

Craven

Demographic Analysis & Forecasts

Assumptions, Methodology & Scenario Results

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For the attention of:

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Acknowledgements

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1. Introduction

Context

- 1.1 In 2011, GVA was commissioned by the North Yorkshire authorities (including the County Council and the Yorkshire Dales and North Yorkshire Moors National Park) to produce a Strategic Housing Market Assessment (SHMA).
- 1.2 Following the SHMA, Craven District Council (CDC) sought to develop a more informed view of housing and future development at a local level. In 2012, CDC commissioned Edge Analytics to develop forecasts for the district in aggregate and for a selection of sub-district areas.
- 1.3 Since the SHMA and the 2012 Edge Analytics report were produced, new demographic evidence has become available:
- 2011 Census statistics from the Office for National Statistics (ONS), including economic activity rates and commuting statistics.
 - Revised mid-year population estimates (MYEs) for the period 2002–2010.
 - 2012 and 2013 MYEs.
 - 2011-based household projections from the Department for Communities and Local Government (DCLG).
 - The 2012-based sub-national population projection (SNPP).
- 1.4 Government Planning Practice Guidance (PPG) has also been finalised, providing guidelines on the approach to assessing housing need.
- 1.5 In September 2014, arc4 was commissioned by CDC to update the SHMA for Craven District. As part of the update, Edge Analytics has been commissioned to provide a range of demographic scenarios for the SHMA to consider.

Requirements

- 1.6 As part of the ongoing work within the Leeds City Region (LCR) Local Economic Partnership (LEP), CDC has commissioned Edge Analytics to produce an updated suite of population and household forecasts for the 2015–2030 period. These forecasts include the latest official population projection, the 2012-based SNPP, as well as trend-forecasts and employment-led forecasts, using the latest demographic evidence.
- 1.7 CDC has requested that demographic scenarios are developed for both the district of Craven as a whole, and also for four sub-district ‘small-areas’. The four small-areas are: North Craven, Mid Craven, South Craven and the area of the Yorkshire Dales National Park which falls within Craven (Figure 1)¹.

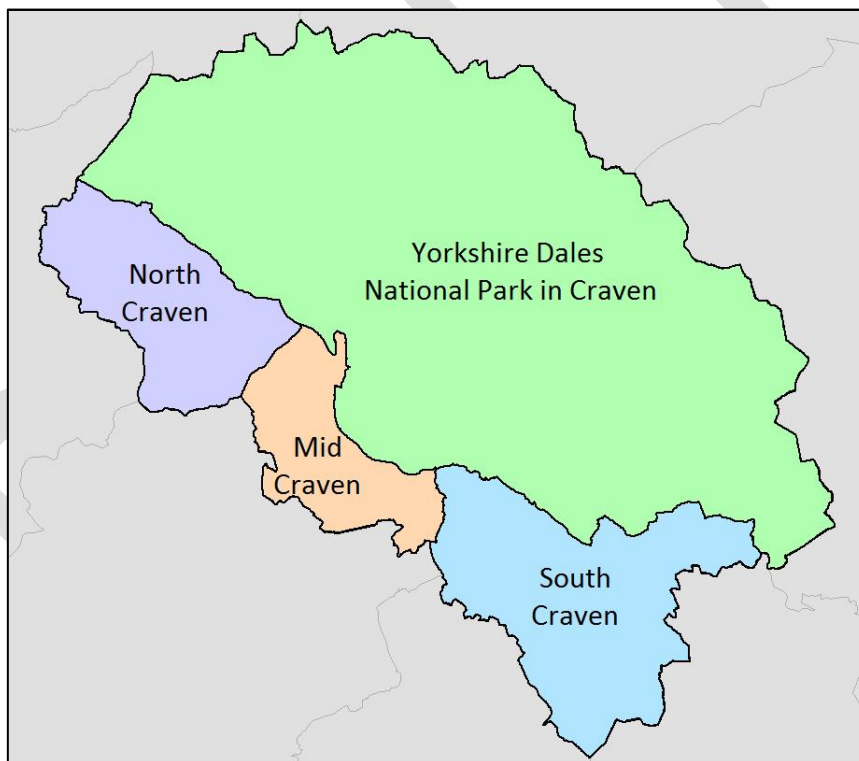


Figure 1: Craven – area definition.

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¹ In the 2012 Edge Analytics report, forecasts were produced for 6 small areas. In this new analysis, CDC has requested that the previous ‘Area 3’, ‘Area 4’ and Skipton be combined to form the ‘South Craven’ small area.

Approach

Official Guidelines

- 1.8 The development and presentation of demographic evidence to support local plans is subject to an increasing degree of public scrutiny. The National Planning Policy Framework (NPPF)² and Planning Practice Guidance (PPG)³ provide guidance on the appropriate approach to the objective assessment of housing need.
- 1.9 These advocate that 'official' statistics should provide a starting point for the evaluation of growth scenarios and that local circumstances, alternative assumptions and the most recent demographic evidence should be considered (PPG paragraphs 2a-015 and 2a-017). Evidence that links demographic change to forecasts of economic growth should also be assessed (PPG paragraph 2a-018).
- 1.10 The use of demographic models, which enable a range of growth scenarios to be evaluated, is now a key component of the objective assessment process. The POPGROUP suite of demographic models, which is widely used by local authorities and planners across the UK, provides a robust and appropriate forecasting methodology (for further information on POPGROUP, refer to Appendix A).
- 1.11 The choice of assumptions used within POPGROUP has an important bearing on scenario outcomes. This is particularly the case when trend projections are considered alongside population and household forecasts that are linked directly to anticipated jobs growth. 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

- 1.12 In accordance with the PPG, Edge Analytics has used POPGROUP (v.4) technology to develop a range of growth scenarios for the district of Craven and the four sub-district small-areas. As the

² <http://planningguidance.planningportal.gov.uk/blog/policy/>

³ <http://planningguidance.planningportal.gov.uk/blog/guidance/>

‘starting point’ of this assessment, the 2012-based SNPP for the district of Craven is presented, with an analysis of the ‘components of change’ underlying this new projection; these statistics are compared to previous estimates and to the historical data on births, deaths and migration.

- 1.13 A number of alternative scenarios have been developed and are compared to the 2012-based SNPP ‘benchmark’ and the earlier, 2010-based SNPP. The alternative scenarios include ‘trend’ scenarios, based on varying migration assumptions and a ‘jobs-led’ scenario, which is driven by growth in the forecast number of jobs. Jobs-led ‘sensitivity’ scenarios have also been produced, in which the sensitivity of population growth to changes in the underlying economic activity and migration assumptions has been assessed.
- 1.14 The household growth implications of each scenario have been assessed using assumptions from both the 2008-based and 2011-based household projection models from the DCLG.
- 1.15 In all the scenarios, historical data are included for the 2001–2013 period. Scenario results are presented for CDC’s 2015–2030 plan period⁴.

⁴ Note that the *forecast* period is 2013 to 2030.

Report Structure

1.16 The report is structured in the following way:

- In Section 2, a profile of Craven is presented. This includes an historical perspective on population change since the 2001 Census and analysis of the 'components of change' from the 2012-based SNPP.
- In Section 3, a definition of each scenario is presented, with the outcome of these scenarios detailed in Section 4.
- Section 5 summarises the analysis and identifies a number of key issues for consideration in the development of the SHMA and CDC's preparation of its Local Plan.
- Appendix A presents an overview of the POPGROUP methodology.
- Appendix B provides detail on the data inputs and assumptions used in the development of the POPGROUP scenarios.

2. Craven: Area Profile

- 2.1 The development of local housing plans is made considerably more challenging by the dynamic nature of key data inputs. Economic and demographic factors, coupled with the continuous release of new statistics, often undermine the robustness of underpinning evidence. This has been a particular issue since 2012, with the release of 2011 Census statistics, revisions to historical population estimates and updated population and household projections.
- 2.2 This section provides an overview of population change in Craven since 2001 and the recent revisions to the mid-year population estimates (MYEs). Also presented is the most recent population projection from ONS, the 2012-based SNPP and its constituent 'components of change'.

Population Change 2001–2011

Mid-Year Population Estimates

- 2.3 Between successive Censuses, population estimation is necessary. These mid-year population estimates (MYEs) are derived by applying the 'components of change' (i.e. counts of births and deaths and estimates of internal and international migration) to the previous year's MYE. Following the 2011 Census, the 2002–2010 MYEs were 'rebased' to align them with the 2011 MYE⁵ and to ensure the correct transition of the age profile of the population over the 2001–2011 decade.
- 2.4 At the 2011 Census, the resident population of Craven was 55,409, a 3.2% increase over the 2001–2011 decade. The 2011 Census population total proved to be *higher* than that suggested by the trajectory of growth from the previous MYEs. For this reason, the revised final MYEs are higher than the 'previous' MYEs, with the difference increasing over time (Figure 2).

⁵ Revised Annual Mid-year Population Estimates, 2001 to 2010. ONS, December 2013
http://www.ons.gov.uk/ons/dcp171778_345500.pdf

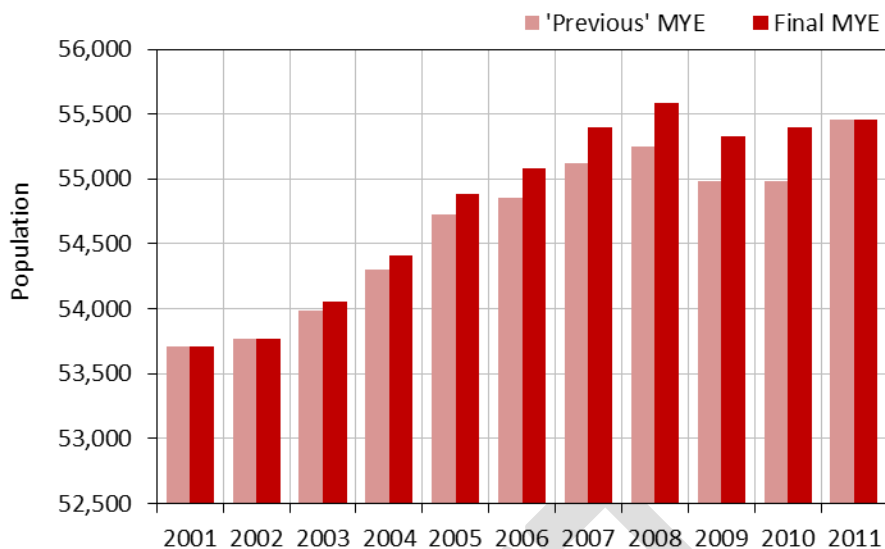


Figure 2: Craven – mid-year population estimates (source: ONS)

Components of Change

- 2.5 The rebasing of the MYEs involved the recalibration of the components of change for 2001/02–2010/11. Between Censuses, births and deaths are accurately recorded in vital statistics registers and provide a robust measure of ‘natural change’ (the difference between births and deaths) in a geographical area. Given that births and deaths are robustly recorded, and assuming that the 2001 Census provided a robust population count, the ‘error’ in the MYEs is due to the difficulties associated with the estimation of migration.
- 2.6 Internal migration is adequately measured through the process of GP registration, although data robustness may be lower where there is under-registration in certain age-groups (young males in particular). It is therefore most likely that the ‘error’ in the previous MYEs was associated with the mis-estimation of international migration, i.e. the balance between immigration and emigration flows to and from Craven.
- 2.7 However, ONS has not explicitly assigned the MYE adjustment to international migration. Instead it has identified an additional ‘unattributable population change’ (UPC) component, suggesting it has not been able to accurately identify the source of the 2001–2011 under-count (Figure 3). The effect of the UPC adjustment depends upon the scale of population recalibration that has been required following the 2011 Census results. For Craven, the population estimates have been subject to a small *uplift* due to the under-count experienced over the 2001–2011 decade.

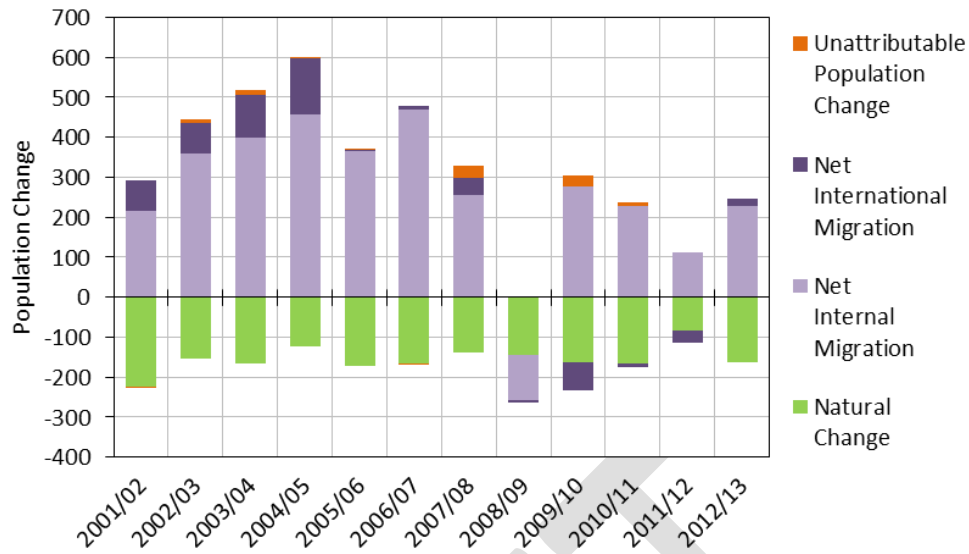


Figure 3: Craven – components of population change 2001/02 to 2012/13 (source: ONS). No UPC component is applied to the 2011/12 or 2012/13 statistics as these relate to the 2012 and 2013 MYEs which followed the 2011 Census.

