

## Tendring: OAN Validation

### A Report for Tendring DC

Version 2 – with Addendum: January 2016

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#### 1. Background

1.1 This report has been commissioned by Tendring DC to validate the EPOA Phase 7 10-year projection prepared by Edge Analytics and preferred by Peter Brett Associates in '*Objectively Assessed Housing Need Study (July 2015)*'. Specifically, this report will:

- Review changes in Tendring's population 2001-14
- Validate the Edge projection against the above review
- Calculate alternative scenarios

#### 2. Demographic Changes 2001-14

2.1 Since mid-2001 the population of Tendring DC has been estimated to have risen by 1,100 to reach 139,900 at mid-2014. This increase has been made up of a loss of 10,500 due to natural change (births to resident women being less than deaths of residents) and a net migration gain of 11,600 persons. The net migration figure includes 'other changes' including an 'unattributable population change' (UPC) loss of 10,500<sup>1</sup>. If UPC and other changes, such as armed forces and prisoners, are ignored there was a net migration gain of 22,100, as seen annually in Table 1. Net migration within the UK was estimated to have been a gain of 20,800 and there was a small net gain from Overseas of 1,300.

2.2 Over the thirteen year period being studied the level of natural loss has declined, due mostly to the rise in the annual number of births, although numbers of deaths have also generally declined (see Figure 1). Net migration within the UK has been the main driver of population increase, with initial high levels of net inflow of around 2,000 per year falling to below 1,000 in 2010-11 and 2011-12. The net inflow has increased in the last two years up to 2014. Net Overseas migration has been virtually nil since 2005-06. Other changes, which apart from UPC includes net movements of prisoners, armed forces and boarding pupils, has also been virtually nil apart from 2001-11 when it included UPC. The net result is that while the population rose to a peak of 140,500 in 2008 it declined to 139,100 in 2011 before starting to rise again. Over the thirteen year period the range of the total population was less than 1,500 or barely 1% of the population.

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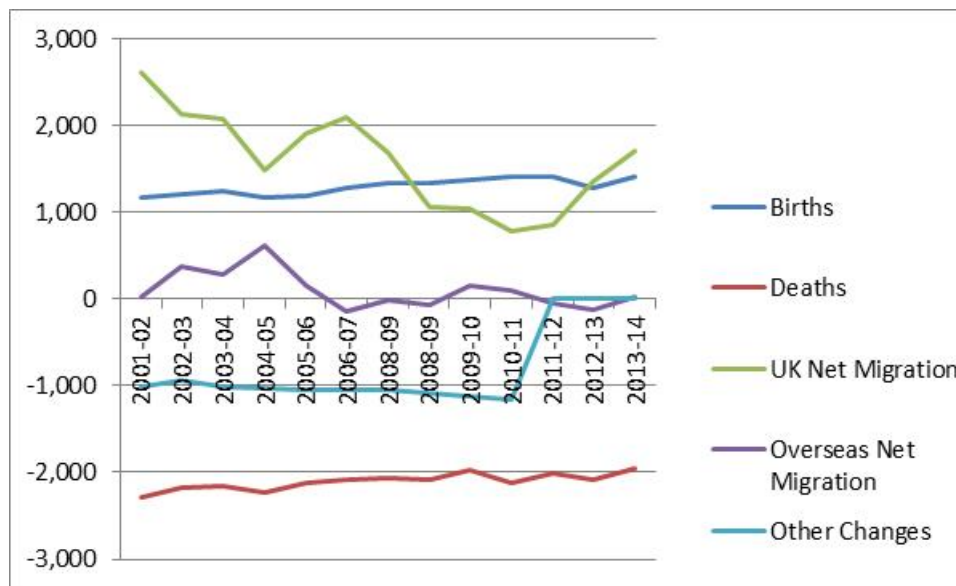
<sup>1</sup> ONS has stated that the 'unattributable' losses (or gains in other authorities), often referred to as UPC, may be due to errors in either the 2001 or 2011 Censuses, giving rise to errors in the mid-year estimates of those years, or errors in either the UK or Overseas migration calculations or both.

**Table 1: Tendring DC: ONS mid-year estimate change analyses 2001-14.**

	Start Population	Births	Deaths	Natural Change	Migration UK Net	Migration Overseas Net	Other	Migration & Other	Total Change	End Population
<b>2001-02</b>	138,802	1,174	2,290	-1,116	2,620	16	-1,004	1,632	516	139,318
<b>2002-03</b>	139,318	1,200	2,173	-973	2,126	378	-940	1,564	591	139,909
<b>2003-04</b>	139,909	1,253	2,161	-908	2,068	284	-1,013	1,339	431	140,340
<b>2004-05</b>	140,340	1,164	2,239	-1,075	1,488	607	-1,035	1,060	-15	140,325
<b>2005-06</b>	140,325	1,196	2,116	-920	1,911	147	-1,040	1,018	98	140,423
<b>2006-07</b>	140,423	1,284	2,088	-804	2,092	-137	-1,051	904	100	140,523
<b>2008-09</b>	140,523	1,334	2,071	-737	1,693	-5	-1,053	635	-102	140,421
<b>2008-09</b>	140,421	1,345	2,081	-736	1,061	-76	-1,077	-92	-828	139,593
<b>2009-10</b>	139,593	1,371	1,978	-607	1,039	158	-1,125	72	-535	139,058
<b>2010-11</b>	139,058	1,408	2,123	-715	782	102	-1,165	-281	-996	138,062
<b>2011-12</b>	138,062	1,412	2,001	-589	858	-56	10	812	223	138,285
<b>2012-13</b>	138,285	1,287	2,075	-788	1,346	-124	2	1,224	436	138,721
<b>2013-14</b>	138,721	1,407	1,952	-545	1,701	30	9	1,740	1,195	139,916

Source: ONS © Crown Copyright

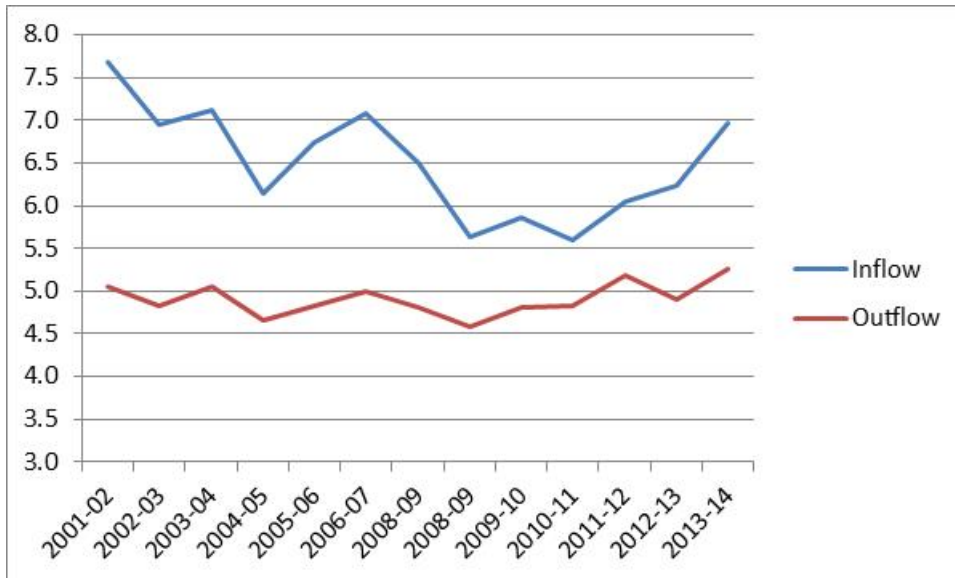
**Figure 1: Tendring DC: Births, Deaths, Net Migration and Other Changes 2001-14: ONS mid-year estimate change analyses**



Source: ONS © Crown Copyright

2.3 Three aspects of population change require more detailed analysis; gross migration movements, both within the UK and with Overseas, and UPC.

