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Determining Urban Indicators in Local Plans—As One of the Sustainable Assumptions of the New European Bauhaus?

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Abstract: The purpose of local spatial development plans in Poland is to shape spatial policy at the local level by establishing local law. On this basis, the intended use of land is determined, as well as the manner of its development. Some of the planning tools used are urban planning parameters and indicators, which are defined in planning documents at the local (commune) level. This article discusses the analyses of two selected urban indicators: the maximum built-up area and the minimum share of biologically active area, which are obligatorily determined in local plans. The issue here is a certain discrepancy between the planning provisions used in theory and their practical application. This paper uses a descriptive, computational, and comparative analytical research method to interpret the planning provisions used in selected Local Spatial Development Plans. This research will allow for answering of the following questions: Are the urban indicators defined by architects adapted to spatial needs? Do they allow for optimal shaping of this space, taking into account the provisions of Polish law? And is their skillful designation likely to be one of the sustainable assumptions of the New European Bauhaus?

Keywords: local spatial development plans; New European Bauhaus; polish legislation; spatial planning; urban parameters and indicators

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1. Introduction

The essence of spatial planning in Poland is "spatial order", i.e., in the general sense, management of space at all three levels of planning activities: at the national, regional, and local levels. However, it is crucial to have a comprehensive understanding of the meaning of this term. Article 2(1) of the Act of 27 March 2003 on Spatial Planning and Development refers to spatial order as: "...such a shape of space that creates a harmonious whole and takes into account all functional, socio-economic, environmental, cultural, compositional and aesthetic conditions and requirements in orderly relations" [1]. All activities at the planning level should be aimed at rational management of space, taking into account the needs of all users, both individual (private) and entire communities, all stakeholders, investors, entrepreneurs, as well as the authorities of cities, communes, districts, provinces, and the country.

Planning is based on modeling. Both activities require foresight. In relation to cities, the problem is extremely complex because cities are large, complex, and rapidly changing organisms, and so long-term forecasting is not easy in their case. City planning is the process of mapping the current and future physical form of a city [2]. It should be remembered that strategic planning also involves introducing certain restrictions related to the use of individual land.

During planning, particular emphasis should be placed on environmental conditions, especially in the context of defining new functions for areas with socio-economic potential, in line with the pursuit of sustainable development. An equally important issue is currently the visible progression of global climate change, which undoubtedly poses a great challenge to contemporary spatial planning [3]. When analyzing current urban planning, including

the development directions of many cities, especially in Europe, it should be recognized that there is still a lot to be completed in terms of sustainable development [4]; although, such sustainable activities that aim at sustainable development are fortunately becoming more and more visible. Promoting public transport and improving air quality, among others, through the thermal insulation of buildings and shaping corridors ventilating housing estates and cities, as well as well-thought-out water management, the use of all ecological solutions that support nature, society, economy, and public finances, are a concrete response to contemporary spatial needs. Investment in green infrastructure by undertaking activities using technical measures aimed at land ecological restoration has a benefit–cost ratio ranging from 3 to 75 [5].

In spatial planning, many factors determine the level of spatial order. The first of them is the proper arrangement of individual functions of the area, as well as the use of optimal connections between them (sometimes also separating one from the other, according to the principle of connecting, by dividing). Depending on purpose, structure of use, and ownership, the above-mentioned functions should be created by plots of land with appropriate shapes, areas, depths, and locations in relation to the cardinal directions, as well as the roadways. The third dimension, which creates the spatial order, includes the appropriate proportions of individual elements in a vertical arrangement, creating a functional spatial composition with accents, dominants, or compositional axes.

From the point of view of space planning, the arrangement of various components of space, as well as the harmony that should prevail between them, should also determine the quality of life. In the understanding of economic science, it is mainly economic growth that leads to a higher quality of life. When it comes to economic growth, GDP per capita is assumed to be an indicator of prosperity. The Gross Domestic Product (GDP) per capita does not fully describe the level of prosperity of a given country, which is why there are also other indicators of the quality of life, i.e., the Quality of Life Index (currently Where-to-be-born Index), which additionally define GDP, i.e., the Human Development Index (HDI), a measure of net economic well-being Economic Welfare (NEW), and others. On the other hand, in terms of planning and urban issues, which are the focus of this paper, it should be pointed out that the increase in the quality or standard of living results mainly from the skillful management of the space in which people live.

