

Gwynedd & Anglesey

Population & Household Forecasts

Assumptions, Methodology & Scenario Results

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For the attention of:

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Acknowledgements

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Table of Contents

Contact Details	i
Acknowledgements	i
Table of Contents	ii
1. Introduction	1
2. Area Profile	5
3. Scenario Development	14
4. Scenario Outcomes	24
5. Summary	35
Appendix A POPGROUP Methodology	37
Appendix B Data Inputs & Assumptions	40

1. Introduction

Context

- 1.1 Gwynedd Council and The Isle of Anglesey County Council ('the Councils') are in the process of preparing a Joint Local Development Plan (LDP). In the Preferred Strategy, the Joint Planning Policy Unit identified a preferred housing growth option, which was decided upon following a period of public consultation, a combined Sustainability Appraisal, a Strategic Environmental Assessment and a Welsh Language Impact Assessment. The preferred annual housing requirement was set at +511 dwellings per year, a total of 7,665 units over the 15-year period to 2026¹.
- 1.2 Since the housing target was agreed in the Preferred Strategy, new demographic evidence has become available. Following the 2011 Census, the inter-censal mid-year population estimates (MYEs) were revised by the Office for National Statistics (ONS), providing updated historical population statistics for Anglesey and Gwynedd. In July 2013, the Welsh Government (WG) released its 2011-based local authority population projections². These replaced the earlier 2008-based local authority population projections. For the 2011-based projections, four 'variant' projections were produced alongside the 'principal' projection for each authority. These projections included a migration variant projection, based on a 10-year migration trend.
- 1.3 In February 2014, the WG released its 2011-based household projections for local authorities in Wales³, based on the 2011-based population projections. 'Variant' projections were produced alongside the 'principal' projection for each authority, based on the variant population projections.
- 1.4 A further recent change 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. For further information on POPGROUP, refer to Appendix A.

¹ Anglesey & Gwynedd Joint Local Development Plan, The Consultation Draft Preferred Strategy Document http://www.gwynedd.gov.uk/upload/public/attachments/1182/preferred_strategy_may_2013.pdf

² <http://wales.gov.uk/statistics-and-research/local-authority-population-projections/?lang=en>

³ <http://wales.gov.uk/statistics-and-research/household-projections/?lang=en>

Requirements

- 1.5 The Councils have commissioned Edge Analytics to provide a suite of demographic forecasts for Gwynedd and Anglesey, using the latest demographic inputs. In particular, the Councils require an assessment of the dwelling growth requirements of a range of scenarios, including the most recent WG 2011-based local authority population projections and employment forecasts for Gwynedd and Anglesey. Scenarios are required for Gwynedd and Anglesey, and for the two districts in aggregate. For Gwynedd, this excludes the area that falls within the Snowdonia National Park (Figure 1).

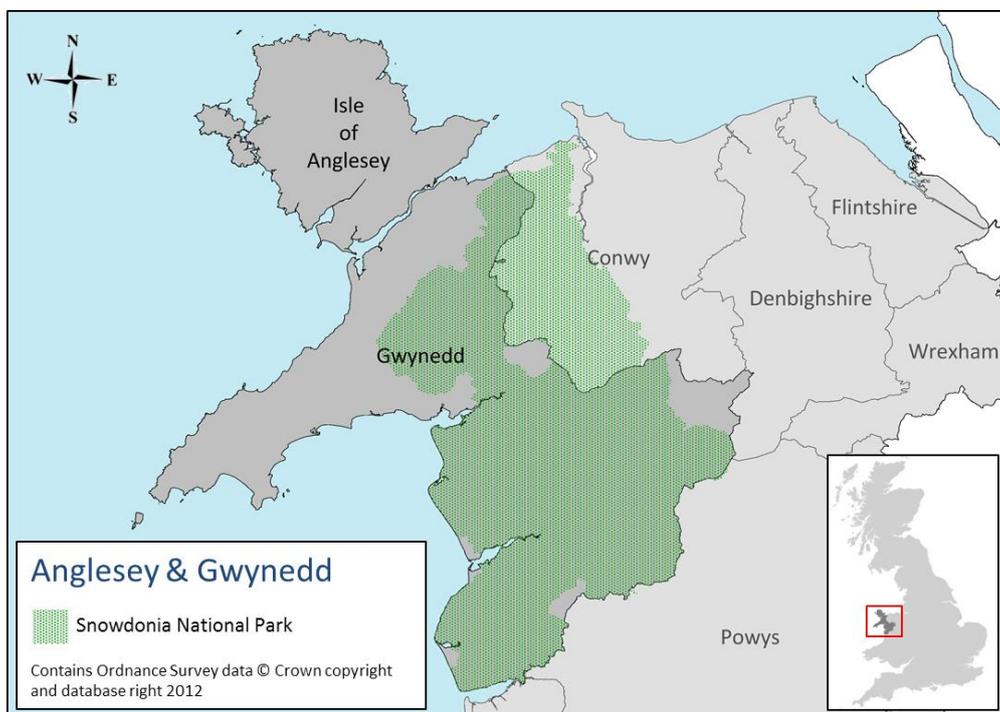


Figure 1: Anglesey and Gwynedd

Approach

Official Guidelines

- 1.6 The development and presentation of demographic evidence to support local housing plans is subject to an increasing degree of public scrutiny. Planning Policy Wales⁴ provides guidance on

⁴ Planning Policy Wales, Edition 7, July 2014 www.wales.gov.uk/topics/planning/policy/ppw

the appropriate approach to the development of Local Development Plans. With regards to the assessment of housing requirements, it is stated that *“the latest Welsh Government local authority level household projections for Wales should form the starting point”* (Planning Policy Wales, paragraph 9.2.2). Consideration should be given to the appropriateness of the projections for each local area and justification given when local authorities deviate from the official WG Projections.

- 1.7 In the assessment of housing requirements, it is appropriate to consider a range of demographic scenarios, including the ‘official’ projections. The use of demographic models is now a key component of this 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).
- 1.8 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.

Edge Analytics’ Approach

- 1.9 Edge Analytics has used POPGROUP (v.4) technology to develop a range of growth scenarios for Gwynedd and Anglesey.
- 1.10 As the starting point of this assessment, the WG ‘principal’ 2011-based local authority population projections for the two districts are considered, with an analysis of the ‘components of change’ underlying these projections. These statistics are compared to previous estimates and to the historical data on births, deaths and migration.
- 1.11 A number of scenario alternatives have been developed and are compared to the WG ‘principal’ 2011-based local authority population projections and the earlier 2008-based local authority population projections. The scenario alternatives include ‘trend’ scenarios, based on varying migration assumptions, ‘jobs-led’ scenarios, which are driven by anticipated changes in the

number of jobs available in an area and 'dwelling-led' scenarios, based on growth in the number of dwellings.

- 1.12 'Sensitivity' scenarios have also been developed to examine the implications of changes to the underlying commuting ratio assumptions in the jobs-led scenarios.
- 1.13 In line with Planning Policy Wales, the household growth implications of each scenario (both 'core' and 'sensitivity') have been assessed using assumptions from the WG 2011-based household projection models for Gwynedd and Anglesey. A sensitivity analysis is also provided using the earlier WG 2008-based household assumptions.
- 1.14 All scenarios have been run to a 2026 horizon. Historical data are included for the 2001–2012 period and scenario outcomes are presented for the 2011–2026 plan period.

Report Structure

- 1.15 The report is structured in the following way:
- In Section 2, a profile of Gwynedd and Anglesey is presented. This includes an historical perspective on population change since the 2001 Census and analysis of the 'components of change' from the 2011-based WG population projection.
 - In Section 3, the scenario alternatives (both 'core' and 'sensitivity') are defined.
 - In Section 4, the scenario results (both 'core' and 'sensitivity') are presented.
 - In Section 5, the scenario results are summarised and the conclusions presented.
 - Appendix A presents an overview of the POPGROUP methodology.
 - Appendix B provides detail on the data inputs and assumptions used in the development of the POPGROUP scenarios.

2. Area Profile

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

Population Change 2001–2011

Mid-Year Population Estimates

- 2.3 Between successive Censuses, population estimation is necessary. These mid-year population estimates (MYEs) are derived by applying the 'components of change' (i.e. counts of births and deaths and estimates of internal and international migration) to the previous year's MYE. Following the 2011 Census, the 2002–2010 MYEs were 'rebased' to align them with the 2011 MYE⁵ and to ensure the correct transition of the age profile of the population over the 2001–2011 decade.
- 2.4 At the 2011 Census, the resident population of Gwynedd⁶ was 121,874, a 4.3% increase over the 2001–2011 decade. The population of Anglesey was 69,751, a 2.8% increase over the same time period. For both districts, the 2011 Census population total proved to be *higher* than that

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

⁶ Note that in this section, when referring to Gwynedd, the area of the Snowdonia National Park that falls within the district is included (see Figure 1). In the scenarios, Snowdonia National Park has been excluded.

suggested by the trajectory of growth from the previous MYEs. For this reason, the revised 'final' MYEs are higher than the previous MYEs (Figure 2).

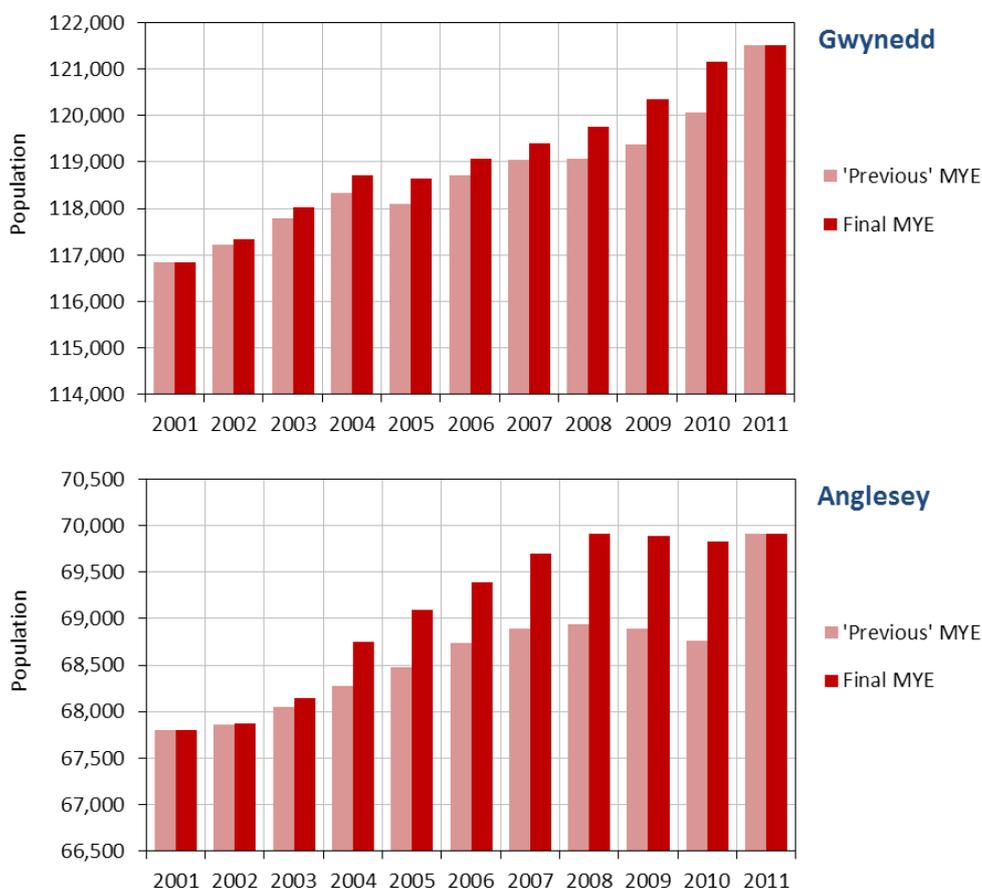


Figure 2: Gwynedd and Anglesey – mid-year population estimates (source: ONS)

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 (i.e. migration flows to and from other areas in the UK) is adequately measured using data from the Patient Register (PR), the National Health Service Central Register (NHSCR) and Higher Education Statistics Agency (HESA), although data robustness may be lower

where there is under-registration in certain age-groups (young males in particular). It is therefore most likely that the 'error' in the previous MYEs was associated with the mis-estimation of international migration, i.e. the balance between immigration and emigration flows to and from Gwynedd and Anglesey.

2.7 However, ONS has not explicitly assigned the MYE adjustment to international migration. Instead it has identified an additional 'unattributable population change' (UPC) component, suggesting it has not been able to accurately identify the source of the 2001–2011 under-count (Figure 3). The effect of the UPC adjustment depends upon the scale of population recalibration that has been required following the 2011 Census results. For Gwynedd and Anglesey, the population estimates have been subject to a consistent annual *uplift* due to the under-count experienced over the 2001–2011 decade.

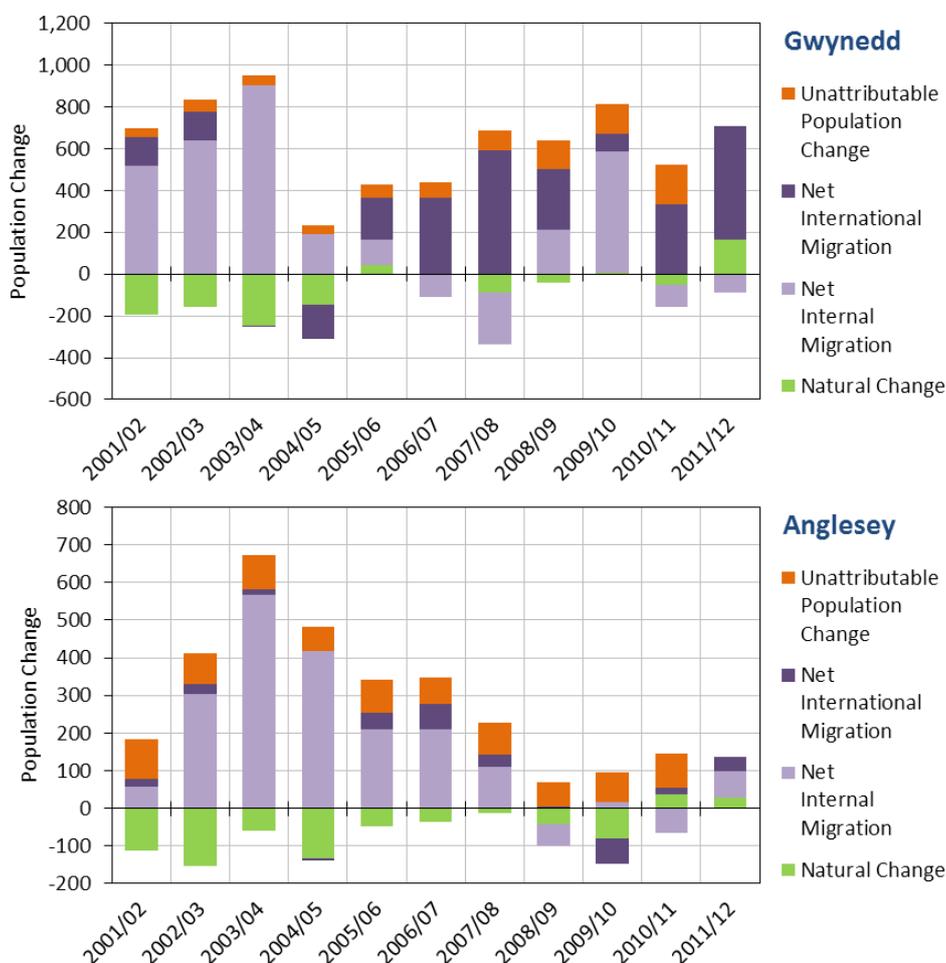


Figure 3: Gwynedd and Anglesey – components of population change 2001/02 to 2011/12 (source: ONS). No UPC component is applied to the 2011/12 statistics as these relate to the 2012 MYE, which followed the 2011 Census.

