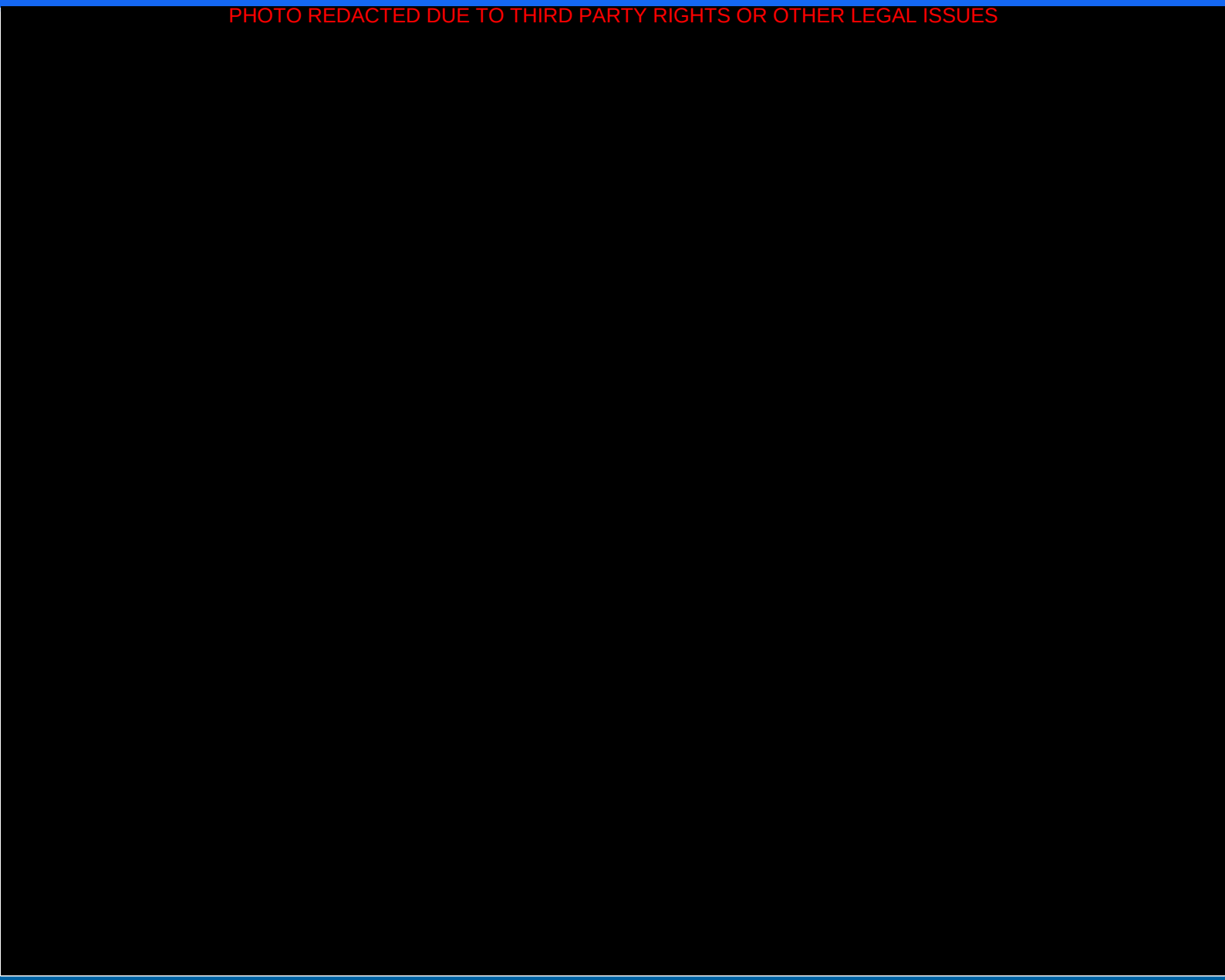
GLAINTELLIGENCE

Briefing 2015-02

Projected demand for school places

GLA Demography

November 2015



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Foreword

This meticulous study by GLA Demography responds to the call of the Mayor's Education Inquiry 2012 for an enhanced GLA intelligence role to support better school places planning across London.

Recommendation 10 called for pan-London collection and analysis of data for planning the provision of school places; while Recommendation 11 called for a more strategic approach in free school developments by identifying sites and targeting areas of local need.

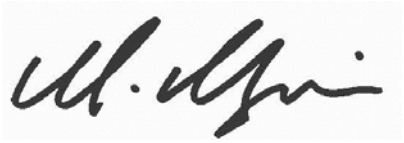
The Inquiry found that a demographic study of the highest quality, when combined with local Boroughs' intelligence about planned increases in school capacity, would provide the DfE with the most accurate possible indication of London's and boroughs' actual needs, to inform their funding allocations.

This study shows where demand for school places can be expected to arise in the future. It does not take into account where new schools and school extensions are already planned or in the pipeline. It is not therefore a study of places *shortfall*. For that, this paper needs to be read in conjunction with the latest estimates issued by London Councils' on behalf of the London Boroughs.

The study finds with regard to London's young population that "the end of an extraordinary period of growth appears to be in sight." It indicates that demand for primary places will peak in 2020/21 and remain steady thereafter. However the population surge will take many more years to work through the secondary phase. Whereas 2,000 extra state primary classes will be required in London over the next decade, 3,500 extra state secondary classes will be needed over the same period (alongside 300 primary and 600 secondary classes in the independent sector). The secondary figures do not include 6th Forms.

This is equivalent to almost 90 standard 1,200-pupil secondary schools. Although we must remind ourselves this is projected need not shortfall, it is nevertheless a sobering figure. Meeting the demand for secondary places over the next decade is the foremost educational challenge facing London today. Secondary provision is costlier, slower and more difficult to provide than primary as it requires bigger sites, bigger schools, more teachers, more classrooms and specialised teachers, classrooms, labs and gyms.

Based on this study, the GLA is leading a project with London Councils, London Boroughs and the DfE to identify which areas of London are most likely to require new secondary schools. This will enable advance preparation by the DfE and London Boroughs who carry the burden of funding and providing school places.



Munira Mirza
Deputy Mayor for Education and Culture

Introduction

The growth in London's population over the last decade has created great challenges for local authorities providing places to meet growing demand. Between 2001/2 and 2011/12, annual births in London rose by almost 30,000 (28 per cent), with many individual authorities seeing much larger increases.

The financial crisis of 2008 had a dramatic impact on London's patterns of migration. Outflows from London to the rest of the UK fell sharply in the aftermath of the crisis, with young families moving to the surrounding counties particularly affected.

The combined impact of these factors has been rapid growth in the number of children living in the city. This growth put immediate pressure on primary school places, necessitating a huge expansion in capacity. A decade on, local authorities now face a rising demand for secondary school places.

Figure 1 illustrates how past births correlated with children looking for reception places and how they are projected to impact on the number of children seeking a place at secondary schools.

The 2013 London Assembly Education Panel's *London Learners, London Lives* report and the 2012 Mayor's Education Inquiry both included recommendations that the GLA should work towards producing pan-London projections of demand for places to help support strategic planning work.

In response to these recommendations the GLA Intelligence Unit has developed a methodology for projecting demand based on its own small area population projections and data from the National Pupil Database (NPD). It is hoped that the resulting projections will inform decisions about the future provision and funding of places across the Capital.

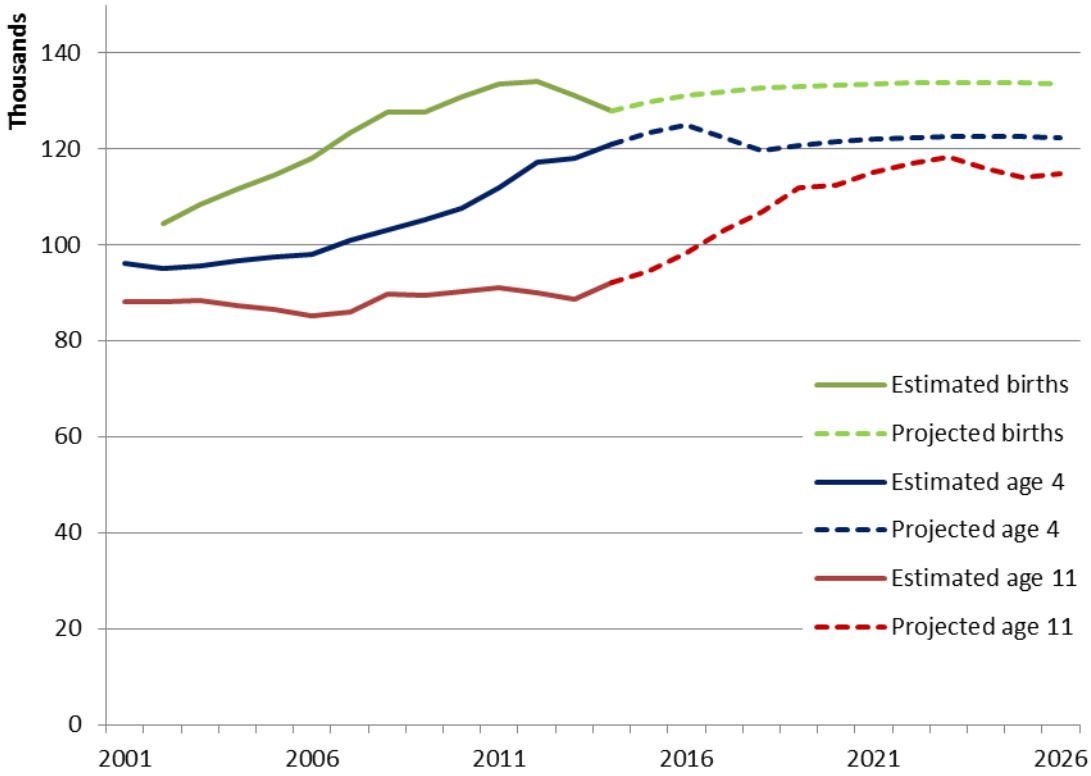
This analysis and results are a first attempt to provide a consistent view of the demand for places across London. The GLA anticipates updating its results, methodology, and outputs as new data becomes available and based on feedback from the community of planners and providers it seeks to support.

This paper describes the methodology and headline results of the GLA's pan-London projection of state school place demand. This model provides a new approach for projecting demand for state-funded places in London.

A Question and Answers document has been published alongside this report. The Q&A can be downloaded from the London Datastore along with the figures, tables and data from the report, the model outputs and the model code:

http://data.london.gov.uk/dataset/resources/pan-london-school-place-demand

Figure 1: Estimated and projected births and population, London



Source: GLA 2014 SHLAA based population projections

Notes on the projections

The task of meeting the needs of planners and providers was made challenging by difficulties in defining what 'demand' truly means in this context. At a fundamental level, each child creates demand for a school place which both meets their educational needs and is accessible to them. Complications arise when trying to understand the spatial distribution of demand and to break down that demand into specific types of provision.

When the London Schools Atlas was launched in 2013, it highlighted the diverse range of pupil mobility patterns across London. These patterns are influenced by many drivers, such as: type and perceived quality of school, area of residence, phase of education, transport links, pressure on places and many other factors. The complex nature of mobility makes it difficult to state definitively where demand from a growing population will manifest or where additional provision might best be located to cater for that demand.

The approach set out here recognises the challenges pupil mobility plays by presenting multiple projections based on different assumptions about how new demand manifests. These assumptions are that demand from a growing population is expressed:

1. Locally – i.e. demand arises in the ward of residence of the population
2. According to existing patterns of mobility – i.e. if half of the resident population currently attends school in a neighbouring ward, then half of the additional demand will manifest in that ward

Users should consider the implications of these assumptions when interpreting the outputs. More detail on the sensitivity of these assumptions at local authority level can be found in Appendix A.

When analysing and quoting the data and information contained in this report and in the pan-London demand model outputs users should be mindful of the following:

Strategic overview
Results are designed to give a strategic-level indication of where additional demand may arise in future. It is not intended that these projections be considered as definitive evidence that additional provision is required in a particular ward. Local knowledge is necessary to understand the complex dynamics underpinning patterns of pupil mobility. These projections are not a replacement for this knowledge.

New Provision
Likewise these projections should not be interpreted as forecasts of future numbers of pupils on roll – growth in roll numbers will be dependent on the location of new provision, which this analysis does not attempt to account for.

Housing Trajectories
Housing trajectories used in projections are based on data from the 2013 Strategic Housing Land Availability Assessment (SHLAA)[1]. The data used gives assumed annual net change in dwellings by ward. It does not contain information about the mix of housing types and tenures of new development.

[1] https://www.london.gov.uk/sites/default/files/FALP%20SHLAA%202013.pdf

Shortfall

No attempt has been made to project shortfall in available places, though the outputs provided could feasibly form an input into such an analysis. London Councils currently produces estimates of capacity and funding shortfall based on their own methodology. Local authorities have plans to address future need and users should avoid drawing conclusions about potential shortfalls without fully investigating current and planned provision.

Comparison with local authority roll forecasts

In light of the above it is important to note that local authorities in London do provide projections of anticipated rolls to the Department for Education on an annual basis. These projections take account of a more detailed local knowledge of housing development, the location and extent of new provision and changes to local circumstances.

Variations between local authorities' roll forecasts and the GLA's demand projections are to be expected, especially in cases where:

- Large-scale increases in school provision are planned which may significantly change future patterns of pupil mobility;
- Large-scale housing development is anticipated – especially in the case of Opportunity Areas. Differences in assumptions about the scale, composition, and phasing of such developments will have significant impacts on the projected number of children resident in the area.

The pan-London demand model presented here does not attempt to provide an alternative to these projections; rather it provides a broader strategic overview of where demand may arise. The results contained herein should not be compared to local authority roll projections.

Model Assumptions

The impact of the model assumptions should be considered when interpreting results. The different scenarios that form the model outputs will vary in their impact depending on local conditions and populations. An overview of the sensitivity of the various model assumptions can be found in Appendix A.

Outline methodology

The following section provides an overview of the methodology used to produce the projections. A more detailed explanation of methodology is provided in Appendix C. In addition, the GLA has published the source code used in the model to aid transparency. A flow diagram describing an outline of the model can be found in Appendix D.

All calculations are carried out for aggregated age groups of primary (age 4 to 10) and secondary (age 11 to 15) rather than by individual school year or pupil year of age.

