



A concept of a model approach to the 3D cadastre in Poland – technical and legal aspects

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A concept of a model approach to the 3D cadastre in Poland

*It is a main result of researches done during preparation of the postdoctoral lecturing qualification thesis (D.Sc. thesis) titled:
„A concept of a model approach to the 3D cadastre in Poland”.*

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further author's research works

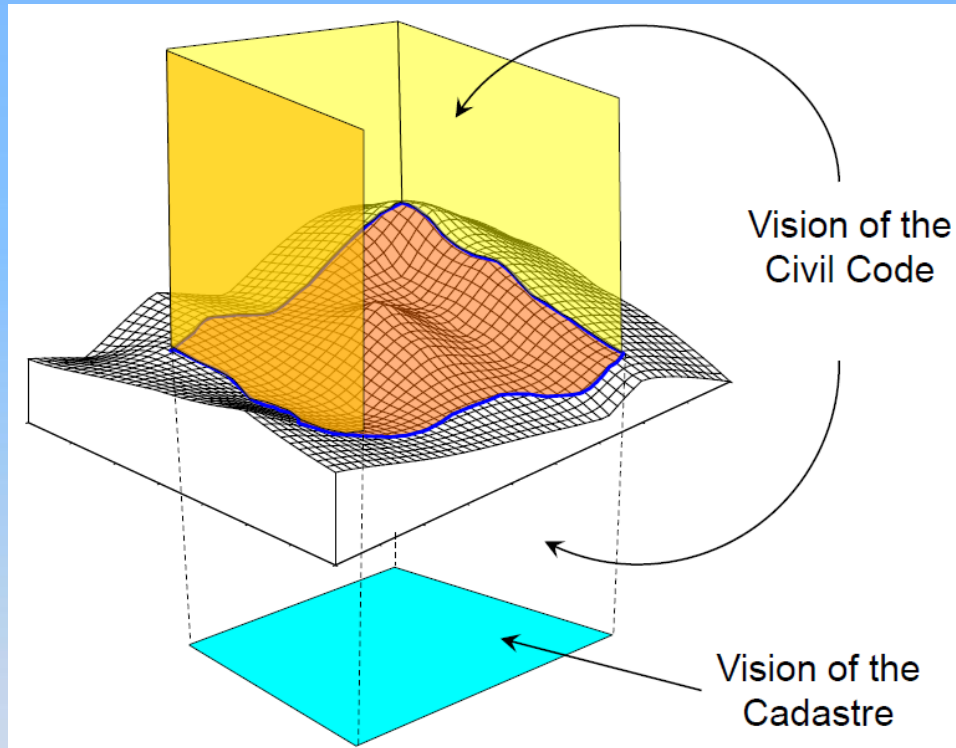
Polish cadaster – registered objects

In Poland cadastral system is 2D based system. System is using 2D parcels in order to register rights to the land and another objects.

According to the cadastral law in polish cadastral system there are registered 3 types of cadastral objects:

- land parcels,*
- buildings,*
- appartments.*

A land parcel in the cadastre - extension of rights to a land parcel



Diego A. Erba, Silvio D. Graciani "3D Cadastre in Argentina: Maps and Future Perspectives" 2nd International Workshop on 3D Cadastres , 16-18 November 2011, Delft, The Netherlands

„Within the ranges defines by social and economic destination of lands, the property right to lands ranges within the spaces over and under the land surface. That regulation does not violate regulations concerning rights to waters”

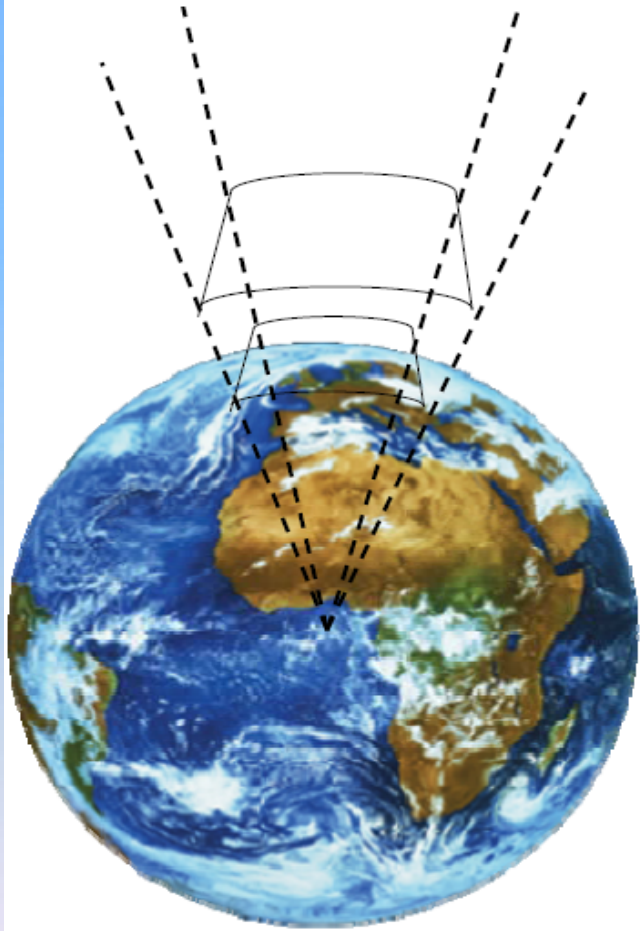
(Act of April 23, 1964, The Civil Code, Art. 143)

„A land parcel is a continuous area of land, located within the boundaries of one cadastral block, uniform with respect to legal issues and delineated from the environment by means of its boundaries”.

(§ 9. 1-2. Cadastral Law)

Defining of the range of property rights

2D Cadastre - one owned everything from the centre of the earth to the heaven



The first action which in many countries is connected with the introduction of the 3D cadastre is redefinition of the term of the range of property rights.

A land property should be considered as a 3D finite spatial object in the cadastre.

The necessity to define the range of property rights was stressed, among others, by Acharya (2011), Dimopoulou and Elia (2012), Erba and Graciani (2011).

*Victor Khoo „3D Cadastre in Singapore”
2nd International Workshop on 3D Cadastres
16-18 November 2011, Delft, The Netherlands*

A land parcel in the cadastre – some current limitations

In general, the property ranges to such altitude and to such depth, which are required for the standard utilisation of the given real estate.

„Waters of a territorial sea, sea inland waters including sea inland waters of the Gdańsk Bay, inland flowing surface waters and underground waters are the property of the State Treasury. A Water Permit is not required for development of water installations used for intake of underground waters for the needs of standard utilisation of water from water intakes located up to the depth of 30 m.”

(Article 10 and 124 of the Act of July 18, 2001 The Water Law)

Result => only waters in wells and stagnant waters may become a private property.

„Deposits of minerals, which are not parts of a land real estate, are the property of the State Treasury. Within the borders specified by legal acts, the State Treasury may, with the exclusion of other persons, use the deposits of minerals and use the rights to them by establishing mining exploitation of those deposits”.