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 Gwynedd and Anglesey is presented (Figure 4).

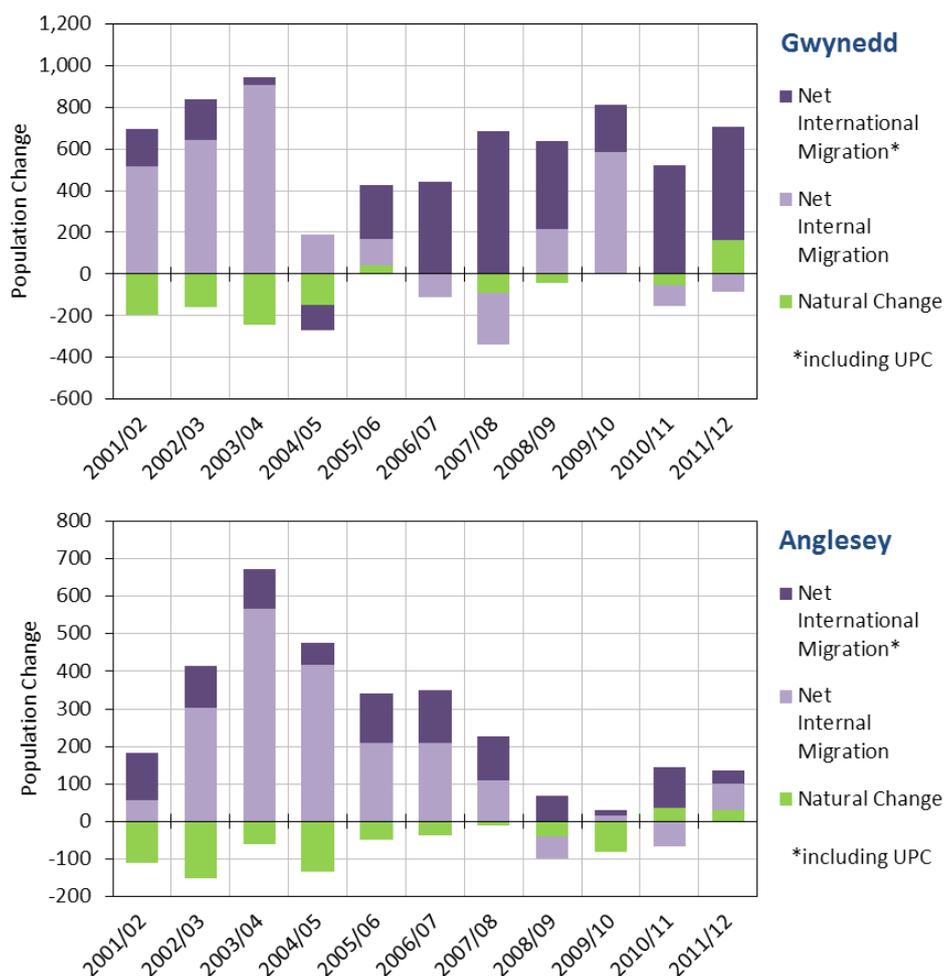


Figure 4: Gwynedd and Anglesey – components of population change 2001/02 to 2011/12, including the UPC component in the 2001/02 to 2010/11 international migration component (source: ONS).

2.9 In both Gwynedd and Anglesey, population change in the 2001/02–2011/12 period was predominantly driven by net in-migration. Natural change has been largely negative, as the number of deaths exceeded the number of births over the historical period. In the case of Anglesey, positive net internal migration was the dominant component of change, particularly in the early half of the decade. Towards the end of the decade, net internal migration reduced and

was negative in 2008/09 and 2010/11. In Gwynedd, net internal migration was the dominant component of change at the beginning of the 2001/02–2011/12 period, with net international migration dominating in the latter half of the decade.

- 2.10 Over the 10-year historical period, the majority of internal in-migrants to Anglesey came from Gwynedd. At the same time, the majority of internal out-migrants from Anglesey moved to Gwynedd (therefore making the net exchange over the decade relatively low). In Gwynedd, the flows of internal migrants are influenced by the University, with migrants in the 15–24 age groups dominating the in- and out- flows (i.e. students moving to Gwynedd for university and leaving after a period of study).
- 2.11 Net international migration (with the inclusion of the UPC element) was largely positive over the 2001/02–2011/12 decade. Student inflows and outflows are an important component of Gwynedd’s international migration profile. In addition, National Insurance number (NINO) registration statistics suggest that the majority of migrant workers to Anglesey and Gwynedd have come from Europe (particularly the ‘Accession’ countries, i.e. those countries that joined the EU from 2004 onwards), although the number of NINO registrations from these countries has reduced in the most recent years of evidence.

Official Population Projections

2.12 In the development and analysis of population forecasts, it is important to benchmark any growth alternatives against the latest 'official' population projection. The most recent official projection is the WG 2011-based local authority population projection, released in July 2013⁷. In this section, the 'principal' WG 2011-based local authority population projection is compared to the earlier 2006-based and 2008-based WG local authority population projections.

2.13 For Gwynedd (Figure 5), under the 2011-based projection, the population is forecast to increase by 8.5% over the 2011–2036 projection period. This is a *lower* rate of growth than under the 2006-based projection (11.9%), but a *higher* rate of growth than under the 2008-based projection (6.2%).

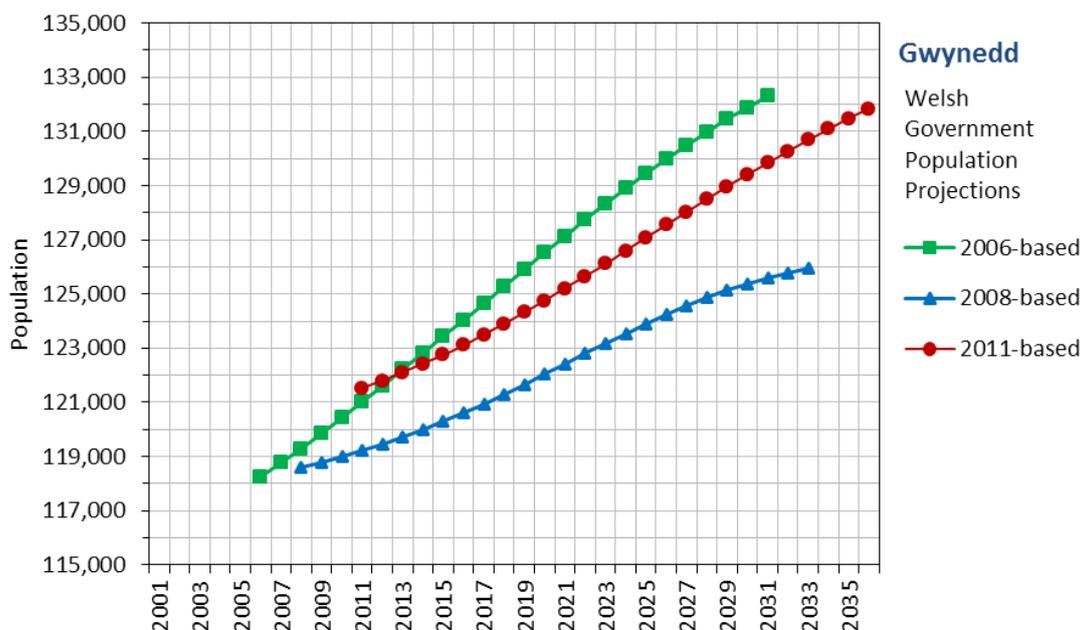


Figure 5: Official population projections for Gwynedd (source: WG)

2.14 For Anglesey (Figure 6), under the 2011-based population projection, the population is forecast to *decline* by 2.7% over the 2011–2036 projection period. This is different to the two earlier projections, which show population *growth* over their respective projection periods (although the population was forecast to decline in the latter years of the 2006-based projection).

⁷ <http://wales.gov.uk/statistics-and-research/local-authority-population-projections/?lang=en>

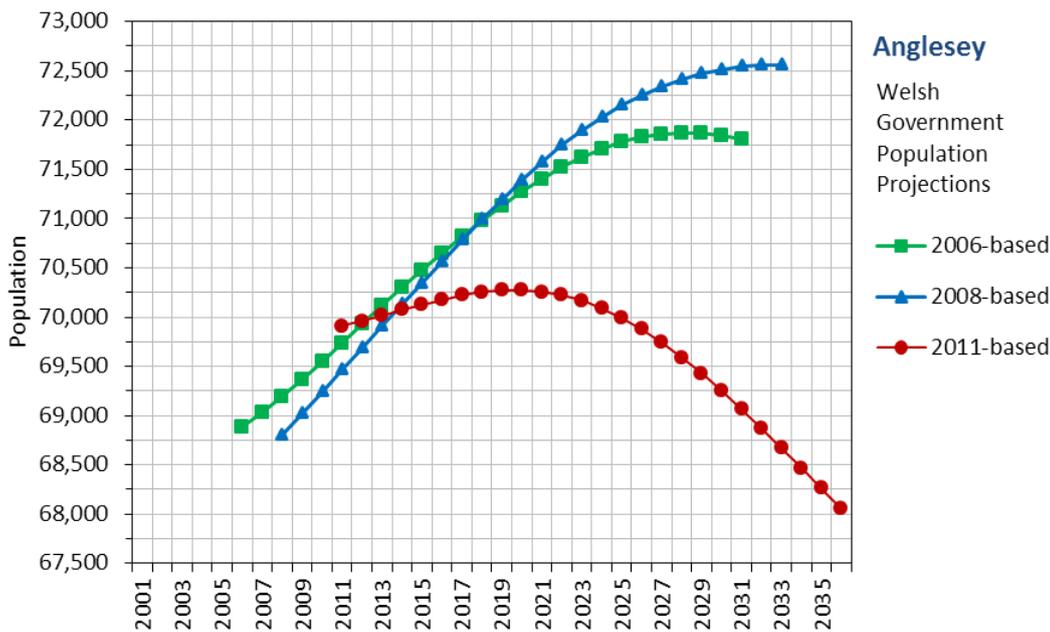


Figure 6: Official population projections for Anglesey (source: WG)

2.15 The WG 2011-based local authority population projection components of change are presented for Gwynedd (Figure 7) and for Anglesey (Figure 8) 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 WG 2011-based population projection are compared to the historical 5-year and 10-year averages in the accompanying tables (Table 1 and Table 2).

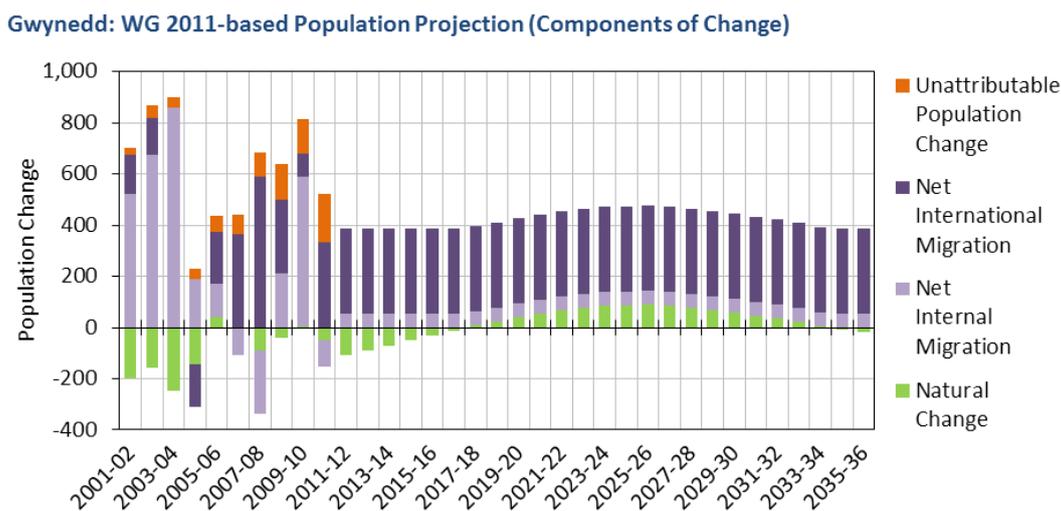


Figure 7: Historical and WG 2011-based components of change for Gwynedd (source: WG)

Anglesey: WG 2011-based Population Projection (Components of Change)

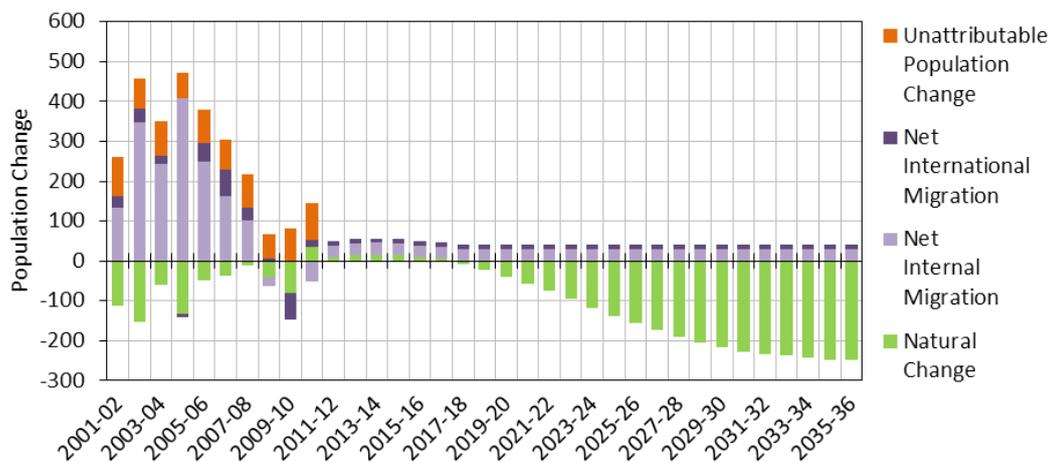


Figure 8: Historical and WG 2011-based components of change for Gwynedd (source: WG)

