

# Queensland Foundation Spatial Data Framework

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## Version History

Version	Date	Description/Comments
	12/1993	QLIS Standard for Foundation Information
	11/1995	QLIS Standard for Foundation Information Foundation Information Standard was refined in terms of the list of data and their associated Base Level Specification.
	11/2009	QSIC Foundation Spatial Data Standard revised to reflect the current needs of the spatial information industry including review of the relevance and currency of the 1995 foundation information 'spatial features'.
	05/2011	QSIC Foundation Spatial Data Standard Scheduled revision of FSDF
1.05	05/2014	QSIC Foundation Spatial Data Standard Scheduled revision of FSDF
1.06	01/2015	QSIC Foundation Spatial Data Standard Minor editing changes completed to reflect the release of QSpatial (replacing QGIS) and the new arrangements with the Digital Road Network database. (SDRN).
1.07	07/11/2016	Update to corporate format
2.00	13/11/2017	Minor amendments and conversion to Policy Register
3.00	15/02/2018	Scheduled major revision of FSDF

## Approval

Position	Name	Date
Executive members	QSIC	1/11/2017

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## 1 What is foundation spatial data?

ANZLIC, the spatial information council, is the peak national spatial governance body in Australia and New Zealand. ANZLIC describes foundation spatial data as:

***‘the authoritative geographic information that underpins, or can add significant value to, any other information. It supports evidence-based decisions across government, industry and the community’.***

Foundation spatial data is also referred to as the base spatial layers required by most users and is generally not derived from other spatial layers. These base spatial layers are mostly held within government departments or agencies.

## 2 Why have a Foundation Spatial Data Framework (FSDF) for Queensland?

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

The Queensland FSDF identifies the type of data that is considered foundation. It is essential that Queensland has a common reference for the capture and maintenance of foundation spatial data and that foundation spatial data is accurate, consistent, reliable, timely and accessible.

The Queensland FSDF will be modified as required to reflect changes in policy, technology or current thinking.

Queensland foundation spatial data also contributes to the national foundation spatial data framework. Having reliable foundation spatial data linked with the national framework brings benefits such as:

- reduction in costs associated with data duplication across agencies, storage and access based on the ‘collect once, use many’ principle
- fast and easy access to basic data that can be easily understood and used by a variety of users to which other spatially referenced data can be added
- improves user confidence and satisfaction by making available reliable and consistent data
- improved decision-making by local state and federal agencies, private sector and community by working from the same authoritative data
- greater levels of innovation and competition resulting in better products and services being available in the market
- increased interoperability through the use of nationally consistent data for cross-organisational analysis, operations and decision.

## 3 Drivers of the FSDF

The Queensland FSDF is driven by the:

- QSIC Roadmap (2017-2020)

The QSIC Roadmap articulates the strategic focus areas for QSIC including facilitating nationally consistent spatial information initiatives as well as revising, developing and maintaining QSIC Frameworks including the FSDF.

- Queensland Government’s Open Data Policy

The Queensland FSDF contributes to the Government’s commitment to release as much of its data as possible to ensure open, accountable and transparent government. The FSDF also supports the Queensland Government ICT Strategy and Action Plan 2013-17, in particular the challenge for government under Action Item 3.02: ‘establish arrangements that support effective information exchange across department’.

- ANZLIC Foundation Spatial Data Framework (FSDF)

The ANZLIC FSDF provides a common reference for the assembly and maintenance of Australian and New Zealand national foundation spatial data. It delivers an open, accessible, affordable and usable national coverage of foundation spatial data. A platform called the Location Information Knowledge Platform (LINK) articulates the jurisdictional data that contributes towards the national datasets. The Queensland FSDF forms a vital part of this effort to organise the nation’s foundation spatial data. <http://www.fsdf.org.au/LINK/>.

## 4 Elements of the FSDF

### 4.1 Foundation Spatial Data Themes

Foundation spatial data themes provide a way of grouping spatial data with similar characteristics. Each foundation spatial data theme may be made up of a single dataset, a group of datasets managed through a single business system, or a group of single datasets disparately managed. The Queensland FSDF has adopted the ten themes identified by ANZLIC under which the nation’s foundation spatial data is grouped:

- **Imagery**
- **Location address**
- **Place names**
- **Transport**
- **Land parcel and property**
- **Administrative boundaries**
- **Land cover and land use**
- **Water**
- **Elevation and depth**
- **Positioning**

Each of the spatial themes have a profile that detail a description of the theme, why the theme is included in the FSDF and the status and future consideration for the theme data.

Spatial datasets are not listed explicitly, however reference is made to the type of spatial data that falls under the particular theme. Profiles also cover legislative mandates for the capture, maintenance of the data and the lead agency to contact.

