

GLA 2021-based Interim Population Projections

Model configuration

January 2023

Introduction

This document provides details about the specific model inputs, assumptions, and configurations used for the GLA's 2021-based demographic projections.

For an overview of the GLA's demographic projection system, the individual models of which it is currently comprised, how the model is implemented and maintained, and the range of outputs available, see the accompanying methodological document 'GLA Demographic Projection Models: System overview'.

These documents, together with the results of the projections are published on the London Datastore¹.

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¹ <https://data.london.gov.uk/demography/population-and-household-projections/>

Trend-based population model

The trend model produces populations at local authority in England and Wales and at national level for Northern Ireland and Scotland. Model inputs are required at this spatial disaggregation.

Model inputs

- Mid-year population estimates (ONS, NISRA, NRS)
- Detailed internal migration estimates by origin and destination (ONS)
- Future fertility and mortality assumptions from the National Population Projections (ONS)

Mid-year population estimates

The ONS mid-year population estimates series provides a number of inputs to the model for local authority districts in England and Wales:

- Annual population estimates by age and sex
- Annual live births by sex
- Annual deaths by age and sex
- International inflows by age and sex
- International outflows by age and sex

National estimates of population are produced by NRS in Scotland and NISRA in Northern Ireland. Component data is not as detailed as for the ONS release and some aspects of the components for these areas are modelled to produce components consistent with the ONS outputs.

- Births by sex are modelled by applying a male-to-female birth ratio of 105:100 to total births.
- Deaths by single-year-of-age are modelled by applying the age structure for England & Wales to total deaths.
- International migration flows by single-year-of age are modelled by applying the age structure for Northern Ireland/Scotland from the NPP to total gross flows.

Production of a revised mid-year estimate series for 2012-2020

The 2021 mid-year estimate (MYE) represents a break in the previous official MYE series (2011-2020). That series was based in the 2011 census estimate of population. The 2011 MYE was a rolled forward estimate from the census and then subsequent years were calculated by adding estimated births, deaths and migration to the previous years' population. The 2021 MYE is rolled forward from the 2021 census estimate and has no reference to the earlier series.

In order to create a consistent series for input into the projection model the GLA has produced a revised backseries of mid-year estimates for the period 2012-2020. The revised series assumes that births, deaths and domestic migration from the existing series are correct and adjusts international migration.

A detailed description of this modelling process has been published in a separate methodology note.

Detailed internal migration estimates by origin and destination

Accompanying the main mid-year population estimates data, ONS publish a detailed series internal migration flow estimates. This is a single-year-of-age and sex matrix of annual domestic migration moves between all local authorities in England & Wales and the nations of Northern Ireland and Scotland.

A flows matrix for 2021 has been modelled using 2020 flows and the total gross migration from the 2021 mid-year estimate.

Future fertility and mortality assumptions from the National Population Projections

The National Population Projections (NPP) are published by ONS on two-year cycle, the most recent being the 2020-based NPP. Included in the projection outputs are the detailed assumptions of future fertility and mortality rates by single-year-of-age for each UK nation.

These annual rates are used as the basis of assumed future changes to fertility and mortality rates within the GLA model.

COVID-19 deaths

Past deaths from COVID-19 are included in the deaths component of the MYE backseries. Projected deaths from COVID-19 are assumed to be accounted for by the normal application of mortality rates.

Model configuration

Variant projections

The GLA 2021-based outputs include three variants of trend projection. These variants incorporate common assumptions about fertility and mortality and are differentiated only by the assumptions made about long-term international and domestic migration trends.

Table: List of 2021-based trend model variants

Variant	International assumption	Domestic assumption
5-year trend	Average of flows for the period 2017-2021	Average of rates for the period 2017-2021
10-year trend	Average of flows for the period 2012-2021	Average of rates for the period 2012-2021
15-year trend	Average of flows for the period 2007-2021	Average of rates for the period 2007-2021

Fertility rates

All variants use the same fertility assumptions.

