Government of Western Australia
Department of Treasury

Geographic Boundaries in Western Australia

A guide for analysts and data users

v1.0

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This guide has been compiled by the Department of Treasury's Program Evaluation Unit (programevaluation.wa.gov.au) with the support of Landgate and data.wa.gov.au.

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Contents

Introduction

Background

Public sector data frequently refers to location. For instance, a survey of public transport users may collect data based on postcodes, or a school may only accept students from a defined intake area.

However, over time, different agencies have taken different approaches to dividing the State into areas relevant to their work. This can make public sector data difficult to interpret and compare.

This publication

This publication provides an introduction to the geographic boundaries used by public sector agencies in Western Australia. It gives an overview of common problems encountered when working with Australian and Western Australian location-based data, and a starting point for overcoming some of these problems. It has been prepared for analysts with minimal experience in geography and spatial sciences, and covers the following:

- how location-based data is used, and some of the problems that arise when boundaries are designated on an *ad hoc* basis;
- types of boundaries used by Western Australian agencies;
- the Australian Statistical Geographic Standard;
- guidance on working with location-based data; and
- best practices in setting boundaries.

It also includes a set of detailed appendices documenting:

- types of boundaries included in the Australian Statistical Geographic Standard; and
- an inventory of major boundaries in use in Australia and Western Australia, along with descriptions and information about how they have been set.

These appendices aim to help readers better understand the location context of agency data, and where possible, understand how different datasets are geographically related.

Working with boundaries: an overview

Location-based data

The term ‘location’ may bring maps to mind. However, location-based information comes in many forms. For example, it may be encountered as a column listing suburb names in a spreadsheet, or a description of boundaries in a contract.

In working with public sector data, it is frequently necessary to understand how different agencies define location. Without this information, it is difficult to understand where government funds are directed, determine who has access to government services, or assess the merits of investing in different regions.

Location-based data can provide a range of insights, particularly when combining data from more than one agency. For example, a researcher may investigate whether residents in areas with high pollution have increased contact with local health services, or whether there is a correlation between local availability of childcare and contact with juvenile justice services.

Matching boundaries

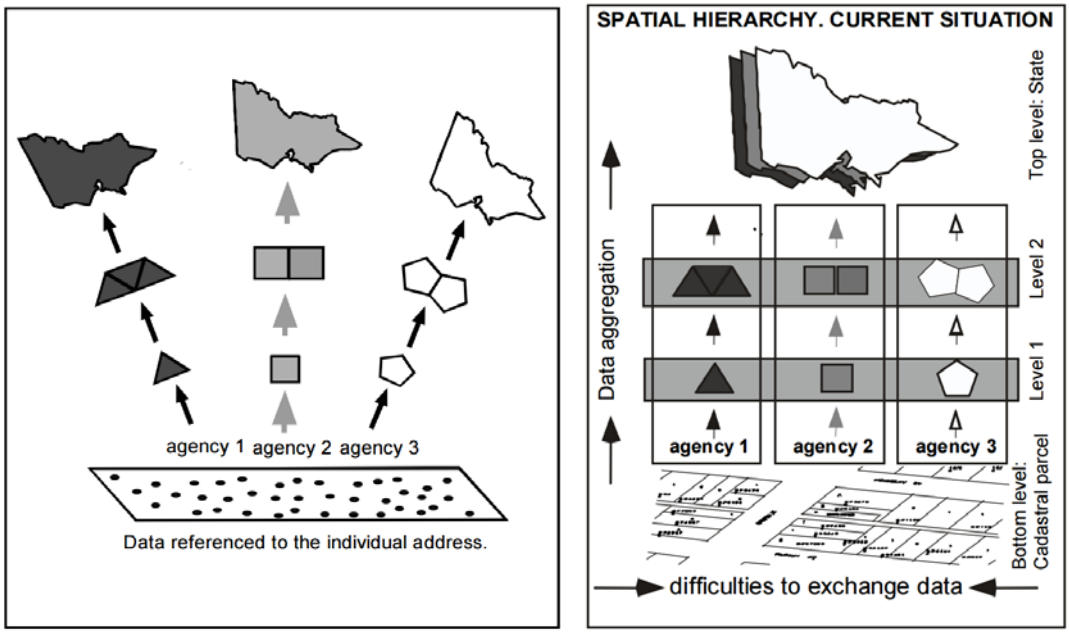
One of the greatest challenges in working with location-based data is the fact that agencies tend to define regions in different ways.

Even well-known terms, such as ‘the Kimberley’ or ‘the South-West’ may have different meanings in different contexts. Similarly, data labelled ‘Perth’ may refer to a suburb, an electorate, a local government area, or the greater metropolitan area, and the intention of the agency that collects the data is not always clear.

This mismatch is, in part, due to the long history of administrative boundaries. In many cases, boundaries were originally drawn up by individual agencies for a specific purpose, with no expectation that they would be applied to data used in complex, whole-of-government analysis.

Figure 1[1] illustrates the problem of relating data collected by various agencies using different boundaries.

Figure 1 Difficulties in exchanging data between agencies with different boundaries



Source: Eagleson et. al. (1999)

In addition to historical context, there are a number of other problems commonly encountered by those seeking to work with location-based data:

- even where boundaries are based on a common standard (such as Local Government Areas or Statistical Areas, as explained in the following sections), agencies frequently fail to specify which standard (or version of the standard) has been used – hence, it can be difficult or impossible for data users to interpret the location data provided in a dataset;
- some agencies and programs have simply never defined a service area, and hence cannot provide information about the locations their services are intended to impact – hence, the only location information available about the service is the address of a head office;
- some services relate to an area that is locally understood, but has never been defined for administrative purposes – for instance, the 'Fitzroy River Valley', and
- while some agencies have made their boundary definitions openly available (for instance, on data.wa.gov.au) others are reluctant to share this data, even within the public sector.

[1] Eagleson, S., Escobar, F., & Williamson, I. P. (1999). Hierarchical Spatial Reasoning applied to the Design of Administrative Boundaries Using GIS. 6th South East Asian Surveyors Congress, Fremantle, Australia. Retrieved from: http://csdila.ie.unimelb.edu.au/publication/conferences/Hierarchical_Using_GIS.pdf

This can make it difficult to understand the locations provided in even simple datasets, let alone combine data from a range of agencies to undertake more sophisticated analysis.

Case Study: The Regional Services Reform Unit

The Regional Services Reform Unit (RSRU) was established in the Department of Regional Development in 2015 with the aim of improving the lives of Aboriginal people in regional and remote Western Australia.

An important piece of preliminary work for the RSRU was to determine the cost of delivering services to Aboriginal Western Australians in the regions. RSRU staff found that this analysis was complicated by the fact that various State Government agencies used different administrative boundaries to define their service areas.

In order to answer the question ‘how much are we spending on service delivery?’ for a given location, the RSRU had to engage geographers from the University of Western Australia, and undertake a lengthy process to convert expenditure data by region to a common geographical standard.

Boundaries in use in Western Australia

Agencies take a variety of approaches to dividing up Australia or the States into different service areas. Many (but not all) agencies adopt a commonly used existing geography as the base, for example, using Local Government Areas (LGAs) or regions defined by the Australian Bureau of Statistics.

The Australian Statistical Geography Standard

The most comprehensive Australian standard for defining geographic boundaries is maintained by the Australian Bureau of Statistics (ABS). It is the Australian Statistical Geography Standard (ASGS), and was released in 2011 to replace the older Australian Standard Geographical Classification (ASGC). A second edition was released in September 2016.

Older ABS standards

While using the ABS website, you may come across terms that do not match those in the ASGS – for instance 'Census Collection District'.

This is because older ABS web pages and documents still refer to the ASGC. The ABS provides a number of tools and documents to assist users in working with older, ASGC-based, data, and can also provide further support on request.

Appendix 1 provides a list of the terminology used under the ASGC standard.

The core ASGS regions are called Statistical Areas (SAs), ranging from SA1 (small areas) to SA4 (large areas). SA1s are built from even smaller areas, called Mesh Blocks. The ASGS also provides a range of alternative boundaries, including an Indigenous geography, Sections of State (defining built-up areas of Australia's cities and towns), Remoteness Areas (representing relative access to services), and Greater Capital City Statistical Areas (the wider economic areas of State and Territory capitals).

Additionally, the ABS provides a selection of boundaries that *approximate* other commonly-used geographies, which are built from Statistical Areas and Mesh Blocks.[2] These boundaries include Postal Areas, State Suburbs, Tourism Regions, Commonwealth and State Electoral Divisions, and Local Government Areas. These allow users to view ABS statistics – for example, Census data – across regions that approximate these familiar geographies.

Appendix 1 provides a visual overview of all the boundaries defined under the ASGS, with information about how different types of boundaries can be used.

Other State and Commonwealth boundaries

Two of the most familiar boundaries are LGAs and postcodes.

Local Government Areas

LGAs are simply the administrative divisions managed by local governments. They have names that vary depending on size and location – for instance, the *City* of Vincent, *Town* of Victoria Park, and *Shire* of Woodanilling are all LGAs. In some cases, local governments will also group together to form a Regional Council.[3]

Western Australian agencies frequently use LGAs as a starting point for defining boundaries, but make some changes to reflect their own operational needs. For example, agencies may merge or split an LGA to create larger or smaller regions, or may make small adjustments to boundaries to reflect their resources on the ground.

Further, LGAs change over time as boundary amendments are gazetted. If an agency initially defines boundaries based on LGAs in a given year, but does not update those boundaries to reflect changes in LGAs, the agency's boundaries will increasingly diverge from current LGA boundaries over time.

Postcodes

Postcodes are defined by Australia Post to allow for the efficient processing and delivery of mail. Consequently, postcodes are based primarily on operational efficiency of the postal service, rather than being designed for demographic or other analysis. Postcode boundaries also change over time, as Australia Post optimises its delivery network.

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2 In the 2011 ASGS, Local Government Areas are constructed from Mesh Blocks, while other approximated boundaries are constructed from Statistical Areas. In the current 2016 ASGS, Commonwealth and State Electoral Districts are constructed from SA1s, Tourism Regions from SA2s, and all other boundaries are based on Mesh Blocks. See Appendix 1 for an explanation of Mesh Blocks and Statistical Areas.