Table 1: WG 2011-based components comparison for Gwynedd (source: WG)

Component of Change	Historical		Projected
	5-year average (2006/07–2010/11)	10-year average (2001/02–2010/11)	WG 2011-based SNPP average (2011/12–2035/36)
Natural Change	-36	-89	21
Net Internal Migration	69	272	113
Net International Migration	333	200	333
Unattributable Population Change*	127	85	-
Annual Population Change	491	468	468
Annual Population Change (%)	0.41%	0.40%	0.34%

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

Table 2: WG 2011-based components comparison for Anglesey (source: WG)

Component of Change	Historical		Projected
	5-year average (2006/07–2010/11)	10-year average (2001/02–2010/11)	WG 2011-based SNPP average (2011/12–2035/36)
Natural Change	-27	-64	-114
Net Internal Migration	38	157	101
Net International Migration	11	18	11
Unattributable Population Change*	79	80	-
Annual Population Change	105	221	-2
Annual Population Change (%)	0.15%	0.31%	-0.11%

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

- 2.16 Historically, over both the 5-year and 10-year period, natural change has been negative in both Anglesey and Gwynedd (i.e. there have been a greater number of deaths than births). In Anglesey, this trend is set to continue in the WG 2011-based population projection, with an annual average reduction of -114 persons through natural change (Table 2). It is this negative natural change that is projected to be the dominant driver of population decline in Anglesey. In Gwynedd, natural change is projected to be, on average, positive over the projection period (Table 1).
- 2.17 The dominant driver of population change over the 2011–2036 projection period in Gwynedd is projected to be international migration, averaging +333 persons per year (Table 1). In the case of Anglesey, net international migration is projected to be positive, as it has been historically (albeit at a very small average annual increase).
- 2.18 Net internal migration is projected to be positive in both Anglesey and Gwynedd; at a higher rate than over the 5-year historical period (2006/07–2010/11) but at a lower rate than the 10-year average (2001/02–2010/11).

3. Scenario Development

Introduction

- 3.1 There is no single definitive view on the likely level of growth expected in Gwynedd and Anglesey; 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 Gwynedd and Anglesey (for detail on the POPGROUP methodology, refer to Appendix A). In the case of Gwynedd, scenarios have been developed for the parts of the district that sit outside of the Snowdonia National Park (see Figure 1 on page 2).
- 3.3 Eleven 'core' scenarios have been produced, including the two most recent official population projections from the WG, the 2011-based local authority population projections. Three alternative trend-based scenarios have been developed, together with three 'dwelling-led' scenarios, in which population growth is determined by growth in the number of dwellings. Three 'jobs-led' scenarios, in which population growth is determined by growth in the number of jobs, have also been produced. The core scenarios are defined in the 'Core Scenario Definition' section on page 15.
- 3.4 A sensitivity analysis has been conducted on the jobs-led scenarios, examining the implications of altered commuting ratios in Gwynedd and Anglesey. The assumptions used in the jobs-led 'sensitivity scenarios' are described in the 'Sensitivity Scenario Definition' section on page 20.
- 3.5 Household growth has been assessed through the application of 'membership rates' from the WG 2011-based household projection model. The impact of the 2008-based membership rates on the dwelling requirements has also been assessed in a separate sensitivity analysis (defined in the 'Sensitivity Scenario Definition' section on page 20).

- 3.6 All scenarios have been run to a 2026 horizon. Historical data are included for the 2001–2012 period and scenario outcomes are presented for the 2011–2026 plan period.
- 3.7 In the following sections, the scenario alternatives (both core’ and ‘sensitivity’) are described and the broad assumptions specified. For detail on the data inputs and assumptions, please refer to Appendix B.

Core Scenario Definition

Official Projections

- 3.8 The scenario alternatives are ‘benchmarked’ against the most recent official population projections from the WG, the ‘principal’ 2011-based local authority population projections for Gwynedd and Anglesey. The ‘**WG-2011**’ scenario replicates this official population projection.
- 3.9 The ‘**WG-2008**’ scenario, which replicates the WG 2008-based local authority population projection for Gwynedd and Anglesey, is included on the output charts for comparison.

Alternative Trend Scenarios

- 3.10 A five year historical period is a typical time-frame from which migration ‘trend’ assumptions are derived (this is consistent with WG and ONS methodologies). Given the unprecedented economic change that has occurred since 2008, and the differences between the historical migration data and the WG 2011-based population projection assumptions (see paragraphs 2.12–2.18 and Table 1 and Table 2 on page 12), it is important to give due consideration to an extended historical time period for assumption derivation.
- 3.11 Three alternative trend scenarios have therefore been developed, based upon the latest demographic evidence:
- ‘**PG-5yr**’⁸: internal migration rates and international migration flow assumptions are based on the last five years of historical evidence (2007/08 to 2011/12).

⁸ Note that ‘PG’ is an abbreviation of POPGROUP.

- **‘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).
- **‘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).

3.12 Note that in the calculation of future assumptions on migration in the ‘PG-5yr’ and ‘PG-10yr’ scenarios the UPC element is included within the international migration component.

Dwelling-led Scenarios

3.13 In a ‘dwelling-led’ scenario, population growth is determined by the number of dwellings available within an area. POPGROUP evaluates the impact of a particular dwelling growth trajectory by measuring the relationship between the number of dwellings in an area and the size of the resident population. Migration is used to balance the relationship between the size of the population and the forecast number of dwellings. A higher level of net in-migration will occur if there is insufficient population to meet the forecast number of dwellings. A higher level of net out-migration will occur if the population is too high relative to the forecast number of dwellings.

3.14 The following dwelling-led scenarios have been developed:

- **‘Dwelling-led (Preferred)’**: population growth is determined by an annual increase of +511 in the number of dwellings (+286 for Gwynedd and +225 for Anglesey). This is the preferred dwelling requirement of the Councils, as set out in the ‘Preferred Strategy’.
- **‘Dwelling-led (Pre-Recession)’**: population growth is determined by an annual increase of +424 in the number of dwellings (+209 in Gwynedd and +215 in Anglesey), which equates to the ‘pre-recession’ housing completions average (2001/02 to 2007/08).
- **‘Dwelling-led (Recession)’**: population growth is determined by an annual increase of +359 in the number of dwellings (+158 in Gwynedd and +201 in Anglesey), which equates to the ‘recession’ housing completions average (2008/09 to 2012/13).

3.15 The following key data items are required to run dwelling-led scenarios: household membership rates and average household sizes, communal population statistics and a dwelling vacancy rate. Detail on these items is provided in Appendix B.

Jobs-led Scenarios

- 3.16 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.
- 3.17 The demographic implications of three employment forecasts have been assessed. These forecasts come from URS Scott Wilson, who conducted the Anglesey and Gwynedd Economic and Employment Land Review Study in July 2012. Five employment forecasts were modelled, based on the scenarios produced for the 'Energy Island potential outcomes and performance measures study' (August 2011). At the request of the Councils, both the 'Base Case' scenario and 'Scenario 4' from the study have been assessed. The employment growth figures shown in Figure 9 have been used to develop the '**Jobs-led (URS Base)**' scenario and the growth figures in Figure 10 the '**Jobs-led (URS 4)**' scenario⁹.

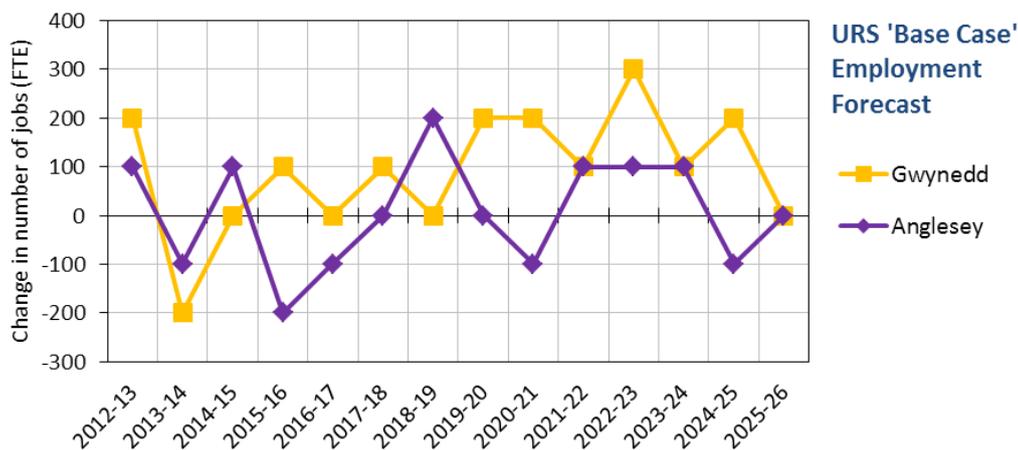


Figure 9: Employment growth figures used in the 'Jobs-led (URS Base)' scenario (source: URS Scott Wilson).

⁹ Note that the URS employment forecasts run to 2025. Therefore, in the jobs-led scenarios, the total number of jobs is kept fixed from 2025 (i.e. jobs growth is set at zero for the 2025/26 year). This applies to all three of the jobs-led scenarios.

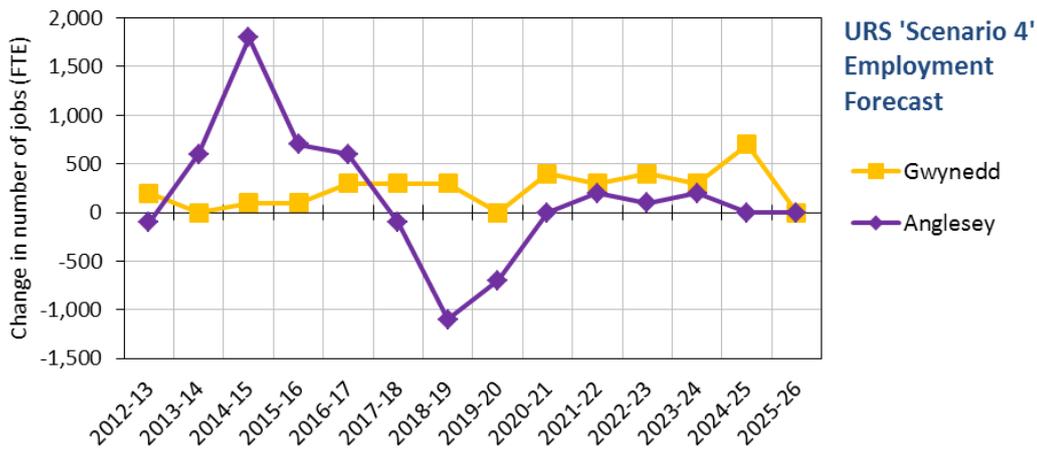


Figure 10: Employment growth figures used in the 'Jobs-led (URS 4)' scenario (source: URS Scott Wilson).

3.18 The third employment forecast applies only to Anglesey and relates to the development of Wylfa Newydd Nuclear Power Station, commencing in 2018. The employment growth figures shown in Figure 11 have been used to develop the '**Jobs-led (Wylfa)**' scenario.

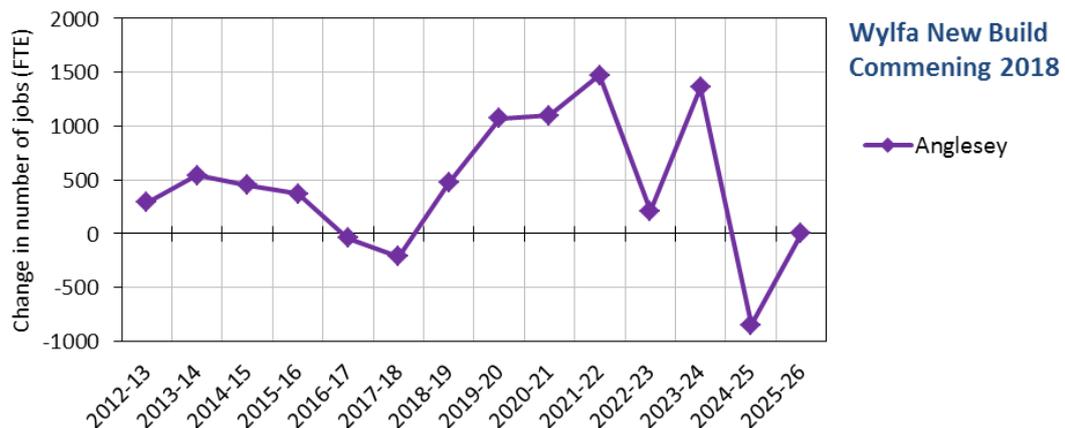


Figure 11: Employment growth figures used in the 'Jobs-led (Wylfa)' scenario for Anglesey (source: the Councils).

3.19 Three key data items are required to run the jobs-led scenarios: economic activity rates, a commuting ratio and an unemployment rate. Economic activity rates by 5-year age group and sex are sourced from the 2011 Census, with uplifts applied in the 60–69 age groups to account for changes to the State Pension Age (SPA). The unemployment rate is incrementally reduced to account for economic recovery following the recession and the commuting ratio is fixed throughout the forecast period, at values derived from 2011 Census data. Detail on these items is provided in Appendix B.

Core Scenarios: Household & Dwelling Growth

- 3.20 In all but the dwelling-led scenarios, the number of households implied by the population growth trajectory is derived using household membership rates from the WG 2011-based household projection model¹⁰. The dwelling growth implications of the household growth trajectories are then assessed through the application of a dwelling ‘vacancy rate’ (refer to Appendix B for further information on the household and dwelling assumptions).
- 3.21 In the dwelling-led scenarios, these data items are used to determine the level of population growth required by the defined number of dwellings.

Core Scenarios: Labour Force & Jobs Growth

- 3.22 In all but the jobs-led scenarios, 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 scenarios, these data items are used to determine the size of the population from the defined number of jobs.
- 3.23 Economic activity rates by 5-year age group and sex are sourced from the 2011 Census, with uplifts applied in the 60–69 age groups to account for changes to the State Pension Age (SPA). The unemployment rate is incrementally reduced to account for economic recovery following the recession and the commuting ratio is fixed throughout the forecast period, at values derived from 2011 Census data. For detail on the labour force/jobs assumptions used in the ‘core’ scenarios, refer to Appendix B.

