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An Assessment of the Impact of the Protection Zone Regime for Cultural Heritage Sites on the Value of Land for Individual Housing Construction in the Context of a Low-Activity Market

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Abstract: The preservation of cultural heritage plays a key role in the development of society. To preserve cultural heritage, protection zones are established, which represent an encumbrance on land plots and, therefore, should be taken into account in the valuation process. Currently, there is a problem that mass (cadastral) and individual valuation methods do not necessarily include cultural heritage objects and their zones in cost coefficients. The absence of a mechanism to address their individual characteristics in the real estate valuation system has a significant impact on the value of real estate and leads to unjustifiably inflated market value and, as a consequence, to disputing the results of cadastral valuation. This article is devoted to determining the impact of protection zones of cultural heritage objects on the value of land intended for individual housing construction, using the example of the city of Orenburg. This article considers various methods of identifying patterns of the influence of zones with special conditions of use of the territory on the market value of land and substantiates the use of the method of comparative sales in the conditions of a low-active land market in Orenburg, a statistical analysis of market information, on the basis of which the type of activity of the real estate market in Orenburg was determined. The patterns of the calculation of corrections for the remoteness of the studied land plots from the objects of the transport and social infrastructure of Orenburg were revealed in this work as well. Through the method of paired sales within the framework of an individual assessment of the land plot intended for individual housing construction, the diminishing impact of the zones of protection of cultural heritage objects on the market value of land plots was revealed. This allows for conclusions to be drawn as to whether objects of cultural heritage have an impact on the value of real estate, and as a result, there is a need to modify the applied methods of mass and individual real estate valuation within the boundaries of historical settlements.

Keywords: cost factors; cost; equivalent objects; buffer zones; land assessment; adjustments; historical settlements; historical and cultural monuments; land parcels



Citation: Dyachkova, I.; Bykova, E.; Dudina, V.; Banikevich, T. An Assessment of the Impact of the Protection Zone Regime for Cultural Heritage Sites on the Value of Land for Individual Housing Construction in the Context of a Low-Activity Market. *Heritage* **2024**, *7*, 2682–2708. <https://doi.org/10.3390/heritage7060128>

Academic Editor: Nicola Masini

Received: 9 April 2024

Revised: 21 May 2024

Accepted: 24 May 2024

Published: 26 May 2024



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1. Introduction

Real estate objects that have historical and cultural value can be included in the unified Russian Federation State Register of Cultural Heritage Objects, be classified as especially valuable objects of World Cultural Heritage and identified as historical and cultural monuments or valuable city-forming objects. All of them have a special status, are protected by the state and, therefore, act as regime-forming objects that impose certain restrictions or prohibitions on the land plots and construction objects adjacent to them. The presence of such an object on the territory of a settlement in any case has consequences for the use of the surrounding real estate objects. Thus, for the preservation of historical and cultural monuments, protection zones are established, within the boundaries of which the requirements for urban planning regulations and land use regimes are clearly defined.

The protection of immovable cultural heritage is an essential component for many spheres of social life and should be taken into account in various types of activities. In 2015, State Members of the United Nations adopted sustainable development goals, one of which is the preservation of the cultural and natural heritage of countries. The importance and necessity of protecting cultural heritage sites (CHSs), also known as monuments of history and culture, is laid down in the postulates of the UNESCO Convention. In order to preserve such objects in the historical environment, protection zones are established, within which real estate objects are subject to restrictions in use, which, as a rule, strongly affect the mode of economic activity. The inability to realize the full potential of a land plot due to such restrictions leads to the fact that its value for some types of permitted use can be significantly reduced, which affects land taxation.

The relevance of the issue of the impact of zones with special conditions of use of territories' use-restricted zones (URZs), which their regimes and legal features have on the value of land plots, is due to the fact that currently, there are no methodological guidelines in Russian legislation on the account for such zones, including zones of protection of CHSs in the process of real estate valuation. This leads to the problem of overestimating the value of lands belonging to certain types of permitted use, for which certain types of economic activities are restricted or prohibited by the regime of the imposed zone. The bias of the results of real estate valuation without regard to the impact of zones of protection of CHSs contributes to the development of social and economic inequality and tension due to the lack of a fair market and (or) cadastral value of land plots. At the same time, this problem is being actively raised in the global community at the legislative level and in the research of various scientists.

The purpose of this work is to determine the impact of CHS protection zones, which are assigned to URZs, on the market value of land plots for individual housing construction (IHC) that are encumbered by such zones. This study was carried out on the example of a historic city of regional significance, where market data on the offer prices of land plots intended for IHC, located within the boundaries of the Unified Zone of Regulation of Development and Economic Activity established in the historical part of Orenburg, and beyond such borders were studied.

In order to achieve the set goal, it is necessary to solve a number of tasks:

Firstly, to conduct a scientific review of research in the field of accounting for CHSs and their protection zones in the process of real estate assessment in Russia and abroad.

Secondly, to define the approach and method within the framework of the assessment approach, which allows for the most accurate determination of the impact of the protection zones of CHSs on the value of land plots.

Thirdly, in the context of the low activity of the real estate market, by means of the method of paired sales, to determine the coefficient (numerical expression) of the influence of the regime of the protection zone of CHSs on the market value of land plots intended for IHC, using the example of the historical settlement of the regional importance of Orenburg city.

This article includes the following structure: the section "Literature Review" presents an overview of the existing methods of assessing the impact of CHSs on the value of real estate and reveals the relevance of the research topic and problems in the existing assessment methodology; section "3. Materials and Methods" contains the methodology of the assessment, justification of the method of the identification of the influence of objects of CHSs and their protection zones on the land value and presents a step-by-step description of the applied methodology of assessing the impact of cultural heritage protection zones on the value of real estate; section "4. Results" includes the obtained research results and their interpretation, including the results of the statistical analysis of real estate transactions, a list of valuation factors and the calculation of the coefficient of the influence of zones of protection of CHSs on the land value for individual housing construction; "5. Discussion" contains a discussion and comparison of the obtained results with similar studies, and the last section of the article "6. Conclusions" includes conclusions on the research results.

2. Literature Review

Due to actively developing urban planning processes, the development of construction and the intensive use of land, the need to establish a URZ is currently becoming more and more urgent both abroad and in Russia. Particularly acute are the issues of CHS protection zones. Significant rates of urbanization should be accompanied by actions that would allow for the preservation of cultural heritage objects with historical and social value [1]. Buffer zones are established in order to achieve the safety of such objects, which have basic characteristics similar to the protection zones of CHSs in Russia [2]. The UNESCO Convention enshrines the concept of such zones, the principles of their operation and the purposes for which they are established. The Xi'an Declaration, adopted by the International Council on Monuments and Sites (ICOMOS) in China in 2005, emphasizes the protection, conservation and management of cultural heritage sites. According to the Vienna Memorandum adopted by UNESCO in Austria in 2005, the establishment of buffer zones is one of the important tools to ensure the sustainable development of territories [3].

In some countries, the establishment of protection zones for cultural heritage sites is mandatory and is accompanied by an assessment of the historical and cultural value of such territories. In China, the boundaries of the buffer zones of cultural heritage sites should be inscribed on the territorial development plan and included in the urban land assessment process [4,5]. Japanese researchers Chen G., Shi J., Xia Y. and Furuya K., using Tokyo as an example, propose a new methodology for cultural urban landscape assessment using spherical cameras to calculate the sky view factor (SVF), garden (cultural heritage site) view factor (GVF) and construction influence factor (CVF) [6]. In France, special areas are set around valuable objects, which are called "surrounding perimeters". Within their borders, all economic work should be carried out only in coordination with the authorities [7]. Knippschild R. and Zöllter C. for the example of the city of Görlitz in East Germany proposed to estimate the historical territories of the city center using the matrix of transformation of urban space, which contributes to the consideration of aspects of historical and cultural heritage in the assessment of the city space [8].

Within the boundaries of historic city centers, real estate objects located near or adjacent to CHSs are subject to dual impacts. On the one hand, the CHS protection zone encumbers land plots and restricts activities on them, and on the other hand, cultural heritage objects increase the prestige and historical and cultural value of the area. Among other things, historic city centers, as a rule, tend to attract the attention of authorities, developers and ordinary citizens. Historical and natural public spaces provide various services that enhance the well-being of those living nearby [9]. This is reflected in the willingness of buyers of real estate located next to landscape, natural and historical monuments to pay significantly high prices for such objects [10].

However, this statement is valid provided that the land is divided into various types of permitted use. The influence of cultural heritage objects can be reflected in two types of factors: price-lowering and price-increasing [1,9].

In their publication, Ryberg-Webster S. and Kinahan K. note that the preservation of cultural heritage objects has many advantages, including increasing the value of real estate located in the buffer zone of these objects [11]. According to Sutyagin V., Gribovsky S. and Bykova E., the zones of protection of CHSs and, in general, URZs are an economic factor, as these zones can have a significant impact on the planned use of land, and this leads to the fact that the market value of land plots may decrease due to the decrease in potential income from land use [12–14].