2.8 Given the robustness of births, deaths and internal migration statistics compared to international migration estimates, it is assumed that UPC is most likely to be associated with the latter. With the assumption that the UPC element is assigned to international migration (for estimates up to 2011), and with the inclusion of statistics from the 2012 and 2013 MYEs from ONS, a twelve-year profile of the ‘components of change’ for Craven is presented (Figure 4).

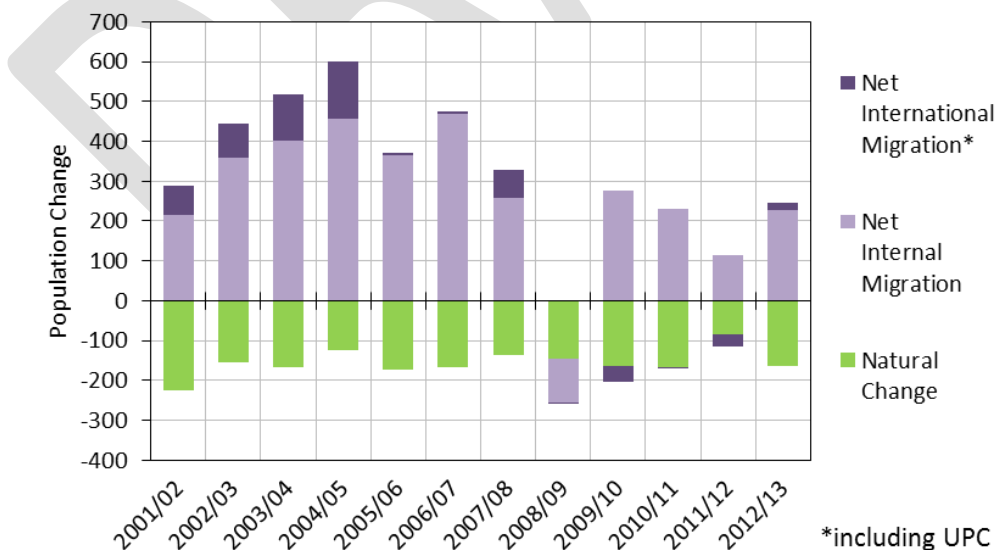


Figure 4: Craven – components of population change 2001/02 to 2012/13 including the UPC component (source: ONS).

- 2.9 Throughout the 2001/02–2012/13 period, natural change in Craven has been negative, with the number of deaths exceeding the number of births. The effect of net internal migration has been largely positive over the 2001/02–2012/13 period, with the exception of 2008/09. Between 2001/02 and 2006/07 net international migration has had a positive impact upon growth, however towards the latter half of the period, net international migration has been estimated to have a predominantly negative impact upon population change.

Official Population Projections

- 2.10 In the development and analysis of population forecasts, it is important to benchmark any growth alternatives against the latest 'official' population projection. The most recent official subnational population projection is the ONS 2012-based SNPP, released in May 2014⁶. This projection is compared to the earlier ONS population projections for Craven in Figure 5.

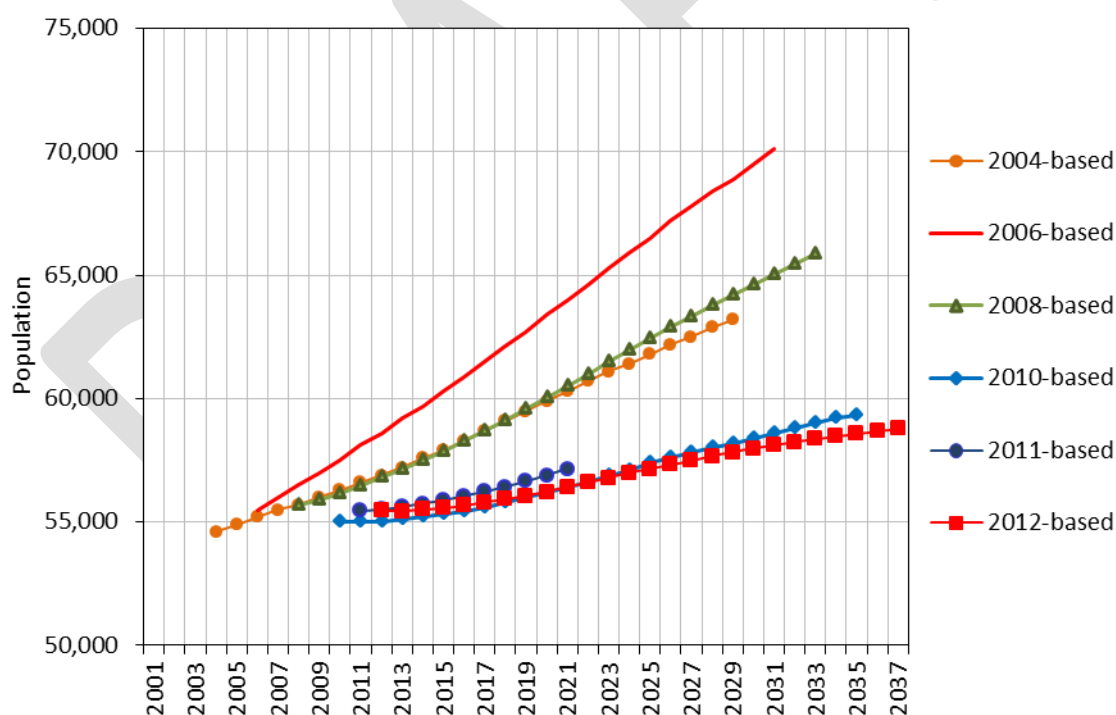


Figure 5: Official Projections for Craven (source: ONS).

- 2.11 The 2012-based SNPP has a *lower* rate of growth than the earlier official projections. Under the 2012-based SNPP, the population of Craven is projected to increase by 3,340 over the 2012–2037

⁶ 2012-based SNPP for England, ONS, 29th May 2014 http://www.ons.gov.uk/ons/dcp171778_363912.pdf

projection period, a 6.0% increase. Under the 2010-based SNPP, the population was projected to increase by 7.8% over the 25-year projection period (2010–2035).

2.12 The 2012-based SNPP components of change are presented in Figure 6, with the historical components of change for 2001/02 to 2011/12 included for comparison. The annual average natural change, net migration (internal and international) and population change for the 2012-based SNPP are compared to the historical 5-year and 10-year averages in Table 1.

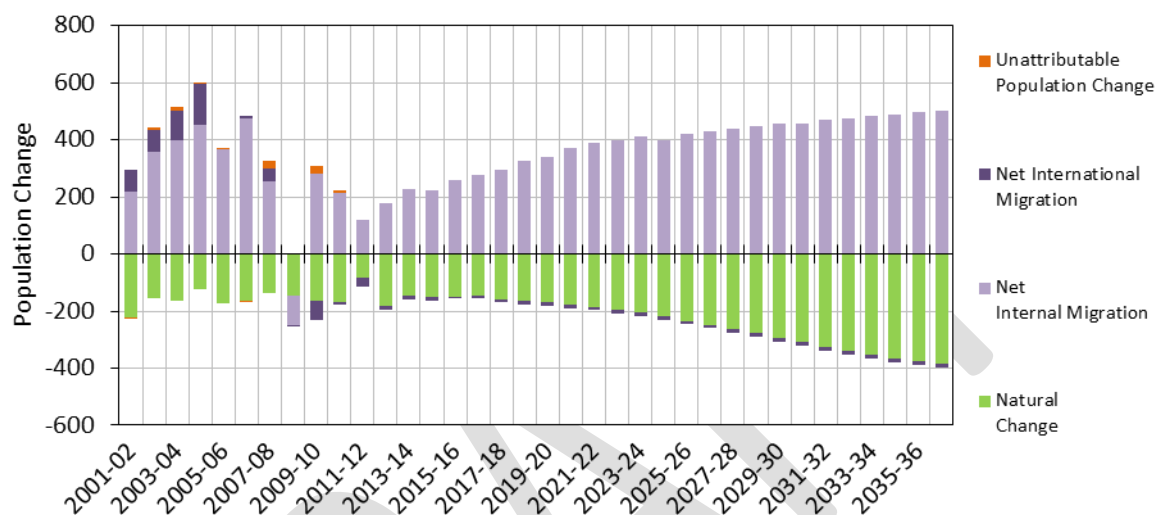


Figure 6: Historical and 2012-based SNPP components of change for Craven (source: ONS).

Table 1: 2012-based SNPP components comparison (source: ONS)

Component of Change	Historical		Projected
	5-year average (2007/08–2011/12)	10-year average (2002/03–2011/12)	2012-based SNPP average (2012/13–2036/37)
Natural Change	-139	-148	-241
Net Internal Migration	153	282	387
Net International Migration	-14	27	-12
Unattributable Population Change*	13	9	-
Annual Population Change	14	169	134
Annual Population Change (%)	0.02%	0.31%	0.24%

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

2.13 Under the 2012-based SNPP, the population is projected to increase by an average of +134 people per year. This is higher than the historical 5-year average (+14 per year) but lower than the 10-year average (+169 per year).

2.14 Historically, over both the 5-year and 10-year periods, average net internal migration has been positive. In the 2012-based SNPP, net internal migration continues to be a dominant component of population change, with the estimated future impact of net internal migration higher than recent historical evidence. Historical evidence suggests that over the 10-year period, average net international migration has been positive (an average of +27 per year). However over the historical 5-year period, average net international migration has been negative, averaging -14 per year. The 2012-based SNPP suggests that this negative net international migration is set to continue, although at a lower rate than the historical 5-year average, at -12 per year. Natural change continues to be negative throughout the forecast period, at a higher rate than over the 5-year and 10-year historical period.

Population Ageing

2.15 The aggregate population change statistics hide the very significant shift in the age profile of Craven's population that is projected by the 2012-based SNPP (Figure 7). The gradual ageing of the resident population has important implications for the size and structure of the local labour force and on the expected profile of future household formation. Summary indicators on population ageing quantify the importance of the issue in Craven relative to the wider regional and national population (Table 2).

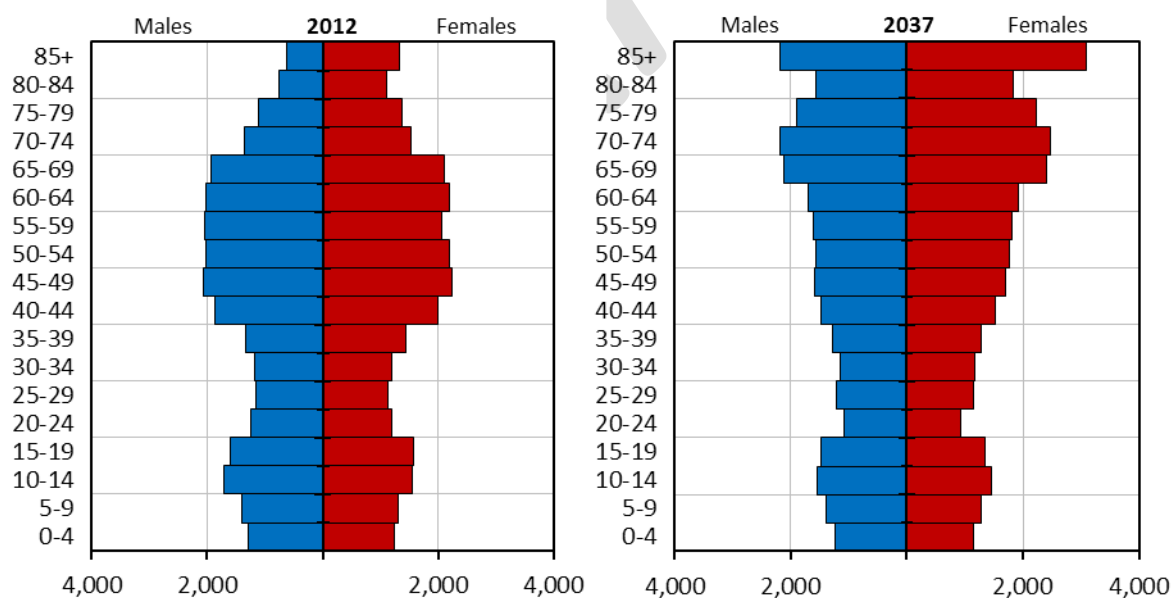


Figure 7: Craven's population age structure 2015–2030 (Source: ONS 2012-SNPP)