In the first year of the projections (2022) births are included as an exogenous input into the model. Total births are calculated from GP registrations counts of 0-year-olds and are then used in the model rather than calculating births through the application of fertility rates.

In the second year of the projection (2023) rates are calculated by trending forward the previous five years' rates including the 2022 GP-based estimate (2018-2022).

In subsequent years this base rate is adjusted by the rate of change taken from the 2020-based NPP principal fertility assumptions.

Mortality rates

All variants use the same mortality assumptions.

In the first year of the projection rates are calculated by trending forward five years of observed rates (2017-2021).

In subsequent years this base rate is adjusted by the rate of change taken from the 2020-based NPP principal mortality assumptions.

Migration methodologies

International migration is based on assumed annual flows and domestic migration is based on deriving rates from periods of past flows and applying them to the population at risk.

Short-term international migration assumptions

International migration assumptions in the initial projection year (2022) are the same for all projection variants. Local authority-level immigration and emigration flows have been calculated to be consistent with available UK-level flows data.

Table: International migration assumptions 2022

	London	UK
International In	334,286	1,064,000
International Out	164,673	560,000
International Net	169,613	504,000

Long-term international migration assumptions

The projections diverge from 2023 onwards as migration patterns incrementally transition toward each variant's individual long-term assumption (which are reached in 2025).

Table: Long-term international migration assumptions, London

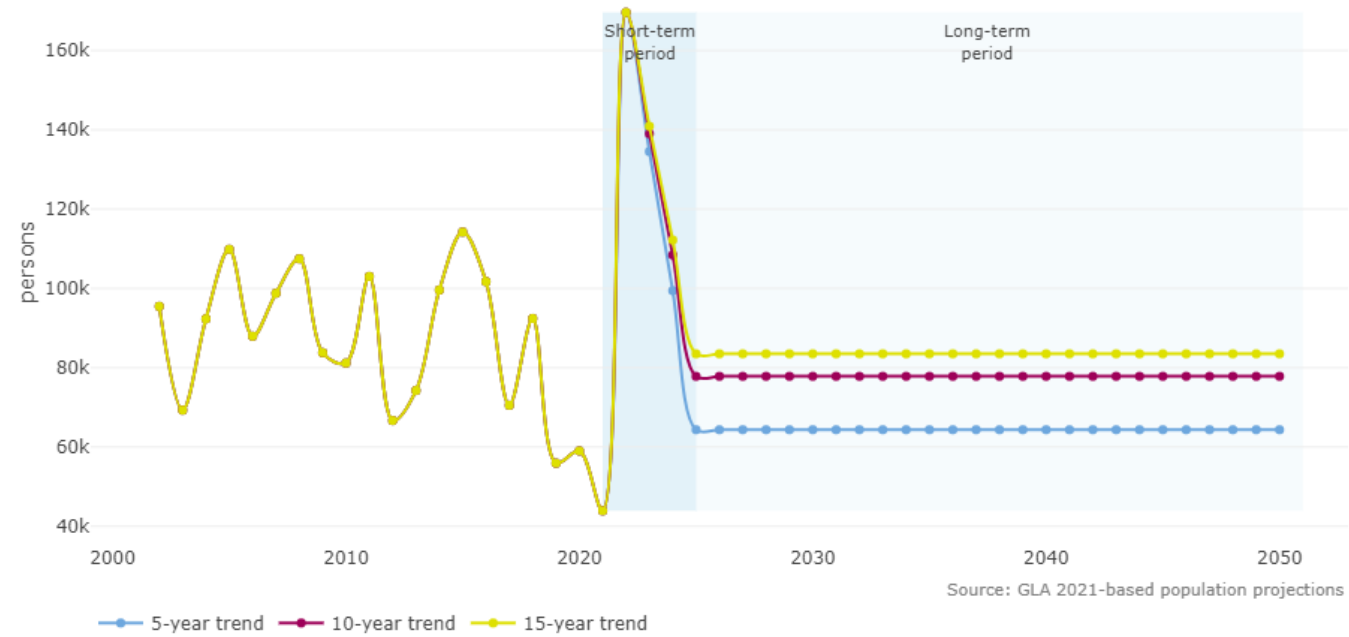
	5-year	10-year	15-year
International In	176,802	182,867	190,657
International Out	112,447	105,043	107,159
International Net	64,355	77,824	83,498

