

# Strategy for Victoria's positioning system

2021-2025



## Acknowledgment

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.



Front cover image: Mount Emu GNSS CORS.

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# Foreword

Immediate and effortless access to spatial information is a feature of the modern world.

Precise and detailed spatial information supports effective management of land and marine resources, and this is essential to the community, economy and environment.

Underpinning all spatial information is an accurate and reliable system of positioning. This supports seamless interaction with independently sourced spatial information. Positioning has been identified by ANZLIC – the Australian and New Zealand Spatial Information Council – as the fundamental layer of foundation spatial information used by government, business and the community.

The ANZLIC Strategic Plan 2020-2024 highlights a major five-year initiative to modernise the Australian Geospatial Reference System (AGRS). This national program is being delivered through the Intergovernmental Committee on Surveying and Mapping (ICSM). The purpose of the program is to support advancements in precise positioning and enhance alignment with underlying spatial information. It recognises the increased reliance on positioning, community safety and productivity gains, and encourages innovation.

The Department of Environment Land Water and Planning (DELWP), through the Surveyor-General Victoria (SGV) Geodesy section, is responsible for managing Victoria's positioning infrastructure and information. SGV Geodesy is leading the development and implementation of the AGRS modernisation program in Victoria, which is highlighted as a major initiative in the Strategic Land Assessment and Information Strategy 2030 and SGV Strategic Plan 2020-2025. The SGV strategy outlines the priorities for SGV Geodesy in maintaining and enhancing Victoria's positioning infrastructure and information to ensure business and the community get maximum benefit from advances in positioning.

**Melissa Harris**

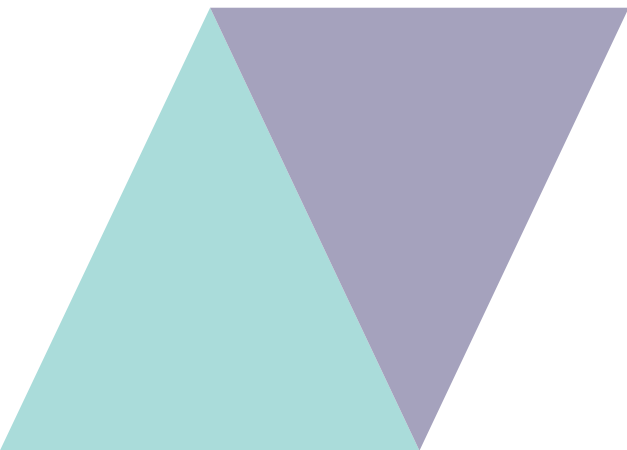
Acting Chief Executive  
Land Use Victoria  
ANZLIC Deputy-Chair

