

# Bradford Housing Requirement Study

## Updated Demographic Analysis & Forecasts

Assumptions, Methodology & Scenario Results

September 2014

For the attention of:

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## Acknowledgements

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# 1. Introduction

## Context & Requirements

### *Context*

- 1.1 The City of Bradford Metropolitan District Council (CBMDC) has commissioned Edge Analytics to provide an update to the demographic evidence that underpinned the Bradford Housing Requirements Study (HRS), which was produced by GVA and Edge Analytics in February and August 2013<sup>1</sup>.
- 1.2 In the initial HRS, a range of scenarios was presented, including the most recent 'official' population projection from the Office for National Statistics (ONS), the 2010-based sub-national population projection (SNPP). Also presented was a 'Natural Change' scenario and a 'jobs-led' scenario. The jobs-led scenario assessed the demographic implications of jobs-growth as defined in the 2012 Yorkshire & Humber Regional Econometric Model (REM) employment forecast. The household growth implications of each scenario were assessed using assumptions from the 2008-based household projection model from the Department for Communities and Local Government (DCLG).
- 1.3 In August 2013, an Addendum to the HRS was produced<sup>2</sup>, in which household growth was assessed using assumptions from the 2011-based interim household projection model from the (DCLG).
- 1.4 Since the HRS was completed, new demographic evidence has become available. Following the 2011 Census, the inter-censal mid-year population estimates (MYEs) were revised by ONS in May 2013, providing updated historical population statistics for Bradford. In June 2014, ONS released the 2012-based SNPP for local authorities in England, replacing the 2011-based interim SNPP and

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<sup>1</sup> <http://www.bradford.gov.uk/NR/rdonlyres/630395D8-045A-42A6-959E-62BA48FC4FA5/0/FinalHousingRequirementsStudyFebruary2013.pdf>

<sup>2</sup> <http://www.bradford.gov.uk/NR/rdonlyres/60098D2C-4B87-4A1E-954A-93B161114E78/0/HousingRequirementAddendumFinalReportAugust13.pdf>

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earlier 2010-based SNPP (the Government's official population and household projections are generally updated every two years to take account of the latest demographic trends). New evidence is also available on economic activity, unemployment and commuting for Bradford.

- 1.5 As part of the ongoing work within the Leeds City Region (LCR) Local Economic Partnership (LEP), Edge Analytics was commissioned to review the demographic evidence that the LCR Councils have used to support the objective assessment of housing need in each of seven LCR local authorities (Bradford, Calderdale, Craven, Leeds, Selby, Wakefield and York). Recommendations were made as to what further work might be required in each case, presented in the July 2014 report entitled 'Leeds City Region – Demographic evidence for the objective assessment of housing need within the Leeds City Region'.
- 1.6 A further change that has occurred since the production of the HRS is the release of the latest version of the population projection modelling software, POPGROUP. For POPGROUP v.4, changes have been made to the way in which internal migration is modelled in each scenario. For further information on POPGROUP, refer to Appendix A.

### *Requirements*

- 1.7 CBMDC has requested an update to the scenarios presented in the HRS, implementing the recommendations made in the July 2014 Edge Analytics report. In this report, it was recommended that the scenarios presented in the HRS should be updated using the most recent economic assumptions, including:
- Economic activity rates from the 2011 Census
  - Commuting Ratio from the 2011 Census
  - Unemployment rates which reflect economic 'recovery'.
- 1.8 It was also recommended that the 2012-based SNPP should be considered as the new 'official' benchmark scenario. Additionally, the jobs-led scenario should be updated using the most recent (June 2014) employment forecast from the Yorkshire and Humber REM.

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## Approach

### *Official Guidelines*

- 1.9 The development and presentation of demographic evidence to support housing targets within Local Plans is subject to an increasing degree of public scrutiny. The National Planning Policy Framework (NPPF)<sup>3</sup> and Planning Practice Guidance (PPG)<sup>4</sup> provide guidance on the appropriate approach to the objective assessment of housing need.
- 1.10 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).
- 1.11 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).
- 1.12 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. Evidence from recent public inspections (e.g. North Somerset, South Worcestershire) suggests that 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.

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

<sup>4</sup> <http://planningguidance.planningportal.gov.uk/blog/guidance/>

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## Edge Analytics Approach

- 1.13 In accordance with the PPG, Edge Analytics has used POPGROUP (v.4) technology to develop a range of growth scenarios for Bradford. As the ‘starting point’ of this assessment, the 2012-based SNPP for Bradford District 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.
- 1.14 A number of scenario alternatives have been developed and are compared to the 2012-based SNPP ‘benchmark’ and the earlier 2010-based SNPP. The scenario alternatives include ‘trend’ scenarios, based on varying migration assumptions, and a ‘jobs-led’ scenario, which is driven by the latest jobs-growth forecasts from the June 2014 Yorkshire & Humber REM.
- 1.15 All the scenarios have been run from a start year of 2012 to a 2030 horizon. Historical data are included for the 2001–2012 period. Scenario results are presented for the 2011–2030 plan period<sup>5</sup>.
- 1.16 The household growth implications of each scenario are assessed using assumptions from both the 2008-based and 2011-based household projection models from the Department for Communities and Local Government (DCLG).

## Report Structure

- 1.17 The report is structured in the following way:
- In Section 2, a profile of Bradford 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, the scenario alternatives are defined.
  - In Section 4, the scenario results are presented.
  - In Section 5, the scenario results are summarised and the conclusions presented.
  - Appendix A presents an overview of the POPGROUP methodology.

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<sup>5</sup> Note that in the HRS, the scenarios were produced for the 2011–2028 period.

- Appendix B provides detail on the data inputs and assumptions used in the development of the POPGROUP scenarios.
- Appendix C provides a comparison of the scenario data inputs and assumptions used in the original HRS, the addendum to the HRS and in this report.



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## 2. Bradford: Area Profile

- 2.1 The assessment of housing needs within Local Plans is made considerably more challenging by the dynamic nature of key data inputs. 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 Bradford 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 MYE<sup>6</sup> 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 Bradford was 522,452, an 11% 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 1).

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<sup>6</sup> Revised Annual Mid-year Population Estimates, 2001 to 2010. ONS, December 2013  
[http://www.ons.gov.uk/ons/dcp171778\\_345500.pdf](http://www.ons.gov.uk/ons/dcp171778_345500.pdf)

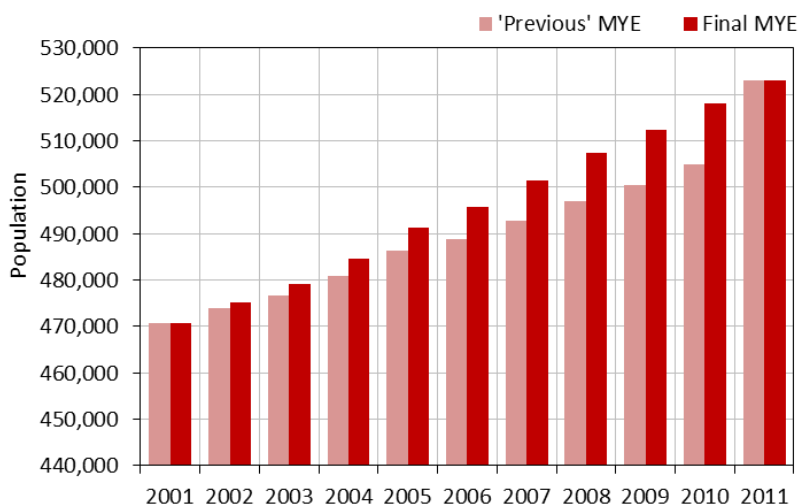


Figure 1: Bradford – mid-year population estimates (source: ONS)

## 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 Bradford.
- 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 2). The effect of the UPC adjustment depends upon the scale of population recalibration that has been required following the 2011 Census results. For Bradford, the population estimates have been subject to a consistent annual *uplift* due to the under-count experienced over the 2001–2011 decade.

