

Queensland Geospatial Reference Frame

Policy

Version 1



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Version History

Date	Version	Author	Description/Comments
02/03/2011	1	Matt Higgins	Replacing former NRW Policy : PBO_2006_2627
05/08/2013	1.1		Rebranding due to departmental name change and organisational structure changes with no substantive changes to policy content.

Approval

Chris Robson Assistant Director-General, Land and Indigenous Services	1 March 2011
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Purpose

To provide a world class Geospatial Reference Frame that supports spatial information and functions to meet Queensland's economic, environmental and social needs.

Rationale

The State of Queensland is responsible for the Geospatial Reference Frame which provides the basis for defining location in Queensland. In order to deliver the Reference Frame, the chief executive of the Department of Natural Resources and Mines has the responsibility under the *Survey and Mapping Infrastructure Act 2003* to develop, maintain and improve the State Control Survey. The State Control Survey is managed by the Land and Spatial Information Group.

The Queensland Geospatial Reference Frame (QGRF) includes the implementation of the geospatial reference system, standards supporting that coordinate system, a realisation of that reference system as the working geodetic datum and the necessary positioning capabilities.

It defines how latitudes, longitudes and heights are measured and enables accurate location of features anywhere in Queensland.

As such the Geospatial Reference Frame is the foundation for all geospatial activities including fundamental geospatial datasets for the cadastre, topography, geophysics, environment, natural resources, transport, utilities and emergency management.

It will be implemented across Queensland using appropriate technologies depending on available communications, infrastructure and community need.

Traditionally, the Queensland Geospatial Reference Frame has been realised through the placement of permanent survey marks and carrying out surveys to generate accurate latitudes, longitudes and heights for those marks.

A global trend during the last decade has seen Continuously Operating Reference Stations (CORS), using Global Navigation Satellite System (GNSS) technology, complementing and/or replacing permanent survey marks as a means of realising and delivering the Geospatial Reference Frame. In Queensland, the CORS approach is delivered by the SunPOZ network in south east Queensland and through participation in the national AuScope network for coverage of the rest of the state.

The rationale behind this policy is to formally recognise that in a world class Geospatial Reference Frame for Queensland, permanent survey marks and Continuously Operating Reference Stations (CORS) combine to form the State Control Survey, and to define the principles by which such a framework will be managed.

Policy

A Geospatial Reference Frame is a public good. As such it can be provided either by government or by a non-government entity on terms and conditions satisfactory to government.

The Queensland Geospatial Reference Frame (QGRF) will be the single authoritative source for geospatial referencing in Queensland in accordance with the provisions of the *Survey and Mapping Infrastructure Act 2003*.

The QGRF will be developed, managed and maintained in line with the various policies relating to foundation information, including the appropriate levels of currency and quality.

The QGRF will support legal traceability of position measurements using GNSS in accordance with the *National Measurement Act 1960*.

The QGRF will be compatible with the National Geospatial Reference Frame, which in turn is linked to the International Terrestrial Reference Frame (ITRF). Therefore the QGRF will be based on:

- The Geocentric Datum of Australia (GDA - for latitudes, longitudes and ellipsoidal heights);
- The Australian Height Datum (AHD - for heights above mean sea level); and
- The Australian Geoid (AUSGEOID - geoid-ellipsoid separation).

The QGRF, in its broadest definition, will be managed by the State and create the environment for the State Control Survey and other survey infrastructure, including associated permanent survey marks and continuously operating reference stations.

Policy Principles

The QGRF will be managed so that it will be:

- **Widely useable** - accessible to the whole community on reasonable terms, and open to a growing user base, including those requiring new approaches to data delivery;
- **Collaborative** - established, managed and maintained by the State Government in cooperation with international, national, regional and local authorities, and with industry where appropriate;
- **Innovative** - capitalise on the latest research and development;
- **Accurate** - capable of meeting the accuracy and quality requirement of the most demanding user;
- **Digitally Enabled** - capable of meeting common operating standards and the needs of users through enhanced digital access to all components of the QGRF;
- **Multi-dimensional** - integrate horizontal, vertical and time varying components;
- **Open Standards based** - supports use of open standards and interoperability with other States.