Thus, the nature of the regime and the degree of influence of the URZ on types of economic activities are the main reasons for including such zones in the composition of value factors taken into account when calculating the value of land plots. At the same time, according to the Federal Law of 29.07.1998 N 135-FZ "On Assessment Activity", as well as the Order of Rosreestr from 04.08.2021 N P/0336 "On Approval of the Methodological Guidelines for State Cadastral Appraisal", currently the assessment of the cadastral and market value of land plots in the Russian Federation does not provide for the mandatory consideration of the impact of protected areas of the OKNF as a cost factor. The scientific community is questioning its necessity. Thus, Kruglyakova V. and Kravtsova P. claim that the inclusion of these zones in the assessment process is mandatory [15]. Kruglyakova V. revealed that the current practice of valuation activities in terms of accounting for URZs is very heterogeneous, different evaluators apply different mechanisms of accounting for encumbrances due to this non-systematicity; there are two groups of problems: either URZs are not taken into account in the assessment at all or their impact is assessed through the exclusion of the encumbered part of the plot from the calculations [15]. Due to the specific nature of the URZ, real estate market entities do not realize the consequences of the location of a land plot within URZ boundaries, which may have various negative consequences ranging from the restriction of certain economic activities up to the impossibility of using the plot. All this may in the future affect the possibility of selling the land plot and its value. Kulkov A. in his work revealed the change in the value of land plots associated with restrictions on their use [16]. Consequently, in order to achieve fair land value and, as a consequence, to ensure stable taxation and the sustainable development of the territory, both when determining the cadastral and market values of real estate and when challenging them, it is required to consider the restrictions and encumbrances imposed by the URZ [17].

Many foreign and domestic researchers are engaged in the study and development of various methods of accounting for land restrictions caused by the presence of the URZ in the process of real estate valuation. Thus, Bykova E. provides for the assessment of the impact of the URZ on economic activity in the process of mass and individual land assessment by expert and statistical methods [14]. Depending on the type and features of CHS protection zones, it is possible to note the influence of the zone of regulation of development and economic activity on the use of garden and horticultural plots, namely agricultural activity and construction. For agricultural land plots, such zones restrict the construction and cultivation of perennial plantings [14]. A method for determining the value of the influence by the method of qualimetric modeling is also proposed, and together with Senkovskaya K., the reaction of the market of horticultural land plots in St. Petersburg to the presence of various URZs is determined [18]. The study of the impact of the regime of protected areas of CHSs on the use of land plots intended for residential housing proves that the regimes of URZs, including zones of protection of CHSs, reduce the rights holder's ability to use land.

Along with the undeniable influence of the qualitative state of land cover on the value of agricultural land, an important factor for residential lands is the presence of the regime-forming objects themselves [19,20]. Lopera C. and López-Morales E. consider the zones of protection of CHSs as an external factor, and the internalization method is singled out as the main method of the state regulation of the land market turnover and its intensification in an imperfect market, which allows for the inclusion of externalized (external) costs in the costs of the subjects causing them [21].

Methods in which land encumbrances act as a cost factor in valuation are actively applied [22,23]. Fedorov E. proposed a scale of levels of influence of easements, which as well as the URZ act as encumbrances of land plots. The proposed scale allows us to determine the weighted average value of the indicator of the loss of utility of the plot while focusing on a subjective assessment of factors that does not have clear numerical criteria [24].

Sutyagin V. proposed the method of paired sales analysis, which allows us to determine the value of real estate objects that differ from each other only by the presence of the URZ [12]. Bakulina A. and Abdryakhimova D. proposed a methodology for calculating the value of a land plot, initially noting that this plot does not have any restrictions but, subsequently, applying to it adjustments for the prohibition of capital construction and other restrictions. The authors believe that in order to assess the value of a real estate object, it is necessary to apply a downward adjustment for land plots intended for the improvement and placement of landscaping facilities [25].

The methodology for assessing land plots with encumbrances, developed by Bykova E., involves the calculation of the zone regulation coefficient, expressing a decrease in income and, in parallel, an increase in costs on the part of the land plot that is encumbered by the zone [14].

Rudokas K. and Landauskas M. considered different methods for assessing the impact of CHSs on real estate value, which depend on spatial conditions, benefits and potential negative effects from the presence of CHSs. Such methods include the following: the real estate price analysis method, travel cost method, the method of conditional assessment and the method of subjective well-being [26]. Antropov D., Zhdanova R. and Gvozdeva O. put forward a proposal to introduce the correction of coefficients into valuers' handbooks that take into account the presence of CLSS on a land plot [27]. This paper proposes formulas for calculating the cadastral value of land plots that consider the part of the land plot (area) covered by such zones, as well as the regulations of these zones [27].

Among other things, it is important to mention zoning restrictions. Zoning restrictions often authorize only one or a few specific land uses. If the severity of restrictions on types of land use is different, then this may lead to the division of the land market into segments related to specific types of use, since the arbitration mechanism between different types of land use is disabled. For example, Levkovich O., Rouwendal J. and Brugman L. provide an example of the division of the land market in the Netherlands into three segments: agricultural, commercial and residential use. In their study, they proved that the value of land plots for agricultural use is much lower than the value of plots allocated for residential and commercial use [28].

Knowing the powers that can be exercised or the restrictions placed on specific land parcels is very important for both the government and the public. The government needs such information to implement and monitor development strategies and policies, and the public needs it to use land within the limits set by legislation [29,30].

To summarize, the following should be concluded: obtaining a fair land value that will improve the institution of taxation, improve social divisions and promote the most efficient use of land resources dictates the need to consider it in the process of the individual and mass assessment of land values of the zone of protection of cultural heritage objects.

3. Materials and Methods

Due to the need for transformation, researchers in many countries of the world have recently proposed methods that would allow us to take into account the presence of the URZ in the valuation process. In addition to those discussed above, some methods that allow for an adequate consideration of the presence of SLHCs can be identified:

- (1) The method of qualitative assessment (Fedorov E., Sutyagin V., Cienciała A., Sobolewska-Mikulska K., Sobura S. [12,22,24]). This methodology does not contain an indication to take into account the impact of such zones on the value of land, as it is designed to calculate losses from the establishment of easements, but the discrete scale of the levels of the impact of easements on losses and the determination of the value of the loss of utility of the land plot proposed by the author is based on a subjective assessment of factors.

- (2) The method of taking into account restrictions in the development of the site. This method is quite often used in practical assessment, but it does not take into account the degree of influence of such an area on the value of the site (Kulkov A., Lopera C., López-Morales E. [16,21]).
- (3) Loss method. The forecast of income loss in the assessment of undeveloped land plots is highly variable, which leads to a high level of subjectivity and, as a consequence, a low level of validity of the relevant conclusions (Kruglyakova V., Rudokas K., Landauskas M. [15,26]).

It is worth noting that subjectivity can be traced in all the considered methods. They also assume the application of universal correction factors, which do not take into account the individuality of real estate objects. Their main problem is that, as a rule, it is quite difficult to understand to which part of the land plot it is necessary to apply them. In addition, in individual land valuation, depending on the differentiation of the real estate market in terms of activity, different methods of determining the impact of the URZ on land value are applied [12]. The choice of one or another valuation method depends mainly on the market activity. Therefore, the next stage is a statistical analysis of the number of transactions with land plots in Orenburg over 12 years. In this study, the sales comparison method is applied in the context of a slow market.

In addition, such methods such as Contingent valuation, the revenue method, Analytical Procedure for Estimating the Market Value of an Urban Property and the Synthetic Procedure for Estimating the Market Value of an Urban Property can be used for the valuation of real estate with encumbrances in the form of CHSs.

Shetty D., Rao B., Prakash C. and Vaibhava S. in their paper talk about the advantage of multicriteria regression analysis in conducting land valuation over traditional methods [31].

Among the various methods of taking into account the impact of the URZ on the value of land and capital construction objects, including those presented above, we can highlight the method of calculating the coefficient of the regulation of such a zone, showing the change in the value of the real estate object due to its presence. One of the effective ways of obtaining such a coefficient with a simultaneous assessment of the market value of the land plot is the method of paired sales [14]. Its essence is to calculate the correction for the characteristic that differs between the object of assessment and the object-analogue (e.g., the presence of the URZ), and then the obtained correction is used to adjust the value of the object of assessment in comparison with the value of objects-analogues [16]. In addition to the above-mentioned authors, the effectiveness of this method is also emphasized by Sutyagin V. [12]. At the same time, it is proposed to use a modified method of paired sales to determine the impact of protection zones of CHSs on the value of land plots. Such a modified method is based on the determination of the regulation coefficient of the CHS protection zone based on the comparison of market values obtained by comparing the objects-analogues falling within the boundaries of the zones and being outside such zones [14]. Next, the stages of the application of the above modified paired sales method will be discussed in more detail.

