

# Queensland Government household projections, 2023 edition: Methodology

## Introduction

To complement the Queensland Government population and dwelling projections, the Queensland Government also produces projections of the types of households the population lives within, and an individual's relationship to other people within their household (living arrangement).

### What is a household?

Households are a demographic concept used to describe where and how people live in relation to other people. Adopting the operational definition of a household used by the Australian Bureau of Statistics (ABS) as part of the 2021 Census of Population and Housing, a household is *one or more people, at least one of whom is at least 15 years of age, usually resident in the same private dwelling*<sup>1</sup>.

A private dwelling is a physical structure which is intended to have people live in it without amenities nor facilities shared with other dwellings. Examples of a private dwelling include a house, apartment, caravan and cabin. A household is the group of people who usually live within a specific, individual dwelling. A person may visit, eat and sleep in more than one dwelling, but the dwelling they live in most of the time is their place of usual residence, and they belong to the household associated with that dwelling. As such, a person can only belong to one household. As households are comprised only of persons who are usual residents, temporary residents and visitors are not represented in these household projections.

Households are categorised based on the number and ages of, as well as relationships between people living within the household (i.e., their living arrangements). For the 2023 edition of the Queensland Government household projections, the types of households are:

- Couple family with children
- Couple family with no children
- One parent family
- Other family
- Multiple family household
- Lone person household
- Group household.

These household types are defined based on the living arrangements of the people that comprise them (see page 5).

### What is a living arrangement?

Living arrangements are a concept connected to that of households, but describe individual persons as opposed to a grouping of people. A living arrangement for an individual person describes their relationship to other people in their household and can depend on their age.

For the purposes of the 2023 edition of the Queensland Government household projections, each person is classified as either living in a non-private dwelling, or as living within a private dwelling in one of 12 other living arrangement categories:

- Person living in a non-private dwelling
- Child aged under 15 years (in sub-state level projections), otherwise:
  - Child aged under 15 years living with two parents (state-level projections only)
  - Child aged under 15 years living with a single parent (state-level projections only)
- Child aged 15 years and over living with parent(s)

<sup>1</sup> ABS, *Household, Census of Population and Housing: Census dictionary, 2021*; ([abs.gov.au](https://abs.gov.au))

- Partnered with child(ren) aged under 15 years
- Partnered with child(ren) aged 15 years and over only
- Partnered with no children
- Single parent with child(ren) under 15 years
- Single parent with child(ren) aged 15 years and over only
- Living with a family (related or unrelated individual)
- Living in an Other family
- Living alone
- Living in a Group household.

For definitions of these living arrangements and an explanation of how they are determined, see page 4.

The estimated resident population includes people living in both private and non-private dwellings. Households are comprised of persons living in private dwellings only. For the purposes of these projections, people living in non-private dwellings are accounted for in living arrangement projections, but not included in the projection of households.

## Specifications

The 2023 edition of the Queensland Government household projections, which include living arrangement projections, were produced concurrently with, and incorporate the 2023 edition of the Queensland Government population and dwelling projections. As such, the household and living arrangement projections from the 2023 edition reflect the underlying assumptions of the population and dwelling projections.

The 2023 edition of the Queensland Government projections suite uses the 2021 preliminary rebased estimated resident population as the base population and incorporates data from multiple ABS Censuses of Population and Housing, including the 2021 Census.

Household and living arrangement data are released for the following geographic boundaries:

- the State of Queensland
- Greater Brisbane Greater Capital City Statistical Area (GCCSA)
- 10 remaining Queensland statistical areas level 4 (SA4)
- local government areas (LGA) (households only).

Projections were generated for these geographical boundaries, as sourced from Edition 3 of the Australian Statistical Geography Standard (ASGS)<sup>2</sup> and defined by the ABS. The 2021 version of boundaries for LGAs is used.

The previous, 2018 edition of the Queensland Government household and dwelling projections were generated for geographical boundaries from the 2016 edition of the ASGS, which differ from Edition 3 at the LGA level for some regions within Queensland. [Maps of individual regions](#) under Edition 3 and the 2016 edition of the ASGS are available on the Queensland Government Statistician's Office website.

