



Bedford Borough

Demographic Forecasts 2012–2032

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For the attention of:

*Bedford Borough Council
Borough Hall
Bedford
MK42 9AP*

edge analytics
www.edgeanalytics.co.uk

Contact Details

Dr Kate Staines kate@edgeanalytics.co.uk

Edge Analytics Ltd.

Leeds Innovation Centre

103 Clarendon Road

Leeds

LS2 9DF

0113 384 6087

www.edgeanalytics.co.uk

Acknowledgements

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Executive Summary

Summary of Requirements

- E1. Bedford Borough Council has sought to update its demographic evidence with the development of a suite of population, household and housing forecasts for the Borough. These forecasts incorporate the latest evidence from:
- 2011 Census statistics on population and households;
 - Revised mid-year population estimates for the period 2002–2010;
 - 2011-based household projections for 2011–2021.
- E2. This report presents the suite of alternative growth scenarios, produced using POPGROUP technology. The scenarios evaluate trend, policy and economic considerations and are accompanied by a transparent definition of key assumptions. They are presented in a consistent format that contrasts the impact of scenario assumptions upon changes to population, households, dwellings, labour force and jobs. All scenarios have been run from a 2012 base year with a 2032 horizon. Historical data has been included for 2001–2012.

Scenario Outcomes

- E3. The latest demographic evidence has provided a timely update to Bedford Borough's population profile, aligning the new 2011 Census total with an historical time series back to 2001, enabling the derivation of a suite of demographic forecasts.
- E4. The substantial 're-calibration' of Bedford Borough's population estimates resulting from the 2011 Census count, has presented considerable uncertainty with regard to the factors that have driven the downward adjustment in the Borough's 2011 population.
- E5. With an assumption that both the 2001 and 2011 Censuses provided a robust enumeration of the population, it is the mis-estimation of international migration that is most likely to have resulted in the over-estimation of mid-year population totals between the two Censuses. However, the Office for National Statistics (ONS) does not attribute the population adjustment to international migration, classifying the required change as 'other unattributable' factors.

- E6. The new demographic evidence has enabled the development of alternative 2012-based trend projections that consider the potential future impact of migration. These provide an alternative to ONS' 2011-based interim projections, which do not provide a sound basis for analysis due to their reliance upon 2010-based assumptions in conjunction with 2011 Census statistics.
- E7. Five-year and ten-year historical perspectives have been used to set migration assumptions in the trend scenarios. The 5-year alternative ('Migration-led 5yr') suggests a higher growth forecast than the 10-year ('Migration-led 10yr'), reflecting the increase in net in-migration to Bedford Borough since 2007. ONS typically use a five-year historical period to derive its long-term assumptions on migration, so the 'Migration-led 5yr' scenario is presented here as the outcome that is most likely to be consistent with the forthcoming 2012-based official projection for Bedford Borough (due Spring 2014).
- E8. The 'Migration-led 10yr 5yr X' scenario removes the 'other unattributable' (downward) adjustment from the historical data used to generate migration assumptions and, as a result, exhibits a relatively high population growth similar to the 'SNPP-2010' scenario¹, with both exceeded only by the 'Dwelling-led RSS' housing-led alternative².
- E9. The 'Natural Change' and 'Net-Nil' scenarios are hypothetical but indicate the 'minimum' expectation of housing growth, given an absence of migration as a component of population change in the Borough.
- E10. The analysis of scenario outcomes is complicated by the 'choice' of appropriate headship rates with which household (and dwelling) growth is estimated. The latest 2011-based rates have been calibrated after a period of unprecedented economic change and stagnation in the housing market and thus suggest a slower rate of household formation than the previous 2008-based rates, calibrated from data collected in a time period with very different market characteristics.
- E11. Deciding which trajectory of household growth is most 'appropriate' is difficult. The 2011-based rates have been trended to 2032 for direct comparison with the 2008-based rates. Dwelling growth suggested by the 2011-based (A) scenarios is lower than the 2008-based (B) scenarios. The approach adopted here has been to evaluate all scenarios using both the A and B alternatives

¹ The 'SNPP-2010' scenario replicates the growth trend of the ONS sub-national population projection (SNPP) for 2010.

² Population growth in the 'Dwelling-led RSS' scenario is constrained by an annual net increase of +879 in the number of dwellings, as outlined in the Regional Spatial Strategy (RSS).

and an indication of the dwelling growth that would result if an 'average' of the two options were applied is presented below.

- E12. The use of the 'average' statistics is a pragmatic approach to the interpretation of the complexity of statistics but the consideration of these outcomes does take some account of 'backlog' in the assessment of immediate housing requirements, raising the anticipated housing growth above the 2011-based formation rate expectations that are likely to persist in the short-term.

Scenario dwelling growth summary

Scenario	Average annual dwelling requirement 2012-2032		
	Option A	Option B	Average
SNPP-2010	854	922	888
Dwelling-led RSS	879	879	879
Migration-led 10yr 5yr X	783	847	815
Migration-led 5yr	621	679	650
Dwelling-led Av CR	600	600	600
Migration-led 10yr	563	617	590
Migration-led 10yr 5yr	525	568	546
Jobs-led EEFM BL	482	524	503
Natural Change	467	497	482
Net Nil	427	472	449

Note: 'Option A' dwelling numbers use 2011-based CLG household model assumptions, 'Option B' use the 2008-based household model assumptions. 'Av CR' refers to average completion rate, 'EEFM BL' refers to the East of England Forecasting Model (EEFM) baseline scenario.

Recommendations

- E13. It is recommended that Bedford Borough Council considers its 'starting point' for the objective assessment of housing need to be within the range of 650–815 dwellings per year over the plan period, consistent with the outcomes of the 'Migration-led 5yr' and 'Migration-led 10yr 5yr X' scenarios.
- E14. The use of these dwelling figures, which are averages of both the A (2011-based) and B (2008-based) alternatives, is considered prudent as it allows an element of suppressed household formation to be accounted for and does not make a judgement as to whether the 2011-based rates will 'recover' to the 2008-based rates.

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- E15. The recommendation of a relatively broad range for the starting point reflects the fact that there is considerable uncertainty associated with the future impact of migration upon the Borough.
- E16. ONS typically use a five-year historical period to derive its long-term assumptions on migration, so the 650 average annual dwelling requirement of the 'Migration-led 5yr' scenario is likely to be most consistent with the forthcoming 2012-based official projection for Bedford Borough (due Spring 2014).
- E17. Whilst the 2011 Census presents an up-to-date and 'definitive' count of local populations, there remains uncertainty with regards to the influence of international migration upon the Borough. The 815 average annual dwelling requirement of the 'Migration-led 10yr 5yr X' scenario, with a higher international migration assumption, has been chosen to reflect the higher end of this uncertainty.
- E18. The recommended range of dwelling growth falls below the original RSS target (at 879 dwellings per year), which reflects the degree to which demographic statistics have changed since RSS evidence was formulated. The range falls above the growth suggested by the latest EEFM jobs forecast (at 503 dwellings per year), which suggests low economic pressure for growth and therefore a lower migration impact over the forecast period.
- E19. It is recommended that Bedford Borough Council uses the 650–815 range as the starting point for its objective assessment of housing need with further consideration required of any appropriate market signals and the need to balance homes and jobs provision within the Borough. Job requirements drawn from the scenario results in 4.23 (Table 8) would therefore be appropriate to consider alongside the 'starting point' housing need range.

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1. Introduction

Context & Requirements

- 1.1 Bedford Borough Council (BBC) has an 'Adopted Core Strategy and Rural Issues Plan' which runs to 2021, reflecting the policies of the former East of England Plan and Milton Keynes South Midlands Sub Regional Strategy. An 'Allocations and Designations Local Plan' for the same plan period was adopted on 17th July 2013.
- 1.2 The Council is in the process of preparing a Local Plan, extending the planning framework beyond 2021 to 2032. It will also be commissioning a new Strategic Housing Market Assessment (SHMA) and an Economy and Employment Land study.
- 1.3 BBC has requested a suite of demographic forecasts to assist in the identification of the 'starting point objectively assessed housing need' for the Borough. This 'starting point' is an assessment of housing need based upon population and household projections which incorporate sensitivity testing of alternative assumptions in relation to the underlying demographic projections and household formation rates. BBC has sought to identify the most appropriate forecast(s) for the plan period.

Methodology

- 1.4 The National Planning Policy Framework (NPPF)³ and the draft National Planning Practice Guidance (NPPG)⁴ provide detailed guidance on the objective assessment of housing need and the Planning Advisory Service (PAS) and Local Government Association (LGA) have together published their own 'ten key principles' for achieving the same objective⁵.
- 1.5 In addition, an informal grouping of organisations with a common interest in planning for housing has sponsored the development of the 'How Many Homes' website⁶. The site provides a repository of statistics to support the derivation of appropriate housing plans but does not

³ CLG. March 2012. *National Planning Policy Framework*

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf.

⁴ CLG. *National Planning Practice Guidance*. <http://planningguidance.planningportal.gov.uk/blog/guidance/>.

⁵ PAS and LGA. April 2013. *Ten Principles for Owning Your Housing Number: Finding Your Objectively Assessed Needs*.

http://www.pas.gov.uk/4-plan-making/-/journal_content/56/332612/4077684/ARTICLE#sthash.BXIPgyB7.dpuf.

⁶ How Many Homes. <http://www.howmanyhomes.org/index.html>

include a demographic forecasting utility. Furthermore, much of the statistical evidence contained within the 'How Many Homes?' website has since been superseded by more recent and relevant demographic information which requires consideration. The analysis presented in this report uses robust forecasting methodologies in combination with the latest demographic statistics to provide a range of evidence which meets the requirements of NPPF/NPPG guidance.

- 1.6 The key datasets that have been incorporated within the analysis for Bedford Borough include:
- 2011 Census data;
 - Revised mid-year population estimates for 2002-2010;
 - 2011-based household projection model assumptions.
- 1.7 Demographic forecasts have been developed for BBC 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 1) is a cohort component model, which enables the development of population forecasts based on births, deaths and migration inputs and assumptions.
- 1.8 The Derived Forecast model (Figure 2) sits alongside the population model, providing a headship rate model for household projections and an economic activity rate model for labour-force projections.
- 1.9 POPGROUP models are used extensively by local authorities across the UK, providing a desktop utility for the evaluation of alternative growth scenarios to support local planning. Under licence to the Local Government Association (LGA), Edge Analytics provides product development and technical support to the product suite and its user base.
- 1.10 For a more complete review of the functionality and methodology which underpin POPGROUP and the Derived Forecast model, users are referred to the respective user manuals, available from the POPGROUP website: <http://www.popgroup.org.uk/>.