In the process of the valuation of land plots, depending on the type of permitted use, different value factors are distinguished, such as physical and legal characteristics, location, economic situation, landscaping and other various factors that can be taken into account both as qualitative indicators and quantitative; for example, urban landscaping can be taken into account by the distance to green spaces and their quality, which can be assessed using remote sensing data and aerial photography [32,33]. The appraisal process includes several stages (Figure 1):

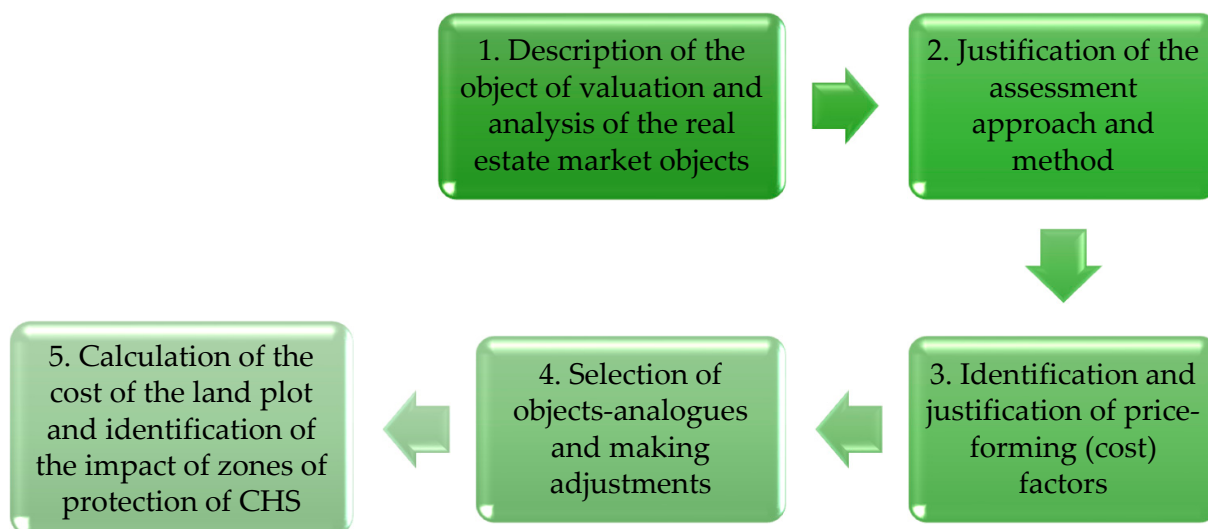


Figure 1. Stages of individual assessment by the paired sales method: own elaboration.

(1) The description of the valuation object and analysis of the real estate market. At this stage, the description of the location of the object of assessment and other characteristics', which to a high degree influence the value of the assessed real estate object, data on purchase and sale transactions of objects belonging to a particular segment of the real estate market are analyzed.

(2) The justification of the approach and valuation method. The income approach is applied to real estate that is capable of generating or producing income. The cost approach includes methods of determining the value of real estate based on the determination of costs taking into account depreciation. On this basis, it is not applied to the valuation of land plots. The comparative approach to valuation is used if it is possible to select a sufficient amount of market information. Like the income approach, it can be applied both for land plots and for the valuation of premises, buildings and other real estate.

(3) Identification and justification of value factors. To compile such a set of factors, it is necessary to conduct a study of the real estate market, its trends and dynamics to identify the conditions of pricing and analyze existing reports on the valuation of real estate located in the locality under consideration.

(4) Selection of objects-analogues and calculation of adjustments. Based on the analysis of the market of real estate objects similar in characteristics to the object of assessment, data on the objects-analogues are collected. In the work, the objects-analogues should be selected in such a way that they are similar. In case of discrepancy, adjustments shall be made to the differing characteristics.

(5) The calculation of the cost of the land plot and the identification of the impact of protection zones of the CHS. At this stage, two values of one land plot are calculated: the value with and without the zone. The coefficient of the influence of the CHS protection zone is also determined by dividing the obtained values.

Further on, all the described stages of appraisal will be disclosed in more detail. Within the framework of this work, the historical settlement of regional significance Orenburg is the research area. It is one of the most ancient cities of the Orenburg region and Russia, which is more than 275 years old. Orenburg has a rich history, which is reflected in its radial layout. It was founded in 1743 at the crossing of the Ural (old name Yaik) and Sakmara (old name Or) rivers as a fortress to protect the Russian borders from the raids of nomadic peoples and later became a center of trade between Russia and Central Asia. Orenburg is a historical settlement of regional significance. According to the data of the Inspectorate for State Protection of Cultural Heritage of the Orenburg Region, as of 1 January 2022, there are 474 historical and cultural monuments, including 171 identified.

The centuries-old history of the city is reflected in the type of its layout: the historical core shows the image of a typical Russian provincial town with predominant buildings of the XVIII-IX centuries.

At the second stage of assessment (Figure 1), the chosen approach and method of valuation are justified. According to the Order of the Ministry of Economic Development of Russia from 14.04.2022 N 200 "On Approval of Federal Valuation Standards and on Amendments to Some Orders of the Ministry of Economic Development of Russia on Federal Valuation Standards", in the practice of both the market and cadastral valuation of real estate, three approaches can be applied (cost, income and comparative). The choice of one or another approach to valuation is conditioned by the type of real estate, possibilities of its application and goals and objectives of the valuation. In addition, it is necessary to take into account the completeness and reliability of the initial information, potential use of the assessment results and possible assumptions.

According to Monin A. and Plotkina A., the comparative approach has a clear advantage over other approaches, which is that the appraiser operates with real market data, which contributes to a more accurate assessment of real estate [34]. The choice of the comparative approach is conditioned by the level of development of the real estate market: it is necessary to ensure the representativeness and sufficiency of the sample.

Both qualitative (relative comparative analysis, expert methods) and quantitative (methods of regression analysis, paired sales, unit of comparison and base plot) methods of the comparative approach can be used in the valuation process. The choice of one or another method depends on the activity of the real estate market, as well as on the volume and quality of the obtained market information [35]. An important step in choosing the approach and method of evaluation is the analysis of the real estate market, in which static methods, spatial analysis and GIS technologies and modeling can be applied [36]. To date, when analyzing the initial data and other purposes in various areas of cadastral, land planning and urban planning activities, as well as in the development of deposits, BIM technologies are actively used, which can become a promising direction in assessment [37].

In the process of mass and individual assessment, the ways of identifying the impact of LSMS on land value are different. In the process of mass land valuation, a necessary condition for assessing such an impact is the entry of data on the boundaries of the URZ into the Unified State Register of Real Estate (USRN) [12].

Within the framework of individual assessment, as already mentioned above, the methods of determining the impact of the URZ on land value differ. Thus, for example, in conditions of a depressed market, the expert-analytical approach is the most effective, in conditions of a low-active market, the expert and correlation–regression approaches should be applied, and in conditions of an active market, the method of neural networks, methods of mathematical statistics, geostatistics, spatial modeling and others. To calculate the coefficients of the regulations of the URZ in the conditions of a low-active market, the most effective method is the method of sales comparison (method of paired sales), which is implemented in the framework of individual assessment (Figure 2).

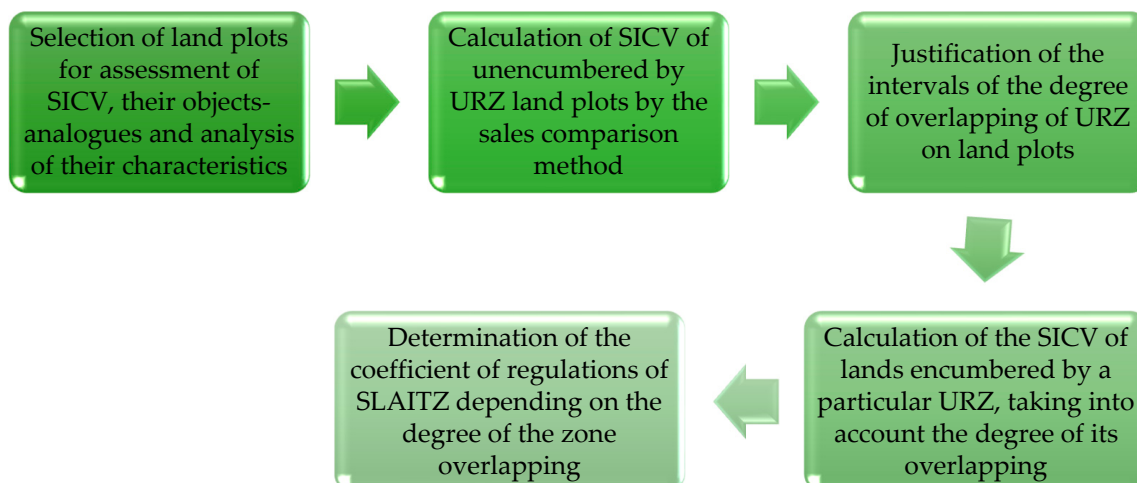


Figure 2. The sequence of the calculation of the coefficients of regulations on the impact of the CHS zone on the SICV of land plots by the method of paired sales in a low-active market: own elaboration.

As noted above, the study of the Orenburg land market, with regard to land plots for housing and communal services, taking into account the zones of protection of CHSs, has shown its low activity. This suggests the need to apply individual assessment methods. Based on the identified advantages and opportunities of the comparative approach, the paired sales method is used in these studies. The choice of this method is due to the fact that the use of other methods of economic and statistical analysis, as well as regression modeling, is not possible, due to the fact that the amount of source data for these methods is insufficient.

