

Technical Appendix to More homes for more people:  
advice to Ministers on housing levels to be considered in regional plans



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# Foreword

These technical appendices have been prepared in support of NHPAU's most recent update of its regional housing supply range advice – More homes for more people: advice to Ministers on housing levels to be considered in regional plans.

The NHPAU is tasked with providing an analysis of medium- and longer-term housing supply requirements. Our analysis is designed to provide planners and decision makers with an outcomes based approach to meeting their obligations in planning for housing. It enables strategic spatial planning decisions to be based on this understanding of longer-term implications.

Two separate methodologies are used by NHPAU to derive recommended housing supply ranges for testing in English regions. They draw on different sets of evidence. The first, a demographic approach, is outlined in appendix 1. It uses household projections and estimates of 'constrained demand'. The second, a housing affordability approach, is outlined in appendix 2. It uses a sophisticated econometric model, the CLG/Reading University model of the housing market. This model forecasts affordability outcomes as a function of expected economic trends and housing supply scenarios.

These appendices go into a reasonable amount of technical detail concerning the methods and assumptions that lie behind them. They also discuss alternative assumptions used in different scenarios and present results for these.

Readers interested in further information are invited to contact the Unit.

# Technical Appendix 1: Demographic Method

## Key Points

1. The demographic method is in line with the traditional approach used by planning authorities when preparing housing plans. It uses a simple formula:

$$\begin{array}{c} \boxed{\text{growth in number of households}} \\ + \\ \boxed{\text{unmet need}} \\ + \\ \boxed{\text{demand for second homes}} \\ + \\ \boxed{\text{vacancies in new supply}} \\ = \\ \boxed{\text{required housing supply}} \end{array}$$

2. The demographic methodology is largely unchanged compared to the 2008 advice except for the use of up-to-date data sources.
3. This appendix provides details for each of the components used in the demographic method along with a break down of results. The differences between the methodology used to inform the 2009 and 2008 versions of the advice are drawn out. To avoid duplication Technical Appendix B of the 2008 advice note is referenced where appropriate.<sup>1</sup>
4. Included is a discussion of household projections as a measure of household growth and whether the recession is likely to influence levels of net migration to England. Each of the other components is considered in turn. A summary of the demographic method results can be found at table 8.

## Household Projections

5. As with the 2008 advice, the official CLG household projections are used as an estimate of the future growth in household numbers. These projections are the most widely used estimates of future households available to national and local planners and to housing market modellers and are recognised as such in Planning Policy Statement 3 paragraph 33. They are a trend-based projection quality assured by an independent advisory group.<sup>2</sup>
6. The 2008 advice incorporated what were then the most recent official household projections – the CLG revised 2004-based household projections. These have since been superseded by the 2006-based set released in March 2009.
7. The CLG household projections are based on the Office for National Statistics population projections which include trend information on births, deaths and migration and assumptions informed by an expert panel.<sup>3</sup> The 2006-based set therefore includes more up-to-date trend information than the 2004-based set which informed the 2008 advice. It should be noted that future household growth increased substantially between the projections. This increase reflects the fact that people are living longer and birth rates are higher than was previously the case.<sup>4</sup> The impact this has on household growth varies from region to region.

<sup>1</sup> 2008 Advice: NHPAU (2008) *Meeting the housing requirements of an aspiring and growing nation: taking the medium- and long-term view*, Fareham. Access here: <http://www.communities.gov.uk/nhpau/keypublications/reports/meetinghousingrequirements/>

<sup>2</sup> 2006-based household projection results and overview: <http://www.communities.gov.uk/documents/statistics/pdf/1172133.pdf>; methodology report: <http://www.communities.gov.uk/documents/statistics/pdf/1172197.pdf>

<sup>3</sup> 2006-based population projection results and methodology: [http://www.statistics.gov.uk/downloads/theme\\_population/pp2no26.pdf](http://www.statistics.gov.uk/downloads/theme_population/pp2no26.pdf)

<sup>4</sup> Detailed discussion here: '4. Comparison with 2004-based projections' of ONS (2008) National Population Projections, 2006-based, Series PP2 No 26. access here: [http://www.statistics.gov.uk/downloads/theme\\_population/pp2no26.pdf](http://www.statistics.gov.uk/downloads/theme_population/pp2no26.pdf)



8. The new projections are also based on a better understanding of the patterns of migration both to this country and between regions. The combined effect is to increase population and household growth more in some regions – most notably Yorkshire and the Humber, the North East and the East Midlands – than in others – particularly London and the South East compared with previous versions of the projections.
9. As was the case with the methodology and sources underpinning the 2008 advice, NHPAU has sought to err on the side of caution when devising our supply range advice. In 2008 this meant opting for the official revised 2004-based projections rather than a set of projections that the NHPAU had derived from 2006-based population projections.<sup>5</sup> In 2009 this has meant deriving our own projection which takes a cautious stance on future international net migration given the effect the recession may have on it.
10. As the latest official projections are 2006 based they pre-date the current recession. Some have argued that as a consequence they over-estimate household formation: that economic pressures will prevent people coming together to form households.
11. In the long term, Bramley et al (2005) found the impact of economic variables on household formation was not a dominant factor.<sup>6</sup> They proposed that for each 1 per cent increase in income, household formation rates increased by 0.15 per cent and that rates decreased slightly as housing costs increased. They concluded that the main drivers of household formation are demographic factors such as age, relationships and children.<sup>7</sup>
12. In the short term household formation may be constrained due to difficult economic conditions as people have less access to credit and optimism for the future is low. This, coupled with a lack of available housing either in the market or affordable housing sectors, will mean that the backlog of unmet housing need will continue to grow.
13. The need for families and individuals to be decently housed will not go away. All that will happen is that the backlog of unmet housing need will grow. This will eventually show itself as increased pressure on the housing market when better economic conditions are re-established.
14. It should also be noted that the household projections are informed by over three decades of demographic trend data on household formation rates which includes the effects from several recessions and booms.<sup>8</sup> As such, they provide a stable long-term view of future household growth – of particular use for planners who are interested in meeting long-term requirements.

### Household formation and the recession

### Migration

#### *Evidence*

15. The economic downturn and the subsequent ongoing recession are likely to result in lower levels of net migration to the UK and England than would have otherwise been expected. As such, future need for housing will also be lower.

<sup>5</sup> Refer to 2008 Advice for more detail: para B12-B34

<sup>6</sup> Bramley, G., Karley, N.K. and Watkins, D. (2006) *Local housing need and affordability model for Scotland – Update (2005 based)*, a report to the Scottish Executive and Communities Scotland

<sup>7</sup> A conclusion also found in: Peterson, W., Pratten, C. and Tatch, J. (1997) *An economic model of the demand and need for social housing: Technical report of a feasibility study*, Report to the DETR

<sup>8</sup> CLG, EXAM24 Household Projections: Presentation to WM EIP, Sub-Matter 3A 6th May, 24 April 2009

16. The leading source of evidence on migration – the ONS long-term international migration release – is not yet available to confirm or otherwise the view that net migration has decreased against expectations.<sup>9</sup> However, early indications are that net international migration has dropped off.
17. Provisional International Passenger Survey (IPS) data showed net migration to the UK of 162,000 people for the year ending June 2008 compared with 240,000 people assumed in the 2006-based population projections for the same time period.<sup>10 11</sup> The difference must be interpreted with some caution as we would generally expect the Provisional IPS data to under-report the net migration effect by approximately 20,000 compared with final figures (when they become available).<sup>12</sup> However, this still suggests that net migration to the UK could be around 60,000 less than that assumed in the ONS population projections for 2007/08.
- Economic Growth forecasts and migration*
18. One year's data is not a basis for establishing a trend; however, if we consider this evidence alongside emerging analysis of the drivers of international migration we can form a picture of the likely pattern of future net international migration.
19. The NHPAU has in particular taken account of the April 2009 National Institute of Economic and Social Research (NIESR) report for CLG which modelled the impacts of different economic growth scenarios for the UK and world economies on migration inflows to the UK.<sup>13</sup> This report showed that the relative economic performance of the UK compared with other countries is an important driver of international migration. It showed that different assumptions about future economic performance have markedly different effects on likely levels of migration inflows.
20. The NIESR modelling finds that if competing economies are stronger relative to the UK they would attract migrants who may under other circumstances have remained in or been attracted to work in the UK. It also finds that those from different migrant source countries respond differently to changing economic circumstances e.g. those from Accession 8 countries such as Poland and Latvia are likely to respond quickly to changing economic conditions while those from Old Commonwealth countries such as Australia are likely to respond more slowly.
21. The key conclusion gained from the NIESR report is that future levels of net migration to the UK will be lower than previously thought. As with any model, the scale of this change fluctuates depending on the relative economic growth assumptions deployed. Now more than ever is a difficult time to make robust assumptions about future economic growth.<sup>14</sup>

<sup>9</sup> The ONS long-term international migration release (MN series), formerly called total international migration, for the full year 2008 is scheduled for release in November 2009. Access here: <http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=507>

<sup>10</sup> Provisional International Passenger Survey data, ONS <http://www.statistics.gov.uk/statbase/product.asp?vlnk=15240>

<sup>11</sup> Assumptions broken down here: <http://www.gad.gov.uk/Demography%20Data/Population/2006/methodology/wmigrationc.xls>

<sup>12</sup> [http://www.statistics.gov.uk/downloads/theme\\_population/Provisional\\_IPS\\_vs\\_TIM.pdf](http://www.statistics.gov.uk/downloads/theme_population/Provisional_IPS_vs_TIM.pdf)

<sup>13</sup> National Institute of Economic and Social Research (2009) *Projections of migration inflows under alternative scenarios for the UK and world economies: Economics Paper 3* a report for CLG <http://www.communities.gov.uk/publications/communities/projectionsmigration>

<sup>14</sup> As represented in the scale of change between the NIESR migration scenarios from July 2008 and January 2009.

22. The NIESR modelling points to a decrease in international net migration of the order of that included in the Office for National Statistics (ONS) 2006-based low migration variant population projection.<sup>15</sup> This assumes that long-term net migration to the UK drops by 60,000 people to 130,000 per year and to 112,000 per year to England.

#### *Will migration return to long-run trend?*

23. The next question is – how long (or if) the relative economic performance of the UK will continue to constrain net migration compared to the latest official principal projection which was informed by the available trend data and expert views at the time?

24. In a March 2009 report the Migration Policy Institute (MPI), supported by the Migration Research Unit at University College London, suggest that the underlying drivers of migration to the UK – including labour demand in high- and low-skilled jobs, existing migrant networks and demographic change – will remain strong.<sup>16</sup>

25. This report points out that migrant inflows are more sensitive to economic circumstances in the UK than outflows. The experience from previous recessions on migrant flows is that:

- inflows of foreign-born migrants to the UK are lower for a limited period
- outflows of foreign-born migrants to the UK seemed to have decreased during periods of high unemployment
- British nationals have tended, at least in the 1970s and 1980s, to return home in periods of rising unemployment.

26. Also, the report suggests that the current recession may see slower emigration among British nationals due to the lock-in effects of a depressed housing market, the depreciating sterling and the devaluation of pension funds of people nearing retirement age.

27. The NHPAU Board are of the view that the relative economic performance of the UK will more than likely return to trend over the medium term and, as a consequence, so will levels of net migration to the UK.

#### **Converting economic assumptions into households**

28. In previous sections we have considered the likely affect of the recession on future levels of migration to the UK. We noted that it would be appropriate to use the 2006-based low migration variant projection as representative of the likely reduced levels of future migration due to economic affects. We also noted that it was our view that the economy and therefore levels of migration would more than likely return to trend over the medium to long term. We now pull these findings together to produce an NHPAU household projection.

#### *Deriving a low migration household projection*

29. We know that the experience of migration is different across age/sex groups; we also know that the regions have different age/sex structures. Therefore to be of value to regional stakeholders it is important to be able to relate the low migration projection to the characteristics of each region.

