Integration of LiDAR to Enhance the Digital Representation of Cadastral Parcels in Queensland

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SUMMARY

Being able to analyse the spatial interaction between different objects or datasets enables decision makers to determine the best options for planning and policies that directly affect residents in their day to day lives. Whether that be for large scale urban planning, for new infrastructure such as Olympic stadiums, or for fastest route emergency response initiatives. Historically the 2D digital portrayal of property boundaries in cadastral parcel-based systems formed the basis for these spatial interactions, however these interpretations fail to show the vertical extent of buildings such as high-rise apartments, townhouses, and other properties with multiple buildings. Due to an increase in these multi-storey apartments and complex building structures in urban cities, it is becoming increasingly important to visualise a 3D built environment and illustrate the individual ownership rights, restrictions and responsibilities that exist within these structures.

The paper outlines the modernisation work currently being undertaken by the Queensland Government and how it can better connect the digital cadastre with other foundational datasets, making it easier to support regional planning, development preparations and deliver essential services like waste collection and utilities maintenance. As part of this work, the spatial cadastre in Queensland is being converted from a 2D representation in an isolated database to a 3D enabled feature service in Esri Parcel Fabric. By including an abundance of new attribute fields such as persistent identifiers, there is the capability to integrate endless data from diverse sources to enable more accurate and informed decision making by stakeholders. A key component of the data integration includes the use of LiDAR technology to identify ground and building heights, therefore individual floor and ceiling levels can be inferred, creating a real-world depiction of stratified properties. Specifically, by having a full 3-dimensional representation of strata parcels will prove invaluable for stakeholders such emergency services and council, from locating a patient in an exact house on a large parcel of land to modelling how flood inundation impacts each specific apartment in a multi-complex property.

1. INTRODUCTION

1.1. History of the Cadastre

The Queensland Digital Spatial Cadastre is a spatial representation of every current registered parcel of land in Queensland, including its legal Lot on Plan description and attributes from the face of the plan such as stated area. The cadastre is considered to be the point of truth for the graphical representation of property boundaries and forms the base map for several other datasets for land related information.

In 1859 when Queensland was proclaimed as a separate colony, the first cadastral map for Queensland was drawn to show the location of pastoral runs being leased (State of Queensland 2025). The 20th century was where cadastral mapping made headway, with real property information being included in 1935 and the 1970s saw the commencement of production of the new 40 chain sheet series based on the Transverse Mercator projection. The mid-1970s additionally saw the change from imperial measurements to metric, with map sheets being established at varying scales from 1:100,000 to 1:2,500 (Figure 1). These map sheets are still used today to represent QLD.

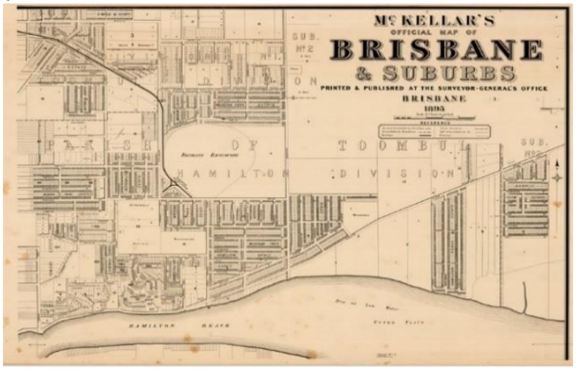


Figure 1: McKellar's official map of Brisbane and Suburbs, 1895.

In 1982, the then Department of Mapping and Surveying launched a program to provide a digital record of QLD's cadastral boundaries due to the growing needs of users for a graphical index of the multiple database type property related systems in use (State of Queensland 2025). The Digital Cadastral Database or DCDB was created through digitising the best available hard copy cadastral maps at a variety of scales and accuracies. At the initial capture, existing control marks from the Survey Control Database (SCDB), topographic maps, photogrammetric and orthophoto collations were all used as part of the digitising process and contributed to the assigned accuracy. The project was completed to an agreed standard in 1992, and the outcome was a seamless database of the QLD cadastral network.

Today, the Digital Cadastral Database, now known as the QLD Spatial Cadastre, is widely used by a number of stakeholders including local councils for utilities, rates, asset management and future planning. The positional accuracy and appropriate representation of survey plans into the cadastre is therefore highly important and requires certain standards to be met (State of Queensland 2025b). However, with recent rapid urbanisation and an increasing number of multi-building complexes and multi-storey buildings being developed, properly illustrating the spatial position and property ownerships of each lot has proven difficult due to the constraints within our current system.

1.2. Ownership rights in a strata property

Land administration systems, such as the QLD Spatial Cadastre, are used to record, manage and visualise spatial information regarding the use, tenure and value of land (Williamson et al. 2010). Traditionally, many of these administrative systems capture a 2D representation of survey plans to communicate the rights, restrictions and responsibilities associated with a piece of land, building or airspace (Casey et al. 2016). With an ever-increasing population resulting in rapid urbanisation, the development of buildings and shared infrastructure facilities has become popular to accommodate these populations and satisfy the growing housing demand.