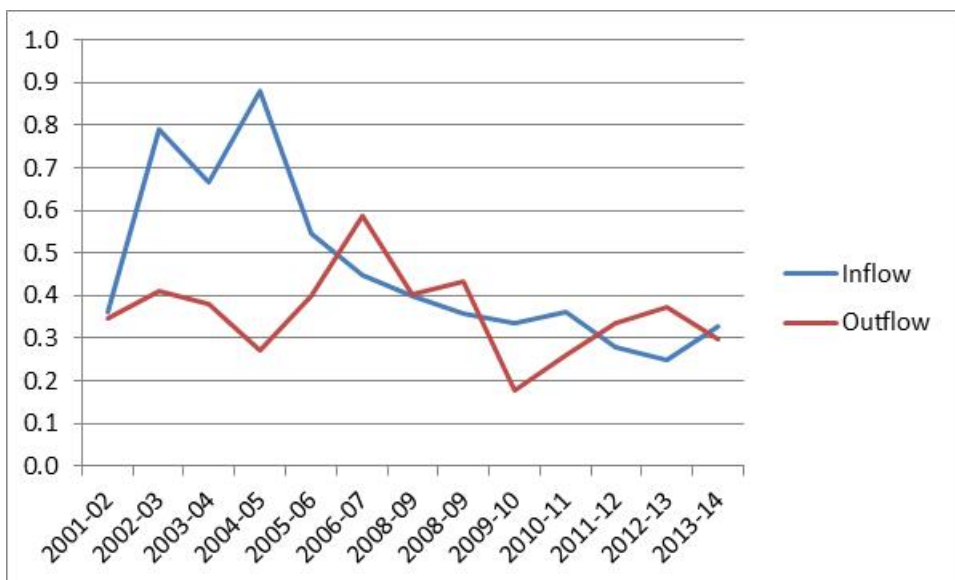
**Figure 2: Tendring DC: Gross UK Migration Flows 2001-14: ONS mid-year estimate change analyses (thousands)**



Source: ONS © Crown Copyright

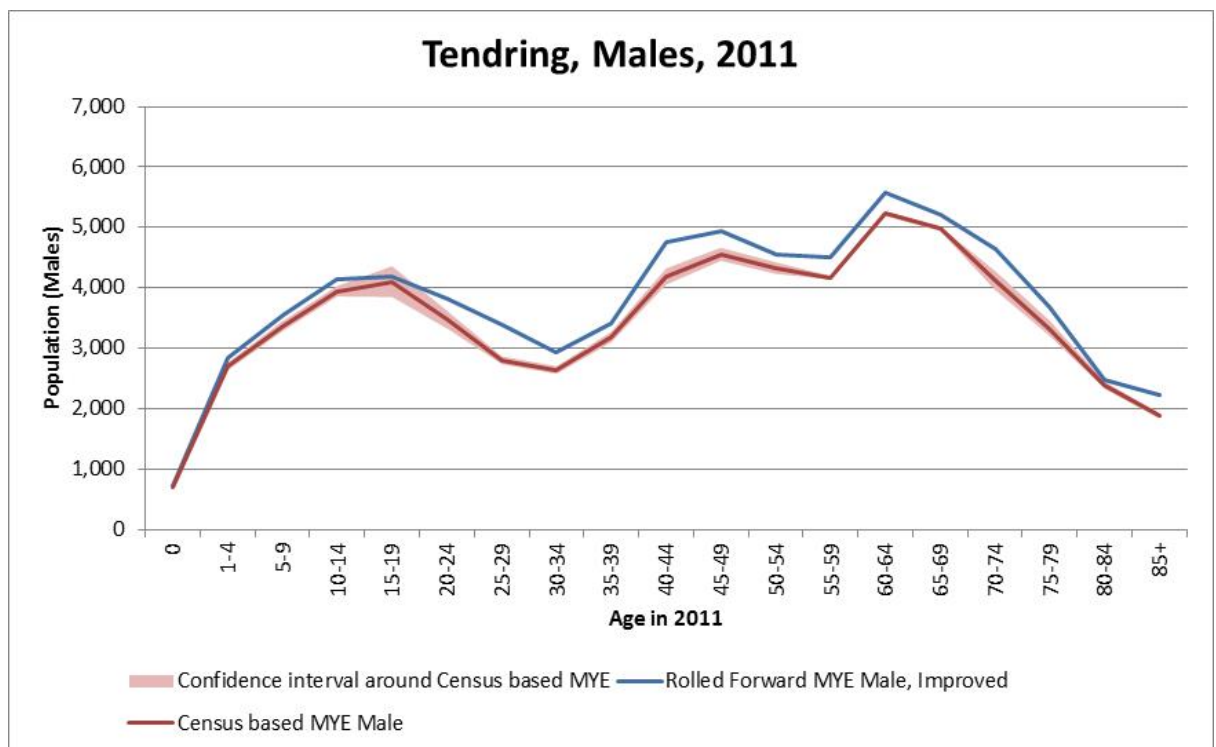
2.4 The gross outflow from Tendring to the rest of the UK has been remarkably stable at around 5,000 per year. The gross inflow has been estimated to have been much more variable, with a peak of 7,700 in 2001-02 falling to below 6,000 per year between 2008 and 2011. There has since been some recovery to reach 7,000 in 2013-14. The decline in flows after 2008 is common within the UK as a response to the recession. It may be particularly marked in Tendring because of the relatively high volume of persons around retirement age moving to the area.

**Figure 3: Tendring DC: Gross Overseas Migration Flows 2001-14: ONS mid-year estimate change analyses (thousands)**



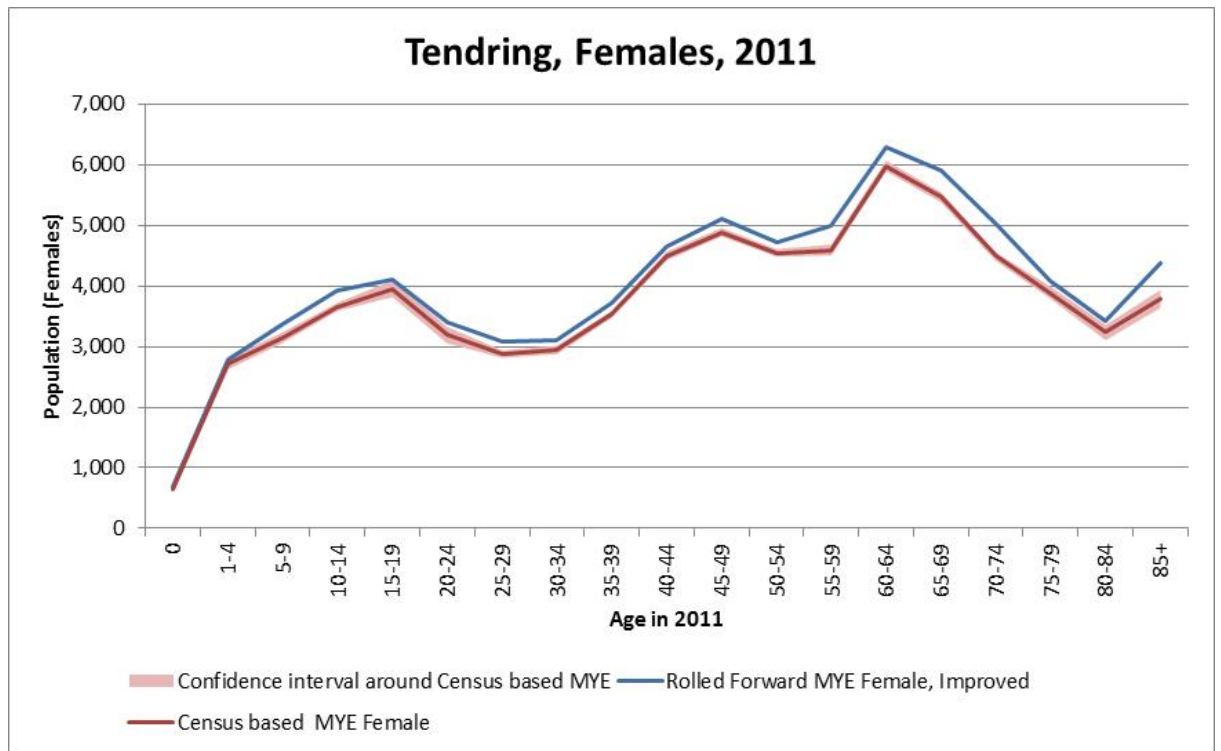
- 2.5 The volumes of migration with Overseas are estimated to be much less than those with the rest of the UK, averaging just a few hundred in each direction each year. There was a peak of inflows in the early part of the period. This includes the time when the eight Eastern European countries joined the EU. Since the peak of 900 in 2004-05 the estimated inflow has declined to around 300 a year since 2011. In most years since 2006-07 the outflow has exceeded the inflow. The net inflow of 1,300 over the thirteen years was split between an inflow of 1,400 in 2001-06 and a net loss of 100 in 2006-14.
- 2.6 The annual ONS mid-year estimate change analyses between 2001 and 2011 showed UPC for Tendring to be a net loss of 10,542. There was a general increase in the annual UPC loss from 997 in 2001-02 to 1,182 in 2010-11. In September 2015 ONS published a paper (*Further understanding of the causes of discrepancies between rolled forward and census based local authority mid-year population estimates for 2011*) and an associated data tool.
- 2.7 The two following charts, prepared by ONS, show that the 2011 Census based mid-year population estimates for Tendring were below the rolled forward estimates based on the 2001 mid-year estimates at all ages. Only for males aged 15-19 and females aged 1-4 were the rolled forward estimates within the 95% confidence intervals of the 2011 Census based estimates.