¹⁰ Note that whilst there are variant household projections from the WG 2011-based household model, there is only one set of membership rates; in the official household model, the membership rates are applied to the population growth trajectories from the WG 2011-based population projections for local authorities in Wales, producing four ‘variant’ household projections.

Sensitivity Scenario Definition

Jobs-led Sensitivity Scenarios

- 3.24 In a jobs-led scenario, population growth is determined by the defined jobs-growth trajectory. The dwelling requirement is then determined from the population growth trajectory. As mentioned in the previous section, three key data items determine the level of population growth resulting from a jobs-led scenario: economic activity rates, the unemployment rate and the commuting ratio. It is the relationship between these data items that ultimately determines the dwelling requirement, as they control the population growth.
- 3.25 In the jobs-led 'core' scenarios, the commuting ratios for Gwynedd and Anglesey have been fixed throughout the forecast period, at values derived from 2011 Census data, at 1.26 for Anglesey and 0.93 for Gwynedd (see Table 19 in Appendix B for detail). These data suggest that, for Anglesey, there is a net *outflow* of workers to surrounding districts (i.e. the size of the resident labour force is *greater* than the number of jobs available in the district). For Gwynedd, there is a net *inflow* of workers from surrounding districts (i.e. the size of the resident labour force is *smaller* than the number of jobs available in the district).
- 3.26 In the case of Anglesey, if high levels of jobs-growth are forecast, maintaining a high level of net *out*-commuting will likely result in *higher* population growth than would be seen with a lower net out-commute. Reducing the net out-commute from Anglesey would reduce the need for additional net in-migration to satisfy the jobs-growth target, thereby reducing population growth and the overall dwelling requirement. In the case of Gwynedd, if high levels of jobs-growth are forecast, maintaining a high level of net *in*-commuting will likely result in *lower* population growth than would be seen with a reduced net in-commute.
- 3.27 In recognition that jobs-growth on Anglesey and in Gwynedd, coupled with successful strategies to improve skills and the type of jobs available, will likely lead to changes to commuting patterns, two alternative jobs-led 'sensitivity scenarios' have been developed, in which the commuting ratios have been altered over the 2012–2026 forecast period.
- 3.28 In the first sensitivity ('SENS1'), the commuting ratios are incrementally altered from their 2011 Census values, returning to their 2001 Census values by 2026 (Table 3). In the case of Gwynedd,

the commuting ratio is incrementally altered from 0.93 to 0.96 (i.e. a reduced net in-commute). For Anglesey, the commuting ratio is incrementally altered from 1.26 to 1.19 (i.e. a reduced net out-commute).

- 3.29 In the second sensitivity ('SENS2'), the change seen historically is continued over the 2012–2026 forecast period (Table 3). In the case of Gwynedd, the commuting ratio is incrementally altered from 0.93 to 0.90 (i.e. an increased net in-commute). For Anglesey, the commuting ratio is incrementally altered to from 1.26 to 1.33 (i.e. an increased net out-commute).

Table 3: Commuting Ratio comparison: 2001 and 2011 Census values and sensitivity scenario values.

District	Census Commuting Ratios			Commuting Ratio Alterations (2012–2026)	
	2001	2011	Change 2001–2011	'SENS1'	'SENS2'
Gwynedd	0.96	0.93	-0.03	0.93 to 0.96	0.93 to 0.90
Anglesey	1.19	1.26	+0.07	1.26 to 1.19	1.26 to 1.33

- 3.30 The economic activity rate and unemployment assumptions are consistent with the core scenarios (see Appendix B for detail on these changes). As in the 'core' scenarios, household growth has been assessed using household membership assumptions from the WG 2011-based household projection models for Gwynedd and Anglesey.

Household Growth Sensitivity

- 3.31 In the core scenarios, assumptions from the 2011-based WG household projection model have been applied. In this sensitivity analysis, the 2008-based WG household membership rates are applied, to assess how different household membership rates impact the scenario dwelling requirements. This is in recognition that the 2011-based and 2008-based household projection models were produced during different economic conditions, which likely will have influenced the household membership rates.

Scenario Summary

3.32 Eleven 'core' scenarios and accompanying 'sensitivity' analyses have been produced (Table 4 and Table 5).

Table 4: Edge Analytics 'core' scenario definition

Scenario Type	Scenario Name	Scenario Description
Official Projections	'WG-2011'	This scenario mirrors the WG 2011-based population projections for Gwynedd and Anglesey and is the official 'benchmark' scenario.
	'WG-2008'	This scenario mirrors the WG 2008-based population projections for Gwynedd and Anglesey and is included for reference only on the scenario summary charts.
Alternative Trend-based Scenarios	'Natural Change'	In- and out- migration rates are set to zero. Population growth is driven by natural change only.
	'PG-5yr'	Migration assumptions are based on the last five years of historical evidence (2007/08 to 2011/12).
	'PG-10yr'	Migration assumptions are based on the last ten years of historical evidence (2002/03 to 2011/12).
Jobs-led Scenarios	'Jobs-led (URS Base)'	Population growth is determined by the change in the number of jobs, as defined in the URS 'Base Case' employment forecast for Gwynedd and Anglesey.
	'Jobs-led (URS 4)'	Population growth is determined by the change in the number of jobs, as defined in the URS 'Scenario 4' employment forecast for Gwynedd and Anglesey.
	'Jobs-led (Wylfa)'	Population growth is determined by the change in the number of jobs, as defined in the URS 'Wylfa New Build commencing in 2018' employment forecast for Anglesey only.
Dwelling-led Scenarios	'Dwelling-led (Preferred)'	Population growth is determined by the change in the number of dwellings, as defined in the Councils 'Preferred Strategy' (+511 dwellings per year).
	'Dwelling-led (Pre-Recession)'	Population growth is determined by the change in the number of dwellings, defined using the average 'pre-recession' completion rate (+424 dwellings per year).
	'Dwelling-led (Recession)'	Population growth is determined by the change in the number of dwellings, defined using the average 'recession' completion rate (+359 dwellings per year).

Table 5: Edge Analytics 'sensitivity' scenario definition

Scenario Type	Scenario Name	Scenario Description
Jobs-led Sensitivity Scenarios	'Jobs-led (URS Base) SENS1'	Population growth is determined by the change in the number of jobs, as defined in the corresponding jobs-led 'core' scenario.
	'Jobs-led (URS 4) SENS1'	The commuting ratio for Gwynedd has been incrementally <i>increased</i> from 0.93 to 0.96 between 2012 and 2026. The commuting ratio for Anglesey has been incrementally <i>reduced</i> from 1.26 to 1.19 between 2012 and 2026. Economic activity rate assumptions and unemployment rate assumptions are consistent with the 'core' scenarios.
Jobs-led Sensitivity Scenarios	'Jobs-led (URS Base) SENS2'	Population growth is determined by the change in the number of jobs, as defined in the corresponding jobs-led 'core' scenario.
	'Jobs-led (URS 4) SENS2'	The commuting ratio for Gwynedd has been incrementally <i>reduced</i> from 0.93 to 0.90 between 2012 and 2026. The commuting ratio for Anglesey has been incrementally <i>increased</i> from 1.26 to 1.33 between 2012 and 2026. Economic activity rate assumptions and unemployment rate assumptions are consistent with the 'core' scenarios.
Household Sensitivity Scenarios	All Scenarios including the jobs-led sensitivity scenarios (listed above)	Household growth is assessed using assumptions from the WG 2008-based household model. The same: (a) communal population; (b) household size; (c) vacancy rate assumptions have been applied as in the 'core' (and jobs-led 'sensitivity') scenarios.

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

4. Scenario Outcomes

Introduction

- 4.1 Eleven 'core' scenarios have been produced for Gwynedd and Anglesey. Summaries of the scenario results are provided in the form of a chart and accompanying table for Gwynedd (Figure 12 and Table 6), Anglesey (Figure 13 and Table 7) and the aggregate of the two districts (Figure 14 and Table 8).
- 4.2 In the summary tables, the population and household change for the 2011–2026 forecast period is presented for each scenario. The scenarios are ranked (high to low) according to the level of population growth over the forecast period. The tables also show the average annual net migration associated with the population change and the expected average annual dwelling and jobs growth.
- 4.3 In the core scenarios, household growth has been assessed using assumptions from the WG 2011-based household projection model. The resulting dwelling requirement is calculated through the application of a dwelling vacancy rate, which is fixed throughout the forecast period. Adjustments have been made to the economic activity rates to take account of changes to the SPA and unemployment rates have been incrementally reduced to account for economic recovery following the recession. In the core scenarios, the commuting ratios have been fixed.
- 4.4 In recognition that an increase in the number of jobs available in both districts would likely lead to changes to the commuting patterns, a sensitivity analysis has been conducted on the jobs-led scenarios. The results of this are presented in the 'Jobs-led Sensitivity Scenarios' (pages 30–31).
- 4.5 An additional sensitivity analysis is also presented, in which the household growth implications of the scenarios (both 'core' and the jobs-led 'sensitivity scenarios') are assessed using assumptions from the WG 2008-based household model. This is in recognition that the 2011-based and 2008-based household models were produced at times of different economic conditions, which likely will have influenced the household membership rates. These results are presented on pages 32–34.

Gwynedd: Core Scenario Outcomes

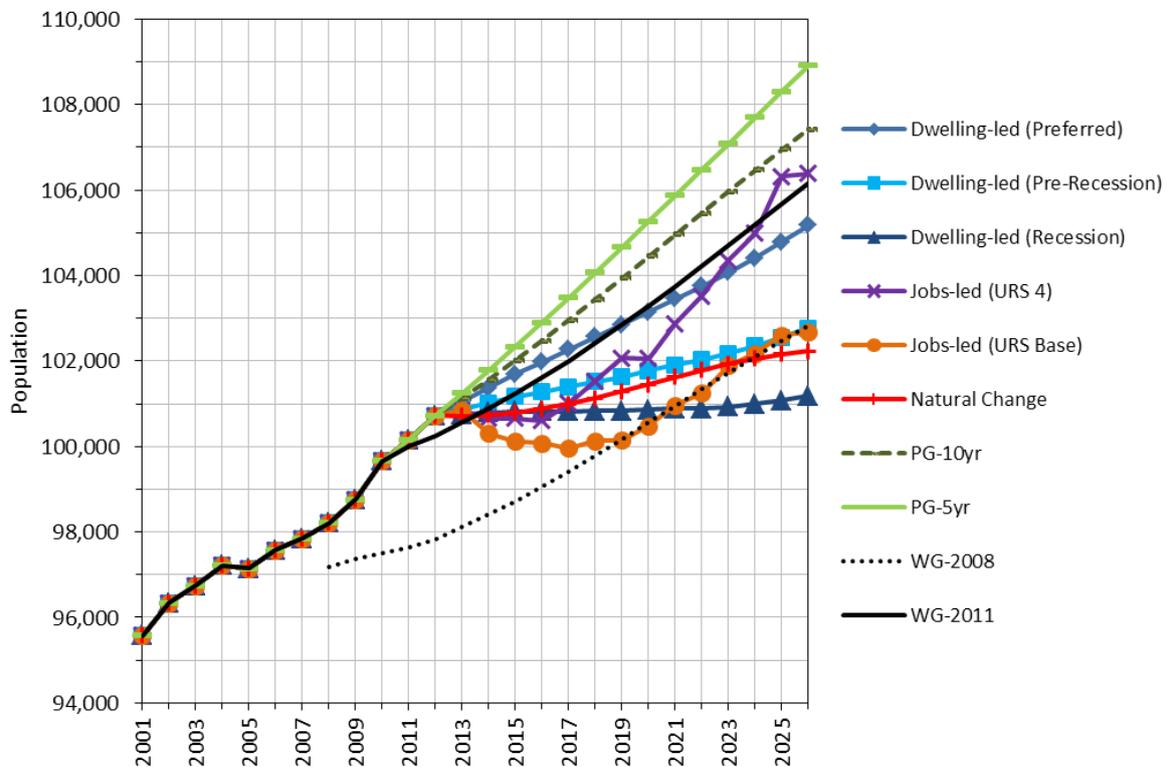


Figure 12: Gwynedd core scenario outcomes: population growth 2001–2026

Table 6: Gwynedd core scenario outcomes 2011–2026

Scenario	Change 2011 - 2026				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
PG-5yr	8,753	8.7%	5,057	11.9%	531	384	296
PG-10yr	7,271	7.3%	4,701	11.1%	422	357	264
Jobs-led (URS 4)	6,228	6.2%	4,281	10.1%	378	325	229
WG-2011	6,184	6.2%	3,819	9.0%	288	290	261
Dwelling-led (Preferred)	5,016	5.0%	3,808	9.0%	289	289	178
Dwelling-led (Pre-Recession)	2,620	2.6%	2,861	6.7%	149	217	89
Jobs-led (URS Base)	2,523	2.5%	2,821	6.6%	156	214	89
Natural Change	2,076	2.1%	2,517	5.9%	0	191	36
Dwelling-led (Recession)	1,033	1.0%	2,235	5.3%	56	170	29