Table 2: Craven - Indicators of population ageing (Source: ONS 2012-SNPP)

Indicator	Craven			Yorkshire & Humber			England		
	2012	2037	Change*	2012	2037	Change*	2012	2037	Change*
Percentage 65+	24%	37%	14%	17%	24%	7%	17%	24%	7%
Percentage 80+	7%	15%	8%	5%	8%	4%	5%	8%	4%
Old age dependency ratio	39	77	37	26	41	15	26	41	15
Median age	48	54	7	40	42	2	40	43	3

*Change for 'Percentage 65+' and 'Percentage 80+' s presented as percentage point change

Old age dependency ratio = percentage of the population aged 65+ relative to the working-age population aged 16–64

Media age = the age that divides the population into two numerically equal groups

- 2.16 The percentage of the population aged 65+ in Craven is expected to increase from 24% to 37% over the 2012–2037 period, with the percentage aged 80+ expected to increase from 7% to 15%. This is at a substantially higher rate than the expected change in both Yorkshire and Humber and in England, where the percentage aged 65+ is projected to increase by 7 percentage points, and the population aged 80+ by 4 percentage points. The 2012-SNPP statistics suggest that Craven's median age is expected to increase from 48 to 54 over the 2012–2037 period. This is above the Yorkshire and Humber and England's median average age in 2037 (age 42 and 43 respectively).
- 2.17 The old age dependency (OAD) ratio measures the relationship between the size of the population aged 65+ and the population aged 16–64. In Craven, the OAD is expected to rise over the 19-year period from 39 to 77. These figures are extreme when compared to the expected regional and national trends.
- 2.18 These projected shifts in the population age structure are important when considering the relationship between anticipated jobs growth and future demographic change. Employment-growth forecasts for Craven need to consider how these new jobs will be fulfilled: through increased rates of economic participation in the resident labour force or through increased net migration.

3. Scenario Development

Introduction

- 3.1 There is no single definitive view on the likely level of growth expected in Craven; a mix of economic, demographic and national/local policy issues ultimately determines the speed and scale of change. For local planning purposes, it is necessary to evaluate a range of growth alternatives to establish the most 'appropriate' basis for determining future housing provision.
- 3.2 Edge Analytics has used POPGROUP (v.4) technology to develop a range of scenarios for Craven (for detail on the POPGROUP methodology, refer to Appendix A). The range of scenarios includes the most recent official population projection from ONS, the 2012-based SNPP. The 2010-based SNPP is also included for comparison. Three alternative 'trend-based' scenarios have also been developed, as well as a 'jobs-led' scenario, in which population growth is linked to jobs-growth implied by the 2014 REM. Additionally, sensitivity analysis has been conducted on the jobs-led scenario, evaluating the impact that changes to the migration assumptions and age- and sex-specific economic activity rates have on population growth. These two 'sensitivity' scenarios are included within the range of scenarios for comparison.
- 3.3 In all scenarios (district- and small-area-level), household growth has been assessed using assumptions from both the 2008-based and the 2011-based DCLG household models. The dwelling-growth implications of these household growth trajectories have then been evaluated.
- 3.4 To produce forecasts for the sub-district small-areas, small-area assumptions on births/fertility, deaths/mortality, migration and household formation have been used to disaggregate the district-level population growth suggested by a particular scenario.
- 3.5 In the following sections, the scenarios are described and the broad assumptions specified. For further detail on the data inputs and assumptions, please refer to Appendix B.

Scenario Definition

Official Projections

- 3.6 In accordance with the PPG, the alternative scenarios are 'benchmarked' against the most recent official population projections from the ONS, the ONS 2012-based SNPP. The '**SNPP-2012**' scenario replicates this official population projection.
- 3.7 The '**SNPP-2010**' scenario, which replicates the ONS 2010-based SNPP for Craven, is included for comparison. The population is re-scaled to the 2012 MYE to ensure consistency with the 2012-based SNPP and the 2010-based growth trajectory is continued thereafter.

Alternative Trend Scenarios

- 3.8 A five year historical period is a typical time-frame from which migration 'trend' assumptions are derived (this is consistent with the ONS official methodology). Given the unprecedented economic changes that have occurred since 2008, and the differences between the projected 2012-based SNPP data and the historical data (see paragraph 2.14), it is important to give due consideration to an extended historical time period for assumption derivation.
- 3.9 Three alternative trend scenarios have been developed, based upon the latest demographic evidence:
- '**PG-5yr**': internal migration rates and international migration flow assumptions are based on the last five years of historical evidence (2008/09 to 2012/13), with the UPC adjustment included within the international migration assumptions.
 - '**PG-10yr**': internal migration rates and international migration flow assumptions are based on the last 10 years of historical evidence (2003/04 to 2012/13), with the UPC adjustment included within the international migration assumptions.
 - '**Natural Change**': internal and international migration rates are set to zero. This scenario is hypothetical, but provides an indication of the degree to which dwelling growth is driven by natural change (i.e. the balance between births and deaths) and migration.

Labour Force, Jobs Growth & Jobs-led Scenarios

- 3.10 In the 'official' and 'alternative trend' scenarios, the labour force and jobs-growth implications of the population growth trajectories have been derived using three key data inputs: economic activity rates, an unemployment rate and a commuting ratio. In a 'jobs-led' scenario, these data inputs are used to determine the level of population growth associated with a defined jobs-growth trajectory.
- 3.11 In all scenarios ('official', 'alternative trend' and 'jobs-led'), economic activity rates by 5-year age group and sex have been sourced from the 2011 Census. Uplifts have been applied in the 60–69 age groups for both men and women to account for changes to the State Pension Age (SPA). In all scenarios, the unemployment rate has been incrementally reduced to account for economic recovery following the recession and the commuting ratio has been fixed throughout the forecast period at the 2011 Census value.
- 3.12 The jobs-led scenarios presented here are driven by the Autumn/Winter 2014 employment forecast from the Yorkshire & Humber Regional Econometric Model (REM). The jobs-growth targets have been applied from the start of the forecast period (i.e. from 2013/14). Jobs growth over the 2013/14–2029/2030 *forecast* period totals +2,736. Over the 2015/16–2029/30 *plan* period, the number of Full Time Equivalent (FTE) jobs increases by +1,956 (Figure 8).

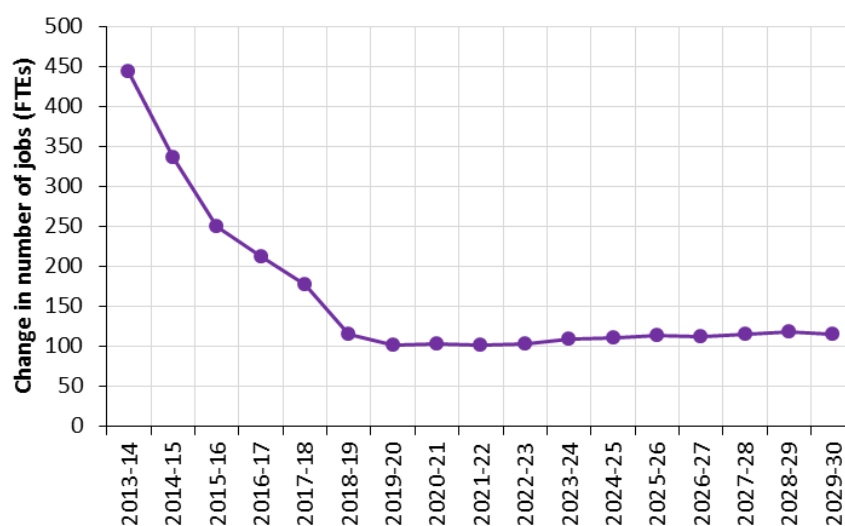


Figure 8: Jobs growth trajectory (FTEs) for Craven District
(source: Yorkshire & Humber REM 2014)

- 3.13 In a jobs-led scenario, migration is used to balance the relationship between the size of the population's labour force and the forecast number of jobs, given the definition of the key assumptions defined above. For example, a higher level of net in-migration will occur if there is insufficient resident labour force to meet the forecast number of jobs.
- 3.14 The level of migration required to balance the size of the labour force to the jobs growth is calculated using schedules of in and out-migration from the 2012-based SNPP. Craven has a relatively high level of in-migration associated with the older age-groups, so three alternative jobs-led scenarios have been tested.
- 3.15 In the first scenario ('**Jobs-led**'), the existing in and out-migration schedules from the 2012-based SNPP have been used.
- 3.16 In the second jobs-led sensitivity scenario ('**Jobs-led SENS1**'), schedules which are more heavily weighted towards the labour-force age-groups have been applied.
- 3.17 Whilst changes to underlying economic activity rates serve to increase labour force participation in line with changes to SPA, the ageing of Craven's population result in a *decline* in the aggregate rate of economic activity for the 16-74 age-range over the forecast period. To illustrate how maintaining the existing overall economic activity rate might affect the scenario outcomes, a third jobs-led sensitivity scenario ('**Jobs-led SENS2**') has been formulated. In this scenario, the overall economic activity rate of the labour force is maintained at the 2011 Census level, which in the case of Craven, was 72%. The commuting and unemployment assumptions remain the same as the other 'Jobs-led' scenario and the migration schedules are those used in the 'Jobs-led SENS1' scenario.
- 3.18 Employment forecasts, commuting ratio, unemployment rate and economic activity rates are only available as district-level inputs. Therefore, the jobs-growth targets specified in the jobs-led scenarios, and the number of jobs derived from the population growth trajectories of the other scenarios ('official' and 'alternative trend'), are only presented at district-level. However, the population-growth outcomes of the three jobs-led scenarios have been used in combination with small-area assumptions to distribute growth between the four small areas.

Household & Dwelling Growth

- 3.19 In each scenario, the implied number of households is derived using household headship rates, from both the 2008-based and 2011-based DCLG household models. This is in recognition of the uncertainty associated with future rates of household formation, given economic and demographic conditions.
- 3.20 The 2011-based headship rates were calibrated after a period of unprecedented economic change and stagnation in the housing market and thus suggest a lower rate of household formation than the previous 2008-based rates, calibrated from data collected in a time period with very different market characteristics. Assessing the household growth implications of a population projection using solely the 2011-based rates can be criticised as being overly dependent upon a period where household formation rates have been suppressed. Conversely, exclusive use of 2008-based rates can be criticised as being influenced by rates of household formation associated with pre-recessionary conditions that are unlikely to be repeated in the immediate future.
- 3.21 The 2011-based headship rates and the 2008-based headship rates are therefore applied to each scenario, producing an 'Option A' and an 'Option B' outcome:
- In 'Option A', the DCLG 2011-based headship rates are applied, with the 2011–2021 trend continued after 2021;
 - In the 'Option B' alternative, the DCLG 2008-based headship rates are applied, scaled to be consistent with the 2011 DCLG household total but following the original trend thereafter.
- 3.22 This approach presents a 'range' of household growth outcomes for each population forecast. The dwelling growth implications of these different household growth trajectories are then assessed through the application of a 'vacancy rate' (refer to Appendix B for further information on the household and dwelling assumptions). The 'Option A' and 'Option B' dwelling requirements are then averaged to provide an annual dwelling requirement for each scenario.

Scenario Summary

- 3.23 Eight scenarios have been produced for Craven (Table 3) under three scenario types; official projections, alternative trend-based scenarios and jobs-led scenarios.

Table 3: Scenario definition

Scenario Type	Scenario Name	Scenario Description
Official Projections	'SNPP-2012'	This scenario mirrors the 2012-based SNPP from ONS for Craven. This scenario is the official 'benchmark' scenario.
	'SNPP-2010'	This scenario mirrors the 2010-based SNPP from ONS for Craven. The population is re-scaled to the 2012 MYE to ensure consistency with the 2012-based SNPP and the 2010-based growth trajectory is continued thereafter.
Alternative trend-based scenarios	'Natural Change'	In- and out- migration rates are set to zero.
	'PG-5yr'	Internal and international migration assumptions are based on the last five years of historical evidence (2008/09 to 2012/13).
	'PG-10yr'	Internal and international migration assumptions are based on the last 10 years of historical evidence (2003/04 to 2012/13).
Jobs-led scenarios	'Jobs-led'	Population growth is determined by the annual change in the number of jobs, as defined by the Yorkshire & Humber REM jobs forecast (a total increase of +1,956 FTE jobs 2015/16–2029/30).
	'Jobs-led SENS1'	As the 'Jobs-led' scenario, but the migration balance is determined by schedules that are more heavily weighted towards the labour force age-groups.
	'Jobs-led SENS2'	As the 'Jobs-led SENS1' scenario but the overall rate of economic activity for 16-74 labour force ages, is maintained at its 2011 Census level (72%).