**Figure 4: Tendring DC: Male Population Estimates, 2011**



Source: ONS © Crown Copyright

**Figure 5: Tendring DC: Female Population Estimates, 2011**



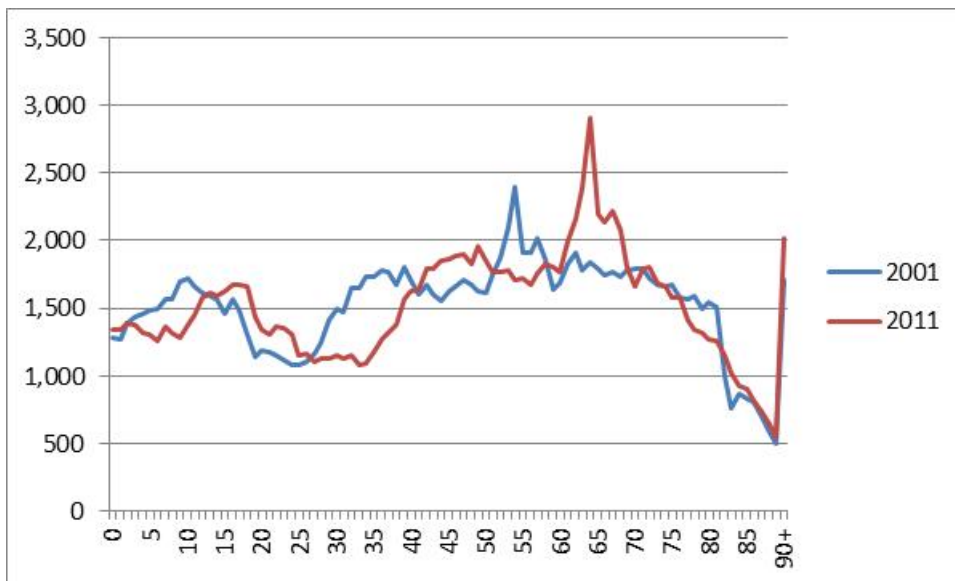
Source: ONS © Crown Copyright

- 2.8 The discrepancies are the accumulated UPC over the period 2001-11. The discrepancies for males were generally higher than for females and were highest at ages 20-34, 40-44, 70-79 and 85+. The discrepancies amongst females were highest at ages 70-74 and 85+. Other significant discrepancies are seen for males aged 35-39, 45-49 and 55-64, and for females aged 5-14, 20-29, 55-59 and 65-69.
- 2.9 The causes of the high rolled forward estimates have been analysed by ONS under a number of headings: international emigration, international immigration, internal migration and the process of rolling forward from 2001.<sup>2</sup>
- 2.10 In terms of **International Emigration** the estimates for Tendring for males aged 20-34 and females aged 25-34 were considered to have boosted the rolled forward estimates.
- 2.11 In terms of **International Immigration** the estimates for Tendring for males aged 20-49 and females aged 20-44 were considered to be too high. These exaggerated estimates of immigration would all tend to boost the rolled forward estimates.
- 2.12 The estimates of **Internal Migration** for Tendring were considered to have boosted the population of males aged 70+ and females aged 20-24 and 70+.

<sup>2</sup> ONS also considered the estimates of school boarders and the presence of armed forces but these are not relevant to Tendring.

- 2.13 The process of **Rolling Forward from 2001** is only likely to have an impact of boosting the rolled forward estimates at higher ages, notably for males aged 75-79 and female ages 55-59 and 70-74.
- 2.14 Although ONS offer no direct numerical insight of the individual effects It appears from the analysis that most of the discrepancy is due to inaccurate estimates of migration: international mainly in the 20s, 30s and 40s and internal mainly in the 70s. There is no indication of the annual effects of each of the factors throughout the decade.
- 2.15 Given the ONS analysis it appears that UPC in any base period of a population projection would be mainly due to inaccuracies in migration estimation and so should be considered as migration in any projection based on that period, for example 2008-13 or 2003-13. As all of the effects boosted the population account needs to be taken of some combination of reduced gross inflow and increased net outflow.
- 2.16 The overstatement of internal immigrants at high ages may be connected with the large number of residential care places in Tendring. Deaths of recent immigrants to Tendring should be assigned back to their districts of previous residence if they had relocated within six months of death. In these cases people would still be 'estimated' to be in Tendring even though they had died. The rolled forward overestimate at ages 70+ is 2,650 and this may be mainly an issue of internal migration. It is extremely difficult to correctly re-estimate migration in a population projection model to account for this phenomenon.
- 2.17 If the above calculation is of the correct magnitude this leaves about 8,000 UPC at lower ages – mainly between 20 and 49 - which has been assessed as mainly a problem of international migration estimation. The net effect of international migration between 2001 and 2011 was estimated to be 1,474 – 5,142 immigrants and 3,668 emigrants. ONS stated that immigration was overestimated and emigration too low. The volume of adjustment required to reduce the net inflow by 8,000 to a net loss of about 6,500 over the ten year period is exceptional. If the 8,000 is split 1:3 between inflow and outflow this could result in a gross inflow of about 3,200 and a gross outflow of about 9,700. Distributing the 8,000 evenly, or assuming a higher impact in the gross inflow, would result in very small gross inflows over the ten years. No adjustment of this order appears to be reasonable.
- 2.18 Figure 6 shows that Tendring's population has noticeably aged over the last inter-censal decade. There are fewer young children and considerably fewer persons in the working ages between 30 and 40. There was also a huge increase in the 60s, but little overall change over age 70. Some of these differences, notably the spike at age 64 in 2011, are partly due to the ageing on of the population resident in 2001, but others are mainly due to net migration effects.