## 4.2 Standards and policies

The spatial information management policies and standards listed are part of the Queensland FSDF:

- Governance:
  - Queensland Government ICT Strategy 2013 -17
  - *Information Privacy Act 2009*
  - Queensland Public Sector Intellectual Property principles
- Custodianship:
  - Queensland Government Information Asset Custodianship
  - QSIC Custodianship Standard 2015
- Access, Pricing and Licensing:
  - Creative Commons Licensing <http://creativecommons.org.au/>
  - Queensland Government Open Data Policy
- Geographic Information
  - AS/NZS ISO 19115 ANZLIC Metadata Profile Version 1.1
  - ISO 19139:2008 Geographic information - Metadata – XML schema implementation
  - ISO 19115/2 Geographic Information – Metadata Part 2 - extensions for imagery and gridded data
  - ICSM Guidelines for Digital Elevation Data Version 1.0 and LiDAR Specifications
  - National Mapping Council of Australia (NMA), Standards of Map Accuracy (1975)
  - AS/NZS 4590:2006 Interchange of client information
  - ISO 19131:2008 Geographic Information – Data product specifications
  - AS/NZS 4819:2011 Geographic Information – Rural and Urban Addressing
  - National Address Management Framework (NAMF)
  - QSIC Queensland Digital Road Network Standard 2016
  - QSIC Location Address Management Framework 2014
  - QSIC Parcel Identification Standard 2016
- Surveying
  - Intergovernmental Committee on Surveying and Mapping. 2014. Standard for the Australian Survey Control Network (SP1). ICSM Publication no 1. Version 2.1 <http://www.icsm.gov.au/>
  - Geocentric Datum of Australia 1994 (GDA94) Technical Manual - <http://www.icsm.gov.au/gda/tech.html>
  - Geocentric Datum of Australia 2020 (GDA2020) Information - <http://www.icsm.gov.au/gda2020/index.html>
  - Australian Height Datum (AHD) - <http://www.ga.gov.au/scientific-topics/positioning-navigation/geodesy/geodetic-datums/australian-height-datum-ahd>

### 4.3 Legislation

Legislation is an enabler and a critical element of the information management functions within each of the foundation spatial data themes.

Many boundaries are defined as a textual description in legislation. Those descriptions may reference coordinates, geographic features or other legally described boundaries. Spatial data about those references is required to visualise the legal description of the boundary. Hence legislation is vital as it is in many cases a requirement for describing the foundation spatial data.

Legislation can also act as an enabler for the information management functions of the FSDF. Theme descriptions may refer to a mandate where the capture and maintenance of data under that theme is required by legislation.

The primary legislation that relates to the Queensland FSDF is the *Survey and Mapping Infrastructure Act 2003*. Under the Act:

- Section 46 sets out requirements for a state digital cadastral dataset be kept
- Section 48 sets out requirements for an administrative area boundary dataset be kept
- Section 50 sets the requirements for a state remotely sensed image library be kept
- Section 131 sets out evidentiary provisions about state remotely sensed image
- Section 51 sets out the requirements for a survey control register recording information about survey marks be kept
- Section 52 sets out options for other survey and mapping datasets to be kept.

## 5 Discovery and access

Discovery and access of Queensland's foundation spatial data is facilitated through:

### 5.1 QSpatial Catalogue

<http://qldspatial.information.qld.gov.au/catalogue/>

QSpatial is a catalogue providing access to Queensland Government geospatial data and information. Users can discover, display and select data over an area of interest and:

- download or order data in selected formats
- access web services
- find contacts for offline data
- find links to spatial related applications
- find online visualisation tools such as Queensland Globe, QImagery or QTopo.

Remote sensing data and products are not currently discoverable through QSpatial. Access to these is through Terrestrial Ecosystem Research Network (TERN). This connects ecosystem scientists and enables them to collect, contribute, store, share and integrate data across disciplines.

TERN has been a key component of Australia's National Collaborative Research Infrastructure Strategy (NCRIS) since 2010. AusCover (a facility of TERN) delivers remote sensing data and products that describe important land-surface and environmental characteristics derived using satellite and airborne imagery. <http://www.auscover.org.au/>.

## 5.2 Queensland Globe

<https://www.business.qld.gov.au/business/support-tools-grants/services/mapping-data-imagery/queensland-globe>

The Queensland Globe is an interactive online tool that allows you to view and explore Queensland spatial data and imagery. It is part of the Queensland Government's open data initiative which aims to increase the number of publicly available datasets.

You can download a cadastral SmartMap or purchase and download a current title search. Queensland Globe users can also view a number of other themed layers such as coal seam gas (CSG), mines, vegetation and land valuation information, plus a range of layers based on ISO themes.

# 6 Characteristics of Foundation Spatial Data

## 6.1 Criteria

The following criteria was developed to determine what spatial data can be considered foundation. For the purpose of the FSDF, foundation spatial data is data upon which other spatial datasets rely or are built and must ideally have more than one of the following characteristics and criteria:

- be geospatial
  - be widely used as a component dataset in geospatial analysis
  - be widely used as a layer in geospatial products.
- essential for public safety and well being
- is critical for a national or government function
  - can be licensed in accordance with open access and licensing policies
  - satisfies statutory obligations or international obligations
  - essential for the maintenance of critical infrastructure
  - funded, owned, or held by the Commonwealth, a state, territory or local government
  - support activities across multiple agencies.
- contribute significantly to economic, social and environmental sustainability
  - support business outcomes, government strategies, or land purchase and ownership requirements.