Note: Refer to Appendix B for further information on the scenario data inputs and assumptions

4. Scenario Outcomes

Introduction

- 4.1 Eight scenarios have been developed for Craven using POPGROUP technology. Scenario outcomes are presented for the district of Craven as a whole, and also for each of the four small-areas: North Craven, Mid Craven, South Craven and the Yorkshire Dales National Park.
- 4.2 All scenarios have been run using household growth assumptions from both the 2011-based DCLG household model and the 2008-based household model. The results are therefore presented under an 'Option A' and an 'Option B' outcome:
- In 'Option A', the DCLG 2011-based headship rates have been applied, with the 2011–2021 trend continued after 2021;
 - In the 'Option B' alternative, the DCLG 2008-based headship rates have been applied, scaled to be consistent with the 2011 DCLG household total but following the original trend thereafter.
- 4.3 For the district as a whole and for each small area, the results are presented in the form of a chart and two tables. The charts (Figure 9 to Figure 13) illustrate the trajectory of population change resulting from each scenario, from 2001 to 2030. The tables (Table 4 to Table 14) summarise the population and household growth outcomes for each scenario over the 2015–2030 plan period, ranked in order of population growth. The tables also show the estimated average annual net migration associated with the population change and the expected dwelling growth. At district level, the expected average annual jobs growth is also presented.

Scenario Outcomes – Craven District

- 4.4 Excluding the hypothetical 'Natural Change' scenario, population growth ranges from 4.0% under the 'PG-5yr' scenario to 16.6% under the 'Jobs-led' scenario (Figure 9, Table 4 and Table 5). These population growth figures result in a range of dwelling requirements, from 137–376 dwellings per year under 'Option A' to 178–420 dwellings per year under 'Option B'.
- 4.5 Population growth under the 'SNPP-2012' scenario (4.3%) is lower than under the previous official projection, the 'SNPP-2010' (5.2%). The 'SNPP-2012' scenario results in an average annual dwelling requirement of 156 dwellings per year under 'Option A' and 198 dwellings per year under 'Option B'. Under the 'SNPP-2010' scenario, the dwelling requirement is higher, ranging from 173 to 214 dwellings per year ('Option A' and 'Option B' respectively).
- 4.6 The differences between the 'SNPP-2012' and the 'SNPP-2010' growth trajectories are a reflection of the historical data that were used to calculate future assumptions. The 2010-based SNPP projection from ONS was produced using the now out-dated 'previous' MYEs. As it uses 'old' data, the age profile of the 2010-based SNPP projection differs from that of the 2012-based SNPP projection and the other scenarios presented here, which were formulated using the latest, updated MYEs for Craven.
- 4.7 The 'PG' scenarios provide alternative 'trend' scenarios. They incorporate fertility and mortality assumptions that are consistent with the 'SNPP-2012' but differ in their calibration of future migration assumptions. For internal migration, a five-year ('PG-5yr') and a ten-year ('PG-10yr') history is used to calibrate migration assumptions, compared to the five years typically used in the 'SNPP-2012'. In addition the PG scenarios use the latest, 2013 MYE in the calibration process, an additional year of historical evidence compared to the 'SNPP-2012'.
- 4.8 Of the two trend scenarios, the 'PG-10yr' scenario suggests higher population growth (8.0%) over the 2015–2030 period. This population growth results in an average annual dwelling requirement ranging from 211 under 'Option A' to and 251 under 'Option B'. The 'PG-5yr' scenario suggests *lower* population growth (4.0%), resulting in lower average annual dwelling requirements of 137 under 'Option A' and 178 under 'Option B'.

Craven District: Scenario Outcomes

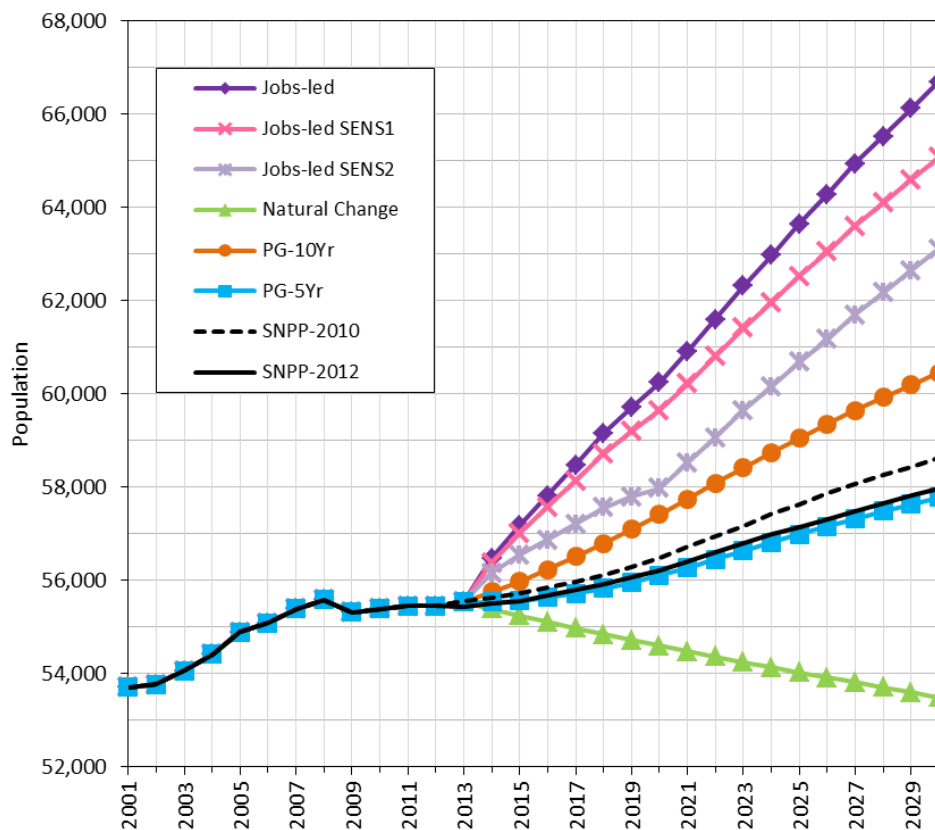


Figure 9: Craven District scenario outcomes: population growth 2001–2030

Table 4: Craven District 'Option A' scenario outcomes 2015–2030

Scenario	Change 2015–2030				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
Jobs-led (A)	9,514	16.6%	5,135	20.0%	792	376	130
Jobs-led SENS1 (A)	8,070	14.2%	4,486	17.6%	682	329	130
Jobs-led SENS2 (A)	6,566	11.6%	3,832	15.1%	602	281	130
PG-10Yr (A)	4,475	8.0%	2,881	11.4%	456	211	-1
SNPP-2010 (A)	2,901	5.2%	2,368	9.4%	467	173	-60
SNPP-2012 (A)	2,399	4.3%	2,129	8.5%	366	156	-103
PG-5Yr (A)	2,215	4.0%	1,876	7.5%	316	137	-102
Natural Change (A)	-1,757	-3.2%	-352	-1.4%	0	-26	-186

Table 5: Craven District 'Option B' scenario outcomes 2015–2030

Scenario	Change 2015–2030				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
Jobs-led (B)	9,514	16.6%	5,738	22.3%	792	420	130
Jobs-led SENS1 (B)	8,070	14.2%	5,039	19.7%	682	369	130
Jobs-led SENS2 (B)	6,566	11.6%	4,391	17.2%	602	322	130
PG-10Yr (B)	4,475	8.0%	3,422	13.5%	456	251	-1
SNPP-2010 (B)	2,901	5.2%	2,922	11.6%	467	214	-60
SNPP-2012 (B)	2,399	4.3%	2,709	10.8%	366	198	-103
PG-5Yr (B)	2,215	4.0%	2,424	9.7%	316	178	-102
Natural Change (B)	-1,757	-3.2%	115	0.5%	0	8	-186

- 4.9 The 'Natural Change' scenario, in which net migration is set to zero for each year of the forecast period (2013–2030), provides an indication of the extent to which population growth is driven by the balance between births and deaths. In the absence of migration, population growth over the 2015–2030 period is negative, at -3.2% (i.e. the number of deaths exceeds the number births over the forecast period). This results in an average annual dwelling requirement of -26 dwellings per year under 'Option A' and 8 dwellings per year under 'Option B'.
- 4.10 In the 'Jobs-led' scenario, population growth is determined by the defined jobs-growth trajectory using the key assumptions on economic activity rates, the unemployment rate and the commuting ratio. Population growth under the 'Jobs-led' scenario is 16.6%, resulting in a dwelling requirement of 376 under 'Option A' and 420 under 'Option B'. This is the highest level of population growth of all the scenarios, and is a reflection of the age structure of Craven's population.
- 4.11 In Section 2, the changing age structure of the population under the 2012-based SNPP is presented (Figure 7 on page 11 and Table 2 on page 12). The old age dependency (OAD) ratio, which measures the relationship between the size of the population aged 65+ and the population aged 16–64, is expected to rise from 39 to 77 over the 2012–2037 projection period. This 'ageing' of the population has important implications for the size of the resident labour force.
- 4.12 Under the 'SNPP-2012' 'benchmark' scenario, the projected population ageing results in a declining labour force in Craven over the forecast period. Despite accounting for changes to the SPA (thereby increasing rates of economic activity in the older age groups), the 'SNPP-2012' scenario suggests that the labour force of Craven will reduce in size by -2,317 over the 2015–2030 plan period (Table 6).

Table 6: Population and Labour Force growth 2015–2030

Scenario	Growth 2015–2030	
	Population	Labour Force
SNPP 2012	2,399	-2,317
Jobs-Led	9,514	1,287
Jobs-Led SENS1	8,070	1,287
Jobs-Led SENS2	6,566	1,279

Note: The 'labour force' refers to the economically active population aged 16–74.

- 4.13 In the jobs-led scenarios, the labour force increases in size as the number of jobs in Craven increases. As the resident labour force is insufficient in size to meet the specified jobs-growth targets, net migration is used to reach the target in each year of the forecast. The jobs-led scenarios therefore suggest *higher* net migration than under the alternative scenarios, ranging from +602 to +792 people per year over the 2015–2030 plan period.
- 4.14 Under the 'Jobs-Led SENS1' scenario, with the migration balance weighted towards the labour force age-groups, population growth over the 2015–2030 plan period is 14.2%. This population growth is lower than under the 'Jobs-led' scenario as more migrants of working age are brought in. This population growth results in a dwelling requirement of 329 under 'Option A' and 369 under 'Option B'.
- 4.15 Of the three jobs-led scenarios, the 'Jobs-Led SENS2' scenario suggests the lowest population growth (11.6%) over the 2015–2030 period. Under the 'Jobs-Led SENS2' scenario, the overall rate of economic activity is maintained at the 2011 Census level (72%) and (as in 'Jobs-led' SENS1) migration is also weighted towards the labour force age-groups. Therefore, population growth is *lower* as a greater proportion of the population are being retained in the labour force and migrants of working age are brought in. These factors in combination result in a reduced need for net in-migration to satisfy the jobs-growth targets. The 'Jobs-Led SENS2' lower rate of population growth consequently results in a lower dwelling requirement range of 281–322 dwellings per year ('Option A' and 'Option B' respectively).

Scenario Outcomes – Craven Small Areas

- 4.16 The following charts (Figure 10–Figure 13) present population growth for the 2001–2030 period for each of the four sub-district small-areas: North Craven, Mid Craven, South Craven and the area of the Yorkshire Dales National Park that falls within Craven.
- 4.17 The tables (Table 7–Table 14) present population and household change for the 2015–2030 period, as well as the average annual net migration and average annual dwelling requirement. Scenarios are ranked in order of population change.
- 4.18 The scenarios have been run using household growth assumptions from both the 2011-based DCLG household model and the 2008-based household model. The results are therefore presented under an ‘Option A’ and an ‘Option B’ outcome:
- In ‘Option A’, the DCLG 2011-based headship rates have been applied, with the 2011–2021 trend continued after 2021;
 - In the ‘Option B’ alternative, the DCLG 2008-based headship rates have been applied, scaled to be consistent with the 2011 DCLG household total but following the original trend thereafter.
- 4.19 At small-area level, employment forecasts, unemployment rate, commuting ratio and commuting ratio are not available. Therefore the average annual jobs-growth for each scenario is not presented in the following tables.

