



LEGAL ASPECTS IN DETERMINING THE SPATIAL EXTENT OF THE REAL ESTATE

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Summary

Spatial boundaries of real estate are a very important issue in the context of the discussions on the multidimensional cadastre. The precise determination of the extent of property rights in 3D space is driven by the dynamic development of urban planning, architecture and construction. It is becoming more and more popular to design modern buildings above or below other structures or the ground. The reason for such solutions is often limited land resources, especially in highly urbanised areas.

Currently, Polish law defines in detail the procedures for demarcating property boundaries exclusively on the ground, i.e. in 2D. Both the definitions of the boundaries, the limit points, and the methods of their designation in various modes, which enable the boundaries to be determined according to the legal status, are specified. The rules for determining the extent of ownership and other property rights are currently set out in the Polish legislation in the rank of acts and regulations. They follow the Roman principle of *superficies solo cedit*, which means that what is on the surface belongs to the land. The intention for the implementation of the 3D cadastre is to move away from this principle. The purpose of this paper is to examine the guidelines concerning the spatial (3D) extent of ownership and other property rights contained in the Polish legislation in force at present. The aim of the publication is to answer the question of whether there are any specific indications of the extent of ownership above and below the ground regulated by special regulations.

Keywords

real property • spatial extent of real property • 3D real property • 3D cadastre

1. Introduction

Determining the spatial extent of real estate becomes essential in the context of the concept of the multidimensional cadastre. This concept implies the possibility of defining property in three dimensions X, Y, Z, which in turn translates to the possibility of spatial delineation of property, not only on the ground, but also above and below. For the last 20 years, 3D cadastre has been a topic addressed by teams of researchers and practitioners all over the world. In Poland, too, there are concepts and outlines

of a system that could be integrated into the existing Polish legal and organisational framework, while maintaining economic feasibility.

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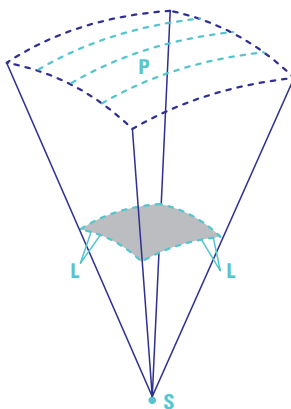
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The approach to establishing the vertical extent of property rights vested in land property derives from the idea of *dominus soli est dominus coeli et inferorum*, i.e. the ownership of land also extends to its underground and the air column above it, which has been expressed figuratively as *usque ad sidera, usque ad inferos*, meaning *all the way to Heaven and all the way to Hell* [Strzelczyk 2016]. Taking into account the shape of the Earth, the spatial extent of real estate (Fig. 1) can be illustrated as a solid pyramid with its vertex at the centre of the Earth (S), bounded by planes intersecting its surface at points determined by the course of boundary lines on the ground (L), and with a base (P) at infinity. Legally, however, the extent of property boundaries is spatially limited by the general clause on the socio-economic use of the land and by the law and rules of social coexistence [Act 1964]. Only when the extent has been determined can the owner, to the exclusion of other persons, spatially use the property above and below the ground [Felcenloben 2013]. Additionally, the owner's ability to exercise his property rights is determined by the socio-economic purpose of that right [Act 1964]. The concept of socio-economic purpose introduced by the legislator has the character of a general clause, i.e. it is deliberately an indeterminate phrase that demands considering extra-legal criteria in each case [Encyklopedia Gazeta Prawna]. This content of this concept was defined in the ruling of the Constitutional Tribunal of 20 April 1993 [P 6/92], in which the limits of the freedom to use one's own property and, therefore, the limits of the protection of property and the limitation of the owner were determined. Its purpose and meaning is to define, in the general interest, the limits of the free use of one's own property. The provisions of the Civil Code are referred to as neighbourhood law. The establishment of these limitations contradicts the notion of property rights as an absolute right.

One of the difficulties in regulating the 2D and 3D cadastre in Poland is the duality of the basic unit of the cadastre. Currently, we distinguish between a real estate and a cadastral parcel, which are not identical concepts. A real estate is documented in the land and mortgage register, while cadastral parcels are in the land and property register. A real estate may consist of one or more parcels of land, but it may also be a building or premises.