## 6.2 Features

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.

## 7 Queensland foundation spatial data themes and profiles



### Imagery

Imagery provides a record of Queensland's natural and physical assets and environment captured by a camera or sensor from terrestrial, remotely piloted aircraft (drone), manned aircraft or satellite platform.



### Location address

Location addressing is used to describe the physical location of a property, i.e. any separately owned or occupied area of land, or each separately owned or occupied building or part of a building.



### Place names

Place Names are the recorded names of cultural and physical features with associated location and extent - the most commonly used spatial identifier and can include alternate and historical place names.



### Transport

Transport provides the means for moving people, goods and freight, and other services from one location to another. The transport themes provides information on roads, rail (incl. stations), ports (air and sea), ferry, pedestrian and active transport (cycle ways) transportation infrastructure.



### Land parcel and property

Land Parcel and Property provides the basic fabric of land ownership. The cadastre is established for land administration including land parcel and property information.



### Administrative boundaries

Administrative Boundaries are a collection of legislative, regulatory, political, maritime and general administrative boundaries.



### Land cover and land use

Land use and land cover data make up the Land Cover theme. Land use describes what the land is used for such as grazing, irrigated cropping, mining, residential or conservation. Land cover describes the physical surface of the earth such as forest, pasture, and water or urban.



### Water

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.



### Elevation and depth

Elevation is the measurement of height of the Earth's surface above or below a vertical datum. Depth is the measurement of the Earth's surface above or below a vertical datum and typically below water.



### Positioning

Positioning provides a common reference system for establishing a coordinate system for all spatial data. It ties all spatial data to a common and recognised horizontal (GDA94) and vertical (AHD) coordinate system.



## 7.1 Imagery

### What is imagery data?

Imagery provides a record of Queensland's natural and physical assets and environment captured by a camera or sensor from terrestrial, Remotely Piloted Aircraft (drone), manned aircraft, or satellite platform. Imagery can be captured passively by optical sensors that rely on reflected sun light from a feature, or through active sensors measuring reflected wavelength intensity, frequency, and distance from non-visible regions of the electromagnetic spectrum including radar (microwave) or laser altimetry. Imagery contains measurable visual and analytical data about a feature that enables complex analysis of the feature or location, and the examination and mapping of geographical locations and issues without the need to visit the site.

The general characteristics of imagery includes:

- spatial resolution - commonly referred to as pixel size which is the smallest individual physical sample distance on the ground.
- temporal resolution - the revisiting frequency of a sensor for a specific location.
- spectral resolution - the number of unique sampling bands that measure different parts of the electromagnetic spectrum (eg radar, infra red, short wave infra red and visible red, blue and green) in which the sensor can collect.
- radiometric resolution - the sensivity of a sensor to incoming reflectance and the bit depth in data collected.

Normally a high spatial resolution means a low spectral resolution and vice versa. Spectral resolution is important for ongoing monitoring and identification of land features such as highlight the difference between the soil and water on the ground. The national aggregation data for the Imagery theme is imagery data classified by resolution.

<http://www.anzlic.gov.au/foundation-spatial-data-framework/imagery>

Imagery products include geometrically and radiometrically corrected images in raster (gridded pixel) formats including aerial photographs, digital orthophotography, multispectral digital data or three-dimensional representations including classified or coloured point clouds.

### Why is imagery part of the FSDF?

In addition to the visual and rich analytical utility of imagery data, the fusion of imagery with additional datasets is a significant component of its value. Imagery, when fused with datasets from any of the other themes, creates a detailed mosaic of information to be exploited by the user. Imagery is also the source of much data. Expanding archives of imagery data enables new time series analyses, which can be used to:

- quantify landscape dynamics
- highlight environmental drivers in natural processes
- monitor compliance with resource usage regulations and
- address issues related to climate change.

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

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

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

In Queensland, imagery and derived datasets are used to support policy and planning initiatives including the agricultural land audit, the *Vegetation Management Act 1999* and the Reef Water Quality Protection Plan 2013 and Reef Protection Program.

### Status

Queensland Government has managed the capture and management of imagery since the first State Coordinated Aerial Photography Program was conducted in 1949. The State Remotely Sensed Imagery Library (the Library) consists of several analogue and digital imagery archives. It comprises in excess of one million images dating back to the early 1930's and its digital footprint is continuing to expand.

Since 1952, the Queensland government has maintained the Library under a legislative requirement undertaking:

- initiatives to ensure the analogue Library archives are preserved
- capture and maintenance of metadata for each record
- management of data quality of the digital imagery archive
- operational practices that ensure the integrity of the digital imagery archives are secured.

The Queensland Spatial Imagery Infrastructure is the combination of the Library with enabling frameworks, standards and policies, activities, and user systems, that maintain and maximise the value of Queensland's spatial imagery. The state imagery program includes:

- information management of the Library.
- facilitating the Queensland Spatial Imagery Acquisition Program 2016 – a coordinated program which outlines the acquisition of spatial imagery by the Spatial Imagery Subscription Plan.
- running preferred supplier panels – orthophotography, LiDAR, satellite, remotely piloted aircraft systems
- facilitating access to High Spatial and Temporal Resolution Satellite Imagery (QSat initiative)
- providing access to Library holdings through QImagery (discovery and access), QSpatial (access), and the Queensland Globe (view and explore).