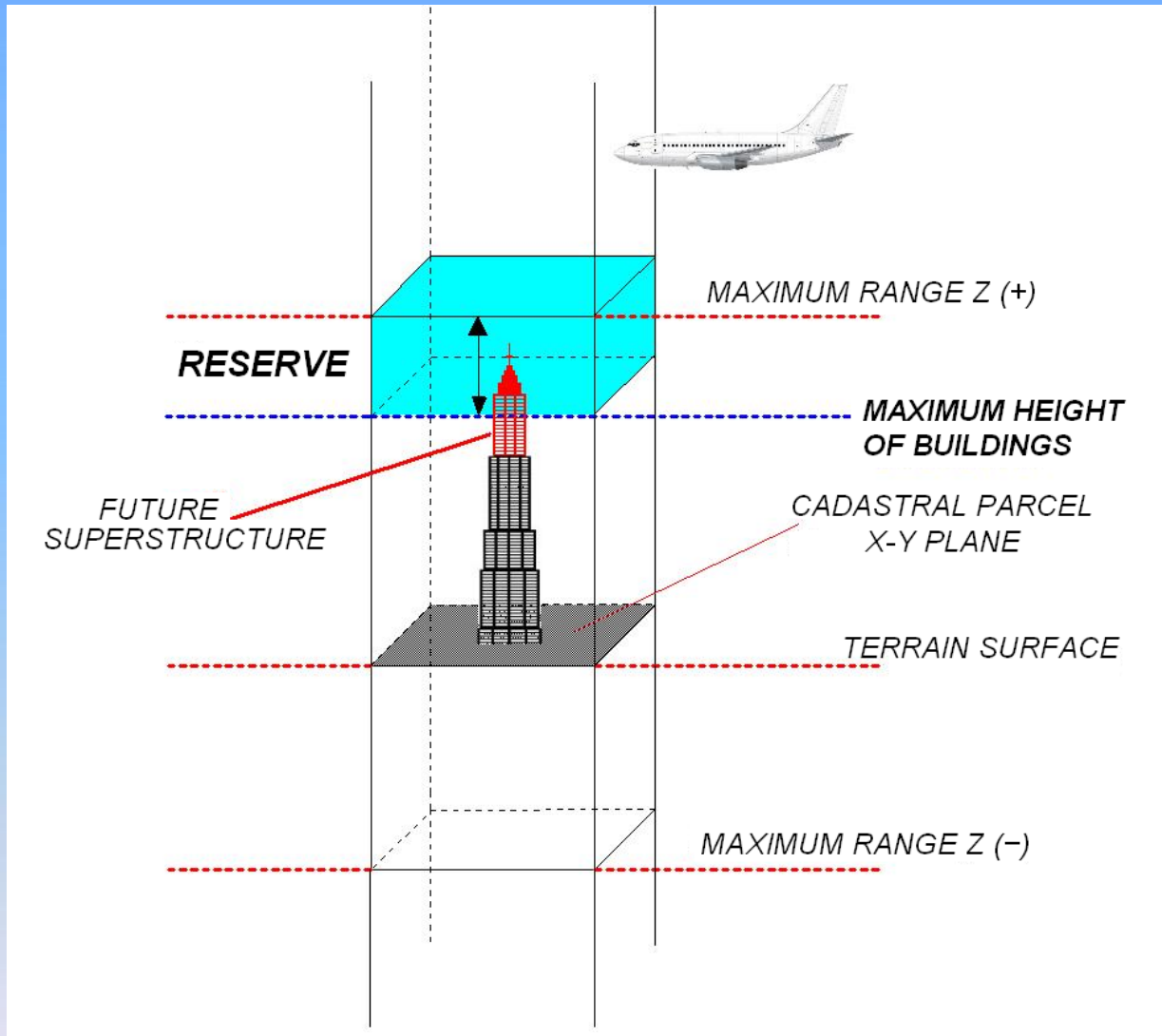
(Art.7 of the Act of February 4, 1994 The Geological and Mining Law)

Defining of the range of property rights

*In Karabin (2013) the author proposed for Poland the following reading of the domestic act dated April 23, 1964, the Civil Code: „**Within the ranges defines by social-and-economic land destination, considering public-and-legal limitations the property right to lands ranges within the spaces over and under the land surface, which is determined in the cadastre”.***

The definition of the range of property rights in metric units will allow for implementation of the idea of the "layer" approach to the rights and their spatial ranges, registered in the cadastre, which has been presented, among other, in: Dimopoulou and Elia „Legal Aspects of 3D Property Rights, Restrictions and Responsibilities in Greece and Cyprus” (3rd International Workshop on 3D Cadastres: Developments and Practices, 25-26 October 2012, Shenzhen, China)

An idea of determination the maximum „Z” range for a 2D cadastral parcel



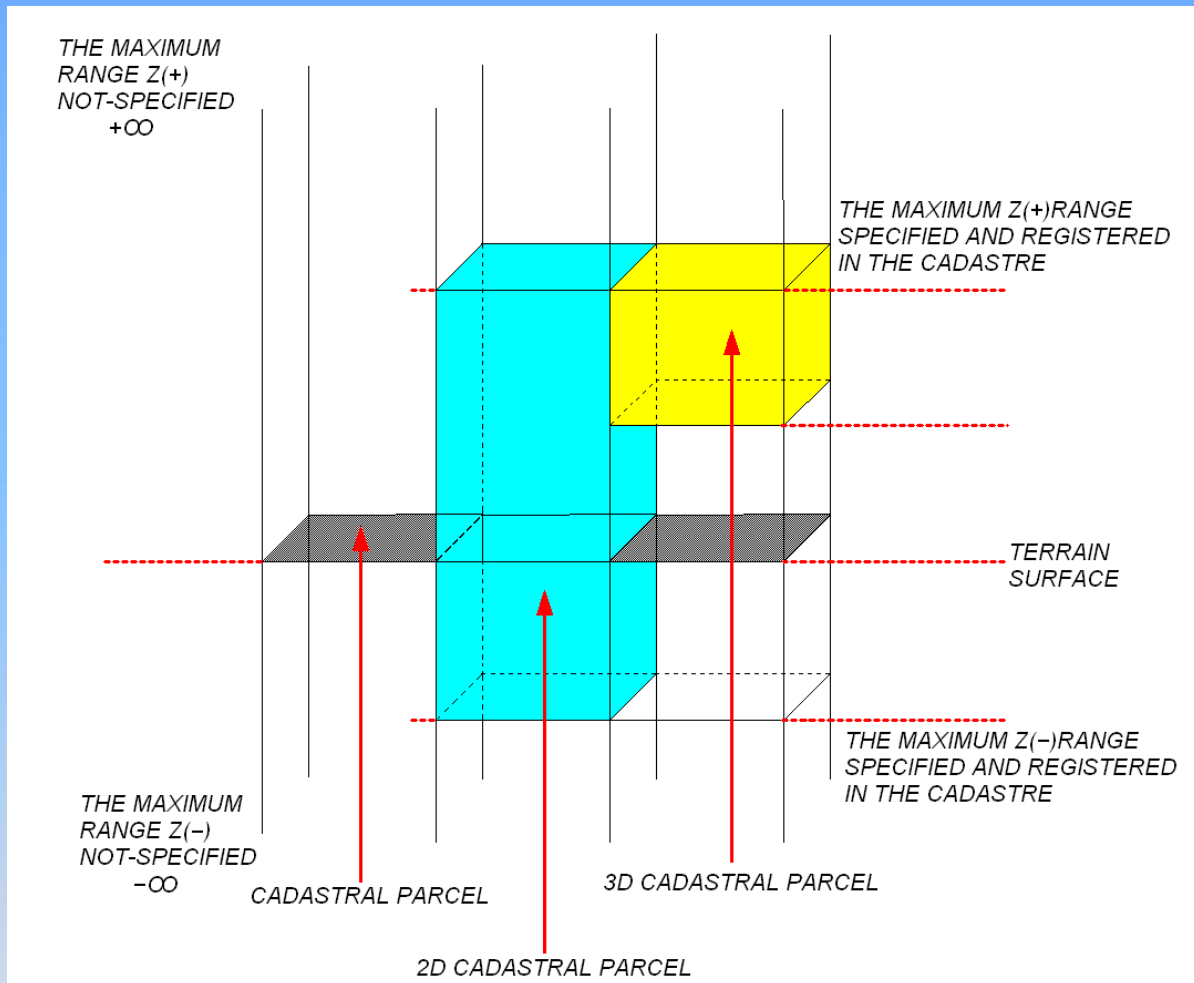
- **General provisions**
- **Detailed regulations**
- **Aviation Law**
- **Spatial Policy of the commune**
- ...

