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GLA 2006 Round Ward Population Projections

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Contents

Background

These projections have been produced as background for the *Review (Further Alterations) of the London Plan*. Summaries have been published in *Draft Further Alterations to the London Plan* (GLA, September 2006) and the detailed results have been used by GLA Economics and Transport for London in work leading up to the Further Alterations to the London Plan Examination in Public.

The 2005 Round projections were considered to be *Interim* as they had been prepared on the basis that the borough level projections were linked to an assumed capacity based upon the 2004 London Housing Capacity Study (LHCS) and an estimate of future average household size. It was stated that *Final* projections would await the availability of the ODPM 2003-based household projections in order to be able to use the projected trends in communal establishment populations, marital status and household representative rates that they incorporate to link population change with the planned growth in homes. The Department for Communities and Local Government (DCLG: formerly ODPM) household projections became available from March 2006. Fully detailed results for boroughs became available in Summer 2006 and these have been used in the 2006 Round of GLA demographic projections.

This *Briefing* follows on from *DMAG Briefing 2006/32 GLA 2006 Round Demographic Projections*, which described how the borough level projections were calculated. It details the methods used to produce the corresponding ward level population projections.

Borough Level Projections

The 2005 Round of GLA projections were prepared in advance of the Government Actuary's Department's (GAD) 2004-based national projections. Early in 2006, as part of a project that looked at the risks inherent in assumptions supporting the *London Plan* it was decided to prepare a projection for London that emulated the GAD assumptions for the UK in terms of fertility trends, survivorship improvement and international migration levels. This projection assumed that London would continue to receive/supply the same proportions of the UK international in and outflows as for the five-year period from 1999 to 2003. This projection has subsequently been adopted as the high projection for London (**RLP High**) for use in the *Review (Further Alterations) of the London Plan*. However, the distribution amongst the boroughs reflects the results of RLP Low, see below.

The **RLP Low** projection has been developed using the same three migration-led projections that were used in the construction of the 2005 Round Scenario 8.07 projection, but with the full use of development data and the DCLG 2003-based household projections to steer the projection results between the three migration-led projections.

The full methods used to produce these borough level population projections are described in *DMAG Briefing 2006/32 GLA 2006 Round Demographic Projections*.

For the 2006 Round ward level projections the main addition was that new data were collected and a new borough constraints were created. This was done primarily for the School Rolls Projections Service so this was termed **RLP Low SRP**. Three main adjustments were made to the data to produce the RLP Low SRP borough level constraints. These were:

- Additional data was collected from the boroughs on housing capacity at ward level since mid-2001.
- The age structure of 0-4 year olds in mid-2001 and subsequent years was adjusted to reflect the relationships between births and the ONS mid-year estimates of 0, 1, 2, 3 and 4 year olds in the years 1996 to 2000. Very similar relationships also hold in years since 2002, with the mid-2001 estimates showing as outliers in m ost boroughs.
- Incorporating actual births for 2005 (as a proxy for 2005-06) and hence altering the projection of births.

Housing Capacity

Output from the 2004 London Housing Capacity Study is one of the key inputs into the ward level population projections. In 2006 these data were revised at borough level, but not at ward, and this additional information has been included in the RLP Low ward level projections. The methods used are described in Box 1.

BOX 1 – LHCS redistribution
There are four components to the data and each needed to be divided up into individual years. This was done as follows.

Additional homes in revised Phase 4 (2017-27) data
It was assumed that these were all on large sites.

Large Sites
Phase 1 (2004-07):
In two cases there was a discrepancy between the Phase 1 data at borough level and the total of the ward level data. This was rescaled to the data in the borough file based on the previous allocation of the borough totals to each ward.

Phase 2 (2007-12) and Phase 3 (2012-17):
The original ward level data were changed by the same factor as the initial large site data were changed at borough level.
So in the case of Brent the borough total was 3,408 in Phase 2 and was adjusted to 5,101. This was an increase by a factor of 1.497 – this was applied at ward level.

