

2011 Census Based Population and Household Estimates for Sub-Borough Areas

1 Introduction

- 1.1 This note gives a detailed explanation of the methodology used, and the reasoning behind it, to produce the Population and Household estimates for sub-borough areas (Wards, Towns and Villages, Parishes etc) within the Tees Valley. It also describes the methodology for moving from Census Day results to a Mid Year figure, in this case to Mid 2011.
- 1.2 ONS released population and household estimates from the 2011 Census on 23rd November, 2012. The release included resident population for five year age bands, population density, occupied households and household population. All variables were available at Census Output Area (COA), Lower Super Output Area (LSOA), Middle Super Output Area (MSOA) and Census Area Wards (CASWards). These can be downloaded from the ONS web-site here [ONSLink01](#).
- 1.3 ONS also released 2011 Mid Year Estimates for Local Authorities on 25th September, 2012 rolled forwards from Census Day figures. These are available from the ONS web-site here [ONSLink02](#) and TVU have released a note outlining the main findings of these estimates available on the TVU web-site here [TVULink01](#).

2 Background

- 2.1 The main building block, upon which all sub-borough areas are built, is the COA these were designed for the 2001 Census and a small number have been updated for the 2011 Census to reflect newly populated areas and to correct anomalies. COAs all nest within LSOAs (some of which have also changed for the same reasons) and LSOAs nest within MSOAs. The COA is the lowest level of geography at which ONS will be releasing Census data for 2011. Boundary files (shape format) can be downloaded from the ONS website here [ONSLink03](#).
- 2.2 Unfortunately, ONS changed its geography policy prior to the 2011 Census so that wards were no longer a priority, with a move to LSOAs and MSOAs which were argued to represent a more stable geography. Any wards that have changed since 2003 that are not coterminous with COAs will be calculated using ONS' "best fit" methodology for allocating COAs to wards, and other higher geographies, based on the population weighted centroid. The whole COA is allocated to the ward (or other area) in which the centroid of the COA falls.

3 TVU Methodology COAs to Wards and other Sub-Borough Areas.

- 3.1 TVU use a method that more accurately reflects the local population. Where COAs are split by a ward (or other boundaries), the COA is split based on the actual proportions in each part using address data from the Royal Mail Postcode Address File (AddressPoint®). The basic assumption is that the population splits in the same proportions as the residential addresses. So where 40% of a COA, in terms of its residential addresses, falls within a particular area, we assume that 40% of its population will also fall there. Using GIS, the splits for any sub-borough area can be calculated and a value given to each COA that determines the proportion that is included. Thus, any sub-borough area is an aggregation of whole or part COAs.
- 3.2 AddressPoint® provides a unique grid reference for every residential postal address in the Tees Valley and is updated each quarter. As an additional check, the splits have been compared with population data based on GP Patient Registrations and the results are very similar. This method gives a better fit than using only whole COAs and the extent of the differences in the ONS and TVU method can be seen in **Appendix 1**.
- 3.3 This method affects only Local Authorities that have seen ward changes since 2003 and so in the Tees Valley, Hartlepool and Stockton-on-Tees are affected. Hartlepool has the additional complication of a further revision to ward boundaries since the 2011 Census. TVU will produce figures for these new wards on the above basis. Initially, ONS will release Census ward data for Hartlepool on their 2004 boundaries (17 wards).
- 3.4 The consequence of TVU adopting this method is that Census figures will differ slightly from the ONS results for Hartlepool and Stockton-on-Tees wards but TVU are confident the results will better reflect the true numbers.
- 3.5 Figures are also given the communal and household population separately. This allows average household size to be calculated.
- 3.6 Population – COA level results from the Census are aggregated into Broad age bands (0-15, 16 – 64 and 65+ - See 3.7 for details) and for males and females. These age bands are used to allow economic activity rates to be calculated in line with ONS age bands. Figures are also available for retirement age prior to the 2011 Census i.e. 60 females, 65 males.
- 3.7 0-15s Census Day – Census figures are given for 5 year age bands at COA level and so the 15 year olds need to be separated out and added to the 0-14s (and taken off the 15-19s). To do this, the Local Authority figure (which is available at single year of age) for those aged 15 are taken as the control and this is split to COAs using GP Patient register data taken from the end of March 2011.
- 3.8 Households – COA level results are used directly from the Census tables. Average household size can be derived using the Household Population which is also provided in Census tables. Total Household spaces are **not yet** available at sub-borough level and so Vacancy rates cannot be calculated. These will be available in March 2013.

