

## School Roll Projections Methodology

### Summary methodology

The school roll projection model creates a roll projection for each school based on the GLA population projections of the wards where its pupils live.

For each ward of residence in London, National Curriculum (NC) year (R to 11) and sex, the proportion of children of the corresponding age attending each mainstream state school is calculated. These proportions are carried forward as the pupils age through the school in the years being projected.

For new pupils entering a school in future years, for example at reception, there is currently no information on what proportions of the residents will attend the schools. In this case the proportions are calculated as averages over the latest years of actuals, for example, with the 3/4 back series, the years used are 2019, 2020 2021 and 2022. The same approach is used at years 7 and 12, even if the school is an all through school as it is assumed that there will be significant changes in the cohort at this point.

Where a school has opened recently, the proportions for its new intake are determined by averaging over all years used for calculating new intake, even if it was only opened, for example, last year. This means that new schools will show lower projections going forward. The reverse is true for schools which closed within the back series – they will still provide a contribution to the projection going forward if they were open at any point during the back series. As a consequence, results for individual schools that have opened or closed within the back-series period may now appear counterintuitive, but the results are expected to be more robust at borough or planning area level as they take into account all of the pupils who were, or were not, present in schools in those areas during the back-year period.

For the current round year (2022), the actual school rolls submitted specify roll numbers but we have no information on wards of residence of the pupils. For this year, the number of pupils from the roll attributed to each ward are estimated by averaging over the previous years' patterns, with the 3/4 back series, the years used are 2019, 2020 and 2021, and scaling to ensure that the total numbers at each school for each age and sex match the submitted rolls.

The rolled forward and calculated new intake proportions for future years are then applied to the population projections to give projections of the number of children on roll by school by age and sex. Due to lower retention rates, sixth form projections are calculated using a survival ratio as the cohort ages through sixth form. School level projections are then aggregated to planning areas and borough totals.

### Options for running the model

The **current** school roll projection model produces annual projections

- 15 years ahead by individual national curriculum year (reception to 14)
- Gender (boys, girls and total)
- Levels of aggregation include school, planning area and borough levels

Three different backseries are included in the projections.

The **3 /4 option** has been used in previous years as the default option incorporating several years of past data to smooth out fluctuations in the data in terms of wards pupils live in and number of pupils in the new intake, giving more stable results than fewer years data, using 3 years of back-data for both as well as the current 2022 roll for the new intake:

- **Three** years of past detailed flow data (2019-2021) to define relationships between ward of residence and school attended for the 2022 roll
- **Four** years of data (2019-2022) to calculate the size of the new intake.

The **3/1 option** is an appropriate choice when there have been changes in your schools over the past year which are not population driven, for example a change in popularity or a school opening or closing in a neighbouring borough which affects your boroughs rolls. This variant uses three years of data to smooth fluctuations in the underlying patterns of pupil movement, while reflecting only the most recent data in terms of overall number of pupils on roll:

- **Three** years of past detailed flow data (2019-2021) to estimate relationships between ward of residence and school attended for the 2022 school roll
- **One** year of data (2022) to calculate the size of the new intake in projected years

The **1/1 option** is based off the most recent data and is the most susceptible to change. It can be useful where there has been a big change in the patterns of pupil residence to school flow patterns in the last year, for example if there has been a lot of development in the borough:

- **One** year of past detailed flow data (2021) to estimate relationships between ward of residence and school attended for the 2022 school roll
- **One** year of data (2022) to calculate the size of the new intake in projected years

### Which population projection to use?

School roll projections can be run based on the following population projection variants:

#### Development options

- **Borough Preferred Option (BPO)**. This is the default option but is dependent on boroughs providing development data to be incorporated into the projections.
- **Strategic Housing Land Availability Assessment (SHLAA)** – This projection is not published and has been run specifically for use in the SRP process. The model assumptions are the same in the BPO projection, but the development used is adapted from the 2017 SHLAA. The trajectory has been adjusted in the first 5 years to account for assumed lower housing delivery resulting from pandemic disruption to both supply and demand. If no BPO development trajectory is provided this projection will be used.