Phase 4 (2017-27):
Where Phase 4 non-zero data were available for some wards in the original data then increases will be applied in the same way as for Phase 2 and 3, ie a constant factor to adjust all non-zero ward cells if there is sufficient information on allocation of Phase 4 sites to wards.

Where the original Phase 4 data were 0 for all wards in a borough and there are additional homes in the revised Phase 4 data assumed to be on large sites (see above) then these sites were apportioned from the borough total to wards according the housing stocks in the 2001 Census. This was also the case for increases to non-zero data where there was limited information on ward allocation in Phase 4.

Small sites
From 2004-2017 a ward level distribution of small sites was available and this has not changed. A 10% reduction in sites was incorporated for 2017-22 and a further 10% reduction in sites was included for 2022-27. For 5 boroughs there was a discrepancy between the small site data at ward and borough level. In these cases the borough level totals were used and the data were distributed in the same ratio as the original ward level data.

Non self-contained and vacant dwellings
These were not previously included in the ward level stock figures.

In both cases the borough total was apportioned to the wards based on the distribution of housing stock in the 2001 Census.

Totals
The average annual increase in stocks was calculated based on these four factors for the different phases. Totals for 2004-07-12-17-27 match the amended LHCS totals.

There were two exceptions to these general rules – Camden and Kingston upon Thames. In Kingston there was a decline in the number of sites in Phase 4. This could not be allocated to large sites as there were a limited number so the loss was assigned to the small sites data. In Camden there was a large difference in the available data for Phase 2. This was due to the timing of proposed developments around Kings Cross and was moved from Phase 2 to Phase 4. This re-timing of the development was built into the calculations.

The following shows how these calculations were carried out for Hackney:

Large sites:
Data in Phase 1 was carried forward. In Phase 2 the Further Alterations to the London Plan estimated that 2,126 large sites would be built compared to 2,693 originally predicted. Therefore the ward data in Phase 2 were all scaled down by this ratio to produce the adjusted total. This was also done in Phase 3. An additional 2,973 large sites were allocated to Phase 4. These were allocated to wards based on the split of dwellings between wards in the 2001 Census.

Small sites
In Hackney the number of new homes on small sites allocated to the borough was 5620, which equated to 562 homes per year from 2007 to 2017. In the first half of Phase 4 (2017-2022) there was a 10% reduction to 506 homes and a further 10% reduction to 2027, which led to 455 per year. These totals were allocated to wards based on the original assignment on sites to wards in 2007-17.

Non self-contained and vacant dwellings
Borough totals were available for each Phase for both non self-contained and vacant dwellings. These were apportioned to wards based on household spaces in the 2001 Census.

Totals
The results of the each of these four calculations were totalled to produce a number of new dwellings for each ward and year.

Once the initial distribution was completed boroughs were contacted to review the allocation of sites. Their adjusted data, where a response was received, was used as an input into the ward level projections. Responses were received from 31 of the 32 boroughs (ward projections are not completed for the City of London). Of those who did respond three said they were unable to check the data due to staff or time constraints and were happy to proceed with the GLA data, three accepted the GLA calculations and the remainder supplied new data. In most cases the data for years 2001-06 were updated, or the latest housing trajectory was supplied to be factored into the calculations.

0-4 year old data adjustment

Estimates of 0-4 year olds were improved at the borough level following (a) the release by ONS of birth occurrences for mid-2004 to mid-2005 and registrations for the full-year 2005, and (b) an analysis of trends associating births with population estimates by single years of age.

Box 2 – 0-4 adjustment

Stage 1: New births
To update the projected number of births at borough level the ratio of the number of births for 2004-05 given in the 2005 MYE and the projected number of births from the GLA population projections was taken. This ratio was then applied to the GLA births projections for 2005-06 to 2030-31. In a second stage birth registration data for the full-year 2005 became available. These were taken as a proxy for 2005-06 and the above process was repeated from the revised baseline.