Project demand for state-funded places by ward of residence
Pupil-level data from the NPD is aggregated by home ward to produce estimated counts of numbers of children attending state-funded schools by ward of residence in 2014/15.

Counts from the NPD are reconciled with rebased August 2014 population estimates:

- Where the population is estimated to be greater than the number of children on the state funded roll, the difference is assumed to be children taking up independent and alternative provision.
- Where the state-funded roll is greater than the estimated population, it is assumed that the population is an underestimate. Estimated and projected population is uplifted to match the count from the NPD.

Account for pupils taking up independent or alternative provision:

- Assumptions about take-up of independent school places are applied to the uplifted population dataset to create projections of demand for state-funded places by ward of residence.
- Projections are produced using two different assumptions about take-up of independent/alternative provision:
  - The *proportion* of pupils in each ward in independent provision will remain constant
  - The *number* of pupils in each ward in independent provision will remain constant
- As the school age population is growing in the majority of wards the scenario assuming constant numbers of children in independent provision gives rise to higher projected demand for state-funded places than the constant proportion scenario.

Figures 3 and 4 show estimated take-up of independent school as a proportion of total residents. These estimates are based on the assumption that the difference between the August 2014 population estimate and the NPD data is the independent school population. These estimates broadly agree with work, based on DfE data, undertaken by the Independent School's Council, the body which represents Independent Schools in the UK, in their report ICS Census, 2015[2].

Independent school take-up is highest in west London. In both age cohorts attendance is focused in Kensington and Chelsea and Westminster. In the latter, in the ward of Knightsbridge and Belgravia 84.8 per cent of primary-age children are absent from the state roll and are assumed to be attending independent school.

[2] http://www.isc.co.uk/media/2661/isc_census_2015_final.pdf, Figure 1b

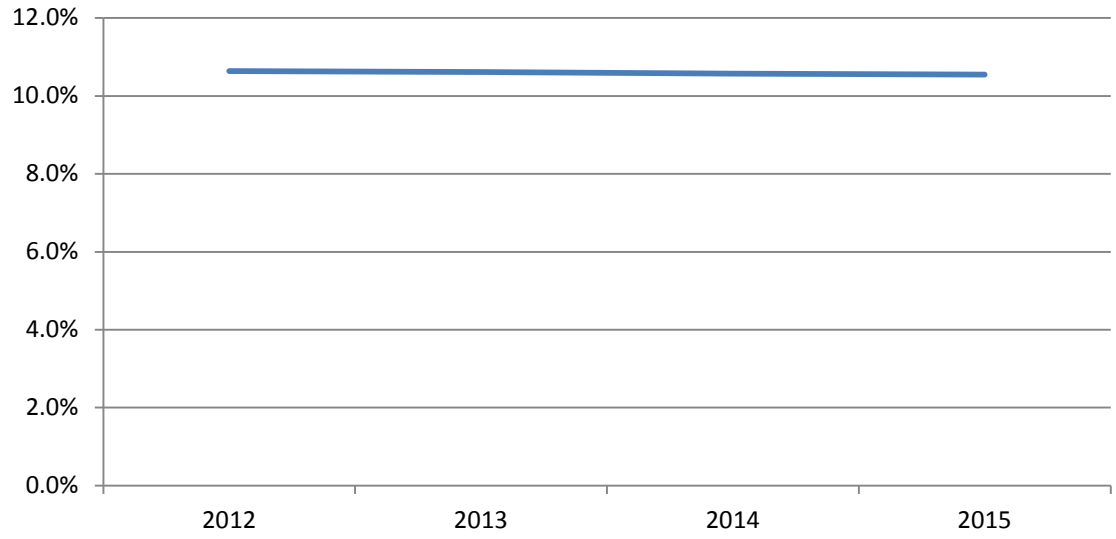
A total of 114 wards (18.2 per cent) are estimated to have no primary-age children attending an independent school. Many of these wards are found in east London, particularly in Barking and Dagenham, Havering, Newham and Bexley.

Across London the total number attending independent school (primary and secondary combined) is estimated at 12.8 per cent. Figure 2 shows the proportion of children in London attending independent school as recorded in the DfE's *Schools, Pupils and their Characteristics* dataset[3]. Over the four-year period the proportion remains constant at 10.6 per cent.

The difference between the two estimates is in part accounted for by the fact the that the DfE numbers include those attending 6th form while the GLA number covers 4 to 15 year olds. Independent take-up in post-16 education is lower than at primary and secondary level and so the inclusion of this group in the calculation will supress the overall proportion. Also, while the pan-London estimate is labelled 'independent take-up' it is in fact a group which includes anyone not on the state roll, for example those who are home schooled. These additional children in the GLA calculation will serve to increase the proportion estimated to be attending 'independent school'. Finally, the two estimates count slightly different populations: the DfE number is children attending independent school in London while the GLA estimate is those who live in London and attend independent school.

The DfE data provides some support for the rationale of the *static proportion* variant of the model which holds the proportion attending independent school constant. Data for the last four years seem to suggest that this is the case in London.

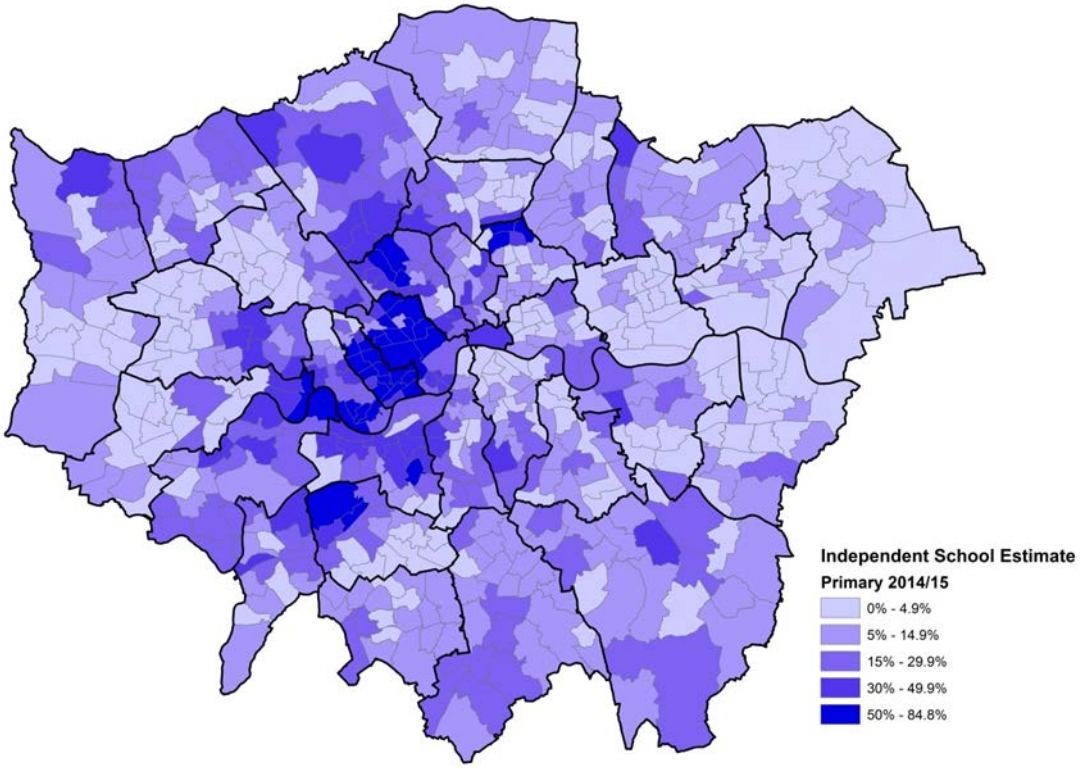
Figure 2: Proportion of children attending independent school, London 2012-2015



DfE, Schools, pupils and their characteristics (2012-2015)

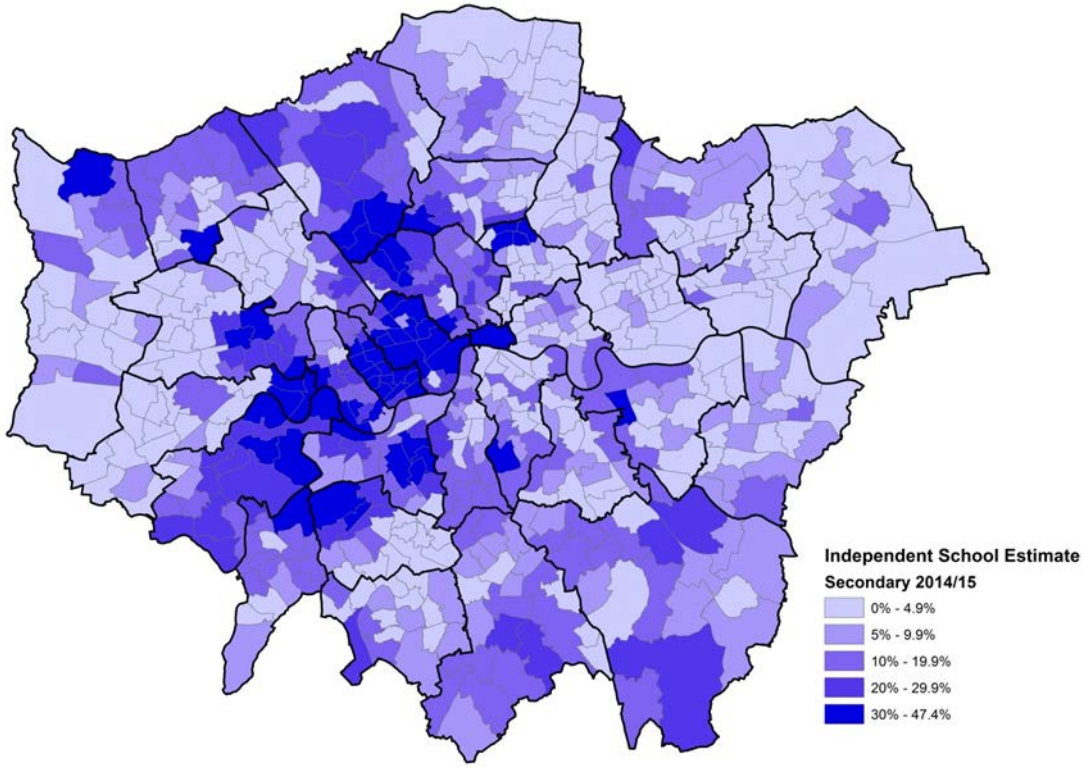
[3] Schools, Pupils and their Characteristics , Local Authority & Regional Tables, Table 7b, 2012-2015 (Department for Education)

Figure 3: Proportion of residents age 4-10 attending Independent school 2014/15



Pan-London model, GLA

Figure 4: Proportion of residents age 11-15 attending Independent school 2014/15



Pan-London model, GLA

Project demand by ward of schooling

Two different approaches are used to translate projected demand by residence into projections of demand by ward of schooling:

1. Demand based on current patterns of pupil mobility

The first approach applies current patterns of mobility to all current and projected resident pupils. This approach effectively assumes that existing patterns of mobility represent how additional demand will manifest in the future as the population grows.

2. Demand based on combination of past mobility and pupil residence

The second approach is to apply current mobility patterns only to as many pupils as existed in the 2014/15 estimate. All growth beyond this level is assumed to manifest as demand in the ward of residence.

Cross-border mobility

Figure 5 shows primary-age pupil mobility in the form of net cross-border flows. Wards which have a net outflow are coloured red while wards with a net inflow are coloured blue. Those wards where net flow is in the range -199 to 200 are coloured white; a total of 233 wards, or 37 per cent, fall into this category.

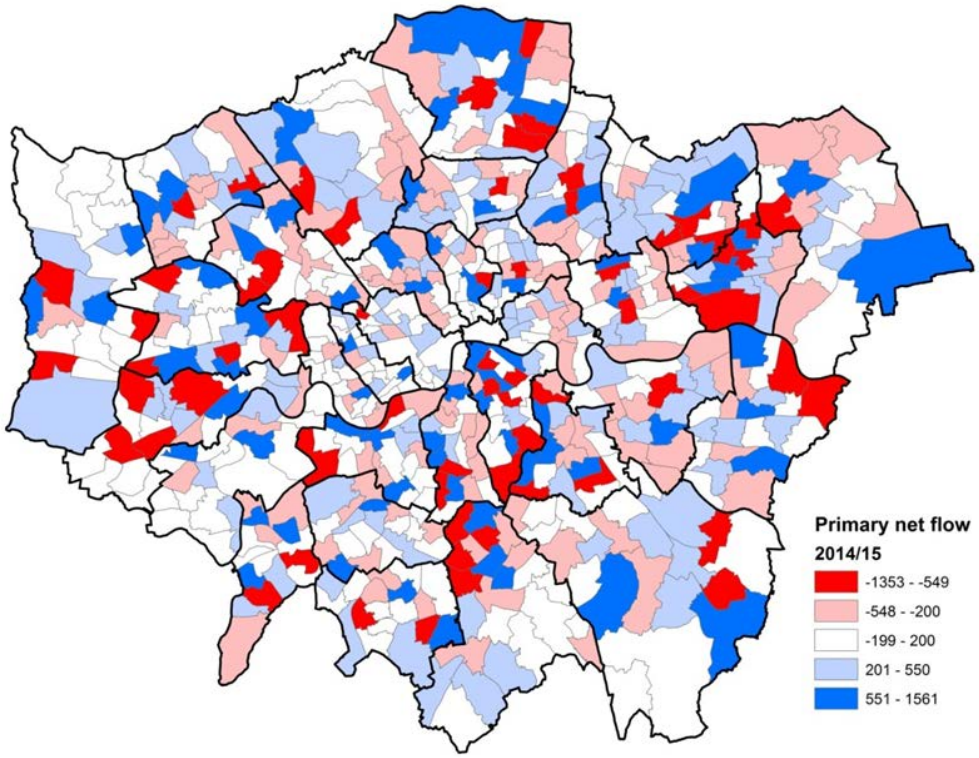
The most significant net exporters are those with a negative net flow of 549 or more. These wards tend to neighbour large importers, as children from a ward without a school move across the boundary to a ward with a school. For example, the largest net exporter in London is Broad Green in Croydon (-1,353 children) which borders the largest net importer Selhurst (1,561 children).