#### Influences of population projections

The biggest driver of projected future school rolls is the population projections for schools' catchment areas. The underlying factors include:

##### • Development

The amount of development projected in a LA will affect that authority's population projections and in turn its school roll projections. More development generally means that the LA will attract more people and its population will therefore rise. If population increases, there will consequently be more children and so school roll projections will also rise.

LAs should assume that significant changes in assumed development will be accompanied by corresponding changes in projected rolls. If LAs are unsure what development assumptions have been used in the past, the GLA is able to provide this information.

**• Births**

The number of births in an area will have a direct effect on the number of children on roll four years later. 2012 saw the highest number of births in London with these children starting school in either academic year 2016/17 or 2017/18 depending on when in the year they were born. Many areas have seen a fall in birth numbers since and this has led to subsequent projections of future births and therefore rolls, being correspondingly lower.

**• Migration**

Migration, both from other areas within the UK and internationally, can significantly influence population projections. The BPO variants used in the 2022 SRP are constrained to projections based on different migration assumptions (see above).

The GLA has created an Excel based dashboard that allows boroughs to see in-, out- and net flow of children to/from their LA from elsewhere in London. It is available to download from the London Datastore and will be updated annually: <http://data.london.gov.uk/dataset/internal-migration-flows-school-age-children-visualisation>

ONS releases both mid-year international and internal migration data by single year of age and sex at the end of June each year. The former is released as part of the mid-year components of change and the latter as part of the internal migration estimates series.

Analysis of trends in the mid-year estimate series, and comparison to administrative sources, suggests that there has been an over estimation of the number of 0-14 year olds in London as a whole since 2011 in the official data. We believe that this is the result of underestimation of international out migration flows in the young population. Following this analysis, the GLA has taken the decision to revise the estimates of migration and population used as the basis for projections. The GLA considers the overall level of migration in ONS estimates to be robust and that the issues identified are with the distribution of outflows by age. Therefore, the GLA adjustment to outflows and total population is a redistribution of population with a reduction in ages 0-14 and a corresponding increase in ages 18-27 so that overall total population remains consistent.

**What the School Roll Projection Model does and does not take into account****School closures**

There is currently no provision in the model to take account of planned school closures.

**New schools**

There is currently no provision in the model to include planned new schools that have yet to open. Where a school has recently opened, it will not have existed at the 2021 January census so we have no information on the wards from which the school draws its pupils. In this case, it is assumed to draw its intake from across the local authority as a whole.

A new school is assumed if the DfE number given in the actual rolls (or its corresponding 'previous DfE number') cannot be matched to a DfE number in the national pupil database extract that the model uses.

**Children who live outside London**

The base population projections for areas outside of London are at local authority level. Therefore, pupil flow data for children resident outside of London is aggregated to LA level rather than ward level.

**The City of London**

The City of London is treated by the model as one entity to match the population projections used by the model.

**Age to NC year**

Boroughs should provide all data by national curriculum year. However, the population projections refer to children's age instead of year group. To line up the population projections with the school roll data, the model converts pupil age at beginning of academic year to year group (Reception <-> age four, Year 1 <-> age five, etc.).

**Cross border mobility**

The model takes cross border mobility into account explicitly as it uses information about pupils' home wards from the national pupil database (NPD). The detailed flow data (i.e. assumed flows for the whole projection period for an authority's schools) can be provided on request.

**Child yield**

Child yields are not incorporated into the model in the same sense that many people think about them. The borough projection models contain assumptions about the age and gender characteristics of migration flows between locations. The difference in characteristics between in- and out-flows defines the resulting population age structure. These migration flows are influenced by assumed development in the model and new development tends to be associated with increased numbers of children in the population.

**Limitations and considerations**

The models are simplifications of complex real-world processes. They project forwards relationships taken from past data, so they are projections and not predictions. Many factors are not explicitly taken into account and LAs should be aware of the limitations of the models when interpreting results.

