

# Transitioning to GDA2020

Australia's new Geocentric Datum



Geodesy



Environment,  
Land, Water  
and Planning

# National implementation

## GDA2020 is now Australia's official national datum

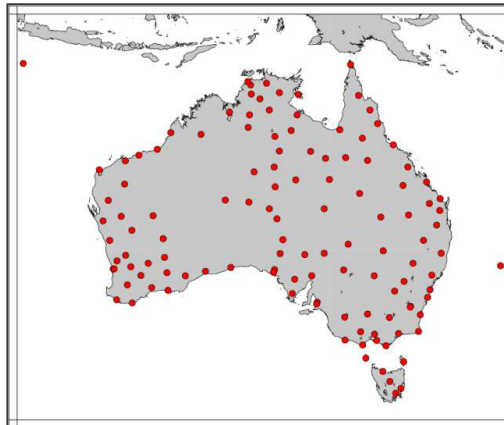
- Published in Commonwealth Legislation as:  
National Measurement (Recognised Value Standard of Measurement of Position)  
Determination 2017
- GDA2020 is Australia's official datum, revoking GDA94
- Effective from 11 October 2017



### National Measurement (Recognized-Value Standard of Measurement of Position) Determination 2017

I, Dr R. Bruce Warrington, Chief Metrologist, National Measurement Institute, make the following determination.

Dated 11 October 2017



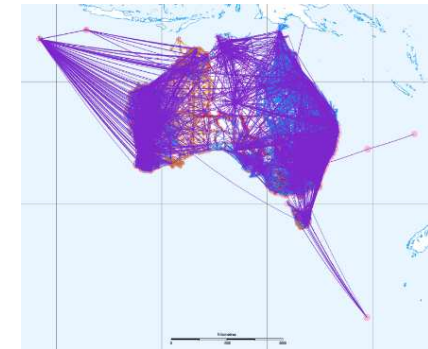
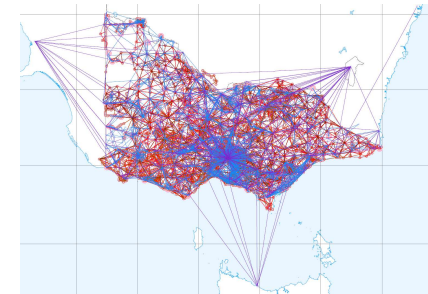
# GDA2020 specifications

- Geocentric Datum of Australia 2020
- Conventional static datum like GDA94 with rigorous uncertainty
- Just like GDA94 — based on ITRF, fixed at a specific epoch:

