

Questionnaire 3D-Cadastres: status September 2014 Australia, Victoria



This questionnaire is an activity of the FIG working group 3D-Cadastres 2014-2018. The purpose of the survey is to make a world-wide inventory of the status of 3D-Cadastres at this moment and the plans/expectations for the near future (2018). By sharing this information, it should be possible to improve cooperation, learn from each other and support future developments. This is the second time that the questionnaire on 3D-Cadastres is conducted by the FIG working group on 3D-Cadastres. The first time was in 2010 in order to document the status in 2010 and expectations back then for 2014. The responses have been analysed (van Oosterom et al. 2011, Karki 2013). For more information on the FIG working group on 3D-Cadastres see the website www.gdmc.nl/3DCadastres. Now a few notes and suggestions, which should be helpful when completing the questionnaire:

- The conceptual model used as background for the 3D Cadastres questionnaire is the ISO 19152 standard (ISO, 2012): the Land Administration Domain Model (LADM).
- In this questionnaire the concept of 3D-Cadastres 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 in the specific country (state, province). 3D parcels include land and water spaces, both above and below 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), responsibilities or restrictions are associated to the whole entity, as included in a Land Administration system.
- As the definition above is quite abstract, it is tried in the questions to be more specific and real world situations are used. Many examples with partial/preliminary answers from 2010 are available on-line at <http://www.gdmc.nl/3DCadastres/participants/>. Inspecting some of the completed 2010 questionnaires from different other countries might help when formulation the answers for your jurisdiction.
- 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-Cadastres is on spaces of the legal objects and not the registration of the physical objects as such.
- 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).
- The questionnaire has been prepared by a mixed Australian (Rod Thompson/Sudarshan Karki)/Dutch (Jantien Stoter/Hendrik Ploeger/Christiaan Lemmen/Peter van Oosterom) team. The questionnaire is grouped in the number of 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.
- Similar to the Questionnaire 3D-Cadastres, the completed forms will be made available on website of FIG working group on 3D Cadastres.
- Please complete this questionnaire before *1 October 2014* and send it to P.J.M.vanOosterom@tudelft.nl (or Peter van Oosterom, TU Delft, OTB, P.O. Box 5030, 2600 GA Delft, The Netherlands).

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.

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.

	Status 2014	Expectations 2018
1.1. Are all 3D parcels (3D spatial units in LADM terminology) constrained to be within one surface 2D parcel?	In the context of a survey plan, the answer is NO. Plans can represent apartments with steps inside. In this case, it is a 3D parcel on two different levels (heights). This situation is represented using cross sections in the survey plan but will not appear on the DCDB. In the context of the DCDB, the answer is NO, We have limited representation of 3D parcels in a layered fashion in our DCDB. Most typical examples are registered tunnels and bridges that are modelled as separate layers on different levels in the DCDB.	There would be no change.
1.2. Are 2D and/or 3D ambulatory ² boundaries permitted?	Yes. There are many boundaries which have natural boundaries.	There would be no change.
1.3.a. Is it allowed to have 3D parcels (spatial units) not related to physical constructs or objects? (e.g. airspace, subsurface volumes)	Yes.	There would be no change.
1.3.b. If 1.3.a positive: approximately what proportion of new 3D parcels (spatial units) would involve such cases (not related to physical object)?	Minority, we cannot quantify them at this stage.	-
1.4. Are disconnected parts of a single 3D parcel allowed?	Yes, car park dwellings are typical examples.	There would be no change.
1.5. Spatial limitation – e.g. must the 3D parcel be related to a closed volume or is it allowed to have ‘open’ or unbounded 3D parcels (e.g. towards the sky).?	It is allowed to have unbounded 3D parcels.	There would be no change.
1.6. Are curved surfaces to bound	Yes.	There would be no change.

