

# Leeds SHMA

## Demographic Analysis & Forecasts

August 2017

For the attention of:

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## Acknowledgements

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*The authors of this report do not accept liability for any costs or consequential loss involved following the use of the data and analysis referred to here; this is entirely the responsibility of the users of the information presented in this report.*

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# Introduction

## Context & Requirements

- 1.1 In 2007, Leeds City Council (LCC) published its Strategic Housing Market Assessment (SHMA)<sup>1</sup> which evaluated potential housing growth in Leeds, considering evidence from a 2006 base year.
- 1.2 In 2010, LCC commissioned Edge Analytics to provide a range of demographic evidence to inform an update to the SHMA<sup>2</sup>, which was later published in May 2011 by GVA. This included the 2008-based Sub-National Population Projections (SNPP) from the Office for National Statistics (ONS), the 2008-based household projection model from the Department for Communities and Local Governments (DCLG) and mid-year population estimates (MYEs) for the 2001/02–2008/09 time-period.
- 1.3 In 2013, Edge Analytics provided LCC with a demographic update which considered the revisions to the MYEs (2002–2010) and 2011-based interim population and household projections<sup>3</sup>. A subsequent update was provided in 2016, in which the latest 2014-based population and household projection models from the ONS and DCLG were considered, prior to the update of the SHMA commissioned in 2017<sup>4</sup>.
- 1.4 Arc4 has been commissioned by LCC to develop a new SHMA for Leeds. As part of this, Edge Analytics are providing a range of growth scenarios based on the most recent demographic and economic evidence to inform the SHMA. This includes:
  - MYEs for the historical (2001/02–2014/15) period
  - 2014-based SNPP from ONS

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<sup>1</sup>[http://www.leeds.gov.uk/docs/FPI\\_SHMA\\_004%20SHMA%202007%20Executive%20Summary.pdf](http://www.leeds.gov.uk/docs/FPI_SHMA_004%20SHMA%202007%20Executive%20Summary.pdf)

<sup>2</sup> [http://www.leeds.gov.uk/docs/FPI\\_SHMA\\_001%20SHMA%202010%20Final%20Report.pdf](http://www.leeds.gov.uk/docs/FPI_SHMA_001%20SHMA%202010%20Final%20Report.pdf)

<sup>3</sup> <http://www.leeds.gov.uk/docs/CD6-48a%20Summary%20of%20Demographic%20Evidence%20-%20Edge%20Analytics.pdf>

<sup>4</sup> <http://democracy.leeds.gov.uk/documents/g7587/Public%20reports%20pack%2022nd-Nov-2016%2013.30%20Development%20Plan%20Panel.pdf?T=10>

- 2014-based household projection model from DCLG
- 2017 Labour market analysis from the Office for Budget Responsibility (OBR)
- Latest March 2017 Regional Econometric Model (REM).

1.5 A range of sensitivity scenarios are also developed to consider the impact of alternative economic assumptions on the relationship between economic and population growth in Leeds.

1.6 Leeds is a key part of Leeds City Region (LCR) which extends to nine other districts<sup>5</sup> within Yorkshire & The Humber. In early 2017, Edge Analytics provided demographic evidence<sup>6</sup> to inform developments within the region. The methodology and approach taken in developing the scenario evidence for LCR aligns with the demographic analysis undertaken in this report to inform the development of Leeds' SHMA. In addition to a range of demographic scenarios, the LCR analysis also considered the December 2016 economic forecasts from the Regional Econometric Model (REM), seeking to align demographic and economic modelling. A similar approach has been taken in this modelling, however using the latest March 2017 REM forecast.

## Approach

### Official Guidelines

1.7 The development and presentation of demographic evidence to support local housing plans is subject to an increasing degree of public scrutiny. The National Policy Planning Framework (NPPF) and Planning Practice Guidance (PPG) provide guidance on the appropriate approach to the objective assessment of housing need. Guidance is also provided by the Planning Advisory Service (PAS)<sup>7</sup>, with practical advice on assessing the housing needs and establishing housing targets for an area.

1.8 In the objective assessment of need, demographic evidence is a key input. 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 and the most recent demographic evidence, including Office for National Statistics (ONS) population estimates, should

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<sup>5</sup> Leeds City Region is a Local Enterprise Partnership (LEP) which consists of ten local authorities: Bradford, Calderdale, Kirklees, Wakefield, Barnsley, Selby, York, Craven, Harrogate and Leeds.

<sup>6</sup> Note that this analysis was undertaken for the aggregate LCR and did not present demographic evidence at district level

<sup>7</sup> <http://www.local.gov.uk/sites/default/files/documents/objectively-assessed-need-9fb.pdf>

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).

- 1.9 The choice of assumptions used for demographic forecasting has an important impact on scenario outcomes. This is particularly the case when trend projections are considered alongside 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

- 1.10 In accordance with the PPG, Edge Analytics has used POPGROUP (v.4) technology to develop a range of growth scenarios. In each of the scenarios, historical data is included for the 2001–2015 period, with scenario results presented for Leeds' designated plan period, 2017–2033.
- 1.11 The scenario analysis is prefaced with a 'demographic profile' of Leeds, illustrating its geographical context, its 'components' of population change (births, deaths, and migration) and its historical pattern of commuting, migration and student flows ([Section 2](#)).
- 1.12 The starting point of the scenario analysis is the 2014-based SNPP and sub-national household projection for Leeds ([Section 3](#)). A number of alternative trend scenarios, using varying migration assumptions, have been developed and are compared to the 2014-based benchmark scenario in [Section 4](#).
- 1.13 In [Section 5](#), the effect of the changing population age structure on Leeds' labour force is considered, linking the demographic scenarios to an estimated employment growth requirement using assumptions on economic activity rates, unemployment and commuting. The relationship between demographic change and economic growth forecasts from the latest REM (March 2017) has been considered, seeking to align the two approaches. An employment growth trajectory reflecting higher economic growth has also been considered, in context of a range of anticipated development projects and initiatives in Leeds. Additionally, 'sensitivity' scenarios have been developed to consider the effect of variant economic assumptions on demographic outcomes.
- 1.14 Household and dwelling growth have been estimated using assumptions from the 2014-based DCLG household projection model for Leeds, with sensitivities which consider the implications of adjustments to headship rates for younger adult age groups (presented in [Section 6](#)).

- 1.15 **Section 7** summarises the new scenario evidence, with the Appendix to this document providing a summary of the POPGROUP methodology and further detail on key data and assumptions used in the development of the forecasts.
- 1.16 It is important to note that the use of POPGROUP methodology and approach closely aligns with that undertaken to develop scenario evidence to inform the SHMA (2010) update. However, whilst the approach is similar, there is a range of new evidence and datasets that have subsequently been made available, resulting in important differences in key data inputs and assumptions. These include revisions to mid-year population estimates (2002–2010), the release of the 2011 Census data, latest ONS 2014-based SNPP and DCLG household projection model, economic assumptions and modelling from the REM and labour market analysis from the Office for Budget Responsibility (OBR).

# 2 Area Profile

## Geography

2.1 The Yorkshire and Humber region is home to approximately 5.39 million people, 14.4% of which reside within Leeds (compared to 10.6% in Sheffield and 9.9% in Bradford). Leeds is bordered by the districts of Harrogate, Selby, Wakefield, Kirklees and Calderdale (Figure 1).

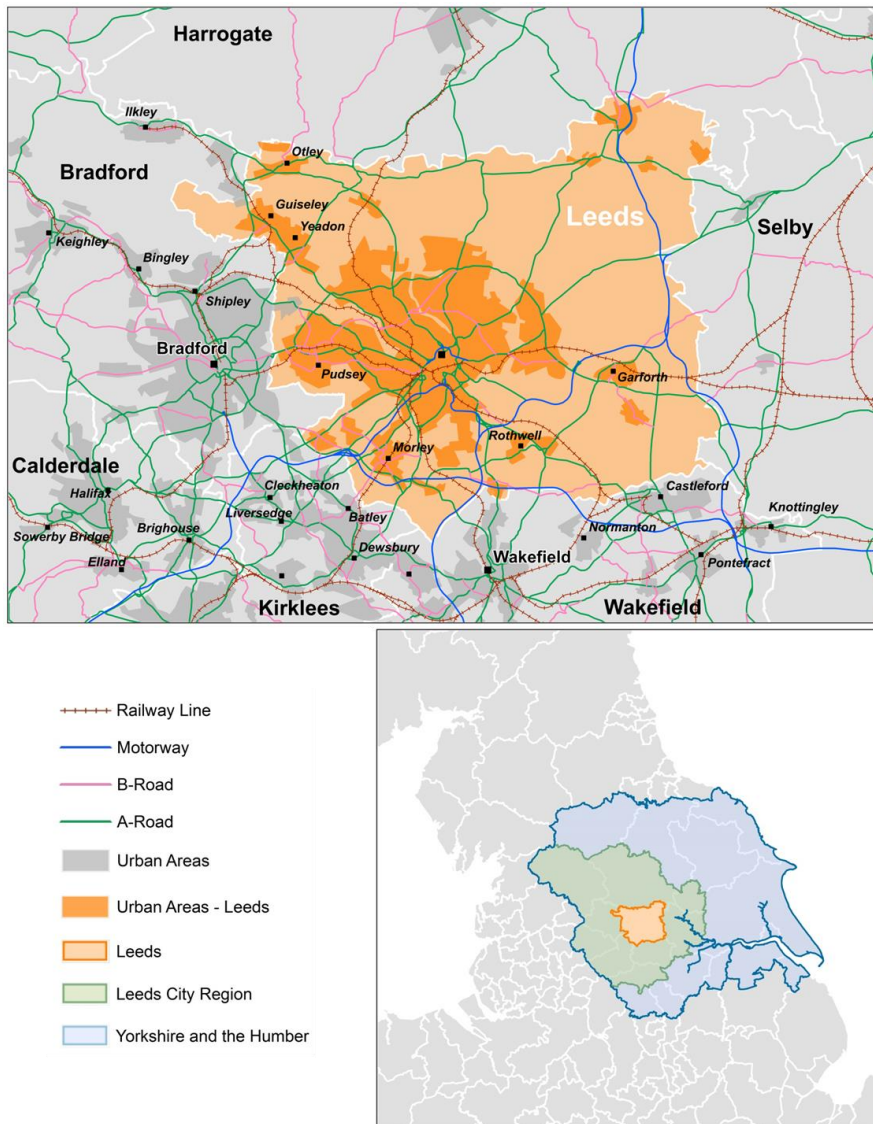


Figure 1: Leeds context map



## Population Growth Profile

- 2.2 The 2015 MYE for Leeds suggests a population of 774,060, an 8.2% increase since 2001 (Table 1). This rate of growth is similar to the regional figure of 8.3% over the 2001–2015 period, however is *lower* than the Leeds City Region (LCR) and national average (9.5% and 10.8% respectively).

Table 1: Leeds population change comparison (Source: ONS)

Area	Population Change 2001–2015			
	2001	2015	Change	Change %
Leeds	715,609	774,060	58,451	8.2%
Leeds City Region	2,764,244	3,026,671	262,427	9.5%
Yorkshire & The Humber	4,976,643	5,390,576	413,933	8.3%
England	49,449,746	54,786,327	5,336,581	10.8%

- 2.3 Whilst the rate of Leeds' population growth has been relatively low compared to the LCR, it has experienced an accelerated growth rate since 2012 (Figure 2).

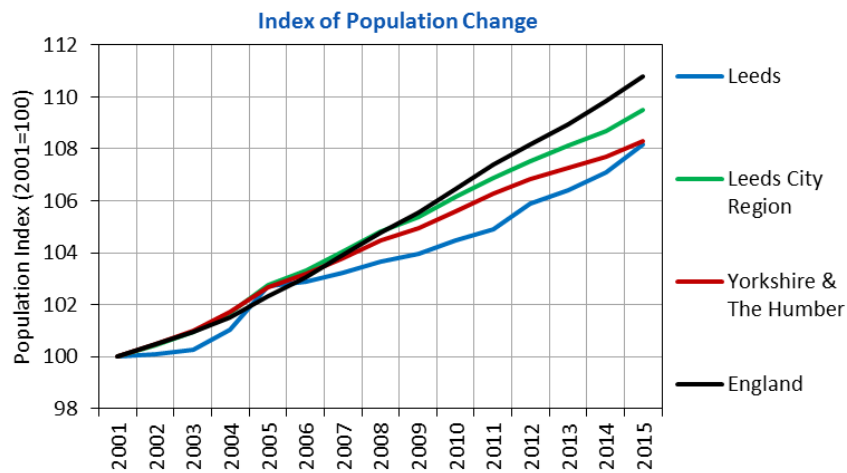


Figure 2: Index of population change 2001–2015

- 2.4 Between Censuses, MYEs are derived through the application of 'components of change' (i.e. counts of births and deaths and estimates of internal and international migration) to the previous year's MYE. Prior to the release of the 2011 Census, ONS revised the MYEs back to 2004/05, making key changes to the methodology in calculating the components of population change. This methodology was used to redistribute the national estimates of international migration between local authorities in England and Wales, resulting in a reduction in the estimated annual net impact of international migration upon Leeds' population growth.

2.5 Following the release of the 2011 Census, the MYEs for the full historical 2002–2010 period were subject to further adjustment (rebasings); ensuring the correct transition of the age profile over the 2001–2011 decade<sup>8</sup>. At the 2011 Census, Leeds' resident population was 751,485, a 5.0% increase from the 2001 Census. The Census population count proved to be *lower* than that suggested by the trajectory of growth from the previous MYEs. As a result, the revised, final MYEs are significantly *lower* than previous population estimates (Figure 3).

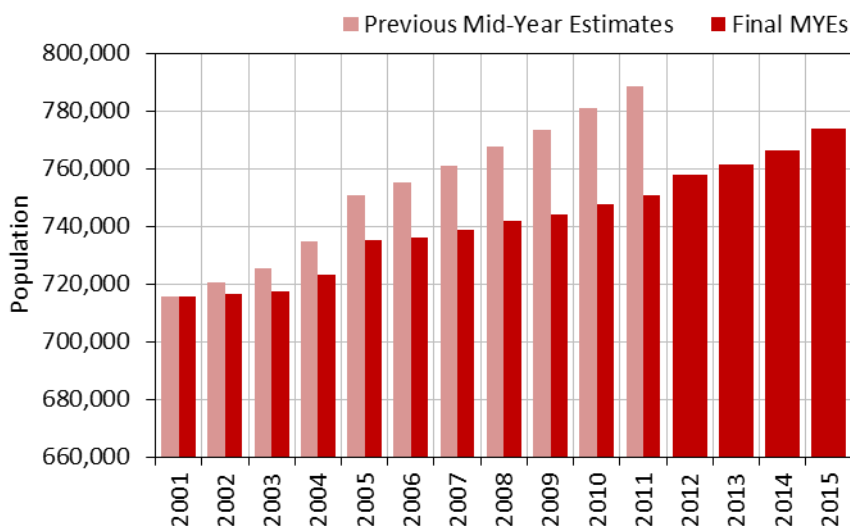


Figure 3: Leeds mid-year population estimates, 2001–2015

2.6 The annual change in Leeds' population has varied from +771 (0.1%) in 2001/02 to a maximum of +12,012 (1.7%) in 2004/05, a spike that is a likely result of previous mis-estimation of international migration pre-Census (Figure 4). In 2011/12, the rate of Leeds' population growth increased to +6,972 (0.9%), falling to almost half the rate of change in the following year, +3,833 (0.5%). However, the rate of growth has since increased in the last two years, reaching +7,661 (1.0%) in 2014/15, the highest growth since 2004/05.

<sup>8</sup> Methods used to revise the subnational population estimates for mid-2002 to mid-2010

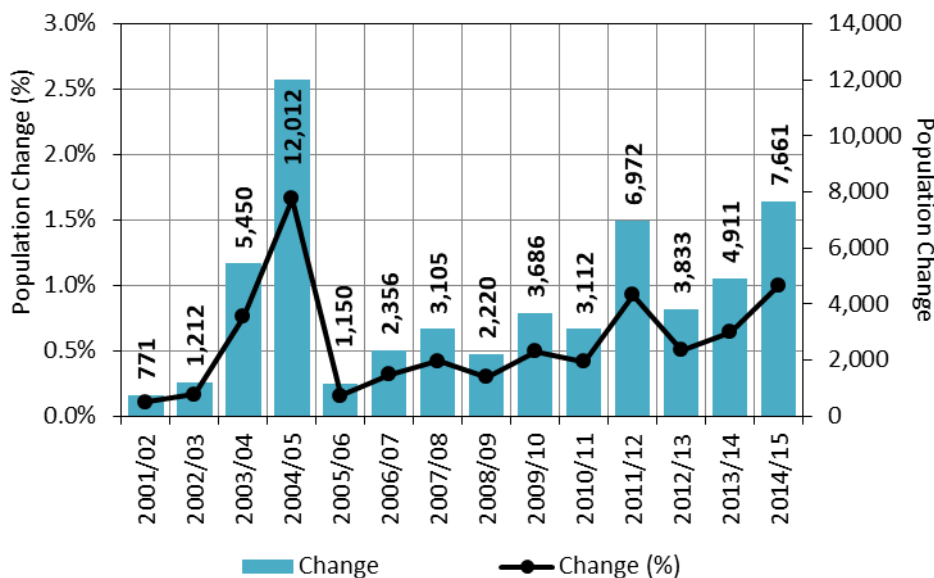


Figure 4: Leeds MYE annual population change (2001/02–2014/15)

- 2.7 The rebasing of the MYEs involved the recalibration of the components of change for 2001/02–2010/11 (Figure 5). After methodological changes and errors in the components were accounted for, the remaining difference between the expected 2011 mid-year estimate and the 2011 Census-based mid-year estimate is referred to as ‘unattributable population change’ (UPC) (Figure 5b). For Leeds, the impact of the UPC component was a significant reduction to the population in each inter-Census MYE, an average of -4,000 per year to 2011.
- 2.8 The ONS has not attributed UPC to any one component-of-change, however, suggesting that it may be due to the Census estimates themselves, international migration estimation or internal migration counts. For Leeds, this reduces international migration significantly with a total reduction of 40,000 over the historical 2001/02–2010/11 period (Figure 5c).

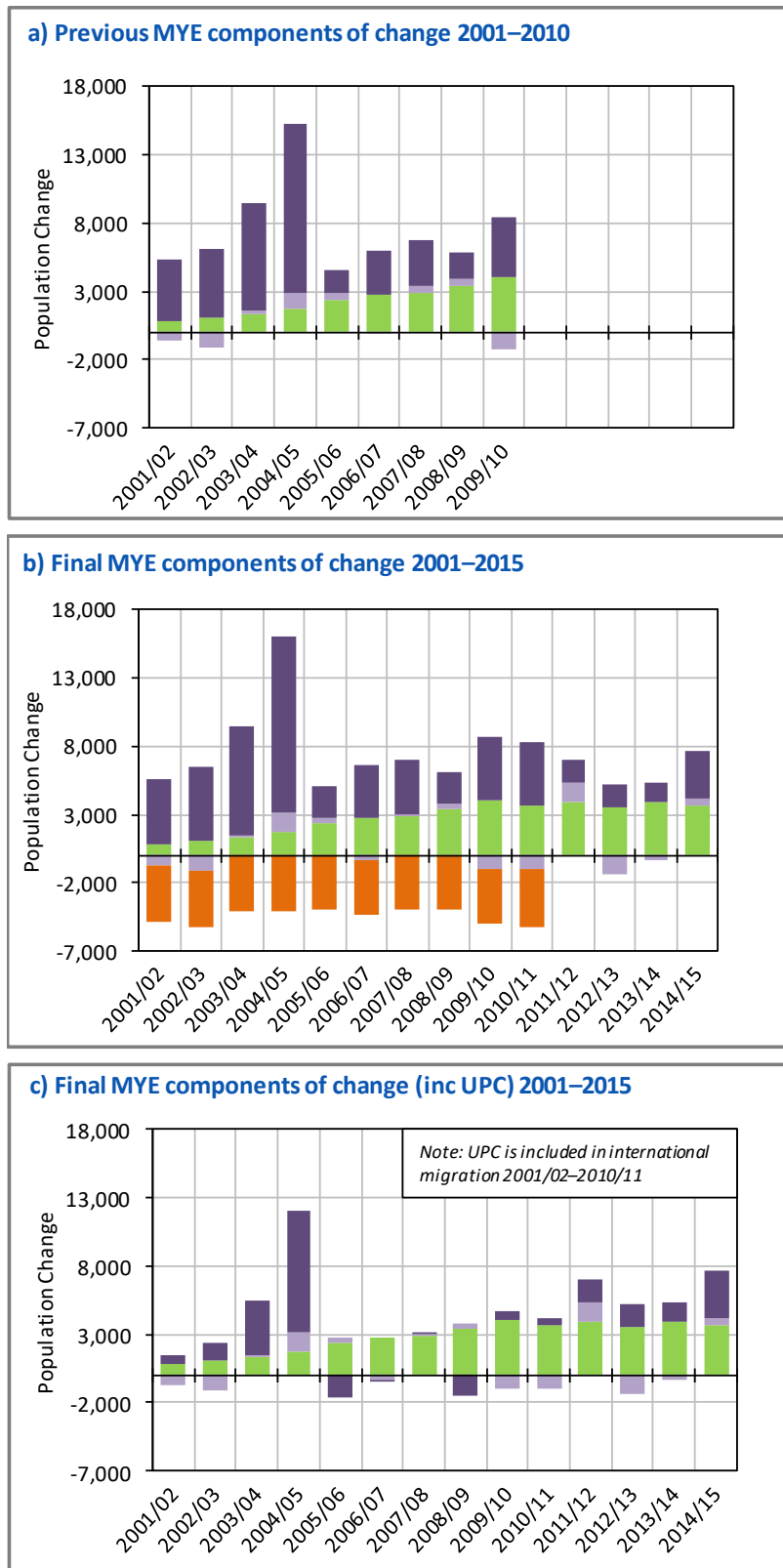


Figure 5: Leeds MYE components of population change (Source: ONS)

2.9 Leeds' population change since 2001/02 has been driven by a combination of natural change, internal and international migration. With the inclusion of the UPC in international migration, natural change has historically been the dominant driver of population change (an excess of births over deaths), a reflection of Leeds' relatively youthful population age structure (Figure 5c).

2.10 Over the 2001/02–2014/15 historical period, net internal migration (i.e. the exchange of migrants between Leeds and other parts of the UK) has had a varied but small impact on Leeds' population change (Figure 5c). However, the greatest net outflows have been recorded over the latter half of the historical period. With the inclusion of the UPC component, international migration is estimated to have had a positive impact on population growth, in all but 2005/06 and 2008/09. International Migration

2.11 The disaggregation of Leeds' net international migration statistics to immigration and emigration totals reveals some important trends. Between 2006/07 and 2012/13, the immigration statistics suggest a reduction in the annual number of people migrating to Leeds from outside the UK (Figure 6). However, in the latter two years of the historical period (2013/14 and 2014/15), immigration to Leeds has increased. The trend in emigration has indicated an overall decline between 2005/06 when emigration was at the highest historical total and 2009/10. Since then, emigration has suggested a steady increase, with the exception of 2014/15 which reflected a reduction in the estimated outflow of migrants from Leeds.

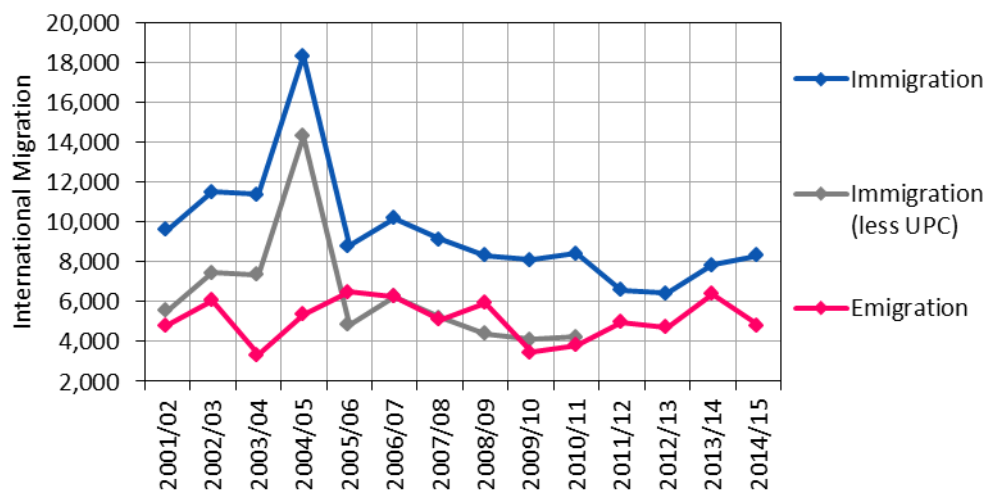


Figure 6: Leeds international migration flows 2001/02–2014/15

2.12 The increase in immigration since 2012/13 is reflected in the profile of National Insurance Number (NINo) statistics to 2016 (Figure 7). From a 2007 peak, NINo registrations fell to a low

point in 2012 but have risen sharply thereafter. Whilst the registration of migrants from New Commonwealth countries has reduced over this period, the number of registrations from EU13 and other EU countries has grown.