Creating an aesthetic space in which people will be happy to stay on is the domain of urban or rural planning, depending on the type of space we are dealing with—urban or rural. On the other hand, shaping a functional space in which people will be able to meet their basic life needs (living, working, recreation) is a question of urban design. With regard to the above statement, Magdalena Staniszkis directly notes that "the restitution of urban design in spatial planning seems to be necessary" [6]. In the case of both activities—urban planning and design—it is crucial to take into account the protection of the natural environment. Edward O. Wilson, an American naturalist, has described the 21st century as "the century of the environment", in which people will strive to restore the environment, mainly through the protection of biodiversity [7]. One of the most important tasks of spatial planning is the protection of natural resources.

Moreover, a team of researchers from China have proven through empirical evidence that environmental pollution is closely linked to socio-economic inequalities in health. This relationship is based on the fact that the greater the environmental pollution, the greater the socio-economic inequalities [8]. Therefore, sustainable space management is essential on many levels: spatial, economic, environmental, social, economic, and health.

Taking into account the above considerations, this article focuses on the analyses of two selected urban indicators: the maximum built-up area and the minimum share of biologically active area, which were determined in the analyzed existing local spatial development plans adopted under the Act before the amendment of 2023. The author has conducted research based on several years of professional practice in the field of spatial planning. He is the co-author of many local spatial development plans, as well as of a study of the conditions and directions of spatial development of communes in Poland.

This experience makes him notice a justified need to conduct a discussion regarding the correctness of the planning arrangements used.

The choice of these two urban planning indicators set in planning documents at the municipal level was deliberate. A comparison of the ratios and the real values of the built-up area to the biologically active area in relation to the building plot within specific functional units will allow for us to see whether the establishment of the level of development and the management of individual building plots, and consequently also functional areas, housing estates, districts, and entire cities or villages, is aimed at the rational management of space. From the point of view of nature, the scale of towns and villages should be analyzed through planning activities, starting from individual areas of greenery (i.e., squares, home gardens, green yards, or green roofs) to complex green areas (street greenery), as well as those large-scale green systems (i.e., parks, allotment gardens, orchards, cemeteries, or agricultural areas) [9].

The material for this research was selected on the basis of a triple selection. First, several local spatial development plans of the dozens adopted and in force in two voivodeships in Poland were selected. Then, as part of their planning arrangements, several different functional units were selected, but only those where the possibility of locating buildings were allowed. As a final result, two building plots were selected from each functional package, which were analyzed in terms of the size of their total area possible for development, in relation to the restrictions resulting from the provisions of the construction law and taking into account the imposed development line.

The entire research process was carried out in two main stages. The first stage focused on comparing the values of selected urban coefficients that were used in the finally selected local plans. The results were quantitative and also revealed a certain repeatability of the provisions used. The second stage consisted in detailed calculations of actual area values adopted for the analyzed urban coefficients used in selected local plans for areas with a separate primary purpose. The results from this part of the research were intended to illustrate the issues of the planning provisions used, which could sometimes contradict each other or cause a situation that was impossible to implement. A detailed description of the research area and methodology is included in chapter four of this paper.

The results of the conducted research allowed for answering three research questions:

1. Are the urban indicators defined by architects adapted to spatial needs?
2. Do they allow for optimal shaping of this space, taking into account the provisions of Polish law?
3. Is their skillful designation likely to be one of the sustainable assumptions of the New European Bauhaus?

The first two research questions suggest that, contrary to appearances, determining urban indicators is not that easy. Designers should be aware of the relationships between the value of the de-fined maximum development area and the minimum biologically active area. The application of the maximum level of the first coefficient and the minimum level of the second coefficient in the local plan for one of the building plots results in shaping the space in a way that is irrational and harmful to the environment and users.

With regard to the third question asked, it should be noted that in the context of the pursuit of sustainable development, the New European Bauhaus (NEB) [10] also focuses on the sustainable development of a specific economic sector, i.e., construction. The NEB was launched by the European Commission in 2020 and aims to support the European Green Deal program [11]. Although the NEB initiative is based primarily on global assumptions, i.e., reduction of greenhouse gas emissions, ecological energy, and eco-transport, it also indicates a new, local dimension of its aspirations. Therefore, the assumptions of the New European Bauhaus also have a chance of being implemented at the level of planning activities in Poland, based on the optimal, sustainable creation of the space of individual municipalities.