Anglesey: Core Scenario Outcomes

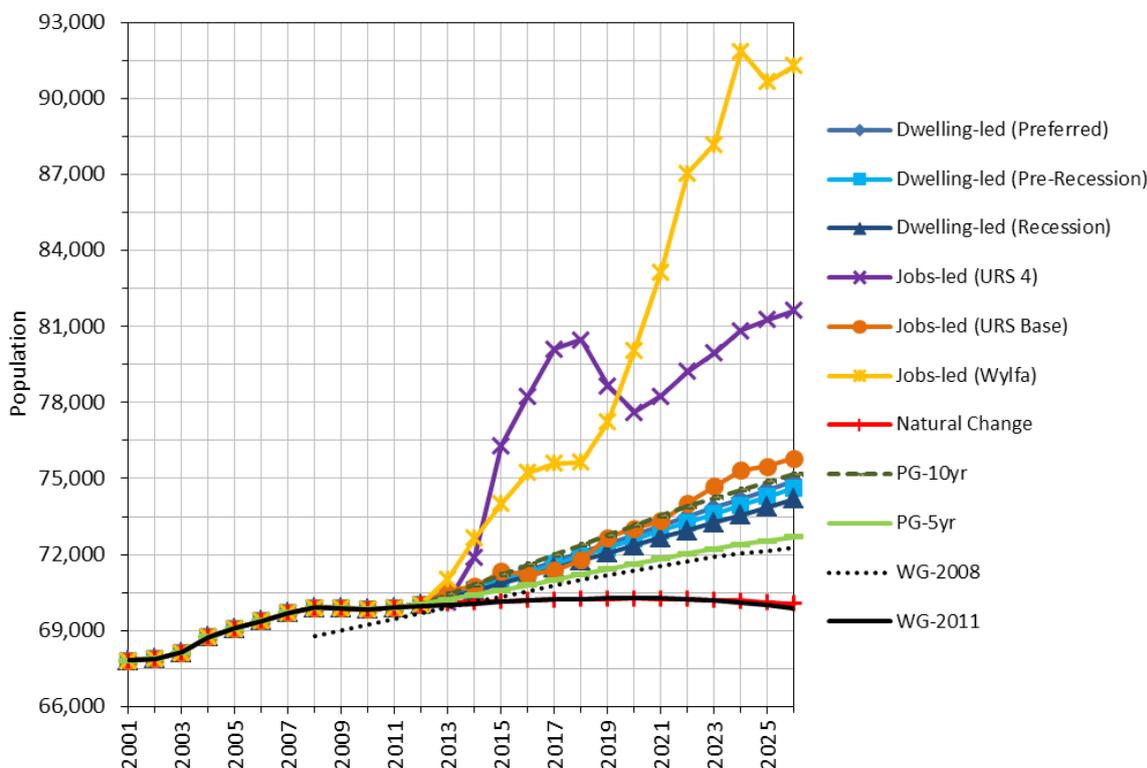


Figure 13: Anglesey core scenario outcomes: population growth 2001–2026

Table 7: Anglesey core scenario outcomes 2011–2026

Scenario	Change 2011 - 2026				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
Jobs-led (Wylfa)	21,389	30.6%	9,520	31.1%	1,312	709	409
Jobs-led (URS 4)	11,736	16.8%	5,666	18.5%	714	422	140
Jobs-led (URS Base)	5,902	8.4%	3,300	10.8%	392	246	0
PG-10yr	5,247	7.5%	3,228	10.5%	364	240	1
Dwelling-led (Preferred)	5,018	7.2%	2,943	9.6%	337	219	-24
Dwelling-led (Pre-Recession)	4,707	6.7%	2,818	9.2%	319	210	-32
Dwelling-led (Recession)	4,272	6.1%	2,643	8.6%	293	197	-44
PG-5yr	2,773	4.0%	2,156	7.0%	201	161	-67
Natural Change	142	0.2%	701	2.3%	0	52	-136
WG-2011	-36	-0.1%	857	2.8%	40	64	-156

Gwynedd & Anglesey 'Core' Scenario Outcomes

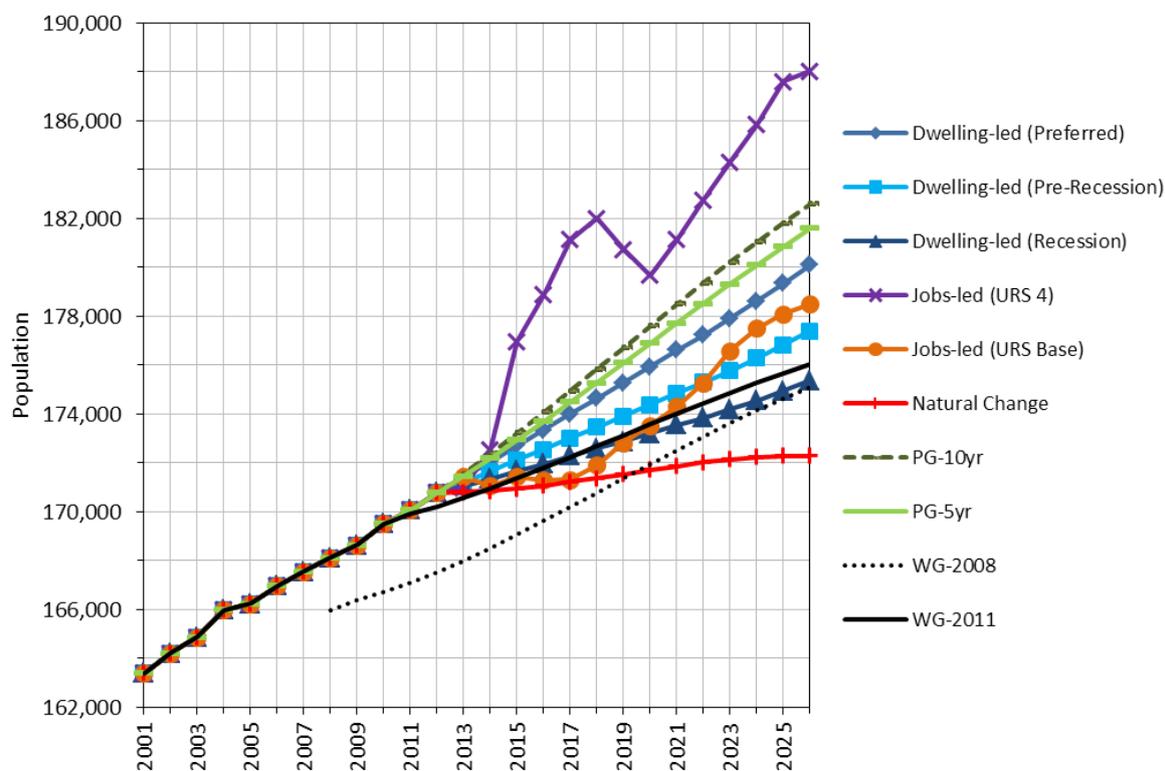


Figure 14: Gwynedd and Anglesey 'core' scenario outcomes: population growth 2001–2026

Table 8: Gwynedd and Anglesey 'core' scenario outcomes 2011–2026

Scenario	Change 2011 - 2026				Average per year		
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings	Jobs
Jobs-led (URS 4)	17,964	10.6%	9,948	13.6%	1,092	747	369
PG-10yr	12,518	7.4%	7,929	10.9%	786	597	265
PG-5yr	11,526	6.8%	7,213	9.9%	733	545	229
Dwelling-led (Preferred)	10,034	5.9%	6,751	9.2%	627	508	154
Jobs-led (URS Base)	8,425	5.0%	6,121	8.4%	547	460	89
Dwelling-led (Pre-Recession)	7,327	4.3%	5,679	7.8%	468	427	56
WG-2011	6,148	3.6%	4,675	6.4%	328	354	105
Dwelling-led (Recession)	5,306	3.1%	4,877	6.7%	348	366	-14
Natural Change	2,219	1.3%	3,219	4.4%	0	243	-100

Note that the 'Jobs-led (Wylfa)' scenario is excluded from the Gwynedd and Anglesey aggregate scenario output as this scenario applies to Anglesey only.

Core Scenario Outcomes

Introduction

- 4.6 In the case of Gwynedd, population growth ranges from 1.0% under the 'Dwelling-led (Recession)' scenario to 8.7% under the 'PG-5yr' scenario. This corresponds to a dwelling requirement of between 170 and 384 dwellings per year over the 2011–2026 forecast period. In the case of Anglesey, population growth ranges from -0.1% under the 'WG-2011' scenario to 30.6% under the 'Jobs-led (Wylfa)' scenario. This corresponds to a dwelling requirement of between 64 and 709 dwellings per year over the 2011–2026 forecast period.

Official Projections

- 4.7 Population growth under the 'WG-2011' scenario is, in the case of Anglesey, negative over the 2011–2026 forecast period, at -0.1% (the population declines by -36 people). In the case of Gwynedd, the 'WG-2011' scenario shows population growth of over 6,180 (7.3%) over the forecast period. For comparison, the population growth trajectory of the WG 2008-based population projection is included on the output charts.

Alternative Trend-based Scenarios

- 4.8 The 'Natural Change' scenario, in which net migration is set to zero for each year of the forecast period, results in 2.1% population growth in Gwynedd and only 0.2% growth in Anglesey, driven solely by the excess of births over deaths. This equates to a dwelling requirement of +191 dwellings per year in Gwynedd and +52 dwellings per year in Anglesey. The 'Natural Change' scenario is hypothetical, but does provide an important illustration of the degree to which dwelling growth is driven by migration (both internal and international) in these districts. The low rates of population growth shown in this scenario also highlight the impact that the 'ageing' population has on population growth.
- 4.9 Of the two alternative trend scenarios ('PG-5yr' and 'PG-10yr'), higher population growth is seen under 'PG-10yr' scenario in Anglesey and the 'PG-5yr' scenario in Gwynedd. The outcomes of these scenarios are a reflection of the historical data from which the future migration assumptions were derived. In the case of Anglesey, the low rates of net migration towards the

end of the 2001/02–2011/12 decade (see Figure 4 on page 8) are continued in the ‘PG-5yr’ forecast, resulting in 4% population growth between 2011 and 2026. The higher rates of net internal migration in the earlier half of the historical period are reflected in the higher growth rate of the ‘PG-10yr’ scenario (7.5% population growth 2011–2026). In the case of Gwynedd, there is little difference in the overall pattern of net migration between the 5-year and 10-year historical periods (see Figure 4 on page 8), resulting in similar growth trajectories for both the ‘PG-5yr’ and ‘PG-10yr’ scenarios. For Gwynedd, both these alternative trend scenarios produce the highest population growth of the range of scenarios, at 7.3% for the ‘PG-10yr’ scenario, and 8.7% for the ‘PG-5yr’ scenario.

Dwelling-led Scenarios

- 4.10 Of the dwelling-led scenarios, the lowest rates of population growth are seen under the ‘Dwelling-led (Recession)’ scenario, at 1.0% population growth in Gwynedd and 6.1% growth in Anglesey. In this scenario, population growth is determined by an annual increase in the number of dwellings, averaging 170 per year in Gwynedd and 197 per year in Anglesey.¹¹ The ‘Dwelling-led (Preferred)’ scenario results in the highest population growth, at 5.0% in Gwynedd and 7.2% in Anglesey.

Jobs-led Scenarios

- 4.11 Of the jobs-led scenarios, population growth in Gwynedd is highest under the ‘Jobs-led (URS 4)’ scenario in Gwynedd and lowest under the ‘Jobs-led (Base)’ scenario. For Anglesey, it is the jobs-led scenarios that produce the highest levels of population growth, ranging from 8.4% under the ‘Jobs-led (URS)’ scenario to 30.6% under the ‘Jobs-led (Wylfa)’ scenario. This corresponds to a dwelling requirement of 246 to 709 dwellings per year. In Gwynedd, the dwelling requirement under the jobs-led scenarios ranges from 214 to 325 dwellings per year.
- 4.12 It is important to note in the ‘jobs-led’ scenarios that variant assumptions on economic activity, commuting and unemployment could influence the forecast dwelling requirements. The

¹¹ Note that the dwelling requirements of the ‘dwelling-led’ scenarios do not exactly match the defined input figures (Table 4 on page 20). This is because the dwelling-growth targets are specified in the model from 2012/13 and the scenario output is provided from 2011. This is also the case in the ‘jobs-led’ scenarios, where the jobs-growth targets start in 2012/13. In the 2011/12 period, population growth is determined by the historical population data.

sensitivity of the 'jobs-led' scenario dwelling requirements to changes in the commuting ratio are examined in the following section.

Sensitivity Scenario Outcomes

Jobs-led Sensitivity Scenarios

4.13 In the core scenarios, the commuting ratio has been fixed at the 2011 Census values, at 0.93 for Gwynedd and 1.26 for Anglesey. In recognition that jobs-growth on Anglesey and in Gwynedd will likely lead to changes to commuting patterns, two different sets of commuting assumptions have been applied to each of the 'core' jobs-led scenarios (see Table 3 on page 21):

- **'SENS1'**: the commuting ratios are incrementally altered from their 2011 Census values in 2012, returning to their 2001 Census values by 2026. In the case of Gwynedd, the commuting ratio is incrementally altered from 0.93 to 0.96. For Anglesey, the commuting ratio is incrementally altered from 1.26 to 1.19.
- **'SENS2'**: the change seen historically (2001–2011) in the commuting ratios is continued over the 2012–2026 forecast period. In the case of Gwynedd, the commuting ratio is incrementally altered from 0.93 to 0.90. For Anglesey, the commuting ratio is incrementally altered to from 1.26 to 1.33.

4.14 The economic activity rate and unemployment assumptions are consistent with the core scenarios (see Appendix B for detail on these assumptions). As in the 'core' scenarios, household growth has been assessed using household membership assumptions from the WG 2011-based household models for Gwynedd and Anglesey.

4.15 The dwelling-growth implications of each of these 'sensitivity' scenarios are compared to the corresponding 'core' scenarios for Gwynedd in Table 9, Anglesey in Table 10, and the aggregate of the two districts in Table 11.

Table 9: Jobs-led sensitivity scenario outcomes: Gwynedd

Gwynedd	Average Annual Dwelling Requirement 2011–2026		
	'Core' Scenario	'SENS1'	'SENS2'
Jobs-led (URS 4)	325	415	236
Jobs-led (URS Base)	214	300	128

Table 10: Jobs-led sensitivity scenario outcomes: Anglesey

Anglesey	Average Annual Dwelling Requirement 2011–2026		
	'Core' Scenario	'SENS1'	'SENS2'
Jobs-led (Wylfa)	709	582	835
Jobs-led (URS 4)	422	310	534
Jobs-led (URS Base)	246	142	349

Table 11: Jobs-led sensitivity scenario outcomes: Gwynedd & Anglesey

Gwynedd and Anglesey	Average Annual Dwelling Requirement 2011–2026		
	'Core' Scenario	'SENS1'	'SENS2'
Jobs-led (URS 4)	747	724	769
Jobs-led (URS Base)	460	442	478

- 4.16 For Gwynedd (Table 9), altering the commuting ratio from 0.93 to 0.96 (as in the 'SENS1' scenario alternatives) results in a *higher* dwelling requirement than in the 'core' scenarios, in which the commuting ratios are fixed. This is because, under the 'SENS1' scenario alternative, there is a reducing net in-commute to Gwynedd. Fewer people are travelling into Gwynedd for work, increasing the proportion of jobs that are taken up by local residents. Under the 'SENS2' alternative, the commuting ratio is incrementally altered from 0.93 to 0.90. This results in a *lower* dwelling requirement than under the 'core' scenario alternatives, as the net in-commute *increases* (i.e. a greater proportion of the jobs are taken up by in-commuters).
- 4.17 In the case of Anglesey (Table 10), altering the commuting ratio from 1.26 to 1.19 (as in 'SENS1') results in a *lower* dwelling requirement than in the 'core' scenarios, in which the commuting ratios are fixed. This is because, under the 'SENS1' scenario alternative, there is a reducing net out-commute from Anglesey. Fewer people are travelling out of Anglesey for work, reducing the need for additional net in-migration to satisfy the jobs-growth target. Under the 'SENS2' alternative, the commuting ratio is incrementally altered from 1.26 to 1.33. This results in a *higher* dwelling requirement than under the 'core' scenario alternatives, as the net out-commute

increases (i.e. a greater number of people travel out of Anglesey for work). Therefore, additional net in-migration is required to satisfy the jobs-growth target.