The term 'strata' originates from the idea of different layers or levels, similar to what you see in a multi-storey building (Kabiraj 2024). The concept of a strata title in Australia was developed as a temporary solution to requirements of regulating tight clusters of individual owners on the same piece of land (Christudason 1996). Strata subdivision is a flexible and efficient way to manage multi-unit buildings and allows property owners to divide a property into separate lots with individual titles, while sharing common areas and facilities (Everton-Moore et al. 2006). Strata subdivision can occur vertically (multi-level apartment block) or horizontally (semi-detached duplexes) and can involve a combination of both individual and shared property ownership (Ardill et al. 2004) (Figure 2).

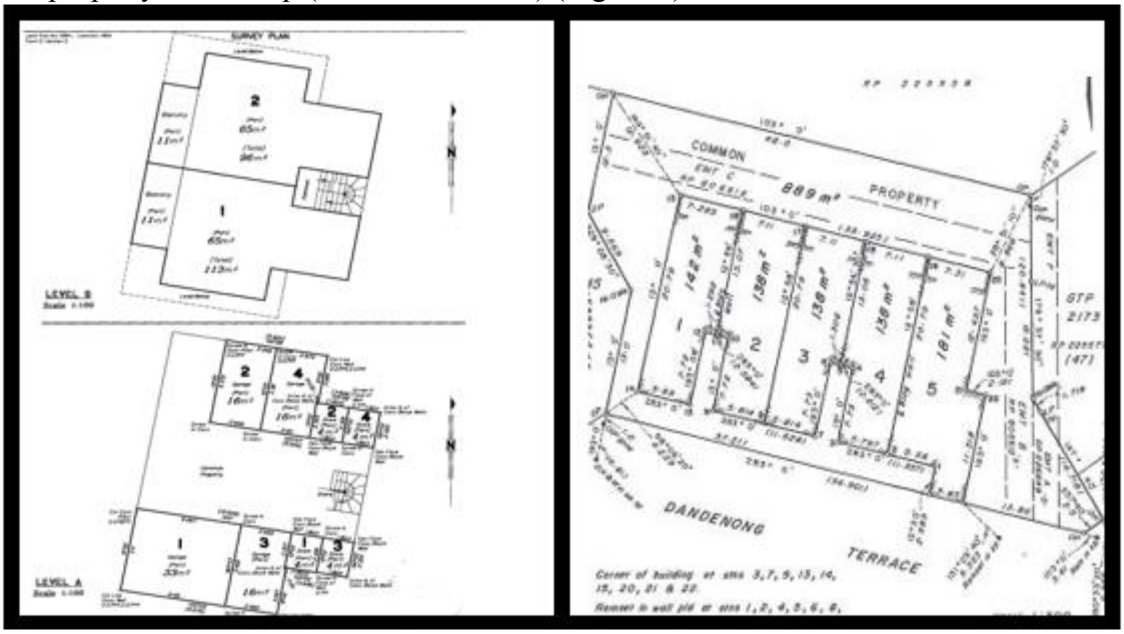


Figure 2: Example of a vertical strata subdivision (left) and a horizontal strata subdivision (right).

Since 1961, state strata legislation has come into effect which allowed each lot or apartment to have its own title which ensures the owners have their own individual rights, restrictions and responsibilities of their lot. Currently in a 2D cadastre, all lots in a multi-level strata property are registered and represented spatially as one land parcel for all non-common property areas within the strata scheme. This poses many challenges for service providers such as councils, valuations and utilities to correctly visualise and manage the individual ownership rights within these complex and multi-level properties. During the last decade, there has been numerous investigations into the use of 3D models to better illustrate the cadastre. With the significant developments in data collection and representation in spatial programs and the capabilities of computers for rendering 3D models, complex strata properties can now be shown in full detail.

1.3. Uses of LiDAR technology

One particular data collection technology that has emerged as a powerful tool for high resolution 3D data capture of the environment is Light Detection and Ranging (LiDAR). LiDAR uses laser pulses to measure distances to physical structures and can create an accurate representation of the physical environment (Waykar 2022). Due to the efficiency of using LiDAR, many stakeholders utilise automatic feature (buildings, trees, roads etc.) extraction to capture their required data and create 3D scenes.

There are three key methods for the creation of a 3D model from LiDAR including 2D vector extrusion, point cloud processing and tilt photogrammetry. One of the most common ways to obtain a 3D model from LiDAR is a 2D vector extrusion method, which involves extruding the 2D vector polygon of the building footprint contour (Zhao et al. 2023). This method involves the characteristics of the 2D vector polygon being lifted to a single height, creating a volumetric 3D shape. The height of the extrusion is taken from LiDAR which identifies the average elevation of all points that fall within a building footprint outline (Picu et al. 2020). For larger urban areas, airborne laser LiDAR is used which acquires point cloud data of buildings by collecting the top surface information (Figure 3).

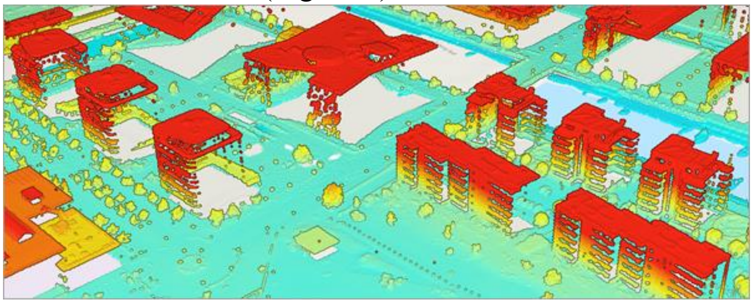


Figure 3: Point cloud LiDAR capture of buildings (Esri 2024).