North Craven: Scenario Outcomes

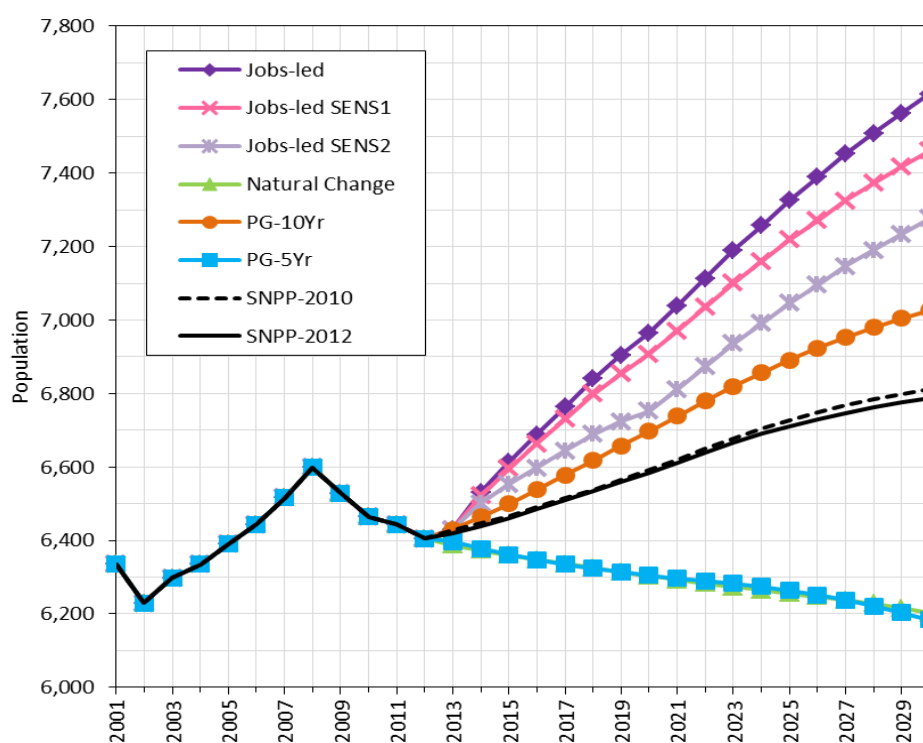


Figure 10: North Craven scenario outcomes: population growth 2001–2030

Table 7: North Craven 'Option A' scenario outcomes 2015–2030

Scenario	Change 2015–2030				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
Jobs-led (A)	1,002	15.1%	581	19.4%	90	44
Jobs-led SENS1 (A)	865	13.1%	510	17.1%	79	38
Jobs-led SENS2 (A)	723	11.0%	448	15.1%	71	34
PG-10Yr (A)	527	8.1%	354	12.0%	57	27
SNPP-2010 (A)	345	5.3%	299	10.1%	50	22
SNPP-2012 (A)	327	5.1%	285	9.7%	48	21
Natural Change (A)	-158	-2.5%	-64	-2.3%	0	-5
PG-5Yr (A)	-177	-2.8%	50	1.7%	11	4

Table 8: North Craven 'Option B' scenario outcomes 2015–2030

Scenario	Change 2015–2030				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
Jobs-led (B)	1,002	15.1%	656	21.9%	90	49
Jobs-led SENS1 (B)	865	13.1%	580	19.4%	79	43
Jobs-led SENS2 (B)	723	11.0%	518	17.4%	71	39
PG-10Yr (B)	527	8.1%	421	14.3%	57	32
SNPP-2010 (B)	345	5.3%	368	12.4%	50	28
SNPP-2012 (B)	327	5.1%	356	12.1%	48	27
Natural Change (B)	-158	-2.5%	-13	-0.4%	0	-1
PG-5Yr (B)	-177	-2.8%	113	3.9%	11	8

Mid Craven: Scenario Outcomes

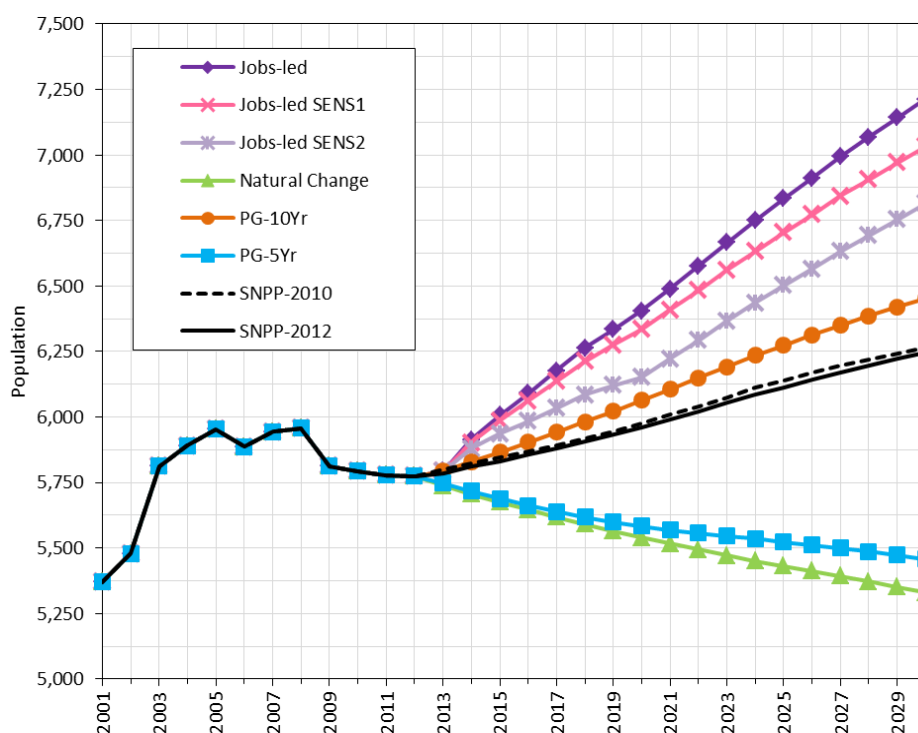


Figure 11: Mid Craven scenario outcomes: population growth 2001–2030

Table 9: Mid Craven 'Option A' scenario outcomes 2015–2030

Scenario	Change 2015–2030				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
Jobs-led (A)	1,206	20.1%	729	26.8%	122	55
Jobs-led SENS1 (A)	1,046	17.5%	632	23.4%	109	48
Jobs-led SENS2 (A)	878	14.8%	558	20.8%	99	42
PG-10Yr (A)	587	10.0%	424	15.9%	78	32
SNPP-2010 (A)	420	7.2%	386	14.5%	73	29
SNPP-2012 (A)	415	7.1%	369	13.9%	72	28
PG-5Yr (A)	-230	-4.0%	55	2.1%	18	4
Natural Change (A)	-345	-6.1%	-46	-1.8%	0	-3

Table 10: Mid Craven 'Option B' scenario outcomes 2015–2030

Scenario	Change 2015–2030				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
Jobs-led (B)	1,206	20.1%	812	29.8%	122	61
Jobs-led SENS1 (B)	1,046	17.5%	708	26.1%	109	53
Jobs-led SENS2 (B)	878	14.8%	635	23.6%	99	48
PG-10Yr (B)	587	10.0%	497	18.6%	78	37
SNPP-2010 (B)	420	7.2%	463	17.2%	73	35
SNPP-2012 (B)	415	7.1%	447	16.8%	72	34
PG-5Yr (B)	-230	-4.0%	110	4.3%	18	8
Natural Change (B)	-345	-6.1%	-7	-0.3%	0	-1

South Craven: Scenario Outcomes

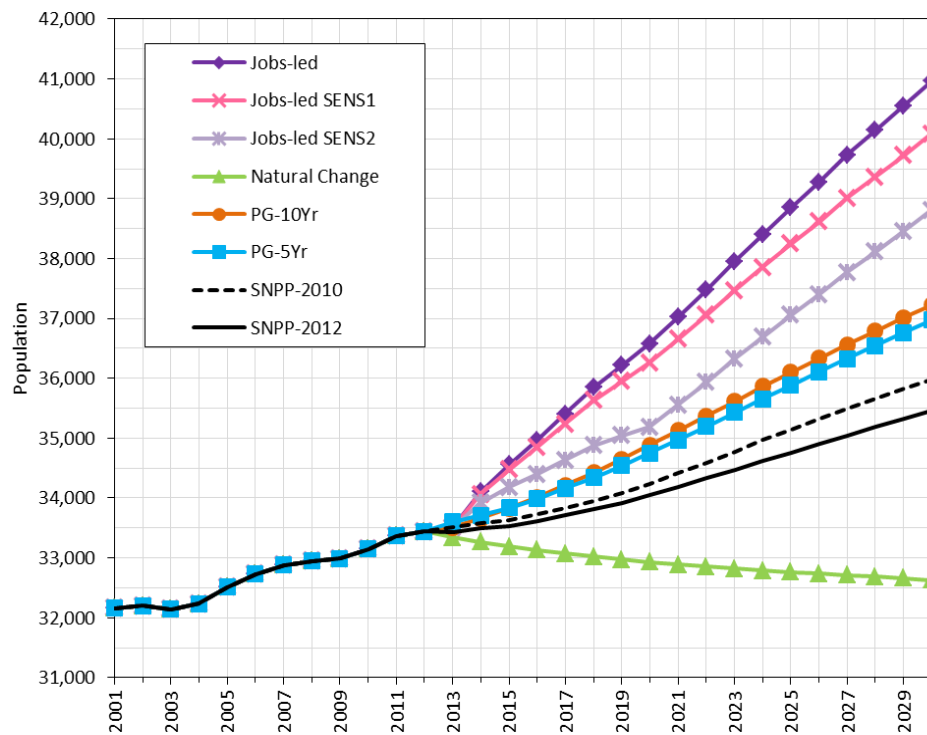


Figure 12: South Craven scenario outcomes: population growth 2001–2030

Table 11: South Craven 'Option A' scenario outcomes 2015–2030

Scenario	Change 2015–2030				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
Jobs-led (A)	6,400	18.5%	3,265	21.2%	481	231
Jobs-led SENS1 (A)	5,605	16.3%	2,927	19.1%	422	207
Jobs-led SENS2 (A)	4,625	13.5%	2,501	16.4%	372	177
PG-10Yr (A)	3,398	10.0%	1,931	12.8%	291	137
PG-5Yr (A)	3,137	9.3%	1,836	12.1%	292	130
SNPP-2010 (A)	2,349	7.0%	1,573	10.4%	244	111
SNPP-2012 (A)	1,928	5.7%	1,398	9.3%	222	99
Natural Change (A)	-560	-1.7%	4	0.0%	0	0

Table 12: South Craven 'Option B' scenario outcomes 2015–2030

Scenario	Change 2015–2030				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
Jobs-led (B)	6,400	18.5%	3,579	23.2%	481	253
Jobs-led SENS1 (B)	5,605	16.3%	3,214	20.9%	422	227
Jobs-led SENS2 (B)	4,625	13.5%	2,793	18.3%	372	198
PG-10Yr (B)	3,398	10.0%	2,217	14.6%	291	157
PG-5Yr (B)	3,137	9.3%	2,152	14.2%	292	152
SNPP-2010 (B)	2,349	7.0%	1,867	12.3%	244	132
SNPP-2012 (B)	1,928	5.7%	1,710	11.3%	222	121
Natural Change (B)	-560	-1.7%	264	1.8%	0	19

Yorkshire Dales National Park: Scenario Outcomes

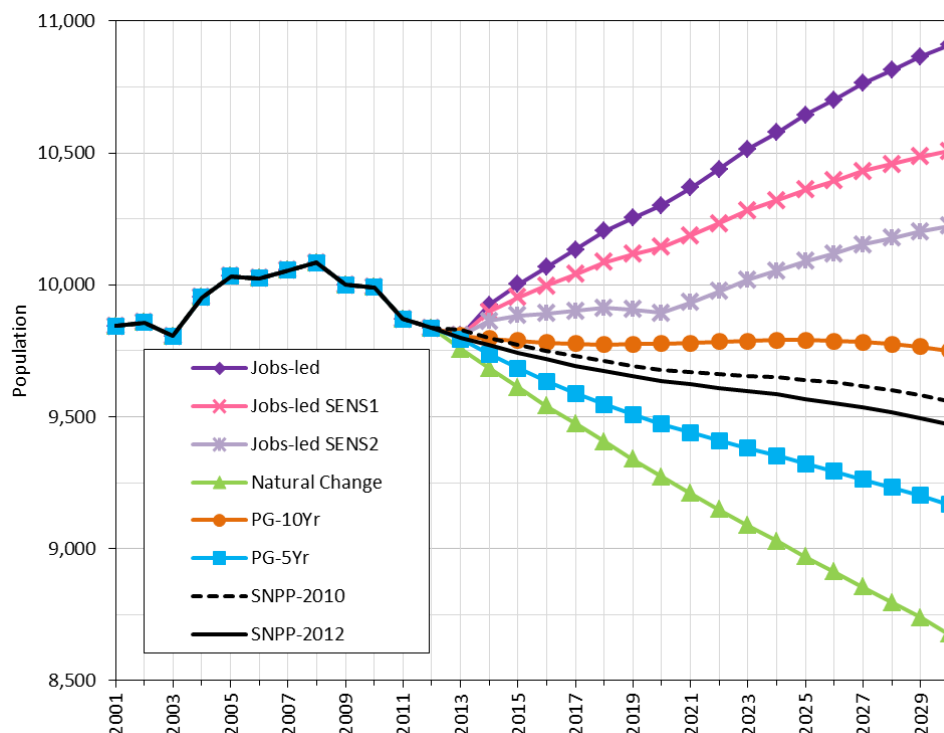


Figure 13: Yorkshire Dales National Park Craven scenario outcomes: population growth 2001–2030