The base year for the 2023 edition is 2021, with time horizons to 2071 for Queensland and to 2046 for sub-state areas. Projections are as at 30 June of each year of the projection horizon.

Household and living arrangement projections for the state of Queensland are available at five-year projection intervals (i.e., 2026, 2031, 2036 through to 2071) for each of the low, medium and high series. Projections for Greater Brisbane GCCSA and the 10 remaining Queensland SA4s are available as per the same specifications as at the state level, except with a horizon of 2046 instead of 2071. LGA-level projections are only available for households, not living arrangements, by five-year projection intervals through to 2046, and for the medium series only.

The specifications of the household projections available for the 2023 edition are summarised in Table 1, and similarly for living arrangement projections in Table 2.

<sup>2</sup> ABS, *Australian Statistical Geography Standard (ASGS) Edition 3, July 2021 – June 2026*; ([abs.gov.au](https://abs.gov.au))

**Table 1 Specifications of household projections released publicly by geography**

Geography	Series	Projection horizon	Projection intervals
State of Queensland	Low, medium and high	2021 to 2071	Five-year
Greater Brisbane GCCSA and 10 remaining SA4s		2021 to 2046	
LGAs	Medium		

**Table 2 Specifications of living arrangement projections released publicly by geography**

Geography	Series	Projection horizon	Projection intervals
State of Queensland	Low, medium and high	2021 to 2071	Five-year
Greater Brisbane GCCSA and 10 remaining SA4s		2021 to 2046	

## Uncertainty and low, medium and high projection series

The Queensland Government projections should not be interpreted as precise point estimate forecasts or predictions. Rather, the projections reflect the outcomes of applying a set of assumptions about the future to a base population. As a result, the accuracy of these projections is dependent on the extent to which the underlying assumptions eventuate.

The household and living arrangement projections reflect assumptions about the propensity of individuals to be in specific living arrangements, as well as household size and formation. In addition, they also depend on the core assumptions of fertility, mortality and migration underlying the 2023 edition of Queensland Government population projections, and assumptions about the magnitude, timing and spatial distribution of housing supply underpinning the dwelling projections at the statistical area level 2 (SA2) and/or LGA level. For more information and details of the assumptions that underpin the 2023 edition Queensland government population projections, see the [Queensland Government population projections: Methodology and assumptions paper](#), and for the dwelling projections, see the [Queensland Government dwelling projections: Methodology paper](#).

To account for uncertainty, three projection series (low, medium and high) for households and living arrangements have been developed. Each series reflects a unique combination of assumptions and factors impacting population change, and when combined with the same set of assumptions about the propensity of individuals to be in specific living arrangements and household size and formation, collectively illustrate a range of possible future outcomes for households and living arrangements in Queensland and its sub-state regions.

Each of the low, medium and high series projections of households and living arrangements align with the corresponding series of the population and dwelling projections and were either derived from, or concurrently with, the population and dwelling projections.

While low, medium and high projection series are released for households and living arrangements for the state as well as Greater Brisbane GCCSA and the 10 remaining SA4s, at the LGA level, only medium series household projections are available.

LGA household projections are modelled from population projections by age and sex at the SA2 level, as well as dwelling projections at the LGA and SA2 levels. Dwelling projections rely on future dwelling supply information drawn from local government planning schemes which are subject to revision over time. The rate at which the available dwelling supply is taken up in future is contingent upon economic conditions and decisions made by the business community and is subject to uncertainty. Given this uncertainty, only a medium projection series is produced for dwellings and population at the SA2 level. Following from this, only a medium series of household projections are generated for LGAs.

Users should exercise caution in the interpretation and use of household and living arrangement projections, particularly sub-state level projections where there is a much greater degree of uncertainty than at the state level. The uncertainty in projections increases the further from the base year into the future. Users are advised to consider the combination of assumptions underpinning each series when using the projections, as outlined in this paper and the methodology and assumptions papers for both the population and dwelling projections, referenced above.

