

Appendix A5

CO-ORDINATE SYSTEMS & MAP PROJECTIONS

A5.1 Co-ordinate Systems.

A5.1.1 The Australian Geodetic Datum 1966 (AGD66).

AGD66 was adopted for use throughout Australia in 1966 replacing the various systems in use by individual States up until that time. This system has remained in use in Victoria and will continue to be used until 1 January 2000 when GDA94 will become the officially sanctioned datum.

AGD66 is defined by the position of the Johnston Geodetic Station (near Alice Springs) on the Australian National Spheroid (ANS) as determined in the National Adjustment of 1966 which provided the AGD66 co-ordinate set.

As satellite and Very Long Base Line Interferometry (VLBI) measurements utilising radio telescopes became available and as further densification of the national network occurred, a further national adjustment was undertaken in 1982 resulting in the AGD84 co-ordinate set. This set was adopted by several States which considered it to offer advantages over the AGD66 set but was not adopted by either Victoria or New South Wales.

A5.1.2 The Geodetic Datum of Australia 1994 (GDA94).

With the advent of the Global Positioning System (GPS), it became possible to obtain geodetic quality measurements over distances from a few to hundreds of kilometres with relative ease. Although originally an American military navigation and positioning system it has been enthusiastically embraced by both civilian and surveying users.

This assisted in the decision to adopt an earth centred datum on a global rather than local ellipsoid (Geodetic Reference System 80 or GRS80) for a new national adjustment utilising both conventional and GPS observations to define the GDA94 national data set.

GDA94 is realised through the global solution of the Australian Fiducial Network and Australian National Network (AFN and ANN) Stations.

The AFN now consists of eight permanently tracking GPS sites which help to provide data to monitor movement of the Australian Plate and also assist in GPS constellation integrity monitoring.

Pending completion of the computation of relevant transformation parameters and of the readjustment of the secondary and tertiary control networks, GDA values will be available for use in Victoria from 1 January, 2000.

A5.2 Projections A5.2.1 The Australian Map Grid 1966 (AMG66).

Geodetic co-ordinates are usually expressed in terms of latitudes and longitudes. It is more convenient for many uses to employ a system of rectangular grid co-ordinates.

The standard representation of the curved earth on a map sheet is by the Universal Transverse Mercator (UTM) projection. The Transverse Mercator projection is a variation of a simple cylindrical projection drawn or projected onto a vertical cylinder tangential at the equator to the spheroid representing the earth.

The UTM system has Zones of 6 degrees width in longitude with the Scale Factor at the Central Meridian of each Zone equal to 0.9996.

The zones are numbered sequentially from Greenwich.

Land surveys in Victoria lie in either Zone 54 or Zone 55 (Fig. A7.2 in Appendix 7 shows the zone boundaries in Victoria).

For cadastral and survey co-ordination purposes, the Parishes in Victoria have been assigned to zones and are listed in Schedule 5 of the Survey Co-ordination (Surveys) Regulations 1992 (see also section 7.7.2 and Fig. 7.3 of Survey Practice Handbook, Part 2).

To avoid the problem of negative co-ordinates south of the equator or west of the Central Meridian, a false origin is used which adds 500,000m to the easting values and 10,000,000m to the Northing values.

Rigorous formulae and worked examples for computations on the AMG may be found in the Australian Geodetic Datum Technical Manual (Special Publication No. 10) published by the National Mapping Council. This is also available through the AUSLIG Web page:
<http://www.auslig.gov.au>

A5.2.2 The Map Grid of Australia 1994 (MGA94).

The MGA94 has been named as such to distinguish it from the AMG66. The grid is still the UTM system, however, the difference of approximately 200m between the AGD66 and GDA94 origins is reflected in the co-ordinate differences between AMG66 and MGA94. The co-ordinate shift from AMG66 to MGA94 is to the north east consisting of about 115m. E-W and 175m. N-S.

The same Zone widths, scale factors and false origins will apply to MGA94 as to AMG66 and computations on the grid will use the same formulae after due allowance is made for the differing figure of the Earth.

A5.2.3 VICGRID Co-ordinates

In 1995, Geographic Data Victoria (GDV), formally announced that a new map projection called VICGRID is to be adopted for the Victorian Geographic Information System Database. This new projection to replace the previously used VICMAP-TM (sometimes referred to as *pseudo-AMG*).

The specifications of VICGRID are as follows:

VICGRID co-ordinates (metres) are derived from Lambert's Conformal Conic projection of latitudes and longitudes on the Australian Geodetic Datum- 1966 (AGD66) with standard parallels of latitude at 36°S. and 38°S. and a central meridian of longitude at 145°E.

The origin of **VICGRID** co-ordinates is 2,500,000 metres west and 4,500,000 metres south of the intersection of the parallel of latitude 37° S. and the central meridian of longitude at 145° E.

Formulae for VICGRID are listed in Appendix D attached to "Report to the Office of Geographic Data Co-ordination on a suitable map projection for the Victorian Geographic Information System Database", October 1994. The report, together with software, is available from Geographic Data Victoria (GDV).