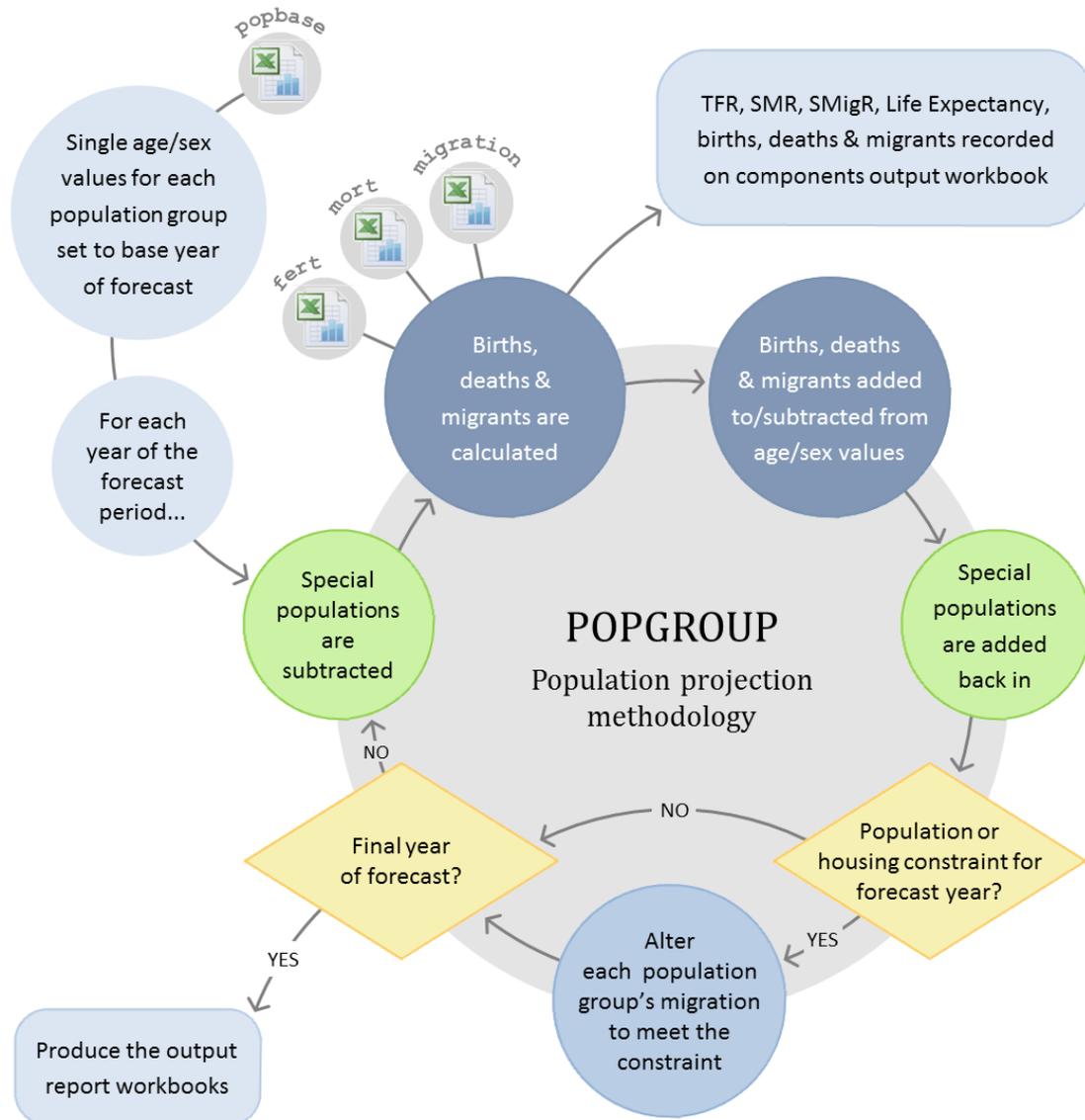
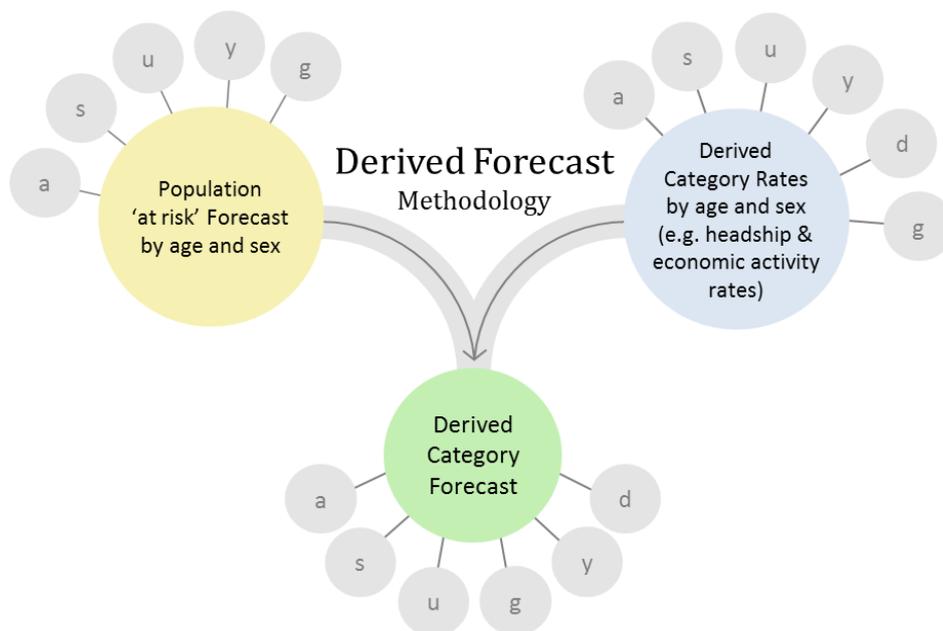


Figure 1: POPGROUP population projection methodology



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

- 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 2: Derived Forecast (DF) methodology

Report Structure

- 1.11 Section 2 provides a short commentary on demographic change in Bedford Borough since 2001 and presents new demographic evidence available from the Office for National Statistics (ONS) and the Department for Communities and Local Government (CLG).
- 1.12 Section 3 describes the suite of scenario alternatives, developed to evaluate trend and policy growth trajectories.
- 1.13 Section 4 summarises the outcomes of each of these scenarios, presenting growth in terms of population, households, dwellings, labour force and jobs impacts.
- 1.14 Section 5 provides a short commentary on the issue of housing backlog, an important

consideration in the development of plans for future housing growth.

- 1.15 Section 6 summarises the analysis and makes recommendations for BBC to consider in its objective assessment of housing requirements.
- 1.16 The Appendix to this document contains guidance on the data inputs and assumptions used in the development of the scenarios, detail on the commuting ratio sensitivity analysis, and a glossary of terms.

2. The Latest Demographic Evidence

Summary of Latest Evidence

- 2.1 In April 2013, CLG released its new household projections for local authority districts in England. These household projections are underpinned by the 2011-based interim sub-national projections, published by ONS in September 2012⁷.
- 2.2 ONS has also released its 'recalibrated' time-series of mid-year population estimates for the 2002–2010 period⁸. These take into account the newly released 2011 Census statistics and have recalculated the components of change (specifically international migration) that have driven local population growth between the 2001 and 2011 Censuses.
- 2.3 This section summarises the impact that these data releases have had on the demographic profile of Bedford Borough, providing a context for the scenarios developed and presented in this report.

Headlines 2001–2011

- 2.4 The population of Bedford Borough at the 2011 Census was 157,479, an increase of 6.5% from its 2001 total of 147,909 (Table 1). An estimated 6,056 properties were added to the dwelling stock; a 9.9% increase. This contrasts with a lower household growth of 7.2% over the decade. The average household size decreased from 2.44 in 2001 to 2.42 in 2011.
- 2.5 There has been an increase in the number of births in Bedford Borough between 2001 and 2011 (Figure 3). In contrast, the number of recorded deaths has been relatively stable over the decade. The number of births exceeded deaths in all years over the 2001–2011 period, resulting in consistent population growth due to 'natural change'.
- 2.6 Population change between 2001 and 2011 has varied between age groups (Figure 4). Movement of the larger birth cohorts of the 1950s and 1960s through the age-profile is reflected by the

⁷ CLG (2013a). Household interim projections (2011 to 2021) in England. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/182412/Stats_Release_2011FINALDRAFT.pdf

⁸ ONS (2013). Methods used to revise the sub-national population estimates for mid-2002 to mid-2010. <http://www.ons.gov.uk/ons/rel/pop-estimate/population-estimates-for-england-and-wales/mid-2002-to-mid-2010-revised--subnational-/index.html>.

relative increase in the 40+ age-group over the 2001–2011 decade. In addition, there has been a general increase in the population of the older age-groups over the ten-year period.

Table 1: Bedford Borough – summary of demographic change 2001–2011

	2001	2011	Change	%
Population	147,909	157,479	9,570	6.5%
Communal Population	2,544	2,943	399	15.7%
Households	59,515	63,812	4,297	7.2%
Dwellings	61,277	67,333	6,056	9.9%
Average household size	2.44	2.42		

Average household size = private household population / households

(Source: 2001 & 2011 Census)

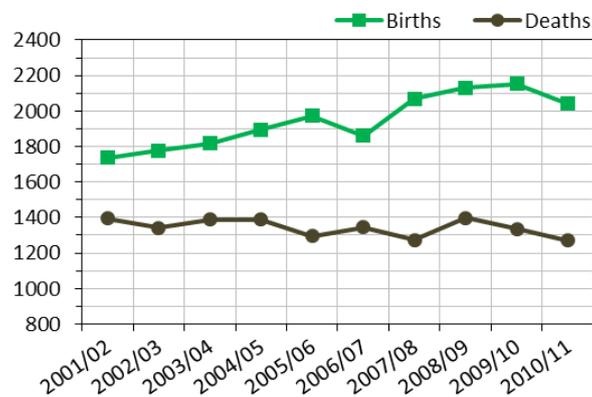


Figure 3: Bedford – births and deaths 2001/2 to 2010/11

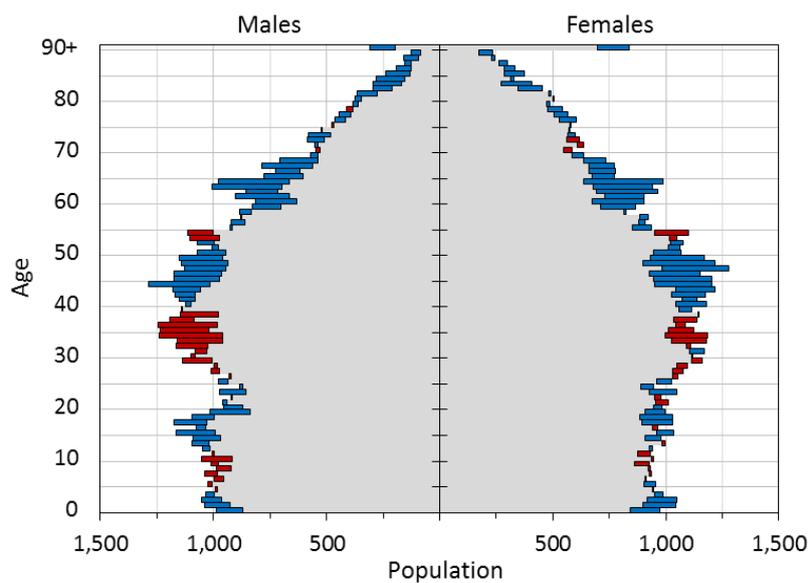


Figure 4: Change in the age profile of Bedford Borough's population, 2001–2011.

Note: Blue bars indicate an excess in 2011 (i.e. population increase 2001–2011), red an excess in 2001 (i.e. population decline 2001–2011).

Mid-Year Estimate Revisions

- 2.7 In May 2013, ONS published its revised mid-year population estimates, which align the 2002–2010 populations with the latest 2011 data. These new data have recalibrated the ‘components of change’ to ensure the correct transition of the age profile of the population over the 2001–2011 decade, taking into account births, deaths, internal migration and international migration.
- 2.8 The 2011 mid-year population estimates (derived from the 2011 Census) suggested that the previous estimates for Bedford Borough (2002–2010) had resulted in an over-estimation of the ten-year growth trajectory (Figure 5).