**GDA94 = ITRF1992 @ 1994.0**

**GDA2020 = ITRF2014 @ 2020.0**

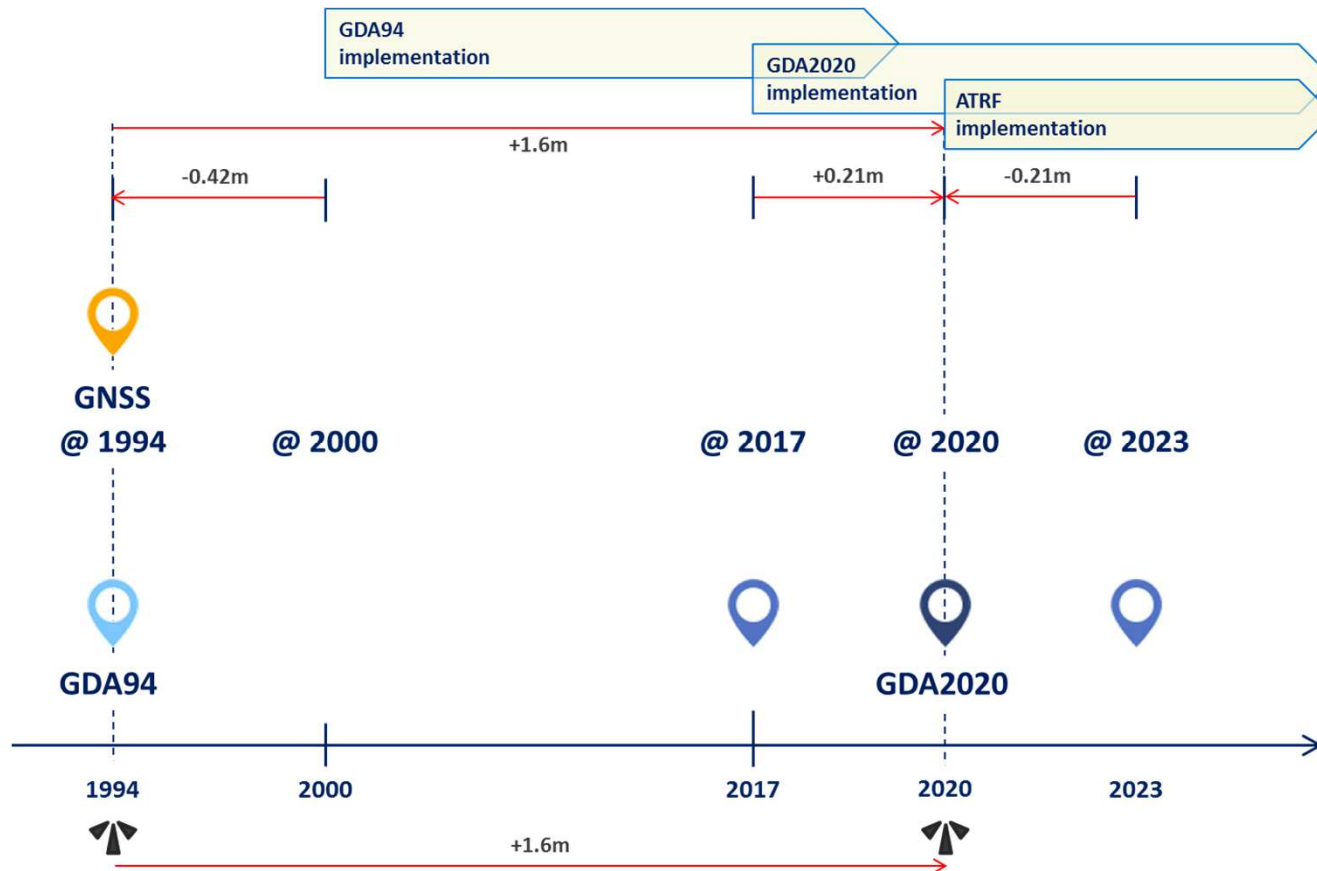
- Horizontal shift of approx. **1.6 m NE** from GDA94, slightly rotated
- Consistent vertical drop of **0.09 m** from GDA94
- AUSGeoid2020
- Projections: **MGA2020** (UTM), **VICGRID** (conformal conic)
- Australian Terrestrial Reference Frame (ATRF), initial release commencing January 2020



GDA94 to GDA2020 shift



# GDA94 - GDA2020 – ATRF implementation





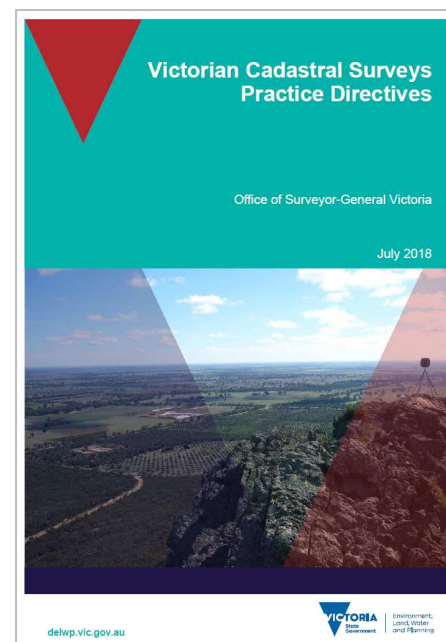
# Victorian Cadastral Surveys Practice Directives – July 2018

## MGA94 to MGA2020 transition period

*Regulation 11 can, for practical purposes, be taken as requiring the licensed surveyor to bring the bearing datum onto MGA2020 or MGA94 as is reasonable in the circumstances*