The Queensland Government also utilises imagery data combined with data from other sources such as field observations to analytically derive other statewide and foundation spatial data products using applied remote sensing and earth observation techniques.

### Future considerations

Provision of a core imagery reference layer that will:

- be openly accessible
- be compliant with the National Nested Grid (ANZLIC's set of specifications for spatial location and resolution for grid cell data)
- have whole of government and/or open content licensing where possible to be delivered through web map services
- be the best available resolution at any point in time.

Spatial resolutions for aerial photography will be:

- very high resolution aerial photography at 10cm resolution and captured at least annually in SEQ urban areas and provincial cities, coastal towns on a three year cycle, and towns in rural and remote areas on a five year cycle.
- high resolution aerial photography at 25cm resolution for regional areas and mining basins, captured every three years.

Spatial resolutions for satellite imagery will be:

- medium resolution satellite imagery available through the Landsat satellites (30m) with repeat coverage every 8 days by United States Geological Survey and NASA.
- medium resolution satellite imagery available through the Sentinel satellites (10m) with repeat coverage every 5 days launched by the European Space Agency as part of their Copernicus program.
- very-high resolution satellite imagery as a tasked acquisition annual mosaic at the preferred resolution of 1.5m or better.

### Mandate

The *Survey and Mapping Infrastructure Act 2003* requires a library of remotely sensed imagery be kept. Under Section 131 of the *Survey and Mapping Infrastructure Act 2003*, the custodian of the Library has a role to provide Imagery as evidence and is authorised to supply a certified State Remotely Sensed Image of land and coastal waters of the state from the Library as evidence for legal proceedings.

### Lead agencies

Spatial Imagery Program:

Department of Natural Resources, Mines and Energy (DNRME) (email: [opendata@dnrme.qld.gov.au](mailto:opendata@dnrme.qld.gov.au))

Applied Remote Sensing and Earth Observation:

Department of Environment and Science (email: [opendata@des.qld.gov.au](mailto:opendata@des.qld.gov.au))



## 7.2 Location address

### What is location address data?

A location address is used to describe the physical location of a property, i.e. any separately owned or occupied area of land, or each separately owned or occupied building or part of a building. Geocoding an address 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.

### Why is location address part of the FSDF?

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 addresses provides confidence in decision-making when using addresses as the constant in temporal, geographical, socio-economic and demographic analyses.

Applications of location addresses include:

Better business	Many organisations rely on address data to support the efficient and effective delivery of their services. Verified location addresses reduce duplication and improve service delivery and allow organisations to develop more accurate socio-economic and demographic analysis.
Emergency response	Verified location 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	Location 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	Location addresses have the capacity to prevent identity fraud, by allowing organisations to confirm the validity of a submitted address.

### Status

Under Queensland's *Local Government Act 2009*, local governments are responsible for road naming and assigning address numbers on those roads (including roads in private estates and gated communities). Location addresses are provided by local governments to Queensland government who collate the state-wide data. Queensland location addresses are geocoded and made available to Geocoded National Address File G-NAF©.

### Future considerations

A location address in its aspirational state shall be:

- accurate and unambiguous (from the process of assigning addresses)
- managed so addresses are recorded as a point of truth, validated and up-to-date
- readily accessible by users and used in mobile location services
- compliant with the ANZLIC National Address Management Framework (NAMF)
- referenced with different extents of the address e.g. the different types of geocodes including building footprints.

### Lead agency

Department of Natural Resources, Mines and Energy (email: [opendata@dnrme.qld.gov.au](mailto:opendata@dnrme.qld.gov.au))



## 7.3 Place names

### What is place names data?

Place names are the recorded names of cultural and physical features and their associated location and extent. They are the most commonly used spatial identifier. A place name is given to an area or geographical feature (whether natural or artificial) and can include approved, unapproved, commonly used, alternate and historical place names.

### Why are place names part of the FSDF?

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 are used to organise and geo-reference 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.

Consistent and accurate place names are the basis of a number of vital activities, including map production, communication services, population censuses and statistics, and emergency services. Utilising the correct place names removes confusion and ambiguity in describing the location of a place.

### Status

Approved place names assigned in accordance with the *Place Names Act 1994* are well maintained in the place names gazetteer as point features. The line or area extents of those features, names approved under other Acts, or names given to features not covered by naming legislation are held in separate repositories and available through various methods. The attributes of a place name includes the name, co-ordinates, boundaries and if available, alternative names and historical information.

### Future considerations

Long term objectives for place names are:

- all official place names are discoverable through a single point of truth
- all place names supported by spatial data are appropriately describing the extent of the place to which the name applies (i.e. lines and areas, not just point data)
- the capacity for appropriately recording and communicating, where relevant, unofficial, alternate, historical, and alias place names to better support the complex and evolving nature of place naming in the community.