Parameters which define the spatial range should be described in the local land management plans. (Land division into zones, for which the maximum and minimum ranges should be determined).

- **The Water Law**
- **The Geological and Mining law**
- ...

Source: own work, published in Karabin (2013)

New objects in the cadastre



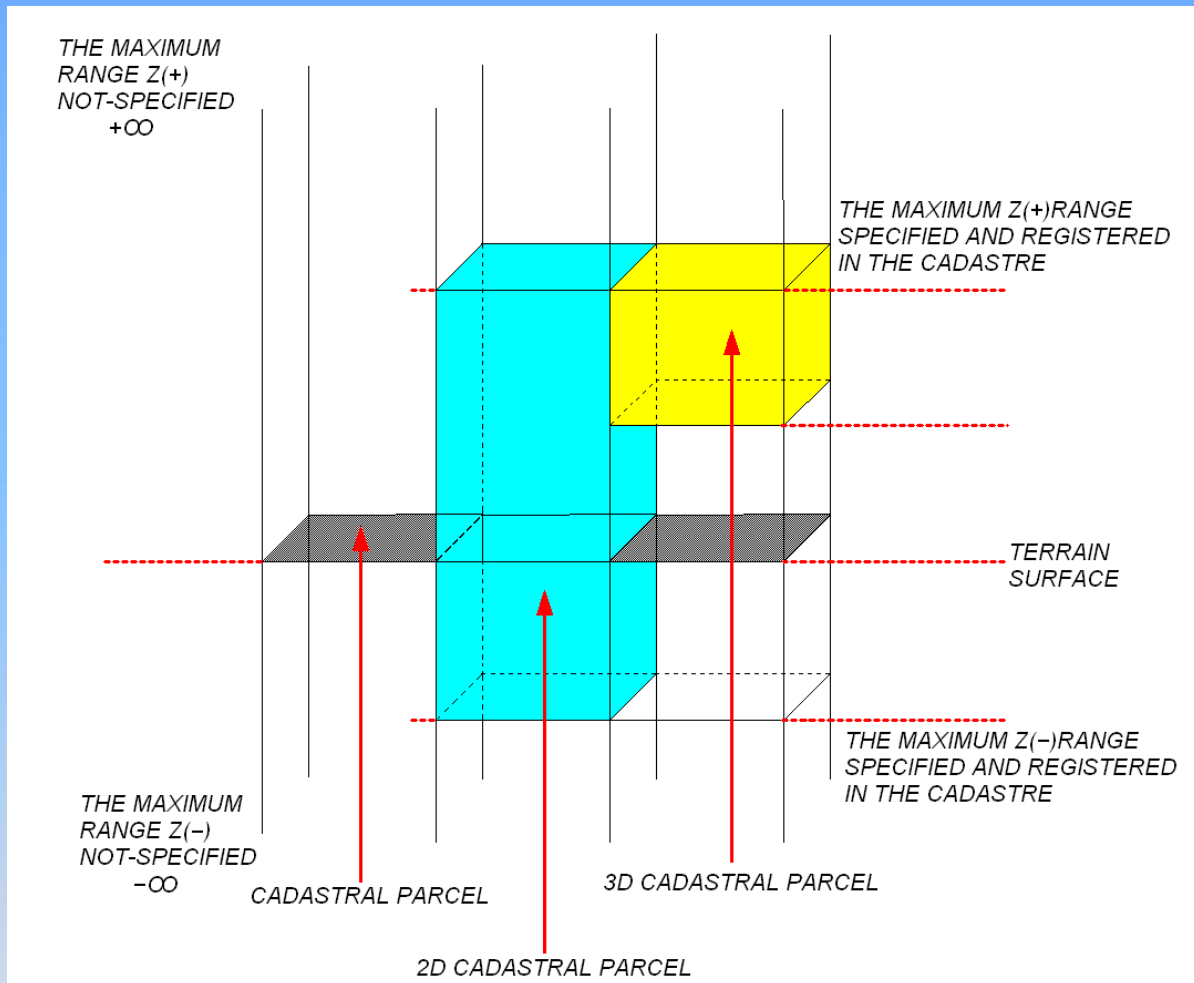
Source: own work, published in Karabin (2013)

2D cadastral parcel would be defined as follows (Karabin,2013):

„2D cadastral parcel - located within the limits of one cadastral district, the continuous piece of land, uniform from the perspective of the legal status, distinguished from the surrounding areas in the (x-y) plane by means of boundary lines and characterised by the determined vertical range in the "z" direction”.

The existing cadastral parcel is defined in Poland as follows (Cadastral Law,2001): the continuous piece of lands, located within the limits of one cadastral district, uniform from the legal perspective and distinguished from the surrounding areas by means of boundary lines.

