Department of Environment, Land, Water & Planning

Dear GPSnet Tier 1 VAR

GPSnet CORS GDA2020 IMPLEMENTATION

GPSnet will soon implement the new Geocentric Datum of Australia (GDA2020). At this time, GPSnet will adopt **new *GDA2020*** Regulation 13 coordinates certified by Geoscience Australia for all Victorian and some New South Wales Continually Operating Reference Stations (CORS) currently contributing to the Victorian GPSnet CORS network.

<u>WHEN</u> is the implementation happening

The implementation of *new GDA2020* coordinates for most national, state and private CORS operators (including AUSCORS, CORSNet-NSW, AllDayRTK, SmartNetAUS and VRSNow) will take place over the weekend of **Saturday** the **9**th and **Sunday** the **10**th of **February 2019** respectively.

For GPSnet, work to implement the new GDA2020 datum will take place during the following times:

7:00am to 5:00pm (AEDT) on **Saturday February 9**th **2019**

and

7:00am and 5:00pm (AEDT) on **Sunday February 10**th **2019**

*(**Note** that GPSnet will endeavour to keep services running, however there will be periods of time (up to 2-4 hours) during the above dates and times where Network RTK and/or Single Base Data streams maybe unavailable.)*

State Government **Victoria**

WHAT is happening during the implementation

GPSnet will be making changes to the *current GDA94* coordinates being used at both GPSnet Primary (PR) MCP and Disaster Recovery (DR) IBM data centres.

As such GPSnet will perform the following 4 steps to transition to GDA2020:

1. **Configure GDA2020 as the default datum**

   (Note that only the GPSnet PR (MCP) data centre will be updated to the *new GDA2020* datum. The GPSnet DR (IBM) data centre will continue to operate with GDA94 as the default datum as it always has.

2. **Update the coordinates at both the PR and DR data centres**

   (Note that only the GPSnet PR (MCP) data centre will be updated to the *new GDA2020* coordinates. The GPSnet DR (IBM) data centre will be updated to operate with *equivalent GDA94* coordinates (transformed from GDA2020).

3. **Configure all Victorian GNSS CORS receivers with GDA2020 coordinates.**

4. **Make available both GDA94 and/or GDA2020 Network RTK and Single Base mountpoints.**

To implement this change, GPSnet will update the coordinates at the Primary (MCP) data centre and the Disaster Recovery (IBM) data centre, as indicated in Table 1 and Table 2 below.

Table 1: Current Data Centre Datum and Coordinates

Data centre	DNS	IP Address	Datum and Coordinates
MCP (PR)	http://gnss.vicpos.com.au	168.128.52.108	GDA94 datum and *current GDA94* coordinates
IBM (DR)	http://www.gpsnet.com.au	121.200.232.45	GDA94 datum and *current GDA94* coordinates

Table 2: Data Centre Datum and Coordinates after GDA2020 Implementation

Data centre	DNS	IP Address	Datum and Coordinates
MCP (PR)	http://gnss.vicpos.com.au	168.128.52.108	GDA2020 Datum and *new GDA2020* Coordinates
IBM (DR)	http://www.gpsnet.com.au	121.200.232.45	GDA94 Datum and **equivalent GDA94** Coordinates

Primary (PR) MCP Data Centre Datum and Coordinates after GDA2020 Implementation

For the Primary **MCP** data centre the following ports and data streams will be available with the vast majority being updated to utilise the new GDA2020 datum and coordinates. New NRTK GDA2020 mountpoints will also be made available via port 2020.

Current NRTK and some Single Base mountpoints will continue to operate in GDA94, via the same mountpoints and ports as they always have.

- **Ports 8080** and **2101** for **Network RTK** data streams

  These Network RTK data streams will continue to operate in GDA94 as they always have. However, it should be noted that these Network RTK data streams will be based on a transformation back from the *new GDA2020* coordinates and datum and therefore small transformational differences of +/- 2 millimetres maybe experienced.

- **Port 2020** will be dedicated to new **GDA2020 Network RTK** data streams

  New GDA2020 Network RTK data streams will be available and will be output in the *new GDA2020* datum. Therefore, users wishing to use these will need to change their port to 2020. Users should ensure that they are operating in the GDA2020 datum or that they are transforming into their preferred datum via transformation tools either within their rovers or software packages.

