

## Effect of engineering factors of the land plot on the efficiency of its use in the event of division

*Alexandra Kovalyshyn<sup>1</sup>, Nadia Kryshenyk<sup>1</sup>, Pshemuslav Len<sup>2</sup>*

<sup>1</sup>*Lviv National Agrarian University; e-mail: nadya\_kryshenyk@ukr.net*

<sup>2</sup>*University of Engineering and Economics in Rzeszów; e-mail: geo.pl@wp.pl*

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**Abstract.** The article analyzes the efficiency of land plot use in the event of its division based on engineering factors.

The concept of a land plot and the process of its division was determined. It was established that the division of land is made at the owner's desire to separate one or more individual land plots. Thus, the land plot is considered to be divided into parts if each of the parts determined after division may become a separate plot with further effective use of each of them.

The possible options for the division of land were analyzed. It has been found that division (unification) of the land plot is made by developing of the technical documentation on land management concerning the division and unification of the land plot. It is possible to carry out this procedure only when the right to land is legalized.

On the basis of experimental studies it was found that newly formed land plots became less compact in configuration after the division which affects the efficiency of their use.

Therefore, it is necessary to develop common methods of land division that will provide its effective use without creating inconvenience to the owners of land plots.

**Key words:** land plot, land division, technical documentation on land management, compactness coefficient, land owners, land use.

### INTRODUCTION

In terms of urban agglomeration division of land between different land owners and land users becomes increasingly important.

The division of land may be carried out for different purposes. In the vast majority it should be done when there is a need in the implementation of civil contracts regarding not the whole area, but its individual parts.

Nowadays in Ukraine clear land division or unification techniques have not been fully established yet as well as limit values of areas and forms of plots, which are formed as a result of these actions, have not been defined.

### ANALYSIS OF RECENT RESEARCHES AND PUBLICATIONS

Division and unification of land are enlightened in many legal acts of Ukraine [1, 2, 5, 8]. Also, a number of works of domestic and foreign scientists, including works of Yu.V.Gudkov, M.I.Krasnova, V.A.Riabchij, M.F. Stepanenko, A.M. Tretiak and others are devoted to this issue. They highlighted the theoretical principles of land division but the question of determining the effectiveness of their use after the division needs further study.

### OBJECTIVES

The purpose of this study is to analyze the effect of engineering factors of the land plot on the efficiency of its use in the event of division based on comparison of the compactness coefficient before and after division.

### THE MAIN RESULTS OF THE RESEARCH

Land - is a part of the earth's surface with established boundaries, certain location, and defined rights on it [1].

The division of land is made at the owner's desire to separate one or more individual land plots. Thus, the land plot is considered to be divided into parts if each of the parts determined after division may become a separate plot with further effective use of each of them.

The division of land is carried out through the development of technical documentation on land management concerning the division and unification of the land plot. It is possible to carry out this procedure only when the right to land is legalized.

Development of technical documentation on land management consists of the following stages:

1. Forming the grounds for the development of technical documentation on land management - an application of the land owner or land user.
2. Carrying out survey works.
3. Getting the technical task for the development of documentation on land management in the local body of National land agency and its approval.
4. Development of the technical documentation on land management concerning the division of the land plots.
5. Determination of the cadastral number (s) of the land plot.

6. Registration of the property right to the land plot by the territorial administration of the registration service and making of the title document on land. According to the Law of Ukraine "On Land Management" [2] the technical documentation on land management concerning the division and unification of land plots includes:

- a) the explanatory note;
- b) the technical task for development of documentation approved by the client of the documentation;
- c) the cadastral plans of land plots, which are combined into one land plot, or a part of the land plot that is distinguished as a separate land plot;
- d) the materials of field geodetic works;
- e) the deed of conveyance of landmarks for retaining while deviding the land plot according to the boundaries of deviation;
- d) the list of encumbrances of land rights, restrictions on its use and available land easements;
- f) notarized consent to the deviation or unification of the land plot of mortgagees, users of land (in case if land is mortgaged or in use);
- g) consent of the land owner for lands of state property - the body authorized to carry out the disposal of the land plot, on division or unification of land plots by the user (except cases of division of the land plot in connection with the acquisition of ownership of a house located on it).

