

4th Questionnaire on 3D Land Administration: status December 2022



Australia QLD

This questionnaire is an activity of the **FIG Working Group 3D Land Administration 2022-2026**. The purpose of the survey is to make a world-wide inventory of the status of 3D Land Administration Systems/ Cadastres at this moment (2022) and the plans/ expectations for the near future (2026).

This is the first time that the questionnaire 3D-Land Administration is conducted as a successor of the questionnaire on 3D-Cadastres that was conducted three times by the FIG working group on 3D-Cadastres. The first time was in 2010 to document the status in 2010 and expectations back then for 2014. This was followed by second questionnaire in 2014 (with status 2014 and expectations 2018) and the third one conducted in 2018 (status of 2018 and plans for 2022).

The earlier responses have been analysed and reported on [van Oosterom et al. 2011](#), [Karki 2013](#), [van Oosterom et al. 2014](#) and [Shnaidman et al., 2019](#). The results of the three earlier questionnaires are available via the participants pages of the 3D Land Administration Working Group website: <http://www.gdmc.nl/3DCadastres/participants/>.

The purpose of this survey is to make a **world-wide inventory of the status of 3D Land Administration** at the current moment and the plans/ expectations for the near future (2026). By sharing this information, it should be **possible to improve cooperation, learn from each other and support future developments**.

A few notes and suggestions, which shall be helpful when completing the questionnaire, are given below:

- The conceptual model used as background for the 3D Land Administration questionnaire is the **ISO 19152:2012 standard** (ISO, 2012), the **Land Administration Domain Model (LADM)**. A new edition of the LADM is **under further development in ISO/TC 211** and is being developed as multipart standard, comprised by the following parts: **Part 1** – Generic Conceptual Model; **Part 2** – Land Registration; **Part 3** – Marine Georegulation; **Part 4** – Valuation Information; **Part 5** – Spatial Plan Information and **Part 6** – Implementations.
- In this questionnaire the concept of 3D Land Administration with **3D parcels** (or 3D spatial units in LADM terminology) is intended in the **broadest possible sense**. However, what exactly is (or could be) a 3D parcel is dependent on the legal and organizational context of the specific country/ state/ province. Therefore, **3D parcels include land and water spaces, both above and below the earth's surface**.
- A more **formal definition**: A **3D parcel** is defined as *“the spatial unit against which (one or more) unique and homogeneous¹ rights (e.g. ownership right, lease or other land use right),*

¹ Homogenous means that the same combination of rights equally apply within the whole 3D spatial unit. Unique means that this is the largest spatial unit for which this is true. Making the unit any larger would result in the combination of rights not being homogenous. Making the unit smaller would result in at least 2 neighbour 3D parcels with the same combinations of rights (ISO19152:2012).

responsibilities or restrictions are associated to the whole entity, as included in a Land Administration system.”

- A **3D parcel is a ‘legal object’** describing a part of the space. Often there is a relationship with a real world/ physical object, which can also be described in 3D. Please be aware of the difference between these two types of objects and that the focus in the context of 3D Land Administration is on the spaces of the legal objects and not the registration of the physical objects as such.
- As the definition above is quite abstract, at the questions below, more specific and real-world examples are being used. Inspecting some of the completed 2010, 2014 and 2018 questionnaires from other countries might help when formulating the answers for your jurisdiction.
- If a certain question is not relevant or if you have no clue what to respond, do not spend any time on this (and leave the field blank).
- Similar to the earlier Questionnaires on 3D- Land Administration, the completed forms will be made available on website of FIG Working Group on 3D Land Administration.
- Please complete this questionnaire before 15 December 2022 and send it to E.Kalogianni@tudelft.nl (the word document completed, or the link with the google document completed) and state as email subject **“Completed FIG Questionnaire on 3D Land Administration 2022-2026 for xxx”** and at the “xxx” name the country.

The questionnaire has been prepared by Peter van Oosterom, Eftychia Kalogianni, Abdullah Kara, Rod Thompson, Sudarshan Karki, Anna Shnaidman, Alias Abdul Rahman, Hendrik Ploeger, Christiaan Lemmen. The questionnaire is grouped in various blocks. This has no meaning in the sense of priority, and it is often the case that a question could belong to multiple blocks. Please do not feel disturbed by this.

1. GENERAL/APPLICABLE 3D REAL-WORLD SITUATIONS

This part of the questionnaire refers to the **applicable 3D real-world situations to be registered by 3D parcels**. It also addressed the types of 3D geometries, which are considered to be valid 3D representations for these parcels.

Questions	Status 2022	Expectations 2026
1.1. Are all 3D parcels (3D spatial units in LADM terminology) constrained to be within one surface 2D parcel?	Primary tenure 3D parcels are initially created through excision from a base 2D parcel. Subdivision of a 2D parcel to create a 3D parcel results also in a 2D 'remainder' or balance parcel. 3D parcels may also be used to define secondary interests (i.e., sub-lease or easement). Secondary interests are always constrained to the extent of the primary tenure, whether they be defined by either 2D, or 3D parcels.	No change expected
1.2. Are 2D and/ or 3D ambulatory ² boundaries permitted?	Both 2D and 3D ambulatory boundaries are permitted. For example, the ambulatory boundary feature originating from a standard format (2D) lot, may be used as the basis for a curvilinear vertical plane for a volumetric (3D) lot boundary.	No change expected

² An ambulatory boundary is a boundary of a land parcel which follows the movements of a natural feature such as a river. Its position determined at points of time (when a survey is carried out), but between such "fixes", the definition of the property is the position of the real world natural feature.