As part of the individual assessment of the land plot using the paired sales method, an important stage is the identification, description and justification of cost factors. The choice of certain factors is influenced by the purpose of the assessment: either to replenish the tax base and calculate the land tax (cadastral value) or to make various transactions (market value). The value type, which is the result of the real estate valuation, also depends on it. According to the Order of Rosreestr N P/0336 of 04.08.2021 “On approval of Methodological guidelines on State Cadastral valuation”, the cadastral value is not only the market value determined by the methods of mass (cadastral) valuation but also the value determined by the methods of individual assessment. The list of cost (price-forming) factors is compiled primarily on the basis of an analysis of the segment of the real estate market to which the object of assessment belongs.

The next stage of assessment by the paired sales method, and sometimes simultaneously with this method, is the selection and description of objects-analogues. They should be similar to the object being valued in terms of legal, physical, technical, economic and other characteristics. After that, if there are any differences between the objects-analogues and the object being valued in any characteristics, adjustments are made to make them equal [38].

When selecting objects-analogues, problems may arise due to the fact that it is difficult to find analogues that are the closest in characteristics to the object of assessment. In this study, additional difficulties arise in connection with achieving the objective of the assessment, namely to identify the impact of the protection zone regime of the CHS on the land value. Firstly, it is necessary to select land plots with similar characteristics and secondly, to select a sufficient number of objects-analogues falling into the protection zone of the CHS. A significant problem in the search for initial information within the framework of this study is the fact that in Orenburg, the boundaries of protection zones of CHSs have been approved, but information about many of them has not been included in the Unified State Register of Natural Resources.

According to the analysis, out of twenty-five approved boundaries of protection zones of CHSs, only seven of them have information about their boundaries in the Unified State Register of Natural Resources. A similar negative situation is observed for many historical settlements of Russia, for example, for the cities of Kasimov, Taganrog, Chistopol, Galich, Yelets, Kineshma and Krapivna. In this regard, there is a problem of insufficient and outdated information on restrictions and encumbrances on land use. Owners of land plots encumbered by the zones of CHSs or adjacent to cultural heritage objects, which in this case are regime-forming objects, may not be notified of the existing restrictions, which may lead to inadvertent violations of the regime of such zones. In March 2023, Orenburg approved the boundaries of the unified zone of protection of CHSs, which covers the entire historical center of the city. All selected objects-analogues are located within the boundaries of the Unified Zone of Regulation of Development and Economic Activity of Cultural Heritage Objects (UZRZHD). This section of the unified protection zone has a strict land use restriction regime, including a ban on construction, the construction of engineering communications, the placement of advertising seedlings, etc.

The principle of the similarity of characteristics of the object of assessment and objects-analogues was used in these studies. The key condition was also to comply with the rule of having or not having CHS zones. When selecting the objects-analogues located within the boundaries of the zones of protection of CHSs, there was a problem associated with the fact that the boundaries of such zones are approved only for the territory of the central part of Orenburg, and in this area of the city, the real estate market is characterized by stagnation for sale and purchase transactions.

According to various studies, the number of objects-analogues can vary. The most common rule is that there should be one more analogue than cost factors. Leifer L. and Kraynikova T. believe that from four to six objects-analogues are sufficient to obtain results with the necessary accuracy [39]. In American appraisal practice, three to eight comparable analogues are usually used with three to five adjustments for value [40]. Boykin J. and Ring A. emphasize that the comparative approach requires at least three or four comparable sales [41].

The resulting list of objects-analogues consists of two groups: land plots in the central part of Orenburg within the boundaries of the CHS protection zone and land plots that are not encumbered by the URZ, four objects in each group, respectively (No. 4 and No. 5). The following sources of information were used to obtain data on the offer prices and characteristics of objects-analogues: Avito, Yandex.Real Estate, Onrealt and Cyan. The sources of market data can also be urban planning information systems, which include both materials in text form and in the form of maps (schemes) [42].

4. Results

4.1. *The Calculation of the Land Plot Value*

The results of the study include the substantiation of evaluation factors, analysis of the real estate market in Orenburg and calculation of the coefficient of the influence of the cultural heritage protection zone. Based on the analysis of market data on completed transactions and sale offers, it can be concluded that the following factors influence the formation of prices: the purity of the transaction, location and the type of rights transferred. In addition, among the factors listed above, one cannot ignore the price change trends reflected in the cost factor "Transaction Date" or "Exposure Date", if the proposals were considered [35].

As a result, a list of cost factors has been determined, which can be divided into two groups: general, which reflect the general characteristics of the market segment of land plots intended for residential housing, and local, which are tied to specific pricing conditions in Orenburg (Figure 3).

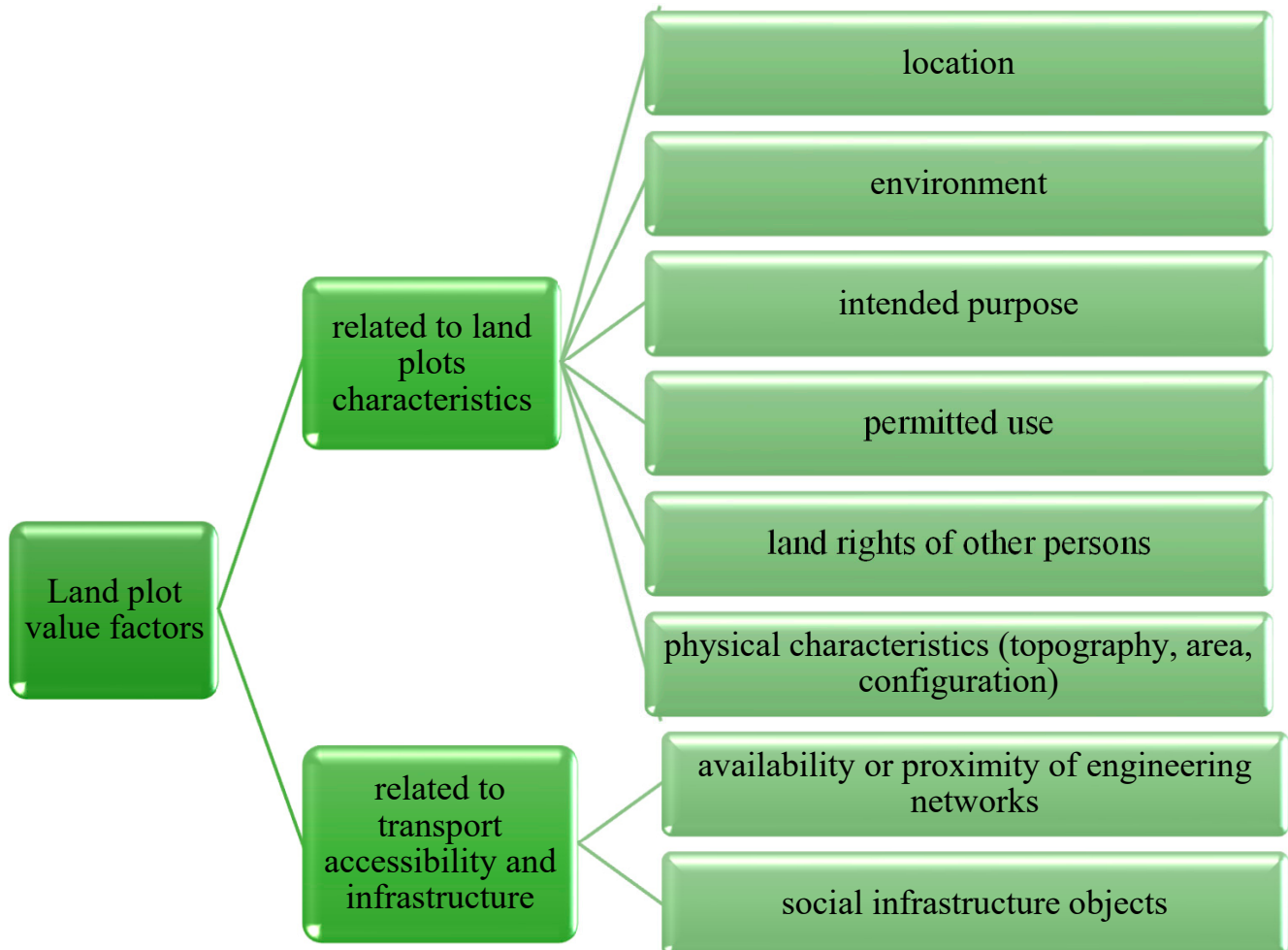


Figure 3. Factors affecting the cost of land plots: own elaboration.

The list of cost factors for each assessment object is individual and depends both on the characteristics and pricing conditions of the real estate market in a particular locality and on the individual characteristics of analogous objects [28].

The result of the analysis of the Orenburg real estate market showed that the segment of land plots intended for residential housing is almost 46%. At the same time, according to market data obtained on the Statrielt website, in this segment of the land market, it is possible to note an increase in prices by almost RUR 1,068,564 per hundred in the period from 2018 to 2021.

In order to form a list of assessment cost factors for land plots intended for residential housing in Orenburg, as well as to identify local pricing conditions, the land market was analyzed, and the report on the results of the state cadastral assessment of lands of settlements, special purpose and industry in the territory of the Orenburg Region dated 09/15/2020 No. 03-2020/NP-PROM was developed by state budgetary institution “Goskadocenter of the Orenburg Region”, on the basis of which a specific list of cost factors was determined, and their type and correlation were identified (Table 1).