Among the factors that the current models do not account for are:

- Changes to future patterns of migration;
- Changes to future planned development;
- Changes to parental preferences for schools;
- Constraints to the capacity of schools;
- Schools opening/closing in neighbouring boroughs
- Future changes to provision, e.g. schools opening or closing, or changes to the characteristics of schools; and
- Future changes to the character of local areas, e.g. gentrification or the impact of welfare reform

## Appendix A. School Roll Projection Model

### Introduction

Not all children attend school in their borough of residence. This is particularly the case in London where the geographic size of local authorities is relatively small and transport networks enable children to travel beyond their borough boundary. Additionally, for children who live close to a borough boundary, their closest school may be in a neighbouring authority.

To create school roll projections based on the ward level population projections it is necessary to know where pupils come from. The National Pupils Database (NPD), based on the School Census, provides home ward and school attended for all pupils attending state funded schools.

As can be seen from the summary diagram at Appendix B, there are four key stages to the projections.

- For the wards that the school draws pupils from, estimate the proportion of the ward attending the school in the current academic year by NC year and sex. (**ward distribution of current roll**).
- By NC year and sex estimate the proportions from each ward moving forward (**aging**).
- Estimate the proportions from each ward for future new intake (**new intake**).
- Aggregate to obtain school, planning area and Borough projections (**aggregating projections**).

### Proportion of ward population attending a school

For each ward in London, national curriculum (NC) year, and sex, the proportion of children attending each mainstream state school is calculated as follows: Divide the number of pupils of that sex who attend the school in that NC year who live in the ward by the total number of children of the equivalent age group and sex who live in the ward (the base population). NC year is matched to age at the beginning of the school year. For example, reception pupils are matched to children from the population projection who were 4 years old at 1<sup>st</sup> September 2022.

$$\text{Pupil ward to school flow proportion} = \frac{\text{number from home ward attending that school}}{\text{home ward base population}}$$

### Ward distribution of current roll

For the 2023 cohort, boroughs provide the numbers on roll for each school by age and sex. As the NPD data is not available yet to obtain the home ward information for the new intake years in 2023, the average home ward patterns over a number of previous years are taken as a proxy. The default being three years (2020–2022) with options for a different number e.g. only the most recent year (2022). These averaged patterns are scaled to ensure that the numbers across all wards equal the number on roll for each school, NC year and sex as submitted in the 2023 rolls.

### Aging

There is no information on the proportion of pupils from each ward beyond the years for which we hold NPD and pupil on roll data. Beyond this point the proportion of pupils from a ward is carried forward as children age. Therefore, the proportion of year 3 pupils living in ward *a* and attending school *z* in 2023 is the same as the proportion of year 4 pupils living in ward *a* and attending school *z* in 2024. Figure 1 shows the aging of proportions through the projection period. It can also be seen from Figure 1, as projections move further forward, proportions for new intake cohorts need to be estimated. In the special case of aging from the NPD 2022 to the current roll year of 2023, the proportions are scaled after aging to ensure that the total numbers at each school for each age and sex match the submitted 2023 rolls.

Figure 2 shows aging of proportions, with the proportion of the latest intake of reception pupils carried forward until, in this example, 2027 and beyond when this proportion is applied to all year groups from that ward.

**Figure 1. Aging of primary school pupils’ resident in one ward**

NC year	NPD 2019	NPD 2020	NPD 2021	estimated 2022	Aging 2023	Aging 2024	Aging 2025	Aging 2026	Aging 2027
R	3/5	2/5	1/3	1/4	?	?	?	?	?
1	3/5	3/5	2/3	1/2	1/4	?	?	?	?
2	2/5	4/5	4/5	3/4	1/2	1/4	?	?	?
3					3/4	1/2	1/4	?	?
4						3/4	1/2	1/4	?