1.3. Regarding the legal/ physical relation of 3D objects: (a) Is it allowed to have 3D parcels (spatial units) not related to physical constructs or objects? (e.g. airspace, subsurface volumes) (b) If 1.3.a positive: approximately what proportion of new 3D parcels (spatial units) would involve such cases (not related to physical object)?	(a) Yes, definition of a volumetric (3D) parcel can be fully enclosed by bounding surfaces which: • may be other than vertical or horizontal • must be capable of precise mathematical definition, i.e., local or • may exist above or below the ground surface. A volumetric parcel must be bounded in all dimensions. Creation of lots or leases with restrictions in either height or depth only is not permitted. However, easements with restrictions in either height or depth only will be accepted.	No change expected
1.4. Are disconnected parts of a single 3D parcel allowed?	Yes	Yes
1.5. Spatial limitations – e.g. the 3D parcel ‘must be’ related to a closed volume or is it allowed to have ‘open’ or unbounded 3D parcels (e.g. towards the sky)?	3D Lots must have closed volumes. It is also possible to have Lots restricted by horizontal planes, or with a single horizontal plane.	No change expected
1.6. Are curved surfaces to bound the 3D parcels allowed?	Yes, curved surfaces are allowed.	No change expected
1.7. Must the curved surfaces (if allowed) be cylindrical sections, or any other constraint?	Curved surfaces are not limited to cylindrical sections. The direction is a curved surfaces must be ‘capable of precise mathematical definition’ (<i>Registrars Directions for the Preparation of Plans 10.2.2</i>).	No change expected
1.8. Any other constraints – e.g. all surfaces must be horizontal or vertical?	Where volumetric lots are not bound by horizontal or vertical surfaces, the surface must be capable of mathematic definition.	No change expected

1.9. Is there legislation (law and/or regulations) for 3D descriptions of parcels? If so please, mention law and article(s).	<i>Body Corporate and Community Management Act 1997, Land Title Act 1994</i> section 48C & D and section 49C & D.	No change expected
1.10. Is the legal text available in original language? For example, professional or scientific papers/reports, which explain and justify the registration of 3D parcels.	English	No change expected
1.11. Is the legal text (relevant part) available in English translation at an official document?	n/a	n/a
1.12. Do you have example descriptions of typical 3D parcels; either 'prototype' or 'operational'?	Yes, there are operational examples. 3D parcels in the jurisdiction are referred to as either 'Volumetric' or 'Building Format' lots. Parcels are given a Lot on Plan description, a 'volumetric' plan format is used for volumetric lots, and a 'building' plan format is used for lots subdivided in strata (floors), and then by the individual units (walls).	No change expected
1.13. Is there a formal model for the 3D parcels (UML style); e.g., based on ISO TC211 series (especially LADM, ISO 19152)?	No	Yes
1.14. Are natural resources (groundwater, mining rights, geo-thermal extraction and storage) shown in your land administration? If yes, are they considered as 3D parcels (spatial units) with RRRs attached? What about mining concessions (could be limited in time)?	Yes, and no. Definitions of water resources etc, may have use permits/rights allocated that are not subject to 'parcel' based 2D or 3D mapping of the resource.	Yes, increasing

1.15. Are legally restricted spaces, above or below the earth's surface, such as polluted areas considered as 3D parcels?	No, they are considered a 2D parcel. 2D lots currently described as being limited "in strata", or only restricted in one direction, i.e., "to the depth of 10m" or "below 10m", are not considered volumetric (3D) parcels. These lots are referred to as "restricted". When subdivided, they continue to be qualified by the term "Restricted". "Restricted" lots are dealt with as though the lot was a standard (2D) format parcel.	No change expected
1.16. Are spatial plans considered as 3D parcels (so rights or restrictions are related to them)? Sometimes they are called 'spatial development plans', 'zoning plans' or 'physical plans' (land use, urban, regional, environmental, ...).	No	No change expected
1.17. Regarding the Marine Space: (a) Is there a Marine Cadastre established? And if so, are 3D parcels included in this registration? (b) Is the IHO Maritime Limits and Boundaries standard (S121) in use or under implementation? (c) Is there a Marine Spatial Plan established? And if so, are 3D marine parcels included in this registration?	Marine parcels can be created in both 2D and 3D representations in the land register. S121 is not implemented as part of land parcel register. There is no specific 'marine only' cadastre or register in this jurisdiction.	No change expected
1.18. Is there any organised legal instrument for the management of common property? For example, does the law, regulations or systems recognize/require a specific right type for common property?	Yes, a Body Corporate. The majority of Body Corporates are community title schemes registered under the <i>Body Corporate and Community Management Act 1997</i> .	No change expected
1.19. Which agency is responsible for the recording of titles information?	Titles Queensland manages the land and water title registers for the state of Queensland.	No change expected