A combination of this LiDAR building data and the building outlines in the spatial cadastre means individual ownership rights for complex properties may have the opportunity to be properly represented in a 3D cadastre.

2. STRATEGIC POLICIES

In Australia, there is a national push for enhanced digital data through multiple projects and policies, such as the 2030 Data and Digital Government Strategy and the $1.2 billion Digital Economy Strategy which includes $40.2 million for the creation of the Digital Atlas of Australia. Additionally, the Queensland State Infrastructure Strategy identifies infrastructure as an interconnected system made up of economic, social and environmental factors, with digital data as the key for assessing them.

2.1. ICSM National Strategy Data Model

The Intergovernmental Committee on Survey and Mapping (ICSM) is responsible for government mapping and surveying standards and is made up of members from all Australian States, Territories, the Commonwealth and New Zealand (Commonwealth of Australia 2025). The core function of the ICSM is to coordinate and foster the development and maintenance of the essential national spatial datasets including geodetic, cadastral, topographic and more. The key strategic actions for achieving these functions are captured in the ICSM Strategic Framework and Action Plan 2019-2024, with some of the principal actions relating to the QLD cadastre being to implement GDA2020 and dynamic datums; and to implement 3D parameters for the digital cadastre (Commonwealth of Australia 2025).

Additionally, in combination with Geoscience Australia and ANZLIC, these essential national datasets are broken up into 14 specific themes comprising the Foundation Spatial Data Framework, along with aspirational goals for each one (Geoscience Australia, 2025). These look to deliver national standardised and authoritative foundation data. The spatial cadastre is directly implemented in a number of these from land parcels and their tenure to positioning and physical infrastructure. Future enhancements of the QLD Spatial Cadastre will only help to support all state and national datasets that use it as a base for their own spatial representation.

2.2. Cadastre 2034

The Cadastre 2034 is perhaps the most influential strategic document for the Qld Spatial Cadastre initiated by the ICSM and captures the trends and vision of what they believe the community will require from their cadastre systems in 2034. The vision is to create a spatial cadastral system that readily enables people to confidently identify the location and extent of all rights, restrictions and responsibilities related to land and property (Commonwealth of Australia 2025). This strategy has been established to create a single point philosophy on what the community can expect and what the government has to deliver in the future for the cadastre. There are five goals to consider for the future cadastre (Figure 4), with one of the main considerations being a spatially accurate, 3-dimensional and dynamic system. To support these goals the ICSM is working on a 3D Cadastral Survey Data Model (3DCSDM) to create a national harmonised data model for exchange of survey information. These are all objectives that are not achieved with the current QLD cadastre but are to be met with the introduction of a new operating and maintenance system.

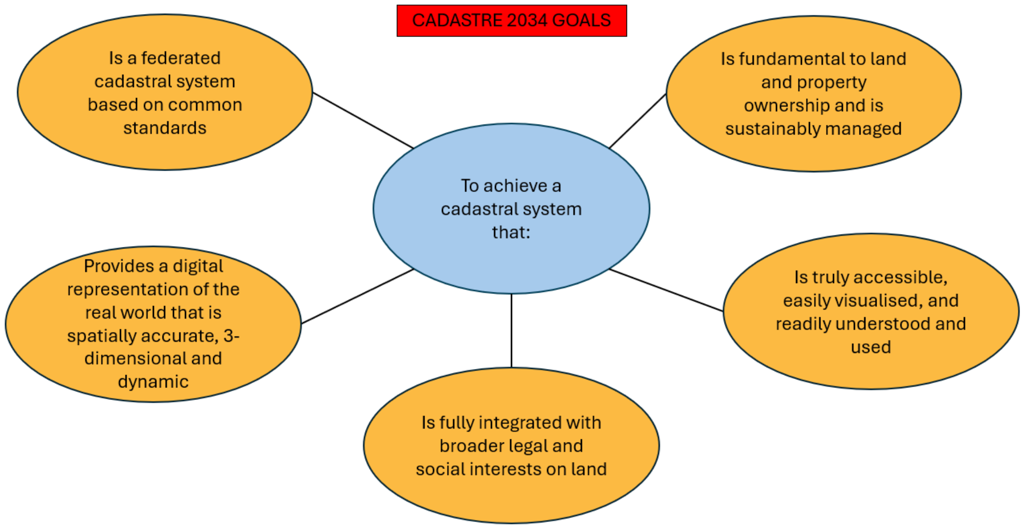


Figure 4: Cadastre 2034 Goals (Commonwealth of Australia 2025).

3. MODERNISATION PROJECT

The Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development is currently undertaking the Cadastre and Address Modernisation (CAM) Project, which aims to transition our spatial cadastre and location addressing data and operations from the current legacy platforms to Esri ArcGIS Enterprise. While the addressing data is being rehomed to a new separate database, the QLD Spatial Cadastre, which is fundamental to land planning, titling, mapping etc. and is a departmental responsibility under the Survey and Mapping Infrastructure Act 2003, is being transformed into a new spatial environment. With the ever-emerging technologies and an increased demand for a more spatially accurate cadastre with future capabilities, it is now more important than ever to migrate the maintenance operations of the QLD Spatial Cadastre to Esri Parcel Fabric.