**Craig Sandy**

Surveyor-General of Victoria

**Roger Fraser**

Chief Geospatial Scientist  
Joint ICSM Representatives, Victoria



# Surveyor-General Victoria

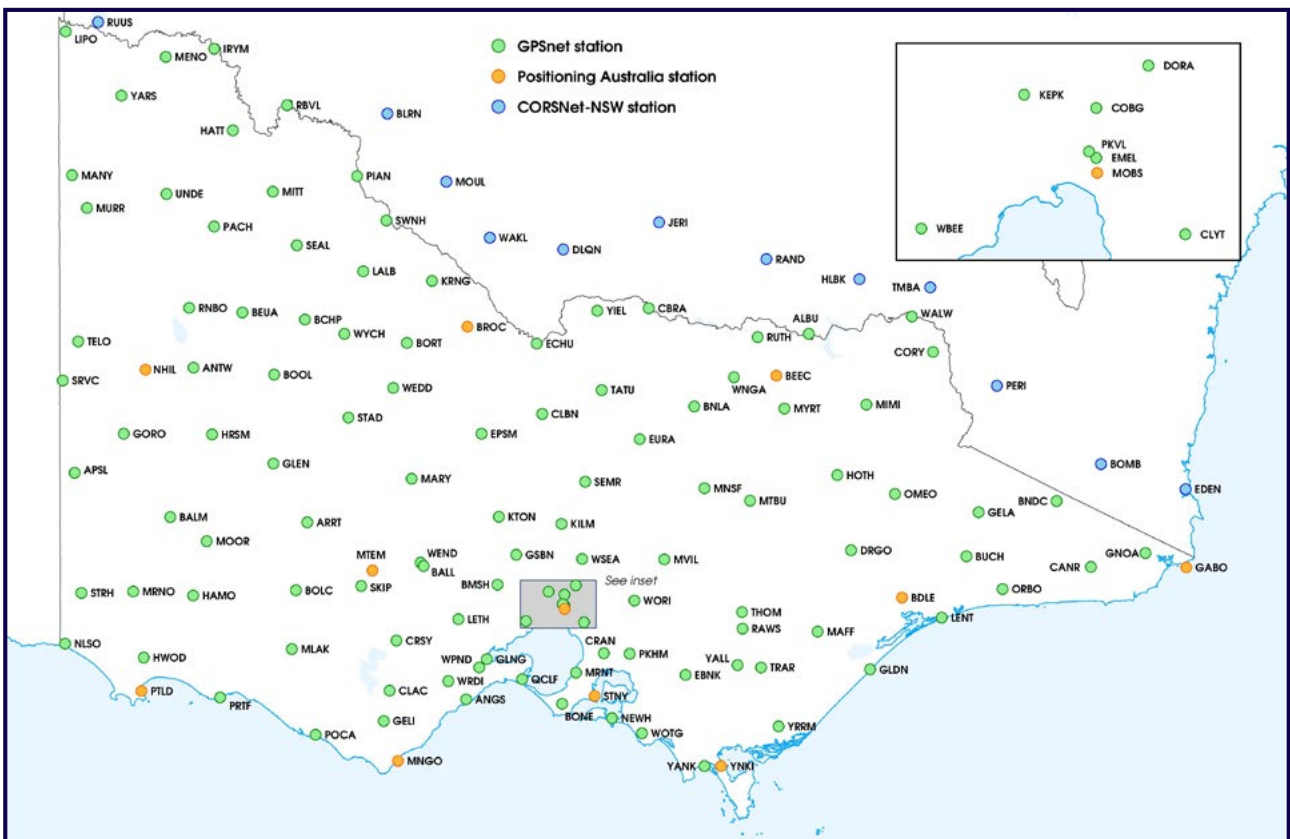
## Geodesy

SGV Geodesy has the governmental responsibility for providing access to an accurate and reliable system of positioning across Victoria. We do this by maintaining and enhancing positioning infrastructure and information services. These enable precise positioning and alignment of spatial information with the national coordinate reference system. The table below lists the major services provided by SGV Geodesy.

| Products and services   | Dimensions   |
|---|--|
| Primary positioning infrastructure and data services (GPSnet) | Integrated, state-wide network of Global Navigation Satellite System (GNSS) Continuously Operating Reference Stations (CORS) that collect positioning data and distribute real-time data streams to enable precise positioning services.             |
| Survey control infrastructure and information                 | State-wide network of more than 170,000 survey control marks to support the surveying and spatial industry. Survey mark information is made available at no cost through an interactive online application, the Survey Marks Enquiry Service (SMES). |
| High precision surveying services                             | Specialised surveying services provided across Victoria to extend the survey control mark network and monitor changes in physical features.  |
| Survey equipment calibration services                         | Facilities for surveyors to calibrate electronic distance measuring equipment to confirm its accuracy and enable traceability to the national standard for length.   |
| Advisory services   | Freely available specialist, authoritative advice and support in relation to positioning infrastructure and information. Represent Victoria in national geodesy and positioning forums.  |
| Stakeholder engagement and education                          | Collaboration with stakeholders to ensure positioning infrastructure and information services meet their needs. Educational presentations and promotion of geodesy and positioning.  |



Regional GNSS CORS with satellite communications.



Victoria's GNSS CORS network.



## Expanding role

SGV Geodesy has supported surveying and mapping in the state since the initial Geodetic Survey of Victoria in the 1860s. This has been mainly through maintaining and enhancing geodetic or survey control infrastructure and information.