3 For example, the Tamala Park Regional Council comprises the Town of Cambridge, City of Joondalup, City of Perth, City of Stirling, Town of Victoria Park, City of Vincent and City of Wanneroo.

Postcode boundary data is proprietary, and can be purchased from PSMA (see 'What is PSMA?' at the end of this chapter for more information) and from Australia Post. However, for the reasons detailed above, postcodes are not ideal for analysis and boundary setting.

The ABS provides an alternative set of boundaries called Postal Areas. This is an approximation of postcodes, built from Mesh Blocks. Appendix 1 provides further information about Postal Areas, as well as other approximated boundaries published by the ABS.

Other boundaries

Many State and Commonwealth agencies set boundaries for their own purposes that do not match any well-known standard. For example the Department of Education's local intake boundaries are based on written descriptions of streets published in the Government Gazette.

Suburbs and some localities are also gazetted. These are frequently based on commonly-understood place names, and have been largely formalised across Australia since 1996 under a program run by the Committee for Geographical Names in Australasia. 'Suburb' generally refers to a place within a city or larger town and 'locality' to a place outside cities and larger towns. Gazetted suburbs and localities do not cover the whole of Australia.

In some cases, boundaries are based on hand-drawn maps compiled many decades ago. In others, boundaries may be based on physical surveys – for example, the cadastre maintained by Landgate.

What is the cadastre?

The cadastre is the legal boundary definition of registerable land parcels within the State of Western Australia.

Some administrative boundaries are available on data.wa.gov.au (State), data.gov.au (Commonwealth), or on the relevant agency's website. However, many more are used largely for internal purposes, and are difficult or impossible to locate online. Appendix 2 and Appendix 3 provide non-exhaustive lists of Commonwealth and State boundaries respectively, grouped by theme. Where available, the appendices note any standard geography used as a base, and provide a link to a map or further information.

Additionally, public company PSMA Australia has recently released the Geocoded National Address File (G-NAF), as explained in the box overleaf. While the G-NAF defines points rather than boundaries, it can be a useful tool for agencies working with data on an individual address-level basis.

What is PSMA?

PSMA Australia (PSMA) is an unlisted public company formed by the nine governments of Australia to collate and standardise, format and aggregate location data from each of the jurisdictions into authoritative location-based national datasets.

PSMA produces the Geocoded National Address File (G-NAF). G-NAF contains more than 13 million Australian physical address records. The records include geocodes. These are latitude and longitude map coordinates. G-NAF does not contain personal information.

Local government

Local governments are responsible for defining wards. These must conform to the requirements of the *Local Government Act 1995,* and must be reviewed periodically (at least every eight years). Ward boundaries are based on factors such as community of interest, physical and topographic features, demographic trends, economic factors, and the ratio of councillors to electors in various wards.[4]

Reading and resources

ABS: Statistical Geography Home Page

data.wa.gov.au: 'Boundaries' group of datasets

data.wa.gov.au: LGA boundaries

data.wa.gov.au: Localities

data.wa.gov.au: Ward boundaries

PSMA/data.gov.au: Australian administrative boundaries

PSMA/data.gov.au: G-NAF

4 Local Government Advisory Board, (2014). Ward Boundaries and Representation: The Processes Associated with Reviewing Ward Boundaries and Representation. Retrieved from https://www.dlgc.wa.gov.au/Publications/Documents/LGAB_ProcessesAssociatedWardRepresentationReviews.pdf

Using location-based data for analysis

Key considerations

As explained in previous chapters, combining and analysing data can be difficult where the boundaries used to allocate values to different geographic areas do not match.

Consequently, working on projects that source data from multiple agencies can be particularly challenging. It is important not to underestimate the work that may be required to establish a common geography for data from a variety of sources. Time and resources should be allocated to this work when scoping a whole-of-government analytics project.

Analysts should also consider whether external help may be required, and identify other agencies or consultants who can provide that assistance early in the process. For example, geographers, agencies with geospatial functions such as Landgate, and managers of data repositories such as data.wa.gov.au may be able to provide useful advice.

The following boxes outline some of the key considerations in setting up a project that relies on data with a location-based component, and some of the most important questions to ask data providers.

Things to consider when starting your project

Will I be working with data from multiple agencies? Do the agencies use different boundaries?

What geography do I want to use when generating my results?

Are there any tools that can help me work with the data?

Will I need to seek assistance from experts to work with the data? Whom can I ask for help?

How accurate do my results need to be? What assumptions can I make to generate results that are acceptably accurate?

Questions to ask data providers

If the data refers to a service, what geographical area does the service cover?

How are your agency's boundaries set? Statistical Areas, Local Government Areas, other?

When did your agency last update the boundaries?

Who is the point of contact in your agency for boundary management and geospatial information?

Do you create concordance (correspondence) files to convert your data to other boundary systems? (*See below for more information on concordance*s.)

Has anyone else tackled this problem before? Can I ask them for advice and guidance?

Concordances (correspondences)

A concordance (or correspondence) is a product that allows data from one set of geographical regions to be converted to another set of geographical regions. When working with data from multiple sources, concordances will be used to convert all datasets to a common geography.

The Queensland Statistician's Office provides advice on common types of concordances, and on creating and applying concordances, as shown in the boxes below.

Types of concordances

In order to convert data from one geographical boundary to another, each region in the new boundary is assigned percentages of data from the old regions. These percentages in the concordance can be constructed using any number of variables. The most commonly used variables include population, dwelling counts and area.

A population-based concordance derives its percentage splits using population. This type of concordance is useful when concording demographic-based datasets, such as labour force and family composition.

A dwelling-based concordance derives its percentage splits using dwelling counts. This type of concordance is useful when concording dwelling-based datasets, such as tenure type of dwelling structure.

An area-based concordance derives its percentage splits using area. This type of concordance is useful when concording area-based datasets, such as agricultural production.

While these three concordance types are the more commonly used concordances, a concordance can be created from any variable to create a more specific concordance. Examples of these variables can include Indigenous persons or a particular age-by-gender cohort.

Source: Queensland Government Statistician's Office

Creating and applying concordances

There are several approaches to creating a concordance file. Determining the best method will depend upon how it is intended to be used.

Hierarchical geographical datasets

Concordances for hierarchical geographical datasets, such as certain parts of the Australian Statistical Geography Standard (ASGS), are simple to create, because each child geographical unit will sit perfectly within a parent geographical unit. There are no percentage splits for a concordance of this type because they are purposely created to align exactly.

Non-hierarchical geographical datasets*

Concording non-hierarchical datasets is a more complex task, because there are several methods for doing so.

The most accurate method for creating a concordance for non-hierarchical datasets is to use the smallest geographical dataset available as a building block for calculating the percentage splits. Examples of some of the smaller geographical datasets that can be used include the Geocoded National Address File (G-NAF), Mesh Blocks (MB) or the Digital Cadastral Database (DCDB).

Another less common and less accurate method is to apply a physical split of one region using another region, and calculating the percentage of the original area within each split region.

Source: Queensland Government Statistician's Office

* *ASGS hierarchical geographical datasets are also referred to as 'allocation tables', under standard ABS terminology.*

The ABS also provides a range of pre-made concordance tables on its website, and lists others that can be provided upon request.

Each file shows the concordance between two specific sets of boundaries. For example, Figure 2 shows the concordance between the ABS's 2011 SA1s (Statistical Area Level 1) and 2011 LGAs (Local Government Areas). The first two columns show the ABS's codes for each SA1, and the third and fourth columns show the code and name for each LGA. The final two columns indicate how much of each SA1 falls within the boundaries of the corresponding LGA. (For instance, 23.7 per cent of SA1 5105201 is within the Kalamunda LGA, and 76.3 per cent within the Mundaring LGA.) In this example, the percentages are based on population.

Figure 2 Example of an ABS concordance between 2011 SA1s and 2011 LGAs

Australian Bureau of Statistics

1270055006C001 Statistical Area Level 1 2011 to Local Government Area 2011

Released at 11.30am (Canberra time) 27 June 2012

Table 3 Correspondence

SA1_MAINCODE_2011	SA1_7DIGITCODE_2011	LGA_CODE_2011	LGA_NAME_2011	RATIO	PERCENTAGE
50402105110	5105110	56090	Mundaring (S)	1	100
50402105201	5105201	54200	Kalamunda (S)	0.2373357	23.7335742
50402105201	5105201	56090	Mundaring (S)	0.7626643	76.2664258
50402105301	5105301	56090	Mundaring (S)	1	100

Source: Australian Bureau of Statistics

Reading and resources

'Australian Statistical Geography Standard Correspondences' – concordance files published by the ABS.

ABS Maps tool – allows users to overlay both ASGS 2011 and ASGS 2016 boundaries on a map.

Setting boundaries: best practices

This publication is largely aimed at data users, who encounter analytical problems as a result of the boundaries that have been applied. However, it would not be complete without a brief mention of best practice in setting those boundaries in the first place.

The key challenge, for those setting boundaries, is to undertake a standardised, co-ordinated approach to the fullest extent possible, without compromising usefulness. For example, when the Western Australian Police establish geographic districts, those districts take into account the real distribution of officers and facilities on the ground. (In fact, they are based on LGAs with specific adjustments to reflect operations).

This section briefly covers some of the key points to consider when establishing boundaries, and some of the supporting tools and resources that are available.

Key considerations

When setting or revising boundaries, there are four key aspects to consider:

- establishing the intent of the boundary setting process;
- seeking to ensure consistency with other boundaries where possible;
- undertaking appropriate consultation; and
- ensuring the usefulness of the boundary data.

Intent

1. What is the purpose of setting these boundaries? What will they be used for within your agency?
2. How might your data be used by other agencies? Will your choice of boundaries affect how useful it is to others?

Consistency

1. Is there a compelling reason not to base boundaries on a standard geography (that is, the ASGS)?
2. Do similar agencies already have established boundaries that you can adopt? If, for example, a cluster of human services agencies all adopt consistent boundaries, it will be far easier to share and analyse human services data across the public sector.
3. Can the boundaries be based on a geography that is relatively consistent over time? Boundaries that move for non-statistical reasons – for example, electoral and postcode boundaries – are rarely a good choice.