Table 1. The composition of the cost factors of the group of land plots intended for individual housing construction.

Factor	Description of the Cost Factor and Its Impact on the Cadastral Value
Distance to public transport stop, m	Characteristics of transport accessibility in terms of opportunity
Distance to the Orenburg City Administration building, m	The administration building is conventionally considered the center of the city of Orenburg. The main significant objects are concentrated here, the beginning of a pedestrian tourist street, the proximity of various natural, cultural and historical sites
Distance to kindergarten, m	This distance allows us to characterize the development of social infrastructure and shows the level of social potential of the city. The development of social infrastructure has a significant impact on land plots intended for housing construction of various stories

In order to consider the impact of the protection zones of the CHS on the value of land plots intended for residential housing construction in the city of Orenburg, we analyzed the data on sale and purchase transactions of land plots for individual housing construction in the period from 2009 to 2021, from the State Cadastral Appraisal Data Fund. Volkova Y., Bykova E. and Baltyzhakova T. reviewed a substantial amount of market data on registered sale and purchase transactions of land plots intended for housing construction for 7000 settlements [14]. Based on the method of principal component analysis and the clustering method, the authors classified settlements depending on the activity of the real estate market: settlements with inactive land market—up to 10 registered transactions per year; with inactive market—from 10 to 150 transactions per year; with active land market—more than 129 sales transactions per year [9,14]. According to these studies and the analysis of the market of land plots intended for residential housing, the real estate market in Orenburg is inactive, which is due to annual fluctuations in the number of completed transactions (approximately 10 per year) (Figure 4).

In this work, the object of assessment is a land plot with cadastral number 56:44:0354003:44, which is located at the following address: Orenburg, Stepnaya St., 47A, which is intended for individual residential construction, not built-up. The land plot has no fences and elements of improvement, but it has good transport accessibility due to its location in the city center. The location of the evaluation object and its analogues is shown in Figure 5.

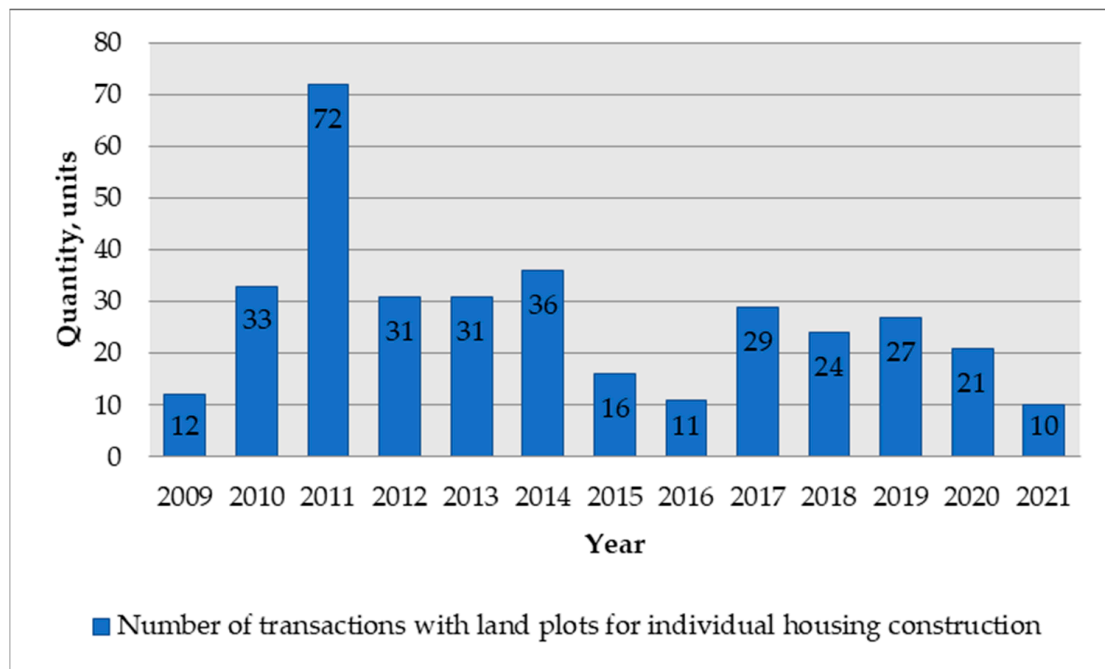


Figure 4. Number of transactions with land plots of individual housing construction in Orenburg by year: own elaboration.

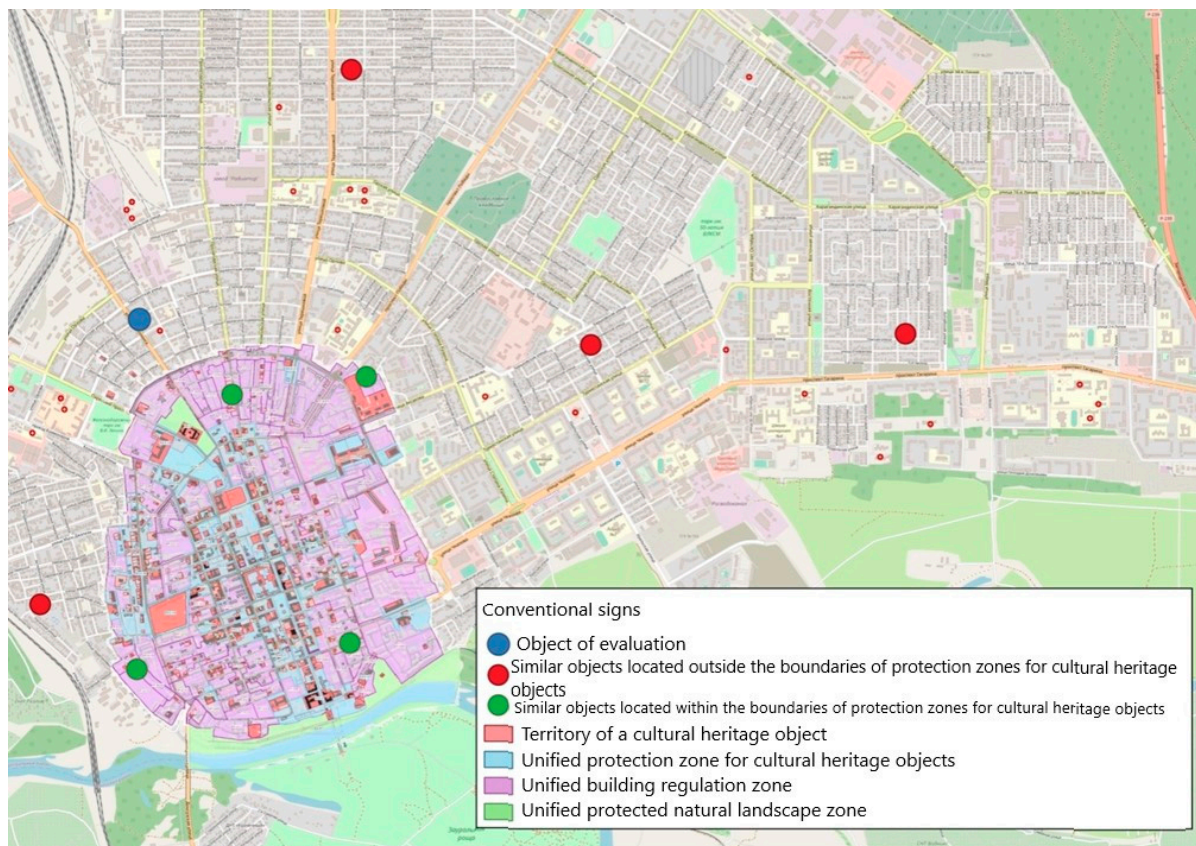


Figure 5. The location of the object of assessment and the objects-analogues in relation to each other and the boundary of the protection zone of CHSs in Orenburg: own elaboration.

The choice of land plots for residential housing as the object of the study is due to the fact that land plots intended for residential housing are common in any settlement in Russia (especially in settlements with an average number of people) and are more often the objects of transactions. According to research of the real estate market in Russia in 2018, almost 90% of all land sale offers were such land plots [12]. Also for historical settlements, preserved historical buildings are also low-rise; especially in Orenburg, the preserved buildings in the center are most often one- and two-story buildings that are either cultural heritage sites or valuable town-forming objects and are used for residential purposes.

After the selection of the objects-analogues, their characteristics are thoroughly studied and compared with the characteristics of the valuation object. Adjustments are similarly made to all objects-analogues. In case of differences, it is necessary to introduce adjustments, which can be dependent and independent, as well as expressed in monetary, percentage or share representation. To comply with the exposure rule, the very first adjustment to be entered is the adjustment for the offer or transaction date. As part of this work, adjustments were first introduced to cost factors reflecting the general characteristics of the market segment of land plots intended for IRC, in accordance with the applicable rules for such adjustments.