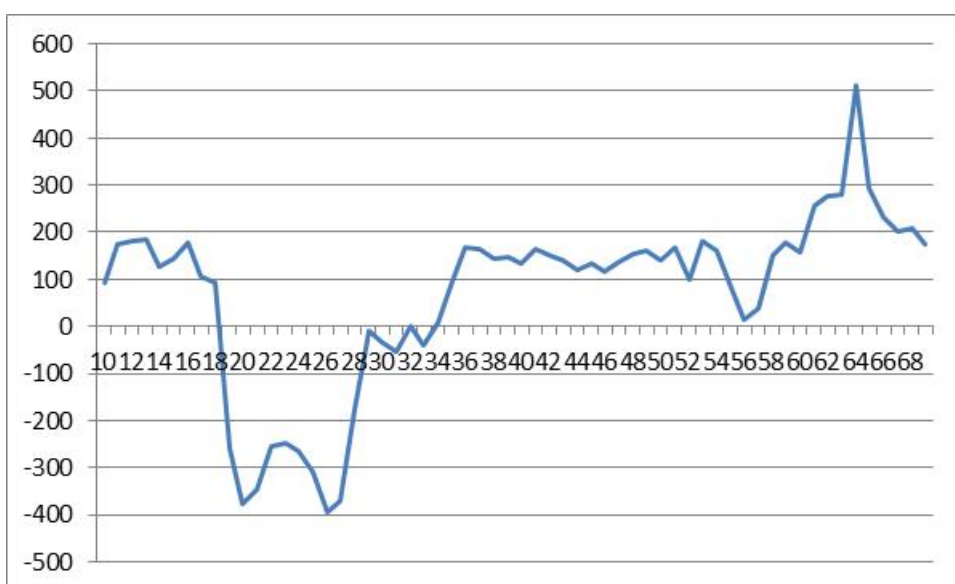
**Figure 6 Tendring DC: Detailed age structure 2001 and 2011. ONS mid-year estimates**



Source: ONS © Crown Copyright

2.19 Figure 7 shows the net migration pattern of Tendring over the decade 2001-11. The data are obtained by differencing the ONS 2001 and 2011 mid-year estimates with an allowance for 10 years difference in age, ie 20 year olds in 2011 less 10 year olds in 2001. The figures will therefore also contain the small impact of deaths in the resident population aged 0-59 at 2001 over the following decade. As all ages are as at 2011 the average age of migration would be about 5 years younger than shown by the x-axis scale, though relatively little migration tends to occur before age 18.

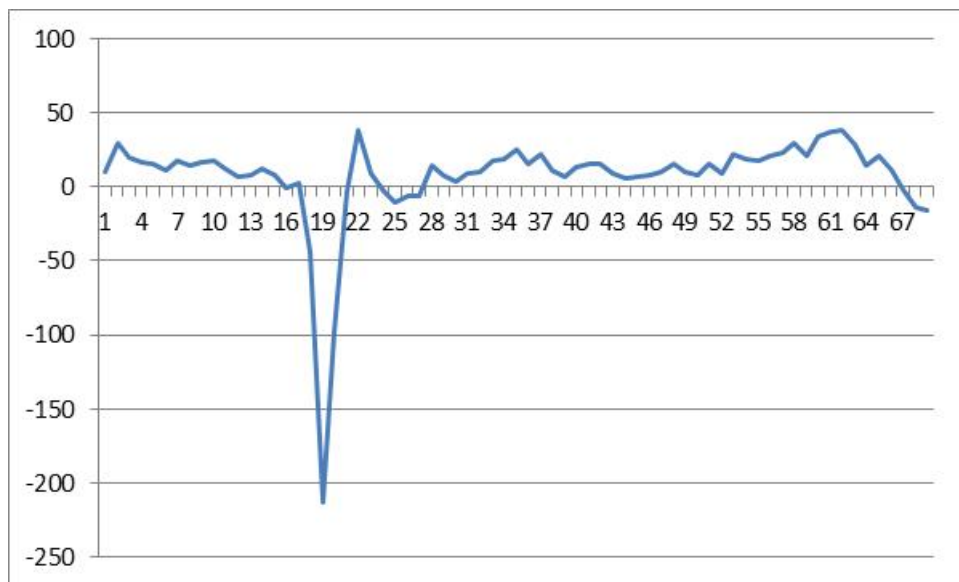
**Figure 7: Tendring DC: Net Migration 2001-11 by ages 10-69 at 2011. ONS mid-year estimates**



Source: ONS © Crown Copyright

- 2.20 The net impact has been a gain of children, a large net loss of students and young workers up to the late-20s and small gains at ages from the mid-30s to the mid-50s. There is then a significant net inflow in the 60s.
- 2.21 Figure 8 takes a different view of net migration, presenting the average annual levels by age over the decade. These data also exclude the minor impact of annual deaths by age 69 of the resident population. The figure clearly confirms the very large net outflows at the student ages (18-20) followed by a small return 'graduate' flow in the early 20s and small net inflows in the 30s rising to large inflows at pre-retirement ages.

**Figure 8: Tendring DC: Average Annual Net Migration 2001-11 by age. ONS mid-year estimates**



Source: ONS © Crown Copyright

### 3. Edge 10-year projection

- 3.1 The Edge PG-10yr projection was produced based on migration change, including UPC, over the period 2003-13. Table 2 shows the base data that was used in the projection. Edge assigned all of the UPC between 2003 and 2011 to international migration, leading to an annual average net international outflow of 764 persons. It is not clear how the average UPC (-854) was distributed between inflow and outflow by Edge, but the net loss of 764 persons was used as a constant throughout the projection.
- 3.2 Edge prepared these projections before the ONS work on the main causes of difference between rolled forward and census-based estimates was available. Edge therefore took the most likely view that all the UPC was due to international migration. Adjusting international flows was unlikely to have made much impact on the projection of the elderly. The over 70 age group was originally overestimated at 2011 by 2,650 or 9.8%.



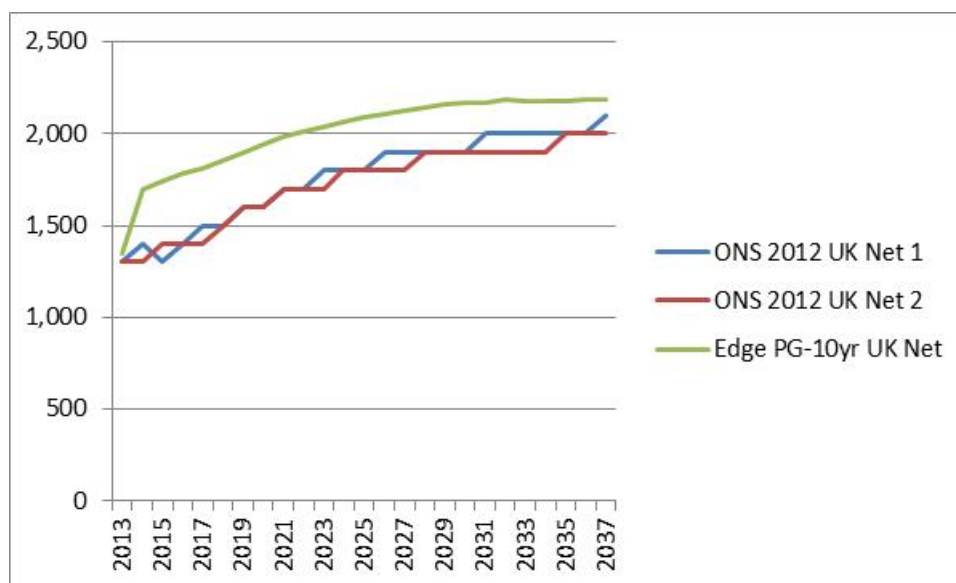
**Table2: Tendring DC: Gross Migration Flows 2003-13 ONS mid-year estimate change analyses**

	UK	UK	UK	Overseas	Overseas	UPC	Overseas
	Inflow	Outflow	Net	Inflow	Outflow		Net
<b>2003-04</b>	7,111	5,043	2,068	665	381	-1,009	-725
<b>2004-05</b>	6,139	4,651	1,488	878	271	-1,032	-425
<b>2005-06</b>	6,737	4,826	1,911	547	400	-1,038	-891
<b>2006-07</b>	7,086	4,994	2,092	448	585	-1,035	-1,172
<b>2008-09</b>	6,494	4,801	1,693	398	403	-1,059	-1,064
<b>2008-09</b>	5,635	4,574	1,061	356	432	-1,070	-1,146
<b>2009-10</b>	5,850	4,811	1,039	336	178	-1,116	-958
<b>2010-11</b>	5,603	4,821	782	363	261	-1,182	-1,080
<b>2011-12</b>	6,048	5,190	858	278	334		-56
<b>2012-13</b>	6,241	4,895	1,346	249	373		-124
<b>Average</b>	<b>6,294</b>	<b>4,861</b>	<b>1,434</b>	<b>452</b>	<b>362</b>	<b>-854</b>	<b>-764</b>

Source: ONS © Crown Copyright

- 3.3 In terms of migration within the UK the Edge projection is supposed to follow the trends in the ONS 2012 projection. However, as Figure 9 shows it projects a far higher net inflow, 50,200 compared to about 43,500 in the period 2012-37. This is mainly due to using the higher gross inflows between 2003 and 2007 in the base period. It is a matter of choice whether to use data over a ten-year period rather than the most recent five-year period. Although the average net inflow from the UK in 2003-13 was 1,434 the Edge projection has an initial value of 1,738 in 2013-14.