Table: Long-term international migration assumptions, UK

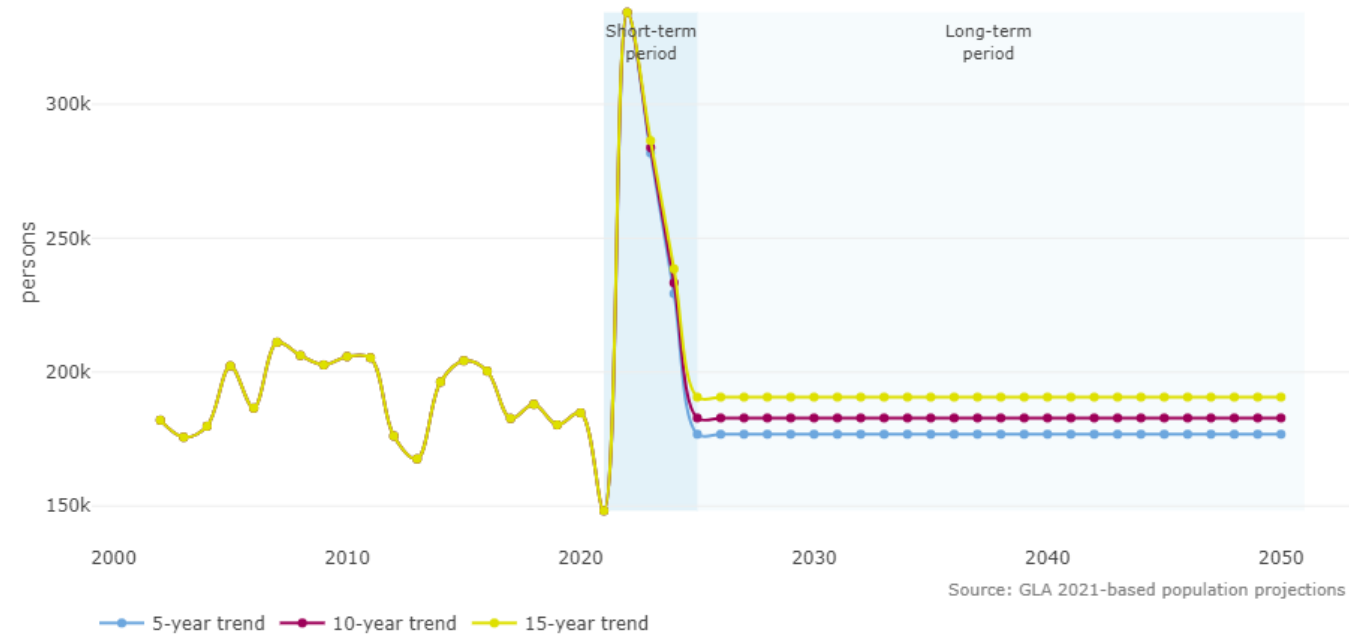
	5-year	10-year	15-year
International In	583,495	582,047	595,062
International Out	392,910	357,217	360,944
International Net	190,584	224,829	234,117