New objects in the cadastre



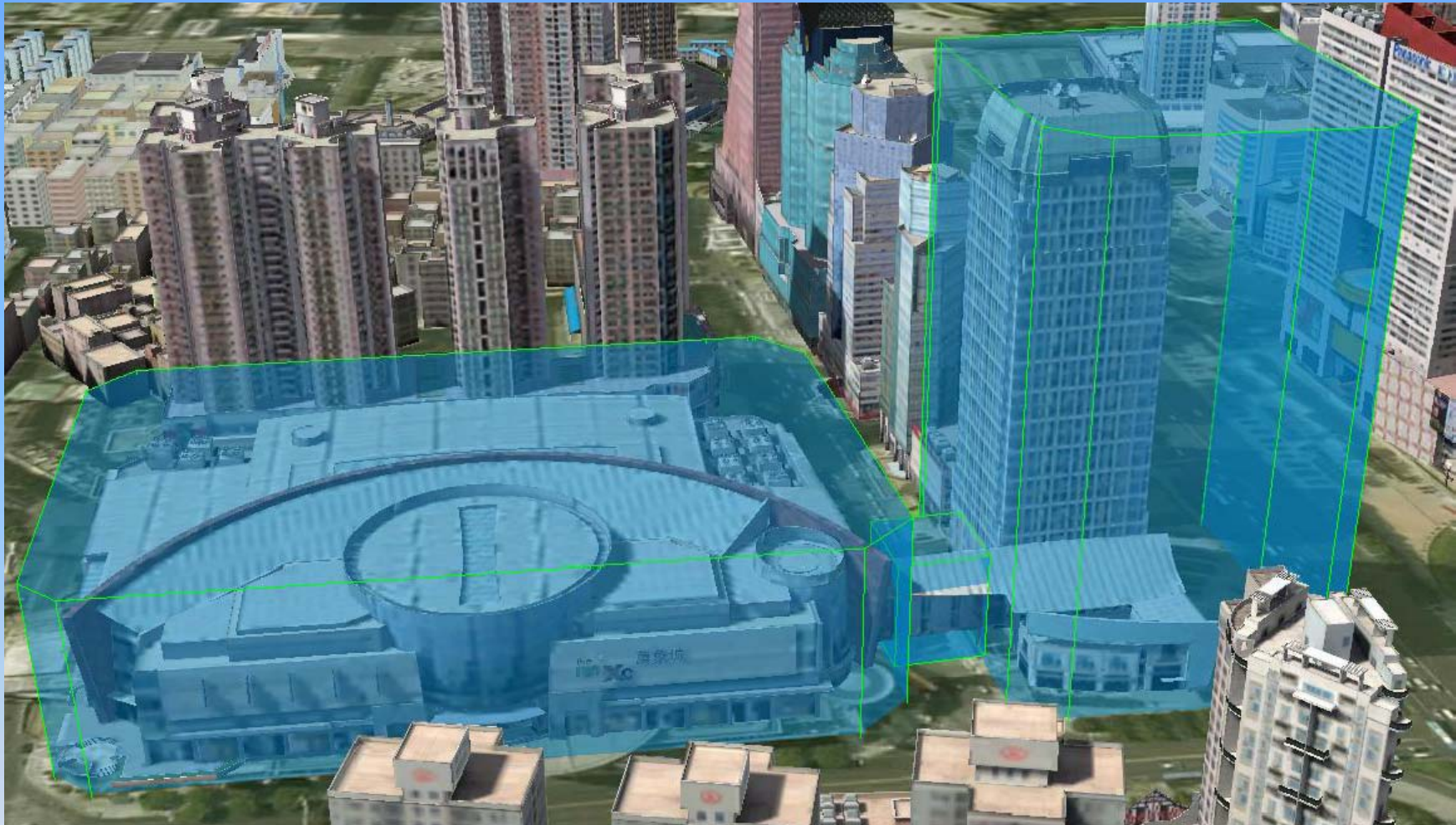
Source: own work, published in Karabin (2013)

3D cadastral parcel would be defined as follows (Karabin, 2013):

„3D cadastral parcel - a continuous and compact piece of land, uniform from the perspective of the legal status, distinguished from the space of one or several 2D cadastral parcels from a given district - having a specified spatial range”.

The existing cadastral parcel is defined in Poland as follows (Cadastral Law, 2001): the continuous piece of lands, located within the limits of one cadastral district, uniform from the legal perspective and distinguished from the surrounding areas by means of boundary lines.

3D cadastral parcel space vs. construction space

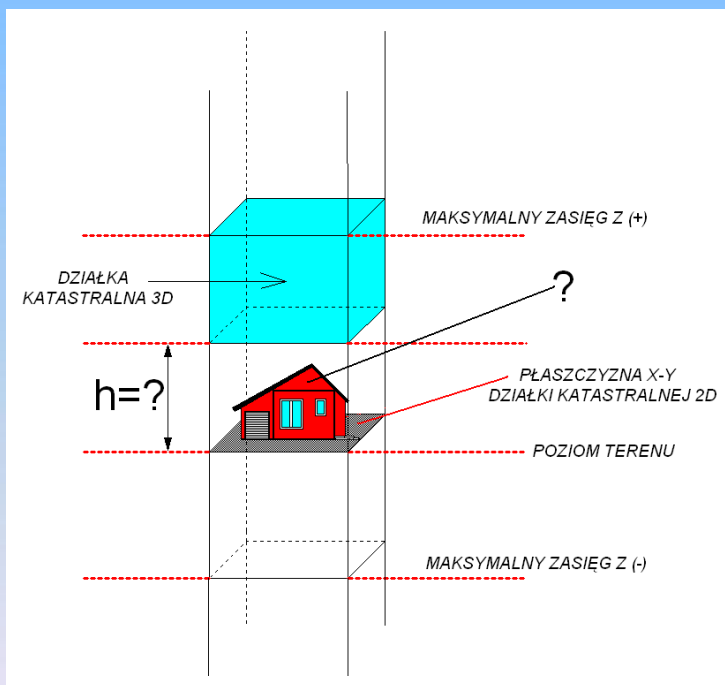


Source: Ying S, Guo R., Li L., He B. (2012): „Application of 3D GIS to 3D Cadastre in Urban Environment” 3rd International Workshop on 3D Cadastres: Developments and Practices, 25-26 October 2012, Shenzhen, China

The author assumed the idea of the division of the space, presented by Ying et al., (2012).: “we design two types of cadastral geospace: 3D land space and 3D housing/building space. 3D land space is a certain vertical extension of the 2D parcel according to plannings or demands of architecture, and 3D housing/building space is the physical space or its approximation”.