Table 13: Yorkshire Dales National Park Craven 'Option A' scenario outcomes 2015–2030

Scenario	Change 2015–2030				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
Jobs-led (A)	906	9.1%	701	15.4%	148	56
Jobs-led SENS1 (A)	555	5.6%	523	11.6%	121	42
Jobs-led SENS2 (A)	340	3.4%	426	9.5%	109	34
PG-10Yr (A)	-36	-0.4%	236	5.3%	81	19
SNPP-2010 (A)	-212	-2.2%	179	4.0%	74	14
SNPP-2012 (A)	-270	-2.8%	167	3.8%	73	13
PG-5Yr (A)	-516	-5.3%	16	0.4%	46	1
Natural Change (A)	-936	-9.7%	-326	-7.5%	0	-26

Table 14: Yorkshire Dales National Park Craven 'Option B' scenario outcomes 2015–2030

Scenario	Change 2015–2030				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
Jobs-led (B)	906	9.1%	838	18.4%	148	67
Jobs-led SENS1 (B)	555	5.6%	650	14.3%	121	52
Jobs-led SENS2 (B)	340	3.4%	552	12.2%	109	44
PG-10Yr (B)	-36	-0.4%	355	7.9%	81	28
SNPP-2010 (B)	-212	-2.2%	298	6.6%	74	24
SNPP-2012 (B)	-270	-2.8%	292	6.5%	73	23
PG-5Yr (B)	-516	-5.3%	132	3.0%	46	10
Natural Change (B)	-936	-9.7%	-237	-5.4%	0	-19

5. Summary

Approach

- 5.1 CDC has commissioned Edge Analytics to provide an updated range of demographic scenarios for Craven district and four sub-district small-areas, using the latest demographic and economic assumptions.
- 5.2 Edge Analytics has produced a range of scenarios using POPGROUP v.4 technology. The 2012-based SNPP is included within this range as the official benchmark scenario. The earlier 2010-based SNPP is included for comparison. Alternative trend-based scenarios have also been developed, together with three jobs-led scenarios, in which population growth is determined by growth in the number of jobs.
- 5.3 In all scenarios, household growth has been assessed using household formation rates from the 2011-based and the 2008-based DCLG household models. Output for each scenario has been presented under an 'Option A' and 'Option B' alternative, using the 2011-based and 2008-based headship rates respectively.

Scenario Outcomes

- 5.4 A summary of the average annual dwelling requirements for each of the scenarios for the district of Craven is presented (Table 15). In light of the uncertainty associated with future rates of household formation, the resulting 'Option A' and 'Option B' dwelling requirements for each scenario are averaged. Excluding the hypothetical 'Natural Change' scenario, the average annual dwelling requirement ranges from 158 dwellings per year under the 'PG-5yr' scenario, to 398 dwellings per year under the 'Jobs-led' scenario.

Table 15: Craven District scenario dwelling requirement summary

Scenario	Average annual dwelling requirement (2015–2030)		
	Option A	Option B	Average
Jobs-led	376	420	398
Jobs-led SENS1	329	369	349
Jobs-led SENS2	281	322	301
PG-10Yr	211	251	231
SNPP-2010	173	214	194
SNPP-2012	156	198	177
PG-5Yr	137	178	158
Natural Change	-26	8	-9

Note: 'Option A' shows the dwelling requirement derived using the 2011-based headship rates; 'Option B' using the 2008-based headship rates. Scenarios are ranked in order of the average dwelling requirement.

- 5.5 The dwelling requirements associated with each scenario have been estimated for each of the four sub-district areas, including the part of Craven covered by the Yorkshire Dales National Park (Tables 16-19).

Table 16: North Craven scenario dwelling requirement summary

Scenario	Average annual dwelling requirement (2015–2030)		
	Option A	Option B	Average
Jobs-led	44	49	46
Jobs-led SENS1	38	43	41
Jobs-led SENS2	34	39	36
PG-10Yr	27	32	29
SNPP-2010	22	28	25
SNPP-2012	21	27	24
PG-5Yr	4	8	6
Natural Change	-5	-1	-3

Table 17: Mid Craven scenario dwelling requirement summary

Scenario	Average annual dwelling requirement (2015–2030)		
	Option A	Option B	Average
Jobs-led	55	61	58
Jobs-led SENS1	48	53	50
Jobs-led SENS2	42	48	45
PG-10Yr	32	37	35
SNPP-2010	29	35	32
SNPP-2012	28	34	31
PG-5Yr	4	8	6
Natural Change	-3	-1	-2

Note: 'Option A' shows the dwelling requirement derived using the 2011-based headship rates; 'Option B' using the 2008-based headship rates. Scenarios are ranked in order of the average dwelling requirement.

Table 18: South Craven scenario dwelling requirement summary

Scenario	Average annual dwelling requirement (2015–2030)		
	Option A	Option B	Average
Jobs-led	231	253	242
Jobs-led SENS1	207	227	217
Jobs-led SENS2	177	198	187
PG-10Yr	137	157	147
PG-5Yr	130	152	141
SNPP-2010	111	132	122
SNPP-2012	99	121	110
Natural Change	0	19	9

Table 19: Yorkshire Dales National Park scenario dwelling requirement summary

Scenario	Average annual dwelling requirement (2015–2030)		
	Option A	Option B	Average
Jobs-led	56	67	61
Jobs-led SENS1	42	52	47
Jobs-led SENS2	34	44	39
PG-10Yr	19	28	23
SNPP-2010	14	24	19
SNPP-2012	13	23	18
PG-5Yr	1	10	6
Natural Change	-26	-19	-22

Note: 'Option A' shows the dwelling requirement derived using the 2011-based headship rates; 'Option B' using the 2008-based headship rates. Scenarios are ranked in order of the average dwelling requirement.

Issues for Consideration

- 5.6 This report provides a suite of demographic growth scenarios for CDC to consider as it updates its Strategic Housing Market Assessment (SHMA) and formulates the housing growth requirements of its Local Plan. Whilst the 'SNPP-2012' scenario provides the suggested starting point for the objective assessment of housing need, the alternative 'trend-based' outcomes presented by the 'PG-5yr' and 'PG-10yr' scenarios should be given due consideration, given the likely impact of the recession upon recent migration flows and given the continuing uncertainty with regard to future international migration impacts.
- 5.7 It is also important to consider the impact that Craven's rapidly ageing population profile has upon scenario outcomes. If jobs 'growth' is to be achieved in the face of this ageing population, then higher net in-migration will be required to sustain the size of Craven's resident labour force.
- 5.8 Whilst the analysis presented here has selected assumptions to model the relationship between jobs growth and the size of the labour force, higher economic activity rates, a modified

commuting ratio and a lower unemployment rate could all alter the resulting level of population growth and thus the dwelling requirement associated with a jobs-led scenario.

- 5.9 The 'Jobs-led SENS1' scenario has indicated how population change linked to jobs growth might be influenced by the influx of a more youthful migrant population. The 'Jobs-led SENS2' scenario has given some indication of how maintaining existing rates of economic participation in the 16-74 labour force age-groups might alter population growth outcomes linked to the change in the number of jobs available.
- 5.10 DCLG intends to release a 2012-based household model for English local authorities in early 2015. It is recommended that the implications of these new data and assumptions upon the household and dwelling growth outcomes presented are considered as part of the evidence base for the new SHMA.

Appendix A

POPGROUP Methodology

Forecasting Methodology

- A.1 Evidence is often challenged on the basis of the appropriateness of the methodology that has been employed to develop growth forecasts. The use of a recognised forecasting product which incorporates an industry-standard methodology (a cohort component model) removes this obstacle and enables a focus on assumptions and output, rather than methods.
- A.2 Demographic forecasts have been developed using the POPGROUP suite of products. POPGROUP is a family of demographic models that enables forecasts to be derived for population, households and the labour force, for areas and social groups. The main POPGROUP model (Figure 14) is a cohort component model, which enables the development of population forecasts based on births, deaths and migration inputs and assumptions.
- A.3 The Derived Forecast (DF) model (Figure 15) sits alongside the population model, providing a headship rate model for household projections and an economic activity rate model for labour-force projections.
- A.4 The latest development in the POPGROUP suite of demographic models is POPGROUP v.4, which was released in January 2014. A number of changes have been made to the POPGROUP model to improve its operation and to ensure greater consistency with ONS forecasting methods.
- A.5 The most significant methodological change relates to the handling of internal migration in the POPGROUP forecasting model. The level of internal in-migration to an area is now calculated as a rate of migration relative to a defined 'reference population' (by default the UK population), rather than as a rate of migration relative to the population of the area itself (as in POPGROUP v3.1). This approach ensures a closer alignment with the 'multi-regional' approach to modelling migration that is used by ONS.
- A.6 For detail on the POPGROUP methodology, please refer to the POPGROUP v.4 user manual, which can be found at the POPGROUP website: <http://www.ccsr.ac.uk/popgroup/index.html>

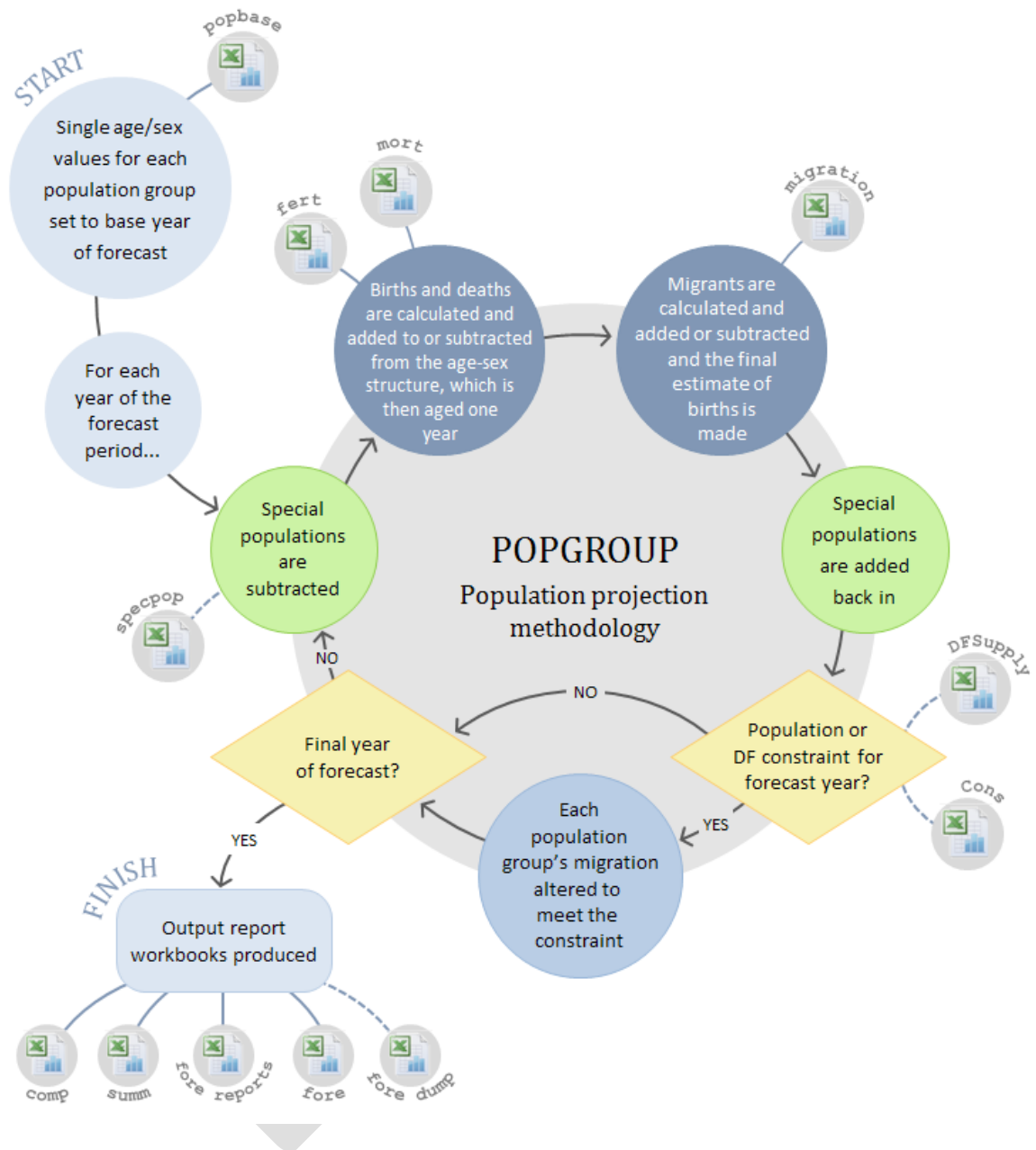
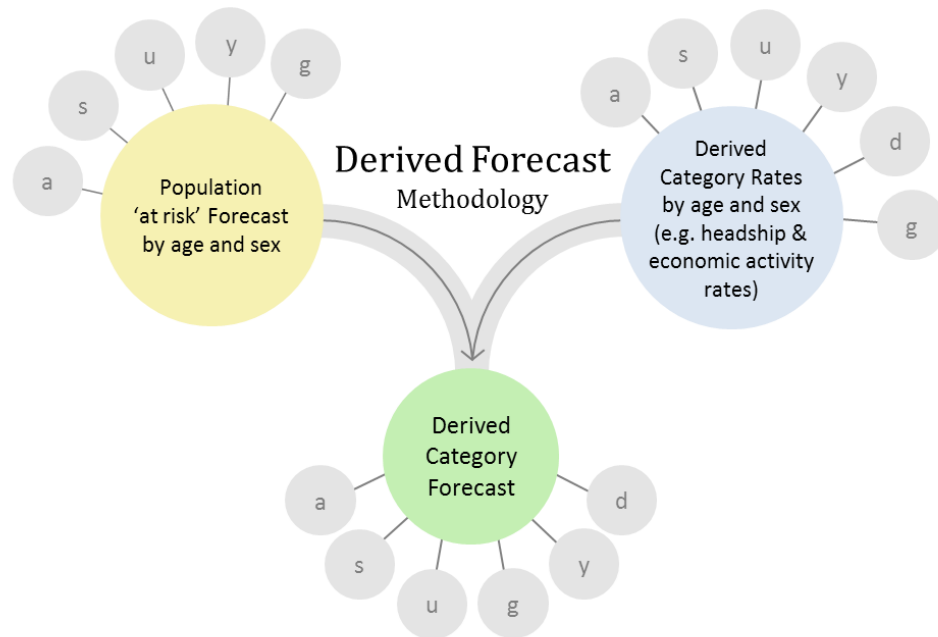


Figure 14: POPGROUP population projection methodology.