1.20. Which agency is responsible for recording cadastral transactions?	Titles Queensland manages cadastral instruments affecting dealings in the land register. The Department of Resources administers other submitted surveying information, databases and maintenance of the State digital cadastre model.	No change expected
1.21. Are transactions for standard 2D lots and 3D lots done by the same agency or titles office?	Yes	Yes
1.22. Are there any 3D storage permissions recorded (e.g. underground storage of CO ₂)?	Not specifically, although a parcel could be reserved for any purpose.	No change expected
1.23 Has there been developed any country profile based on LADM ISO19152 ³ ? (a) Does it support 2D spatial units? (b) Does it support also 3D spatial units? (c) Is there any provision to include/ align with the new LADM developments of the second Edition of the standard (inclusion of valuation information, marine spaces, spatial plans, interoperability/ reuse of BIM/IFC, ..)?	No national based 'country profile' for Australia exists, although some Australian States have investigated LADM profile limited to their own jurisdiction.	No change expected
1.24. Any other geometric issues related to 3D parcels?	Nil	Nil

³ If yes, is it included at the index presented at the Table 1 of the publication Kalogianni et al. 2021? If it is included, are there any further developments/ publications related to it apart from those mentioned at the table? In case there are, could you please provide with a link of a relevant publication?

2. INFRASTRUCTURE/UTILITY NETWORKS

This refers to the situation where an **infrastructure network** is considered to be **defined within the land administration**. For example, in some jurisdictions, an underground network might be privately constructed for the purpose of leasing space in it for other organisations to run cabling. In this case, a network, or part of that network may be considered to be a real estate object.

Questions	Status 2022	Expectations 2026
2.1. Do you register utility networks as an entity in the land administration? (e.g. subterranean conduit networks)	Not as an entity but as individual spatial units, where tenure over parcel supports infrastructure i.e., utility easements.	No change expected
2.2. If so, then: (a) can the network structure be viewed graphically in the land administration? (b) can the network structure be traced in the database(s)? (c) are networks registered by means of a cadastral identifier (such as a 'parcel number')? (d) are RRRs and parties attached to these network objects? (e) in which format are usually the utility networks submitted for registration (i.e. CityGML Utility ADE, IFC, MUDDI, shp, ...)?	(a) Only in 2D, (b) yes, in part, (c) not entire network but individual spatial units (d) not entire network but individual spatial units (e) graphical survey plan, no standard format for digital information submission related to utilities.	Future land administration systems may facilitate better visualisation of infrastructure network information.
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	Yes – broad range of regulation affecting private networks.	No change expected
2.4. If so, are they registered as 3D property parcels (spatial units)?	Rarely, but may be registered as 3D spatial units	No change expected
2.5. Is the text of relevant laws or regulations (question 2.3) available in original language? If so, give references to relevant document(s).	English	No change expected
2.6. Is the text of laws and regulations (relevant part) available in English translation of an official document?	n/a	n/a
2.7. Do you have example descriptions of typical 3D parcels (spatial units) for networks; either 'prototype' or 'operational'?	Yes, operationally a 'lot on plan' description is used for individual spatial units. The digital cadastre does not record utility network	No change

	objects as a network.	
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	Represented in 2D within land administration systems (digital cadastre). Source documents (graphical survey plans) must be interpreted manually to determine the full extent.	Better 3D representation of objects in digital cadastre, allowing visualisation of intersecting or parallel 3D objects.
2.9. Any other geometric issues related to the registration of networks?	Nil	Nil

3. CONSTRUCTION/ BUILDING UNITS

This refers to 3D properties that are related to **constructions and apartment (condominium) buildings**. The individual units are often defined by the actual walls and structure of a building, rather than by metes and bounds, e.g. “unit 5 on level 6 of ... building”.

Questions	Status 2022	Expectations 2026
3.1. Do you register legal spaces for 3D construction/ building units (separate from the land)?	Yes	No change expected
3.2. If so, what are the conditions for doing so, and what are the most important types? E.g. apartment units (at least 2 or more in building), or also other buildings or even more general constructions (infra related; such as bridge, tunnel or even other, such as windmills, ...)	Generally, a building format plan must create common property and two or more building format lots. Most common uses are residential or commercial building units.	No change expected
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	<i>Yes, Body Corporate and Community Management Act 1997, Land Title Act 1994.</i>	No change expected
3.4. Is the legal text available in original language?	English	Yes
3.5. Is the legal text (relevant part) available in English translation at an official document?	Yes	Yes
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	Yes, operational	No change expected
3.7. Regarding the boundaries’ definition: (a) What would be typical 3D boundaries in an apartment complex: i) middle of the wall and floor/ceiling, ii) interior/ exterior of the wall or iii) walls, floor/ceiling as neutral/ shared 3D space? (b). Is it mentioned in any legislation or is it the convention?	(a) - (i) middle of the walls, floor and ceiling) & (b) this is mentioned in legislation i.e., Land Title Act 1994 section 49C.	No change expected
3.8. Is common property inside the building registered? If so, how?	Yes, Lot on plan with a title.	No change expected
3.9. Who owns the common property inside the building?	All lot owners, managed through body corporate.	No change expected
3.10. Who owns the land on which the	All lot owners, managed	No change expected

