Sunderland to take up the newly created jobs implied by the Experian employment forecast, the commuting ratio is reduced to 0.94 (by 2021) in the **SENS D**, **E**, **F** and **G** sensitivities, representing an *increased* net in-commute. This follows the trend in the 2001 and 2011 Census commuting ratios of 0.98 (2001) and 0.96 (2011).

4.32 In the **SENS H**, **I**, **J** and **K** sensitivities, the implications of a more substantial reduction in the commuting ratio (to 0.92 by the end of the forecast period) are tested.

[11] http://cdn.budgetresponsibility.org.uk/41298-OBR-accessible.pdf

Table 11: Economic assumptions used in the **Jobs-led Experian** scenario and sensitivities

		Jobs-led Experian	Jobs-led Experian sensitivities										
		Jobs-led Experian	SENS A	SENS B	SENS C	SENS D	SENS E	SENS F	SENS G	SENS H	SENS I	SENS J	SENS K
Economic activity	2011 Census economic activity rates by sex & 5-year age-group (ages 16-74), with SPA uplifts applied to males & females aged 60-69 to 2020, then fixed	✓				✓				✓			
	2011 Census economic activity rates by sex for the aggregate 16-74 age-group, fixed		✓				✓				✓		
	2011 Census economic activity rates by sex & 5-year age-group (ages 16-74), with OBR adjustments applied to males & females aged 60-74 to 2031, then fixed			✓				✓				✓	
	2011 Census economic activity rates by sex & 5-year age-group (ages 16-74), with OBR adjustments applied to males aged 60-74 & females aged 30-74 to 2031, then fixed				✓				✓				✓
Unemployment	ONS (2014) unemployment rate for Sunderland (9.0%) applied, reducing to a pre-recession (2004–2007) average of 6.5% by 2020 and fixed thereafter.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Commuting	2011 Census commuting ratio for Sunderland (0.96) fixed	✓	✓	✓	✓								
	2011 Census commuting ratio for Sunderland (0.96) reducing to 0.94 between 2014–2021, then fixed					✓	✓	✓	✓				
	2011 Census commuting ratio for Sunderland (0.96) reducing to 0.92 between 2014–2035									✓	✓	✓	✓

Jobs-led Scenario Outcomes

4.33 In the two tables that follow, the outcomes of sensitivities **A–K** are summarised.

4.34 The effect of the variant economic activity rate and commuting ratio assumptions is first illustrated with reference to the **SNPP-2012** scenario (Table 12).

4.35 Note that in the **SNPP-2012** sensitivities, only the jobs growth outcomes differ, reflecting the alternative economic activity rate and commuting ratio assumptions applied.

4.36 Under the core scenario assumptions, Sunderland's population growth is estimated to support 357 *fewer* jobs per year (2015–2035).

4.37 In sensitivities **A–H**, higher economic activity rates and/or a reduced commuting ratio result in a *reduced* annual decline in the number of jobs that can be supported, ranging from -240 (**SENS B**) to -14 (**SENS E**).

4.38 In sensitivities **I–K**, higher economic activity rates in combination with a more substantial reduction in the commuting ratio, results in annual jobs *growth*, ranging from +33 (**SENS J**) to +133 (**SENS I**).

4.39 Of the eleven sensitivities presented here, the highest level of jobs growth (+133 per year) is implied by sensitivity **I**, which maintains the 2011 Census aggregate economic activity rates for males and females aged 16-74 and applies a more substantial reduction to commuting ratio.

Table 12: **SNPP-2012** sensitivity outcomes

Scenario	Change 2015 - 2035				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
SNPP-2012 SENS I	4,216	1.5%	9,063	7.5%	92	467	133
SNPP-2012 SENS K	4,216	1.5%	9,063	7.5%	92	467	107
SNPP-2012 SENS J	4,216	1.5%	9,063	7.5%	92	467	33
SNPP-2012 SENS E	4,216	1.5%	9,063	7.5%	92	467	-14
SNPP-2012 SENS G	4,216	1.5%	9,063	7.5%	92	467	-39
SNPP-2012 SENS H	4,216	1.5%	9,063	7.5%	92	467	-90
SNPP-2012 SENS F	4,216	1.5%	9,063	7.5%	92	467	-111
SNPP-2012 SENS A	4,216	1.5%	9,063	7.5%	92	467	-146
SNPP-2012 SENS C	4,216	1.5%	9,063	7.5%	92	467	-170
SNPP-2012 SENS D	4,216	1.5%	9,063	7.5%	92	467	-231
SNPP-2012 SENS B	4,216	1.5%	9,063	7.5%	92	467	-240
SNPP-2012	4,216	1.5%	9,063	7.5%	92	467	-357

Note that scenarios are listed in order of the average annual growth in the number jobs that can be supported

4.40 For the jobs-led scenario, the choice of assumptions has a direct bearing on the estimated *population* and *dwelling* growth that supports the Experian employment forecast.

4.41 The core **Jobs-led Experian** scenario results in an average annual dwelling growth requirement of +1,212 per year.

4.42 Sensitivities **E**, **F**, **G**, **I**, **J**, and **K**, which combine higher rates of economic activity with a reduced commuting ratio, maintain a larger number of workers within Sunderland. This results in less in-migration being required to meet the employment forecast. Under these assumptions, the average annual dwelling requirement reduces to between +809 (**SENS K**) and +984 (**SENS F**) dwellings per year (Table 13).

4.43 Of the eleven sensitivities presented here, the lowest level of dwelling growth (+809 dwellings per year) is implied by sensitivity **K**, which applies improvements to future economic activity rates in older age-groups and in the female population more generally, and applies a more substantial reduction to the commuting ratio.

Table 13: **Jobs-led Experian** sensitivity outcomes

Scenario	Change 2015 - 2035				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
Jobs-led Experian	39,160	14.1%	23,527	19.2%	1,557	1,212	551
Jobs-led Experian SENS B	34,429	12.4%	21,574	17.7%	1,357	1,111	551
Jobs-led Experian SENS A	34,047	12.3%	21,352	17.5%	1,362	1,100	551
Jobs-led Experian SENS D	33,281	12.0%	21,031	17.2%	1,333	1,083	551
Jobs-led Experian SENS C	31,298	11.3%	20,271	16.6%	1,228	1,044	551
Jobs-led Experian SENS F	28,604	10.3%	19,099	15.7%	1,135	984	551
Jobs-led Experian SENS H	27,841	10.0%	18,873	15.5%	1,074	972	551
Jobs-led Experian SENS E	27,693	10.0%	18,641	15.3%	1,123	960	551
Jobs-led Experian SENS G	25,566	9.2%	17,833	14.6%	1,010	919	551
Jobs-led Experian SENS J	23,179	8.3%	16,946	13.9%	877	873	551
Jobs-led Experian SENS I	21,289	7.7%	16,098	13.2%	819	829	551
Jobs-led Experian SENS K	20,186	7.3%	15,698	12.9%	754	809	551

Note that scenarios are listed in order of the average annual dwelling growth requirement

5 Summary

Requirements & Approach

5.1 Edge Analytics has been commissioned by arc4 to produce a suite of population, household and housing forecasts for the City of Sunderland, underpinned by the latest demographic inputs and economic assumptions. This includes the latest official population and household projections from ONS and the DCLG respectively.