- **Port 2102** for **Single Base** data streams in the **RTCM3.1** format

  Single Base RTCM3.1 data streams will be updated to output the *new GDA2020* coordinates. Therefore, users wishing to continue to use these should ensure that they are operating in the GDA2020 datum or that they are transforming into their preferred datum via transformation tools either within their rovers or software packages.

- **Port 2103** for **Single Base** data streams in the **RTCM3.2** (MSM7) format

  Single Base RTCM3.1 data streams will be updated to output the *new GDA2020* coordinates. Therefore, users wishing to continue to use these should ensure that they are operating in the GDA2020 datum or that they are transforming into their preferred datum via transformation tools either within their rovers or software packages.

- **Port 2104** for **Single Base** data streams in the **CMR+** or **CMRx** format

  Single Base CMR+ and/or CMRx data streams will continue to operate in GDA94 as they always have. However, it should be noted that the Single Base CMR+ or CMRx corrections will be based on a transformation back from the *new GDA2020* coordinates and datum and therefore small transformational differences of +/- 2 millimetres maybe experienced.

- **Port 2105** for **Single Base** data streams rebroadcasting the **RAW** receiver data in the same format it is received from the individual GNSS receiver. Port 2105 will also broadcast some specialised single base **BINEX** data streams.

  Single Base RAW and/or BINEX data streams will be updated to output the *new GDA2020* coordinates. Therefore, users wishing to continue to use these should ensure that they are operating in the GDA2020 datum or that they are transforming into their preferred datum via transformation tools either within their rovers or software packages.

- **Port 2106** for **Single Base** data streams in the **DGPS** (RTCM2.3 or RTCM2.4) format (if they are required)

Single Base DGPS data streams will be updated to output the *new GDA2020* coordinates. Therefore, users wishing to continue to use these should ensure that they are operating in the GDA2020 datum or that they are transforming into their preferred datum via transformation tools either within their rovers or software packages.

For further information relating to individual **MCP** data centre mountpoints, ports, datum and coordinates, please refer to Table 4 in Appendix 1.

Disaster Recovery (DR) IBM Data Centre Datum and Coordinates after GDA2020 Implementation

For the Disaster Recovery **IBM** data centre**,** the following ports and data streams will be available and will continue to use the GDA94 datum, however the coordinates will be updated to the *equivalent GDA94* coordinates (transformed from GDA2020).

- **Ports 8080** and **2101** for **Single Base** and **Network RTK** data streams

    Both Single Base and Network RTK data streams will continue to operate in GDA94 as they always have. However, it should be noted that the Single Base and Network RTK data streams will be based on the *equivalent GDA94* coordinates and therefore small transformational differences of +/- 2 millimetres maybe experienced.

For further information relating to individual **IBM** data centre mountpoints, ports, datum and coordinates, please refer to Table 5 in Appendix 1.

<u>WHAT</u> to do prior to the GDA2020 implementation

To prepare for the transition to GDA2020, Tier 1 VAR's are asked to take note of the *new GDA2020* coordinates contained in the attached spreadsheet and implement these coordinates (if relevant) on or as near to the 9th and 10th of February 2019.

If the *new GDA2020* coordinates cannot be adopted at this time for technical reason, then GPSnet suggest that the *equivalent GDA94* coordinates be adopted until such times as the *new GDA2020* coordinates can be implemented.

The attached spreadsheet provides comprehensive details of both the *new GDA2020 (red)*, and *equivalent GDA94 (blue)* coordinates that will be adopted on the 9th and 10th of February at the **MCP** and **IBM** data centres respectively.

The spreadsheet also provides details of the *current GDA94 (green)* coordinates in use, and the differences (see second tab) between the *current GDA94 (green)* and the *equivalent GDA94* (blue) coordinates (transformed from GDA2020).

<u>WHAT</u> to do after the GDA2020 implementation

Several of the GPSnet CORS coordinates have shifted when comparing the *current GDA94* coordinates to the *equivalent GDA94* coordinates. These shifts vary by approximately 20-25mm due to and number of factors including antenna changes, localised ground movement, and/or building movement, on which the CORS are mounted. The differences between the *current GDA94* and *equivalent GDA94* can be seen in the second tab of the attached spreadsheet.

Tier 1 VAR's are asked to take note of these differences and inform their own customers directly if it is believed that these differences will impact single base users.