Such land plots are subjects to deviation: devolved to several heirs; belonging to two or more persons on the right of joint ownership; formed as a result of the contract of donation of the land plot to several persons; the purpose use of the land plot changes and so on.

There are following options for the division of the land plot in the scientific literature [3]:

1. The best option - when the buildings stand apart. There are two separate passages and entrances to buildings of both owners, no common parts of buildings, structures. In this case, the land plot can be called "divisible".

2. Under situational conditions of placement of buildings on the land as to the street, some passages are not only absent, but they cannot be made. In this case, it is proposed to divide the land into three parts.

Two separate plots are only for the seller and buyer and one general - in their joint lease or joint property for passage and so on. In this case, this land plot can be called "partially divisible".

3. According to the mutual location of buildings, structures, the land plot cannot be divided at all. For example: the first floor belongs to the seller, and the second - to the buyer. In this case the only possible thing is a joint lease. A rent for the lease of the land plot provided in a joint lease, should be determined in proportion to shares (areas) of real estate owned by the seller and the buyer. This land plot is called "indivisible".

Every option of the possible division of the land plot affects the efficiency of its use.

The effectiveness of the reorganization of the land plot can be seen in various aspects. One of them is an engineering aspect – effect of the configuration of the land plot on the effectiveness of its division. Under the configuration of the land plot we understand the external

outline (contour) of the land plot with mutual location of turning angles.

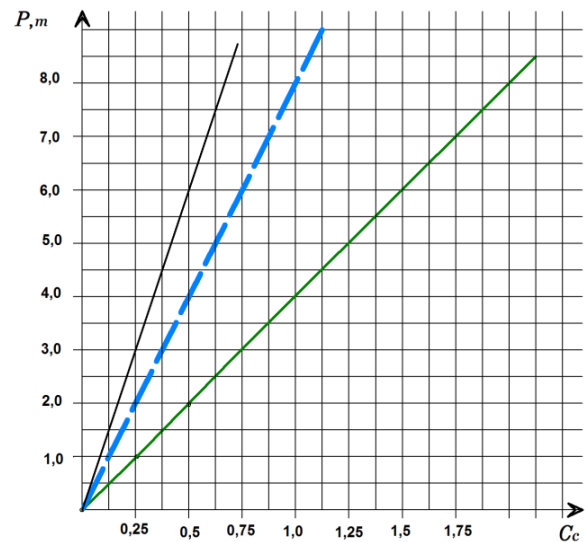
A.M. Tretiak proposes to hold assessment of the configuration of the land plot using the compactness coefficient of the territory [4]:

$$C_c = \frac{P}{4\sqrt{S}}, \quad (1)$$

where:  $C_c$  – the coefficient of compactness of the territory,  $P$  – the perimeter of the land plot,  $S$  – the area of the land plot,  $m^2$ .

After calculating the authors believe that "the closer the compactness coefficient to the number one, the better the configuration of the land plot". Thus, the coefficient of compactness is a quotient of deviation of the perimeter of certain ownership and land tenure by the perimeter of the square of the same area as the figure that has the smallest perimeter.

Dependence of the compactness coefficient of the territory on the perimeter is shown in the graph (Fig. 1).



**Fig.1.** Dependence of the compactness coefficient of the territory on the perimeter of the land plot\*.

\* Source: developed by the authors.

That is, the most compact configuration of the land plot is in the form of a square.

Experimental data affirm changes of the compactness coefficient of the land plot before and after its division, and this has an effect on the efficiency of its use.