apartment is built?	through body corporate	
3.11. Do you allow sub-division of apartments or apartment blocks?	Yes	Yes
3.12. Can the land on which the building is built be sub-divided or sold or mortgaged without the consent of majority of the apartment owners?	No	No
3.13. What is the numbering convention for apartments (please specify in terms of cadastral parcel as well as street addressing)	Apartments are generally numbered consecutively from the first occupied level upwards. e.g. Apartment 201 (i.e. first apartment on level two); 17 Smith Street.	Geocoded addressing in future aspirational state
3.14. Are there any mandates ⁴ that set specifications on the delivery of design/ construction drawing of properties in BIM-based format, when registering new 3D parcels (from design)?	No	No change expected
3.15. Are there any operational or in prototype stage platforms. implementations that reuse BIM information from design as cadastral/ land administration input?	No	No change expected
3.16. Any other geometric issues?	Spatial cadastre captures base parcel, where captured building format lots shown as footprint	3D representation of building format parcels in spatial cadastre

⁴ That arise through legislation or from the procurement process.

4. COORDINATES

This refers to the use of **x, y coordinates** and the relevant issues.

Questions	Status 2022	Expectations 2026
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	No	No change expected
4.2. Are the cadastral database coordinates authoritative?	No	No change expected
4.3. If not, what is the authoritative source of X/Y coordinates?	Absolute coordinates are not used authoritatively for definition of land parcel boundaries.	No change expected
4.4. Do you have parcels defined by the walls of a building (with no recorded geometry)?	Yes, building format parcels use structural elements to define the parcel boundary.	No change expected
4.5. What is the spatial reference system for X/Y Coordinates? (Please , provide the EPSG)	GDA2020 (EPSG:1168)	No change expected
4.6. When owners receive or purchase a copy of the plan what can they see on the plan to help them identify their parcel/lot (e.g. bearings and distance, identifying corners or recovery marks, neighbouring lots, coordinates etc.)?	Diagram of subject lot with description, bearings and distances of parcel boundaries, identifying corners and recovery marks, adjoining lot information, etc.	No change expected
4.7. Have there been any changes, w.r.t. the spatial reference system, made in the way cadastral information is recorded and represented from a historical point of view?	Yes, change in units, legislative references, face of plan depictions etc.	Operational requirements updated over time.
4.8. Any other X/Y coordinate issues?	Nil	

5. REPRESENTATION OF 3rd DIMENSION: HEIGHT (OR DEPTH)

This section refers to the representation and registration of the **third dimension**.

Questions	Status 2022	Expectations 2026
5.1. Are the height values of 3D parcels relative to local ground?	Registration: extent of volumetric parcels may be defined with combination of polar dimensions and rectangular co-ordinates; and levels on the Australian Height Datum. Approximate ground levels are sometimes shown.	No change expected
5.2. Are height values reduced to a standard datum (absolute)? If so, what is the spatial reference system for this 3rd ordinate?	Where so, it is Australian Height Datum (AHD 71)	No change expected
5.3. In principle, is it possible to store both relative and absolute height/depth values?	Registration: possible in principle but does not occur in practice.	No change expected
5.4. Is the earth surface (elevation) explicitly stored (in the DCDB or other accessible register)?	Not in the DCDB. There are other state datasets for topographical data.	Future spatial cadastres will better facilitate presentation of (DCDB) land boundaries relative to terrain and other state datasets.
5.5. What is the source of height values for the 2D surface parcel?	None, bearings and horizontal distance at average local terrain height used to describe 2D parcels.	No change expected
5.6. How is elevation information recorded in the cadastral plan or database?	3D plan usually shows approximate relative height difference to ground points which is connected at a corner of the parcel to a height datum.	No change expected
5.7. Do you expect the elevation recorded in cadastral plans to be used for any other purpose (e.g. development of 3D city models or civil constructions etc.)?	3D geometries from volumetric parcels to be recorded in 3D city models / digital twins.	Yes, limited but increasingly advanced and widespread application.
5.8. Are there any 3D City Model/ Digital Twin developments carried out at a national or city level that can be used for orientation or reference purposes?	Yes, there are local State and nationally developed digital twin developments / pilot projects.	Digital twin type developments beginning to supersede predominately 2D based spatial cadastres.

5.9. Any other 3 rd dimension ordinate value issues?	Nil	
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6. TEMPORAL ISSUES (4th DIMENSION)

This section refers to the representation and registration of the **fourth dimension**.