Tier 1 VAR's are also asked to monitor the coordinates after the implementation and if any discrepancies or differences are detected, they should contact GPSnet Support immediately.

Users wishing to continue to use Single Base or Network RTK data streams that are to remain in **GDA94** should not have to do anything other than to check the data streams on known marks or reference points, to ensure there is no coordinate variation (outside normal tolerances).

Users wishing to use Single Base or Network RTK data streams that have transitioned to GDA2020 should ensure that they are operating in the **GDA2020** datum or that they are transforming into their preferred datum via transformation tools either within their rovers or software packages. Users should ensure that they check the data streams on known marks or reference points, to ensure there is no coordinate variation (outside normal tolerances).

Height determination in GDA94 and GDA2020
For ALL mountpoints and data streams that continue to use the GDA94 coordinates and datum, real time users **MUST** continue to use **AUSGeoid09** to obtain compatible AHD heights from their GNSS observations.

For ALL mountpoints and data streams that are being updated to the *new GDA2020* coordinates and datum, real-time users **MUST** use **AUSGeoid2020** to obtain compatible AHD heights from their GNSS observations.

Tier 1 VAR's are advised to communicate the appropriate use of AUSGeiod09 and AUSGeoid2020 to their customer accordingly.

Further Information
Whilst all steps have been taken to try and ensure a smooth implementation of GDA2020, GPSnet will be available to assist any VARs if problems occur once the GDA2020 Implementation has been completed.

If VARs do require assistance they can contact GPSnet via one of the following options:
Email: GPSnet.Support@delwp.vic.gov.au
Phone: Kris Halewood – (03) 9194 0265
Hayden Asmussen – (03) 9194 0261

Additional terms, references and links relating to GDA2020 and AUSGeiod2020 are available on the following page.

Yours sincerely

Hayden Asmussen
Manager GPSnet

24 / 01 / 2019

TERMS and REFERENCES

Current GDA94 – means the current GDA94 coordinates and/or datum in use by GPSnet (prior to February 9th, 2019). These are displayed in **Green** in the attached spreadsheet,

New GDA2020 – means the new GDA2020 coordinates and/or datum being adopted and implemented on the 9th and 10th of February 2019. These are displayed in **Red** in the attached spreadsheet,

Equivalent GDA94 – means the equivalent GDA94 coordinates transformed from the GDA2020 coordinates. These are displayed in **Blue** in the attached spreadsheet,

GDA2020 and AUSGeoid2020 INFORMATION

The following links provide further details relating to GDA2020, including fact sheets, transformation products and tools and technical manuals.

What is GDA2020
https://www.icsm.gov.au/what-we-do/geocentric-datum-australia

Transformation Products and Tools
https://www.icsm.gov.au/datum/gda-transformation-products-and-tools

GDA2020 Fact Sheets
https://www.icsm.gov.au/datum/gda2020-fact-sheets

GDA2020 and GDA94 Technical Manuals
https://www.icsm.gov.au/datum/gda2020-and-gda94-technical-manuals

Australian Height Datum
http://www.ga.gov.au/scientific-topics/positioning-navigation/geodesy/ahdgm/ahd

AUSGeoid2020
http://www.ga.gov.au/scientific-topics/positioning-navigation/geodesy/ahdgm/ausgeoid2020
http://www.ga.gov.au/ausgeoid/

Differences between AUSGeoid09 and AUSGeoid2020
http://www.ga.gov.au/scientific-topics/positioning-navigation/geodesy/ahdgm/differences

APPENDIX 1:

GPSnet Data Centre Port, Data Stream, Datum and Coordinate Tables

Table 4: MCP Data Centre Datum and Coordinates after GDA2020 Implementation

Data centre	Data Stream Type	Data Stream Formats	Data Stream Port(s)	Data Stream (Mountpoint) Name	Datum/Coordinates
MCP	Network RTK	Multiple	**8080 & 2101**	**RTKNet-CMRplus** **RTKNet-CMRx** **RTKNet-RTCM3** **DGPSNet** **DGNSS_HP** **NearestCORS-CMRplus** **NearestCORS-CMRx** **NearestCORS-RTCM3** **NearestCORS-RTCM32** **CMRplus-G** **CMRplus-GG** **CMRx-GG** **RTCM3-G** **RTCM3-GG** (The Data Stream format is dependent on Data Stream selected)	**GDA94 Datum** (Transformed from GDA2020)
		Multiple	**2020**	**GDA2020-CMRplus** **GDA2020-CMRx** **GDA2020-RTCM3** **GDA2020-DGPSNet** **GDA2020-NC-CMRplus** **GDA2020-NC-CMRx** **GDA2020-NC-RTCM3** **GDA2020-NC-RTCM32** **RTXNet-CMRx** **RTXNet-RTCM32**	GDA2020 Datum and *new GDA2020* Coordinates
	Single Base	RTCM3.1	**2102**	**XXXX-RTCM3**	GDA2020 Datum and *new GDA2020* Coordinates
		RTCM3.2 (MSM 7)	**2103**	**XXXX-RTCM32**	GDA2020 Datum and *new GDA2020* Coordinates
		CMR+ & CMRx	**2104**	**XXXX-CMR+** Or **XXXX-CMRx** (only select CORS output the CMR+ and CMRx formats)	**GDA94 Datum** (Transformed from GDA2020)
		RAW & BINEX	**2105**	**XXXX-Rx-RTCM31** Or **XXXX-Rx-RTCM32** (The RTCM format is dependent on receiver capability) Or **XXXX-BINEX** (only select CORS output the BINEX formats)	GDA2020 Datum and *new GDA2020* Coordinates
		DGPS	**2106**	**XXXX-DGPS** (only select CORS output the DGPS formats)	GDA2020 Datum and *new GDA2020* Coordinates

- **-G = GPS only & -GG = GPS and Glonass**
- **NC = Nearest CORS**
- **XXXX** represents the CORS 4-character ID (eg **Albury** = **ALBU**)
- The **RTXNet-CMRx** and **RTXNet-RTCM32** mountpoints output multi GNSS corrections (GPS-GLN-GAL-BeiDou-QZSS) in GDA2020. These mountpoints are currently being tested and if users wish to use them then they should do so with caution.

Please note that Single Base data streams for RTCM3.2 MSMS7 have been set up for each GPSnet CORS. However not all GPSnet CORS are currently capable of supporting the RTCM3.2 format and as such are only outputting RTCM3.1. For example, the mountpoint for the Apsley CORS is APSL-RTCM32, but because the CORS receiver is only capable of supporting RTCM3.1, the actual data format being output via the APSL-RTCM3.2 is RTCM3.1.

The RTCM3.2 mountpoints have been setup this way such that T1 VAR's can choose to use either the RTCM3 mountpoints via port 2102, or the RTCM3.2 MSM7 mountpoints via port 2103, as opposed to having to manage different RTCM3 formats for different GPSnet CORS across multiple ports.