Stage 2: New 0-4's
ONS MYE were used to calculate the 'survival' ratios of:

- births in years 1995-96 to 1999-2000 becoming 0-year olds in years 1996 to 2000
- births in years 1994-95 to 1998-99 becoming 1-year olds on 1996 to 2000
- …
- births in years 1991-92 to 1995-96 becoming 4-year olds in 1996 to 2000

The averages over the five years of each of these ratios were applied to the births in 1996-97 to 2000-01 to recalculate the 0, 1, 2, 3 and 4-year olds in 2001. The process was extended to future years by incorporating the actual births to 2004-05 and registrations for 2005 and the revised birth projections from Stage 1.

Stage 3: Division by sex
This data is calculated for all persons but for the projections division by sex is required. ONS mid-year estimates for year 2001 were used to split the estimated numbers of 0 to 4 year olds into males and females. These revised estimates form the basis of the new borough level projections.

Stage 4: Update to ages beyond 4
To carry the improved data through to older ages 'survival' ratios were calculated from the previous GLA borough lprojections. This means the re-estimated 4 year olds in 2001 are aged to become 5 year olds in 2002, 10 year olds in 2012, 15 year olds in 2017, etc. There are no changes at older ages.

The following shows how these calculations were carried out for Hackney:

Stage 1:
In 2005 actual births were 4,378 and we projected there to be 4,366 therefore the GLA projections needed to be increased by a factor of 1.003. Actual births for the full year 2005 (4,439) were taken to be indicative of the figure that will be released as the 2006 mid-year estimate. This was compared with the new projected figure for 2006 (4,425). Again future births were increased by a factor of 1.003.

Year	Births	NEW BIRTHS	NEW BIRTHS	FINAL BIRTHS
2001	**3,911**			3,911
2002	**4,130**			4,130
2003	**4,220**			4,220
2004	**4,256**	1.003		4,256
2005	4,366	**4,378**	1.003	4,378
2006	4,413	4,425	**4439**	4,439
2007	4,436	4,449	4,463	4,463
2008	4,473	4,485	4,500	4,500
2009	4,512	4,524	4,539	4,539
2010	4,553	4,566	4,580	4,580

Stage 2:

The transition rates from births to 0 year olds, births to one year olds etc were calculated as shown below. The average of the data from 1996 to 2000 was used in the next stage of calculations. These transition rates were used to calculate the numbers of 1 to 4 years olds in the projections years based on the births calculated in Stage 1 above.

	Births	0	1	2	3	4
1992 ONS	3,721	3,643	3,587	3,129	3,125	3,032
1993 ONS	3,537	3,456	3,506	3,482	3,071	3,087
1994 ONS	3,542	3,469	3,372	3,410	3,377	3,045
1995 ONS	3,641	3,539	3,339	3,296	3,302	3,302
1996 ONS	3,642	3,527	3,335	3,203	3,177	3,198
1997 ONS	3,866	3,700	3,293	3,127	3,036	3,064
1998 ONS	3,814	3,713	3,566	3,190	3,018	2,973
1999 ONS	3,988	3,806	3,605	3,448	3,135	2,976
2000 ONS	3,880	3,573	3,550	3,459	3,343	3,059
2001 ONS	3,911	3,466	3,354	3,346	3,364	3,249
2002 ONS	4,130	3,974	3,307	3,230	3,181	3,269
2003 ONS	4,220	3,996	3,714	3,109	3,070	3,027
2004 ONS	4,256	4,097	3,825	3,460	2,903	2,875
2005 ONS	4,378	4,186	3,903	3,633	3,259	2,761