2. Polish Planning Regulations in Relation to the Issues Discussed

In Poland, local spatial development plans are planning studies at the local (commune) level. They are created on the basis of the regulations contained in the Act of 27 March 2003 on spatial planning and development [1], as well as in the Regulation of the Minister of Development and Technology of 17 December 2021 on the required scope of the draft local spatial development plan [12]. Their objectives are defined in Article 4 (1) of the Act as: "the determination of the purpose of land, location of public purpose facilities and determination of development methods and development conditions". The last of the above-mentioned objectives is achieved, among others, by establishing urban parameters and indicators, which are mandatory.

Before the amendment to the Act on Spatial Planning and Development, local development plans specified the principles of built-up space, as well as land development indicators, such as the following: maximum and minimum intensity of development as an indicator of the total built-up area in relation to the area of the building plot, minimum percentage of biologically active area in relation to the area of the building plot, the maximum height of buildings, the minimum number of parking spaces, including spaces for parking vehicles equipped with a parking card and the manner of implementation of such spaces, as well as building lines and dimensions of facilities [13]. In addition, the Regulation of the Minister of Infrastructure of 26 August 2003 on the required scope of the draft local spatial development plan also defined the arrangements concerning the parameters and indicators of building and land development, where, in addition to those mentioned above in the cited Act, the Regulation also includes a ratio of the size of the built-up area in relation to the area of the plot or terrain [14].

Pursuant to the Act of 7 July 2023 amending the Act on Spatial Planning and Development and certain other acts, which entered into force on 24 September 2023, the following land development indicators shall be mandatorily specified in the local plan: maximum and minimum above-ground intensity of development, minimum share of biologically active areas, maximum share of built-up area, maximum building height, the minimum number and manner of construction of parking spaces, including spaces for parking vehicles equipped with a parking card, as well as building boundary lines and dimensions of facilities" [15]. On the basis of the above comparison, it should be pointed out that the new wording of the Act on Spatial Planning and Development defines the intensity of development factor as above-ground, and also directly provides for the maximum share of the built-up area.

The current act contains definitions of both the biologically active area, the share of biologically active area, and the share of the built-up area. Prior to the amendment, the Act did not define the meaning of the discussed urban planning indicators. Their meaning was understood through other documents or legal provisions. The concept of the size of the built-up area is presented in the Polish Standard PN-ISO 9836 of 1997, according to which it is determined by the vertical projection of the external edges of buildings, and in the case of local plans also of all building facilities on the surface of the land. It does not include objects below the surface of the ground (the so-called underground), nor the surface of secondary elements, such as stairs, external ramps, canopies, awnings, roof protrusions, and the surface of separate auxiliary facilities, such as gazebos, greenhouses, and sheds [16]. The current act defines the concept of the share of a built-up area, which is understood as "the ratio of the sum of the area of the horizontal projection of buildings, measured along the external outline of the horizontal projection of the external walls of such buildings located on: (a) a building plot to the area of such a building plot-in the case of local spatial development plans, (b) a site to the area of such site-in the case of a decision on the conditions of development and land use" [1].

On the other hand, the concept of the biologically active area is defined in the Regulation of the Minister of Infrastructure of 12 April 2002 on technical conditions to be met by buildings and their location as "native soil covered with vegetation and surface water on a building plot, as well as 50% of the sum of terrace and flat roof surfaces, arranged as

permanent lawns or flowerbeds on a substrate ensuring their natural vegetation, with an area of not less than 10 m^2" [17]. According to the new wording of this regulation from 2022, the area of the biologically active area is "an area with a surface arranged in such a way as to ensure natural vegetation of plants and rainwater retention, as well as 50% of the area of terraces and flat roofs with such a surface and other surfaces ensuring natural vegetation of plants, with an area of not less than 10 m^2, and surface water in this area" [18].

The current definition of a biologically active area according to the amended Act on Planning and Spatial Development treats this concept similarly, but in a slightly broader way, as it also specifies such an area as "covered by watercourses or water reservoirs, excluding recreational and industrial pools" [1].

The above examples of definitions of concepts of urban coefficients, which are constantly being made more precise, prove the undoubted need for such attempts. Relations between the share of the built-up area and the share of the biologically active area in relation to the area of the building plot established in local spatial development plans undoubtedly determine the quality of a given space. The more optimal these relations are, the more sustainable the quality of this space will be.

3. Problems and Inaccuracies in Planning Provisions

Contemporary spatial planning is struggling with many problems—starting from the conditions resulting from population growth, through attempts to reconcile private and public interests, to the issues of environmental protection, real estate management, and limited social participation.