For secondary pupils cross-border mobility is much more common. As a result fewer wards fall within the range -199 to 200 (just 127 or 20 per cent). The relationship between exporter and importer remains but is more complex due to the greater distances individuals are prepared to, or have to, travel to attend secondary school.

Net flows are useful in identifying the overall shape of mobility across London, however they must be used with caution as they can act to obscure detail. For example, St James ward in Kingston, which has no primary school, has an outflow of 685 residents and no inflow. In Thornton Heath in Croydon 451 primary-age children live and go to school in the ward, 611 live in another ward and go to school in Thornton Heath and 1,296 children live in the ward but are schooled outside. These are very different systems but in both cases there is a net outflow –of 685 children.

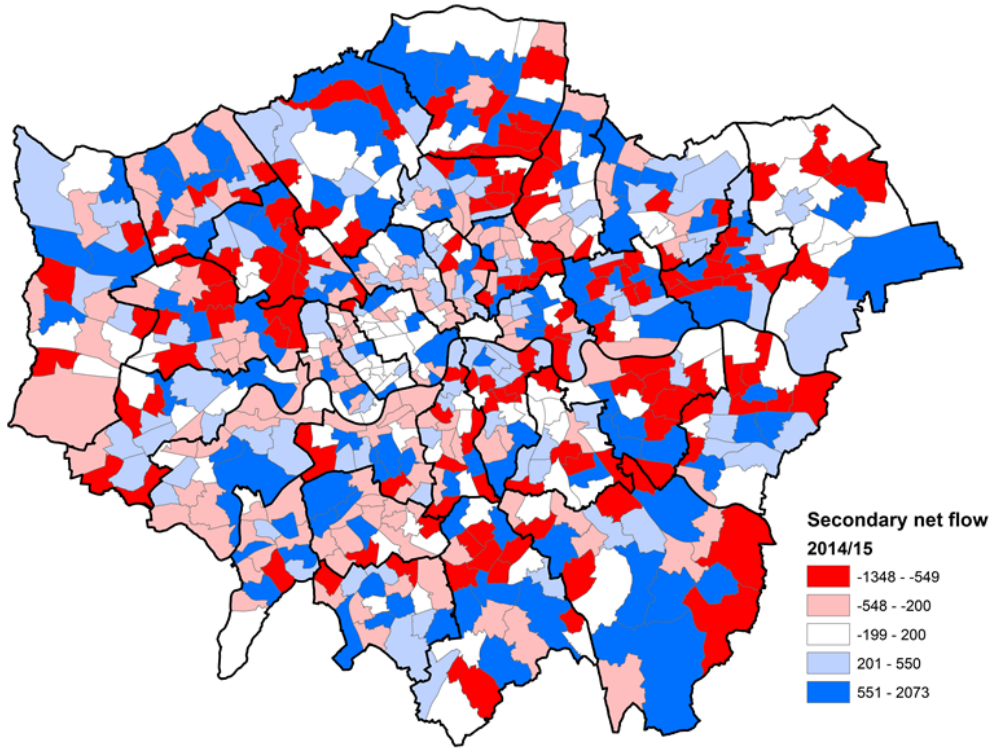
Figures 7 and 8 show the proportion of ward residents who cross the ward boundary to go to school. This visualisation shows which wards have the capacity to be self-sufficient and which require residents to commute to find a school place. Across London 48 per cent of primary age children go to school in the ward they live in. Among secondary children just 18 per cent stay in their home ward for school.

Figure 5: Net cross-border flows, primary pupils 2014/15



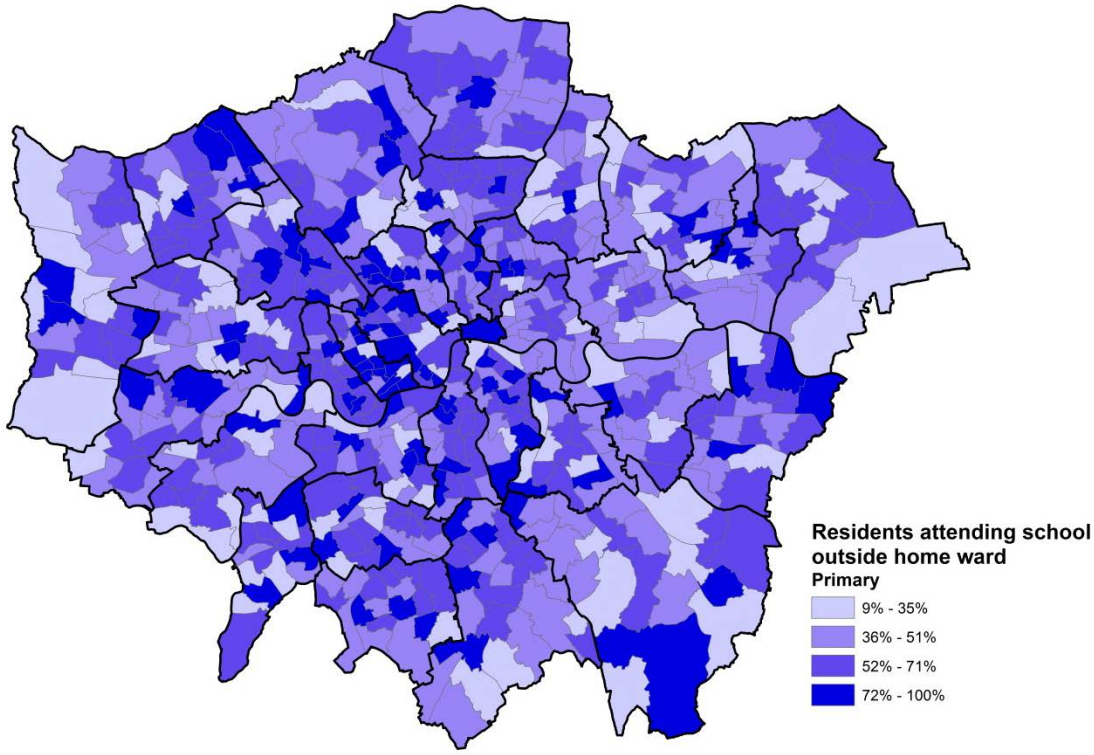
Pan-London model, GLA

Figure 6: Net cross-border flows, secondary pupils 2014/15



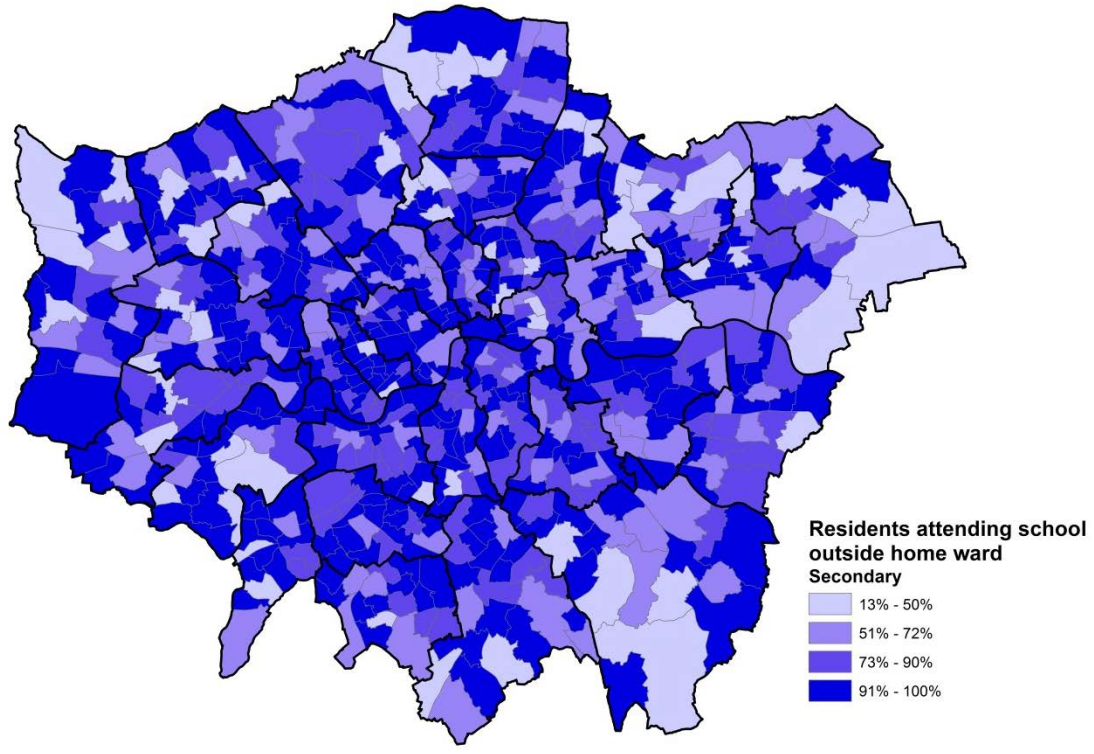
Pan-London model, GLA

Figure 7: Proportion of residents attending school outside their home ward, primary 2014/15



Pan-London model. GLA

Figure 8: Proportion of residents attending school outside their home ward, secondary 2014/15



Pan-London model, GLA

Data sources

The pan-London model has two main dataset inputs; these are the GLA's own ward-level population projections and the National Pupil Database which is provided to the GLA under licence by the Department for Education.

Ward-level population projections

This analysis makes use of ward-level population projections that incorporate housing trajectories derived from the 2013 Strategic Housing Land Availability Assessment (SHLAA)[4]. The projections were produced using the GLA's 'capped-household size' modelling approach which produces projections designed for general use. This model aims to balance recent trends in population growth, long-term trends in household formation, and anticipated changes in dwelling stock to produce plausible results across London's diverse range of localities.

Projections are produced for all wards in London's 32 boroughs and for City of London as a whole. The projection outputs give population by single year of age. The full projection dataset can be found on the London Datastore[5].

The National Pupil Database

The National Pupil Database (NPD) is a pupil-level database containing information on pupils personal characteristics (age, address, etc.) taken from the School Census as well attainment data and variables collected from other sources. Access to the data is via application to the Department for Education[6]. The GLA receives pupil-level data containing a limited number of variables for use in specific projects.
The key variables used in this work are:

- Home address of child (coded to Lower Super Output Area)
- School attended
- Year group of child
- Age of child at start of school year

The projection model uses data for all pupils on roll in state-funded education, including those in special schools and pupil referral units.

Notes on data:

- The population data used gives estimated and projected populations for mid-year (30th June) of each year. The NPD extract used is based on the 2014/15 Spring School Census. This data was collected on January 15th 2015. The age recorded in the census is the child's age on 31st August 2015, i.e. the beginning of the academic year. To align the population data with the school year, the projections are rebased to refer to August 31st. This is explained further in the detailed methodology section.
- The GLA's population projections are produced for wards as they existed at census day 2011. Since then three local authorities: Tower Hamlets, Hackney, and Kensington and Chelsea have adopted new ward boundaries. As the necessary input data is not available for the revised geographies, projections continue to be produced on the old boundaries.

[4] https://www.london.gov.uk/sites/default/files/FALP%20SHLAA%202013.pdf
[5] 2014 round population projections
[6] https://www.gov.uk/guidance/national-pupil-database-apply-for-a-data-extract

- Due to the potentially disclosive nature of the NPD data it is not possible to release the model inputs publically. All other model inputs are in the public domain.

Note on nomenclature and rounding

Four sets of demand projections were produced. These are based on different combinations of assumptions about: future take-up of independent school places, and distribution of demand from future population growth.

These variant projections are referred to using the following descriptions:

Take up of independent places

- *Static number*: the number of pupils in each ward in independent provision will remain constant
- *Static proportion*: the proportion of pupils in each ward in independent provision will remain constant

Distribution of growing demand

- *Mobility model*: growing demand manifests according to existing patterns of mobility
- *Hybrid model*: growing demand manifests locally (in the ward of residence)

In the description of results, London-level data have been rounded to the nearest thousand and results for local authorities to the nearest hundred. Tables in this report and in the output files available from the Datastore do not include any rounding. This precision should not be mistaken as an indication of likely accuracy. Unrounded results are provided to maximise their utility in further modelling and analysis.

Results – Greater London

The results presented here for Greater London are based on the *Hybrid static proportion* model. This variant of the model projects an additional 60 thousand primary places and 105 thousand secondary places will be needed in London over the decade to 2024/25. This constitutes an 8.8 per cent rise in primary places and a 26.5 per cent rise in secondary places.

For Greater London as a whole, the *Hybrid* and *Mobility* models show only minor differences in their demand projections. These arise from differences in modelled flows across London's border. In the *static proportion* scenario in 2024/25 there is a difference in demand of 1,500 places – combined primary and secondary – in London between the *Mobility* and *Hybrid* models.

The *static number* scenario yields higher demand for London as a whole. This is due to all growth in population beyond 2014/15 levels presenting as additional demand within the state-funded system. In contrast, for the *static proportion* variants, growth in population manifests as additional demand in both the independent and state sectors.

Demand for primary school places (age 4 to 10)

The NPD recorded 677 thousand children on roll in state-funded primary schools in London in 2014/15. By reconciling with the base population it is estimated that 100 thousand primary-age children resident in London are not attending a state-funded school. This constitutes 13.0 per cent of the population based on GLA estimates for 2014. The majority of these children are attending independent schools, though others will not be attending school or be home-schooled. For conciseness this report will simply refer to this group as children attending independent schools.

Figures 9 and 10 show projected growth in demand for places in each scenario: state-funded and independent, respectively.

Over the decade to 2024/25, demand for state funded places is projected to increase by 60 thousand pupils (8.8 per cent) in the *static proportion* scenario and 67 thousand pupils (9.9 per cent) in the *static number* variant. The difference between the two scenarios in 2024/25 is 8 thousand with a range of total projected demand of 737 to 745 thousand places.

In the *static proportion* variant, projected demand for independent places is projected to rise to a peak of 110 thousand in 2019/20, before falling away again. In the *static number* scenario independent demand remains constant at 101 thousand.

The decrease in independent demand in the *static proportion* model after 2020 (Figure 10) may seem counterintuitive in light of the continually rising state demand (Figure 9). This occurs at the aggregated London level because of the uneven geographical distribution of the independent population. The wards with the highest proportions of independent school residents tend to be those which see a decline in total school age population after 2020. As a result, though it is assumed that the proportion of children in independent education in each ward remains static, the model projects an overall decrease in the proportion for London as a whole.