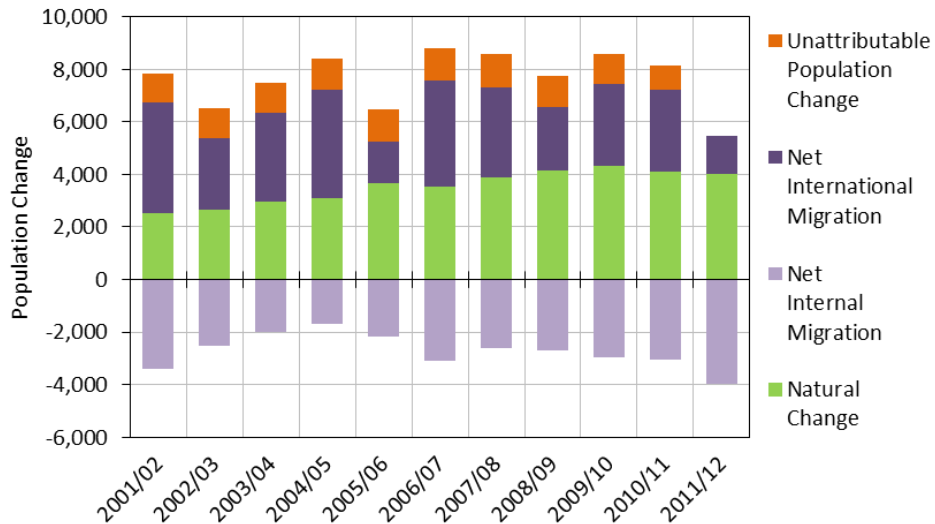


Figure 2: Bradford – components of population change 2001/02 to 2011/12 (source: ONS). No UPC component is applied to the 2011/12 statistics as these relate to the 2012 MYE which followed the 2011 Census.

2.8 For demographic analysis, the classification of UPC is unhelpful, but given the robustness of births, deaths and internal migration statistics compared to international migration estimates, it is assumed that it is most likely to be associated with the latter. With the assumption that the UPC element is assigned to international migration (for estimates up to 2011), and with the inclusion of statistics from the 2012 MYE from ONS, an eleven-year profile of the ‘components of change’ for Bradford is presented (Figure 3).

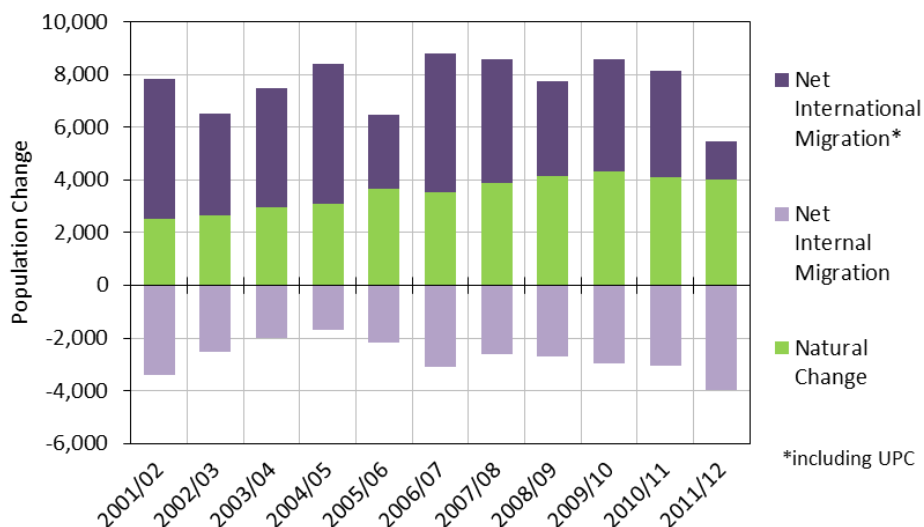


Figure 3: Bradford – components of population change 2001/02 to 2011/12 including the UPC component (source: ONS).

- 2.9 Between 2001/02 and 2011/12 natural change in Bradford was positive, as the number of births exceeded the number of deaths. Net international migration was positive throughout the historical period; however net internal migration remained negative.

## 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 PPG states that "local needs assessments should be informed by the latest available information" (PPG paragraph 2a-016). The most recent official subnational population projection is the ONS 2012-based SNPP, released in May 2014<sup>7</sup>. This projection is compared to the earlier ONS population projections for Bradford in Figure 4.

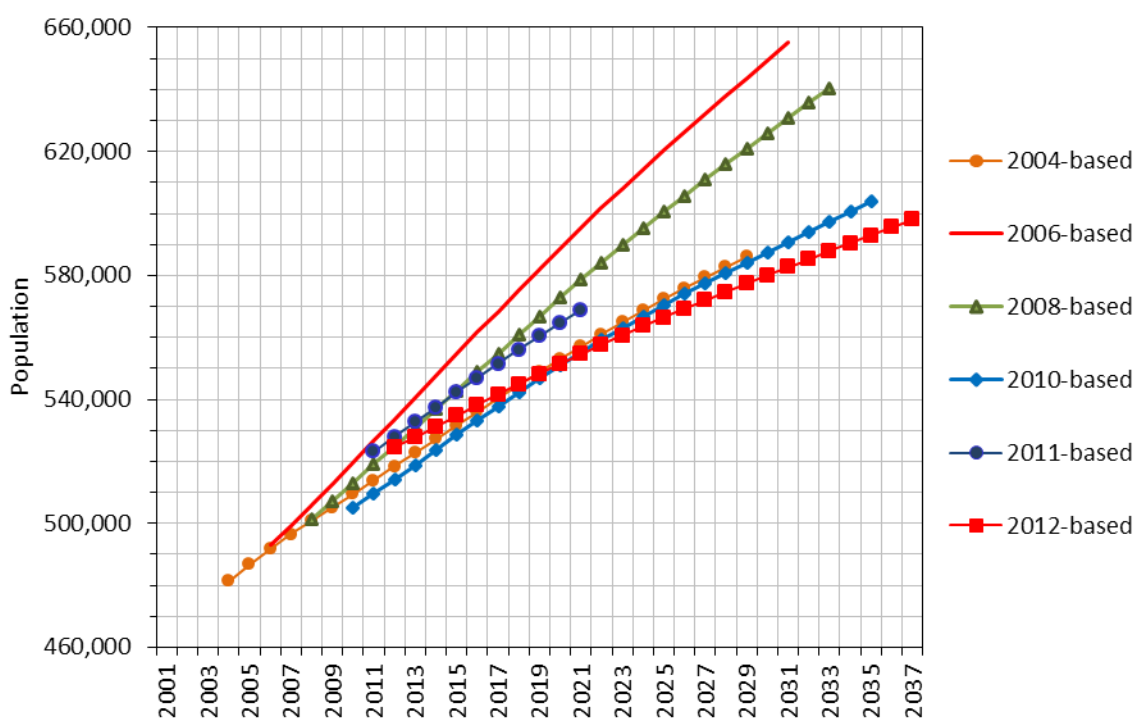


Figure 4: Official Projections for Bradford (source: ONS).

- 2.11 The 2012-based SNPP has a *lower* rate of growth than the earlier official projections (apart from the 2004-based SNPP). Under the 2012-based SNPP, the population of Bradford is projected to increase by 73,332 over the 2012–2037 projection period, a 14% increase. Under the 2010-based

<sup>7</sup> 2012-based SNPP for England, ONS, 29th May 2014 [http://www.ons.gov.uk/ons/dcp171778\\_363912.pdf](http://www.ons.gov.uk/ons/dcp171778_363912.pdf)

SNPP, the population was projected to increase by 19.6% over the 25-year projection period (2010–2035).

2.12 The 2012-based SNPP components of change are presented in Figure 5, 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.