In 2018, the Polish Academy of Sciences (PAN) published a report by the Committee on National Spatial Development of the Polish Academy of Sciences, which, among others, pointed to the negative social and economic effects caused by chaotic and uncontrolled urbanization [19]. The report quotes the so-called spatial chaos, which we have been dealing with since the political changes in 1989, and which has intensified especially in the last fifteen years. Numerous amendments to the Spatial Planning and Development Act have unfortunately not changed much.

It is important to remember that spatial planning is the essential tool for managing spatial, economic, and social development and for doing so in a sustainable manner. It is also a tool to protect culture, the environment, and also citizens against various threats. According to the assumptions of the New Urban Agenda, sustainable and integrated urban and territorial development take place at all levels in the hierarchical structure of planning policy [20]. However, plans at the local level have a special place in spatial planning. The United Nations (UN) and the Intergovernmental Panel on Climate Change (IPCC) confirm that the very basis of local development is climate change management [21]. Based on current legislation, planning processes at the municipal level in Poland are equipped with a range of tools to enable sustainable management, but due to certain regulatory shortcomings or deficiencies, they do not always go in the right direction.

The third WHO report from 2022 presents an overview of indicators that have the potential to support urban planning for the resilience and health of cities, as well as citizens. The above-mentioned support applies to all activities at the local level [22]. Environmental and public health protection are priorities because they influence each other. The degradation of space and the environment, as well as progressing climate change, are the result of incompetent urban management and planning. An appropriate approach to spatial planning will ensure safety and health for sustainable cities

Below, by way of an example, cases of application of specific planning arrangements concerning urban indicators are subjected to analysis: the biologically active area and the built-up area are presented and discussed. Both of them are included in the obligatory arrangements, among others, during the creation of local spatial development plans, but they are also specified in other planning documents at the local (commune) level, such as the still valid studies of conditions and directions of spatial development of the commune, or in decisions on development conditions. In the case of the first indicator—the biologically

active area, its minimum value, and in the case of the other indicator—the built- up building area, its maximum value is determined. Both numbers are given as a percentage (%) and constitute, in mathematics, a fractional value of a number, a certain strictly defined value. It should be remembered that urban planning indicators defined in local plans should always refer to the area of the building plot (Figure 1).

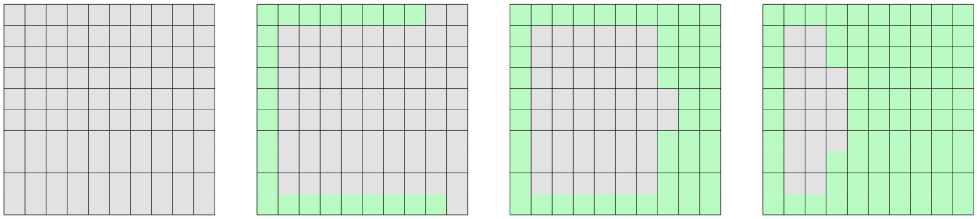


Figure 1. Relations between the share of the biologically active area (green area) and the built-up area (grey area) in the plot area: (**a**) 0%, (**b**) 25%; (**c**) 50%; (**d**) 80%. Source: author's study.

Resolutions on local plans often allow for a minimum indicator of the share of a biologically active area at the level of 0%, and sometimes they do not even explicitly state it (Figure 2a). The above-mentioned provision, which is commonly used, is necessary in certain circumstances, but it raises some doubts at a purely logical level, namely: Is the number zero a reasonable numerical value that can provide additional specification of the nature of development of land with a specific function? In mathematics, the concept of zero is conventional. With regard to planning requirements, the abuse of this type of provision is common, and if it is assumed that the value of the indicator may be 0%, it means that there will simply be no biologically active area on a given plot at all. The definition of a biologically active area, which is used in the legal system in Poland, also assumes that the area of terraces and flat roofs with a surface arranged in a way that ensures natural vegetation of plants and rainwater retention is classified as a biologically active area, although only half (50%) is, with an area of not less than 10 m^2. Therefore, the minimum ratio of the share of biologically active area does not have to be 0% in a situation where the built-up area is equal to the area of the building plot.