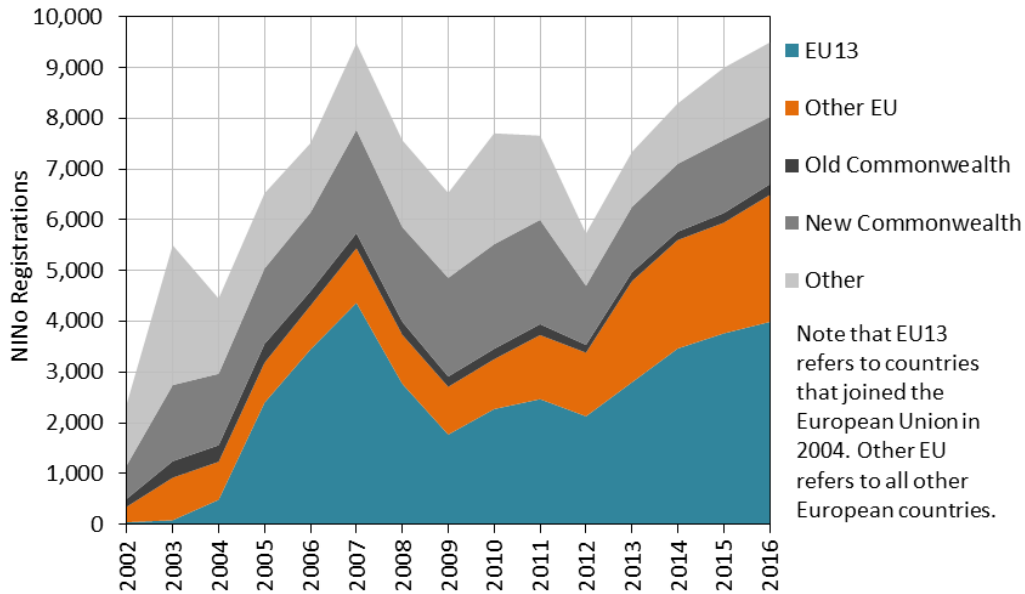


Figure 7: Leeds NINO Registrations by Country of Origin, 2002–2016 (Source: DWP)

2.13 Historically, migrants from Poland have been the dominant component of annual NINO registration in Leeds (Table 2), although numbers have reduced since 2012 to a 15% share in 2016 (Table 2). Since 2012, migrant workers from Poland and Romania comprise 26% of total NINO registrations to Leeds, with the latter rising sharply following the lifting of restrictions on Bulgarian and Romanian migration to the UK from January 1st 2014.

Table 2: Leeds NINo registration by Top-20 countries of origin (Source: DWP)

Top 20 countries of origin	Sum 2002–2016	Average per year		Share 2012–2016
		2002–2011	2012–2016	
<b>All Areas</b>	105,139	6,529	7,970	<b>100%</b>
1 Poland	17,835	1,192	1,184	15%
2 India	9,415	655	574	7%
3 Romania	5,240	61	925	12%
4 Pakistan	4,336	335	197	2%
5 Spain	4,280	125	606	8%
6 Lithuania	3,586	221	275	3%
7 China	3,468	253	187	2%
8 Italy	3,189	105	428	5%
9 Nigeria	2,792	176	207	3%
10 Portugal	2,513	102	298	4%
11 Zimbabwe	2,438	225	37	0%
12 Slovakia	2,374	160	154	2%
13 Czech Republic	2,272	125	205	3%
14 France	2,233	142	162	2%
15 Iraq	2,004	177	46	1%
16 Latvia	1,864	164	110	1%
17 Iran	1,760	124	105	1%
18 Australia	1,630	119	88	1%
19 Germany	1,470	98	99	1%
20 Ireland	1,469	86	122	2%

2.14 NINo statistics are a useful but imperfect measure of international migration. NINo registrations provide an indication of those registering to work in the UK, regardless of length of stay. ONS population statistics only estimate migration totals for international moves of more than twelve months duration. NINo registrations do not include a record of any accompanying dependants and, more importantly, do not include any information on subsequent *emigration* from the UK.

2.15 ONS uses NINo statistics in combination with GP registration statistics and HESA international student data, to estimate immigration at a local level. Leeds' allocation of immigration totals will be influenced by its high NINo totals and relatively large number of international students studying at its three Universities (Figure 8). ONS population statistics only estimate migration totals for international moves of more than twelve months duration, so any students that undertake courses for less than twelve months duration should, theoretically, not appear in immigration and emigration statistics. As previously illustrated in Figure 5 and Figure 6, international migration was recorded as particularly high in 2004/05, driven by increased

immigration flows. However, this peak was not reflected in the alternative datasets (Figure 8), reflecting the likelihood of a residual error in this year.

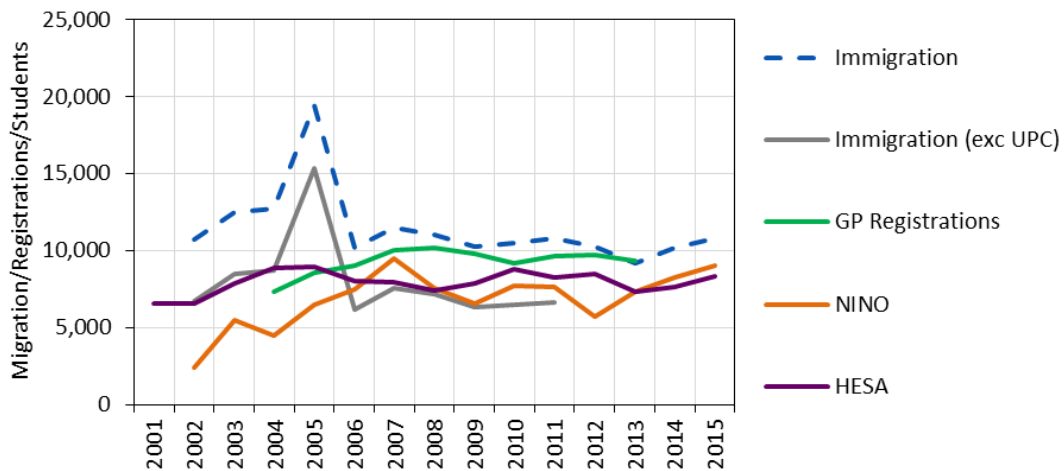


Figure 8: Leeds international migration statistics

2.16 As part of its post-2011 Census quality assurance of its MYE and as part of its development of an ‘administrative’ alternative to the Census<sup>9</sup>, ONS has provided a range of evidence on how mid-year populations compare to populations derived from administrative data sources. Whilst the administrative data are a research output and remain some way from having ‘National Statistics’ status, the new Statistical Population Dataset (SPD) does provide a very useful perspective on potential issues with the robustness of the MYEs. The latest SPD has used record-matching from a combination of NHS Patient Register, School Census, DWP/HMRC statistics and HESA student data, to derive an alternative population estimate for each local authority, by age and sex.

2.17 A direct comparison of the 2015 MYE with the 2015 SPD for Leeds provides an illustration of potential under and over-count issues associated with the two sources (Figure 9). The dominant feature is the relatively high population of young adults aged 17–24 in the MYE; combined with a significantly lower population MYE counts in the 25+ age groups. These are key migrant, student and graduate age-groups and are most likely the higher SPD population, a reflection of the difficulties associated with ‘de-registration’ of students in the GP register. Leeds’ GP register continues to maintain a population total that is inconsistent with Leeds’ mid-year estimate and

<sup>9</sup> Research outputs estimating the size of the population in England and Wales: 2016 release. ONS <https://www.ons.gov.uk/census/censustransformationprogramme/administrativedatacensusproject/administrativedatacensusresearchoutputs/sizeofthepopulation/researchoutputsestimatingthesizeofthepopulationinenglandandwales2016release>



population Census counts. The 2015 SPD for Leeds estimates a population of 804,482, compared to 774,060 in the 2015 ONS MYE (a 4% difference).

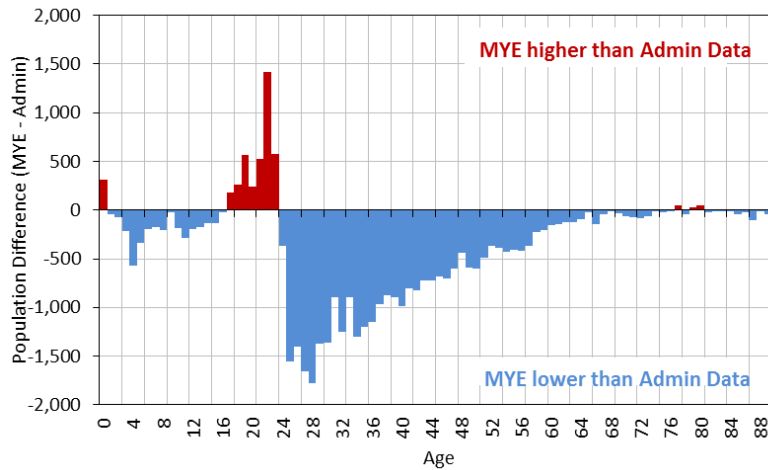


Figure 9: Leeds MYE and SPD comparison, 2015

## Students

- 2.18 Leeds has a large student population, with approximately 60,500 domestic and international students<sup>10</sup> attending its three universities in 2015: University of Leeds, Leeds Beckett University and Leeds Trinity University. Total student numbers have fluctuated over the last fourteen years, reaching a low point 2012/13. However, the recent 2014/15 HESA records suggest an increase in numbers thereafter.
- 2.19 HESA data suggests that there were approximately 8,300 international students studying both undergraduate and postgraduate courses at the three universities in 2015, a total that has steadily increased since 2012/13 (Figure 10).

<sup>10</sup> This includes students in both part time and full time study.

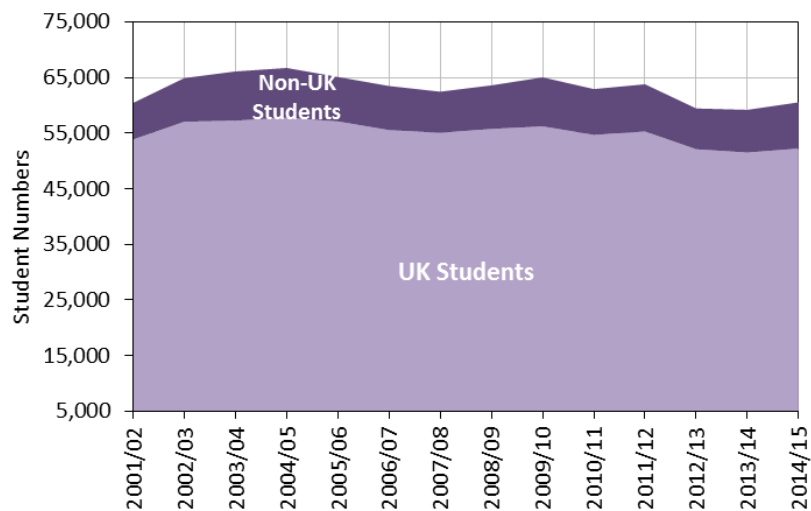


Figure 10: Leeds students, 2001–2015

- 2.20 Whilst these international student numbers are relatively high, the large majority of students will return to their country-of-origin at the end of study; prompt departure from the UK is a requirement that has been more stringently enforced by the UK government as part of its tougher restrictions on non-EU migration since 2012.
- 2.21 In the development of growth scenario for Leeds, student populations are not identified explicitly in the ONS annual MYEs or in the underpinning migration components of change. However, student migration flows will be implied within the population estimates, in both internal and international migration components and historical student numbers will therefore contribute to derived trend migration assumptions. Student populations that reside in communal establishments are excluded when calculating household growth but included in total population forecasts.

## Internal Migration

- 2.22 Internal migration statistics record the in-flow and out-flow of population to and from Leeds, from and to elsewhere in the UK. The average annual change of Leeds' population as a result of internal migration exchanges has averaged -127 per year since 2001/02 (Figure 11). This illustration reflects the 'components-of-change' profile but also presents the separate in-migration and out-migration flows that make up the net total.
- 2.23 During the 2001/02–2014/15 period, internal *in*-migration averaged 35,326 per year, with internal *out*-migration averaging 35,453 people per year. The variance between internal *in*-migration and *out*-migration has remained relatively stable since 2001, with both subject to a

steady increase year-on-year. A sharp increase in the estimated level of *in*-migration to Leeds in 2011/12 resulted in an increase in net migration, followed by a decrease in the subsequent year (2012/13). *In*-migration to Leeds from the rest of the UK has increased since 2013, with *out*-migration flows falling in 2014/15.

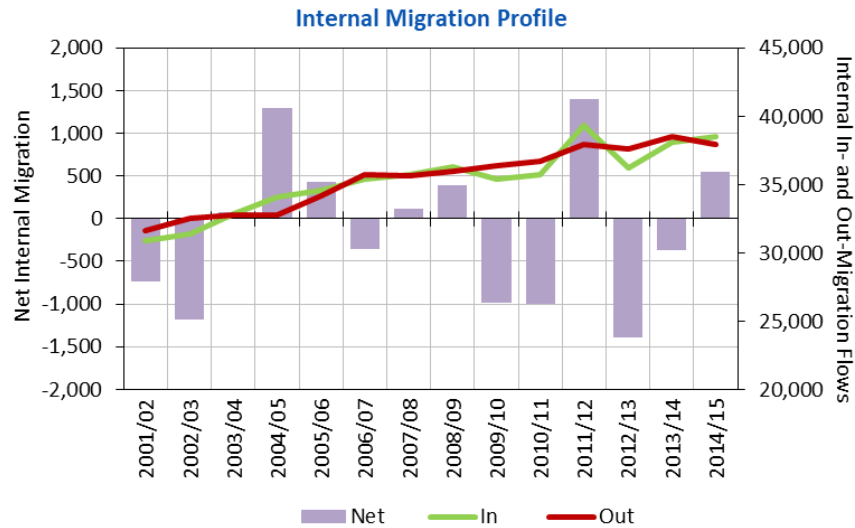


Figure 11: Leeds internal migration profile, 2001/02–2014/15 (source: ONS)<sup>11</sup>

2.24 In terms of migration linkages between Leeds and surrounding areas, the largest *positive* net exchanges (i.e. a higher inflow than outflow) have been with Hull and Sheffield (Figure 12). For the net *outflow* exchange, the dominant flow has been between Wakefield, Harrogate and Selby (Figure 12).

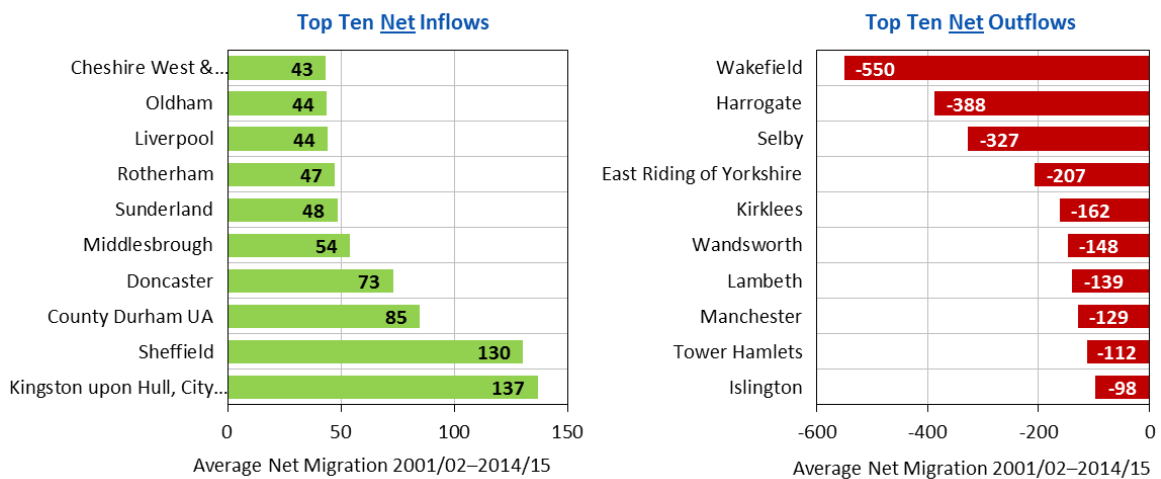


Figure 12: Top-10 internal migration net inflows & outflows, average 2001/02–2014/15 (source: ONS)

<sup>11</sup> Note that net migration flows are presented on a different scale to the internal in and out-migration flows

2.25 The historical internal in-, out- and net migration flows between Leeds and its neighbouring local authorities are summarised in Figure 13. Leeds has consistently been a net contributor of population to Wakefield, Harrogate, Selby and Kirklees. A variable but small net inflow and outflow is evident for the migration exchange with York, with only Bradford being a key net exporter of population to Leeds since 2010/11.

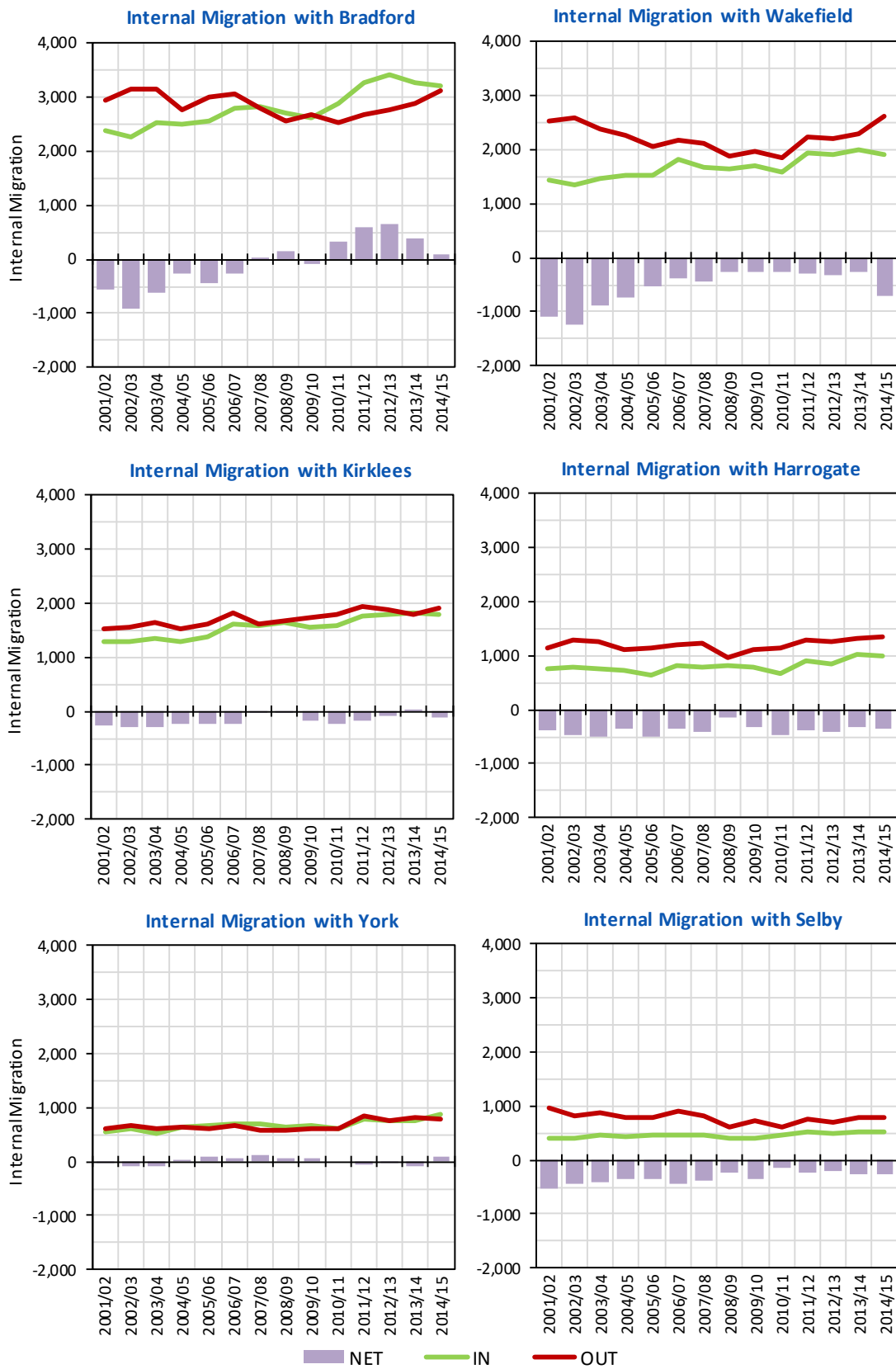


Figure 13: Historical internal migration flows between Leeds and neighbouring local authorities (2001/02–2014/15). Green indicates the flows to Leeds from the neighbouring authority and red the flows from Leeds (Source: ONS)

2.26 The age profile of migration reveals that Leeds has experienced a net outflow in all age-groups apart from 15–19 year olds (Figure 14). The large net inflow at age 15–19 is associated with the student population to Leeds’ universities, with a smaller corresponding net outflow reflected in the 20–24 and 25–29 age groups. These net outflows in the 20–29 age groups are associated with the return flow of graduates and the migration of young adults for employment opportunities.

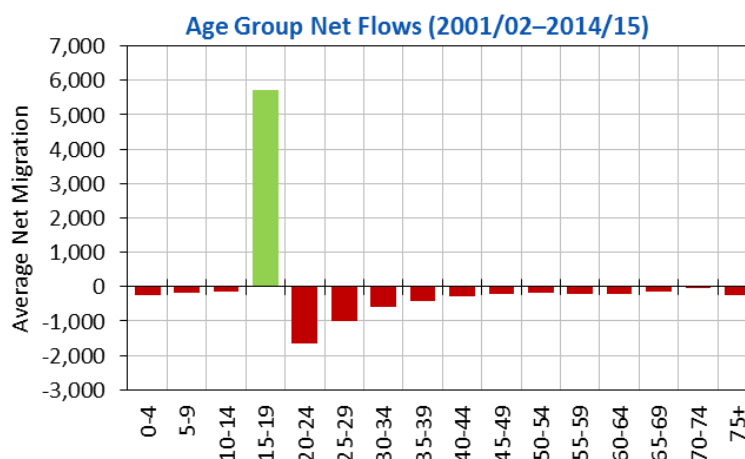


Figure 14: Leeds internal migration age profile, 2001/02–2014/15 (source: ONS)

2.27 The annual impact of migration flows in the younger age groups over the 2001/02–2014/15 historical period is considered in Figure 15. Internal in- and out-migration flows of 15–19 age group have remained relatively stable over the historical period, experiencing a peak in net migration in 2011/12 as a result of a sharp increase in in-migration flows.

2.28 In the 20–24 age group, internal out-migration flows increased to 2008/09, but have remained stable thereafter. Since 2001, there has been an increasing net outflow of 20–24 year-olds from Leeds. Internal in- and out-migration in the 25–29 age group has remained relatively stable over the 2001/02–2014/15 period, with the pattern being a loss of population in this age group.

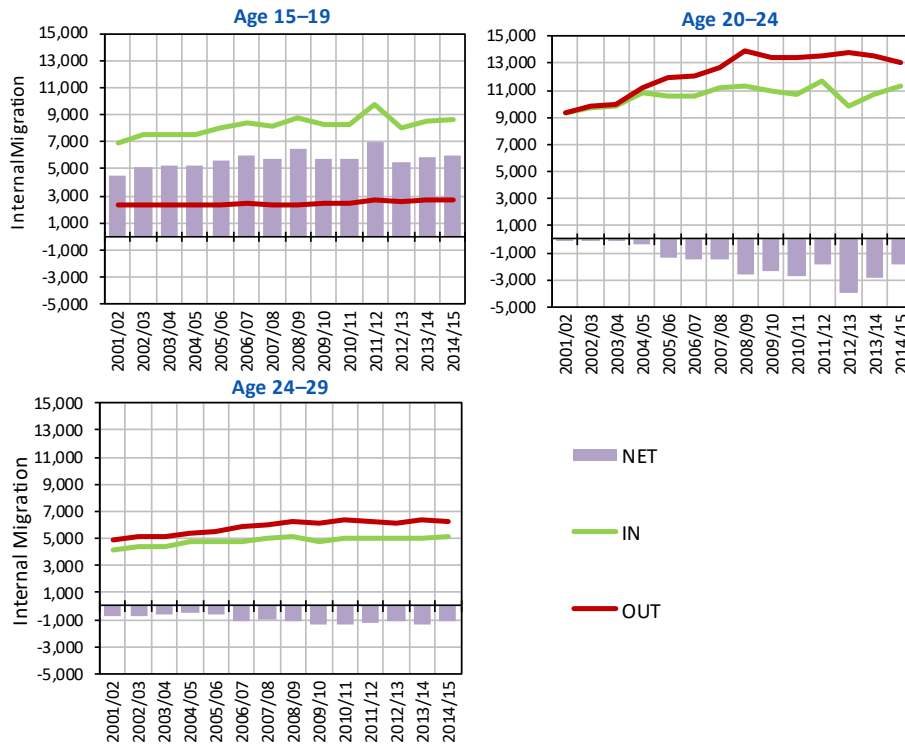


Figure 15: Leeds migration flows by age group, 2001/02–2014/15 (source: ONS)

## Age Structure

2.29 When considering future housing needs and the size and shape of the resident labour force, the age structure of Leeds’ population is a key factor. Figure 16 compares Leeds’ age profile to the City Region, Region and to England in total, using the 2014 base year of the latest ONS sub-national projections.