How property rights are exercised is defined in the provisions of the local development spatial plan and other regulations [Act 2003]. In the context of establishing three-

dimensional property boundaries, such as those below the ground surface, it seems essential to determine the owner's rights to groundwater and minerals, as well as the extent of ownership of buildings and technical infrastructure. With regard to ownership above the ground, the restrictions under the Aviation Law [Act 2002] should be taken as applicable.



Source: Author's own study

Fig. 1. Illustration of the spatial extent of property rights

2. Research subject and methodology

The following analysis provides an overview of the legal acts in force that, in their scope, relate to the possibility of determining the extent of property rights in real estate. The adopted research methodology includes document examination. The main objective is to identify the existing restrictions on the exercise of property rights and other rights related to real estate. This analysis should also indicate whether the existing regulations are sufficient to spatially determine the extent of property rights.

The analysis began by quoting the definitions binding in Polish law: the boundary of land property and a cadastral parcel, boundary points and boundary sections. The next step was to examine the three laws and executive regulations containing potential restrictions for the vertical range of the exercise of property rights. The main legal acts adopted for the indicated research method were the Act of 20 July 2017 – Water Law [Act 2017], the Act of 9 June 2011 – Geological and Mining Law [Act 2011] and the Act of 3 July 2002 – Aviation Law [Act 2002].

3. Findings and discussion

Civil Code [Act 1964] defines land property as 'parts of the surface of the Earth constituting a separate piece of property (land)', i.e. as two-dimensional objects.

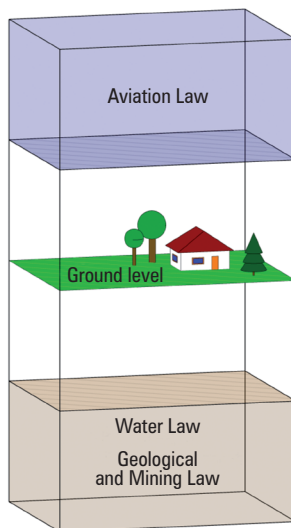
The regulation on the land and property register [Regulation 2021] is an act that addresses in detail the recording of parcel boundaries. A cadastral parcel was defined as 'a continuous area of land that is located within a single cadastral precinct, homogeneous in legal terms, and separated from its surroundings by the cadastral parcel boundaries.' The boundary of a cadastral parcel, in turn, should be understood as a broken line or a section shared by two adjacent cadastral parcels or shared by a cadastral parcel and a state border (for parcels adjacent to state borders). Another significant piece of information is the cadastral data concerning the boundary point recorded in the land and property register. These data include the coordinates of the boundary point, which are defined in a rectangular coordinate system of the X,Y plane. On the basis of these coordinates, it is possible to calculate the area of the cadastral parcel, taking into account the deformation correction.

Furthermore, the regulation on the method and procedure for the division of real estate [Regulation 2004] defines a section of real estate boundary as determined by the two nearest boundary points. Whereas, according to the regulation on the demarcation of real estate [Regulation 1999] boundary points define the course of real estate boundaries, i.e. they designate the boundary break points. These points are mathematical in nature, and thus determined in two dimensions by X and Y coordinates in the applicable reference system.

According to the provision of the Civil Code [Act 1964] in order for land to be referred to as land property it has to have demarcated boundaries that separate it from its surroundings. The boundaries of real estate in the current form can be defined as boundaries of a single parcel or multiple parcels that comprise a real estate, forming a closed set of boundary sections, limited by boundary points with known X, Y coordinates.

Following Hycner [2006] it can be stated that the boundaries determining the extent of property rights are the most important spatial attribute of a property. Real estate boundaries have a crucial role in determining the extent of property rights in space by characterising at the same time the location of the property, its surface area and its shape. Furthermore, in order to fulfil its function, a boundary must be drawn with the utmost accuracy and shown on the ground by boundary signs. As a rule, a boundary is always one, as the indicated extent of property rights is one. Thus, the real estate boundary is a subordinate concept to property rights, as well as to other rights established for a given subject on the real estate.

Given the spatial nature of the earth's surface and the current need to build a 3D cadastre, the current rules for defining boundaries in three-dimensional space, i.e. above and below the ground, are essential. The basic spatial limits to property rights are set by the Geological and Mining Law [Act 2011], the Water Law [Act 2017], and the laws delimiting the space for air traffic – the Aviation Law [Act 2002] and its implementing acts. The extent of these boundaries is presented in Figure 2.