5.2 In line with the PPG, Edge Analytics has developed a range of demographic scenarios for Sunderland, using POPGROUP technology. Scenarios outputs are presented for the 2015–2035 plan period.

5.3 The 2012-based population projection from ONS is presented as the official 'benchmark' scenario, with household growth assessed using household headship rate assumptions from the 2012-based DCLG household projection model. This provides the 'starting point' for the assessment of housing need (in line with PPG paragraph 2a-015).

5.4 For comparison with the official benchmark scenario, a range of alternative trend scenarios has been developed, in which variant migration assumptions have been applied. In addition, household growth has been assessed using assumptions from the previous, 2008-based, DCLG household model, for comparison with the 2012-based outcomes.

5.5 Consideration of the alignment of housing growth with economic growth is a key requirement of the PPG. This analysis has evaluated the demographic implications of a 'baseline' jobs growth forecast for Sunderland, developed by Experian, considering how key assumptions on future economic activity rates and commuting might influence dwelling growth outcomes.

Dwelling Growth Outcomes

5.6 A summary of the average annual dwelling growth outcomes for the range of scenarios presented in this analysis is summarised below, for the 2015–2035 plan period (Figure 16).

5.7 The **SNPP-2012** scenario provides the benchmark against which to consider alternative growth outcomes, with a dwelling requirement of +467 per year over the 2015-2035 plan period, when the 2012-based household growth assumptions (**HH-12**) are applied.

5.8 Alternative headship rates have been applied, to evaluate the impact of the earlier, 2008-based, household growth assumptions upon each scenario outcome. The application of the 2008-based assumptions (**HH-08**) generating results in a higher average annual dwelling requirement.

5.9 The **PG-5yr** and **PG-10Yr** scenarios make more explicit use of the historical evidence on internal and international migration for a 5-year and 10-year historical period (2009/10–2013/14 and 2004/05–2013/14 respectively). Dwelling growth is lower under the **PG-10yr** scenario (+442 per year), a reflection of *lower* levels of net international in-migration and *higher* levels of net internal out-migration that occurred in Sunderland over the extended 10-year historical period (see Figure 7). With a shorter, 5-year historical period, the **PG-5yr** scenario results in a higher dwelling growth outcome (+504 per year).

5.10 With a reduced net outflow to County Durham, dwelling growth is higher under the **PG-10yr SENS** scenario (+495 per year), compared to the **PG-10yr** scenario (+442 per year).

5.11 In seeking to align the 'baseline' Experian jobs growth forecasts with housing requirements, a number of variant assumptions have been tested. The jobs growth forecast, in combination with variant assumptions on economic activity rates and commuting, presents a wider range of dwelling growth outcomes, from +809 per year (**Jobs-led Experian SENS K**) to +1,212 per year (**Jobs-led Experian**).

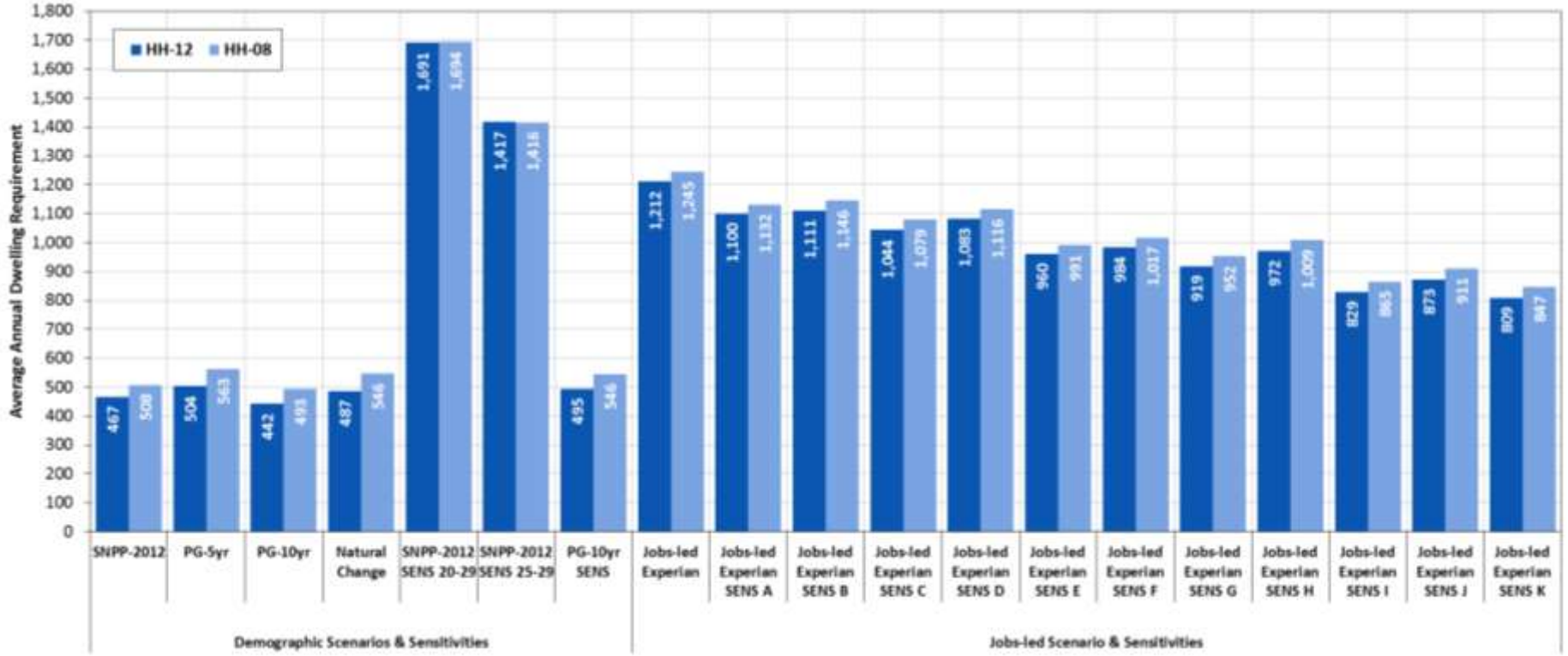


Figure 16: Sunderland, summary of average annual dwelling growth outcomes, 2015–2035

5.12 In considering the range of dwelling growth outcomes presented in this analysis, it is important to emphasise the challenges associated with linking anticipated jobs growth to population change and associated housing requirements.