### Mandate

*Place Names Act 1994*

### Lead agency

Department of Natural Resources, Mines and Energy (email: [opendata@dnrme.qld.gov.au](mailto:opendata@dnrme.qld.gov.au))



## 7.4 Transport

### What is transport data?

Transport provides the means for moving people, goods and freight, and other services from one location to another. The transport theme provides information on roads, rail (incl. stations), ports (air and sea), ferry, pedestrian and active transport (cycle ways) and transportation infrastructure. In areas as remote and relatively sparsely populated such as Queensland, having effective transport systems is crucial for maintaining competitive and sustainable trade, business and recreation activities.

### Why is transport part of the FSDF?

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. 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.
- Roads and rail can define administrative boundaries.

### Status

The Baseline Roads and Tracks – Queensland is a digital representation of the road centre-lines and ferry routes of Queensland. It is based on the QSIC Standard Digital Road Network (DRN Standard) that defines the optimal method for capture and maintenance of a digital road network. There are also commercial offerings based on the standard that offer richer attributes than the baseline roads and tracks. Other features within the transport theme such as railways, aviation, crossings and traffic control devices are derived from a range of sources.

### Future considerations

Transport data will be essential for the delivery of cooperative intelligent transport systems and autonomous vehicles. 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.

Transport data will be consistently classified and described and will be easily accessible to users. It will be enhanced by systematic improvements to meet all future transport infrastructure need and delivered through web map services.

### Lead agency

Department of Natural Resources, Mines and Energy (email: [opendata@dnrme.qld.gov.au](mailto:opendata@dnrme.qld.gov.au)).



## 7.5 Land parcel and property

### What is land parcel and property data?

The land parcel and property theme provides the basic fabric of land ownership. Land parcel and property (cadastre) are established for the purpose of land administration and include land parcel and property information. The cadastre refers to all land whether it is leasehold, freehold, national park or strata title. The cadastre is an up-to-date parcel based land information system which contains descriptive data including the identifier, tenure, ownership type, size and a record of interests in land (i.e. rights, restrictions and responsibilities).

### Why is land parcel and property part of the FSDF?

Land and property data 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 3 million legal land parcels across Queensland being managed by the state governments and is used to:

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

Land and property data is often the basis of planning and operational applications and can be used as a reference system to register other information.

### Status

Land parcel and property information is maintained in the digital cadastral database (DCDB). The DCDB is continuously updated by entering new survey data from registered plans and administrative advices. Client service standards ensure that 90% of new survey plans be entered in to the DCDB within 7 working days from date of registration in the titling system.

The DCDB is used to produce digital datasets for administrative boundaries, namely locality and local government boundaries. Data in the DCDB consists of two parts - spatial and attribute components. The spatial component is used to depict the position and boundaries of parcels and the attribute information contains details about each parcel. Through upgrade projects, the spatial component of the parcel is adjusted to a greater accuracy while the unchanged attribute data moves with the adjusted parcel. The integrity of the database is maintained. The DCDB has evolved to become the essential graphical data source which underpins all land information systems in the state.

The DCDB is continually improved using information from survey control data and survey plans, registered plans of subdivisions, government gazettes and administrative notifications as well as upgraded data and survey control network received from local authorities.

### Future considerations

The future state of the land parcel and property theme will be a stable and reliable property rights systems that ensure information can be easily, uniquely and accurately identified in a common reference system. Land parcel and property data will be consistent with addressing and administrative boundaries datasets.

The DCDB is widely used by local governments in the administration of their rates databases and asset management environments. To achieve a desirable level of spatial upgrade to the DCDB, projects are undertaken as a co-operative venture with local governments. DCDB internal upgrade program is an ongoing program which supplements the co-operative ventures with local governments. The latest available imagery and survey control is utilised and is achieving accuracy results ranging from +/- 1 metre to +/- 25 metres. The desired outcome is a DCDB with improved positional accuracies to better meet the contemporary needs for vegetation monitoring and other natural resource management needs.

### Mandate

*Survey and Mapping Infrastructure Act 2003* requires a digital cadastre database and administrative boundary dataset be kept.

### Lead agency

Department of Natural Resources, Mines and Energy (email: [opendata@dnrme.qld.gov.au](mailto:opendata@dnrme.qld.gov.au))



## 7.6 Administrative boundaries

### What is administrative boundaries data?

The administrative boundaries theme is a collection of legislative, regulatory, political, maritime and general administrative boundaries.

### Why is administrative boundary part of the FSDF?

The administrative boundaries theme supports the requirements of visualising administrative areas such as suburb and locality boundaries, local and state government boundaries. Administrative boundary data combined with location address data, demographic information and agency specific information underpins high quality spatial analysis.

### Status

The administrative boundaries data provide the best available full state coverage of base data that is required to manage, differentiate and delineate specific areas and points. Accuracy varies between datasets dependent on the source data used to define the boundary but is generally equivalent to that of the digital cadastral data for that area.

Maritime boundaries and the legislative definitions are available online through the Australian Maritime Spatial Information System (AMSIS) portal sourced from Geoscience Australia.

### Future considerations

Administrative boundaries datasets in their aspirational state shall be updated daily and be aligned to the other foundation data from which they are derived (e.g. cadastre).