**Figure 2. Aging of primary school pupils’ resident in one ward**

NC year	NPD 2019	NPD 2020	NPD 2021	estimated 2022	Aging 2032	Aging 2024	Aging 2025	Aging 2026	Aging 2027
R	3/5	2/5	1/3	1/4	1/4	1/4	1/4	1/4	1/4
1	3/5	3/5	2/3	1/2	1/4	1/4	1/4	1/4	1/4
2	2/5	4/5	4/5	3/4	1/2	1/4	1/4	1/4	1/4
3					3/4	1/2	1/4	1/4	1/4
4						3/4	1/2	1/4	1/4

**New intake**

We don’t have information on which wards pupils entering a school in its intake NC year (reception year in the above example) will come from in the future, and what proportion of each ward’s population will attend. To estimate this, the proportions of pupils in that NC year attending the school from each ward in previous years are averaged to give an estimated proportion to use for calculation of new intake in future years. The default number of years to average over is 4 (2020 - 2023); 3 years from the NPD and the estimated current year proportions. As noted below there is the option to use a different number of years. The same approach is used at NC years 7 and 12, even if the school is an all-through school as it is assumed that there will be significant changes in the cohort at this point.

Where a school has opened recently, the proportion for its new intake is calculated by averaging over all years used for calculating new intake (default of four), even if it was only opened, for example, last year. This means that new schools will show lower projections going forward. The reverse is true for schools which closed within the back series – they will still provide a contribution to the projection going forward if they were open at any point during the back series. Consequently, results for individual schools that have opened or closed within the back-series period may now appear counterintuitive, but the results are expected to be more robust at borough or planning area level as they take into account all of the pupils who were, or were not, present in schools in those areas during the back-year period.

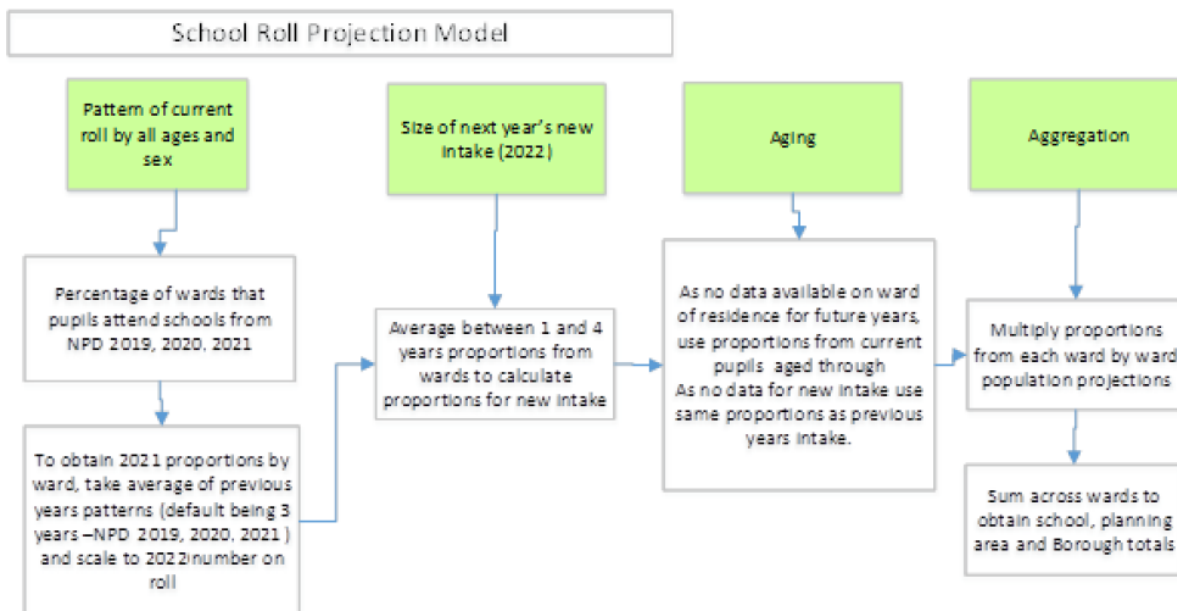
**Sixth form**

It was found that projecting the proportions forward in the sixth form years over-projected the numbers of pupils in NC years 13 and 14. For this reason sixth form projections are calculated using a survival ratio as the cohort ages through sixth form. For example, for each of the projection years, the number of year 13 pupils in a school in that year is a fixed proportion of year 12 pupils at the school the year before. Year 12 pupils are always treated as new entry even if the school also includes younger years. Projections for year 12 pupils are calculated using the methodology outlined in the New Intake passage above.