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

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

Figure 15: Derived Forecast (DF) methodology

Appendix B

Data Inputs & Assumptions

Introduction

- B.1 Edge Analytics has developed a suite of demographic scenarios for Craven using POPGROUP v.4. The POPGROUP model draws data from a number of sources, building an historical picture of population, households, fertility, mortality and migration on which to base its scenario forecasts. Using the historical data evidence for 2001–2013, in conjunction with information from ONS sub-national projections, a series of assumptions have been derived which drive the scenario forecasts.
- B.2 In the following sections, a narrative on the data inputs and assumptions underpinning the scenarios is presented.

Model Configuration

- B.3 In developing the demographic forecasts for Craven, scenarios were first run at district-level (i.e. for Craven as a whole). To produce the forecasts for the four sub-district areas⁷, POPGROUP was configured for 'small areas'. Using postcode data in combination with 2011 Census Output Area (OA) statistics, the 'base' population for each small area was calculated.
- B.4 OA-level assumptions on fertility, mortality, migration and household formation were then used to disaggregate the district-level population growth suggested by a particular scenario to each of the four small-areas (thereby ensuring consistency with the district-level population total).
- B.5 The assumptions used at small-area-level are detailed alongside the district-level assumptions in the following sections. Unless stated, the assumptions detailed in the following sections apply at district-level (i.e. Craven as a whole).

⁷ North Craven, Mid Craven, South Craven and the area of the Yorkshire Dales National Park that falls within Craven.

Population, Births & Deaths

Population

- B.6 In each scenario, historical population statistics are provided by the mid-year population estimates for 2001–2013, with all data recorded by single-year of age and sex. These data include the revised mid-year population estimates for 2002–2010, which were released by the ONS in May 2013. The revised mid-year population estimates provide consistency in the measurement of the components of change (i.e. births, deaths, internal migration and international migration) between the 2001 and 2011 Censuses.
- B.7 In the ‘SNPP-2010’ scenario, future population counts are provided by single-year of age and sex to ensure consistency with the trajectory of the ONS 2010-based SNPP. The ‘SNPP-2010’ scenario is scaled to ensure consistency with the start point of the 2012-based SNPP, following its designated growth trend thereafter. This does not alter the underlying assumptions or growth trajectory.
- B.8 In the ‘SNPP-2012’ scenario, future population counts are provided by single-year of age and sex to ensure consistency with the trajectory of the ONS 2012-based SNPP.

Births & Fertility

- B.9 In each scenario, historical mid-year to mid-year counts of births by sex from 2001/02 to 2012/13 have been sourced from ONS Vital Statistics (at district-level and small-area-level).
- B.10 In the ‘SNPP-2010’ and ‘SNPP-2012’ scenarios, future counts of births are specified to ensure consistency with the official projections.
- B.11 In the other scenarios, a ‘local’ (i.e. area-specific) age-specific fertility rate (ASFR) schedule, which measures the expected fertility rates by age in 2013/14, is included in the POPGROUP model assumptions. This is derived from the ONS 2012-based SNPP.
- B.12 Long-term assumptions on changes in age-specific fertility rates are taken from the ONS 2012-based SNPP.

- B.13 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.
- B.14 A fertility differential for each of the 'small-areas' of Craven has been derived from the OA-level historical data. This is used in combination with the district-level ASFR schedule to calculate births in each year of the forecast.

Deaths & Mortality

- B.15 In each scenario, historical mid-year to mid-year counts of deaths by age and sex from 2001/02 to 2012/13 have been sourced from ONS Vital Statistics.
- B.16 In the 'SNPP-2010' and 'SNPP-2012' scenarios, future counts of deaths are specified to ensure consistency with the official projections.
- B.17 In the other scenarios, a 'local' (i.e. area-specific) age-specific mortality rate (ASMR) schedule, which measures the expected mortality rates by age and sex in 2013/14 is included in the POPGROUP model assumptions. This is derived from the ONS 2012-based SNPP.
- B.18 Long-term assumptions on changes in age-specific mortality rates are taken from the ONS 2012-based SNPP.
- B.19 In combination with the 'population-at-risk' (i.e. the total 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.
- B.20 A mortality differential for each of the 'small-areas' of Craven has been derived from the OA-level historical data. This is used in combination with the district-level ASMR schedule to calculate deaths in each year of the forecast.

Migration

Internal Migration

- B.21 In all scenarios, historical mid-year to mid-year estimates of in- and out-migration by five year age group and sex from 2001/02 to 2012/13 have been sourced from the 'components of population change' files that underpin the ONS mid-year population estimates. These internal migration flows are estimated using data from the Patient Register (PR), the National Health Service Central Register (NHSCR) and Higher Education Statistics Agency (HESA).
- B.22 In the 'SNPP-2010' and 'SNPP-2012' scenarios, future counts of internal migrants are specified, to ensure consistency with the official projections.
- B.23 In the alternative 'trend' scenarios, age-specific migration rate (ASMigR) schedules are derived from the area-specific historical migration data. In the 'PG-5yr' scenario, a five year internal migration history is used (2008/09 to 2012/13). In the 'PG-10yr' scenario, a ten year history is used (2003/04 to 2012/13).
- B.24 In the 'Natural Change' scenario, internal in- and out-migration flows are set to zero for each year in the forecast period (i.e. no in- or out-migration occurs).
- B.25 Each jobs-led scenario calculates its own internal migration assumptions to ensure an appropriate balance between the population and the targeted increase in the number of jobs that is defined in each year of the forecast period. A higher level of net internal migration will occur if there is insufficient population and resident labour force to meet the forecast number of jobs.
- B.26 In the 'Jobs-led' scenario, the profile of internal migrants is defined by an ASMigR schedule, derived from the ONS 2012-based SNPP. In the 'Jobs-Led SENS1' and 'Jobs-Led SENS2' scenarios the migration balance is determined by schedules that are more heavily weighted towards the labour force age-groups.
- B.27 In the case of internal in-migration, the ASMigR schedule of rates is 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 and international migration), where the schedule of

rates is applied to the area-specific population. The reference population is derived through an analysis of migration into the Leeds City Region (LCR) Local Enterprise Partnership (LEP), of which Craven is a member. The reference population is defined by considering the areas which have historically contributed the majority of migrants into the LCR LEP. In this case, it comprises all districts which cumulatively contributed 70% of migrants into the LCR LEP over the 2007/08–2011/12 period.

International Migration

- B.28 Historical mid-year to mid-year counts of total immigration and emigration from 2001/02 to 2012/13 have been sourced from the ‘components of population change’ files that underpin the ONS mid-year population estimates. Any ‘adjustments’ made to the mid-year population estimates to account for asylum cases are included in the international migration balance.
- B.29 Implied within the international migration component of change in all scenarios is an ‘unattributable population change’ (UPC) figure, which ONS identified within its latest mid-year estimate revisions. The POPGROUP model has assigned the UPC to international migration as it is the component with the greatest uncertainty associated with its estimation.
- B.30 In all scenarios, future international migration assumptions are defined as ‘counts’ of migration. In the ‘SNPP-2010’ and ‘SNPP-2012’ scenarios, the international in- and out-migration counts are drawn directly from the official projections.
- B.31 In the alternative ‘trend’ scenarios, the international in- and out-migration counts are derived from the area-specific historical migration data. In the ‘PG-5yr’ scenario, a five year international migration history is used (2008/09 to 2012/13). In the ‘PG-10yr’ scenario, a ten year history is used (2003/04 to 2012/13). An ASMigR schedule of rates is derived from either a five year or ten year migration history and is used to distribute future counts by single year of age.
- B.32 In the ‘Natural Change’ scenario, the future migration counts set the in- and out-migration flows to zero for each year in the forecast period (i.e. no in- or out-migration occurs).
- B.33 In the jobs-led scenarios, international migration counts are taken from the ONS 2012-based SNPP (i.e. counts are consistent with the ‘SNPP-2012’ scenario). An ASMigR schedule of rates from the ONS 2012-based SNPP is used to distribute future counts by single year of age.

Small-Area Migration Assumptions

- B.34 At 'small-area' level, 'net migration' equates to the cumulative impact of the four types of migration modelled within POPGROUP (in-migration, out-migration, immigration and emigration). Migration is calculated as a 'residual' of the population, after taking account of births and deaths.

Household & Dwellings

- B.35 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."*⁸

- B.36 A dwelling is defined as a unit of accommodation which may comprise one or more household spaces (a household space is the accommodation used or available for use by an individual household).
- B.37 For each scenario, 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 2011-based household projection models from the DCLG.
- B.38 The latest DCLG household projections provide headship rate statistics and communal population statistics, but only at district-level. In the case of the small-areas in Craven, sub-district household assumptions have therefore been derived using DCLG district statistics, in combination with sub-district statistics from the 2001 and 2011 Censuses.

⁸ <http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/2011-census-user-guide/glossary/index.html>

Household Headship Rates

- B.39 Household headship rates define the likelihood of a particular household type being formed in a particular year, given the age-sex profile of the population in that year. Household-types are modelled within a 17-fold classification (Table 20).

Table 20: Household type classification

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

- B.40 The household headship rates used in the POPGROUP modelling have been taken from the DCLG 2008-based and 2011-based household projections. The 2011-based household projections were released for local authority districts in England in April 2013, superseding the 2008-based model. However, as the 2011-based household model is underpinned by the 2011-based SNPP, the headship rate assumptions have only been published for the 2011–2021 period. Therefore, the headship rates have been trended after 2021 to extend the rates to the end of the forecast period.
- B.41 Sub-district level statistics on the total number of households by household type, and two broad age groups for one-person households, are available from the Census. These have been used to scale the DCLG district headship rates to sub-district totals (i.e. for the each of the small-areas), ensuring consistency with the total number of households in the district in 2001 and 2011.

- B.42 Although sub-district-specific headship rates are derived, the *trend* in headship rates for each small area mirrors that evident in the district level statistics. This trend in headship rates is applied by household type, age and sex for all years of the projection period.
- B.43 Edge Analytics assesses household growth using the 2008-based *and* the 2011-based headship rates, in recognition of the uncertainties surrounding future rates of household formation.
- B.44 Both the 2008-based and 2011-based headship rates have been applied, producing two alternative outcomes for each scenario:
- ‘Option A’: DCLG 2011-based headship rates, with the 2011–2021 trend continued after 2021.
 - ‘Option B’: DCLG 2008-based headship rates, scaled to be consistent with the 2011 DCLG household total, but following the original trend thereafter.

Communal Population

- B.45 Household projections in POPGROUP exclude the population ‘not-in-households’ (i.e. the communal/institutional population). These data are drawn from the DCLG 2011-based household projection, which uses statistics from the 2011 Census. Examples of communal establishments include prisons, residential care homes and student halls of residence.
- B.46 For ages 0–74, the number of people in each age group ‘not-in-households’ is kept 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.
- B.47 The 2011 Census provides information on the communal establishment population by age and sex for Census Output Areas. By aggregating and apportioning these data for the sub-districts (i.e. each of the small-areas in Craven), the DCLG district-level communal establishment assumptions for 2011 have been updated.