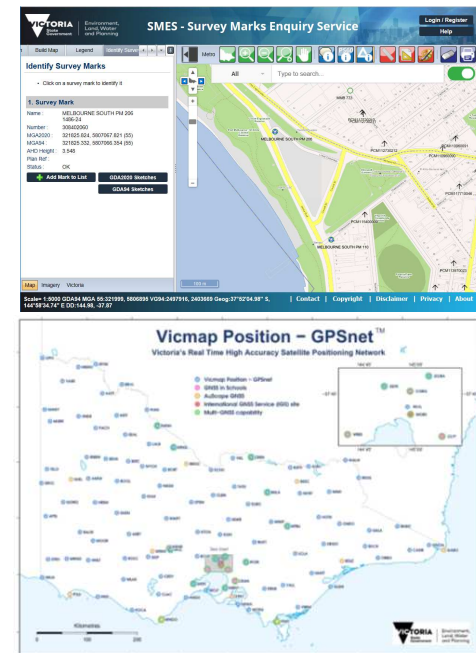
*MGA2020 is preferred*

*All survey plans and abstracts of field records related to MGA are to clearly display the datum as **MGA2020 or MGA94** (i.e. full title)*



## Supporting both GDA94 and GDA2020

- DELWP GDA2020 Implementation Plan
- Survey Marks Enquiry Service (SMES)
- Vicmap Position – GPSnet
- Vicmap, Spatial Datamart
- Know your data, know your datum
- Encouraged to commence transition
- Geodesy – OSGV offering support



## GDA94 and GDA2020 coordinates available

- Available for all marks (SCN and Non-SCN)
- On-screen information
- Downloads (Sketch plans, reports, csv)
- Can submit sketch plans with either GDA2020 or GDA94 coordinates

Editing New Mark

Mark Name: SCORESBY PM 900 Figure No: 347809000

Plan Number:  Use commas to separate plan numbers when entering multiple plan numbers (e.g. P51234, P56789)

Comments:

Approximate coordinates

Latitude:  Longitude:

Zone:  Datum:

Height:  Technique (IHD):

Antenna:  Technique (GPS):

Marker Post Exists: ☐ No ☐ Yes

Mark Type:  Cover Exists: ☐ No ☐ Yes

Ground to Mark Offset (metres):  GNSS Suitability:

Supporting Files:

Buttons: Submit, Update, Cancel

VICTORIA State Government Environment, Land, Water and Planning

SMES - Survey Marks Enquiry Service

Login / Register Help

Build Map Legend Identify Survey Marks

Click on a survey mark to identify it

1. Survey Mark

Name: MELBOURNE SOUTH PM 206 1496-24

Number: 306402060

MGA2020: 321825.824, 5807067.821 (65)

MGA94: 321825.332, 5807066.354 (55)

Plan Ref: 3.548

Status: OK

Add Mark to List

GDA2020 Sketches

GDA94 Sketches

Map Imagery Victoria

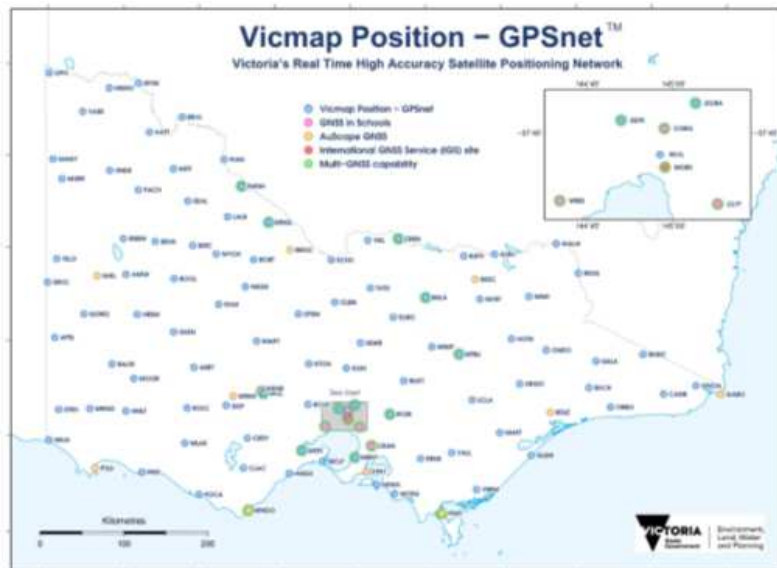
Scale= 1:5000 GDA94 MGA 55:321999, 5806895 VG94:2497916, 2403869 Geog:37°52'04.98" S, 144°58'34.74" E DD:144.98, -37.87

