Cheshire East Local Plan

Background Paper:

Population Projections and Forecasts

January 2013

1. Introduction

1.1 Determining how much new housing should be provided and where it should be located is an important element of the Local Plan. This paper is intended to give background information on the work done to date on the population projections and forecasts. Some of these projections also incorporate information from past economic trends and baseline projections of expected future economic growth, particularly growth in employment and economic output.

1.2 It is needs to be acknowledged at the outset that forecasting is not an exact science and it will not result in a definitive 'right' answer. For example, the forecasts and projections outlined below are based on a judgement of what is **most likely** to occur under a specific scenario, but it is of course possible for actual outcomes to differ from what was predicted, because of unlikely or unforeseen circumstances, or because of limitations with the forecasting/ projection method. Understanding the housing requirement involves considering a range of relevant information and making a judgement about the weight that should be given to each of these elements. Ultimately, it will result in a figure which feels right for the Borough taking account of wider policy aspirations and constraints. This explains why it is an area of planning policy that can be much debated during a Local Plan's preparation and approval process.

1.3 The elements which have been considered in the Cheshire East Housing Requirement identified in the Development Strategy include the following:

- The outputs from a variety of population projections and forecasts;
- Past economic trends and baseline projections of expected future economic growth (particularly growth in employment and economic output);
- The context provided by past housing policy and levels of housing completion;
- The conclusions from relevant studies such as the Strategic Housing Market Assessment and the Strategic Housing Land Availability Assessment, including the current housing supply situation; and
- The influence of wider policy considerations such as national planning guidance, the Council's economic aspirations, the regeneration aspirations of neighbouring authorities, environmental capacity including impact on the Green Belt and countryside, the capacity of current infrastructure and any other significant constraints on growth.

Table 1 – Summary of the Demographic Scenarios Modelled for Cheshire East for the Plan Period i.e. 2010 to 2030

Scenario Number	Modelling Type	Population Change	Dwelling Change		Labour Supply Change		Job Change	
			Over Plan Period	Average Per Annum	Over Plan Period	Average Per Annum	Over Plan Period	Average Per Annum
1	Natural Change Forecast	2,500	9,900	495	-11,900	-595	-9,900	-495
2	Migration Rates Forecast	9,900	17,200	860	-10,200	-510	-11,300	-565
3	Nil Net Migration Forecast	-9,700	9,700	485	-21,300	-1,065	-18,600	-930
4	Net Increase of 1,150 Dwellings p.a.	23,900	23,000	1,150	-2,300	-115	-1,100	-50
5	Net Increase of 1,350 Dwellings p.a.	33,600	27,000	1,350	2,900	145	3,800	190
6	Net Increase of 1,600 Dwellings p.a.	45,800	32,000	1,600	9,500	475	9,800	490
7	Zero Jobs Growth Forecast	26,000	23,900	1,195	-1,200	-60	0	0
8	CHWEM Baseline Projection	44,200	31,400	1,570	8,900	445	9300	465
9	ONS 2008 Based Sub-National Projections	38,600	29,300	1,465	8,000	400	8,400	420
10	ONS 2010 Based Sub-National Projections	47,800	32,000	1,600	12,100	605	12,200	610

Note: Average per annum numbers are rounded to the nearest 5, all other numbers are rounded to the nearest 100.

2. Projections and Forecasts

2.1 The number of people living in Cheshire East has, in general, shown a steady growth over the last 30 years i.e. the mid year estimate figures show that it has grown around 13% from 328,500 in 1981 to 370,700 in 2011. This compares with a 13% growth in England & Wales and 2% growth in North West England over the same period. To help understand how this may change in the future the Council commissioned a range of forecasts to be produced based on the Office for National Statistics (ONS) indicative population estimates for 2010. This involved a mixture of population led, dwelling led and economic led forecasts. Further details on the methodology and assumptions involved in this work are provided in Appendix 1.

2.2 For comparison purposes consideration was also given to the outputs of the 2008 based and 2010 based sub national population projections produced by ONS.

2.3 This led to ten demographic scenarios being considered. These are outlined below and summarised in Table 1. They provide important information about the underlying demographic trends in Cheshire East which have implications for determining the housing requirement in the Local Plan. These are highlighted in the subsequent analysis.

2.4 The scenarios considered comprise a mixture of projections and forecasts. It is perhaps worth appreciating the difference between projections and forecasts. Briefly, the sub national population projections assume that past recent trends in fertility, mortality and migration will continue into the future. They do not always include local information on births and deaths and do not take account of expectations of future house building i.e. they are policy neutral. Population forecasts differ from projections in that they take some account of the expected future impact of development projects (e.g. future house-building), policies and initiatives (whether under way, in the pipeline or simply a proposal) as well as past trends. Alternatively they can forecast the result of economic policy (for example, how a particular increase in the number of future jobs would affect the population). Therefore, forecasts are perhaps a more useful tool in estimating the future housing requirement as they are based on more locally specific information and aspirations.

Scenario 1 – Natural Change Forecast

2.5 This scenario involved forecasting how the existing population would change assuming that there was no movement (or migration) of people in or out of Cheshire East during the plan period. This meant forecasting the future population based on the likely level of births and deaths and then determining the number of dwellings the resultant population would require. It represents a

standard baseline position and is provided for comparison purposes only, as it is unrealistic to expect there to be zero migration in reality.

2.5 The findings were that the existing population of Cheshire East would increase by around 1% or 2,500 people, which would require an additional 495 dwellings to be provided annually to meet the Borough's needs during the plan period i.e. between 2010 and 2030. There are a number of reasons for this increase including the fact that people are living longer due to improved social conditions and better health, as well as the fact that household size is reducing with more people living on their own and getting divorced.

2.6 However, the age structure of the population is forecast to change significantly with a 8% reduction in young people (0-15), 12% reduction in working age people (16-59 Female, 16-64 Male) and 42% increase in people of retirement age (60/65+), with the number of older people (85+) increasing by around 92%. While this has implications for education, social care / health and public sector service provision generally, the forecast also estimated that there would be an annual average reduction in the local labour supply (the number of economically active Cheshire East residents) of 595.[1] This would make it more difficult for businesses in Cheshire East to recruit locally and would make them more reliant on people having to commute into Cheshire East, with resultant adverse implications for environmental pollution and congestion on the transport network. A summary of age structure breakdown for all the scenarios is shown in Table 2.

2.7 Further work was undertaken on the Natural Change Forecast to identify how the population of the 11 largest settlements in Cheshire East is likely to change over the Plan period. A summary figure for the Local Service Centres and the remaining rural area was also identified. This helps to indicate any underlying issues within the existing population, particularly regarding the impact of ageing. The findings are shown in Table 3 and indicate that only four of the largest settlements (Crewe, Macclesfield, Middlewich and Wilmslow) would see any growth in population. The remaining settlements would be unable to sustain their current level of population without migration. Poynton and Knutsford have a particularly marked ageing issue, as do the Local Service Centres generally (particularly Mobberley, Prestbury, Alderley Edge, Audlem and Shavington) and the remaining rural area. This could be addressed through planning policy i.e. through the allocation of housing

[1] The labour supply – the economically active population - consists of people who are either unemployed (available for and actively seeking work) or in employment. The labour supply estimates presented here relate only to people aged 16 to 74 inclusive. In other words, the calculations implicitly assume that the number of economically active people aged 75 and above is zero or negligible. Labour can of course be supplied by local (Cheshire East) residents or by people who live outside Cheshire East. However, the figures quoted in this paper are for the local (Cheshire East) labour supply only.

suitable for newly forming households and young families in these settlements. This would assist in retaining a range of good services and facilities in these settlements in the longer term, as well as address issues around maintaining / improving local labour supply.

Table 2 – Summary of Forecasted Change to the Population Age Structure for Each Modelled Scenario between 2010 and 2030

Population Structure	Population 2010	% Change between 2010 and 2030 by Scenario									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
0-4	20,300	-7%	-18%	-28%	-12%	-8%	-3%	-12%	-3%	-1%	3%
5-10	23,900	-6%	-6%	-13%	-1%	4%	9%	0%	7%	10%	15%
11-15	21,700	-12%	-3%	-8%	0%	3%	7%	1%	5%	2%	9%
16-17	9,100	-14%	-3%	-7%	-1%	2%	5%	0%	4%	-3%	5%
18-59 Female, 18-64 Male	207,300	-12%	-12%	-18%	-8%	-5%	-1%	-7%	-2%	-2%	0%
60/65 -74	50,400	25%	29%	27%	31%	32%	34%	31%	33%	26%	29%
75-84	23,300	57%	65%	63%	67%	68%	69%	67%	69%	62%	63%
85+	9,600	92%	114%	113%	118%	120%	123%	119%	123%	126%	117%
Total	**365,600**	**1%**	**3%**	**-3%**	**7%**	**9%**	**13%**	**7%**	**12%**	**11%**	**13%**

Source: **2011 - 2030** Population Forecasts produced by Cheshire West in cooperation with Cheshire East Council

2010 population source: **Office for National Statistics INDICATIVE population estimates** 2010**. ONS Crown Copyright** 2012**.** Office for National Statistics licensed under the Open Government Licence v.1.0.

Scenario 2 – Migration Rates Forecast

2.8 This scenario is the same as scenario 1 except that migration movements in and out of the area were factored into the forecast based on recent migration data for Cheshire East. The findings of the modelling were that the population of the Borough would increase by 9,900 people over the period of the plan and that the housing requirement would also increase to 860 dwellings per annum. While there would continue to be a fall in the local labour supply under this scenario, the annual average reduction of 510 people was slightly less marked than under scenario 1.

Table 3 – Breakdown of Natural Change Forecast for the Largest Cheshire East Settlements, Local Service Centres and Remaining Rural Area between 2010 and 2030

Settlement	Population at 2010	Population at 2030	Population Change	% Change	Dwelling Requirement
Alsager	12,200	12,100	-100	-1	200
Congleton	26,600	26,300	-300	-1	460
Crewe	71,000	77,500	6,200	9	5620
Handforth	6,200	6,100	-100	-2	40
Knutsford	12,700	12,200	-500	-4	-40
Macclesfield	51,200	53,000	1,800	4	2160
Middlewich	13,800	14,500	600	5	820
Nantwich	18,000	17,800	-200	-1	160
Poynton	13,100	12,400	-700	-5	-140
Sandbach	17,800	17,700	-100	-1	380
Wilmslow	23,000	23,300	300	1	740
Local Service Centres	51,200	48,600	-2,606	-5	-420
Rural (Remaining Areas)	48,800	46,500	-2,300	-5	-120
Total	365,600	368,000	2,400	1	9860

Source: **2011 - 2030** Population Forecasts produced by Cheshire West in cooperation with Cheshire East Council

Scenario 3 – Nil Net Migration Forecast

2.9 This scenario also builds on scenario 1 except this time it considers migration in a different way to scenario 2. It assumes that migration will occur but that the net level of migration will be zero. This allows us to consider how those people who migrate into Cheshire East would impact on the age structure of the Borough over the plan period when compared with the natural change model (i.e. scenario 1).

2.10 The findings suggest that the population of Cheshire East would fall by 9,700 people by 2030, as there would be a higher proportion of older people (60/65+) moving into the Borough, less younger children (0-10) and less adults (18-59/64) than under the natural change model (see Table 2). Despite the fall in the population there would still be a requirement for an additional 485 dwellings per annum as the underlying demographic trends outlined under scenario 1 will still apply and the household size of older people tends to be smaller. In addition, the higher proportion of older people than under the natural change model means that the figure for local labour supply (i.e. for economically active Cheshire East residents) is forecast to reduce by an average of 1,065 people per annum over the plan period. This represents a much greater reduction than the previous two forecasts and highlights the underlying impact that migration has on age structure and labour supply within the Borough.

Scenario 4 – Net Increase of 1,150 dwellings per annum

2.11 The Council consulted on three strategic options for growth for the Local Plan in its Issues and Options Paper in November 2010. This scenario represents the low growth strategy identified in that paper. It also represents the annual average rate of net housing provision for the Borough identified in the North West of England Regional Spatial Strategy (RSS) to 2021 i.e. the current housing requirement figure for Cheshire East. Modelling was used to forecast the population required to fill a net increase of 1,150 dwellings per annum over the plan period. The findings estimated that this level of housing would result in an increase in population of 23,900 people in Cheshire East by 2030 and an average annual reduction of 115 people in the local labour supply figure over the same period.

2.12 Modelling was also undertaken using a similar annual net dwelling increase figure of 1,195, which represents the average number of housing completions in the Borough over the last fifteen years (1996 to 2011). The findings estimated that this level of housing would result in an increase in population of 26,100 people in Cheshire East by 2030 and an average annual reduction of 55 people in the local labour supply figure over the same period.

Scenario 5 – Net Increase of 1,350 dwellings per annum

2.13 This scenario represents the medium growth strategy identified in the Council's Issues and Options Paper. Modelling was used to forecast the population required to fill a net increase of 1,350 dwellings per annum over the plan period. The findings estimated that this level of housing would result in an increase in population of 33,600 people in Cheshire East by 2030 and an average annual increase of 145 people in the local labour supply figure over the same period.