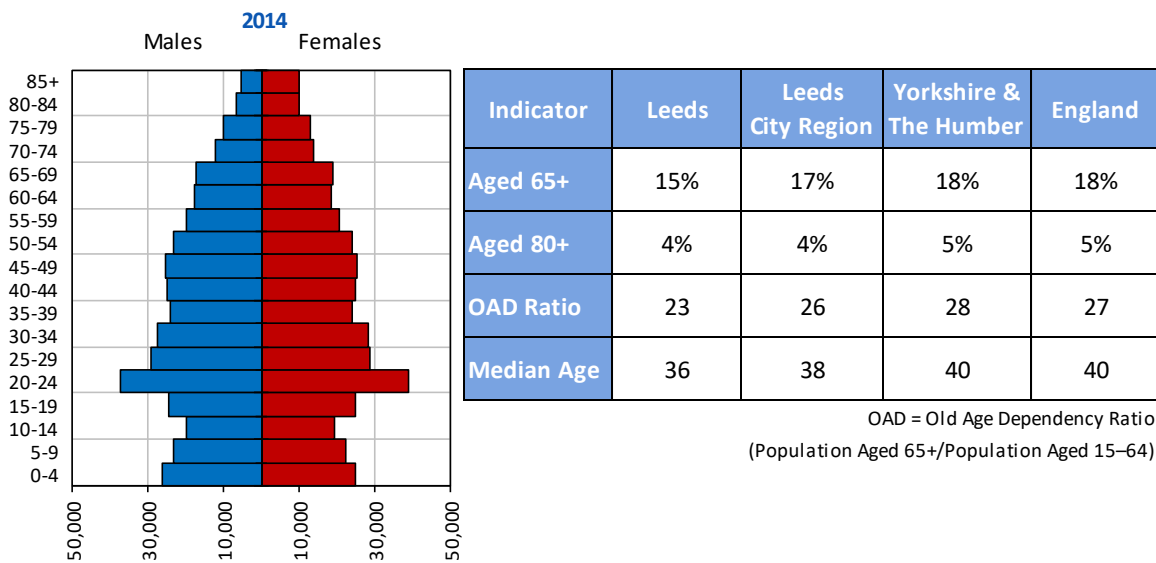


Figure 16: Leeds population age structure (source: ONS)

2.30 Leeds has a more youthful age profile than the City Region, Yorkshire and Humber and England, with 15% in the 65+ age-range and a median age of 36. This compares with 18% in the 65+ age range and a median age of 40 for both the Yorkshire and the Humber region and England. Leeds has an Old Age Dependency (OAD) ratio of 23; the size of Leeds’ population aged 65+ is equivalent to 23% of its 15–64 age-group population in 2014. This compares to 26%, 28% and 27% for the City Region, Yorkshire & Humber region and England respectively.

## Historical Housing Completions

2.31 A comparison of Leeds’ estimated population growth with a history of annual housing completions reveals some disparity in their respective trends since 2002 (Figure 10). A higher housing completions rate in the early part of the historical period contrasts with the relatively low population change (excluding the year 2004/05).

2.32 Following 2010/11, the rate of population growth increased, however this has not been reflected in housing completions which fell from an average of approximately 3,145 per year (2001/02–2009/10) to 2,058 (2011/12–2015/16). Both housing completions and population change have increased over the latter three years of the historical period, however not at the same rate.

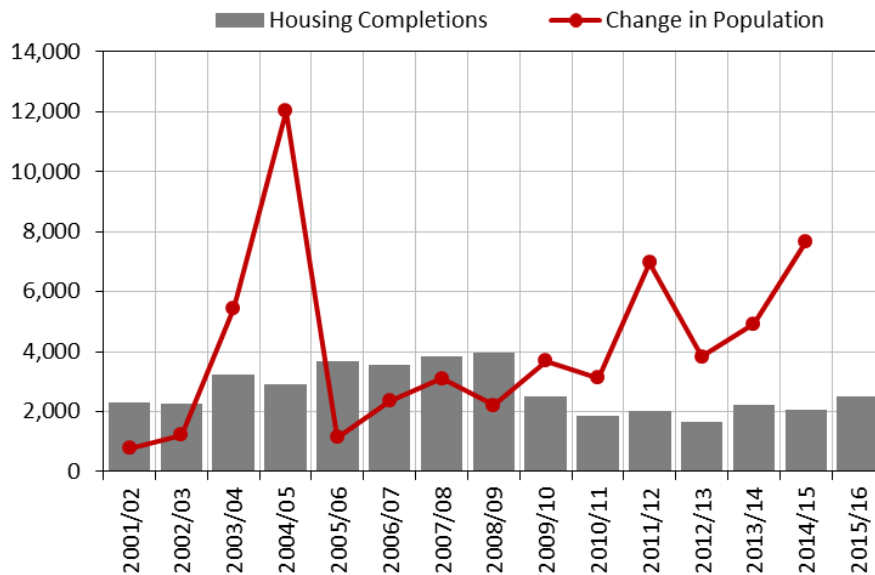


Figure 17: Leeds housing completions and population change



## Commuting Flows

- 2.33 With regards to travel-to-work patterns, the 2011 Census recorded 356,677 workers aged 16+ living within Leeds and 411,605 workers aged 16+ working within Leeds.
- 2.34 Approximately 81.4% of Leeds’ labour force both lives and works within the district, with 4.8% commuting to Bradford, 3.6% to Wakefield and the remaining 10.3%<sup>12</sup> elsewhere (Figure 18).
- 2.35 In terms of employment, the majority of Leeds’ jobs are taken up by the local workforce (70.5%), with 6.7% of workers commuting from Bradford, 5.2% from Wakefield, 4.8% from Kirklees and 2.1% from Harrogate<sup>13</sup> (Figure 18).

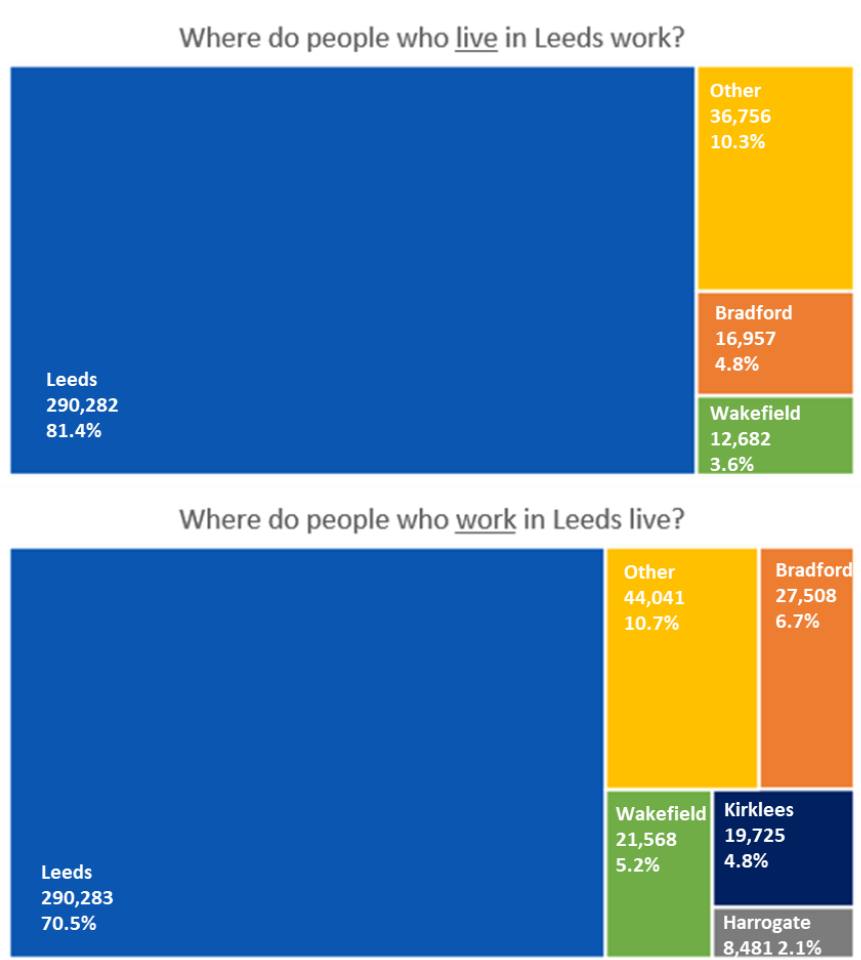


Figure 18: 2011 Census commuting flows: workers and employment (aged 16+)

<sup>12</sup> This includes flows from Kirklees (6,950, 1.9%), Harrogate (6,019, 1.9%), York (2,582, 0.7%), Calderdale (2,401, 0.7%), Selby (2,047, 0.6%), Sheffield (1,154, 0.3%), Barnsley (893, 0.3%) and other districts (4.1%)

<sup>13</sup> 10.7% commute from elsewhere including: Selby (6,193, 1.5%), York (5,023, 1.2%), Calderdale (4,988, 1.2%), Barnsley (3,518, 0.9%), Sheffield (2,477, 0.6%), Doncaster (2,005, 0.5%), East Riding of Yorkshire (1,858, 0.5%) and Rotherham (1,212, 0.3%)

2.36 The balance between the number of workers and jobs in Leeds changed slightly over the 2001–2011 Census decade; with a greater increase in the number of resident workers (+33,868) compared to jobs (+33,584) (Table 3). In 2011, Leeds had a commuting ratio of 0.87, compared to a slightly higher in-commuting ratio of 0.85 in 2001<sup>14</sup>.

Table 3: Leeds Census travel-to-work commuting ratios, ages 16+ (Source: ONS)

Leeds		2001 Census	2011 Census
Workers	<i>a</i>	322,809	356,677
Jobs	<i>b</i>	378,021	411,605
Commuting Ratio	<i>a/b</i>	<b>0.85</b>	<b>0.87</b>

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* .

<sup>14</sup> 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. The number of workers is calculated by the number of people who are 'usually resident' in Leeds and work anywhere in the UK (including Leeds), offshore and abroad, from home, in 'no fixed place'. The number of jobs includes all people who work in Leeds, work from home and who have no fixed place of work.

# 3 Official Projections

- 3.1 In this section, the latest population and household projections from the ONS and the DCLG are considered. Together with Section 2, this section presents the context for the development of a range of alternative growth scenarios, detailed in Section 4.

## Official Statistics

- 3.2 In the absence of a population register, the UK continues to rely on the ten-yearly Census for a definitive count of population within its constituent local authority areas. Between Censuses, MYEs are calculated, using data on births, deaths, internal and international migration to quantify annual growth (Figure 19).

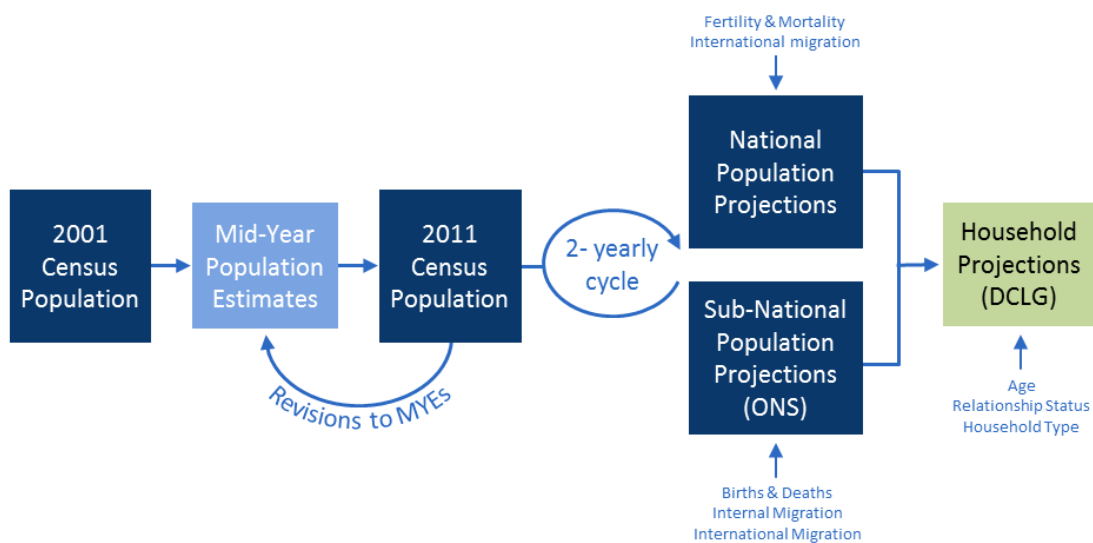


Figure 19: Official Statistics – population and households

## ONS National Population Projections

- 3.3 Every two years ONS publishes its *national* population projections, setting key assumptions on the long-term effects of fertility, mortality and international migration to estimate population

growth outcomes for England, Wales, Scotland and Northern Ireland. The 2014-based *National Population Projection* (NPP) was released in October 2015<sup>15</sup>.

- 3.4 Under the Principal 2014-based NPP, the population of the UK is expected to increase by 9.7 million over the 25-year projection period. This is *higher* than under the earlier 2012-based NPP which suggested an increase of 9.6 million, but *lower* than under the 2010-based NPP (10.9 million).
- 3.5 Under the Principal 2014-based NPP, net international migration is a dominant driver of population change, with the long term net international migration assumptions set at +185,000 per year for the UK. This is *higher* than that estimated under the earlier 2012-based NPP (+165,000 per year) but *lower* than that projected under the 2010-based NPP (+200,000 per year).
- 3.6 As part of the 2014-based NPP, the ONS released variant projections in which differing levels of international migration were modelled for the 2014–2025 projection period<sup>16</sup> (Figure 20). The *Principal* 2014-based NPP is considered as the starting point, whilst the *High* and *Low* variants provide an indication of alternative international migration growth assumptions.

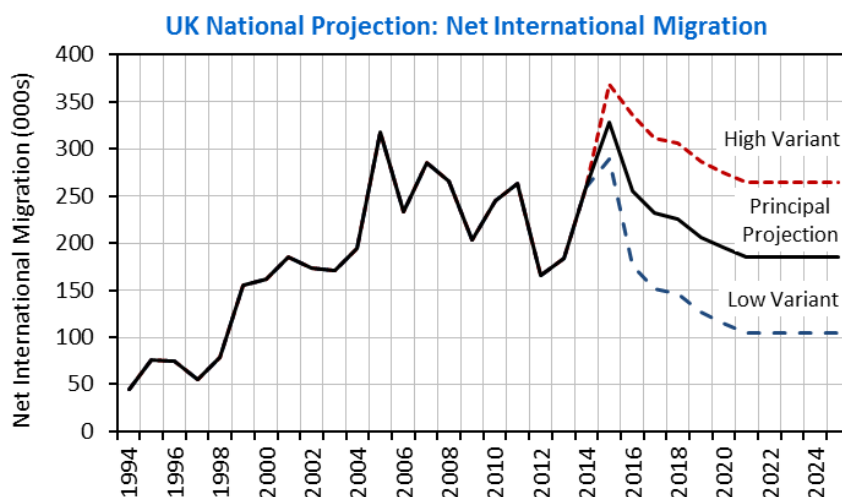


Figure 20: Historical and 2014-based NPP variant net international migration 1994–2025 (Source: ONS)

<sup>15</sup> <http://www.ons.gov.uk/ons/rel/npp/national-population-projections/2014-based-projections/index.html>

<sup>16</sup> The principal national population projection extends for the 2014–2039 period, whilst the variant projections extend for a shorter 2014–2025 period.

- 3.7 Under the *High* 2014-based NPP variant, net international migration is +265,000 per year, whilst the *Low* variant assumes a significantly lower level of net international migration at +105,000 per year (Figure 20). However, the most recent figures from the ONS suggest that the current level of net international long-term migration is approximately +248,000<sup>17</sup>, a decrease of approximately 84,000 from the previous year and possibly a very early sign of the impact of ‘Brexit’ on international migration flows. Whilst this is lower than the annual level of international migration under the *High* variant, it remains at a level that is higher than that estimated under the *Principal* projection.
- 3.8 The *Principal* national projection informs the *sub-national* population projection for English local authorities, also published on a bi-yearly cycle. The latest, 2014-based SNPPs use a combination of national and local assumptions on births, deaths and migration to formulate a 25-year projection for each local authority area.
- 3.9 The SNPPs provide the key demographic input to the DCLG household projections. The latest 2014-based household projection model provides a 25-year projection of household growth in each of the English local authorities.
- 3.10 The PPG states that the DCLG household projections should provide the “*starting point estimate of overall housing need*” (PPG paragraph 2a-015). The remainder of this section considers the 2014-based SNPP and the 2014-based DCLG household projection for LCR, providing the context for complementary scenario analysis in Section 4.

## ONS Sub-National Population Projection

- 3.11 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 2014-based SNPP, released in July 2016. These projections use demographic assumptions derived from a pre-2014, 5–6 year historical period in combination with national assumptions on fertility, mortality and international migration<sup>18</sup>.
- 3.12 Figure 21 presents the seven most recent ONS population projections for Leeds. Under the latest,

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<sup>17</sup><https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/bulletins/migrationstatisticsquarterlyreport/may2017>

<sup>18</sup><http://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/subnationalpopulationprojectionsforengland/2014basedprojections>

2014-based SNPP, the population of Leeds is expected to increase by 111,182 over the 25-year projection period (2014–2039), a growth of 14.5%.

3.13 The rate of growth is *lower* than that estimated by each of the previous projections. The 2012-based projection had a marginally higher rate of growth (15.7%), whereas 2010-based, 2008-based and 2006-based forecasts have substantially higher growth rates (20%–30%), driven primarily by higher international migration assumptions.

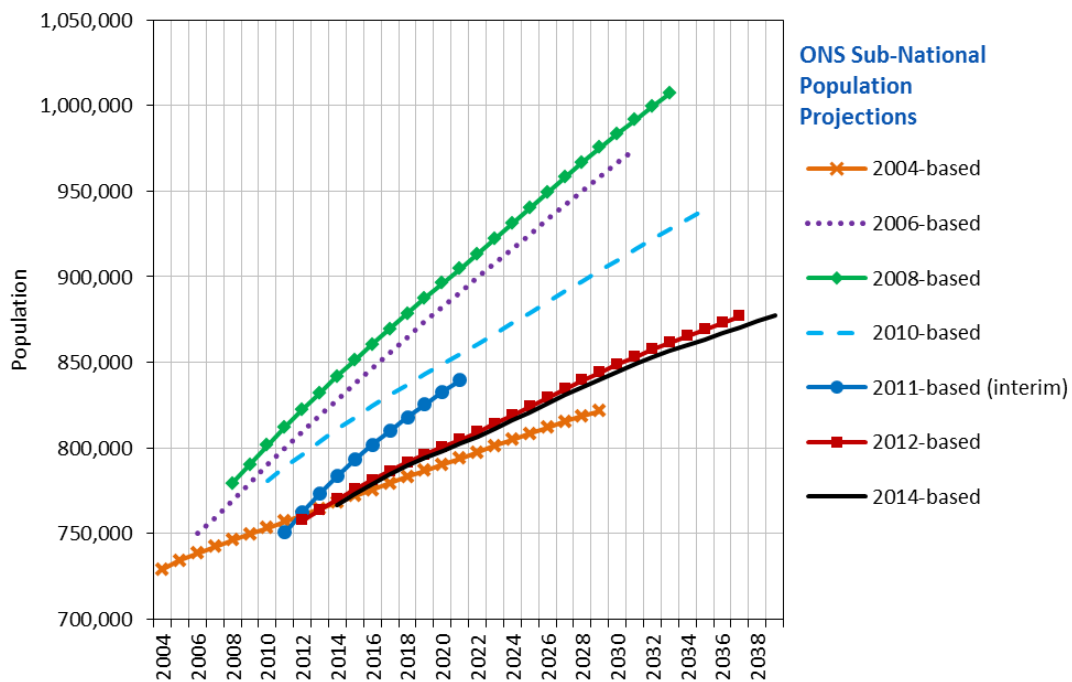


Figure 21: Official Projections for Leeds (Source: ONS)

3.14 The rate of population growth projected by the 2014-based SNPP for Leeds (14.5%) is *higher* than that projected for the Yorkshire and Humber (10.2%) and City Region (12.4%), however *lower* than the level of growth projected for England in total (16.5%) (Figure 22).

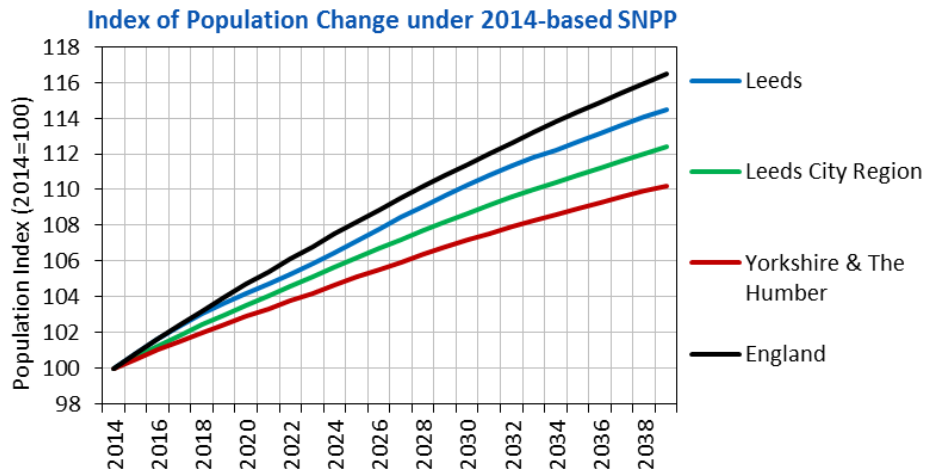


Figure 22: Index of population change under 2014-based projection

3.15 The components of population change that underpin the 2014-based projection for Leeds are presented in Figure 23, with the historical components of change for 2001/02 to 2013/14 included for comparison. Natural change is projected to be the dominant driver of population growth over the 2014–2039 projection period, reducing towards the end of the period as the population ages.

3.16 International migration is projected to have a positive impact on population growth in each year of the 2014–2039 projection period, with future net international migration at a similar level to that estimated over the historical period (with the UPC component *excluded*). Net internal migration is projected to be an annual outflow, at a significantly higher level than that experienced over the historical period.

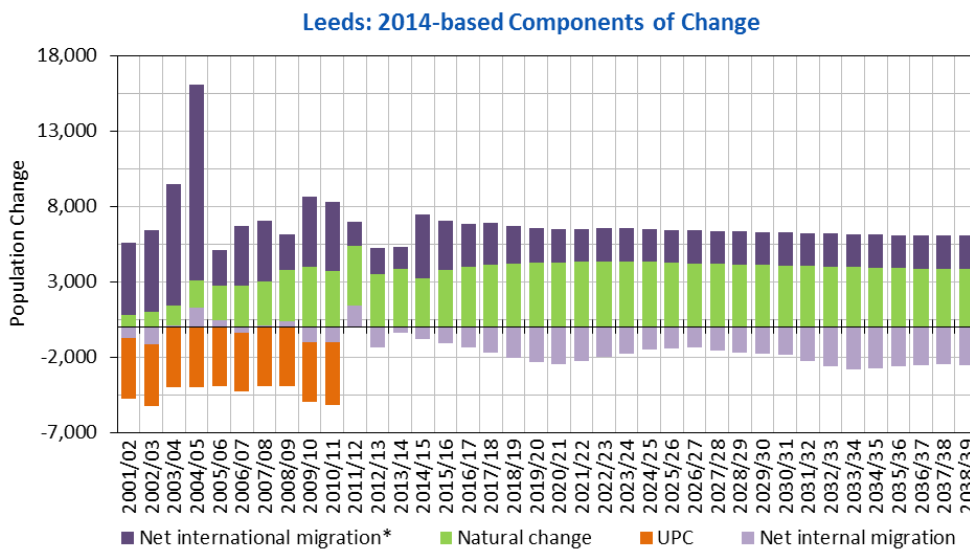


Figure 23: Historical and 2014-based SNPP components of change (Source: ONS)

3.17 To illustrate how the 2014-based ONS assumptions on demographic change in Leeds compare to the historical evidence, the annual average natural change, net internal and international migration and the annual population change for the 2014-based projection are compared to the 6-year and 13-year estimated historical averages in Table 4.

Table 4: Leeds 2014-based SNPP components comparison (Source: ONS)

Component of Change	Historical		Projected
	6-year Average (2008/09–2013/14)	13-year Average (2001/02–2013/14)	2014-based SNPP Average (2014/15–2038/39)
<b>Natural Change</b>	<b>3,734</b>	<b>2,714</b>	<b>4,056</b>
<b>Net Internal Migration</b>	<b>-329</b>	<b>-179</b>	<b>-1,988</b>
<i>Net International Migration (exc UPC)</i>	2,727	4,448	<b>2,378</b>
<i>Unattributable Population Change*</i>	-4,021	-4,000	
<b>Net International Migration (inc UPC)**</b>	<b>717</b>	<b>1,371</b>	
<b>Annual Population Change</b>	<b>4,122</b>	<b>3,907</b>	<b>4,447</b>
<b>Annual Population Change (%)</b>	<b>0.56%</b>	<b>0.55%</b>	<b>0.58%</b>

\*UPC component applies only to the years 2001/02 to 2010/11. Therefore the average UPC has been calculated for these years included in the respective 6-year and 13-year historical periods.

\*\*Calculated by including the annual UPC components up to 2010/11 in net international migration

3.18 The annual rate of population change under the 2014-based SNPP (0.58% per year) is *higher* than the annual rate of change estimated over both the 6-year and 13-year historical periods (0.56% and 0.55% respectively). This slightly higher rate of population growth reflects the projected increased positive impact of natural change (+4,056 per year) under the 2014-based SNPP, compared to that experienced in the preceding 6-year (+3,734) and 13-year (+2,714) historical periods.

