



# The Australian and New Zealand Foundation Spatial Data Framework

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Making common foundation spatial data ubiquitous across  
Australia and New Zealand

(Edition 2 – April 2014)

*The Australian and New Zealand Foundation Spatial Data Framework: Making common foundation data ubiquitous across Australia and New Zealand.*

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Digital versions of this publication are also available on the ANZLIC website at [www.anzlic.org.au/FSDF](http://www.anzlic.org.au/FSDF).

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## Message from the Chair of ANZLIC

### ***The Australian and New Zealand Foundation Spatial Data Framework – a critical information infrastructure to support the digital economy***

On behalf of ANZLIC I am delighted to present you with this second iteration of the plain English document of the work that we have undertaken over the last 12 months in continuing to build the concepts for our Foundation Spatial Data Framework. You will notice that ANZLIC's goal has not changed. We remain committed to making common foundation spatial data ubiquitous across Australia and New Zealand and to building the foundation for a comprehensive spatial data infrastructure for both Australia and New Zealand.

I deliberately use the term *infrastructure* because the framework itself is indeed the beginning of a spatial data infrastructure that the community has been asking for over many years. The framework will be an enabler for a wide range of other information activities, in a similar way that the internet has been an enabler for business and social interaction. I have absolutely no doubt that by making the data described in the framework as accessible and useable as possible that we will have contributed significantly to the economy, society and the environment through innovation, competition, productivity and job creation.

Many organisations and individuals across Australia and New Zealand have been working hard to establish the baseline documentation for the themes, datasets and governance arrangements outlined in this publication and, in more detail, on the ANZLIC website. Most importantly, this effort has further strengthened the relationships between the ten governments involved, and between government and spatial industry organisations that will need to work collaboratively to make the ongoing operation of the framework a reality.

The real and tangible benefits of the framework will become self-evident as we progress from the current (*as is*) state of our national foundation spatial data towards the desired (*to be*) state. Some of the benefits to be realised include improving supply chains, realising efficiencies and reducing the duplication of effort in the Australian, state and territory governments. This will be achieved through strong leadership from ANZLIC. By leveraging its extensive networks of expertise throughout the jurisdictions and the Intergovernmental Committee on Surveying and Mapping, I remain confident that this can all be achieved.

The challenge for us now will be to deliver high value national spatial data and services to the 'marketplace' in ways that allow immediate and sustained access to trusted data by users. Over the course of the next few years ANZLIC will continue to focus on the business reforms necessary to ensure that goal is reached.

I would like to personally thank all those people who have contributed to the framework. ANZLIC values your continued support, which will be integral to the ongoing development and success of the framework. There is much work to be done and I look forward to providing you with further updates as we progress into the future.

**Drew Clarke**

Chair

ANZLIC—the Spatial Information Council

# The Australian and New Zealand Foundation Spatial Data Framework

## Background

ANZLIC—the Spatial Information Council (ANZLIC) is the peak national spatial governance body in Australia and New Zealand; comprising, as equal partners, senior officials from the Australian, state and territory governments and the New Zealand Government. ANZLIC recognises the need for a consolidated effort to develop an agreed foundation spatial data framework that would provide easy access to authoritative government spatial data over the geographic extent of Australia.

ANZLIC envisages that foundation spatial data will become ubiquitous in all sectors of both the Australian and New Zealand economies. When realised, the use of data managed under a common framework that is embedded into the day-to-day business of government and private sector entities alike, will allow for seamless exchange of information and knowledge across organisational, sectoral and jurisdictional boundaries.

**Foundation spatial data** is the authoritative geographic information that underpins, or can add significant value to, any other information; and supports evidence-based decisions across government, industry and the community.

The New Zealand Government has actively participated in and supports the initiatives arising from the ANZLIC Strategic Plan, including the FSDF. While New Zealand is committed to the conceptual and logical model of the FSDF, it is not obliged to implement the FSDF to the dataset level identified under the theme descriptions. The continued support from New Zealand provides a unique external perspective complementing those of the Australian member jurisdictions. New Zealand will collaborate and continue to contribute to outcomes that benefit the region as a whole.

### ***Why build a Foundation Spatial Data Framework?***

The FSDF provides a common reference for the assembly and maintenance of Australian and New Zealand foundation level spatial data in order to serve the widest possible variety of users. It is delivering national coverage of the best available, most current, authoritative source of foundation spatial data which is standardised and quality controlled.

### ***Why have national foundation spatial data themes?***

**National foundation spatial data themes** group data with similar characteristics in order to improve the efficiency and effectiveness of information management processes. Some data

may naturally fit within more than one theme; for example, a road may be both a part of the transport infrastructure and also used to delineate some administrative boundaries. This situation is resolved within the logic of the theme structure.

## The ten themes

In conjunction with other government and non-government agencies, ANZLIC has identified ten data themes under which the national foundation datasets can be grouped.

Figure 1 Icons for each of the ten foundation spatial data themes



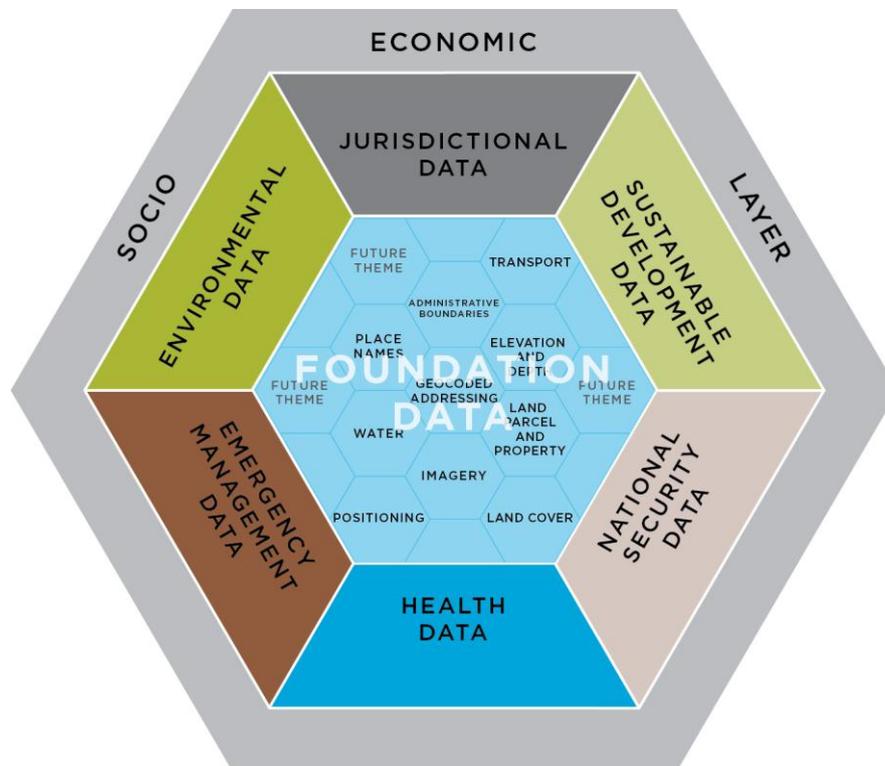
1. **Geocoded Addressing** data is the specific identification of a place with respect to buildings and road networks. An address is critical for the delivery of goods and services to a particular location.
2. **Administrative Boundaries** are the collection of legislative, regulatory, political, statistical, electoral, maritime and other general boundaries. These boundaries tend to be widely used by government and industry for delivery of services and for analysis of business and statistical data over particular areas.
3. The **Positioning** system enables all geospatial datasets to be spatially aligned with each other. At its simplest, positioning data tells us the precise location of points above, on or within the Earth's surface.

4. **Place Names** are the names we assign to provide identity to particular locations. Official place names have been assigned by a government authority under jurisdiction legislation.
5. **Land Parcel and Property** are central to defining and managing our property rights, responsibilities and restrictions. These rights are a cornerstone of Australia's free market economy as they provide economic and social certainty.
6. **Imagery** datasets are images of the Earth's surface and are acquired by cameras and other sensors from the air, space and sometimes the ground. They are used as a base for identifying and classifying other features, and used in vegetation and water monitoring, mineral exploration, map making, urban planning, natural disaster assessments, and agricultural planning.
7. **Transport** is the means by which we move goods, services and people from one location to another, and includes roads, railways, airports, ports and crossings. Transport information is used in the planning and delivery of emergency and commercial services, infrastructure planning and asset management, and safer navigation. Knowing which transport corridor to use based on its importance, connectivity and characteristics can save time, money, resources and lives.
8. **Water** datasets show where water collects and flows on and below the Earth's surface. This includes rivers, streams, lakes, aquifers and oceans, and is particularly important for primary industries, environmental protection and water security.
9. **Elevation and Depth** provides 3D views of the Earth's surface, including the sea floor.
10. **Land Cover** is data about man-made and natural features that sit on the Earth's surface. Examples of land cover include forests, deserts, pasture and built-up areas. Land Cover data is important for understanding society's impact on the environment.