Questions	Status 2022	Expectations 2026
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	Not part of the parcel description specifically, but tenure such as secondary interests (e.g., leases, permits) may have temporal aspects.	No change expected
6.2. Are moving parcels allowed?	It is possible to amend the boundaries of certain State tenures, reserves, leases for grazing and mining purposes etc, however a new lease is registered each time. Ambulatory (physical feature-based) boundaries may shift over time subject to the doctrine of accretion and erosion.	No change expected
6.3. Are there any limitations on the range of temporal limits? (e.g. only on 3D apartments).	No	No
6.4. Is there any attempt to integrate 3D space and temporal representations, into a single 4D space/time representation?	No	No
6.5. In the case of tidal boundaries, what happens to the 3D ambulatory parcel if the 2D land parcel changes extent due to the movement of High-water Mark?	The 3D parcel may ambulate (accrete or erode) along with movement of a related natural feature binding the 2D parcel subject to the doctrine of accretion and erosion.	No change expected
6.6. In case 3D Marine Cadastre is present and moving boundaries are allowed, how is this represented? e.g. using 4D geometry and topology.	Marine parcels are often created as secondary interests and have the same representation as other parcels.	No change expected
6.7. Can time bound rights be created and extinguished in the title? (e.g. temporary titles created for a period and when the time is up it can be extinguished)?	In Titles system. There are some examples of volumetric parcels created for a specific purpose or period such as during	No change expected

	construction.	
6.8. Is it possible to identify all the changes made by any operator to the cadastral plans or database and to rollback if there is an error made?	Yes, changes to cadastral plans are made by authorised persons and are fully documented, which triggers database update. Database tracking recognises operator and changes made are listed textually in another table, which can be rolled back. Some rollbacks need higher level authorisation.	No change expected
6.9. For Cadastral transactions, how far in time do buyers need to make a search to ensure the title or deed is legal?	The Torrens titling system is implemented, which alleviates the need for searching to prove title. The register is the authoritative record of ownership and other interests at any point in time.	No change expected
6.10. Are there object classes in the registration that require both real-world (or valid) times and database load (or system) times, i.e. bi-temporal support?	No	No change expected
6.11. Any other temporal issues?	Nil	Nil

7. RIGHTS, RESTRICTIONS AND RESPONSIBILITIES (RRRs)

This section refers to the **RRRs and their registration at the LA system**. At a vast majority of the countries, the restrictions and the responsibilities are not registered at the LAS.

Questions	Status 2022	Expectations 2026
7.1. Please provide the range of RRRs on 3D parcels. If there is an online depository, provide the link.	Volumetric parcels (3D) may have the same range of RRR as standard format (2D) parcels. Building format parcels incorporated into community title schemes with a mix of individual and shared ownership.	No change expected
7.2. Are there any limitations on the range of rights related to 3D spatial units? (e.g. subterranean parcels must be owned by Govt).	No	No
7.3. Are there any limitations on the range of restrictions or responsibilities related to 3D spatial units? (i.e. currently in use and related to 2D spatial units, but that would not be applicable to 3D).	No	No
7.4. Are there RRRs that are only allowed in 3D (and not valid for 2D)	No	No
7.5. Is there specific legislation (laws, regulations) defining 3D RRR types? If so, provide details, e.g. references to documents/ articles.	<i>Body Corporate and Community Management Act 1997, Land Title Act 1994, Land Act 1994.</i>	No change expected
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other than the person owning the land parcel?	Yes	Yes
7.7. What applications do you foresee for 3D land administration?	Spatial digital twins are promoting the development of more accurate visualisation of 3D land interests.	No change expected
7.8. Are the administrative source documents (source of RRRs) title or deed based?	Title based - (Torrens system).	No change expected
7.9 Who is responsible for the correctness of the specified 3D boundaries in spatial source	The land registry (government) is responsible for accuracy of the register.	No change expected

documents (which authority)?	Registered surveyors take individual responsibility for accuracy of their own plans of survey, which are the source instruments for the extent of an interest in the register.	
7.10. Is registration of 3D parcels done inside the cadastral mapping agency, the land registry or elsewhere?	In the land register, by Titles Queensland - the same as 2D.	No change expected
7.11. Are 3D registrations handled by the same organisation that handles traditional (2D) land administration?	In the land register, by Titles Queensland - the same as 2D.	No change expected
7.12. Do you supply paper-based titles or deeds or proof of ownership? If yes, does this contain depictions of the 2D or 3D parcel?	No	No change expected
7.13. Is the 3D registry separate or integrated with the 2D registry?	Integrated, the same register accommodates 2D (standard format lots) and 3D (building format and volumetric format lots).	No change expected
7.14. Any other RRR issues?	Nil	Nil

8. THE CADASTRAL DATABASE (Digital Cadastral Database - DCDB)

This section refers to the **structure and functionalities of the cadastral database**.