3.19 The projected effect of international migration in the 2014-based SNPP is estimated at a level that is considerably *higher* than both the 6-year (+717 per year) and 13-year (+1,371 per year) average, with an annual net inflow of 2,378 per year. With the *exclusion* of the UPC adjustment within the historical international migration statistics, the levels of international migration projected under the 2014-based SNPP are more consistent with the historical 6-year average.



- 3.20 Internal migration is projected to average -1,988 per year 2014/15–2036/37, a significant deviation from historical evidence, with a higher net outflow that exceeds both the 6-year (-329 per year) and 13-year (-179) averages.
- 3.21 This projected net effect of increased internal out-migration over the 25-year projection period is a twofold impact of historical trends, combined with the effect of population growth as a result of increased net international migration flows and natural change.
- 3.22 Internal migration is projected using age-specific migration rates, calibrated by ONS using the historical internal migration data. To estimate future levels of internal in-migration, these rates are applied to the population of those local authorities 'sending' migrants to Leeds, whereas the out-migration rates are applied to Leeds' resident population<sup>19</sup>. If population growth occurs in these external areas, then the inflow to Leeds from these areas also increases. In the case of internal out-migration, the number of people leaving Leeds changes relative to the changing size of its resident population. Again, if the population grows in Leeds, then the internal migration outflow from it will also increase.
- 3.23 It is the impact of international migration and natural change that is driving population growth in Leeds. However, at the same time, the higher levels of international migration and natural change increase the level of internal out-migration from Leeds. This results in a net outflow through internal migration over the projection period, at a higher level than trends suggested by the historical data.

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<sup>19</sup> Note that this methodology is consistent with that used in the POPGROUP scenario development presented in this report.

## Yorkshire & Humber Region

- 3.24 The projected rate of population change under the 2014-based SNPP varies across the Yorkshire & Humber region, ranging from -2.5% in Richmondshire to 16.6% in York (Figure 24). Leeds, along with surrounding districts such as York (16.6%), Sheffield (15.7%), Selby (14.6%), Barnsley (14.5%), and Kirklees (14.4%) is expected to experience the highest percentage population growth over the 25-year projection period (Figure 24). Excluding Selby and Barnsley, population growth in these districts is driven by both high net international migration inflows and high natural change that reflects relatively youthful age profiles. For Selby, an annual net internal migration inflow is the dominant driver of population change.
- 3.25 Districts to the north of Leeds are projected to have a lower rate of population growth over the 25-year period. The population of Harrogate, which borders the north of Leeds, is projected to increase by 3.5%, driven by net internal migration inflows (Figure 24)<sup>20</sup>.
- 3.26 The components of population change profile for Bradford is similar to that of Leeds, with net international migration and natural change projected to be dominant drivers of population change. The 2014-based SNPP also assumes an annual net outflow of internal migrants over the 25-year projection period, however this is closely aligned to the internal migration trends over the historical period.

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<sup>20</sup> Note that the scale on the charts presented the 2014-based components of population change in Figure 24 (on the following page) differs.

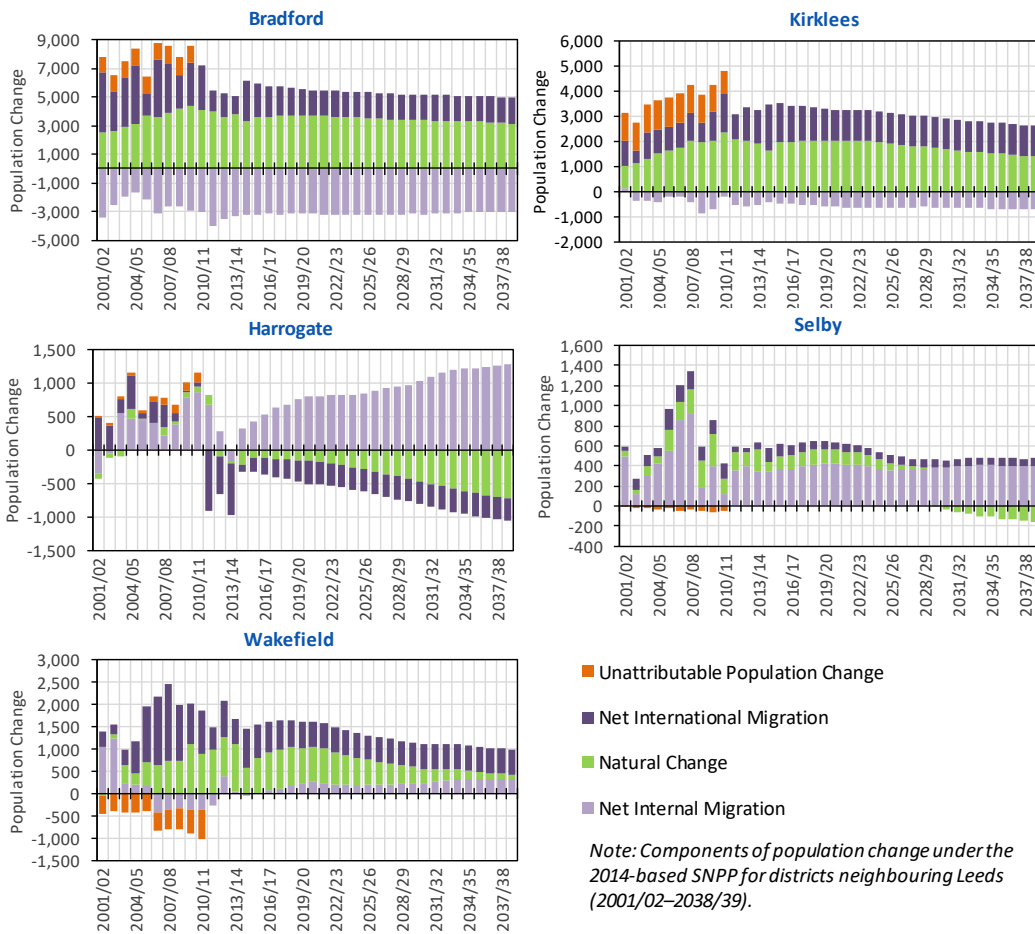
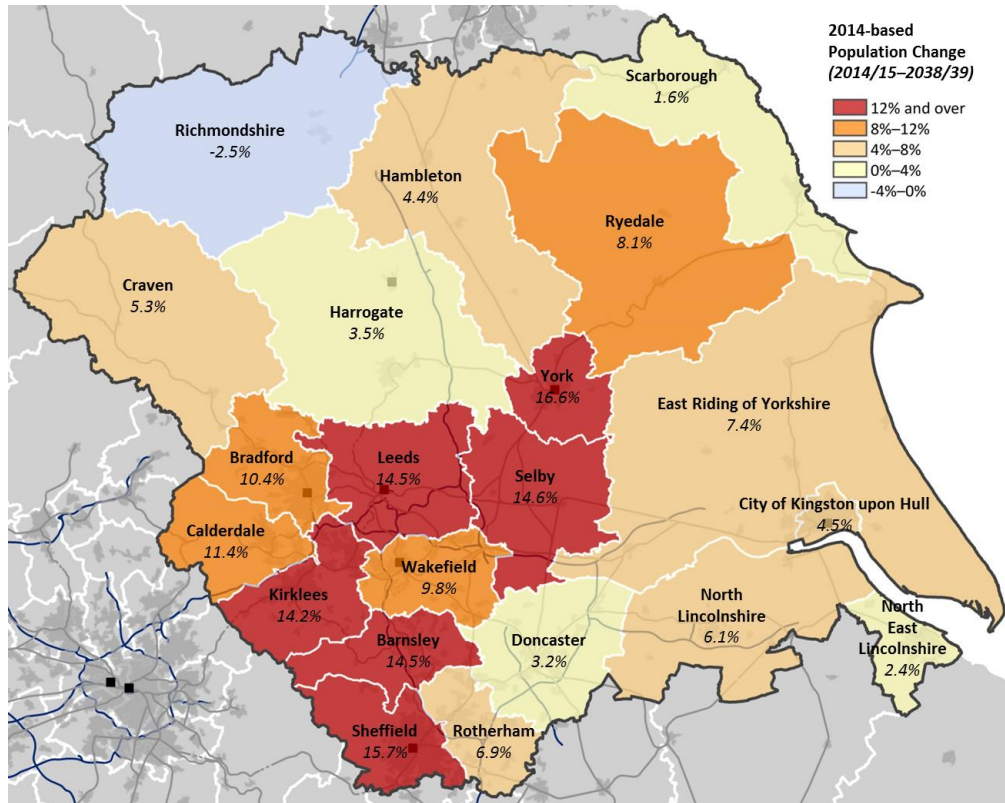


Figure 24: Population change under the 2014-based SNPP (2001/02-2038/39)

## DCLG Household Projections

- 3.27 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 2014-based household projection model, which is underpinned by the 2014-based SNPP, was released by the DCLG in July 2016, superseding the 2012-based household projection model.
- 3.28 The methodological basis of the new 2014-based model is consistent with that employed in the previous 2008-based and 2012-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.
- 3.29 The 2014-based household headship rates (also referred to as household representative rates) have changed little from the 2012-based model, with only small adjustments made to account for new evidence arising from the latest Labour Force Survey (LFS) extracts. As a result, the 2014-based household projections differ from the 2012-based versions primarily on the basis of a different underpinning population projection. Conversely, a significantly higher population growth trajectory combined with higher household formation rates; results in a greater difference between the 2008-based and 2014-based models.
- 3.30 The 2014-based DCLG household projection model for Leeds, underpinned by the 2014-based SNPP, estimates that the number of households will increase by 61,456 over the 2014–2039 projection period, equivalent to an additional 2,458 households per year, compared to 2,796 per year under the 2012-based model (Figure 25).
- 3.31 A significantly larger population growth expectation in the 2008-based household projection, coupled with household formation rates that suggest a more rapid reduction in average household size, resulted in an average annual household growth estimate of 5,503 per year under the 2008-based model alternative.

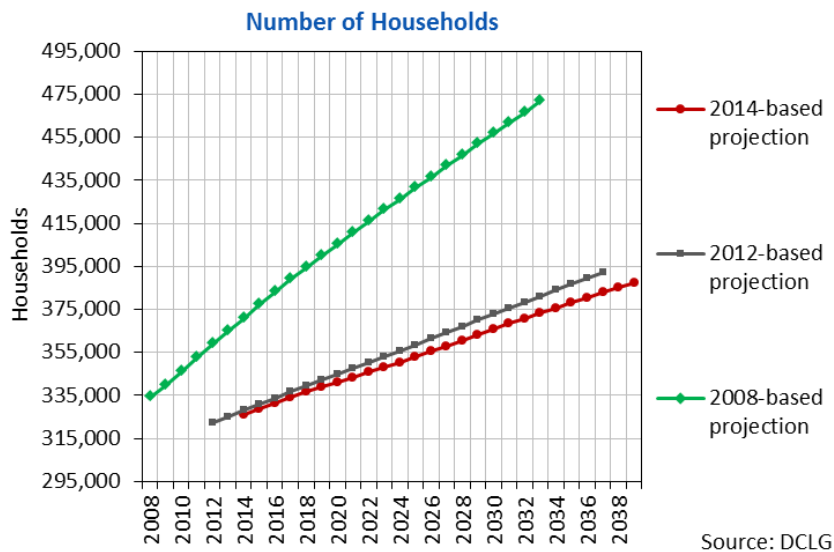


Figure 25: Household growth 2014 based DCLG household projections for Leeds

### Starting Point Estimate

3.32 The DCLG household projection, underpinned by the latest ONS population projection, provides the ‘starting point’ in the assessment of housing need (PPG paragraph 2a-015). For the 2017–2033 projection period, the 2014-based household projection model suggests an increase of 39,173 households, approximately 2,448 per year. Over the same period, the 2014-based SNPP projects a 9.2% growth in the population, equivalent to an additional 4,523 people per year (Table 5).

Table 5: Leeds ‘starting point’ estimates 2017–2033 (source: ONS and DCLG)

	Variable	2017	2033	Change	% Change	Average per year
2014-based SNPP	Population	784,458	856,819	72,361	9.2%	4,523
2014-based DCLG Model	Households	334,142	373,315	39,173	11.7%	2,448
	Household Population	764,283	835,295	71,012	9.3%	4,438
	Average Household Size	2.29	2.24	-0.05	-2.2%	-0.003

3.33 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). In Section 4, a range of alternative trend scenarios is presented, for comparison with the SNPP and DCLG benchmarks.

# 4 Demographic Scenarios

## Introduction

- 4.1 In Section 3, the latest 2014-based ONS and DCLG population and household projections for Leeds have been presented. Whilst these form the official ‘starting point’ in the analysis of future population and household growth, the PPG states that 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).
- 4.2 A range of ‘alternative trend’ scenarios have been developed using POPGROUP v.4 technology, for comparison with the official 2014-based ‘benchmarks’. In line with the PPG, the latest 2014-based household growth assumptions have been applied in each scenario in combination with a 2011 Census dwelling vacancy rate for Leeds of 3.4%.
- 4.3 The definition of these scenarios is detailed in this Section, with a summary of the scenario outcomes presented thereafter. Additional detail on the scenario data inputs and assumptions can be found in Appendix E.
- 4.4 The PPG states that the likely change in employment in an area should be considered, as should the size and structure of the labour force (PPG paragraph 2a-018). Section 5 compares the labour force and employment growth implications of the demographic scenarios with economic forecasts from the REM, considering key assumptions on future economic activity rates, level of unemployment and balance of commuting between resident workers and local employment.

## Demographic Scenario Definition

- 4.5 There is no single definitive view on the likely level of growth expected in Leeds. Ultimately, a mix of economic, demographic and national/local policy issues will determine the speed and scale of change.
- 4.6 In line with the PPG, the 2014-based population projection from ONS is presented as the official 'benchmark' scenario, with household growth estimated using headship rate and communal population assumptions from the 2014-based DCLG household projection model. Dwelling (housing) growth outcomes have been estimated through the application of a 2011 Census dwelling vacancy rate of 3.4%. This **SNPP-2014** scenario provides the 'starting point estimate' for Leeds' housing growth analysis.
- 4.7 For comparison with this official benchmark, a range of 'alternative trend' scenarios has been developed, in which variant migration assumptions have been applied. In each scenario, household and dwelling growth assumptions consistent with the **SNPP-2014** benchmark scenario have been applied (i.e. 2014-based DCLG headship rate and communal population assumptions, plus a 3.4% dwelling vacancy rate). Fertility and mortality assumptions have been drawn from the 2014-based SNPP.
- 4.8 The PPG recommends that, as part of the assessment of housing need, the most recent demographic statistics from ONS and alternative demographic projections should be considered (PPG Paragraph 2a-017). This is appropriate in the case of Leeds given: (a) the unprecedented economic conditions that have occurred since 2008; (b) the differences between the projected 2014-based SNPP data and the historical evidence on population change in Leeds. Three alternative trend scenarios have therefore been developed for Leeds, for comparison with the **SNPP-2014** benchmark scenario. For detail on the data inputs and assumptions for each of the scenarios, refer to Appendix E.
- 4.9 ONS states that the 2014-based SNPP uses demographic assumptions based on six years historical evidence preceding 2014 (i.e. 2009 to 2014)<sup>21</sup>. Examination of the component data underpinning the 2014-based SNPP (in Section 3) has indicated that the projected levels of internal migration are markedly different to the levels seen over the 6 years prior to 2014 (see

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<sup>21</sup><https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/methodologies/methodologyusedtoproducethesubnationalpopulationprojectionsforengland>

Table 4 on page 29). To consider the impact of varying migration histories on population change, the following 'alternative trend' (PG<sup>22</sup>) scenarios have been developed for Leeds. These scenarios consider the latest 2015 MYE in the derivation of future migration assumptions and include UPC adjustments in the historical data up to 2011 in the derivation of international migration assumptions.

- **PG 5yr:** Internal migration rates and international migration flow assumptions are based on the latest *five* years of historical evidence (2010/11–2014/15). This scenario considers a shorter historical period than the **SNPP-2014** scenario, however includes the latest MYE.
- **PG-10yr** Internal migration rates and international migration flow assumptions are based on the latest *ten* years of historical evidence (2005/06–2014/15), considering a longer historical period.
- **PG Long-Term:** Internal migration rates and international migration flow assumptions are based on the latest *fourteen* years of historical evidence (2001/02–2014/15), considering the full historical period from which to draw migration assumptions.

## Scenario Results

4.10 Scenario results are presented in Figure 26 and Table 6 for the 2017–2033 plan period. Each of the demographic scenarios has been run with the inclusion of the 2001–2015 MYEs, except for the benchmark **SNPP-2014** scenario, which retains its base-year of 2014.

4.11 Population growth is highest under the benchmark **SNPP-2014** scenario, in which an annual net migration flow of +332 is assumed, primarily driven by increased net international migration. Population change under the **SNPP-2014** scenario is projected to be 9.2% over the 16-year plan period, equivalent to an additional 72,361 people, with an estimated annual dwelling growth of +2,534 per year (2017–2033).

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<sup>22</sup> Note that PG stands for POPGROUP, the demographic forecasting model in which these scenarios have been generated.



- 4.12 Population growth is lowest under the **PG 10yr** scenario (7.7%), in which an annual net migration outflow of -406 per year is estimated (2017–2033). Under the **PG 10yr** scenario, population growth results in an average annual dwelling growth of +2,282 per year over the 16-year plan period.
- 4.13 Of the alternative trend scenarios, population growth is estimated to be highest under the **PG Long Term** scenario, at 9.1% over the 2017–2033 plan period, closely aligned to that estimated under the benchmark **SNPP-2014** scenario. Population growth under the **PG Long Term** scenario is primarily driven by net international migration and positive natural change (i.e. an excess of births over deaths). However, the annual impact of internal migration outflows results in a net migration of -163 over the 2017–2033 period. The estimated level of population growth results in an average annual dwelling growth of +2,638 per year.
- 4.14 Under the **PG 5yr** scenario, population change is slightly lower (8.4%) as a result of a reduced annual impact of natural change. However, the estimated higher international migration inflows, in combination with a reduction in annual net internal outflows, result in an average annual net migration of +109 per year (2017–2033). Population change under the **PG 5yr** scenario results in an estimated average annual dwelling growth of +2,354 per year.

### Leeds: Scenario Outcomes

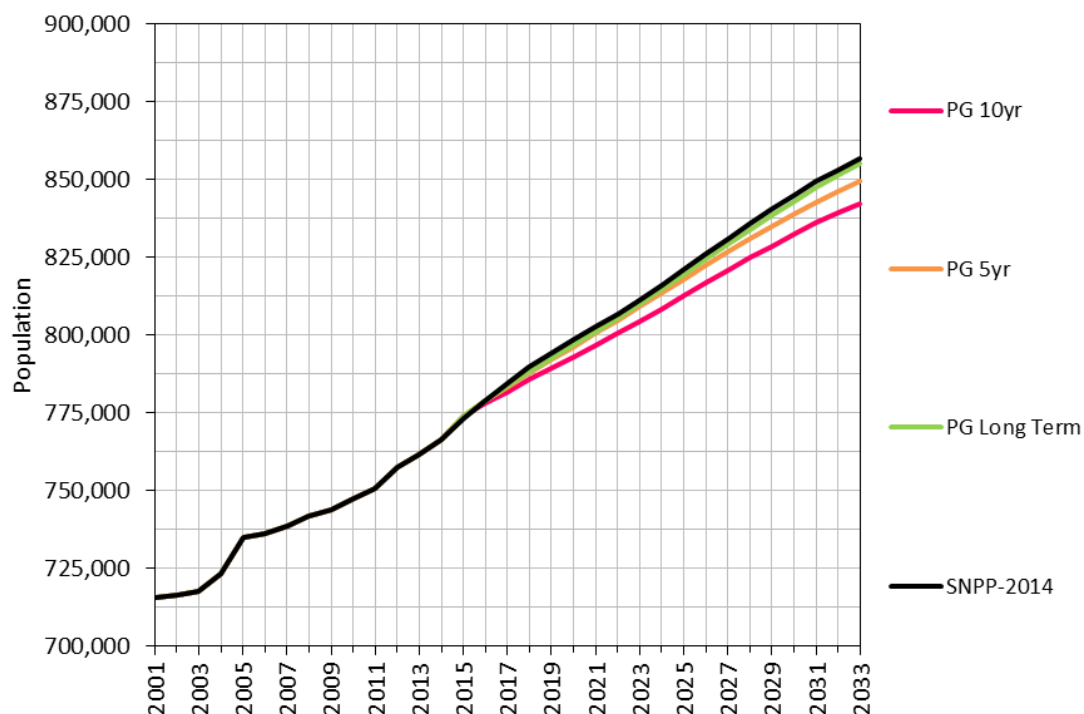


Figure 26: Leeds population change (2001–2033)

Table 6: Leeds demographic scenario outcomes 2017–2033

Scenario	Change 2017–2033				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
<b>SNPP-2014</b>	<b>72,361</b>	<b>9.2%</b>	<b>39,173</b>	<b>11.7%</b>	<b>332</b>	<b>2,534</b>
PG Long Term	71,571	9.1%	40,779	12.2%	-163	2,638
PG 5yr	65,891	8.4%	36,384	10.9%	109	2,354
PG 10yr	60,438	7.7%	35,273	10.6%	-406	2,282

Note: Household and dwelling growth assessed using assumptions from the 2014-based household projection model. Scenarios ranked in order of population change.

## Age Profile

- 4.16 The changing age structure of Leeds' population is important when considering future housing needs, and the progression of its labour force. The change in the age profile depends on the history of population change, particularly the relative size of successive birth cohorts, and continued improvements in life expectancy. The large birth cohorts of the 1940s, 1950s and 1960s are set to have a substantial effect upon local population profiles and this is reflected in Leeds' data. The term 'ageing population' generally refers to an increase over time in the share of the population in the older age-groups, specifically 65+.
- 4.17 Using a 2017 base year for comparison, Leeds' projected 5-year age group profile under each scenario has been calculated for the plan period 2017–2033 (Figure 27). The red bars indicate where the population increases over the period and the blue bars indicate where the population decreases in that age group.
- 4.18 As the population ages, an increase in the older age groups over the 2017–2033 period is reflected in all scenarios. The increase in the older 65+ age groups ranges from 26%–28% under the **PG Long-Term** and **PG 10yr** scenarios to 30% under the **SNPP-2014** and **PG 5yr** scenarios.
- 4.19 The difference in population change under the scenarios is driven by growth in the younger age groups. The **PG 5yr** and **PG 10yr** scenarios reflect a lower level of population growth, with a reduced impact of natural change over the plan period. This is evidenced in the small population change in the younger 0–9 age groups. Conversely, natural change is estimated to have a greater impact on population growth under the **SNPP-2014** and **PG Long Term** scenarios. Subsequently, an increase in the 0–9 age groups also reflects the increased number of births as a result of the youthful population age structure.

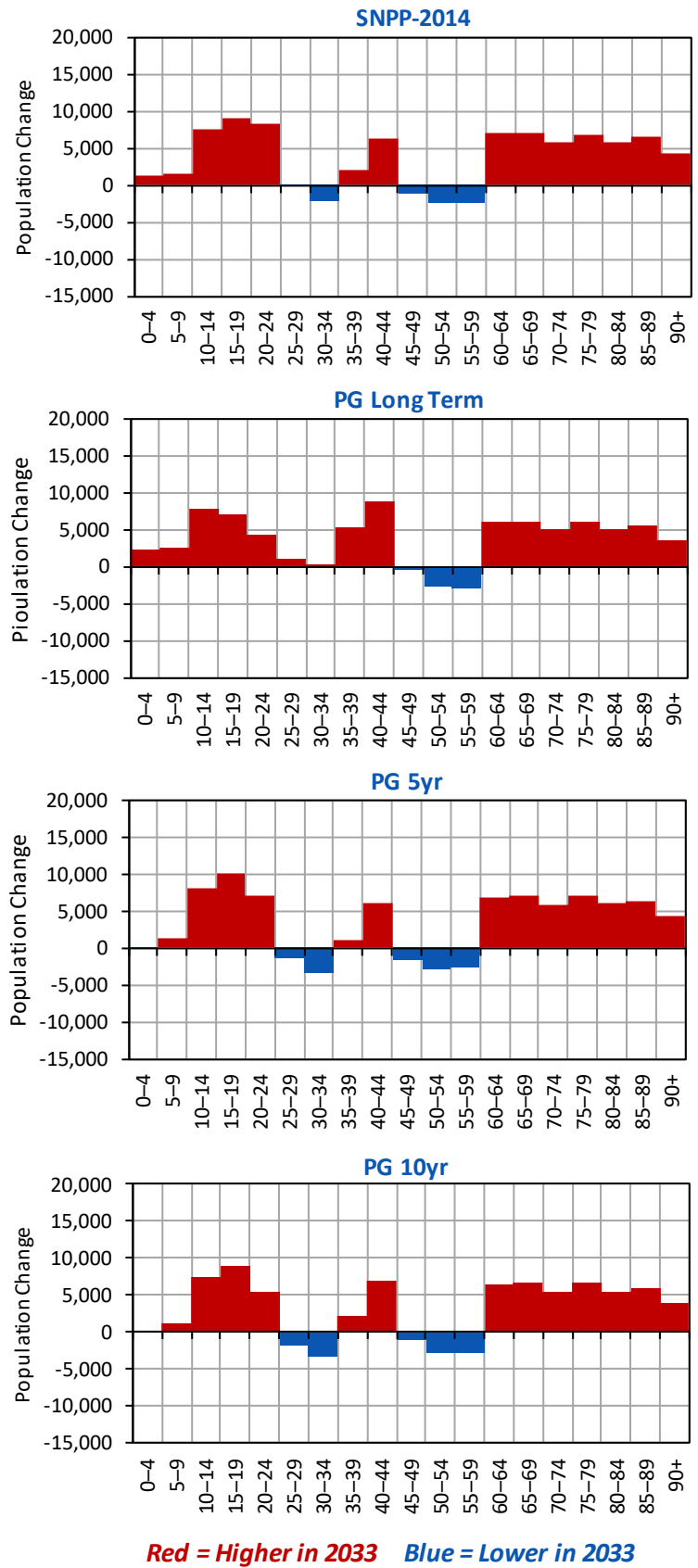


Figure 27: Demographic scenarios population change by age group 2017–2033

# 5 Labour Force & Employment

## Introduction

- 5.1 In the assessment of housing need, the PPG states that *“plan makers should make an assessment of the likely change in job numbers based on past trends and/or economic forecasts as appropriate and also having regard to the growth of the working age population in the housing market area”* (PPG paragraph 2a-018).
- 5.2 Alignment of demographic and economic model forecasts is challenging due to different methodologies, data inputs and assumptions. In POPGROUP, it is possible to derive the size and structure of the labour force and the level of employment that an implied level of population growth could support, through the application of three key assumptions: (1) economic activity rates; (2) unemployment rates; (3) a commuting ratio.
- 5.3 Economic forecasts (from the REM) combine a national and regional economic outlook, with data on the sectoral mix of businesses, to produce a forecast of employment growth for Leeds. These forecasts incorporate the latest ONS sub-national population projection data, balancing employment and population growth through changes to economic activity and unemployment rates and, in some instances, commuting ratios.