3.1. Current Systems and Approaches

Since the creation of the Digital Cadastre, data management and maintenance has been performed using the CAD-based program called MicroStation with purpose-built tools to capture boundary line drawings and parcel attribute information. Being a CAD system, a basic schema is used with different linestyles for different parcel boundaries (e.g. base, road, watercourse, easement) and separate layers for the parcel polygons (Figure 5). Although the custom tools allow operators to plot boundaries; move, rotate and snap to reference files; and create new polygon attributes, all bearing and distance information that is entered into MicroStation to build parcels and perform graphic upgrades is lost when the job is submitted back to the database. This linework is additionally manually adjusted and abstracted using various map projections, meaning that it is not a true representation of the surveyed dimensions on a plan.

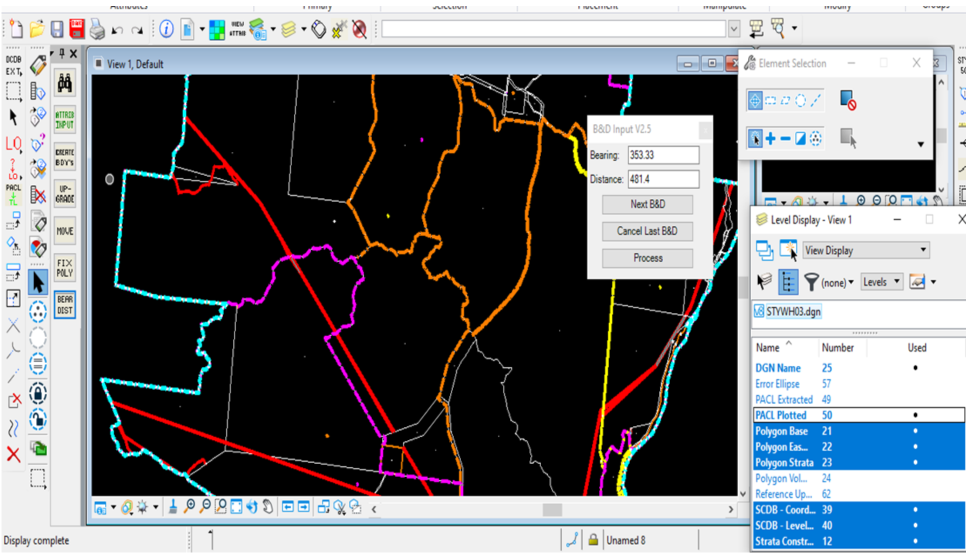


Figure 5: Current CAD-based maintenance environment for the QLD Spatial Cadastre.

Additionally, the current QLD Digital Cadastre is constrained by standards and procedures adopted to fit the software limitations. For example, although cadastral surveys capture 3D data for volumetric parcels or building format parcels, these must be abstracted to a static 2D digital representation to be captured. Volumetric parcels are captured in a separate level above the base parcel, but as a 2D polygon with no height or 3D specifications, and volumetric roads are not even captured as 'volumetric'. Similarly, building format parcels, or strata in other terms, are captured as a single 2D building footprint, with any lot details captured non-spatially in a related table (Figure 6). With the evolution of technologies, constant requests for a more accurate cadastre and the strive for a 3D digital world, the 27-year reign of MicroStation as the maintenance environment for the QLD cadastre is coming to an end.

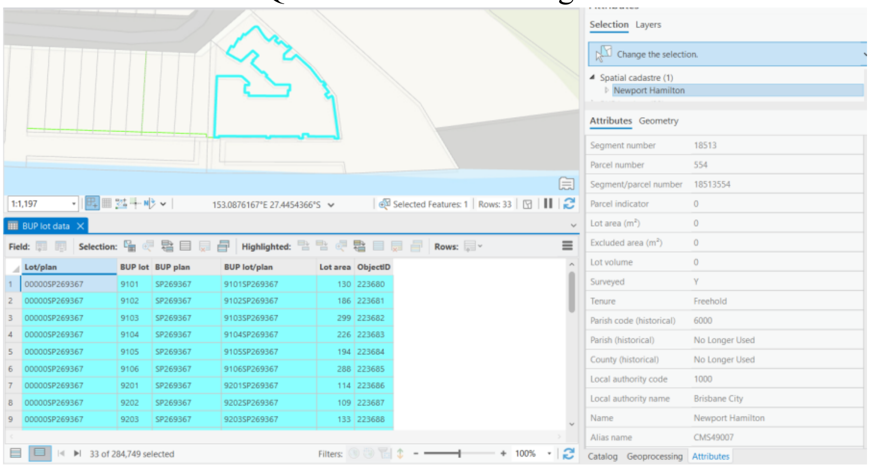


Figure 6: Single 2D Building footprint in QLD cadastre for Newport Hamilton with 33 lots in the building stored in a related table.