Scenario 6 – Net Increase of 1,600 dwellings per annum

2.14 This scenario represents the high growth strategy identified in the Council's Issues and Options Paper. Modelling was used to forecast the population required to fill a net increase of 1,600 dwellings per annum over the plan period. The findings estimated that this level of housing would result in an increase in population of 45,800 people in Cheshire East by 2030 and an average annual increase of 475 people in the local labour supply figure over the same period.

Scenario 7 – Zero Jobs Growth Forecast

2.15 This scenario assumes that there will be no job growth throughout the 20 year forecast period. This means that the employment level at the end of the Plan period in 2030 will be the same as it was at the start in 2010 i.e. 166,100 employees. This is a useful baseline model as it estimates the change in population and housing provision that will be required to maintain the status quo in terms of job provision in the Borough.

2.16 The findings suggest that the population would have to increase by 26,000 people if the employment level is to remain the same. It may seem surprising that, in future, a larger population will be needed to sustain an unchanged number of jobs, but this partly reflects the impact of an ageing population. A further 1,195 dwellings would need to be provided each year to accommodate this increased population.

2.17 As might be expected, this scenario results in relatively little change in the number of economically active people or the local labour supply (an average fall of 60 per annum): for example, if jobs growth does not occur in Cheshire East, then people will be less inclined to migrate there (to look for or take up jobs), so inward migration is likely to contribute less to the local labour supply than it would in a more buoyant local jobs market.

2.18 However, it should be stressed that the employment and local labour supply figures do not equal each other, or follow the same trend. In particular, some of those who make up the local labour supply commute to jobs outside Cheshire East. Conversely, some of the jobs at Cheshire East sites are occupied by people who live outside the Borough and commute inwards. In addition, some of those who make up the local labour supply are unemployed. Therefore commuting patterns and economic conditions in general affect the relationship between employment and the local labour supply.

2.19 It is also important to note that economic output – the value of the goods and services that the economy produces – can grow, even if the number of jobs does not. This is because productivity (the economic output generated per hour of work) improves over time: for example, technological improvements

make it possible to produce particular goods and services more quickly than before. More specifically, even with zero employment growth, economic output is likely to grow by an average of 1% to 2% a year, because of productivity growth.[2]

Scenario 8 – CHWEM (Local Economic Forecasting Model) Baseline Projection for Jobs Growth

2.20 This scenario uses the Cheshire, Halton and Warrington economic forecasting model's (the CHWEM's) baseline projection for job growth of 0.3% a year for 2010-25 and assumes that this growth rate will continue over the rest of the Plan period (i.e. 2025-30).[3] This rate of job growth is forecast to require a yearly average increase in the local labour supply of 445 people and an overall increase of 44,200 in the Borough's population during the Plan period. This in turn would produce a yearly average housing requirement of 1,570 additional dwellings to 2030.

2.21 The 0.3% average yearly job growth figure is relatively modest when compared with past levels of growth in Cheshire East, for example 1.2% per annum during 1991-98 (which includes part of a recession) and 1.3% during 1995-2008 (the longest recent period for which a continuous data series is available, but not one that includes any major economic downturns). However, it is a rate of growth which is considered more achievable for the plan period, considering the current challenging global and national economic climate.

2.22 Two further modelling scenarios were undertaken: for job growth at 1.2% and 0.75% per annum (with the 0.75% rate chosen because it is midway between the CHWEM baseline projection and the 1.2% employment growth scenario). However, both produced population forecasts that were too high to be acceptable, in terms of the likely impact that accommodating this level of development would have on the environment of Cheshire East i.e. a 1.2% job growth per annum would require an increase of 126,050 people and an additional 3,200 houses p.a., while a 0.75% job growth per annum would require an increase of 86,000 people and an additional 2,410 houses p.a. over the plan period. These implausible scenarios were discounted from serious consideration.

[2] This is after allowing for the effects of inflation. The 1% to 2% range is consistent with local baseline projections (from the "CHWEM" economic forecasting model) and with the views of some nationally renowned economic forecasting organisations.

[3] At present, the CHWEM does not produce projections beyond 2025.

Scenario 9 – ONS 2008 Based Sub-National Projections

2.23 The 2008 based sub-national projections produced by ONS estimate that the population of Cheshire East will increase by 38,600 people during the Plan period. This would produce a requirement for an additional 1,465 dwellings per annum and increase the local labour supply by an average of 400 people per year.

Scenario 10 – ONS 2010 Based Sub-National Projections

2.24 The 2010 based sub-national projections produced by ONS estimate that the population of Cheshire East will increase by 47,800 people during the Plan period. This would produce a requirement for an additional 1,600 dwellings per annum and increase the local labour supply by an average of 605 people per year.

Forecasting Update

2.25 Both sub national projections and population forecasts are produced at a given point in time and based on the most reliable assumptions at that point in time. Since the 2010 sub national population projections were released and the forecasts (based on the 2010 indicative estimates) were produced for Cheshire East the initial results of the 2011 Census have been released. These initial census results have shown that the Office for National Statistics (ONS) has underestimated the population in Cheshire East. If ONS had not run the 2011 census they would have underestimated the population of CE in 2011 by about 3,500 people (based on their rolled forward indicative estimates). ONS would also have underestimated the number of people aged 30-34 (by about 7%) and also those aged 15-19 and 35-39 (to a lesser extent).

2.26 Since the first 2011 mid year estimate (MYE) of population was produced by ONS in September 2012, ONS have produced interim 2011 based sub national projections. These use the same assumptions on future fertility, mortality and migration rates as the 2010 sub national projections. Comparing the 2010 sub national projections and the 2011 interim projections shows the results of the changes to the base population (i.e. the impact of the 2011 Census results). The 2011 interim projections only run to 2021. Even though they start from a higher base population (as a results of the 2011 census) the 2011 projections project a lower population in 2021 (389,700) than the 2010 based projections (393,000). The 2010 projections project an increase of around 25,000 between 2011 and 2021 compared to a projected increase of around 19,000 in the same period in the 2011 based projections.

2.27 We are working towards producing updated forecasts to take account of the 2011 Census results, the 2011 MYE and also other statistics that are due to

be released. For example ONS are due to re-release past mid estimates of population in light of the Census results and re-release past estimates of migration, they will also release information on household composition from the 2011 census (along with a number of other census datasets). It is too early to say what the implications of all these new datasets will be on the forecasts.

3. Conclusion

3.1 In conclusion, there is a wide range in the outputs of the ten scenarios that have been modelled depending on whether a narrow view is taken based on providing for the likely needs of the existing population only, or a wider view is taken based on providing for continued economic growth in the area and taking account of underlying demographic trends. The national trend of an ageing population is particularly marked in Cheshire East, with a higher proportion of older people in both the existing population and those migrating into the Borough. This means that a higher level of housing growth is needed to maintain the existing labour supply.

3.2 The existing housing requirement figure for Cheshire East of 1,150 dwellings per annum shown in the Regional Spatial Strategy (RSS) is estimated to result in an average annual reduction in labour supply of 115 people during the plan period to 2030 (scenario 4). Similarly, scenario 7 (no jobs growth) is expected to result in a reduction of 1,200 people in the local labour supply and a need for 1,195 net new dwellings per annum. However, a net increase of 1,350 dwellings per annum (scenario 5) is predicted to result in an increased labour supply (up 2,900 people). This suggests that the appropriate housing requirement should lie between the medium and high growth requirement identified in the Council's Issues and Options Paper (i.e. between 1,350 and 1,600 dwellings), if the area is to not only increase its economic output but maintain employment growth in the future.

3.3 The forecasts will require updating in 2013 once further information from the 2011 census becomes available. As indicated in the introduction, the outputs from modelling work represent only one of the elements that have been considered by the Council in determining the level of housing growth shown in the Development Strategy and considered appropriate for Cheshire East until 2030.

Appendix 1 - Forecasting Methodology

1 Introduction

1.1 This paper details the methodology used to produce the 2010 based population forecasts[4] requested by Cheshire East planners. The forecasts will be one element of supporting evidence to be considered for the Authority's Local Development Framework.

1.2 This paper includes sections on:

- The POPGROUP software (used to produce the forecasts)
- The forecasting methodology
- The assumptions (the data the forecasts are based on).

2 The POPGROUP software

2.1 POPGROUP is a suite of demographic models that enable population, household and labour force forecasts to be produced.

2.2 POPGROUP uses MS Excel to manage its data inputs and outputs and enables users to experiment and analyse alternative forecasts of demographic change.

2.3 The forecasting model estimates future population change based on fertility, mortality & migration assumptions which the user builds and can model with the help of the software.

2.4 Population forecasts can be used to derive likely dwelling and household numbers consistent with the population's size and age-sex composition. Likewise the forecast can be used to derive the changing size and shape of the labour force.

2.5 Alternatively, policy-constrained scenarios may be evaluated, linking the future size and profile of a local population to the provision of new dwellings and/or projected economic growth.

2.6 POPGROUP is used by a large number of local and regional organisations[5] in the UK and has been subject to extensive enhancement and development over the last ten years. The POPGROUP model suite is owned by the Local Government Association.

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4 The forecasts were produced by Lee Huxley (Demographic Analyst, Cheshire West and Chester Council) with support from Eleanor Spencer (Demography and Research Officer). Expertise and guidance on the economic aspects of the forecasts was provided by Nick Billington (Senior Research Analyst, Cheshire East).

5 POPGROUP has over 90 users including academic and public service staff in housing, planning, health, policy, research, economic development, and social services.

2.7 Edge Analytics[6], the company currently responsible for developing the software state "*Its robustness and transparency are ideally suited to the rigorous nature of public scrutiny that accompanies the production of local development plans*".

2.8 Version 4 of POPGROUP (due in late 2012) will include some small changes which will have only marginal effects on the results of forecasts. However, they will bring POPGROUP's approach as close as possible to those of the statistical agencies[7], and therefore further help users' reports to withstand scrutiny, including at formal Examinations in Public.

3 The forecasting methodology

3.1 POPGROUP uses a cohort component methodology to produce population projections or forecasts. This is a standard approach that is applied by most national statistical agencies. A population in a base period is projected forward taking account of the impact of births, deaths and migration. The number of births, deaths and migrants is based on assumptions on fertility, mortality and migration built by the user of the model.

3.2 The headship rate methodology is the current standard for producing household projections. This approach is used by CLG for its household projections and is replicated in the POPGROUP derived forecast methodology. Headship rates measure the proportions of household residents in an age/sex group that 'represent' a household of a particular type (couple, lone-parent, other multi-person, one-person, for example). The forecast number of households is calculated as the product of the population resident in households multiplied by the headship rate (for each age, sex, household type combination).

3.3 The derived forecast methodology can also be used along with economic activity rates and population forecasts to forecast the size of the labour force.

3.4 The user also has the option of running policy led forecasts and can constrain the model to either the number of new dwellings or new jobs, the model then adjusts the forecast population to meet this constraint.

3.5 The forecasts give the population on 30th June, i.e. mid-year for each year from 2010 (the base year) to 2030.

3.6 The following table identifies;

- the factors used to produce the population forecasts
- what each factor was used to calculate.

[6] http://www.edgeanalytics.co.uk/

[7] ONS and the statistical agencies of the devolved governments.