**Figure 9: Tendring DC: Net UK Migration: 2012-13 to 2036-37: ONS 2012<sup>3</sup> and Edge PG-10yr projections.**



Source: ONS © Crown Copyright and EPOA projections

- 3.4 Average annual net migration, including UPC over the period 2003-13 was 669. The Edge projection, based on probabilistic migration for UK flows and constant numbers for Overseas flows starts at 936 in 2013-14 and rises to 1,418 in 2036-37. While the start point is high compared to the base period it must be compared with the ONS estimate for 2013-14 of 1,731. This increase is mainly a result of increased movement within the UK that brought nearly 7,000 new residents to Tendring while about 5,300 left for other UK destinations. The inflow was the highest recorded since 2003-04 and the outflow the highest of any year since before 2001. Whether these levels are sustainable is not part of the estimation and projection process. However, in 2013-14 Tendring DC only showed a net increase in housing stock of just over 200 units, whereas the estimated growth in population would have generated a need for an additional 590 homes (allowing for vacancy at 2011 levels).
- 3.5 Overall the Edge methodology, using PopGroup software, is sound. However a few questions remain that are specific to projections for Tendring. Are the high levels of UPC estimated by ONS realistic or have there been reasons apart from incorrect migration estimation for the rolled-forward estimates to have been too high compared to the 2011 Census based estimates? What are the assumed levels of international flows in the projection? Would Edge have treated UPC differently had the recent ONS report been available? Is it reasonable to use a ten-year period, rather than the latest five-year period, as the migration base? Is it reasonable to use constant international migration flows? Should international outflows be treated as probabilistic in the modelling?

<sup>3</sup> Two separate calculations of the ONS net migration projection are shown as the available source data are rounded to the nearest 100. One estimate sums the four individual UK flows the other differences the total net flow with the two international flows.

- 3.6 Given the problem of UPC estimated for Tendring any migration-led projection taking a base period that includes years up to 2011 may produce results that are difficult to interpret for one reason or another. On the face of it the Edge PG-10yr projection produces feasible results. It indicates a growth in the need for homes of about 470 per year. Since 2001 this average level was only achieved in 2004-09 and in the Edge base period the average was about 360 per year. The latest five years (2009-14) have only produced about 240 additional units on average.

**Table 3: Tendring DC: Household Spaces 2001 and 2011**

	Census 2001	Census 2011	Change	Change per year
<b>Household Spaces:</b>				
<b>Total</b>	<b>64,907</b>	<b>67,036</b>	<b>2,129</b>	<b>213</b>
<b>Occupied</b>	61,411	62,105	694	69
<b>Not Occupied (inc 2nd Homes, Holiday Lets)</b>	3,496	4,931	1,435	144
<b>Vacancy (%)</b>	5.39	7.36		
<b>Of Which:</b>				
<b>Whole House, Bungalow etc</b>	54,617	55,171	554	55
<b>Flats</b>	9,722	11,165	1,443	144
<b>Caravans etc</b>	568	700	132	13
<b>CLG Households (2012 projection)</b>	<b>61,608</b>	<b>62,138</b>	<b>530</b>	<b>53</b>

Source: ONS & CLG © Crown Copyright

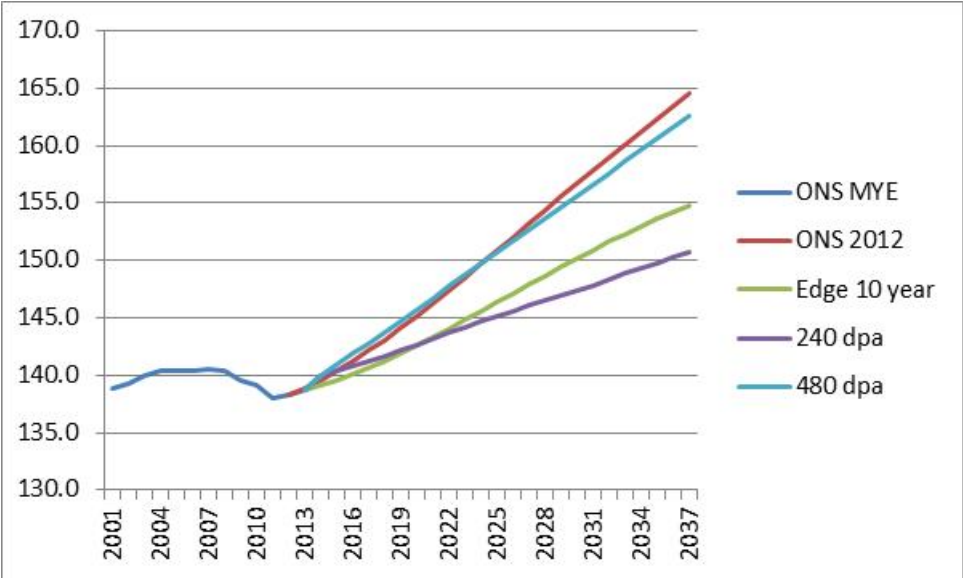
- 3.7 Table 3 shows statistics from the 2001 and 2011 Censuses in relation to household spaces in Tendring. Over the ten years there was a growth of only 2,100 spaces. This compares to data from the Annual Monitoring Reports of over 4,000. Of the growth shown by the censuses there was a net increase of over 1,400 vacancies, including second homes and holiday lets. This figure is similar to the net increase in flats in Tendring. The increase in occupied household spaces of 694 may be compared to the CLG estimated mid-2001 to mid-2011 growth in households of 530. The difference may be due to some reduction in sharing.
- 3.8 If there was a growth of over 4,000 homes in Tendring there is major discrepancy with one or both of the last two censuses. If the growth in homes and population was much as described by the two censuses it seems that about 70% of new homes have in effect contributed to increases in the number of vacancies. These are most likely due to being used as second homes and holiday lets, neither of which contribute to the local resident population as defined by ONS and CLG.
- 3.9 It is therefore necessary to look at the future population and households of Tendring in other ways. One of which would be to investigate the outcome of increasing the housing stock at particular rates between 2013 and 2037. Two possibilities would be by 240 per year, as per the most recent five year period, and 480 per year as per the

best five consecutive years since 2001 (2004-09). Other possibilities would be to look at migration trends over different periods to those used by Edge. This could be 2004-14, 2008-13 or 2009-14. However each of these options would also have to interpret UPC over a number of years as part of the migration flows and leave the same uncertainty as the Edge PG-10Yr projection. Therefore the following section investigates the impact of two building rates between 2013 and 2037. The resulting projections are compared to the Edge projection and the ONS/CLG 2012 projection.