Consultation

1. Do you need to consult with an expert? Geospatial experts may be able to highlight potential issues and provide solutions. Staff from Landgate, data.wa.gov.au, and universities may be able to assist.
2. Who are your stakeholders? Will it be useful to consult with the community or other stakeholders? Can the public or specific stakeholder groups provide input or local knowledge?
3. Who are your internal and external data users? Have you discussed how new boundaries will meet their analytical needs? Are new boundaries going to cause issues or inconsistencies with historical data?

Usefulness

1. What supporting materials can you provide to make things easier for your data users? Consider:
    - Publishing boundaries in a geospatial file format (for example, KML/KMZ, GeoJSON, or FileGeodatabase) as well as a PDF map.
    - Publishing concordance tables if your boundaries are not already consistent with the ASGS.
    - Including detailed metadata about how the boundaries were set, when, by whom, etc.
    - Releasing your boundaries and concordance files on data.wa.gov.au to assist others who are using your data.

Reading and resources

Marine Managed Areas: Best Practices for Boundary Making (US Marine Boundary Working Group)
Note: This guide was prepared for those setting marine boundaries, but provides a good overview of best practice boundary setting in general.

Research Data Management Toolkit: Metadata Standards (University of Western Australia)

ANZLIC Spatial Metadata Resources (ANZLIC: the Spatial Information Council)

Statistical Spatial Framework (Australian Bureau of Statistics)

Next steps

Short of moving to a standard geography across the Western Australian public sector, there are a number of steps agencies can, and are, taking to mitigate problems caused by mismatching boundaries.

- Consulting more extensively with other agencies and data users when establishing new boundaries.
- Providing better documentation to help users understand how boundaries have been set (for example, stating that 'the boundaries in this file are based on 2011 LGAs' provides useful context to your data).
- Ensuring boundary data published to data.wa.gov.au is accompanied by descriptive metadata, and good documentation. (You can also contact opendata@landgate.wa.gov.au to have your dataset added to the site's 'Boundaries' group.)
- Publishing concordance tables.
- Joining the Western Australian Land Information System (WALIS) Council to assist in developing a whole-of-government approach to location information challenges.

At the time of writing, data.wa.gov.au is also investigating the possibility of developing some simple tools to assist users in setting boundaries and developing concordances.

What is WALIS?

Established by the Western Australian Government in 1981, WALIS is responsible for coordinating across-government access and delivery of the location information held by Western Australian Government agencies. WALIS achieves this through committees and the WALIS Office.

The WALIS Office coordinates the implementation of the Location Information Strategy for Western Australia; which provides a direction for the collection, management and sharing of location-based information used to enhance decision-making in Western Australia, including the Shared Location Information Platform (SLIP).

Appendix 1: Australian Statistical Geography Standard

Overview

The Australian Statistical Geography Standard (ASGS) was established by the Australian Bureau of Statistics (ABS) in July 2011 and updated in September 2016, replacing an older standard (the Australian Standard Geographical Classification).[5] A diagram illustrating the ASGS is provided at the end of this appendix.

The ASGS provides a set of boundaries showing different levels of detail. These start at a very low level of detail (for instance, the boundary defining Australia), through to highly detailed boundaries defining very small areas. Each area bounded at a given level is an aggregation of smaller units from the level below – this means that ABS boundaries are consistent with one another, and will always 'line up'.

Figure 3[6] provides a conceptual example of boundaries being aggregated up from a very detailed level (a cadastral level), into mesh blocks, and to a higher level (the administrative boundary shown on the right).

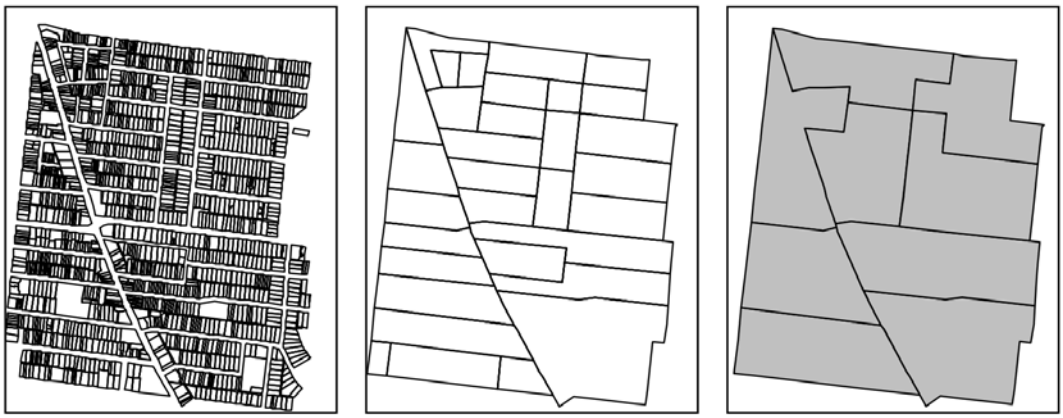
What are mesh blocks?

Mesh blocks are the smallest units in the ASGS. Mesh blocks cover the whole of Australia without overlaps or gaps.

[5] Note that, due to the staged release of the 2016 ASGS, charts and diagrams provided in this section are based on the 2011 ASGS. Additionally, some figures refer to the older 2011 ASGS where 2016 information is yet to be published – this is noted in the text.

[6] Eagleson, S., Escobar, F., & Williamson, I. P. (2000). Hierarchical spatial reasoning applied to the automated design of administrative boundaries using GIS. In, *Proceedings, URISA 2000*, Orlando, U.S.A.

Figure 3 Aggregating smaller parcels of land to create administrative boundaries



Cadastral parcel layer | Mesh block layer | Administration boundary Layer 1, suitable for demographic information

Source: Eagleson et. al. (2000)

Benefits of the ASGS

The ASGS is a useful framework for defining boundaries, because it is relatively stable over time (unlike, for example, electoral boundaries) and has been designed to reflect real settlement patterns.

Additionally, ABS data is prepared using ASGS boundaries. This means that an agency using the ASGS framework to define boundaries can easily combine ABS data with its own to perform analysis and undertake planning.

Statistical Areas and Mesh Blocks

The main administrative levels defined in the ASGS are called Statistical Areas (SAs). The ASGS defines four levels of SA, from SA1 (small areas) to SA4 (large areas). SA1s are themselves composed of collections of mesh blocks. The table below provides more information about SA levels and related boundaries.

Level	Population	Number (in 2016)	Description
Mesh Block	30 to 60 dwellings if populated	358, 122	Smallest region defined. Generally reflects land use. Mesh Blocks have variable populations.
SA1	200 to 800 people; avg. 400 people	57,523	Smallest unit for the release of Census data. Areas with similar characteristics. Built from Mesh Blocks.

Level	Population	Number (in 2016)	Description
SA2	3,000 to 25,000 people; avg. 10,000 people	2,310	Optimised for demographic data; SA2s represent a community that interacts together socially and economically. The ABS provides Estimated Resident Population data, Health and Vitals data, and other non-census data at an SA2 level. Built from clusters of SA1s.
SA3	30,000 to 130,000 people	358	A standardised regional breakup of Australia. Often the functional areas of regional cities, and large urban transport and service hubs. Built from clusters of SA2s with similar regional characteristics.
SA4	100,000 to 500,000 people	107	The largest sub-State regions. Designed to reflect labour markets (labour catchments in large cities, regional labour markets outside, based on Journey to Work analysis). Built from clusters of SA3s.

Source: *Australian Bureau of Statistics*

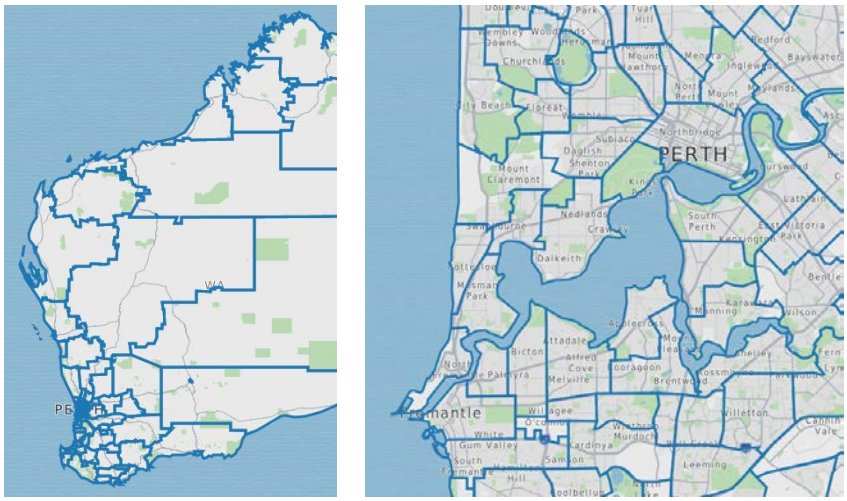
The figures below show examples of various SAs in Western Australia.[7]

Statistical Area Level 1

Source: Australian Bureau of Statistics

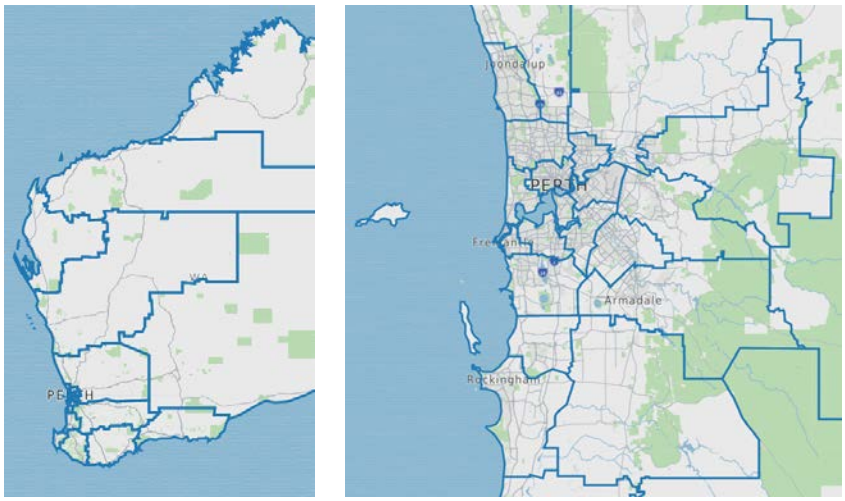
[7] Images sourced from ABS Maps: http://stat.abs.gov.au/itt/r.jsp?ABSMaps

