

# Victoria's Digital Cadastre Modernisation

A case study



**Spatial  
Vision**



*in collaboration with*

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CIVIL ENGINEERING  
PLANNING  
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**COLLIER**  
GEODETTIC SOLUTIONS

*for*

**VICTORIA**  
State  
Government



## Planning for housing, transport, as well as most environmental and social infrastructure demands reliable and accurate mapping of land boundaries.

Spatial Vision played a key role in the digitisation and alignment of the Australian state of Victoria's property boundaries to produce a more accurate "single source of truth", reducing costs and boosting productivity across both the public and private sectors, as well as increasing information accessibility.

The automation and scale of international collaboration to enable the digitisation of 1 million survey plans and adjustment of 4.2 million land parcels across 250,000km<sup>2</sup> is unprecedented globally.

The project is delivering benefits to various sectors:

- Improved access to previous survey information for land and engineering surveyors
- More efficient land registration processes including digital survey plan lodgement
- More accurate property boundaries for
  - all levels of government
  - the building, property and construction industry
  - utility providers

**"It's inspirational, the commitment DTP and their associated partners have made to improve the quality of the State's digital cadastre. While challenges still exist, the technical excellence and perseverance in making such a large jigsaw representation of the cadastre conform to the real world, will definitely be of benefit to future generations."**

**Charles Moscato**

**Digital Intelligence Officer, Yarra Valley Water**

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## Customer Profile

[www.dtp.vic.gov.au](http://www.dtp.vic.gov.au)

## Organisation

Victorian State Government  
(Department of Transport & Planning)

## Location

Victoria, Australia

## Sectors

State Government, surveying

## Outputs

Digital Cadastral Map and Survey Data

## Solution

Over the past 3 years the project has effectively utilised industry-leading least-squares survey adjustment software, DynAdjust, along with highly a skilled team, to adjust 4.2 million land parcels. This ground-breaking solution addresses a complex and computationally demanding problems previously considered 'too hard'.

## Benefits

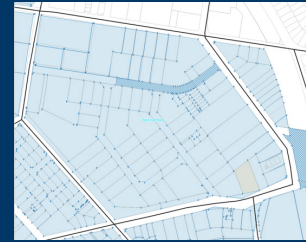
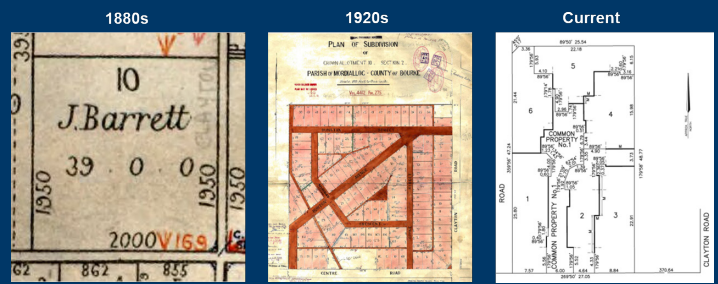
- Significant productivity gains across many sectors of the economy – from property and land development, through to utility and other infrastructure asset management.
- Social and economic benefits arising from the project include better and more integrated land use planning and a stronger foundation for emerging 3D and 4D geospatial applications.

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## The Issue

For some time, the Victorian Government recognised the limitations of its existing cadastral mapping and the need for improved accuracy to serve a wide range of modern applications. Less than 4% of land parcels met spatial accuracy standards. Developed over the past 30 years from digitised survey plan boundaries, existing property boundaries exhibited highly variable precision.

The goal to create a new digital cadastre required digitising around one million survey plans representing some 4.2 million land parcels. The challenge of bringing together all of these plans (some as much as 150 years old), coping with differences in measurement technology and regulation, working in areas with limited cadastral measurements was significant. The complexity and technical issues that had to be resolved was daunting.



## The Solution

The automation and scale of collaboration required is significant. Underpinning the new adjusted digital cadastre is a cloud-based technical infrastructure that allows data to flow efficiently.

An automated adjustment engine was built using open source software components. Our skilled technical team worked closely with our client and local surveying experts. Collaboration was essential as the adjustment engine development and processes faced many technical and logistical challenges including;

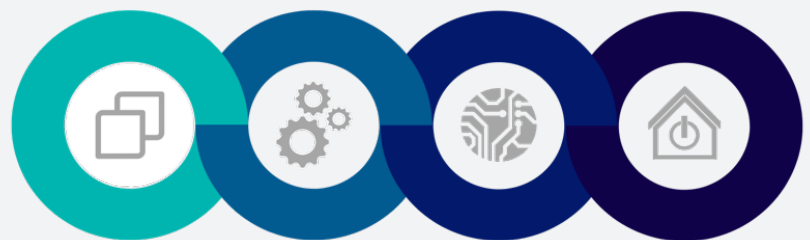
- Defining a suitable quality measure for output data
- Developing highly automated multistage processing to achieve required efficiency and consistency within limited time and budget constraints
- Delivering a comprehensive cadastral fabric including areas with limited survey control (rural areas), discarded plans, abutting plan inconsistencies, plan topology and unsurveyed natural boundaries
- Overcoming back-captured plan data deficiencies
- "Baking in" the quality assurance verification into the production process for efficiency and to ensure a level of consistency of the end product will meet client standards