5.13 In comparing jobs-led scenario and sensitivity outcomes to the benchmark **SNPP-2012** scenario, the assumptions made on future economic activity rates, unemployment and commuting are key. Higher rates of economic activity, combined with a declining unemployment rate and a reducing commuting ratio, results in the retention of a larger workforce in Sunderland, requiring less in-migration to meet jobs growth forecasts. These assumptions act as a counter-balance to the unavoidable effects of ageing upon Sunderland's population profile.

5.14 Whilst the jobs-led scenario sensitivities have considered changes to economic activity rates and levels of commuting, further modifications would affect the dwelling growth requirement of the jobs-led scenarios.

5.15 In addition, Sunderland's unemployment rate may be a factor which influences the balance of population, dwellings and jobs. All scenarios presented here have considered a reduction in the proportion of the labour force that is unemployed. A more substantial reduction in the unemployment rate for Sunderland would enable a higher level of jobs growth to be supported with lower implied growth in net in-migration and dwellings.

5.16 These factors should be given due consideration in the formulation of Sunderland's OAN using this demographic evidence.

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 17) 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 18) 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 The latest development in the POPGROUP suite of demographic models is POPGROUP v.4, which was released in January 2014. A number of changes have been made to the POPGROUP model to improve its operation and to ensure greater consistency with ONS forecasting methods. The most significant methodological change relates to the handling of internal migration in the POPGROUP forecasting model. The level of internal in-migration to an area is now calculated as a rate of migration relative to a defined 'reference population' (by default the UK population), rather than as a rate of migration relative to the population of the area itself (as in POPGROUP v3.1). This approach ensures a closer alignment with the 'multi-regional' approach to modelling migration that is used by ONS.

A.5 For further information on POPGROUP, please refer to the Edge Analytics website: http://edgeanalytics.co.uk/popgroup.

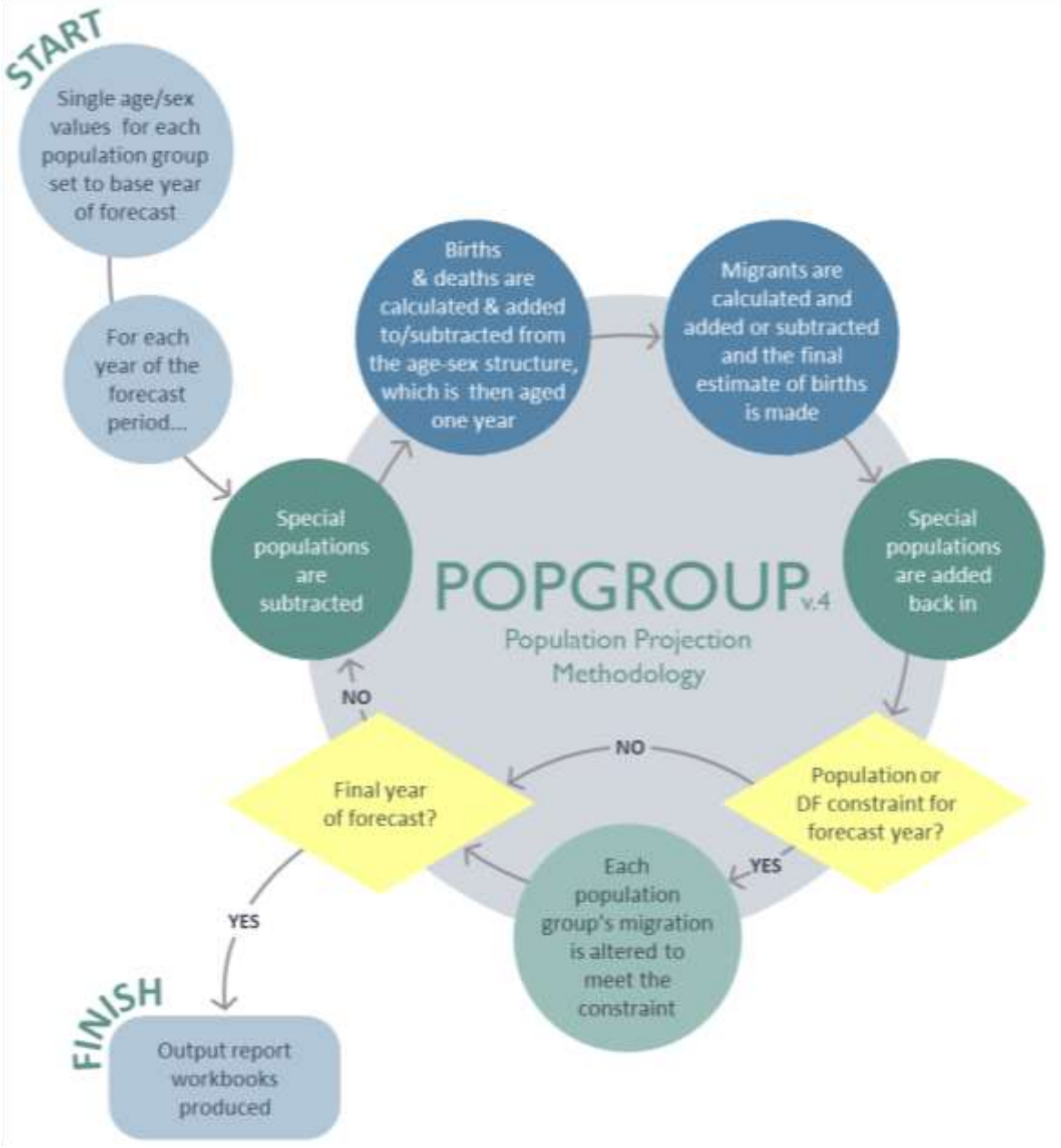
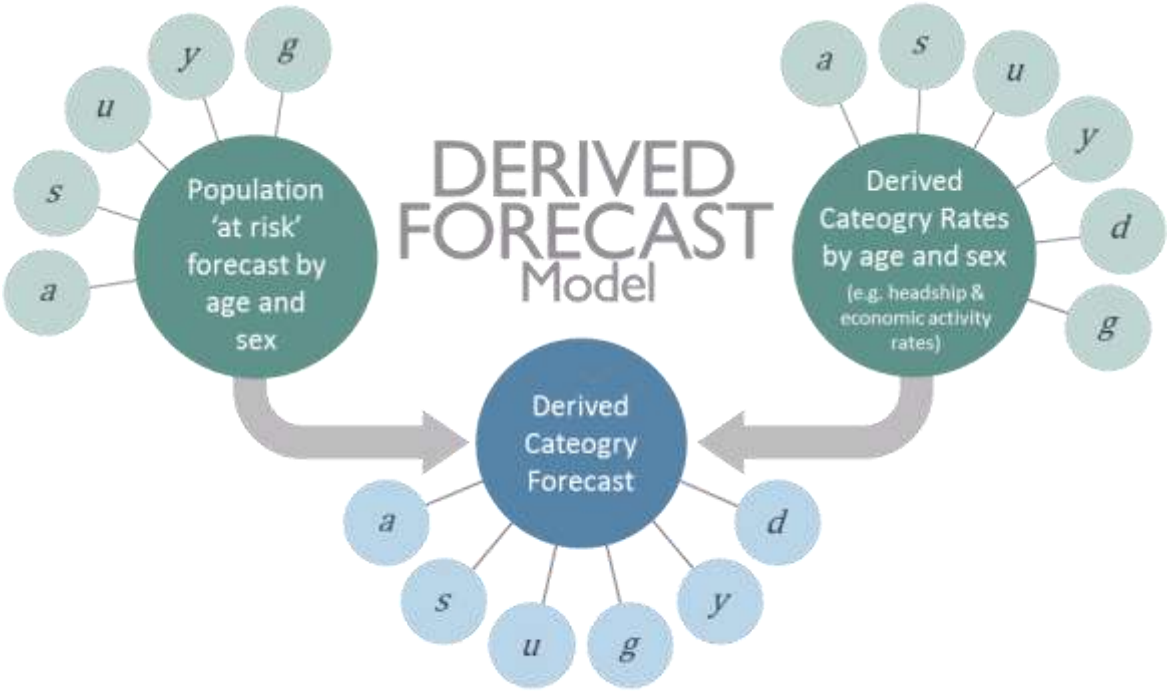