## Foundation spatial data

Foundation spatial data can be described as the base spatial layers required by most users and are generally not derived from other spatial layers. These base spatial layers are mostly held within government departments or agencies.

Figure 2 Conceptual view of the FSDF



The terms *fundamental* and *foundation* are often interchangeable. In the context of the FSDF, fundamental is a measure of the importance of a dataset, whereas foundation is a measure of how applicable a dataset may be to a number of applications. A dataset can be regarded as fundamental for one particular application but not be relevant to a range of applications.

## Characteristics

Criteria have been developed to unambiguously determine which spatial datasets can be considered foundation. For the purpose of the FSDF foundation spatial data must have one or more of the following characteristics:

1. be geospatial
2. essential for public safety and wellbeing
3. critical for a national or government function
4. contribute significantly to economic, social and environmental sustainability.

Table 1 **Characteristics of foundation spatial data.**

Characteristics	Criteria
1. Geospatial	<ul style="list-style-type: none"> <li>widely used as a component dataset in geospatial analysis</li> <li>widely used as a layer in geospatial products (including web maps, raster maps, and paper maps)</li> </ul>
2. Public safety and wellbeing	<ul style="list-style-type: none"> <li>essential for public safety and wellbeing</li> </ul>
3. Critical for a national or government function	<ul style="list-style-type: none"> <li>can be licensed in accordance with open access and licensing policies</li> <li>satisfies (or when combined with other datasets, satisfies) statutory obligations or international obligations</li> <li>essential for the maintenance of critical infrastructure</li> <li>funded, owned, or held by the Australian Government</li> <li>funded, owned, or held by a state, territory or local government</li> <li>support activities across multiple agencies and organisations</li> </ul>
4. Contributes significantly to economic, social and environmental sustainability	<ul style="list-style-type: none"> <li>supports business outcomes, strategic results areas, government strategies, or land purchase and ownership requirements</li> <li>a foundation dataset upon which other geospatial datasets rely or are built</li> </ul>

Additionally, foundation spatial data has the following features that are consistent with general information management principles:

- Authoritative.** Foundation spatial data comes from a reliable source that is known (someone has responsibility for management of that data), structured, coherent and consistent. That source (a custodian) is responsible for ensuring that the data is accurate.

- **Accurate.** Content reflects the real world within user expectations and standards. Accuracy includes measures such as positional accuracy, attribute accuracy, currency and coverage.
- **Accessible.** Easily discoverable by a range of users and technologies and ready to be used with little or no further manipulation.

## Dataset profiles

Dataset profiles have been developed for each of the national foundation spatial datasets defined under the theme. The profiles detail the description, purpose, use, current status in jurisdictions, and future status of the dataset. Profiles also cover the relevant standards access and licensing, quality, coverage, related websites, key users and the custodian, aggregator and distributor and related products and formats. Detailed dataset descriptions for each of the ten themes can be accessed from the ANZLIC website at [www.anzlic.org.au/FSDF](http://www.anzlic.org.au/FSDF).

Figure 3 Defined themes and datasets for the FSDF



## Governance of the FSDF

### *Leadership*

ANZLIC will continue to provide the broad policy direction and oversight of the FSDF. ANZLIC remains in a unique position within the Australian spatial community to align the direction of users, custodians and suppliers of foundation spatial data. ANZLIC, through its secretariat and contact officers, will remain closely engaged with Sponsors and Custodians to assist in the planning and reporting on the evolution of datasets against long-term goals.

### *Theme sponsors*

An agency or organisation (Australian, state or territory) having a special interest in ensuring that the National Foundation Datasets within a particular theme are widely available and of high quality. The agency/organisation must have the structure and resources to enable it to provide leadership, in conjunction with the Department of Communications, to a number of national dataset custodians covering a range of national foundation datasets. Their role will include liaising with other national sponsors, consulting a community of users and coordinating activities with custodians to report on the progress of the foundation datasets in line with the broader ANZLIC objectives. ANZLIC will monitor progress of the FSDF at its regular meetings, held three times each year.

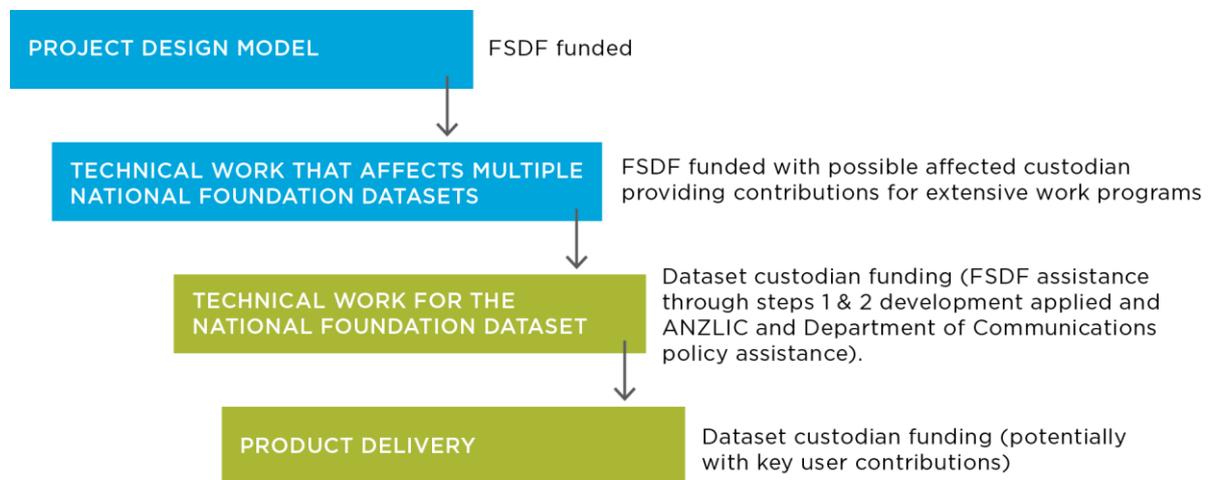
Figure 4 ANZLIC reporting schedule for a calendar year



### *Dataset custodians*

An agency or organisation identified as being responsible for the development and management of a national foundation dataset, and who has the right to determine the condition applying to the use, distribution and composition of the national foundation dataset. The national dataset custodian would be responsible for the ongoing evolution of datasets as defined by itself and the theme leadership groups. Their role would comprise the development and delivery of their national foundation dataset and the maintenance of a close working relationship with thematic sponsors to ensure that yearly vision statements are achieved.

Figure 5 **Responsibility for the development of datasets within the FSDF.**



### ***Users***

Key user groups of the FSDF include government, industry, research, academia and the general public. A key user is a consumer of a national foundation dataset as an input to solve problems and/or make decisions. A key user may be from the public or private sectors and would be identified for their key role by a sponsor or custodian.

Input from user groups will remain critical to the successful evolution of FSDF datasets. A FSDF user may apply for membership to a theme leadership group or be invited by the sponsor or custodian.

### ***The role of the Intergovernmental Committee on Survey and Mapping***

The Intergovernmental Committee on Surveying and Mapping (ICSM) is a standing committee of ANZLIC and performs a key role implementing the national spatial policy developed by ANZLIC; particularly through development of work programs and endorsement of national instruments, such as technical standards. The representatives on the various ICSM permanent sub-committees and working groups are provided from the jurisdictions represented by the ANZLIC members.

ICSM is a key agent in achieving the ANZLIC vision through the delivery of the FSDF by providing specialist expertise and assistance in the areas of user demand, existing and aspirational information modelling and standards development. It is the expectation of the ANZLIC that the FSDF will leverage existing ICSM working groups.