Questions	Status 2022	Expectations 2026
8.0. Is the database schema LADM based?	No	Compliant
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	As footprint of the geometry only.	As 3D objects
8.2. If so, how are they represented (in the DCDB)?	As a projection on the base 2D parcel (footprint).	As 3D objects
8.3. If so, how are they presented on cadastral “maps” (including screen presentations)?	Generally, as 2D objects (footprint). Some 3D representations in the spatial cadastre in pilot areas.	As 3D objects
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	No, volumetric parcel geometry is not possible. Only 2D projection is stored, but multi-level (strata) is possible.	No change expected
8.5. Is it possible to manage a 3D topological structure in the DCDB?	No, only cadastral boundaries. Topological information may be sourced from other datasets/layers.	No change expected
8.6. Are constraints/rules defined for valid 3D objects (closed volume, no overlap, no gap in 3D)? What about rules for a mix of 2D and 3D representations?	Fully enclosed by bounding surfaces, which may be other than vertical or horizontal. must be capable of a precise mathematical definition. May be above or below or partly above and partly below the surface of the ground. Validation is limited to manual checks.	Similar constraints, automated validation.
8.7. How can internal and external user query and visualize the 3D content supporting rotating, slicing, transparency, perspective (3D web/view service, 3D pdf documents, ..)?	Not really supported.	To be determined
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	Digital cadastral database is implemented using INGRES. 3D is currently not implemented.	To be determined

8.9. Do you have any validation rules for 3D representation in the database?	No	Yes
8.10. What (GIS/CAD) software is used for updating, editing, analysis, and visualization of the cadastral data? Any 3D capabilities included and used?	The DCDB maintenance environment is implemented using microstation. 3D capabilities not used.	The DCDB maintenance environment is implemented using ESRI parcel fabric.
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	Data viewer based on SVG, ARGIS API for javascript, various web services, Limited 3D available but not used.	ARCGIS API for Javascript. Various web services. To be determined.
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	Object oriented	Object oriented
8.13. How do you query 3D objects in your DCDB?	Only as 2D a representation.	To be determined
8.14. Is it possible to query neighbourhood parcels to a 3D object, vertically as well as horizontally?	Horizontal only	Yes
8.15. Any other DCDB issues?	Nil	Nil

9. PLANS OF SURVEY (INCLUDING FIELD SKETCHES)

This section poses questions about the data acquisition process and **cadastral survey plans**.

Questions	Status 2022	Expectations 2026
9.1. Do the survey plans carry 3D parcel representations?	Yes, they 3D parcels are represented through building format or volumetric format plans.	Similar, but working from graphical presentations toward digital encoding of the survey information.
9.2. If so, how are they represented?	Isometric views, vertical or horizontal planes, polar dimensions, and rectangular coordinates.	No change expected
9.3. Is there specific legislation (regulations) describing the requirements for Plans of Survey in 3D? This could cover: (a) accuracy/ quality, (b) 3D survey method, (c) conceptual information model survey plan, (d) portrayal rules for graphic representation, (e) format or encoding for submission. If so, please give link to the relevant documents.	Land Act 1994 (Qld), Land Title Act 1994 (Qld), Body Corporate and Community Management Act 1997 (Qld), Registrar of Titles Directions for the preparation of Plans, Cadastral Survey Requirements.	No change expected
9.4. Is sketch level allowed (low geometric quality, but in principle enough to indicate the 3D object)?	A sketch is allowed as additional information in addition to a building format plan.	No change expected
9.5. Is it possible to define a 3D parcel by referring to other 3D real world objects/ topography (and not specifying coordinates)?	Yes, for example the basis of a building/unit format plan. 3D parcel may be described by the physical building structure.	Yes
9.6. In what format are the 3D parcels submitted for registration; attached to legal document in a single pdf (which has good 3D capabilities) or in an extension of (city) GML for 3D parcels, or....?	As a graphical image (tif/pdf) submitted as a building format survey plan or volumetric format survey plan.	Digital, rather than graphical submission of survey information.
9.7. Are the 3D parcels somehow checked for spatial validity; e.g. volume is closed, does not overlap with neighbour volume (and also no unwanted 3D gaps)?	There may be a manual check of the parcel description on the plan.	Automated checks that will be supported by submission of digital survey information, or records.

9.8. Do you have examples of (prototype or production) 3D survey plans available?	Yes, production - building format and volumetric format plans have been in regular use for some time.	Yes
9.9. Are any reference objects visible on the survey plan (e.g. real buildings, roads, that is 3D topography)?	Yes, sometimes occupation is recorded. Occupation refers to physical structures.	Yes
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning, ...)?	Predominately terrestrial surveying, remote sensing may be used.	No change expected
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	CAD software: SurvaCad - AutoCad, LisCAD, Microstation. 3D capabilities are not often used.	Similar software is used to facilitate digital information submission.
9.12. Can 3D parcels be subdivided, consolidated or nullified?	Yes	Yes
9.13. Is there any existing technical circular or directive to assist Surveyors in 3D data collection in the field?	Yes, the <i>Registrar of Titles Directions for the Preparation of Plans</i>	Yes
9.14. Are the surveyors required to undertake a field survey for 3D cadastral data?	Yes	No change expected
9.15. Are building construction plans used to compile 3D cadastral information for apartments?	No, cadastral information for apartments must be measured / checked by field survey.	No change expected
9.16. Is 2D/3D field survey done by private licensed surveyors or by government surveyors?	Predominately private surveyors, although surveyors employed by government also perform 2D and 3D surveys of State land.	No change expected
9.17. Are plans of survey created for each new 2D/3D parcel or are they updated in an index map or a cadastral database.	A plan of survey is created for each new 2D or 3D parcel. The exception is a limited number of secondary interests that may be created with an administrative plan or sketch instead of plan of survey.	No change expected
9.18. Do you show dimensions or isometric views of 3D parcels on survey plans (do you also store this in a database)	Both dimensions and isometric views are shown on the survey plan. Currently, this information is not uniformly stored in the	Digital submission of surveying information will facilitate capture of 3D parcels in cadastral databases.