Statistical Area Level 2



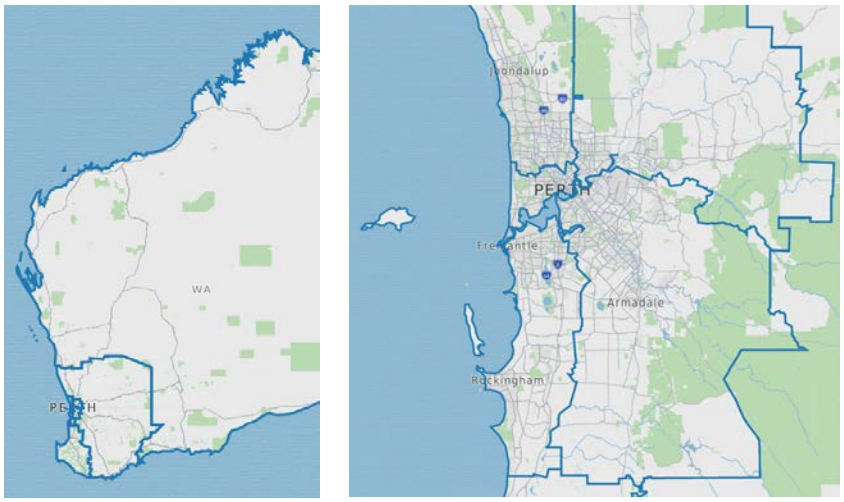
Source: Australian Bureau of Statistics

Statistical Area Level 3



Source: Australian Bureau of Statistics

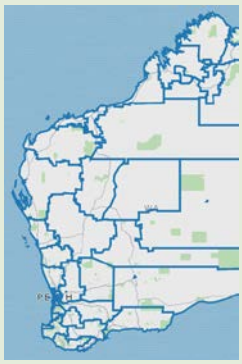
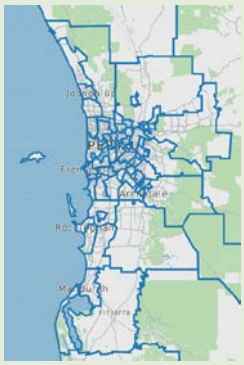
Statistical Area Level 4



Source: Australian Bureau of Statistics

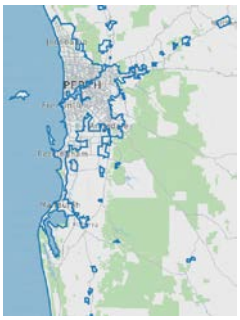
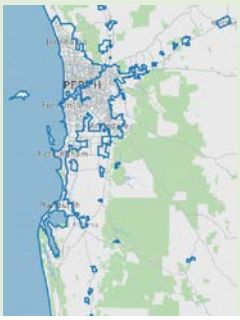
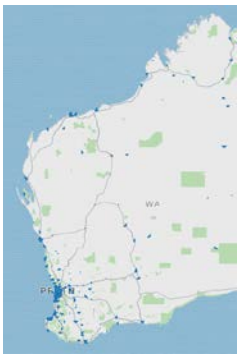
Other ASGS boundaries

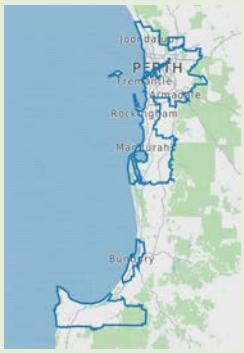
The ASGS also provides other useful boundaries that align with SAs, for instance providing information about Indigenous areas, relative access to services, and urban centres. The table below explains these boundaries and provides an illustration of each where available.[8]

Level	Number	Description	
Indigenous Regions	58 (ASGS 2016)	The Indigenous Structure of the ASGS provides a geographical standard for the publication of statistics about the Aboriginal and Torres Strait Islander population of Australia. It has been designed for the purpose of disseminating Census data by spatial areas relevant to the distribution of Aboriginal and Torres Strait Islander populations.	
Indigenous Areas	430 (ASGS 2016)	The boundaries produced for the Indigenous Structure are constructed from Statistical Areas Level 1 (SA1s). Indigenous Locations (ILOCs) are aggregates of one or more SA1s. ILOCs generally represent small Aboriginal and Torres Strait Islander communities (urban and rural) with a minimum population of 90 Aboriginal and Torres Strait Islander usual residents.	
Indigenous Locations	1,115 (ASGS 2016)	Indigenous Areas (IAREs) are medium sized geographical units designed to facilitate the release of more detailed statistics. IAREs provide a balance between spatial resolution and population size, which provides the ability to release more detailed socioeconomic attribute data. They are created by aggregating one or more ILOCs. Indigenous Regions (IREGs) are large geographical units loosely based on the former Aboriginal and Torres Strait Islander Commission boundaries. They are created by aggregating one or more IAREs. The greater population of IREGs enables greater cross classification of variables when compared with IAREs and ILOCs.	

[8] Images sourced from ABS Maps: http://stat.abs.gov.au/itt/r.jsp?ABSMaps; descriptions provided by the ABS.

Geographic Boundaries in Western Australia

Level	Number	Description	
Section of State	52 (ASGS 2011)	Section of State aggregates the Urban Centres and Localities in each state on the basis of their population.	
Section of State Ranges	89 (ASGS 2011)	Section of State Ranges disaggregate the Section of State on the basis of population ranges. That is, all Urban Centres and Localities in a State or Territory with a particular population range are combined into a single Section of State Range. Section of State Range regions are consequently not contiguous.	
Urban Centres & Localities	1,839 (ASGS 2011)	The Urban Centres & Localities/Section of State structure provides a definition of urban areas. These regions are constructed from whole SA1s. An Urban Centre is a cluster of contiguous SA1s with an aggregate population exceeding 1,000 persons contained within SA1s that are 'of urban character'. Localities consist of contiguous clusters of one or more SA1s with a population of at least 200 'Usual Residents' and representing a clear aggregation of residential population.	
Remoteness Areas	6 (ASGS 2011)	Remoteness Areas (RAs) define relative access to services. The RAs divide Australia into broad geographic regions that share common characteristics of remoteness for statistical purposes. The Remoteness Structure divides each State and Territory into several regions on the basis of their relative access to services. There are six classes of RA in the Remoteness Structure: Major Cities of Australia, Inner Regional Australia, Outer Regional Australia, Remote Australia, Very Remote Australia and Migratory. RAs are based on the Accessibility and Remoteness Index of Australia (ARIA) produced by the Australian Population and Migration Research Centre at the University of Adelaide. RAs are built from SA1s.	

Level	Number	Description	
Greater Capital City Statistical Areas	34 (ASGS 2016)	Greater Capital City Statistical Areas (GCCSA) are geographical areas built from SA4s and are designed to represent the functional extent of each of the eight State and Territory capital cities. They were designed to reflect labour markets using the Census travel to work data. Therefore, the GCCSAs reflect the labour market of each capital city.	
Significant Urban Areas	110 (ASGS 2011)	Significant Urban Areas (SUAs) represent concentrations of urban development with populations of 10,000 people or more using whole Statistical Areas Level 2 (SA2s). They do not necessarily represent a single Urban Centre, as they can represent a cluster of related Urban Centres with a core urban population over 10,000. They can also include related peri-urban and satellite development and the area into which the urban development is likely to expand.	

Source: Australian Bureau of Statistics

Approximated (non-ABS) boundaries

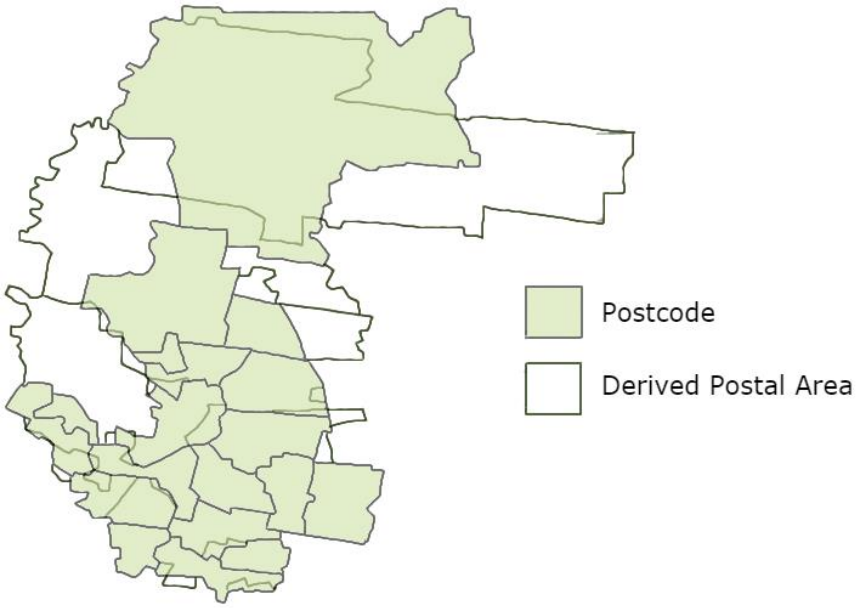
The ASGS includes a set of boundaries called the 'Non ABS Structures'. These are boundaries that matter to users, but that are not defined by the ABS, such as postcodes, suburbs and LGAs.

The ABS creates these boundary sets by approximating the original boundaries as closely as is feasible using Mesh Blocks, SA1s, or SA2s. This allows ABS data to be (at least approximately) mapped using alternative boundary systems.

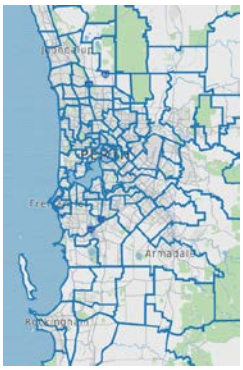
As shown in Figure 4[9], the difference between the approximated boundaries and the original boundaries can be quite different at a large scale, although they may be sufficient for more general analysis.