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.

the 3D parcels allowed?		
1.7. Must the curved surfaces (if allowed) be cylindrical sections, or any other constraint?	No.	There would be no change.
1.8. Any other constraints – e.g. all surfaces must be horizontal or vertical?	No.	There would be no change.
1.9. Is there legislation (law and/or regulations) for 3D descriptions of parcels? If so please, mention law and article(s).	• Transfer of Land Act • Schedule 2 subdivision Act • Subdivision (Registrar's Requirements) Regulations 2011	There would be no change.
1.10. Is the legal text available in original language?	Yes.	There would be no change.
1.11. Is the legal text (relevant part) available in English translation?	All legislation is in English.	There would be no change.
1.12. Do you have example descriptions of typical 3D parcels; either 'prototype' or 'operational'?	2D diagrams using cross sections	There would be no change.
1.13. Is there a formal model for the 3D parcels (UML style); e.g. based on ISO TC211 series (especially LADM, ISO 19152)?	ePlan has a data model and supports simple 3D objects, but not complex shapes. www.icsm.gov.au/ePlan	Under investigation.
1.14. Are natural resources (groundwater, mining rights) shown in your land administration? If yes, are they considered as 3D parcels (spatial units) with RRRs attached?	Yes. Upon alienation. Crown grant contains conditions.	There would be no change.
1.15. Are legally restricted spaces, above or below, such as polluted areas considered as 3D parcels?	Not sure what the meaning of this sentence is.	Not sure what the meaning of this sentence is.
1.16. Are spatial plans considered as 3D parcels (as rights or restrictions are related to them)? Sometimes also called spatial development plans, zoning plans or physical plans (land use, urban, regional, environmental,...)	No.	There would be no change.
1.17. Any other geometric issues related to 3D parcels?	• Unbounded volumes • Filling space with common property. Walls sometimes are common property, but we are not able to show them completely due to the complexity.	-

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.

	Status 2014	Expectations 2018
2.1. Do you register networks as an entity in the land administration? (e.g. subterranean conduit networks)	We usually identify them as easements or common property inside the parcel.	There would be no change.
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?	(a) Easements can be viewed graphically. But not in common property and when easements are implied. (b) some of them (c) in ePlan yes. In general we identify easements with a unique ID. (d) No.	Not sure.
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	Yes. (Water, Energy, etc.)	There would be no change.
2.4. If so, are they registered as 3D property parcels (spatial units)?	No.	There would be no change.
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).	Yes, they have their own Acts.	There would be no change.
2.6. Is the text of laws and regulations (relevant part) available in English translation?	Yes.	There would be no change.
2.7. Do you have example descriptions of typical 3D parcels (spatial units) for networks; either 'prototype' or 'operational'?	The DCDB does not record network objects	There would be no change.
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	They need to graphically show on plans.	There would be no change.
2.9. Any other geometric issues related to the registration of networks?	-	-

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”.

	Status 2014	Expectations 2018
3.1. Do you register 3D construction/building units?	Yes.	There would be no change.
3.2. If so, what are the most important types? E.g. apartment units, or also other buildings or even more general constructions (infra related; such as bridge, tunnel or even other, such as windmills,..)	Apartment buildings. Bridges, tunnels	There would be no change.
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	Subdivision Act 1988 Transfer of Land Act 1958	There would be no change.
3.4. Is the legal text available in original language?	Yes.	There would be no change.
3.5. Is the legal text (relevant part) available in English translation?	Yes.	There would be no change.
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	• Stratum Plans (1950-1967) • Strata Plans (1967-1988) • Subdivision Act (1988-present)	There would be no change.
3.7. What would be typical 3D boundaries in an apartment complex: middle of the wall and floor/ceiling, or walls, floors/ceiling as neutral/shared 3D space? Is it mentioned in any legislation or is it the convention?	Typically the units are defined by unit boundaries. Boundaries can be interior, median, exterior or in some other locations as set out in the Subdivision (Registrar's Requirements) Regulations 2011, Regulation 10(3).	There would be no change.
3.8. Is common property inside the building registered? If so, how?	Yes, common property is defined as a parcel.	There would be no change.
3.9. Who owns the common property inside the building?	Relevant Owner Corporations	There would be no change.
3.10. Who owns the land on which the apartment is built?	It depends how it has been registered.	There would be no change.
3.11. Do you allow sub-division of apartments or apartment blocks?	Yes.	There would be no change.
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?	Usually not, but in unique circumstances as long as it meets legislative requirements yes.	There would be no change.