<sup>15</sup> CLG, EXAM24 *Household Projections: Presentation to WM EIP, Sub-Matter 3A 6th May, 24 April 2009*

<sup>16</sup> Migration Policy Institute (2009) *Immigration in the United Kingdom: The recession and beyond*, a report for the Equality and Human Rights Commission <http://www.migrationpolicy.org/pubs/Immigration-in-the-UK-The-Recession-and-Beyond.pdf>

30. The ONS low migration variant population projection and the corresponding CLG household projection are produced at an England level only. A straight forward approach has been used to produce a region-level low migration projection which assumes that the migration experience of age/sex groups at the England level is generic across the regions:

- ‘low migration factors’ have been produced for each of the five-year age and sex groups of the household representative for each year of the projection period by dividing the national low migration variant projection for each group by the corresponding principal projection; and then,

- applying these factors to the region level principal household projections by age and sex group to produce a low migration variant.

31. It could be argued that account should be taken of how changes to each region’s economic structure and to their international migration experience may affect need and demand for housing. A lack of available data makes this difficult if not impossible to quantify.

32. Table 1 shows a comparison between the derived low migration variant and CLG principal household projections.

**Table 1: Derived low migration variant household projection compared to the principal projection – average annual change, 2006 based**

**England regions,  
2008-2031 (24 years)**

**households**

	<b>principal</b>	<b>derived low migration</b>	<b>Diff to principal</b>
North East	8,300	6,900	-17%
North West	27,800	23,800	-14%
Yorkshire & Humber	30,200	26,900	-11%
East Midlands	27,700	24,900	-10%
West Midlands	21,200	18,200	-14%
East of England	33,800	30,400	-10%
London	34,200	29,000	-15%
South East	39,700	35,000	-12%
South West	31,900	28,800	-10%
England	254,800	223,800	-12%

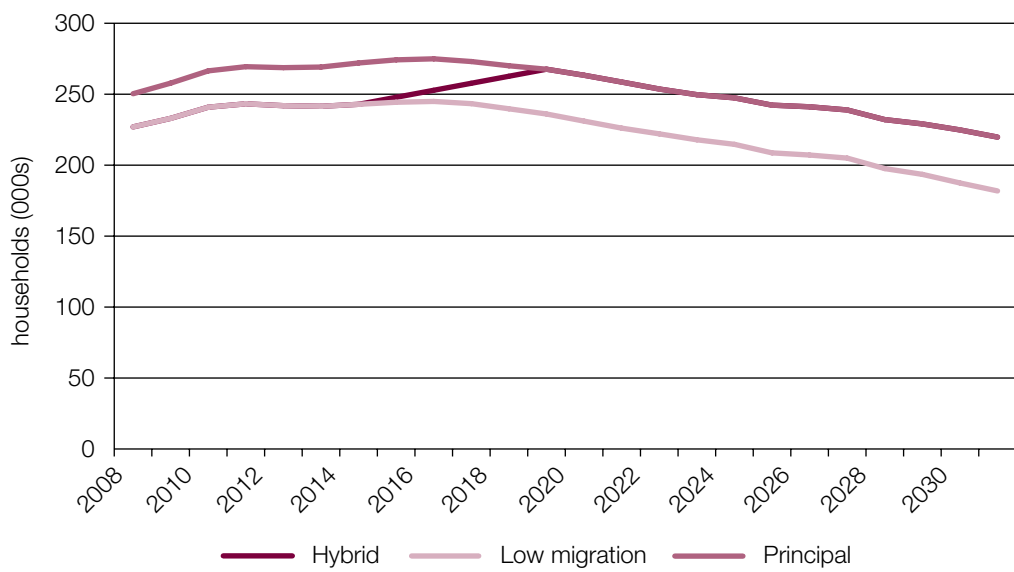
*Totals may not add due to rounding*

*Source: NHPAU analysis, CLG*

### NHPAU hybrid projection

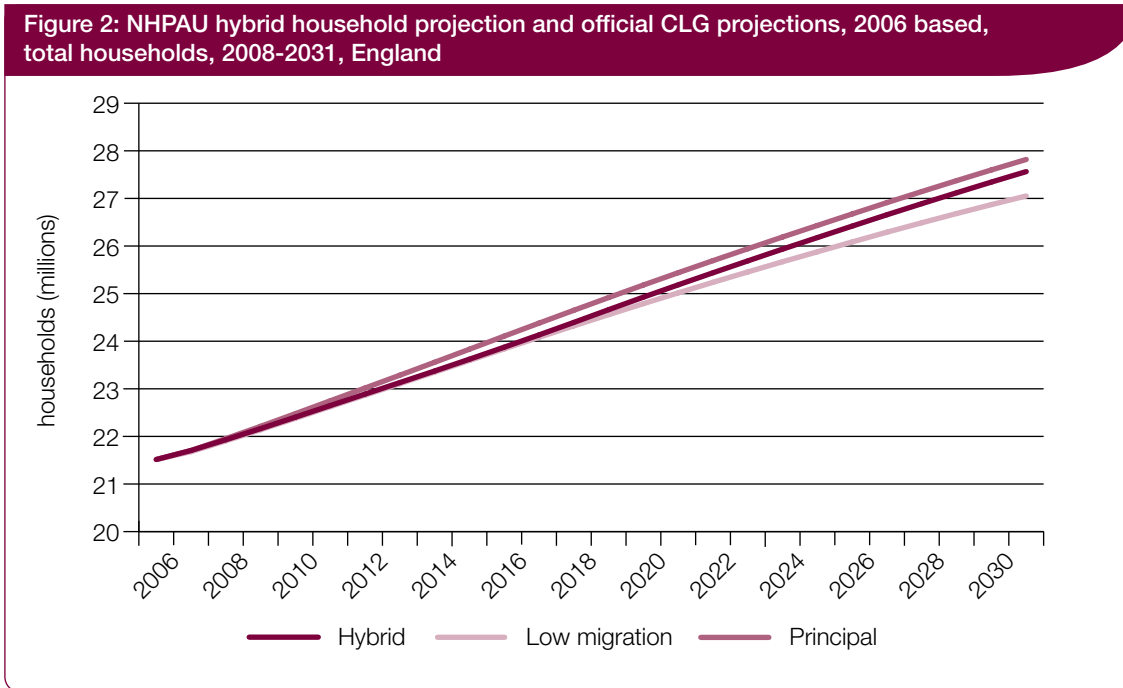
33. For the purposes of updating our advice the NHPAU has assumed that overall household growth will follow the low migration variant to 2014 before gradually returning to trend over the following five years (figure 1).

**Figure 1: NHPAU hybrid household projection and official CLG projections, 2006 based, annual change, 2008-2031, England**



Source: NHPAU analysis, CLG

34. As expected the hybrid projection sits between the official principal and low migration variant sets for the period up to 2031 (figure 2).



Source: NHPAU analysis, CLG

35. The proportionate difference between the hybrid and principal projections varies between regions for the same reason as the derived low migration projection (table 2).

**Table 2: NHPAU hybrid household projection, derived low migration variant projection and the official CLG principal projection – average annual change, 2006 based**

	<b>principal</b>	<b>households</b>	
		<b>hybrid</b>	<b>Diff to principal</b>
England regions, 2008-2031 (24 years)			
North East	8,300	7,700	-7%
North West	27,800	26,300	-5%
Yorkshire & Humber	30,200	29,000	-4%
East Midlands	27,700	26,800	-3%
West Midlands	21,200	20,100	-5%
East of England	33,800	32,700	-3%
London	34,200	32,400	-5%
South East	39,700	38,200	-4%
South West	31,900	30,900	-3%
England	254,800	244,100	-4%

Source: NHPAU analysis, CLG

36. To ensure its ongoing relevance to regional and local planners the supply range advice is presented over the period 2008-2031 rather than for 2008-2026 used in the 2008 advice. For comparison, table 3 shows the household projections used in the 2008 advice (revised 2004 based) compared to the 2006-based sets for the period 2008-2026.
37. The average annual change for the shorter period of 2008-2026 is higher than for 2008-2031. This is a consequence of an ageing population. Population growth is not expected to be as great after 2021 due to a large projected rise in the number of deaths reflecting the large numbers born after the Second World War and during the 1960s baby boom.<sup>17</sup>
38. Household growth implied by the NHPAU projection over the period 2006 to 2026 is 5 per cent lower than the 2006-based principal projection and 10 per cent higher than the 2004-based projection we used in our 2008 advice.

**Table 3: NHPAU hybrid household projection, derived low migration variant projection and the official CLG principal projection – average annual change, 2006 based**

<b>England regions, 2008-2026 (19 years)</b>	<b>households</b>			
	<b>Rev2004- based principal</b>	<b>2006-based principal</b>	<b>derived low migration</b>	<b>hybrid</b>
North East	6,100	8,600	7,300	7,900
North West	25,700	28,800	24,900	26,900
Yorkshire & Humber	23,300	30,800	27,600	29,300
East Midlands	22,100	28,400	25,800	27,200
West Midlands	18,400	21,800	18,900	20,500
East of England	29,900	34,600	31,300	33,200
London	33,000	35,400	30,200	33,100
South East	36,000	40,600	36,200	38,700
South West	28,800	32,600	29,700	31,300
England	223,300	261,600	231,900	248,100

Source: NHPAU analysis, CLG

<sup>17</sup> [http://www.statistics.gov.uk/downloads/theme\\_population/pp2no26.pdf](http://www.statistics.gov.uk/downloads/theme_population/pp2no26.pdf)



## Unmet Housing Need

39. Growth in projected households has consistently exceeded housing supply over previous decades and has resulted in an unmet need for housing.<sup>18</sup> In determining housing supply ranges a view needs to be taken about the scale of unmet housing need and how this will be tackled.
40. Traditionally measures of unmet housing need have included allowances for:
- sharing households, overcrowding and concealed households;
  - non-dependent children; and
  - homelessness including those in temporary accommodation.
41. An analysis of this type estimates unmet housing need at a point in time does not take into account future requirements caused by not meeting projected housing need. Regions should consider arising unmet need as they monitor housing supply over the plan period.
42. The methodology used to calculate unmet housing need in the 2009 demographic method is the same as that used in 2008 apart from two detailed changes – see paragraphs 52 and 55. Neither has a significant impact on the results. One consequence of the changes is that the Survey of English Housing is used as the single data source for all aspects of unmet need apart from homelessness.
43. **As in the 2008 advice cases of unmet need for housing are identified; we then use a series of cautious assumptions to calculate the housing requirement – it is this distilled estimate that forms part of the demographic method result.**

44. It is important to note that households that qualify for more than one aspect of unmet need (e.g. a concealed household living in overcrowded conditions) are only counted once in the total.
45. Each category of unmet need for housing is considered in turn.

## Sharing households

46. Sharing households are defined as those in a dwelling with at least one other household (including single people households) that share basic facilities e.g. kitchen and bathroom.
47. As in the 2008 advice it is assumed that sharing households need their own home. The assessment is on the basis that one household remains in the existing dwelling and that all others are re-housed in separate dwellings. This is calculated by examining patterns of sharing over three years – 2005/06 to 2007/08 – and applying an average weight to the number of shared dwellings based on the number of households in shared dwellings in the North, Midlands and the South, and London.<sup>19</sup>
48. It is then assumed that only a portion of the identified unmet need require a home, as some are content to remain in shared accommodation. As with the 2008 advice only 60 per cent of households found to be in need are assumed to require their own self contained accommodation.<sup>20</sup> This draws upon work by Alan Holmans which was based on a 1990 shared accommodation survey.<sup>21</sup> It is hoped that future advice will incorporate more up-to-date proportions. To this end NHPAU has worked with CLG to augment an existing question in the English Housing Survey to enable this.

<sup>18</sup> Barker, K. (2004), *Review of Housing Supply*, ODPM

<sup>19</sup> Three area groupings – North (North East, North West, Yorkshire and Humber), Midlands and the South (West Midlands, East Midlands, East of England, South East and South West), London – and a three year average were used due to the small sample size in the SEH.

