

WGS84 TO GDA94 Christmas and Cocos Island

Geocentric Datum of Australia 1994 (GDA94) on Christmas and Cocos Island has been realised by holding one GDA94 point fixed in each of the island networks. In the case of Christmas Island, the fixed point is CRI 25 an Australian National Network (ANN) point. On Cocos the fixed point is COC 308 an Australian Fiducial Network (AFN) point.

Given that WGS84 coordinates can be considered the same as GDA94, the difference between the coordinate sets is simply a block shift.

Notes

1. The block shift of coordinates does not take into account the distortion introduced between data sets (WGS84-GDA94) as a result of reprocessing and readjusting the data on Christmas and Cocos Island. Differences however will not exceed 0.1m.
2. Given the means by which original WGS84 positions were obtained, DOLA continues to say that, *"at the level of WGS84 positioning accuracy, there is no transformation between GDA94 and WGS84 (i.e. the parameters are zero)"*.
3. The ellipsoidal heights for CRI 25 (WGS84) and COC 308 (WGS84) were determined by applying the geoid height from OSU89A to the mean sea level height of each point. More recent geoid models include OSU91 and EGM96.
4. The ellipsoidal heights for CRI 25 (GDA94) and COC 308 (GDA94) were realised from the 8 points used to define GDA94, known as the Australian Fiducial Network (AFN). The adopted coordinates of the AFN were computed in terms of the International Terrestrial Reference Frame (ITRF). The ITRF is based on very accurate observations, including Very Long Baseline Interferometry (VLBI), Satellite Laser Ranging (SLR), Lunar Laser Ranging (LLR) and the Global Positioning System (GPS).

Christmas Island

Station	Latitude	Longitude	Ellipsoidal Height	RL (CIHD)
CRI 25 (WGS 84)	10° 26' 58.51609" S	105° 41' 22.60358" E	258.262	261.033
CRI 25 (GDA94)	10° 26' 58.57131" S	105° 41' 22.60130" E	260.387	261.033

The resultant shifts in 3D Cartesian coordinates (WGS84 to GDA94) are:

DX = -0.415
 DY = 1.734
 DZ = -2.054

As a 2D vector and ellipsoidal height difference:

Azimuth = 182° 20' 25"
 Distance (metres) = 1.698
 Height difference (metres) = 2.125

Or as a difference in UTM coordinates:

-0.07m E
 -1.70m N

Cocos Island

Station	Latitude	Longitude	Ellipsoidal Height	RL (CKIHD)
COC 308 (WGS84)	12° 11' 18.10083" S	96° 50' 02.16341" E	-37.640	2.330
COC 308 (GDA94)	12° 11' 18.06832" S	96° 50' 02.27115" E	-35.221	2.330

The resultant shifts in 3D Cartesian coordinates (WGS84 to GDA94) are:

DX = -3.540

DY = 2.170

DZ = 0.466

As a 2D vector and ellipsoidal height difference:

Azimuth = 72° 56' 52"

Distance (metres) = 3.407

Height difference (metres) = 2.419

Or as a difference in UTM coordinates:

3.25m E

1.02m N