Recognising the capability of precise positioning, support for the surveying and spatial industry broadened to include providing satellite positioning infrastructure and information services from the 1990s. Additional industries have benefited from adopting precise positioning services, including construction, agriculture, transport, scientific research, asset and resource management and other location-based services

*The positioning system supports precise positioning, seamless integration of spatial information and increased productivity for businesses and the Victorian community.*

## Major national programs

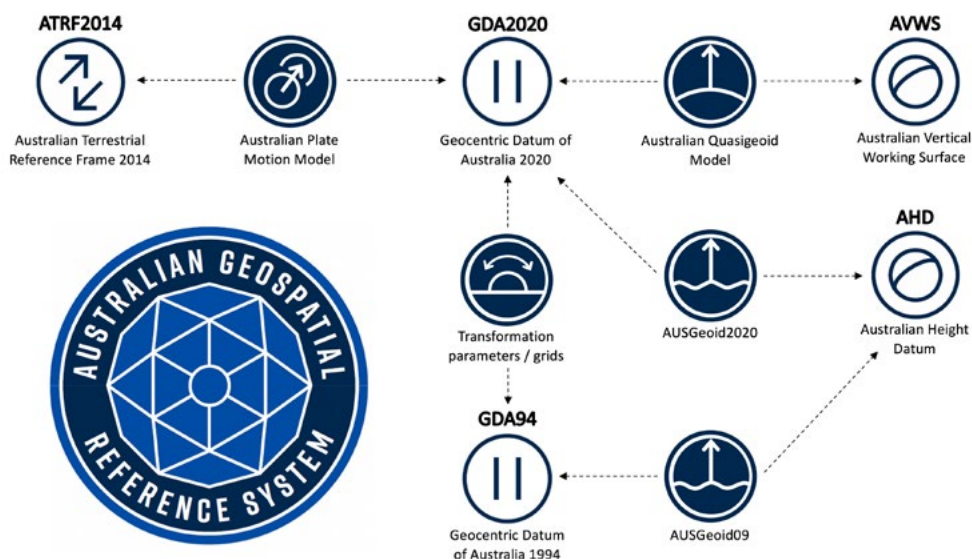
Over the next five years, SGV Geodesy will continue its work for major national programs designed to enable government, businesses and the community to gain maximum benefit from advances in positioning technology. Through collaborative arrangements, SGV Geodesy will lead and support the implementation of these national programs in Victoria.

### 1. Australian Geospatial Reference System (AGRS) modernisation

ANZLIC and ICSM have endorsed a strategic program to update the fundamental components of the national coordinate reference system, featuring:

- GDA2020 – Geocentric Datum of Australian 2020 (GDA2020)
- ATRF2014 – Australian Terrestrial Reference Frame
- AVWS – Australian Vertical Working Surface

The AGRS modernisation program will enhance alignment with the International Terrestrial Reference Frame and enable seamless interaction between precise positioning technology and spatial information.





GNSS surveying Victoria's highest peaks.

## 2. Positioning Australia

The Positioning Australia Program, led by Geoscience Australia, will deliver a national precise positioning capability. It is designed to accelerate adoption and facilitate innovation in positioning technology and applications. The program includes:

- National Positioning Infrastructure Capability which will support 3cm accuracy precise positioning anywhere in Australia where there is internet coverage.
- Southern Positioning Augmentation Network which is planned to be operational by 2023 and will provide instant access to 10cm accuracy positioning across the Australia/ New Zealand region.

## Major projects in Victoria

SGV Geodesy will collaborate and support major Victorian programs including:

- Digital cadastre modernisation (DCM) project
- State-wide LiDAR observation for Vicmap elevation products
- Major infrastructure projects
- Digital twin

GNSS surveying to support major infrastructure projects.



# Applications that benefit from precise positioning

## Precision agriculture

Support auto steer farming operations for cropping, spraying, harvesting and crop mapping.

## Water management and irrigation

Enhanced surveying, construction and monitoring of irrigation infrastructure to improve water resources allocation efficiency.