### Mandate

- *Local Government Act 2009*
- *Place Names Act 1994*
- *Queensland Boundaries Declaration Act 1982*
- *Electoral Act 1992*
- *Survey and Mapping Infrastructure Act 2003*
- *Constitutional Powers (Coastal Waters) Act 1980*

### Lead agency

Department of Natural Resources, Mines and Energy (email: [opendata@dnrme.qld.gov.au](mailto:opendata@dnrme.qld.gov.au))



## 7.7 Land cover and land use

### What is land cover and land use data?

Land use describes what the land is used for such as grazing, irrigated cropping, mining, residential or conservation. Land cover describes the physical surface of the earth such as forest, pasture or urban.

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. Remote sensing data recorded over a period of time allows the observation of land cover dynamics. Classifying these responses provides a robust and repeatable way of characterising land cover types. These complement on-ground surveys.

### Why is land cover and land use part of the FSDF?

Land management practices have a profound impact on Queensland's natural resources, agricultural production and the environment. The availability of consistent and reliable spatial information regarding land use and land cover is critical for sustainable natural resource management by the Queensland, Australian, and local governments, regional Natural Resource Management groups, industry groups, community groups and land managers. 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 data has a wide variety of drivers, both natural and anthropogenic which impact across the foundation spatial data themes.

### Status

Queensland Government provides mapping of both land use and land cover. The Queensland Land Use Mapping Program (QLUMP) maps and assesses land use patterns and changes across the state, according to the Australian Land Use and Management (ALUM) Classification. QLUMP is part of the Australian Collaborative Land Use and Management Program (ACLUMP), coordinated by the Australian Bureau of Agricultural and Resource Economics and Sciences. ACLUMP promotes nationally consistent land use information. Government, the private sector, research agencies and community groups use the QLUMP datasets for natural resource assessment, monitoring and planning. Land use is mapped to the ACLUMP standard, agreed technical standards, including the Australian Land Use and Management Classification and the national Land Use Management Information System (LUMIS).

The Statewide Landcover and Trees Study (SLATS) provides spatial data on land cover. SLATS monitors Queensland's forests and woodlands to assess vegetation extent and clearing activities, in support of the *Vegetation Management Act 1999* and regional planning initiatives. It also provides satellite images, detailed spatial data and reports to help landholders, scientists, industry and government to improve land management practices. SLATS conforms to standards set in accordance with Joint Remote Sensing Research Program (NSW, QLD, VIC) protocols.

The Queensland Ground Cover Monitoring Program (QGCMP) provides spatial data for Queensland's ground cover, including pasture, leaf litter and bare ground. This data is consistent the Geoscience Australia's National Dynamic Land Cover Dataset - the comprehensive land cover reference for Australia.

### Future considerations

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.

### Mandate

- *Vegetation Management Act 1999*
- *Land Act 1994*
- *Great Barrier Reef Protection Amendment Act 2009*
- *Regional Planning Interest Act 2014*

### Lead agency

Department of Environment and Science (email: [opendata@des.qld.gov.au](mailto:opendata@des.qld.gov.au))



## 7.8 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. Data that makes up the water theme, includes groundwater, the water monitoring network, bore hole and well locations, catchments, waterfalls, surface water features such as lakes and waterholes, man-made water storage reservoirs, the natural drainage network (perennial or non-perennial) that is ordered, man-made canals and floodplains.

### Why is water part of the FSDF?

Australia is the driest inhabited continent and has the highest per capita surface water storage capacity in the world. The monitoring and allocation of water is critical for Australia's economic, social and environmental sustainability.

To develop and deliver water resources information, location of water features is vital as is information about the interactions between features that make up the hydrological system. Key users of surface hydrology data are state, local and Commonwealth government agencies. Surface hydrology data provides the component of the Australian Hydrological Geospatial Fabric as a critical input to the Australian Water Resources Information System. Widespread use of the surface hydrology data is also found in emergency management response and recovery efforts, hazard mitigation or disaster risk reduction, climate change, natural resource assessment, environmental planning and monitoring, insurance, mining and agriculture.

### Status

Queensland government collects, manages and delivers data on the quantity and quality of fresh water in the state's streams and aquifers, as the basis for water resource planning and water management activities. Discrete water quality data at selected surface water and groundwater sites is also collected. This is water quality data from the laboratory analysis of water samples collected in the field and is available publically on data request.

The Queensland Integrated Waterways Monitoring Framework integrates and aligns waterway monitoring and reporting to increase efficiency, and avoid unnecessary duplication and increasing access to monitoring information and data. Wetland mapping data is sourced from a variety of institutions in Queensland, Australia and internationally. Downloadable data can be incorporated into studies via GIS systems.

### Future considerations

Queensland Government will continue to provide the reliable source of truth for foundation water data with a view to integrate the best available data and undertake continuous revision to meet user needs.

### Mandate

- *Water Act 2000* provides for the sustainable management of water and other resources and the establishment and operation of water authorities in Queensland.
- *Water Act 2007 (Cth)* makes provision for the management of the water resources of the Murray-Darling Basin, and to make provision for other matters of national interest in relation to water and water information.