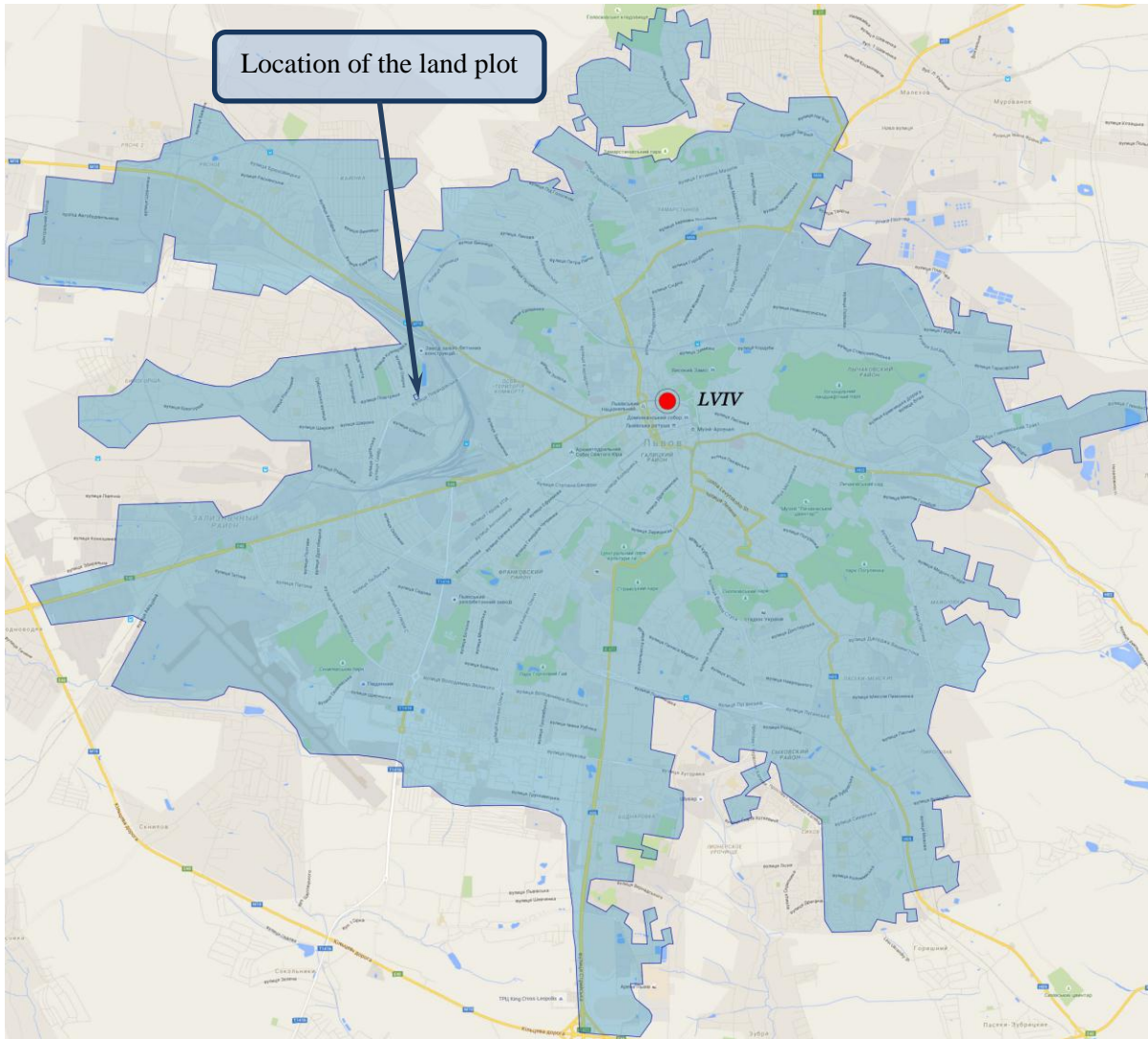
For example, let us consider the land plot, which is located in the western part of the city Lviv (Fig. 2).

A characteristic feature of the area which is under study is that land plots of the square configuration are met here very rarely, and the most prevailing ones are rectangular plots of arbitrary length and width.

The total land area of the studied plot is 0.0681 ha (Fig. 3).