## REM Employment Forecasts

- 5.4 The latest employment forecasts for Leeds have been supplied from the REM (2017), providing trajectories of growth, measured as an annual change in the number of workplace-based (WPB) employment (Figure 28). The WPB employment growth trajectory for the 2017/18–2032/33 *plan* period under the latest REM (2017) is presented alongside earlier REM forecasts for Leeds (2014, 2015, September 2016 and December 2016) in Figure 28.

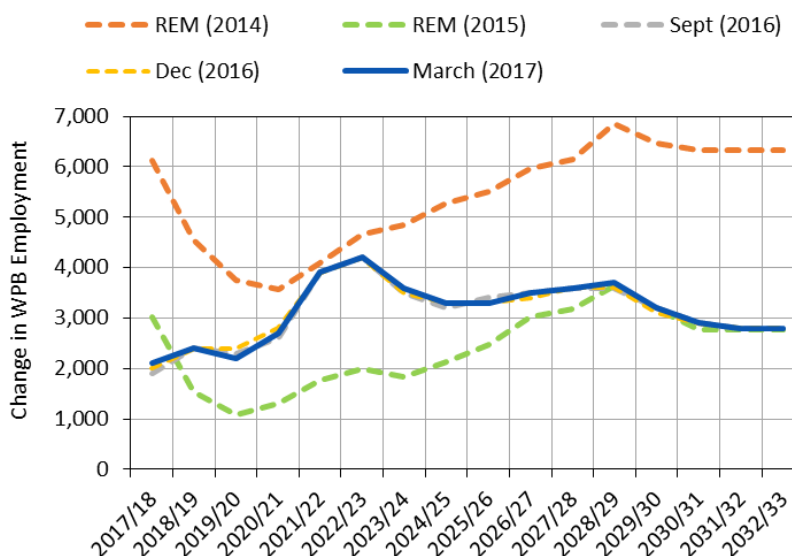


Figure 28: Leeds workplace-based (WPB) employment growth forecast (Source: REM 2017, 2016, 2015 & 2014)<sup>23</sup>

- 5.5 The expected growth trajectory under the latest March (2017) REM is closely aligned to that estimated under the December (2016) and September (2016) forecasts. Under the March (2017) REM, the expected average annual workplace-based employment growth over the 2017–2033 *plan* period is +3,138, compared to +3,113 and +3,125 under the September (2016) and December (2016) REM forecasts respectively.
- 5.6 The REM (2015) estimated the lowest average annual employment of +2,403 per year (2017/18–2032/33). Conversely, the REM (2014) forecast assumed a considerably higher level of employment growth compared to recent REM trajectories.

## REM Assumptions

- 5.7 In the demographic scenarios developed in POPGROUP, employment growth is estimated through the application of three economic assumptions; economic activity rates, unemployment rates and a commuting ratio. The workplace-based employment forecasts in the March (2017) REM are derived using a different, economic-led methodology but also include output which indicates how economic activity rates, unemployment and commuting are expected to influence employment growth.

<sup>23</sup> Note that the workplace-based employment under the REM 2014 and REM 2015 has been estimated from the respective FTE forecasts.

5.8 Economic activity rates determine the size of the labour force; the sum of the employed and unemployed population. Future economic activity rates are a key consideration in seeking to align demographic and economic change. Changes to economic activity rates resulting from changes to State Pension Age (SPA) and a trend towards higher rates of participation in older age-groups (particularly females) have a direct impact upon the level of employment growth that could be supported within local populations.

5.9 The latest March (2017) REM output identifies an economic activity rate for the 16–75+ age groups for Leeds, which is presented for the 2017–2033 forecast period in Figure 29. Over the forecast period, the REM assumes an overall increase in economic activity, increasing from 64.6% at the start of the plan period to 65.2% by 2033, assuming a greater proportion of the resident population is maintained in the labour force.

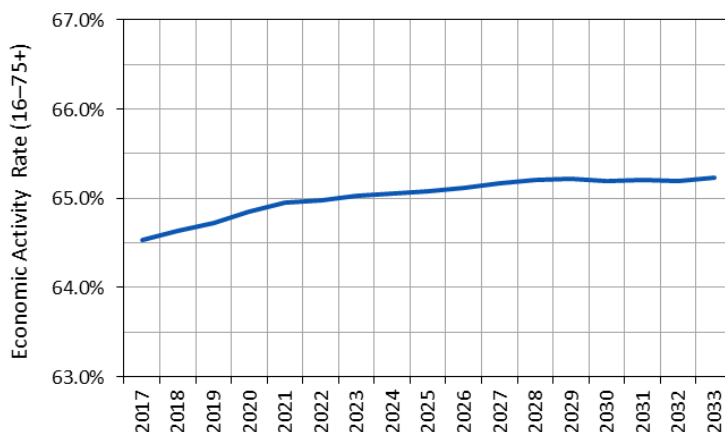


Figure 29: Leeds aggregate economic activity rate (16–75+) 2017–2033

5.10 In conjunction with the changing economic activity rates, March (2017) REM output suggests a small decrease in the unemployment rate between 2017 and 2033 for Leeds (Figure 30), from 5.9% to 5.3%. The unemployment rate assumptions under the March (2017) REM compare to the ONS modelled unemployment rates of 6.2% in 2015 and a pre-recession average (2004–2007) of 5.4%. Therefore, the assumptions on unemployment under the March (2017) REM are deemed appropriate to reflect economic recovery in Leeds.

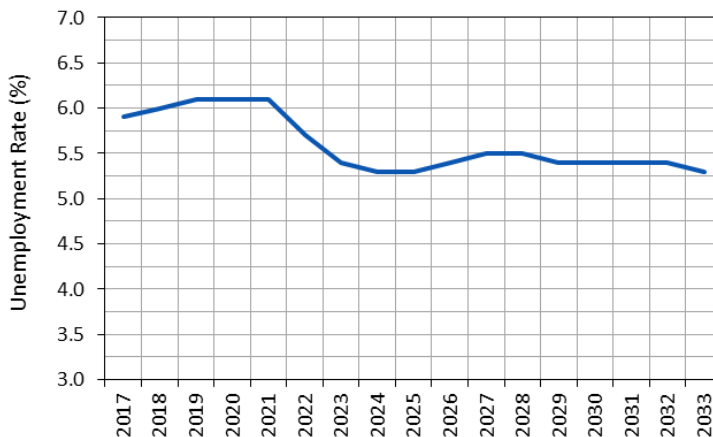


Figure 30: Leeds unemployment rate 2017–2033

5.11 The commuting ratio is the balance between the level of employment in an area and the size of the resident workforce. 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. Under the March (2017) REM for Leeds, a net in-commute is implied throughout the plan period (Figure 31), (i.e. the number of jobs in the district exceeds the size of the labour force). In 2017, a commuting ratio of 0.875 is assumed, reducing slightly to 0.874 by the end of the forecast period. This is similar to the 2011 Census commuting ratio of 0.87 for Leeds (refer to Table 3 on p23).

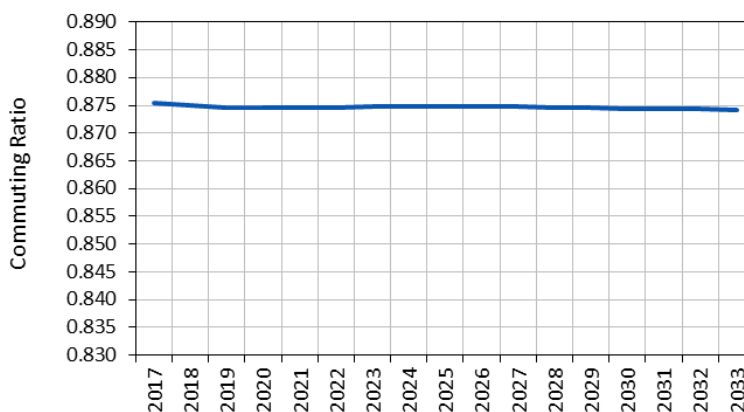


Figure 31: Leeds commuting ratio 2017–2033

5.12 For alignment of the demographic and economic forecasts, the economic activity rate, unemployment rate and commuting ratio measures from the March (2017) REM have been applied to each of the demographic scenarios, to derive an estimate of the changing size of the labour force that the population growth under the demographic scenarios implies. Additionally,



the level of employment growth (equivalent to the WPB employment estimated by the REM) that could be supported using these assumptions has been calculated (Table 7).

- 5.13 The use of the March (2017) REM assumptions within the demographic scenarios enables direct alignment of the two approaches and the basis for testing the sensitivity of estimated population change to variations in economic activity assumptions.
- 5.14 In Table 7, the **SNPP-2014** employment growth outcome closely aligns with the March (2017) REM, with each approach using similar population inputs and economic assumptions. The growth outcomes for the other demographic scenarios illustrate the potential annual employment growth that each might support if the March (2017) REM measures of economic activity, unemployment and commuting were applied.

Table 7: Labour force and employment growth outcomes 2017–2033

Scenario	Change 2017–2033			Average Annual Employment Growth
	Labour Force (16–75+)	Employed People	Unemployed People	
PG Long Term	45,765	45,805	-40	3,310
<b>SNPP-2014</b>	<b>42,657</b>	<b>42,859</b>	<b>-202</b>	<b>3,099</b>
PG 5yr	37,755	38,206	-451	2,766
PG 10yr	36,803	37,304	-501	2,702

Note: Scenarios ranked in order of average annual employment growth

- 5.15 Labour force growth is lowest under the **PG 10yr** scenario, driven by lower growth assumptions for migration. This results in an estimated annual employment growth of 2,702, compared to +3,099 under the **SNPP-2014** benchmark scenario. The **PG Long Term** scenario reflects a more youthful population age profile, thus resulting in the largest labour force change (+45,765), supporting an average annual employment growth of +3,310 over the 16-year plan period.

## Employment-led Scenarios & Sensitivities

- 5.16 The application of the March (2017) REM assumptions to the demographic scenarios illustrates how higher or lower population growth might influence economic change. However, it is also important to consider the potential impact of variant employment growth trajectories on population change in Leeds.
- 5.17 This requires an 'Employment-led' formulation of the POPGROUP model. POPGROUP evaluates the impact of an employment growth trajectory by measuring the relationship between the workplace-based employment in Leeds (as defined by the economic forecasts), the size of the resident labour force and the size of the resident population. 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.
- 5.18 An **Employment-led REM 2017** scenario has been developed in which the annual change in workplace-based employment, as defined by the March 2017 REM, is applied in each year of the forecast period (Figure 28).

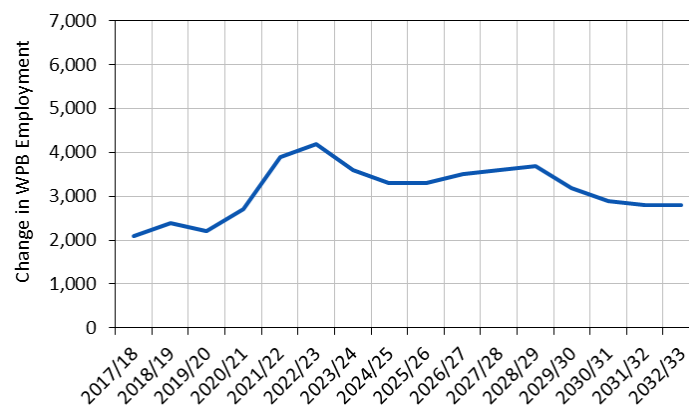


Figure 32: Workplace-based employment growth trajectories 2017/18–2032/33

- 5.19 Forecasting changes to age-specific economic activity rates is a challenging proposition. The Office for Budget Responsibility (OBR) has undertaken analysis of labour market trends in its 2017 Fiscal Sustainability Report<sup>24</sup>. Included within its analysis is a forecast of changing economic activity rates for males and females, extending to a long-term 2066 forecast horizon.

<sup>24</sup> [http://cdn.budgetresponsibility.org.uk/FSR\\_Jan17.pdf](http://cdn.budgetresponsibility.org.uk/FSR_Jan17.pdf)

5.20 A sensitivity variant has been presented here to compare how the OBR assumptions on economic activity align to the March REM (2017) assumptions and how the application of these rates to the three employment forecasts (outlined in Figure 32) might influence population growth outcomes in Leeds.

- **Core:** Economic activity rates, unemployment rates and commuting ratio assumptions derived from the March (2017) REM forecast.
- **OBR:** Economic activity rates by five year age group (ages 16–75+) and sex from the 2011 Census, with OBR adjustments made to all age groups (Figure 33).

5.21 At the start of the plan period, economic activity rate assumptions under the March (2017) REM and the 2011 Census with adjustments made in line with OBR, are closely aligned. However, the effect of the OBR economic activity rate adjustments is a fall in the aggregate rate of economic participation over the plan period (Figure 33).

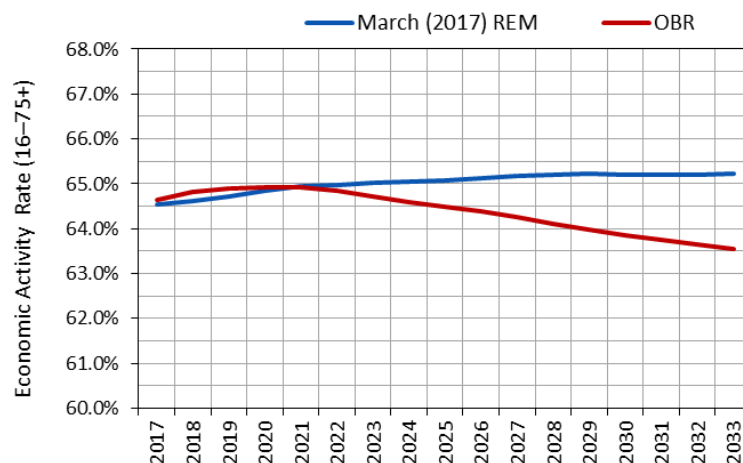


Figure 33: Leeds aggregate economic activity rates (16–75+) 2017–2033

5.22 The reduction in the aggregate OBR economic activity rates implies that a smaller proportion of the labour force will be economically active by the end of the plan period, compared to that under the March (2017) REM assumptions. In an **Employment-led** scenario, if there is insufficient population and resident labour force to meet the forecast employment growth, a higher level of internal migration will occur. Therefore, under the OBR assumptions which reflect a reduction in economic activity rates, a higher level of migration results in increased population and dwelling growth over the 16-year plan period.

5.23 Under the **Employment-led REM 2017 OBR** scenario, lower economic activity rate assumptions by the end of the plan period, results in population growth of 11.8% and an average annual dwelling growth of 3,101 per year (2017–2033) (Table 8). This compares to a population growth of 9.3% and an associated average annual dwelling growth of 2,604 under the **Employment-led REM 2017** scenario, which assumes a higher aggregate economic activity rate by the end of the plan period (Table 8).

Table 8: Employment-led **REM 2017** scenario outcomes (2017–2033)

Employment-led REM 2017 Scenarios	Change 2017–2033				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Employment
OBR	93,538	11.8%	47,934	14.2%	1,332	3,101	3,137
<i>Core</i>	<b>74,022</b>	<b>9.3%</b>	<b>40,249</b>	<b>11.9%</b>	<b>244</b>	<b>2,604</b>	<b>3,137</b>

Note: Scenarios ranked in of dwelling growth

## High Employment Growth

5.24 A ‘High Growth’ employment trajectory has been developed by the Regional Economic Intelligence Unit, to consider a pragmatic level of higher economic growth in Leeds whilst taking account of wider growth strategies for the City (refer to Appendix F for detail on the economic modelling assumptions in the development of the High Growth employment forecast). Under the ‘High Growth’ trajectory the annual growth in employment averages at +3,650 per year, compared to +3,137 under the REM 2017 trajectory (2017–2033) (Figure 34).

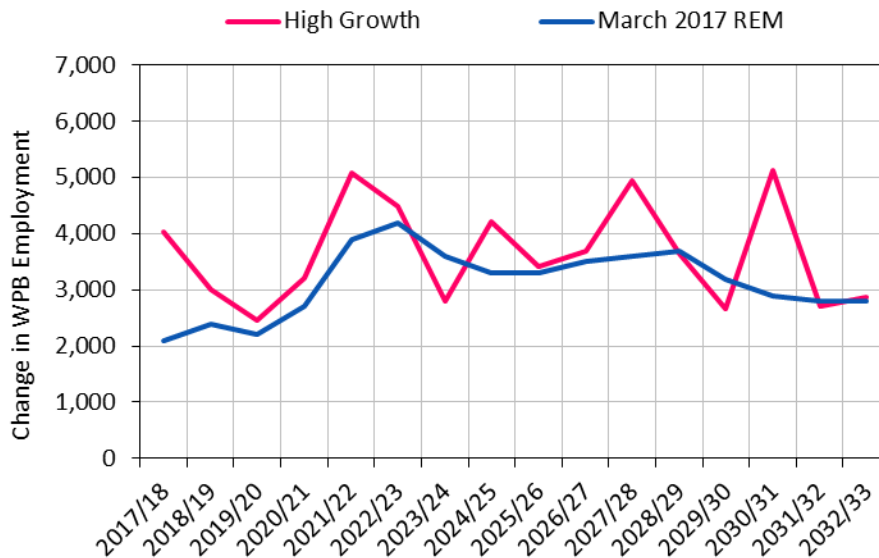


Figure 34: Workplace-based employment growth trajectories 2017/18–2032/33 (REM 2017 & High Growth)

5.25 The ‘High Growth’ employment trajectory has taken account of ‘double counting’ and has been adjusted to reflect new growth in Leeds. In the development of the ‘High Growth’ economic forecast, the underpinning assumptions on unemployment, commuting and economic activity rate have been adjusted to reflect the expected higher employment growth. In order to align economic and demographic modelling, the underpinning economic assumptions have been applied in the configuration of the **Employment-led High Growth** scenario.

5.26 The economic activity and unemployment rate assumptions derived from the ‘High Growth’ forecast are presented in Figure 35, with the assumptions under the March (2017) REM included for comparison. The unemployment rate under the ‘High Growth’ forecast reduces from 6.0% in 2017 to 5.0% by 2033, a greater reduction than that assumed under the March (2017) REM forecast. The ‘High Growth’ forecast assumes a more substantial increase in the aggregate economic activity (16–75+) than under the March (2017) REM, increasing from 65.3% in 2017 to 66.7% in 2033. The increase in economic activity reflects the assumed increase in employment in Leeds over the forecast period, with the assumption that a higher proportion of the resident population will be maintained in the labour force by the end of the plan period. The assumptions on commuting are consistent with those derived from the March (2017) REM forecast, reducing slightly from a ratio of 0.875 in 2017 to 0.874 by 2033.

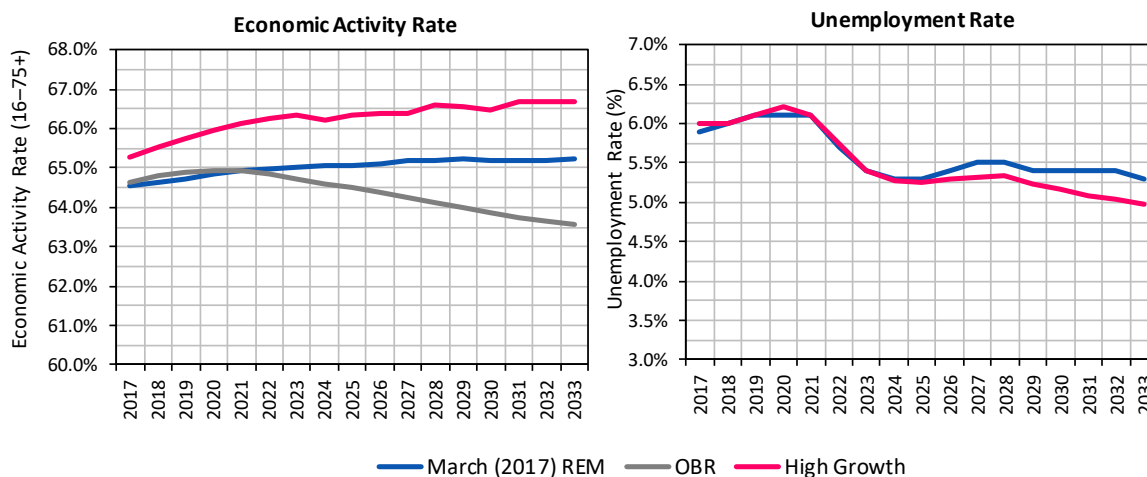


Figure 35: Economic activity and unemployment rate assumptions 2017–2033 (March 2017 REM, OBR & High Growth)

5.27 Two additional **Employment-led High Growth** scenarios have been developed to examine the impact of (1) applying economic assumptions consistent with the March (2017) REM trajectory (identified by the ‘REM’ suffix) and (2) apply economic activity rate assumptions with adjustments made in line with the OBR (identified by the ‘OBR’ suffix).

### High Employment Growth Scenario Outcomes

5.28 The impact of applying higher economic activity rates in combination with a reducing unemployment rate under the **Employment-led High Growth** scenario, result in a greater proportion of the resident population maintained in the labour force, thus reducing the need for net migration. Therefore, population growth is lowest under the **Employment-led High Growth** scenario (9.2%), resulting in an associated average annual dwelling growth of +2,587 per year (2017–2033).

5.29 In applying the OBR adjustments to the economic activity rates, a higher level of population growth is expected, driven by increased net migration (+1,748 per year) in order to meet the annual change in employment growth. Under the **Employment-led High Growth OBR** scenario, a 13.0% increase in population results in an average annual dwelling requirement of +3,403 per year (2017–2033).

5.30 The application of the economic assumptions under the March (2017) REM forecast (under the **Employment-led High Growth REM** scenario) results in an estimated population growth of 11.0%, an associated dwelling growth of +2,978 per year.

Table 9: Employment-led **High Growth** scenario outcomes (2017–2033)

Employment-led High Growth Scenarios	Change 2017–2033				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Employment
OBR	104,438	13.0%	52,608	15.5%	1,748	3,403	3,650
REM	87,710	11.0%	46,031	13.6%	827	2,978	3,650
<i>Core</i>	<i>73,297</i>	<i>9.2%</i>	<i>39,994</i>	<i>11.8%</i>	<i>158</i>	<i>2,587</i>	<i>3,650</i>

Note: Scenarios ranked in order of dwelling growth

## Economic Summary

- 5.31 Robustly forecasting changes to future economic activity rates is challenging, particularly with many local authorities facing an ageing population profile and a range of global and national uncertainties. Aligning economic and demographic growth is important factor of forecasting. Assumptions derived from the REM and High Growth economic models provide this alignment and a starting point for underpinning assumptions on economic activity.
- 5.32 However, the OBR labour market analysis provides economic activity forecasts relative to the national level and it is widely regarded in demographic analysis and forecasting. The deviation in economic activity rates under the REM and OBR reflect the inherent uncertainty around future economic activity, with the OBR rates assuming a decrease in economic activity rates by the end of the plan period, whilst the REM 2017 assumes an increase.
- 5.33 Therefore, it could be deemed appropriate to take a ‘mid-point’ between the two sets of economic activity rate assumptions to assesses the balance between employment growth (defined by March 2017 REM and High Growth economic forecast), the size of the resident labour force and population.
- 5.34 This would result in an average annual dwelling growth requirement of approximately 2,858 under the REM 2017 trajectory and 3,155 under the High Growth trajectory (Figure 36). Refer to Appendix A for detail on definition and outcomes under the **Employment-led Mid** scenarios.