### Lead agency

Department of Natural Resources, Mines and Energy (email: [opendata@dnrm.qld.gov.au](mailto:opendata@dnrm.qld.gov.au))



## 7.9 Elevation and depth

### What is elevation and depth data?

Elevation is the measurement of height of the Earth's surface above or below a vertical datum.

The height is expressed in positive values above the datum and negative values below the datum and is often referred to as a level.

Depth is the measurement of the Earth's surface above or below a vertical datum and typically below water. The depth is expressed in positive values below the datum and negative values above the datum and is often referred to as a sounding (or dry sounding above datum).

Elevation and depth information data is collected using a range of sensors; including light detection and ranging (LiDAR), sound navigation and ranging (sonar), radio detection and ranging (radar), optical remote sensing and survey techniques to derive spot heights, raster surfaces, contours, digital models of terrain and point cloud data.

### Why is elevation and depth part of the FSDF

Elevation and depth theme 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.

Elevation and Depth underpins:

- safe hydrographic, aeronautical and road navigation
- climate science
- emergency management and natural hazard risk assessment
- environmental analysis including water management
- engineering projects and infrastructure development
- definition of maritime and administrative boundaries
- defence and national security
- natural resource exploration.

### Status

Queensland Government is improving the extent, reliability and currency of data. Data is available in seamless datasets that are suitable for multiple purposes including terrain, storm and flood modelling, environmental management, infrastructure development and small and large scale mapping projects.

### Future considerations

Ability to download digital data 24/7 through a variety of software applications including smart phones and web map and web image services. Increased accuracy of elevation data to meet the demands of the community and industry. Ability to use data derived from numerous sources to create new products such as 3D visualisation for urban and infrastructure design.

### Lead agency

Department of Natural Resources, Mines and Energy (email: [opendata@dnrm.qld.gov.au](mailto:opendata@dnrm.qld.gov.au))



## 7.10 Positioning

### What is positioning data?

Positioning is Queensland's authoritative, reliable, high accuracy spatial referencing system. The positioning service under this theme ties all spatial data to a common and recognised horizontal (GDA) and vertical (AHD) datum. It is defined in terms of three dimensional coordinates and their uncertainty related to the Australian Fiducial Network (AFN) and the Australian National Levelling Network (ANLN).

The positioning data includes recognised permanent survey marks as well as recognised Continuously Operating References Stations (CORS) for Global Navigation Satellite Systems (GNSS). Survey marks and CORS form the 'State Control Survey' under the *Surveying and Mapping Infrastructure Act 2003*. Attributes attached to these include name, unique code, latitude, longitude, height and the relevant datums.

### Why is positioning part of the FSDF?

Positioning plays a vital role in developing all foundation spatial data and is Queensland's authoritative, reliable, high accuracy spatial referencing system, providing a common reference for all spatial data. Services are used 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.

### Status

Permanent survey mark data from the Survey Control Register is available under the Open Data policy.

The state's geodetic infrastructure is being progressively upgraded with datum modernisation being driven by the development of the National Positioning Infrastructure (NPI) which will be capable of delivering coordinates with centimetre accuracy. Queensland's DNRM has developed the SunPOZ CORS and operates those national AuScope CORS that are in Queensland. These CORS networks improve spatial accuracy using a combination of GNSS technology and mobile communication systems to deliver centimetre-accurate, real time positions.

CORS data is available under the Open Data policy. Several third party service providers use that data to deliver centimetre accurate real-time positioning services in relevant coverage areas across the State. The national geoid model (i.e. AUSGeoid) supports the measurement of height with respect to AHD using GNSS.

### Future considerations

The SunPOZ and AuScope CORS networks have moved from the construction phase to ongoing operation and maintenance. The refinement of the state's geodetic infrastructure is an integral part of the national geodetic infrastructure outlined in the National Positioning Infrastructure (NPI) Plan. The NPI will improve the existing GNSS 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 200km inter-station spacing.

Positioning data is currently supplied in the Geocentric Datum of Australia 1994 (GDA94). Between 2017 and 2020, Queensland will adopt a new and more homogenous conventional plate-fixed (or static) datum with the defining coordinates projected forward to a reference date of 1 January 2020. The new datum will be known as GDA2020.

### Mandate

- *Survey and Mapping Infrastructure Act 2003* sets out survey standards and requires a survey control register be kept.
- *National Measurement Act 1960* requires the positions of the Australian Fiducial Network are a recognized-value standards of measurement of the physical quantity position.  
See: <http://www.measurement.gov.au/Publications/Pages/determinations.aspx>

### Lead agency

Department of Natural Resources, Mines and Energy (email: [opendata@dnrm.qld.gov.au](mailto:opendata@dnrm.qld.gov.au))