<sup>20</sup> Refer to 2008 Advice for more detail: para B44

<sup>21</sup> Office of Population Censuses and Surveys (1993), *SN 2965 – Shared Accommodation in England, 1990*, HMSO.

### **Concealed households and non-dependent children**

49. Concealed households are potential households; they are distinct family units such as married/cohabiting couples with or without children, lone parents, or singles that live within a wider household.

50. The method used to determine the number of homes required to meet this portion of unmet need differs between concealed households including two or more people and single concealed households. The method to estimate the homes required due to unmet need from non-dependent children is the same as that for single concealed households.

#### *Concealed households with two or more people*

51. As in the 2008 advice, and as for sharing households, only 60 per cent of households found to be in need are assumed to require their own home.

#### *Single concealed households and non-dependent children*

52. In the 2008 advice unmet need for housing from non-dependent children and single concealed households was considered separately as part of an estimate of 'other constrained demand'. A change included in the 2009 advice allows a single data source – the Survey of English Housing – to be used for all elements of unmet need (except for homelessness covered in the next section). This change simplifies the methodology and eliminates any chance of double counting.

53. As in the 2008 advice our view remains that it is not appropriate to take a blanket approach to assessing unmet need from single households and non-dependent children as there are substantial numbers within these categories that are content to live with others. In estimating the number of homes required to meet the needs of people in these categories we have:

- excluded students – they are assumed to be happy living with others.
- excluded people aged over 50 on the basis that they are likely to be a relative or carer who is unlikely to want to move.
- excluded instances where the household reference person is satisfied with the standard of their accommodation.<sup>22</sup>

54. An additional home is deemed to be required for each single household or non-dependent child apart from those that fall in any of the above excluded categories. However, only after each case has been considered as part of the analysis of overcrowding – see the next section.

### **Overcrowding**

55. A small change from the 2008 advice is that the 'persons per room' measure no longer contributes to the measure of overcrowding. The aim of this change is to better align our advice to the SHMA guidance and the existing practice of stakeholders. The effect of this change on the overall number of households identified as in need is small as most households that are overcrowded on the 'persons per room' measure that are not overcrowded on the bedroom standard will qualify for one of the other categories of need.

<sup>22</sup> Draws upon work by Palmer e.g. Palmer, G. (2004) *The numbers of hidden homeless and other people in housing need*, New Policy Institute

*Single family households (without non-dependent children)*

56. To provide an additional home for every overcrowded household would overestimate the requirement for extra homes as the home vacated by the overcrowded household would become available for another household. For example, consider the case of a couple with two young children living in a one bedroom flat. They move to a two bedroom house and their flat is occupied by a newly-formed couple. Only one additional home is needed for the two households in this example and the newly formed household would have been counted in the estimate of household growth. It is therefore not necessary to count the overcrowded household in estimating the number of additional homes required.
57. To put this another way, the assumption is that an overcrowded single family household does not split up and so still only needs one home and there is therefore no net increase in the number of dwellings required.
58. There is an assumption here that the size and location of additional housing stock and the allocation of existing stock will operate with 100 per cent efficiency. This emphasises the importance of planning authorities ensuring that the right mix of housing types are made available. Insofar as the mix is not optimal additional housing will be needed.

*Sharing households or concealed households with two or more people*

59. Sharing households or concealed households with two or more people are counted as requiring separate accommodation irrespective of whether that accommodation is overcrowded (see above). It would therefore be double counting to consider them again if they are overcrowded.

*Households with single concealed households and/or non-dependent children*

60. Unmet need for housing from single concealed households and/or non-dependent children due to overcrowding is considered before the analysis discussed at paragraph 52 to 54.
61. It is assumed there is an unmet need for a home for every single concealed household and non-dependent children that would need to move out of an overcrowded dwelling until either the dwelling is no longer overcrowded or only one family remains. It is then assumed that only 60 per cent of this unmet need requires a home.
62. Please note that double counting between categories is removed during processing so that need for a household is considered only once. A three year average is used to inform the demographic method results due to sample variability.

**Homelessness including temporary accommodation**

63. As with the 2008 advice a four quarter average of CLG homelessness data is used to inform this element of unmet need for housing (table 4).
64. A household is defined as homeless if they meet the requirements for statutory homelessness in the 1996 Housing Act. Either:
- there is no accommodation that they are entitled to occupy, or
  - they have accommodation but it is not reasonable for them to continue to occupy this accommodation.

65. When considering this element of unmet need for housing it is important to consider only those households that are not occupying an existing household space (or dwelling) which could be used by another household were they to be housed elsewhere. For this reason, as with the 2008 advice, some temporary accommodation types such as those LA/RSL stock have been discounted.<sup>23</sup>

**Table 4: Statutory homelessness: households in temporary accommodation**

**England regions,  
2008 Q2 – 2009 Q1, quarterly average.**

**households**

	<b>Bed &amp; Breakfast/ Hotels</b>	<b>Hostels &amp; Women's Refuges</b>	<b>Total</b>
North East	70	40	110
North West	100	540	640
Yorkshire & Humber	240	210	450
East Midlands	100	250	350
West Midlands	220	150	370
East of England	200	680	880
London	1,350	2,730	4,080
South East	370	570	930
South West	290	410	690
England	2,940	5,580	8,480

*Totals may not add due to rounding*

*Source: derived from CLG<sup>24</sup>*

<sup>23</sup> Refer to 2008 Advice for more detail: para B51-55

<sup>24</sup> Derived from CLG data, Table 625: Households in accommodation arranged by local authorities under the homelessness provisions of the 1985 and 1996 Housing Acts by type of accommodation by region

## Results: housing requirement due to unmet need

66. The unmet need element of the 2009 advice is provided at table 5. This includes allowances for homelessness, sharing households, overcrowding and concealed households including single concealed households and non-dependent children. As with the 2008 advice three years data are averaged due to sample variability.

**Table 5: Homes required due to unmet need for housing**

England regions	Homes required
North East	17,700
North West	69,000
Yorkshire & Humber	53,600
East Midlands	28,600
West Midlands	64,500
East of England	54,800
London	173,600
South East	78,700
South West	43,700
England	584,300

*Totals may not add due to rounding*

*Source: NHPAU analysis of SEH*

## Second Homes

67. Second homes made up 1.1 per cent of England's housing stock in 2008 with 245,400 homes across the nine regions.<sup>25</sup> As in the 2008 advice we see no reason why current levels of second homes as a proportion of stock will not be maintained.<sup>26</sup>

68. The most up-to-date proportions, from the 2008 data, have been used to apportion the national incidence of second homes amongst the regions over the period of the advice (table 6).

**Table 6: Second Homes**

England regions	dwellings					
	2006		2007		2008	
North East	7,400	3.1%	7,300	3.1%	7,800	3.2%
North West	18,400	7.7%	19,100	8.0%	20,400	8.3%
Yorkshire & Humber	16,600	6.9%	17,200	7.2%	18,200	7.4%
East Midlands	10,200	4.3%	10,300	4.3%	10,200	4.2%
West Midlands	15,900	6.6%	15,600	6.5%	16,100	6.6%
East of England	28,400	11.8%	28,500	11.9%	28,700	11.7%
London	50,000	20.8%	47,700	20.0%	47,800	19.5%
South East	41,700	17.4%	42,100	17.6%	44,700	18.2%
South West	51,500	21.4%	51,100	21.4%	51,400	21.0%
England	240,000	100%	238,900	100%	245,400	100%

Source: LGF

<sup>25</sup> For the purpose of projecting the number of second homes in England, a second home is defined as a property owned by a household member, which is not the household's main residence. However, properties which are the main residence of someone else, or which the owner intends to sell because they have moved are not counted as second homes. Second homes located outside England are not included in the analysis.

<sup>26</sup> Refer to 2008 Advice for more detail: para B84-88

## Vacancies

69. The key question when considering vacant stock is not: if it is necessary?; but, what rate of vacancies is needed for the housing market to operate effectively? As such housing plans must include an allowance for vacant stock.

70. It could be argued that a short-term vacancy rate on new stock should be used rather than the total vacancy rate. This would potentially restrict the fluidity of the market so has been discounted from this analysis. Nevertheless, as with the 2008 advice we have been cautious in

our assumptions and capped the vacancy rate in the North East, North West, Yorkshire & Humber, East Midlands and West Midlands, at 3 per cent. This has been done to reflect the fact that the vacancy rate in new stock may be lower than the overall rate because of a greater difference in quality between new and old supply in these regions.<sup>27</sup>

71. As with the 2008 advice the allowance for vacancies in additional stock is gained from a three year average using the latest available HSSA and RSR data (table 7).

**Table 7: Vacancy rates in housing stock**

England regions	Percentage					
	2004	2005	2006	2007	2008	3yr avg. 2006-08
North East	3.5	3.4	3.5	3.7	3.7	3.6
North West	4.2	4.2	4.1	4.1	4.1	4.1
Yorkshire & Humber	3.8	3.6	3.4	3.5	4.0	3.6
East Midlands	3.2	3.1	3.2	3.3	3.2	3.2
West Midlands	3.3	3.4	3.2	3.1	3.1	3.1
East of England	2.5	2.3	2.6	2.5	2.6	2.5
London	3.2	2.8	2.6	2.6	2.5	2.6
South East	2.4	2.6	2.4	2.3	2.5	2.4
South West	2.8	2.5	2.6	2.5	2.5	2.5
England	3.2	3.1	3.0	3.0	3.1	

*Note: The vacancy rate for North East, North West, Yorkshire & Humber, East Midlands, and West Midlands is capped at 3 per cent (see text).*

*Source: HSSA/RSR*

<sup>27</sup> The Home Builders Federation (HBF) also stated a vacancy rate of 3% in new supply in evidence they presented to a Parliamentary Select Committee (see <http://www.publications.parliament.uk/pa/cm200203/cmselect/cmmodpm/77-ii/77m18.htm>)

## Summary of Demographic Method Result

72. The output of the Demographic Method which informs the supply range advice is shown in table 8. This represents the average annual change in housing supply to be met that accounts for the expected increase in households over the period 2008-2031, the current backlog of unmet housing need and basic trends in second homes and vacancies.