Source: Author's own study

Fig. 2. Legal limits to the extent of property rights in 3D space

3.1. Aviation Law

The Aviation Law [Act 2002] applies in limiting the use of the property in the above-ground part. The Law does not provide for specific heights limiting the use of the aboveground space. However, from the point of view of the operation and execution of flights, aerial obstacles are subject to notification to the President of the Civil Aviation Office. The obstacles that must be marked are:

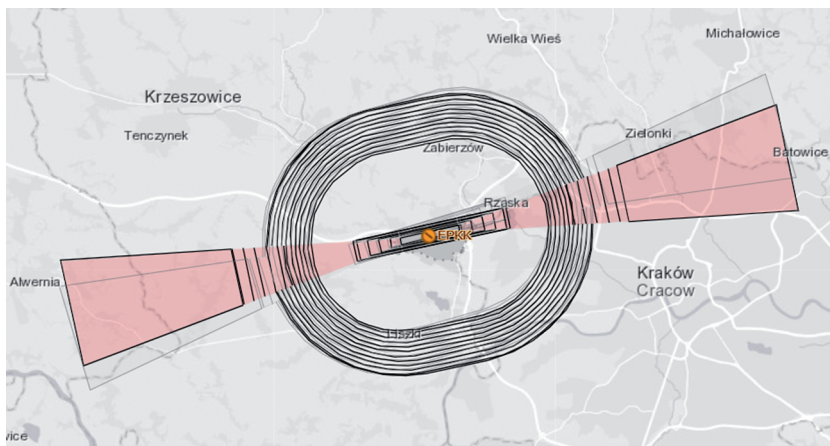
- higher than heights determined by the designated obstacle limitation surfaces;
- higher than 100 m above the level of the surrounding land or water, located on the territory of the Republic of Poland and in the exclusive economic zone of the Republic of Poland;
- located on the airstrip, regardless of their height;
- others which have been recognised by the President of the Office, the Minister of National Defence or the Minister in charge of internal affairs as an aviation obstacle due to their potential danger to aircraft traffic.

Regulations on building heights in aviation areas can be found in Articles 86 and 87 of the Aviation Law [Act 2002]. There are special rules for areas with aeronautical ground facilities, where areas of restricted development have been designated or where a decision has been issued to introduce changes to the functional system. For these areas it is necessary to consult the President of the Civil Aviation Office already at the stage of drafting local spatial development plans or a draft decision on development conditions, as well as request the President's opinion on the draft study of conditions and directions for the

development of a municipality, the draft framework study of conditions and directions for the development of a metropolitan association and the spatial development plan of a voivodeship. Natural and artificial objects must not exceed the heights determined by the obstacle limitation surfaces, which are established on the basis of existing buildings with a height of more than 15 m above the level of the surrounding land, water and land-forms. The President of the Civil Aviation Office issues an opinion on the possibility of locating investments in the area where the limiting surfaces are in force.

The Aviation Law [Act 2002] and the regulation on the aerodrome classification and registry of aerodromes [Regulation 2013] require the designation of height-limiting surfaces and natural objects, as well as the preparation of a map representing these surfaces. These limiting surfaces should be understood as areas that are within the extent of surfaces establishing the permissible dimensions of buildings and natural objects.

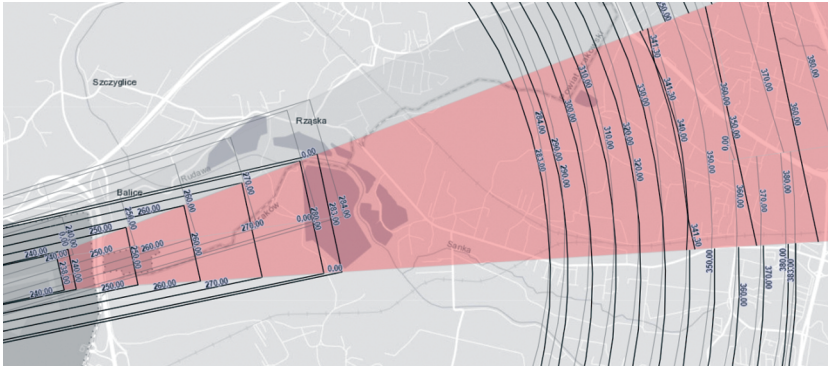
Figures 3 and 4 illustrate the extent and height of limiting surfaces using Balice Airport near Krakow as an example. For the areas within the range of the limiting surfaces in the vicinity of the airport, indicated by the ellipses in Figure 3, the extent of the maximum height (determined by the outer ellipse) is 383 m, while the minimum height of the limiting surface (determined by the inner ellipse) is 283 m. The size of the largest ellipse measured from the airport along the long axis is 7.4 km, while along the short axis it is 6 km. However, in the runway extension, the extent of the obstacle that limits the surface reaches 16.5 km, restricting the height to 388 m (shown in pink in Figure 3).