	B>0	B>1	B>2	B>3	B>4
1992 ONS	0.979				
1993 ONS	0.977	0.942			
1994 ONS	0.979	0.953	0.916		
1995 ONS	0.972	0.943	0.932	0.887	
1996 ONS	0.968	0.916	0.904	0.898	0.859
1997 ONS	0.957	0.904	0.859	0.857	0.866
1998 ONS	0.974	0.922	0.876	0.829	0.839
1999 ONS	0.954	0.945	0.892	0.861	0.817
2000 ONS	0.921	0.890	0.907	0.865	0.840
2001 ONS	0.886	0.864	0.839	0.882	0.840
2002 ONS	0.962	0.846	0.832	0.798	0.857
2003 ONS	0.947	0.899	0.795	0.791	0.759
2004 ONS	0.963	0.906	0.838	0.742	0.741
2005 ONS	0.956	0.917	0.861	0.789	0.706
1996-00 ONS Av	0.955	0.916	0.888	0.862	0.844

These transition rates were used to calculate the numbers of 1 to 4 years olds in the projections years based on the births calculated in Stage 1 above. For example there were

4,439 births in 2006, this meant that there were (4,439 x 0.955) 4,239 0 year olds in 1996 and (4,439 x 0.916) 4,064 1 year olds in 2007.

The table below gives the resulting 0-4 year olds for Hackney following these changes compared to the ONS mid-year estimates. The greatest differences are seen for 0 year olds.

Year	0	1	2	3	4
2001 MYE	3,466	3,354	3,346	3,364	3,249
2001 GLA	3,734	3,552	3,540	3,287	3,265

Stage 3

	M	M	M	M	M
Year	0	1	2	3	4
2001	0.52	0.51	0.50	0.52	0.51
	F	F	F	F	F
Year	0	1	2	3	4
2001	0.48	0.49	0.50	0.48	0.49

This data then needs to be split between the sexes. The division in the 2001 MYE data was used and then applied to all other projection years.

The results for Hackney are shown below.

	M	M	M	M	M	F	F	F	F	F
Year	0	1	2	3	4	0	1	2	3	4
2001 MYE	1,805	1,722	1,675	1,749	1,669	1,661	1,632	1,671	1,615	1,580
2001 GLA	1,945	1,824	1,772	1,709	1,677	1,790	1,729	1,768	1,578	1,588

Stage 4

Cohort transition ratios based on the change between, say, 4 year olds in year x and 5 year olds in year (x+1) in the original RLP Low projection were used to generate numbers of males and females aged 5 and over in later years in each of the cohorts with improved numbers of 4 year olds. This process only affects 5 year olds in 2002, 5 and 6 years olds in 2003, etc.

This leads to an improved borough constraint for use in the ward projections model.

The primary drivers for these changes were to ensure that the demographic inputs to the School Roll projections took account of as much local data as possible and that the age structure of the child population reflected trends consistently observed prior to 2001 as well as since 2002.

RLP High Ward Projections

RLP High is the projection that is being used in the *Review of the London Plan* and by TFL for its long term transport modelling.

This ward level projection had to be produced quickly by adjusting the 2005 Round *Interim* ward population projections by the same ratios as the borough level projections had changed by age and gender at each year.

Simply:

$$Ward_{2006}(x, y, z) = \frac{Borough_{2006}(x, y, z)}{Borough_{2005}(x, y, z)} * Ward_{2005}(x, y, z)$$

Where: x is age, y is gender and z is year

This means that that new borough level projection was used as a constraint to the new ward level projections but the distributions between wards and age groups within each borough were unchanged.

RLP Low Ward Projections

A standard RLP Low ward projection was produced in the same way as the RLP High projection. This projection was used as the base population within the Claimant Count model produced by the Social Exclusion Team in early 2007. See *DMAG Briefing 2007-02 Claimant Count Model 2007: Technical Note*.

RLP Low SRP Ward Projections for School Rolls

The full ward model was run to produce the RLP Low SRP projections. This is the main projection for the Low variant. The data inputs were updated as follows:

- Improved borough constraint as described above
- Ward level births and deaths (to 2004-05)
- RPF29 elections data (to 2007)
- Ward level actual and projected stock validated and updated by boroughs (to 2031)
- Improved private household population (to 2031) (see Box 3 below)

There were no fundamental changes to the ward model in this round. The only practical difference was that that model was only run once. Adjustments to set the initial levels of private household population were made outside the model before it was run, rather than as a second part of the modelling process as had been the case in previous years.