The QGRF will also be managed to provide for the avoidance of duplication of infrastructure.

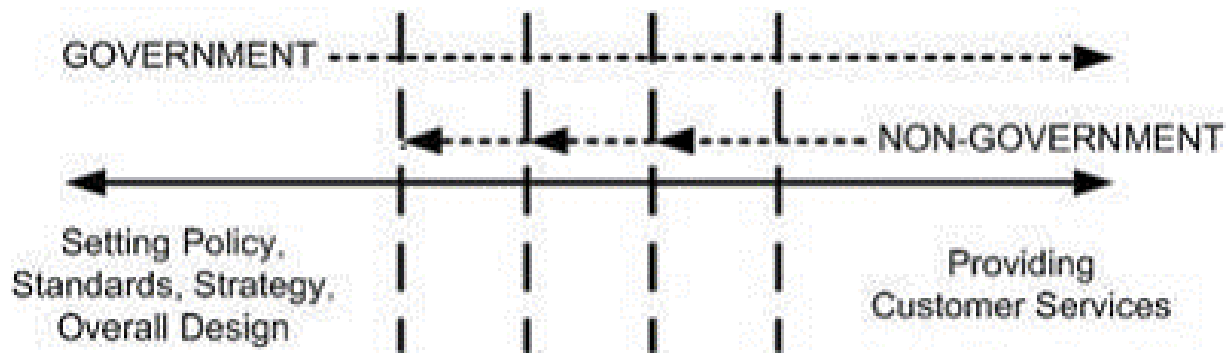
Role of Government and Non-Government Parties

Government will set QGRF policy, establish standards, provide strategic direction and overall design of the QGRF with advice from non-government parties if available.

On a prima facie basis it is not necessary for the delivery of the QGRF to be solely by the State government. There is potential for non-government bodies to supply both infrastructure and services. Consequently, within the Policy Principles there is scope for other parties to be involved depending on such factors as user market, geographical area and special use.

The diagram below is designed to portray the role that government and non-government parties might play in the management and delivery of a QGRF.

GOVERNMENT AND NON-GOVERNMENT ROLES IN THE QGRF



Responsibilities

Responsibility for the QGRF, its maintenance and development will be with the Executive Director, Land and Spatial Information Group, Department of Natural Resources and Mines.

Definitions

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.

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.

AuScope : Infrastructure including a CORS network operating across Australia supporting earth sciences and linking the QGRF to the national and international reference frames.


CORS : Continuously Operating Reference Stations that continuously track GNSS satellites to enable improved accuracy and reliability for GNSS users.

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.

Geodetic Datum : A generic term for the way a geospatial reference frame is used to realise a particular coordinate system.

Geospatial Reference Frame : A Geospatial Reference Frame is the underlying definition for and the links between the working geodetic datum, the height datum and the supporting data sets and standards. It is the foundation for all fundamental geospatial datasets such as cadastre, topography, geophysics, environment, natural resources, transport, utilities and emergency management.

GNSS : 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.



ITRF : International Terrestrial Reference Frame is a mathematical model of the shape of the earth with its origin at the centre of mass of the earth. It enables consistent coordinates across the globe. GDA is based on the ITRF.

QGRF : Queensland Geospatial Reference Frame is an umbrella term for the specific definition of Queensland's implementation of the Geocentric Datum of Australia, the Australian Height Datum and AUSGEOID and includes the necessary supporting data sets and standards.

State Control Survey : A survey of high precision carried out under the *Survey and Mapping Infrastructure Act* for the purpose of establishing recognised permanent survey marks throughout the State.

SunPOZ : A CORS network operating in South-East Queensland that enables centimetre accuracy for users in real-time.

References

Policy on Acquisition, Management and Preservation of Geographic Reference Data (PBO/900/101)

Policy on Aerial Photography and Remote Sensing (PBO/900/104)

Policy on Calibration Service (SIG/2010/4034)

Policy on Place Names (PBO/900/106)

Legislation

Survey and Mapping Infrastructure Act 2003 (Qld)

National Measurement Act 1960 (Cth)