## Impacts of the COVID-19 pandemic

The 2023 edition of the Queensland Government projections suite incorporated the most up-to-date and relevant data available at the time of production and aims to reflect the latest population outcomes and trends in the available data. There was still a considerable level of uncertainty around some future demographic impacts due to the COVID-19 pandemic.

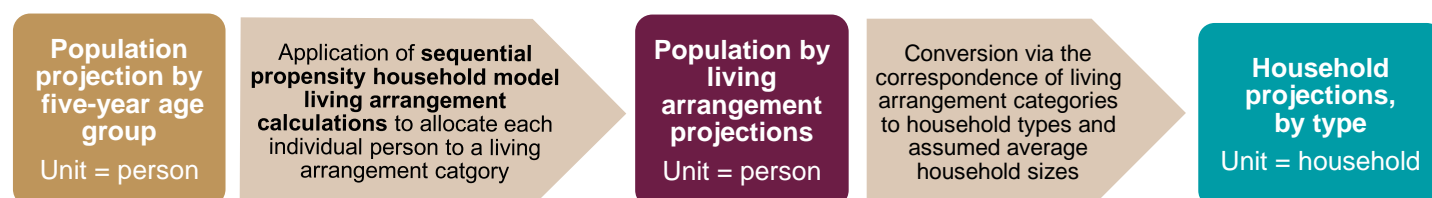
The World Health Organization declared the novel coronavirus (COVID-19) a worldwide pandemic on 11 March 2020. The pandemic and associated response measures and restrictions enacted by different levels of government both within Australia and internationally, have impacted population growth in Australia since early 2020. Most restrictions and associated health measures were eased incrementally in Australia during 2022, however some demographic impacts of the COVID-19 pandemic were still apparent at the time of production of the 2023 edition projections. Queensland's population is expected to be smaller and slightly older than what was anticipated prior to the COVID-19 pandemic.

While past and current trends provide background to the possible demographic outlook for Queensland, there is uncertainty around how these trends will evolve over a 50-year projection horizon for Queensland and a 25-year projection horizon at the sub-state level. For an overview of recent population growth in Queensland, and how this has varied from historical trends since the onset of the COVID-19 pandemic in early 2020, see the [Queensland Government population projections: Background research paper](#).

## Model methodologies

Queensland's state and sub-state household and living arrangement projections are generated for each projection interval, in sequential stages by variable and geography, and rely on different models across geographical levels. The production of household and living arrangement projections for both the State of Queensland and the Greater Brisbane GCCSA and 10 remaining SA4s is summarised in Figure 1. Household projections for LGAs were developed using a different method.

**Figure 1 Sequential stages of modelling variables for State and Greater Brisbane GCCSA and 10 remaining SA4s**



## State, Greater Brisbane Greater Capital City Statistical Area and statistical areas level 4 projections

Household and living arrangement projections were produced for the State of Queensland, Greater Brisbane GCCSA and 10 remaining SA4s using a sequential propensity household projection model<sup>3</sup>. The model uses the population of Queensland and each of the regions by five-year age group, as per the Queensland Government population projections, 2023 edition, as an input.

### Living arrangements

Firstly, for each projection interval, living arrangement projections for Queensland are generated. Each five-year age group of the Queensland population is successively subdivided based on their age-specific likelihood to have certain characteristics or specific types of relationships with another person they live with, until they are allocated to one of the 13 living arrangement types. The likelihoods of members of a population to have certain characteristics or specific types of relationships with another person they live with are informed by ABS 2021 Census of Population and Housing data.

Figure 2 on page 9 depicts the process of subdividing the population following a tree-like decision structure, where the share of the population allocated to each branch in a subdivision is the likelihood of having a certain characteristic.

