An update on the status of PNG94

Richard Stanaway, Charles Ouba, John Kwasi & John Oa

Geodetic Section, Office of Surveyor General, Department of Lands & Physical Planning
Status at the ASPNG Congress in 2008

- Geodetic Section not funded or supported by OSG
- No proposal for PNG94 densification and support
- unserviceableable GPS equipment (15 year old receivers)
- No computing facilities or software
- No staff training and support
- PNG94 datum maintenance undertaken by private sector!
Situation in 2012

- Geodetic Section now fully supported by OSG
- Improvement of PNG94 with inclusion of validated data from private sector and geodynamics studies
- Procurement of 3 Leica GS15 GNSS receivers and total station
- Procurement of Leica GNSS base station at NMB (NMB2 base station) – on the APREF network
- Leica Geo Office – for data processing
- Funding for geodetic control densification & border surveys
Geodetic Section acquires 3 new Leica GS15 receivers and Flexline Total Station.
New GNSS base station on APREF (NMB2)

Leica GRX1200+ GNSS receiver and AR10 antenna
NMB2 performance
Cartesian Coordinates and Velocities (ITRF2008)

Position: X, Y, Z (metres), Velocity: X, Y, Z (metres per year), Coordinate Epoch

NMB2 1 510010003 C -5286524.8937 3499955.6286 -1038574.3978 -0.0468 -0.0065 0.0470 01-May-12

Geodetic Coordinates and Velocities (ITRF2008)

Position: longitude (degrees minutes seconds), latitude (degrees minutes seconds), height (GRS80, metres) Velocity: East, North, Height (metres per year), Coordinate Epoch

NMB2 1 510010003 C 147 11 12.2200 -9 -26 -2.7384 122.9830 0.0309 0.0523 0.0276 01-May-12
PNG94 is the gazetted national datum for Papua New Guinea (National Gazette of 22 May 1996). PNG94 is realised by the coordinates of 14 zero order geodetic stations within Papua New Guinea (listed below) related to the International Terrestrial Reference Frame 1992 (ITRF92) at epoch 1994.0 (same as GDA94 in Australia). It is defined as follows:

**Reference Ellipsoid:** GRS80
**Map Projection:** Papua New Guinea Map Grid 1994 (PNGMG94)
**Projection type:** Universal Transverse Mercator (UTM)

**Usage:**
PNG94 should be used as the geodetic datum for all cadastral, topographical, engineering and resource sector surveys commenced after 2000.

**Access:**
Surveys should be connected to the nearest high order PNG94 control. This can be by means of connection to a PNG94 coordinated monument or to a CORS station. Because of the highly complex tectonic setting in PNG, the closest coordinated monument should be used for connection.

**First Order Coordinate Listing:**
Click on the link [PNG94 1st order adjustment 2008 (update 1st December 2011)](update) to view and download the spreadsheet of the current first order coordinate list for PNG94. The adjustment has resulted in small changes in the original zero order PNG94 realisation (listed in the table below). The data area also provided as a [Google Earth kml file](file).

Site and access information for these stations (and others) are available at the Australian National University Research School of Earth Sciences:

**PNG GPS Site Information**
Note that the coordinates in these site logs are ITRF2000 at epoch 2000.0 and may be up to 0.5 m different from the PNG94 values.

**Using PPP, AusPOS and OmniSTAR with PNG94:**
These GNSS precision surveying systems and post-processing services deliver coordinates in terms of ITRF2005 or ITRF2008 and these coordinates will be up to two metres different from PNG94. A block-shift correction to be applied to derived coordinates from these systems can be determined by occupation of the nearest PNG94 coordinated monument.

**Coordinate transformations:**
Since PNG94 and GDA94 share the same realisation, the GDA94 technical manual can be used with PNG94 (substitute PNG94 for GDA94).
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46th Association of Surveyors of Papua New Guinea Congress, Port Moresby, 1-3 August 2012
PNG94 1st order control on Google Earth
Geodetic Section – work flow 2012 and 2013

- 1st order control at every Airport, township (at government office or school) and resource location
- Site velocity model for transformation between ITRF2008 and PNG94 (Richard Stanaway) for inclusion in AusPOS
- GNSS at Tide Gauges to determine offset between EGM2008, MSL, LAT and HAT (to improve PNG08 model)
- 1st order Geodetic control station summaries (PSM sketches) available free of charge from ASPNG web-site
- continue DCDB control connection work
- finalise AGD66 to PNG94 transformation parameters
What can the geodetic section do for you?

- Provide PNG94 control connection to your survey
  (in some instances this may be free of charge, otherwise charges will be minimal)

- NMB2 base station data for surveys in POM, Oro and Central Province
  (K200 for 24 hrs of Rinex data and Nav file at 30 second epoch interval)

- Process static GNSS data to obtain PNG94 and MSL
  (free or minimal charge on the proviso that a PSM is established and sketch provided)

- Geodetic surveys for resource sector projects
  (charged according to ASPNG scale of fees)

- Provide guidance and PSM numbers

**Key personnel:** John Kwasi, John Oa, Richard Stanaway

46th Association of Surveyors of Papua New Guinea Congress, Port Moresby, 1-3 August 2012
What you can do for PNG Geodesy!

- Connect all your surveys to PNG94 1st order control
- Submit PSM sketches!!! Many hundreds not provided.
- Provide GNSS static data on existing 1st order stations
  (8 hrs + data for these will be processed for free !)
  (email this data to Richard Stanaway for free PNG94 derivation until online facility becomes active)
- Maintain survey control and witness posts in your area
  (replace witness posts and do a sketch showing new connections)
- Get PSM numbers for good quality stations

Geodetic PSMs are the fundamental physical infrastructure of PNG!
Contact details

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- **Richard Stanaway** — Geodetic advisor to OSG
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Thank you!