Contact | Copyright | Disclaimer | Privacy | About

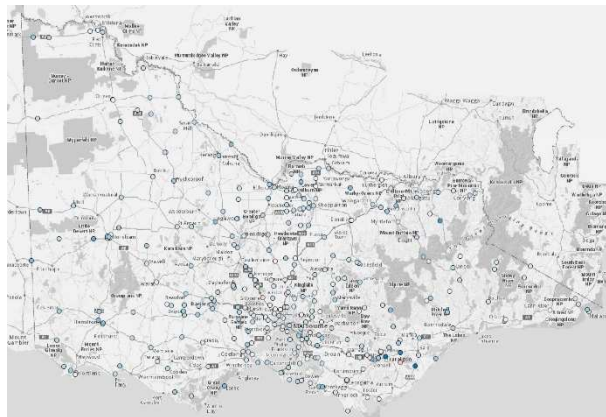


## GPSnet will support GDA94 and GDA2020

- Dual streams
- Need to be mindful of which datum
- Enhanced harmony with SCN marks
- Ensure correct geoid model



- **AUSGeoid2020 must be used with GDA2020**
- Allows derivation of AHD heights from GNSS ellipsoidal heights
- Gravimetric component – quasi-geoid model
  - Global gravity model, land and marine gravity anomalies, DEM
- Geometric component – offset between quasi-geoid and AHD
  - Marks with AHD and ellipsoidal height (300 marks in VIC)



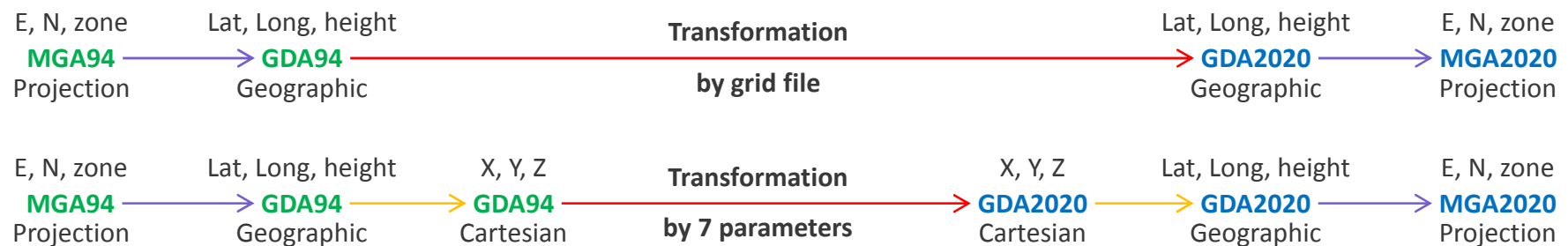
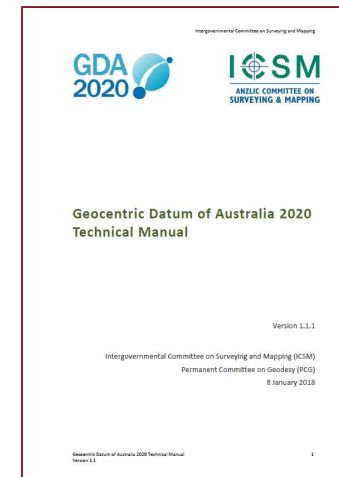
- +250 test marks
- 95% within 36 mm
- Greater Melbourne all sub 30 mm
- Larger offsets in Gippsland and remote areas

# Transformation parameters

## Transformation parameters

- 7 transformation parameters  
**GDA94 ↔ GDA2020**
- Plate motion model (3 rates of change)  
**GDA2020 ↔ ITRF2014**