Private Household Population

Following new household projections received from DCLG, and revised housing development data supplied or verified by each borough it was decided to review the private household population input to the ward level projections. The process is described in Box 3.

Box 3 – Private Household Population

This calculation uses the revised housing data at ward level and the projected average household size at the borough together with the private household population from the 2001 Census. The private household population was initially estimated for each of the projection years. Data inputs:

- Projected homes (2001 Census occupied household spaces plus new homes data from the borough)
- Actual and projected average household size, assuming borough rate of change is reflected in each ward
- Total population from the 2001 Census adjusted to mid-year and the institutional population from the 2001 Census to calculate that base private household population

The importance of making this initial estimate of the private household population is that it guides the use of the ward level migration data in the model. The 2001 Census based age and gender-specific probabilities to leave the ward were used to estimate the out-migrants. This means the number of immigrants required to top up the population could be calculated. This number of immigrants was then introduced to the ward population with the age/gender structure as determined from 2001 Census data.

The primary calculation is:

$$\text{Population}(x, y) = \frac{\text{Homes}(x, y) * \text{AHS}(x, y-1) * \text{Borough AHS}(y)}{\text{Borough AHS}(y-1)}$$

Where: x = ward, y = year, AHS = Average Household Size

For example,
In Alexandra Ward in Kinston upon Thames the data were as shown below (all data are rounded for display purposes.

So the private household population in Alexandra ward in 2003 was (3,535 x 2.595 x 2.361) / 2.353 = 9,140

	Alexandra ward / Kingston upon Thames
2003 homes	3,535
2002 ward AHS	2.595
2002 borough AHS	2.361
2003 borough AHS	2.353
2003 ward private household population	9,140

For further information on previous ward models see:

- *DMAG Briefing 2005/40 – GLA 2005 Round Interim Ward Population Projections*
- *DMAG Briefing 2005/15 – GLA Ward Population Projection Manual*

Model Processes

The step-by-step modelling processes are described below with a small number of examples included. A fully worked example for each borough can be supplied on application to Caroline Hall (caroline.hall@london.gov.uk)

Stage 1- Review housing inputs at the borough level and take account of these in the borough constraint

At this stage the data calculated by the process in Box 1 had been validated by each borough and either new data had been supplied or the calculations were confirmed. This new housing stock data was then fed into the model to produce borough level projections. The revised data were used in the same way as housing stock data were used as described in *DMAG Briefing 2006/32*.

Stage 2 – QA check between old RLP Low and RLP Low SRP (due to dog-leg at 2004)

In RLP Low projections a smoothing process was undertaken for years 2002 to 2004 as, in a few boroughs, there was a 'dog-leg' in the output at 2004. This was due to the trend in mid-year estimates not lining up with the projection based on housing capacity. In the case of the RLP Low SRP projections, if a dog-leg was identified the standard RLP Low projection was used for years 2002 to 2004.

Stage 3 – Update births information

This involved the calculations described in Box 2. For example, in Kingston upon Thames in 2005-06 actual births were recorded as 2000 but the model had projected 2046. Therefore all projected birth totals after 2006 were multiplied by 0.977 to reduce them to match the actual total in 2005-06. This was carried out for all boroughs. In most boroughs this raised the number of projected births.

Stage 4 – Full borough constraint available

Data from above, including births, were transferred to a new spreadsheet. There was no change in the deaths calculation. Net migration was calculated as the residual of population change from one year to the next not accounted for by natural change.

Stage 5 – Copy new data into ward model

1. *Borough constraint*

This was copied in from above.

2. *Ward births and deaths to 2005*

These are supplied by ONS. Data from 2000-01 to 2004-05 were supplied.