Note: UK total includes London

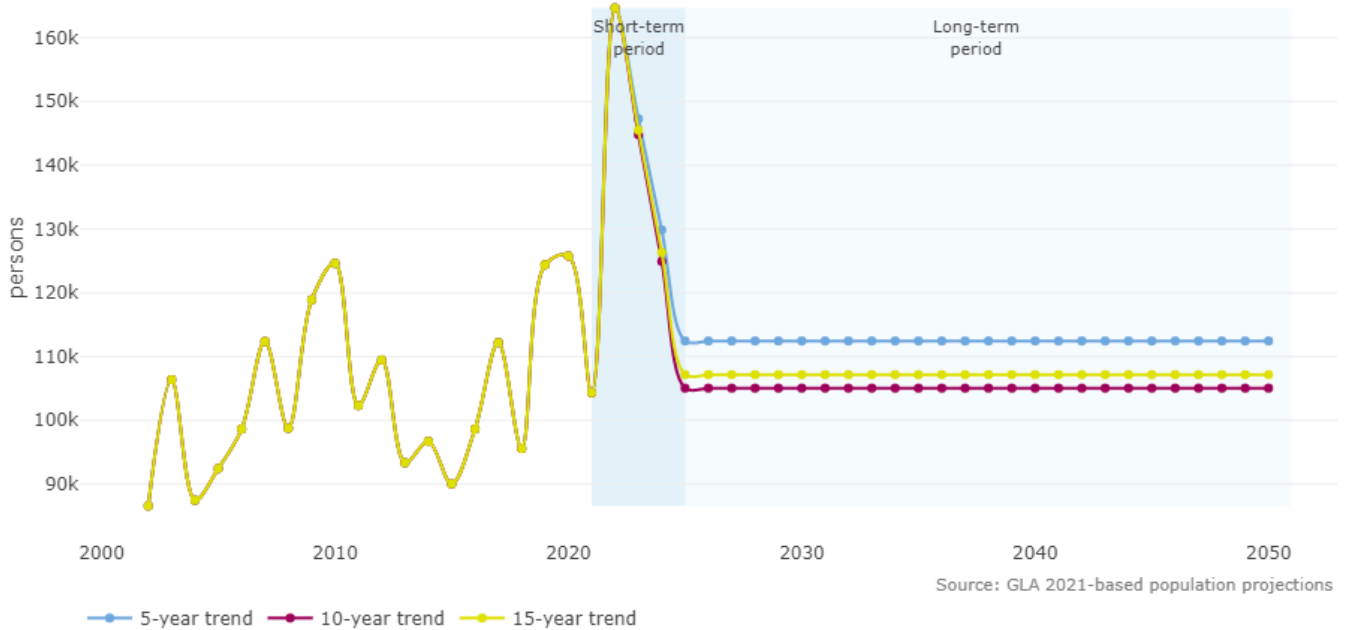
Net International migration assumptions, London



International In migration assumptions, London



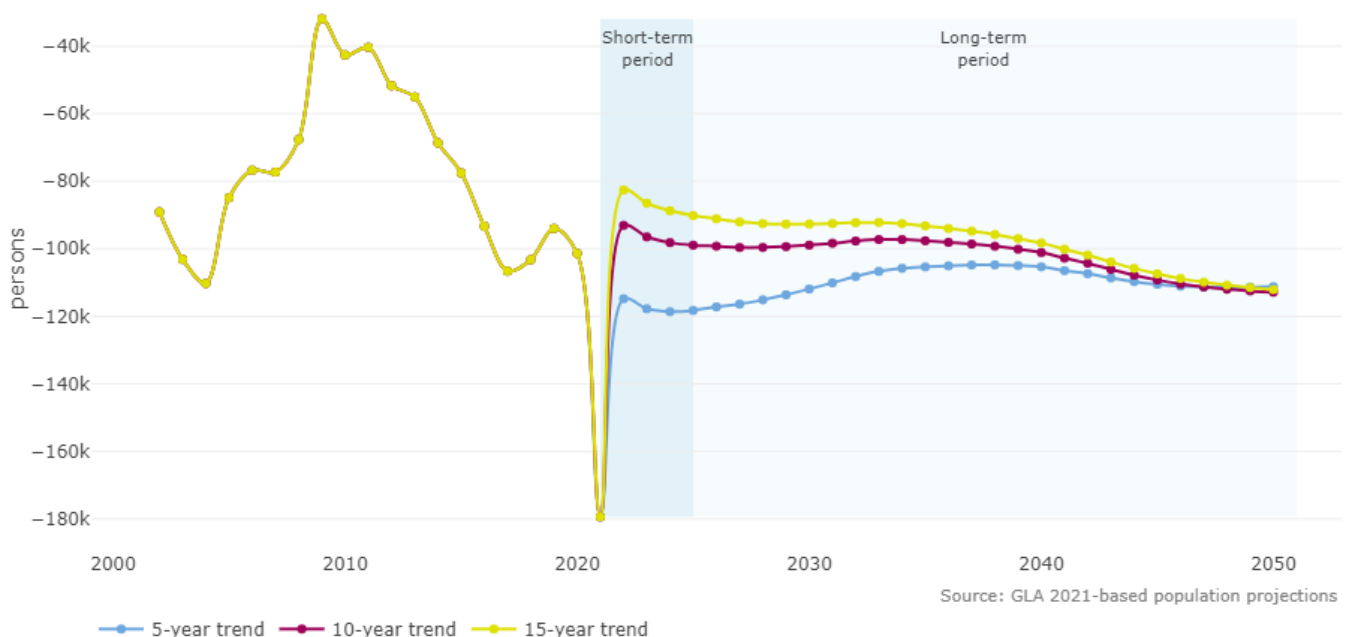
International Out migration assumptions, London