<sup>3</sup> Tom Wilson, *The sequential propensity household projection model*, Demographic Research, 28(24), 681-712, 2013



Some of the characteristics used to allocate the population to a living arrangement include:

- Whether someone lives in a private dwelling or a non-private dwelling
- Whether someone (living in a private dwelling) is aged 15 years or over
- Whether someone (aged 15 years or over) is considered partnered or single
- Whether someone (aged 15 years or over) has their children living with them, and if so, the age of their children
- Whether someone (aged 15 years or over) is living with their parent/s
- Whether someone (aged 15 years or over) is living with any person/s they are related to by blood, marriage (registered or de facto), adoption, step or fostering, that isn't their parent or child
- Whether someone is living alone or with other people.

Each person aged 15 years or older and living in a private dwelling is categorised as either partnered or single. For the purpose of generating living arrangement projections, someone is considered partnered if they live in the same household as a person they are in a registered marriage or de facto marriage with, whether they be of the opposite or same sex. A person is considered single if they are not partnered.

Persons living in an Other family are living with people who are all related to each other by either blood, marriage (registered or de facto), adoption, step or fostering, but there is no couple or parent-child relationship identified between household members.

### Households by household type

Following the projection of persons by living arrangement, household projections are generated by allocating the population in each living arrangement category to corresponding household types. Table 3 summaries the types of households that people in each living arrangement category may live within.

Each person, excluding persons living a non-private dwelling, is allocated to a single household type, dependent on the relationship between living arrangements and household types (see Table 3). As a result, the number of people in each living arrangement will determine the number of households by type that can be formed.

For each household type, an individual household must contain persons from a combination of specific living arrangements by definition. The basis for an individual household is an exact number of representative adults (persons aged 15 years or over, and of a living arrangement specific to the household type), with the number informed by definition or assumptions based on ABS 2021 Census of Population and Housing data. For example, an individual Couple family with no children must contain two persons (representative adults) in the living arrangement Partnered with no children, and cannot contain any persons in a child living arrangement, by definition.

The allocation of the population of each living arrangement to household types is informed by the following assumptions about representative adults by household type:

- Couple family with children: Two persons in either of the categories of Partnered with child(ren) aged under 15 years or Partnered with child(ren) aged 15 years and over only form the basis of this household type.
- Couple family with no children: Two persons in the Partnered with no children category form the basis of this household type.
- One parent family: Each person in either of the categories Single parent with child(ren) under 15 years or Single parent with child(ren) aged 15 years or over form the basis of One parent family.
- Other family: An Other family household is formed from persons in the Living in an Other family category, with the total number of other families informed by the assumed average size of an Other family household (around 2.1 for Queensland in 2021).
- Lone person household: Each person in the Living alone category forms a lone person household, by definition.
- Group household: A Group household is formed from persons in the Living in a Group household category, with the total number of Group households informed by the assumed average size of a Group household (around 2.2 for Queensland in 2021).

As noted previously, persons living in a non-private dwelling are not allocated to a household, as by definition, households reside in private dwellings only.



**Table 3 Correspondence between living arrangements and household types**

Living arrangement	Couple family with children	Couple family with no children	One parent family	Other family	Multiple family household	Lone person household	Group household
Child aged under 15 years living with two parents (state only)	✓				✓		
Child aged under 15 years living with a single parent (state only)			✓		✓		
Child aged under 15 years (sub-state only)	✓		✓		✓		
Child aged 15 years and over living with parent(s)	✓		✓		✓		
Partnered with child(ren) aged under 15 years	✓				✓		
Partnered with child(ren) aged 15 years and over only	✓				✓		
Partnered with no children		✓			✓		
Single parent with child(ren) under 15 years			✓		✓		
Single parent with child(ren) aged 15 years and over only			✓		✓		
Living with a family (related or unrelated individual)	✓	✓	✓		✓		
Living in an Other family				✓	✓		
Living alone						✓	
Living in a Group household							✓
Person living in a non-private dwelling	Persons residing in non-private dwellings are not assigned to a household						

The number of Couple families with children is not only informed by the number of representative adults in the corresponding living arrangement types, but is also balanced against the number of children available to form these households, i.e. persons who are a Child aged under 15 years living with two parents or Child aged 15 years and over living with parent(s). Similarly for the number of One parent families, the number of persons who are a Child aged under 15 years living with a single parent or Child aged 15 years and over living with parent(s) determine the number of families.