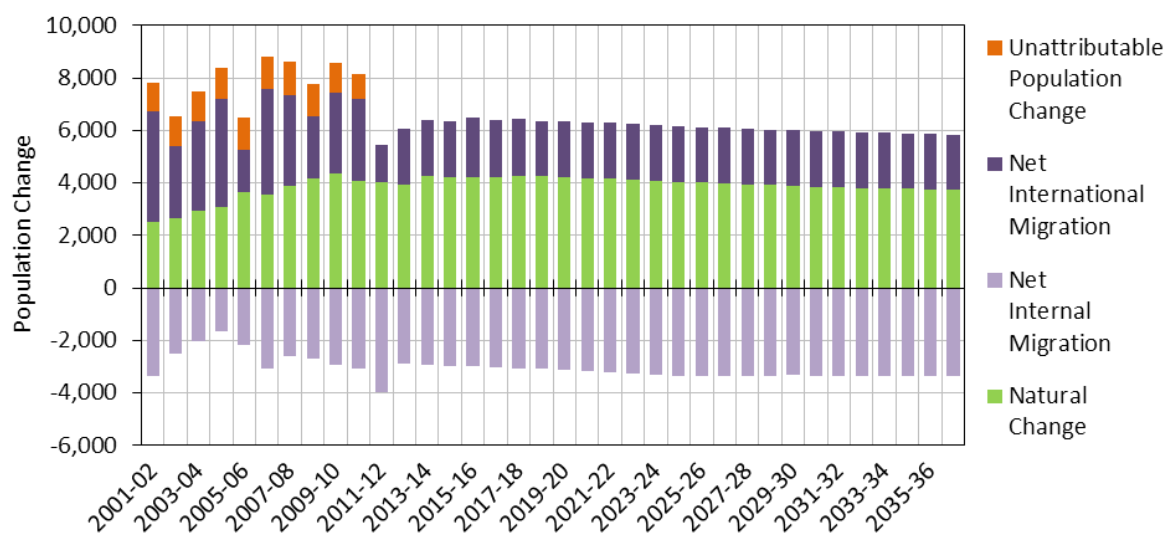


Figure 5: Historical and 2012-based SNPP components of change for Bradford (source: ONS).

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

| Component of Change               | Historical                          |                                      | Projected                                       |
|-----------------------------------|-------------------------------------|--------------------------------------|---|
|                                   | 5-year average<br>(2007/08–2011/12) | 10-year average<br>(2002/03–2011/12) | 2012-based SNPP<br>average<br>(2012/13–2036/37) |
| Natural Change                    | 4,104                               | 3,639                                | 4,019   |
| Net Internal Migration            | -3,057                              | -2,670                               | -3,217  |
| Net International Migration       | 2,699                               | 2,935                                | 2,131   |
| Unattributable Population Change* | 909                                 | 1,045                                | -   |
| Annual Population Change          | 4,649                               | 4,942                                | 2,933   |
| Annual Population Change (%)      | 0.93%                               | 1.04%                                | 0.56%   |

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

Annual population change is calculated as a % change from the start year of the time period

2.13 Historically, over both the 5-year and 10-year period, average net internal migration has been negative and net international migration has been positive (Table 1). In the 2012-based SNPP, net

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internal and net international migration continue to be dominant components of population change, although the estimated future impact of international migration is reduced compared to recent historical evidence, in line with ONS' national assumptions on immigration and emigration. The 2012-based *national* population projection for England shows a reducing long-term impact of international migration, averaging +150,000 per year, compared to +188,000 per year in the 2010-based national projection<sup>8</sup>. Natural change continues to be positive throughout the forecast period and is aligned with the 5-year historical average. The projected reduction in the net effect of international migration means that the 2012-based SNPP's annual growth forecast is below the 5-year and 10-year history. The differences between the historical data and the projected data for the 2012-based SNPP are discussed further in the 'Scenario Outcomes' section.

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<sup>8</sup> National Population Projections, 2012-based projections. Chapter 5: Migration, 2012-based NPP Reference Volume, ONS, March 2014 [http://www.ons.gov.uk/ons/dcp171776\\_355190.pdf](http://www.ons.gov.uk/ons/dcp171776_355190.pdf)

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## 3. Scenario Development

### Introduction

- 3.1 There is no single definitive view on the likely level of growth expected in Bradford; 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 scenario alternatives for Bradford (for detail on the POPGROUP methodology, refer to Appendix A). Six scenarios have been produced, including the two most recent official population projections from ONS, the 2012-based SNPP and 2010-based SNPP. Three 'alternative' trend-based scenarios have also been developed, together with a 'jobs-led' scenario, in which population growth is determined by the jobs-growth forecasts provided by the June 2014 Yorkshire & Humber REM.
- 3.3 In all scenarios, household growth has been assessed through the application of headship rates from both the 2011-based and 2008-based DCLG household models. Scenario outcomes are therefore presented under an 'Option A' and an 'Option B' outcome, using the 2011-based and 2008-based headship rates respectively.
- 3.4 In the following sections, the scenario alternatives 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*

- 3.5 In accordance with the PPG, the scenario alternatives are 'benchmarked' against the most recent official population projections from the ONS. The most recent official projection is the ONS 2012-

based sub-national population projection (SNPP), released in May 2014 (see paragraphs 2.10–2.11). The ‘**SNPP-2012**’ scenario replicates this official population projection.

- 3.6 The ‘**SNPP-2010**’ scenario, which replicates the ONS 2010-based SNPP for Bradford, is included for comparison. The population is re-scaled to the 2012 MYE to ensure consistency across scenarios and the 2010-based growth trajectory is continued thereafter.

### *Alternative Trend Scenarios*

- 3.7 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 historical migration data for Bradford and the 2012-based SNPP projection assumptions (particularly with regards to international migration, see paragraphs 2.12–2.13), it is important to give due consideration to an extended historical time period for assumption derivation.

- 3.8 Three alternative trend scenarios have therefore 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 (2007/08 to 2011/12), with the UPC adjustment included.
- ‘**PG-10yr**’: internal migration rates and international migration flow assumptions are based on the last 10 years of historical evidence (2002/03 to 2011/12), with the UPC adjustment included.
- ‘**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).

### *Jobs-led Scenario*

- 3.9 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” (PPG paragraph 2a-018). In the 2013 HRS and the HRS addendum, a ‘jobs-led’ scenario was produced, in which the demographic implications of the April 2012 Yorkshire & Humber REM forecast were assessed.



- 3.10 CBMDC is seeking to update this assessment using the latest jobs-growth forecast from the 2014 Yorkshire & Humber REM. Using this updated growth trajectory, the '**Jobs-led REM**' has been developed (Figure 6). Between 2013/14 and 2030/31, the number of jobs increases by +28,867 (an average of +1,604 per year)<sup>9</sup>. This annual jobs-growth figure is slightly higher than in the April 2012 REM, which showed an average increase of +1,591 jobs per year over the 2011–2028 forecast period (a total of +27,041 jobs).

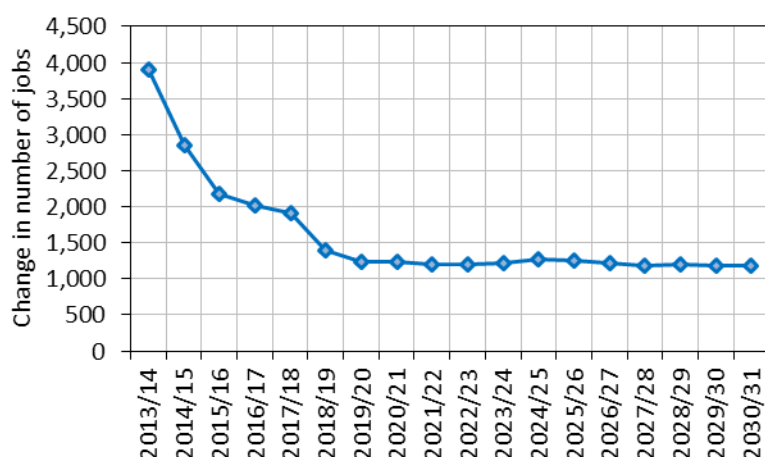


Figure 6: Jobs growth figures for Bradford from the June 2014 Yorkshire and Humber REM

- 3.11 In a jobs-led scenario, population growth is determined by the number of jobs available within an area. POPGROUP evaluates the impact of a particular jobs growth trajectory by measuring the relationship between the number of jobs in an area, the size of the labour force and the size of the resident population. Migration is used to balance the relationship between the size of the population's labour force and the forecast number of jobs. A higher level of net in-migration will occur if there is insufficient population and resident labour force to meet the forecast number of jobs. A higher level of net out-migration will occur if the population is too high relative to the forecast number of jobs.
- 3.12 Three key data items are required to run a jobs-led scenario: economic activity rates, a commuting ratio and an unemployment rate. Detail on these items is provided in Appendix B.