Long term domestic migration assumptions

Net domestic migration has consistently been negative over the past two decades meaning more people leave London for elsewhere in the UK than migrate to the capital. During periods of economic downturn mobility is reduced meaning fewer people are moving with the UK. This can be seen in the figure below where the period around the 2008 'Great Recession' shows a fall in net out migration (2009 minimum of 31,900). Conversely, the recent pre-pandemic past was a period of relatively strong economic growth which saw high levels of mobility with London reaching a peak of net outmigration in 2017 (106,600). The outflow in 2021 was a temporary response to the pandemic and outflow reached a record 179,400.

Domestic net migration, London



Housing-led population model

Housing-led projections are produced using the GLA flexible area model. The model operates at the small area (e.g. ward) with the option that projected populations and components are constrained to trend projections at higher geographic aggregations.

Model inputs

The flexible area model requires a population and components of change backseries for the specific geography being projected. This series is used to produce rates of fertility, mortality and migration. There is a separate GLA methodology note on the preparation of the estimates series.

In addition to these, the model uses the following housing data inputs:

- Assumed future housing development trajectories (GLA)
- Estimated annual change in dwellings since 2011 (GLA)
- 2011 census estimates of the number of households and dwellings in 2011 (ONS)
- 2021 census estimates of communal establishment population (ONS)

Estimated numbers of existing dwellings

Estimates of the number of dwellings in each local authority are created by applying estimated annual change, based on data captured in the London Development Database, to a base estimate of dwelling numbers in 2011 from the census. Data from the 2021 census is not yet available.

Future dwelling stock capacity

The housing-led model requires an input development trajectory in the form of annual net changes in housing units for each model area.

This annual change is applied to the estimated number of dwellings in the base year to create the assumed number of dwellings for each projection year.

The ratios of households to dwellings captured in the 2011 census are applied to these dwelling stocks to create a nominal household capacity by local authority for each projection year.

Model configuration

The 2021-based housing-led projections include outputs based on three alternative housing delivery scenarios. These scenario projections differ only in the input housing trajectory used. All other model inputs and configuration settings are identical across the projections.

Fertility and mortality rates in the initial projection year are based on an average of five years' data (2017-2022) and projected rates are calculated using the 2020 NPP principal projection assumptions.

Migration rates are based on a 10-year average of past rates (2012-2021). Note that the flexible area model works with total in and total out migration and, unlike the trend model, does not separate flows out into international and domestic.

The ONS household model is used as the basis for estimating nominal demand for household spaces for a given population.