3.2. Our new environment – Esri Parcel Fabric

The QLD Whole of State Cadastre in Esri Parcel Fabric is currently the largest in the world and has a new and improved data model for increased data capture from survey plans and the potential for digital lodgement in the future. Parcel Fabric's out of the box functionalities allow the capture and storage of the direction and distance of lot boundaries exactly as they appear on a survey plan. These observations are then also given an initial estimate as to their accuracy based on the date of survey and the technology available at the time. As part of the system design it was thought prudent to look towards the future and to implement a data model that could be used to not only capture the current information contained in the spatial cadastre, but also to move our services to align more closely with the national and state strategies mentioned earlier.

With these strategies in mind, additional fields were also included to capture features such as survey control, reference marks, connections from cadastral parcels to the marks, historical survey observations, and adjoining lot information. These additions to the data stored against the cadastre allow the integration of least squares adjustments to calculate the most probable location of the corner of cadastral parcels. By being able to store the original captured information against the feature, even after an adjustment, we are able to show traceability and repeatability to the derivation of the spatial representation of our cadastre like never before.

Another specific difference between the current MicroStation environment and Parcel Fabric is the ability to include a persistent unique identifier on all features. Once published as a feature service this gives the capability to enable integration of other datasets, be that from a spatial intersect or relate to a specific field. For future focus and integration, the data model in Parcel Fabric has been built with an emphasis on harmonisation and ease of alignment of data. As such we have looked to implement the proposed ICSM 3D-CSDM vocabularies from the outset. The Spatial Cadastre is the base foundational dataset and the spatial origin for many published services, from administrative boundaries to property valuations to environmental themes. This not only greatly enhances the captured data in the spatial cadastre, but also enables far greater analysis and therefore decision making by all users of government open data.

3.3. Future of Strata in Parcel Fabric

With a new model capable of accurately representing volumetric parcels by way of vertical extrusion, there are opportunities to visualise Strata for each individual unit within a building in a 3D space to inform decision making.

Building outlines have been created from captured LiDAR on behalf of Queensland Reconstruction Authority (QRA) for the purpose of performing rapid damage assessments for natural disaster events. They have been captured via automatic processors with minimal manual input. Emphasis is on identifying these structures rather than accurate outlines.

The integration of LiDAR building outlines into the strata layer of the parcel fabric was completed over an area of interest and it was found that with minimal capture of the floor order, parcel name, and by duplicating parcels using the ‘Duplicate Parcels’ built in tool within ESRI Parcel Fabric, a building could be extruded from the existing base lot, showing the various floors of the building. This form of 3D extrusion from the data is with minimal intervention required and would represent the data at floor level.
Furthermore, with the capture of each parcel within the base lot, a building can be accurately represented to the detail of each individual unit within an apartment complex by combining the LiDAR information with the parcels.

The process to integrate the LiDAR information into Strata and produce a 3D scene starts with the Strata layer being joined with the LiDAR building outlines by way of a Spatial Join where an intersection occurs, and relevant fields are temporarily added to the Strata layer from the LiDAR layer (Figure 7). An important field which enables the joining of two datasets is the OBJECTID from the LiDAR layer. The persistent OBJECTID which uniquely identifies the building outline for a specific building is copied to the Strata layer as the Building Identifier.

Figure 7: A LiDAR building outline with relevant fields highlighted.

Using the OBJECTID (Building Identifier), attributes from the captured LiDAR buildings are copied across to their equivalent fields in the Strata layer based on the identifier and the temporary join is removed. These fields include minimum building elevation, maximum building elevation, average building elevation, ground elevation at building centroid, building area UFI, predicted building class, predicted habitable floor height, and predicted habitable floor elevation, and optionally lidar square metre areas for validation.

ArcGIS arcade scripts perform the extrusion calculations, for example the total number of floors where the total number of floors has not been captured manually already for the lots in a building (Figure 8, 10). The total number of floors are calculated using the predicted building classification (one, two or multistorey). For multistorey buildings the formula in Figure 8 is used, with division by 3 because, on average a floor is found to be between 2.7 and 3.3 metres:

$$\textit{Total Number of Floors} = \frac{\textit{Maximum Building Elevation} - \textit{Predicted Habitable Floor Elevation}}{3}$$

Figure 8: Total number of floors for multistorey buildings.

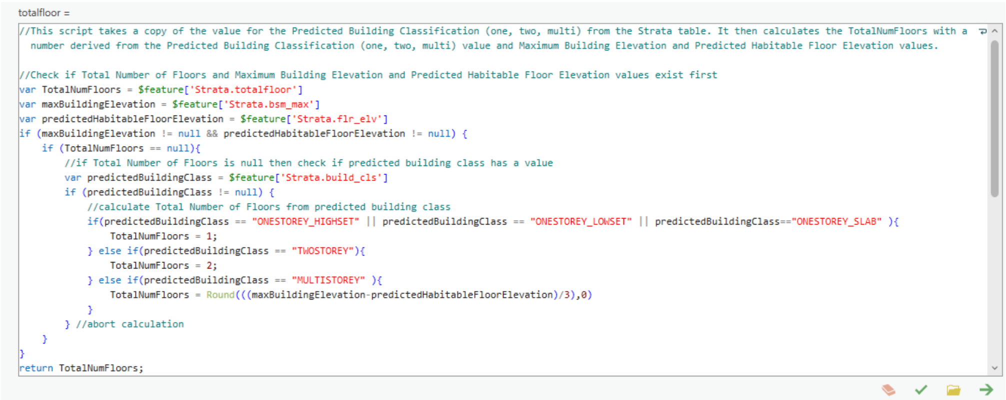
The ceiling height can be inferred by a series of calculations (Figure 9). The final extrusion (Figure 12) is displayed in an ArcGIS 3D scene by extruding the Ceiling Height to at an absolute height (Figure 11).