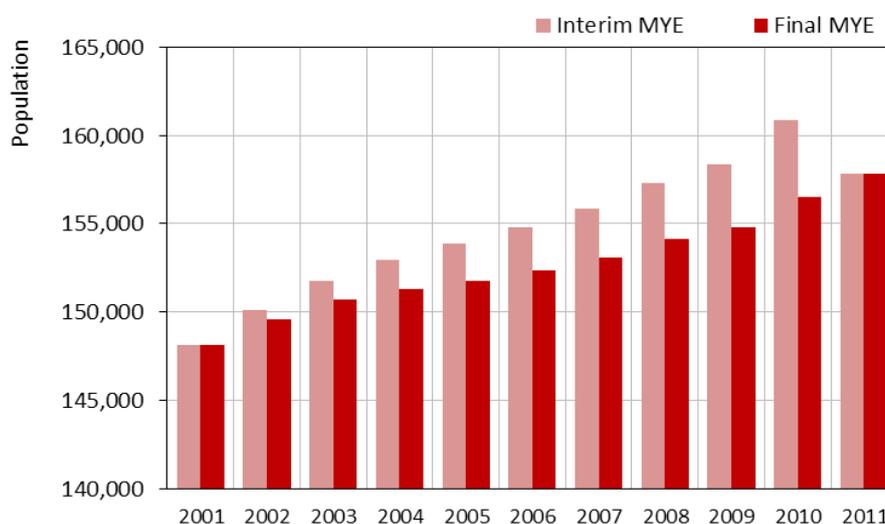


Figure 5: Bedford Borough’s mid-year population estimate revisions. Data source: ONS

- 2.9 Between successive censuses, births and deaths are accurately recorded in vital statistics registers and provide the most robust measure of ‘natural change’ (the difference between births and deaths). Internal migration data are derived from GP registers, providing an accurate representation of inter-area flows, albeit with some issues with regard to potential under-registration in certain age-groups (young males, in particular). International migration is the most difficult component to estimate with confidence.
- 2.10 On the assumption that births, deaths and internal migration have been robustly measured (and that the 2001 Census provided a robust population count for Bedford), the ‘adjustment’ that resulted from the mid-year estimate revisions is predominantly associated with the mis-estimation of international migration; the balance between immigration and emigration flows to and from Bedford. This has important implications when considering the ‘components of

change' that have driven historical population growth, particularly migration and its impact upon the calculation of 'trend' projections.

- 2.11 The result of the mid-year estimate recalibration is that birth and death totals (and therefore natural change) remain largely unchanged. Small changes to internal migration impacts are evident but not significant. With regard to international migration, ONS has not explicitly assigned the mid-year estimate adjustment to international migration. Instead it has identified an additional 'other unattributable' component, suggesting it has not been able to accurately identify the source of the 2001–2011 over-count (Figure 6).

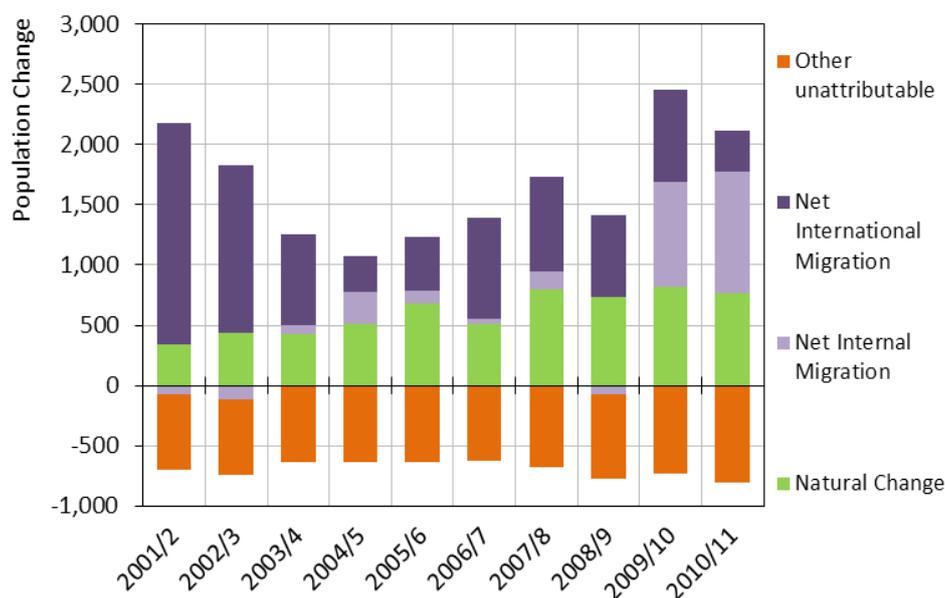


Figure 6: Bedford Borough's components of change 2001/02 – 2010/11

- 2.12 For demographic analysis, the classification of this 'other unattributable' 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.
- 2.13 With the inclusion of statistics from the 2012 mid-year estimate from ONS, an eleven-year profile of the components of change for Bedford Borough is presented (Figure 7). Over the 2001/02 to 2011/12 time period, natural change has increased in its importance as a driver of population growth, as has net internal migration, which fluctuates between a net loss and a net gain over the period. The integration of the 'other unattributable' element within international migration results in a relatively small impact of this component over the historical period.

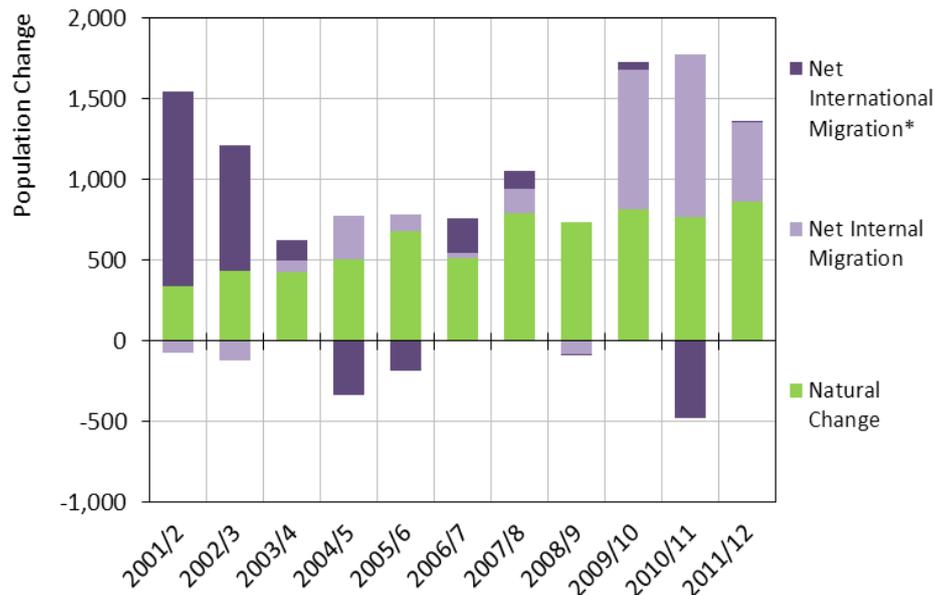


Figure 7: Bedford's components of change 2001/02–2011/12

*Net international migration includes the 'other unattributable'

Household Projections

2.14 Sub-national population projections provide the basis for the formulation of sub-national household projections. During the 2001–2011 decade the household projection methodology has been subject to substantial review, with a new approach adopted between the 2006-based and 2008-based outputs.

2.15 A household is defined as:

“One person living alone, or a group of people (not necessarily related) living at the same address with common housekeeping - that is, sharing a living room or sitting room or at least one meal a day.”⁹

2.16 In a household projection model, rates of household growth are determined by two factors: first, the profile and change in household 'headship rates' (also referred to as household representative rates in CLG documentation) by household type, age and sex; and second, the underlying rate of population growth.

2.17 An estimate of the 'communal establishment' population is subtracted from the total population

⁹ CLG. *Household Projections: Notes and Definitions for Data Analysts*.
<https://www.gov.uk/household-projections-notes-and-definitions-for-data-analysts>

to derive the 'private household' population. These population figures, split by age, sex and marital status group, are multiplied by the projected household headship rates that represent the proportion of the population in that category who are head of household (or household 'representatives').

- 2.18 The projected household headship rates used in the 2011-based household model have been derived using 2001 and 2011 Census data in combination with statistics from the Labour Force Survey (LFS).
- 2.19 The new CLG household model projections are underpinned by the interim 2011-based population projection (ONS). This projection uses 2011 Census statistics for its base period population, but uses assumptions from the 2010-based population projection to define its fertility, mortality and migration components of change. For this reason, the 2011-based population projections do not provide a suitably robust 'trend' projection of population growth.
- 2.20 In order to present an appropriate test of the 'sensitivity' of the new household headship rates upon future household growth, the ONS 2010-based sub-national population projection has been used in conjunction with 2008-based and 2011-based household headship rates. The population projection is scaled to match 2011 Census totals, following the 2010-based growth trend thereafter.
- 2.21 The impact of the 2011 headship rates is to reduce the scale of household growth in Bedford Borough over the 2011–2021 forecast period (Figure 8).

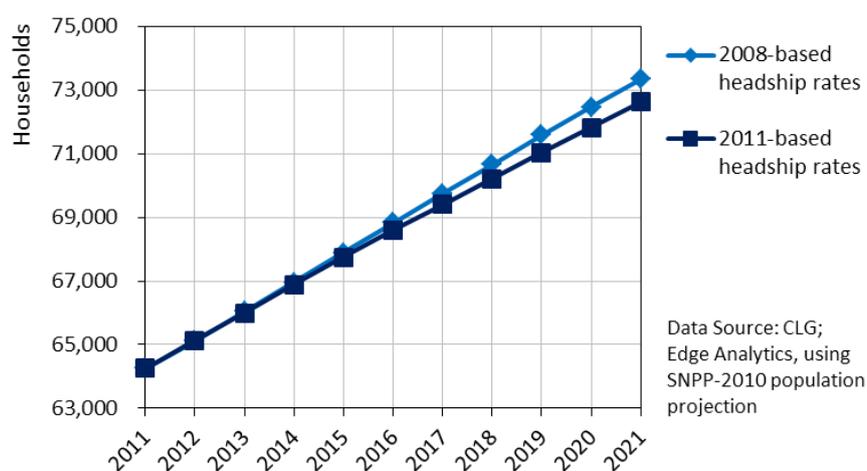


Figure 8: Impact of the 2011 headship rates on the scale of household growth in Bedford Borough (2011-21).

- 2.22 Using the 2010-based population projection, scaled to the 2011 Census population total, household numbers are projected to increase by 13% using the 2011-based headship rates, compared to 14.1% with the 2008-based headship rates (Table 2).

Table 2: Change in Bedford Borough's household numbers 2011-21 using 2008- & 2011-based headship rates

	Households			Change 2011-2021	
	2011	2016	2021	Total	%
2008-based headship rates	64,265	68,832	73,346	9,082	14.1%
2011-based headship rates	64,251	68,608	72,628	8,377	13.0%

- 2.23 With a reduction in the projected rate of household formation, a higher average household size is maintained when applying the 2011-based headship rates; by 2021, the average household size in Bedford Borough is 2.34 using the 2008-based headship rates, compared to a ratio of 2.37 when using the 2011-based headship rates (Table 3).

Table 3: Change in Bedford Borough's average household size 2011-21 using 2008- & 2011-based headship rates.

	Population / Households		
	2011	2016	2021
2008-based headship rates	2.41	2.38	2.34
2011-based headship rates	2.41	2.39	2.37

- 2.24 The revised 2011-based headship rates have had the most significant impact upon single-person households (OPMAL, OPFEM)¹⁰ and one-family households (FAM C0) (Figure 9), with all seeing a decrease in household numbers. There have been increases in rates of household formation associated with family households (FAMC1, FAMC2) households comprising a couple and one or more other adults with no dependent children (MIXC0) and the 'other' household classification (OTHHH).