The three housing delivery scenarios are as follows:

Identified Capacity scenario

This scenario adapts the 2017 Strategic Housing Land Availability Assessment (SHLAA)² housing capacity study for use as a future delivery scenario. A SHLAA is a technical exercise to determine the quantity and suitability of land potentially available for housing development. It is a required part of the evidence base needed for the preparation of a Local Plan.

In the initial years of the projection the delivery assumptions have been amended to reflect housing market analysis undertaken by Savills Estate Agents. In 2020 assumed delivery is 41,700 while for 2021–2025 it is 43,000 per annum. The total delivery over this period is 256,700 while the SHLAA capacity identifies 333,100 units over the same period. The difference (76,400) is assumed to come forward over the period 2026–2041 and is distributed to the trajectory for those years.

In later years the trajectory assumes lower levels of delivery. This is largely because the SHLAA, on which this delivery scenario is based, is a capacity study with a focus on identifying sites in the short-to-medium term. In the longer-term SHLAA capacity is based on more generalised assumptions about the level of development likely to come forward rather than that from specific sites. As a result, annual delivery in later years is much lower than the initial years of the trajectory.

In the Identified Capacity scenario, the number of dwellings in London is forecast increase by 788 thousand over the 21-year period to 2041. This is an increase of 21.6 percent over current stocks.

Past Delivery scenario

This scenario assumes that the average of past levels of development, as reported in the London Development Database (LDD) will come forward each year for the period 2022–2041.

In the initial years of the projection, the level of delivery is assumed to be the same as in the Identified Capacity scenario: 41,700 in 2020 and 43,000 in 2021. Beyond 2021, the LDD average of 31,100 units is used.

In this scenario, the number of dwellings is forecast increase by 664 thousand over the 21-year period to 2041. This is an increase of 18.2 percent over current stocks.