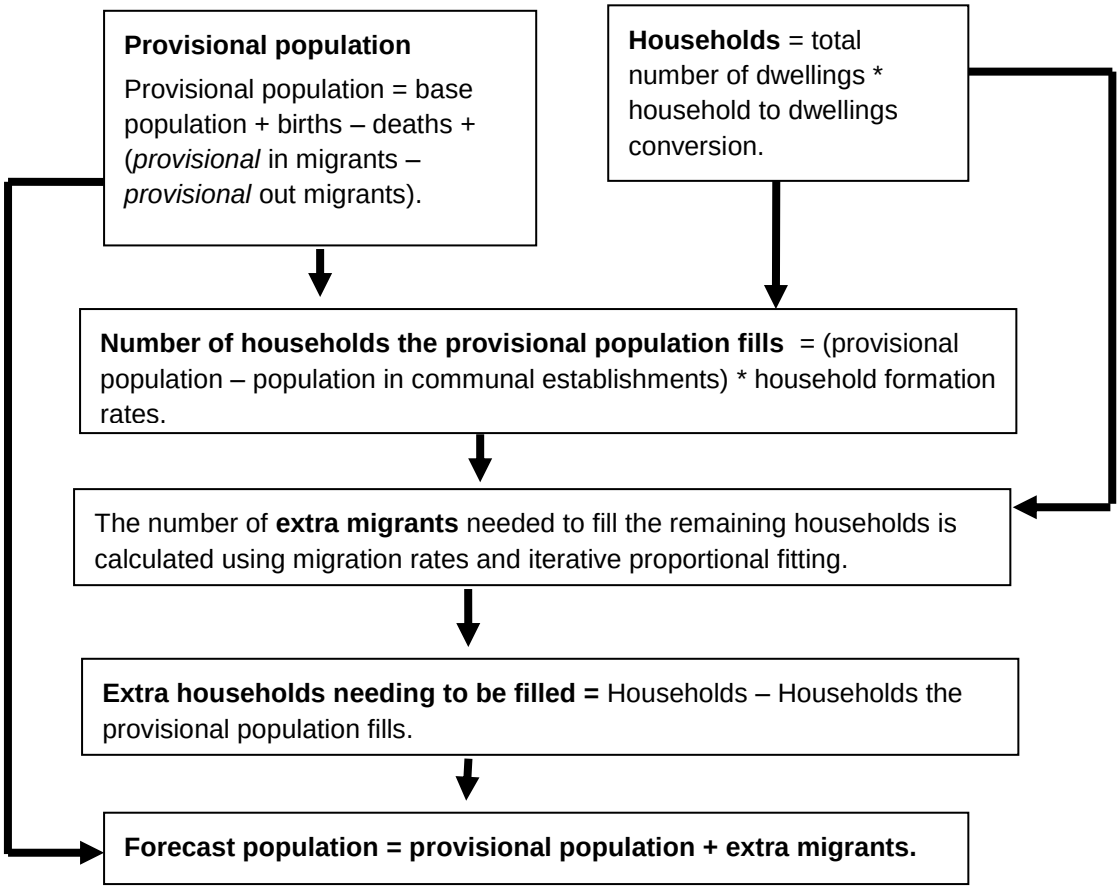
Table 1: Factors in the population forecasts

Factors	Used to calculate
Population factors	
Population by single years of age and sex for 2010	Base population
Fertility rates	The number of births
Mortality rates	The number of deaths
Migration (age structure)	The number of in and out migrants (and age structure of all migrants). In models constrained to new dwellings or new jobs the number of migrants is adjusted so the model meets the constraint.
Factors needed to produce dwelling impact (or constrain a forecast to the number of new dwellings)	
Population in communal establishments	Households = (population – population in communal establishments) * headship rates
Headship rates	
Household to dwellings conversion information (vacancy rates, holiday/second homes rates, households sharing rates)	Dwellings = households / household to dwellings conversion
Number of new dwellings	Total number of dwellings = dwellings in previous year + new dwellings
Factors needed to produce economic impact (or constrain a forecast to the number of new jobs)	
Labour force to jobs conversion information (unemployment and commuting rates)	Jobs = labour force / labour force to jobs conversion
Economic activity rate	Labour force = population * economic activity rate
Number of new jobs	Total number of jobs = jobs in previous year + new jobs

3.7 Each factor is explained in more detail in the section on assumptions.

3.8 The following diagram is a very basic outline of the processes (calculations) the software follows to produce the population each year (constrained to number of dwellings).

Figure A: The forecasting process



3.9 Part of the process of producing forecasts is to validate the results. Validation helps build confidence that forecasts will stand scrutiny from those who will use them or challenge them. The validation process included:

- Ensuring the assumptions are well documented and convincing
- Ensuring the results are plausible
- Ensuring the results are consistent with other evidence
- Investigating how sensitive the results are to plausible alternative assumptions

4 The forecasts produced

4.1 A number of forecasts were produced at the request of the planners:

Table 2: Forecasts produced

Population led forecasts	
Natural change forecast	• Ages on the 2010 resident population • Factors in births and deaths • No migration • Forecasts the population and the number of dwellings this population would require.
Migration rates forecast	• Ages on the 2010 resident population • Factors in births, deaths and migrants • Forecasts the population and the number of dwellings this population would require.
Nil net migration forecast	• Ages on the 2010 resident population • Factors in births and deaths • Allows for in and out migration (total number in and out based on average *in* over past 4 years (i.e. net migration = 0) • When compared to the natural change model shows how the age structure of migrants impacts on forecast • Forecasts the population and the number of dwellings this population would require.
Dwelling led forecasts	

• 1,150
• 1,195
• 1,350
• 1,600
	• Calculates a provisional population by:
	  ○ Ageing on the 2010 resident population
	  ○ Factoring in births and deaths
	  ○ Calculating provisional migrants
	• Calculates number of households (subject to number of new dwellings, household formation rates and household to dwelling conversion rates)
	• Calculates numbers of households the provisional population fills
	• Calculates number of remaining households to be filled
	• Calculates population needed to fill these extra households (using migration rates)
	• Calculates forecast population
	• Forecasts the population required to fill a given number of dwellings.

Economic led forecasts (for more detail see section 6)	

Zero jobs growth
 	
Cheshire, Halton & Warrington Econometric Model (CHWEM) baseline projections of job growth
	• Calculates a provisional population by:
	  ○ Ageing on the 2010 resident population
	  ○ Factoring in births and deaths
	  ○ Calculating provisional migrants
	• Calculates required labour force (subject to number of new jobs, economic activity rates, unemployment rates and commuting rates)
	• Evaluates how the provisional population fills the required labour force (by applying economic activity rates to provisional population)
	• Adjusts the provisional population (using migration rates) until the provisional labour force fills the required labour force
	• Forecasts the population required to fill a given number of jobs.

Others (sub national projections for comparison)	
2008 based subnational population projections 2008 based subnational population projections (constrained to meet RSS dwelling requirement) 2010 based subnational population projections	Source: Office for National Statistics

5 The population assumptions

5.1 The forecasting process involves using demographic expertise to form assumptions on the many factors affecting the future population. Forecasting is an iterative process, assumptions are developed and refined several times before arriving at final forecasts.

5.2 When new data becomes available then the quality of a previous forecast decreases. Over the coming months several key datasets are due to be released:

- The 2011 MYE (mid year estimate of population) is due in September 2012 (this will be based on results from 2011 census)
- Rebased MYEs 2002-2010 are due in spring 2013
- Census 2011 tables detailing vacancy rates and population living in communal establishments are expected to be due by Spring 2013
- Updated subnational household projections (currently 2008 based are the latest available) are expected to be due in 2013

5.3 The 2010 based population forecasts should be reviewed once these new datasets become available. All the data needed to produce 2011 based forecasts should be available in 2013.

5.4 To produce the 2010 based forecasts, assumptions were made of what would happen over the next twenty years (2010 to 2030) to a variety of factors. The assumptions are generally based on past trends, local policy and assumptions of future trends from the national projections published by the Office for National Statistics.

5.5 The figures in this paper are rounded. However, all the calculations run by the forecasting software and the assumptions the model used were built using unrounded data where possible.

Starting (base) population

5.6 The starting (base) population of the forecasts is the indicative mid year estimates of population for June 30th 2010 produced by the Office for National Statistics. These indicative estimates are the most up to date population estimates available at the time (and ONS see these as using an improved methodology compared to the 2010 official MYEs).

Fertility

5.7 The number of births in an area depends on two things, the number of women of childbearing age and the likelihood that these women will give birth within the next year (fertility rates). There was a general trend throughout the 1990s for the number of births to fall, whilst throughout the 2000's the number of births generally increased in Cheshire East.

5.8 There were around 4,100 live births in Cheshire East in 1991 compared with around 3,500 in 2001 and around 4,000 in 2010.

5.9 Fertility rates are the probability that a woman of a stated age will give birth within the next year. The fertility rates used at the start of the forecasts (2010) were calculated at a unitary level for 2010 using the number of births to women by age. Using a three year average (i.e. 2008-10) was considered, as this technique theoretically would smooth out any anomalies in the data. However, fertility rates were quite different over the three year period and to take an average would have assumed a lower fertility than the 2010 rates themselves.

5.10 ONS do not publish information on the numbers of live births by single year of age of female at unitary level. However, it is not appropriate to use the same fertility rates for each single year of age within an age group (for example 35 year olds and 39 year olds). National figures of the number of births by single year of age of women (from the 2010 National Population Projections) were used to apportion the number of births for each age group to single years of age.

Fertility rate = Number of live births in 2010 (vital statistics, ONS) / Number of females (2010 indicative estimates, ONS) * 1,000.

Figure B: Age Specific Fertility Rates

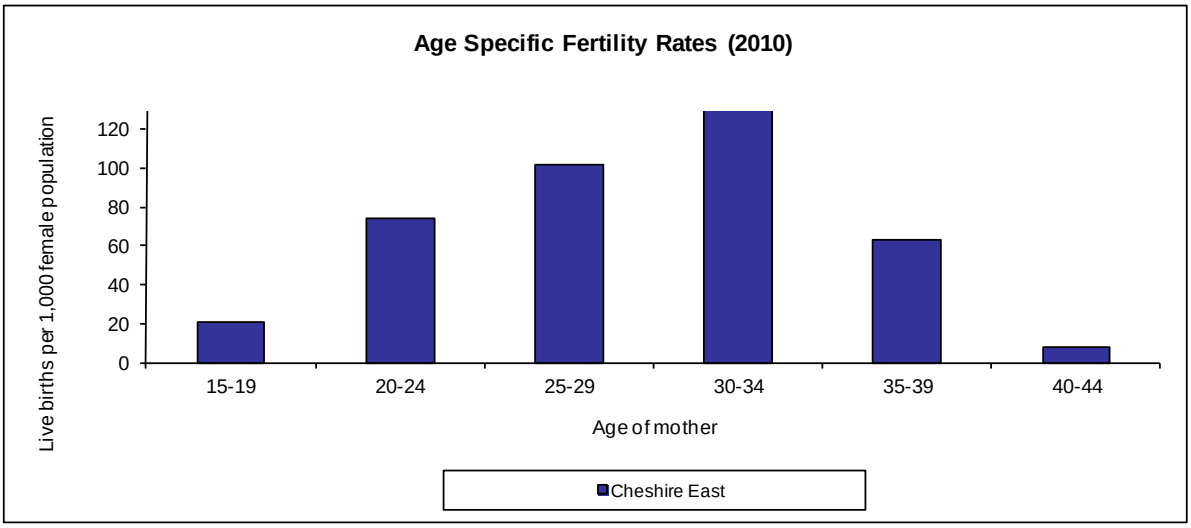


Table 3: Age Specific Fertility Rates

	Fertility rates 2010 (live births per 1,000 females)					
	15-19	20-24	25-29	30-34	35-39	40-44
Cheshire East	20	75	102	130	63	8

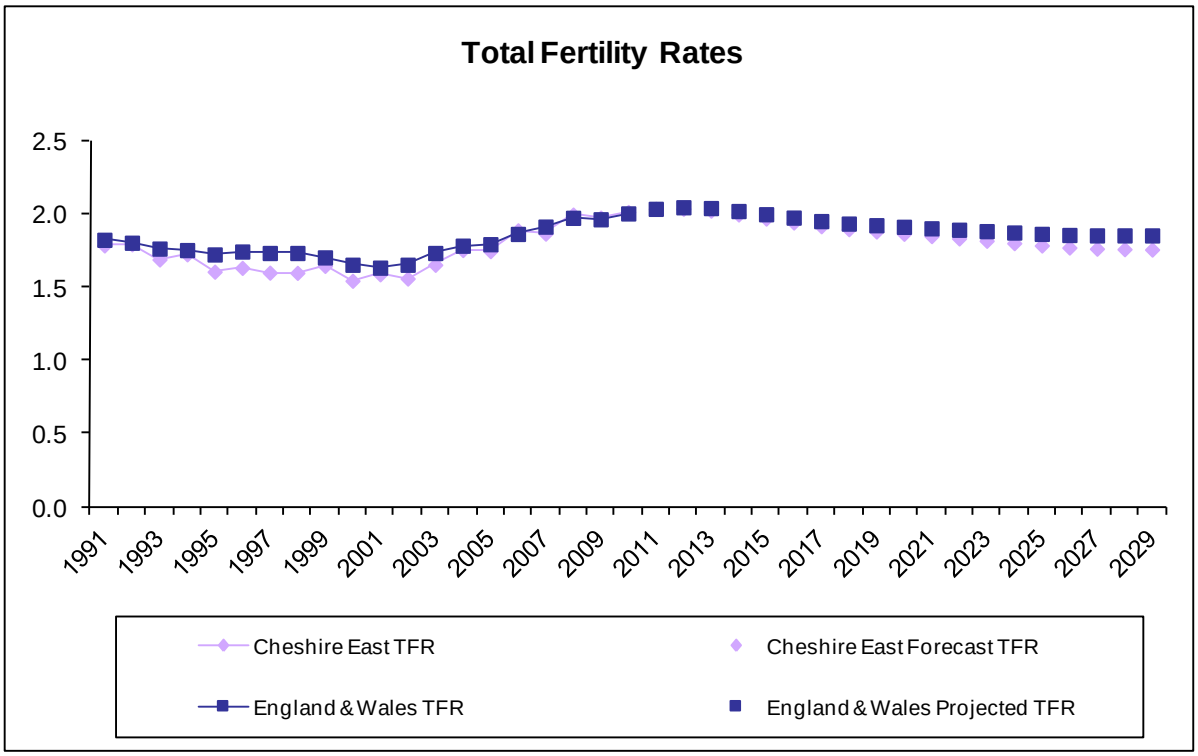
5.11 The 2010 based National Population Projections[8] assume that the long-term total fertility rate (TFR)[9] for England & Wales will be around 1.85. These assumptions are based on family building patterns to date and other relevant evidence. National trends of changes in fertility (for each age of mother) from the (2010 based) national projections were applied to the Local Authority level age specific fertility rates throughout the model (by applying a differential to the 2010 Local Authority rates).