[9] Eagleson, S., Escobar, F. & Williamson, I. P. (2002b), 'Hierarchical spatial reasoning theory and GIS technology applied to the automated delineation of administrative boundaries.' *Computers, Environment and Urban Systems*, no. 26, pp. 185-200

Figure 4 Comparison of postcodes and derived postal areas in North-West Melbourne

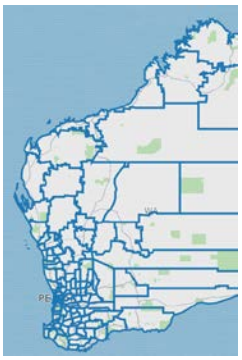


The table below explains these boundaries and provides an illustration of each where available.[10]

Level	Number (in 2016)	Description
Tourism Regions	77	Tourism Regions (TR) are an ABS approximation of Tourism Regions provided by Tourism Research Australia (TRA). They are administrative regions primarily used by Tourism Research Australia for research and policy purposes. They are based on SA2s.
Postal Areas	2,670	Postal Areas (POAs) are an ABS approximation of postcodes created to enable the release of ABS data on areas that, as closely as possible, approximate postcodes. This enables the comparison of ABS data with other data collected using postcodes as the geographic reference. They are based on SA1s (ASGS 2011) or Mesh Blocks (ASGS 2016). 

[10] Images sourced from ABS Maps: http://stat.abs.gov.au/itt/r.jsp?ABSMaps; descriptions provided by the ABS.

Level	Number (in 2016)	Description	
State Suburbs	15,304	State Suburbs (SSC) are an ABS approximation of localities gazetted by the Geographical Place Name authority in each State and Territory. Gazetted Localities are the officially recognised boundaries of suburbs (in cities and larger towns) and localities (outside cities and larger towns). Gazetted Localities cover most of Australia. They are based on SA1s (ASGS 2011) or Mesh Blocks (ASGS 2016).	
Commonwealth Electoral Divisions	168	Commonwealth Electoral Divisions (CED) are an ABS approximation of the Australian Electoral Commission (AEC) electoral division boundaries. They are based on SA1s.	
State Electoral Divisions	448	State Electoral Divisions (SEDs) are an ABS approximation of State electoral districts. They are based on SA1s.	
Australian Drainage Divisions	16	Australian Drainage Divisions (ADDs) are an ABS approximation of drainage divisions. Drainage divisions are defined by major landscape features and climatic zones to form broad hydrological regions as represented in the Australian Hydrological Geospatial Fabric (Geofabric) developed by the Bureau of Meteorology. They are based on SA1s (ASGS 2011) or Mesh Blocks (ASGS 2016).	

Level	Number (in 2016)	Description	
Natural Resource Management Regions	78	Natural Resource Management Regions (NRMR) are an ABS based approximation of Natural Resource Management regions (NRM). They are administrative regions primarily used by the Department of the Environment and Energy and the Department of Agriculture and Water Resources who share responsibility for delivery of the Australian Government's environment and sustainable agriculture programs, which are broadly referred to as Natural Resource Management (NRM). They are based on SA1s (ASGS 2011) or Mesh Blocks (ASGS 2016).	
Local Government Areas	563	Local Government Areas (LGAs) are an ABS approximation of officially gazetted LGAs as defined by each State and Territory (S/T) Local Government Department. The 2016 Australian Statistical Geography Standard (ASGS) edition of Local Government Areas takes into account the August 2016 PSMA Australia edition of the Administrative Boundaries. They are based on allocations of Mesh Blocks.	

Source: Australian Bureau of Statistics

Superseded ABS boundaries

When using the ABS website and other data resources compiled prior to 2011, you may come across terms like ‘Statistical Districts’, ‘Statistical Divisions’, and ‘Census Collection Districts’. These refer to the outdated Australian Standard Geographical Classification (ASGC) that predates the current standard. The terminology used under the ASGC is detailed in the table overleaf.[11]

[11] Descriptions provided by the ABS.

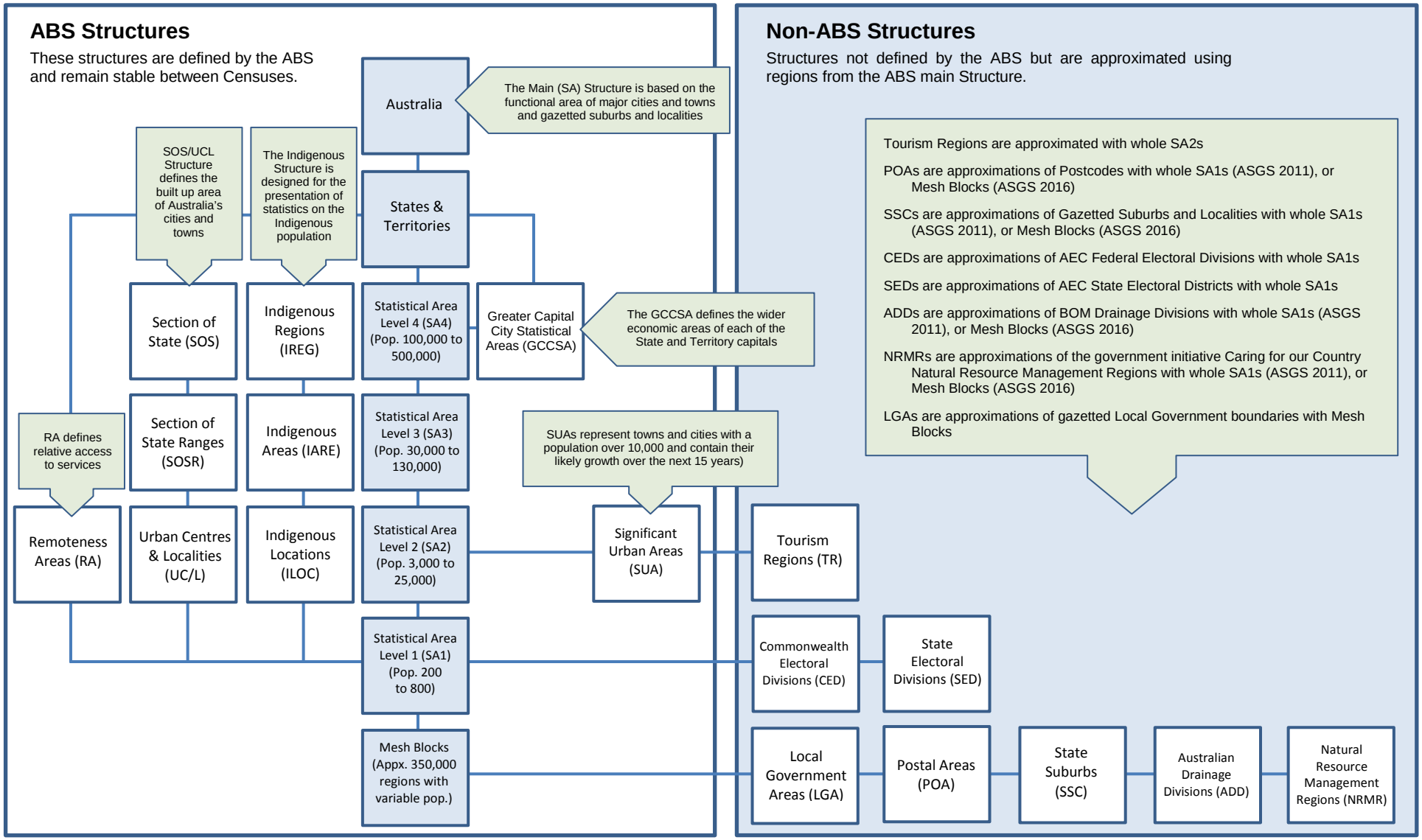
The ABS provides downloadable concordance files to assist in undertaking conversions. The concordance files are in Excel format and list, for example, which Census Collection District matches which SA1. (Where there is not an exact match, the correspondence file indicates what percentage of a Census Collection District falls within a given SA1).

Level	Description
Statistical Districts	A Statistical District (S Dist) is an Australian Standard Geographical Classification (ASGC) defined area which bounds a large predominantly urban area outside the Capital City Statistical Divisions (SDs). An S Dist consists of one or more urban centres in close proximity to each other, with a total population of 25,000 or more. The boundaries of S Dists are defined to contain the anticipated urban spread of the area for a period of at least twenty years.
Statistical Divisions	A Statistical Division (SD) is an Australian Standard Geographical Classification (ASGC) defined area which represents a large, general purpose, regional type geographic area. SDs represent relatively homogeneous regions characterised by identifiable social and economic links between the inhabitants and between the economic units within the region, under the unifying influence of one or more major towns or cities. They consist of one or more Statistical Subdivisions (SSDs) and cover, in aggregate, the whole of Australia without gaps or overlaps. They do not cross State or Territory boundaries and are the largest statistical building blocks of States and Territories.
Statistical Subdivisions	The Statistical Subdivision (SSD) is an Australian Standard Geographical Classification (ASGC) defined area which represents an intermediate level, general purpose, regional type geographic unit. SSDs consist of one or more Statistical Local Areas (SLAs) and cover, in aggregate, the whole of Australia without gaps or overlaps.
Statistical Local Areas	The Statistical Local Area (SLA) is an Australian Standard Geographical Classification (ASGC) defined area which consists of one or more Collection Districts (CDs). SLAs are Local Government Areas (LGAs), or parts thereof. Where there is no incorporated body of local government, SLAs are defined to cover the unincorporated areas. SLAs cover, in aggregate, the whole of Australia without gaps or overlaps.
Census Collection Districts (CCD)	The census Collection District (CD) is the smallest geographic area defined in the Australian Standard Geographical Classification (ASGC). It has been designed for use in the Census of Population and Housing as the smallest unit for collection, processing and output of data (except for some Work Destination Zones). CDs also serve as the basic building block in the ASGC and are used for the aggregation of statistics to larger census geographic areas.

Level	Description
Statistical Regions	The Statistical Region (SR) Structure has been in use since 1986 for the production of standard statistical outputs from Population Censuses and labour force surveys. SRs are maintained as a separate structure from the Main Structure because of the complex manner in which they relate to SSDs and SDs. For example, SRs can be whole SSDs, aggregates of SSDs, or part of an SSD. Similarly they can be whole SDs, aggregates of SDs or part of an SD. SRs can also be as large as a State or Territory. SRs are aggregates of SLAs. The SR Structure has six levels of hierarchy in census years, comprising in ascending hierarchical order: Collection District (CDs) – Statistical Local Areas (SLAs) - Statistical Region Sector (SRSs) - Statistical Regions (SRs) – Major Statistical Region (MSRs) - States/Territory (S/Ts). In non-census years, with CDs undefined, it has only five levels of hierarchy.
Census Collection District Derived Postcodes (Postal Areas)	Census Collection District Derived Postcodes (Postal Areas) are ABS approximations of Australia Post postcodes, created by allocating whole Collection Districts (CDs) on a 'best fit' basis to postcodes.