<sup>9</sup> Note that in the 'Jobs-led REM' scenario, the jobs-growth targets are applied from 2013/14 onwards. Historical population data are included up to 2012 and the scenario results are presented from 2011. Therefore, in the scenario results, the presented average annual number of jobs is slightly lower than the +1,604 figure stated here.

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## *Household & Dwelling Growth*

- 3.13 In each of the scenarios, 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.
- 3.14 The 2011-based interim 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 a period of economic growth and housing market conditions that are unlikely to be repeated in the immediate future.
- 3.15 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 interim headship rates are applied, with the 2011–2021 trend continued after 2021 (the 2011-based household model only extends to 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.
- 3.16 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.

## Labour Force & Jobs Growth

- 3.17 In all but the 'Jobs-led REM' scenario, the size of the labour force and the number of jobs are derived through the application of economic activity rates, a commuting ratio and an unemployment rate. In the jobs-led scenario, these data assumptions are used to determine the level of population growth required by the defined jobs-growth trajectory.
- 3.18 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). The unemployment rate has been incrementally reduced to account for economic recovery following the recession and the commuting ratio has been fixed throughout the 2012–2030 forecast period at the 2011 Census value. For detail on the labour force/jobs assumptions used in the scenarios, refer to Appendix B.

## Scenario Summary

- 3.19 Six scenarios have been produced (Table 2) under three scenario types; official projections, alternative trend-based scenarios and a jobs-led scenario.

Table 2: Edge Analytics scenario definition

| Scenario Type                     | Scenario Name    | Scenario Description   |
|-----------------------------------|------------------|--|
| Official Projections              | 'SNPP-2012'      | This scenario mirrors the 2012-based SNPP from ONS for Bradford. This scenario is the official 'benchmark' scenario.   |
|                                   | 'SNPP-2010'      | This scenario mirrors the 2010-based sub-national population projection (SNPP) from ONS for Bradford. The population is re-scaled to the 2012 MYE to ensure consistency with the SNPP-2012 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 (2007/08 to 2011/12).   |
|                                   | 'PG-10yr'        | Internal and international migration assumptions are based on the last 10 years of historical evidence (2002/03 to 2011/12).   |
| Jobs-led scenario                 | 'Jobs-led REM'   | Population growth is determined by the annual change in the number of job, as defined in the June 2014 Yorkshire & Humber REM.   |

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

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## 4. Scenario Outcomes

### Introduction

4.1 Six scenarios have been developed for Bradford using POPGROUP technology. A summary of the results for each scenario is provided in the chart (Figure 7) and tables (Table 3 and Table 4) on the next page. The chart illustrates the trajectory of population change resulting from each scenario. The tables are presented under an 'Option A' and 'Option B' alternative:

- In 'Option A', the DCLG 2011-based interim 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.

4.2 The table summarises the changes in population and household numbers from 2011–2030 that result from each scenario. The scenarios are ranked (high to low) according to the expected population growth over the forecast period. The table also shows the estimated average annual net migration (internal and international migration) associated with the population change, the average annual jobs growth and the average annual dwelling requirement.

4.3 Note that under the 'Option A' and 'Option B' alternatives, population growth, net migration and the annual average increase in the number of jobs and labour force are the same. Only the household and dwelling numbers are different, reflecting the two alternative approaches to assessing household growth.

### Bradford: Scenario Outcomes

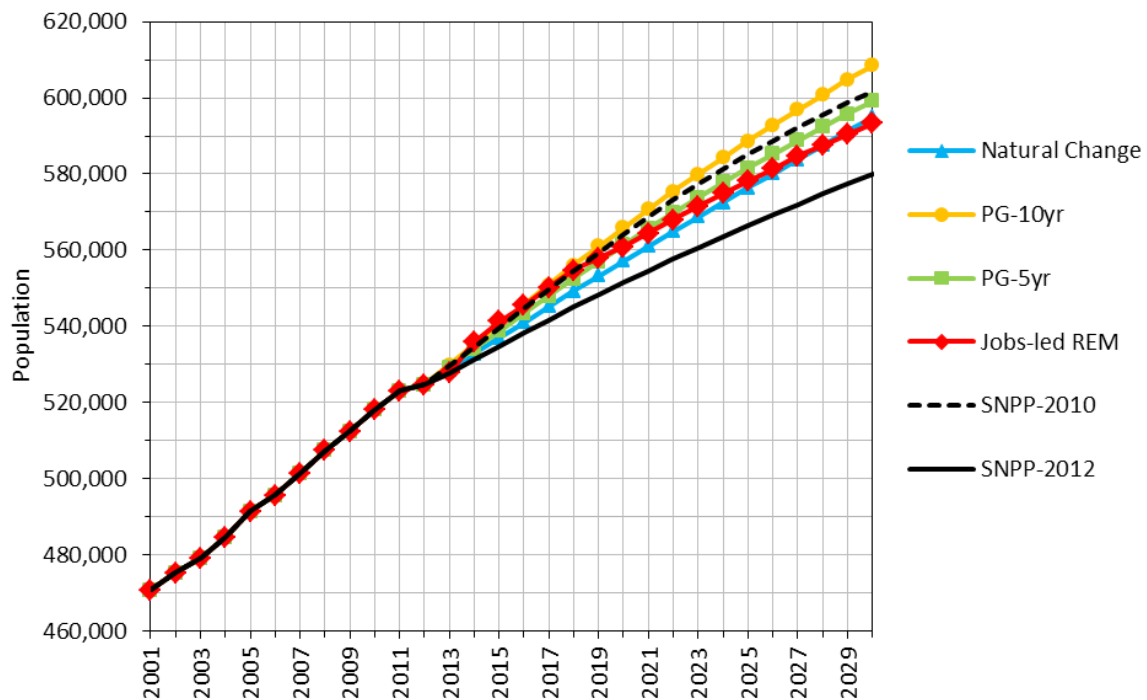


Figure 7: Bradford scenario outcomes: population growth 2001–2030

Table 3: Bradford 'Option A' scenario outcomes 2011–2030

| Scenario           | Change 2011–2030  |                     |                   |                     | Average per year |           |       |
|--------------------|-------------------|---------------------|-------------------|---------------------|------------------|-----------|-------|
|                    | Population Change | Population Change % | Households Change | Households Change % | Net Migration    | Dwellings | Jobs  |
| PG-10yr (A)        | 85,422            | 16.3%               | 37,279            | 18.7%               | 59               | 2,041     | 1,934 |
| SNPP-2010 (A)      | 78,679            | 15.0%               | 31,304            | 15.7%               | -582             | 1,713     | 1,674 |
| PG-5yr (A)         | 76,087            | 14.5%               | 35,472            | 17.8%               | -262             | 1,942     | 1,682 |
| Natural Change (A) | 71,818            | 13.7%               | 35,649            | 17.9%               | 0                | 1,951     | 1,500 |
| Jobs-led REM (A)   | 70,192            | 13.4%               | 32,712            | 16.4%               | -563             | 1,791     | 1,536 |
| SNPP-2012 (A)      | 56,928            | 10.9%               | 27,980            | 14.0%               | -1,107           | 1,532     | 1,231 |

Table 4: Bradford 'Option B' scenario outcomes 2011–2030

| Scenario           | Change 2011–2030  |                     |                   |                     | Average per year |           |       |
|--------------------|-------------------|---------------------|-------------------|---------------------|------------------|-----------|-------|
|                    | Population Change | Population Change % | Households Change | Households Change % | Net Migration    | Dwellings | Jobs  |
| PG-10yr (B)        | 85,422            | 16.3%               | 46,824            | 23.5%               | 59               | 2,563     | 1,934 |
| SNPP-2010 (B)      | 78,679            | 15.0%               | 40,371            | 20.2%               | -582             | 2,210     | 1,674 |
| PG-5yr (B)         | 76,087            | 14.5%               | 44,766            | 22.4%               | -262             | 2,450     | 1,682 |
| Natural Change (B) | 71,818            | 13.7%               | 45,001            | 22.6%               | 0                | 2,463     | 1,500 |
| Jobs-led REM (B)   | 70,192            | 13.4%               | 42,146            | 21.1%               | -563             | 2,307     | 1,536 |
| SNPP-2012 (B)      | 56,928            | 10.9%               | 37,250            | 18.7%               | -1,107           | 2,039     | 1,231 |

Note that in the 'Natural Change' scenario, the net migration figure in the tables above have been set at zero.