## **Management**

To assist in the management of this FSDF and to ensure that the individual themes remain coordinated and integrated, through their 3 year plans, coordination and management committees will be refreshed. Sponsors and custodians will be engaged more regularly with the Project Management Committee and the Theme Leadership Group. A new policy and coordination mechanism will be implemented and will be comprised of four groups:

- **FSDF Project Management Committee.** This committee will be responsible for the day-to-day management of the FSDF. Membership will comprise senior representatives from the Department of Communications and Geoscience Australia and this committee will meet monthly.
- **Theme leadership groups.** These groups will be responsible for the development / evolution of the datasets within their respective themes against their three-year plan and annual vision statements. Each group will be led by their theme sponsor and will comprise the custodians, aggregators, users and suppliers. These groups will replace the existing thematic working groups.
- **FSDF Technical Advisory Group.** This group will be responsible for providing technical advice to the FSDF Project Management Committee and the theme leadership groups as required. This group will comprise the Australian Government representatives to the Open Geospatial Consortium, the international technical committee for geospatial standards (ISO/TC211) and Standards Australia; as well as representatives from research organisations such as NICTA, CSIRO and the Cooperative Research Centre for Spatial Information (CRCSI).
- **Industry Advisory Committee.** This committee will be responsible for industry engagement; and will comprise industry bodies, jurisdictional representatives, eminent individuals from the spatial community and the Project Management Committee.

**Table 2 Reporting framework for the FSDF.**

<b>Report</b>	<b>Delivered by</b>	<b>Role</b>
3-year road map	Department of Communications and theme sponsors	Outlines the development goals and a 'road map' for the following three years, for all national foundation datasets within each theme. This plan will be referenced as a benchmark during yearly vision

		statements and ANZLIC meeting updates.
Annual vision statements	Theme sponsors and theme leadership groups	Delivered before the last ANZLIC meeting of each year. This statement will comprise the ongoing goals and work plan for the national foundation datasets within each FSD Theme for the next 12 months in relation to ANZLIC 3-year goals.
Update report	Theme sponsors and theme leadership groups	For each ANZLIC meeting update progress against yearly vision statement.
Options paper	Department of Communications and theme sponsors	Ad hoc method for resolving significant issues within a theme or the FSD.
Governance update	Project Management Committee	Yearly update to ANZLIC on the ongoing governance of the FSD. The formal inclusion of new datasets, changes in Custodians or Sponsors would be reported and approved through this report.

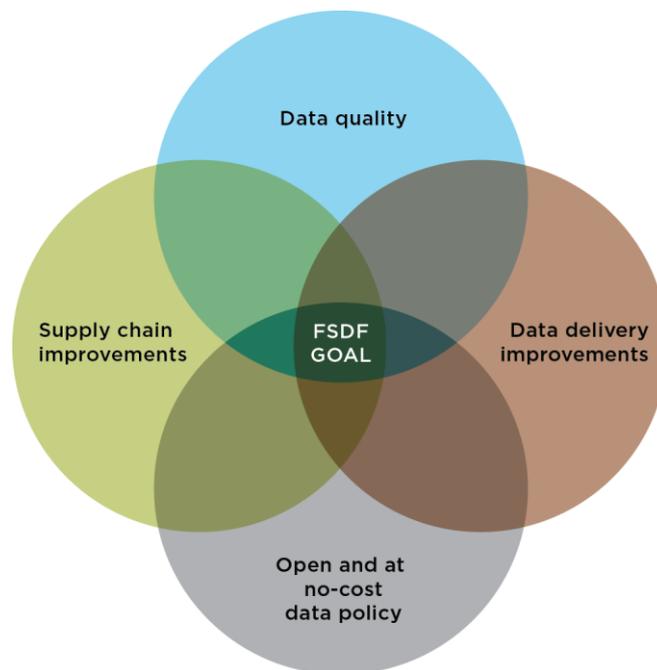
## Development phases

Development of the FSD is being undertaken in several phases, recognising the requirement for long term and ongoing efforts to generate measured results.

- **Phase 1** (completed July 2012) identified the ten data themes, commenced initial development of limited theme templates and descriptions, and developed dataset templates.
- **Phase 2** (completed November 2012) focused on Australian Government user consultations and prioritised data themes and datasets.
- **Phase 3** (completed March 2014) documented use cases, theme descriptions and dataset descriptions of the FSD.
- **Phase 4** (in progress) will socialise three-year road maps for ANZLIC by August 2014 and finalise delivery of road maps by December 2014. The development of each theme, identify the future goals and plans to resolve gaps, evolve datasets and delivery mechanisms.

- **Phases 5 & 6** (from December 2014 onwards) will progress concurrently and focus on the delivery and ongoing evolution of datasets within the established reporting framework respectively.

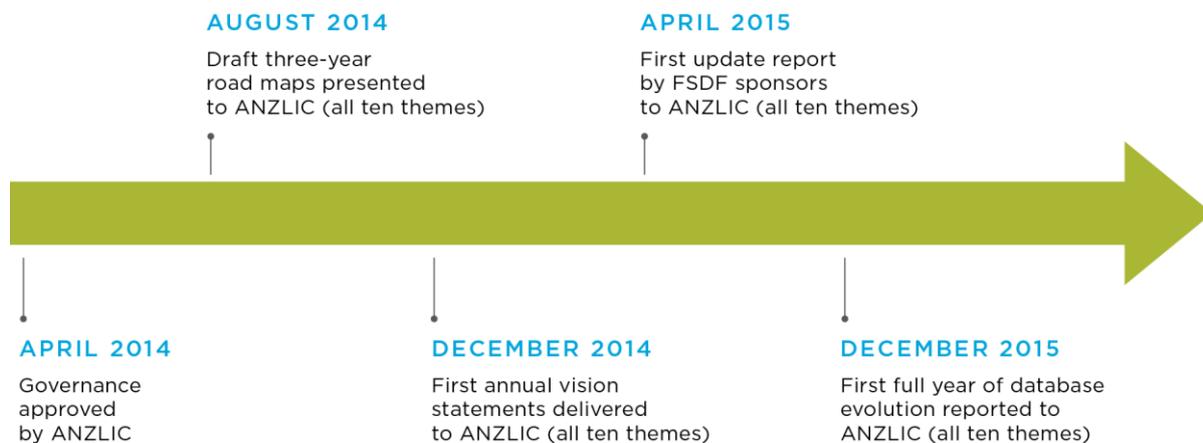
Figure 6 **Evolution of FSDF datasets: Areas of focus.**



### Next steps

During 2014, ANZLIC will continue working on Phases 4 through 6, including development of the necessary policies to support the implementation of the FSDF. Implementation of regular reporting from the sponsors and the governance model will remain key early steps for the Project Management Committee.

Figure 7 Next steps for the FSDF.



## Spatial information management policies

Implementation of the FSDF will be guided by spatial information management policies that define a common approach to management of national-level spatial information.

- The policies have been developed in consideration of the broader national information management and policy environment, and explain the impact of legislation and policy covering privacy, security, intellectual property and licensing.
- The FSDF relies on the adoption of international standards and their application across multiple jurisdictions and agencies will require a major coordination effort.
- Governance, custodianship and the foundation spatial data policies describe the structure and management arrangements for the FSDF and its data.
- The access policy defines the current and aspirational frameworks for user access to the information given the evolving supply chain arrangements for source data. It also acknowledges increasing demand to make government-held data open and free to the end user and the increasing use of digital service delivery.

## Project risks

ANZLIC is committed to the continued development of the FSDF; however, as with any major project of this nature, there are ongoing external influences and risks that may delay or slow the progress of work outlined in this booklet. Some of these risks include:

- changing policy settings in one or more jurisdictions
- resource constraints – people and funding

- a requirement for greater levels of consultation than anticipated.

The Department of Communications provides the secretariat for ANZLIC. In this capacity, and working with the Project Management Committee, it will manage project risks on an ongoing basis through the three-year roadmaps.

### **The measure of success**

The key measure of success is that the datasets managed under the FSDF will be used by all levels of government, industry, research and academic sectors as the authoritative source of foundation spatial data for all other value-added data, information and applications.

Ongoing measurements will be identified in three-year road maps and annual vision statements that will be publically available following ratification by ANZLIC.

### **More information**

For more details about the FSDF or to provide feedback, please contact the ANZLIC Secretariat or visit the ANZLIC website.

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## Annex 1. FSDF theme narrative – Geocoded Addressing

### What is geocoded addressing?

An address is a structured label—usually containing a property number, a road name and a locality name—used to identify a plot of land, a building or part of a building, or some other construction. Geocoded addressing is the process of associating an address with coordinates such as a latitude and longitude to enable it to be readily mapped and related to other spatial data. There are currently over 13 million geocoded physical addresses in Australia.<sup>1</sup>



### What datasets make up the Geocoded Addressing theme?

The national foundation datasets that currently make up the Geocoded Addressing theme include:

- **Geocoded National Address File (G-NAF®)** (PSMA Australia Limited). G-NAF validates the captured address and makes it possible to verify a physical address and locate its position.
- **Postal Address File (PAF®)** (Australia Post). PAF provides bulk identifiers to facilitate mail delivery and validate captured addresses, including supporting bulk mail discounts mainly for those people or organisations using Australia Post’s services.