3.13. What is the numbering convention for apartments (please specify in terms of cadastral parcel as well as street addressing)	There is a numbering convention for Australia. States and Territories should be complying with the standard AZ/NZS 4819:2011 Rural and urban addressing which allocates hotel style addressing for apartments. The Guidelines for Geographic Names 2010 Version 2 also cover basic addressing here in Victoria.	There would be no change.
3.14. Any other geometric issues?	-	-

4. X/Y Coordinates

	Status 2014	Expectations 2018
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	No. parcels are defined by bearing and distances, or structures, or natural boundaries. Surveyors need to connect their measurements to MGA (Map Grid of Australia). Survey marks are used with their coordinates. However, measurements are only bearing and distances.	There would be no change.
4.2. Are the cadastral database coordinates authoritative?	No. The reference marks are only authoritative.	There would be no change.
4.3. If not, what is the authoritative source of X/Y coordinates?	Redefinition from the survey plans	Redefinition from the survey plans
4.4. Do you have parcels defined by the walls of a building (with no recorded geometry)?	Yes, building subdivisions	Yes, building subdivisions
4.5. What is the spatial reference system for X/Y Coordinates?	MGA 94 Zone 54,55	There would be no change.
4.6. Any other X/Y coordinate issues?	-	-

5. Z Coordinates/height representation

	Status 2014	Expectations 2018
5.1. Are the Z coordinates of 3D parcels relative to local ground?	Yes. We can have a parcel defined by height (e.g. car park and its height). However, the based height for control points are AHD (Australian Height Datum).	There would be no change.
5.2. Are Z coordinates reduced to a standard datum (absolute)? If so, what is the spatial reference system for the Z coordinate?	Yes, AHD.	There would be no change.
5.3. In principle possible to store both relative and absolute Z coordinate?	Yes.	There would be no change.
5.4. Is the earth surface (height) explicitly stored (in the DCDB or other accessible register)?	No.	There would be no change.
5.5. What is the source of elevation for the 2D surface parcel?	Not recorded.	There would be no change.
5.6. Any other Z coordinate issues?	-	-

6. Temporal Issues

	Status 2014	Expectations 2018
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	Yes. Easements can be defined with time limits (very rare). All crown land leases are for specific time period.	There would be no change.
6.2. Are moving parcels allowed?	No.	There would be no change.
6.3. Are there any limitations on the range of temporal limits? (e.g. only on 3D apartments).	N/A	There would be no change.
6.4. Are there any attempt to integrate 3D space and temporal representations, into a single 4D space/time representation?	No.	There would be no change.
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?	All ambulatory boundaries change in accordance with the movements. Doctrine of accretion and erosion -slow and imperceptible	There would be no change.
6.6. Any other temporal issues?	Possessory rights	-

7. Rights, Restrictions and Responsibilities

	Status 2014	Expectations 2018
7.1. Range of RRR on 3D parcels.	Same as 2D parcels.	There would be no change.
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.	There would be no change.
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.	There would be no change.
7.4. Are there RRRs that are only allowed in 3D (and not valid for 2D)	No.	There would be no change.
7.5. Is there specific legislation (laws, regulations) defining 3D RRR types? If so, provide details, e.g. references to documents/ articles.	Marine Act Utility Acts Subdivision Act Transfer of Land Act	There would be no change.
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other than the person owning the land parcel?	Yes.	There would be no change.
7.7. What applications do you foresee for 3D land administration?	Managing 3D RRRs Urban planning Easy conveyancing Plan examination Asset relationship to strata	There would be no change.
7.8. Are the administrative source documents (source of RRRs) title or deed based?	Folio of the register.	There would be no change.
7.9 Who is responsible for the correctness of the specified 3D boundaries in spatial source documents (which authority)?	Land Registry in Victoria (Land Victoria)	There would be no change.
7.10. Is registration of 3D parcels done inside the cadastral mapping agency, the land registry or elsewhere?	Land Registry	There would be no change.
7.11. Are 3D registrations handled by the same organisation that handles traditional (2D) land administration?	Yes.	There would be no change.
7.12. Do you supply paper-based titles or deeds or proof of ownership? If yes, does this contain	Paper-based titles. Electronic folio contains reference to diagram source for parcel.	There would be no change.