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## Scenario Outcomes

- 4.4 Population growth ranges from 10.9% under the 'SNPP-2012' scenario to 16.3% under the 'PG-10yr' scenario. These population growth figures result in a range of dwelling requirements, from 1,532–2,041 dwellings per year under 'Option A' (using the 2011-based headship rates) to 2,039–2,563 under 'Option B' (using the 2008-based headship rates).
- 4.5 Population growth under the 'SNPP-2012' scenario (10.9%) is lower than under the previous official projection, the 'SNPP-2010' (15.0%). The 'SNPP-2012' scenario results in an annual average dwelling requirement of 1,532 dwellings per year under 'Option A' (using the 2011-based headship rates) and 2,039 dwellings per year under 'Option B' (using the 2008-based headship rates). Under the 'SNPP-2010' scenario, the dwelling requirement is higher, ranging from 1,713 to 2,210 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 Bradford.
- 4.7 The 'Natural Change' scenario, in which net migration is set to zero for each year of the forecast period (2012–2030), results in 13.7% population growth, driven solely by the balance between births and deaths. The 'Natural Change' scenario is hypothetical, but does provide an important indication of the degree to which dwelling growth is driven by natural change in Bradford. This is further highlighted by the annual net migration figures which, for all scenarios but the 'PG-10yr', are negative. The dwelling growth expectation under the 'Natural Change' scenario ranges from 1,951 dwellings per year under 'Option A' to 2,463 under 'Option B'.
- 4.8 The 'PG' scenarios provide alternative 'trend' scenarios. Of the two, the highest growth trajectory is suggested by the 'PG-10yr' scenario, showing 16.3% growth in population over the forecast period. Under the 'PG-5yr' scenario, population growth is lower, at 14.5% over the forecast period. The 'PG-10yr' scenario results in an expected dwelling growth of 2,041 dwellings per year under 'Option A' and 2,563 dwellings per year under 'Option B'. The 'PG-5yr' scenario results in a

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lower expected dwelling growth ranging from 1,942–2,450 ('Option A' and 'Option B' respectively).

- 4.9 The 'PG' scenarios result in higher population growth than the 'SNPP-2012'. The 'PG' scenarios incorporate fertility and mortality assumptions that are consistent with the 'SNPP-2012' but differ in their calibration of future migration assumptions. For internal migration, both a five-year ('PG-5yr') and a ten-year ('PG-10yr') history are used to calibrate migration assumptions, compared to the five years typically used in the 'SNPP-2012'.
- 4.10 With regard to future international migration assumptions, the 'PG' scenarios consider both a five-year and a ten-year perspective, plus they also incorporate the UPC adjustment to the international migration estimates. The inclusion of this results in *higher* net international migration than in the 'SNPP-2012' scenario.
- 4.11 ONS' treatment of international migration and the UPC adjustment in the 'SNPP-2012' is not sufficiently transparent to enable definitive commentary to be provided. However, a five-year history is typically used for calibration of assumptions, but this is scaled to ensure that the aggregate long-term assumption on international migration for England, in total, is achieved. Significantly, the 2012-based *national* population projection for England has assumed a *lower* rate of long-term growth due to international migration than has been recorded in the last five or ten years.
- 4.12 Under the 'Jobs-led REM' scenario, population growth is driven by the increase in the number of jobs, as defined in the June 2014 Yorkshire and Humber REM. This scenario results in an annual dwelling requirement of 1,686 under 'Option A' and 2,200 under 'Option B'. Using the selected economic activity rates, unemployment rate and commuting ratio assumptions, the scenario suggests that the jobs-growth forecast will result in an average annual dwelling requirement that exceeds the SNPP-2012 outcome but which is lower than the alternative 5-year and 10-year scenarios.

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## 5. Summary

### Requirements Summary & Approach

- 5.1 CBMDC has commissioned Edge Analytics to provide an update to a range of demographic scenarios, using the latest demographic statistics for Bradford, updated economic assumptions and the most recent employment forecast from the 2014 Yorkshire and Humber REM.
- 5.2 Edge Analytics has produced a range of six scenarios using POPGROUP v.4 technology, including the latest official population projection from ONS, the 2012-based SNPP. Alternative trend-based scenarios have also been developed, together with a 'jobs-led' scenario, in which population growth is determined by the jobs-growth forecasts from the Yorkshire & Humber REM (2014).
- 5.3 In the scenarios, 2011 Census economic activity rates were applied, with adjustments made in the older age groups to account for changes to the SPA. In all scenarios the unemployment rate was incrementally reduced to account for economic recovery following the recession and the commuting ratio was fixed at the 2011 Census value.
- 5.4 In all scenarios, household growth was assessed using household formation rates from the 2011-based and the 2008-based DCLG household models. Output for each scenario was presented under an 'Option A' and 'Option B' alternative, using the 2011-based and 2008-based headship rates respectively.

### Scenario Outcomes

- 5.5 A summary of the annual average dwelling requirements for each of the scenarios is presented in Table 5. In light of the uncertainty associated with future rates of household formation, and the criticisms that can be applied when assessing household growth using only the 2008-based or only the 2011-based rates, the resulting 'Option A' and 'Option B' dwelling requirements for each scenario are averaged. This produces a dwelling requirement range of 1,785 under the 'SNPP-2012' scenario to 2,302 under the 'PG-10Yr' scenario.



Table 5: Scenario dwelling requirement summary

| Scenario       | Average Annual Dwelling Requirement (2011–2030) |          |         |
|----------------|---|----------|---------|
|                | Option A  | Option B | Average |
| PG-10Yr        | 2,041   | 2,563    | 2,302   |
| Natural Change | 1,951   | 2,463    | 2,207   |
| PG-5Yr         | 1,942   | 2,450    | 2,196   |
| Jobs-led REM   | 1,791   | 2,307    | 2,049   |
| SNPP-2010      | 1,713   | 2,210    | 1,962   |
| SNPP-2012      | 1,532   | 2,039    | 1,785   |

Note: 'Option A' shows the dwelling requirement derived using the 2011-based headship rates and 'Option B' that 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 CBMDC to consider as it updates its Housing Requirement Study.
- 5.7 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 the future impacts of international migration.
- 5.8 The dwelling growth outcome linked to CBMDC's jobs growth forecast has been presented. When interpreting this scenario's outcomes, it should be noted that variant assumptions on economic activity, commuting and unemployment could influence the forecast dwelling requirements. For example, a reduced net out-commute and/or higher rates of economic participation in the older age-groups could each contribute to lower housing need over the plan period.
- 5.9 DCLG intends to release a 2012-based household model for English local authorities in autumn 2014. The implications of these new data and assumptions upon the household and dwelling growth outcomes presented here will need to form part of the housing requirements evidence.

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# 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 8) 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 9) 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>