Household Growth Sensitivity

- 4.18 In the 'core' scenarios and jobs-led 'sensitivity scenarios', the household growth implications have been assessed using assumptions from the WG 2011-based household projection model. In the dwelling-led scenarios, these household assumptions are used to determine the population growth trajectory of the defined dwelling-growth targets. In this sensitivity, 2008-based membership rates are applied.
- 4.19 As the two household projection models were formulated during different economic conditions, which likely will have impacted household formation and household size, the implications of the WG 2008-based household membership rates are assessed here. In this sensitivity analysis, the same (a) communal population (b) household size and (c) vacancy rate assumptions are used as in the 'core' and jobs-led 'sensitivity' scenarios.
- 4.20 Using the 2008-based membership rates results in a *higher* dwelling requirement than the requirement derived using the 2011-based membership rates (Table 12, Table 13 and Table 14). In the dwelling-led scenarios, the dwelling-growth trajectory is defined from 2012/13 (and therefore differs only very slightly between the two alternatives¹²).
- 4.21 The jobs-led 'sensitivity scenario' dwelling requirements are summarised in Table 15, Table 16 and Table 17. As with the core scenarios, the dwelling requirement is *higher* using the 2008-based assumptions.

¹² Note that the dwelling requirements of the 'dwelling-led' scenarios do not exactly match the defined input figures (as specified in Table 3 on page 20). The dwelling-growth targets are specified in the model from 2012/13 onwards and the scenario output is provided from 2011. In the 2011/12 period, population growth is determined by the historical population data.

Table 12: Gwynedd core scenarios: 2011-based and 2008-based dwelling requirement comparison

Scenario	Average Annual Dwelling Requirement (2011–2026)	
	2011-based Membership Rates	2008-based Membership Rates
PG-5yr	384	487
PG-10yr	357	458
Jobs-led (URS 4)	325	425
WG-2011	290	387
Dwelling-led (Preferred)	289	299
Jobs-led (URS base)	214	307
Natural Change	191	279
Dwelling-led (Pre-Recession)	217	227
Dwelling-led (Recession)	170	179

Table 13: Anglesey core scenarios: 2011-based and 2008-based dwelling requirement comparison

Scenario	Average Annual Dwelling Requirement (2011–2026)	
	2011-based Membership Rates	2008-based Membership Rates
Jobs-led (Wylfa)	709	862
Jobs-led (URS 4)	422	547
Jobs-led (URS base)	246	356
PG-10yr	240	348
Dwelling-led (Preferred)	219	227
Dwelling-led (Pre-Recession)	210	218
PG-5yr	161	262
Dwelling-led (Recession)	197	205
WG-2011	64	159
Natural Change	52	145

Table 14: Gwynedd and Anglesey core scenarios: 2011-based and 2008-based dwelling requirement comparison

Scenario	Average Annual Dwelling Requirement (2011–2026)	
	2011-based Membership Rates	2008-based Membership Rates
Jobs-led (URS 4)	747	972
PG-10yr	597	806
PG-5yr	545	749
Jobs-led (URS base)	460	663
Dwelling-led (Preferred)	508	526
WG-2011	354	545
Dwelling-led (Pre-Recession)	427	444
Dwelling-led (Recession)	366	384
Natural Change	243	425

Table 15: Gwynedd jobs-led sensitivity scenarios: 2011-based and 2008-based dwelling requirement comparison

Scenario	Average annual dwelling requirement (2011–2026)	
	2011-based Membership Rates	2008-based Membership Rates
Jobs-led (URS Base) SENS1	300	398
Jobs-led (URS Base) SENS2	128	216
Jobs-led (URS 4) SENS1	415	519
Jobs-led (URS 4) SENS2	236	330

Table 16: Anglesey jobs-led sensitivity scenarios: 2011-based and 2008-based dwelling requirement comparison

Scenario	Average annual dwelling requirement (2011–2026)	
	2011-based Membership Rates	2008-based Membership Rates
Jobs-led (URS Base) SENS1	142	242
Jobs-led (URS Base) SENS2	349	469
Jobs-led (URS 4) SENS1	310	425
Jobs-led (URS 4) SENS2	534	669
Jobs-led (Wylfa) SENS1	582	724
Jobs-led (Wylfa) SENS2	835	1,000

Table 17: Gwynedd and Anglesey jobs-led sensitivity scenarios: 2011-based and 2008-based dwelling requirement comparison. (Note that 'Jobs-led (Wylfa)' is not included as it only applies to Anglesey.

Scenario	Average annual dwelling requirement (2011–2026)	
	2011-based Membership Rates	2008-based Membership Rates
Jobs-led (URS Base) SENS1	442	640
Jobs-led (URS Base) SENS2	478	685
Jobs-led (URS 4) SENS1	724	944
Jobs-led (URS 4) SENS2	769	999

5. Summary

Requirements Summary & Approach

- 5.1 Gwynedd Council and The Isle of Anglesey County Council are in the process of preparing a Joint LDP. In the LDP Preferred Strategy, the JPPU identified a preferred housing growth option, which was decided upon following a period of public consultation. Since these housing targets were identified, new demographic evidence has become available, including 2011 Census statistics, revised MYEs and the WG 2011-based population and household projections for local authorities.
- 5.2 In light of these new demographic statistics, the Councils commissioned Edge Analytics to provide a suite of demographic forecasts for Gwynedd and Anglesey. In particular, the Councils required an assessment of the dwelling growth implications of a range of scenarios, including the most recent WG 2011-based local authority population projections and employment forecasts for Gwynedd and Anglesey.
- 5.3 Edge Analytics has used POPGROUP (v.4) technology to develop a range of growth scenarios for Gwynedd and Anglesey. Eleven 'core' scenarios have been produced and are benchmarked against the latest official population projection, the WG 2011-based local authority population projections. Jobs-led 'sensitivity' scenarios have also been developed, which assess the implications of altered commuting patterns on the resulting dwelling-growth implications. Household growth has been assessed using assumptions from the WG 2011-based household projection model, and also assumptions from the 2008-based model for comparison.

Scenario Outcomes

- 5.4 For the joint LDP area (i.e. Gwynedd and Anglesey), population growth indicated by the 'core' scenarios ranges from 1.3% under the 'Natural Change' scenario to 10.6% under the 'Jobs-led (URS 4)' scenario. This results in a range of dwelling requirements, from 243 to 747 dwellings per year, using the 2011-based membership rates. Note that this range excludes the 'Jobs-led

(Wylfa)' scenario, which was produced for Anglesey only. This scenario results in the highest dwelling requirement for Anglesey, at 709 dwellings per year under the core scenario outcome.

- 5.5 A key requirement of this study was an assessment of the dwelling requirements implied by a range of employment forecasts for Gwynedd and Anglesey. Under the 'core' scenario outcomes, the dwelling requirement ranged from 214–325 dwellings per year for Gwynedd and 246–709 dwellings per year for Anglesey. In these scenarios, no changes were made to the commuting assumptions.
- 5.6 In recognition that jobs-growth on Anglesey and in Gwynedd will likely lead to changes to commuting patterns, two different sets of commuting assumptions have been applied to each of the 'core' jobs-led scenarios. Under the 'SENS1' alternative, the net in-commute to Gwynedd and the net out-commute from Anglesey were reduced. When compared to the 'core' jobs-led scenario alternatives, these commuting ratio changes result in a *higher* dwelling requirement for Gwynedd and a *lower* requirement for Anglesey. Under the 'SENS2' alternative, the net in-commute to Gwynedd and the net out-commute from Anglesey were increased. This results in a *lower* dwelling requirement for Gwynedd and a *higher* requirement for Anglesey when compared to the 'core' scenarios.
- 5.7 When interpreting the jobs-led scenario outcomes, it is important to recognise that variant assumptions on economic activity, commuting and unemployment have an influence upon the forecast dwelling requirements. Whilst commuting sensitivities have been presented here, jobs growth linked to higher rates of economic activity (and/or lower unemployment) would lead to a lower dwelling growth outcome; reducing the requirement for net in-migration to satisfy labour force needs.

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 15) 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 16) 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>

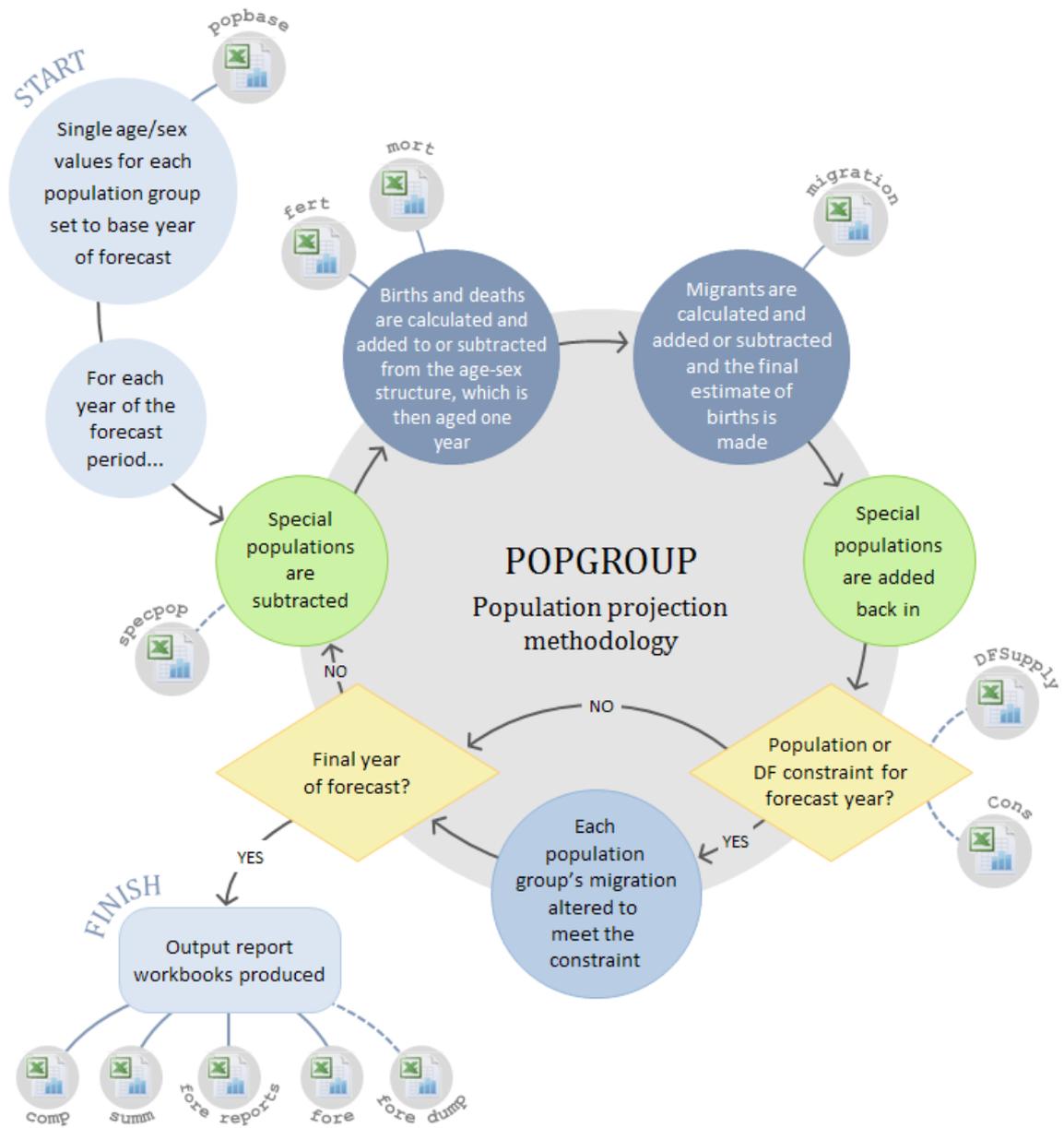
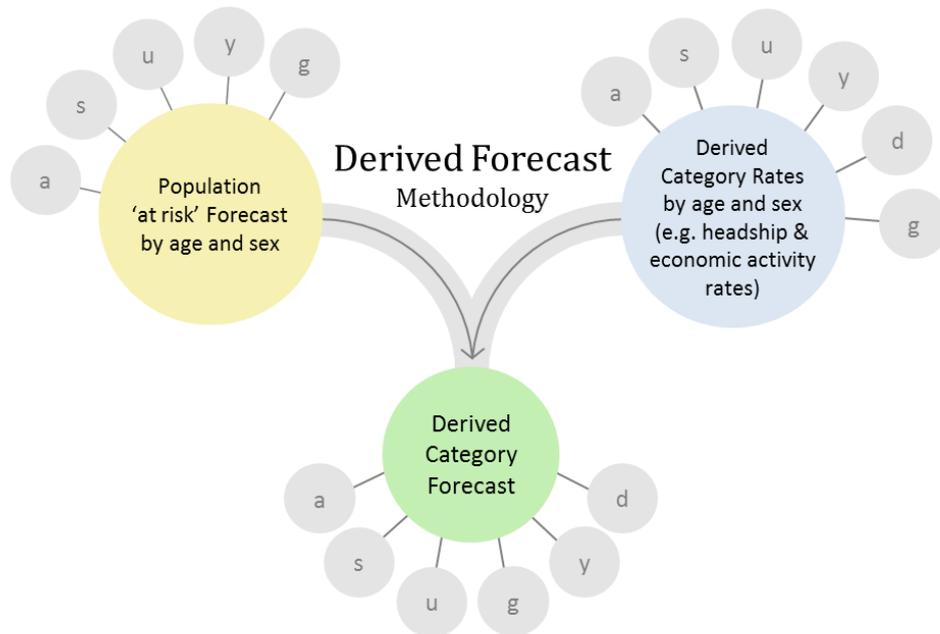


Figure 15: POPGROUP population projection methodology.