4 Census Day to Mid-2011

- 4.1 ONS publish annual estimates (Mid Year) of the resident population (Local Authority down to LSOA level) for use by a wide variety of government departments and other organisations. Its main uses are:-
- As a base for Local Authority, Health Service, Fire, Police financial settlements
 - As a divisor for official statistics such as Unemployment, GDP, Birth and Death rates.
 - The estimates form a base for population projections which are used in projections work such as CLG Household projections and DfES School Pupil projections.
 - The decennial Census is a vital part in re-aligning the estimates to a sounder base and the Census results also inform ONS as to where the weaknesses lie in the population estimates produced between the censuses.
 - Between Censuses, the Mid Year figures are used as the basis for all population figures.
- 4.2 COA population and household figures are rolled forwards from Census Day to Mid Year 2011 in the following manner.
- 4.3 Resident Population – Census Day to Mid 2011 :
- Stage 1 – taking the 2011 Census Day resident population as a base and using the change in numbers of addresses between Census Day and Mid Year 2011, an estimate is calculated, at COA level, of the corresponding change in population based on an average household size (roughly 2 people per address).
 - Stage 2 - COA level resident population is then scaled to Borough level ONS Mid Year Population Estimates for each age and sex group. These act as interim estimates at COA level until such time as ONS release estimates for LSOAs for Mid 2011 which will be in the summer of 2013. Once these are released, COA estimates will be scaled to match ONS LSOA estimates by age group and sex.
- 4.4 Household Population - this is assumed to change in line with the Total resident Population and so each COA's Household population is scaled by the same change in resident population over the three month period to Mid 2011.
- 4.5 Occupied Households – Usually the number of dwellings (total household spaces) is calculated and households are derived using the vacancy rate. ONS have not yet released numbers of dwellings and so, for the purposes of these estimates, the change in addresses is being used as a proxy for the change in households.
- Changes between Census Day and Mid Year are calculated from AddressPoint ® which is updated quarterly by Royal Mail and which TVU track for new and obsolete addresses. The time between the Census and Mid Year (3 months) means that, in practice, there is very little change.

5 ONS Outputs - 2011 Census Day

- 5.1 ONS have released estimates for resident population at five year age bands and sex, total household population and occupied households. These are available for:-

- England and Wales, Regions and Counties
- Local Authorities
- 2011 Census Wards on a “**Best Fit**” basis. (For Tees Valley these are the wards in place in 2005)
- ONS Middle Super Output Areas (MSOAs) estimates
- ONS Lower Super Output Areas (LSOAs) estimates
- ONS Census Output Areas (COAs) estimates

These can be all be downloaded from the ONS web-site here [ONSLink01](#)

6 TVU Outputs – 2011 Census Day

6.1 TVU have produced estimates of resident population by broad age band and sex, total household population and occupied households. Based on the TVU method, these are available for the following sub-borough areas in the Tees Valley:-

- 2011 Census Wards (2005 Wards)
- 2012 Wards (as above but includes Hartlepool new ward boundaries from May 2012)
- Parishes
- Towns, Villages and Settlements
- Postcode Areas
- Parliamentary Constituencies

The 2012 wards will be the ones placed on the Census hub of the TVU website.

7 TVU Outputs – Mid 2011

7.1 TVU also have estimates for Mid 2011 of resident population by broad age band and sex, total household population and occupied households. Again, based on the TVU method, these are available for the following sub-borough areas in the Tees Valley:-

- 2011 Census Wards (2005 Wards)
- 2012 Wards (Includes Hartlepool new ward boundaries from May 2012)
- ONS Lower Super Output Areas (LSOAs) estimates
- ONS Middle Super Output Areas (MSOAs) estimates
- Parishes
- Towns, Villages and Settlements
- Postcode Areas
- Parliamentary Constituencies

7.2 Bespoke areas can be modelled and estimates calculated on request, subject to minimum thresholds.

7.3 The TVU population estimates for Mid 2011 are consistent with the latest ONS estimates at their lowest geographical area (currently at Borough level); as soon as better information is released, so the estimates are updated.

8 Non-Residential Population

- 8.1 Population for all areas is available for the Household Population i.e. excluding the more general non-residential population living in Student Accommodation, Nursing Homes, Hospitals, Prisons, Hostels and so on. Proportions for subsequent estimates of non-residential populations for each age group and sex by COA will be based on the 2011 Census data and these proportions retained for all future estimates, unless other information become available e.g. changes to the prison populations, new student accommodation.

9 Future Updates

- 9.1 TVU will keep the LSOA estimates in line with ONS figures. The next set of ONS LSOA population estimates will be for Mid 2011 and are due out in summer 2013.
- 9.2 Household Estimates - other than after the decennial census, ONS do not provide updates of household or dwelling estimates. CLG release estimates of households but only at Local Authority level. Consequently, for sub-borough household and dwelling estimates this element will continue to be based on TVU estimates which will use a combination of Royal Mail's address file AddressPoint®, Council Tax and other locally held information.