Figure 9: State school place demand in London (primary)

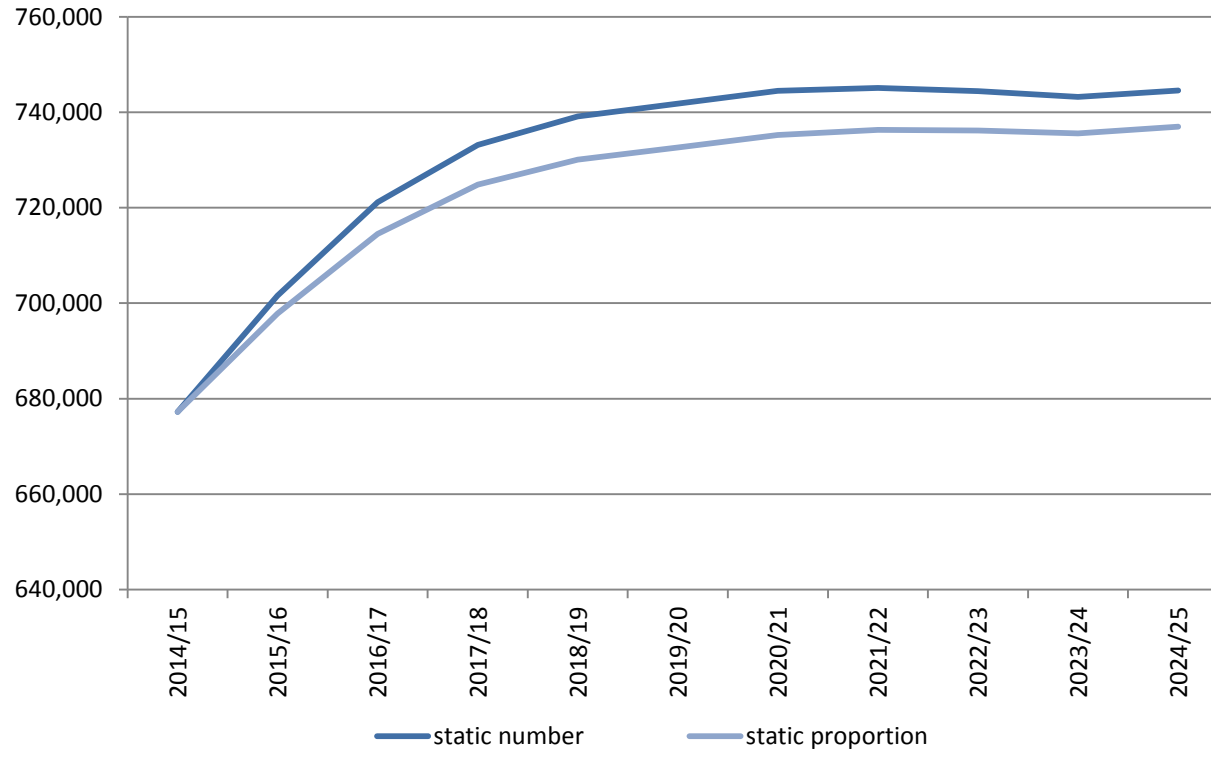
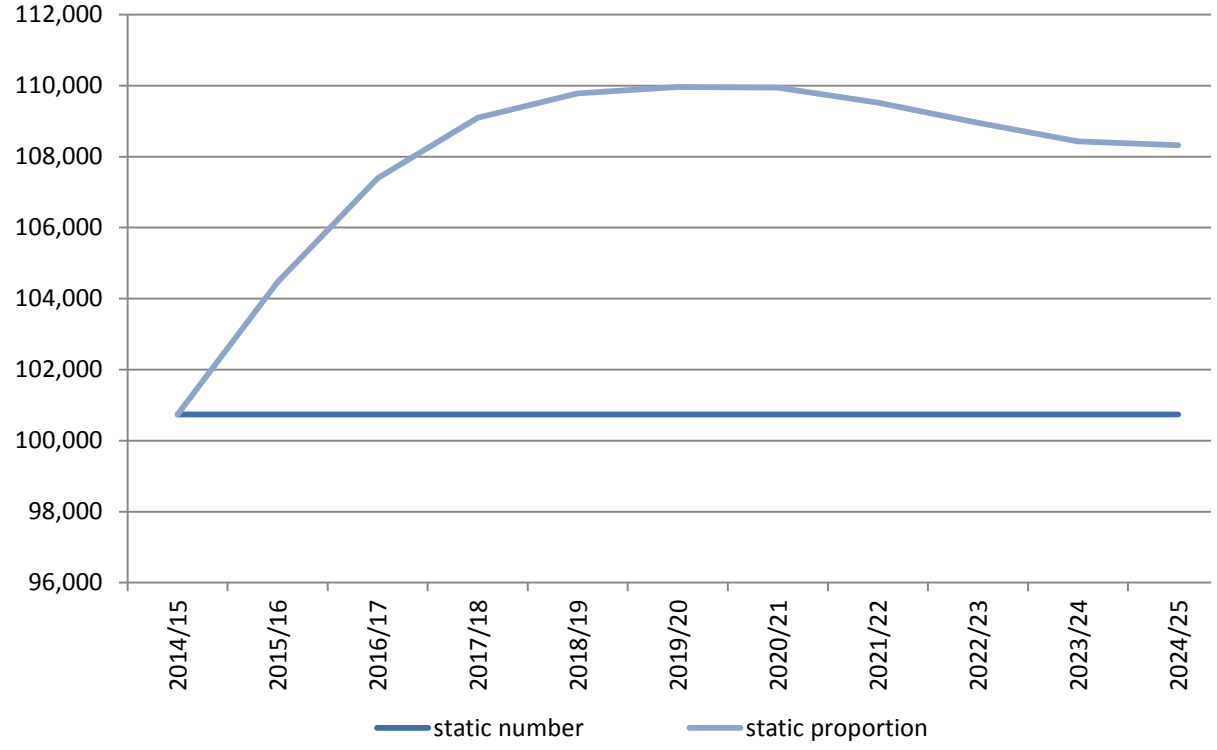


Figure 10: Independent school place demand in London (primary)



Source: Pan-London model (Hybrid variant), GLA

Demand for secondary school places (age 11 to 15)

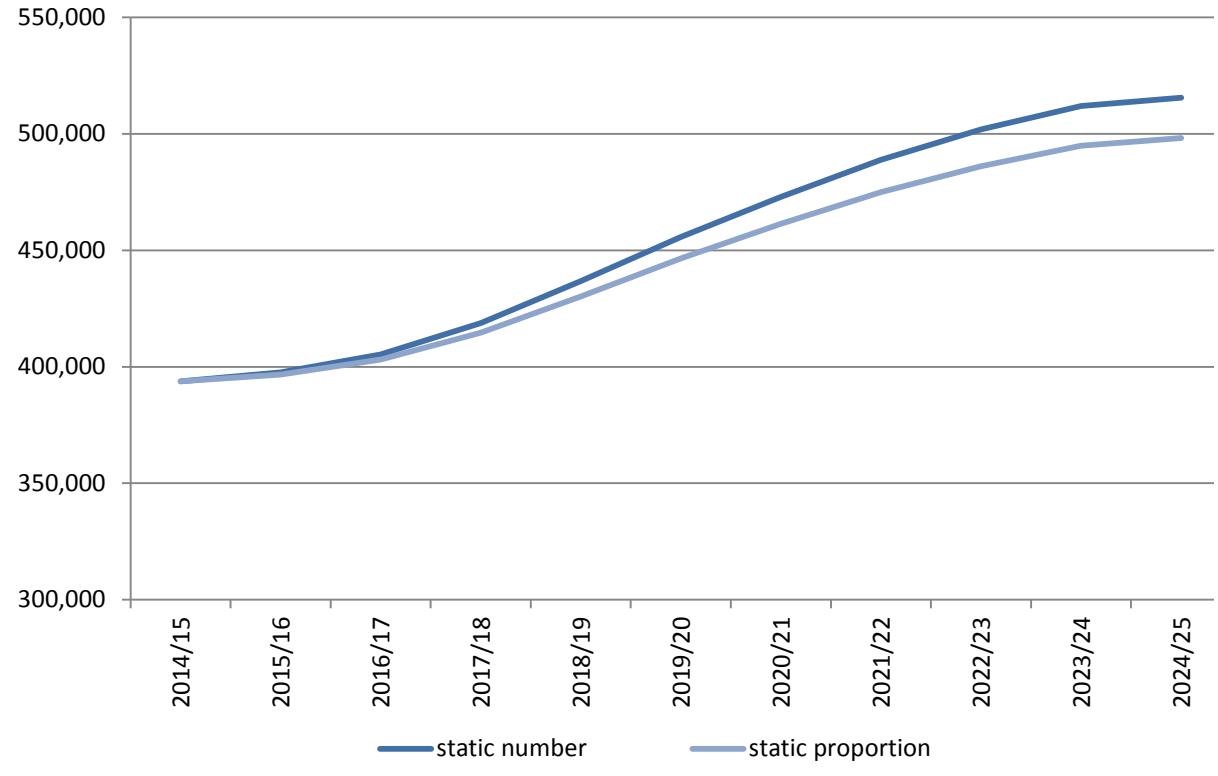
The NPD recorded 394 thousand children on roll in state-funded secondary schools in London in 2014/15. By reconciling with the base population it is estimated that 57 thousand secondary-age children resident in London are not attending a state-funded school. This constitutes 12.5 per cent of the population based on GLA estimates.

Figures 11 and 12 show projected growth in demand for each scenario.

Over the decade to 2024/25, demand for state-funded places is projected to increase by 105 thousand pupils (26.5 per cent) in the *static proportion* variant and by 122 thousand pupils (30.9 per cent) in the *static number* scenario. The difference between the two scenarios in 2024/25 is 17 thousand with a range of total projected demand of 498 to 516 thousand places.

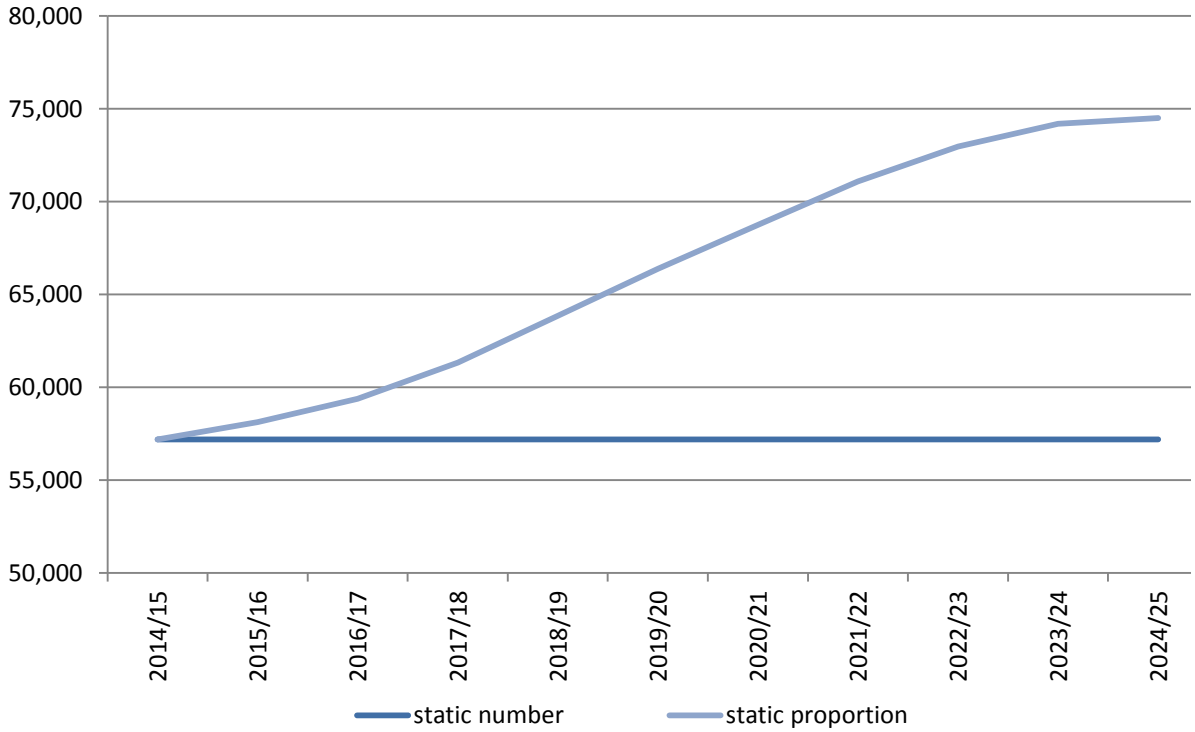
Demand for independent places is projected to rise to 75 thousand places by 2024/25 in the *static proportion* scenario. In the *static number* scenario independent demand remains constant at 57 thousand.

Figure 11: State school place demand in London (secondary)



Source: Pan-London model (Hybrid variant), GLA

Figure 12: Independent school place demand in London (secondary)



Source: Pan-London model (Hybrid variant), GLA

Results – ward and local authority

Primary

Figure 13 shows how the growth in demand of 60 thousand places projected in the *static proportion* variant is distributed among London's wards.