## Science and earth monitoring

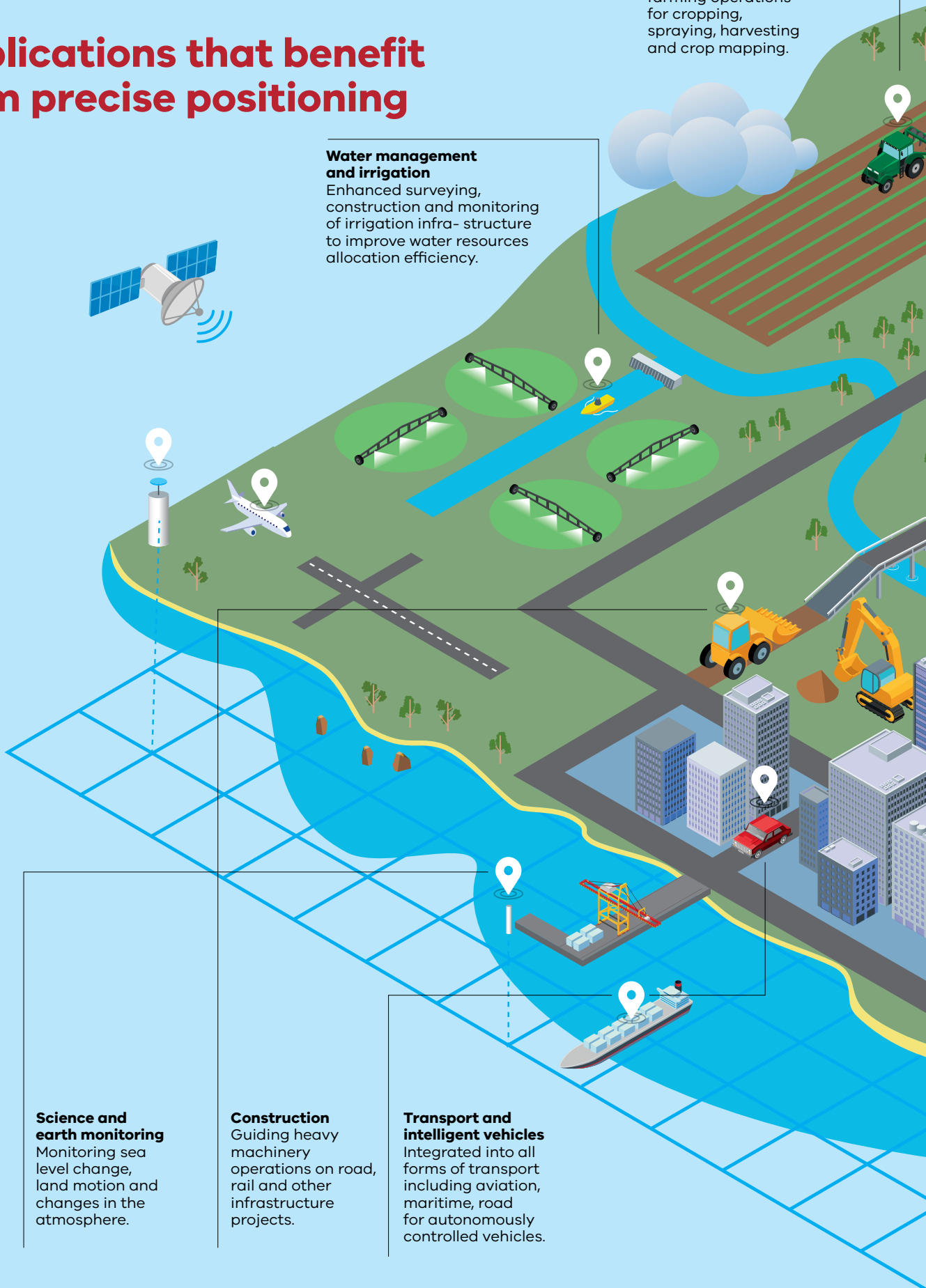
Monitoring sea level change, land motion and changes in the atmosphere.

## Construction

Guiding heavy machinery operations on road, rail and other infrastructure projects.

## Transport and intelligent vehicles

Integrated into all forms of transport including aviation, maritime, road for autonomously controlled vehicles.





**Emergency services**

Enhanced rescue operations, improved hazard risk modelling and safety of life applications.

**Surveying**

Accurate surveying of property boundaries, natural features, assets and infrastructure.

**Mining**

Guiding heavy machinery operations and supporting autonomous haulage.



**Location based services**

Improved personal navigation and interaction with spatial information.

**Mapping**

Enhanced capture of spatial information such as imagery and elevation products.