The project team brought together a mix of highly sophisticated algorithms, least squares adjustment theory, cadastral knowledge and skills, bespoke software development, open-source tools and GIS software for a world-first, ground-breaking solution. The DCM project has been innovative in a number of ways;

- A highly automated workflow maximised the value of surveying and GIS professionals who investigated and resolved many complex cadastral adjustment issues productively and efficiently
- DynAdjust was implemented within sophisticated adjustment management systems
- Custom-built systems using an open-source technology stack - based on the least squares adjustment engine – DynAdjust
- Extensive and intensive project team collaboration to resolve the significant technical challenges arising
- Automation freed operators to do the highest value work
- The production system was necessarily highly scalable
- Wide range of skills and expertise delivered the project within the client's budget/timeframe

### A Four-Stage Project

*Spatial Vision primarily led and undertook the complex and labour-intensive adjustment phase (Stage 2b) of Victoria's DCM project. Survey measurement data from individual plans were combined by matching adjoining parcel nodes (like assembling a patchwork quilt). Parcels were mathematically adjusted and spatial accuracy calculated. After almost three years this was completed on schedule in June 2023.*



STAGE 1 Digitalisation      STAGE 2 Adjustment      STAGE 3 Integration      STAGE 4 Automation

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## The Benefits

A digitally transformed cadastre that provides certainty will lead to more efficient land registration processes, protection of landholder rights, and improved land use planning and land tax calculations for the state of Victoria.

Victoria's DCM is part of Land Use Victoria's longer-term initiatives to transform the legacy spatial database of Victoria's cadastral parcel and property boundaries into a data-driven, spatially accurate, 2D digital representation of the cadastre.

The project is expected to speed up land development and social and economic processes, enable more efficient automated land transactions and enhance the accuracy and useability of Vicmap by the private sector, emergency services and all levels of government. Enhanced property boundary information is more easily used in the broader spatial domain.

These benefits are being realised through a visionary and radical transformation of the processes by which survey plans are lodged and leveraged in a new business-as-usual process that continually enhances the underpinning spatial representation of the Victoria's cadastral fabric.

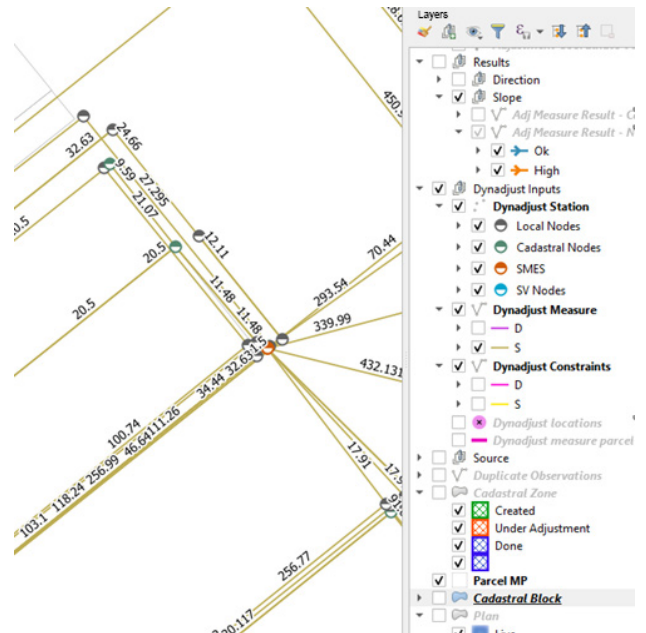
Benefits beyond the scope of work completed to assist Victoria include:

- ✔ A clear plan and business case for digital enhancement of cadastral mapping
- ✔ Technical methodology and architecture for transformation
- ✔ Large-scale delivery of cadastral adjustments from common data standards format plan and survey data to create an adjusted, integrated cadastral fabric
- ✔ Future-ready for automation and rapid updates with common data standards format plan representation of their cadastral fabric
- ✔ Provide a stronger foundation for emerging 3D and 4D visualisation in modern geospatial applications
- ✔ Provide for a coordinated and consistent approach to planning future policies, legislations, standards, models and research

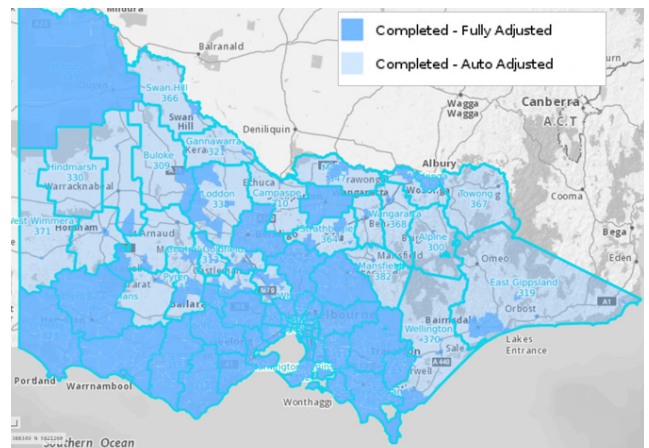
The Government of Victoria's Digital Cadastre Modernisation (DCM) project is a key vehicle for improving foundational spatial data.

This world-leading initiative is digitally transforming Victoria's cadastral fabric and Vicmap product suite, facilitating timely updates of key authoritative datasets.

If you'd like to know more, [please get in touch.](#)



Customised operator interface



Winner of the 2022 Asia Pacific Spatial Award for Technical Excellence

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