Source: Australian Bureau of Statistics

Map of the ASGS (2016)



Source: [Australian Bureau of Statistics]

Appendix 2: Commonwealth Geographic Boundaries

The datasets below are a non-exhaustive list of boundaries defined and used by public sector organisations in Australia. Boundaries defined by natural features (for example, vegetation and geology) have not been included, with the exception of selected administrative natural resource boundaries.[12] The descriptions are those provided or published by the responsible agency, with limited information available in some cases.

Aboriginal and Torres Strait Islander

Name	Underlying geography	Number	Description
Australasian Institute of Aboriginal and Torres Strait Islander Studies Indigenous Boundaries	-	-	The Aboriginal Language Map attempts to represent all of the language or tribal or nation groups of Indigenous people of Australia. It indicates general locations of larger groupings of people which may include smaller groups such as clans, dialects or individual languages in a group.
Tindale Tribal Boundaries	-	-	The Tindale tribal boundaries were determined by Norman Tindale, after extensive research across Australia, publishing his findings in 1940.
Prime Minister & Cabinet Indigenous Regional Network	-	12 regions	Regional Network divisions are responsible for implementing the Indigenous Advancement Strategy on the ground across Australia. Regional Networks engage directly with Indigenous communities, identifying joint priorities and tailoring investment strategies to local need.

[12] Citations for the underlying geography, number, and descriptions are per the dataset link provided, except where otherwise referenced.

Name	Underlying geography	Number	Description
Representative Aboriginal and Torres Strait Islander Body Boundaries	-	15 (formerly 17)[13]	This dataset depicts the boundaries of native title representative body areas. Boundary data has been compiled by National Native Title Tribunal (NNTT) based on reference material sourced from the Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and spatial data sourced from Geoscience Australia, Department of Natural Resources and Water, Sinclair Knight Merz Pty Ltd. and the NNTT.

Communications

Name	Underlying geography	Number	Description
Broadcasting Licence Areas	ACMA defines Licence Areas in terms of areas defined by the Australian Bureau of Statistics (ABS) for the purposes of the Australian Census.[14]	556 regions[15]	The *Broadcasting Services Act 1992* mandates that Commercial and Community broadcasting services are licensed to serve specific geographic areas. These geographic areas are referred to as Licence Areas, and are determined by the Australian Communications and Media Authority (ACMA) in Licence Area Plans (LAPs).
Postcodes	-	~ 2,500[16]	Australia Post's proprietary postcodes dataset. These boundaries are used in optimising Australia Post's service delivery network, and postcodes can be introduced, retired or changed at Australia Post's discretion to support operational requirements. Postcodes do not cover the entirety of Australia.

[13] Retrieved from http://auroraproject.com.au/host-organisations-0#ntrb-host-organisations

[14] Retrieved from https://data.gov.au/dataset/broadcasting-licence-areas

[15] Retrieved from http://www.acma.gov.au/Industry/Broadcast/Spectrum-for-broadcasting/Spectrum-digital-television/broadcasting-licence-areas-television-acma

[16] Based on the number of ABS approximated Postal Areas, the two datasets being roughly similar.

Geographic Boundaries in Western Australia

Name	Underlying geography	Number	Description
NBN rollout areas	-	5	Availability and future availability of National Broadband Network and other fibre services. Categories: Service available, build commenced, build preparation, other fibre provider, none.

Economic

Name	Underlying geography	Number	Description
Employment Regions	-	51	Employment Areas and Regions 2009 – present (Job Services Australia, Remote Jobs and Communities Programme, Disability Employment Services), 2015-2020 (jobactive). Concordance files are available for SA2s, SA4s, postcodes, suburbs, and Employment Service Areas.
Employment Service Areas	-	17	Employment Service Areas for Job Services Australia programme (ending 1 July 2015) and Disability Employment Services (ongoing) and the Remote Jobs and Communities Programme (ongoing).
Regional Development Australia Regions (2015-16)	Built from ABS-approximated LGA boundaries as at 2015.	55	Regional Development Australia (RDA) Regions are created and maintained by the Commonwealth Department of Infrastructure and Regional Development. The RDA Regions (2015-16) were built from the ABS LGA/PSMA 2015 boundary datasets.
Internet Vacancy Index Regions	-	37	Defined by the Federal Department of Employment for its Internet Vacancy Index (IVI) data on online job vacancies. The IVI is the only publicly available source of detailed data on online vacancies, including for around 350 occupations (at all skill levels), as well as for all States/Territories and 37 regions. The IVI is based on a count of online job advertisements newly lodged on SEEK, CareerOne and Australian JobSearch during the month.

Electoral

Name	Underlying geography	Number	Description
Australian Electoral Commission Federal Electoral Divisions	-	150	Each electoral division, or electorate, is responsible for electing one Member to the Federal House of Representatives. In some cases, a locality/suburb or postcode may be in more than one Federal electorate.

Health and community

Name	Underlying geography	Number	Description
Primary Health Networks (PHN) regions (including concordances for ABS SA1, SA2, SA3, LGA and POA)	-	31	Boundaries for the Primary Health Networks, Australia-wide and on State and Territory maps. PHNs align with Local Hospital Networks (LHNs) where possible.
Medicare Locals (including various concordances)	-	61	Medicare Locals are a discontinued structure that was replaced by Primary Health Networks on 30 June 2015.
Local Hospital Networks (LHNs)	-	138[17]	Legal entities established by each Australian State/Territory government in order to devolve operational management for public hospitals, and accountability for local service delivery, to the local level. Most LHNs are responsible for the provision of public hospital services in a defined geographical area, but in some jurisdictions a small number of LHNs provide services across a number of areas.
Aged Care Planning Region Boundaries	SA2s	73[18]	Aged Care Planning Regions are used for assessing service delivery requirements and allocating funding.

[17] Based on: http://meteor.aihw.gov.au/content/index.phtml/itemId/490921

Natural resources

Name	Underlying geography	Number	Description
Australian Irrigation Areas	-	-	Shows designated and actual irrigation areas in Australia compiled by the National Land Use Mapping Project of the National Land and Water Resources Audit to assist in the identification of irrigation areas in Australia.
Conservation Management Zones	Ecology	23	The 23 Conservation Management Zones of Australia are geographic areas, classified according to their ecological and threat characteristics. The zones are also aligned with the Interim Biogeographic Regionalisation of Australia. The Conservation Management Zones provide a way of understanding Australia's natural environment that will assist in long-term conservation planning and help the Australian Government to better design, deliver and report on Natural Resource Management (NRM) investments, including ensuring alignment of national NRM priorities with local action.
Natural Resource Management Regions (2016)	-	61[19] (or 54[20])	The Natural Resource Management (NRM) Regions dataset is maintained for the purpose of authoritative reporting on the Australian Government's NRM investments. The number of NRM Regions appears to have changed over time.

Tourism

Name	Underlying geography	Number	Description
Tourism Regions	-	76[21]	Tourism region boundaries are set by Tourism Research Australia, as part of the Australian Government Department of Resources, Energy and Tourism. They are used to assess tourism supply and demand.

[18] Based on: https://agedcare.health.gov.au/sites/g/files/net1426/f/documents/01_2015/correspondence_of_2015_acprs_and_2011_sa2s.pdf

[19] Based on: https://data.gov.au/dataset/natural-resource-management-nrm-regions-2016

[20] Based on: http://www.climatechangeinaustralia.gov.au/en/impacts-and-adaptation/nrm-regions/

[21] Based on: https://www.tra.gov.au/research/Regional-overview.html

Weather

Name	Underlying geography	Number	Description
Western Australian Forecast Districts (Bureau of Meteorology)	-	14	Land forecast areas.
Western Australian Coastal Waters Forecast Boundaries (Bureau of Meteorology)	-	16	Coastal waters forecast areas.

Appendix 3: State Geographic Boundaries

The datasets below are a non-exhaustive list of boundaries defined and used by public sector organisations in Western Australia. Boundaries defined by natural features (for example, vegetation and geology) have not been included, with the exception of selected administrative natural resource boundaries.[22] The descriptions are those provided or published by the responsible agency, with limited information available in some cases.

Aboriginal and Torres Strait Islander

Name	Underlying geography	Number	Description
AACC Regions	SA2s	8	Regional boundaries defined for the purpose of reporting COAG Closing the Gap indicators (Aboriginal disadvantage) by Western Australian region.
+ AACC Regions SA2 Concordance			List of ABS Statistical Areas 2 (SA2) and which AACC Region they fit into. The AACC Data Warehouse Regions *match exactly* to SA2 boundaries
+ AACC Regions LGA Correspondence			Since the AACC Data Warehouse Regions are based on ABS Statistical Areas 2 (SA2). They *do not match* exactly to all Local Government Areas (LGAs) (although they do match to most of them).
Aboriginal Communities and Town Reserves (DAA-002)	Cadastre, aerial photography, and terrain	312	A discrete Aboriginal community is a geographic location, bounded by physical or cadastral (legal) boundaries and inhabited or intended to be inhabited predominantly (i.e. 50% or more of usual residents) by Aboriginal or Torres Strait Islander peoples, with housing or infrastructure that is managed on a community basis either by them or an Indigenous Housing Organisation.

[22] Citations for the underlying geography, number, and descriptions are per the dataset link provided, except where otherwise referenced.