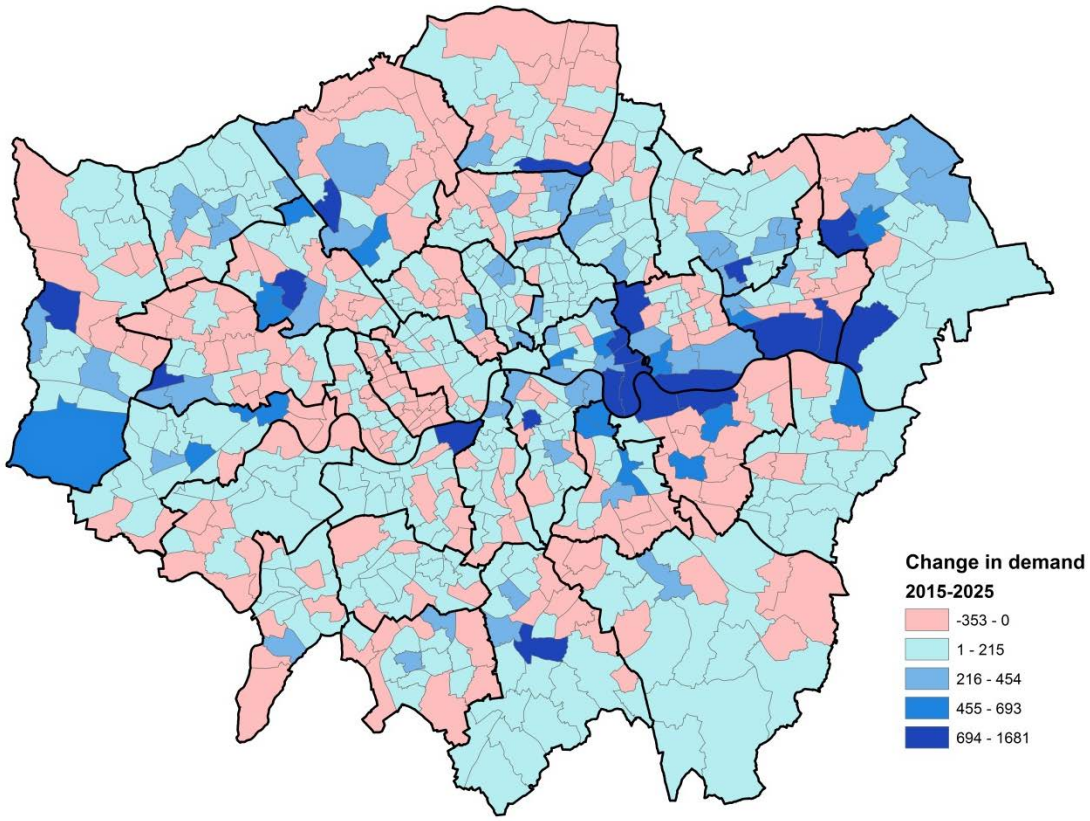
Projected growth is concentrated in areas where substantial new housing development is included in the model. As such a large proportion of growth is to occur in the Thames Gateway corridor where large scale development is anticipated.

The ward with the largest projected increase is Stratford and New Town in Newham where demand grows by 1,700 places over the decade. This coincides with thousands of new homes being built in the East Village and Chobham Farm developments.

Tables 1 and 2 show projected change in demand for places in the *Hybrid* and *Mobility* models, respectively. In each case the results for the *static proportion* model are shown.

In each model, Tower Hamlets is the borough with the highest growth in demand with projected increases of 7,000 (*Hybrid*) and 6,900 (*Mobility*) by 2024/25. Kensington and Chelsea is the only authority projected to experience falls in demand for places of 400 (*Hybrid*) and 300 (*Mobility*).

Figure 13: Change in state place demand 2014/15 to 2024/25 by ward (primary)



Source: Pan-London model (Hybrid model, static %), GLA

Table 1: Projected demand for state-funded primary places 2014/15 to 2024/25: Hybrid model

Local Authority	2014/15 on Roll	Growth 2014/15 to 2019/20	Growth 2014/15 to 2024/25
City of London	204	95	157
Barking and Dagenham	23,472	2,977	3,921
Barnet	27,891	2,011	2,631
Bexley	21,751	1,653	1,431
Brent	26,618	2,890	3,257
Bromley	25,464	1,470	230
Camden	11,042	492	398
Croydon	31,410	2,541	1,999
Ealing	29,878	1,739	997
Enfield	31,282	1,615	1,229
Greenwich	22,827	1,892	2,628
Hackney	18,372	983	1,524
Hammersmith and Fulham	9,790	688	563
Haringey	21,451	650	882
Harrow	20,338	2,080	1,946
Havering	20,467	2,664	4,139
Hillingdon	26,667	2,640	2,239
Hounslow	21,692	2,363	2,059
Islington	13,568	1,576	1,871
Kensington and Chelsea	6,804	-176	-433
Kingston upon Thames	12,513	904	579
Lambeth	21,123	924	1,086
Lewisham	25,017	1,873	1,628
Merton	16,660	1,462	974
Newham	32,927	2,091	4,164
Redbridge	27,507	2,932	3,558
Richmond upon Thames	15,651	1,034	398
Southwark	23,111	1,837	2,560
Sutton	16,087	1,531	730
Tower Hamlets	22,922	3,831	6,955
Waltham Forest	23,999	1,957	1,749
Wandsworth	18,048	1,389	1,360
Westminster	10,700	737	313

Source: Pan-London model (Hybrid model, static proportion independent), GLA

Table 2: Projected demand for state-funded primary places 2014/15 - 2024/25: Mobility model

Local Authority	2014/15 on Roll	Growth 2014/15 to 2019/20	Growth 2014/15 to 2024/25
City of London	204	54	90
Barking and Dagenham	23,472	2,930	3,917
Barnet	27,891	2,064	2,680
Bexley	21,751	1,569	1,356
Brent	26,618	2,787	3,251
Bromley	25,464	1,399	177
Camden	11,042	534	468
Croydon	31,410	2,417	1,885
Ealing	29,878	1,862	1,189
Enfield	31,282	1,518	1,081
Greenwich	22,827	1,960	2,727
Hackney	18,372	980	1,481
Hammersmith and Fulham	9,790	668	486
Haringey	21,451	820	1,032
Harrow	20,338	2,129	2,019
Havering	20,467	2,560	3,933
Hillingdon	26,667	2,599	2,249
Hounslow	21,692	2,232	2,013
Islington	13,568	1,557	1,923
Kensington and Chelsea	6,804	-28	-290
Kingston upon Thames	12,513	932	618
Lambeth	21,123	997	1,104
Lewisham	25,017	1,828	1,474
Merton	16,660	1,467	982
Newham	32,927	2,164	4,216
Redbridge	27,507	2,957	3,603
Richmond upon Thames	15,651	1,120	415
Southwark	23,111	1,905	2,707
Sutton	16,087	1,486	790
Tower Hamlets	22,922	3,825	6,941
Waltham Forest	23,999	1,970	1,823
Wandsworth	18,048	1,404	1,344
Westminster	10,700	839	457

Source: Pan-London model (Mobility model, static proportion independent), GLA

Secondary

The map in Figure 14 shows the projected change in demand between 2014/15 and 2024/25 from the results of the *static proportion Hybrid* model. For London as a whole, growth is projected to be 105 thousand places over the decade. The map shows how this total is distributed among London's wards and the City of London.

According to this projection just 32 wards will see a fall in demand over the decade. In contrast, 133 wards will see demand increase by 245 places or more with 37 of these seeing growth in demand of over 400 places. Average growth over the decade is projected to be 167 places per ward.

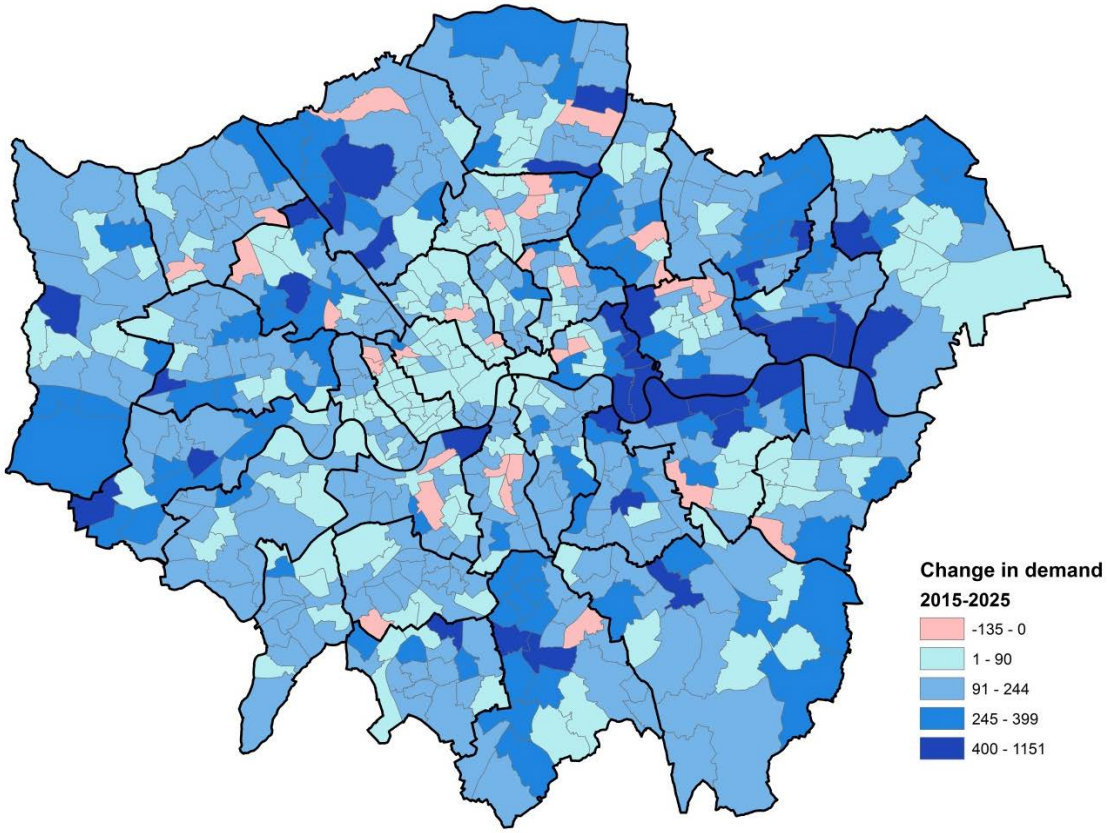
As with the projections of primary demand, strong growth is projected in areas with significant housing development. Growth in demand is also projected in areas which experienced large increases in births over the preceding decade.

Tables 3 and 4 show projected change in demand for places in the *Hybrid* and *Mobility* models, respectively. In each case the results for the *static proportion* model are shown. At secondary level, the two models give large differences in results between local authorities. This is a result of a combination of both the large scale of growth in the population in this age group and high levels of pupil mobility across local authority boundaries. Local authorities which are net importers of pupils from other authorities will see higher projected growth in the *Mobility model* and vice versa.

The largest projected growth in both *Hybrid* and *Mobility* models is projected to occur in Barking and Dagenham, with demand increasing by 5,900 and 5,000 places, respectively. This large growth corresponds with both a 60 per cent increase in births seen in the borough over the period 2001/2 to 2012/13, and large-scale development in the wards adjoining the Thames.

The smallest projected increase in demand occurs in Kensington and Chelsea (400 and 900 places).

Figure 14: Change in state place demand 2014/15 to 2024/25 by ward (secondary)



Source: Pan-London model (Hybrid model, static %), GLA

Table 3: Projected demand for state-funded secondary places 2014/15 to 2024/25: Hybrid model

Local Authority	2014/15 on Roll	Growth 2014/15 to 2019/20	Growth 2014/15 to 2024/25
City of London	0	17	46
Barking and Dagenham	11,480	3,299	5,871
Barnet	18,553	2,526	4,750
Bexley	16,280	1,315	2,912
Brent	15,437	1,643	4,084
Bromley	16,787	1,875	3,673
Camden	7,697	807	1,311
Croydon	18,004	3,068	5,799
Ealing	14,428	2,353	4,315
Enfield	18,099	2,571	4,325
Greenwich	11,569	2,769	4,575
Hackney	10,803	1,078	2,183
Hammersmith and Fulham	6,679	791	1,583
Haringey	11,311	637	1,367
Harrow	10,723	1,062	2,651
Havering	14,985	1,540	3,690
Hillingdon	15,806	1,717	3,907
Hounslow	13,180	2,484	4,628
Islington	7,421	962	2,279
Kensington and Chelsea	3,973	259	384
Kingston upon Thames	7,759	1,195	2,213
Lambeth	10,509	1,149	2,146
Lewisham	11,642	2,120	3,883
Merton	7,558	1,265	2,578
Newham	18,713	1,503	3,268
Redbridge	17,092	2,147	4,627
Richmond upon Thames	7,357	1,136	2,002
Southwark	12,505	1,634	3,133
Sutton	13,136	1,456	3,067
Tower Hamlets	13,473	2,356	5,276
Waltham Forest	13,946	1,852	3,615
Wandsworth	8,951	1,278	2,639
Westminster	7,898	937	1,734

Source: Pan-London model (Hybrid model, static proportion independent), GLA

Table 4: Projected demand for state-funded secondary places 2014/15 to 2024/25: Mobility model

Local Authority	2014/15 on Roll	Growth 2014/15 to 2019/20	Growth 2014/15 to 2024/25
City of London	0	0	0
Barking and Dagenham	11,480	2,784	4,997
Barnet	18,553	2,581	4,928
Bexley	16,280	1,812	3,573
Brent	15,437	1,571	3,852
Bromley	16,787	1,927	3,715
Camden	7,697	847	1,704
Croydon	18,004	2,600	4,931
Ealing	14,428	1,950	3,667
Enfield	18,099	2,286	3,855
Greenwich	11,569	2,304	3,973
Hackney	10,803	1,084	2,155
Hammersmith and Fulham	6,679	983	1,863
Haringey	11,311	688	1,486
Harrow	10,723	966	2,397
Havering	14,985	1,791	4,066
Hillingdon	15,806	1,666	3,729
Hounslow	13,180	2,376	4,506
Islington	7,421	884	1,885
Kensington and Chelsea	3,973	498	873
Kingston upon Thames	7,759	1,261	2,424
Lambeth	10,509	1,064	2,006
Lewisham	11,642	1,777	3,279
Merton	7,558	1,100	2,195
Newham	18,713	1,584	3,375
Redbridge	17,092	2,129	4,493
Richmond upon Thames	7,357	1,337	2,327
Southwark	12,505	1,648	3,171
Sutton	13,136	1,755	3,707
Tower Hamlets	13,473	2,342	5,217
Waltham Forest	13,946	1,810	3,536
Wandsworth	8,951	1,280	2,551
Westminster	7,898	1,174	2,170

Source: Pan-London model (Mobility model, static proportion independent), GLA

Conclusions

After a decade of rapidly growing birth numbers in the capital, annual births have fallen in the last two years and are projected to remain relatively steady in the medium term. As a result, while overall primary demand is projected to grow over the decade, it is at a slower rate than has occurred in the recent past.

For London as a whole, demand for reception places is anticipated to peak in 2016/17, corresponding with the high point of recorded births in 2011/12. So, though pressure on places will continue to provide challenges for years to come, the end of an extraordinary period of growth now appears to be in sight.

However, as growth in primary demand begins to taper, so London now faces a large increase in demand for secondary school places. Much more than for primary places, mobility of pupils will add to the challenge of planning for this growth. The relatively small geographic size of London's local authorities, combined with strong public transport links, gives rise to very large cross border flows of pupils.