Persons in the Living with a family (related or unrelated individual) category are allocated to a range of household types. While all persons in this category are aged 15 years or over living in a private dwelling, they are not treated as representative adults, so do not determine the number of households that are formed.

Following this, the number of Multiple family households are determined, with the projected number of families allocated to either a single or multiple family household. A single-family household contains only one family, and is either a Couple family with children, Couple family with no children, One parent family or Other family. A Multiple family household is a household made up of more than one family, living together in the same dwelling.

The number of families in a Multiple family household may vary between each Multiple family household, as may the combination of family types that comprise a Multiple family household. The share of each family type allocated to Multiple family households is informed by ABS 2021 Census of Population and Housing data. In Queensland, around 9 in 10 families are allocated to single family households for each family type.

## Modelling process differences between state and Greater Brisbane GCCSA and 10 remaining SA4s

Differences in the processes used to model living arrangement and household projections for Greater Brisbane GCCSA and the 10 remaining SA4s compared to that for the state level, are as follows:

- Projections for Greater Brisbane GCCSA and the 10 remaining SA4s are underpinned by region-specific assumptions about living arrangement propensities and household formation and size, which may differ to corresponding state-level assumptions.
- State-level projections are available for the categories of Child aged under 15 years living with two parents and Child aged under 15 years living with a single parent, however, these are combined into the single category Child aged under 15 years at the sub-state level.
- Living arrangement and household projections for Greater Brisbane GCCSA and 10 remaining SA4s are constrained to be additively consistent with state-level figures.

## Local government area projections

Household projections are not directly modelled at the LGA level. Instead, projections of households by type are generated for SA2s, which are then concorded to produce LGA-level figures. SA2 household projections are not published and are produced only for the purpose of creating LGA projections. Projections of households by type for SA2s are modelled following a process of several steps.

Initially, household by type figures for SA2s in the base year (2021) are derived.

- This base set constrains counts of households by type at the SA2 level from the ABS 2021 Census of Population and Housing Census to the number of households by type in 2021 generated for Greater Brisbane GCCSA and the 10 remaining SA4s.
- This process aligns the Census-based SA2 household counts to counts at the higher level of geography which are consistent with the estimated resident population in 2021.

Next, projections of total households at the SA2 level are generated.

- The number of total households in each SA2 is projected forward from the number in the 2021 base set for each successive five-year interval by applying either the rate of change in dwellings or population, specific to each combination of SA2 and projection interval. These SA2 projections are then constrained to be additively consistent to the number of total households in Greater Brisbane GCCSA and the 10 remaining SA4s.
- These total household figures for SA2s are used as a constraint during the process of projecting households by type at the SA2 level.

Following this, projections of households by type are generated for each SA2 by five-year projection interval.

- A process similar to that used to generate living arrangement projections at the state level is applied at the SA2 level, using the Queensland Government population projections for each SA2 and five-year age group as an input. These pseudo-living arrangement projections at the SA2-level are then converted to provisional counts of households by type. This approach accounts for individual SA2-specific age structures on the projected number and type of households at the SA2 level.
- These provisional SA2-level projections of household by type are used to produce a final set of projections, sequentially for each projection interval. The projected growth rate of provisional households, for each SA2, projection interval and household type is calculated. These growth rates are applied to the base set of SA2 households by type in 2021 to project the number of households for 2026 or are applied to the final projected households by type for the previous projection interval for years beyond 2026.