Name	Underlying geography	Number	Description
ALT Estate (DAA-003)	Cadastre	309	The *Aboriginal Affairs Planning Authority Act 1972* (WA) (AAPA) established the Aboriginal Lands Trust (ALT) with responsibility for administering lands. These properties are now collectively known as the ALT Estate. This is effectively a holding house for Aboriginal land, with the intent being that the land will be utilised in a sustainable manner for the benefit of Aboriginal people, and subject to suitable governance arrangements being in place, land will be transferred to Aboriginal organisations.
Aboriginal Settlements – Recommended Settlement Zone (DOP-045)	-	-	Recommended boundary for identification and planning of Aboriginal settlements.
Native Title Areas			
Native Title (Fed Court) (LGATE-005)	-	-	Contains the external spatial extent of all Native Title Applications within Western Australia that have been filed/lodged with the Federal Court of Australia. This dataset is a spatial depiction of the first stage of the Native Title process. When a claimant group files an application with the Federal Court to have Native Title determined over their lands the extent of those lands are captured in this dataset
Native Title (Fed Court) (LGATE-005)	-	-	Contains the external spatial extent of all Native Title Applications within Western Australia that have been filed/lodged with the Federal Court of Australia. This dataset is a spatial depiction of the first stage of the Native Title process. When a claimant group files an application with the Federal Court to have Native Title determined over their lands the extent of those lands are captured in this dataset.
Native Title (NNTT) (LGATE-004)	-	-	Contains the external spatial extent of all Native Title Applications within Western Australia that have been registered with the National Native Title Tribunal (NNTT). This dataset is a spatial depiction of the second stage of the Native Title process. NNTT applies a registration test to all filed/lodged applications and if the application passes that test, the application is captured in this dataset.
Native Title (Determination) (LGATE-066)	-	-	Contains the external spatial extent of all Native Title Applications within Western Australia that have been determined by the Federal Court of Australia. This dataset is a spatial depiction of the last stage of the Native Title process. When a Determination of Native Title over an Application has been handed down from the Federal Court (by litigation or mediation) the Application is captured in this dataset.

Geographic Boundaries in Western Australia

Name	Underlying geography	Number	Description
NTT Determination Outcomes (LGATE-173)	-	-	A further classification of the Native Title (Determination) dataset which reflects the native title outcomes within each determination area. The native title outcomes depicted in this dataset include: Native Title exists (exclusive); Native Title exists (non-exclusive). Native Title does not exist and Native Title extinguished. The areas shown according to this classification are based on the best information available at the time and should be considered indicative only. Not all native title outcome areas included in determinations can be mapped. Confirmation of the native title outcomes applying to particular areas should be sought by reference to the relevant published determination document.
Native Title (ILUA) (LGATE-067)	-	-	Contains the external spatial extent of all Indigenous Land Use Agreements (ILUA) within Western Australia, which has been registered or is in notification with the National Native Title Tribunal (NNTT). This dataset is a spatial depiction of ILUAs that can be made outside of the Native Title process but can still be part of a Native Title Determination. When an ILUA is registered or in notification with NNTT the extent of the agreement is captured in this dataset.
Western Australian Department of Aboriginal Affairs Regions and Districts	LGAs, ICC boundaries	7 districts, 3 regions	The DAA District boundaries were chosen based on proximity to DAA regional offices and are derived from LGA boundaries except for the East/West Kimberley boundary which is based on ICC (Indigenous Coordination Centre) boundaries (which were derived from ATSIC boundaries). DAA Regions are made up of multiple DAA Districts and so are based on the DAA District boundaries.

Administrative (Various)

Name	Underlying geography	Number	Description
Regional Councils	LGAs	9	Groupings of local governments: Bunbury Regional Council; Eastern Metropolitan Regional Council; Mindarie Regional Council; Pilbara Regional Council; Rivers Regional Council; Southern Metropolitan Regional Council; Tamala Park Regional Council; Western Metropolitan Regional Council; and Wildflower Country Regional Council.
Local Government Authority (LGA) Boundaries (LGATE-006)	Cadastre	139	The extents of Local Government Authorities are determined by technical description and are published in the Government Gazette.

Name	Underlying geography	Number	Description
Townsites (LGATE-007)	-	636	Townsites are the urban centres described by technical description. A townsite must be approved (by document) by the Minister for Lands, under the *Land Administration Act 1997*. A townsite consists of urban land, rather than rural land.
Localities (LGATE-008)	-	1,697	Suburb and Locality Boundaries for the State of Western Australia. Derived from the Spatial Cadastral Database (SCDB) and based on GDA 94.
Districts (LGATE-009)	-	96	Originally Land Districts were described by technical description, and Proclaimed under the Land Act, and published in the Government Gazette. Today, a document is raised on behalf of the Minister for Lands, in accordance with section 26(2) of the *Land Administration Act 1997,* whereas changes to the Land Districts in question are described.
Ward Boundaries (LGATE-051)	LGAs	210	A digital representation of the local government Ward boundaries for the State of Western Australia. Ward boundaries are being progressively added. Not all local governments are divided into wards.
Land Divisions (LGATE-182)	-	5	Western Australia is divided into five Land Divisions (*Land Administration Act 1997*). Originally Western Australia was divided into divisions for cadastral purposes, including the classifying and demarcation of pastoral leases. Derived from the SCDB and based on GDA 94.
Agricultural Areas (LGATE-183)	-	51	Declared parcels of land to which special provisions are applied for both alienation and improvement. Many of the Agricultural Areas were declared shortly after World War I, for the purposes of soldier resettlement, and were eventually opened up for sale to civilians. Derived from the SCDB and based on GDA 94.
Suburban Areas (LGATE-184)	-	11	An area of land may be declared a ‘Suburban Area’, a major purpose being to provide townspeople with blocks of land suitable for supportable commercial activities such as agriculture. Derived from the SCDB and based on GDA 94.
Cadastre (No Attributes) (LGATE-001) & similar	Cadastre	-	The SCDB is an integrated database comprising of a number of datasets (layers) of digital spatial data, defining all Crown and Freehold land parcels within the State as well as subsidiary survey network control.
Coastal Regions and Compartments	Geological & geomorphic	13 regions	Divisions for Marine and coastal planning and management in Western Australia.

Business

Name	Underlying geography	Number	Description
Small Business Development Corporation (SBDC) Regions	Regional Development Commission boundaries	Perth and 9 other regions[23]	-

Education

Name	Underlying geography	Number	Description
Education District Boundaries (DET-002)	-	-	This dataset depicts the education district boundaries.
Education Regions	-	8	Major education regions, being Kimberley, Pilbara, Mid-West, Goldfields, Wheatbelt, South-West, North Metro, and South Metro.
Schools with local intake areas	-	Varies from year to year	Many public primary and secondary schools have local-intake areas. Students of compulsory school age, and residing within the local-intake area of a school, are entitled to enrol at that school if it provides an appropriate educational program. The list of schools with local-intake areas is published in the Western Australian Government Gazette. Maps of local intake areas for individual schools are available on the Department of Education's website.
School Networks	-	Up to 75	In each Education Region there are a number of school networks – up to 75 networks across Western Australia.

[23] Based on: https://www.smallbusiness.wa.gov.au/assets/File-Folder/business-local/Business-Local-Locations-Regional-Version-6-25.pdf

Emergency Services

Name	Underlying geography	Number	Description
Emergency Management Districts	LGAs (with adjustments)	11	Western Australia has eleven emergency management districts, each with its own District Emergency Management Committee (DEMC). The key function of the DEMC is to assist in the establishment and maintenance of effective emergency arrangements in their districts. DEMCs focus on risk within their district and ensure information received from the State flows down to the Local Emergency Management Committees (LEMCs). They support the LEMCs with advice on emergency management arrangements, as well as participating in exercises and testing of arrangements. Emergency Management regions are gazetted through the State Emergency Management Committee to support prompt and coordinated organisation of emergency management in the State, and for related purposes under the *Emergency Management Act 2005.*
Emergency Services Levy Boundaries (DFES-013)	Cadastre (with adjustments)	107	Gazetted Emergency Services Levy (ESL) boundaries defining areas of Western Australia declared under Section 36F(2) of the *Fire and Emergency Services Act 1998*.
Cyclone Areas	Cadastre (with adjustments)	n/a	Designated under s.16 of the *Emergency Management Act 2005* by a notice in the Gazette. This is done by the State Emergency management Committee after receiving advice from DFES and consultation with any affected local governments. This then applies provisions of the Act with regard to people having to make their properties safe from hazards such as loose material etc.
DFES Regions (DFES-015)	LGAs (with adjustments)	11	This dataset consists of polygon data showing the FESA Fire Services regional and district boundaries.
Fire and Rescue Services Districts (DFES-016)	Cadastre (with adjustments)	95	Fire and Rescue Service (FRS) Fire District boundaries define the gazetted descriptions of fire station districts, based upon cadastral information.

Health and community

Name	Underlying geography	Number	Description
Health Districts of Western Australia	SA2	34	Health Districts for health service reporting, latest version 1st July 2016.
Health Regions of Western Australia	SA2	10	Health Regions for health service reporting, latest version 1st July 2016.
WA Country Health Service Regions	SA2	4	Health Service Regions for health service reporting, latest version 1st July 2016.
Child & Adolescent Community Health (CACH) Regions (Metro)	SA2	10	Child & Adolescent Community Health (CACH) service regions.
Child & Adolescent Community Health (CACH) Zones (Metro)	SA2	2	Child & Adolescent Community Health service zones.
Health Districts of Western Australia	SA2	34	Health Districts for health service reporting, latest version 1st July 2016
Health Regions of Western Australia	SA2	10	Health Regions for health service reporting, latest version 1st July 2016
Disability Services Commission regions	-	11	Service provision regions, being Cockburn-Kwinana (WA NDIS), Goldfields, Great Southern, Kimberley, Lower South West (WA NDIS), Metropolitan, Metropolitan-East (Hills WA NSDIS NDIA), Midwest, Pilbara, Upper South West, and Wheatbelt.
Western Australian Department of Child Protection and Family Support Metropolitan and Country Districts	LGAs (Metropolitan) and RDC boundaries (Country) with adjustments	7 metro, 9 regional	The Department for Child Protection and Family Support has two regions: County Services and Metropolitan Services. Metropolitan Services district boundaries are based generally on Local Government Authorities and reflect localities or suburb/area clusters rather than larger regions (such as north metropolitan or south metropolitan). There are seven districts across the metropolitan area and services are delivered to families in the suburbs of that district, with boundaries determined according resource allocation across the population/number of families. The Department's metropolitan districts are most similar to WA Police with regards to boundaries according to servicing localities and area clusters, rather than larger regions.