The impact of different mobility assumptions on projected demand highlights the need for coordination between planners across local authority boundaries. Cooperation is likely to be of key importance to ensuring that limited resources are used efficiently and that the needs of the growing population are fully met.

Appendix A: Sensitivity Testing

The assumptions in the model around independent school take-up and future pupil mobility do not have uniform impacts across London. Boroughs where a high proportion of children are in independent school will see larger differences between the *static number* and *static proportion* variants. Similarly, boroughs with high levels of cross-border mobility will see greater differences between the Hybrid and Mobility scenarios than those boroughs with low mobility.

Understanding how sensitive a borough is to these assumptions can help users make sense of the range of projection scenarios, and assist users in selecting the correct variants for their purposes.

This appendix provides a brief analysis of sensitivity, at borough level, for the primary and secondary projections. Two assumptions are tested and in both cases projected state school demand in 2024/25 is compared. The difference between the two projections is expressed as a percentage. In this analysis whether one projection is higher or lower than the other is not important, the relevant measure is how different they are.

The two assumptions tested are:

- The impact of the Independent school *static number* and *static proportion* scenarios. The two projections compared are the Hybrid *static number* (H1) and the Hybrid *static proportion* (H2) scenarios.
- The impact of choosing the Hybrid over the Mobility variant. The two projections compared are: the Mobility *static proportion* (M2) and the Hybrid *static proportion* (H2).

Sensitivity to Independent School assumptions

Independent school assumptions have the greatest impact in those boroughs which currently have high levels of independent school take-up. This is because under the *static proportion* scenario the size of the independent school population grows in line with overall population growth. Therefore, the greater proportion attending independent school, the greater the divergence between the *static proportion* and *static number* variants.

Boroughs with high growth overall will also see greater differences between the two variants. Again, this is because the *static proportion* scenario follows the trajectory of the total population while the *static number* holds independent take-up constant.

Primary-age projections

Figure A1 shows the sensitivity to independent school assumptions at borough level. Kensington and Chelsea, Westminster, City of London and Hackney are most affected by the independent school assumptions at primary level while Greenwich, Tower Hamlets and Islington also see notable divergence. In 20 boroughs the difference between the two scenarios makes less than one per cent difference after ten years of projection (2024/25).

Figure A1: Difference between H1 and H2 projections in 2024/25, primary state school population

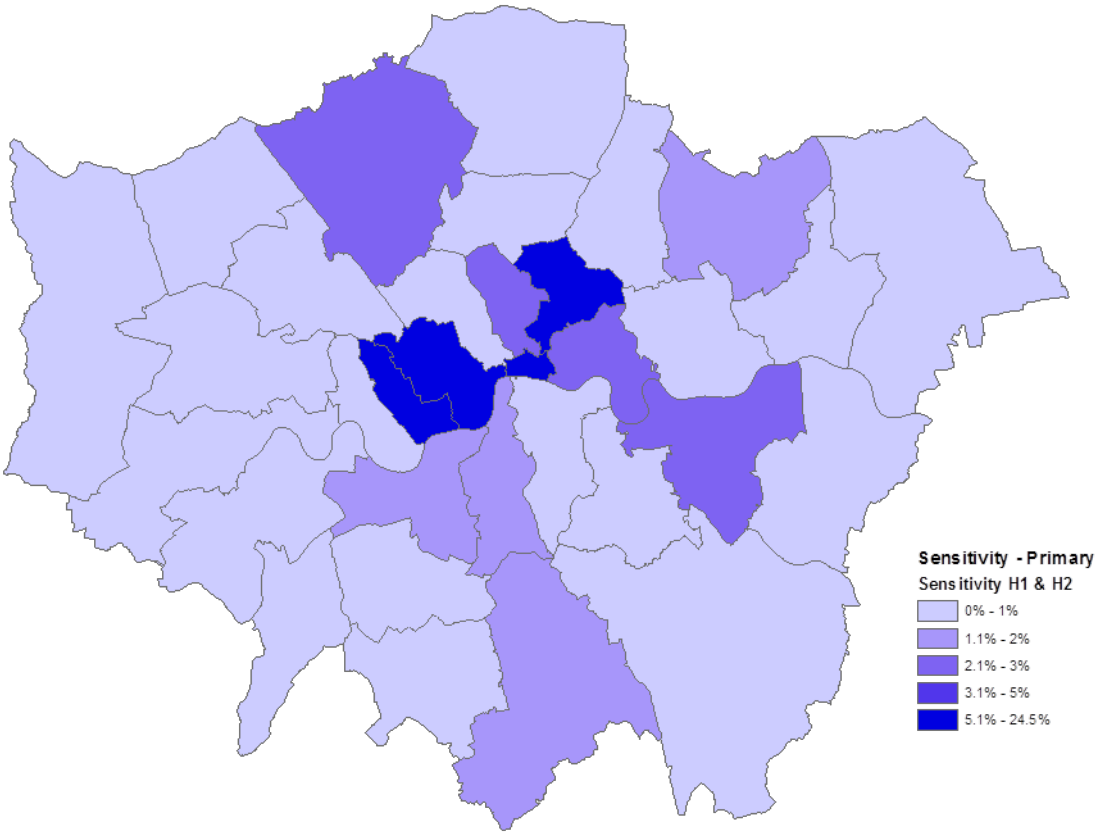
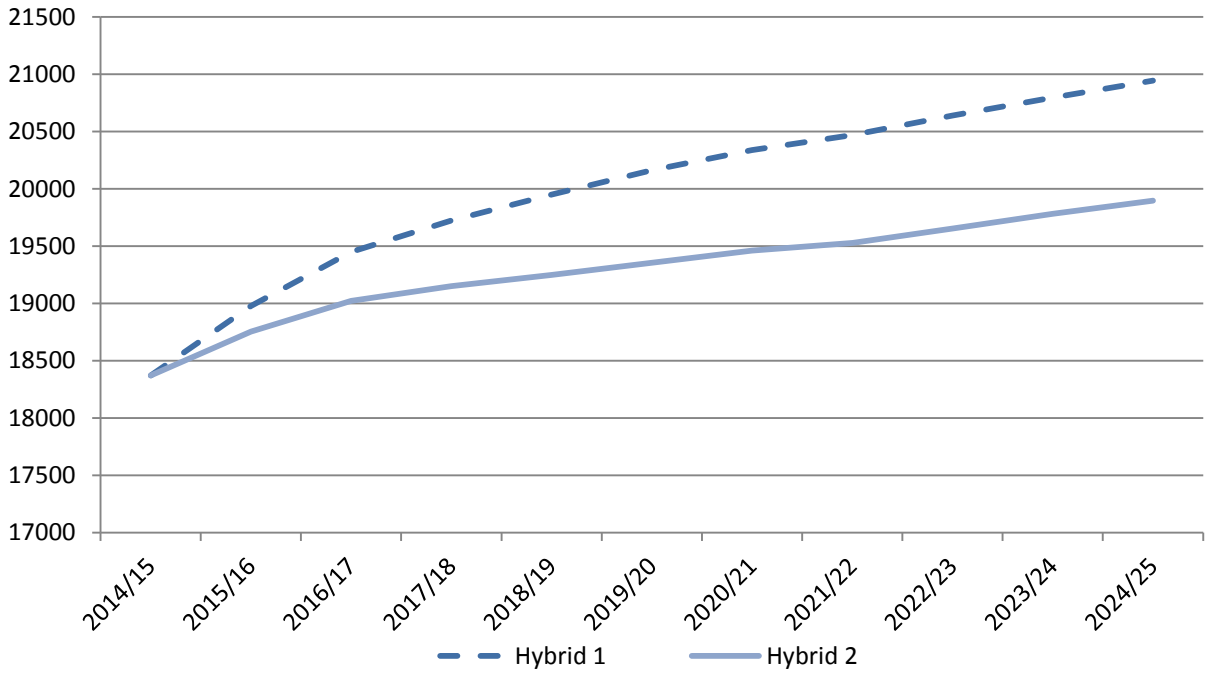


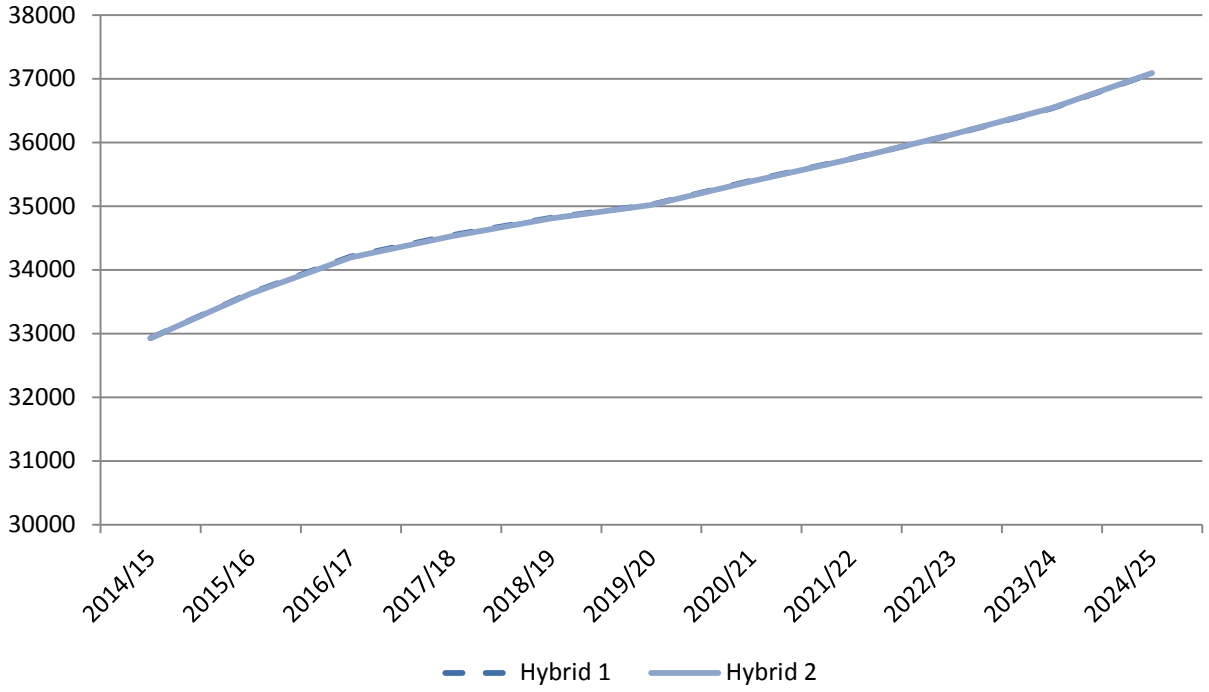
Figure A2 shows two ten-year projections of primary state school place demand in Hackney. The projections begin at the same point but quickly diverge. The Hybrid 1 model, the *static number* scenario, is the higher of the two because all of the population growth manifests as state place demand while in the H2 scenario the growth is shared between the state and independent sectors. There is a difference of 1,048 children in 2024/25.

Figure A2: State school place demand (primary) in Hackney 2015-2025, H1 and H2 scenarios



In the opposite position is Newham where independent assumptions have little impact on projected demand. In 2014/15 just 1.5 per cent of Newham's primary age children attended independent school. As a result the divergence between the two projections is negligible, just three children in 2024/25.

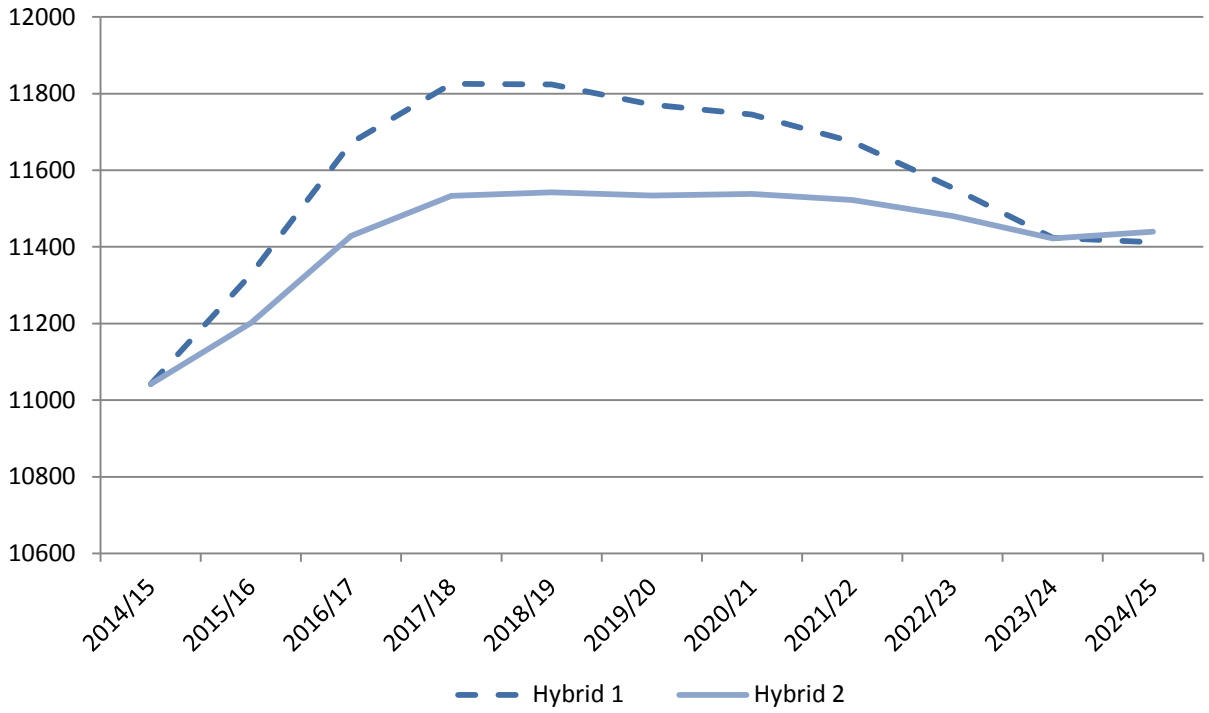
Figure A3: State school place demand (primary) in Newham 2015-2025, H1 and H2 scenarios



In both Hackney and Newham population growth is projected to be relatively constant throughout the projection period. However, if the underlying population fluctuates this will manifest in the H1 and H2 demand projections very differently. Figure A4 demonstrates the roll of the underlying population projection on the two scenarios in Camden. Here the primary age population over the next ten years is projected to rise to a peak in 2017/18 before entering a period of steady decline over the remaining years.