¹⁰ For full descriptions of the various household types see Appendix A, Table 10

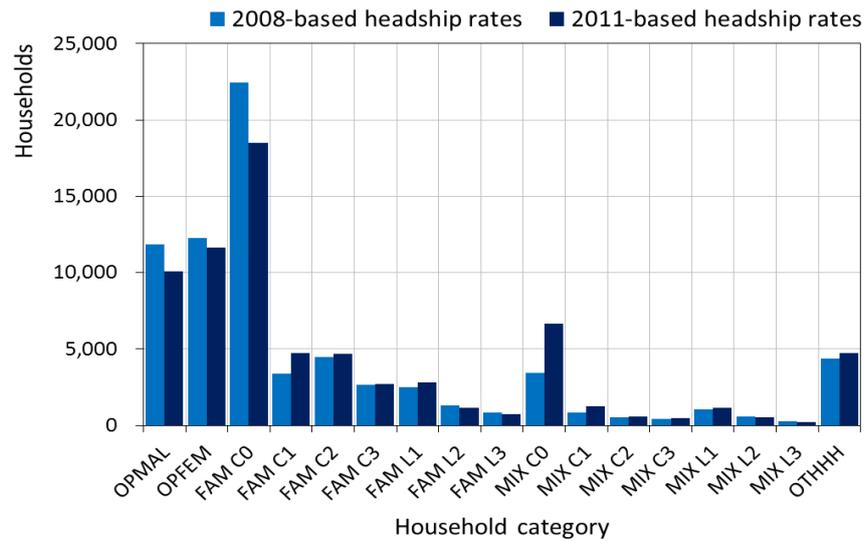


Figure 9: Impact of the 2011 headship rates on the scale of household growth by household category (2011-21).

Data source: CLG; Edge Analytics, using ONS 2010-based population projection

3. Scenario Development

Scenario Context

- 3.1 The NPPF provides guidance on the development of a robust evidence base to support the development of local housing plans. The guidance makes it clear that data inputs, assumptions and methodology should be robust and should consider future growth potential from a number of perspectives.
- 3.2 The development of Local 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 during 2013, with the release of new 2011 Census statistics, updated household projections and revisions to historical population estimates.
- 3.3 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 (POPGROUP) which incorporates an industry-standard methodology (cohort component model) removes this obstacle and enables a focus on assumptions and output, rather than methods.
- 3.4 Transparency is an important component of any forecasting analysis. It is necessary to ensure that all data inputs and assumptions are clearly documented and that outcomes are benchmarked against the latest 'official' forecasts, wherever possible.
- 3.5 There is no single, definitive view on the likely level of growth expected in Bedford Borough; a mix of economic, demographic and national/local policy issues ultimately determine 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.
- 3.6 The scenarios that have been developed for BBC include the following:
 - Official projections from ONS;
 - Updated 'migration-led' trend forecasts using the latest demographic evidence;
 - Housing growth trajectories, based on the Regional Spatial Strategy (RSS) targets and past completion rates;

- Economic growth trajectories, as outlined in the East of England Forecasting Model (EEFM)¹¹.
- 3.7 Each scenario has been evaluated using both 2011-based (Option A) and 2008-based (Option B) household headship rates, providing a 'range' of household and dwelling growth options for consideration.
- 3.8 All scenarios have been produced with a 2012 base year and a horizon of 2032.
- 3.9 Information on the assumptions underpinning the scenarios can be found in the Appendix to this document.

Scenario Definition

Official Projections

- 3.10 In all scenario analysis it is important to 'benchmark' any growth alternatives against the latest 'official' population projection.
- 3.11 With the publication of the 2011 Census, ONS released an 'interim' 2011-based population projection. Unfortunately, this projection has failed to follow ONS' normally robust rules on the calculation of long-term assumptions. Instead, the migration (and fertility and mortality) assumptions from the 2010-based model have been applied to a 2011 Census base population. This is inappropriate for two key reasons: firstly the revisions to the historical mid-year populations and the subsequent change in the historical impact of migration have not been taken into account; secondly, the 2011 Census population has a different age structure to the previous 2010-based population data. Both of these issues mean that the 2011-based projection is not sufficiently robust to underpin any analysis of long-term housing requirements.
- 3.12 The 2010-based sub-national projection (SNPP-2010) from ONS is used in this analysis as the trend benchmark. This scenario has been developed using historical evidence from the period 2006–2010 and incorporates long-term assumptions on fertility, mortality and international migration that were defined in the 2010-based national projection for England.
- 3.13 The SNPP-2010 scenario is scaled to ensure consistency with the 2011 Census population,

¹¹ <http://www.cambridgeshireinsight.org.uk/EEFM>

following its designated growth trend thereafter.

Alternative Trend Scenarios

- 3.14 During 2012–2013, ONS has released detailed statistics from the 2011 Census and has followed this with a release of the revised mid-year population estimates for 2002–2010. These new data provide the basis for the derivation of a number of alternative ‘trend’ scenarios to compare with the most recent official projection (the SNPP-2010).
- 3.15 In determining the migration assumptions for a new trend projection, historical data on the components of demographic change during the 2001–2011 time period are a key consideration. 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). However, given the unprecedented economic changes that have occurred since 2008, it is important to give due consideration to an extended historical time period for assumption derivation.
- 3.16 A range of scenario alternatives have been developed:
- **Migration-led (5yr)**
Internal and international migration assumptions are based on five years of historical evidence (2007/08 – 2011/12).
 - **Migration-led (10yr)**
Internal and international migration assumptions are based on 10 years of historical evidence (2002/03 – 2011/12).
 - **Migration-led (10yr 5yr)**
Internal migration assumptions are based on the last 10 years, international migration assumptions are based on the last five years of historical evidence.
 - **Migration-led (10yr 5yr X)**
Internal migration assumptions are based on the last 10 years, international migration assumptions are based on the last five years but with the ‘other unattributable’ element removed.
 - **Net-Nil Migration**
In-migration, out-migration, immigration and emigration are maintained, but the net migration balance is set at zero.
 - **Natural Change**
Migration is set at zero across the forecast period.

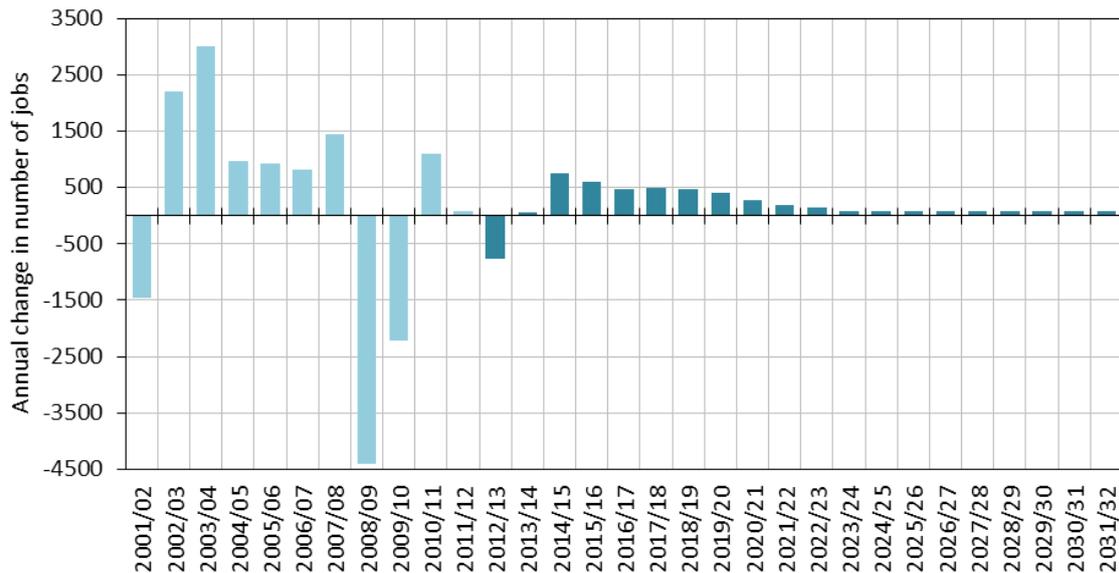
Dwelling-led Scenarios

- 3.17 The impact of designated housing growth targets can be evaluated against other scenario alternatives by running a ‘dwelling-led’ model, in which in and out-migration are used to balance the relationship between population size and planned housing provision.
- 3.18 Two dwelling-led scenarios have been developed, in line with housing completion rates over the 2001 – 2013 time period¹²:
- **Dwelling-led (Average Completion Rate)**
Population growth is constrained by an annual net change in dwelling numbers of +600, the average number of completions over the 2001–2013 time period.
 - **Dwelling-led (Regional Spatial Strategy)**
Population growth is constrained by an annual net change in dwelling numbers of +879, as outlined in the RSS.

Jobs-led Scenarios

- 3.19 The impact of employment growth forecasts can be evaluated against other scenario alternatives by running a ‘jobs-led’ model, in which in- and out-migration are used to balance the relationship between population size and jobs growth.
- 3.20 The following jobs-led scenario has been developed:
- **Jobs-led (East of England Forecasting Model Baseline)**
Population growth is constrained by an annual net change in jobs numbers as defined in the ‘EEFM baseline (EEFM BL)’ scenario for Bedford Borough (Figure 10). As the EEFM forecast horizon is 2031, the change in the number of jobs for 2031/32 is an average of the years 2026-2031.
- 3.21 There are three key data items required to run forecasts that are linked to employment forecasts: economic activity rates provide the basis for calculating the size of the labour force within the population; the commuting ratio and the unemployment rate control the balance between the size of the labour force and the number of jobs available within an area. Further detail on these items is provided in the Appendix.

¹² Bedford Borough Council, Housing Monitoring Report 2012-2013



Source: EEFM Baseline Scenario

Figure 10: EEFM jobs growth trajectory from 2001. Data used in the POPGROUP model is highlighted in dark blue. Note that for 2031/32 the change in jobs number is an average of 2026/27 to 2030/31.

Commuting Balance Sensitivity

3.22 In all of the scenarios outlined above, the commuting balance is set at 1.018, indicating a net outflow of commuters. To examine the sensitivity of the commuting balance, two commuting ratio variations have been applied to each scenario. In both of these sensitivity scenarios, the commuting ratio is changed incrementally over the 2011 to 2020 period and kept fixed from 2020 to 2032. The following scenarios have been developed:

- **Sensitivity 1: Commuting Ratio 1.0**

From 2011, the commuting ratio decreases incrementally from 1.018 to reach 1.0 by 2020. Beyond 2020 the commuting ratio is maintained at 1.0. A commuting ratio of 1.0 results in a balance between the number of resident workers and number of jobs within the Borough.

- **Sensitivity 2: Commuting Ratio 1.036**

From 2011, the commuting ratio increases incrementally from 1.018 to reach 1.036 by 2020. Beyond 2020 the commuting ratio is maintained at 1.036. A commuting ratio of 1.036 results in a greater net out-commute from the Borough than the original jobs-led scenario.

Dwelling-led / Jobs-led Scenarios & Migration

- 3.23 POPGROUP is able to evaluate the impact of a particular dwelling trajectory by measuring the relationship between the number of homes in an area, the number of households and the size of the resident population. Similarly, POPGROUP is able to evaluate the impact of a particular jobs growth trajectory by measuring the relationship between the number of jobs in an area, the size of its labour force and the size of the resident population.
- 3.24 If there is an 'imbalance' between either the size of the 'target' number of homes or the 'target' number of jobs and the resident population, then migration is used to redress the imbalance. A higher level of net in-migration will occur if there is insufficient population to meet dwelling or jobs targets. A higher level of net out-migration will occur if the population is too high relative to dwelling or jobs targets.

Scenario Definition Summary

- 3.25 Ten scenarios have been developed for Bedford Borough Council. These can be grouped into those that are trend-based, those that are dwelling-led and those that are jobs-led (Table 4). The official SNPP-2010 projection provides a benchmark for the scenario alternatives.