In this study, data on land plot sale and purchase offer prices are used for individual land plot assessment; therefore, it is necessary to adjust the values of the price of supply on the date of exposure. According to the information from the appraisers' handbook edited by Jaskiewicz E., the minimum exposition period at which the market dynamics do not show serious changes is approximately 6–9 months. The adjustment is not introduced when no more than 6 months have passed between the date of exposure (transaction) and the date of assessment of the objects-analogues. Otherwise, it is necessary to make an adjustment according to the indices of changes in market prices (in rubles) [43]. In this paper, the correction for the offer date was made based on the analysis of land plot sale announcements published on the Internet for each six-month period. Such an adjustment was introduced into the offer price values for objects-analogues No. 2 and No. 3, which are located within the boundaries of the CHS protection zones, and for object-analogue No. 4, located outside the boundaries of such zones.

An adjustment for the value of the area is introduced for land plots if the object of assessment or the object-analogue has an area of more than 1500 sq.m. (Rosreestr Order No. PP/0336 of 04.08.2021 "On Approval of Methodological Guidelines on State Cadastral Assessment"). This amendment was made to the value of the SIMV of only object-analogue No. 2 located within the boundaries of the CHS zone.

No location adjustments were introduced into the value of the objects-analogues located within the boundaries of the CHS zones since all of them are located within the boundaries of the historical core of Orenburg.

One of the adjustments, which characterizes the purity of the transaction and is accepted by the majority of appraisers, is the adjustment for the type of transferred rights. All selected objects-analogues are offered for sale, so this adjustment was not made. All objects-analogues have no other encumbrances except for the zone of CHSs.

As shown in Table A1 (Appendix A), all land plots have engineering communications. The resulting values of the adjustments made for the objects-analogues located within the boundaries of the UZRZHD are presented in Table A2 (Appendix A).

All initial data (land plots sale announcements) are obtained from publicly available sources of the Internet; real estate market conditions are typical. According to the research of Leifer L., as well as analysts of the real estate market Statrielt, the price of advertising offers, published ads and the real price of the already completed transaction differ. This difference is commonly referred to as a “bargaining discount”. Adjustment for bargaining on the results of the analysis of the real estate market in Russia, conducted by Statrielt experts, depends on the locality where the object of valuation is located. Thus, Orenburg belongs to group B—the regional center, where the value of the correction for bargaining for land plots intended for IHS is 8%. This correction is included in the price values of all the objects-analogues. According to Statrielt appraisers, the adjustment for dilapidated buildings to be demolished is 8%.

The second group of adjustments to factors relevant to specific pricing conditions in Orenburg, for the distance from the education facility (kindergarten), the city administration building (considered to be the central point of the city) and public transport stops (transport accessibility, is a calculated value in the form of coefficients. In order to identify the impact of these distances on the value of land plots, the market information contained in the substantiation materials of the Assessment Report was analyzed. According to the studied data for the period from 2015 to 2020, about 30,000 sale and purchase transactions of land plots intended for IHC were concluded in the territory of the Orenburg region. From these data, 1700 objects were sampled for transactions with land parcels located directly in the city of Orenburg. The conducted correlation analysis of the values of specific market value indicators (SIMVs) of these land plots and indicators of the distance from the object of education, bus stop and the building of the city administration, determined in a straight line and expressed in meters, showed a high inverse relationship between these characteristics: as the distance from the land plot to the object of social or transport infrastructure increases, the value of this land plot decreases (Table 2).

Table 2. A correlation analysis of the dependence of distances to infrastructure facilities and SIMV, rub/sq.m land plots.

Factor	Correlation Coefficient
Distance to public transport stop, m.	−0.93
Distance to the Orenburg city administration building, m.	−0.65
Distance to the object of education, m.	−0.81

In order to identify and describe the mathematical dependencies between the characteristics of infrastructure and the value of land plots, the values of the SIMV of the land plots at every hundred meters of the distance and their respective distances were chosen. As a result of studying this sample, it was revealed that the value of land plots decreases every hundred meters away from the educational institution by 0.2% (Figure 6).

Similarly, it is obtained that at the distance of the land plot from the public transport stop, there is also a decrease in the SIMV, while the value of this decrease is 0.4% (Figure 7). In order to express the dependence between the SIMV of land plots intended for IHC and the distance from them to the building of the Orenburg administration, the average values of the SIMV of land plots at a distance of 300 m were taken. The result of the analysis of the obtained sample showed a 1.65% decrease in the values of the cost of plots every 300 m of distance from the Orenburg administration building (Figure 7).

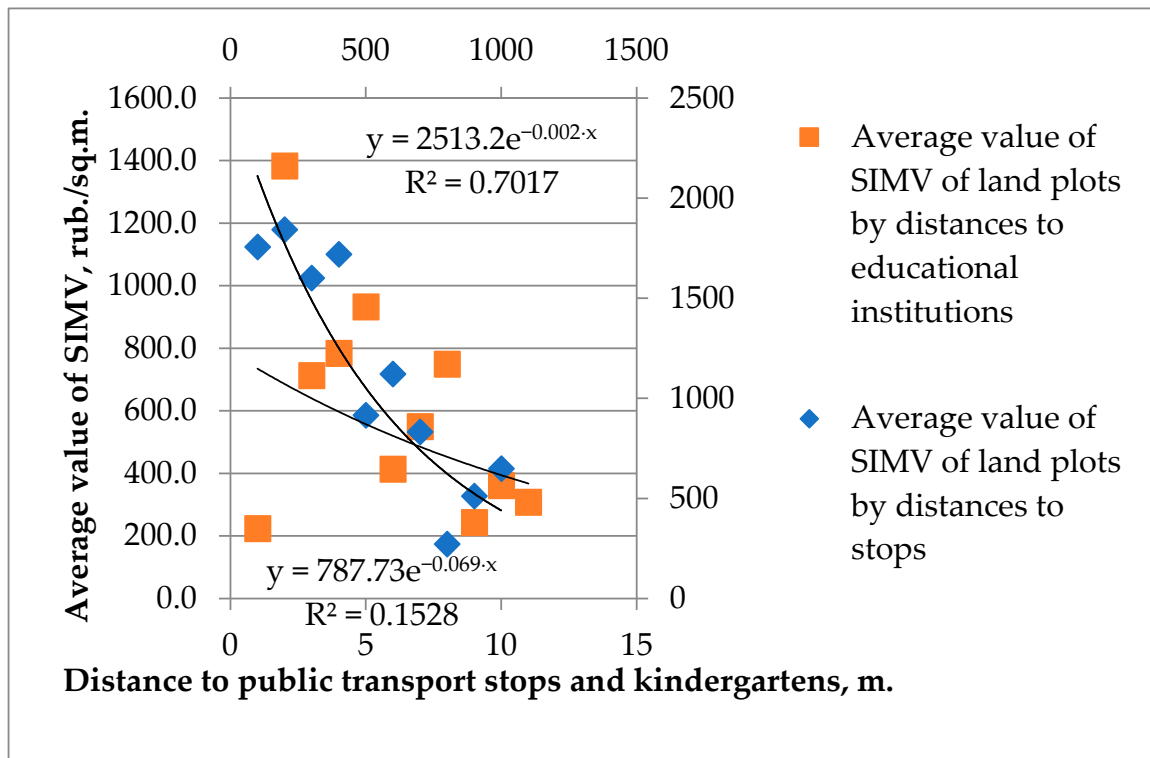


Figure 6. The trend of the change in specific indicators of the market value of land plots at a distance from the object of education and stops: own elaboration.

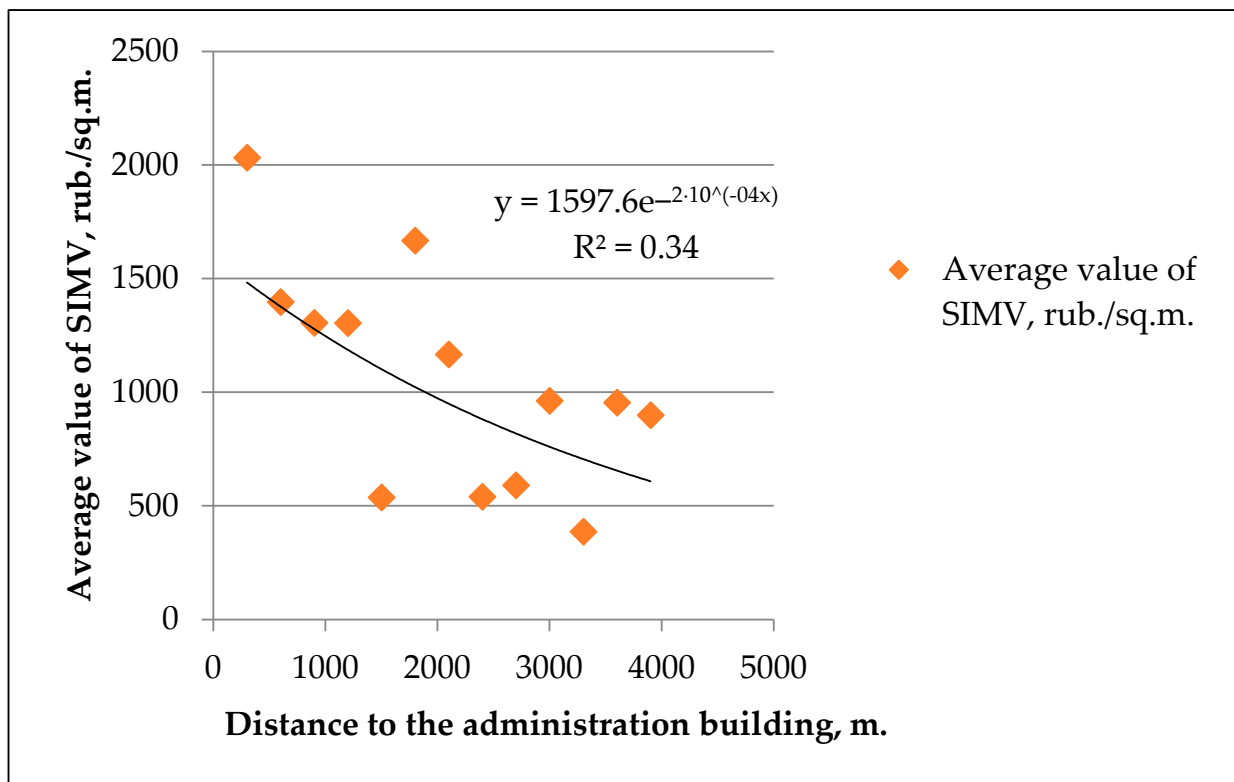


Figure 7. The trend of the change in specific indicators of the market value of land plots at a distance from the building of administration of the city of Orenburg: own elaboration.