10 Further Information

- 10.1 For further information please visit our web-site at [TVULink02](#). From here it will be possible to download the data in spreadsheet format or view the data geographically with a mapping background.

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APPENDIX 1 – DIFFERENCES IN WARD ESTIMATES : ONS vs TVU METHOD

Numbers of Addresses INCLUDED (Down) and EXCLUDED (Across) by ONS Method – HARTLEPOOL – 2004 WARDS

Sum of AddCountCen11		CASWardName_2011										Net Losses as		
Name	In/OUT	Burn Valley	Fens	Foggy Furze	Grange	Greatham	Park	Rift House	Rossmere	Seaton	Stranton	Grand Total	Net Losses	% Total Address
Brus													0	0%
Burn Valley	OUT				60			11				71	-11	0%
Dyke House													0	0%
Elwick	OUT					45						45	45	5%
Fens	OUT					4			86			90	17	1%
Foggy Furze	OUT							80	52	44	88	264	231	10%
Grange	OUT	70					77				8	155	85	3%
Greatham	OUT									1		1	-48	-5%
Hart													0	0%
Owton	OUT		73									73	73	3%
Park	OUT				1							1	-145	-6%
Rift House	OUT	12		30			2					44	-47	-2%
Rossmere	OUT			3						81		84	-54	-2%
St. Hilda													0	0%
Seaton													-126	-5%
Stranton	OUT				9							9	-87	-3%
Throston	OUT						67					67	67	3%
Grand Total		82	73	33	70	49	146	91	138	126	96	904	0	

Note – The Net Losses column – a positive number indicates a net loss, a negative number indicates a net gain. As an example, Burn Valley loses 60 addresses to Grange and 11 to Rift House but gains 70 addresses from Grange and 12 from Rift House – Net effect -11 which is a net gain of 11 addresses.

There are 29 Census Output Areas that are split by 2004 ward boundaries out of 313 COAs – almost 10%. Foggy Furze is the worst affected with 10% of its addresses excluded under the ONS methodology. This will have a significant impact on any figures, which will be 10% too low and on any rates, which will be higher by 10%. Park on the other hand has a net gain of 6% so ONS figures will be 6% too high and rates will be 6% too low.

APPENDIX 1 (cont-) – DIFFERENCES IN WARD ESTIMATES : ONS vs TVU METHOD

Numbers of Addresses INCLUDED (Down) and EXCLUDED (Across) by ONS Method – HARTLEPOOL – 2012 WARDS

Sum of AddCountCen11	StatWardName											Net Losses as		
Name	IN/OUT	Burn Valley	De Bruce	Fens and Rossmere	Foggy Furze	Hart	Jesmond	Manor House	Rural West	Seaton	Victoria	Grand Total	Net Losses	% Total Address
Burn Valley	OUT				106						90	196	-5	0%
De Bruce	OUT					44						44	0	0%
Fens & Rossmere	OUT							24		52		76	-54	-1%
Foggy Furze	OUT									19		19	-87	-2%
Hart	OUT		44				6		30			80	-8	0%
Headland & Harbour	OUT	75								25		100	100	3%
Jesmond	OUT					44			37		150	231	144	4%
Manor House	OUT			40					2			42	18	0%
Rural West	OUT			58						2		60	-9	0%
Seaton	OUT			32								32	-66	-2%
Victoria	OUT	126					81					207	-33	-1%
Grand Total		201	44	130	106	88	87	24	69	98	240	1087	0	

Note – The Net Losses column – a positive number indicates a net loss, a negative number indicates a net gain. As an example, Burn Valley loses 106 addresses to Foggy Furze and 90 to Victoria but gains 75 from Headland and Harbour and 126 from Victoria – Net effect - 5 which is a net gain of 5 addresses. In this example, the numbers balance so it may not be an issue - as long as the areas of gains and losses have a similar demographic profile.

There are 33 Census Output Areas that are split by 2012 ward boundaries out of 313 COAs, nearly 11% of all COAs. There are two instances where a COA is split across three wards (E00060356 and E00165754).

The 2012 wards are not as badly affected, in terms of net losses, as the 2005 wards. Jesmond is the worst affected with 4% of addresses excluded under the ONS methodology. This will have an impact on any figures, which will be 4% lower and on any rates, which will be higher by 4%.