Table 4: Scenario summary

Scenario Type	Scenario Name
Official	SNPP-2010
Trend	Migration-led 5yr Migration-led 10yr 5yr Net-Nil Migration
	Migration-led 10yr Migration-led 10yr 5yr X Natural Change
Dwelling-led	Dwelling-led (Av CR) Dwelling-led (RSS)
Jobs-led	Jobs-led (EEFM Baseline)
Sensitivity analysis	Sensitivity 1: Commuting ratio 1.000 Sensitivity 2: Commuting ratio 1.036

- 3.26 Each scenario has been produced as an 'Option A' and 'Option B' alternative, using the 2011-based and 2008-based CLG headship rates respectively. In addition, sensitivity analysis has been conducted using different commuting ratio assumptions.

4. Scenario Outcomes

Scenario Summary

- 4.1 A summary of the results of each scenario is provided in the form of a chart and an accompanying table of statistics. The chart illustrates the trajectory of population change resulting from each scenario. The table summarises the change in population and household numbers from 2012–2032 that result from each scenario.
- 4.2 The scenarios are ranked according to the estimated level of population change over the forecast period. The tables also show the average annual net migration associated with the population change; plus the expected average annual dwelling and jobs growth based on the assumptions used in each scenario.
- 4.3 Scenario results are presented in two separate illustrations, each relating to the application of different household headship rates. The 'Option A' results use the CLG 2011-based headship rates and the 'Option B' the 2008-based rates.

Scenario Outcomes (A)

- 4.4 This first set of scenarios has been produced using CLG's 2011-based household headship rates (trended after 2021). With the exception of the 'Net Nil' and 'Natural Change' scenarios, population growth over the 2012–2032 forecast period ranges from 11.1% to 23.3%, with estimated dwelling growth ranging from 525 to 879 units per year (Figure 11 and Table 5).
- 4.5 With the exception of the 'SNPP-2010' scenario, each scenario uses the same historical data as the basis for its forecast. The 'SNPP-2010' projection was developed by ONS, using the now outdated mid-year estimates. It does not include 2011 Census information, although the forecast presented here has rescaled the 2010 trajectory to the 2011 Census population total, continuing its trend thereafter.
- 4.6 The 'SNPP-2010' scenario suggests a 20.4% increase in population between 2012 and 2032, higher than the population growth forecast in the migration-led trend scenarios. These scenarios (the 'Migration-led 5yr', 'Migration-led 10yr', 'Migration-led 10yr 5yr' and 'Migration-led 10yr 5yr

X') use the recalibrated mid-year estimates as the basis for the derivation of growth assumptions.

- 4.7 The 'Net Nil' scenario suggests that, with the net-migration balance set at zero, the population of Bedford Borough would increase by 8.1% over the forecast period. The 'Natural Change' scenario, in which population growth is driven only by births and deaths, shows population growth of 7.5%. With a gradual ageing of the resident population and relatively modest changes to older-age economic activity rates, the job requirement in Bedford Borough would increase by 146 per year in the 'Net Nil' scenario and 98 per year in the 'Natural Change' scenario.
- 4.8 Of the migration-led trend scenarios, the highest growth trajectory is suggested by the 'Migration-led 10yr 5yr X' scenario, with a 20.2% growth in population and an annual dwelling requirement of 783. In this scenario, the 'other unattributable' component has been removed. The outcome of the 'Migration-led 10yr 5yr X' scenario is very similar to that of the 'SNPP-2010' scenario, which is understandable as the 'SNPP-2010' was calibrated on mid-year estimates prior to any 2011 Census adjustments.
- 4.9 With a 5-year perspective, the 'Migration-led 5yr' scenario results in lower population growth to 2032 (15.5%) and an estimated dwelling requirement of 621 per year. The 'Migration-led 10yr 5yr' scenario alternative produces the lowest population growth of the trend-based migration-led scenarios, with 11.1% population growth and a dwelling requirement of 525 per year.
- 4.10 The most substantial population growth is associated with the 'Dwelling-led RSS scenario' in which population growth is forecast against an annual increase of 879 dwellings per year over the plan period. Population growth suggested by this scenario is 23.3% to 2032, with an annual net inflow through migration of approximately 1,010 per year. In the 'Dwelling-led Av CR' scenario, population growth is constrained by an annual increase of 600 in the number of dwellings. This results in population growth of 13.7% and an annual net inflow through migration of 391.
- 4.11 Population growth in the 'Jobs-led EEFM BL' scenario, in which growth is constrained by the employment (jobs) growth defined in the EEFM baseline scenario, is just under 10%. With an average annual jobs growth target of 186 per year, it is estimated that an average net inflow through migration of approximately 152 would be required to meet the applied jobs constraint. This suggests population growth of 9.8% to 2032, with an associated dwelling requirement of 482 per year.
- 4.12 The jobs-growth trajectory estimated by the EEFM implies a short-term decline in employment,

followed by a modest recovery after 2014. When considered alongside a declining unemployment rate, this results in relatively low population growth and a smaller annual housing requirement. A lower rate of migration is required to sustain the balance between the size of the labour force and the number of jobs available in Bedford, assuming a constant commuting balance for the Borough.

Scenario Outcomes (B)

- 4.13 The second set of scenarios has been run using CLG's 2008-based household headship rates (Figure 12 and Table 6). The headship rates have been scaled to ensure that they reproduce the 2011 CLG household total. The original trend is then followed for the remainder of the projection period.
- 4.14 The 2008-based headship rates have higher rates of household formation for single-person and one-family households. This is reflected in the Option B scenario outcomes, which generate the highest household growth forecasts of the two A & B alternatives.
- 4.15 For the trend forecasts, the Option B scenarios result in higher dwelling requirements; the 2008-based headship rates applying a lower average household size resulting in more households per head of population. For example, the 'Migration-led 5 yr' scenario suggests a dwelling requirement of 621 per year in Option A, rising to 679 per year in Option B.
- 4.16 Headship rate differences affect the relationship between the annual dwelling constraint and the population growth associated with the two dwelling-led scenarios. Population growth is lower in the Option B dwelling-led scenarios due to the headship rate trajectory resulting in a lower average household size; the same number of dwellings is associated with a smaller population size. With this reduction in average household size, population growth associated with the 'Dwelling-led RSS' scenario is 21.1%, compared to 23.3% in the Option A scenario.
- 4.17 For the 'Jobs-led EEFM BL' scenario, household growth is again higher in Option B; the 2008-based headship rates apply a lower average household size, resulting in a greater number of households per head of population.

Option A: 2011-based CLG household model

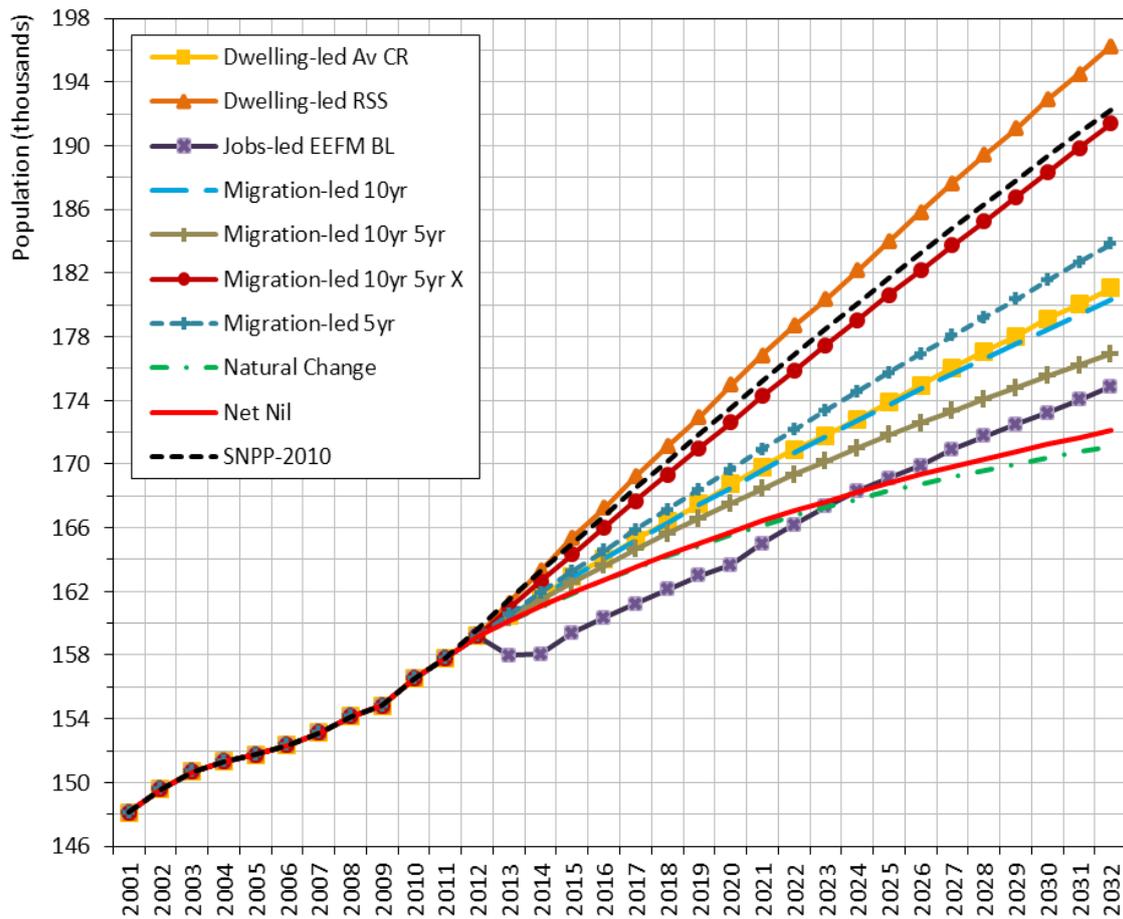


Figure 11: Bedford Borough scenario forecasts 2012–2032 (A)

Table 5: Bedford Borough scenario forecasts 2012–2032 (A)

Scenario	Change 2012 - 2032				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
Dwelling-led RSS (A)	37,031	23.3%	17,053	26.4%	1,010	879	729
SNPP-2010 (A)	32,634	20.4%	16,575	25.4%	863	854	672
Migration-led 10yr 5yr X (A)	32,189	20.2%	15,197	23.5%	815	783	612
Migration-led 5yr (A)	24,612	15.5%	12,038	18.6%	452	621	418
Dwelling-led Av CR (A)	21,855	13.7%	11,640	18.0%	391	600	342
Migration-led 10yr (A)	21,102	13.3%	10,916	16.9%	315	563	328
Migration-led 10yr 5yr (A)	17,713	11.1%	10,177	15.7%	214	525	234
Jobs-led EEFM BL (A)	15,663	9.8%	9,343	14.4%	152	482	186
Net Nil (A)	12,883	8.1%	8,285	12.8%	0	427	146
Natural Change (A)	11,898	7.5%	9,055	14.0%	0	467	98