The obtained dependencies are realized in the form of a formula, which was used to calculate and make adjustments to the distances (1) indicated above:

$$C = \frac{(L_{analogue} - L_{OA}) \cdot SIMV_{analogue} \cdot a}{m}, \quad (1)$$

where C is a correction for the remoteness of the land plot intended for housing and communal services from the infrastructure object, unit: rub/sq.m; $L_{analogue}$ is a value of the distance from the boundaries of the land plot, which is the object-analogue, to the object of transport and social infrastructure (educational institution, public transport stop or Orenburg administration building), unit: m; L_{OA} is a value of the remoteness from the object of assessment to the object of transport and (or) social infrastructure (school, city administration building or public transport stop); m is a distance interval for different infrastructure objects, unit: m (300 m or 100 m); a is a value of the impact of the distance from the kindergarten building, public transport stop or Orenburg administration building described above in the text of the article, unit: share, %.

As a result of the market value assessment of the land plot with cadastral number 56:44:0354003:44 by the method of paired sales by comparing its characteristics with the objects-analogues located within the boundaries of the UZRZHD, the value of the SIMV was calculated, taking into account the presence of protection zones of CHSs, which equals RUR 4216/square meter. The SIMV of the assessed land plot, also obtained according to the above method, without encumbrance by the zone of protection of CHSs and other URZs amounted to RUR 5498/sq.m. (Table A3, Appendix B).

4.2. The Calculation of the Coefficient of Regulations of the Zones of Protection of Cultural Heritage Objects for the City of Orenburg and Its Use for Determining Market Value

To identify the impact of CHS zone regulations on land value, it is necessary to calculate the coefficient, which can subsequently indicate the presence of this impact and can be used to justify the consideration of CHS zones as a cost factor. The calculation of the coefficient of regulations of CHS protection zones, which allows us to identify the difference in the value of the same land plot under the influence of the CHS zone and without its influence; using the method of paired sales is carried out as follows (Formula 2):

$$K = \frac{SIMV_{zone/CHS}}{SIMV_{not_zone/CHS}} = \frac{4216.21}{5498.38} = 0.77, \quad (2)$$

where K is the coefficient of the influence of the UZRZHD regulations on the cost of land plots, unit: share, %; $SIMV_{zone/CHS}$ is a specific indicator of the market cost of a land plot in the city of Orenburg, considering the influence of the UZRZHD regulations: unit: rub/sq. m; $SIMV_{not_zone/CHS}$ is a specific indicator of the market cost of a land plot intended for IHC and located in the city of Orenburg without taking into account encumbrances in the form of the UZRZHD, unit: rub/sq.m.

As a result of the individual assessment of the land plot, the market value of the assessed land plot was obtained and calculated on the basis of the comparison of objects-analogues located in the zones of protection of CHSs, which amounted to RUR 3,372,971 and in the case of the location of objects-analogues being outside such a zone, RUR 4,398,704.

Having analyzed the obtained results, it can be concluded that the presence of CHS protection zones on the land plot significantly reduces the market value of the land plot, in this case by RUR 1,025,732. Thus, it can be stated that the decrease in value is due to the encumbrances imposed on the land plot that restrict its use. The reliability of the obtained results can be substantiated by the fact that the basis for obtaining this coefficient of the CHS zone regulations is the real values of costs (prices) of the objects-analogues, which are close to the object of assessment by most characteristics (or leveled by the introduced amendments) and differ only by the presence of the CHS zone.

5. Discussion

As a result of this study, the coefficient of the regulations of the URZ protection zone was obtained, which amounted to 0.77 or 77%. This value can be interpreted as follows: the value expression of having a CHS zone on land plots intended for housing and residential development and located in Orenburg is 23% of its value unburdened by such a zone. Thus, in the conditions of a low-active market of land plots for IHC in Orenburg, there is a 23% decrease in the value of land plots due to the presence of the CHS protection zone. Similar results were obtained in the process of conducting similar studies by students of the Department of Land Management and Cadastres in the framework of scientific work on the example of historical settlements of Pskov and Yaroslavl, where the value of the coefficients of the impact of zones of CHSs on the value of residential land amounted to 17% and 42%, respectively.

The results obtained in this work correlate with the opinion of Vaillencourt F. and Monty L., who, based on the analysis of market data in Quebec City (Canada), came to the conclusion that undeveloped agricultural land plots, on which any buffer zones are imposed, sell at 15–30% less in value than unencumbered land [44]. The above proves that there is a negative impact of the URZ, in particular zones of protection of CHSs, on the cost of land for residential construction, and that when conducting the cadastral (mass) valuation of land plots of historical settlements, it is fundamentally crucial to consider the presence of zones of protection of CHSs as a price-forming factor.

At the same time, according to the research of Forte F. and De Paola P., who reviewed the change in the value of land plots on the example of the city of Naples, it can be concluded that the value of land plots intended for residential housing is the highest in the historical districts of the city with more developed infrastructure and the lowest in remote suburbs [45]. Duke J.M. and Go T. came to the opposite results in their studies. The authors discovered that the value of land plots located in historic city centers is lower than in suburbs represented by new construction. This indicates the ambiguous influence of CHSs on pricing [46]. Beaton W.D.'s research on land restrictions shows that it is the power of the impact of the zone regime that determines the difference in value with and without encumbrance [47].

The method used in this work has some limitations related to the activity of the real estate market. Thus, in the depressed market conditions of refractory sites, only an expert method can be used. The active market allows for the application of regression analysis. In his paper, Gnat S. proves that by applying a sequence of regression analysis steps, accurate results can be achieved, even with a small set of input data [48]. It is important to note that in this paper, the use of more advanced methods of economic–statistical analysis and regression modeling is not possible due to insufficient initial data.

The results obtained differ from the opinion of Alexandrakis G., Manasakis C. and Kampanis N., who in their research concluded that the presence of CHSs leads to additional revenues due to the development of tourism potential [49].

Similar results to this paper were obtained by Franco S. and Macdonald J., who estimated the impact of cultural heritage on the value of residential real estate in Lisbon using multiscale geographical weighted regression and spatial interactions. The results showed that the proximity to cultural heritage sites has a positive price elasticity of 0.0075. This impact is equivalent to the location of additional cultural heritage sites within a radius of 100 m [50].

Bade D., Castilo J., Fernandez M. and Aguilar-Bohorquez J. found a price premium to the value of real estate located near a CHS, which amounted to 4.3% [51].

Salinger E., Shefer D. and Mualam Nir Y. obtained the opposite price-lowering effect of the presence of CHSs, which amounted to 12.5% [52]. This value is fully correlated with the results obtained in this study. Also, Dzupka P. and Grof M., applying a hedonic model to determine the effect of new cultural infrastructure (Kulturpark barracks) on the prices of nearby apartments in Slovakia, found that the positive effect of cultural infrastructure on the value has a temporary effect and decreases gradually after the reconstruction of CHSs. Consequently, the negative impact of cultural infrastructure on apartment prices may mean that the negative aspects of cultural infrastructure (noise, transport traffic, parking problems, security, etc.) dominate over positive aspects [53].

At the same time, it should be noted that such a decrease in value is associated with the imposed restrictions on the use of land plots. For example, for land plots intended for residential housing, construction is prohibited within the boundaries of protection zones of CHSs; the impossibility of this use of the land plot reduces the demand for such objects and may lead to a decrease in their cost. Thus, it was experimentally revealed that in order to ensure fair taxation in the cadastral land assessment process, the presence of CHS zones should be considered as a cost factor.

But it is worth noting that the exact opposite situation occurs with regard to public, business and commercial objects, the cost of which increases due to the intangible historical and cultural value that cultural heritage objects possess. Using the example of the Netherlands, foreign authors have analyzed the prices of land transactions, as a result of which they managed to identify a clear pattern: the highest price is for undeveloped residential land and the lowest for agricultural land. Thus, undeveloped land intended for residential use has a value more than twice as high as land intended for industrial use, all other things being equal [28]. According to the results of research by Yaskiewicz A. on the example of the city of Yaroslavl, the entrepreneur's profit for objects located near the CHS is higher than 19% compared to similar objects, which are not CHSs. Market data show that the entrepreneur's profit can reach 150–250% for objects with historical and cultural value. According to realtors, such buildings, focused on office and representative purposes, are sold on the secondary market usually at 15...30% more than new offices. In the Central Administrative District of Moscow, the cost of such buildings can reach 130% of their functional analogues [54].