### *Current access, licensing and pricing arrangements*

Geocoding Addressing datasets	Access	Licensing	Pricing
Geocoded National Address File (G-NAF®)	Searchable	Restricted	Full cost
Postal Address File (PAF®)	Searchable	Restricted	Full cost

Detailed descriptions of the Geocoded Addressing data theme and its constituent datasets (including access, standards, policy, metadata, status) can be accessed online at [www.anzlic.org.au/geocodedaddressing](http://www.anzlic.org.au/geocodedaddressing).

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<sup>1</sup> PSMA Australia Limited, *G-NAF*, viewed 18 March 2014, <[www.pma.com.au/?product=g-naf](http://www.pma.com.au/?product=g-naf)>.

## Why is the Geocoded Addressing theme part of the FSDF and how is it used?

Accurate addressing has become vital to the modern economy. In particular the location element of address data has become a vital link that enables the ready linking of big, geospatial, statistical and social data.

An authoritative source of geocoded addresses provides confidence in decision-making when using address as the constant in temporal, geographical, socio-economic and demographic analyses<sup>2</sup>. Addresses are cultural by nature and without an authoritative source of addresses; the same location may be referred to in many ways by different people resulting in confusion and unnecessary cost. For example, a location may be known by its building name, its proximity to a well-known monument or its street address.

To maximise the benefit of address information, there needs to be a comprehensive national repository of geocoded addresses. It needs to hold authoritative addresses as well as in-use addresses and link alias addresses.

Applications of geocoded addresses include:

- **Better business.** Many organisations rely on address data to support the efficient and effective delivery of their services. Verified, geocoded addresses reduce duplication and improve service delivery, and allow organisations to develop more accurate socio-economic and demographic analysis.
- **Emergency response.** Verified geocoded addresses allow emergency responders to more quickly respond to incidents. Comprehensive repositories of reliable address information allow a flexible response for responders to quickly attain the correct address and allow for the planning of the most efficient route to the incident.
- **Personal navigation.** Geocoded addresses are used in a growing number of websites, mobile phones, tablets, and personal navigation products. Accurate location intelligence provides connectivity between other services such as travel planning, imagery and features of interest information.
- **Fraud prevention.** Geocoded addresses have the capacity to prevent identity fraud, by allowing organisations to confirm the validity of a submitted address.

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<sup>2</sup> *ibid.*

## Future status

New addresses will be assigned in accordance with the rural and urban addressing standard, AS/NZS 4819, and be made available at a national level on a daily basis. The number of unofficial 'in use' addresses will decline as those addresses are resolved and official addresses are allocated to the relevant property. Address datasets will fully include addresses for apartments and complexes; such as retirement villages, indigenous communities, gated communities and other similar facilities with private road addresses. Addressing datasets will be more closely aligned with datasets including land parcels, property, roads, surface water and buildings.

The Geocoded Addressing theme sponsor will develop a comprehensive three-year road map, detailing how the sponsors, custodians, users and suppliers will progress the development of this theme to its desired future state. It is intended that the road map will be delivered to ANZLIC in December 2014 for endorsement and subsequent public release.

## Annex 2. FSDF theme narrative – Administrative Boundaries

### What are Administrative Boundaries?

Administrative Boundaries define the spatial extent of legislative jurisdictions and regulatory, electoral, statistical and maritime geographic areas. Foundation datasets are aggregated by the custodians from the local, state, territory and Australian governments.

The datasets depict national, regional and local boundaries that can be used in visualising geospatial information within the areas defined by the relevant boundaries. In addition, Administrative Boundaries can also be used to aggregate information for analytical purposes that support planning and reporting.



ADMINISTRATIVE  
BOUNDARIES

### What datasets make up the Administrative Boundaries theme in the FSDF?

The national foundation datasets that currently make up the Administrative Boundaries theme include:

- **Jurisdictional Boundaries** are a collection of legislative, regulatory, political and general administrative boundaries sourced from Federal, State and Territory authorities; including national boundary, state and territory boundaries, local government areas, parishes, regions and suburbs.
- **Australian Statistical Geographical Standard Boundaries.** The geographical boundaries that divide the area of interest on which statistics are collected under the *Australian Bureau of Statistics Act 1975* (Cwlth).<sup>3</sup>
- **Australian Electoral Boundaries.** The geographical boundaries for the purposes of an election or referendum held under the *Commonwealth Electoral Act 1918*.<sup>4</sup>

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<sup>3</sup> Australian Bureau of Statistics 2012, *ABS Corporate Plan*, viewed 17 March 2014, <[www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/C581FC0D399660D5CA257A4B001468A2/\\$File/abs\\_corp\\_plan\\_web1.pdf](http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/C581FC0D399660D5CA257A4B001468A2/$File/abs_corp_plan_web1.pdf)>.

<sup>4</sup> Australian Electoral Commission, *Overview of the AEC*, viewed 17 March 2014, <[www.aec.gov.au/About\\_AEC/index.htm](http://www.aec.gov.au/About_AEC/index.htm)>.

- **Maritime Boundaries.** The delineation of the baseline from which the outer limits of the various maritime zones are measured as set out in the United Nations Convention on the Law of the Sea (UNCLOS) and *Seas and Submerged Lands Act 1973* (Cwlth).<sup>5</sup>

### ***Current access, licensing and pricing arrangements***

<b>Administrative Boundaries datasets</b>	<b>Access</b>	<b>Licensing</b>	<b>Pricing</b>
Jurisdictional Boundaries	Searchable	Restricted	Full cost
Australian Statistical Geographical Standard Boundaries	Searchable	CC-BY	Free
Australian Electoral Boundaries	Searchable	Open – other	Free
Maritime Boundaries	Searchable	Open – other	Free

Detailed descriptions of the Administrative Boundaries data theme and its constituent datasets (including access, standards, policy, metadata, status) can be accessed online at [www.anzlic.org.au/administrativeboundaries](http://www.anzlic.org.au/administrativeboundaries).

### ***Why are Administrative Boundaries part of the FSDF and how are they used?***

Spatial information is an important tool in understanding key statistics on a wide range of economic, environmental and social issues.<sup>6</sup> Administrative Boundaries are required by all levels of government and non-government bodies involved in visualising, analysing, or reporting information within defined geographical areas. Understanding the distribution of different types of information relative to administrative areas is critical in planning for change and understanding past trends from a national through to local scale.

The data within the Administrative Boundaries theme is used to visualise administrative areas that represent onshore and offshore jurisdictions, voting districts and statistical geographies. They are required when assessing electoral redistributions, analysing statistical

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<sup>5</sup> Geoscience Australia, *Australia's [Maritime] Jurisdiction*, viewed 18 March 2014, <[www.ga.gov.au/marine/jurisdiction/australia.html](http://www.ga.gov.au/marine/jurisdiction/australia.html)>.

<sup>6</sup> Australian Bureau of Statistics, *1005.0 ABS Corporate Plan, Jul 2012*, viewed 18 March 2014, <[www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1005.0Jul%202012?OpenDocument](http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1005.0Jul%202012?OpenDocument)>.

information, zoning, socio-economic analysis, service distribution and government planning and reporting at a local, regional and national level.

### ***Future status***

The future status for Administrative Boundaries will deliver a nationally consistent and authoritative suite of administrative boundary datasets that supports analysis across and within the different levels of Australian Governments and other important boundary zones. This delivery will support the fusion of statistical and geographic information. Administrative Boundaries will be available in their original legal definitions, or aligned with other foundation datasets, or be specified by coordinates.

The Administrative Boundaries theme sponsor will develop a comprehensive three-year road map, detailing how the sponsors, custodians, users and suppliers will progress the development of this theme to its desired future state. It is intended that the road map will be delivered to ANZLIC in December 2014 for endorsement and subsequent public release.

## Annex 3. FSDF theme narrative – Positioning

### What is Positioning?

Positioning is Australia’s authoritative, reliable, high accuracy spatial referencing system. The positioning service defined under this theme includes the coordinates and their uncertainty of all location-based data promulgated from, or related to, the Australian Fiducial Network (AFN) and the defining Australian Height Datum tide gauge stations.



POSITIONING

The positioning service is underpinned by physical geodetic infrastructure, such as the survey marks and Global Navigation Satellite System (GNSS) networks, geodetic modelling (e.g. the coordinate transformations), and definitions of the geoid and bathymetric reference surfaces.