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

- 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 16: Derived Forecast (DF) methodology

Appendix B

Data Inputs & Assumptions

Introduction

- B.1 Edge Analytics has developed a suite of demographic scenarios for Gwynedd and Anglesey using POPGROUP. 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 and the WG population projections for Gwynedd and Anglesey, a series of assumptions have been derived which drive the scenario forecasts.
- B.2 In the case of Gwynedd, the area covered by the Snowdonia National Park has been excluded from the scenario analysis. This involved different configurations of the POPGROUP model for Gwynedd and for Anglesey; for Gwynedd, a ‘small-area’ configuration was used. Using Census Output Area population statistics, which provide population statistics at a ‘sub-district’ level, the scenarios were produced for the population that resides outside of the National Park.
- B.3 Where the assumptions differ between the two model configurations, details are provided..

Population, Births & Deaths

Population

- B.4 In each scenario, historical population statistics are provided by the mid-year population estimates for 2001–2012. 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 'WG-2011' scenario, future population counts are provided by single-year of age and sex to ensure consistency with the trajectory of the WG 2011-based population projections for Gwynedd and Anglesey.
- B.6 In the 'WG-2008' scenario (included for reference only on the scenario summary charts), future population counts are provided to ensure consistency with the trajectory of the WG 2008-based population projections for Gwynedd and Anglesey.

Births & Fertility

- B.7 Historical mid-year to mid-year counts of births from 2001/02 to 2011/12 have been sourced from ONS Vital Statistics.
- B.8 A 'local' (i.e. area-specific) age-specific fertility rate (ASFR) schedule, which measures the expected fertility rates by age in 2013/14, is included in the POPGROUP model assumptions. This is derived from the WG 2011-based local authority population projections. Long-term assumptions on changes in age-specific fertility rates are taken from the WG 2011-based local authority population projections.
- B.9 In combination with the 'population-at-risk' (i.e. all women between the ages of 15–49), the ASFR and future fertility rate assumptions provide the basis for the calculation of births in each year of the forecast period.

Deaths & Mortality

- B.10 Historical mid-year to mid-year counts of deaths from 2001/02 to 2011/12 have been sourced from ONS Vital Statistics.
- B.11 A 'local' (i.e. area-specific) age-specific mortality rate (ASMR) schedule, which measures the expected mortality rates by age in 2013/14, is included in the POPGROUP model assumptions. This is derived from the WG 2011-based local authority population projections. Long-term assumptions on changes in age-specific mortality rates are taken from the WG 2011-based local authority population projections.

- B.12 In combination with the 'population-at-risk' (i.e. the total population), the ASMR and future mortality rate assumptions provide the basis for the calculation of deaths in each year of the forecast period.

Migration

Migration: Gwynedd

- B.13 As outlined in the introduction to this Appendix, the POPGROUP model has been configured differently for Gwynedd, to enable the population that resides in the Snowdonia National Park to be removed from the scenario analysis.
- B.14 Other than Census statistics, there are no historical migration statistics available at a sub-district-level. Therefore, in the 'small-area' setup for Gwynedd, migration is calculated as the 'residual' of the population, after taking account of births and deaths. 'Net migration' equates to the cumulative impact of the four types of migration modelled within POPGROUP (in-migration, out-migration, immigration and emigration).
- B.15 Using the Census statistics, historical estimates of migration are derived at the 'small-area' level by comparing the migration implied by the schedules of rates with the pattern of migration in the Census statistics.
- B.16 In the case of the 'PG-10yr' scenario, a weighted average of the last ten years (2002/03–2011/12) of estimated migrant counts is used directly as input to scenario forecasts. In the case of the 'PG-5yr' scenario, a weighted average of the last five years (2007/08–2011/12) of estimated migrant counts is used directly as input to scenario forecasts. The weighted averages, calculated for each age-sex category, and separately for each of the four migration flows, are repeated for each year of the scenario forecast.
- B.17 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.18 The 'jobs-led' and 'dwelling-led scenarios calculates their own migration assumptions to ensure an appropriate balance between the population and the targeted increases in the number of

jobs/dwellings that are 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 jobs/dwelling target. The profile of internal migrants is defined by an ASMigR schedule, derived from a 10-year migration history.

Migration: Anglesey

Internal Migration

- B.19 In all scenarios for Anglesey, 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.20 In the 'WG-2011' scenario, future counts of internal migrants are specified, to ensure consistency with the official projection.
- B.21 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.22 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.23 The 'jobs-led' and 'dwelling-led' scenarios calculates their own internal migration assumptions to ensure an appropriate balance between the population and the targeted increases in the number of jobs/dwellings that are 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 jobs/dwelling target. The profile of internal migrants is defined by an ASMigR schedule, derived from the WG 2011-based population projections for Anglesey.
- B.24 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, international migration and internal out-migration),

where the schedule of rates is applied to the area-specific population. In the case of Anglesey, the reference population is defined as the total population of the districts where 70% of the in-migrants to Anglesey and Gwynedd have come from over the 2008/09 to 2012/13 period.

International Migration

- B.25 Historical mid-year to mid-year counts of total immigration and emigration from 2001/02 to 2011/12 for Anglesey 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.26 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.27 In all scenarios, future international migration assumptions are defined as 'counts' of migration. In the 'WG-2011' scenario, the international in- and out-migration counts are drawn directly from the official projections.
- B.28 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.29 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.30 In the 'jobs-led' scenario and 'dwelling-led' scenarios, international migration counts are consistent with the 'WG-2011' scenario. An ASMigR schedule of rates from the WG 2011-based population projections for Anglesey is used to distribute future counts by single year of age.

Household & Dwellings

Household Membership Rates

- B.31 In all but the dwelling-led scenarios, the household-growth implications of the population growth trajectory have been evaluated through the application of household assumptions from the WG 2011-based and 2008-based household projection models. In the dwelling-led scenarios, these assumptions are used to determine the population growth trajectory of a defined dwelling target. In the 'core' scenarios, membership rate assumptions from the WG 2011-based household model have been applied. In the household sensitivity scenarios, the WG 2008-based household membership rate assumptions have been applied.
- B.32 In the WG household model, household numbers are derived using 'membership rates', which are based on 12 household types, defined by size and presence of children. A membership rate is estimated for each age, sex household type combination, with rates in each age-group always summing to '1', to ensure a consistent proportional split of the population:
- 1 person
 - 2 person (no children)
 - 2 person (1 adult, 1 child)
 - 3 person (0 children)
 - 3 person (2 adults, 1 child)
 - 3 person (1 adult, 2 children)
 - 4 person (0 children)
 - 4 person (2 adults, 1+ children)
 - 4 person (1 adult, 3 children)
 - 5+ person (no children)
 - 5+ person (2+ adults, 1+children)
 - 5+ person (1 adult, 4+children)
- B.33 In the WG model, household totals are estimated as the product of household population projections (by age and sex) and household membership rates (by age, sex and household type) taking account of the population 'not in households' (people living in communal establishments).

Communal Population Assumptions

- B.34 Household projections in POPGROUP exclude the population 'not-in-households' (i.e. the communal/institutional population). These data are drawn from the WG 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. The same communal population assumptions have been used in all scenarios (both core and sensitivity).
- B.35 The 2011 communal population statistics for both Gwynedd and Anglesey are shown in Figure 17. For Anglesey, the majority of communal establishment residents in 2011 were in the elderly age groups. For Gwynedd, nearly 50% of the communal establishment residents in 2011 were aged 19–24 (i.e. of student age).

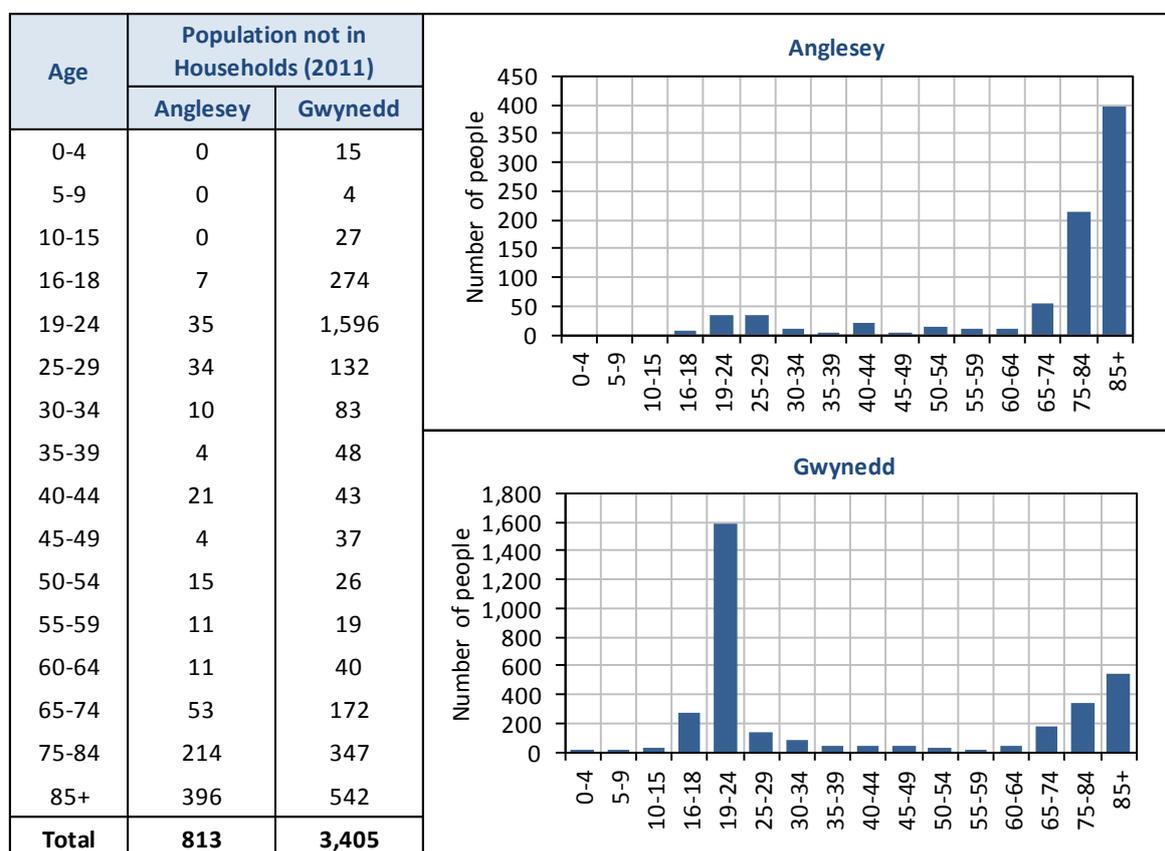


Figure 17: Gwynedd and Anglesey communal population statistics (source: WG). Note that for ages 0–74, these figures are fixed throughout the forecast period. For ages 75–85+, the communal population is calculated as a percentage of the population; therefore, the number of people aged 75–85+ in communal establishments will vary throughout the forecast period.

- B.36 In POPGROUP, for ages 0–74, the number of people in each age group ‘not-in-households’ is kept fixed throughout the forecast period. For ages 75–85+, the *proportion* of the population ‘not-in-households’ is recorded. Therefore, the population not-in-households for ages 75–85+ varies across the forecast period depending on the size of the population.
- B.37 The dwelling numbers derived through POPGROUP do not include the housing requirement of any of the people included in the population ‘not-in-households’ statistics, as they are excluded from the household calculation.

Vacancy Rate

- B.38 The relationship between households and dwellings is modelled using a ‘vacancy rate’, sourced from the 2011 Census. The vacancy rate includes second homes and holiday lets.
- B.39 Using the vacancy rate, the ‘dwelling requirement’ of each household growth trajectory has been evaluated (apart from in the dwelling-led scenarios where the vacancy rate is used in combination with the household membership rate assumptions to determine the population growth of a defined dwelling target).
- B.40 The following vacancy rates have been applied (in both the core and sensitivity scenarios) and are fixed throughout the forecast period:
- Gwynedd = 12.2%
 - Anglesey = 10.5%

Labour Force & Jobs

B.41 In all but the jobs-led scenarios, 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. In the jobs-led scenarios (both core and sensitivity), 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 Gwynedd (Figure 18) and Anglesey (Figure 19), rates of economic activity decreased for men in the younger age groups between the 2001 and 2011 Censuses. For the other male age groups, the economic activity rates increased over the historical period. For women in both Gwynedd and Anglesey, rates of economic activity increased across all age groups. The greatest changes were predominantly seen in the older age groups for both sexes.

Gwynedd: Economic Activity Rate Comparison

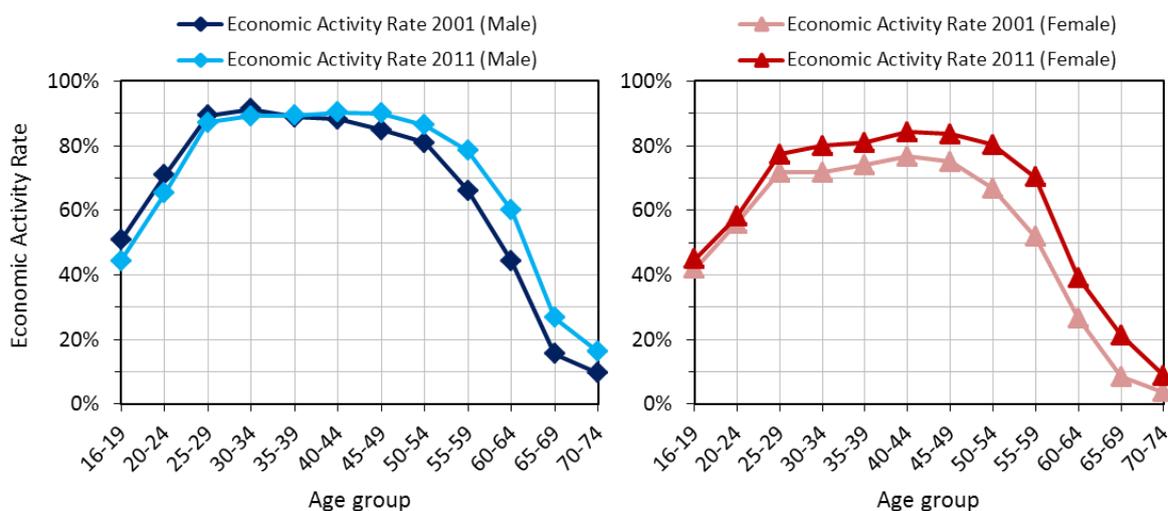


Figure 18: Gwynedd economic activity rates: 2001 and 2011 Census comparison (source: ONS)