depictions of the 2D or 3D parcel?		
7.13. Any other RRR issues?	-	-

8. DCDB (The Cadastral Database)

	Status 2014	Expectations 2018
8.0. Is database schema LADM based?	No	There would be no change.
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	Yes, in limited circumstances, tunnel, bridges ...	Under investigation.
8.2. If so, how are they represented (in the DCDB)?	Layered.	Under investigation.
8.3. If so, how are they presented on cadastral “maps” (including screen presentations)?	Layered in the GIS which is indexed to survey plans with cross sections.	Under investigation.
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	No.	There would be no change.
8.5. Is it possible to manage a 3D topological structure in the DCDB?	No.	There would be no change.
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?	No.	There would be no change.
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,...)?	Nothing.	Under investigation.
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	Oracle spatial.	There would be no change.
8.9. Do you have any validation rules for 3D representation in the database?	No.	There would be no change.
8.10. What (GIS/CAD) software is used for updating, editing, analysis, and visualization of the cadastral data? Any 3D capabilities included and used?	Internal web services and applications for visualisation and validation, but not in 3D. LISCAD, LAASI, LASSI-SPEAR, GeoCivil.	Under investigation.
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	LASSI, LASSI-SPEAR, SPEAR. Not any 3D capabilities.	Under investigation.
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	Multilayer.	Under investigation.
8.13. How do you query 3D objects in your DCDB?	There are no 3D objects in DCDB to query them.	There would be no change.
8.14. Is it possible to query	Query on layers that are	There would be no change.

neighbourhood parcels to a 3D object, vertically as well as horizontally?	indexed to plans.	
8.15. Any other DCDB issues?	-	Supporting 3D primitive objects and required 3D analysis and validation. We started forming a 3D Working Party (WP) in Victoria to investigate 3D cadastral aspects. The questions of this Section will be discussed in this WP. The members of the 3D WP are from two universities, the land registry (Land Victoria), and Melbourne City council.

9. Plans of Survey (including field sketches)

	Status 2014	Expectations 2018
9.1. Do the survey plans carry 3D parcel representations?	Yes, by 2D plans with cross sections.	There would be no change.
9.2. If so, how are they represented?	As cross-section diagrams on 2D plans.	There would be no change.
9.3. Is there specific legislation (regulations) describing the requirements for Plans of Survey in 3D? If so, please give link to the relevant documents.	Yes. Subdivision (Registrar regulations) Registrar 2011	There would be no change.
9.4. Is sketch level allowed (low geometric quality, but in principle enough to indicate the 3D object)?	Yes. Basic representation through cross-section. But all boundaries must be defined.	There would be no change.
9.5. Is it possible to define a 3D parcel by referring to other 3D real world objects/ topography (and not specifying coordinates)?	Yes. Referring to walls, floors, ceiling, etc above and below ground level.	There would be no change.
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....?	3D parcels are submitted in paper, 2D PDF, or LandXML with no 3D capabilities.	Not sure. We may not have any paper based submission.
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)?	No. Usually a visual check overlaps on cross sections and plans in 2D.	Under investigation.
9.8. Do you have examples of (prototype or production) 3D survey plans available?	Yes. Building subdivision plans.	Under investigation.
9.9. Are any reference objects visible on the survey plan (e.g. real buildings, roads, that is 3D topography)?	Yes. Roads, buildings, lifts, balconies, stairs, etc.	There would be no change.
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning,...)?	There is no 3D acquisition.	Under investigation.
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	AutoCAD Microstation Liscad GeoCivil No 3D capabilities are used.	Not sure about vendors.
9.12. Can 3D parcels be subdivided, consolidated or nullified?	Yes.	There would be no change.

9.13. Is there any existing technical circular or directive to assist Surveyors in 3D data collection in the field?	Yes. Building subdivision guidelines.	Under investigation.
9.14. Are the surveyors required to undertake a field survey for 3D cadastral data?	We do not collect 3D data for cadastre.	There would be no change.
9.15. Are building construction plans used to compile 3D cadastral information for apartments?	Yes.	There would be no change.
9.16. Is 2D/3D field survey done by private licensed surveyors or by government surveyors?	Private licensed surveyors	There would be no change.
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.	Both. Plans are created and index map is updated. Survey only for original title.	There would be no change.
9.18. Do you show dimensions or isometric views of 3D parcels on survey plans (do you also store this in a database)	Yes in 2D plans and not in field notes.	There would be no change.
9.19. Any other survey plan issues?	-	Back capturing (digitising) the plans and converting them to LandXML format.