## 8 Glossary of Terms

AHD	The Australian Height Datum approximates mean sea level around the Australian continent and is the surface to which all heights used in mapping and surveying are referred.
AuScope	Infrastructure including a CORS network operating across Australia supporting earth sciences and linking the QGRF to the national and international reference frames.
AUSGEOID	The Australian Geoid is a mathematical model used to convert purely mathematical ellipsoidal heights measured using GNSS to more practical heights above mean sea level and in terms of the AHD.
Cadastre	A comprehensive register of the dimensions and locations of land parcels of a country. A cadastral map shows the boundaries and ownership of land parcels. Some cadastral maps show additional details, such as survey district names, unique identifying numbers for parcels, certificate of title numbers, positions of existing structures, section or lot numbers and their respective areas, adjoining and adjacent street names, selected boundary dimensions and references to prior maps.
CORS	Continuously operating reference stations that continuously track GNSS satellites to enable improved accuracy and reliability for GNSS users.
DCDB	Digital Cadastre Database - a computerised map of property boundaries and the related property description of all land parcels in Queensland.
DEM	Digital Elevation Models contain relief data through a regular or irregular grid of elevation heights. The representation of continuous elevation values over a topographic surface by a regular array of sampled z-values, referenced to a common datum. To be expressed as a grid or raster data set. The DEM is ground only representation and excludes vegetation such as trees and shrubs and human constructed features such as sheds and houses.
DSM	Digital Surface Model - the terrain elevations and surface elevation of tree canopy and the top of buildings. Break lines are not added to the DSM. Bodies of water are flattened. Can be in point (ASCII), vector or raster format.
GDA	Geocentric Datum of Australia is the specific geodetic datum used in Australia and to which all coordinates used in mapping and surveying are referred. It enables coordinates across Australia to be expressed in a consistent way in terms of latitudes, longitudes and ellipsoidal heights.
GDA94	Geocentric Datum of Australia 1994 - the official geodetic datum adopted nationally across Australia. GDA94 is a coordinate reference system that best fits the shape of the earth as a whole. It has an origin that coincides with the centre of mass of the Earth, hence the term 'geocentric' GDA94 is a static coordinate datum based on the International Terrestrial Reference Frame 1992 (ITRF92), held at the reference epoch of 1 January 1994.
Geocode	Geocoding is the process of finding associated geographic coordinates (often expressed as latitude and longitude) from other geographic data such as street addresses. With geographic coordinates, the features can be mapped and entered into geographic information systems or embedded into media.
Geodetic Datum	A generic term for the way a geospatial reference frame is used to realise a particular coordinate system.
Geospatial Reference	A Geospatial Reference Frame - underlying definition for and link between the working geodetic datum, height datum and supporting data sets and standards. It is foundation for all fundamental geospatial datasets such as cadastre, topography, geophysics, environment, natural resources, transport, utilities and emergency management.

G-NAF©	Geocoded National Address File (G-NAF©) (PSMA Australia Ltd) that enables validation of addresses and also provides a physical location for addresses. It is derived from jurisdictional addressing information.
GNSS	Global Navigation Satellite Systems - GNSS combines satellite and ground infrastructure to determine geographic positions on earth. Global Navigation Satellite Systems is an umbrella term for satellite positioning systems such as the Global Positioning System (GPS) operated by the United States of America, GLONASS from Russia, Beidou from China or Galileo from the European Union.
GPS	Global Positioning System
ISO	International Organization for Standardization – an independent, non-governmental international organization that provides world-class specifications for products, services and systems to ensure quality, safety and efficiency.
LiDAR	Airborne laser scanning (ALS) or LiDAR is a remote sensing technology that determines distance to a surface using laser pulses. Distance is computed by measuring the time delay between transmission and detection of the reflected signal used to make high resolution maps.
Monumentation	Monumentation in surveying refers to the practice of marking known horizontal and vertical control points with permanent structures such as concrete pedestals and metal plaques.
NAMF	ANZLIC National Address Management Framework
NMA	National Mapping Council of Australia ceased in the late 1980s and the Intergovernmental Committee on Surveying and Mapping (ICSM) was formed.
NPI	National Positioning Infrastructure is instantaneous, reliable and fit-for-purpose positioning and time services anywhere, anytime across the Australian landscape and its maritime jurisdictions. NPI ensures sustainable, nationally compatible deployment of GNSS Continuously Operating Reference Stations (CORS) infrastructure capable of accommodating a variety of providers and ensure efficient, effective Australia wide coverage and service.
PNDB	Place Names Database - the cumulated list in electronic form of approved, unapproved, alternative and obsolete place names recorded in Queensland and accessed through the departments SmartMap Information System (SMIS). The PNDB provides the name, descriptive code, status, co-ordinates, map reference, gazettal information and if available, alternative names and historical information.
QGRF	Queensland Geospatial Reference Frame is a term for the specific definition of Queensland's implementation of the Geocentric Datum of Australia, the Australian Height Datum and AUSGEOID, including supporting data sets and standards.
SCDB	Survey control database
SDRN	State Digital Road Network - a digital representation of the road centre-lines of Queensland.
SMIS	SmartMap Information System - displays current information on Queensland property boundaries, valuations and sales data, and survey information.
State Control Survey	A survey of high precision carried out under the <i>Survey and Mapping Infrastructure Act 2003</i> for establishing recognised permanent survey marks throughout the State.
Sun POZ	A CORS network operating in South East Queensland that enables centimetre accuracy for users in real time.