As the flow of tourists increases, so does the income from the use of these objects and, consequently, the value of land plots. Therefore, it can be argued that this area of research is very promising, since the impact of the protection zones of the CHS in such a context also correlates with a more prestigious location. One of the important nuances to be taken into account in the assessment process is the consideration of public law restrictions. The most common option for such restrictions on capital construction is to establish the status of a cultural heritage site. The status of a cultural heritage object manifests itself in two ways: in the form of advantages (expressed as an additional rate of profit) and encumbrances (restrictions on the rights of use) [55,56]. The importance of considering the dualistic nature of this status will allow us to obtain fair values of real estate and make informed decisions in the process of territorial management.

6. Conclusions

Currently, URZs, including the protection zones of CHSs, are not yet considered by land market participants as a mandatory cost factor. The presence of encumbrances is rarely mentioned in sale announcements, and professional appraisers apply various methods of assessing the impact of these encumbrances. Such zones are considered as indirect characteristics of land plots. This circumstance can lead both to violations of the regime of such zones and to the overestimation of the cost of land plots, since the use of land and therefore its limitations are closely interrelated with its value.

In these studies, the authors revealed the impact of the regime of the Unified Zone of Regulation of Development and Economic Activity of the Cultural Heritage Objects in Orenburg manifested in the form of a decrease in the cost of land plots intended for IHC. Based on the results obtained, the following conclusions can be drawn:

- (1) Firstly, when assessing the value of land plots, it is important to take into account the location of cultural heritage sites and their protection zones in the vicinity of the assessed object, primarily due to the fact that there are restrictions on the use of such lands, which may lead to changes in the value of real estate objects. In further research of the authors of this article, it is planned to study the simultaneous positive (price-increasing) impact of cultural heritage objects and negative (price-reducing) impact of their protection zones on the commercial land value;
- (2) Secondly, the method of paired sales in the process of individual real estate assessment has shown sufficient efficiency for the purposes of studying the impact of protection zones of CHSs on the market value of land plots;
- (3) Thirdly, in the process of searching for initial data within the framework of this research, an acute problem was identified in the field of cadastral activity, which is related to the lack of information about the CHS protection zones in the Unified State Register of Natural Resources. This leads to the fact that landowners may violate land use regimes within the boundaries of such zones due to insufficient information awareness. This may also become a problem in the process of real estate assessment and other activities;
- (4) Fourthly, according to the results obtained in this study, it can be concluded that in the conditions of a low-active land market in Orenburg, the impact of CHS protection zones is confirmed by the decrease in the value of land plots intended for individual residential construction. This is confirmed by the fact that the full possible potential of the land plot cannot be realized due to restrictions on certain types of permitted use provided by the regime of the zone of influence;
- (5) Fifthly, taking into account the impact of protection zones of the CHS in the process of land assessment will make it possible to obtain a fair market value of land plots and more rationally plan the use of land resources within the boundaries of historical settlements;
- (6) Sixthly, when considering the impact of the URZ on land value, it is necessary to adhere to a differentiated approach to the assessment of land plots for various purposes depending on the type of zone and types of permitted use;
- (7) Seventhly, ensuring the rational use of limited lands of settlements is provided, in addition to other tools, by obtaining a fair cadastral value of land, which is achieved by the consideration of the most influential factors affecting pricing in specific conditions of territorial development in the assessment process.

Author Contributions: The justification of the research concept—E.B.; manuscript text writing—V.D. and I.D.; the critical revision of the manuscript text—E.B.; the work with graphic materials—V.D.; the analysis and generalization of literature data—V.D., E.B. and I.D.; the collection and systematization of data—I.D., V.D. and T.B.; the application of statistical and mathematical methods for data analysis—I.D. and T.B.; the interpretation of research results—V.D. and E.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: The materials can be sent upon request by mail.

Conflicts of Interest: The authors declare that they have no conflicts of interest. All authors have read and agreed to the published version of the manuscript.

Appendix A. Characteristics of Comparable Objects

Table A1. Analogous objects with the presence of zones of protection of cultural heritage objects: own elaboration.

№ Analogue object	Address (location)	Area, sq.m	Sale price, sq.m	Specific indicator of the offer price, rub/sq.m	Date of exposure	Distance to the Orenburg city administration building, m	Distance to public transport stop, m	Distance to educational institution, m	Type of right	Landscaping, availability of buildings	Communications	Availability of protection zone, CHS
1	Orenburg, Cardonny Lane., 25	380	2,100,000	3513	9 April 2023	990	160	786	Property	Dilapidated house	There are	Yes
2	Orenburg, Yaitskaya St., 21	1500	8,900,000	5567	5 May 2021	1280	288	120	Property	Dilapidated house	There are	Yes
3	Orenburg, Maxim Gorky Street, 60	1000	4,500,000	4222	11 March 2021	1800	145	395	Property	No	There are	Yes
4	Orenburg, Proletarskaya St., 69	555	2,999,000	5518	29 April 2023	1092	121	181	Property	Dilapidated house	There are	Yes
Object of evaluation	Stepnaya str., d.47A	800	-	-	-	1060	62	230	Property	No	There are	No

Table A2. Analogous objects located outside the boundaries of the zones of protection of cultural heritage objects: own elaboration.

№ Analogue object	Address (location)	Area, sq.m	Sale price, sq.m	Specific indicator of the offer price, rub/sq.m	Date of exposure	Distance to the Orenburg city administration building, m	Distance to public transport stop, m	Distance to educational institution, m	Type of right	Landscaping, availability of buildings	Communications	Availability of protection zone, CHS
1	Chernorechenskaya street.	420	2,399,000	5712	2 February 2022	1510	443	775	Property	No	There are	No
2	Grebenskaya Street, 199	450	2,000,000	4089	10 January 2022	2620	179	343	Property	No	There are	No
3	Kievskaya street,3	250	1,600,000	6400	1 February 2022	4560	430	818	Property	Dilapidated house	There are	No
4	Krasnopartizanskaya St., d. 53	370	2,500,000	6757	27 October 2021	2460	144	150	Property	Dilapidated house	There are	No
Object of evaluation	Stepnaya str., 47A	800	-	-	-	1060	62	230	Property	No	There are	No

Appendix B. Features of Making Adjustments

Table A3. The determination of the market value of the valuation object within the boundaries of the (CHS) zone: own elaboration.

Indicator/object	OV	Analogue object 1	Analogue object 2	Analogue object 3	Analogue object 4
Address (location)	Orenburg, Stepnaya str., 47A	Orenburg, Cardonny Lane., 25	Orenburg, Yaitskaya str., 21	Orenburg, Maxim Gorky str., 60	Orenburg, Proletarskaya str., 69
Cadastral number	56:44:0230013:34	56:44:0432004:830	56:44:455004:12	56:44:0232018:3	56:44:0445007:13
Offer price	-	2,100,000	8,900,000	4,500,000	2,999,000
Date of exposure	-	09.04.2023	05.05.2021	11.03.2021	29.04.2023
Correction as of the offer date	-	1.00	1.02	1.02	1.00
Adjusted price at the valuation date	-	2,100,000	9,078,000	4,590,000	2,999,000
Market conditions	-	Offer	Offer	Offer	Offer
Bid adjustment	-	8%	8%	8%	8%
<i>Adjusted price</i>	-	1,932,000	8,351,760	4,222,800	2,759,080
<i>SIMV, rub/sq.m.</i>	-	3513	5567	4222	5518
Area, sq.m	800	550	1500	1000	500
Area adjustment	-	0%	8%	0%	0%
<i>Adjusted SIMV, rub/sq.m.</i>	-	3513	5456	4138	5518
Availability of landscaping	The access road is provided with a hard surface.	The access road is provided with a hard surface.	The access road is provided with a hard surface.	The access road is provided with a hard surface.	The access road is provided with a hard surface.
Adjustment for the presence of landscaping	No	6%	6%	6%	6%
<i>Adjusted SIMV, rub/sq.m.</i>	-	3302	5129	3890	5187
Availability of buildings	-	Dilapidated house	Dilapidated house	No	Dilapidated house
Adjustment for the presence of buildings	-	8%	8%	0	8%
<i>Adjusted SIMV, rub/sq.m.</i>	-	3232	4718	3890	4772

Table A3. *Cont.*

Distance to public transport stop, m	62.3	160	288	145	120
Adjustment for the distance to the public transport stop, m	-	12.63	42.59	12.87	11.15
Distance to the Orenburg city administration building, m	1060	990	1280	1800	1092
Adjustment for the distance to the Orenburg city administration building, m	-	-12.44	57.09	158.32	8.43
Distance to the object of education, m	230	786	120	395	181
Adjustment for the distance to the object of education, m	-	24.30	-62.84	21.40	-20.44
Total	4216.21	3256.20	4754.84	4082.59	4771.23

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