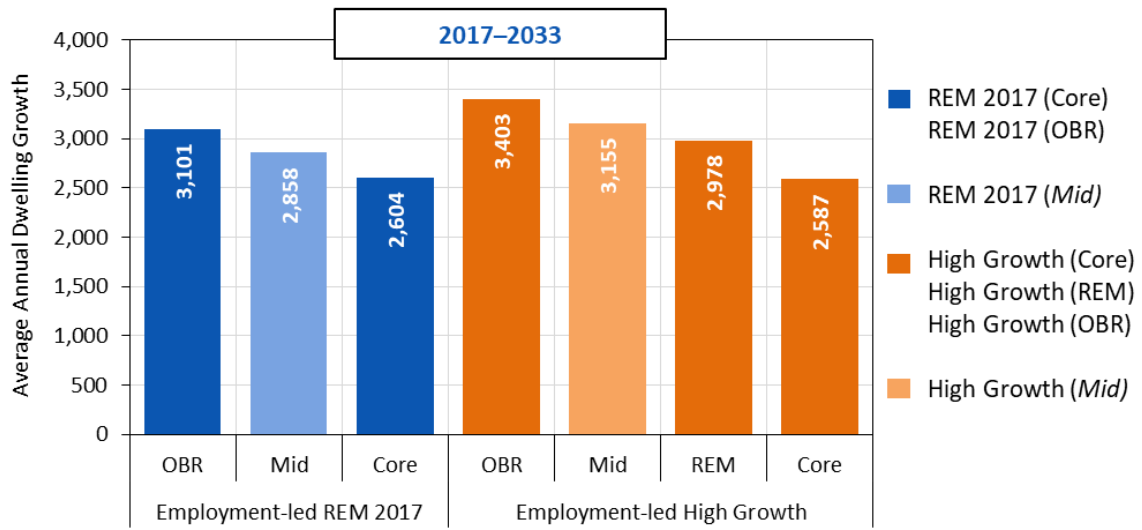


Figure 36: Average annual dwelling growth under employment-led scenarios 2017–2033<sup>25</sup>

<sup>25</sup> Note that this chart presents the average annual dwelling growth outcomes under the Employment-led Mid scenarios alongside the core and sensitivity Employment-led REM 2017 (Table 8) and Employment-led High Growth (Table 9) dwelling growth.



# 6 Headship Rate Sensitivity

- 6.1 Each of the demographic and employment-led scenarios presented in this report has been run using the 2014-based DCLG headship rate assumptions, in line with the PPG. However, the PPG also recommends that “*alternative assumptions in relation to ... household formation rates*” are considered (PPG Paragraph 2a-017). In addition, the Local Plans Expert Group (LPEG) recommends that the headship rates from the latest household projection model are adjusted in context of the 2008-based rates. Therefore, in this section, each of the scenarios has been run with two alternative set of 2014-based headship rates.
- 6.2 The 2014-based DCLG headship rates are defined by age group, sex and relationship status. The age-group headship rates for Leeds are presented in Appendix B. The charts presented in Appendix B present the headship rates by five-year age group and sex, illustrating that over time the headship rates for the younger (25–44) age groups suggest a lower rate of growth compared to the 2008-based headship rates.
- 6.3 Although the latest evidence continues to suggest that the level of household formation has fallen from historical levels, many Local Plans are responding to national policy initiatives aimed at reversing this trend. It is argued that it is the younger age groups that have seen the most significant change in household formation, due to a combination of housing undersupply and affordability issues, which in some areas may have led to ‘supressed’ rates of household formation.
- 6.4 Therefore, two modified sets of headship rates have been generated for Leeds, in which the headship rates for the younger 25–44 age groups are adjusted. This sensitivity analysis evaluates how a return to previous projected household growth rates could manifest itself in higher household growth outcomes<sup>26</sup>.
- 6.5 Under the ‘Return’ sensitivity, headship rates return to 2008-based values by 2033, following their original trend thereafter (refer to Appendix E). These rates evaluate the impact of a more

<sup>26</sup> The approach taken in considering alternative headship rate assumptions broadly aligns with the recommendations made by LPEG (March 2016, Appendix 6).

<http://lpeg.org/wp-content/uploads/2016/02/Appendices-local-plans-report-to-government.pdf>

optimistic household formation in the younger age groups over the plan period, as reflected by the 2008-based rates.

- 6.6 In recognition that the 2008-based rates might be deemed ‘over-optimistic’ given some of the longer term evidence underpinning the projections, and recent social and economic influences will mean that the rates are unlikely to return to such previously high household formation, an alternative ‘Partial Return’ sensitivity has been developed. Under these rates, the headship rates return to a mid-point between the 2008-based and 2014-based headship rates by 2033, following their original trend thereafter (refer to Appendix E).
- 6.7 With the application of the 2014-based *Partial Return* headship rates, household change and the average annual dwelling requirements for each of the demographic scenarios increase by between 8%–10% compared to the 2014-based rate outcomes (Table 10). Under the 2014-based *Return* rates, this increases to around 15%–19% greater than the unadjusted rates.
- 6.8 Under the benchmark **SNPP-2014** scenario, the total dwelling growth increases from 40,544 over the 16-year plan period to an additional +3,701 and +7,205 under the *Partial Return* and *Return* rates respectively. Of the alternative trend-based scenarios, the **PG Long Term** scenario results in the highest dwelling growth of 42,207 over the 2017–2033 plan period. Under the *Partial Return* and *Return* rates, this increases to an additional +3,893 and +7,591 dwellings respectively.
- 6.9 The ‘High Growth’ scenario outcomes range from 41,394 to 54,450 under the 2014-based headship rates (High Growth and OBR). This increases to 3,751–4,055 additional dwellings under the *Partial Return* and 7,304–7,911 dwellings under the *Return* rates. The **Employment-led High Growth Mid** scenario results in an average annual dwelling growth outcome of 50,476 under the 2014-based headship rates, increasing to an additional +3,966 and +7,733 dwellings under the *Partial Return* and *Return* sensitivities.
- 6.10 Under the ‘REM 2017’ scenarios, the 2014-based headship rates result in a dwelling growth range of 41,658–49,612. The *Partial Return* and *Return* headship rates results in an additional dwelling growth of 3,759–3,932 and 7,321–7,666 respectively. The **Employment-led REM 2017 Mid** scenario dwelling growth is approximately half way between that under the **Employment-led REM 2017 REM** and **Employment-led REM 2017 OBR** outcomes.
- 6.11 For annualised dwelling growth under each of the scenarios, refer to Appendix C.

Table 10: Leeds headship rate sensitivity: dwelling growth outcomes (2017–2033)

Scenario	Population Change (%)	Dwelling Growth 2017–2033		
		2014-based	2014-based Partial Return	2014-based Return
High Growth (OBR)	13.0%	54,450	+4,055	+7,911
High Growth (Mid)	11.8%	50,476	+3,966	+7,733
REM 2017 (OBR)	11.8%	49,612	+3,932	+7,666
High Growth (REM)	11.0%	47,643	+3,903	+7,608
REM 2017 (Mid)	10.6%	45,725	+3,845	+7,493
PG Long Term	9.1%	42,207	+3,893	+7,591
REM 2017 (Core)	9.3%	41,658	+3,759	+7,321
High Growth (Core)	9.2%	41,394	+3,751	+7,304
<b>SNPP-2014</b>	<b>9.2%</b>	<b>40,544</b>	<b>+3,701</b>	<b>+7,205</b>
PG 5yr	8.4%	37,658	+3,585	+6,974
PG 10yr	7.7%	36,508	+3,619	+7,042

Note: The benchmark SNPP-2014 scenario is highlighted in red, Employment-led scenarios are highlighted in grey. Scenarios are ranked in order of dwelling growth under 2014-based rates.

- 6.12 It should be noted that the inclusion of the 'Return' and 'Partial Return' sensitivities is not a recommendation, and that the current evidence is clear that the trend has changed. However, it is sensible to consider the potential impact, and for the SHMA to take a clear and balanced view on whether it is relevant and should be applied in Leeds.

## Consideration of LPEG

- 6.13 The Local Plans Expert Group (LPEG) was established in September 2015 to consider how Local Plans could be made more effective and efficient; seeking to identify an approach which can be considered in the process of considering local plan development.
- 6.14 LPEG outlines the following OAN points to be considered when assessing the demographic starting point of the SHMA<sup>27</sup>:

<sup>27</sup> <http://lpeg.org/wp-content/uploads/2016/02/Appendices-local-plans-report-to-government.pdf>

- Compare the latest official projections with a 10-year migration trend projection, taking the highest at Housing Market Area (HMA) level
- Apply the household formation rates from the latest official projection and compare against the 2008-based rates for the younger 25–44 age groups. In instances where the latter are higher, LPEG recommends adjusting the headship rates to partially recover by 2033.
- Apply the local rate for vacant and second homes based on DCLG data for the most recent year. For areas where the vacancy rate is above the national average, LPEG recommends reducing it to this figure.

6.15 Whilst the approach taken by Edge Analytics in the modelling has considered the above points, it has also provided variants to the LPEG methodology. This methodology and analysis is deemed appropriate in considering the latest demographic and economic evidence to assess Leeds' future population, household and dwelling growth.

6.16 The demographic analysis developed has compared the latest 2014-based SNPP (**SNPP-2014**) with a range of alternative trend scenarios based on variant migration histories. The most comparable scenario to that recommended by LPEG is the **PG 10yr** scenario, which derives its migration assumptions from the 2005/06–2014/15 period. However, whilst LPEG makes specific reference to the historical ten-year migration trend, Edge Analytics considers it appropriate to consider a range of migration histories including a five-year (**PG 5yr**) and fourteen-year (**PG Long-Term**) period, to better reflect Leeds' historical migration profile. On this basis the trend projections provide a demographic starting point range of 36,508–42,207 dwellings, prior to taking account of adjustments for housing need and type.

6.17 In considering the relationship between households and dwelling growth, Edge Analytics has applied a 2011 Census vacancy rate for Leeds, rather than the DCLG rates that could be subject to annual variation. This approach is deemed robust and consistent with modelling undertaken for the City Region and neighbouring local authorities.

6.18 The analysis within this report has considered the impact of alternative headship rates on household and dwelling growth, in line with LPEG recommendations. The 2014-based '*Partial Return*' rates best align with that outlined in the LPEG methodology, however as the recent and latest evidence is not currently indicating that this '*Partial Return*' is happening, the outcomes should be considered with caution.

- 6.19 This analysis has also considered how differing evidence on economic change in Leeds, aligns with the demographic data and forecasts of demographic change, suggested by the trend scenarios.

# 7 Summary & Conclusions

## Approach

- 7.1 This report has presented a range of evidence to be considered in the development of Leeds' new SHMA. A summary of the most recent demographic history precedes the presentation of a suite of growth scenarios which will underpin the analysis and commentary formulated in the SHMA.
- 7.2 POPGROUP has been used to develop the scenarios, using the latest demographic statistics available at the time of analysis. In line with PPG guidelines, the 2014-based population and household projections from ONS and DCLG respectively are presented as the official 'starting point' for the formulation of evidence on future housing growth. A range of alternative trend scenarios has been developed which consider the potential effect of different migration assumptions upon population and dwelling growth outcomes.
- 7.3 The analysis presented in this report has sought to improve the alignment between demographic and economic change; considering a range of economic growth forecasts formulated by Yorkshire's REM, with a particular focus on the underpinning assumptions which accompany these forecasts and their link to the components of demographic change.
- 7.4 The future relationship between population, household and dwelling growth has been estimated using assumptions from DCLG's 2014-based household model, with additional consideration given to the higher rates of household growth amongst younger adults that were a feature of earlier household model forecasts.

## Growth Outcomes

- 7.5 A summary of the suite of population and dwelling growth outcomes indicates a range of 2,282-3,403 dpa over the 16-year plan period, equivalent to 36,500 – 54,500 in total (Figure 37). Population growth associated with these outcomes ranges from 7.7% to 13.0% over the plan period.
- 7.6 The scenario sensitivities which consider a full or partial return to higher household growth in young adult age-groups add approximately 8–10% and 15–19% respectively to these dwelling growth outcomes.

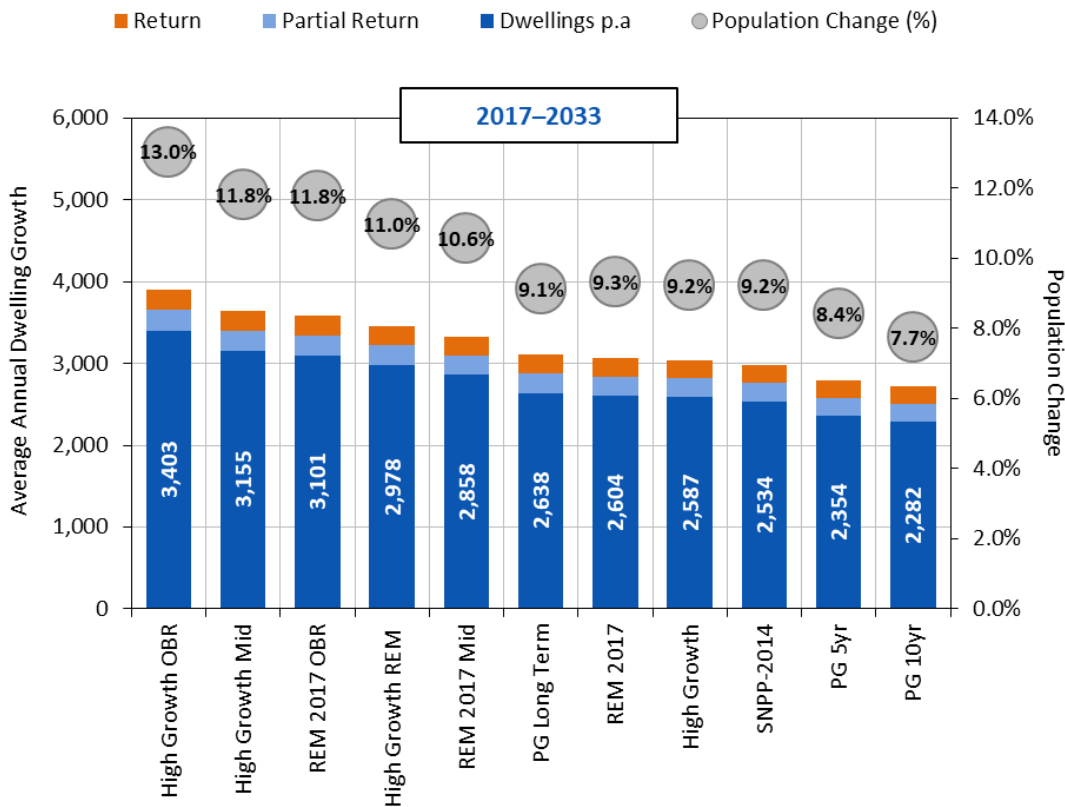


Figure 37: Average annual dwelling growth and population change 2017–2033<sup>28</sup>

- 7.7 The benchmark **SNPP-2014** scenario estimates dwelling growth of 2,534 dpa, underpinned by an increasing net outflow from Leeds due to domestic migration. The **PG 5yr** and **PG 10yr** scenarios

<sup>28</sup> The chart presents the average annual dwelling growth under each scenario over the 16-year plan period. The dark blue bars indicate the average annual dwelling growth under the unadjusted 2014-based headship rates, with the light blue and orange bars (cumulative) presenting the additional annual dwelling growth under the ‘Partial Return’ and ‘Return’ headship rate sensitivities. For annualised dwelling growth figures under each of the scenarios, refer to Appendix C. Employment-led scenarios are highlighted in yellow.

present a similar outcome and components of demographic change. However, with a longer-term history driving its migration assumptions, the **PG Long Term** scenario records higher growth, at 2,638 dpa.

- 7.8 A number of employment-led scenarios are presented, with estimated dwelling growth outcomes all falling within the two extremes. With Leeds' commuting balance assumed relatively constant over the plan period, it is the key assumptions on labour force economic activity rates and the associated unemployment rate that determine the modelled relationship between employment growth and population change. Maintaining a larger resident labour force as a result of higher economic activity rates and a lower unemployment rate, ensure that higher employment growth can be accommodated without the requirement for higher net in-migration.
- 7.9 The employment-led outcomes are presented using both the underpinning REM assumptions on economic activity and unemployment rates and those estimated by the OBR in its latest labour force analysis. The highest employment growth outcome (High Growth) in combination with the OBR's assumptions, implies dwelling growth of 3,403 dpa (54,500 in total) without any headship rate adjustment. Under the REM 2017 trajectory and application of OBR assumptions, the average annual dwelling growth is 3,101 compared, to 2,604 using economic activity rate assumptions underpinning the forecast.
- 7.10 In considering a 'mid-point'<sup>29</sup> between the OBR and REM 2017 assumptions on economic activity, the REM 2017 employment growth trajectory results in an average annual dwelling growth outcome of 2,858 (45,725 in total) without any adjustments to the headship rates. Under the High Growth employment growth trajectory, the 'mid-point' economic activity assumptions result in a dwelling growth of 3,155 (50,480 in total) under the 2014-based rates.

## Key Issues for Consideration in the SHMA

- 7.11 Since the completion of Leeds' 2011 SHMA, there have been significant changes to the demographic evidence reported in official statistics, with lower growth evident in both ONS and DCLG population and household forecasts respectively.

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<sup>29</sup> Note that these assumptions target an aggregate economic activity rate (16–75+) that is a 'mid-point' between the OBR and REM 2017 economic activity rate assumptions by 2033. As a result of the scenario configuration and modelling in POPGROUP, the household and dwelling growth outcomes are not an exact average of the REM and OBR.



- 7.12 Leeds' population change statistics were subject to a major downward revision following the 2011 Census and this has had an impact upon official growth projections thereafter. At the same time, prevailing economic conditions, lower housing growth and acute affordability issues have dampened the projected rates of household growth suggested by previous household models. There is no certainty that these lower household growth rates will be reversed in the foreseeable future.
- 7.13 International migration, its estimation and its impact upon Leeds' future population change, continues to be an issue of particular uncertainty. However, current national, long-term assumptions on international migration which underpin official statistics are based on lower net immigration totals than is currently being experienced across the UK.
- 7.14 The pace of change in growth through international migration and natural change, combined with the effect of domestic migration in official projections, results in an increased net outflow. Greater retention of this population will be a key factor for Leeds in maintaining its economic growth whilst avoiding unsustainable levels of in-commuting.

## Appendix A Employment-led 'Mid-Point' Scenarios

A.1 In recognition that there are inherent challenges and uncertainty in forecasting future economic activity rates, two scenarios have been configured with an alternative set of economic activity rates which express a 'mid-point' between the REM 2017 and OBR assumptions (Figure 38)<sup>30</sup>.

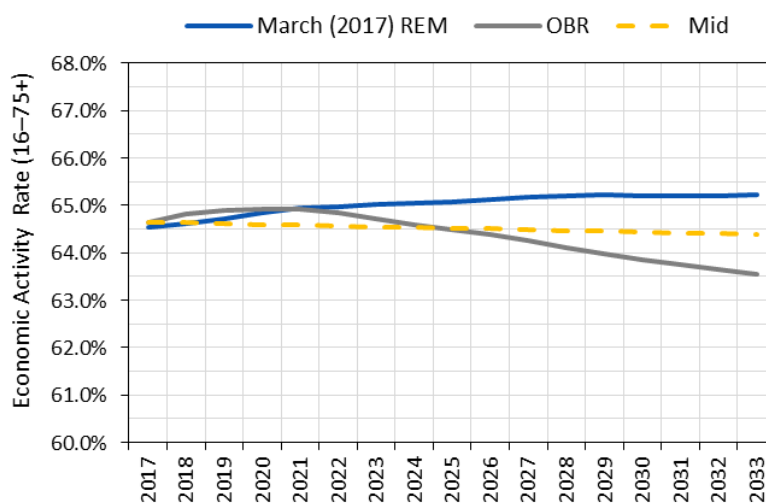


Figure 38: Economic activity rates  
(March 2017 REM, OBR, Mid) 2017–2033

A.2 Under the 'Mid' scenarios, commuting ratio assumptions are consistent with the all other employment-led scenarios. Assumptions on unemployment are consistent with the respective core employment-led scenarios (i.e. the first derived from the March 2017 REM and the latter from the High Growth economic model):

- **Employment-led REM 2017 Mid:** Unemployment rate assumptions are consistent with the core *Employment-led REM 2017* scenario (i.e. derived from the March 2017 REM which assumes a reduction from 5.9% in 2017 to 5.3% by 2033)
- **Employment-led High Growth Mid:** Unemployment rate assumptions are consistent with the core *Employment-led High Growth* scenario (i.e. derived from the 'High Growth' model which assumes a reduction from 6.0% in 2017 to 5.0% by 2033)

<sup>30</sup> Note that to express the 'mid-point' economic activity rate, the rates have been trended between 2017–2033

A.3 The **Employment-led REM 2017 Mid** and **Employment-led High Growth Mid** scenario outcomes are presented in Table 11, and Table 12 respectively, alongside the employment-led scenarios that are presented in the main body of this report.

Table 11: Employment-led **REM 2017** scenario outcomes

Employment-led REM 2017 Scenarios	Change 2017–2033				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Employment
OBR	93,538	11.8%	47,934	14.2%	1,332	3,101	3,137
<i>Mid</i>	<i>83,926</i>	<i>10.6%</i>	<i>44,179</i>	<i>13.1%</i>	<i>771</i>	<i>2,858</i>	<i>3,137</i>
Core	74,022	9.3%	40,249	11.9%	244	2,604	3,137

Note: Scenarios are ranked in order of dwelling growth

Table 12: Employment-led **High Growth** scenario outcomes

Employment-led High Growth Scenarios	Change 2017–2033				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Employment
OBR	104,438	13.0%	52,608	15.5%	1,748	3,403	3,650
<i>Mid</i>	<i>94,610</i>	<i>11.8%</i>	<i>48,769</i>	<i>14.4%</i>	<i>1,175</i>	<i>3,155</i>	<i>3,650</i>
REM	87,710	11.0%	46,031	13.6%	827	2,978	3,650
Core	73,297	9.2%	39,994	11.8%	158	2,587	3,650

Note: Scenarios are ranked in order of dwelling growth

A.4 It is important to note that under **REM 2017 Mid** scenario, only the economic activity rates differ to the **REM 2017** and **OBR** scenarios. Therefore, the population and associated average annual dwelling growth outcomes are approximately half way between the **REM 2017** and **OBR** scenarios.

A.5 However, the **High Growth REM** and **High Growth OBR** scenarios apply different assumptions on unemployment; the first uses assumptions derived from the March 2017 REM and the latter from the 'High Growth' economic forecast. Under the **High Growth Mid** and **High Growth OBR** scenarios, unemployment rate assumptions are consistent (i.e. derived from the 'High Growth'

trajectory); however differ from the **Employment-led High Growth REM** scenario. Therefore, although the estimated average annual dwelling growth under the **High Growth Mid** scenario is within the range of dwelling growth outcomes under the **High Growth REM** and **High Growth OBR** scenarios, it does not exactly reflect the half way dwelling growth estimate.

# Appendix B Headship Rates

B.1 The following charts (Figure 39 and Figure 40) present the DCLG Stage 1 2008-based and 2014-based headship rates (males and females). These have been used in the configuration of the headship rate sensitivities (refer to Section 6 in the main body of the report).