Conditions of creation of 3D cadastral parcels

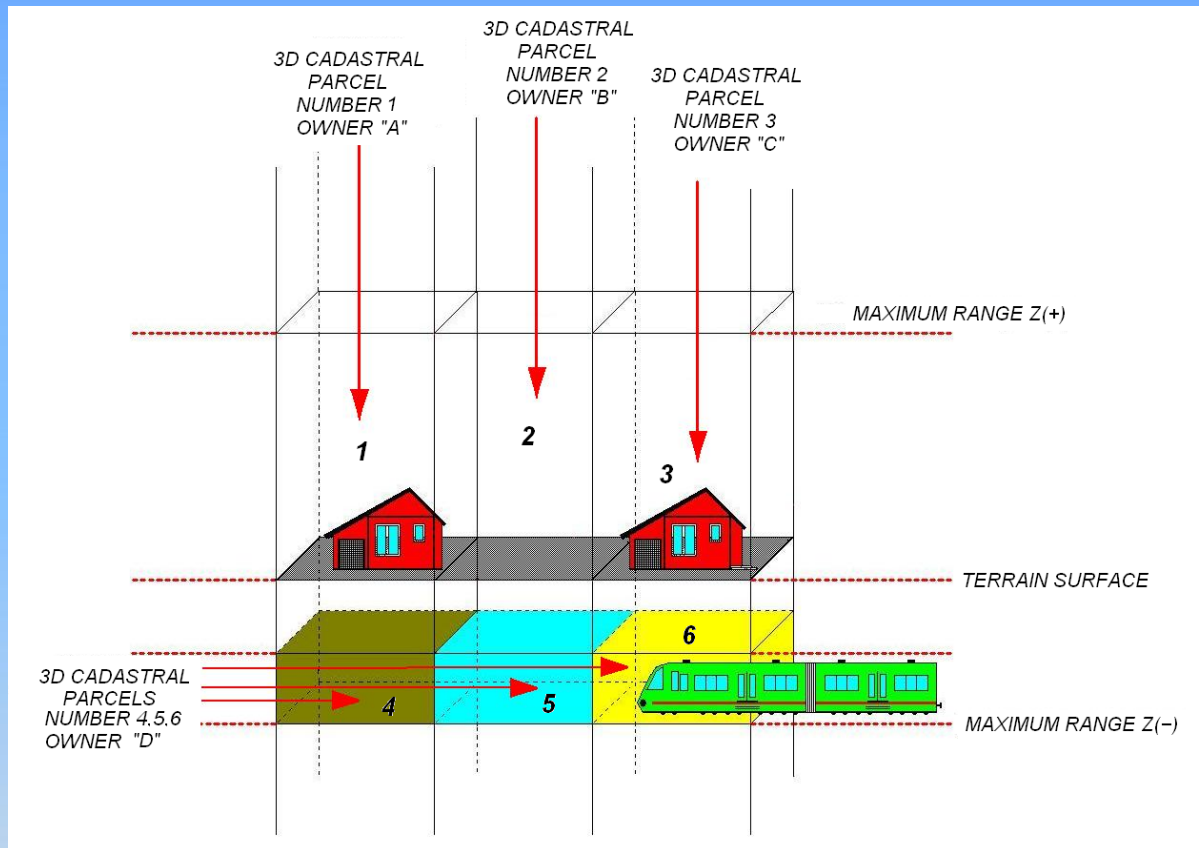
Following the author (see Karabin, 2013): „the 3D cadastral parcel - should not preclude the use of the existing, built-up or non built-up, 2D cadastral parcel, according to its destination and the existing way of use. In the opposite case the 3D cadastral parcel should be created, which would contain, in its solid, the area of the existing 2D cadastral parcel or the owner, who applies for creation of the 3D cadastral parcel should present a respective statement in the documentation”.



Source: own work, published in Karabin (2013)

Following the author (see Karabin,2013): „In the process of separation of the 3D cadastral parcel, in the case when on the 2D cadastral parcel, from which the 3D parcel to be separated or on other, neighbouring 2D or 3D cadastral parcels building objects are located - the surveyor should design the range of the new parcel after obtaining the respective expertise from an authorised expert. The range of the designed 3D cadastral parcel should guarantee that the existing constructions will remain unaffected in the course of implementation of the future building works. If the future works are to concern reconstruction of the existing objects, such information should be specified in the documentation of separation of parcels, and the owner who applies for creation of the 3D cadastral parcel should present a respective statement in the documentation”.

The effect of expropriation according to the 3D Cadastre Approach



Source: own work, published in Karabin (2013)

„the 3D cadastral parcel located in a space of several existing 2D cadastral parcels may be created only as a result of combination of 3D cadastral parcels located in the space of existing individual 2D cadastral parcels, if the final 3D cadastral parcel meet the condition of continuity and compactness and, if it is additionally included within the cadastral district. 3D cadastral parcels, being the subject of combination, must have the same, uniform legal status” (Karabin, 2013)

parcels 4, 5, 6 → could be combined into one 3D cadastral parcel

**Less dramatic effect
of expropriation**

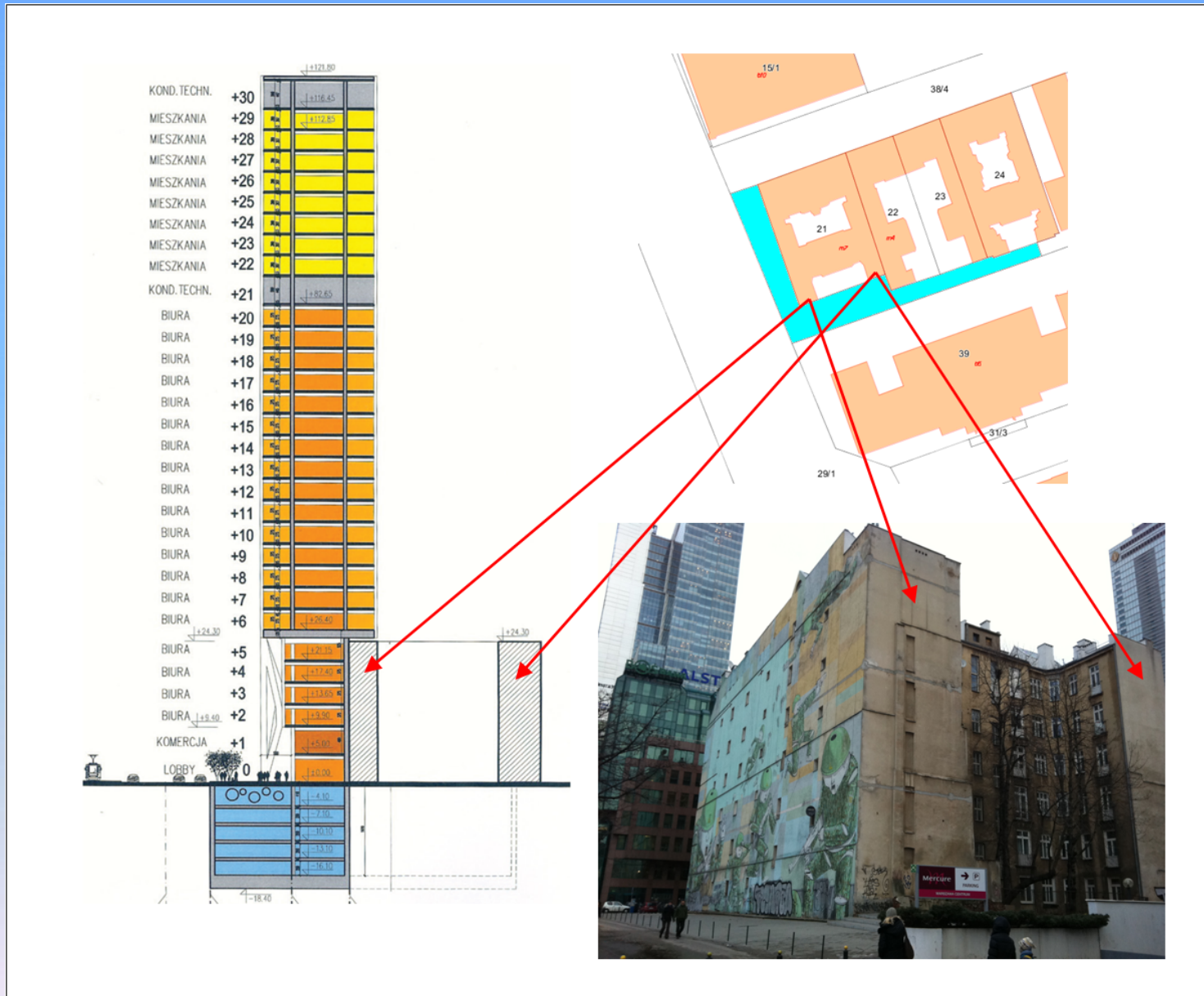
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**Law-makers
more open-minded**