Vacancy Rate

- B.48 The relationship between households and dwellings is modelled using a ‘vacancy rate’, sourced from the 2011 Census. The vacancy rate is calculated using statistics on households (occupied, second homes and vacant) and dwellings (shared and unshared).
- B.49 At district level, a vacancy rate of 9.0% for Craven has been applied, fixed throughout the forecast period. At small-area-level, the vacancy rates ranges from 5.8% in South Craven to 16.1% in the Yorkshire Dales National Park (Table 21). Using these vacancy rates, the ‘dwelling requirement’ of each household growth trajectory (i.e. ‘Option A’ and ‘Option B’ – see paragraph B.44) is evaluated. The resulting ‘Option A’ and ‘Option B’ dwelling requirements are then averaged to provide an average dwelling requirement for each scenario.

Table 21: Small-Area 2011 Census Vacancy Rates

Small Area	Vacancy Rate
North Craven	11.1%
Mid Craven	11.5%
South Craven	5.8%
Yorkshire Dales National Park within Craven	16.1%

Labour Force & Jobs

- B.50 Apart from in the jobs-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. In the ‘Jobs-led’ and ‘Jobs-led EA1’ scenarios, these three data items are used to determine the population growth required by the defined jobs growth trajectory.
- B.51 It is important to note that the commuting ratio, unemployment rate and economic activity rates are only available at district-level; labour force and jobs-growth are therefore only assessed at district-level. However, the population-growth outcomes of the two jobs-led scenarios have been used in combination with small-area assumptions to distribute the population growth between the four small areas.

Economic Activity Rates

- B.52 The level of labour force participation is recorded in the economic activity rates. Economic activity rates by five year age group (ages 16-74) and sex have been derived from 2001 and 2011 Census statistics. The 2011 Census statistics include an open-ended 65+ age categorisation, so economic activity rates for the 65–69 and 70–74 age groups have been estimated using a combination of Census 2011 tables, disaggregated using evidence from the 2001 Census.
- B.53 For Craven, rates of economic activity increased for women in all age groups between the 2001 and 2011 Censuses and in the older age groups for men. (Figure 16).

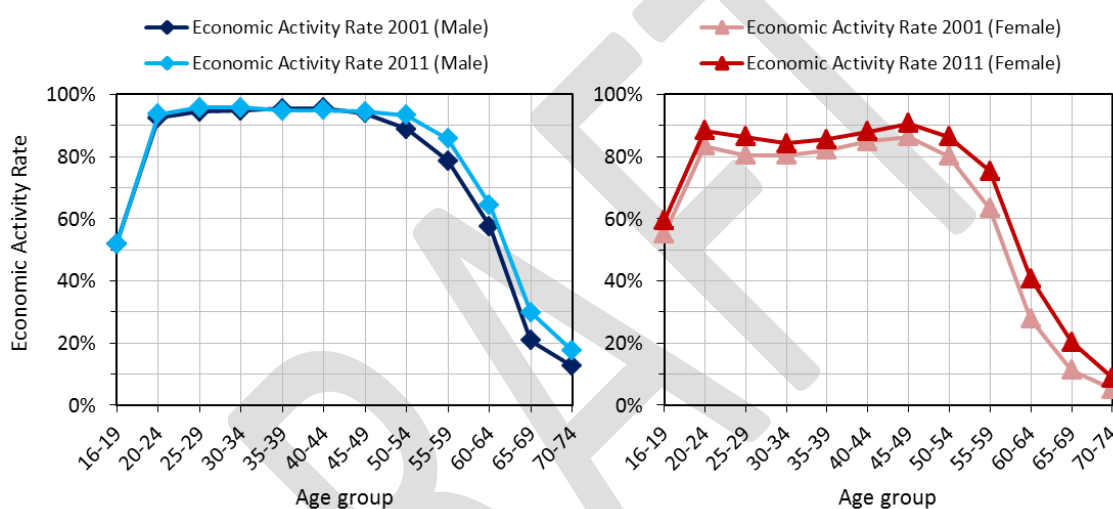


Figure 16: Craven economic activity rates: 2001 and 2011 Census comparison (source: ONS)

- B.54 In all scenarios, the 2011 Census age-sex specific economic activity rates have been applied. Changes have been made to the economic activity rates to take account of changes to the State Pension Age (SPA) and to accommodate potential changes in economic participation which might result from an ageing but healthier population in the older labour-force age-groups.
- B.55 The SPA for women is increasing from 60 to 65 by 2018, bringing it in line with that for men. Between December 2018 and April 2020, the SPA for both men and women will then rise to 66. Under current legislation, the SPA will be increased to 67 between 2026 and 2028⁹.

⁹ <https://www.gov.uk/state-pension>

B.56 ONS published its last set of economic activity rate forecasts from a 2006 base¹⁰. These incorporated an increase in SPA for women to 65 by 2020 but this has since been altered to an accelerated transition by 2018 plus a further extension to 66 by 2020. Over the 2011–2020 period, the ONS forecasts suggested that male economic activity rates would rise by 5.6% and 11.9% in the 60-64 and 65-69 age groups respectively. Corresponding female rates would rise by 33.4% and 16.3% (Figure 17).

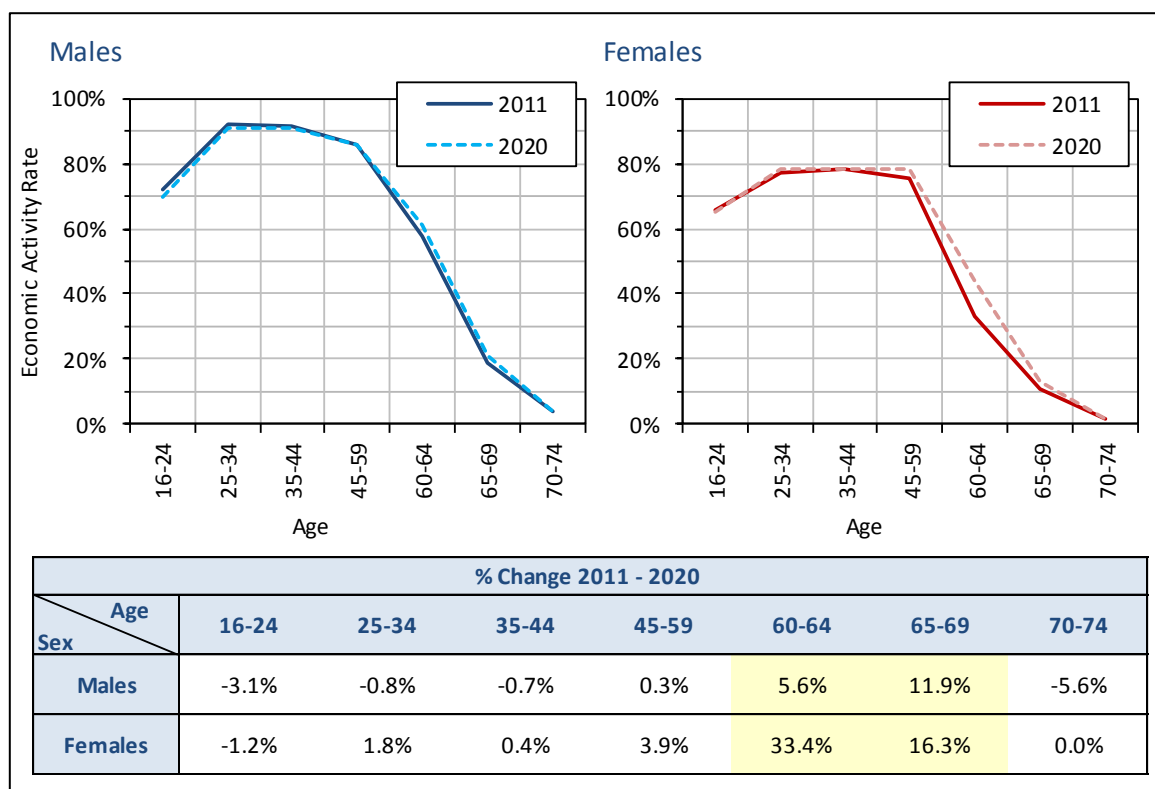


Figure 17: ONS Labour Force Projection 2006 – Economic Activity Rates 2011–2020. Source: ONS

B.57 To take account of planned changes to the SPA, the following modifications have been made to the economic activity rates:

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

¹⁰ ONS January 2006, Projections of the UK labour force, 2006 to 2020

<http://www.ons.gov.uk/ons/rel/lms/labour-market-trends--discontinued-/volume-114--no--1/projections-of-the-uk-labour-force--2006-to-2020.pdf>

- B.58 Note that the rates for women in the 60–64 age and 65–69 age-groups are higher than the original ONS figures (Figure 17), accounting for the accelerated pace of change in the SPA. No changes have been applied to other age-groups. In addition, no changes have been applied to economic activity rates beyond 2020. This is an appropriately prudent approach given the uncertainty associated with forecasting future rates of economic participation. Given the accelerated pace of change in the female SPA and the clear trends for increased female labour force participation across nearly all age-groups in the last decade (Figure 16), these 2011–2020 rate increases (Figure 18) would appear to be relatively conservative assumptions.

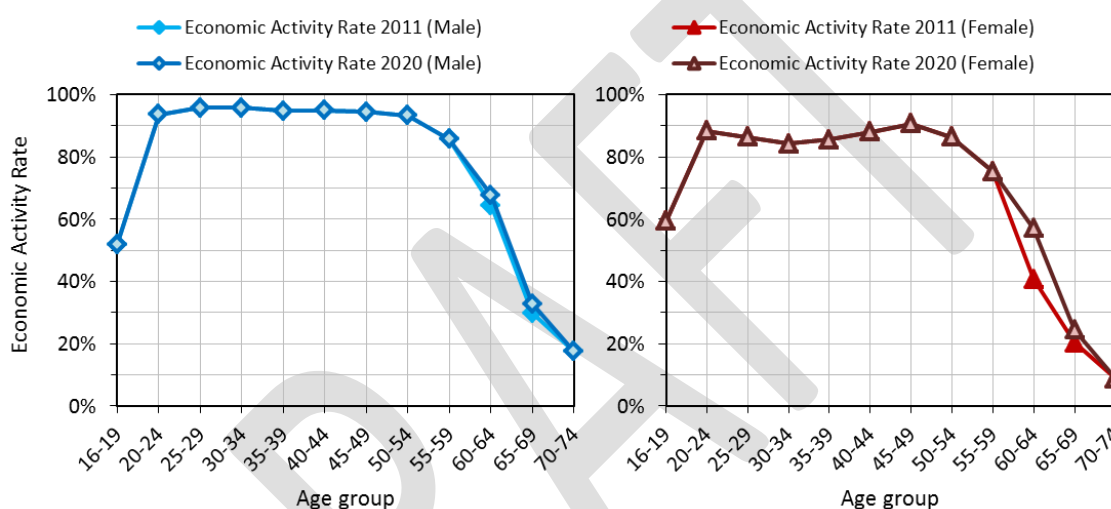


Figure 18: Edge Analytics economic activity rate profiles, 2011 and 2020 comparison.

- B.59 As well as the adjustments made to account for changes to the SPA, in the 'Jobs-Led SENS2' scenario, the overall economic activity rate is maintained at the 2011 Census rate of 72%.

Unemployment Rate

- B.60 The unemployment rate, together with the commuting ratio, controls the balance between the size of the labour force and the number of jobs available within an area. The same unemployment rate profile is applied in all the scenarios (both core and sensitivity).
- B.61 An average 'recession' unemployment rate (2008–2012) of 5.3% is applied in 2013 (Table 22). The unemployment rate then incrementally decreases to the 'pre-recession' average (2004–2007) of 2.5% by 2030. These improvements in the unemployment rate provide an appropriate basis for what is likely to be a gradual recovery from current economic conditions.

Table 22: Historical unemployment rates 2004–2012 for Craven

	2004	2005	2006	2007	2008	2009	2010	2011	2012	Recession Average (2008–2012)	Pre-recession Average (2004–2007)
Unemployment Rate (%)	2.1	1.7	3.8	!	4.7	3.9	3.4	9.3	!	5.3	2.5

Note: Unemployment rates are for April to May (source: Annual Population Survey, NOMIS). The symbol (!) signifies the estimate and confidence interval not available.

Commuting Ratio

- B.62 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. A commuting ratio greater than 1.0 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 1.0 indicates that the number of jobs in the district exceeds the size of the labour force, resulting in a net in-commute.
- B.63 From the 2011 Census Travel to Work statistics, published by ONS in July 2014, a commuting ratio of 1.01 has been derived for Craven, indicating a net out-commute. Comparison with the corresponding value from the 2001 Census shows that in 2001, there was a higher net out-commute from Craven (Table 23). The 2011 Census commuting ratio has been applied, fixed throughout the forecast period.

Table 23: 2001 and 2011 Census commuting ratio comparison

Craven		2001 Census	2011 Census
Workers	<i>a</i>	25,749	27,600
Jobs	<i>b</i>	24,058	27,294
Commuting Ratio	<i>a/b</i>	1.07	1.01

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.