Source: Register of Civil Aerodromes (RLC) and their Obstacle Limiting Surfaces (OLS) <https://www.ulc.gov.pl>

Fig. 3. Obstacle limitation surfaces and height limitation surfaces for Balice Airport and its surroundings

This means that – in accordance with the guidelines in the airport register – for sites in close proximity to the airport, the potential for development in the obstacle space is limited.



Source: Register of Civil Aerodromes (RLC) and their Obstacle Limiting Surfaces (OLS) <https://www.ulc.gov.pl>

Fig. 4. Heights of the limiting surfaces for Balice Airport and its surroundings

In addition to these limitations resulting from the proximity of an airport or other ground aviation facilities, there are also flight restrictions in Polish airspace over cities. These are defined in the Flight Prohibitions or Restrictions Regulation [Regulation 2019]. One of the provisions is a ban on flights over cities, below heights of 500 m, 1000 m, 1500 m or 2000 m, depending on the population. The flight altitude of passenger aircraft is between 5000 and 11000 m. Given that the world's tallest building currently reaches 828 m [observatorgospodarczy.co.uk], these ranges do not interfere with the potential for the development of space above ground level. Aviation law does not set a limit on the height of flights strictly based on the extent of property rights, so it must be assumed that flights take place above the property boundaries.

3.2. Geological and Mining Law

The exceptions to the principle of *superficies solo cedit* are the minerals covered by mining property rights listed in Article 10(1) and (2) of the Geological and Mining Law [Act 2011]: deposits of hydrocarbons, hard coal, methane as a concomitant mineral, lignite, metal ores with the exception of bog iron ores, metals in their native state, ores of radioactive elements, native sulphur, rock salt, potassium salt, potassium-magnesium salt, gypsum and anhydrite, precious stones, rare earth elements, noble gases, regardless of where they occur, as well as deposits of medicinal waters, thermal waters and brine. Furthermore, parts of the rock mass located outside the spatial boundaries of the land property are covered by mining ownership. Deposits not mentioned in Article 10(1) and (2) that are located in the rock mass within the spatial boundaries of the land property are covered by the right of ownership, i.e. they are part of the land property.

Mining property rights were introduced into Polish law by the Act of 9 June 2011 – Geological and Mining Law. The mining property right is vested in the State Treasury and is independent of the ownership of the land and its boundaries. The State Treasury

may use the subject matter of this right within the limits set by the acts, and may also dispose of this right by establishing a mining usufruct in favour of the entrepreneur carrying out geological works on the deposit in question. The mining usufruct agreement and the laws define the limits of the use of the space defined by this usufruct [Act 2011].

With regard to the use of the ground part of the property, if it is necessary for the activities regulated by the Law, the entrepreneur may request the right to use the property or part of it for a fixed period of time, against payment of a fee. If, as a result of a restriction of the right, the property or part thereof is unsuitable for the existing use, the owner or perpetual usufructuary may require the entrepreneur to repurchase it [Act 2011].

An interesting case in the discussed issue, considering the spatial boundaries of a property, was the case of a mining right for diabase deposits located under a forest plot, which was referred to by the Supreme Court in a 2015 ruling (V CSK 200/14). Diabase deposits are not listed in the Law as deposits covered by the mining property of the State Treasury, and therefore could only be covered by its ownership if their location was outside the spatial boundaries of the landed property. However, the boundaries are not directly defined in Polish law. When considering the case, the Supreme Court ruled that the extent of ownership to the interior of the earth, as defined in Article 143 of the Civil Code, which provides for the limitation of the extent by the socio-economic purpose of the land, should be determined for each property individually, taking into account its location, its designation in the local zoning plan, and also considering how the owner can actually and potentially use the property in accordance with the law. In the subject case, considering all the conditions and prerequisites, the Court of Appeal granted the owner of the land the right to the diabase deposit [I ACa 406/15].