$$\textit{Extrusion Height} = \frac{(\textit{Maximum Building Elevation} - \textit{Predicted Habitable Floor Elevation})}{\textit{Total Number of Floors}}$$

$$\textit{Floor Height} = \textit{Predicted Habitable Floor Elevation} + (\textit{Extrusion Height} * \textit{Floor Order})$$

$$\textit{Ceiling Height} = \textit{Floor Height} + \textit{Extrusion Height}$$

Figure 9: Extrusion height, floor height and ceiling height formulae.



```
totalfloor =
//This script takes a copy of the value for the Predicted Building Classification (one, two, multi) from the Strata table. It then calculates the TotalNumFloors with a
  number derived from the Predicted Building Classification (one, two, multi) value and Maximum Building Elevation and Predicted Habitable Floor Elevation values.

//Check if Total Number of Floors and Maximum Building Elevation and Predicted Habitable Floor Elevation values exist first
var TotalNumFloors = $feature['Strata.totalfloor']
var maxBuildingElevation = $feature['Strata.bsm_max']
var predictedHabitableFloorElevation = $feature['Strata.flr_elv']
if (maxBuildingElevation != null && predictedHabitableFloorElevation != null) {
    if (TotalNumFloors == null){
        //if Total Number of Floors is null then check if predicted building class has a value
        var predictedBuildingClass = $feature['Strata.build_cls']
        if (predictedBuildingClass != null) {
            //calculate Total Number of Floors from predicted building class
            if(predictedBuildingClass == "ONESTOREY_HIGHSET" || predictedBuildingClass == "ONESTOREY_LOWSET" || predictedBuildingClass=="ONESTOREY_SLAB" ){
                TotalNumFloors = 1;
            } else if(predictedBuildingClass == "TWOSTOREY"){
                TotalNumFloors = 2;
            } else if(predictedBuildingClass == "MULTISTOREY" ){
                TotalNumFloors = Round(((maxBuildingElevation-predictedHabitableFloorElevation)/3),0)
            }
        } //abort calculation
    }
}
return TotalNumFloors;
```

Figure 10: ArcGIS arcade script to calculate total number of floors.

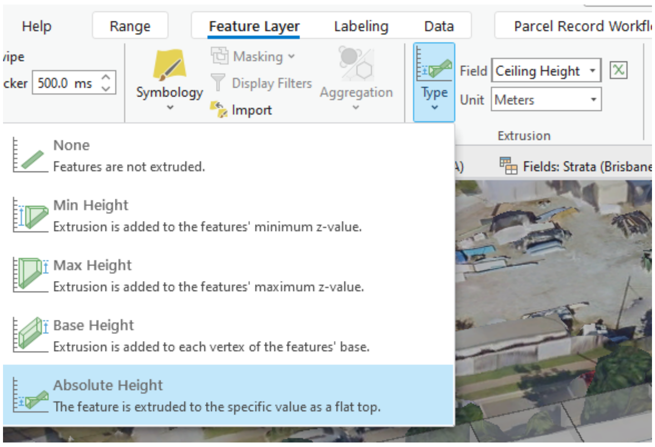


Figure 11: Extrusion of ceiling height to absolute height.

The floor order value contained in the formulae (Figure 9) is part of the manual capture described in section 3.2. The floor order specifies which floor a parcel resides within a building and starts at 0. For Strata parcels extruded (Figure 12), the LiDAR (Figure 7) predicted a TWOSTOREY building. In this example, the survey plan only contains horizontal strata, but not vertical strata. The building and its floors are not represented on the survey plan. This highlights the ability of the spatial cadastre to take many sources to enhance the spatial representation of parcels, even when it cannot be done with the survey plan alone. The calculations allow for the inference of missing data to create a more fully realisable cadastral data product.

Figure 12: 3D strata parcels extruded from horizontal strata.

A caveat identified was that some strata parcels intersect multiple lidar building outlines due to small lidar objects which may lead to incorrect extrusions. The small lidar outlines can be excluded from the spatial join using their area or alternatively the building identifier can be manually updated after the fact and the fields recalculated using on the fly attribute rules to ensure the correct result. A further issue to be highlighted is that the calculations derived from the LiDAR dataset use the maximum building elevation. This in many cases may differ from the elevation of the eave of the highest habitable floor which we would want to use in future.

4. THE USE OF LIDAR FOR 3D PLANNING – BRISBANE CITY COUNCIL CASE STUDY

Like many international cities, Brisbane is increasingly subject to devastating disaster events. One of the major sources of concern for residents in the city is the propensity for their property to be impacted by a flood event, usually as the result of intense rainfall. Over time the local council has been able to not only collate historical flood information, but also has modelled and distributed information on the likelihood of an event impacting a property. The likelihood of this occurring has also been rated as to the chance of this occurring annually (Brisbane City Council 2025b). A high likelihood rating of impact from a river, creek or storm tide flooding has a 5% chance of occurring or is classed as a 1 in 20-year event. While a very low likelihood rating has a 0.05% chance of occurring. From these models, residents can then use the published information to assess their own risk rating for their property. This not only impacts the decisions that residents may make on where to purchase a property, but can also be used by others, such as insurance companies, to make their own decisions over a property.