APPENDIX 1 (cont-) – DIFFERENCES IN WARD ESTIMATES : ONS vs TVU METHOD

Numbers of Addresses INCLUDED (Down) and EXCLUDED (Across) by ONS Method – STOCKTON-ON-TEES – 2005 WARDS

Sum of AddCountCen11	CASWardName_2011												
Name	In/OUT	Billingham C	Billingham E	Billingham N	Bishopsgarth and Elm Tree	Fairfield	Grangefield	Hardwick	Hartburn	Ingleby Barwick E	Ingleby Barwick W	Mandale and Victoria	
Billingham Central	OUT		73										
Billingham East	OUT			53									
Billingham North	OUT		75										
Billingham South													
Billingham West	OUT	70											
Bishopsgarth and Elm Tree	OUT					9		14					
Eaglescliffe	OUT									2			
Fairfield	OUT				60					12			
Grangefield	OUT												
Hardwick	OUT				53								
Hartburn													
Ingleby Barwick East	OUT											63	
Ingleby Barwick West	OUT									57			
Mandale and Victoria	OUT												
Newtown	OUT							11					
Northern Parishes													
Norton North	OUT												
Norton South	OUT												
Norton West													
Parkfield and Oxbridge	OUT									2			
Roseworth													
Stainsby Hill	OUT												50
Stockton Town Centre	OUT												
Village	OUT												
Western Parishes													
Yarm													
Grand Total		70	148	53	113	9	11	14	16	57	63	50	

...see overleaf for continuation of this table...

Table continued here Numbers of Addresses INCLUDED (Down) and EXCLUDED (Across) : STOCKTON-ON-TEES – 2005 WARDS

Sum of AddCountCen11 Name	continued.... In/OUT									Net Losses as		
		Newtown	Norton N	Norton S	Parkfield and Oxbridge	Roseworth	Stainsby Hill	Stockton Town Centre	Village	Grand Total	Net Losses	% Total Address
Billingham Central	OUT									73	3	0%
Billingham East	OUT									53	-95	-3%
Billingham North	OUT									75	22	1%
Billingham South											0	0%
Billingham West	OUT									70	70	3%
Bishopsgarth and Elm Tree	OUT									23	-90	-3%
Eaglescliffe	OUT				37					39	39	1%
Fairfield	OUT									72	63	2%
Grangefield	OUT	3								3	-8	0%
Hardwick	OUT					95				148	134	4%
Hartburn											-16	-1%
Ingleby Barwick East	OUT									63	6	0%
Ingleby Barwick West	OUT									57	-6	0%
Mandale and Victoria	OUT						46			46	-4	0%
Newtown	OUT					8				19	16	0%
Northern Parishes											0	0%
Norton North	OUT			105						105	75	2%
Norton South	OUT		30							30	-75	-2%
Norton West											0	0%
Parkfield and Oxbridge	OUT							33		35	-153	-4%
Roseworth											-103	-3%
Stainsby Hill	OUT								11	61	11	0%
Stockton Town Centre	OUT				151					151	118	3%
Village	OUT						4			4	-7	0%
Western Parishes											0	0%
Yarm											0	0%
Grand Total		3	30	105	188	103	50	33	11	1127	0	0

Note – The Net Losses column – a positive number indicates a net loss, a negative number indicates a net gain. As an example, Billingham Central loses 73 addresses to Billingham East but gains 70 from Billingham West – Net effect 3 which is a net loss of 3 addresses. In this example, the numbers balance so it may not be an issue - as long as the areas of gains and losses have a similar demographic profile.

There are 46 COAs that are split by 2005 ward boundaries out of 618 COAs – 7%. Hardwick is worst affected with the ONS method allocating 4% of addresses elsewhere. ONS figures, using their “best fit” method, will be 4% lower than the TVU method, while rates using the ONS method will be 4% too high.

Appendix 2 – Links

Page 1 & 3 - ONSLink01- Excel Tables of Population and Household Estimates

<http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-284349>

Page 1 – TVULink01 – TVU note on results of ONS 2011 Mid Year Estimates.

https://www.teesvalleyunlimited.gov.uk/media/130902/tvu_2011_mye_census_based_results.pdf

Page 1 - ONSLink02- ONS Mid Year Population Estimates for Mid 2011

<http://www.ons.gov.uk/ons/rel/pop-estimate/population-estimates-for-england-and-wales/mid-2011--2011-census-based-/rft---mid-2011--census-based--population-estimates-for-england-and-wales.zip>

Page 1 - ONSLink03 – Boundary files (Shape format) for MSOAs, LSOAs and COAs including Population Weighted Centroids.

<http://www.ons.gov.uk/ons/guide-method/geography/products/census/spatial/index.html>

Page 5 – TVULink02 – TVU web-site – entry point for Census Statistics.

<https://www.teesvalleyunlimited.gov.uk/tees-valley-unlimited/information-hub/economic-intelligence.aspx>