This behaviour is mirrored in the H1 *static number* projection while in the H2 *static proportion* projection there is less volatility.

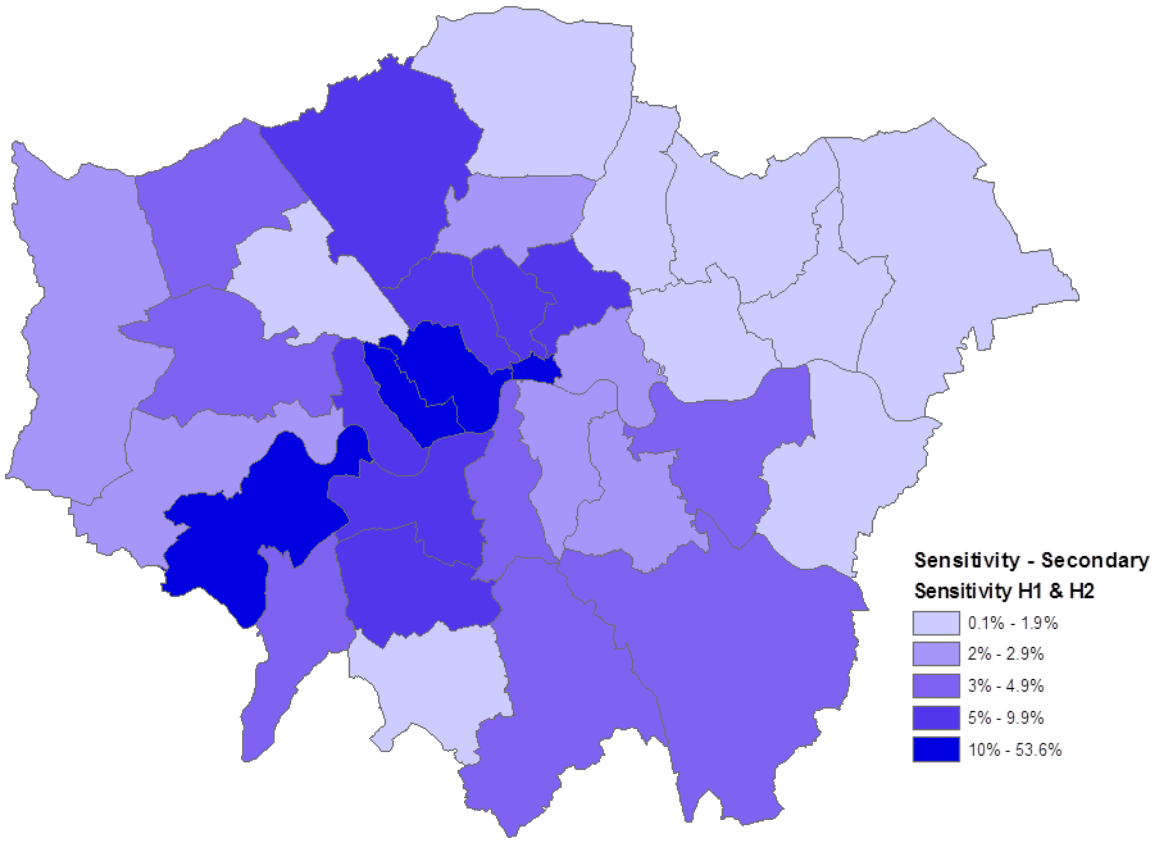
Figure A4: State school place demand (primary) in Camden 2015-2025, H1 and H2 scenarios



Secondary-age projections

At secondary age the boroughs showing the greatest sensitivity to the independent assumptions are Westminster, Kensington and Chelsea and Richmond. As with the primary age projections the boroughs with the greatest sensitivity have the highest levels of independent take-up in 2014/15.

Figure A5: Difference between H1 and H2 projections in 2024/25, secondary state school population



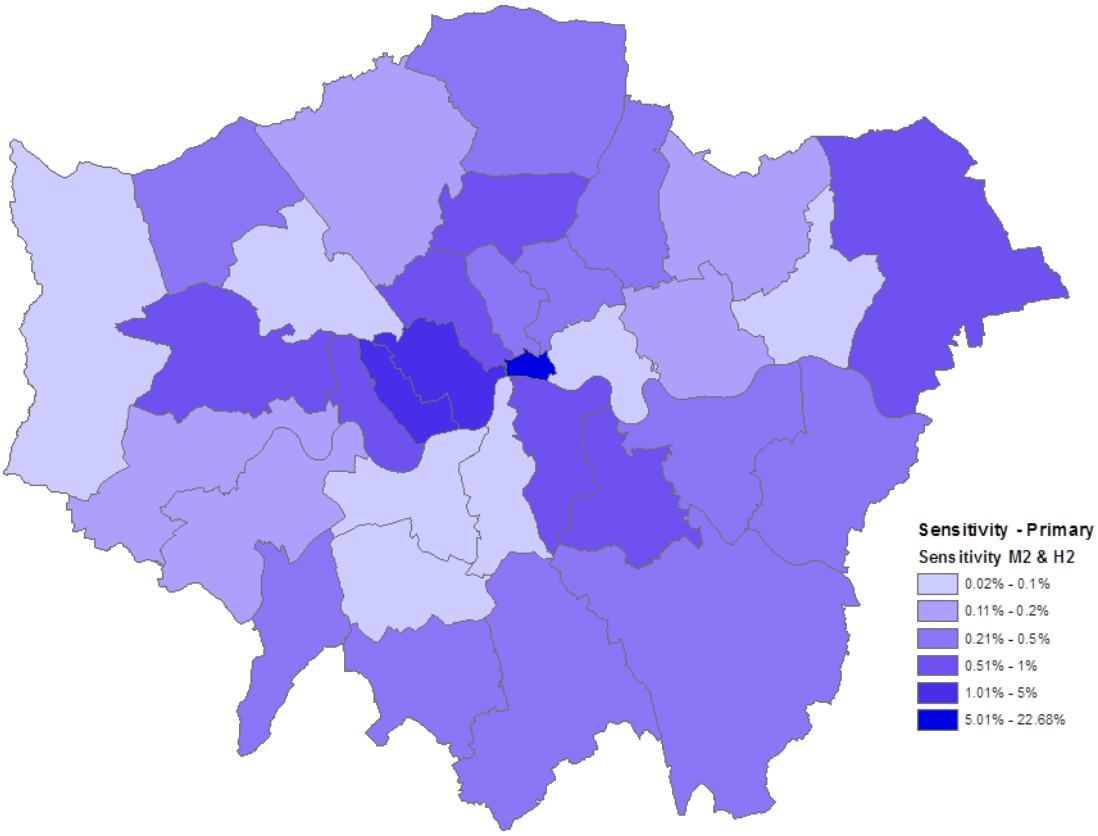
Sensitivity to scenario selection

This analysis of sensitivity to scenario selection uses the *static proportion* model and compares the Mobility (M2) projection with the Hybrid (H2) projection. Here the current level of mobility is the driver of difference. In the Mobility model, growth in the residential population manifests as additional demand both in and out of borough in line with current patterns. However, in the Hybrid model, growth manifests as demand in the home borough.

Primary-age projections

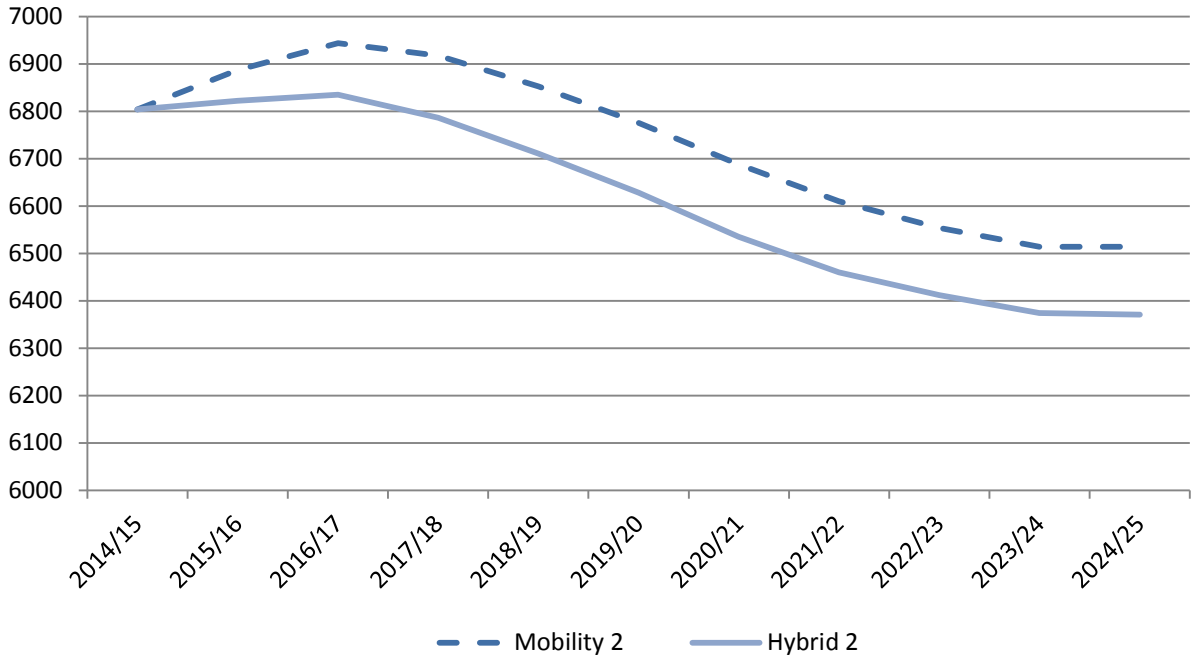
In boroughs with very high mobility the M2 variant will see much lower growth in demand than the H2 variant. For example, City of London, which has only one primary school and therefore high levels of mobility, has the highest sensitivity.

Figure A6: Difference between M2 and H2 projections in 2024/25, primary state school population



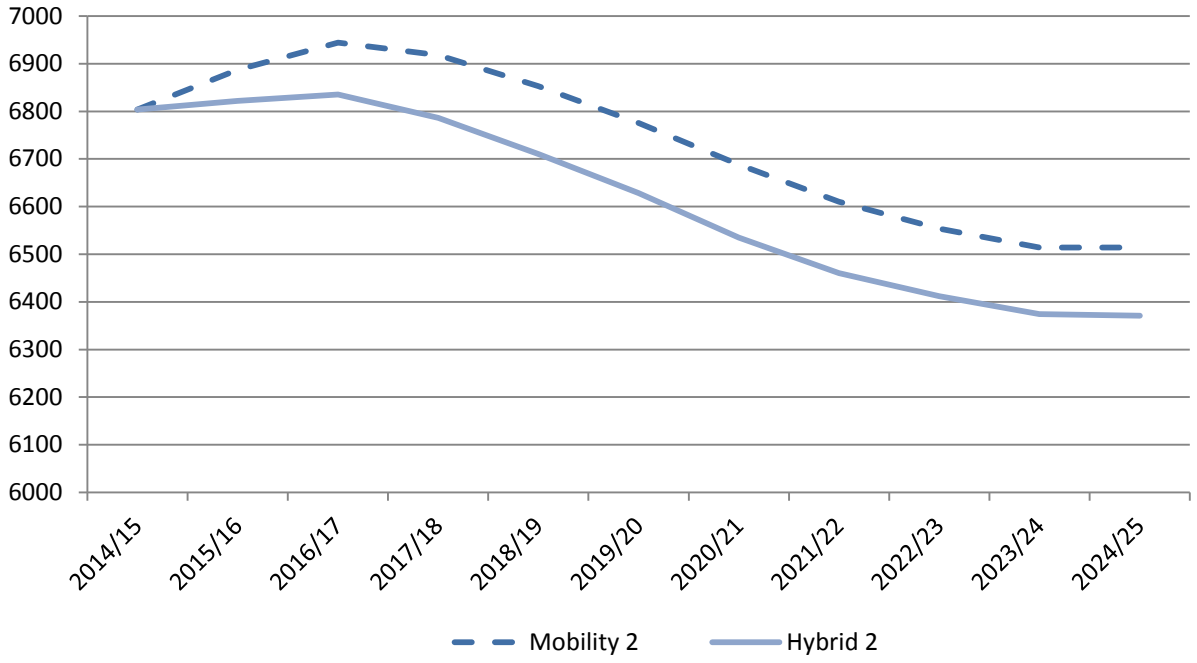
Kensington and Chelsea and Westminster also show relatively high sensitivity, although both are net importers of children and therefore the Hybrid scenario projects lower numbers than the Mobility. All other boroughs have a difference of less than one per cent between the two projections. Figure A7 shows how state demand manifests differently for Kensington and Chelsea under the Hybrid and Mobility models (2.2per cent or 143 children by 2024/25).

Figure A7: State school place demand (primary) in Kensington and Chelsea 2015-2025, M2 and H2 scenarios



In boroughs where there is little cross-border mobility – i.e. a high proportion of children are schooled in-borough and inflows from other boroughs are minimal – there is little difference between the two projections. An example is Barking and Dagenham, shown in Figure A8.