Figure 17: POPGROUP population projection methodology



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

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 18: Derived Forecast (DF) methodology

Appendix B

Data Inputs & Assumptions

Introduction

B.1 Edge Analytics has developed a suite of demographic scenarios and sensitivities for the City of Sunderland using POPGROUP v.4 and the Derived Forecast model. The POPGROUP suite of demographic models draws data from a number of sources, building an historical picture of population, households, fertility, mortality and migration on which to base its scenario forecasts.

B.2 Using historical data evidence for 2001–2014, 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.3 A range of demographic scenarios, a jobs-led scenario and a number of sensitivities have been produced for Sunderland. In all cases, household growth has been assessed using assumptions from the 2012-based DCLG household projection model. For the official projection and alternative trend scenarios, household growth has also been assessed using assumptions from the earlier 2008-based household projection model.

B.4 In the following sections, a narrative on the data inputs and assumptions underpinning the scenarios and sensitivities is presented.

Population, Births & Deaths

Population

B.5 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.6 In the **SNPP-2012** scenario, the historical MYEs are defined 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.7 In the two **SNPP-2012** sensitivities, the historical MYEs are defined up to 2012. In all other scenarios and sensitivities, the historical MYEs are defined up to 2014.

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 and the two **SNPP-2012** sensitivities, historical births are defined 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 all other scenarios and sensitivities, historical births are defined from 2001/02 to 2013/14. From 2014/15, an area-specific age-specific rate (ASFR) schedule, derived from the ONS 2012-based SNPP, is included in the POPGROUP model assumptions. Long-term assumptions on changes in age-specific fertility rates are taken from the ONS 2012-based SNPP.

B.11 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.

Deaths & Mortality

B.12 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.13 In the **SNPP-2012** scenario and the two **SNPP-2012** sensitivities, historical deaths are defined 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.14 In all other scenarios and sensitivities, historical deaths are defined from 2001/02 to 2013/14. From 2014/15, an area-specific age-specific mortality rate (ASMR) schedule, derived from the ONS 2012-based SNPP, is included in the POPGROUP model assumptions. Long-term assumptions on changes in age-specific mortality rates are taken from the ONS 2012-based SNPP.

B.15 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.

Migration

Internal Migration

B.16 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.17 In the **SNPP-2012** scenario, historical counts of internal in and out-migrants are defined 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.18 In the **SNPP-2012** sensitivities, historical counts of internal in and out-migrants are defined from 2001/02 to 2011/12. From 2012/13, future counts of migrants are specified, to ensure consistency with the 2012-based official projection, but with adjustments made to reduce the annual 'loss' of internal out-migrants aged 20–29 or 25–29 during the 2015–2035 plan period, as specified in Table 6.

B.19 In the **Natural Change** scenario, historical counts of internal in and out-migrants are defined from 2001/02 to 2013/14. From 2014/15, future counts of internal migration are set at zero (i.e. no internal in- or out-migration occurs).

B.20 In the **PG** scenarios, historical counts of migrants are defined from 2001/02 to 2013/14. From 2014/15, 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 (2009/10 to 2013/14). In the **PG-10yr** scenario and the **PG-10yr SENS** sensitivity, a ten year history is used (2004/05 to 2013/14).

B.21 The relevant historical time period is used in the **PG** scenarios to derive the age-specific migration rate (ASMigR) schedules, which are then used to determine the future number of internal in- and out-migrants from 2014/15. 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 Sunderland, the reference population comprises all districts which cumulatively contributed 70% of migrants into the North East Local Enterprise Partnership (LEP) area over the 2008/09–2013/14 period.

B.22 The **Jobs-led** scenario and sensitivities calculate their own internal migration assumptions to ensure an appropriate balance between the population and the targeted increase in the number of jobs 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 number of jobs. In the **Jobs-led** scenario and sensitivities, the profile of internal migrants is defined by an ASMigR schedule, derived from the ONS 2012-based SNPP.

International Migration

B.23 In each scenario, 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.24 In all scenarios, future international migrant counts are specified.