5.12 The following graph shows the TFRs for Cheshire East and England & Wales for 1991 to 2010 and illustrates the fairly constant TFRs that are assumed over the forecast period. This is fairly optimistic given the levels seen since 1991 but takes into account the increases seen over the past few years.

[8] Office for National Statistics.

[9] The TFR is the average number of live children a group of women would have if they experienced the age-specific fertility rates for the calendar year in question throughout their childbearing lifespan.

Figure C: Total Fertility Rates



5.13 A ratio of male to female births was entered into the model. Using this ratio, total births each year were apportioned to males and females. The number of boys per 1,000 girls was entered as 1,061 for Cheshire East. This represented the ratio of male to female births seen in the Local Authority from 1991 to 2010.

Mortality

5.14 Mortality rates are the likelihood that a person of a given age and sex will die within a given year. Mortality rates have been falling in recent years due to improved social conditions and medical care. It is assumed mortality rates will continue to decrease during the forecast period.

5.15 The mortality rates used in the forecasts were calculated at unitary level. Rates were calculated by age group and sex for a 3 year average period of 2008-2010. A three year average was used to smooth out any anomalies in the single year mortality data. This was an appropriate technique to use for the mortality data as mortality rates overall were very similar throughout this period. Mortality rates have not seen the same rate of change as fertility rates (where this method was discounted).

Mortality rate = Number of deaths in 2008-2010 (Vital Statistics, ONS) / Population (2008-2010 indicative mid-year estimates, ONS) * 1,000.

Figure D: Age Specific Mortality Rates

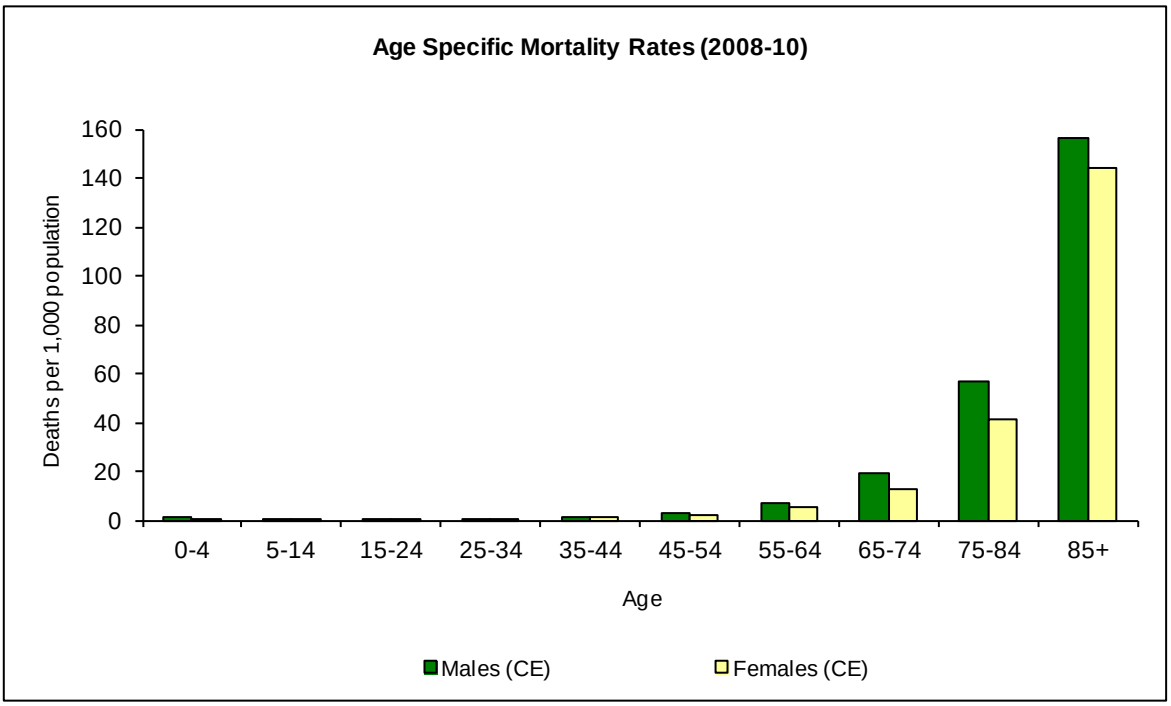


Table 4: Age Specific Mortality Rates

Mortality rates 2008 to 2010 (deaths per 1,000 population)		
	Cheshire East	
	Males	Females
0-4	1	1
5-14	0	0
15-24	0	0
25-34	0	0
35-44	1	1
45-54	3	2
55-64	7	5
65-74	19	13
75-84	57	41
85+	156	144

5.16 ONS do not publish information on the number of deaths by single years of age. However, it is not appropriate to use the same mortality rates for each single year of age within an age group (for example 85 year olds and 99 year olds). National figures of the number of deaths by gender and single year of age (from the 2010 National Population Projections) were used to apportion the number of deaths for each gender and age group to single years of age.

5.17 The 2010 based national population projections assume that mortality rates will continue to decrease. These assumptions are based on mortality and life expectancy patterns to date and other relevant evidence. The national trends of changes in mortality (for each age group and gender) were applied to the Local Authority mortality rates throughout the model (by applying a differential to the Local Authority rates).

Internal Migration (i.e. moves within UK)

5.18 Migration rates indicate the likelihood that a person of a certain age and sex will move in to or out of an area within the next year. Internal migration is migration within the UK.

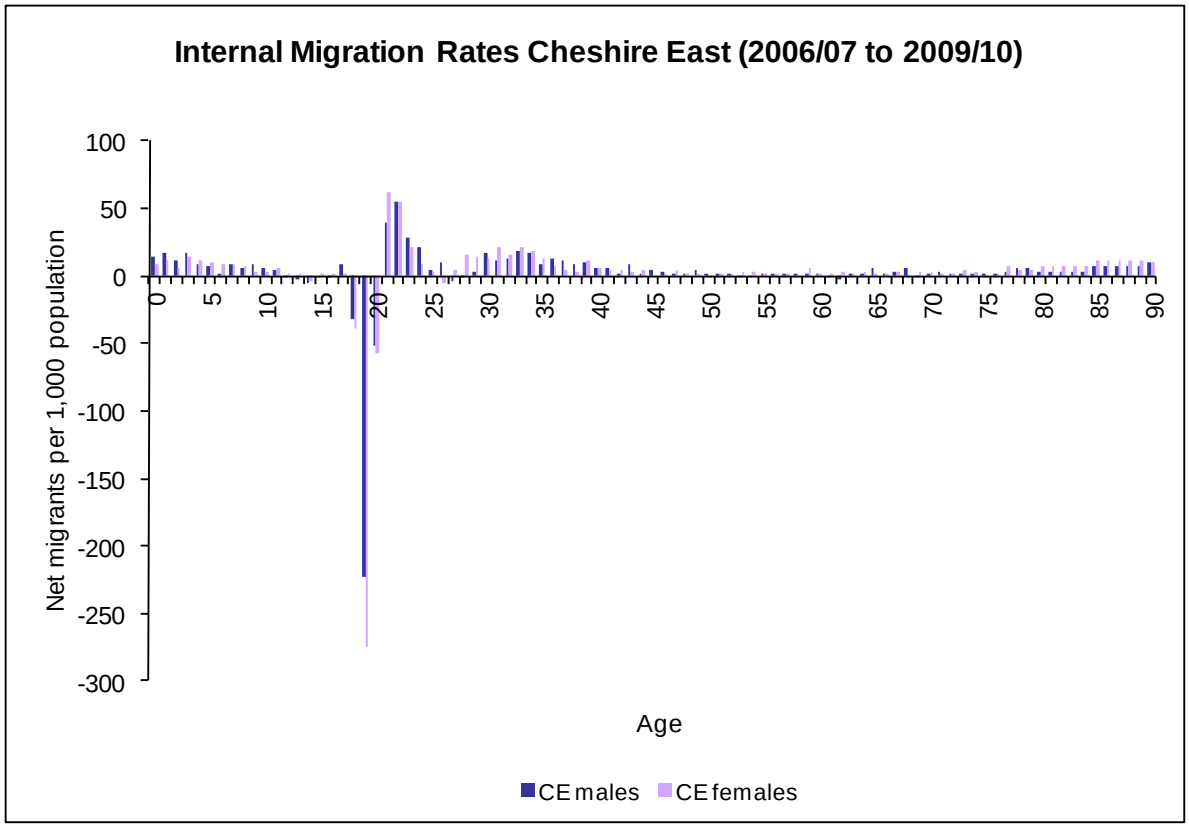
5.19 For the dwelling led population forecasts the forecasting model assumes the number of migrants each year is heavily influenced by the number of new dwellings built each year. The migration rates were used to assign the proportion of total migrants to people from each age group and gender. The age and sex structure of migrants has remained similar over recent years and so the same rates were used throughout the forecast. Thus, the model assumed that the proportion of total migrants from each age group and gender would remain the same throughout the forecast period.

5.20 The migration rates used in the forecasts were calculated using unitary level migration data (2006/07 to (modelled) 2009/10). In-migration and out-migration rates were calculated by single year age group and sex.

Migration rate = Sum of migrants (2006/07 to (modelled) 2009/10) (ONS) / Sum of indicative population estimates (2007 to 2010) (ONS) * 1,000

5.21 The key age groups affected by migration (unsurprisingly) are the late teens which have experienced highest levels of net out migration in recent years and the early twenties which have experienced the highest net in migration.

Figure E: Internal Migration Rates Cheshire East



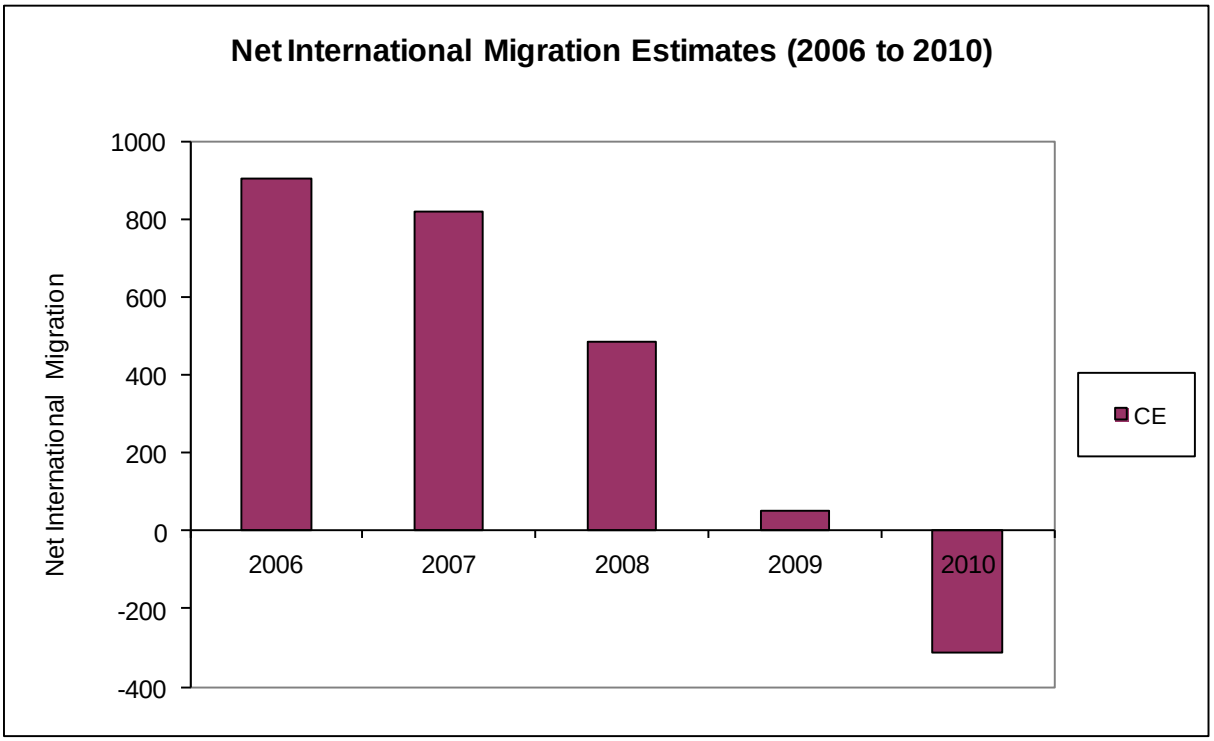
International Migration

5.22 International migration has not been taken into account in past forecasts the Local Authority has produced as numbers of international migrants have been small in the past. However, in recent years, numbers of international migrants have been increasing, so the option of including an international migration input in the forecasts was explored.