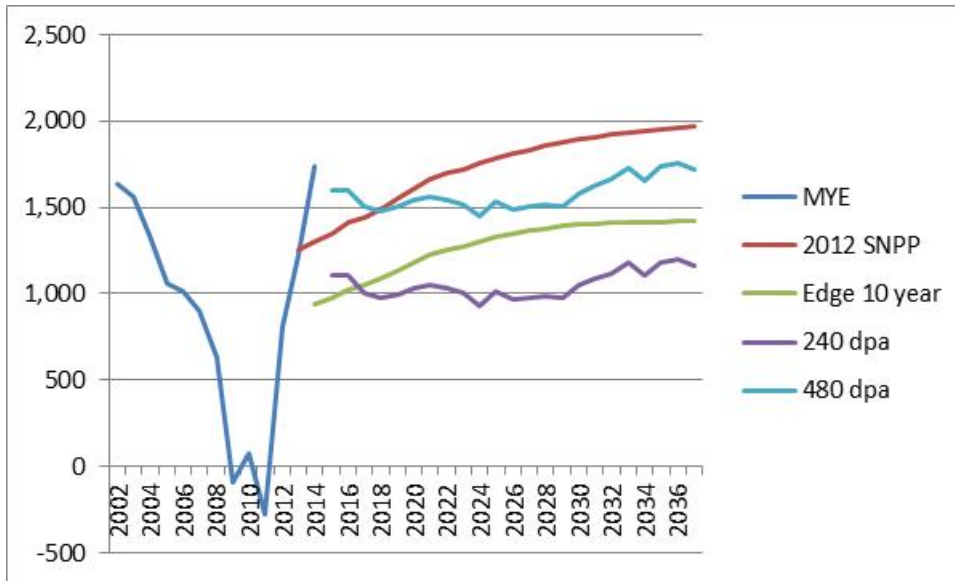
**4. Alternative Projection Scenarios**

- 4.1 Two projection scenarios have been developed. Both use the 2014 ONS population estimates as the base. The first investigates the consequences of an average build rate of 240 net new homes per year between 2013 and 2037. The second considers an average build rate of 480 homes per year. In converting net new homes to additional households a constant vacancy rate of 92.64 per cent has been used. This is the rate as at the 2011 census (Table KS401).
- 4.2 Figure 10 shows the resulting population with the build rate of 480 dpa being very similar to the ONS projection and the 240 dpa projection being lowest of all. Figure 11 shows the resulting net migration. The 480 dpa projection lies mainly between the ONS and Edge projections while the 240 dpa projection still indicates a net inflow of about 1,000 per year. Figure 12 shows that the projection of households from the 480 dpa projection is very close to the Edge projection, but is significantly lower than the CLG 2012 projection.

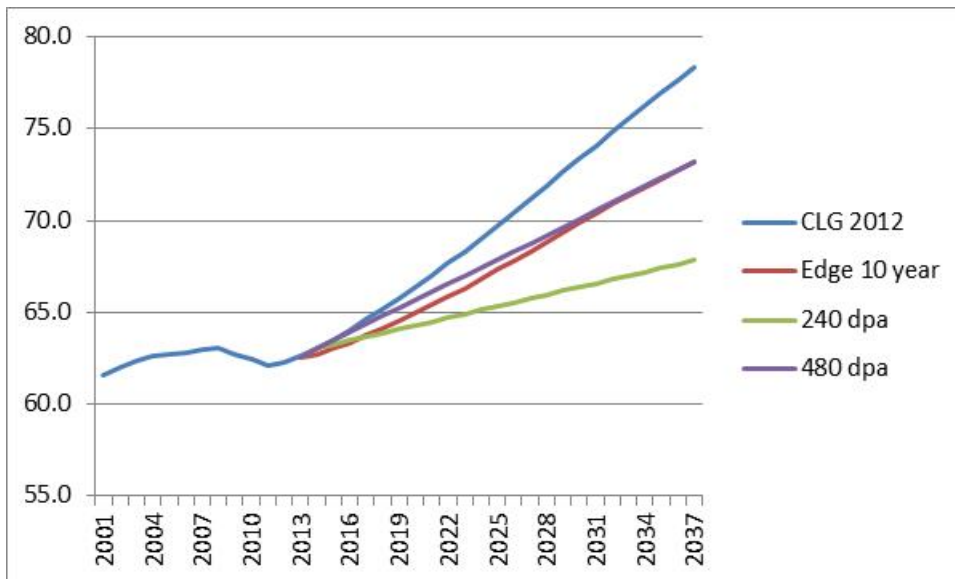
**Figure 10: Tendring DC: Population: 2001-37: Projections compared (thousands)**



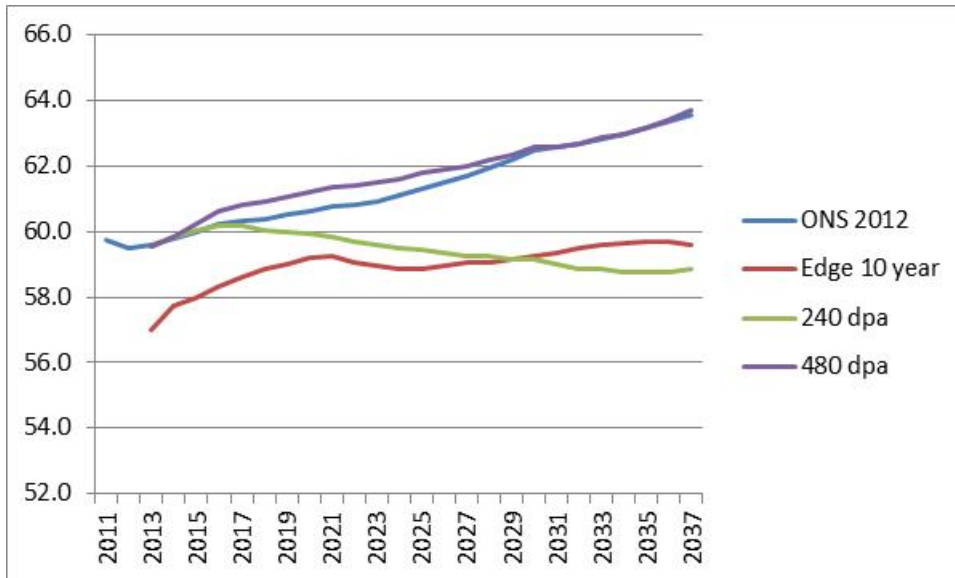
**Figure 11: Tending DC: Net Migration and Other Changes: 2001-37: Projections compared (thousands)**



**Figure 12: Tending DC: Households: 2001-37: Projections compared (thousands)**



**Figure 13: Tendring DC: Labour Force: 2011-37: Projections compared (thousands)**



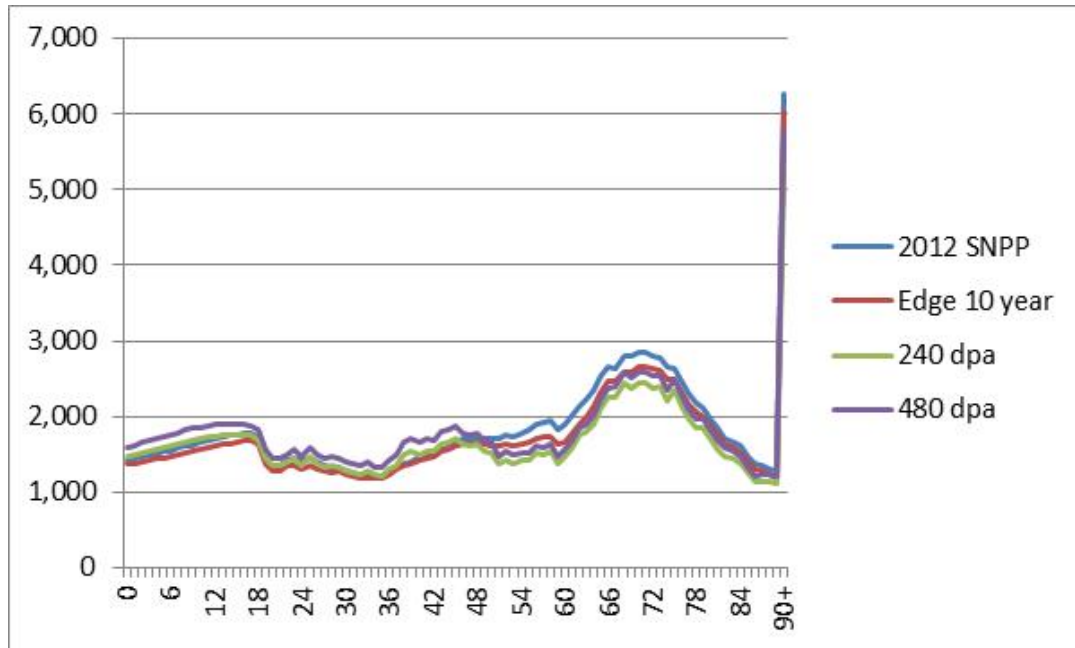
- 4.3 Figure 13 shows the projection of resident labour force. Here the 480 dpa projection is similar to the ONS 2012 projection and significantly higher than the Edge projection. It is unclear why the Edge projection starts so much lower than figures derived from the 2011 Census.
- 4.4 The results are summarised in Table 4 in which the conversion of all four projections from households to homes uses the same vacancy rate. The main difference between the Edge projection and that based on building 480 dpa is age structure. This is shown in Figure 14.