3. *Housing change data added using new figures supplied by borough*

Full details were supplied and validated by the borough. These were used to calculate a change in homes (housing stock) and this change figure is used in the ward projections.

4. *Electorate change from RPF29 data*

RPF29 data at ward level was supplied by ONS. However the new data excluded EU citizens registered to vote. As it is change rates that are used in the calculations only rates for 2001-02, 2002-03 (EU citizens included) and 2005-06 (EU citizens excluded) were used. Rates were not used in the intervening years due to the discontinuity in the data.

5. *Private household population update (see Box 3 above)*

This was calculated as in Box 3 above and used in the final stage of the ward projections

Stage 6 – Full ward model run

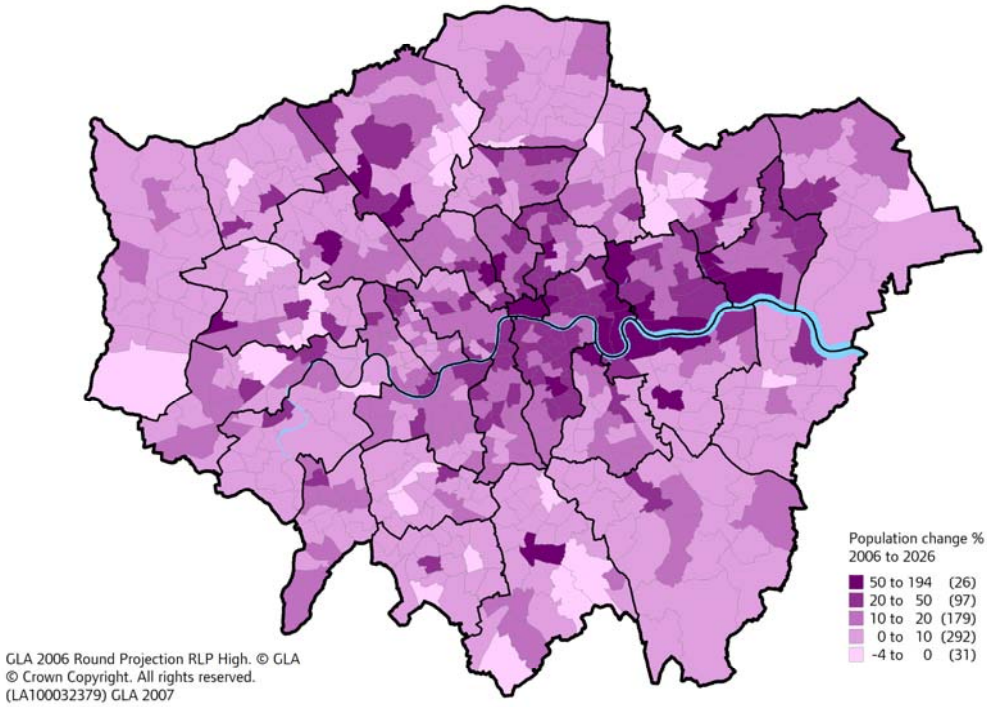
One run of the ward model was completed for each borough once all the data had been provided and assembled. Each borough was then checked for negative values and there was a visual check to see if housing and population growth rates in each ward were consistent between 2001 and 2016.

Results

RLP High

Map 1 shows the percentage change in population in each ward in London from 2006 to 2026. The areas projected to experience the largest growth are in Tower Hamlets, Newham and North Greenwich, with the largest growth being in Stratford and New Town ward in Newham followed by Peninsula ward in Greenwich.