5.23 Information is not available at a Local Authority level on the age structure of international migrants and the only option would have been to use national data to build assumptions on the age structure of international migrants.

5.24 The past five years immigration and emigration estimates (from the indicative estimates (ONS)) were examined. It was found that net international migration has generally decreased over the past five years in Cheshire East. The total net gains and losses have been small (in relation to the total population). As the following graph shows, the past two years (2009 and 2010) have seen net losses due to more emigration than immigration.

Figure F: International Migration Estimates



5.25 Due to all the factors above it was decided that robust assumptions on immigration and emigration rates (over the twenty year forecast period) would be impossible to build. Given that in recent years net numbers of international migrants have been small (and varied) (and we have no information on the age structure of these migrants at a Local Authority level) it was decided not to account for international migration in the forecasts.

Population in communal establishments

5.26 The percentage of people of a given age and sex who were not living in households (living in communal establishments) was taken from the 2001 census. Just over 1% of the population in Cheshire East were living in communal establishments in 2001 People aged 85 or above were most likely to live in a communal establishment. It was assumed that there will be no change in the percentage of people living in communal establishments throughout the forecast period.

Population in communal establishment rate = Number of people not in households (standard table ST001, 2001 census) / Total number of people (standard table ST001, 2001 census) * 1,000

Figure G: Population living in communal establishments

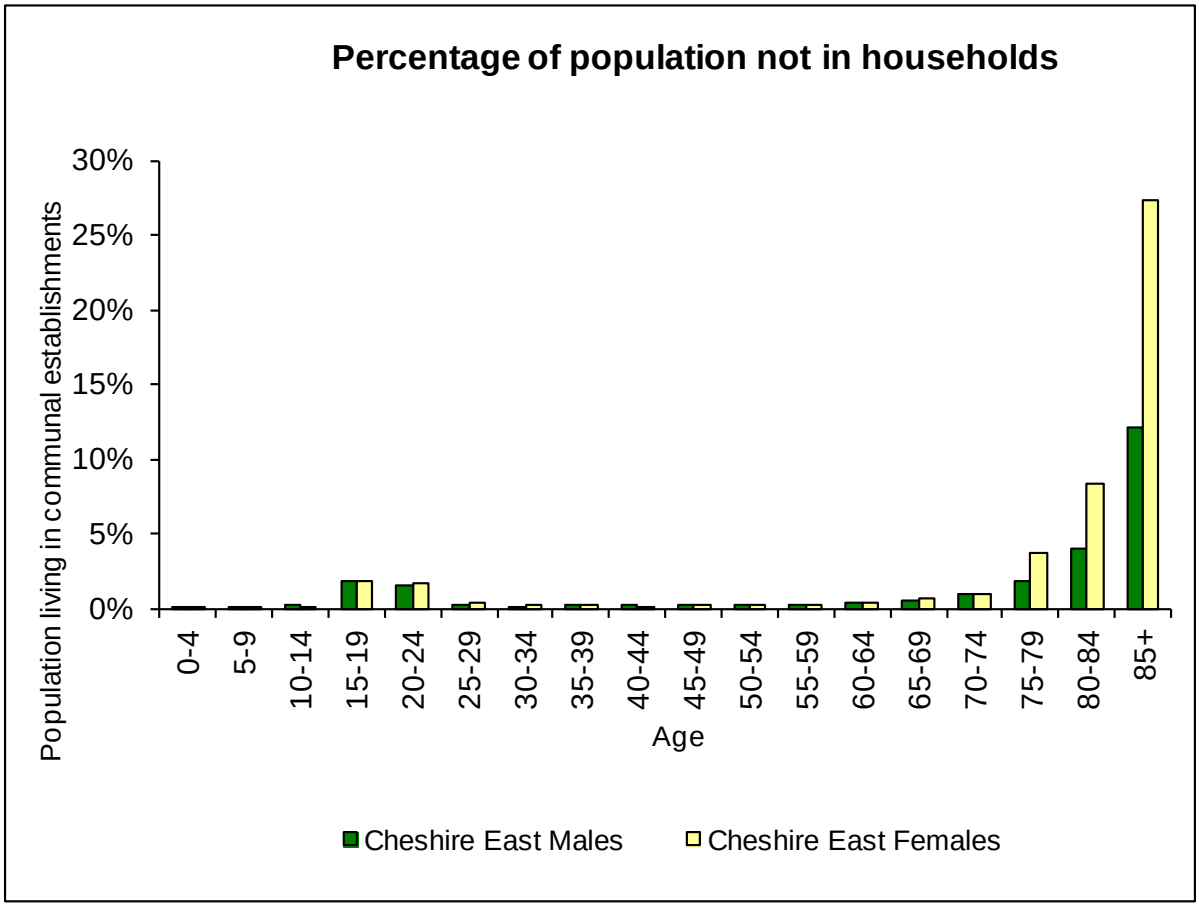


Table 5: Population living in communal establishments

Population in communal establishments Cheshire East		
	Males	Females
0-4	0.1%	0.0%
5-9	0.1%	0.1%
10-14	0.3%	0.1%
15-19	1.9%	1.8%
20-24	1.5%	1.6%
25-29	0.2%	0.4%
30-34	0.1%	0.2%
35-39	0.2%	0.2%
40-44	0.2%	0.1%
45-49	0.2%	0.2%
50-54	0.3%	0.2%
55-59	0.2%	0.3%
60-64	0.4%	0.3%
65-69	0.6%	0.6%
70-74	1.0%	1.0%
75-79	1.8%	3.7%
80-84	4.0%	8.4%
85+	12.1%	27.3%

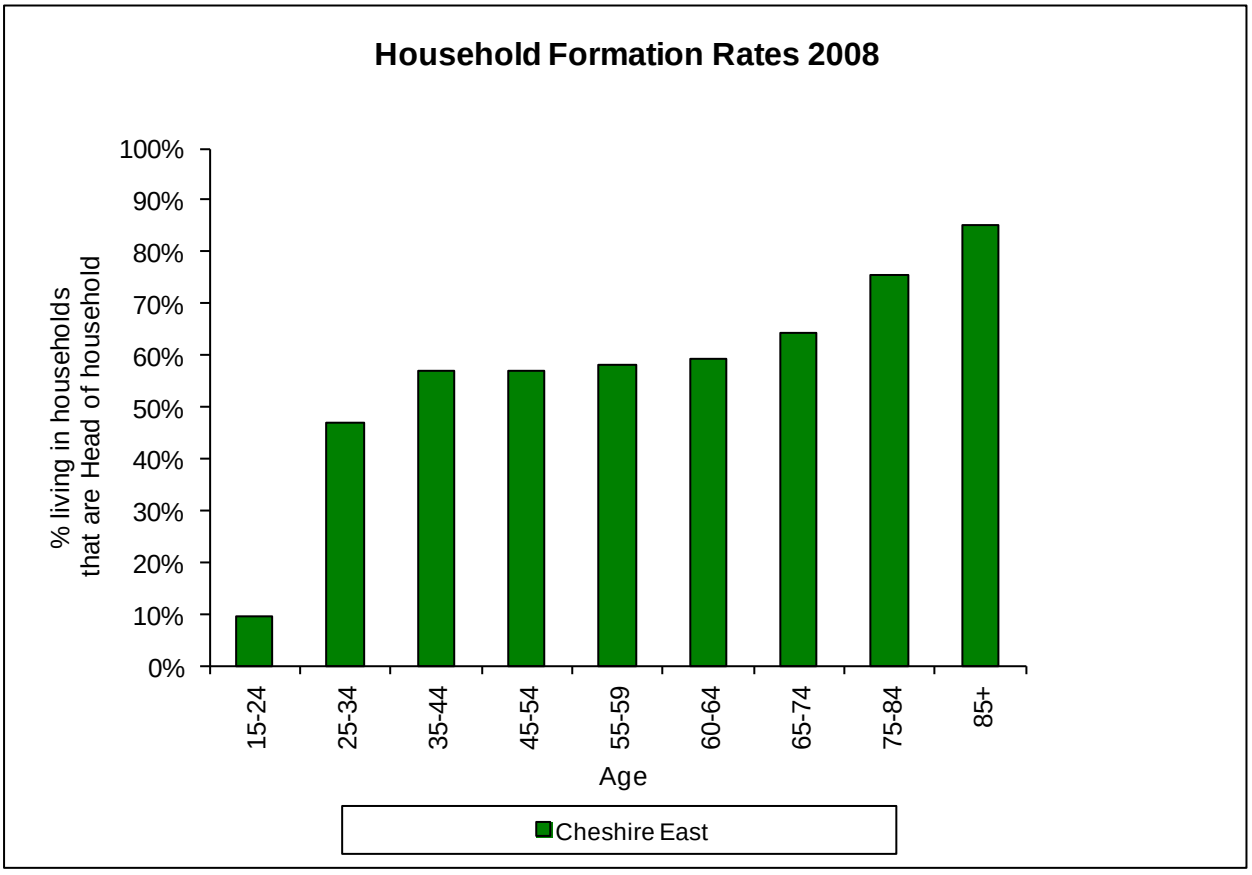
Household formation rates

5.27 Household formation rates are the likelihood that a person of a given age will be the head of a household. These rates are also known as headship rates and household representative rates.

5.28 The model uses household formation rates (at a Local Authority level) from the Department for Communities and Local Governments (CLG) 2008 based household projections[10]. These were projected from historical data derived from censuses and Labour Force Surveys.

5.29 The chart and table below illustrate the household formation rates for 2008. So for example, around 10% of people aged 15-24 living in households are the head of their household.

Figure H: Household Formation Rates



[10] Department for Communities and Local Government.

http://www.communities.gov.uk/publications/corporate/statistics/2033household1110

Table 6: Household Formation Rates

Household formation rates 2008	
	Cheshire East
15-24	9%
25-34	47%
35-44	57%
45-54	57%
55-59	58%
60-64	59%
65-74	64%
75-84	75%
85+	85%

5.30 Past trends have shown a general increase in the proportions of people who are heads of a household. This is due to increased trends in people living alone and an increased trend in the divorce rate. The CLG rates continue these past trends. These Local Authority trended rates produced by CLG are used in the forecast.

Household/dwellings conversion information

5.31 The percentage of dwellings that were vacant, holiday or second homes or shared by separate households was taken from the 2001 census.

The rates were calculated using standard table ST048:

- Vacancy rate = Number of vacant properties / Number of household spaces (dwellings)*100
- Holiday/second home rate = Number of second residence/holiday accommodation / Number of household spaces (dwellings) *100
- Households sharing rate = Number of households in a shared dwelling / Number of household spaces (dwellings) *100

5.32 The table below shows the rates used in the forecasts.

Table 7: Household to dwellings conversion information

	Vacancy	Holiday/second home	Households sharing
Cheshire East	3.6%	0.3%	0.1%

5.33 It was assumed that there will be no change in the rates of occupancy throughout the forecast.

6 The economic assumptions

Rounding of data

6.1 For convenience, the figures quoted in this section of the methodology paper are rounded. However, all the economic modelling calculations and assumptions use unrounded data where possible[11].

Definition of employment

6.2 Any housing requirement study has to take account of employment levels and how these might change in future. "Employment" therefore needs to be clearly defined, as it can be measured in various ways.

6.3 Firstly, there is the issue of how to allocate jobs or employed people to a particular geographical area. The allocation can be based on either:

a) where employed people live (residence-based employment); or
b) where employed people work or where jobs are located (workplace-based employment). This in turn can be measured as either:
    i. the number of jobs located in that geographical area; or
    ii. the number of employed people working in that area.

6.4 The number of jobs can of course differ from the number of employed people working in the area, because an employed person can have two or more jobs[12].

6.5 Secondly, there are different forms of employment status. For example, people can:

a) work full-time or part-time;
b) be employees or self-employed;
c) be employed in a permanent post, on a fixed term contract or employed as casual labour.

6.6 Thirdly, employment can be defined as filled jobs only, or it can be defined so that it includes vacant posts.

6.7 The forecasts require the input of workplace-based "jobs" data into POPGROUP software. In other words, it requires workplace-based employment data and ideally a measure of jobs, rather than employed people. If the impact on housing is to be accurately assessed, it needs to be based on as broad a definition of "employment" as possible. Therefore it requires a definition that includes part-

[11] ONS' model-based estimates of broad unemployment (all those available for and actively seeking work), which were used to forecast future unemployment, were available only as rounded figures. However, for other data sets, unrounded figures were available.

[12] Conversely, two people can share the same job.

timers as well as full-timers, self-employed people as well as employees and non-permanent as well as permanent staff. However, vacant posts, at least while they remain vacant, do not affect people's housing needs or their commuting patterns. Therefore housing requirements are perhaps best based on a measurement of employment that includes all filled jobs.