### What makes up the Positioning theme in the FSDF?

The information comprising this theme relates to positioning services and is provided through the reference system using the Geocentric Datum of Australia 1994 (GDA94) and the Australian Height Datum (AHD). While there are no datasets produced for the Positioning theme, products can be derived from the service to support specific users (such as surveyors).

### *Current access, licensing and pricing arrangements*

Positioning	Access	Licensing	Pricing
Service	Digital service	CC-BY	Free

A detailed description of the Positioning theme (including access, standards, policy, metadata, status) can be accessed online at [www.anzlic.org.au/positioning](http://www.anzlic.org.au/positioning).

### Why is Positioning part of the FSDF?

Positioning is Australia’s authoritative, reliable, high accuracy spatial referencing system and it provides a common reference for all geospatial data. Positioning services are used by specialists and non-specialists alike, for a growing number of applications (e.g. surveying, construction, mining, precision agriculture, asset capture, tracking, navigation, emergency response, law enforcement, insurance, security, climate/weather forecast and recreation).

In order to maximise the benefits of positioning and the enabling infrastructure, and to provide assurance to users of the fitness for purpose of the position outputs, guiding principles are required to enable the consistent and reliable determination and use of position information.

Positioning underpins all foundation spatial data themes and is critical in the location of information. Australia will adopt a new datum in 2015.

### **Future status**

The refinement of the national geodetic infrastructure is outlined in the National Positioning Infrastructure Plan. This plan will improve the existing GNSS continuously operating reference stations (CORS) infrastructure, governance and data sharing arrangements; and will augment the existing infrastructure with a fully multi-GNSS capable, high integrity, trusted CORS network with a 200 km inter-station spacing.

The Positioning theme sponsor will develop a comprehensive three-year road map, detailing how the sponsors, custodians, users and suppliers will progress the development of this theme to its desired future state. It is intended that the road map will be delivered to ANZLIC in December 2014 for endorsement and subsequent public release.

## Annex 4. FSDF theme narrative – Place Names

### What are Place Names?

Place Names are the names of cultural and physical features and their associated spatial identifiers, location and extent. Place Names constitute the most commonly used spatial references and can be approved, unapproved, commonly used or historical.



### What datasets make up the Place Names theme in the FSDF?

The national foundation dataset that currently makes up the Place Names theme is:

- The **National Gazetteer of Australia** holds an amalgamation subset of all jurisdictions' official naming databases.

### *Current access, licensing and pricing arrangements*

Place Names dataset	Access	Licensing	Pricing
National Gazetteer of Australia	Searchable	CC-BY	Free

Detailed descriptions of the Place Names data theme and its constituent datasets (including access, standards, policy, metadata, status) can be accessed online at [www.anzlic.org.au/placenames](http://www.anzlic.org.au/placenames).

### Why are Place Names part of the FSDF and how are they used?

Place Names are the first point of reference used by the majority of the general community when referring to a spatial location and the theme's core correlation with virtually all other foundation spatial datasets underlines its importance. Place names and place identifiers such as administrative unit codes are used to organise and georeference statistical data. All foundation themes contain place names with the exception of imagery, making standardisation of the names of paramount importance for interoperability between the themes.

The use of consistent and accurate geographic names is extremely important across daily activities in every sector. As the United Nations Group of Experts on Geographical Names (UNGEGN) recognise: 'Place names can identify and reflect culture, heritage and landscape.'

Correct use of accurate place names can provide benefits to local, national and international communities engaged in a wide range of sectors within the economy.

### **Future status**

Place Names will continue to be an essential component of a range of other FSDF datasets and gazetteer products. Place names will expand to include unofficial or historic place names along with officially gazetted names due to the burgeoning demand for these place names as a means of direction. Products will evolve to include the boundaries or physical descriptions of the extents of place names, building on or enhancing datasets in the administrative boundaries, addressing, transport, water and land cover themes. Place names will be integrated into the United Nations Spatial Data Infrastructure Gazetteer Framework along with other international gazetteers.

The Place Names theme sponsor will develop a comprehensive three-year road map, detailing how the sponsors, custodians, users and suppliers will progress the development of this theme to its desired future state. It is intended that the road map will be delivered to ANZLIC in December 2014 for endorsement and subsequent public release.

## Annex 5. FSDF theme narrative – Land Parcel and Property

### What is Land Parcel and Property?

Land Parcel and Property is a land boundary system. The term Land Parcel and Property can be interchangeable with cadastral, land administration and property systems.

Land Parcel and Property contains a record of interest in land. The data has geographical descriptions that allow users to link to information describing ownership, value of real property in a district and nature of the boundary.



LAND PARCEL  
AND PROPERTY

### What datasets make up the Land Parcel and Property theme in the FSDF?

The national foundation datasets that currently make up the Land Parcel and Property theme include:

- **Land Parcel Boundaries** is a dataset that contains parcels representing easements, roads, crossings, rail and water, in addition to the traditional view of land and strata based information.
- **Land Tenure** is a dataset that contains hierarchical classification of land parcels.

### *Current access, licensing and pricing arrangements*

Land Parcel and Property datasets	Access	Licensing	Pricing
Land Parcel Boundaries	Searchable	Restricted	Full cost
Land Tenure	Searchable	Restricted	Full cost

Detailed descriptions of the Land Parcel and Property data theme and its constituent datasets (including access, standards, policy, metadata, status) can be accessed online at [www.anzlic.org.au/landparcelandproperty](http://www.anzlic.org.au/landparcelandproperty).

### Why is Land Parcel and Property part of the FSDF and how is it used?

Land Parcel and Property underpins the economic, social and environmental fabric of Australia. It is fundamental for land tenure transactions and securing the legal status of property boundaries. There are 14.7 million legal land parcels across Australia being managed by state and territory governments.

The Land Parcel and Property datasets are used to:

- define allowable use of land
- secure tenure for access to capital
- manage title and tenure, nature conservation, heritage protection, defence and disaster management
- improve infrastructure and property development planning
- inform water and carbon accounting programs.

### **Future status**

The future state of the Land Parcel and Property theme will be stable and reliable property rights systems that ensure information can be easily, uniquely and accurately identified in a common reference system. National Land Parcel and Property data will be consistent with addressing and administrative boundaries datasets, and include richer information such as planned and actual land use, land valuation, developments, and land rights, responsibilities and restrictions.

ICSM has developed a cadastre strategy highlighting the future needs of the cadastre system. This strategy will address how the cadastre will support information related to land parcel and properties.

The Land Parcel and Property theme sponsor will develop a comprehensive three-year road map, detailing how the sponsors, custodians, users and suppliers will progress the development of this theme to its desired future state. It is intended that the road map will be delivered to ANZLIC in December 2014 for endorsement and subsequent public release.

## Annex 6. FSDF theme narrative – Imagery

### What is Imagery data?

Imagery is derived from sensor technologies used to detect, locate, classify and record objects relative to the surface of the Earth. This includes data sourced from satellite, airborne sensors and terrestrial cameras. It includes but is not limited to orthorectified multispectral, hyper spectral and panchromatic sensors. Raw data is collected from a satellite or airborne mission and then processed and orthorectified to remove tilt, terrain, atmospheric and other image distortions.



IMAGERY

### What datasets make up the Imagery theme in the FSDF?

The national foundation datasets that currently make up the Imagery theme include:

- **Low Resolution (>80 m), High Temporal Coverage.** These datasets (spatial resolution > 80 m and providing close to weekly temporal coverage) are widely used for a range of applications in Australia.
- **Medium Resolution (>10–80 m), Medium Temporal Coverage (Weekly – Monthly).** These datasets (spatial resolution 10–80 m and temporal coverage of weekly to monthly) are the most commonly used category of data.
- **High Spatial Resolution (>2.5–10 m), Low Temporal Coverage.** These datasets (spatial resolution 2.5–10 m and providing national coverage every quarter) are primarily operated by the jurisdictions and/or commercial enterprises.
- **Very High Resolution (<2.5 m), Very Low Temporal Coverage:** These datasets (spatial resolution <2.5 m) are primarily operated by the jurisdictions and/or commercial enterprises.

### *Current access, licensing and pricing arrangements*

Imagery datasets	Access	Licensing	Pricing
Low Resolution	Searchable	CC-BY	Free
Medium Resolution	Searchable	CC-BY	Free
High Resolution	Searchable	Restricted	Full cost
Very High Resolution	Searchable	Restricted	Full cost

Detailed descriptions of the Imagery data theme and its constituent datasets (including access, standards, policy, metadata, status) can be accessed online at [www.anzlic.org.au/imagery](http://www.anzlic.org.au/imagery).