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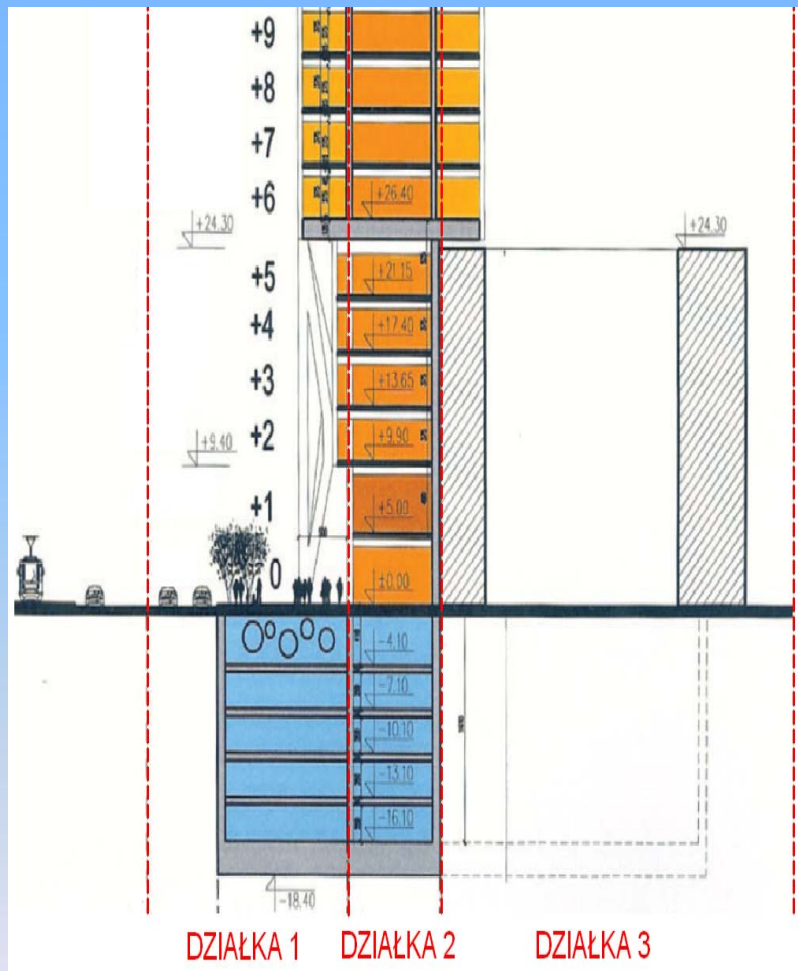
**Converting the results
of researches into
the law**

Practical utilisation of the 3D cadastre "The Sienna Street in Warsaw Project"



Source: The vertical projection of the investment – designing documents of "Kuryłowicz-Associates" Company published in Nowakowska (2011), photograph taken by the author, the cadastral map - The Office of Geodesy and Cadastre of the City of Warsaw, Poland, All published in Karabin (2013)

Practical utilisation of the 3D cadastre "The Sienna Street in Warsaw Project"



Source: The vertical projection of the investment – designing documents of "Kuryłowicz-Associates" Company published in Nowakowska (2011),

As it was mentioned in Nowakowska (2011), four usufructs should be established for the needs of this investment:

- ✓ first usufruct for location of some underground parking places under the neighbouring street,
- ✓ second for location of underground parking places under the apartment house located on the neighbouring parcel,
- ✓ third for hanging the part of the designed building over the neighbouring street,
- ✓ fourth for hanging the designed building over the neighbouring parcel with the apartment house.

An alternative for this idea is the 3D cadastral model for Poland, presented in Karabin (2013); as a result of introduction of new objects - 2D and 3D parcels - into the conventional cadastre, it would allow to base the discussed investment on the ownership rights to those cadastral objects.

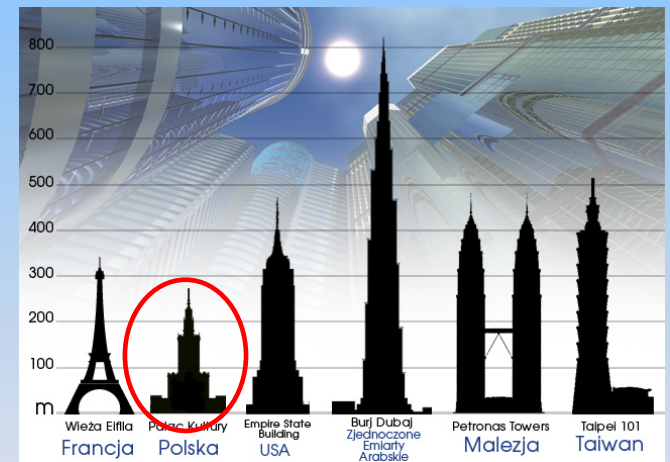
Practical utilisation of the 3D cadastre "The Sienna Street in Warsaw Project" Setting Z(+)

Due to the missing rules of determination of the range of property rights in the existing legislation, it was assumed for testing the model, that the maximum level, which can be utilised by the owner of the conventional parcel, located in the area where the future investment is to be performed, would not be greater than in the case of neighbouring objects.

This area is not located within the zone of limited use, resulting from the vicinities of the airport, therefore additional limitations in the Z(+) range, required to ensure the air traffic security within the zone of take offs and landings of aircrafts do not occur.



http://manager.nf.pl/media/images/articles/46750_banner_700x330.png



<http://bi.gazeta.pl/im/1/7418/m7418341.jpg>

The maximum Z(+) range was assumed at the level determined by the Palace of Culture and Science, the highest object in Warsaw, which is located within the distance of about 450 m.

Practical utilisation of the 3D cadastre "The Sienna Street in Warsaw Project" Setting Z(-) ranges

For the bottom Z(-) level, also due to the lack of detailed regulations concerning the determination of this level, the level of 30 m under the ground was assumed.