6.8 Workplace-based employment forecasts are available from the Cheshire, Halton & Warrington Econometric Model (CHWEM), an economic forecasting model that Cheshire East Council maintains and operates on behalf of Cheshire, Halton & Warrington partner organisations. (For more details on the CHWEM and its capabilities, see Annex 1.) These employment forecasts include self employment and they are a measure of jobs, rather than employed people. They include all filled jobs, but exclude vacancies. Furthermore, these forecasts were produced by the nationally-renowned forecasters Cambridge Econometrics and as such they are robust, credible estimates of future employment.

6.9 The employment scenarios therefore draw heavily on the CHWEM employment (jobs) forecasts, but also take account of past employment trends and strategic documents. These employment scenarios are described in more detail on the following pages.

SCENARIOS AND INPUT DATA

Employment scenarios

6.10 The CHWEM's baseline projections[13] point to relatively modest employment growth (averaging 0.3% a year) during 2010-25. Given the current weak economic climate and the absence so far of any signs of an early and robust recovery, this forecast still seems highly plausible. However, an analysis of past trends suggests faster long-term growth is possible. Conversely, it is also conceivable that employment growth will actually fall short of that predicted by the CHWEM. It is therefore prudent to model a number of employment growth rates, so that the impacts of all these scenarios can be assessed.

6.11 Table 8 provides full details of all the employment growth scenarios that were modelled in POPGROUP, and their rationale.

6.12 Each of these modelled scenarios is based on a particular average growth rate (%) per annum. As such, it can either be assumed that the growth rate varies from year to year, or that it remains constant. The first of these assumptions is much more plausible, for two reasons. Firstly, national and local economies experience significant variations in growth over the long term. Secondly, the current economic climate is relatively weak, so there is a strong likelihood that

[13] As noted in Annex 1, the CHWEM's baseline predictions take account of local population forecasts and locally-developed expectations about future house building, but they do not otherwise allow for the impact that incomplete or future development projects, policies or initiatives may have. As such, they are largely projections of past trends, rather than "forecasts" in the strict sense of the word.

employment growth will be weak in the short to medium term and more robust in the longer term. As such, each scenario allows for year-on-year variations in employment growth. These year-on-year variations are constrained so that year-to-year growth follows the same 2010-25 trajectory as the CHWEM baseline scenario[14], but the figures are scaled up so that the average annual growth rate matches that implied by the scenario in question.

6.13 The CHWEM does not produce forecasts for 2026 onwards and there is no alternative source for local employment forecasts (for either the post-2025 period or earlier). Therefore it is difficult to make an objective assessment of the path that employment growth might take in the late 2020s, and in particular of how much the growth rate might vary from year to year. As a result, it was assumed that, for each scenario, the annual percentage employment growth for 2025-30 would be constant and equal to the 2010-25 average.

6.14 Figure I shows the resulting growth paths for Scenarios 2, 3 and 4 under this assumption that year-on-year growth matches the baseline trajectory. (The other scenario, Scenario 1, assumes zero net change in employment.)

6.15 In each case, the base year (2010) employment levels were taken from POPGROUP (which generates employment estimates for the base year only) and then projected for future years (2011-30) by applying the scenario's growth rate and the CHWEM trajectory. In other words, the employment input data are constrained so that they (a) match the POPGROUP figures in the base year, but (b) follow the shape of the CHWEM trajectory and (c) equal the average annual rate of growth for the scenario in question. For example, if a commuting rate of 1.03 is assumed, POPGROUP estimates Cheshire East's employment to be 166,100. Under the CHWEM baseline scenario, employment in 2014 will be 100.4% of its 2010 level, or 100.4 if indexed (with 2010=100). Hence the 2014 employment level will be 166,100 * 100.4/100, or 166,800.

6.16 In summary, the chosen scenarios are as follows:

- **Scenario 1: Zero employment growth.** Employment remains at its 2010 level throughout the 20-year forecast period.
- **Scenario 2: CHWEM baseline projection (which is for relatively modest employment growth).** Under these baseline projections, employment growth averages 0.3% a year.[15]
- **Scenario 3: Very high employment growth.** Growth averages 1.2% a year. This is based on the Great Britain average for 1995-2008 (the longest recent

[14] In other words, the employment figures for a particular scenario are constrained so that the cumulative employment change between 2010 and Year X (2018 in the next paragraph's worked example) makes the same percentage contribution to 2010-2025 growth as it does under the CHWEM baseline scenario. In effect, this means that the employment trend (the green line in the Figure I chart) is the same "shape" for each scenario, but the cumulative growth between 2010 and any given year (as measured by the Y axis) is different for each scenario.

[15] The rate is 0.27% if less rounded.

period for which a continuous data series is available at national and Local Authority level). Cheshire East did achieve a slightly higher rate (1.3%) for the same thirteen-year period, but local level figures are subject to larger error margins. Furthermore, this period was significantly shorter than the current 20-year forecasting period and (unlike 2008 to 2011) 1995-2008 was a period of relatively robust economic growth. Hence even an average growth rate of 1.2% over two decades is a significant challenge and probably represents the upper limit of what can be achieved.

- **Scenario 4: High employment growth.** Growth averages 0.75% a year, i.e. midway between the rates for the CHWEM baseline scenario (0.3%) and the high growth scenario (1.2%).

6.17 All four scenarios were modelled within POPGROUP, to see what population forecasts they generated. Scenarios 1 and 2 produced credible population forecasts. However, Scenario 4 resulted in rates of population growth that were too high to be plausible; for Scenario 3, the implied population growth was even more implausible (i.e. higher still). Consequently, it was decided to focus only on Scenarios 1 and 2. These two scenarios may involve zero to modest employment growth, but both are likely to generate significant growth in economic output (GVA, or Gross Value Added). For Scenario 2 (the CHWEM baseline scenario of 0.3% p.a. employment growth), the CHWEM forecast is for 2010-25 GVA growth to average 2.9% p.a. in Cheshire East. Even under Scenario 1 (zero employment growth), GVA growth p.a. is likely to be between 1% and 2%, because of increases in productivity (the output per hour worked)[16].

6.18 Another scenario was also considered, but not modelled in POPGROUP: one in which employment growth rates match those set out in Cheshire & Warrington's "Unleashing the Potential" strategic report.[17] "Unleashing the Potential", which was drafted in 2010, has not been finalised and adopted, but it was intended to be a measure of Cheshire & Warrington's aspirations for demographic, housing and economic growth. In terms of employment, it aspires to cumulative employment growth of 5% in Cheshire East over the next two decades.[18] However, this cumulative growth rate implies an average annual growth rate of

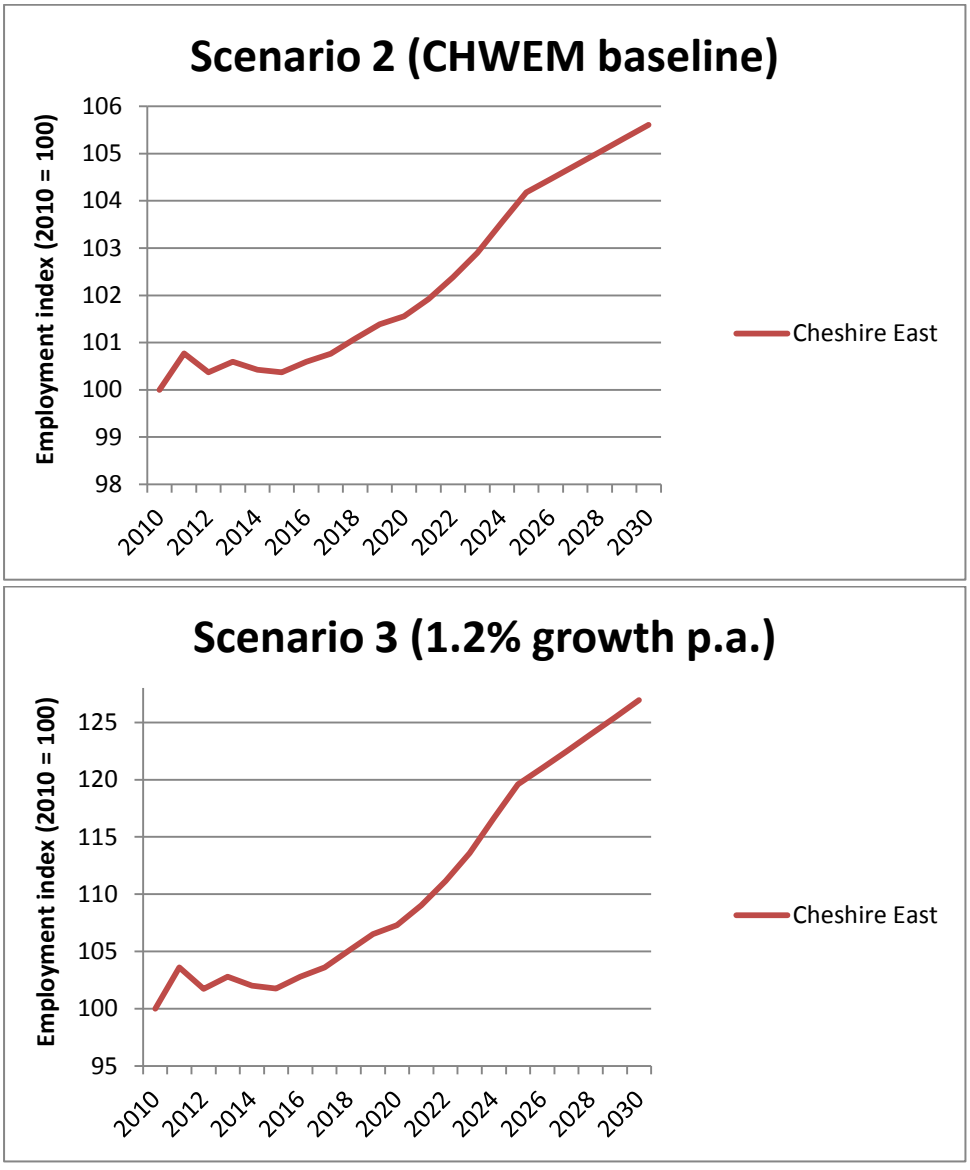
[16] The CHWEM does not recalculate GVA growth for alternative (non-baseline) employment scenarios, so it is not possible to quote specific GVA growth rates for Scenario 1. However, analysis of the relationship between the CHWEM baseline scenario's employment forecasts and its GVA forecasts (for other time periods and for the UK as well as the Local Authority) suggests that GVA is expected to expand by 1% to 2% a year during some spells of zero or negative net change in employment. For example, the CHWEM baseline figures suggest that, between 2009 and 2014, the UK will see 0.0% employment growth p.a., but 2.0% GVA growth p.a.. Furthermore, at least some national economic forecasting organisations take the view that GVA has to grow by around 2% if employment is to grow at all.

[17] "Unleashing the Potential of Cheshire and Warrington" (Joint response by the Cheshire & Warrington Local Authorities and CWEA to the draft Part 1 RS2010 Consultation). March 2010 draft.

[18] The document mentions 2030 as the target date for these aspirations; it does not specify a date for the base year, but its text suggests the intended base year is either 2010, or slightly earlier.

0.2% for Cheshire East[19], i.e. very little difference from Scenario 2, the CHWEM baseline scenario. Therefore the "Unleashing the Potential" growth was not modelled as a separate scenario.

Figure I: Employment index values (2010 = 100) for Scenarios 2 to 4



[19] In less rounded form, this rate is 0.24% (compared to a rate of 0.27% under Scenario 2).