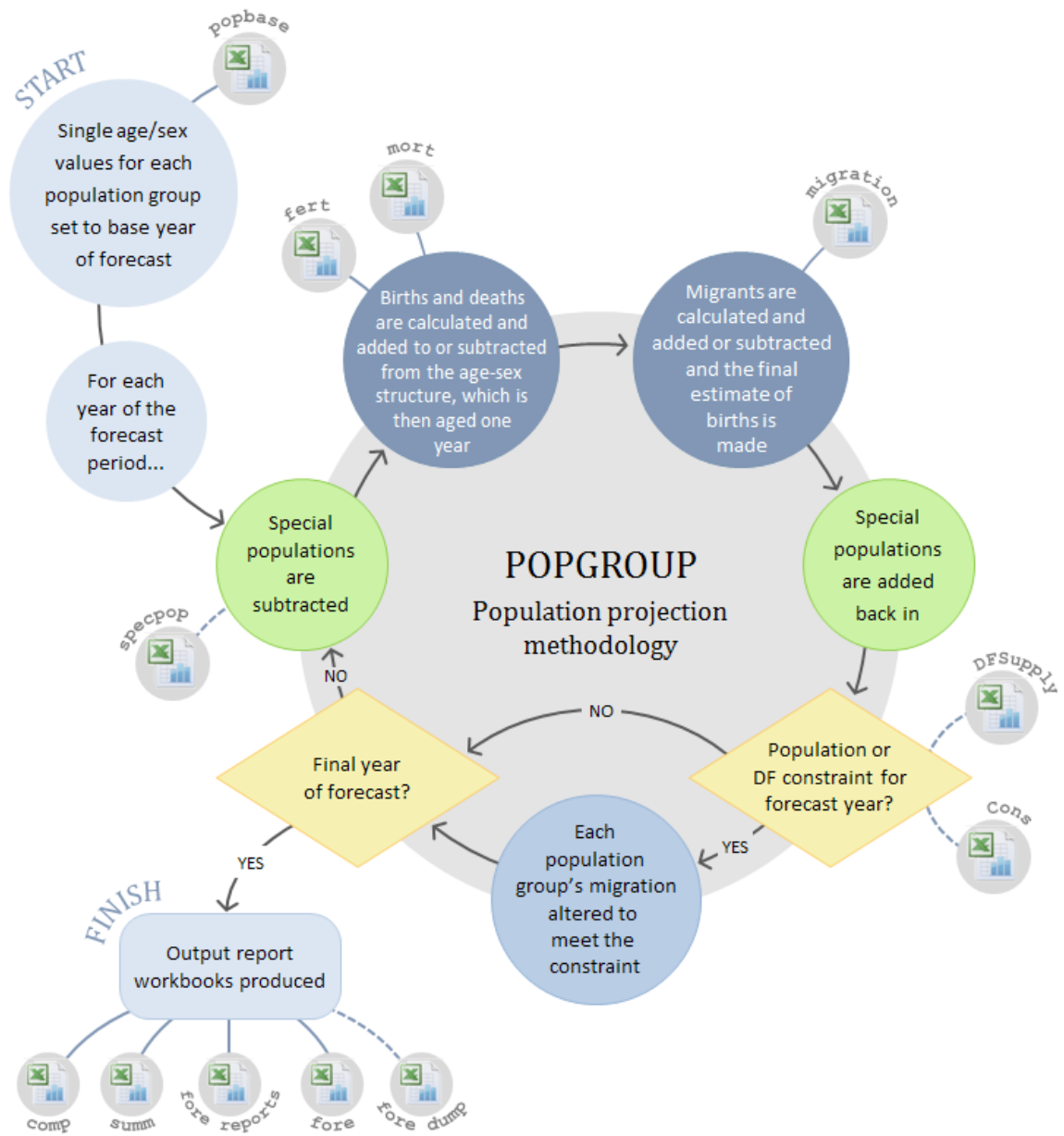
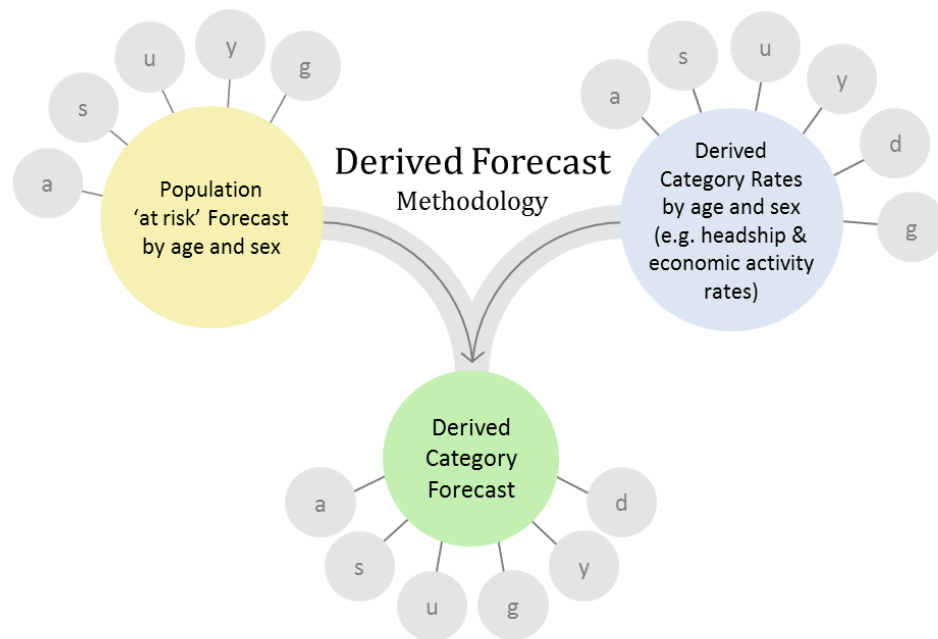


Figure 8: POPGROUP population projection methodology.



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

- 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 9: Derived Forecast (DF) methodology

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# Appendix B

## Data Inputs & Assumptions

### Introduction

- B.1 Edge Analytics has developed a suite of demographic scenarios for Bradford using POPGROUP.
- B.2 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 2001–2012, in conjunction with information from ONS sub-national projections, a series of assumptions have been derived which drive the scenario forecasts.
- B.3 In the following sections, a narrative on the data inputs and assumptions underpinning the scenarios is presented.

### Population, Births & Deaths

#### *Population*

- B.4 In each scenario, historical population statistics are provided by the mid-year population estimates for 2001–2012, 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.5 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 2012 mid-year population estimate total, following its designated growth trend thereafter. This enables the different scenario alternatives to be more

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easily compared from a consistent base year and does not alter the underlying assumptions or growth trajectory.

- B.6 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.7 In each scenario, historical mid-year to mid-year counts of births by sex from 2001/02 to 2011/12 have been sourced from ONS Vital Statistics.
- B.8 In the 'SNPP-2010' and 'SNPP-2012' scenarios, future counts of births are specified to ensure consistency with the official projections.
- B.9 In the other scenarios, a 'local' (i.e. area-specific) age-specific fertility rate (ASFR) schedule, which measures the expected fertility 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.10 Long-term assumptions on changes in age-specific fertility rates are taken from the ONS 2012-based SNPP.
- B.11 In combination with the 'population-at-risk' (i.e. all women between the ages of 15–49), the area-specific ASFR and future fertility rate assumptions provide the basis for the calculation of births in each year of the forecast period.

### *Deaths & Mortality*

- B.12 In each scenario, historical mid-year to mid-year counts of deaths by age and sex from 2001/02 to 2011/12 have been sourced from ONS Vital Statistics.
- B.13 In the 'SNPP-2010' and 'SNPP-2012' scenarios, future counts of deaths are specified to ensure consistency with the official projections.
- B.14 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.

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- B.15 Long-term assumptions on changes in age-specific mortality rates are taken from the ONS 2012-based SNPP.
- B.16 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.

## Migration

### *Internal Migration*

- B.17 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 2011/12 have been sourced from the 'components of 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.18 In the 'SNPP-2010' and 'SNPP-2012' scenarios, future counts of internal migrants are specified, to ensure consistency with the official projections.
- B.19 In the alternative trend-based 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 (2007/08–2011/12). In the 'PG-10yr' scenario, a ten year history is used (2002/03–2011/12).
- B.20 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.21 The 'Jobs-led REM' 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 to meet the forecast labour force increase. The profile of internal migrants is defined by an ASMigR schedule, derived from the ONS 2012-based SNPP.

B.22 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. In the case of Bradford, the reference population is defined as the total population of the districts where 70% of the in-migrants to the Leeds City Region come from.

### *International Migration*

B.23 Historical mid-year to mid-year counts of total immigration and emigration from 2001/02 to 2011/12 have been sourced from the 'components of 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.24 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 (see paragraphs 2.7–2.8 of the main report).

B.25 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.26 In the alternative trend-based 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 (2007/08–2011/12). In the 'PG-10yr' scenario, a ten year history is used (2002/03–2011/12). 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.27 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.28 In the 'Jobs-led REM' scenario, 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.



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## Household & Dwellings

B.29 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.”<sup>10</sup>*

B.30 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.31 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.

### *Household Headship Rates*

B.32 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 6).

B.33 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.34 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.

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<sup>10</sup> <http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/2011-census-user-guide/glossary/index.html>

B.35 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.

Table 6: Household type classification

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

## Communal Population

B.36 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.37 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.