The attached map (See Appendix 2) indicates the GPSnet CORS (circled green) that are currently outputting RTCM3.2 MSM7 data streams. The GPSnet CORS circled in blue are only outputting RTCM3.1.
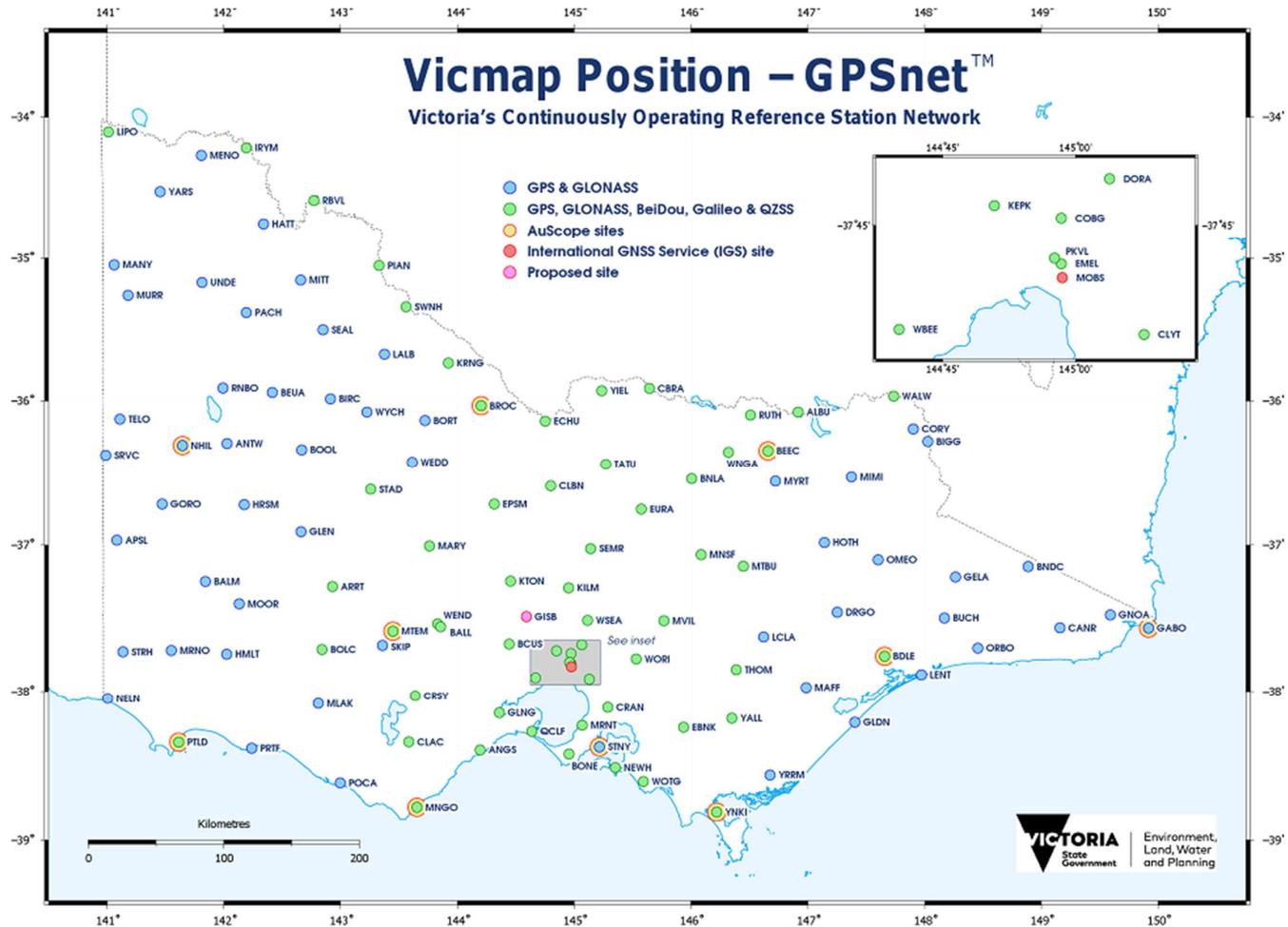
Table 5: IBM Data Centre Datum and Coordinates after GDA2020 Implementation

Data centre	Data Stream Types	Data Stream Formats	Data Stream Port(s)	Data Stream (Mountpoint) Name	Datum/Coordinates
IBM	Network RTK and Single Base	Multiple	**8080** & **2101**	**RTKNet-CMRplus** **RTKNet-RTCM3** **DGPSNet** **DGNSS_HP** **CMRplus-G** **CMRplus-GG** **CMRx-GG** **RTCM3-G** **RTCM3-GG** **NearestCORS-CMRplus** **NearestCORS-RTCM3** (The Data Stream format is dependent on Data Stream selected)	GDA94 Datum and *equivalent GDA94* Coordinates
		RTCM3.1	**8080** & **2101**	**XXXX-RTCM3**	GDA94 Datum and *equivalent GDA94* Coordinates
		CMR+ & CMRx	**8080** & **2101**	**XXXX-CMR+** Or **XXXX-CMRx** (only select CORS output the CMRx format)	GDA94 Datum and *equivalent GDA94* Coordinates
		RAW	**8080** & **2101**	**XXXX-RAW** Or **XXXX-RTCM3-RAW** (only select CORS output the RAW formats)	GDA94 Datum and *equivalent GDA94* Coordinates
		BINEX	**8080** & **2101**	**XXXX-BINEX** (only select CORS output the BINEX format)	GDA94 Datum and *equivalent GDA94* Coordinates
	Network RTK	Special Network RTK Mountpoints	**2102**	**CMRplus-GG** **CMRx-GG** **RTCM3-GG** **NearestCORS-CMRx**	GDA94 Datum and *equivalent GDA94* Coordinates

- **-G = GPS only & -GG = GPS and Glonass**
- **XXXX** represents the CORS 4-character ID (eg **Albury** = **ALBU**)

Vicmap Position – GPSnet™
Victoria's Continuously Operating Reference Station Network