Name	Underlying geography	Number	Description
			The main point of different between the Department's metropolitan district boundaries and other State Government departments' is that the most distant metropolitan suburb covered is Singleton. Areas past Singleton are covered by the Peel district which forms part of Country Services. The nine districts that form Country Services are based generally on those of the Regional Development Commission, with slight variations in the Kimberley (with East and West Kimberley district offices), and the Murchison district covers the Midwest and Gascoyne towns of other departments.
Western Australian Department of Sport and Recreation Regions	Regional Development Commission boundaries	9	-

Housing and planning

Name	Underlying geography	Number	Description
Housing Authority Regions	Localities (with adjustments)	11 – 3 metro and 8 non-metro	The WA Housing Authority Regions are the administrative areas used by the Housing Authority. In general, Locality boundaries are followed, except in only a handful of non-metro locations where this does not suit Housing Authority needs.
Aboriginal Housing Services Remote Service Regions	-	6	The Housing Authority manages the housing in Aboriginal communities in the East Kimberley, West Kimberley, Mid-West/Gascoyne and Halls Creek, and engages Regional Service Providers to manage housing in the East Kimberley, Derby, Fitzroy Crossing, Goldfields and Ngaanyatjarra Lands.
Housing Authority Metropolitan Preference Zones	Localities	12 – 5 North Metro Region, 4 South East Metro Region, & 3 South Metro Region	The Metropolitan Preference Zones are the administrative areas within the 3 metropolitan Regions. When a member of the public applies for public housing they are asked to request the zone they would prefer to live in; depending on the localities/suburbs within that zone they will be placed into public housing in one of those localities.

Geographic Boundaries in Western Australia

Name	Underlying geography	Number	Description
Western Australian Department of Planning District Planning Committees	-	5	The district planning committees of the Perth metropolitan region are created under schedule 2 clause 9 of the *Planning and Development Act 2005*. The committees have members from local governments in the districts and provide a forum for discussion and recommendations on regional planning issues. They comprise the Eastern District, North-West District, South-East District, South-West District and Western Suburbs District.
Western Australian Department of Planning Regional Planning Committees	-	6	Gascoyne Regional Planning Committee, Kimberley Regional Planning Committee. Mid-West Regional Planning Committee, Peel Regional Planning Committee, Pilbara Regional Planning Committee, and South-West Regional Planning Committee.
Western Australian Department of Planning administrative areas	Regional Development Commission boundaries	10	Administrative areas forming the base layer of the Department of Planning's PlanWA tool. They comprise the Kimberley, Pilbara, Gascoyne, Mid-West, Goldfields-Esperance, Wheatbelt, Peel, South-West, Great-Southern and Perth areas.

Justice

Name	Underlying geography	Number	Description
WA Police Regions	LGA (with adjustments)	2 – metro & non-metro	The WA Police Metropolitan Region is similar, but not identical, to definitions of the Metropolitan Region used by other agencies. In general, Local Government Authority boundaries are followed, except where this does not suit WA Police administrative needs.
WA Police Districts	LGA (with adjustments)	11 – 4 metro & 7 non-metro	WA Police Districts are similar, but not identical to, some naming and area definitions used by other agencies. Originally, Police Districts were used to define Emergency Management Districts. However, these administrative boundaries are now maintained separately, and there is less of an emphasis on ensuring WA Police District boundaries match these. As with WA Police Regions, Local Government Authority boundaries are followed, except where this does not suit WA Police administrative needs.

Name	Underlying geography	Number	Description
WA Police Subdistricts	Gazetted Locality / Suburb (with adjustments)	185 – 35 metro & 123 non-metro	The WA Police Subdistricts originally represented the 'patrol area' for one police station, and are generally formed by aggregating several localities or suburbs. Locality/suburb boundaries are usually followed, except where this does not suit WA Police administrative needs.

Resources and land management

Name	Underlying geography	Number	Description
DPAW Region Boundaries (DPAW-033)	LGA, cadastral boundaries and topographic features such as rivers and roads	9 regions	Boundaries have been aligned as to allow best management and protection of DPaW Managed Lands and Waters taking into account the location and availability of personnel and facilities. The boundaries are defined by a combination of administrative boundaries and topographical features and extend seaward to the State Waters limit. There are nine regions that cover all of Western Australia. They are not gazetted boundaries and changes are determined within and by the Department. There are no regular updates – changes are triggered by notification from the Director of Regional and Fire Management Services when required. The Regions are used for DPaW reporting purposes and because of this, changes are not common or done without due diligence. Spatial data is maintained by the DPaW GIS Branch and held in the form of multipart polygons in an ESRI environment.
DPAW District Boundaries (DPAW-034)	LGA, cadastral boundaries and topographic features such as rivers and roads	15 district	DPaW Regions, where warranted, have been divided into smaller District management cells. Note that not all of the State is covered by a DPaW district, and in these areas the area is administrated from the relevant Regional Office. There are 15 DPaW Districts within Western Australia and 3 areas administered /managed from Regional offices. As for DPaW Regions, District boundaries have been aligned as to allow best management and protection of DPaW Managed Lands and Waters taking into account the location and availability of personnel and facilities.

Geographic Boundaries in Western Australia

Name	Underlying geography	Number	Description
			The boundaries are defined by a combination of administrative boundaries and topographical features and extend seaward to the State Waters limit. They are not gazetted boundaries. There are no regular updates – changes are triggered by notification from the Director of Regional and Fire Management Services when required. Spatial data is maintained by the DPaW GIS Branch and held in the form of multipart polygons in an ESRI environment.
Regional inspectorate boundaries for mining operations	-	3	Department of Mines and Petroleum inspectorate boundaries. There are three mines inspectorates in Western Australia - West, East and North.
Rangelands NRM subregional areas	-	7	Rangelands Natural Resource Management (Rangelands NRM) is the largest of the 56 NRM regions in Australia. It covers around 85 per cent (2,266,000 sq. km) of the WA State's land mass, and 75 per cent of the coastline. Due to the vast size of Rangelands, community engagement is undertaken through seven recognised subregional areas: the Kimberley, Pilbara, Gascoyne, Murchison, Goldfields, Nullarbor and Western Desert.

Regional development

Name	Underlying geography	Number	Description
Regional Development Commission Boundaries	-	9[24]	This dataset contains the operational boundaries for Regional Development Commissions.

[24] Based on: http://www.drd.wa.gov.au/projects/Economic-Development/Pages/Regional-Blueprints.aspx

Transport

Name	Underlying geography	Number	Description
Main Roads Regional Responsibility Areas	-	8	Statistics in the document relate to highways and main roads managed on a Regional Responsibility Area basis (i.e. represents those roads that each Region is responsible for managing). In some cases this may differ from the roads contained within the regional boundary.
Western Australian Department of Transport Remote Areas Licensing Regions	Regional Development Commission boundaries	9	Communities, towns, and regions the Department of Transport services, supports and assists.
Western Australian Department of Transport Taxi Fare Regions	Regional Development Commission boundaries	1 metro, 9 non-metro	-
Coastal Infrastructure Asset Regions	-	63	Department of Transport's Coastal Infrastructure Business Unit's locations for grouping and naming both offshore assets (beacons, lighthouses, etc.) and land-based assets (jetties, boat ramps, etc.).
Patrol zones	-	267	Department of Transport's Marine Safety Business Unit's boundaries for classifying infringements and patrol areas.
Department of Transport Regional Services	Regional Development Commission boundaries	8	Department of Transport Regional Services Branch's regions (currently under review as at October 2016).
OSRA Regions WA	-	6	Polygon coverage showing the OSRA (Oil Spill Response Atlas) Regions of Western Australia.
West Plan First Strike	Boundaries align with local shire and regional boundaries	9	State agreement. First strike response boundaries. Result of MOU between Port Authorities and DoT for initial response to major oil spills outside port boundaries.

Utilities

Name	Underlying geography	Number	Description
Western Power Area Categories	Metropolitan Region Scheme, Townsites, Mandurah LGA	3	Defines boundaries for the Metropolitan area, townsites and rural areas within Western Power's Approved Licence Area.
Western Power Regions	None	10	Broad categorisation of Western Power's operating areas (i.e. North County, South Country, etc.)
Western Power Districts	None	24	Sub-set of Western Power Regions. Typically relates to Western Power depots.
Water Demand Region Boundaries (DOW-059)	Various	24 (based on linked dataset, previously 19[25])	The Western Australian Department of Water's Water Demand Region boundaries are primarily used in the department's Water Demand Study, entitled: Water Futures for Western Australia 2008-2030. They are the ABS boundaries, closely aligning with the Western Australian Development Commission boundaries, adjusted to follow the Resource Availability boundaries, which are a combination of ABS boundaries, DWAID Groundwater Boundaries (DoW), Surface Water Boundaries (DoW) and Local Government Boundaries.
Western Australian Department of Water (DoW) Regional Boundaries (DOW-062)	-	7[26]	Department of Water Regional Boundaries were created as a result of the splitting of Department of Water from the Department of Environment. At the time of creation the Department of Water and Department of Environment boundaries were the same. The Department of Water administers a variety of environmental services to the public through 16 regional offices throughout Western Australia. Services include collection and analysis of water resources information, issuing licences, regulating water use, protecting the quality of our water and preparation of policies and plans critical to the future development of Western Australia. The boundaries define the jurisdictional boundaries for regional offices to deploy DOW services.

[25] Based on: https://www.water.wa.gov.au/__data/assets/pdf_file/0011/2612/90953.pdf

[26] Based on data in Landgate's SLIP.

Appendix 4: Contact details and further information

Contacts

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Further reading

Automating the administration boundary design process using Hierarchical Spatial Reasoning theory and Geographic Information Systems (Eagleson, Escobar & Williamson)

Future directions of administrative boundary design in support of Spatial Data Infrastructures (Eagleson & Escobar)

Hierarchical Spatial Reasoning applied to the Design of Administrative Boundaries Using GIS (Eagleson, Escobar & Williamson)

Note: This paper refers to the superseded ASGC standard (see Appendix 1)

Lost in the mail: the inherent errors of mapping Australia Post postcodes to ABS derived postal areas (Jones, Eagleson, Escobar & Hunter) *Paywalled article.*

Note: The above papers refers to the superseded ASGC standard (see Appendix 1)