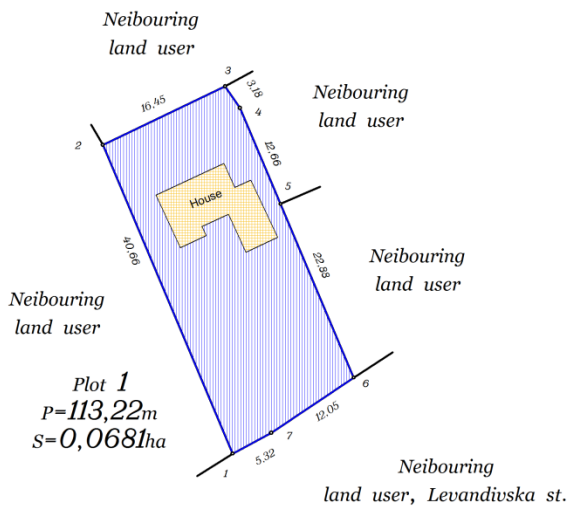
The vehicle entrance is available from Levandivska street. In the process of land use there was a need in its division between two heirs. Since the conventional methods of deviation of land plots are absent, the division is made at the owners' desire.

(Fig. 4) shows a plan of division of the land plot among heirs. According to the will inherited shares of the territory are equal.



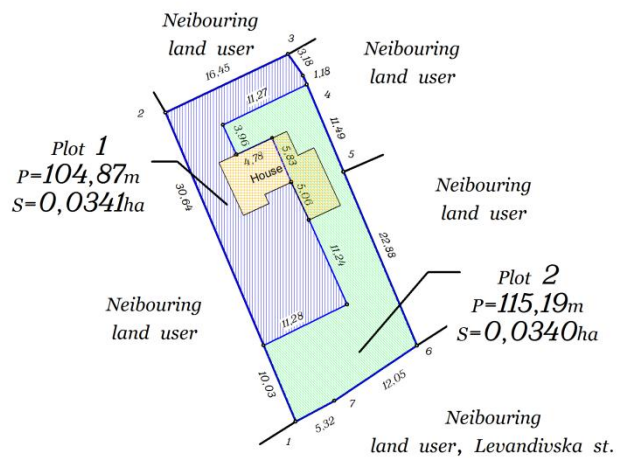
**Fig. 2.** Location of the land plot\*.

\*Source: developed by the authors on the basis of Google Map.



**Fig. 3.** Plan of the land plot in Levandivska street\*.

\*Source: developed by the authors.



**Fig.4.** Plan of the land plot division in Levandivska street\*.

\*Source: developed by the authors.

(Table 1) shows the characteristics of the land plot in Levandivska street before and after deviation.

**Table 1.** Characteristics of the land plot in Levandivska street

Number of the land plot	Form of the land plot	Number of turning angles of the land plot boundaries	Perimeter, $P$ , m	Area, $S$ , ha
Before deviation				
Plot 1	Approximate to the rectangular	7	113,22	0,0681
After deviation				
Plot 1	Polygon	12	104,87	0,0341
Plot 2	Polygon	13	115,19	0,0340

According to the performed data we calculate the compactness coefficient of the territory.

Before division:

$$C_c \text{ plot } 1 = \frac{113,22}{4\sqrt{681}} = 1,08. \quad (2)$$

After deviation the compactness coefficient of the territory for two plots is:

$$C_c \text{ plot } 1 = \frac{104,87}{4\sqrt{341}} = 1,42, \quad (3)$$

$$C_c \text{ plot } 2 = \frac{115,12}{4\sqrt{340}} = 1,56. \quad (4)$$

So, after the division the newly formed land plots became less compact in configuration.

The division of the land plot in Levandivska street in accordance with the plan of deviation is impractical. First of all, it is connected with the compactness coefficient of the land plots, which changed from 1.08 - for general territory to 1.42 and 1.56 - for some of its parts. Also unreasonableness of this division is that the newly formed land №2 has an awkward shape and broken lines complicating its use for the intended purpose – for construction and maintenance of residences, farm buildings and structures.

## CONCLUSIONS

So, on the basis of the experimental studies it was defined that after the division the newly formed land plots became less compact in configuration, which affects the efficiency of their use.

Modern conditions of land market functioning require from lawmakers improvement of existing and adoption of new standards. It is necessary to develop conventional methods of deviation of the land plots that will ensure their effective use without creating inconvenience

to land owners and land users. These methods also should provide the size of the minimum allowable area of the land plot for a specific intended use.

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