B.25 In the **SNPP-2012** scenario and the two **SNPP-2012** sensitivities, historical counts of migrants are defined 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.26 In the **Natural Change** scenario, historical counts of internal in and out-migrants are defined from 2001/02 to 2013/14. From 2014/15, future counts of international migration are set at zero (i.e. no international in- or out-migration occurs).

B.27 In the **PG** scenarios, historical mid-year to mid-year counts of immigration and emigration by 5-year age-group and sex are defined from 2001/02 to 2013/14. From 2014/15, future international migration counts are derived from the area-specific historical migration data. In the **PG-5yr** scenario, a five year international migration history is used (2009/10 to 2013/14). In the **PG-10yr** scenario and the **PG-10yr SENS** sensitivity, a ten year history is used (2004/05 to 2013/14).

B.28 Implied within the international migration component of change in the **PG** scenarios and sensitivity is an 'unattributable population change' (UPC) figure, which ONS identified within its latest mid-year estimate revisions. The UPC component has been assigned to the international migration component as this is the component with which it is most likely associated.

B.29 In the **PG** scenarios and sensitivity, an ASMigR schedule of rates is derived from a 5-year or 10-year migration history and is used to distribute future counts by single year of age.

B.30 In the **Jobs-led** scenario and sensitivities, international migration counts are taken from the ONS 2012-based SNPP (i.e. counts are consistent with the **SNPP-2012** scenario). An ASMigR schedule of rates from the ONS 2012-based SNPP is used to distribute future counts by single year of age.

Households & Dwellings

B.31 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.32 In POPGROUP, a dwelling is defined as a unit of accommodation which can either be occupied by one household or vacant.

B.33 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 2008-based and 2012-based household projection models from the DCLG.

Household Headship Rates

B.34 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.35 The household headship rates used in the POPGROUP modelling have been taken from the DCLG household projection models. In all scenarios, the latest 2012-based headship rates have been applied. The core demographic scenarios have also been run using the earlier 2008-based headship rates.

B.36 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. All Stage One output and assumptions for the 2012-based household projection model has been released by DCLG.
- **Stage Two** provides the detailed 'household-type' projection by age-group, controlled to the previous Stage One totals. Stage Two assumptions and output are available for the 2008-based household projection model, but have yet to be made available for the 2012-based model.

[12] Household Projections 2012-based: Methodological Report. DCLG (February 2015).

2012-based Headship Rates

B.37 In POPGROUP, the 2012-based headship rates are defined by sex, 5-year age-group and relationship status (Table 14). The rates therefore determine the likelihood of person of a particular age-group, sex and relationship status being head of a household in a particular year, given the age-sex structure of the population.

Table 14: 2012-based headship rate classification household type classification

DCLG Category	Description
Single	Not in a couple – marital status single
Couple	In a couple (whether married or cohabiting)
Previously Married	Not in a couple – marital status previously married

2008-based Headship Rates

B.38 The 2008-based headship rates in POPGROUP are defined by age-group and household type and therefore define the likelihood of a particular household type being formed in a particular year, given the age-sex profile of the population. Household-types are modelled with a 17-fold classification (Table 15).

B.39 The 2008-based headship rates are scaled to the 2011 DCLG household total, following their original trend thereafter. This does not alter the trajectory of growth implied by the household projection models; it ensures a consistent start point in the assessment of household growth.

Table 15: 2008-based household type classification

ONS Code	DF Label	Household Type
OPM	OPMAL	One person households: Male
OPF	OPFEM	One person households: Female
OCZZP	FAMC0	One family and no others: Couple: No dependent children
OC1P	FAMC1	One family and no others: Couple: 1 dependent child
OC2P	FAMC2	One family and no others: Couple: 2 dependent children
OC3P	FAMC3	One family and no others: Couple: 3+ dependent children
OL1P	FAML1	One family and no others: Lone parent: 1 dependent child
OL2P	FAML2	One family and no others: Lone parent: 2 dependent children
OL3P	FAML3	One family and no others: Lone parent: 3+ dependent children
MCZDP	MIX C0	A couple and one or more other adults: No dependent children
MC1P	MIX C1	A couple and one or more other adults: 1 dependent child
MC2P	MIX C2	A couple and one or more other adults: 2 dependent children
MC3P	MIX C3	A couple and one or more other adults: 3+ dependent children
ML1P	MIX L1	A lone parent and one or more other adults: 1 dependent child
ML2P	MIX L2	A lone parent and one or more other adults: 2 dependent children
ML3P	MIX L3	A lone parent and one or more other adults: 3+ dependent children
OTAP	OTHHH	Other households
TOT	TOTHH	Total

Communal Population Statistics

B.40 Household projections in POPGROUP exclude the population 'not-in-households' (i.e. the communal/institutional population). These data are drawn from the DCLG 2012-based household projections, which use statistics from the 2011 Census. Examples of communal establishments include prisons, residential care homes and student halls of residence.

B.41 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

B.42 The relationship between households and dwellings in all scenarios is modelled using a 'vacancy rate', sourced from the 2011 Census. The vacancy rate is calculated using statistics on households (occupied, second homes and vacant) and dwellings (shared and unshared).

B.43 A vacancy rate of 2.9% for Sunderland has been applied, fixed throughout the forecast period. Using this vacancy rates, the 'dwelling requirement' of each household growth trajectory has been evaluated.

Labour Force & Jobs

B.44 In the demographic scenarios and sensitivities, the labour force and jobs growth implications of the population growth trajectory have been evaluated through the application of three key data items: economic activity rates, an unemployment rate and a commuting ratio.

B.45 In the jobs-led scenario and sensitivities, these assumptions are used to determine the level of population growth required by the defined Experian 'baseline' jobs growth trajectories.

Economic Activity Rates

B.46 The economic activity rates determine the size of the labour force. The labour force includes those in employment and those who are unemployed.

B.47 Four alternative economic activity rate profiles have been used in the POPGROUP modelling:

1. In the core demographic and jobs-led scenarios and sensitivities **D** and **H**, the 2011 Census economic activity rates by 5-year age-group and sex (ages 16–74) have been applied, with adjustments to take account of changes to the State Pension Age (SPA)

2. In sensitivities **A**, **E** and **I**, the aggregate economic activity rates for males and females (for the 16–74 age-group) have been applied, fixed throughout the forecast period.

3. In sensitivities **B**, **F** and **J**, the 2011 Census economic activity rates by 5-year age-group and sex (ages 16–74) have been applied, with adjustments applied to males and females aged 60-74, in line with the OBR forecasts.

4. In sensitivities **C**, **G** and **K**, the 2011 Census economic activity rates by 5-year age-group and sex (ages 16–74) have been applied, with adjustments applied to males aged 60-74 and females aged 30–74, in line with the OBR forecasts.