Currently for capture of building or strata plans in the QLD Spatial Cadastre these are usually input as a single 2D object of the entire building, with a related table holding the individual unit information. This can lead to obvious issues as it then can be problematic when datasets from other parties are used as an intersect to create information packages. For this example, a FloodWise Property Report (Figure 13) that is available from Brisbane City Council can be referenced.

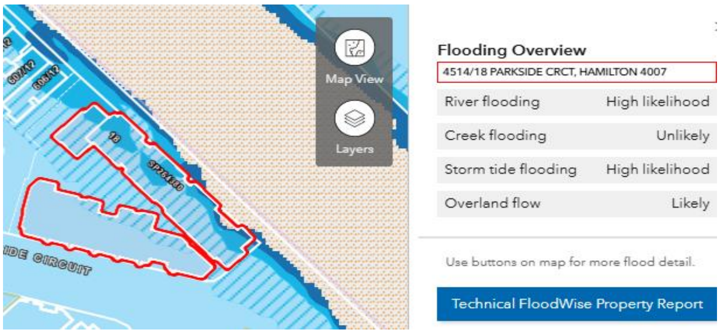


Figure 13: Brisbane City Council Flooding Overview.

These reports are an incredible tool for residents to see at a glance the risk to their property. Unfortunately, these are only as good as the information that they are derived from. At 18 Paradise Circuit, Hamilton, QLD 4007 we have 69 units, as well as common property, stairs, courtyards and ramps. An enquiry of the building however shows the limitations of what the Flooding Overview shows for an individual unit. As part of the building is subject to the dark blue polygon, equating to high likelihood of river flooding, then every unit in the entire complex is then assessed as being at high likelihood. The high likelihood classification is applied even if they are on the southern wing and only subject to an estimated very low risk.

While looking at the generated report itself for unit 4514 we can also see the estimated elevation of these likelihoods, as well as the level of the 2011 Brisbane flood (Figure 14).

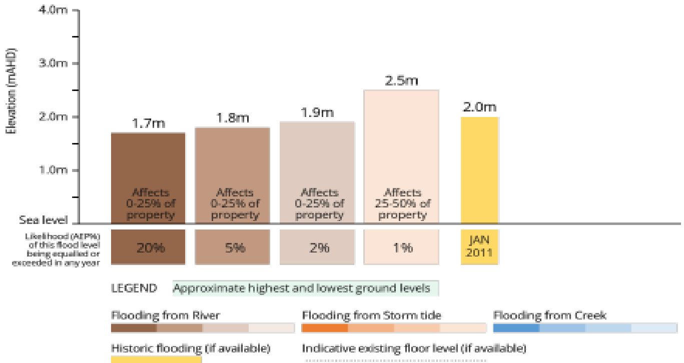


Figure 14: Brisbane City Council graph showing highest and source of flooding for their likelihoods categories as well as historic flood levels.

By the inclusion of individual strata lot information in our new QLD Spatial Cadastre model, as well being able to use information directly from the survey plan and the integration of the LiDAR data, we can then model the individual strata lots at their correct position in the building as well as their elevation. Lot 4514 on survey plan SP264380 is in fact on the 4th level of the building (Figure 15). Using the calculations as shown in section 3.3 we can therefore infer an absolute floor and ceiling height for the parcel. The floor height for the parcel being at an elevation of 19.586m AHD, far above the 2.5m that the FloodWise report states as its worst-case scenario. We do take into consideration that the ground level of the property would be estimated to be subject to inundation in some scenarios, but we can show that the direct impact to specific properties may be much different than was previously able to be forecasted.

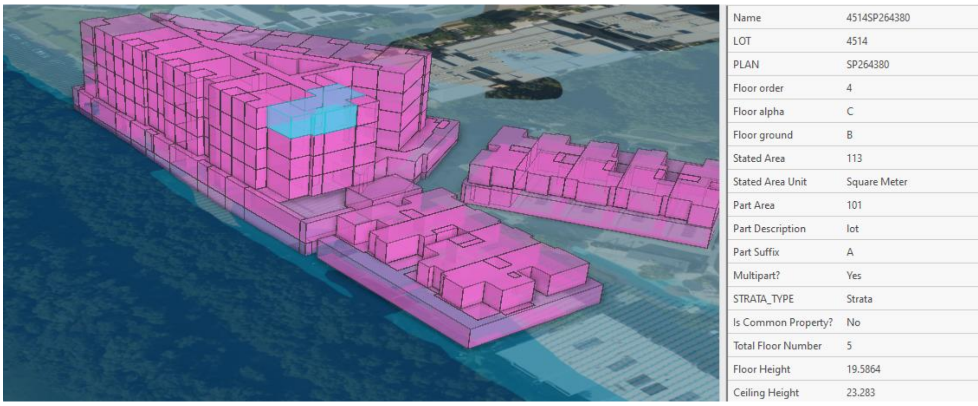


Figure 15: Lot 4514 shown as a 3D Strata unit with height information extracted from LiDAR, overlayed on Brisbane City Council Flood Risk Overall feature service.