**Aggregating proportions**

For each NC year and sex, the proportions of each ward attending a school is projected, then multiplied by the ward population projection to obtain the number from that ward attending the school. This is summed across all wards that pupils are resident in to obtain the school projection for a particular NC year and sex. Schools are summed to planning area and Borough totals.

**Appendix B. School Roll Projection Model summary diagram**



**Appendix C. Population Projections – GLA methodology used to produce the 'Borough preferred Option' (BPO) projections**

The 2021-based BPOs have been produced using a revised ward-level model which uses modelled estimates of gross migration at the small area. This methodology differs from both past BPO projections and that used to produce the published small area population projections. In addition, the housing trajectory input for this borough is replaced by bespoke ward-level housing development data provided by the borough. Full methodology papers for the housing-led and small area projection models used to produce these outputs are available from the GLA. This set of projections may differ in some aspects from those from previous years but the GLA believes the revised methodology provides robust and sound projections based on the most recently available data. There is a BPO FAQ document available in the BPO Hub on the Datastore which provides more detail about the projections and how they vary from the publicly available outputs.

## Appendix D. Summary methodology details for DfE School Capacity Survey (SCAP) returns

### How the GLA's school roll projections are produced

There is no single accepted method for projecting school numbers and London boroughs have recently faced major challenges in providing places to meet a growing child population. Harrow, along with the majority of other London boroughs, commission's school roll projections from the Greater London Authority's (GLA) School Roll Projections Service. The GLA provides the baseline projections to which local knowledge is applied to make reasonable adjustments in line with pressure at Reception, Year 7 and other school year groups.

### Data Sources

- Greater London Authority (GLA) bespoke Borough Preferred Option population projections
- Pupil level School Census data from National Pupil Database (Spring Census 2019 to 2022)
- School level current roll data by sex and NC year (from Spring Census 2023)
- Data on linked schools and maximum and minimum NC years from Edubase/Get Information About Schools and school census data

### Data Processing

The GLA school roll projection model creates a roll projection for each school based on the GLA population projections of the wards where its pupils live.

For each ward of residence in London, National Curriculum (NC) year (R to 11) and sex, the proportion of children of the corresponding age attending each mainstream state school is calculated. These proportions are carried forward as the pupils age through the school in the years being projected.

For new pupils entering a school in future years, for example at reception, proportions are calculated as averages over the latest years of actuals, with 4 being the standard number of years used (2020, 2021, 2022 and 2023). The same approach is used at years 7 and 12, even if the school is an all through school as it is assumed that there will be significant changes in the cohort at this point.

For the current round year (2023), the school level rolls submitted by London Boroughs to the GLA have no information on wards of residence of the pupils. For this year, the number of pupils from the roll attributed to each ward are estimated by averaging over the previous years' patterns, with the default being 3 years (2020, 2021 and 2022), and scaling to ensure that the total numbers at each school for each age and sex match the submitted rolls.

The rolled forward and calculated new intake proportions for future years are then applied to the population projections to give projections of the number of children on roll by school by age and sex. Due to lower retention rates, sixth form projections are calculated using a survival ratio as the cohort ages through sixth form. School level projections are then aggregated to planning areas and borough totals.



## Population projections

The Spring 2023 school roll projections are underpinned by the GLA 2021-based interim population projections. More information about these projections, including model methodology and configuration, reporting, and publicly available outputs, are available at:

<https://data.london.gov.uk/demography/population-and-household-projections/>

Additional commentary and background to these projections are available in this blog post:

<https://data.london.gov.uk/blog/new-population-projections-for-london-building-on-the-2021-census/>

The GLA's 2021-based interim population projections are the first to incorporate data from the 2021 Census. The Census highlighted a number of issues with the accuracy of the existing official series of mid-year population estimates and resulted in significant revisions to estimates for many areas, with some of the largest differences being for London local authorities.