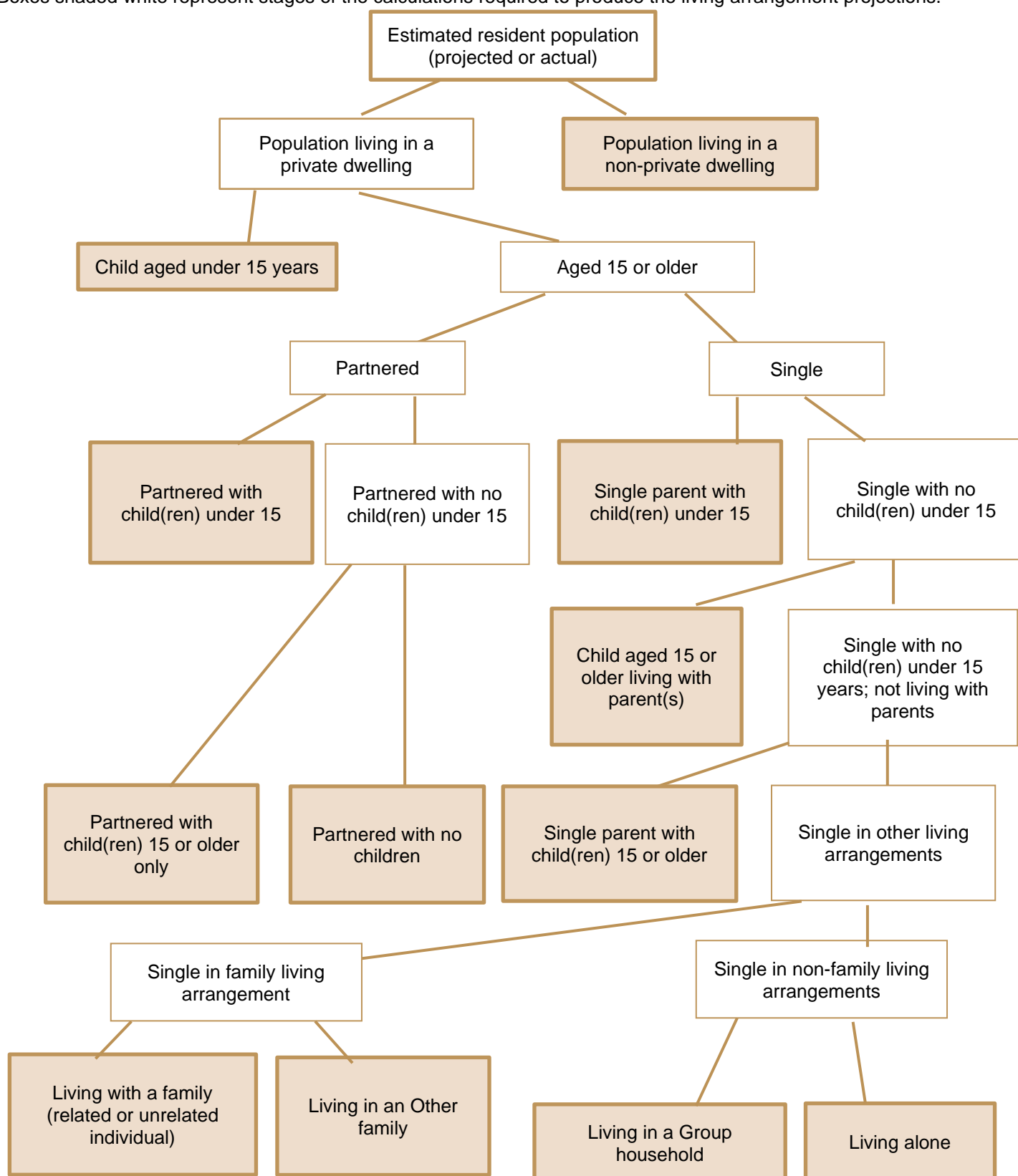
The resulting number of SA2 households by type for 2026 or beyond are then scaled using iterative proportional fitting, to constrain to both the projected number of total households by SA2 and projected households by type at the level of Greater Brisbane GCCSA and the 10 remaining SA4s.

Finally, projections of households by type for LGAs for each projection interval are concorded from SA2-level figures.

**Figure 2 Outline of the sequential propensity household model living arrangement calculations**

Boxes shaded gold represent the 12 living arrangement categories that sub-state projections are produced for.

Boxes shaded white represent stages of the calculations required to produce the living arrangement projections.



Source: Tom Wilson, *The sequential propensity household projection model*, Demographic Research, 28(24), 681-712, 2013