Option B: 2008-based CLG household model

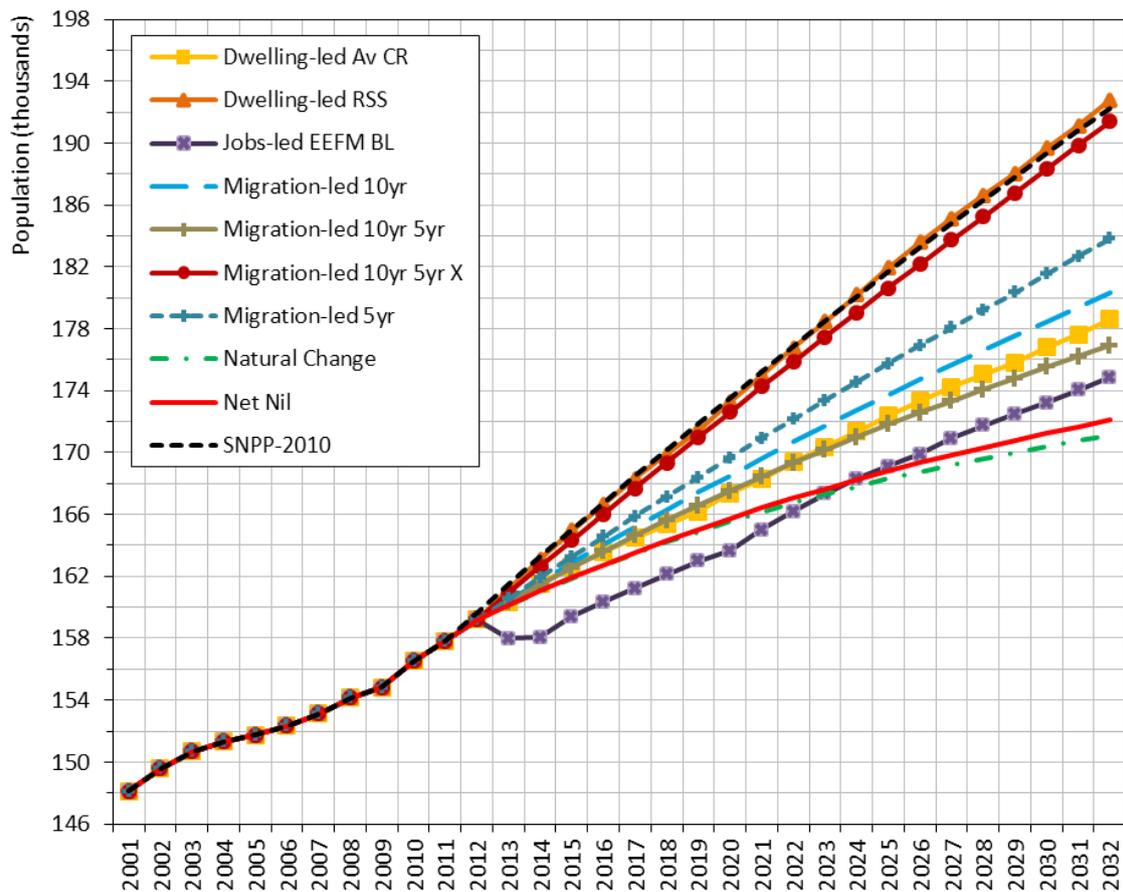


Figure 12: Bedford Borough scenario forecasts 2012–2032 (B)

Table 6: Bedford Borough scenario forecasts 2012–2032 (B)

Scenario	Change 2012 - 2032				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
Dwelling-led RSS (B)	33,558	21.1%	17,053	26.4%	869	879	641
SNPP-2010 (B)	32,634	20.4%	17,879	27.5%	863	922	672
Migration-led 10yr 5yr X (B)	32,189	20.2%	16,438	25.4%	815	847	612
Migration-led 5yr (B)	24,612	15.5%	13,173	20.4%	452	679	418
Migration-led 10yr (B)	21,102	13.3%	11,970	18.5%	315	617	328
Dwelling-led Av CR (B)	19,404	12.2%	11,640	18.0%	292	600	280
Migration-led 10yr 5yr (B)	17,713	11.1%	11,016	17.0%	214	568	234
Jobs-led EEFM BL (B)	15,663	9.8%	10,164	15.7%	152	524	186
Net Nil (B)	12,883	8.1%	9,149	14.2%	0	472	146
Natural Change (B)	11,898	7.5%	9,650	14.9%	0	497	98

Commuting Balance Sensitivity

- 4.18 Both the Option A and Option B scenarios presented above retain a fixed commuting ratio of 1.018 throughout the forecast period. This ratio implies that the size of Bedford Borough's labour force is greater than the number of jobs available locally, resulting in a net out-commute.
- 4.19 In the evaluation of jobs-led forecasts, the modelling approach uses net in-migration to address the imbalance between the size of the labour force and anticipated annual jobs growth. Whilst net in-migration will continue to contribute to Bedford Borough's labour force, it is also likely that jobs growth within the authority could promote greater self-containment of its labour force. Greater self-containment would mean an improvement in the balance between the size of the resident labour force and the number of jobs available; i.e. a greater number of people living and working locally. A commuting ratio of 1.0 would indicate a local labour force that is equivalent in size to the number of jobs available.
- 4.20 It is noted that evidence suggests that the commuting ratio may have reduced from 1.036 in 2001 to 1.018 in 2011 (see Appendix A, Table 11). To reflect this and to assess the impact that future commuting balance changes might have upon population, household and job growth, two different commuting ratio assumptions have been applied to each of the scenarios presented in the previous sections:
- (a) **Sensitivity 1:** The commuting ratio has been decreased incrementally from 1.018 to reach 1.0 by 2020. Beyond 2020 the commuting ratio is maintained at 1.0.
 - (b) **Sensitivity 2:** The commuting ratio has been increased incrementally from 1.018 to reach 1.036 by 2020. Beyond 2020 the commuting ratio is maintained at 1.036.
- 4.21 Each scenario has been run twice to test the impact of the Option A and Option B household formation rates upon dwelling growth outcomes. In Table 7 and Table 8, the average dwelling and job requirements are presented for the two commuting ratio sensitivities and for the 'standard' commuting ratio of 1.018. Note that the dwelling and job outcomes are derived from an average of the Option A scenarios and Option B scenario outcomes (full scenario detail is provided in Appendix B, Table 12 and Table 13).
- 4.22 For the average dwelling requirement (Table 7), only the 'Jobs-led EEFM BL' scenario outcomes are altered by the commuting ratio modifications. All other scenario outcomes are unchanged. A lower commuting ratio has the effect of reducing the dwelling requirement associated with the

job forecast, with lower net in-migration required to maintain a labour force that meets the economic activity, unemployment and commuting assumptions.

Table 7: Scenario dwelling requirement using altered commuting ratios

Scenario	Average Dwelling Requirement		
	Sensitivity 1 (Commuting Ratio at 1.0 by 2020)	1.018	Sensitivity 2 (Commuting Ratio at 1.036 by 2020)
Dwelling-led Av CR	600	600	600
Dwelling-led RSS	879	879	879
Jobs-led EEFM BL	448	503	558
Migration-led 10yr	590	590	590
Migration-led 10yr 5yr	546	546	546
Migration-led 10yr 5yr X	815	815	815
Migration-led 5yr	650	650	650
Natural Change	482	482	482
Net Nil	449	449	449
SNPP-2010	888	888	888

Note: dwelling numbers are an average of those derived using the 2008-based and 2011-based household headship rates. For full scenario summary detail, refer to Appendix B.

- 4.23 For the average job requirement (Table 8), all scenario outcomes are altered by the commuting ratio modification, with the exception of the 'Jobs-led EEFM BL' scenario which has its defined trajectory of jobs growth. A lower commuting ratio has the effect of increasing the job requirement, with a larger labour-force both living and working within the Borough.

Table 8: Scenario job requirement using altered commuting ratios

Scenario	Average Jobs Requirement		
	Sensitivity 1 (Commuting Ratio at 1.0 by 2020)	1.018	Sensitivity 2 (Commuting Ratio at 1.036 by 2020)
Dwelling-led Av CR	382	311	242
Dwelling-led RSS	763	685	609
Jobs-led EEFM BL	186	186	186
Migration-led 10yr	400	328	259
Migration-led 10yr 5yr	304	234	166
Migration-led 10yr 5yr X	689	612	538
Migration-led 5yr	492	418	348
Natural Change	166	98	33
Net Nil	215	146	80
SNPP-2010	752	672	596

Note: job numbers are an average of those derived using the 2008-based and 2011-based household headship rates. For full scenario summary detail, refer to Appendix B.

4.24 An additional factor to consider, in conjunction with the commuting ratio, is the underlying rate of economic activity and how it might be influenced in the future by higher rates of labour force participation in the older age-groups. The assumptions made in this analysis apply a relatively modest uplift to older-age economic activity rates, to account for changes to state pension age entitlement. When considering the impact of the 'Jobs-led EEFM BL' scenario, a more significant uplift in the participation of the 60+ age-group within the labour force would reduce both the need for net in-migration and the requirement for new homes.

5. Housing Backlog Considerations

5.1 In the development and scrutiny of local housing plans there has been considerable debate surrounding the issue of 'backlog'. Whilst there remains no clear and definitive methodology for assessing this component, it is important that backlog is given explicit consideration in the formulation of housing need.

5.2 Whilst the 'backlog' term does not appear explicitly in NPPF/NPPG guidance, the NPPG makes reference to the potential need to adjust future housing requirements to account for historical constraints on household formation:

“The household projection-based estimate of housing need may require adjustment to reflect factors affecting local demography and household formation rates which are not captured in past trends. For example, formation rates may have been suppressed historically by under-supply and worsening affordability of housing. The assessment will therefore need to reflect the consequences of past under delivery of housing. As household projections do not reflect unmet housing need, local planning authorities should take a view based on available evidence of the extent to which household formation rates are or have been constrained by supply”.¹³

5.3 The PAS/LGA guidance documentation defines backlog specifically in terms of housing provision:

“Under-provision that has accrued against a previous development plan target”.¹⁴

5.4 A range of terms is in general use in the backlog deliberations. 'Pent-up' demand and 'latent' demand are often used interchangeably with backlog, whilst 'unmet' need, which also refers to housing requirements that have not been met, is used in the same context.

5.5 PAS/LGA attempts to provide further guidance on the backlog issue and in doing so uses the mixture of terminology. Two alternative perspectives are presented on the need to address housing backlog:

¹³ National Planning Practice Guidance: What is the starting point to establish the need for housing?
<http://planningguidance.planningportal.gov.uk/blog/guidance/assessment-of-housing-and-economic-development-needs/what-methodological-approach-should-be-used/>

¹⁴ Ten key principles for owning your housing number - finding your objectively assessed needs, Planning Advisory Service http://www.pas.gov.uk/c/document_library/get_file?uuid=bcd9c05f-0042-4e4c-9258-653ebc11b5b1&groupId=332612

“The first view is that household projections take into account unmet need, and therefore there is no need to try and ‘make up’ any past shortfall in housing provision, as the shortfall is reflected in future household projections.

The second is that because there has been a lack of suitable accommodation provided, households have not formed which means that the trends on which the projections are based do not reflect the real need. This creates a ‘pent-up demand’ for housing, which should be measured or estimated, and added onto household projections”.¹⁵

- 5.6 The most obvious way to quantify housing backlog is to compare past housing completions with previous housing targets. The most recent targets are those defined in the RSS, which has subsequently been revoked. Therefore it could be argued that no backlog provision is required, as new plans will provide a forward-looking perspective from a revised base period. However, for Bedford Borough, RSS targets formed the basis of the 2008 Core Strategy and so it is useful to consider recent housing growth in relation to these original plan expectations.
- 5.7 In considering any backlog statistics that are derived in this way, it is important to reflect on the ‘appropriateness’ of the original RSS target. The underpinning household projection evidence from which the targets were defined was drawn from the (revised) 2004-based population and household projections. These projections have been superseded by later household projections which have not only used different data inputs but which also incorporate a very different household projection methodology.
- 5.8 Interpreting the differences between successive household projection methodologies is challenging and is made more so by the significant changes that have occurred in the underpinning population projections (2004-based, 2006-based, 2008-based, 2010-based and 2011-based) and the ‘recalibration’ of population estimates resulting from the 2011 Census count.
- 5.9 The ‘recalibration’ impact has been shown to be especially significant in Bedford. This brings into question the appropriateness of any backlog calculation which uses RSS targets that were based on very different demographic statistics to those that have resulted from the 2011 Census. It is therefore reasonable to argue that a ‘new’ plan with an updated base period, which considers all

¹⁵ Ten key principles for owning your housing number - finding your objectively assessed needs, Planning Advisory Service http://www.pas.gov.uk/c/document_library/get_file?uuid=bcdbc05f-0042-4e4c-9258-653ebc11b5b1&groupId=332612

the very latest evidence and which gives due recognition of the uncertain impact of 'higher' and 'lower' rates of household formation is a preferred approach.