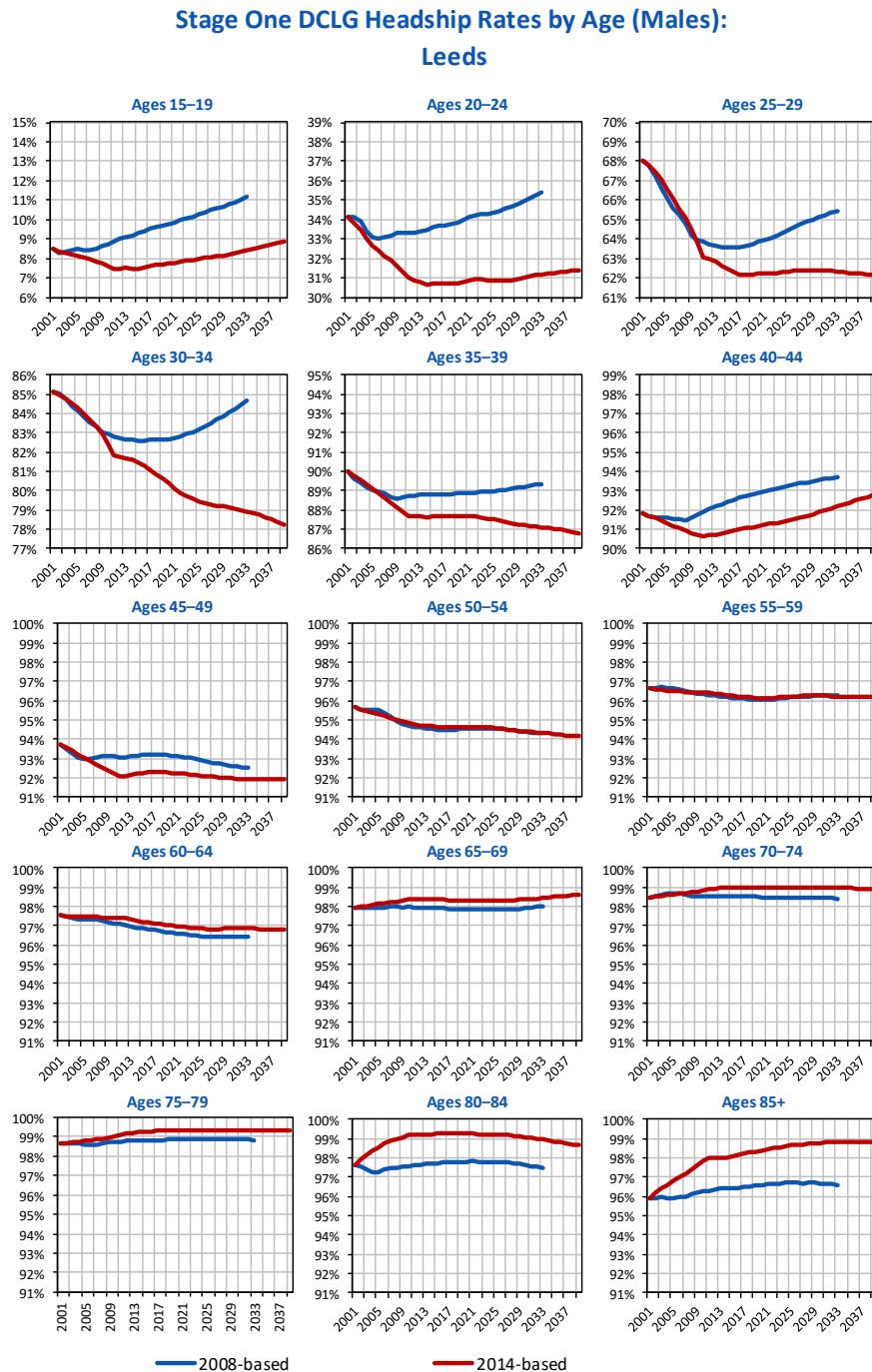
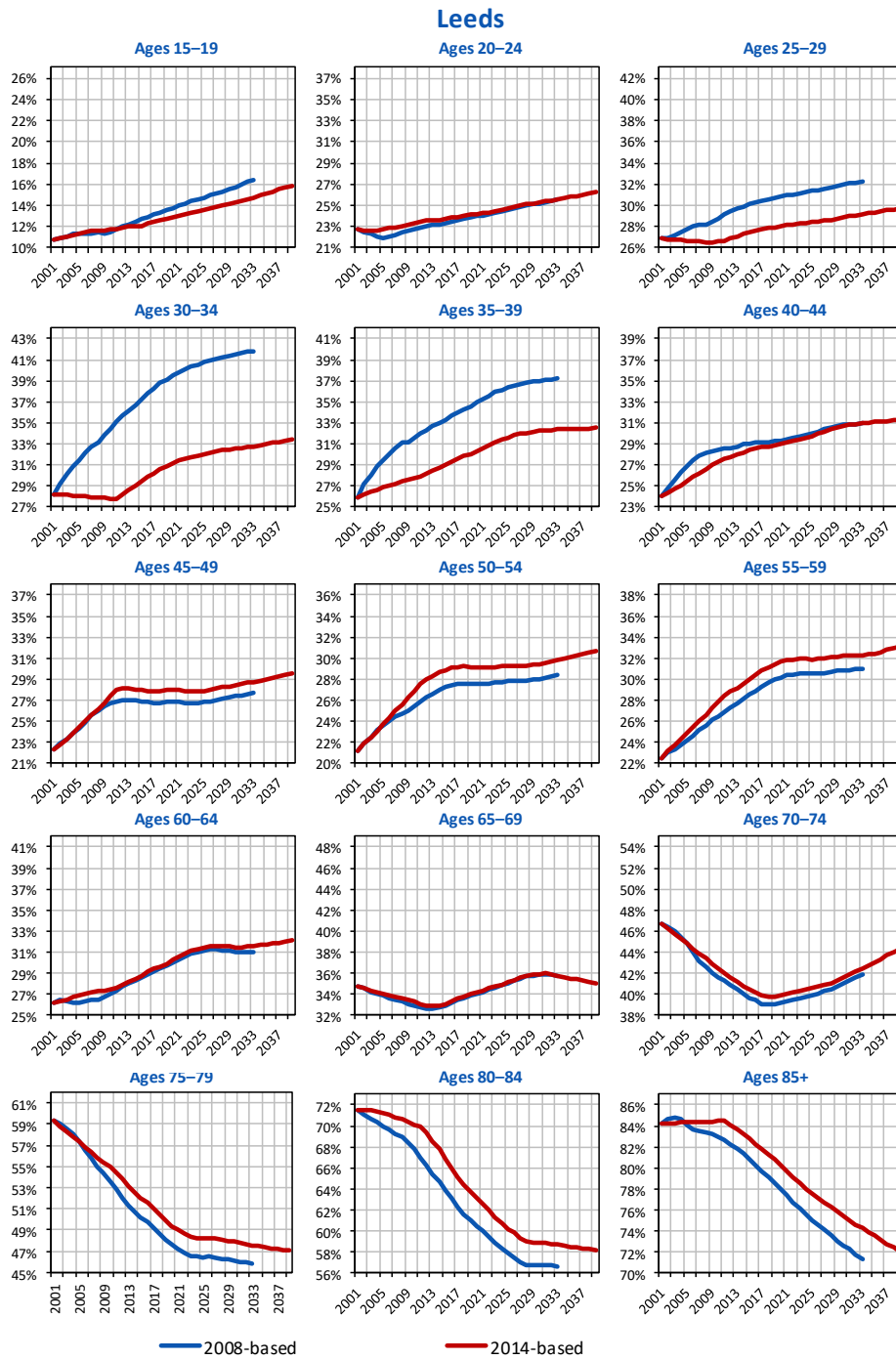


Figure 39: DCLG Stage 1 2008-based and 2014-based male headship rates by 5-year age group

Stage One DCLG Headship Rates by Age (Females):



Source: DCLG & ONS

Figure 40: DCLG Stage 1 2008-based and 2014-based female headship rates by 5-year age group

## Appendix C Dwelling Growth 2017–2033

C.1 Table 13 presents the average annual dwelling growth (2017–2033) under each of the demographic and employment-led scenarios. The scenarios are ranked in order of dwelling growth under the 2014-based headship rates and the employment-led scenarios are highlighted in grey. The average annual dwelling growth under the *Partial Return* and *Return* headship rates are expressed as additional growth to the annualised figures under the unadjusted 2014-based headship rates.

Table 13: Average annual dwelling growth 2017–2033

Scenario	Population Change (%)	Average Annual Dwelling Growth 2017–2033		
		2014-based	2014-based Partial Return	2014-based Return
High Growth (OBR)	13.0%	3,403	+253	+494
High Growth (Mid)	11.8%	3,155	+248	+483
REM 2017 (OBR)	11.8%	3,101	+246	+479
High Growth (REM)	11.0%	2,978	+244	+475
REM 2017 (Mid)	10.6%	2,858	+240	+468
PG Long Term	9.1%	2,638	+243	+474
REM 2017 (Core)	9.3%	2,604	+235	+458
High Growth (Core)	9.2%	2,587	+234	+457
<b>SNPP-2014</b>	<b>9.2%</b>	<b>2,534</b>	<b>+231</b>	<b>+450</b>
PG 5yr	8.4%	2,354	+224	+436
PG 10yr	7.7%	2,282	+226	+440

# Appendix D POPGROUP Methodology

## Forecasting Methodology

- D.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.
- D.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 41) is a cohort component model, which enables the development of population forecasts based on births, deaths and migration inputs and assumptions.
- D.3 The Derived Forecast (DF) model (Figure 42) sits alongside the population model, providing a headship rate model for household projections and an economic activity rate model for labour-force projections.
- D.4 For further information on POPGROUP, please refer to the Edge Analytics website (<http://www.edgeanalytics.co.uk/>).



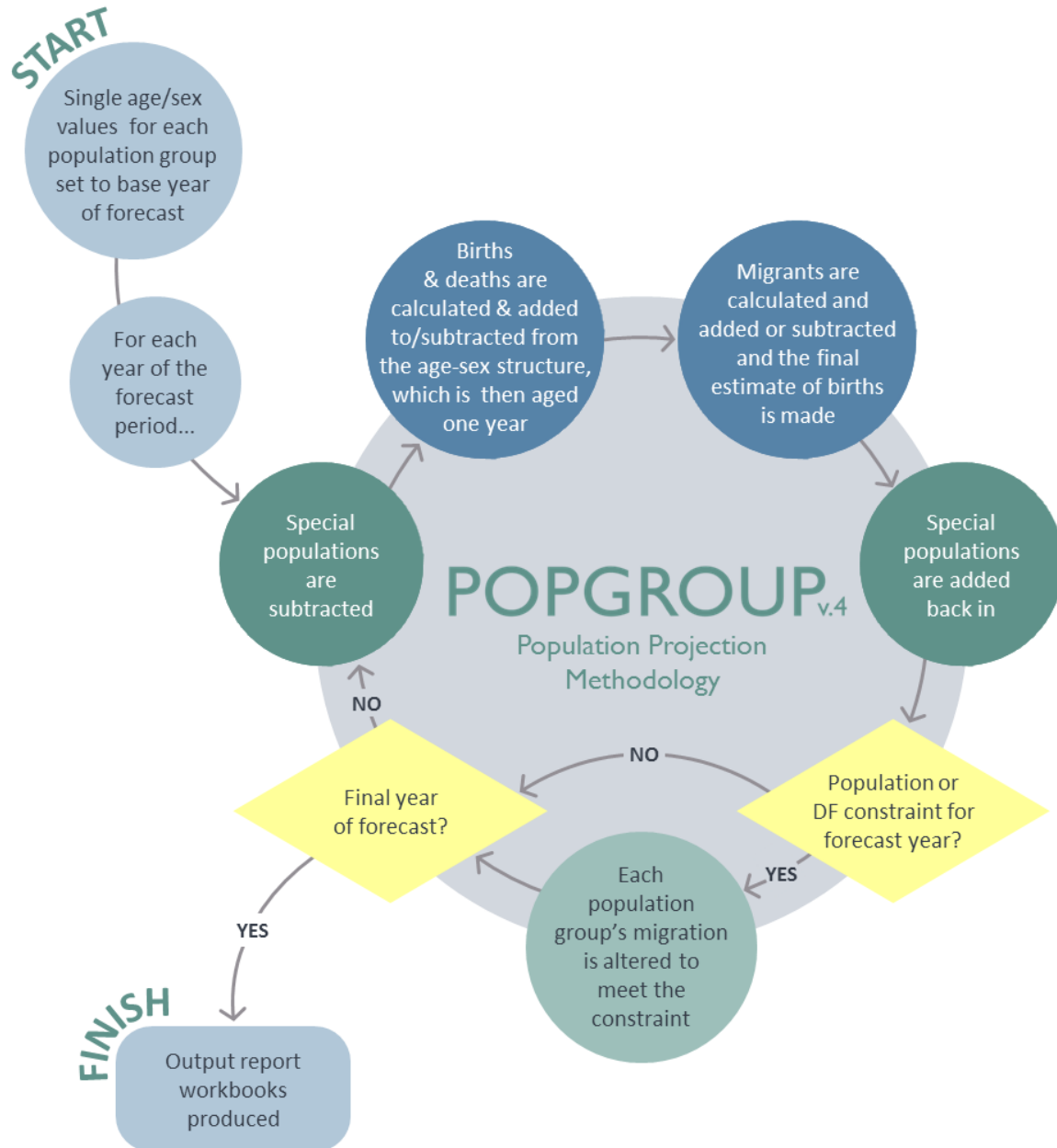
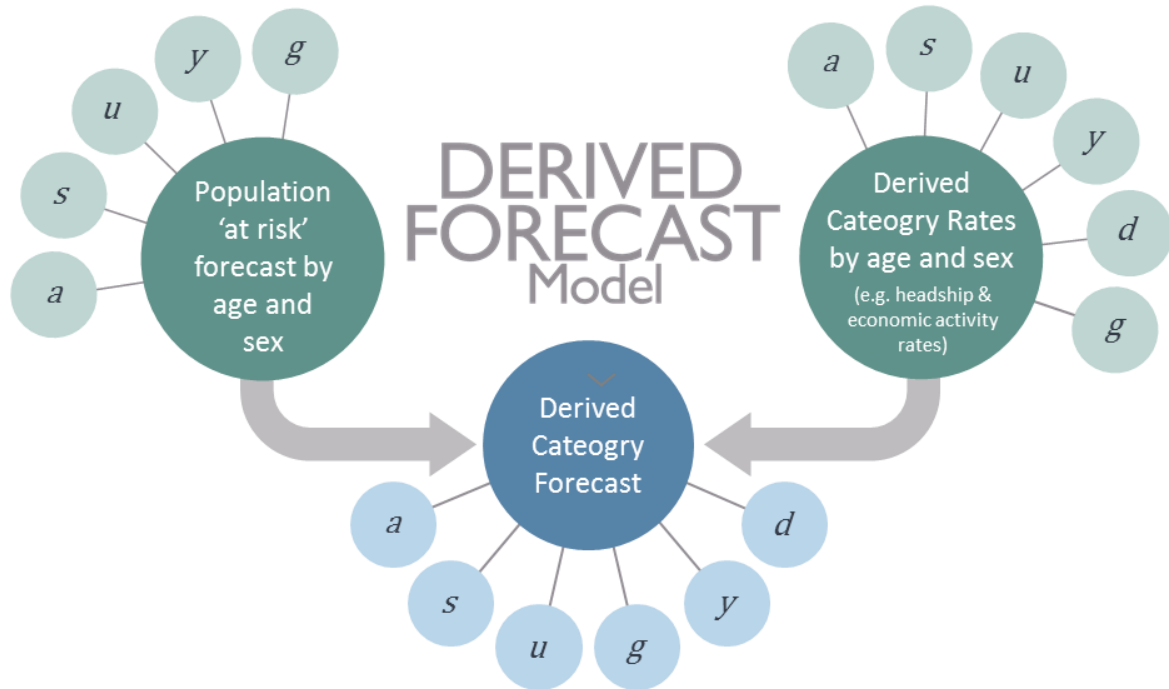


Figure 41: POPGROUP population projection methodology



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

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

Figure 42: Derived Forecast (DF) methodology

# Appendix E

## Data Inputs & Assumptions

### Introduction

- E.1 Edge Analytics has developed a suite of demographic scenarios for Leeds using POPGROUP v.4 and the Derived Forecast model. The POPGROUP suite of demographic models draw data from a number of sources, building an historical picture of population, households, fertility, mortality and migration on which to base its scenario forecasts. Using historical data evidence for 2001–2015, 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.
- E.2 The following scenarios have been produced:
- SNPP-2014
  - PG 5yr
  - PG 10yr
  - PG Long-Term
  - Employment-led *REM 2017*
  - Employment-led *REM 2017 (OBR)*
  - Employment-led *REM 2017 (Mid)*
  - Employment-led *High Growth*
  - Employment-led *High Growth (REM)*
  - Employment-led *High Growth (OBR)*
  - Employment-led *High Growth (Mid)*

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

# Population, Births & Deaths

## Population

- E.3 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.
- E.4 In the **SNPP-2014** scenario, the historical MYEs are used up to 2014. From 2014, future population counts are provided by single-year of age and sex to ensure consistency with the trajectory of the ONS 2014-based SNPP.
- E.5 In the other scenarios, the historical MYEs are used up to 2015.

## Births & Fertility

- E.6 In each scenario, historical mid-year to mid-year counts of births by sex have been sourced from the ONS MYEs.
- E.7 In the **SNPP-2014** scenario, historical births are used from 2001/02 to 2013/14. From 2014/15, future counts of births are specified, to ensure consistency with the 2014-based official projection.
- E.8 In all other scenarios, historical births are used from 2001/02 to 2014/15. From 2015/16, an area-specific age-specific rate (ASFR) schedule, derived from the ONS 2014-based SNPP, is included in the POPGROUP model assumptions. Long-term assumptions on changes in age-specific fertility rates are taken from the ONS 2014-based SNPP.
- E.9 In combination with the ‘population-at-risk’ (i.e. all women between the ages of 15–49), the area-specific ASFR and future fertility rate assumptions provide the basis for the calculation of births in each year of the forecast period (i.e. from 2015 onwards).

## Deaths & Mortality

- E.10** 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.
- E.11** In the **SNPP-2014** scenario, historical deaths are used from 2001/02 to 2013/14. From 2014/15, future counts of deaths are specified, to ensure consistency with the 2014-based official projection.
- E.12** In all other scenarios, historical deaths are used from 2001/02 to 2014/15. From 2015/16, an area-specific age-specific mortality rate (ASMR) schedule, derived from the ONS 2014-based SNPP, is included in the POPGROUP model assumptions. Long-term assumptions on changes in age-specific mortality rates are taken from the ONS 2014-based SNPP.
- E.13** In combination with the 'population-at-risk' (i.e. the whole population), the area-specific ASMR and future mortality rate assumptions provide the basis for the calculation of deaths in each year of the forecast period (i.e. from 2015 onwards).

## Migration

### Internal Migration

- E.14** 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).
- E.15** In the **SNPP-2014** scenario, historical counts of internal in and out-migrants are used from 2001/02 to 2013/14. Future counts of migrants are specified from 2014/15, to ensure consistency with the 2014-based official projection.
- E.16** In the **PG** scenarios, historical counts of internal in and out-migrants are used from 2001/02 to 2014/15. From 2015/16, 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 (2010/11 to

2014/15). In the **PG 10yr** scenario, a *ten* year history is used (2005/06 to 2014/15). In the **PG Long-Term** scenario, a 14-year internal migration history is used (2001/02 to 2014/15).

- E.17** In the **PG 5yr**, **PG 10yr** and **PG Long-Term** alternative trend scenarios, the relevant historical time period is used to derive the age-specific migration rate (ASMigR) schedules, which are then used to determine the future number of in- and out-migrants.
- E.18** 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 Leeds, it comprises all districts which cumulatively contributed 70% of migrants into the Leeds City Region, Sheffield City Region, York and North Yorkshire, Humber, Greater Lincolnshire and Derby, Derbyshire, Nottingham and Nottinghamshire LEPs over the 2008/09–2014/15 period.
- E.19** In the **Employment-led** scenarios (*REM 2017*, *REM 2017 OBR*, *REM 2017 Mid*, *High Growth*, *High Growth REM*, *High Growth OBR* and *High Growth Mid*), historical counts of internal in and out-migrants are used from 2001/02 to 2014/15. From 2015/16, these scenarios then calculate their own internal migration assumptions to ensure an appropriate balance between the population and the targeted increase in the workplace-based employment that is defined in each year of the forecast period. A higher level of net internal migration will occur if there is insufficient population and resident labour force to meet the forecast employment. In the **Employment-led** scenarios, the profile of internal migrants is defined by an ASMigR schedule, derived from the ONS 2014-based SNPP.

## International Migration

- E.20** 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.
- E.21** In all scenarios, future international migrant counts are specified.

- E.22 In the **SNPP-2014** scenario, historical counts of migrants are used from 2001/02 to 2013/14. From 2014/15, the international in- and out-migration counts are drawn directly from the 2014-based official projection.
- E.23 In the **PG** scenarios, historical counts of international in and out-migrants are used from 2001/02 to 2014/15. From 2015/16, future international migration counts are based on the area-specific historical migration data. In the **PG 5yr** scenario, a five year international migration history is used (2010/11 to 2014/15). In the **PG 10yr** scenario, a ten year history is used (2005/06 to 2014/15) and in the **PG Long-Term** scenario, a 14-year history is used (2001/02 to 2014/15). In all **PG** scenarios, an ASMigR schedule of rates is derived from the relevant migration history and is used to distribute future counts by single year of age.
- E.24 Implied within the international migration component of change in the **PG 5yr**, **PG 10yr** and **PG Long-Term** scenarios is an 'unattributable population change' (UPC) figure, which ONS identified within its latest mid-year estimate revisions. The POPGROUP model has assigned the UPC to international migration as it is the component with the greatest uncertainty associated with its estimation.
- E.25 In the **Employment-led** scenarios (*REM 2017*, *REM 2017 OBR*, *REM 2017 Mid*, *High Growth*, *High Growth REM*, *High Growth OBR* and *High Growth Mid*), historical counts of international in and out-migrants are used from 2001/02 to 2014/15. From 2015/16, international migration counts are taken from the ONS 2014-based SNPP (i.e. counts are consistent with the **SNPP-2014** scenario). An ASMigR schedule of rates from the ONS 2014-based SNPP is used to distribute future counts by single year of age.

## Households & Dwellings

- E.26 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.”*
- E.27 In POPGROUP, a dwelling is defined as a unit of accommodation which can either be occupied by one household or vacant.

E.28 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 2014-based household projection model from the DCLG. The 2014-based model was released by the DCLG in July 2016, and is underpinned by the 2014-based SNPP from ONS.

## Household Headship Rates

E.29 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”*<sup>31</sup>.

E.30 The household headship rates used in the POPGROUP modelling have been taken from the latest DCLG 2014-based household projection model, which is underpinned by the ONS 2014-based SNPP. The DCLG household projections are derived through the application of projected headship rates to a projection of the private household population.

E.31 The DCLG produces national and local authority projections for the total number of households by sex, 5-year age group and relationship status group over the projection period. These headship rates have been applied in POPGROUP.

E.32 Three alternative sets of headship rates have been applied to each scenario (Figure 43):

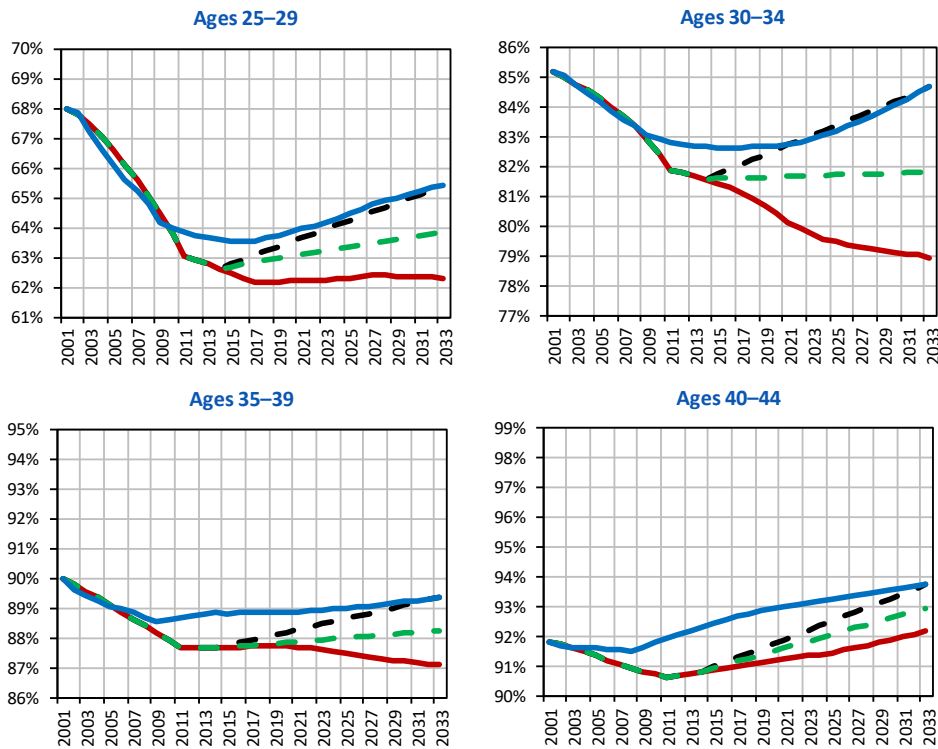
- **2014-based:** These are the DCLG 2014-based headship rates
- **2014-based Partial Return:** From 2014, the 2014-based headship rates for 25–29, 30–34, 35–39 and 40–44 age groups return to a ‘mid-point’ between the 2008-based and 2014-based rate by 2033, following the original trend thereafter.
- **2014-based Return:** From 2014, the 2014-based headship rates for 25–29, 30–34, 35–39 and 40–44 age groups return to the 2008-based rate by 2033, following the original trend thereafter.

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<sup>31</sup> Household Projections 2014-based: Methodological Report. Department for Communities and Local Government (July 2016). <https://www.gov.uk/government/statistics/2014-based-household-projections-methodology>



Male Headship Rates by 5yr Age Group



Female Headship Rates by 5yr Age Group

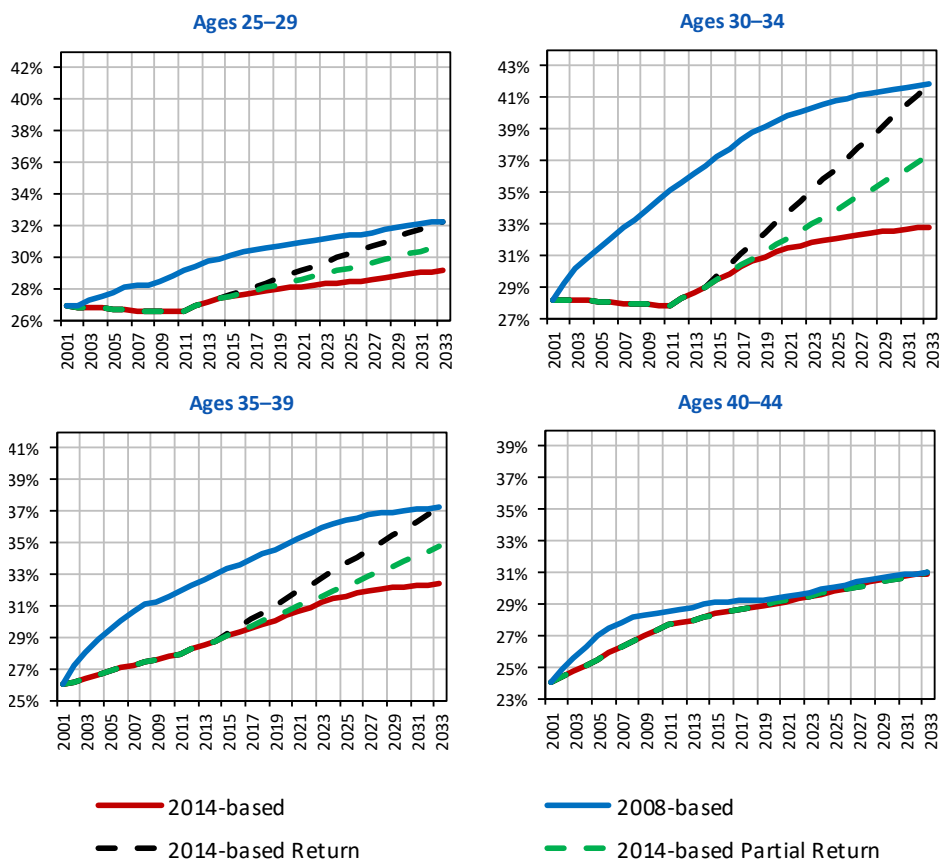


Figure 43: Headship rate sensitivities

## Communal Population Statistics

- E.33** Household projections in POPGROUP exclude the population 'not-in-households' (i.e. the communal/institutional population). These data are drawn from the DCLG 2014-based household projections, which use statistics from the 2011 Census. Examples of communal establishments include prisons, residential care homes and student halls of residence.
- E.34** 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.