By including this information in the QLD Spatial Cadastre in Parcel Fabric we then can publish a service of these parcels. By the very nature of a published feature service it is fairly simple to then add in imagery of the surround, as well as in this case the Flood Awareness - Flood Risk Overall feature service as published by Brisbane City Council through their Open Data Portal (Brisbane City Council 2025). The ability for residents, and in fact any users of the data, to make insightful decisions is therefore greatly increased.

5. CONCLUSION

The current maintenance environment for the QLD Spatial Cadastre does not allow for the accurate representation of the cadastre. Specifically, spatial depiction of ownership rights in a strata property cannot be adequately detailed in a 2D environment. Through the migration to a new 3D capable and highly functional maintenance environment such as Esri Parcel Fabric, plus the integration of supporting data, such as LiDAR building information, the individual lots in a multi-storey building are not just realised but illustrated in their spatially accurate position within the building. The direct impact of the work that is being done here is evident through the Brisbane case-study and can be used to provide valuable intelligence in making decisions in a multitude of real-world scenarios.

6. REFERENCES

Ardill, A, Everton-Moore, K, Fredline, L, Guilding, C and Warknen, J, 2004, 'Community Titles Reforms in Queensland: A Regulatory Panacea for Commercial, Residential, and Tourism Stakeholders', 25 Queensland Lawyer.

Brisbane City Council, 2025, 'Brisbane Open Data' viewed 30 January 2025 https://data.brisbane.qld.gov.au/pages/home/

Brisbane City Council, 2025b, 'Flood Awareness Map', viewed 27 January 2025, https://www.brisbane.qld.gov.au/community-and-safety/community-safety/disasters-and-emergencies/be-prepared/flooding-in-brisbane/flood-awareness-map.

Casey, T, Valovirta, V, Heino, I, Porkka, J, Kotovirta, V, & Ruutu, S, 2016, 'Interoperability Environment for Smart Cities (InterCity) Report of Phase 2–Smart City Interoperability Environment Concept', Espoo, Finland.

Christudason, A, 1996, 'Subdivided Buildings — Developments in Australia, Singapore and England', 45 International and Comparative Law Quarterly.

Commonwealth of Australia, 2025, 'ICSM Strategic Plan', viewed 30 January 2025, https://www.icsm.gov.au/about/strategic-plan.

Esri, 2024, 'Extract 3D Buildings from LiDAR Data', viewed 30 January 2025, https://learn.arcgis.com/en/projects/extract-3d-buildings-from-lidar-data/.

Everton-Moore, K, Ardill, A, Guilding, C & Warnken, J, 2006, 'The Law of Strata Title in Australia: A Jurisdictional Stocktake', Australia, Australian Property Law Journal.

Geoscience Australia, 2025, 'Foundation Spatial Data' viewed 30 January 2025, https://www.ga.gov.au/scientific-topics/national-location-information/foundation-spatial-data.

LandSurvey101, 2023, 'The Basics of Cadastral Surveying: An Overview', viewed 29 January 2025, https://www.landsurvey101.com/the-basics-of-cadastral-surveying-an-overview/.

State of Queensland, 2025, 'History of Digital Mapping in Queensland', viewed 28 January 2025, https://www.qld.gov.au/recreation/arts/heritage/museum-of-lands/surveying/mapping-process/digital-mapping.

State of Queensland, 2025b, 'Improving Positional Accuracy of the Digital Cadastral Database', viewed 28 January 2025, https://www.business.qld.gov.au/running-business/support-services/mapping-data-imagery/data/digital-cadastral/accuracy.

Waykar, Y, 2022, ‘Lidar Technology: A Comprehensive Review and Future Prospects’, India, Journal of Emerging Technologies and Innovative Research.

Williamson, I. P, Enemark, S, Wallace, J, and Rajabifard, A, 2010, ‘Land Administration for Sustainable Development’, Redlands, CA, ESRI Press Academic.

Zhao, Q, Zhou, L & Lv, G, 2023, ‘A 3D Modeling Method for Buildings Based on LiDAR Point Cloud and DLG’, Vol. 102, China, Computers, Environment and Urban Systems.

7. BIOGRAPHICAL NOTES

Tahlia Seeto is an experienced environmental spatial scientist with a wealth of knowledge in the field. Her work and experience have taken her throughout our state and abroad to Europe. She has used her extensive experience with Esri products to manipulate the tools to create efficient processes and methods for capturing increased data.

Before joining the Department **Garry Thomson** gained extensive experience as a surveyor in the private sector. As well as leading the maintenance of the Survey Control Register, he uses this high level of knowledge as a technical lead on the transition of the Spatial Cadastre to Esri Parcel Fabric. Garry is passionate about modernisation and the ease of integration of data.

Jessica Watson has a background in IT and joined the Department in 2018. She demonstrates enthusiasm in utilising technology for business process improvement, including automation of workflows. Her current focus is on the creation of Extract, Transform, Load (ETL) process to ingest data into the Esri Parcel Fabric from LiDAR, DWG, LandXML and custom formats.

8. CONTACTS

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