**Table 4: Tendring DC: Projections Summary**

		ONS/CLG	Edge	240 dpa	480 dpa
		2012	PG-10yr		
<b>Population</b>					
2001	thousands	138.8	138.8	138.8	138.8
2011	thousands	138.1	138.1	138.1	138.1
2013	thousands	138.9	138.7	138.7	138.7
2037	thousands	164.5	154.8	150.7	162.5
2001-11	thousands	-0.7	-0.7	-0.7	-0.7
2013-37	thousands	25.6	16.1	11.9	23.8
p.a.	persons	1,068	672	498	993
<b>Households</b>					
2001	thousands	61.6	61.6	61.6	61.6
2011	thousands	62.1	62.1	62.1	62.1
2013	thousands	62.6	62.5	62.5	62.5
2037	thousands	78.3	73.2	67.8	73.2
2001-11	thousands	0.5	0.5	0.5	0.5
2013-37	thousands	15.7	10.7	5.3	10.7
p.a.	households	654	444	222	445
<b>Homes</b>					
2013-37	thousands	17.0	11.5	5.8	11.5
p.a.	homes	706	480	240	480
<b>Labour Force</b>					
2011	thousands	59.7	59.7	59.7	59.7
2013	thousands	59.6	57.0	59.6	59.6
2037	thousands	63.6	59.6	58.9	63.7
2013-37	thousands	4.0	2.6	-0.7	4.1
p.a.	Labour Fce	165	108	-29	173
<b>Labour Force/Hhold</b>					
2013		0.95	0.91	0.95	0.95
2037		0.81	0.81	0.87	0.87

- 4.5 The ratio of resident labour force to households is already very low in 2013 and becomes lower in all projections.

**Figure 14: Tendring DC: Age Structure in 2037: Projections compared (thousands)**



- 4.6 Figure 14 shows that the projection based on 480 dpa build rate tends to have more people at all ages up to 50 while the Edge projection has more above that age. This is due to the different approaches the two models make in treating overall net migration by age. The 240 and 480 dpa projections consider the net migration in the base data at each age group whereas the Edge projection, as discussed earlier, tends to utilise the structures of migration streams from the ONS 2012 projection that did not take account of UPC.
- 4.7 The reactive sizes of the populations projected above and below 50 explain the differences in the projections of the labour force.
- 4.8 The Edge projection has about 7,700 fewer people overall in 2037 therefore the average household size is lower in the Edge projection, even though the same basic household representative rates were used. All four projections show a broadly similar age structure with a peak around retirement age and a relatively flat structure at most working ages.
- 4.9 A further feature of the projection of households is the assumption about the numbers of elderly persons over 75 who would be expected to be resident in some form of communal establishment. Following CLG methodology constant proportions of the population over age 75 by gender, age group and marital status are used. The numbers are assumed to rise from 1,236 in 2013 to between 2,040 (240 dpa) and 2,200 (480 dpa). The CLG projection shows a rise to 2,398. This statistic is not available from the Edge projection, but would be expected to be about 2,275 based on the overall age structure in 2037.



## 5. Summary

- 5.1 There are considerable doubts about the demographic changes that occurred in Tendring between the times of the last two Censuses (2001 and 2011).
- 5.2 ONS could not explain a difference of 10,500 fewer residents than had been previously estimated on the basis of its original estimates of migration.
- 5.3 Much of this difference has been determined by ONS to be an overestimate of net international migration into Tendring.
- 5.4 However, some of the difference was amongst the elderly population and was unlikely to be a feature of faulty international flows.
- 5.5 These issues are Tendring specific and do not seem to be repeated in adjacent authorities.
- 5.6 ONS did not account for the unattributable population change (UPC) in its 2012 projection.
- 5.7 In the Edge PG-10yr projection the UPC between 2003 and 2011 was added to the net international migration for 2003-13 and together they were projected at the same level each year. It is not clear how Edge altered the ONS gross international inflow and outflow streams to accommodate UPC.
- 5.8 However the Edge projection arrives at a reasonable outcome of the requirement of about 480 net new homes per year. This was the level achieved in the best five year period since 2001. The age structure of the Edge projection may be biased to the elderly and hence shows lower numbers of economically active residents than the 480 dpa projection.
- 5.9 According to the AMR Tendring increased its housing stock by over 4,000 homes between 2001 and 2011, although the comparison of Census data for 2001 and 2011 shows a net increase of only about 2,100, of which vacancies increased by 1,400.
- 5.10 Whatever the true net stock increase it would appear that there has been a significant increase in second homes and holiday lets. The net vacancy level, which includes all properties not used as a main residence, increased from 5.4% to 7.4% over the decade.
- 5.11 Apart from the growth in the housing requirement the calculations do not take into account the likely rise in the number of residents who, on the basis of the 2011 Census, would require some form of residential accommodation outside of the private housing stock. The estimated number in 2013 was 1,236 and this could rise to between 2,040 and 2,398 according to the four projections considered.

## Addendum

- A1 The demographic models have been used to test the results of average annual net additional building rates of 500, 550 and 600 dwellings per year throughout 2013-37
- A2 The results are compared to those of the ONS 2012 SNPP and the Edge PG-10yr projections.
- A3 The projection models have been updated in one regard compared to the models used in the main part of the report. The calculation of resident economically active population has been amended to cover all persons over the age of 16 rather than those aged 16-74. This has been made possible by an additional ONS 2011 Census table. At the same time as the age range has been extended it has also been made a little more detailed. The 18-24 group has been split to 18-19, 20-21 and 22-24. It should be noted that from September 2015 it has been required that all 16 and 17 year olds should be in education, therefore from mid-2016 the projections assume no 16-17s are in the economically active population.
- A4 The results are shown in Table A1. In terms of households the projections are all higher than the Edge projection that implied 480 dpa but even the 600 dpa projection is lower than the ONS 2012 SNPP.
- A5 As a consequence of incorporating UPC the migration into Tendring has a lower age profile than either the ONS or Edge projections. This results in more persons in the working ages and therefore a higher number of economically active residents – the resident labour force. This is best illustrated by looking at the ratio of labour force per household. The elderly age structure of Tendring ensured that this statistic was less than unity in 2013. While the ratio falls in all projections it falls most in the ONS and Edge projections.
- A6 In the three new projections the resident labour force is projected to grow over the period 2013-37 by 3.7, 4.7 and 5.7 thousand respectively. If one concentrates on changes projected for persons aged 18 and over – rather than 16 and over – the change over the projection period would be 4.9, 5.9 and 6.9 thousand respectively as a consequence of the 1.3 thousand 16 and 17 year olds in the labour force in 2013 who drop out of the calculations after 2015.