Table 14: Communal Population 75+ (2017 and 2033)

Scenario	Communal Population 75+		
	2017	2033	Change (%)
High Growth OBR	2,984	4,395	47.3%
High Growth Mid	2,984	4,380	46.8%
REM 2017 OBR	2,976	4,367	46.7%
High Growth REM	2,983	4,369	46.5%
REM 2017 Mid	2,976	4,353	46.3%
REM 2017	2,976	4,338	45.8%
High Growth	2,977	4,339	45.7%
SNPP-2014	2,963	4,315	45.6%
PG 5yr	2,959	4,305	45.5%
PG 10yr	2,933	4,133	40.9%
PG Long Term	2,929	4,068	38.9%

Note: scenarios ranked in order of change in communal population

## Vacancy Rate

- E.35 The relationship between households and dwellings is modelled using a 'vacancy rate', sourced from the 2011 Census<sup>32</sup>. The vacancy rate is calculated using statistics on households (occupied household spaces) and dwellings (shared and unshared).
- E.36 A vacancy rate of 3.4% for Leeds has been applied, fixed throughout the forecast period. Using the vacancy rate, the 'dwelling requirement' of each household growth trajectory has been evaluated.

## Labour Force & Jobs

- E.37 Apart from in the **Employment-led** scenarios, the labour force and jobs implications of the population growth trajectory are evaluated through the application of three key data items: economic activity rates, an unemployment rate and a commuting ratio.
- E.38 In the **Employment-led** scenarios, these assumptions are used to determine the level of population growth required by the defined jobs growth trajectory.

## Economic Activity Rates

- E.39 Between the 2001 and 2011 Censuses, rates of economic activity increased, most notably for females and males in the older age groups (Figure 44).

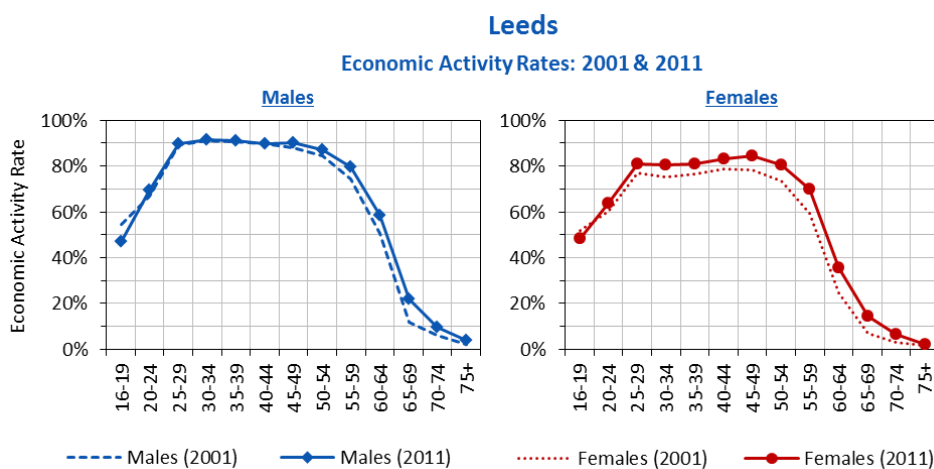


Figure 44: Leeds economic activity rates: 2001 and 2011 Census comparison (source: ONS)

<sup>32</sup> Census Table KS401EW: Dwellings, household spaces and accommodation type

## REM Economic Activity Rates

- E.40 The level of labour force participation is recorded in the economic activity rates. In the demographic, **Employment-led REM 2017** and **Employment-led High Growth (REM)** scenarios, economic activity rates have been derived from the REM (March 2017) forecast for the 16–75+ age groups. Under these assumptions, the aggregate economic activity rate increases from 64.6% in 2017 to 65.3% by 2033 (Figure 45).

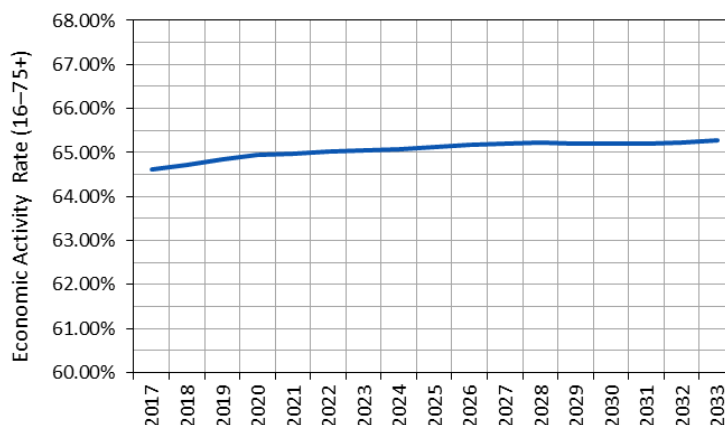


Figure 45: Economic activity rate (16–75+) derived from the REM (March 2017)

## OBR Economic Activity Rate Sensitivities

- E.41 The Office for Budget Responsibility (OBR) has undertaken analysis of labour market trends in its 2017 Fiscal Sustainability Report<sup>33</sup>. Included within its analysis is a forecast of changing economic activity rates for males and females, extending to a long-term 2066 forecast horizon. This forecast has been used to generate an alternative set of economic activity rates for Leeds.
- E.42 Adjustments have been made to all age groups (16–75+) (Table 15), with the economic activity rate profiles summarised over the plan period in Figure 46. These economic activity rates have been applied to the **Employment-led REM 2017 OBR**, and **Employment-led High Growth OBR** scenarios only.

<sup>33</sup> [http://cdn.budgetresponsibility.org.uk/FSR\\_Jan17.pdf](http://cdn.budgetresponsibility.org.uk/FSR_Jan17.pdf)

Table 15: OBR Economic Activity Rate adjustments

OBR Economic Activity Rates Change 2017–2033			
Males		Females	
16–19	5%	16–19	1%
20–24	1%	20–24	1%
25–29	0%	25–29	0%
30–34	0%	30–34	0%
35–39	-1%	35–39	0%
40–44	-1%	40–44	4%
45–49	0%	45–49	3%
50–54	-1%	50–54	2%
55–59	0%	55–59	1%
60–64	8%	60–64	20%
65–69	35%	65–69	100%
70–74	8%	70–74	59%
75+	16%	75+	104%

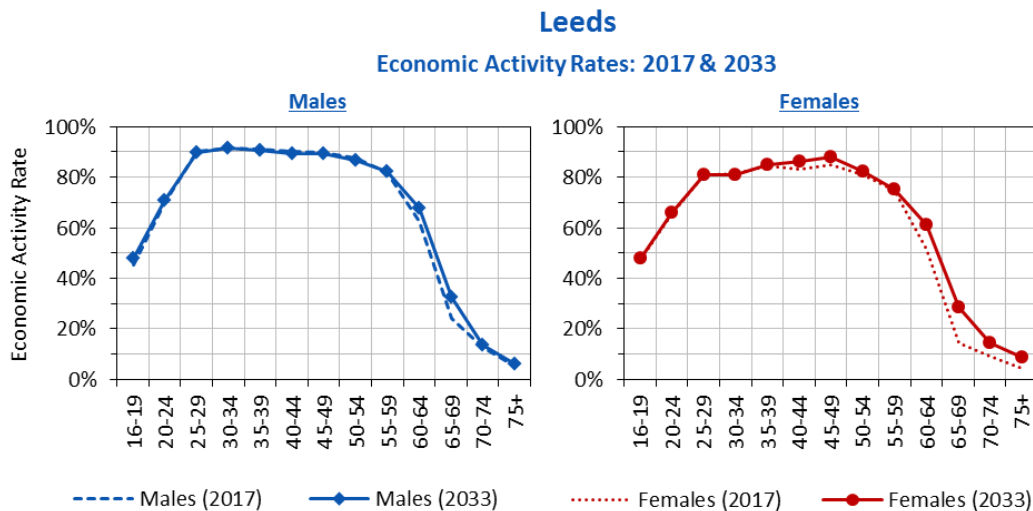


Figure 46: OBR economic activity rate profile for Leeds

### ‘Mid’ Economic Activity Rate Sensitivities

E.43 Under the **Employment-led REM 2017 Mid** and **Employment-led High Growth Mid** scenarios, the economic activity rate (16–75+) express a mid-point between the March 2017 REM economic activity rate assumptions and the OBR assumptions by 2033. Under the ‘Mid’ economic activity rate assumptions, the aggregate rate decreases from 64.6% in 2017 to 64.4% by 2033 (Figure 47).

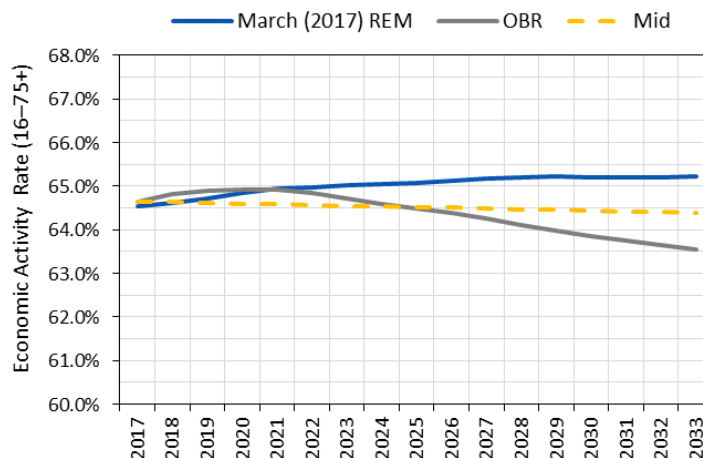


Figure 47: Economic activity rates (Mid, OBR & March 2017 REM) 2017–2033

### High Growth Economic Activity Rates

E.44 Under the **Employment-led High Growth** scenario, economic activity rate assumptions have been derived from the High Growth forecast for the 16–75+ age groups. Under these assumptions, the aggregate economic activity rates increases from 65.3% in 2017 to 66.7% in 2033 (Figure 48).

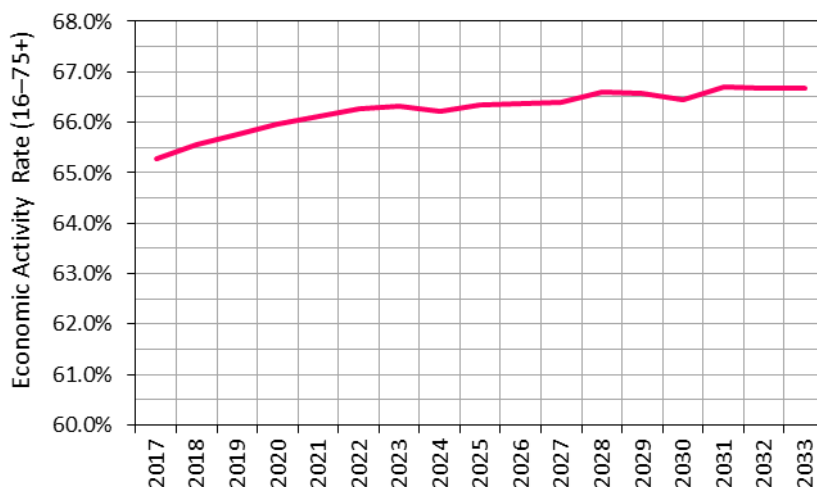


Figure 48: Economic activity rate (16–75+) derived from the High Growth forecast

### Commuting Ratio

E.45 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.

- E.46 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.
- E.47 In all scenarios, the commuting ratio has been derived from the March 2017 REM and applied in each year of the forecast period (Figure 49). Under these assumptions, the commuting ratio is maintained at a relatively constant ratio of 0.87 between 2017 and 2033. Under the **Employment-led High Growth, Employment-led High Growth Mid and Employment-led High Growth OBR** scenarios, the commuting ratio has been derived from the *High Growth* trajectory; however this is consistent with the commuting assumptions under the March 2017 REM.

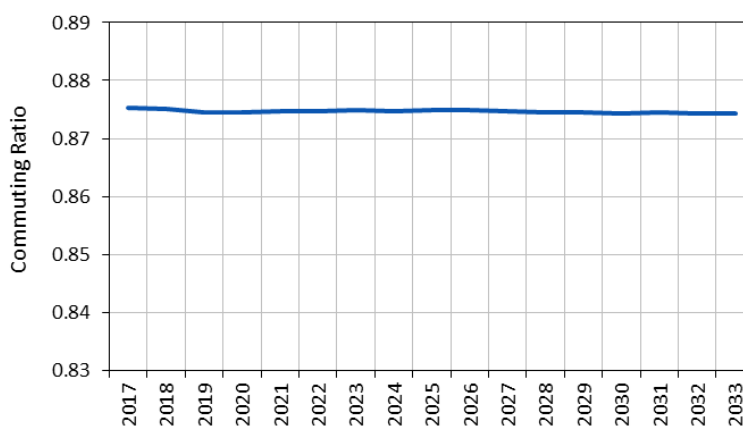


Figure 49: Leeds commuting ratio (March 2017 REM)

## Unemployment Rate

- E.48 The unemployment rate, together with the commuting ratio, controls the balance between the size of the labour force and the employment available within an area. In all scenarios (except **Employment-led High Growth, Employment-led High Growth Mid and Employment-led High Growth OBR** scenarios), the unemployment rate has been derived from the REM (March 2017) and applied in each year of the forecast period. Under these assumptions, the unemployment rate reduces from 5.9% in 2017 to 5.3% by 2033 (Figure 50).
- E.49 The unemployment rate under the **Employment-led High Growth, Employment-led High Growth Mid and Employment-led High Growth OBR** scenarios has been derived from the 'High Growth' forecast and applied in each year of the forecast period. Under these assumptions, the unemployment rate reduces from 6.0% in 2017 to 5.0% by 2033 (Figure 50).

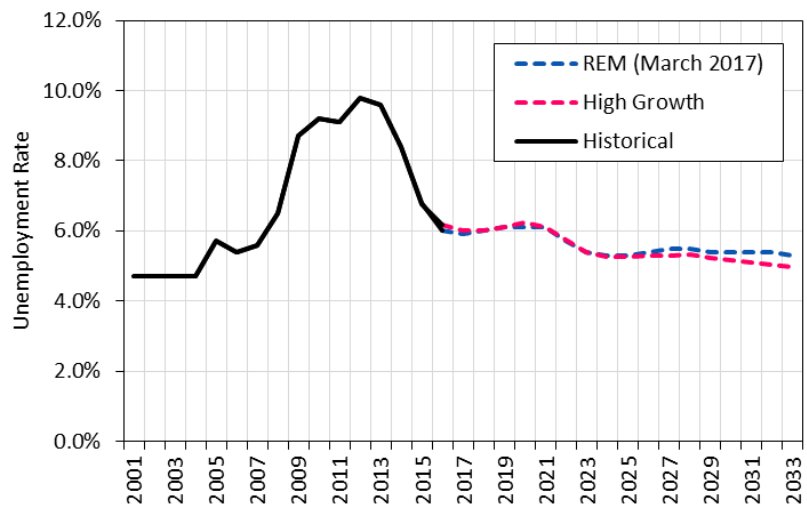


Figure 50: Unemployment rate (REM & High Growth)



## Appendix F Economic Modelling Methodology

- F.1 This appendix outlines the methodology underpinning the economic modelling assumptions which have been used in; (a) the development of the employment-led scenarios and (b) considering the relationship between demographic and economic change. Detail has been provided by the Regional Economic Intelligence Unit (REIU) on both the Regional Econometric Model (REM) and 'High Growth' forecast.

### Regional Econometric Model (REM)

- F.2 The principal tool used to produce the economic forecasts is the Yorkshire & Humber Regional Economic Model (REM). The REM is an interactive database of economic, demographic and environmental data across Yorkshire and Humberside as well as for a number of surrounding areas.
- F.3 Developed by Experian, the REM has been continually developed and upgraded over a number of years to help forecast industry growth and decline over the coming years. The model includes both historical data and forecasts on 38 industry sectors between the years 1997 and 2036. It can produce forecasts of output, productivity, employment, occupations, carbon emissions and skills. This data is provided for Yorkshire & Humber as well as the Local Authority Districts (LADs) within the region and several City Regions.
- F.4 The REM is designed to serve as an illustrative guide to economic research as well as a useful quantitative aid to future economic analysis. The REM is a workable tool that enables users to examine changes in the economic structure of Yorkshire & Humber, and observe the impact on all other economic, demographic and environmental variables.

### Baseline REM Employment Forecast

- F.5 The baseline employment forecasts in the model are calculated using a combination of national and local factors. UK forecasts drive regional forecasts which in turn drive local area forecasts. In broad terms, the historical performance of local economies is interpreted in terms of their share of the regional economy of which they are a part. Regional and industry sectors forecasts vary on the basis of their differing economic structures and historic performance, as well as on UK wide

relationships. The full explanation and method behind Experian's forecasts is set out at the end of this Appendix.

- F.6 Baseline forecasts from the current REM (2017) were considered along with historic sets of data from previous versions of the REM and Experian's RPS dataset to sense check these.

## High Growth Employment Forecast

- F.7 There are a number of ways to produce a higher growth variant to the baseline forecasts from the REM. Considerable care was taken in producing these and a range of inputs was considered and then sense checked. This is particularly the case as baseline forecasts do make assumptions that there will be certain levels of public investment and that interventions are likely to be at least as successful as previous ones.
- F.8 As a result, higher growth scenarios make most sense when they're undertaken in a top down way and based on, a higher jobs target, or equally from the bottom up, considering investments and interventions which can be justified as being on a higher level than previous activity.
- F.9 Therefore, higher growth scenarios ideally consider significant economic changes, especially given the point above about the baseline jobs forecast assuming future investments and interventions are at least as successful as those previously.
- F.10 The scenarios considered in this analysis have considered both of these, as well as the ambition outlined in the wider Leeds City Region Strategic Economic Plan for an additional 36,000 jobs by 2036. Bottom up and top down scenarios were tested with the principal source of economic growth for the city being the plans to double the size of Leeds City Centre. This would primarily be achieved through the South Bank Masterplan and the arrival of HS2 to Leeds in 2036.
- F.11 The bottom up modelling considered the mid-range of additional jobs that have previously been modelled for South Bank (7,000–8,000), as well as the additional jobs that could be produced through the innovation district (c2,000). These assumptions were input into the REM to model full likely effects.
- F.12 As there is also a range of other economic activity taking place in the city, a top down set of benchmarks were also produced to locate these bottom up effects. These used a starting

adjustment of baseline growth + 1%, with the uplift gradually increasing to +2% in the years prior to HS2 arriving in 2033 and as South Bank delivery accelerates.

- F.13 These growth assumptions were considered justifiable by a range of stakeholders for two reasons; they represent (a) a pragmatic view, in capturing the activity on the ground perspective and (b) an ambitious one, in modelling a shared view that Leeds' economy can perform better.
- F.14 The outcome of these, broadly fit with other forecasts including the mid-range forecasts that have recently been produced for the Leeds Growth Strategy and Leeds' share of the LCR SEP ambition for 36,000 additional jobs (over the baseline) by 2036. This gives further justification for their use as a higher growth scenario.

## Overview of Experian's Forecasting Methodology

- F.15 Most of data in the REM is drawn from Experian Economics' Regional Planning Service (RPS). The RPS provides detailed data for the UK regions, their constituent counties and local authority districts for the period 1997–2036. The headline indicators of GVA and employment are provided for 38 SIC-97 sectors. Demographic estimates are also supplied alongside key output, housing, financial and labour market indicators.

### Core Forecasting Methodology

- F.16 The methodology is based on a top-down approach to regional and local area forecasting; therefore views on the international and UK economies form the basis of the regional view and the regions in turn feed the forecasts for their constituent local areas (as shown in Figure 51).

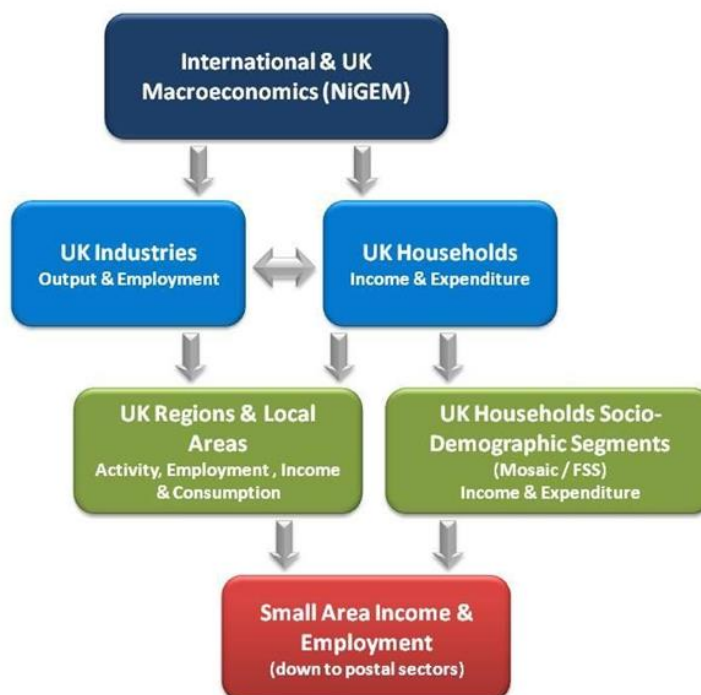


Figure 51: Experian's Top-Down approach to forecasting local area employment

- F.17** The high level economic forecast assumptions are generated within international & UK macro-economic forecast models. To produce the UK forecast, a customised version of the National Institute of Social & Economic Research's (NISER) model called NIGEM is used to provide the core macro-economic forecast. NIGEM is a general equilibrium model of the UK and World economy which forecasts, amongst other things, aggregate output, expenditure, income and employment based on the UK National Accounts published by the Office of National Statistics (ONS).
- F.18** In order to split this core forecast into industries and sub-sectors, Experian have a 'Sectoral Model' which expands on the forecasts from the core NIGEM model. This modelling framework provides substantial flexibility in specifying forecast and scenario assumptions and to allow structured sensitivity testing. NIGEM also provides confidence intervals around UK forecasts which provide a robust basis for assessing the range of forecast outputs for more detailed expenditure forecasts. The UK industry and household finance forecasts then drive regional forecasts for economic output (GVA), employment, household income and expenditure which in turn drive local area forecasts (for Local & Unitary Authority Districts).
- F.19** The overall forecasting approach is based on a methodology that combines long-term supply and demand influences with short-term demand side influences. In the short- to medium-term, the

performance of the UK is driven by demand side influences while supply potential is the long-term determinant of growth. The model is used to produce an initial forecast which is evaluated by sector experts in light of their detailed knowledge. Alterations are made for significant pieces of inward investment, or infrastructure development, or changes to European funding, in the form of 'add factors'. A new forecast is then produced, which is again subject to rigorous inspection. This process continues until those responsible for the forecast are satisfied with the results. A similar process and model methodology (demand-driven in the short to medium term, but supply-determined in the longer term) is adopted to produce regional forecasts.

**F.20** County and local/unitary authority area (LAD) forecasts are prepared once national and regional forecasts are finalised using a shift-share methodology. In broad terms, the historical performance of county economies is interpreted in terms of their share of the regional economy of which they are a part. In turn, the performance of the LAD areas is based on their share of their encompassing county. For each sector of the economy (38 categories, SIC97 definition), equations are produced for output and employment that explain the observable relationship between these variables at the local and regional level.

**F.21** The models are solved to initially produce forecasts of output for each of the counties for each of the 38 categories. For example, if a county X has accounted for a steadily rising share of a sector P in region Y, then its share will continue to increase into the future. This applies whether the sector is increasing or decreasing in size at the regional level. These calculations are executed for every sector and every county in a region. All county totals must sum to regional totals. Output forecasts in each county in each industry are translated to employment by using wider regional productivity trends. The process is then repeated to produce forecasts for local areas relative to their wider counties. The forecasting process culminates with a set of county and sub-county level forecasts that are consistent with the national and regional forecasts which it is based on.