**Table 8: Demographic Method output – annual average change**

	Net additions to housing stock				
	<b>NHPAU Household Projection</b>	<b>Unmet need</b>	<b>Second Homes</b>	<b>Vacancies</b>	<b>TOTAL</b>
North East	7,700	700	110	270	8,900
North West	26,300	2,900	300	900	30,400
Yorkshire & Humber	29,000	2,200	260	970	32,400
East Midlands	26,800	1,200	120	870	28,900
West Midlands	20,100	2,700	210	710	23,700
East of England	32,700	2,300	350	920	36,300
London	32,400	7,200	570	1,030	41,200
South East	38,200	3,300	640	1,020	43,100
South West	30,900	1,800	630	860	34,300
<b>ENGLAND</b>	<b>244,200</b>	<b>24,300</b>	<b>3,200</b>	<b>7,500</b>	<b>279,200</b>

*Totals may not add due to rounding*



73. For information, table 9 shows the demographic method as a total over the period 2008-2031.

**Table 9: Demographic Method output – total over period**

	<b>England regions, 2008-2031 (24 years)</b>				
	<b>NHPAU Household Projection</b>	<b>Unmet need</b>	<b>Second Homes</b>	<b>Net additions to housing stock</b>	
				<b>Vacancies</b>	<b>TOTAL</b>
North East	185,800	17,700	2,700	6,400	212,600
North West	631,100	69,000	7,100	21,700	728,900
Yorkshire & Humber	695,400	53,600	6,100	23,300	778,400
East Midlands	642,400	28,600	2,800	20,800	694,600
West Midlands	483,300	64,500	5,100	17,000	569,800
East of England	785,100	54,800	8,400	22,100	870,400
London	777,400	173,600	13,800	24,800	989,500
South East	916,500	78,700	15,400	24,500	1,035,200
South West	742,700	43,700	15,000	20,700	822,100
<b>ENGLAND</b>	<b>5,859,800</b>	<b>584,300</b>	<b>76,400</b>	<b>181,100</b>	<b>6,701,600</b>

*Totals may not add due to rounding*

74. The Demographic Method results that inform the supply range advice assume that the housing requirement due to unmet housing need will be satisfied over the advice period i.e. over 24 years. This is a cautious assumption that planning authorities may wish to revisit given that SHMA guidance suggests meeting need over a period of five years (table 10).<sup>28</sup>

**Table 10: Housing requirement due to unmet housing need – total and averages**

<b>England regions</b>	<b>households</b>			
	<b>total</b>	<b>Averaged over 5 years</b>	<b>Averaged over 10 years</b>	<b>Averaged over 24 years</b>
North East	17,700	3,500	1,800	740
North West	69,000	13,800	6,900	2,880
Yorkshire & Humber	53,600	10,700	5,400	2,240
East Midlands	28,600	5,700	2,900	1,190
West Midlands	64,500	12,900	6,400	2,690
East of England	54,800	11,000	5,500	2,290
London	173,600	34,700	17,400	7,230
South East	78,700	15,700	7,900	3,280
South West	43,700	8,700	4,400	1,820
<b>ENGLAND</b>	<b>584,300</b>	<b>116,900</b>	<b>58,400</b>	<b>24,350</b>

*Totals may not add due to rounding*

<sup>28</sup> CLG (2007) Strategic Housing Market Assessments: Practice Guidance  
<http://www.communities.gov.uk/publications/planningandbuilding/strategichousingmarket>

# Technical Appendix 2: Affordability Model

## Summary

1. One of the two key methods used by the NHPAU in deriving our revised housing supply range advice to Ministers is our use of the CLG/Reading Affordability Model.
2. The following technical annex introduces the model, how we have used it, the scenarios we have considered and the assumptions used to derive a 'central scenario'. It concludes with a full analysis of this scenario and various sensitivity tests.
3. In general we have taken a cautious approach to deriving the assumptions that form our central scenario. These assumptions are laid out later in this annex, in Table 3.
4. The results from our central scenario in answer to the question 'how many net additions to the housing stock will be required to both house the population and stabilise the market?' are reproduced below in Table 1. These results are from the model run labelled 'Run 1A' in the results section at the end.

Table 1 – Central scenario used to inform the NHPAU housing supply range									
Region	Afford-ability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Afford-ability ratio 2026	Afford-ability ratio 2031
North East	5.62	7,510	10,554	7,222	6,032	7,222	7,222	4.93	4.79
North West	5.97	26,050	39,468	26,449	21,799	26,449	26,449	5.92	5.95
Yorkshire & Humber	6.19	20,270	39,654	26,387	21,648	26,387	26,387	5.82	5.84
East Midlands	6.90	20,620	36,908	25,083	20,860	25,083	25,083	6.52	6.56
West Midlands	6.77	15,790	28,143	22,134	16,508	19,570	20,104	6.70	6.77
East of England	8.18	26,730	59,661	40,282	34,170	40,878	40,754	8.18	8.18
London	9.62	27,570	72,406	38,500	40,583	48,957	46,779	9.62	9.62
South East	8.70	35,410	80,663	65,476	47,063	55,905	57,899	8.70	8.70
South West	8.97	27,520	43,607	36,970	27,508	31,745	32,833	8.97	8.97
England	7.3	207,470	411,063	288,502	236,170	282,194	283,509	7.2	7.2

5. Table 1 shows modelled outcomes for each region of the country. The first column gives the ratio of lower quartile house prices to lower quartile earnings (the affordability ratio) based on 2007 actual data. Column two shows the actual number of net additions to the housing stock in 2007/08, as reported by CLG.
6. In shaping a housing supply trajectory we assume a sharp drop in net additions in 2009 and 2010. From 2011 onwards we project a simple straight line growth in net additions, to reach a plateau level from 2021. This plateau level enables overall delivery in the period 2008 to 2026 to be enough to at least stabilise affordability at its 2007 level in each region. We then further model the level of delivery required to do the same from 2027 to 2031.
7. The results of applying this trajectory in terms of net additions required are shown in columns 3 – 7. Column 3 gives the projected plateau level of net additions required to be achieved from 2021 to 2026, and column 4 the level required from 2027 to 2031. Columns 5 – 7 show what this trajectory means in terms of the average annual number of net additions required in the periods 2008 to 2016, 2008 to 2026, and 2008 to 2031.
8. Finally columns 8 and 9 show the modelled affordability ratios that result in both 2026 and 2031 as a result of meeting these trajectories.

## Context

9. Last year's NHPAU housing supply range advice included a summary of how the CLG/Reading Affordability Model works.<sup>29</sup> Alongside this update to our advice, we are also publishing a standalone guide to the model.<sup>30</sup> It provides a synthesis and simplification of recent technical publications concerning developments in the model. Readers interested in gaining a background to the model, and the concepts behind economic modelling in general, are encouraged to download the guide from our website.
10. The model has been enhanced over the course of the last year. In addition it incorporates annual data updates and re-estimates of equations and assumptions.
11. The version of the model which forms the basis of our work is referred to in this document as the 'baseline Reading Model'. It is the assumptions in this baseline model that we amend to derive our central scenario. Results from this central scenario, the baseline Reading Model, and various sensitivity tests designed to indicate the impact of key variables are presented and discussed.
12. The sensitivity testing we have carried out looks at a number of factors including: a different housing supply trajectory; different economic conditions; and credit market constraints. A national level analysis of the impact of these factors and CLG's 2006-based household projections (released in March 2009) was published in May 2009.<sup>31</sup> That paper provides further context for the sensitivity tests we have carried out in deriving this update to our regional advice.

<sup>29</sup> Meeting the housing requirements of an aspiring and growing nation, NHPAU, June 2008

<sup>30</sup> A guide to the Reading/CLG Affordability Model, NHPAU, September 2009

<sup>31</sup> Housing requirements and the impact of recent economic and demographic change, NHPAU, May 2009

### Using the model

13. As with our original advice, the modelling we carry out has the aim of finding the level of housing supply required to stabilise affordability, all other things being equal, both nationally and within each region. Affordability is defined in terms of the ratio of lower quartile house prices to lower quartile earnings.
14. We again aim to stabilise affordability at its 2007 level in line with the PSA20 requirement, targeting this to be achieved by 2026. As regional planning bodies are now starting to look beyond 2026, we have extended our modelling to 2031. This extension aims to determine the level of supply required from 2027 to 2031 in order to maintain affordability at its actual 2007 and modelled 2026 level.
15. The target level of affordability in each region is derived from actual house price and earnings data from 2007, as outlined in Table 2.
16. These affordability ratios are slightly different to those we targeted last year, as affordability ratios for 2007 were previously modelled outputs rather than actuals. It should also be noted that they vary slightly from those published by CLG as the model uses earnings based on place of work rather than place of residence.

**Table 2 – Regional target affordability ratios**

	Targeting in 2026 and 2031
North East	5.6
North West	6.0
Yorkshire & Humber	6.2
East Midlands	6.9
West Midlands	6.8
East of England	8.2
London	9.6
South East	8.7
South West	9.0
<b>England</b>	<b>7.3</b>

### Establishing a central scenario

17. The Affordability Model is a long-run model. It is not designed to predict short-term house price levels or the fluctuations of system shocks. Key long-run relationships are captured and modelled to continue into the future. Examples include: the relationship between the number of households in comparison to housing stock; the impacts of real and nominal interest rate changes and earnings levels on house prices. Results from the model are based on the actual decisions of buyers and sellers over the last thirty years.
18. With the establishment of key relationships, model equations are estimated. These equations incorporate many variables. Future values for these variables are either endogenised within the model or set as exogenous inputs.
19. The model is not a macroeconomic model and does not include feedback to and from the wider economy. Where variables are set as exogenous inputs, the model will best continue to capture their future impact the closer values remain to long-run historical averages.
20. For example, GDP and GVA are not modelled but are reflected in variables such as earnings and employment. Similarly, a change made to long term assumptions for earnings growth will not be reflected in changes to company profits as a share of GDP, which itself might be expected to generate a compensating impact on housing demand through greater dividend payments.
21. When using the model and adjusting variables, judgement and care must be used in both scenario design and results analysis. In order to reflect developments in the economy and housing industry over the last year, we have consciously taken a cautious forward looking view in terms of model assumptions. This reflects the approach taken in our original advice.
22. The assumption for real earnings growth that underpinned last year's advice was for growth of 1.5 per cent per annum. This was 1 per cent lower than the assumption in the baseline Reading Model. In revising our central scenario we have reduced this to zero growth in 2009 and 2010, 0.5 per cent in 2011 and 2012, returning to 1.5 per cent from 2013 onwards. These assumptions should not be viewed as NHPAU's prediction of economic performance, but are designed to model the impact of the current recession followed by a period of slow recovery. Given these national rates of earnings growth, the model determines regional variations endogenously.
23. Last year we were concerned with how to incorporate the possible impact on the market of a credit crunch. We noted that formally this was a form of credit rationing that raises the user cost of capital as a shadow price, or to put it another way, the cost of owning a house. Mortgage interest rates form part of the user cost of capital, and we used them as a proxy measure for credit rationing, noting also that generally available mortgage rates had started to decouple from Bank of England base rates. The assumption for mortgage interest rates that underpinned last year's advice was that they would average 6.25 per cent over the period modelled. This was 0.5 per cent higher than the baseline Reading Model assumption.
24. As a result of developments in the model, we are now able to model the impact of mortgage supply not meeting mortgage demand in the user cost of capital. This is a theoretically more correct way of modelling the impact of 'mortgage rationing', with historical data on its effect available from the period prior to the early 1980's.

25. In the last 25 years, mortgage supply has broadly matched the demand for mortgages from those households satisfying a minimum 10 per cent deposit requirement and a maximum loan to income ratio of approximately 3:1. We can alter this assumption by, for example, saying that there will be no net increase in mortgage lending, or that only a proportion of new mortgage demand will be met. In our central scenario we take a cautious view, assuming no net increase in lending throughout 2009, 2010 and 2011. From 2012 to 2015 we assume that only two thirds of additional mortgage demand is matched by supply, before the market returns to fully matching demand from 2016 onwards.
26. Although we no longer have to use mortgage interest rates as a proxy for credit rationing, we have kept them averaging 6.25 per cent in our central scenario. Whilst Bank of England base rates have hit historically low levels in the last year, the rates available from mortgage providers have decoupled even further as a result of inter-bank lending rates, gilt yields, and lenders pricing in a higher element of risk. With conflicting views on the likelihood of future inflationary or deflationary pressures in the economy, we see no reason to alter our central long-term assumption.
27. In order to reflect better historically higher house price levels in London, growth in the FTSE all-share index has now been included in London's house price equation. Assumptions for future growth in this index could cover a very wide range indeed based on past trends, assumptions for inflation, and judgements about whether past trends are likely to continue. Again, we have taken a cautious view. Our central assumption is that over the period modelled, the historic trend of real growth in the index of 4.7 per cent per annum, as measured from 1975 to 2008, will be maintained. However, we take this growth rate trend from the closing 2008 index level. The result is shaped to show zero growth in the index in 2009, an above trend period of growth from 2010 to 2013, with the growth rate stabilising at 2 per cent above earnings from 2014 onwards.
28. Earlier analysis using the model has indicated that the type of housing delivered also impacts on house prices. In our central scenario we assume that the supply mix will mirror the existing stock. This largely moves away from the increased delivery of smaller flats in the last few years, with a move back towards family housing.
29. Last year's advice assumed an underlying delivery trajectory rising in a straight line from CLG's published net additions for 2006/07 (approximately 200,000 nationally) to a peak level of delivery from 2016. CLG have since published a net additions figure for 2007/08 of 207,000. Figures for later quarters indicate a sharp decline in house building starts and completions.
30. As the level of housing delivery is a key exogenous input into the model, delivery trajectory assumptions have been significantly changed in our central scenario. We now model net additions dipping to 100,000 in 2009 and 2010, with recovery shaped in a straight line from 2011 to 2021. Regional dips in delivery are shaped using the most recent data available.
31. In general, as long as the delivery dip is not more prolonged or pronounced than our assumption, the effect on the overall level of delivery required to stabilise to affordability in both 2026 and 2031 will be relatively negligible. The main impact of this dip in delivery, however, will be to back-load the trajectory needed to stabilise affordability. The annual level of delivery required towards the end of the period will be much higher than under the trajectory assumed last year.