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## *Vacancy Rate*

- B.38 The relationship between households and dwellings is modelled using a 'vacancy rate', sourced from the 2011 Census. A vacancy rate of 3.8% for Bradford has been applied, fixed throughout the forecast period.
- B.39 Using this vacancy rate, the 'dwelling requirement' of each household growth trajectory (i.e. 'Option A' and 'Option B' – see paragraph B.35) has been evaluated. The resulting 'Option A' and 'Option B' dwelling requirements are then averaged to provide a total dwelling requirement for each scenario.

## *Labour Force & Jobs*

- B.40 For each scenario (excluding the 'Jobs-led REM' scenario), the labour force and jobs implications of the population growth trajectory have been evaluated through the application of three key data items: economic activity rates, an unemployment rate and a commuting ratio.
- B.41 In the 'Jobs-led REM' scenario, these three data items are used to determine the population growth required by a particular jobs growth trajectory.

## *Economic Activity Rates*

- B.42 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.43 For Bradford, rates of economic activity decreased for men and women in the younger age groups between the 2001 and 2011 Censuses (Figure 10). Economic activity rates increased amongst the older age groups, for both men and women.
- B.44 In all scenarios, the 2011 Census economic activity rates have been applied, with changes made to the age-sex specific economic activity rates to take account of changes to the State Pension

Age (SPA) and to accommodate potential changes in economic participation which might result from an ageing but healthier population in the older labour-force age-groups.

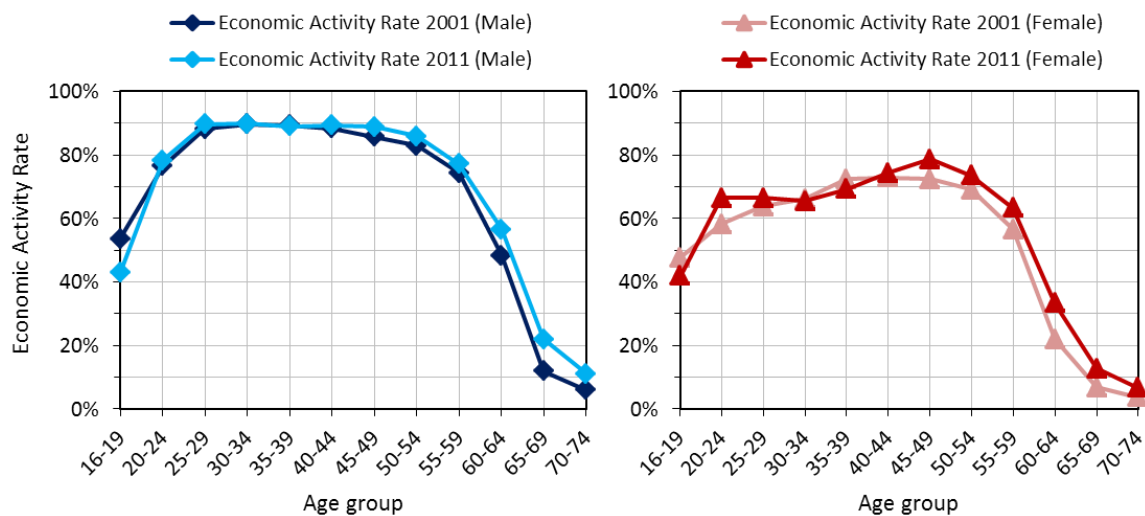


Figure 10: Bradford economic activity rates: 2001 and 2011 Census comparison (source: ONS)

- B.45 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 2028<sup>11</sup>.
- B.46 ONS published its last set of economic activity rate forecasts from a 2006 base<sup>12</sup>. 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 11).

<sup>11</sup> <https://www.gov.uk/state-pension>

<sup>12</sup> 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>

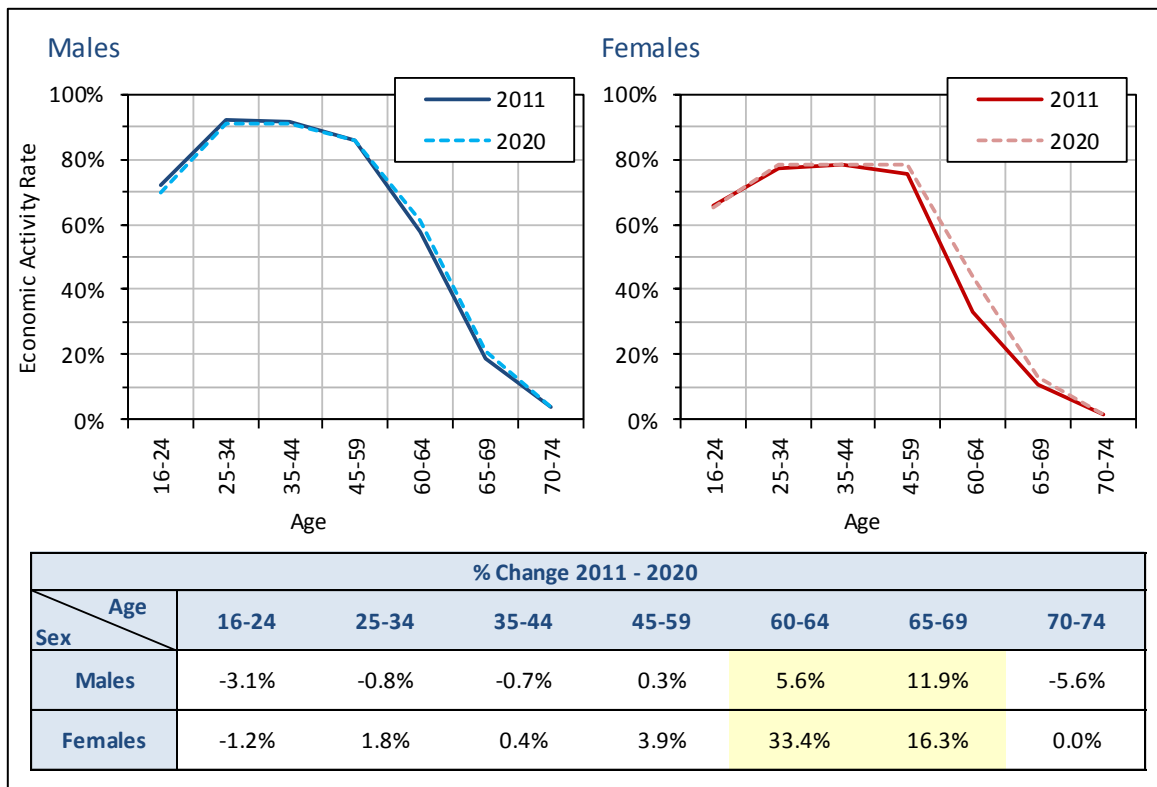


Figure 11: ONS Labour Force Projection 2006 – Economic Activity Rates 2011–2020. Source: ONS

B.47 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.

B.48 Note that the rates for women in the 60–64 age and 65–69 age-groups are higher than the original ONS figures (Figure 11), 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 10), these 2011–2020 rate increases (Figure 12) would appear to be relatively conservative assumptions.

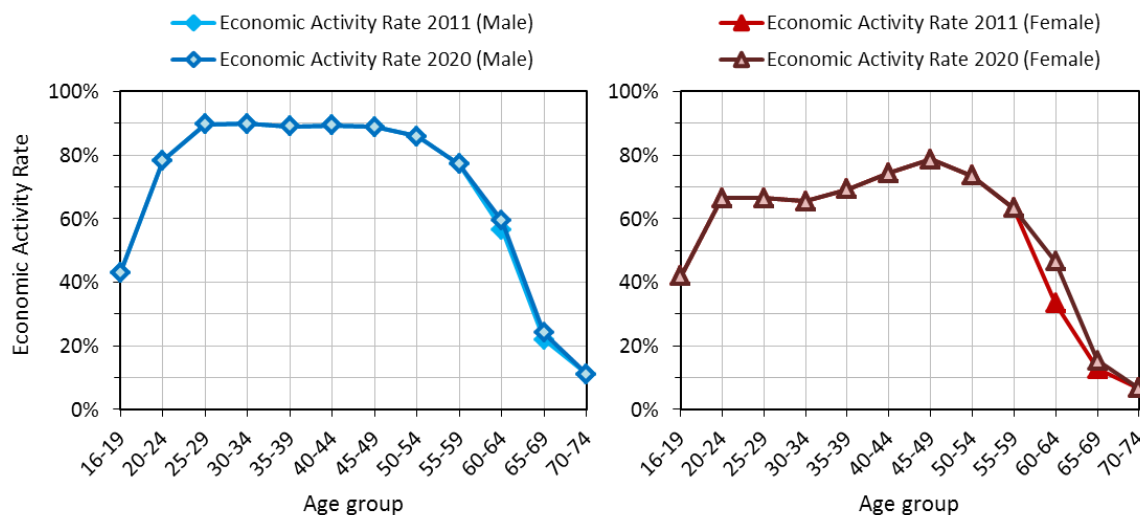


Figure 12: Edge Analytics economic activity rate profiles, 2011 and 2020 comparison.