### ***Why is Imagery part of the FSDF and how is it used?***

The fusion of imagery with additional datasets is a significant component of its value. Through a variety of techniques, this fusion can expand the temporal coverage and allow identification of key features of interest. Imagery, when fused with datasets from any of the other ten themes, creates a detailed mosaic of information to be exploited by the user.

Expanding archives of imagery data enables new time series analyses, which is being used to quantify land landscape dynamics, highlight environmental drivers in natural processes, monitor compliance with resource usage regulations and address issues related to climate change. Imagery underpins ground cover monitoring for Australia and is critical for assessments of environmental targets that are nationally agreed, reliable and provides a cost effective basis for measuring and mapping<sup>7</sup>.

Low and medium resolution imagery data form a fundamental input for assessing land cover and land use mapping, along with assessing environmental and land use changes across Australia.

High resolution data is used extensively in the private sector for resource exploration and environmental compliance.

Very high resolution data is used within state, territory and local governments for planning and approval processes, emergency management, mapping and environmental monitoring.

### ***Future status***

Imagery will continue to be collected at a range of resolutions and by a mix of government and industry suppliers. Earth observation datasets will be 'stacked' in time sequences covering the same area of ground, which will improve the ability of users to analyse the effects of land degradation, flood damage, deforestation across time. The concept of this

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<sup>7</sup> Department of Agriculture, *Ground Cover Monitoring for Australia*, viewed 18 March 2014, <[www.daff.gov.au/abares/aclump/pages/land-cover/ground-cover-monitoring-for-australia.aspx?wasRedirectedByModule=true](http://www.daff.gov.au/abares/aclump/pages/land-cover/ground-cover-monitoring-for-australia.aspx?wasRedirectedByModule=true)>.

‘data cube’ will be expanded from the current Landsat archive through to current and historic higher resolution imagery. Urban areas will be covered by very high to high resolution imagery on at least an annual basis; medium resolution imagery will be captured at least annually across regional areas; and low resolution imagery will continue to be captured on a high frequency for seamless continental coverage.

The Imagery theme sponsor will develop a comprehensive three-year road map, detailing how the sponsors, custodians, users and suppliers will progress the development of this theme to its desired future state. It is intended that the road map will be delivered to ANZLIC in December 2014 for endorsement and subsequent public release.

## Annex 7. FSDF theme narrative – Transport

### What is the Transport data?

The Transport network provides the means for moving people, goods and freight, and other services from one location to another.

In countries as remote and relatively sparsely populated such as Australia and New Zealand, having effective transport systems is crucial for maintaining competitive and sustainable trade, business and recreation activities.



TRANSPORT

Australia's transport network dataset covers the 813 000 km of public roads<sup>8</sup> and several thousand kilometres of private road networks, 44 800 km of rail<sup>9</sup>, 58 marine ports<sup>10</sup> and 330 certified or registered airports<sup>11</sup>. Australia relies on sea transport for 99 percent of its exports and a substantial proportion of domestic freight also depends on coastal shipping.<sup>12</sup> New Zealand has over 83 000 km of public roads<sup>13</sup>, 4 000 km of operating rail lines<sup>14</sup>, 16 major marine ports<sup>15</sup> and 82 airports.<sup>16</sup> Ninety-two per cent of freight (by

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<sup>8</sup> Australian Automobile Association, *Road length and use by road type*, viewed 18 March 2014, <[aaa.asn.au/documents/stats/72.xls](http://aaa.asn.au/documents/stats/72.xls)>.

<sup>9</sup> Geoscience Australia (2003). *Railways Map of Australia*, viewed 18 October 2013, <[www.ga.gov.au/webtemp/1473712/RailwaysOfAustralia.pdf](http://www.ga.gov.au/webtemp/1473712/RailwaysOfAustralia.pdf)>.

<sup>10</sup> Ports Australia, *Ports of Australia* map, viewed 18 March 2014, <[www.portsaustralia.com.au/misc/Ports%20Australia%20map.pdf](http://www.portsaustralia.com.au/misc/Ports%20Australia%20map.pdf)>.

<sup>11</sup> Civil Aviation and Safety Authority, Certified aerodromes register, viewed 18 March 2014, <[www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC\\_90408](http://www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_90408)>.

<sup>12</sup> Department of Infrastructure and Regional Development, *Maritime*, viewed 18 March 2014, <[www.infrastructure.gov.au/maritime/](http://www.infrastructure.gov.au/maritime/)>.

<sup>13</sup> New Zealand Ministry of Transport, *Infrastructure and investment: Infrastructure size*, viewed 18 March 2014, <[www.transport.govt.nz/ourwork/TMIF/Pages/II002.aspx](http://www.transport.govt.nz/ourwork/TMIF/Pages/II002.aspx)>.

<sup>14</sup> Rail Safety, *Rail safety in New Zealand*, viewed 18 March 2014, <[www.railsafety.co.nz/facts/rail-in-new-zealand](http://www.railsafety.co.nz/facts/rail-in-new-zealand)>.

<sup>15</sup> New Zealand Customs Service, *Customs ports of entry*, viewed 18 March 2014, <[www.customs.govt.nz/about/contactus/ports/Pages/default.aspx](http://www.customs.govt.nz/about/contactus/ports/Pages/default.aspx)>.

<sup>16</sup> Aircraft Charter World, *Airports in New Zealand*, viewed 18 March 2014, <[www.aircraft-charter-world.com/airports/oceania/newzealand.htm](http://www.aircraft-charter-world.com/airports/oceania/newzealand.htm)>.

weight) in New Zealand is moved by road.<sup>17</sup> Of the three billion tonnes of freight moved in Australia in 2009–10, two billion was moved by road and 800 million by rail. Of the 389 billion kilometres travelled by passengers in 2009–10, 264 billion kilometres were travelled by passenger car.<sup>18</sup>

Maintaining and protecting our transport systems requires significant investment. In 2009, the governments of Australia invested \$15.8 billion in road maintenance alone.<sup>19</sup> This investment relies upon detailed and accurate spatial datasets.

### What datasets make up the Transport theme in the FSDF?

The national foundation datasets that currently make up the Transport theme include:

- **Roads.** This data defines paths for the transfer of goods or movement of vehicles and people. They do not have fixed tracks for vehicular movement like a railway; and include foot tracks, cycle-ways and ferry routes.
- **Railways and Railway Stations.** This data comprises transport systems using one or more rails to move vehicles carrying freight or passengers; as well as recognised stopping places where goods, vehicles or passengers may be transferred from one form of transport to the railway network (and vice versa).
- **Airports and Airfields.** This data defines areas intended to be used for the arrival, departure and surface movement of aircraft and associated cargo, and the transfer of goods and passengers from one form of transport to the air network (and vice versa).
- **Navigation aids and obstacles – land.** This data includes variable forms of markers or devices that aid travellers in determining their position or safe course. Includes transmission lines, buildings, radio towers and masts, skyscrapers, chimneys on power plants (Note: this may be an information product rather than a dataset).

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<sup>17</sup> NZ Transport Agency, *Roads of national significance*, viewed 18 March 2014, <[www.nzta.govt.nz/network/rons/](http://www.nzta.govt.nz/network/rons/)>.

<sup>18</sup> Bureau of Infrastructure, Transport and Regional Economics (2012), *Australian infrastructure statistics – Yearbook 2012*, viewed 18 March 2014, <[www.bitre.gov.au/publications/2012/files/stats\\_002.pdf](http://www.bitre.gov.au/publications/2012/files/stats_002.pdf)>.

<sup>19</sup> Bureau of Infrastructure, Transport and Regional Economics (2011), *Public road-related expenditure and revenue in Australia*, viewed 18 March 2014, <[www.bitre.gov.au/publications/2011/files/is\\_040.pdf](http://www.bitre.gov.au/publications/2011/files/is_040.pdf)>.

- **Crossings.** This data includes structures built to facilitate transport over or under another physical feature; and includes bridges, tunnels, fords, culverts and boardwalks.
- **Traffic Control Devices** – structures used to control, calm, slow or impede the movement of traffic on another transport feature.

### ***Current access, licensing and pricing arrangements***

<b>Transport datasets</b>	<b>Access</b>	<b>Licensing</b>	<b>Pricing</b>
Roads	Searchable	Restricted	Full cost
Railways and Railway Stations	Searchable	Restricted	Full cost
Airports and Airfields	Searchable	Restricted	Full cost
Navigation Aids and Obstacles – land	Searchable	CC-BY	Free
Crossings	Searchable	Restricted	Full cost
Traffic Control Devices	Searchable	Restricted	Full cost

Other related datasets in the FSDF that are important in the maintenance of these datasets and the generation of information products include Buildings, Place Names, the Coast and Prohibited Areas and Protected Areas.