32. If delivery were to remain subdued for a greater length of time, or recovery to the level of delivery required were not to happen by 2021, the main effect will be on the gradient of recovery eventually required to reach ever higher annual numbers of net additions. To this end a key focus must now be on how such levels of delivery can be achieved in the future. Much higher annual levels of delivery than we have seen in the past 30 years will be increasingly essential. Without these higher levels, general housing requirements will not be met, and the desire for future stability in the housing market at affordable and sustainable price levels will not be realised.
33. The delivery of social housing for rent, to address housing need, is included in our modelled net additions totals. In terms of its impact on house prices, the supply of social housing is discounted. Empirical studies have shown that the effect of social stock on house prices is between 30 and 50 per cent of the effect of private stock. We have broadly maintained the 2007 Housing Green Paper ambition in this regard, with delivery reaching 50,000 social rented units by the slightly later date of 2013. Whilst it is true that if more of these net additions were in the private sector there would be a better affordability pay-off, a critical trade-off is needed to ensure a balanced housing offer that also addresses housing need.
34. Both intermediate and privately rented housing is treated as market housing in the model.
35. In summary, the assumptions underpinning our central scenario are set out in Table 3.

**Table 3 – Modelling assumptions**

<b>Variable</b>	<b>NHPAU current central scenario assumptions (2009)</b>	<b>NHPAU previous central scenario assumptions (2008)</b>	<b>Baseline Reading Model baseline assumptions (2009)</b>
Real earnings growth	0% in 2009 and 2010; 0.5% in 2011 and 2012; 1.5% p.a. from 2013	1.5% p.a.	-0.5% in 2009; 0.5% in 2010; 1.5% in 2011; 2.5% from 2012
Consumer expenditure deflator	2.5% p.a.	2.5% p.a.	2.5% p.a.
Mortgage interest rates	4.5% until Q3 2010; Then rising 0.25% every Qtr until reaching 6.25% from Q1 2012	6.25%	4.5% until Q3 2010; Then rising 0.25% every Qtr until reaching 5.75% from Q3 2011

<b>Table 3 – Modelling assumptions (continued)</b>			
<b>Variable</b>	<b>NHPAU current central scenario assumptions (2009)</b>	<b>NHPAU previous central scenario assumptions (2008)</b>	<b>Baseline Reading Model baseline assumptions (2009)</b>
Mortgage rationing	No net increase in lending until 2011;  Mortgage supply equals 2/3 demand from 2012 to 2015;  Mortgage supply equals demand from 2016	Mortgage supply equals demand	No net increase in lending until Q3 2009;  Mortgage supply equals demand from Q4 2009
Loan to value constraint	Varies regionally between 87% and 93%	Varies regionally between 87% and 93%	Varies regionally between 87% and 93%
Mortgage income multiple constraint	Varies regionally between 2.32 and 3.07	Varies regionally between 2.32 and 3.07	Varies regionally between 2.32 and 3.07
FTSE all-share index	0% growth in 2009;  5% growth above earnings in 2010 and 2013;  10% growth above earnings in 2011 and 2012;  2% growth above earnings from 2014	n/a	20% growth in 2009;  3% growth above earnings from 2010 to 2021;  5% growth above earnings from 2022
Housing supply mix	As existing stock	As existing stock	As existing stock
Social rented housing delivered	Reaches 50,000 p.a. nationally from 2013	Reaches 50,000 p.a. nationally from 2011	n/a
Short term dip in net additions	Drops to 100,000 p.a. nationally in 2009 and 2010	n/a	n/a
Shape of delivery trajectory	Straight line growth from 2011 to plateau in 2021	Straight line growth from 2008 to plateau in 2016	n/a

## Inter-regional effects

36. The model takes into account the interaction between regions in terms of, for example, migration flows and the existence of a house price ripple effect. This is an important feature of the model which reflects well-documented effects. However, the consequences of this need to be taken into account in using the model results to inform decisions of the level of provision that should be made for housing.
37. There are two particular consequences that need to be considered. First, simulations with a high level of provision in the South may indicate that affordability targets in the North and Midlands can be achieved with a limited additional supply of housing. This would not support the regional economic growth agenda and would risk a future supply of housing that failed to keep up with projected household growth and backlog need in those regions.
38. To avoid this, in the model runs used to inform our supply range advice we have set minimum delivery constraints. These require that each region delivers a level of housing over the period 2008-2031 that at least meets the bottom of our recommended supply range (see Table 4). The minima have been derived using our demographic method and reflect the projected growth in households during the same period.<sup>32</sup> Where this constraint bites, the level of build in that region is higher than would be required to achieve the 2007 affordability ratio in 2026, and so the affordability ratio is better (lower) than the target.

<sup>32</sup> see Technical Appendix 1 in this document

**Table 4: Revised supply range minima – derived using the demographic methodology**

	Annual average net additions 2008 – 2031
North East	7,200
North West	26,500
Yorkshire & Humber	26,400
East Midlands	25,100
West Midlands	19,600
East of England	31,700
London	33,100
South East	38,000
South West	30,400
<b>Total</b>	<b>238,000</b>

39. The second issue is that in carrying out modelling to determine what level of housing needs to be provided in each region to achieve the affordability target in 2026, we assume that practical or political constraints do not prevent any region from delivering the required volume of housing. However if, for example, regions in the South are unable to deliver the level of housing indicated, this will not only have an impact on affordability in Southern regions – it will also affect other regions as a result of the way in which they interact.

40. To understand the scale of this effect we have carried out model runs in which regions in the South are assumed to only deliver at the bottom of our supply range. This provides an indication of how many additional homes would need to be provided to stabilise affordability in other regions to compensate for higher prices in the South.

## Sensitivity testing

41. In the model results that follow, those using our central scenario are contained in ‘Set 1’. The effects on the results of applying the regional delivery constraints outlined above are also reported.
42. Key assumptions in the central scenario can be amended to determine some ‘what if’ scenarios, and to illustrate their effect. We have carried out a number of such sensitivity tests as follows:
- what if real earnings growth is higher (‘Set 2’ in the results section);
  - what if mortgage interest rates are lower (‘Set 3’);
  - what if some mortgage rationing persists (‘Set 4’);
  - what if the FTSE all share index grows at a faster rate (‘Set 5’);
  - what is the impact of a faster recovery in housing supply (‘Run 1D’ in ‘Set 1’);
  - what if the economy returns to previous trends relatively quickly, as per the baseline Reading Model assumptions (‘Set 6’).

## Fixed housing supply scenarios

43. Finally we model the impact on affordability of fixed supply scenarios. These reflect the top and bottom of our recommended housing supply range, and also current Regional Spatial Strategy (RSS) targets. In order to smooth changes, the new top and bottom of range figures have been set mid-way between the levels indicated by our latest modelling work, and the figures in our previous supply range advice, as described in our advice to Ministers.<sup>33</sup>
44. These fixed supply model runs are analysed using our central scenario. They are, therefore, useful in isolating the effect of housing supply on house prices and affordability, by holding all other factors constant.

<sup>33</sup> More homes for more people: advice to Ministers on housing levels to be considered in regional plans, NHPAU, July 2009

## Model results

The following model runs are presented:

Code	Scenario
1A	Central scenario with regional supply minimas
1B	Central scenario with supply constrained in the South
1C	Central scenario with no constraints
1D	Central scenario with a steeper and faster recovery in the supply trajectory and regional supply minimas
2A	Real earnings growth to 2% p.a. from 2016 with regional supply minimas
2B	Real earnings growth to 2% p.a. from 2016 with supply constrained in the South
2C	Real earnings growth to 2% p.a. from 2016 with no constraints
3A	Mortgage interest rates down to 5.75% from 2016 with regional supply minimas
3B	Mortgage interest rates down to 5.75% from 2016 with supply constrained in the South
3C	Mortgage interest rates down to 5.75% from 2016 with no constraints
4A	Mortgage rationing persists such that only 90% of demand is met from 2016, with regional supply minimas
4B	Mortgage rationing persists such that only 90% of demand is met from 2016, with supply constrained in the South
4C	Mortgage rationing persists such that only 90% of demand is met from 2016, with no constraints
5A	FTSE all share index grows by 4% in real terms p.a. from 2016, with regional supply minimas
5B	FTSE all share index grows by 4% in real terms p.a. from 2016, with supply constrained in the South
5C	FTSE all share index grows by 4% in real terms p.a. from 2016, with no constraints
6A	Baseline Reading Model scenario with regional supply minimas
6B	Baseline Reading Model scenario but with interest rates rising to 8%, with regional supply minimas
7A	Central scenario with net additions matching the bottom of the recommended supply range
7B	Central scenario with net additions matching the top of the recommended supply range
7C	Central scenario with net additions matching current RSS targets

## Set 1: Model runs using the central scenario

Run 1A – Regional supply minimas applied									
Region	Afford-ability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Afford-ability ratio 2026	Afford-ability ratio 2031
North East	5.62	7,510	10,554	7,222	6,032	7,222	7,222	4.93	4.79
North West	5.97	26,050	39,468	26,449	21,799	26,449	26,449	5.92	5.95
Yorkshire & Humber	6.19	20,270	39,654	26,387	21,648	26,387	26,387	5.82	5.84
East Midlands	6.90	20,620	36,908	25,083	20,860	25,083	25,083	6.52	6.56
West Midlands	6.77	15,790	28,143	22,134	16,508	19,570	20,104	6.70	6.77
East of England	8.18	26,730	59,661	40,282	34,170	40,878	40,754	8.18	8.18
London	9.62	27,570	72,406	38,500	40,583	48,957	46,779	9.62	9.62
South East	8.70	35,410	80,663	65,476	47,063	55,905	57,899	8.70	8.70
South West	8.97	27,520	43,607	36,970	27,508	31,745	32,833	8.97	8.97
England	7.3	207,470	411,063	288,502	236,170	282,194	283,509	7.2	7.2

Run 1A is our central scenario, with minimum supply constraints set in all regions i.e. each region is required to deliver a level of housing over the period 2008-2031 that reflects the projected growth in households during that period. The minimum constraints bite in the North East, North West, Yorkshire and The Humber, and the East Midlands. In these regions there are, therefore, some welcome improvements in affordability.

This is the run used in our revised supply range, with the average net additions figures required from 2008 to 2031 informing the top of the range in the East of England, South East, and London. In all other regions, the numbers of net additions required are below those indicated by the demographic method. This is a consequence of the stabilisation of prices in the South reducing price rises in the other regions by virtue of the ripple effect. At the same time more households are able to be housed in the Southern market sector, easing pent up demand pressures.

Run 1B – Supply constrained in the South									
Region	Afford-ability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Afford-ability ratio 2026	Afford-ability ratio 2031
North East	5.62	7,510	10,554	7,200	6,032	7,222	7,217	5.29	5.26
North West	5.97	26,050	55,255	26,500	28,565	35,589	33,695	5.97	5.77
Yorkshire & Humber	6.19	20,270	43,632	45,264	23,353	28,690	32,143	6.19	6.19
East Midlands	6.90	20,620	43,351	44,409	23,621	28,813	32,062	6.90	6.90
West Midlands	6.77	15,790	40,034	37,612	21,604	26,454	28,779	6.77	6.77
East of England	8.18	26,730	43,733	31,700	27,344	31,657	31,666	9.30	9.68
London	9.62	27,570	45,008	33,100	28,841	33,095	33,096	11.28	11.25
South East	8.70	35,410	49,727	38,000	33,804	37,995	37,996	10.30	10.76
South West	8.97	27,520	41,236	30,400	26,492	30,372	30,378	9.40	9.70
England	7.3	207,470	372,530	294,184	219,656	259,886	267,031	7.9	8.0

Run 1B is our central scenario but with housing delivery in Southern regions (the East of England; London; South East and South West) fixed at the bottom end of our revised supply range advice. Other regions have supply minimas applied so that they do not fall below the bottom of our revised ranges. In practice, this constraint only bites in the North East.