B.48 Economic activity rates by five year age-group (ages 16-74) and sex have been derived from 2001 and 2011 Census statistics. The 2011 Census statistics include an open-ended 65+ age categorisation, so economic activity rates for the 65–69 and 70–74 age-groups have been estimated using a combination of Census 2011 tables, disaggregated using evidence from the 2001 Census.

B.49 Rates of economic activity increased for women in all age-groups (ages 20+) between the 2001 and 2011 Censuses and in the older age-groups for men (Figure 19).

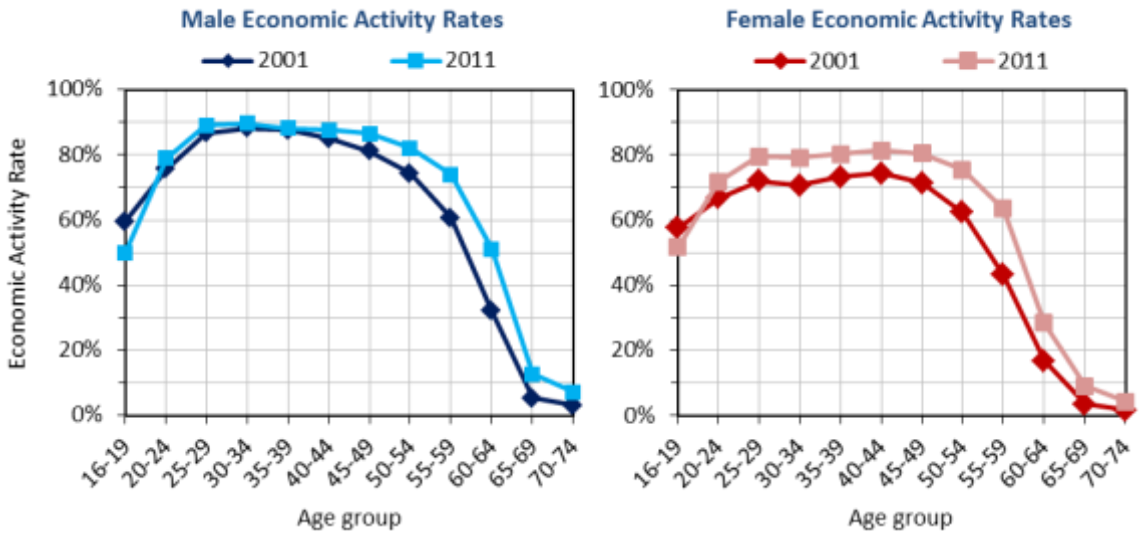


Figure 19: Sunderland economic activity rates: 2001 & 2011 Census comparison (source: ONS)

B.50 In the core demographic and jobs-led scenarios and sensitivities **D** and **H**, changes have been made to the age-sex specific economic activity rates to take account of changes to the State Pension Age (SPA) and to accommodate potential changes in economic participation which might result from an ageing but healthier population in the older labour-force age-groups.

B.51 The SPA for women is increasing from 60 to 65 by 2018, bringing it in line with that for men. Between December 2018 and April 2020, the SPA for both men and women will then rise to 66. Under current legislation, the SPA will be increased to 67 between 2034 and 2036 and 68 between 2044 and 2046. It has been proposed that the rise in the SPA to 67 is brought forward to 2026–2028[13].

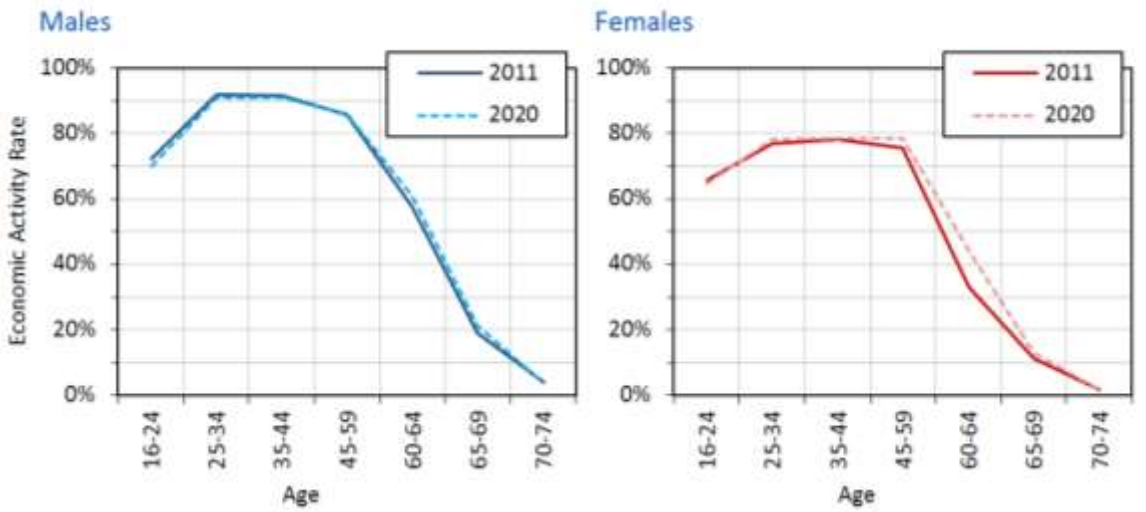
B.52 ONS published its last set of economic activity rate forecasts from a 2006 base. These incorporated an increase in SPA for women to 65 by 2020 but this has since been altered to an accelerated transition by 2018 plus a further extension to 66 by 2020. Over the 2011–2020 period, the ONS forecasts suggested that male economic activity rates would rise by 5.6% and 11.9% in the 60-64 and 65-69 age-groups respectively. Corresponding female rates would rise by 33.4% and 16.3% (Figure 20).

B.53 To take account of planned changes to the SPA, the following modifications have been made to the core economic activity rates:

- Women aged 60–64: 40% increase from 2011 to 2020.
- Women aged 65–69: 20% increase from 2011 to 2020.
- Men aged 60–64: 5% increase from 2011 to 2020.
- Men aged 65–69: 10% increase from 2011 to 2020

B.54 Note that the rates for women in the 60–64 age and 65–69 age-groups are higher than the original ONS figures (Figure 21), accounting for the accelerated pace of change in the SPA. No changes have been applied to other age-groups. In addition, no changes have been applied to economic activity rates beyond 2020. This is an appropriately prudent approach given the uncertainty associated with forecasting future rates of economic participation.