Anglesey: Economic Activity Rate Comparison

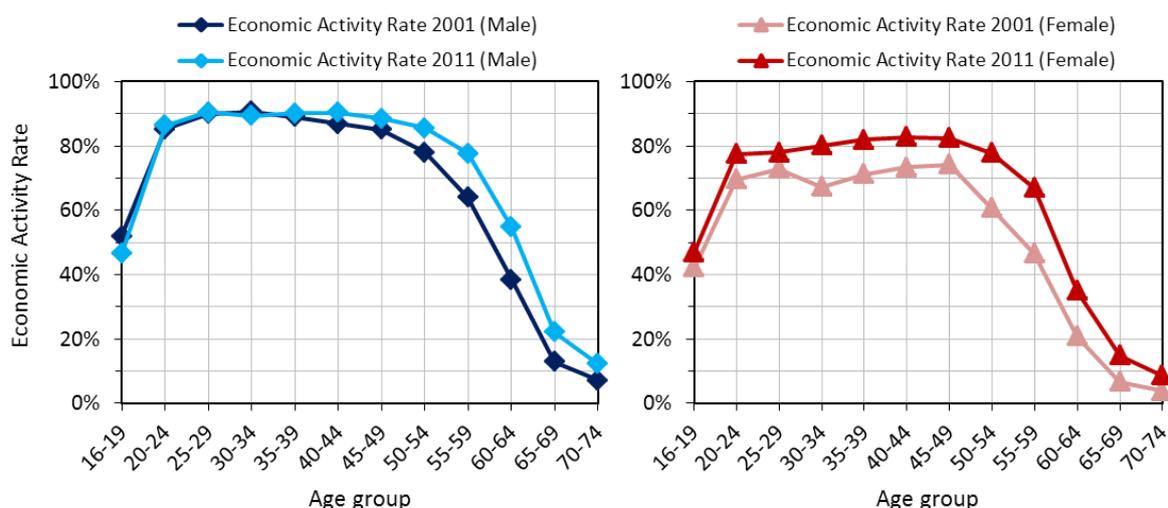


Figure 19: Anglesey economic activity rates: 2001 and 2011 Census comparison (source: ONS)

- B.44 In all scenarios, changes have been made to the age-sex specific economic activity rates to take account of changes to the State Pension Age (SPA) and to accommodate potential changes in economic participation which might result from an ageing but healthier population in the older labour-force age-groups. 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 2028¹³.
- B.45 ONS published its last set of economic activity rate forecasts from a 2006 base¹⁴. These incorporated an increase in SPA for women to 65 by 2020 but this has since been altered to an accelerated transition by 2018 plus a further extension to 66 by 2020. Over the 2011–2020 period, the ONS forecasts suggested that male economic activity rates would rise by 5.6% and 11.9% in the 60-64 and 65-69 age groups respectively. Corresponding female rates would rise by 33.4% and 16.3% (Figure 20).

¹³ <https://www.gov.uk/state-pension>

¹⁴ 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>

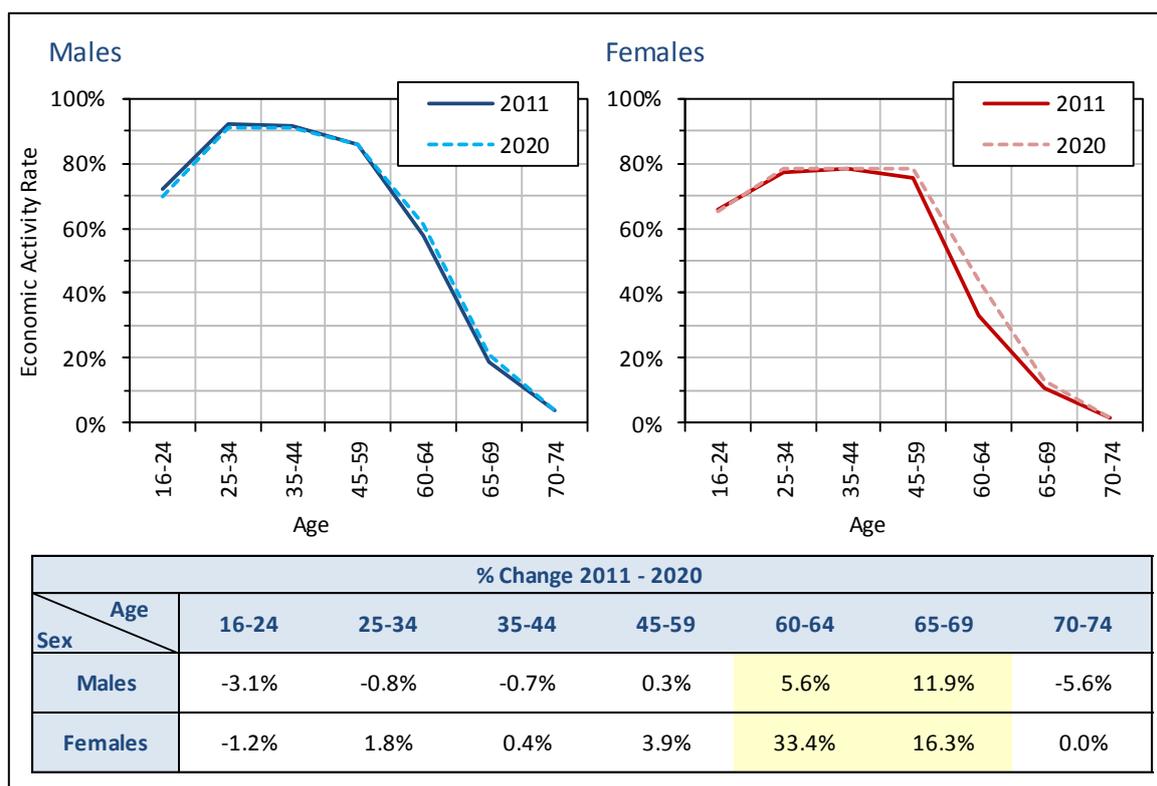


Figure 20: ONS Labour Force Projection 2006 – Economic Activity Rates 2011–2020. Source: ONS

B.46 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.47 Note that the rates for women in the 60–64 age and 65–69 age-groups are higher than the original ONS figures (Figure 20), 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.

B.48 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 18 and Figure

19), these 2011–2020 rate increases (Figure 21 and Figure 22) would appear to be relatively conservative assumptions.

Gwynedd: Economic Activity Rate Adjustments 2011–2020

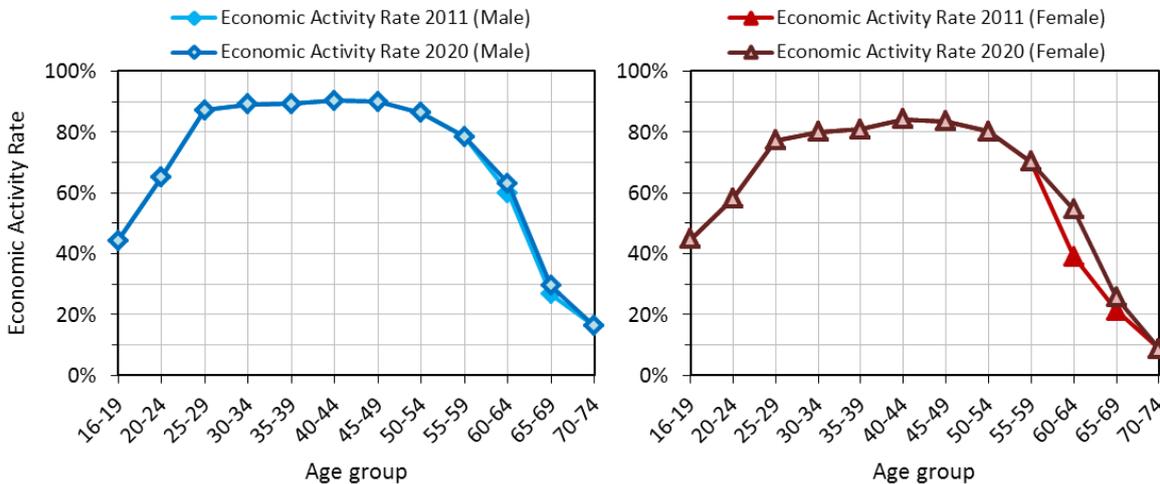


Figure 21: Gwynedd economic activity rate profiles, 2011 and 2020 comparison.

Anglesey: Economic Activity Rate Adjustments 2011–2020

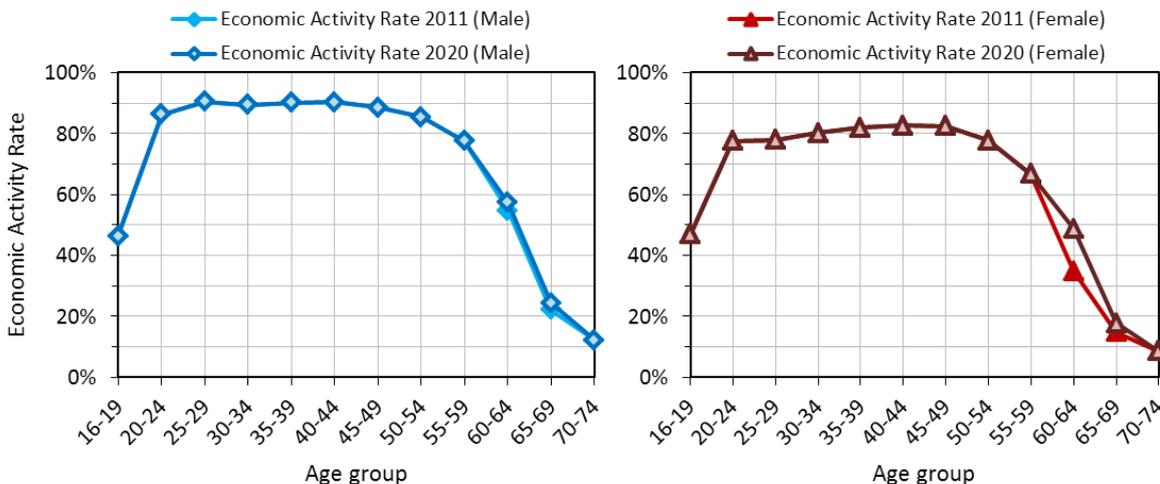


Figure 22: Anglesey economic activity rate profiles, 2011 and 2020 comparison.

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.
- B.50 The same unemployment rate profile is applied in the 'core' and 'sensitivity' scenarios.
- B.51 For Gwynedd, an average 'recession' unemployment rate (2008–2012) of 5.6% is applied in 2012. The unemployment rate then incrementally decreases to the 'pre-recession' average (2004–2007) of 3.9% by the end of the forecast period (i.e. 2026). For Anglesey, the same approach is taken, with the unemployment rate decreasing from 6.0% to 5.3% over the same time period (Table 18).
- B.52 These improvements in the unemployment rate provide an appropriate basis for what is likely to be a gradual recovery from current economic conditions.

Table 18: Historical unemployment rates 2004–2012 for Gwynedd and Anglesey

Unemployment Rate (%)	2004	2005	2006	2007	2008	2009	2010	2011	2012	Recession Average (2008–12)	Pre-Recession Average (2004–2007)
Gwynedd	3.8	3.7	2.6	5.5	4.6	5.6	5.7	6.3	5.6	5.6	3.9
Anglesey	5.0	4.9	6.2	5.0	7.0	7.3	4.6	6.1	5.1	6.0	5.3

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

Commuting Ratio

- B.53 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.54 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.55 Using a combination of statistics from the 2011 Census (including ‘Workday Population’ statistics), a 2011 commuting ratio of 0.93 has been derived for Gwynedd and a ratio of 1.26 for Anglesey (Table 19). For Gwynedd, over the 2001–2011 decade, the commuting ratio decreased from 0.96 to 0.93, indicating an increased net in-commute. For Anglesey, the commuting ratio increased from 1.19 to 1.26, indicating an increased net out-commute.
- B.56 In the ‘core’ scenarios, fixed commuting ratios (2011 values) have been used throughout the forecast period, i.e. 0.93 for Gwynedd and 1.26 for Anglesey.

Table 19: 2001 and 2011 commuting ratio comparison for Gwynedd and Anglesey

Gwynedd		2001 Census	2011 Census
Workers	<i>a</i>	46,068	51,063
WorkDay Population			125,530
<i>minus those not in Work</i>			37,850
<i>minus 0-15 yr olds</i>			20,951
<i>minus 75+</i>			12,010
Jobs	<i>b</i>	48,164	54,719
Commuting Ratio	<i>a/b</i>	0.96	0.93
Anglesey		2001 Census	2011 Census
Workers	<i>a</i>	25,968	29,423
WorkDay Population			63,705
<i>minus those not in Work</i>			21,395
<i>minus 0-15 yr olds</i>			11,861
<i>minus 75+</i>			7,072
Jobs	<i>b</i>	21,850	23,377
Commuting Ratio	<i>a/b</i>	1.19	1.26

Note: In the case of the 2001 Census commuting ratio, ‘workers’ and ‘jobs’ are both derived from aggregating the travel-to-work statistics. The number of workers includes all those who are in employment. For the 2011 commuting ratio, the number of jobs has been calculated by subtracting the number of residents not in employment and the number of residents aged 0–15 and those aged 75+ from the district’s workday population.

- B.57 In the jobs-led sensitivity scenarios, the commuting ratios have been altered over the forecast period (i.e. 2012–2026). This is in recognition of the fact that the commuting patterns will likely alter with jobs growth in both districts. Two sensitivities have been assessed.

- B.58 In the first sensitivity (**'SENS1'**), the commuting ratios are incrementally altered from their 2011 values, returning to their 2001 Census values by 2026. In the case of Gwynedd, the commuting ratio is incrementally *increased* from 0.93 to 0.96 between 2012 and 2026. For Anglesey, the commuting ratio is incrementally *reduced* from 1.26 to 1.19.
- B.59 In the second sensitivity (**'SENS2'**), the change seen over the 2001–2011 decade is continued over the forecast period.. In the case of Gwynedd, the commuting ratio is incrementally *reduced* from 0.93 to 0.90 between 2012 and 2026. For Anglesey, the commuting ratio is incrementally *increased* to from 1.26 to 1.33.

Students

- B.60 Students are included within the migration flows to and from Anglesey and Gwynedd. In the POPGROUP model, future migration assumptions are calculated from the historical migration data (in the 'PG-5yr' and 'PG-10yr' scenarios from a 5-year and 10-year history respectively). Therefore, where students have been included in the historical migration data (in the Patient Register (PR), the National Health Service Central Register (NHSCR) and Higher Education Statistics Agency (HESA)), these flows will be accommodated within the future assumptions.
- B.61 A proportion of students are excluded from the household calculation through the population 'not-in-household' statistics (i.e. the 'communal' population, see paragraphs B.34 to B.37). Those students that live in accommodation provided solely for students during term-time are therefore not included in the dwelling requirement calculations.