This run gives an indication of both the worsening in affordability that should be expected in the South, if delivery only meets the bottom of our supply range, and of the significant increases in the level of delivery required to stabilise affordability in the Midlands and North that result. In all such regions bar the North East, the level of delivery required is now above the top of our revised supply range. Whilst the minimum constraint still bites in the North East, the improvement seen in affordability is not as great as that seen in run 1A.



Run 1C – No constraints									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	-2,621	2,143	385	-406	125	5.62	5.62
North West	5.97	26,050	38,637	31,808	21,443	25,967	27,184	5.97	5.97
Yorkshire & Humber	6.19	20,270	29,220	27,761	17,177	20,346	21,891	6.19	6.19
East Midlands	6.90	20,620	26,550	22,335	16,421	19,086	19,763	6.90	6.90
West Midlands	6.77	15,790	26,811	28,956	15,937	18,799	20,915	6.77	6.77
East of England	8.18	26,730	60,667	45,234	34,601	41,460	42,246	8.18	8.18
London	9.62	27,570	76,185	47,587	42,202	51,145	50,404	9.62	9.62
South East	8.70	35,410	80,927	67,661	47,176	56,058	58,475	8.70	8.70
South West	8.97	27,520	44,922	39,711	28,072	32,506	34,007	8.97	8.97
England	7.3	207,470	381,298	313,194	223,413	264,962	275,010	7.4	7.3

Run 1C removes all constraints from all regions. The notable reductions in net additions required in the North East, Yorkshire and The Humber, and East Midlands result in varying levels of increases in all other regions, indicating the spatial inter-connectivity built into the model. Whilst affordability is stabilised in these 3 regions as a result of high levels of delivery elsewhere, this is an unbalanced solution. It is likely to run counter to the regional growth agenda and will fail to meet housing requirements, as indicated by underlying demographic projections.

Run 1D – A faster recovery in the supply trajectory to plateau from 2016, and regional supply minimas									
Region	Afford-ability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2016 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Afford-ability ratio 2026	Afford-ability ratio 2031
North East	5.62	7,510	9,067	7,222	6,563	7,222	7,222	4.90	4.79
North West	5.97	26,050	33,672	26,449	23,869	26,449	26,449	5.90	5.95
Yorkshire & Humber	6.19	20,270	33,745	26,387	23,759	26,387	26,387	5.80	5.86
East Midlands	6.90	20,620	31,626	25,083	22,746	25,083	25,083	6.52	6.59
West Midlands	6.77	15,790	24,299	22,516	17,880	19,569	20,183	6.68	6.77
East of England	8.18	26,730	51,462	44,832	37,285	41,016	41,811	8.18	8.18
London	9.62	27,570	59,013	40,700	42,537	46,872	45,586	9.62	9.62
South East	8.70	35,410	69,645	68,222	51,062	55,952	58,508	8.70	8.70
South West	8.97	27,520	37,597	39,673	29,020	31,277	33,026	8.97	8.97
England	7.3	207,470	350,125	301,085	254,719	279,826	284,255	7.2	7.2

Run 1D models our central scenario with minimum regional supply constraints, but exemplifies the impact of a faster recovery in housing delivery. It therefore compares with run 1A. The key difference lies in the peak annual level of delivery required as a result. Nationally this drops from 411,000 per annum from 2021 in run 1A, to 350,000 per annum from 2016. This suggests that any delay in recovery will ultimately result in a bigger challenge to house the nation and stabilise the market.

## Set 2: Model runs with real earnings 0.5% p.a. higher (2% p.a.) than the central scenario from 2016

Run 2A – Regional supply minimas applied									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2016 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	10,554	7,222	6,032	7,222	7,222	5.02	4.90
North West	5.97	26,050	42,752	34,604	23,206	28,350	29,653	5.97	5.97
Yorkshire & Humber	6.19	20,270	39,654	26,387	21,648	26,387	26,387	5.93	6.01
East Midlands	6.90	20,620	36,908	25,083	20,860	25,083	25,083	6.64	6.74
West Midlands	6.77	15,790	29,875	32,199	17,250	20,572	22,995	6.77	6.77
East of England	8.18	26,730	65,233	38,717	36,558	44,104	42,982	8.18	8.18
London	9.62	27,570	64,110	21,668	37,027	44,154	39,470	9.62	9.62
South East	8.70	35,410	88,484	77,587	50,414	60,433	64,007	8.70	8.70
South West	8.97	27,520	49,403	41,037	29,992	35,100	36,337	8.97	8.97
England	7.3	207,470	426,973	304,503	242,988	291,405	294,134	7.3	7.3

Run 2A incorporates an increase in real earnings growth from 1.5% per annum to 2% per annum from 2016. As the growth in earnings is increased, so is the growth in house prices. The only exception to this is in London, where earnings growth affects the denominator of the affordability ratio to a greater extent than the numerator. Significant increases in supply are required in all other Southern regions as a result, most notably in the South East. Increases are also required in the North West and West Midlands, whilst the improvements in affordability seen in the other Northern and Midlands regions in our central scenario (run 1A) are reduced.

Run 2B – Supply constrained in the South									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	10,554	7,200	6,032	7,222	7,217	5.41	5.45
North West	5.97	26,050	61,003	26,500	31,028	38,916	36,330	5.97	5.68
Yorkshire & Humber	6.19	20,270	50,575	47,299	26,329	32,710	35,749	6.19	6.19
East Midlands	6.90	20,620	50,397	54,303	26,641	32,893	37,353	6.90	6.90
West Midlands	6.77	15,790	46,208	25,548	24,250	30,028	29,095	6.77	6.77
East of England	8.18	26,730	43,733	31,700	27,344	31,657	31,666	9.58	10.07
London	9.62	27,570	45,008	33,100	28,841	33,095	33,096	11.13	10.89
South East	8.70	35,410	49,727	38,000	33,804	37,995	37,996	10.61	11.17
South West	8.97	27,520	41,236	30,400	26,492	30,372	30,378	9.69	10.12
England	7.3	207,470	398,440	294,048	230,760	274,887	278,879	8.0	8.1

Run 2B both limits supply levels in Southern regions to the bottom of our revised range and requires all other regions to at least meet the bottom of the revised supply range. Affordability deteriorates in all Southern regions with the exception of London when compared with run 1B.

It also deteriorates in the North East although the minimum constraint still bites in that region. Significant increases in delivery are required in all other Northern and Midlands regions to stabilise affordability, although the minimum constraint bites in the North West from 2027.

Run 2C – No constraints									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	-1,354	3,384	928	328	964	5.62	5.62
North West	5.97	26,050	43,657	36,354	23,594	28,874	30,432	5.97	5.97
Yorkshire & Humber	6.19	20,270	32,866	32,154	18,739	22,457	24,477	6.19	6.19
East Midlands	6.90	20,620	29,793	27,155	17,811	20,964	22,254	6.90	6.90
West Midlands	6.77	15,790	30,263	33,218	17,417	20,797	23,385	6.77	6.77
East of England	8.18	26,730	66,079	42,791	36,921	44,594	44,218	8.18	8.18
London	9.62	27,570	66,868	27,692	38,209	45,751	41,989	9.62	9.62
South East	8.70	35,410	88,787	79,703	50,544	60,608	64,586	8.70	8.70
South West	8.97	27,520	50,360	39,140	30,402	35,654	36,380	8.97	8.97
England	7.3	207,470	407,319	321,592	234,565	280,027	288,686	7.3	7.3

Run 2C removes all supply constraints. Again, with the exception of London, the effect of increasing the earnings growth assumption by 0.5% a year is that increases in delivery are required in all regions compared with the results seen in run 1C.

**Set 3: Model runs with mortgage interest rates 0.5% lower (5.75%) than the central scenario from 2016**

<b>Run 3A – Regional supply minimas applied</b>									
<b>Region</b>	<b>Afford-ability ratio 2007</b>	<b>Actual net additions (CLG) 2007/08</b>	<b>Projected net additions from 2021 to 2026</b>	<b>Projected net additions from 2027 to 2031</b>	<b>Average annual net additions 2008 - 2016</b>	<b>Average annual net additions 2008 - 2026</b>	<b>Average annual net additions 2008 - 2031</b>	<b>Afford-ability ratio 2026</b>	<b>Afford-ability ratio 2031</b>
North East	5.62	7,510	10,554	7,222	6,032	7,222	7,222	4.87	4.70
North West	5.97	26,050	39,468	26,449	21,799	26,449	26,449	5.87	5.88
Yorkshire & Humber	6.19	20,270	39,654	26,387	21,648	26,387	26,387	5.85	5.87
East Midlands	6.90	20,620	36,908	25,083	20,860	25,083	25,083	6.59	6.63
West Midlands	6.77	15,790	28,518	27,455	16,669	19,787	21,385	6.77	6.77
East of England	8.18	26,730	64,277	29,467	36,148	43,550	40,616	8.18	8.18
London	9.62	27,570	79,936	40,319	43,810	53,317	50,609	9.62	9.62
South East	8.70	35,410	87,112	66,742	49,826	59,638	61,118	8.70	8.70
South West	8.97	27,520	48,883	35,228	29,769	34,799	34,888	8.97	8.97
England	7.3	207,470	435,310	284,351	246,561	296,232	293,757	7.2	7.2

Run 3A incorporates a reduction in mortgage interest rates to 5.75% from 2016. The effect is similar to that seen in Set 2 above, reflecting an increase in demand backed with money. This increase is most noticeable in the net additions required to stabilise affordability in London, the South East, and South West. As a result of extra delivery here, the results in other regions are broadly similar to those seen in run 1A.

Run 3B – Supply constrained in the South									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	10,554	7,200	6,032	7,222	7,217	5.29	5.27
North West	5.97	26,050	56,021	26,500	28,893	36,032	34,046	5.97	5.77
Yorkshire & Humber	6.19	20,270	48,975	43,898	25,643	31,783	34,307	6.19	6.19
East Midlands	6.90	20,620	50,596	51,711	26,726	33,008	36,904	6.90	6.90
West Midlands	6.77	15,790	45,650	23,520	24,011	29,705	28,417	6.77	6.77
East of England	8.18	26,730	43,733	31,700	27,344	31,657	31,666	9.66	10.06
London	9.62	27,570	45,008	33,100	28,841	33,095	33,096	11.80	11.69
South East	8.70	35,410	49,727	38,000	33,804	37,995	37,996	10.72	11.22
South West	8.97	27,520	41,236	30,400	26,492	30,372	30,378	9.74	10.05
England	7.3	207,470	391,501	286,030	227,786	270,868	274,027	8.1	8.2

Run 3B limits supply levels in the South to the minima of the revised supply range and compares with run 1B in the same way as run 3A compares with run 1A. Affordability deteriorates further in the South, whilst generally more net additions are required in the North and Midlands to stabilise affordability.