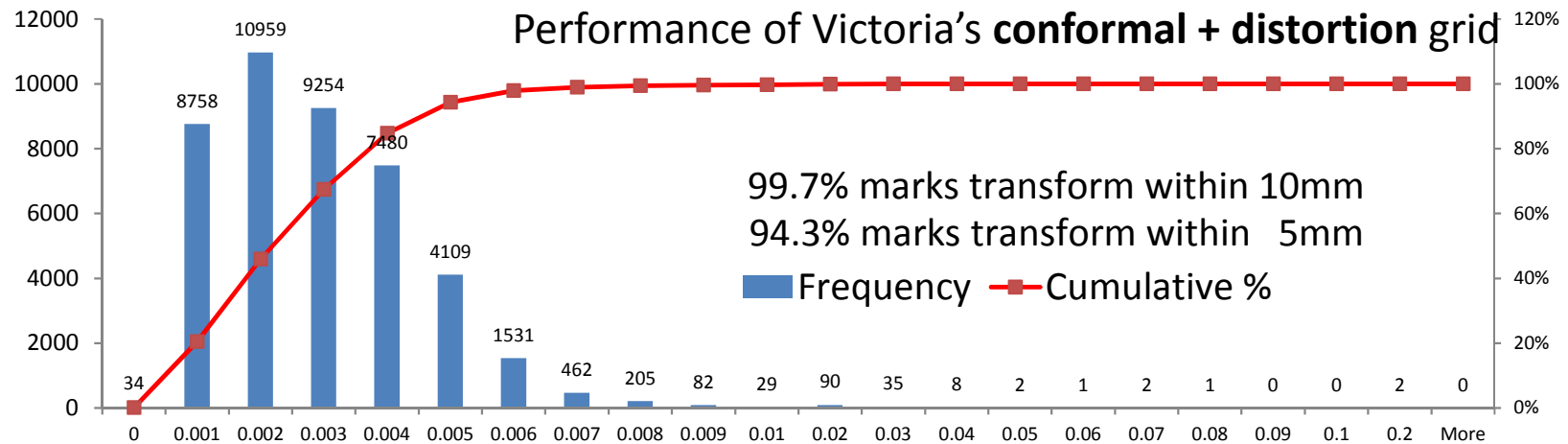
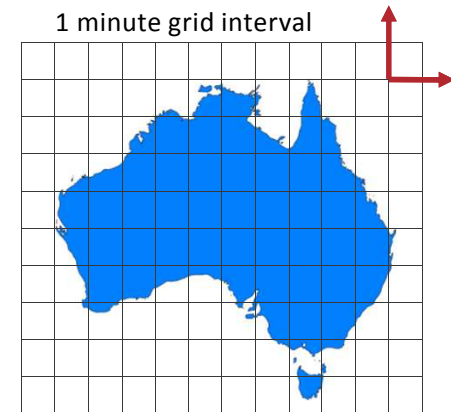
Can be applied using conventional  
14 parameter transformation



## Two transformation grids

- Conformal only grid
- Conformal + distortion grid

Available from <http://www.icsm.gov.au>



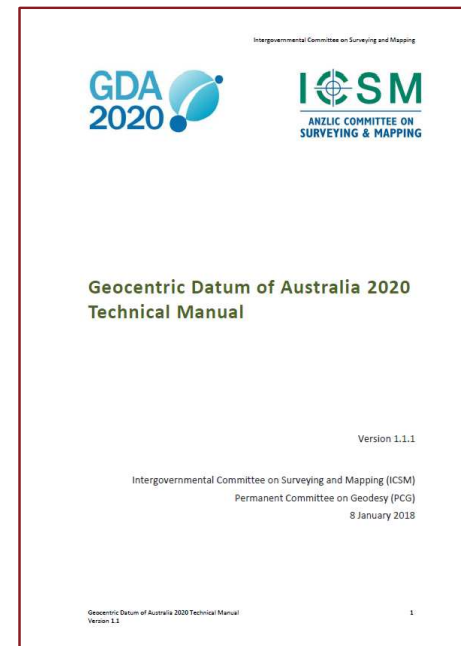
## Which grid should I use to transform GDA94 coordinates?

- **Generally, the grids are very similar in Victoria**
  - Minimal distortion
- **What technique were the coordinate derived from?**
  - GNSS CORS – conformal only grid
  - SMES – conformal + distortion grid