**GNSS ground stations**

Enabling precise positioning and ensuring alignment with spatial information and the underlying coordinate reference system.



## Vision

SGV Geodesy's vision is accurate, reliable and accessible positioning for Victoria.

## Strategic priorities

To achieve this vision for Victoria, SGV Geodesy will lead and collaborate in programs linked to the following strategic priorities.

### 1. AGRS modernisation

SGV Geodesy will lead the development and implementation of the AGRS modernisation program in Victoria. Major activities include:

- Technical development, and implementation of GDA2020, ATRF and AVWS.
- Procurement of airborne gravity data over targeted regions of Victoria to enhance the AVWS and the vertical accuracy of precise positioning.
- Contribute to the ICSM Geodesy Working Group, support national initiatives and collaborate across borders.
- Develop applications and processes to support efficient delivery of spatial data and transformation of data between datums.
- Research and development of deformation models for targeted regions of Victoria.

### 2. Positioning

SGV Geodesy will manage the operation, maintenance and enhancement of Victoria's primary positioning infrastructure and information services. Central to this priority is our work to:

- Contribute to the Positioning Australia program and provide free and open access to Victorian CORS network positioning data.
- Maintain high quality Victorian CORS network infrastructure, including:
  - Ongoing CORS infrastructure maintenance, upgrades and equipment refreshment program.
  - Upgrade to next generation communication technologies and provide additional communications redundancy to increase reliability.
  - Enhance the density of CORS to support development in regional and metropolitan growth areas and other major infrastructure projects.
- Enhance positioning data integrity and the use of Information and Communications Technology (ICT), including:
  - Migration of the GNSS CORS data centres to the cloud with a heavy focus on IoT.
  - Implement the latest fit-for-purpose data protocols to securely deliver CORS data and safeguard data integrity.
  - Contribute to the Asia-Pacific Reference Frame as a GNSS CORS processing analysis centre, with a focus on CORS position monitoring.
  - Maintain high standard of CORS operation and enhance reporting of GNSS CORS performance against Service Level Agreements and Key Performance Indicators

### 3. Survey control

SGV Geodesy will manage the maintenance and enhancement of survey control infrastructure and information in order to:

- Enhance survey control network infrastructure:
  - In consultation with the surveying industry, proactively extend the survey control network to meet monumentation and mark density requirements.
  - Protect survey control mark infrastructure and provide advice and resources for survey control mark maintenance.
  - Collaborate and support state-wide digital transformation and digital engineering projects such as DCM, LiDAR data capture and major infrastructure development.
- Improve survey control mark information maintenance and delivery:
  - Improve SMES user experience, access and delivery processes.
  - Migration to scalable, cloud-based technologies and standards to support seamless SMES data delivery.
  - Contribute to national spatial data infrastructure development and implementation.
  - Enhance analysis tools to improve management of survey control data and metadata.
  - Contribute to the development and implementation of eGeodesy to support increased automation of processes (data processing, national adjustment).
  - Improve processes for the submission of survey measurements from the surveying industry (including Government) to collaboratively maintain Victoria's SCN.
- Enable licensed surveyors to align cadastral surveys with the national coordinate reference system to meet the regulatory requirements of:
  - Surveying (Cadastral Surveys) Regulations 2015
  - Survey Co-ordination Regulations 2014
- Support calibration of electronic distance measuring equipment for the surveying industry.

### 4. Stakeholder engagement and education

SGV Geodesy will engage with stakeholders and ensure they are informed and have the capability to capitalise from advances in positioning.

Core components of this strategy are to:

- Maintain strong and responsive relationships with all stakeholders:
  - Provide expert advice and simplify complex concepts and technology.
  - Identify new stakeholders and collaborate with stakeholders to achieve enhanced outcomes.
- Support education and training through:
  - Universities with presentations, research projects, internships, mentoring, and contribute to curriculum development.
  - Presentations and training resources to stakeholders on products and services as well as major initiatives.
- Contribute to research and development:
  - Continually monitor national and international geodetic and positioning research, standards and practices.
  - Develop and actively contribute to research to improve the delivery of positioning infrastructure and information services.
  - Continue to develop skills, expertise and capability of SGV Geodesy personnel.

## Want to know more?

### **Geodesy**

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