Run 3C – No constraints									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	-3,999	2,018	-205	-1,204	-532	5.62	5.62
North West	5.97	26,050	35,547	36,000	20,119	24,179	26,641	5.97	5.97
Yorkshire & Humber	6.19	20,270	30,484	27,400	17,719	21,078	22,395	6.19	6.19
East Midlands	6.90	20,620	28,784	23,194	17,378	20,379	20,966	6.90	6.90
West Midlands	6.77	15,790	28,814	28,553	16,795	19,958	21,749	6.77	6.77
East of England	8.18	26,730	65,159	34,413	36,526	44,061	42,051	8.18	8.18
London	9.62	27,570	83,854	49,641	45,489	55,585	54,347	9.62	9.62
South East	8.70	35,410	87,334	68,958	49,921	59,767	61,682	8.70	8.70
South West	8.97	27,520	50,097	32,988	30,289	35,502	34,978	8.97	8.97
England	7.3	207,470	406,074	303,164	234,031	279,306	284,276	7.4	7.3

Run 3C removes all constraints and compares with run 1C in the same way as run 3A compares with run 1A.



### Set 4: Model runs with mortgage rationing persisting post 2016 such that only 90% of mortgage demand is met by mortgage supply

Run 4A – Regional supply minimas applied									
Region	Afford-ability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Afford-ability ratio 2026	Afford-ability ratio 2031
North East	5.62	7,510	10,554	7,222	6,032	7,222	7,222	4.87	4.73
North West	5.97	26,050	39,468	26,449	21,799	26,449	26,449	5.84	5.87
Yorkshire & Humber	6.19	20,270	39,654	26,387	21,648	26,387	26,387	5.74	5.76
East Midlands	6.90	20,620	36,908	25,083	20,860	25,083	25,083	6.44	6.48
West Midlands	6.77	15,790	28,143	19,570	16,508	19,570	19,570	6.60	6.69
East of England	8.18	26,730	56,253	45,850	32,709	38,905	40,352	8.18	8.18
London	9.62	27,570	68,799	40,352	39,037	46,869	45,511	9.62	9.62
South East	8.70	35,410	76,156	62,700	45,131	53,296	55,255	8.70	8.70
South West	8.97	27,520	41,236	32,770	26,492	30,372	30,872	8.90	8.97
England	7.3	207,470	397,172	286,382	230,216	274,151	276,699	7.2	7.2

Run 4A sees an element of mortgage rationing persisting throughout the whole period modelled. This tends to reduce demand backed by money. It should be noted that this reflects the continued rationing of mortgages to households meeting historic deposit and loan to income constraints, as indicated in Table 3. These 'rationed' households, and those unable to meet the deposit and loan to income constraints, are housed in the social sector where possible, or in privately rented housing where not.

Slightly less net additions are required to stabilise affordability in Southern regions compared with run 1A. At the same time small improvements in affordability are seen where minimum supply constraints bite in the North and Midlands.

Run 4B – Supply constrained in the South									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	10,554	7,200	6,032	7,222	7,217	5.20	5.14
North West	5.97	26,050	50,220	26,500	26,407	32,674	31,387	5.97	5.91
Yorkshire & Humber	6.19	20,270	39,654	39,276	21,648	26,387	29,072	6.16	6.19
East Midlands	6.90	20,620	38,346	39,472	21,476	25,915	28,740	6.90	6.90
West Midlands	6.77	15,790	35,479	37,569	19,652	23,817	26,682	6.77	6.77
East of England	8.18	26,730	43,733	31,700	27,344	31,657	31,666	9.09	9.44
London	9.62	27,570	45,008	33,100	28,841	33,095	33,096	11.06	11.11
South East	8.70	35,410	49,727	38,000	33,804	37,995	37,996	10.06	10.47
South West	8.97	27,520	41,236	30,400	26,492	30,372	30,378	9.19	9.48
England	7.3	207,470	353,956	283,218	211,696	249,133	256,234	7.8	7.9

Run 4B limits supply levels in the South to the minima of the revised supply range. Compared with run 1B affordability improves slightly in the South whilst generally less net additions are required in the North and Midlands to stabilise affordability.

Run 4C – No constraints									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	-3,393	2,308	54	-853	-194	5.62	5.62
North West	5.97	26,050	35,339	30,691	20,029	24,058	25,440	5.97	5.97
Yorkshire & Humber	6.19	20,270	27,071	27,070	16,256	19,102	20,762	6.19	6.19
East Midlands	6.90	20,620	24,582	21,373	15,577	17,947	18,661	6.90	6.90
West Midlands	6.77	15,790	24,450	28,383	14,925	17,432	19,713	6.77	6.77
East of England	8.18	26,730	57,323	48,871	33,168	39,524	41,472	8.18	8.18
London	9.62	27,570	73,550	51,700	41,073	49,620	50,053	9.62	9.62
South East	8.70	35,410	76,369	65,148	45,222	53,419	55,862	8.70	8.70
South West	8.97	27,520	41,630	38,196	26,661	30,600	32,183	8.97	8.97
England	7.3	207,470	356,920	313,740	212,966	250,848	263,951	7.4	7.3

Run 4C removes all constraints and compares with run 1C in the same way as run 4A compares with run 1A.

**Set 5: Model runs with the FTSE all share index growing 0.5% p.a. (2.5% above earnings) faster from 2016**

Run 5A – Regional supply minimas applied									
Region	Afford-ability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Afford-ability ratio 2026	Afford-ability ratio 2031
North East	5.62	7,510	10,554	7,222	6,032	7,222	7,222	4.93	4.79
North West	5.97	26,050	39,468	26,449	21,799	26,449	26,449	5.92	5.96
Yorkshire & Humber	6.19	20,270	39,654	26,387	21,648	26,387	26,387	5.82	5.84
East Midlands	6.90	20,620	36,908	25,083	20,860	25,083	25,083	6.52	6.56
West Midlands	6.77	15,790	28,143	22,416	16,508	19,570	20,162	6.70	6.77
East of England	8.18	26,730	59,282	39,154	34,008	40,659	40,345	8.18	8.18
London	9.62	27,570	77,335	46,863	42,695	51,811	50,780	9.62	9.62
South East	8.70	35,410	80,173	64,618	46,852	55,621	57,495	8.70	8.70
South West	8.97	27,520	43,292	36,188	27,373	31,562	32,526	8.97	8.97
England	7.3	207,470	414,809	294,381	237,775	284,363	286,449	7.2	7.2

Run 5A sees an improvement in the performance of the FTSE all-share index. This increases demand backed with money in the London market, thus requiring a higher level of net additions to stabilise affordability in this region compared with run 1A.

Run 5B – Supply constrained in the South									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	10,554	7,200	6,032	7,222	7,217	5.29	5.26
North West	5.97	26,050	55,400	26,500	28,627	35,673	33,762	5.97	5.77
Yorkshire & Humber	6.19	20,270	43,783	45,552	23,418	28,777	32,272	6.19	6.19
East Midlands	6.90	20,620	43,465	44,555	23,670	28,880	32,145	6.90	6.90
West Midlands	6.77	15,790	40,165	37,639	21,660	26,530	28,844	6.77	6.77
East of England	8.18	26,730	43,733	31,700	27,344	31,657	31,666	9.31	9.68
London	9.62	27,570	45,008	33,100	28,841	33,095	33,096	11.44	11.49
South East	8.70	35,410	49,727	38,000	33,804	37,995	37,996	10.31	10.77
South West	8.97	27,520	41,236	30,400	26,492	30,372	30,378	9.40	9.69
England	7.3	207,470	373,072	294,646	219,888	260,199	267,376	7.9	8.0

Run 5B limits supply in the South to the minima of the revised supply range and compares with run 1B in the same way as run 5A compares with run 1A. Affordability deteriorates slightly in London.

Run 5C – No constraints									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	-2,657	2,099	370	-427	99	5.62	5.62
North West	5.97	26,050	38,697	31,625	21,468	26,002	27,173	5.97	5.97
Yorkshire & Humber	6.19	20,270	29,264	27,646	17,196	20,371	21,887	6.19	6.19
East Midlands	6.90	20,620	26,479	22,224	16,390	19,045	19,707	6.90	6.90
West Midlands	6.77	15,790	26,828	29,198	15,944	18,808	20,973	6.77	6.77
East of England	8.18	26,730	60,244	43,431	34,420	41,216	41,677	8.18	8.18
London	9.62	27,570	81,433	56,478	44,452	54,184	54,662	9.62	9.62
South East	8.70	35,410	80,358	66,771	46,932	55,728	58,029	8.70	8.70
South West	8.97	27,520	44,624	38,826	27,944	32,333	33,686	8.97	8.97
England	7.3	207,470	385,268	318,298	225,115	267,260	277,893	7.4	7.3

Run 5C removes all constraints and compares with run 1C in the same way as run 5A compares with run 1A.

## Set 6: Baseline Reading Model scenario

Run 6A – Regional supply minimas applied									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	10,554	7,200	6,032	7,222	7,217	5.12	5.05
North West	5.97	26,050	52,596	26,500	27,425	34,049	32,476	5.97	5.90
Yorkshire & Humber	6.19	20,270	41,796	32,352	22,566	27,627	28,611	6.19	6.19
East Midlands	6.90	20,620	40,667	27,219	22,471	27,259	27,251	6.90	6.90
West Midlands	6.77	15,790	41,255	34,283	22,127	27,161	28,644	6.77	6.77
East of England	8.18	26,730	78,874	31,700	42,404	52,002	47,772	8.18	7.81
London	9.62	27,570	73,401	33,100	41,009	49,533	46,110	9.62	9.62
South East	8.70	35,410	114,730	54,859	61,663	75,628	71,301	8.70	8.70
South West	8.97	27,520	61,776	30,400	35,295	42,263	39,792	8.97	8.31
England	7.3	207,470	515,649	277,612	280,992	342,744	329,175	7.3	7.2

Run 6A uses the baseline Reading Model scenario, as defined in the last column of Table 3. The baseline model is the one we use to build our scenarios from, by altering some of the exogenous variable inputs and assumptions. Although this year's baseline model incorporates a recessionary dip, it also assumes full recovery to trend levels of earnings growth and mortgage supply relatively quickly. In our central scenario, as described earlier and outlined in Table 3, we take a more cautious view.

In this run we have again set minimum supply constraints in all regions. These only bite from 2027 onwards, in a number of regions. To stabilise affordability using the baseline Reading Model requires a very significant level of supply, over and above the top of our recommended range in all regions with the exception of the North East, Yorkshire and the Humber, and East Midlands. Indeed, delivery in these regions is only below the top of our revised range due to the sheer level of supply required in other regions.

To meet the target of stabilising affordability by 2026, using the delivery trajectory that builds from a base of 100,000 net additions in 2010 to a plateau level from 2021, requires an unprecedented level of supply to be achieved, especially in the South.

Run 6B – Interest rates rising to 8% with regional supply minimas applied									
Region	Afford-ability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Afford-ability ratio 2026	Afford-ability ratio 2031
North East	5.62	7,510	10,554	7,200	6,032	7,222	7,217	5.43	5.37
North West	5.97	26,050	62,155	26,500	31,522	39,584	36,858	5.97	5.56
Yorkshire & Humber	6.19	20,270	39,654	26,400	21,648	26,387	26,389	6.05	6.15
East Midlands	6.90	20,620	36,908	25,100	20,860	25,083	25,087	6.56	6.73
West Midlands	6.77	15,790	29,966	34,224	17,289	20,625	23,458	6.77	6.77
East of England	8.18	26,730	56,754	52,116	32,924	39,195	41,887	8.18	8.18
London	9.62	27,570	45,008	33,100	28,841	33,095	33,096	9.33	9.13
South East	8.70	35,410	76,068	74,101	45,093	53,245	57,590	8.70	8.70
South West	8.97	27,520	41,236	42,119	26,492	30,372	32,819	8.89	8.97
England	7.3	207,470	398,303	320,860	230,701	274,807	284,401	7.2	7.2

Run 6B replicates the baseline Reading Model assumptions, but puts interest rates up to 8%, where they then stay for the duration of the period modelled. Given the relatively rapid economic recovery reflected in the baseline Reading Model assumptions, there is likely to be a need for significant interest rate increases to counter inflationary pressures in the economy, especially so given recent quantitative easing undertaken by the Bank of England.

In the absence of this and perhaps other demand side measures, and if supply were to only recover to current RSS aspirations, the market would be at huge risk of overheating, becoming increasingly volatile and vulnerable to very sharp and destabilising corrections.