- 5.10 The use of both 2008-based and 2011-based household formation (headship) rates in any scenario analysis is an important consideration. Exclusive use of the 2011-based assumptions can be criticised for being overly dependent upon a period where household formation rates have been suppressed; whereas exclusive use of the 2008-based rates can be criticised as being influenced by rates of household formation associated with an 'over-heated' housing market. Furthermore, attempts to identify a point at which 2011-based formation rates will 'return' to their original 2008-based schedule can be seen to be too subjective.
- 5.11 A more considered approach is to use a combination of both 2008-based and 2011-based household formation rates. Evaluating each population growth scenario using both types of household formation rate provides a range of household growth outcomes. Taking an 'average' of the 2008-based and 2011-based household growth outcomes would therefore appear to be a reasonably prudent approach which, on the assumption that 2011-based rates are likely to continue in the short-term, ensures that an element of suppressed household formation is accounted for from the base year of the new plan period.
- 5.1 In summary, whilst a definitive approach to the assessment of housing backlog does not exist, it is essential that local authorities provide suitable evidence to enable its consideration as part of housing growth plans. In compiling this evidence, local authorities should:
- Consider the appropriateness of previous RSS targets bearing in mind the historic demographic forecasts on which they are based;
 - Examine the recent trend in housing completions and consider the factors that have influenced this trend;
 - Assess the degree to which changes and recalibration of historical demographic evidence might have altered previous expectations of household growth;
 - Consider growth scenarios which use a combination of 2008-based and 2011-based household formation rates, thus accounting for an element of suppressed household formation from the start of the plan period, assuming that 2011-based rates continue in the short-term.

6. Summary and Recommendations

Requirements Summary

- 6.1 BBC has sought to update its demographic evidence with the development of a suite of population, household and housing forecasts for the Borough. These forecasts incorporate the latest evidence from:
- 2011 Census statistics on population and households;
 - Revised mid-year population estimates for the period 2002–2010;
 - 2011-based household projections for 2011–2021.
- 6.2 This report has presented the suite of alternative growth scenarios developed using POPGROUP technology. The scenarios evaluate trend, policy and economic considerations and are accompanied by a transparent definition of key assumptions. They are presented in a consistent format that contrasts the impact of scenario assumptions upon changes to population, households, dwellings, labour force and jobs. All scenarios have been run from a 2012 base year and with a 2032 horizon. Historical data has been included for 2001–2012.

Scenario Outcomes

- 6.3 The latest demographic evidence has provided a timely update to Bedford Borough's population profile, aligning the new 2011 Census total with an historical time series back to 2001, enabling the derivation of a suite of demographic forecasts.
- 6.4 The substantial 're-calibration' of Bedford Borough's population estimates resulting from the 2011 Census count has presented considerable uncertainty with regard to the factors that have driven the downward adjustment in the authority's 2011 population.
- 6.5 With an assumption that both the 2001 and 2011 Censuses provided a robust enumeration of the population, it is the mis-estimation of international migration that is most likely to have resulted in the over-estimation of mid-year population totals between the two Censuses. However, ONS does not attribute the population adjustment to international migration, classifying the required change as 'other unattributable' factors.

- 6.6 The new demographic evidence has enabled the development of alternative 2012-based trend projections that consider the potential future impact of migration. These provide an alternative to ONS' 2011-based interim projections, which do not provide a sound basis for analysis due to their reliance upon 2010-based assumptions in conjunction with 2011 Census statistics.
- 6.7 Five-year and ten-year historical perspectives have been used to set migration assumptions in the trend scenarios. The 5-year alternative ('Migration-led 5yr') suggests a higher growth forecast than the 10-year ('Migration-led 10yr'), reflecting the increase in net in-migration to Bedford Borough since 2007. ONS typically use a five-year historical period to derive its long-term assumptions on migration, so the 'Migration-led 5yr' scenario is presented here as the outcome that is most likely to be consistent with the forthcoming 2012-based official projection for Bedford Borough (due Spring 2014).
- 6.8 The 'Migration-led 10yr 5yr X' scenario removes the 'other unattributable' adjustment from the historical data used to generate migration assumptions and, as a result, exhibits population growth similar to the 'SNPP-2010' scenario and is exceeded only by the 'Dwelling-led RSS' housing-led alternative.
- 6.9 The 'Natural Change' and 'Net-Nil' scenarios are hypothetical but indicate the 'minimum' expectation of housing growth, given an absence of migration as a component of population change in the Borough.
- 6.10 The jobs-growth trajectory estimated by the EEFM implies a short-term decline in employment, followed by a modest recovery after 2014. When considered alongside a declining unemployment rate, the 'Jobs-led EEFM BL' scenario results in relatively low population growth and a smaller annual housing requirement. A lower rate of migration is required to sustain the balance between the size of the labour force and the number of jobs available in Bedford, assuming a constant commuting balance for the Borough.
- 6.11 The analysis of scenario outcomes is complicated by the 'choice' of appropriate headship rates with which household (and dwelling) growth is estimated. The latest 2011-based rates have been calibrated after a period of unprecedented economic change and stagnation in the housing market and thus suggest a slower rate of household formation than the previous 2008-based rates, calibrated from data collected in a time period with very different market characteristics.
- 6.12 Deciding which trajectory of household growth is most 'appropriate' is difficult. The 2011-based

household formation rates have been trended to 2032 for direct comparison with the 2008-based rates. Dwelling growth suggested by the 2011-based (A) scenarios (Figure 11 and Table 5) is lower than the 2008-based (B) scenarios (Figure 12 and Table 6).

- 6.13 Alternative approaches to the application of the different household formation rates have been suggested, including a 'recovery' of the Option A headship statistics towards the Option B trajectory. These alternatives generally result in scenarios outcomes that lie between the A and B household growth extremes presented in this report. The difficulty with the 'mix-and-match' approach to the household formation rates is that it is impossible to predict the timing or likelihood of 'recovery' in these rates. The approach adopted here has been to evaluate all scenarios using both the A and B alternatives and an indication of the dwelling growth that would result if an 'average' of the two options were applied is provided (Table 9).
- 6.14 The use of the 'average' statistics is a pragmatic approach to the interpretation of the complexity of statistics but the consideration of these outcomes does take appropriate account of 'backlog' in the assessment of immediate housing requirements, raising the anticipated housing growth above the 2011-based formation rate expectations that are likely to persist in the short-term.

Table 9: Scenario dwelling growth summary

Scenario	Average annual dwelling requirement 2012-2032		
	Option A	Option B	Average
SNPP-2010	854	922	888
Dwelling-led RSS	879	879	879
Migration-led 10yr 5yr X	783	847	815
Migration-led 5yr	621	679	650
Dwelling-led Av CR	600	600	600
Migration-led 10yr	563	617	590
Migration-led 10yr 5yr	525	568	546
Jobs-led EEFM BL	482	524	503
Natural Change	467	497	482
Net Nil	427	472	449

Note: 'Option A' dwelling numbers use 2011-based CLG household model, 'Option B' use the 2008-based model

Recommendations

- 6.15 It is recommended that Bedford Borough Council considers its 'starting point' for the objective assessment of housing need to be within the range of 650–815 dwellings per year over the plan period, consistent with the outcomes of the 'Migration-led 5yr' and 'Migration-led 10yr 5yr X' scenarios (see Table 9).
- 6.16 The use of these dwelling figures, which are averages of both the A (2011-based) and B (2008-based) alternatives, is considered prudent as it allows an element of suppressed household formation to be accounted for and does not make a judgement as to whether the 2011-based rates will 'recover' to the 2008-based rates.
- 6.17 The recommendation of a relatively broad range for the starting point reflects the fact that there is considerable uncertainty associated with the future impact of migration upon the Borough.
- 6.18 ONS typically use a five-year historical period to derive its long-term assumptions on migration, so the 650 average annual dwelling requirement of the 'Migration-led 5yr' scenario is likely to be most consistent with the forthcoming 2012-based official projection for Bedford Borough (due Spring 2014).
- 6.19 Whilst the 2011 Census presents an up-to-date and 'definitive' count of local populations, there remains uncertainty with regards to the influence of international migration upon the Borough. The 815 average annual dwelling requirement of the 'Migration-led 10yr 5yr X' scenario, with a higher international migration assumption, has been chosen to reflect the higher end of this uncertainty.
- 6.20 The recommended range of dwelling growth falls below the original RSS target (at 879 dwellings per year), which reflects the degree to which demographic statistics have changed since RSS evidence was formulated. The range falls above the growth suggested by the latest EEFM jobs forecast (at 503 dwellings per year), which suggests low economic pressure for growth and therefore a lower migration impact over the forecast period.
- 6.21 It is recommended that Bedford Borough Council uses the 650–815 range as the starting point for its objective assessment of housing need with further consideration required of any appropriate market signals and the need to balance homes and jobs provision within the Borough. Job requirements drawn from the scenario results in 4.23 (Table 8) would therefore be appropriate

to consider alongside the 'starting point' housing need range.

Appendix A: Data Inputs & Assumptions

- 6.22 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 national projections, a series of assumptions have been derived which drive the scenario forecasts.

Population

- 6.23 Historical population statistics are provided by the mid-year population estimates for 2001 to 2012. All data are recorded by single-year of age and sex. These data include the revised mid-year population estimates for 2002–2010, released by ONS in May 2013, providing consistency in the measurement of the components of change (births, deaths, internal migration and international migration) between the 2001 and 2011 Censuses.

Births and Fertility

- 6.24 Historical mid-year to mid-year counts of births by sex from 2001/02 to 2011/12 have been sourced from ONS Vital Statistics.
- 6.25 A 'national' age-specific fertility rate (ASFR) schedule, which measures the expected fertility rates by age and sex for England in 2011/12, is included in the POPGROUP model assumptions. Local birth statistics are combined with this ONS 2010-based standard fertility schedule to produce age-specific fertility rates for the district.
- 6.26 Long-term assumptions on change in age-specific fertility rates are taken from the ONS 2010-based national population projection for England.

Deaths and mortality

- 6.27 Historical mid-year to mid-year counts of deaths by age and sex from 2001/2 to 2011/12 have been sourced from ONS Vital Statistics.

- 6.28 A 'national' age-specific mortality rate (ASMR) schedule, which measures the expected mortality rates by age and sex for England in 2011/12, is included in the POPGROUP model assumptions. Local death statistics are combined with this ONS 2010-based standard mortality schedule to produce age-specific mortality rates for the district.
- 6.29 Long-term assumptions on change in age-specific mortality rates are taken from ONS 2010-based national population projection for England.

Migration

- 6.30 In determining the migration assumptions for a new '2012-based' trend projection, historical data on the components of demographic change during the 2001–2011 time-period are a key consideration. Historical migration data are drawn from patient registration statistics for internal migration and from mid-year population estimate assumptions for international migration.
- 6.31 A five-year historical period is a typical time-frame from which migration 'trend' assumptions are derived. However, given the unprecedented economic changes that have occurred since 2008, it is important to give due consideration to an extended historical time-period for assumption derivation. Migration assumptions have therefore been derived from a 5-year and a 10-year historical period for both internal and international migration.
- 6.32 For internal migration, future migration flows are calculated using a schedule of Age-Specific Migration Rates (ASMigR), which has been derived from both a 5-year and 10-year migration history.
- 6.33 For international migration, future counts of migrants are defined. These are based on an average of international migration over either a 5-year or a 10-year historical period. A schedule of ASMigRs is derived from either a 5-year or 10-year migration history and used to distribute future counts by single year of age.
- 6.34 Implied within the international migration component of change is an 'other unattributable' figure, which ONS identified within its latest mid-year estimate revisions for Bedford Borough. The POPGROUP model has assigned the 'other unattributable' to international migration as it is the component with the greatest uncertainty associated with its estimation.