Detailed descriptions of the Transport data theme and its constituent datasets (including access, standards, policy, metadata, status) can be accessed online at [www.anzlic.org.au/transport](http://www.anzlic.org.au/transport).

### **Why is Transport part of the FSDF and how is it used?**

Spatial information is an important tool in the management of the transport network. Knowing which transport corridors to use based on their importance and their characteristics can save time, money and lives. Spatial information, as part of a broader asset management system, forms the basis for efficient spending of public monies on the maintenance of the transport network.

The primary uses of spatial information in the transport sector include:

- **Planning and delivery of emergency, security or commercial services.** Businesses need to efficiently deliver goods and services using less fuel and time, and therefore

realise greater profits. Emergency services need to deliver services to save lives and protect infrastructure.

- **Infrastructure planning and asset management.** Planners and developers need to understand gaps in the existing infrastructure so new investment can be made in the most appropriate locations.
- Asset managers need to know where to make best use of transport funding.
- **Navigation, safer driving and logistics tracking.** Manufacturers of car-safety critical systems need accurate positioning and near real-time updates in order to maximise traveller safety. Commuters, tourists and logistics companies need to know how to efficiently reach their destination.
- Transport regulators need to ensure the safe arrival and departure of users of transport services.
- **Defining administrative boundaries.** Roads and rail can form the boundaries between adjacent local government or other administrative areas.

## Future status

Transport data will be fundamental to the implementation of intelligent transport and safety systems. In the short- to medium-term, existing national datasets will be enhanced from a full suite of transport data held by jurisdiction land management and transport agencies, volunteered information, and industry. Information will be accurate to no worse than one metre in urban areas and across major transport routes, and between two and ten metres in rural and remote areas. In the long term, changes to the transport network (such as the creation of new roads) will be reflected to users in near-real-time currency, and will be managed and delivered so that users experience a seamless transition across all transport modes.

The Geocoded Addressing theme sponsor will develop a comprehensive three-year road map, detailing how the sponsors, custodians, users and suppliers will progress the development of this theme to its desired future state. It is intended that the road map will be delivered to ANZLIC in December 2014 for endorsement and subsequent public release.

## Annex 8. FSDF theme narrative – Water

### What is Water data?

Water can be described by hydrology; the study of the movement, distribution and quality of water, including the hydrologic cycles, water resources, environmental watershed sustainability and groundwater systems. The Water theme focuses on datasets related to surface and groundwater and excludes atmospheric, industrial or oceanic water processes. Understanding water interactions requires knowledge of the features that make up the hydrological system such as catchments, streams, aquifers, floodplains, and storages.



### What datasets make up the Water theme in the FSDF?

The national foundation datasets that currently make up the Water theme include those related to Surface Water and Groundwater:

- **Surface Hydrology** provides a set of related feature classes to be used as the basis of the production of consistent hydrological information. This dataset contains a geometric representation of the (major) surface water features of Australia. Primarily, these are natural surface hydrology features, but the dataset also contains some artificial features (notably reservoirs, canals and other hydrographic features).
- **Catchment Boundaries** represent geographic surface boundaries that have a hydrological relationship to surface hydrology features.
- **Hydrological Obstructions** are manmade features that impact the water network either by obstruction, diversion or storage of water.
- **Flow Direction Grid** is a national regular grid of surface flow directions accompanying a digital elevation model.
- **Groundwater Boundaries** are a nationally consistent set of groundwater boundaries and properties; including aquifer boundaries, geometry, salinity, yield and hydraulic conductivity.
- **Groundwater Bores** are a nationally consistent set of groundwater bores (including monitoring, irrigation and commercial bores) and associated lithology, construction and hydro-stratigraphy logs.

- **Groundwater Dependent Ecosystems** are ecological and hydrogeological information on known groundwater dependent ecosystems and ecosystems that potentially use groundwater.

### ***Current access, licensing and pricing arrangements***

<b>Water datasets</b>	<b>Access</b>	<b>Licensing</b>	<b>Pricing</b>
Surface Hydrology	Searchable	CC-BY	Free
Catchment Boundaries	Searchable	CC-BY	Free
Hydrological Obstructions	Searchable	CC-BY	Free
Flow Direction Grid	Searchable	CC-BY	Free
Groundwater Boundaries	Digital service	CC-BY	Free
Groundwater Bores	Digital service	CC-BY	Free
Groundwater Dependent Ecosystems	Searchable	CC-BY	Free

Other related datasets in the FSDF which are important in the maintenance of these datasets and the generation of information products include the Gazetteer, digital elevation models, the Coast, State Borders, Wetlands, Water Observation from Space, Landsat imagery archive, Road and Rail Networks and Crossings.

Detailed descriptions of the Water data theme and its constituent datasets (including access, standards, policy, metadata, status) can be accessed online at [www.anzlic.org.au/water](http://www.anzlic.org.au/water).

### **Why is Water part of the FSDF and how is it used?**

Australia is the driest inhabited continent and has the highest per capita surface water storage capacity of any country in the world. Australia has 84 800 gigalitres of storage capacity and over 500 large dams<sup>20</sup>, with many thousands of additional farm dams throughout the nation. Australia has a high water storage capacity per person, which is

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<sup>20</sup> Australian Bureau of Statistics (2010), *1370.0 – Measures of Australia’s Progress, Inland waters*, viewed 18 March 2014, [<www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1370.0~2010~Chapter~Water%20storage%20\(6.3.6.2\)>](http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1370.0~2010~Chapter~Water%20storage%20(6.3.6.2)>).

needed to sustain agricultural production and water supplies for human use during long dry periods.

The monitoring and allocation of water is critical for Australia's economic, social and environmental sustainability. In 2011–12 the extraction of water from the environment for use within the Australian economy was 74 925 gigalitres<sup>21</sup>. Groundwater resources underpin the agriculture, manufacturing and mining industries worth an estimated \$34 billion per annum and contribute \$6.8 billion annually to Australia's Gross Domestic Product<sup>22</sup>.

Spatial information plays an important role in the management and reporting of water use and resources. To develop and deliver water resources information, location of these features is vital as is information about the interactions between features that make up the hydrological system.

A key response to managing Australia's water network are the Bureau of Meteorology responsibilities under the *Water Act 2007* (Cwlth) to collect, hold, manage, interpret and disseminate Australia's water information. The National Water Account and the *Australian Water Resources Assessment 2012*<sup>23</sup> provides information on about the state of Australia's water resources and climatic conditions. The large number and size of water storages is a function of both Australia's aridity and the highly variable rainfall.

The primary uses of spatial information in the water sector include:

- **National water accounting.** Business need to understand the water reform process both on which to base decisions and against which to measure progress.
- **Asset management and monitoring.** Water accounting helps to ensure that adequate water measurement, monitoring and reporting systems are in place.

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<sup>21</sup> Australian Bureau of Statistics, *4610.0 – Water Account, Australia, 2011–12*, viewed 18 March 2014, <[www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4610.0Main+Features202011-12](http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4610.0Main+Features202011-12)>.

<sup>22</sup> Deloitte Access Economics (2013), *Economic value of groundwater in Australia*, viewed 18 March 2014, <[www.deloitte.com/view/en\\_AU/au/services/financial-advisory/deloitte-access-economics/dc9cf735afd02410VgnVCM1000003256f70aRCRD.htm](http://www.deloitte.com/view/en_AU/au/services/financial-advisory/deloitte-access-economics/dc9cf735afd02410VgnVCM1000003256f70aRCRD.htm)>.

<sup>23</sup> Bureau of Meteorology, *Australian Water Resources Assessment 2012*, viewed 18 March 2014, <[www.bom.gov.au/water/awra/2012/](http://www.bom.gov.au/water/awra/2012/)>.

- **Delivering emergency or security services.** Understanding the location of water storages and to discover how much water we have in our storages in each state, capital city, drainage division and major water supply system.
- **Defining administrative boundaries.** Catchments and aquifers can form the boundaries between adjacent state governments or other administrative areas.
- **Managing flood risks.** Understanding flood risk, developing guidelines covering collection, and publishing of flood risk information.
- **Modelling water flow is** used to understand river to aquifer water contamination, groundwater aquifer water storages and inundation models.
- **Managing environmental assets.** Understanding ecological sustainability, assist planning for agriculture, mining and other industries.