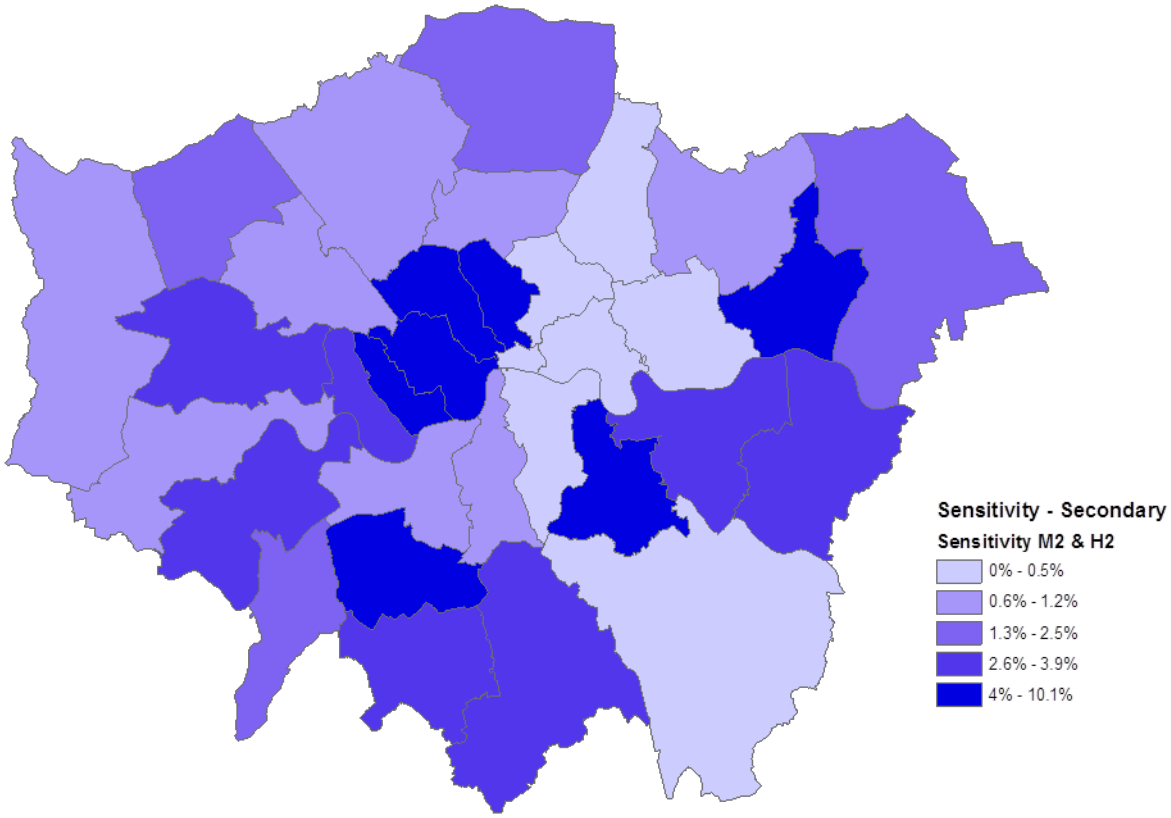
Figure A8: State school place demand (primary) in Barking and Dagenham, 2015-2025, M2 and H2 scenarios



Secondary-age Projections

The boroughs with the greatest sensitivity to variant selection at secondary level are Kensington and Chelsea (10.0 per cent difference in projected demand in 2024/25) and Barking and Dagenham (5.3 per cent). Thirteen boroughs had proportions lower than one per cent and in Bromley the difference between the two projections was just 0.2 per cent.

Figure A9: Difference between M2 and H2 projections in 2024/25, secondary state school population



Using Demand Projections

Users of the projections should consider which variant/scenario is most suitable for their circumstances and should bear in mind the varying impact choosing different assumptions can have. In boroughs with little current independent take-up switching between the *static number* and *static proportion* scenarios will have little effect, however in places where independent take-up is high the effect can be significant. Similarly the current level of cross-border mobility will determine whether the Hybrid and Mobility scenarios show significant difference. The fundamental driver for difference between the various scenarios is the underlying population change – if London saw no population growth over the projection period then all variants would project the same number of pupils.

Appendix B: Detailed Methodology

The methodology used to produce the projections is described in the following sections. This methodology is implemented in an R-based model, the code for which is available through the London Datastore (see Appendix C for details).

This document does not attempt to provide a review of the code but rather outlines the principal steps taken in generating the projections.

All calculations are carried out for aggregated age groups of primary (age 4 to 10) and secondary (age 11 to 15) rather than by individual school year or pupil year of age.

Preparing the base population

a. Ward level population projections

The GLA's population projection outputs provide ward-level estimates of the population by single year of age for wards in London.

No official population projections are available at ward-level for areas outside of London. To account for flows from surrounding counties, the GLA created simple ward-level population projections for wards outside of London. These were produced by calculating year-by-year district-level single year of age population growth from ONS's most recent Sub-National Population Projections (2012-based) and applying that growth to population estimates for each ward within the district.

These two ward-level projections were combined to form the base population projection.

b. Rebasing projections to align with the school year

The base projection provides estimates at mid-year and so to achieve consistency with the NPD data the base projection was rolled forward by two months to August 31st. This is achieved by simple linear interpolation between successive years of population data. The rebased August 31st population for a year *y* is calculated as follows:

$$Rebased\ population_y = \frac{5}{6} MidYear\ Population_y + \frac{1}{6} MidYear\ Population_{y+1}$$

The single year of age data were then aggregated into two groups: 4 to 10 for the primary base population and 11 to 15 for the secondary base population.

Finally, data for years which preceded the date of the NPD extract were removed from the base projection as they are not needed in the model.

Preparing the NPD extract

The NPD contains a record for every child with a state-funded school place. To be used in the model the data must be aggregated. First, the pupil-level records were assigned a ward of residence and a ward of schooling. The total number of children attending state-funded schools was calculated for each ward of residence to be added to dataset later. All pupils attending a school outside London were then removed from the dataset – this filtered the total number of records to just over 1.07 million. Finally, the data were grouped by origin-destination pair and the previously calculated residence totals added in.

Reconciling the NPD extract and the base population

For each ward, the number of children attending a state-funded school was subtracted from the base population. The remainder (i.e. those children who live in the ward but do not attend state school) were assumed to be attending independent school or alternative provision. Both the total number and the proportion attending independent school were recorded.

Where the number of children attending a state-funded school was greater than the base population it was assumed that the difference arose from an underestimate of the population. In 382 wards the base population was lower than the on-roll population as recorded in the NPD. The difference ranged from 438 children in Southall Green in Ealing to less than one. Among those wards where the roll was greater than the population estimate, the average difference was 69.8.

There are a number of factors which could account for this. Firstly, the two datasets count slightly different populations. The NPD includes anyone at state-funded school. The GLA's population estimates, which are fundamentally based on census data, aim to count the *Usually Resident* population – those people in the country, or intending to stay, for over twelve months. Therefore areas with high migration and transient populations might be expected to show more resident children on roll in the NPD than are present in the estimated population.

Investigation of some of the wards affected in this way seems to bear this out: wards in the Southall area of Ealing are particularly affected and have high levels of recent migration. This effect may be further compounded by the fact that areas with these characteristics are traditionally harder to enumerate in the census leading to potential undercounts in the base data. Any undercount in the 2011 Census will tend to propagate forward to the 2014 estimates and subsequent projections.

There may also be social and economic factors at play in some wards which increase the likelihood that resident children will attend state over independent school thus reducing the margin of error between the two estimates.

In cases where the roll exceeds the base population: the difference calculated in 2014 was added to each year of the estimated and projected population for the ward concerned. The assumed independent school population for that ward was then set to zero.

Projecting demand for school places

1. Projected demand for places by ward of residence

Two projections of roll demand at residence level were generated. Both use the same methodology but differ in their assumptions about the number of children attending independent school.

In the first variant the number of residents attending independent school is held constant at 2014/15 levels. This number is subtracted from each year of the base projection to arrive at an on-roll projection. This is a high demand scenario as any growth in population is pushed into the state school system.

The second scenario assumes that the proportion of residents in the ward attending independent school will remain constant. For each year of the projection the population is multiplied by the proportion that attended state school in 2014/15 to arrive at on on-roll projection. This variant shares population growth between the state and independent sectors.

For each scenario, the model outputs projected numbers of children requiring a place at a state-funded school place by ward of residence as well as projected numbers taking up independent places.

Each of the two projection variants are used as inputs to subsequent stages of the model.

2a. Demand by current patterns of mobility

The NPD data provides information on the numbers of pupils travelling from each ward of residence to attend state-funded schools in any other. Dividing this flow by the total on-roll population in the ward of origin gives a proportion of pupils living in a ward who travelled to school in another ward in 2014/15. Across London a total of 52 per cent of primary school pupils and 82 per cent of secondary school pupils travelled to a school outside their ward of residence.

These ward to ward propensities are applied to the two variant residence-based projections in order to distribute future pupils to wards of schooling based on current patterns of mobility.

Areas which are 'importers' of pupils from other wards can see significant projected increases in demand even if little growth in population is projected to occur in the ward itself. Likewise, wards with no schools will continue to show no demand throughout the projection, regardless of whether the resident population is growing. No attempt is made to account for the capacity to meet demand.

Projections by ward of schooling are not provided for independent and alternative schools as the necessary flow data is not available from the NPD.

2b. Hybrid approach to projected demand

A third projection was produced which attempts to combine aspects of the purely resident-based initial projection and the purely school-based mobility pattern projection.

The hybrid model holds constant the number of residents travelling from their ward of residence to another ward at 2014/15 levels for the entirety of the projection. Any growth in the resident population beyond this level manifests as additional demand in the ward of residence.

The results from this model provide demand estimates for wards which take into account the current location of schools but which also show those areas where population growth is greatest.

Appendix C: Model details

The full model, coded in R, is available to download from the Datastore. The model works from a single core module which makes calls to specially written functions to perform many of the operations. The code requires the R packages data.table, dplyr and tidyr which are all available in CRAN.

Note that running the model requires inputs derived from the NPD dataset which are not publically available.

The code is provided for information and transparency:
http://data.london.gov.uk/developers/data-science/pan-london-demand-code

The model takes five input datasets structured as follows:

Ward Population projections
GLA ward-level population projections. Produced using the GLA's capped-household size model and SHLAA-based development data.

Filename: ward_shlaa_2014.csv

Field Name	Description
Borough.Name	Local authority name
Borough.Code	Local authority GSS code
Ward.Name	Ward name
GSS.Code	Ward GSS code
Year	Projection year
Total	Total population
X0…X90	Single year of age population form 0 to 90+ (91 columns)

NPD
National Pupil Database – pupil level information aggregated to ward for use in the model. Flows to schools outside London are removed before the data is imported into the model. Additionally, the data are split into two files – one for primary school flows and one for secondary.

Filename: primary_wardflows_2015.csv; secondary_wardflows_2015.csv

Field Name	Description
HomeWard	GSS code of ward of residence
SchoolWard	GSS code of ward of school
PupilFlow	Number of pupils living in HomeWard who attend school in SchoolWard
PupilsOnRoll	Total pupils on roll in HomeWard irrespective of whether their school is within or outside London
School_LA_9Code_SPR15	GSS code of local authority of school
Home_LSOA11_SPR15	GSS code of LSOA of residence

Ward District Lookup

A lookup used to add variables to outputs.

Filename: ward to district.csv

Field Name	Description
Ward	Ward GSS code
Name	Ward name
District	Local authority GSS code
D_Name	Local authority name

Ward Population

Census 2011 ward populations for every ward in England and Wales. These populations are used as the 'jumping-off point' for national ward-level population projections.

Filename: WARD POP CENSUS 2011.CSV

Field Name	Description
areacode	Ward GSS code
Age	Single year of age
2011	Population count

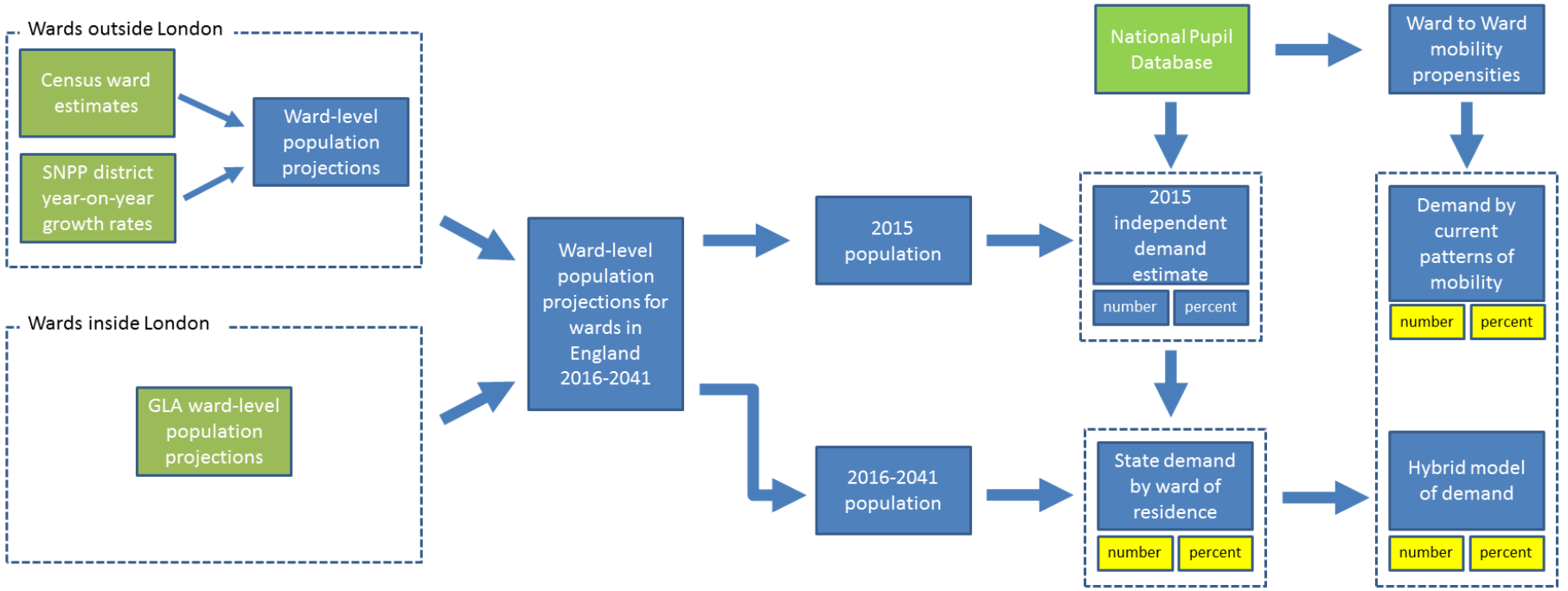
SNPP

Sub-National Population Projections – the ONS 2012-based local authority level population projections for England and Wales. The data provide the population growth rates used to estimate ward population projections for wards outside London.

Filename: 2012 SNPP Population persons.csv

Field Name	Description
areacode	Local authority GSS code
areaname	Local authority name
areatype	Type of geographic entity (all are LAD = Local Authority District)
AgeGroup	Single year of age 0 to 90+
sex	Persons
2011…2037	Projection year (27 columns)

Appendix D: Model flow diagram



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