The circumstances under which the 2021 Census was conducted has led to increased uncertainty about how well it captured specific population groups. Most relevant for school place planners, concerns were raised by both officers of London boroughs and the GLA about the potential under enumeration of young children (under age 4), leading ONS to apply adjustments to the final estimates for many authorities. Information about this issue is included in ONS's published documentation:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/methodologies/maximisingthequalityofcensus2021populationestimates#changes-made-because-of-the-quality-assurance-process>

As the GLA's 2021-based projections use ONS's (Census-derived) 2021 Mid-Year Population estimates as their starting point, there is potential for any errors in the Census estimates of young children to directly impact the accuracy of the projected numbers of school age children.

The current round of population projections has been badged as 'interim' largely to reflect that they were produced at a point when much of the data that underpins the models had yet to be updated following the release of results from the 2021 Census. A complete set of updated official estimates aren't due until November 2023, when ONS's rebasing work concludes with the release of a revised population series for small areas. It was therefore necessary for the GLA to create 'best fit' versions of many of the required inputs to the projections, which will be subsequently updated or superseded as more data is released.

## Migration and Housing Developments

The effects of migration and housing developments feed into the school roll projection model via the underlying population projections.

### Housing development

The Interim 2021-based population projections comprise both variant trend projections and housing-led scenario projections. Trend projections are based on an extrapolation of past patterns of population change while the housing-led projections also incorporate considerations of future housing delivery. Trend projections are typically most robust at larger geographic scales, such as regions or subregions, while the incorporation of housing data becomes increasingly important at lower geographies.

The population projections used in the current round incorporate assumptions about future housing delivery at ward level, with future development trajectories being based either on data submitted directly by local authority users for this purpose or, if no data has been supplied, on trajectories derived from the 2017 Strategic Housing and Land Availability Assessment (SHLAA). Projections are labelled as Borough Preferred Option (BPO) or SHLAA, respectively.

## Migration

The GLA produces multiple variants of population projection variants that reflect a range of possible future migration patterns. The three projection scenarios used in the current round differ only in the periods of past migration patterns used as a basis for the rates and flows that are projected forward. Assumptions about fertility and mortality are the same across all scenarios, with any variations in annual births and deaths being due to differences in the at-risk populations. The three scenarios used in this year's roll projection service are:

- **5-year variant** - based on 5 years of past local migration patterns and constrained to match the 5-year trend projection results at subregional (ITL2) level. Migration trends during this period (mid-2016 to mid-2021) were dominated by the effects of Brexit and the COVID-19 pandemic and this projection represents a pessimistic scenario of future population growth in London.
- **10-year variant** - based on 10 years of past local migration patterns and constrained to match the 10-year trend projection results at subregional (ITL2) level. The period (mid-2011 to mid-2021) used to determine future migration trends covers five years of high levels of population growth in London and five years of low growth impacted by Brexit and the pandemic. The results typically lie between those of the 5-year and 15-year projections.
- **15-year variant** - based on 10 years of past local migration patterns and constrained to match the 15-year trend projection results at subregional (ITL2) level. The 15-year period (mid-2006 to mid-2021) includes a decade of high population growth in London which offsets the subsequent years of lower growth in the trends projected forward. This is the most optimistic scenario of the 2021-based outputs, but still shows lower growth than previous rounds of projections.

Provisional estimates for the UK published by ONS in November, indicated a record net inflow to the UK of 504 thousand long term international migrants in the year to mid-2022. An attempt has been made to account for this in the population projections by including a temporary uplift to international migration in the first few years of the projection period.

## Cross Border Movement

The GLA model explicitly accounts for cross border mobility by calculating the contribution from all wards that the school draws pupils from, both from inside and outside of the local authority. The model does not account for changes in cross border mobility patterns which may happen in the future due to factors such as changes in a school's popularity with parents, or schools opening and closing.

## Changes made since last year

The migration assumptions that GLA population projections which feed into the school roll projection model have been updated to reflect new assumptions since the pandemic. In addition, the underlying population projections model has been updated to incorporate a new

method for calculating small area (ward) migration flows. See the documentation here for further information.

**Quality Assurance**

Comparisons are made with last year and with population and births data. Changes to information about specific schools are identified and flagged for checking.