	digital cadastre database. The plan is stored as a graphical image with the land registry.	
9.19. Do the cadastral survey plans differentiate between different types (e.g. volumetric plans, building plans and standard 2D plans)?	Yes, there are three main types of plans: Standard format, Building format and Volumetric format.	No change expected
9.20. What are the usual elements shown on the plan (e.g. North Arrow, Marks table, Observation table, Administrative data, Plan face and dimensions etc.?)	North Arrow, Reference marks and Permanent marks table, Plan face with bearings and distance between numbered stations, Surveyor information, Plan number, Created and destroyed Parcel numbers, Scale, Administrative and locality information, previous title and any secondary interests etc.	No change expected
9.21. Are authoritative cadastral surveys carried out by government surveyors or private licensed surveyors or both?	Both, surveys are carried out by licenced surveyors. Private or government employed surveys are subject to the same registration requirements for performing cadastral surveys. Individual surveyor bears responsibility for the accuracy of surveys carried out.	No change expected
9.22. What is the legal description of a cadastral boundary (e.g. coordinates or bearing and distance or lines on plan or any other)?	Generally, bearings and distances describing each boundary line, relative to reference marks placed on the ground.	No change expected
9.23. How much time does it usually take for a subdivision process to complete?	At least 3-6 months in very simple cases because process includes approval and construction of supporting infrastructure for each lot.	Development timeframes reducing over time.
9.24. What is the legal source for cadastral representation (e.g. cadastral plans, or DCDB or index plans or descriptive sketch/text	Cadastral plans, the legal source of a parcel associated with an interest in land may is the Deed of Grant, along	A plan of survey remains the source instrument for cadastral boundary descriptions, whether it be

etc.?)	with any contemporaneous survey plan and subsequent plans of subdivision of the land.	represented graphically, or in a digital information submission.
9.25. What is the positional accuracy of the cadastral plans (e.g. boundaries may be accurate but may not be referenced in datum properly)?	Cadastral plans have low survey uncertainty (they are very accurate relative to local boundary reference marks) but variable levels of positional uncertainty (absolute accuracy relative to datum).	Increasing requirements for connection to datum (increased positional accuracy) .
9.26. Any other survey plan issues?	Nil	Nil

10. DISSEMINATION OF 3D LAND ADMINISTRATION INFORMATION

This section refers to the **dissemination of 3D LA-related information** and the advances in this domain.

Questions	Status 2022	Expectations 2026
10.1. Is there a general-purpose web-based dissemination of 2D cadastral (graphical or text) information (e.g. a portal for the public or for professionals)? If yes, please provide the link and refer it includes 3D data?	Yes, digital cadastre presented by Queensland Globe https://qldglobe.information.qld.gov.au/ , or as a dataset from https://qldspatial.information.qld.gov.au/ - generally 2D information. Survey plan information available through search of titles register or by third party resellers using external web-services – 2D & 3D graphical survey plans available.	No change expected
10.2. Are there specific file formats or standards used to distribute 3D LA/ Cadastral information? (e.g. LandXML, CityGML, BIM/IFC, 3D pdf,...)	3D parcel data is not distributed digitally. However, copies (tif, pdf) of graphical plan images (2D or 3D) are available from the land register.	To be determined. Interjurisdictional (ICSM) working group underway to develop a new digital cadastral data model standard.
10.3. Are there specific cartographic styling rules for representing 3D cadastral plans, or to represent 3D cadastral objects on 2D cadastral maps?	Yes	Yes
10.4. Are there specific cartographic styling rules for 3D cadastral maps (models; e.g. as disseminated in 3D pdf)? If yes, are there 3D specific cartographic rules developed or being developed?	Yes	Yes
10.5. Is the 3D Cadastral information accessible in integrated manner with the 2D Cadastral information?	Yes	Yes
10.6. Are there specific symbols on the 2D cadastral map (paper,	Yes	Yes

digital or web-based) indicating the presence of 3D Cadastral objects (and in web-context perhaps even linked)?		
10.7. Is the legal information (RRRs and Parties) available in integrated manner in dissemination portal with the 3D Cadastral objects? (even if source of legal data may be a different organization, but then use information infrastructure approach)	Yes	Yes
10.8. Are 2D/3D cadastral data available to the general public or just to the relevant parties?	Yes, survey plan and state-wide digital cadastre information is available to the public. DCDB information is freely available while survey plan information is available for a fee (search of title register).	Yes
10.9. Any other 3D cadastral information dissemination issues?	Nil	Nil

11. STATISTICAL INFORMATION

This part of the questionnaire refers to **statistical information** (and is most relevant for jurisdictions with parts of 3D Cadastre registration operational, but all are encouraged to complete this section, and especially the expectations for 2022).