## Unemployment Rate

- B.49 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.
- B.50 An average 'recession' unemployment rate (2008–2012) of 9.8% is applied in 2012 (Table 7). The unemployment rate then incrementally decreases to the 'pre-recession' average (2004–2007) of 6.3% 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 7: Historical unemployment rates 2004–2012 for Bradford

| Bradford              | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | Recession Average (2008–2012) | Pre-Recession Average (2004–2007) |
|-----------------------|------|------|------|------|------|------|------|------|------|-------------------------------|-----------------------------------|
| Unemployment Rate (%) | 5.3  | 5.2  | 6.3  | 8.2  | 7.3  | 7.6  | 10.7 | 12.7 | 10.7 | 9.8                           | 6.3                               |

Note: Unemployment rates are for January to December (source: Annual Population Survey, NOMIS)

## Commuting Ratio

- B.51 The commuting ratio, together with the unemployment rate, controls the balance between the number of workers living in a district (i.e. the resident labour force) and the number of jobs available in the district.
- B.52 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.53 From the 2011 Census Travel to Work statistics, published by ONS in July 2014, a commuting ratio of 1.02 has been derived for Bradford, indicating a net out-commute. Comparison with the corresponding value from the 2001 Census (Table 8) shows that in 2001, there was a net *in*-commute to Bradford.

Table 8: Commuting ratio comparison

| Bradford        |            | 2001 Census | 2011 Census |
|-----------------|------------|-------------|-------------|
| Workers         | <i>a</i>   | 191,225     | 218,937     |
| Jobs            | <i>b</i>   | 194,672     | 213,618     |
| Commuting Ratio | <i>a/b</i> | <b>0.98</b> | <b>1.02</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*.

# Appendix C

## Comparison of Key Data Inputs

Table 9 presents a summary of the scenarios developed in (a) the original HRS (February 2013), (b) the addendum to the HRS (August 2013) and (c) this report (i.e. September 2014 scenario update). Table 10 compares the key data inputs and assumptions used in the demographic scenarios. For detail on the scenarios and the data inputs and assumptions, please refer to the relevant report.

Table 9: Summary of scenarios

| Scenario Type                  | Scenarios  |   |   |
|--------------------------------|--|---|---|
|                                | HRS<br><i>GVA &amp; Edge Analytics</i><br>(February 2013)  | HRS Addendum<br><i>GVA &amp; Edge Analytics</i><br>(August 2013)                              | Scenario Update<br><i>Edge Analytics</i><br>(September 2014)  |
| <b>'Core' Scenarios</b>        | <ul style="list-style-type: none"> <li>• 2010-based SNPP</li> <li>• Rebased 2010-based SNPP</li> <li>• Natural Change</li> <li>• Employment-Led (REM)</li> </ul>   | <ul style="list-style-type: none"> <li>• SNPP-2010</li> <li>• Employment-Led (REM)</li> </ul> | <ul style="list-style-type: none"> <li>• Natural Change</li> <li>• SNPP-2010</li> <li>• SNPP-2012</li> <li>• PG-5yr</li> <li>• PG-10yr</li> <li>• Jobs-Led REM</li> </ul> |
| <b>'Sensitivity' Scenarios</b> | <ul style="list-style-type: none"> <li>• Employment-Led (Adjusted EA Rates)</li> <li>• Employment-Led (Adjusted Commuting Rates)</li> <li>• Employment-Led (Combined adjusted EA Rates and commuting rates)</li> </ul> |   |   |

Note that scenario names are presented exactly as in the respective reports.



Table 10: Data inputs and assumptions

| Data Input/Assumption           | Study   |   |  |
|---------------------------------|---|---|--|
|                                 | HRS<br>GVA & Edge Analytics<br>(February 2013)  | HRS Addendum<br>GVA & Edge Analytics<br>(August 2013)   | Scenario Update<br>Edge Analytics<br>(September 2014)  |
| Historical population data      | 2001–2011   | 2001–2011   | 2001–2012  |
| Forecast period                 | 2011–2028   | 2011–2028   | 2011–2030  |
| Official 'benchmark' projection | 2010-based SNPP   | 2010-based SNPP   | 2012-based SNPP  |
| <i>Household assumptions</i>    |   |   |  |
| Household headship rates        | 2008-based  | 2008-based<br>2011-based  | 2008-based<br>2011-based   |
| Communal population statistics  | 2001 Census   | 2001 Census   | 2011 Census  |
| Dwelling vacancy rate           | 3%  | 3%  | 3.8% (2011 Census)   |
| <i>Employment assumptions</i>   |   |   |  |
| Unemployment rate               | Fixed at 9.3%<br>5yr average (2007–2011)  | Fixed at 9.3%<br>5yr average (2007–2011)  | 9.8% to 6.3%<br>(Recession to pre-recession average,<br>reducing incrementally<br>from 2012 to 2030) |
| Unemployment rate sensitivity   | Incrementally reduced<br>from 9.3% (5yr average<br>2007–2011) to 6.9%<br>(national average) by<br>2030    | -   | -  |
| Economic activity rates         | EA rates (Nomis)<br>incrementally increased<br>by 10% over 2011–2030<br>in 50–64 and 65–74 age-<br>groups | EA rates (Nomis)<br>incrementally increased<br>by 10% over 2011–2030<br>in 50–64 and 65–74 age-<br>groups | 2011 Census economic<br>activity rates with<br>SPA adjustments in the<br>60–69 age groups            |

| Data Input/Assumption                     | Study   |  |  |
|---|---|--|--|
|   | HRS<br><i>GVA &amp; Edge Analytics</i><br>(February 2013)   | HRS Addendum<br><i>GVA &amp; Edge Analytics</i><br>(August 2013) | Scenario Update<br><i>Edge Analytics</i><br>(September 2014) |
| <b>Economic Activity Rate sensitivity</b> | Age groups where the current economic activity rate falls below national averages are incrementally adjusted to the current national rate by 2030 | -  | -  |
| <b>Commuting ratio</b>                    | 1.01<br>Derived from APS and BRES data (Nomis) <sup>†</sup>   | 1.01<br>Derived from APS and BRES data (Nomis) <sup>†</sup>      | 1.02 (2011 Census)   |
| <b>Commuting ratio sensitivity</b>        | Balanced commuting ratio of 1.0 by 2018 (fixed thereafter)  | -  | -  |
| <b><i>Employment forecast</i></b>         |   |  |  |
| <b>REM model</b>                          | April 2012  | April 2012   | June 2014  |
| <b>REM forecast period</b>                | 2011–2028   | 2011–2028  | 2013–2031  |
| <b>Average jobs growth per annum</b>      | +1,591<br>(2011/12–2027/28)   | +1,591<br>(2011/12–2027/28)                                      | +1,604<br>(2013/14–2030/31)*                                 |
| <b>Total jobs growth</b>                  | +27,041<br>(2011/12–2027/28)  | +27,041<br>(2011/12–2027/28)                                     | +28,867<br>(2013/14–2030/31)                                 |

<sup>†</sup> APS stands for Annual Population Survey, BRES for the Business Register and Employment Survey.

\* Note in the 'Jobs-led REM' scenario in the September 2014 report that the jobs-growth targets are applied from 2013/14 onwards. Historical population data are included up to 2012 and the scenario results are presented from 2011. Therefore, in the scenario results, the presented average annual number of jobs is slightly lower than the +1,604 figure stated here.