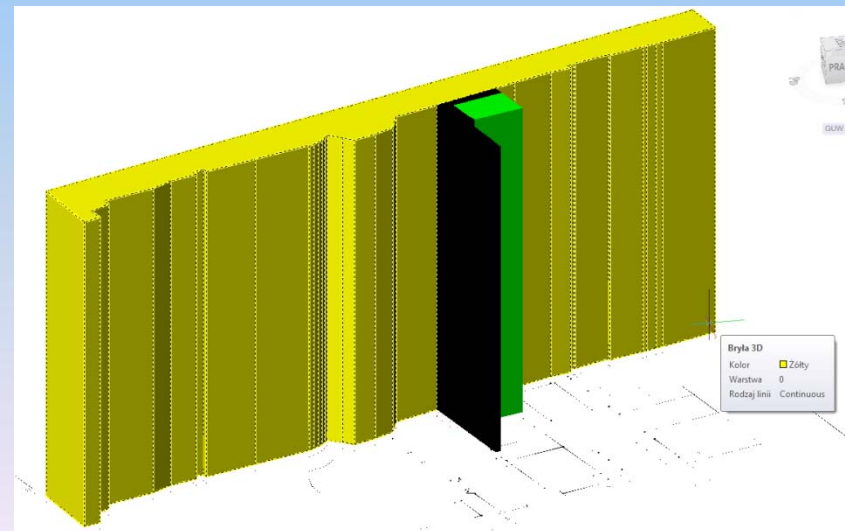
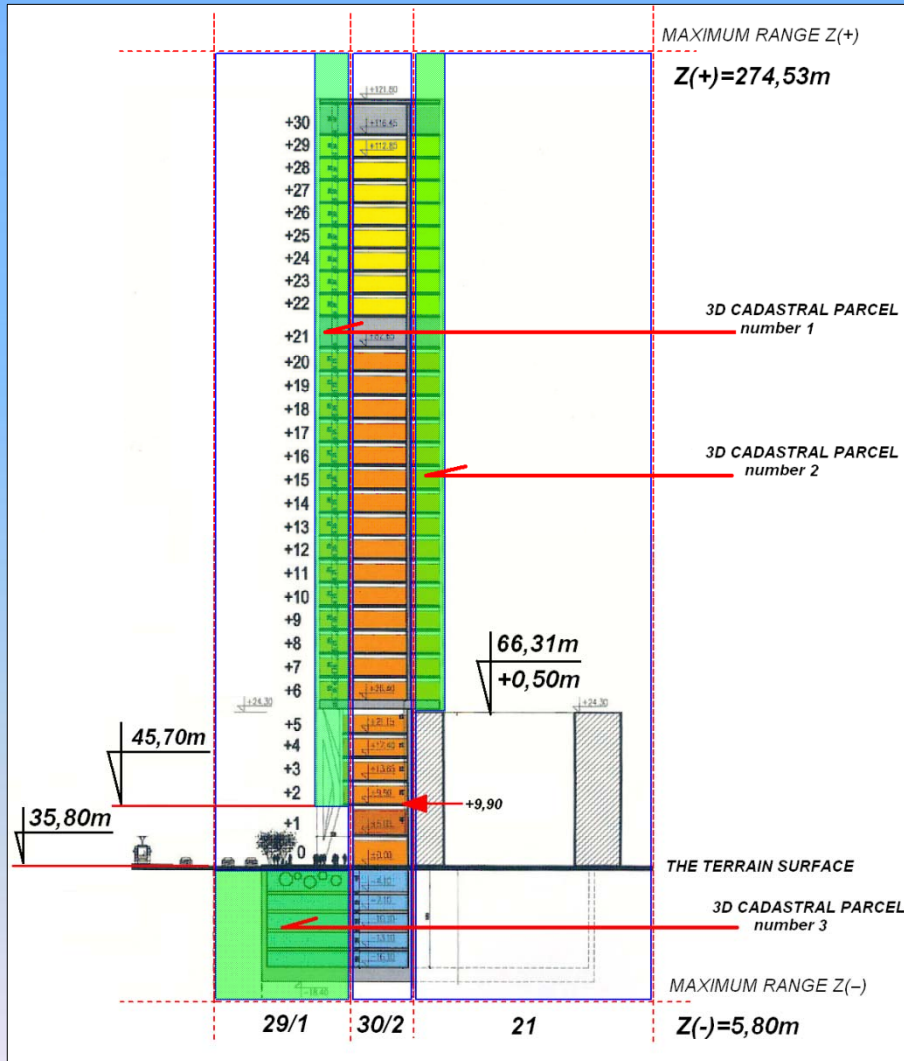
According to the act of July 18, 2001 The Water Law - Art. 124, the water permit is not required in the case of construction of underground water intake installations for the needs of the standard water use from water intakes up to the depth up to 30m.

Therefore, it may be assumed for the needs of testing, that this Z(-) level is accessible for operations performed by land properties (Under the condition that mineral being the property of the State Treasury do not occur within this space), and utilisation of the lower level is limited and it is not accessible for the investor.

Thus, the range of the property rights of the owner of parcels within the planned investment, according to the above assumptions and to the results of field measurements, was determined in the reference system, obligatory in Warsaw (Level Zero of the Vistula River).

The upper range Z(+) equals to 274.53m, and the bottom range, Z(-) equals to 5.80m.

Practical utilisation of the 3D cadastre "The Sienna Street in Warsaw Project" Setting Z(+) and Z(-) ranges

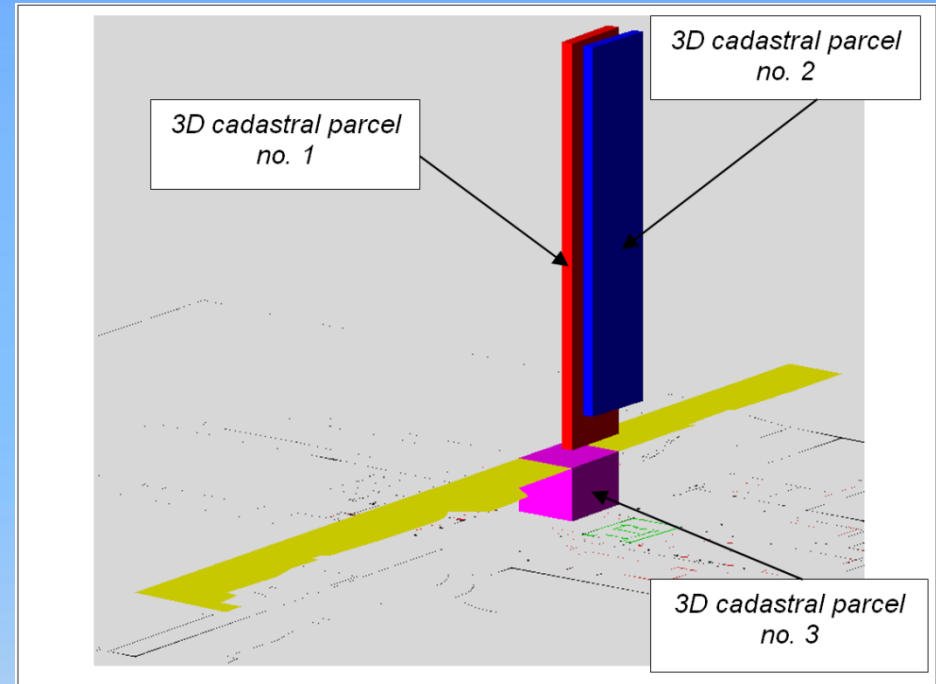
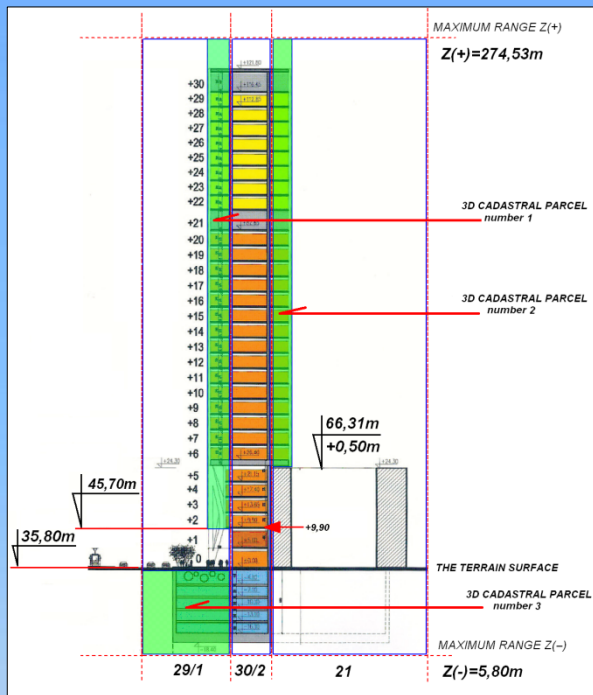