Questions	Status 2018	Expectations 2022
11.1. What is the smallest 2D and 3D parcel that is present/ allowed to be registered in the land administration?	No statutory lower limit.	No change expected
11.2. What is the largest 2D and 3D parcel that is present allowed to be registered in the land administration?	No statutory maximum limit.	No change expected
11.3. What is the typical (or average) size of 2D and 3D parcels which are registered in the land administration? Subdivide by nature of 3D parcel when relevant (e.g. related to building, apartment, airspace, tunnel,...)	Approximate average sizes = Volumetric Format (3D): 24, 500 m ² Building format (3D): 117 m ² Standard Format (2D Base): 745,000 m ² (Although more than 80 % are ≤ 10,000m ²),	No significant change expected
11.4. How many 2D and 3D parcels do you currently have in your land administration?	Volumetric Format (3D): 3,069 Building Format (3D): 274,095 Standard Format (2D Base): 2,252,878 (Statistics do not include secondary interest parcels, or common property parcels).	Number of 3D parcels continue to increase over time due to high-density development.
11.5. Which year did you start registering 3D parcels in the land administration?	1998 for registration of volumetric lots. 1980 for registration of building format lots.	No change expected
11.6. What is the ratio of 3D parcels in rural vs. urban areas?	>90 % within urban areas (approximate by number).	No change expected
11.7. Please specify names of cities or towns or suburbs or regions or locations where there are significant numbers of 3D parcels.	Brisbane and surrounding localities, Gold Coast, Sunshine Coast.	Similar trends for increased use of Volumetric Format and Building Format lots for infrastructure and regional areas subject to dense urban re-development.

11.8. Please provide the following data: (a) Size of jurisdiction in square kilometres (b) Current number of 2D parcels (c) Current number of 3D parcels (d) Current population	a) 1 730 648 km² b) 2,252,878 (Standard Format) 2D parcels c) 3 069 (Volumetric) + 274 095 (Building Format) 3D parcels. d) Estimated resident population was 5,296,098 at 31 March 2022 (ABS publication - Australian Demographic Statistics)	Increasing over time due to high density development.
11.9. Approximately what are the proportions of various types of the 3D parcels (related to apartments, subsurface parking, subsurface shopping centres, bridges, tunnels, airspace, utility networks, etc)?	This information is not explicitly available; but generally Building Format parcels are used for apartment buildings along with mixed commercial use. Volumetric parcels are used for (a) infrastructure (transport, tunnels etc), (b) staged or layered subdivision of land in complex mixed-use development (land is first divided into volumetric lots, to encapsulate various parts of buildings etc. which are the subject building format subdivision (a community management scheme is established within the different volumes), (c) mining tenures) and (d) to encapsulate overhanging structures (i.e. a permit to occupy for an awning, balcony or signage encroaching onto the adjoining road).	No significant change expected

11.10. Approximately what surface area of the jurisdiction is affected by 3D parcels (the total area of all the footprint of all 3D parcels).	The surface area of the jurisdiction affected by 3D parcels is not available. A simple approximation of the total area of the footprint of all 3D parcels (by type) is = Volumetric Format (3D): 75, 104,000 m² Building Format (3D): 32,079,000 m².	n/a
11.11. Any other interesting statistical fact(s)?	Building Format parcels tend to be more limited in size. The size of Volumetric Format parcels varies greatly and is dependent on purpose. The average size of volumetric lots is skewed by a small number of very large lots.	n/a

12. REFLECTION

This section is only relevant in case also one of the previous questionnaires for your jurisdiction (2010, 2014 and/ or 2018) was completed (otherwise skip this section).

Statements	Remarks
12.1. Compared to the 2010, 2014, 2018 and 2022 expectations, which 3D land administration developments did go faster than expected?	None
12.2. Same question, but now, which developments did go slower than expected?	Modernisation of land administration systems and processes.
12.3. If some (limited) form of 3D Land administration functionality has become available, what are the observed benefits? And for who?	n/a
12.4. What are the (top 3) challenges of issues to be addressed to realize further 3D Land administration progress?	Digital submission of surveying information.
12.5. In case of not, yet, fully operational status, were there any 3D LA/ Cadastre registration pilots to take steps towards a more complete implementation?	There have been pilot projects on themes such as digital submission of surveying information, digital cadastre modernisation and Digital Twin.
12.6. In case of known legal barriers, have there been made progress in creating and adopting new legislation to support 3D land administration?	Legislative support for registration of 3D spatial interests has existed for some time.
12.7. Any other reflections?	n/a

13. OTHER ISSUES

At this section, please include any other issues that may be of interest in an international context (for example, in some foreign jurisdictions 3D parcels can only be separated by horizontal planes).

Contact Details & other issues	Remarks
13.1. Country (State, Province)	Australia, Queensland
13.2. Name	Ben Cowie
Function/ Position	Principal Policy Officer
Organization	Queensland Department of Resources
13.3. Contact details:	
Address	
Email	Benjamin.cowie@resources.qld.gov.au
Telephone	
13.4. Other issues	

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