Another important provision of the Geological and Mining Law is the possibility to dig trenches and boreholes up to a depth of 30 m for the purpose of using geothermal energy, outside mining areas, and to dig trenches and boreholes up to a depth of 30 m for the purpose of drilling groundwater intakes for the extraction of up to 5 m³ per day outside mining areas [Act 2011]. Although this provision does not directly delimit the extent of the property, it does indicate the possibility of exploiting resources from below the surface of a parcel up to a depth of 30 m. This provision corresponds to the law governing water ownership.

3.3. Water Law

In terms of water law, the right to groundwater is particularly relevant from the perspective of spatial ownership. According to Article 214 of the Water Law [Act 2017], the owner of a land property has a property right to inland standing waters, water in a ditch or in a pond filled with rainwater, snowmelt or groundwater located within the boundaries of the property. Meanwhile, the waters of the territorial sea, internal marine waters, inland flowing waters, as well as the land covered by these waters and groundwater are the property of the State Treasury [Act 2017]. In order to meet the needs of

their own household or agriculture, the property owner has the right to make ordinary use of the waters they own, as well as the groundwater on their land.

Thus, the ownership of the property does not extend to the waters flowing through it or to the groundwater, which are public waters. The course of these waters and groundwater limits the spatial extent of the property. Groundwater, including near-surface groundwater, deep groundwater and deep water, is located at different depths, which cannot be clearly defined because groundwater levels fluctuate on an annual (0.5–6 m) and multiannual (± 1.5 m) basis [Traczynski 2022]. Droughts also contribute to the lowering of groundwater levels. It is therefore not possible to determine the extent of property rights on the basis of groundwater depth.

Furthermore, for the construction of water facilities for the intake of groundwater for the purpose of ordinary water use from wells up to 30 m deep and the intake of surface water or groundwater in an annual average amount not exceeding 5 m³ per day and the discharge of sewage into waters or into the ground in an amount not exceeding a total of 5 m³ per day, for the purposes of ordinary water use, does not require a permit or notification under the Water Law [Act 2017]. This provision is consistent with the Geological and Mining Law.

It should be remembered that waters, regardless of their ownership, are subject to protection as an integral part of the environment and a habitat for organisms. Additionally, the arduousness of earthworks for the construction of underground structures, as well as the foundations of above-ground buildings, depends on the course and abundance of these waters.

Another aspect of ownership, both below and above the ground, is the conduits and facilities of utility networks that are located within the property boundaries. The ownership or possession of these facilities is governed by the specific regulations for utility infrastructure. This is a very broad subject and will be addressed in a separate publication.

4. Summary and conclusions

Current legislation in Poland defines the rules for property boundaries in a two-dimensional aspect on the ground. The aforementioned laws and regulations concerning the extent of property above and below the ground only indirectly indicate its extent, but there are no rules that allow for the detailed delimitation of boundary points and property boundary lines in 3D.

Indirectly, the Aviation Law, the Water Law and the Geological and Mining Law impose certain restrictions on the scope of the exercise of property rights. In terms of Aviation Law, the height limits associated with passenger air traffic exceed even the tallest building in the world and are therefore not relevant. Special rules are laid down for areas with aeronautical ground facilities and surrounding areas with designated areas restricting development or for which a decision on changes to the functional system has been issued. The Water Law only indicates the possibility of using water from intakes up to a depth of 30 m. The Geological and Mining Law, in turn, stipulates

that the types of minerals listed in the Law are property of the State Treasury, while the others that are not listed are treated as part of the property.

The existing guidelines in the relevant laws are not sufficient to determine in detail the extent of property ownership in 3D. They do, however, delimit areas that must necessarily be excluded when considering the possibilities of indicating the vertical extent of ownership and other rights to real estate. In conclusion, aspects related to the determination of the spatial extent of property ownership must be determined individually for each property, taking into account special regulations and local zoning plans.

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