### ***Future status***

National water datasets will continue to be developed for the needs of water forecasting and identifying the likely impacts of floods and droughts. Data held by state and territory agencies, and other information providers identified under the Water Regulations 2008<sup>24</sup>, will continue to be incorporated into national water datasets and products. To support water flow modelling, all surface water information will be compatible with relevant elevation datasets. In the longer term, water information will be compliant with the emerging Water Data Transfer Format (WDTF)<sup>25</sup>, and modelling of water flows in 3D will be made possible as groundwater and surface water datasets are brought together.

The Water theme sponsor will develop a comprehensive three-year road map, detailing how the sponsors, custodians, users and suppliers will progress the development of this theme to its desired future state. It is intended that the road map will be delivered to ANZLIC in December 2014 for endorsement and subsequent public release.

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<sup>24</sup> Bureau of Meteorology, *Water Regulations 2008*, viewed 18 March 2014, <[www.bom.gov.au/water/regulations/index.shtml](http://www.bom.gov.au/water/regulations/index.shtml)>.

<sup>25</sup> Bureau of Meteorology, *About WDTF*, viewed 19 March 2014, <[www.bom.gov.au/water/standards/wdtf/aboutWDTF.shtml](http://www.bom.gov.au/water/standards/wdtf/aboutWDTF.shtml)>.

## Annex 9. FSDF theme narrative – Elevation and Depth

### What is Elevation and Depth?

Elevation and Depth is the measurement of the Earth’s surface (wet or dry) above or below a vertical datum to obtain either the height of the land or a bathymetric depth. Elevation and Depth information data is collected using a range of sensors; including laser, sound navigation and ranging (sonar), radio detection and ranging (radar), optical remote sensing and survey techniques to derive spot heights, raster surfaces, contours and digital models of terrain.



ELEVATION AND DEPTH

Digital surface models (DSMs) are derived from source survey data and represent 3D representation of the Earth showing all features in the landscape, including buildings and vegetation. DSMs are used for telecommunications management, air safety, forest management and 3D modelling and simulation. Digital elevation models (DEMs) are a 3D representation of the Earth’s surface, devoid of all natural and vegetation and man-made above ground features, which is usually derived from a DSM.

### What datasets make up the Elevation and Depth theme in the FSDF?

The national foundation datasets that currently make up the Elevation and Depth theme include:

- **Elevation.** The one arc second (~30m) DEMs provide a nationally consistent, medium resolution dataset essential for national and regional scale analysis using the best available source data. It comprises data derived from the Shuttle Radar Topography Mission (SRTM) and LiDAR where available.
- **Depth.** 50m multibeam dataset of Australia provides an understanding of the nature of the seafloor.
- **Coastal Zone.** Various depictions of the coast ranging from lowest to highest tide.

#### *Current access, licensing and pricing arrangements*

Elevation and Depth datasets	Access	Licensing	Pricing
1 second (~30m) derived DEM	Searchable	CC-BY	Marginal cost
50m multibeam dataset of Australia	Searchable	CC-BY	Free
Coastal Zone	Searchable	CC-BY	Free

Detailed descriptions of the Elevation and Depth data theme and its constituent datasets (including access, standards, policy, metadata, status) can be accessed online at [www.anzlic.org.au/elevationanddepth](http://www.anzlic.org.au/elevationanddepth).

### **Why are Elevation and Depth part of the FSDF and how are they used?**

Elevation and Depth provides an authoritative digital representation of the Earth's surface enabling evidence-based decision-making, policy development and an essential reference to other foundation datasets. Surface information underpins many spatial data processes and provides additional context to the Transport and Water datasets.

Elevation and Depth data underpins decision-making and policy development across all levels of government. Key uses of Elevation and Depth data include flood risk management; safe hydrographic, aeronautical and road navigation; climate science; emergency management and natural hazard risk assessment; the definition of maritime and administrative boundaries; defence and national security operations; natural resource exploration, exploitation and conservation; and agriculture and precision farming.

#### ***Future status***

Elevation and Depth data will be seamlessly integrated to better support decision-making in the coastal zone. National elevation products will be derived from more finely-detailed data held by local or state/territory authorities. In urban and other areas vulnerable to hazards, the quality of national elevation information will improve from the current 30m spacing to 5m spacing. Elevation products will be more widely delivered as web services. Datasets supporting intelligent transport and safety, and water modelling, will be co-developed in line with the evolution of elevation information. Improvements in data storage capacities and bandwidth underpin this future state.

The Elevation and Depth theme sponsor will develop a comprehensive three-year road map, detailing how the sponsors, custodians, users and suppliers will progress the development of this theme to its desired future state. It is intended that the road map will be delivered to ANZLIC in December 2014 for endorsement and subsequent public release.

## Annex 10. FSDF theme narrative – Land Cover

### What is Land Cover?

Land Cover is the observed biophysical cover on the Earth's surface including trees, shrubs, grasses, soils, exposed rocks and water bodies; as well as anthropogenic elements such as plantations, crops and built environments. Land cover changes for many reasons, including seasonal weather, severe weather events such as cyclones, floods and fires, and human activities such as mining, agriculture and urbanisation.



LAND COVER

A significant component of the value of land cover data comes from the capacity to use land cover dynamics to track change over time and in combination with the appropriate ancillary data sources, map changes in land use and land management practice.

### What datasets make up the Land Cover theme in the FSDF?

The national foundation datasets that currently makes up the Land Cover theme include:

- **Dynamic Land Cover.** This data provides nationally consistent land cover information at 250m resolution. It is essential for understanding and addressing a range of national challenges such as drought, salinity, water availability and ecosystem health.
- **Fractional Ground Cover.** This data is the fraction of an area that is covered by a specific cover type such as green or photosynthetic vegetation, non-photosynthetic vegetation (e.g. stubble, senescent herbage, leaf litter) or bare soil/rock. Fractional cover can be used to characterise the wind and water erosion risk, and in conjunction with appropriate ancillary data can be used to characterise soil carbon dynamics, grazing dynamics and stubble management practices.
- **National Vegetation Information System (NVIS).** NVIS provides a nationally consistent vegetation dataset aggregated from jurisdictions. It provides a comprehensive means of describing and representing vegetation information based on establishing relationships between structural and floristic data.
- **National Forest Inventory (NFI).** The NFI describes the extent and distribution of Australia's major forest types.

- **National Topographic Data.** This data contains elements that form key constraints in defining various land cover datasets and also provides data for mapping the built environment.
- **Australian Collaborative Land Use and Management Program (ACLUMP).** Land use mapping provides nationally consistent land mapping at catchment and national level.

### *Current access, licensing and pricing arrangements*

Land Cover datasets	Access	Licensing	Pricing
Dynamic Land Cover	Searchable	CC-BY	Free
Fractional Ground Cover	Searchable	CC-BY	Free
National Vegetation Information System	Searchable	CC-BY	Free
National Forest Inventory	Searchable	CC-BY	Free
National Topographic Data	Digital service	CC-BY	Free
ACLUMP	Digital service	CC-BY	Free

Detailed descriptions of the Land Cover data theme and its constituent datasets (including access, standards, policy, metadata, status) can be accessed online at [www.anzlic.org.au/landcover](http://www.anzlic.org.au/landcover).

### **Why is Land Cover part of the FSDF and how is it used?**

Across various area of government and private industry there is a need to understand, describe and classify land cover. Land cover is a geographical expression of a combination of remnant and native vegetation communities as well as past and present human activities. Land cover represents geographical features which may form a reference base for applications ranging from forest and rangeland monitoring, production of statistics, planning, investment, biodiversity, climate change, to desertification control. This supports development of sustainable land use systems. There is also a growing need for standardisation and compatibility between datasets and for the possibility to map, evaluate and monitor wide areas of land to follow change over time.

Decision makers need to know whether the landscape is following similar patterns to those observed in the past and whether policy interventions are having the desired effect. Land

cover has a wide variety of drivers, both natural and anthropogenic which impact across the foundation spatial data themes.

### **Future status**

The Land Cover datasets will evolve to support a range of time-series mapping, which tracks changes in land cover over time. In agricultural areas, changes in land cover will be tracked down to the paddock level on an annual basis; in urban areas, building footprints will be modelled in 3D and incorporate construction materials to better determine their exposure to hazards; and in remote areas changes in vegetation cover, sand, ice and water will be used to monitor ecosystem health. The maintenance of these datasets will continue to rely heavily on other FSDF datasets such as those identified in the Imagery theme.

The Land Cover theme sponsor will develop a comprehensive three-year road map, detailing how the sponsors, custodians, users and suppliers will progress the development of this theme to its desired future state. It is intended that the road map will be delivered to ANZLIC in December 2014 for endorsement and subsequent public release.