Map 1: Projected change in population 2006-2026: RLP High

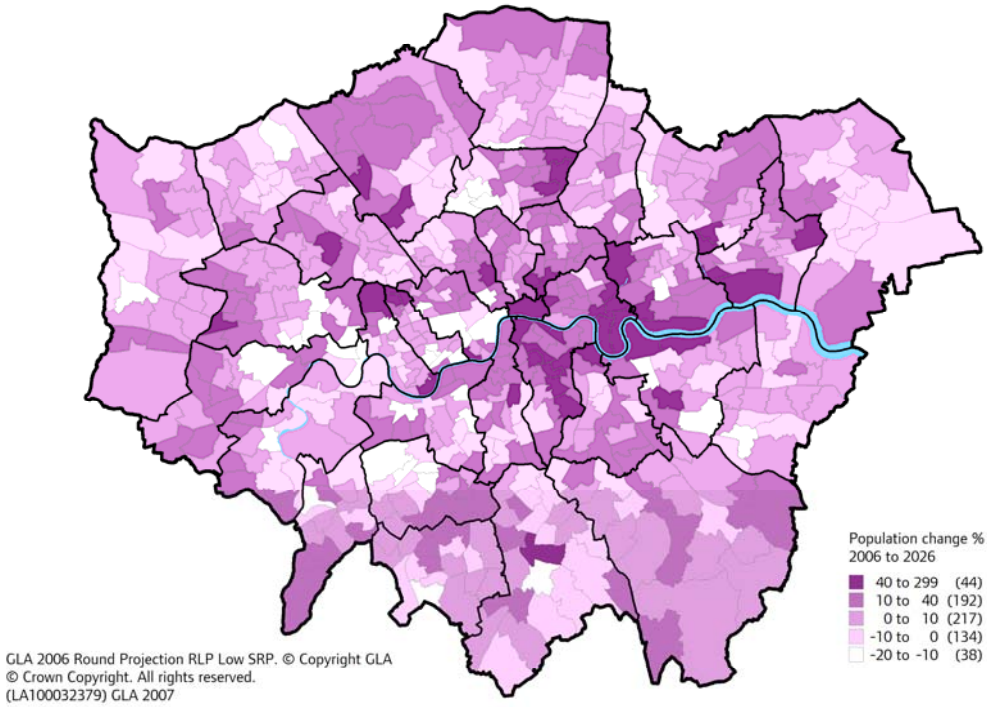


The wards that are predicted to decline in size are primarily in Outer London boroughs. Five wards are predicted to have a decline of 3%. These are in Enfield, Merton, Redbridge, Ealing and Barnet.

RLP Low SRP

As with RLP High Map 2 for RLP Low SRP shows the projected percentage change in population 2006 to 2026. In RLP Low there are many more wards that are projected to have population decline. These are shown in white and the lightest shading where the wards with the lightest shading are projected to decline by a similar magnitude to those similarly shaded in RLP High. The wards shaded white are all projected to have greater losses than any wards in the RLP High map.

Map 2: Projected change in population 2006-2026: RLP Low SRP



The RLP Low projection shows more extreme results at 2026 than the RLP High but the largest growth wards are also similar to those identified in RLP High – in Tower Hamlets, Newham and North Greenwich.

The main reason for the differences between the two projections is that the borough constraints in RLP High are significantly higher due to the basic premise that the projection was driven by London retaining its shares of international migration to and from the UK. When the borough constraints are driven by expected development, as in RLP Low, they tend to lower. Where there are wards with limited or no housing growth expected then a declining average household size will reduce the population. More extreme population losses will accompany wards with a net loss of housing.

Access to Data

Full population results are available for Greater London, each London borough, borough groups and *London Plan* sub-regions as follows:

- RLP High: Ward level by single year of age, 5 year age bands and working age splits to 2031
- RLP Low: Ward level by single year of age, 5 year age bands and working age splits to 2031
- RLP Low SRP: Ward level by single year of age to 2031

These data are available on request from Caroline Hall (caroline.hall@london.gov.uk) 020 7983 4347.

Previous Rounds of GLA projections are also available on request.

For further information on the school rolls projections service please contact Shen Cheng (shen.cheng@london.gov.uk) 0207 983 4889

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Please use the above descriptions in deciding whom to contact to assist you with your information needs. For further details of DMAG staff please contact richard.walker@london.gov.uk