**Table A1: Tendring DC: Projections Summary**

		ONS/CLG	Edge	500 dpa	550 dpa	600 dpa
		2012	PG-10yr			
<b>Population</b>						
<b>2001</b>	<b>thousands</b>	138.8	138.8	138.8	138.8	138.8
<b>2011</b>	<b>thousands</b>	138.1	138.1	138.1	138.1	138.1
<b>2013</b>	<b>thousands</b>	138.9	138.7	138.7	138.7	138.7
<b>2037</b>	<b>thousands</b>	164.5	154.8	163.5	166.0	168.5
<b>2001-11</b>	<b>thousands</b>	-0.7	-0.7	-0.7	-0.7	-0.7
<b>2013-37</b>	<b>thousands</b>	25.6	16.1	24.8	27.3	29.8
	<b>p.a. persons</b>	1068	672	1034	1137	1240
<b>Households</b>						
<b>2001</b>	<b>thousands</b>	61.6	61.6	61.6	61.6	61.6
<b>2011</b>	<b>thousands</b>	62.1	62.1	62.1	62.1	62.1
<b>2013</b>	<b>thousands</b>	62.6	62.5	62.5	62.5	62.5
<b>2037</b>	<b>thousands</b>	78.3	73.2	73.6	74.7	75.8
<b>2001-11</b>	<b>thousands</b>	0.5	0.5	0.5	0.5	0.5
<b>2013-37</b>	<b>thousands</b>	15.7	10.7	11.1	12.2	13.3
	<b>p.a. households</b>	654	444	463	510	556
<b>Homes</b>						
<b>2013-37</b>	<b>thousands</b>	17.0	11.5	12.0	13.2	14.4
	<b>p.a. homes</b>	706	480	500	550	600
<b>Labour Force</b>						
<b>2013</b>	<b>thousands</b>	60.3	60.3	60.3	60.3	60.3
<b>2037</b>	<b>thousands</b>	63.6	59.8	63.9	65.0	66.0
<b>2013-37</b>	<b>thousands</b>	3.3	-0.4	3.7	4.7	5.7
	<b>p.a. Labour Force</b>	136	-19	152	194	236
<b>Labour Force/Hhold</b>						
<b>2013</b>		0.963	0.965	0.965	0.965	0.965
<b>2037</b>		0.812	0.818	0.869	0.869	0.870

## Appendix 1: Description of Demographic Models – updated January 2016

### Inputs

#### Population

Base Population (gender and single years 0 to 90+): ONS 2014 mid-year estimate.

Other Populations: ONS MYE 2001-2013.

Births: latest mid-year to mid-year (2013-14) consistent with MYE change analysis.

Age-specific Fertility Rates and Total Fertility Rate Assumption: as ONS 2012 national and subnational projections.

Deaths: latest mid-year to mid-year (2013-14) consistent with MYE change analysis.

Survival/Mortality Assumptions: as ONS 2012 national and subnational projections.

Migration: Age/gender probabilities linked to annual average migration changes over a recent minimum five-year period between 2001 and 2014 (eg 2004-14 or 2009-14) using data from ONS MYE and ONS MYE change analyses.

#### Households

Household Representative Rates: Stage 1 rates from CLG 2012 projection for year 2011 to 2037. The model uses the CLG Stage 1 rates that are specific to 5-year age groups (15-19 ... 85+), gender and relationship status.

Communal Population: as CLG 2012 assumptions.

Relationship Status (in a couple, formerly in a couple, single): as CLG 2012 assumptions.

#### Labour Force

Economic Activity Rates: 2011 Census by age groups and gender.

National Trends in EA Rates by age/gender: ONS national projection to 2020 (*Labour Market Trends* January 2006) with extension to 2037 using analysis by Kent County Council *Activity Rate Forecasts to 2036 (Provisional)* (published March 2014).

### Processes

#### Population

- 1 Survive base populations (single years of age and gender) by one year.
- 2 Calculate and add net migration by single years of age and gender for the survivors. This gives the population of persons aged 1+ at the end of first projection year.
- 3 Calculate births by single years of age of mother (15 ... 49) using the average female population at each age group throughout the projection year.
- 4 Split total births by gender using most recent 5-year average.
- 5 Survive births by gender to the end of projection year.

- 6 Calculate and add net migration of those surviving infants by gender born in the projection year. This gives the population of 0 year old boys and girls at the end of the first projection year.
- 7 Repeat cycle until the final projection year.

## Households

- 1 Separate total population (by gender and five-year age groups) into the three relationship statuses by following CLG assumptions of the proportions in each status.
- 2 Calculate communal establishment population by gender, age and relationship status by following CLG assumptions (constant numbers by gender, relationship status and age groups to 74 by and then constant proportions).
- 3 Calculate private household population by gender, age and relationship status by difference between total population and communal population.
- 4 Apply CLG Stage 1 household representative rates to the private household population by age, gender and relationship status. This gives total households.
- 5 Apply 2011 Census net vacancy rates, or other agreed rates, to convert households to homes.
- 6 The model may be run 'backwards' by defining a net annual increase in homes and iterating by adjusting the migration in the population projection to reach a fixed state where the population produces growth in households that is matched by the growth in homes allowing for a vacancy assumption.

## Labour Force

- 1 Accumulate the 2011 Census data on economic activity by age to the required age groups (16-17, 18-19, 20-21, 22-24, 25-29, ... 70-74, 75+) by gender and calculate the EA rates using the 2011 Census resident population as base.
- 2 Project the EA rates to 2036 according to the changes by age group and gender in the ONS and KCC projections. Extend from 2036 to 2037 and ensure rates do not exceed 100% or fall below 0%.
- 3 Accumulate the population projection to the required age groups by gender.
- 4 Apply the projected EA rates to the projected population.

## Outputs

Total **Population** by single years of age (0-90+) and gender for all projection years to 2037.  
Annual births, total fertility rates, deaths and net migration to 2036-37.

Total population, private household population and communal establishment population by age (0-4 ... 85+), gender and relationship status every year 2011 to 2037.

**Households** by age (15-19 ... 85+), gender and relationship status of household representative every year 2011 to 2037.

Households are converted to **homes** every year 2011 to 2037.

**Economically active** resident population by gender and age groups (16-17, 18-19, 20-21, 22-24, 25-29, ... 70-74, 75+) for all years to 2037.

## Appendix 2: John Hollis: Personal Biography

John Hollis has an M.A. in Demography from the University of California, Berkeley and is a Fellow of the Royal Statistical Society (RSS). He was President of the British Society for Population Studies (BSPS) in 2005-07 and has also been Chair of the Local Authorities Research and Intelligence Association (LARIA).

He was Demographic Consultant at the Greater London Authority until retiring in 2011. He prepared borough and ward level demographic projections for the various incarnations of the *London Plan*. He was demographic adviser to SEERA and prepared demographic projections and analyses for several local authorities.

He led the local government side of the CLIP (Central and Local Government Information Partnership) Census Advisory Group for both the 2001 and 2011 Censuses. In 2011-12 he was one of four external experts assisting ONS with quality assurance of the initial results of the 2011 Census. In 2013 he was part of the small team that wrote a methodological assessment of the ONS *Beyond 2011* project, which advised ONS not to forego a Census in 2021, and also advised ONS on future requirements for small area data.

He was a member of the CLIP Population Sub-group, which discusses methodology for population and household estimates and projections with ONS and DCLG. He has also been a member of the ONS Expert Panel advising on assumptions for National Population Projections and the CLG Steering Group on Household Projections, focussing on the 2010 redevelopment of the modelling process as well as the 2008 and 2011 Interim projections.

In 2010 he co-wrote a critique for PopGroup focussing on suggestions for improving the model's demographic methods in order to better represent ONS and DCLG projection methodologies.

His demographic projections have recently been used relating to objectively assessed need for housing in:

- Birmingham Development Plan
- Brentwood Local Plan
- Cheltenham, Gloucester & Tewkesbury JCS
- Cheshire East LP
- Cheshire West & Chester LP
- Luton & South Bedfordshire SHMA
- Maidstone SHMA
- Maldon LP
- South Hampshire SHMA
- South Worcestershire
- Telford & Wrekin OAN
- Warwick OAN
- West Dorset