[13] https://www.gov.uk/changes-state-pension



% Change 2011 - 2020							
Sex \ Age	16-24	25-34	35-44	45-59	60-64	65-69	70-74
Males	-3.1%	-0.8%	-0.7%	0.3%	5.6%	11.9%	-5.6%
Females	-1.2%	1.8%	0.4%	3.9%	33.4%	16.3%	0.0%

Figure 20: ONS Labour Force Projection 2006 – Economic Activity Rates 2011–2020. Source: ONS

B.55 Given the accelerated pace of change in the female SPA and the clear trends for increased female labour force participation across all age-groups in the last decade, these 2011–2020 rate increases (Figure 21) would appear to be relatively conservative assumptions.

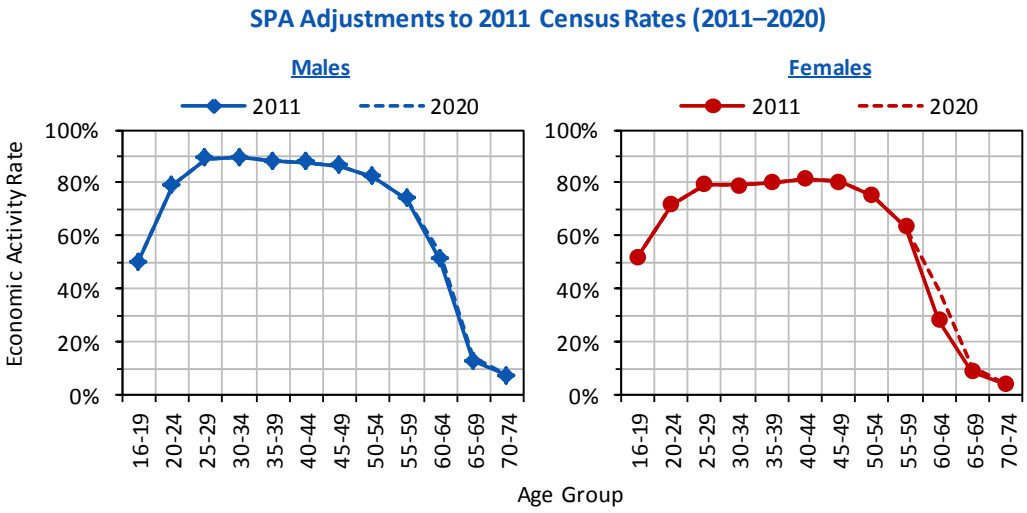


Figure 21: Core, **SENS D** and **SENS H** economic activity rates

B.56 In sensitivities **A**, **E** and **I**, the 2011 Census *aggregate* economic activity rates by sex for ages 16–74 have been applied, fixed throughout the forecast period (Figure 22). These rates have been applied to the **SNPP-2012** scenario, and to the **Jobs-led Experian** scenario.

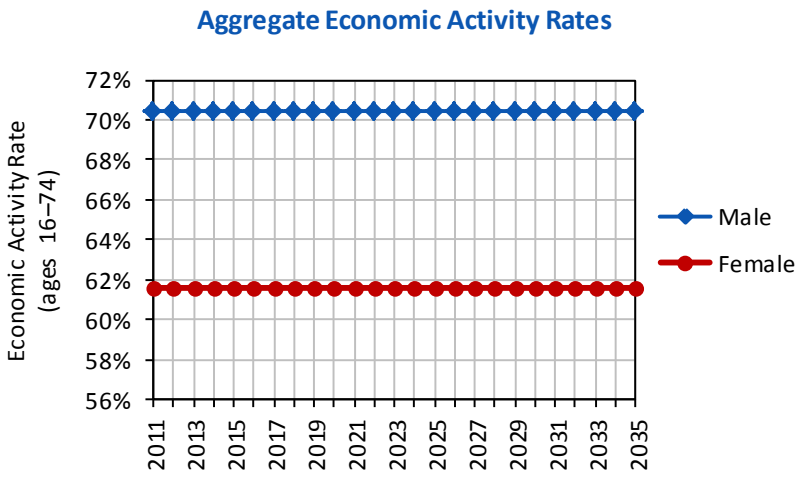


Figure 22: **SENS A**, **E** and **I** economic activity rates

B.57 In sensitivities **B**, **F** and **J**, the 2011 Census economic activity rates by 5-year age-group and sex have been applied, with the following age-specific adjustments made, based on OBR labour market analysis[14]:

Males	**Females**
• **60–64:** 17%	• **60–64:** 71%
• **65–69:** 39%	• **65–69:** 93%
• **70–74:** 20%	• **70–74:** 83%

B.58 The above alterations to the economic activity rates have been incrementally applied over the 2011–2031 period (Figure 23). From 2031, the rates have been held constant. These rates have been applied to the **SNPP-2012** scenario, and the **Jobs-led Experian** scenario.

[14] http://cdn.budgetresponsibility.org.uk/41298-OBR-accessible.pdf

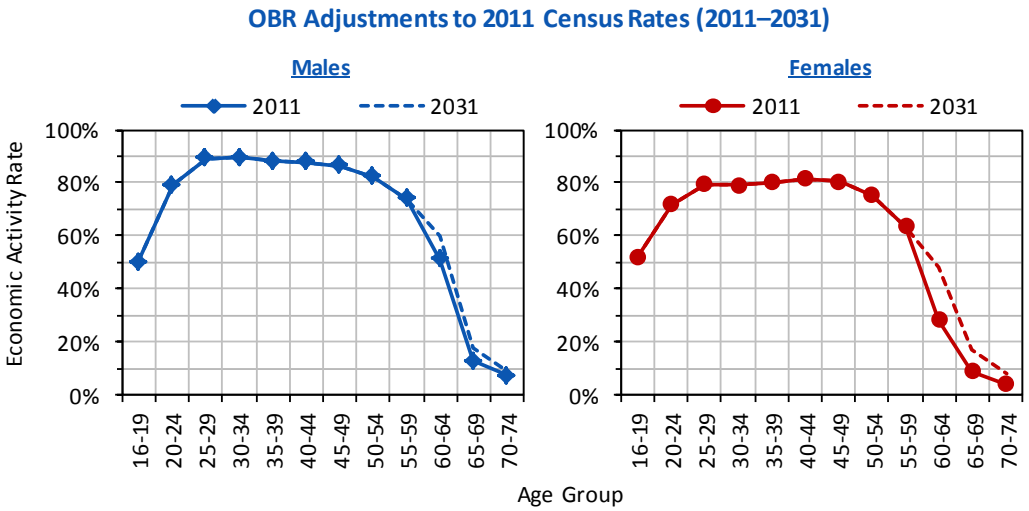


Figure 23: **SENS B**, **F** and **J** economic activity rates

B.59 In sensitivities **C**, **G** and **K**, the 2011 Census economic activity rates by 5-year age-group and sex have been applied, with the following age-specific adjustments made, based on OBR labour market analysis[15]:

Males	Females
•	• **30–34:** 5%
•	• **35–39:** 5%
•	• **40–44:** 5%
•	• **45–49:** 5%
•	• **50–54:** 5%
•	• **55–59:** 5%
• **60–64:** 17%	• **60–64:** 71%
• **65–69:** 39%	• **65–69:** 93%
• **70–74:** 20%	• **70–74:** 83%

B.60 The above alterations to the economic activity rates have been incrementally applied over the 2011–2031 period (Figure 23). From 2031, the rates have been held constant. These rates have been applied to the **SNPP-2012** scenario, and the **Jobs-led Experian** scenario.

[15] http://cdn.budgetresponsibility.org.uk/41298-OBR-accessible.pdf

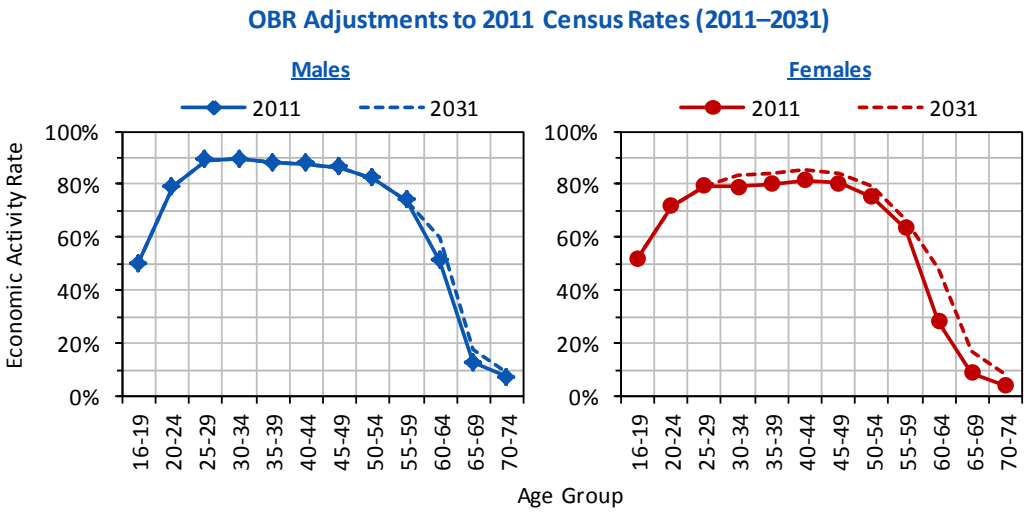


Figure 24: **SENS C**, **G** and **K** economic activity rates

Unemployment Rate

B.61 The unemployment rate determines the proportion of the labour force that is unemployed. Together with the commuting ratio, this controls the balance between the size of the labour force and the number of jobs within an area.

B.62 To account for recovery following the recession, the 2014 unemployment rate for Sunderland (9.0%), has been applied, reducing to a pre-recession (2004–2007) average of 6.5% by 2020 and remaining fixed thereafter. These unemployment rates have been sourced from the ONS model-based estimates of unemployment for Sunderland. In all scenarios and sensitivities, the same unemployment rate profile has been applied (Figure 25).

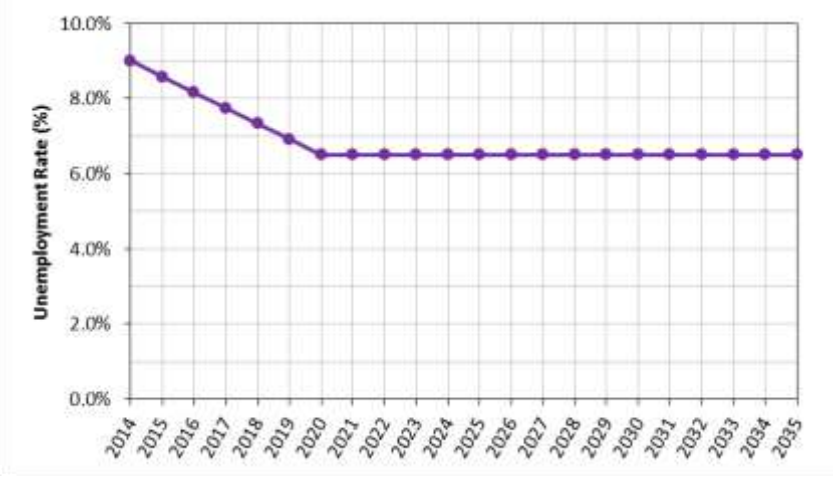


Figure 25: Unemployment rate profile used in all scenarios and sensitivities

Commuting Ratio

B.63 The commuting ratio, together with the unemployment rate, controls the balance between the number of workers living in a district (i.e. the resident labour force) and the number of jobs available in the district.

B.64 A commuting ratio greater than 1.00 indicates that the size of the resident workforce exceeds the number of jobs available in the district, resulting in a net out-commute. A commuting ratio less than 1.00 indicates that the number of jobs in the district exceeds the size of the labour force, resulting in a net in-commute.

B.65 From the 2011 Census 'Travel to Work' statistics, published by ONS in July 2014, commuting ratios have been derived for Sunderland. Between the 2001 and 2011 Censuses, the commuting ratio in Sunderland reduced from a net in-commute of 0.98 to a net in-commute of 0.96 (Table 16).

Table 16: Commuting ratio comparison

Sunderland		2001 Census	2011 Census
Workers	a	114,095	121,511
Jobs	b	117,015	126,157
Commuting Ratio	a/b	**0.98**	**0.96**

Note: 2001 data from Census Table *T101 – UK Travel Flows* ; 2011 data from Census Table *WU02UK - Location of usual residence and place of work by age* .

B.66 In the core demographic and jobs-led scenarios and sensitivities **A–C**, the 2011 Census commuting ratio of 0.96 has been applied, fixed throughout the forecast period.

B.67 In sensitivities **D–G**, the 2011 Census commuting ratio of 0.96 has been applied, incrementally reducing to 0.94 between 2014–2021 and fixed thereafter.

B.68 In sensitivities **H–K**, the 2011 Census commuting ratio of 0.96 has been applied, incrementally reducing to 0.92 between 2014–2035.