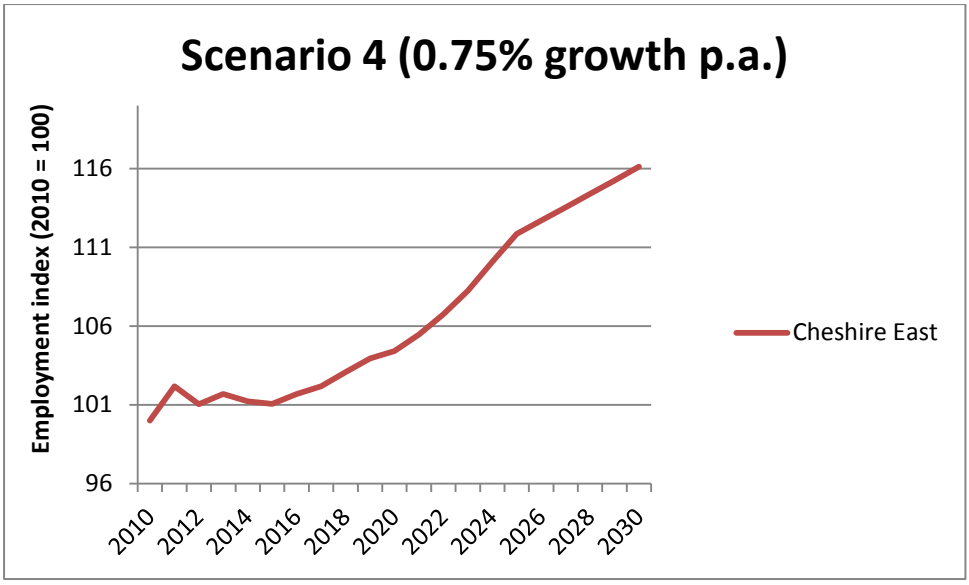

Scenario 4 (0.75% growth p.a.)
Employment index (2010 = 100)
116
111
106
101
96
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Cheshire East

Table 8: Employment growth scenarios

No.	Scenario title	Description	Notes
1	Zero employment growth	Employment level in final year (2030) is the same as it was in 2010. (166,100 employees in Cheshire East in 2010 if Census commuting rates used.)	Economy still relatively weak in 2010 (and 2011-12), so no long-term change from 2010 is a relatively pessimistic scenario. Analysis of Cheshire East's past (1984-2010) employment trends suggests that the worst average for a period of 7+ years is 0.5% (the average for 2001-8). Therefore zero long-term growth would be worse than the weakest periods of past performance.
2	CHWEM (Cheshire, Halton & Warrington Econometric Model) baseline projection (which is for relatively modest employment growth).	During the forecast period (2010-30), employment grows at the rate implied by the CHWEM baseline projections. (CHWEM baseline figures suggest average annual growth of 0.3% for 2010-25).	At the time that the employment growth scenario work was undertaken (Spring 2012), 2009 was the default base year for the latest CHWEM employment projections, i.e. 2009 figures are outturns and 2010 figures are forecasts. (The CHWEM has since been updated, as Annex 1 notes.) However, the 2009-25 employment growth average (0.2% p.a.) is little different to that for 2010-25, so the choice of 2010 as the base year for the forecasts makes no significant difference.
3	Very high employment growth.	During the forecast period (2010-30), employment grows at an average of 1.2% p.a. (the Great Britain average for 1995-2008).	In Cheshire East, the rate was 1.2% p.a. during 1991-8 (which includes part of a recession) and 1.3% during 1995-2008 (the longest period for which a continuous data series is available, but not one that includes any major economic downturns). For Great Britain, the equivalent rates are 1.1% (1991-8) and 1.2% (1995-2008). The Great Britain figures are much more robust (i.e. they have smaller error margins) than the Local Authority level data and are therefore a more reliable indicator of realistic long-term growth rates. Since 1984, employment growth p.a. has never exceeded 1.5% in Great Britain over any 10 to 13 year period (there is no recent, continuous employment series of more than 13 years that includes Local Authority level as well as national level data). As the forecast period is longer still (20 years) and as the current global and national economic climate is challenging, 1.2% seems to be a more reasonable upper limit (than 1.5% is) for 2010-30 growth p.a.
4	High employment growth.	During the study period (2010-30), employment grows at an average of 0.75% p.a.	0.75% p.a. chosen because it is midway between CHWEM baseline projection of 0.3% p.a. and the 1.2% p.a. very high employment growth scenario.

Sources for historic (1984-2008) data: Annual Business Inquiry 1998-2008, rescaled 1995-7 data from the Annual Employment Survey (ABI forerunner), AES 1991-8 (not rescaled) and Census of Employment 1984-91, ONS, NOMIS. Crown Copyright.

Unemployment rates

6.19 There are two widely-used measures of unemployment. One is the claimant count, which includes only those people claiming Jobseeker's Allowance (JSA). The other is a broader measure, which covers all those who are available for and actively seeking work. Consequently, there are also two widely-used unemployment rates, one based on the claimant count and one on broad unemployment.

6.20 It is the latter rate which is used as an input into POPGROUP. This broad unemployment rate measures broad unemployment as a proportion of the labour force (employment plus broad unemployment).

6.21 Given the frequency and fluctuations of past economic cycles, it is likely that any future 20-year period will see major changes in economic performance, with weak growth or recessions, as well as spells of robust growth. This is particularly likely for 2010-30, given that the current UK economic climate is difficult - with GDP still about 3% below its pre-recession peak (as of 2012 Q3)[20] and the (broad) unemployment rate at 7.8% (as of July-September 2012)[21] – and global prospects remain uncertain. Therefore it is unrealistic to assume that the unemployment rate will stay constant over the next 20 years.

6.22 That begs the question of what trajectory the unemployment rate will actually follow. With the national and global economies in their current, challenging position, it is likely that local unemployment rates will remain relatively static in the short to medium term: unemployment tends to lag behind GDP growth anyway. In the longer term, once there is evidence of a return to sustained economic growth, the unemployment rate is likely to fall.

6.23 The CHWEM does not produce forecasts for broad unemployment per se, but it does generate forecasts for claimant unemployment.[22] Its baseline projections show the claimant unemployment count rising between 2010 and 2015, then falling over the following five years and changing relatively little during 2020-25 (see Table 9). In the absence of alternative forecasts for unemployment, this trajectory appears very plausible.

[20] Source: Office for National Statistics GDP data (Preliminary Estimate of GDP Time Series Dataset 2012 Q3: http://www.ons.gov.uk/ons/rel/gva/gross-domestic-product--preliminary-estimate/q3-2012/tsd---preliminary-estimate-of-gdp-2012-q3.html). Crown Copyright.

[21] "Labour Market Statistics" Statistical Bulletin, November 2012 issue, ONS. However, 7.8% represents a fall from the 8.4% peak reached in late 2011. (These rates relate to the percentage of economically active people aged 16+ who are unemployed, and the rates are seasonally adjusted.)

[22] The CHWEM does exclude an adjustment for non-claimant unemployment, but it was felt that this adjustment significantly understates the actual number of non-claimant jobseekers.

Table 9: CHWEM baseline projections for claimant unemployment, 2010-25

	2010	2011	2012	2013	2014	2015	2020	2025
Cheshire East	5.8	6.0	6.2	6.2	6.4	6.5	5.3	5.0

Source: Baseline projections from the Cheshire, Halton & Warrington Econometric Model (CHWEM). Projections were obtained using Cambridge Econometrics/IER LEFM software and are consistent with Regional Economic Prospects, February 2011.

6.24 Forecasts for broad unemployment counts and rates were therefore calculated, as follows:

- The CHWEM baseline claimant count forecasts were converted to an index (with the 2010 counts set equal to 100). For example, the CHWEM forecasts put Cheshire East's claimant count at 5,805 in 2010 and 6,006 in 2011. Therefore the index value for 2011 = (6,006/5,805) * 100 = 103.5.
- Base year (2010) broad unemployment counts were obtained from ONS' model-based unemployment estimates for January - December 2010.[23]
- Broad unemployment counts were estimated for each year, by taking the base year broad unemployment count, multiplying it by the claimant count index value for that year and dividing by 100. For example, the model-based January - December 2010 broad unemployment count for Cheshire East was 10,300 and so the Authority's estimated broad unemployment count for 2011 was 10,300 * 103.5/100 = 10,700.
- Broad unemployment rates were calculated by dividing the broad unemployment counts by the labour force (i.e. the economically active population aged 16+). For this purpose, Cheshire West & Chester Council's population forecasts and pre-2012 activity rate projections were used.[24] For example, these population and activity rate data imply that Cheshire East's labour force was 179,000 in 2011, giving a broad unemployment rate of (10,700/179,000) * 100 = 6.0%.

Commuting rates

6.25 The commuting rate is a measure of net commuting (outgoing commuter journeys offset against incoming commuter journeys). More specifically, it is calculated as R/W, where R is residence-based employment (the number of employed residents in a particular geographical area) and W is workplace-based

[23] Model-based estimates of unemployment (for Jan-Dec 2010), ONS, NOMIS. Crown Copyright.

[24] These are the population forecasts and activity rate projections that were used as inputs into the 2011 CHWEM update. Sources: [1] 2009 based Cheshire Population Forecasts (produced by the Research, Intelligence & Consultation Team, Cheshire West and Chester Council). [2] Economic activity rate projections (produced by the Research, Intelligence & Consultation Team, Cheshire West and Chester Council); data provided in January-February 2011.

employment (the number of employed people working in that geographical area).[25]

6.26 Commuting rates can be easily calculated using data from the 2001 Census. For Cheshire East, R = 169,000 and W = 164,600, giving a commuting rate of 169,000/164,600, or 1.03.

6.27 More recent figures are available for R and W, most obviously from ONS' Annual Population Survey (which contains data up to 2010/11). However, the APS is a national survey and its survey sample sizes for individual Local Authorities are relatively small. It was felt that the APS data were not precise enough to provide a robust estimate of Cheshire East's commuting rates at a particular date, nor of how commuting rates have changed between 2001 and 2010.

6.28 Commuting rates can also be derived from the CHWEM forecasts. However, the CHWEM baseline figures predict relatively little change in commuting rates over time, and relatively little divergence from the 2001 Census-based rates. In particular, the CHWEM baseline scenario indicates that Cheshire East's commuting rate was 1.02 in 2010 and will rise to 1.03 by 2025.

6.29 Given this, a decision was made to model three commuting scenarios, all of which assume a constant commuting rate over the 2010-30 period. One of these scenarios assumes a commuting rate of 1.01, the second a rate of 1.03 and the third a rate of 1.08.

6.30 However, all three commuting rates – which are not very different to each other - produced very similar population forecasts. As the CHWEM-based commuting rate is a modelled estimate and the 1.01 and 1.08 rates are merely arbitrary (slightly lower and higher rate) choices, it was decided to adopt the Census-based commuting rate (1.03 for Cheshire East) as the default (preferred) rate.

Higher economic activity rate scenario

6.31 It is also possible that economic activity rates could be higher or lower than the forecast rates. To test out the impact of alternative activity rates, a new CHWEM scenario was created: this scenario assumed a gradual increase of two percentage points in the activity rate for each gender/ age group[26] (over and above the baseline rates) by 2025.[27] For example, if the baseline projection is for

[25] As noted earlier, workplace-based employment can also be measured as a count of jobs, rather than a count of employed people. However, in calculating the commuting rate R/W, it would be inconsistent (and spurious) to use a jobs count for W when R can be measured only as a count of employed people.

[26] The CHWEM requires economic activity rate input values for seven age groups (0-15, 16-24, 25-34, 35-44, 45-59, 60-64 and 65+) for each gender, i.e. fourteen gender/ age groups in total. (However, the rates are set to zero for the 0-15 age group.)

[27] Cheshire West & Chester Council's pre-2012 economic activity rate projections – which were used as inputs for the CHWEM baseline projections - imply that the 2010-25 economic activity rates will be as high as 93% for some gender / age groups in Cheshire East). It seems possible that the rates for these groups might be one or

the activity rate for a particular female age band to increase from 70.0% in 2010 to 70.5% in 2011 and 70.6% in 2012, then an additional two point rise over 2010-25 implies additional growth of 0.13% (2%/15) a year, bringing the activity rates for 2011 and 2012 up to 70.63% [70.5 + (1 * 0.13)] and 70.87% [(70.6+ (2 * 0.13)] respectively.

6.32 This scenario was then run, to see what impact it had on the CHWEM's employment forecasts. However, the resulting employment forecasts differed from the CHWEM baseline employment figures by only a negligible amount.[28] Furthermore, the main effect of a change in economic activity rates is on existing residents, so the impact on housing (of an additional two-point activity rate increase) is likely to be much less than that of an equivalent change in employment. Therefore the scenario was not modelled in POPGROUP.

two points higher than projected, but it is probably unrealistic to assume that rates might be much higher still: hence the choice of a two percentage point increment for this alternative scenario.

[28] More specifically, the scenario implies employment growth of 0.28% in Cheshire East (compared to 0.27% under the CHWEM baseline scenario).

Annex 1: The Cheshire, Halton & Warrington Econometric Model

A1. Model location, operation and licensing

Cheshire East Council's Economic Development & Regeneration Team maintains and operates the Cheshire, Halton & Warrington Econometric Model (CHWEM), an economic forecasting model, on behalf of Cheshire, Halton & Warrington partners. The Model was commissioned from Cambridge Econometrics (from whom the Council also commissions Model updates).

The Models' software and data may be installed on several machines, but the current licence (and the hence direct access to the Models) is restricted to only one organisation (i.e. Cheshire East).

A2. 2011 and 2012 updates

The CHWEM was updated in Spring 2011. The CHWEM results from this update are consistent with the Model supplier's (Cambridge Econometrics) February 2011 regional forecasts. The forecasts from this 2011 update therefore take account of the 2008-9 UK and global economic recession and much of the subsequent (2009-11) period of modest economic growth (but not the temporary resumption of the recession later in 2011). It is this 2011 "vintage" of the CHWEM which was used for the employment growth scenarios and other economic modelling work outlined in Section 6 of this methodology paper.

The CHWEM has since been updated again, in the summer of 2012. The results of this more recent update are consistent with Cambridge Econometrics' UK Regional Forecast, as published on Cambridge's Knowledge Base website in June 2012. The forecasts from the 2012 update therefore take some account of the renewed downturn (late 2011 onwards), as well as earlier evidence.