In comparison with our central scenario, in run 1A, although there are some regional variations (notably in the North West and London), the supply requirement in most regions is very similar.



## Set 7: Central scenario with fixed net additions

Run 7A – Supply matches the bottom of the recommended supply range									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	9,480	9,480	5,571	6,600	7,200	5.53	5.52
North West	5.97	26,050	35,476	35,476	20,088	24,138	26,500	6.59	6.67
Yorkshire & Humber	6.19	20,270	35,528	35,528	19,880	23,998	26,400	6.55	6.61
East Midlands	6.90	20,620	33,238	33,238	19,287	22,958	25,100	7.37	7.45
West Midlands	6.77	15,790	25,509	25,509	15,379	18,045	19,600	7.44	7.59
East of England	8.18	26,730	40,024	40,024	25,754	29,509	31,700	9.62	9.80
London	9.62	27,570	41,292	41,292	27,248	30,944	33,100	11.69	11.52
South East	8.70	35,410	46,069	46,069	32,237	35,877	38,000	10.54	10.84
South West	8.97	27,520	37,883	37,883	25,055	28,431	30,400	9.75	9.91
England	7.3	207,470	304,500	304,498	190,500	220,500	238,000	8.3	8.4

Run 7A uses our central scenario, with the number of net additions matching the bottom of the revised supply range in the period 2008 – 2031. If the delivery of housing is planned to only reflect the projected increase in households, then we expect housing to get less affordable across the country. The only regional exception to this is in the North East, where affordability is broadly stabilised at its 2007 level.

Run 7B – Supply matches the top of the recommended supply range									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	10,980	10,980	6,214	7,468	8,200	5.06	4.75
North West	5.97	26,050	40,727	40,727	22,338	27,178	30,000	6.05	5.95
Yorkshire & Humber	6.19	20,270	40,028	40,028	21,809	26,603	29,400	5.99	5.86
East Midlands	6.90	20,620	35,788	35,788	20,380	24,435	26,800	6.77	6.63
West Midlands	6.77	15,790	30,909	30,909	17,693	21,171	23,200	6.78	6.71
East of England	8.18	26,730	52,474	52,474	31,090	36,717	40,000	8.67	8.55
London	9.62	27,570	58,692	58,692	34,705	41,018	44,700	10.35	9.74
South East	8.70	35,410	69,769	69,769	42,394	49,598	53,800	9.24	9.14
South West	8.97	27,520	44,183	44,183	27,755	32,078	34,600	9.08	8.98
England	7.3	207,470	383,550	383,551	224,379	266,266	290,700	7.5	7.4

Run 7B uses our central scenario, with the number of net additions matching the top of the revised supply range in the period 2008 – 2031. Affordability is broadly stabilised across the country, although some deterioration is still evident in the South whilst some improvements are seen in the North and Midlands. The deterioration seen in the South is the result of the way in which, in order to smooth changes, the revised top end of the range has been set halfway between last year's figure and the figure derived by our new analysis. Improvements in the North and Midlands result as the top of the revised supply range in these regions is derived from our demographic method.

Run 7C – Supply matches current Regional Spatial Strategy (RSS) supply targets									
Region	Affordability ratio 2007	Actual net additions (CLG) 2007/08	Projected net additions from 2021 to 2026	Projected net additions from 2027 to 2031	Average annual net additions 2008 - 2016	Average annual net additions 2008 - 2026	Average annual net additions 2008 - 2031	Affordability ratio 2026	Affordability ratio 2031
North East	5.62	7,510	11,173	7,580	6,297	7,580	7,580	5.55	5.59
North West	5.97	26,050	33,703	23,111	19,328	23,111	23,111	6.73	7.03
Yorkshire & Humber	6.19	20,270	32,526	22,260	18,594	22,260	22,260	6.76	7.09
East Midlands	6.90	20,620	30,748	21,517	18,220	21,517	21,517	7.59	7.99
West Midlands	6.77	15,790	25,915	18,280	15,553	18,280	18,280	7.53	7.90
East of England	8.18	26,730	35,396	26,830	23,771	26,830	26,830	10.00	10.56
London	9.62	27,570	35,511	27,597	24,771	27,597	27,597	12.12	12.37
South East	8.70	35,410	40,582	32,700	29,885	32,700	32,700	10.88	11.51
South West	8.97	27,520	37,956	28,473	25,086	28,473	28,473	9.83	10.32
England	7.3	207,470	283,509	208,348	181,504	208,348	208,348	8.6	8.9

Run 7C uses our central scenario, with the number of net additions broadly matching current or proposed RSS targets to both 2026 and 2031. Some assumptions are made where the timescale of our modelling does not match those in the RSS'.

With the exception of the North East, where the current RSS target sits firmly within our recommended supply range, affordability deteriorates markedly in all regions, most significantly in the South. The market will become increasingly inaccessible to large groups of the population with an increasing need for state assistance. It will also be more susceptible to shocks, with greater volatility expected as a result.

In general the three scenarios modelled in set 7 exemplify the fact that supply into the market is a critically important component driving house prices. It is the interaction of supply and demand that determines market prices.

# NHPAU Board Members



**Stephen Nickell (Chair)**

Currently Warden of Nuffield College, Oxford, and a Board Member of the UK Statistics Authority. Previously he has held Economics Professorships at both LSE (London School of Economics) and Oxford and was President of the Royal Economic Society from 2000 to 2003. He was a member of the Bank of England Monetary Policy Committee from 2000 to 2006, and during this time he made a number of speeches on the housing market. He is a fellow of both the Econometric Society and the British Academy as well as being a foreign honorary member of the American Economic Association and the American Academy of Arts and Sciences.



**Prof Glen Bramley**

Professor of Housing and Planning/ Urban Studies at Heriot – Watt University in Edinburgh since 1994 leading research on planning, housing and urban policy. Prior to this he lectured in Urban Studies at the University of Bristol specialising in local government finance, housing and economic aspects of public policy. He has published papers and extensive research analysing the economics around housing affordability and its relationship with planning and house building.

Glen is the linked Board member for the South West and North East regions.



**Prof Paul Cheshire**

Has been Professor of Economic Geography at the London School of Economics and Political Science since 1995. Prior to this he was Professor of Urban and Regional Economics at the University of Reading and has spent time at Washington University in the USA. He has written extensively and conducted research on applied urban and regional economics, particularly the economics of housing, land markets and land use regulation.

Paul is the linked Board member for London and the East Midlands region.



**Max Steinberg**

Has been Chief Executive of Elevate East Lancashire, a housing market renewal pathfinder since 2003, following 25 years at the Housing Corporation where his roles included, Director of Investment & Regeneration for the North and Regional Director of the North West and Merseyside. He is a leading UK practitioner in Urban Regeneration and Housing. Max is Chair of the Board of Liverpool John Moores University European Institute for Urban Affairs and the Chair of Governors at King David High School in Liverpool.

Max is the linked Board member for the Yorkshire and Humber region.



**Bob Lane**

Bob is currently Chair of the London Thames Gateway Urban Development Corporation and a Board member of the Homes and Communities Agency. Until April 2008 he was Chief Executive for North Northants Development Company responsible for housing growth and regeneration in the area. His previous roles include Chief Executive of Speke Garston Development Company, Liverpool, Assistant Chief Executive of the Merseyside Development Corporation and roles at Oldham and Lambeth Councils managing urban programmes. He is a specialist in the delivery of complex urban regeneration projects, with more than twenty five years experience as a regeneration practitioner/manager.

Bob is the linked Board member for the East of England and the North West regions.



**Dr Peter Williams**

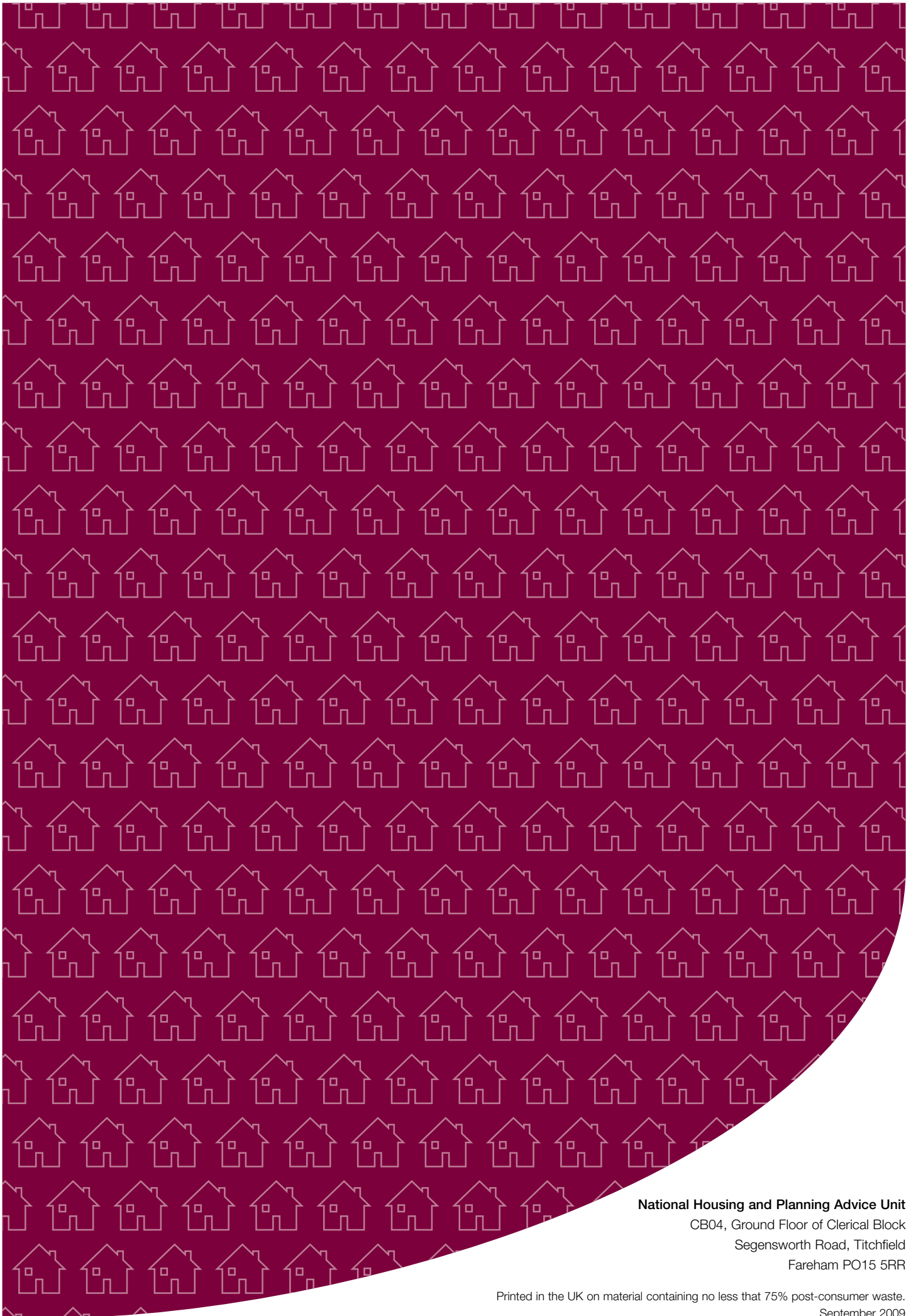
Is now an independent consultant on housing and mortgage markets. His clients include the Intermediary Mortgage Lenders Association and Acadametrics. He was previously Deputy Director General of the Council of Mortgage Lenders. Prior to that, he was Professor of Housing Management at Cardiff University, Deputy Director at the Chartered Institute of Housing and as an academic at the Australian National University and the University of Birmingham. He previously served on the Board of the Housing Corporation (1995 – 2002) and Housing for Wales (1989 to 1993). He is a Visiting Professor at the Centre for Housing Policy at the University of York.

Peter is the linked Board member for the West Midlands and South East regions.









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