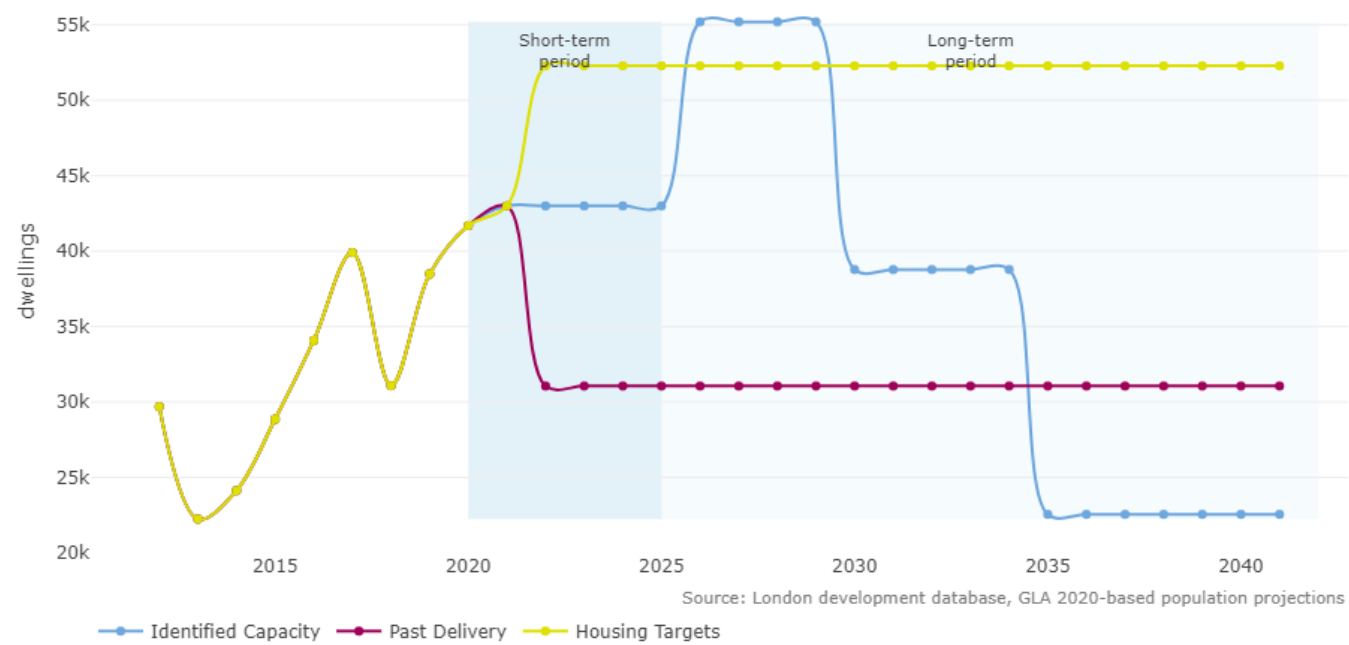
Housing Targets scenario

This scenario assumes that the London Plan target of 52,300 dwellings will be delivered in each year of the projection period up to 2041. In the initial years of the projection, the level of delivery is assumed to be the same as in the Identified Capacity scenario: 41,700 in 2020 and 43,000 in 2021.

In the Housing Targets scenario, the number of dwellings is forecast increase by 1.089 million over the 21-year period to 2041. This is an increase of 29.8 percent over current stocks.

² <https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan/strategic-housing-land-availability-assessment>

Assumed annual housing delivery, London



Links to data sources

Population Estimates

ONS mid-year population estimates -

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland>

NRS mid-year population estimates - [https://www.nrscotland.gov.uk/statistics-and-](https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates)

[data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates](https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates)

NISRA population estimates - <https://www.nisra.gov.uk/statistics/population/mid-year-population-estimates>

ONS Internal migration: detailed estimates by origin and destination local authorities, age and sex -

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/migrationwithintheuk/datasets/internalmigrationbyoriginanddestinationlocalauthoritiessexandsingleyearofagedetailedestimatesdataset>

Small Area inputs

ONS Lower layer Super Output Area population estimates -

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/lowersuperoutputareamidyearpopulationestimatesnationalstatistics>

Births by Lower Layer Super Output Area (LSOA), England and Wales, mid-year 2001 to 2019 -

<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/adhocs/12627birthsbylowerlayersuperoutputarealsoenglandandwalesmidyear2001to2019>

Deaths by Lower Layer Super Output Area (LSOA), England and Wales, mid-year 2001 to 2019 -

<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/adhocs/12626deathsbylowerlayersuperoutputarealsoenglandandwalesmidyear2001to2019>

External model

ONS National Population Projections: 2018-based -

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2018based>

ONS 2018-based household projections for England -

<https://www.ons.gov.uk/releases/householdprojectionsforengland2018based>

DCLG 2014-based household projections for England - <https://www.gov.uk/government/statistics/2014-based-household-projections-in-england-2014-to-2039>

ONS Subnational Population Projections for England: 2018-based -

<https://www.ons.gov.uk/releases/subnationalpopulationprojectionsforengland2018based>

Housing development data

The Planning London Datahub (supersedes the London Development Database) -

<https://www.london.gov.uk/what-we-do/planning/digital-planning/planning-london-datahub>

London Strategic Housing Land Availability Assessment - <https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan/strategic-housing-land-availability-assessment>

The London Plan Housing Targets -

https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

Census data

ONS 2011 Census data - <https://www.ons.gov.uk/census/2011census/2011censusdata>

ONS 2021 Census data - <https://www.ons.gov.uk/census>

Glossary of Acronyms

DCLG	Department for Communities and Local Government (now MHCLG, Ministry of Housing, Communities and Local Government)
LDD	London Development Database
LSOA	Lower-level Super Output Area
MSOA	Middle-level Super Output Area
MYE	Mid-year Estimate
NISRA	Northern Ireland Statistics & Research Agency
NPP	National Population Projections
NRS	National Records Scotland
ONS	Office for National Statistics
SAPE	Small Area Population Estimates
SNPP	Subnational Population Projections

GLA INTELLIGENCE

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