A3. Caveats

A3.1 Input data and geographical comparisons

Official data are a key input into the Model. However, local demographic data and knowledge are also fed into each Model update, to improve its accuracy. The key local inputs into the 2011 Model update were Cheshire West & Chester Council's latest population forecasts and economic activity rate projections for Cheshire & Warrington[29], which use ONS' mid-year population estimates as the base year figures (2009 for the Cheshire Unitary Authorities and 2008 for Warrington). The population forecasts differ from ONS' sub-national projections, in that they take account of local intelligence, including expectations of future house building (which are based on guidance from Local Authority planners). These population and

[29] "Latest" means the latest available population forecasts and economic activity projections at the time of the 2011 update.

economic activity inputs are provided for fourteen gender/ age groups (seven age bands for each gender).

The 2011 update's economic activity rate projections for Cheshire East were calculated by taking the 2001 Census data on economically active residents and applying growth rates (year-on-year changes in the economic activity rate) that are derived from ONS' last national labour force projections.[30] However, ONS' last national labour force projections were published in 2006 and ONS has recently decided it will not update them again.

A3.2 Allowances made for policy intervention

The forecasts do not take account of local, unofficial economic intelligence. Nor (apart from taking account of future house building and of population forecasts) do they allow for the impact that incomplete or future development projects, policies or initiatives may have. They are, therefore, "policy-off" forecasts.

A3.3 Accuracy of forecasts

The forecasts draw heavily on historic economic data, much of it from the Annual Business Inquiry (ABI), and its successor, the Business Register and Employment Survey (BRES). The ABI/ BRES is a survey which covers all Great Britain and therefore the survey sample sizes are relatively small for very disaggregated groups of businesses. The smaller the sample size, the greater the risk of the survey sample being unrepresentative. Hence the forecasts for individual Local Authority areas are based on smaller samples (and are therefore less accurate) than those for larger areas, such as regions or countries.

A3.4 Time periods covered by the updated forecasts

For employment forecasts from the 2011 CHWEM update, 2009 is the base year (with the figures for subsequent years generally being "genuine" forecasts rather than estimates of actual performance).[31] This is because:

(a) the key local inputs into the CHWEM's Cheshire forecasts – the Cheshire population forecasts produced by Cheshire West & Chester Council –were 2009-based;
(b) at the time of the 2011 CHWEM update, 2009 was the most recent year for which ABI/ BRES data had been published.

The CHWEM can currently produce forecasts for any years up to 2025, but cannot generate any forecasts for 2026 and beyond.

[30] The same approach was taken for the Cheshire West & Chester economic activity rate projections.

[31] The figures for 2010-2011 are also estimates to some extent, in that they take account of evidence – albeit only regional and national level evidence - of actual performance in these years.

For employment, figures relate to the mid-point of the calendar year: for example, a forecast for employment growth during “2010-25” relates to the change between 30 June/ 1 July 2010 and 30 June/ 1 July 2025.

A4. Functionality

The Model now consists of four “Areas”, namely Cheshire East, Cheshire West & Chester, Halton and Warrington. Each of these Areas is in effect a “Sub-Model”, in the sense that it can be operated and updated independently of the others.

The Cheshire Areas are in turn each broken into three “Sub-Areas”, one for each of the six former (pre-April 2009) Cheshire Districts. Sub-Area forecasts can be produced for economic output[32] (by industry) and employment (by industry or occupation). The CHWEM can also produce comparable forecasts for the North West and the UK.

“Areas” have additional functionality (to Sub-Areas). For example, Area-level forecasts can be produced for investment, labour demand, the qualifications needed for specific occupations and the impact of specific businesses expanding or downsizing.

For Areas (but not Sub-Areas), alternative scenarios can be generated by altering some of the input values and assumptions (including population forecasts and economic activity rate projections), and running the Model again.

[32] Gross Value Added.

Annex 2: Methodology for updating the local economic activity rate projections

As noted in Annex 1, Cheshire West & Chester Council produces local economic activity rate projections for both Cheshire Local Authorities. Up until 2012, these forecasts were produced by taking Local Authority level population and labour force data from the 2001 Census data, using this to calculate economic activity rates and then applying year-on-year growth rates derived from ONS' last national labour force projections (published in 2006).

However, ONS has announced that it will no longer update its labour force projections and its last projections only cover the period up to 2020.

Furthermore, since the last ONS projections were produced, central government has made some new announcements about the State Pension Age (SPA) and how it will change in future. In particular, it has announced that:

a) the rise in the female SPA (from 60 to 65) – previously being phased in between 2010 and 2020 – will now be completed in November 2018, with an accelerated increase between 2016 and 2018.
b) the phased rise in the SPA to 66 (for both males and females) will run from December 2018 to October 2020 (previously, it was scheduled for 2024-26).[33]

Furthermore, the statutory retirement age (of 65) was abolished in 2011 and this will have some impact on the number of economically active older people.

Some Local Authorities, such as Kent County Council (KCC), have already considered how to calculate economic activity rate projections so that they take account of these more recent SPA announcements and the abolition of the statutory retirement age.

In its paper[34], KCC considers the SPA changes. The paper also assesses economic activity rates over the last decade - it reports an increase in the rates for older working-age groups – and considers other factors that will affect future economic

[33] It is also likely that the timetable for SPA increases to 67 and 68 – scheduled for 2034-36 and 2044-46 respectively under current legislation – will change. In particular, the Government announced in May 2012 that a Pensions Bill would be introduced in the 2012/13 parliamentary session, with provisions to (a) "[b]ring forward the SPA to 67 between 2026 and 2028" and (b) "[e]nsure the SPA is increased in future to take into account increases in longevity" (reported in Standard Note SN02234, House of Commons Library: www.parliament.uk/briefing-papers/SN02234.pdf).

[34] Technical Paper: Activity Rate projections to 2036, Research & Evaluation, Business Strategy & Support, Kent County Council, October 2011. This paper predates the 2011 Autumn Statement announcement (referred to in the previous footnote) about the increase to 67 being brought forward to 2026-28.

activity rates. It highlights some key factors which are likely to contribute to future growth in economic activity rates:

- people are living longer and remaining active for longer.
- the growth of part-time employment opportunities, which makes economic activity more attractive to older people, particularly if they wish to supplement their pensions.
- as the population grows, there is a corresponding increase in demand for goods and services, and hence a need for additional labour to produce/ provide these goods and services.

However, KCC believes it is questionable whether the removal of the statutory retirement age will have a substantial impact on the number of economically active 70-74 year-olds.

On the basis of all these issues and evidence, KCC has developed assumptions for economic activity rates up to 2030.[35] Its assumptions are set out in Table 10.

Table 10: Kent County Council activity rate assumptions up to 2030

Gender	Age group	2001-2020	2021-30
M	16-24	ONS national growth rates (as published in 2006)	Held constant (=2020 economic activity rate)
M	25-34	As above	Held constant (=2020)
M	35-44	As above	Held constant (=2020)
M	45-59	As above	Growth rate = half that of 2010-20
M	60-64	As above	Growth rate = half that of 2010-20
M	65-69	As above	Growth rate = half that of 2010-20
M	70-74	As above	Held constant (=2020)
F	16-24	As above	Held constant (=2020)
F	25-34	As above	Held constant (=2020)
F	35-44	As above	Held constant (=2020)
F	45-59	As above	Growth rate = half that of 2010-20
F	60-64	As above	Same growth rate as for 2010-20
F	65-69	As above	Growth rate = half that of 2010-20
F	70-74	As above	Held constant (=2020)

Cheshire West & Chester Council believes that the KCC assumptions are sound, and have taken this approach as a starting point for updating economic activity rate assumptions. However, the KCC approach assumes that the new timetables for (a) bringing the female SPA to 65 and (b) raising the male and female SPA to 66 will not affect economic activity rates until 2020, even though the rescheduling will change the working-age and SPA population numbers from 2016 onwards.

Cheshire West & Chester Council has therefore made further adjustments to the KCC approach, so that there are additional increases in economic activity rates for

[35] The KCC paper also includes assumed rates for 2031-36, but these are not considered here, as the two Cheshire Local Authorities' forecasting work does not yet require projections beyond 2030.

some older age groups during 2016-20, but so that longer term (2010-2030) growth rates match those proposed by KCC. In other words, this approach redistributes the activity rate growth within 2010-30, rather than increasing the cumulative 2010-30 growth.

In particular, Cheshire West & Chester Council has made the adjustments set out in Table 11.

Table 11: Additional adjustments made by Cheshire West & Chester Council

Change to SPA timetable	Cheshire West & Chester Council's assumptions
Rise in female SPA to 65 now being achieved by 2018 (not 2020), with an accelerated increase during 2016-18	Assumed that, for 60-64 females: [1] economic activity rates will grow in line with ONS projections (and, by implication, in line with KCC projections) up to but not beyond 2016. [2] the growth that ONS' (and KCC's) approach predicts for 2016-2020 will be achieved by 2018, and the 2017 rate will be midway between the 2016 and 2018 rates. [3] the actual cumulative growth for 2018-30 equals the cumulative 2020-30 growth that would be achieved under the ONS/KCC approach (i.e. 2018-30 annual growth rate = 5/6 of KCC's 2020-30 annual growth rate = 5/6 of ONS' 2010-20 annual growth rate).
Rise in female and male SPA to 66 now being phased in during 2018-20, instead of 2024-26.	Assumed that: [1] from 2020 onwards, economic activity rates for female (male) 65 year-olds will equal those for female (male) 60-64 year-olds.* [2] from 2020 onwards, economic activity rates for female (male) 66-69 year-olds will equal the KCC-based rates (those that the KCC approach would predict) for female (male) 65-69 year-olds.* [3] 2019 economic activity rates for female (male) 65-69 year-olds will be midway between the 2018 and 2020 rates for this gender/ age group. *Rates for 65-69 age group then calculated as a weighted average of the rates for 65s and 66-69s (by using Cheshire West & Chester's 2009-based population forecasts for 2020-30 as the weights).

Population forecasts were generated, in POPGROUP, for three different methodologies: 1) the original KCC approach; 2) the more refined approach set out in Table 11; and 3) a slight variation of Table 11 in which 2011-16 economic activity rates for 60-64 year-old females are not constrained to grow in line with ONS projections. (This latter variation effectively assumes that 60-64 females' economic activity rates will change at an even pace during 2010-18. However, given the acceleration of the SPA change during 2016-18, it seems more likely that annual growth will be significantly greater during 2016-18 than in the pre-2016 period.)

There was no significant difference in the population forecasts that these alternative methodologies generated. Therefore the preferred economic activity rate modelling approach – for the forecasts and for other work involving economic activity rate projections – involves all the Table 11 adjustments.

Table 12 shows the assumptions and adjustments for all gender/ age groups, using this preferred approach

Table 12: Cheshire West & Chester Council's activity rate assumptions up to 2030

Gender/ age group	2001-2016	2017-18	2019-20	2021-30
M 16-24	ONS growth rates (i.e. growth in line with ONS national projections)	ONS growth rates	ONS growth rates	Held constant (=2020 economic activity rate)
M 25-34	As above	ONS growth rates	ONS growth rates	Held constant (=2020)
M 35-44	As above	ONS growth rates	ONS growth rates	Held constant (=2020)
M 45-59	As above	ONS growth rates	ONS growth rates	Growth rate = half that of 2010-20
M 60-64	As above	ONS growth rates	ONS growth rates	Growth rate = half that of 2010-20
M 65-69	As above	ONS growth rates	[1] 2020: economic activity rate for 65s = that for 60-64s. Rate for 66-69s = rate that KCC (and ONS) approach predicts for 65-69s. 2020 rate for whole 65-69 group calculated as a weighted average of the rates for 65s and 66-69s (using Cheshire West & Chester Council's 2009-based population forecasts for 2020 as the weights). [2] 2019: rate constrained to be midway between 2018 and 2020 rates.	As for 2020 (see previous column).
M 70-74	As above	ONS growth rates	ONS growth rates	Held constant (=2020)
F 16-24	As above	ONS growth rates	ONS growth rates	Held constant (=2020)
F 25-34	As above	ONS growth rates	ONS growth rates	Held constant (=2020)
F 35-44	As above	ONS growth rates	ONS growth rates	Held constant (=2020)
F 45-59	As above	ONS growth rates	ONS growth rates	Growth rate = half that of 2010-20
F 60-64	As above	ONS' 2016-2020 growth achieved by 2018. 2017 rate midway between 2016 and 2018 rates.	Actual cumulative growth for 2018-30 equals the cumulative 2020-30 growth that would be achieved using KCC approach (KCC assumes 2020-30 growth rate equals ONS' 2010-20 growth rate). This means the 2030 economic activity rate is the same as it would be if the KCC approach were used.	As for 2019-20.
F 65-69	As above	ONS growth rates	As for M 65-69	As for M 65-69
F 70-74	As above	ONS growth rates	ONS growth rates	Held constant (=2020)