For more information, see

### **GDA2020 Technical Manual**

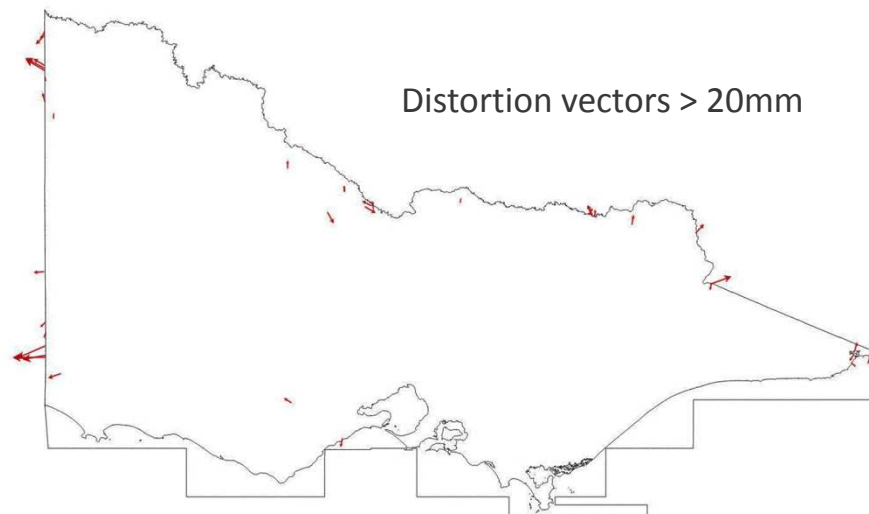
Available from <http://www.icsm.gov.au>





## Poor-performing areas

- Distortion inconsistencies around the border
- Predominantly due to influence of measurements from neighbouring states in national adjustment
- Changed GNSS CORS at Cressy and Anglesea



# Open Source software and tools

Online transformation tool

<http://positioning.fsdf.org.au>



NTv2 transformer plugin for QGIS

<https://github.com/icsm-au>

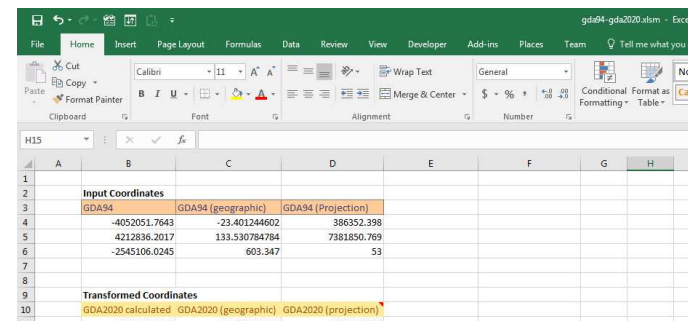


GDAy



Excel Spreadsheets

<https://github.com/icsm-au>

The image shows a screenshot of an Excel spreadsheet titled 'gda94-gda2020.xlsx'. The spreadsheet contains data for coordinate transformation from GDA94 to GDA2020. It includes sections for 'Input Coordinates' and 'Transformed Coordinates'. The data is organized into columns for GDA94 (geographic), GDA94 (projection), GDA2020 (geographic), and GDA2020 (projection).

	A	B	C	D	E	F	G	H
1								
2		Input Coordinates						
3		GDA94	GDA94 (geographic)	GDA94 (projection)				
4			-4052051.7643	-23.401244602	386352.398			
5			4212836.2017	133.530784784	7381850.769			
6			-2545106.0245	603.347	53			
7								
8								
9		Transformed Coordinates						
10		GDA2020 calculated	GDA2020 (geographic)	GDA2020 (projection)				

## Proprietary software and tools

### **ESRI ArcGIS and ArcMap**

ArcGIS 10.6, ArcGIS Pro 2.1, ArcMap 10.5



### **MapInfo**

MapInfo Pro 16.0.3



### **FME**

NTv2 grids from 2018.0 (Beta 18240)



### **AUTOCAD MAP 3D**

Transformations available via coordinate system files





## Proprietary software and tools

**LISCAD** – Supported from version 12.2

<https://www.listech.com/liscad/whatsnew.aspx>

**Neo** – Support from version 1 November 2017

<https://www.listech.com/neo/whatsnew.aspx>

**Trimble TBC** – Configurable via Coordinate System Manager

<https://www.trimble.com>

**Leica Infinity** – Configurable via Coordinate Systems

<https://www.leica.com>

# Proprietary software and tools

## Factsheets

<https://www.icsm.gov.au/datum/gda2020-fact-sheets>

## Online forum:

<http://gda2020.invisionzone.com>

The screenshot shows the homepage of the 'GDA2020' forum. The header features the 'GDA2020' logo and navigation links for 'Browse', 'Activity', 'Forums', 'Downloads', 'Calendar', and 'Guidelines'. A search bar is also present. The main content area welcomes users to the 'Official GDA2020 Forum' and provides information about the forum's purpose and moderation. Below this, there are three subforum sections: 'GDA1994 ↔ GDA2020' (18 posts), 'Technology-Specific Questions' (11 posts), and 'Jurisdiction Questions' (9 posts). Each section includes a brief description and a list of subforums.





# Thank you

Geodesy – Office of Surveyor General Victoria



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