Household Headship Rates

- 6.35 The most recent household projections come from the 2011-based CLG model, released for local authority areas in 2013. The headship rate statistics and the communal household populations which underpin this model are used as the basis for the development of the household forecasts presented here.
- 6.36 To assess the impact of the newly-available household statistics, the 2008-based CLG statistics have been used in conjunction with the 2011-based rates in each scenario. Each of the scenarios has been run with the 2011-based (Option A) and the 2008-based (Option B) CLG headship rates and communal household population. In the Option A scenarios, the CLG 2011-based headship rates are applied, with the 2011–2021 trend continued after 2021. In the Option B scenarios, the CLG 2008-based headship rates are applied, scaled to be consistent with the 2011 CLG household total.
- 6.37 There is a 17-fold classification of household types used in both the 2008-based and 2011-based household forecasts (Table 10). This classification underpins the calculation of total household numbers in each scenario.

Table 10: Household category descriptions

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

Vacancy Rates

- 6.38 The vacancy rate determines the relationship between the number of households and the number of dwellings. For the analysis presented here, a vacancy rate of 3% was applied. The vacancy rate remains fixed throughout the projection period.

Economic Activity Rates

- 6.39 Economic activity rates have been derived from a combination of 2001 Census statistics for Bedford and the latest evidence from the Labour Force Survey (via NOMIS). NOMIS data provide an average economic activity rate for the period 2001–2011 by broad age-group. Using the 2001 Census data, these activity rates have been disaggregated to provide an economic activity rate by five year age-group and sex for all labour-force ages to age 74 (Figure 13).

- 6.40 To account for an expected increase in the rate of labour force participation in the older age groups resulting from changes to stage pension age, economic activity rates have been increased in the following way:

- Women aged 60–64: 40% increase by 2020;
- Women aged 65–69: 20% increase by 2020;
- Men aged 60–64: 5% increase by 2020;
- Men aged 65–69: 10% increase by 2020.

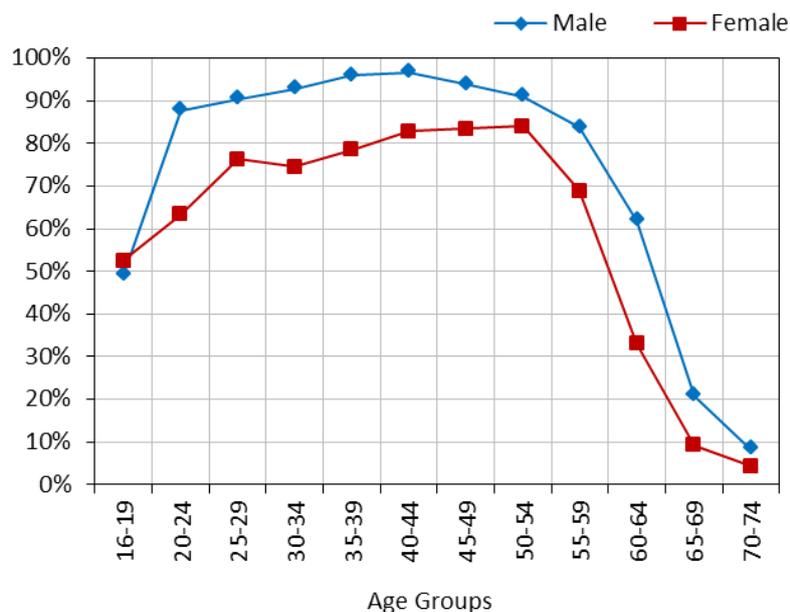


Figure 13: Economic Activity Rates

Unemployment Rate

- 6.41 In consultation with BBC, improvements in the level of unemployment have been modelled. In the start year of the forecasts (2012), an unemployment rate of 7.8% has been used. Between 2012 and 2020, the unemployment rate decreases incrementally to 4%. Beyond 2020, the unemployment rate remains fixed at 4%.

Commuting Ratio

- 6.42 The commuting ratio is defined as the balance between the size of the resident labour force and the number of jobs available in Bedford. Using travel-to-work statistics from the 2001 Census (2011 data is not yet available) a commuting ratio of 1.036 for Bedford has been derived. This indicates that the size of the resident workforce exceeds the number of jobs available in the Borough.
- 6.43 Using 2011 Census 'Workday Population' statistics, an updated commuting ratio of 1.018 has been derived (Table 11). This indicates that the commuting ratio has reduced over the 2001-2011 decade, indicating an improved balance between resident workers and jobs in the Borough.

Table 11: Commuting ratio derivation (2001 and 2011 Census)

Bedford UA		2001 Census	2011 Census
People who live in Bedford and are in employment (workers)	<i>a</i>	72,012	72,610
WorkDay Population			156,172
<i>minus those not in Work</i>			41,154
<i>minus 0-15 yr olds</i>			31,608
<i>minus 75+</i>			12,107
Jobs	<i>b</i>	69,543	71,303
Commuting Ratio	<i>a/b</i>	1.036	1.018

- 6.44 The commuting ratio remains fixed throughout the projection period in each of the scenarios presented in the main body of the report.
- 6.45 To test the impact of altering the commuting ratio on the dwelling and job requirements, sensitivity testing has been conducted. Each of the scenarios presented in this report has been run with two alternative commuting ratio profiles. In 'Sensitivity 1', the commuting ratio has

been reduced incrementally to 1.0 by 2020. In 'Sensitivity 2', the commuting ratio has been increased incrementally to 1.036 by 2020. Beyond 2020, the commuting ratio is kept fixed at 2020 levels. The impact of these commuting ratio alterations upon scenario outcomes is detailed in Appendix B.

Appendix B: Commuting Ratio Sensitivity

Table 12: Commuting ratio sensitivity for Option A scenarios (2011-based CLG household model)

Option A: 2011-based CLG Model								
Sensitivity 1: Commuting Ratio 1.0	Scenario	Change 2012 - 2032				Average per year		
		Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
Sensitivity 1: Commuting Ratio 1.0	Dwelling-led Av CR	21,855	13.73%	11,640	17.99%	391	600	414
	Dwelling-led RSS	37,031	23.26%	17,053	26.36%	1,010	879	808
	Jobs-led EEFM BL	12,866	8.08%	8,308	12.84%	47	428	186
	Migration-led 10yr	21,102	13.25%	10,916	16.87%	315	563	400
	Migration-led 10yr 5yr	17,713	11.13%	10,177	15.73%	214	525	304
	Migration-led 10yr 5yr X	32,189	20.22%	15,197	23.49%	815	783	689
	Migration-led 5yr	24,612	15.46%	12,038	18.61%	452	621	492
	Natural Change	11,898	7.47%	9,055	14.00%	0	467	166
	Net Nil	12,883	8.09%	8,285	12.80%	0	427	215
	SNPP-2010	32,634	20.44%	16,575	25.45%	863	854	752
Commuting Ratio 1.018	Scenario	Change 2012 - 2032				Average per year		
		Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
	Dwelling-led Av CR	21,855	13.73%	11,640	17.99%	391	600	342
	Dwelling-led RSS	37,031	23.26%	17,053	26.36%	1,010	879	729
	Jobs-led EEFM BL	15,663	9.84%	9,343	14.44%	152	482	186
	Migration-led 10yr	21,102	13.25%	10,916	16.87%	315	563	328
	Migration-led 10yr 5yr	17,713	11.13%	10,177	15.73%	214	525	234
	Migration-led 10yr 5yr X	32,189	20.22%	15,197	23.49%	815	783	612
	Migration-led 5yr	24,612	15.46%	12,038	18.61%	452	621	418
	Natural Change	11,898	7.47%	9,055	14.00%	0	467	98
Net Nil	12,883	8.09%	8,285	12.80%	0	427	146	
SNPP-2010	32,634	20.44%	16,575	25.45%	863	854	672	
Sensitivity 2: Commuting Ratio 1.036	Scenario	Change 2012 - 2032				Average per year		
		Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
	Dwelling-led Av CR	21,855	13.73%	11,640	17.99%	391	600	272
	Dwelling-led RSS	37,031	23.26%	17,053	26.36%	1,010	879	653
	Jobs-led EEFM BL	18,461	11.60%	10,376	16.04%	257	535	186
	Migration-led 10yr	21,102	13.25%	10,916	16.87%	315	563	259
	Migration-led 10yr 5yr	17,713	11.13%	10,177	15.73%	214	525	166
	Migration-led 10yr 5yr X	32,189	20.22%	15,197	23.49%	815	783	538
	Migration-led 5yr	24,612	15.46%	12,038	18.61%	452	621	348
	Natural Change	11,898	7.47%	9,055	14.00%	0	467	33
Net Nil	12,883	8.09%	8,285	12.80%	0	427	80	
SNPP-2010	32,634	20.44%	16,575	25.45%	863	854	596	

Table 13: Commuting ratio sensitivity for Option B scenarios (2008-based CLG household model)

Option B: 2008-based CLG Model								
Sensitivity 1: Commuting Ratio 1.0	Scenario	Change 2012 - 2032				Average per year		
		Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
	Dwelling-led Av CR	19,404	12.19%	11,640	18.00%	292	600	351
	Dwelling-led RSS	33,558	21.08%	17,053	26.37%	869	879	718
	Jobs-led EEFM BL	12,866	8.08%	9,066	14.02%	47	467	186
	Migration-led 10yr	21,102	13.25%	11,970	18.51%	315	617	400
	Migration-led 10yr 5yr	17,713	11.13%	11,016	17.04%	214	568	304
	Migration-led 10yr 5yr X	32,189	20.22%	16,438	25.42%	815	847	689
	Migration-led 5yr	24,612	15.46%	13,173	20.37%	452	679	492
	Natural Change	11,898	7.47%	9,650	14.93%	0	497	166
	Net Nil	12,883	8.09%	9,149	14.15%	0	472	215
	SNPP-2010	32,634	20.44%	17,879	27.46%	863	922	752
Sensitivity 2: Commuting Ratio 1.036	Scenario	Change 2012 - 2032				Average per year		
		Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
	Dwelling-led Av CR	19,404	12.19%	11,640	18.00%	292	600	211
	Dwelling-led RSS	33,558	21.08%	17,053	26.37%	869	879	566
	Jobs-led EEFM BL	18,461	11.60%	11,261	17.42%	257	580	186
	Migration-led 10yr	21,102	13.25%	11,970	18.51%	315	617	259
	Migration-led 10yr 5yr	17,713	11.13%	11,016	17.04%	214	568	166
	Migration-led 10yr 5yr X	32,189	20.22%	16,438	25.42%	815	847	538
	Migration-led 5yr	24,612	15.46%	13,173	20.37%	452	679	348
	Natural Change	11,898	7.47%	9,650	14.93%	0	497	33
	Net Nil	12,883	8.09%	9,149	14.15%	0	472	80
	SNPP-2010	32,634	20.44%	17,879	27.46%	863	922	596

Glossary of Terms

Abbreviation	Definition
ASFR	Age-specific fertility rate
ASMR	Age-specific mortality rate
ASMigR	Age-Specific migration rate
BL	Baseline
CLG	Department for Communities and Local Government
CR	Completion Rate
EEFM	East of England Forecasting Model
GP	General Practitioner
LFS	Labour Force Survey
LGA	Local Government Association
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
ONS	Office for National Statistics
PAS	Planning Advisory Service
RSS	Regional Spatial Strategy
SHMA	Strategic Housing Market Assessment
SNPP	Sub-national population projection