10. Dissemination of 3D Cadastral information

	Status 2014	Expectations 2018
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, does it include 3D data?	LASSI, LASSI-SPEAR. No 3D capabilities.	Under investigation.
10.2. Are specific file formats or standards used to distribute 3D Cadastral information? (e.g. LandXML, CityGML, BIM/IFC, 3D pdf,...)	LandXML but not supporting 3D information.	Under investigation.
10.3. Are there specific cartographic styling rules for representing 3D cadastral plans, or to represent 3D cadastral objects on 2D cadastral maps?	Yes. Surveying handbook has defined some styling rules for preparing 2D plans. -Building subdivision guidelines (on line).	Under investigation.
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?	No.	Under investigation.
10.5. Is the 3D Cadastral information accessible in integrated manner with the 2D Cadastral information?	No.	Under investigation.
10.6. Are there specific symbols on the 2D cadastral map (paper, digital or web-based) indicating the presence of 3D Cadastral objects (and in web-context perhaps even linked)?	Lot numbers are presented for individual parcels on LASSI.	Links might be available.
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)	No. Folio search	Not sure.
10.8. Are 2D/3D cadastral data available to the general public or just to the relevant parties?	2D data is available to general public.	There would be no change.
10.9. Any other 3D cadastral information dissemination issues?	-	Proper methods of 3D visualisation might be required.

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 2018).

	Status 2014	Expectations 2018
11.1. What is the smallest 2D and 3D parcel that is present/ allowed to be registered in the land administration?	1cm X 1cm X 1cm	There would be no change.
11.2. What is the largest 2D and 3D parcel that is present allowed to be registered in the land administration?	No practical limit.	There would be no change.
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,...)	Varies significantly. Between 40 to 60 square meter would be average.	There would be no change.
11.4. How many 2D and 3D parcels do you currently have in your land administration?	Near 5 million.	More than 5 million.
11.5. Which year did you start registering 3D parcels in the land administration?	1950s	1950s
11.6. What is the ratio of 3D parcels in rural vs. urban areas?	More in urban areas.	There would be no change.
11.7. Please specify names of cities or towns or suburbs or regions or locations where there are significant numbers of 3D parcels.	Melbourne metropolitan area, Geelong	There would be no change.
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) 227,416 km ² (b) ~3,122,000 (the number of land parcels) (c) ~435,000 (strata parcels) (d) 5,821,300	(a) 227,416 km ² (b) - (c) - (d) ~ 6,400,000
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)?	-	-
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).	Quite low though.	-

11.11. Any other interesting statistical fact(s)?	-	-
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12. Reflection

This section is only relevant in case also in 2010 the 3D cadastres questionnaire for your jurisdictions was completed (otherwise skip this section).

	Remarks
12.1. Compared to the 2010 expectations, which 3D land administration developments did go faster than expected?	-
12.2. Same question, but now, which developments did go slower than expected?	-
12.3. If some (limited) form of 3D Land administration functionality has become available, what are the observed benefits? And for who?	-
12.4. What are the (top-3) challenges of issues to be addressed to realize further 3D Land administration progress?	3D data acquisition, 3D data visualisation, 3D data maintenance.
12.5. Any other reflections?	-

13. Other Issues

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.

	Remarks
13.1. Country (State, Province)	Victoria, Australia
13.2. Your name, function/position and your organization	• Davood Shojaei (ePlan Project officer, Department of Transport, Planning and Local Infrastructure) • Hamed Olfat (ePlan Coordinator, Department of Transport, Planning and Local Infrastructure) • Jason Matthews (Specialist Plan Registration Officer, Department of Transport, Planning and Local Infrastructure) • Neil Coupar, (Branch Manager Subdivision, Department of Transport, Planning and Local Infrastructure)
13.3. Contact details: address email, telephone	davood.shojaei@dtpli.vic.gov.au hamed.olfat@dtpli.vic.gov.au jason.matthews@dtpli.vic.gov.au neil.coupar@dtpli.vic.gov.au Level 23 , 570 Bourke St , Melbourne , Victoria 3000, Australia
13.4. Other issues	-

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