"The Sienna Street in Warsaw Project" – a proposal of creation of 3D cadastral parcels
Source: Own work, with the use of designing documents of "Kuryłowicz-Associates" Company, published in (2011) and data from own surveys

Visualisation of the 2D cadastral parcel – no 29/1 (in yellow)
Source: own work, with the use of the AutoCadMap 3D software tools (free trial version)

Practical utilisation of the 3D cadastre "The Sienna Street in Warsaw Project"

Creating 3D cadastral parcels

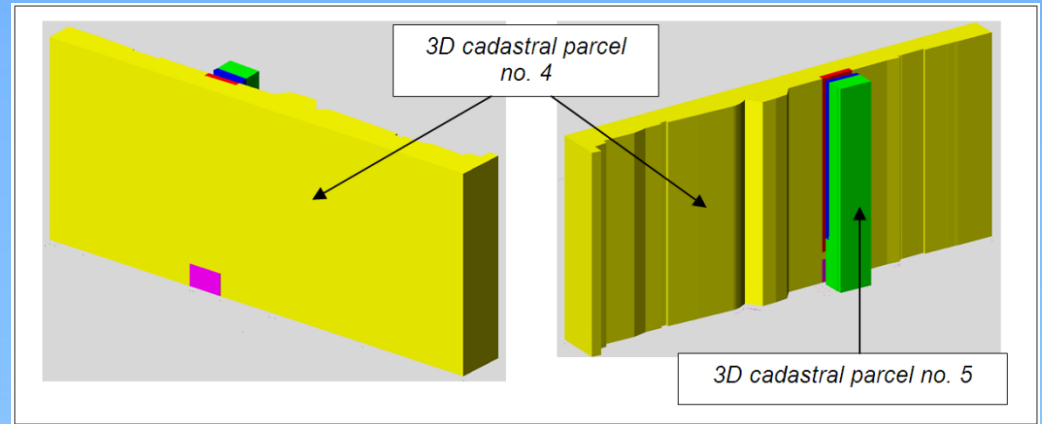
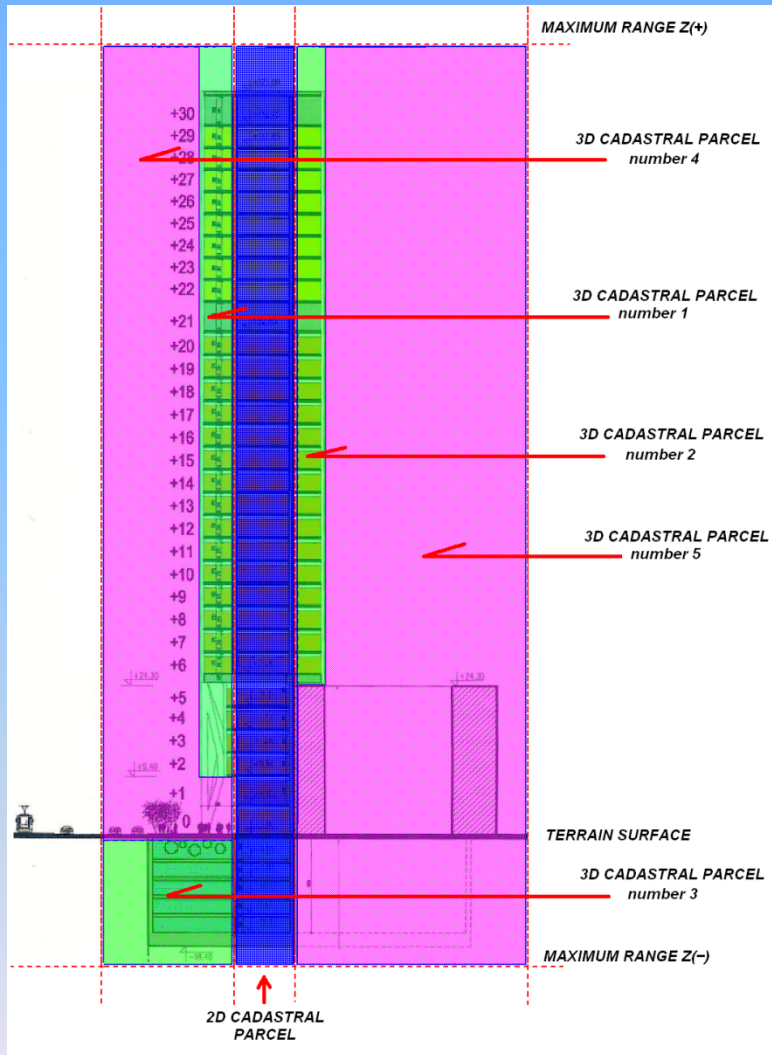


The Sienna Street in Warsaw Project" – a proposal of creation of 3D cadastral parcels
 Source: Own work, with the use of designing documents of "Kuryłowicz-Associates" Company, published in (2011) and data from own surveys

Visualization of the 3D cadastral parcels, no. 1, 2, 3
 Source: own work, using AutoCadMap 3D software tools (free trial version)

- ✓ the 3D cadastral parcel no.1 - would cover the space required by the investor to build an overhead part of the building (floors 6 to 30), hanging in the space of the 2D cadastral parcel no. 29/1 and supported by pillars,
- ✓ the 3D cadastral parcel no 2 would cover the space required by the investor to build and overhead part of the building (floors 6 to 30) over the building existing on the cadastral parcel no. 21,
- ✓ the 3D cadastral parcel no.3 - would cover the space required by the investor to build the underground parking place under the street existing on the 2D cadastral parcel no. 29/1.

Practical utilisation of the 3D cadastre "The Sienna Street in Warsaw Project" Final Effect



Visualisation of the 3D cadastral parcels no.4 and no.5
Source: own work, using AutoCadMap 3D software tools (free trial version)

"The Sienna Street in Warszawa" Project – the status after separation of 3D cadastral parcels
Source: own work, with the use of designing documents of "Kuryłowicz-Associates" Company,
published in (2011). All published in (2013)

Conclusions

- ✓ *Both in Poland and abroad it is necessary to solve the problem of the disposal of the real estate space "in layers", basing on the ownership right, which would substitute the method of implementation of investments, basing on other rights, including the usufruct rights.*
- ✓ *3D cadastre would allow for reference of the property rights (ownership right) to the 3D cadastral parcels and would enable to financially secure an investment basing on such cadastral objects.*
- ✓ *The author assumed introduction of the "air-space parcel" type of cadastral parcels (not „3D construction property” type) as more convenient from the perspective of the investor and implementation of the investment.*
- ✓ *Introduction of the 3D cadastre will allow for reference of all legal procedures to new cadastral objects, including the expropriation procedure, which will have less dramatic impacts,*
- ✓ *The author assumes that the proposed 3D cadastral model will be operating in such places where the problem of implementation of the investment should be solved according to the "layer" approach, so it will mainly concern cities.*

THANK YOU FOR YOUR ATTENTION