Studies show that determination of the ratio of the biologically active surface is extremely important. If it has the right value, it can improve the environmental performance of urban structures, especially residential spaces. When analyzing the legitimacy of the determination of the correct value of the biologically active area indicator, it is worth quoting the research carried out by a team of researchers led by Barbara Szulczewska in 2014 in Warsaw. They tried to answer the question: How much green is needed for a vital neighborhood? The researchers searched for empirical evidence by analyzing eighteen residential neighborhoods in Warsaw, for which the value of the biologically active area ranged from 20 to 70%. Finally, they indicated that from a planning point of view, the biologically active area ratio should be about 45% for each plot [23].

On the other hand, even if the most optimal indicator of a biologically active area in the local plan is determined, it does not guarantee that the subsequent land use will be in accordance with the adopted planning arrangements. Permeable surfaces are an important element of the rain water management system. It is worth quoting Dorota Jopek's study entitled: "Water in the city. The development of permeable surfaces in urban areas", which calls for improving the integration of spatial planning with water management, especially in urban areas where the effects of climate change are clearly felt. In Jopek's study carried out in Cracow, she showed the potential to increase the absorption capacity of identified sites. The results presented by the researcher revealed a clear underestimation of the size of the existing open areas in relation to the required share of biologically active areas on the basis of local spatial development plans or decisions on land development conditions [24].

A FRAGMENT OF THE PROVISIONS OF A LOCAL DEVELOPMENT PLAN RESOLUTION:

4. In the U2 area, there is a former church cemetery at Pl. M. Kolbe square of unknown location, for which the provisions of § 7.2 letter t apply.

§24. 1. For the area marked with the U4 symbol in the plan drawing, the following basic purpose is established - public service development area.

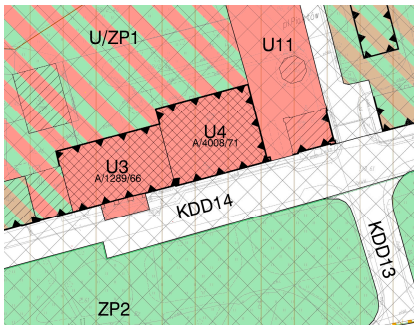
2. All activities related to the facility entered in the register of monuments under the number A/4008/71 should be undertaken in accordance with separate regulations.

3. For the area referred to in section 1, the following provisions apply: applicable building lines along the outline of the existing building's cubic space, as shown in the plan drawing.

§25. 1. The following designation is established for the areas marked in the plan drawing with symbols U5 to U8:

1) basic: public service development areas;
2) supplementary:
   a) accompanying greenery,
   b) parking lots,

(**a**)



(**b**)

Figure 2. An example of the application of specific planning arrangements for two different urban indicators: (**a**) a text provision in the resolution of the local plan, which makes it impossible to determine the share of the biologically active area other than at the level of 0%—in this case for the area of commercial development; (**b**) a graphic record of the local plan for commercial development (area marked as U4), where the area of the building is equal to the area of the plot itself. Source: author's study based on [25].

The second, no less astonishing, example of the application of the mentioned planning provision was the assumption of the size of the built-up area at the level of 100%. Such a situation seems justified only if the built-up area, defined as the floor plan area of the building, in the outline of its outer edges, is equal to the area of the building plot (Figure 2b). The above-quoted urban planning indicator indicates that it is not possible to determine all the urban planning indicators required by the regulation for such an area., etc.

Guidelines with significant discrepancies in the values of built-up areas in relation to the biologically active areas in planning studies are a cause for concern, especially in times of rapidly advancing climate change, which is becoming more and more visible on such a large scale as it is today. According to the European Commission's Communication, green infrastructure is "a tool that brings about ecological, economic and social benefits through natural solutions" [26]. From the point of view of planning activities, it provides an opportunity to integrate spaces and resources of various types, creating a complex, coherent system like the model "Green City". Pro-quality planning with respect for the environment is now necessary [27] (pp. 54–55).

4. Analysis of Selected Urban Indicators

4.1. The Area of Research and Research Method

The research area was defined on the basis of a three-stage selection. In the first approach to the study of the values of urban indicators used in selected local spatial development plans adopted in the Lower Silesian and Greater Poland Voivodeships, both urban and rural areas were taken into account. It could be expected that the values set for both would be different, due to the different nature of space in cities and villages, if only due to the fact that building plots in cities are usually smaller (as the prices of land in cities are much higher). As the subject of this study was the determination of local plans for various areas, regardless of their location, those that represented specific functional areas and appeared most frequently in the analyzed studies were selected. Therefore, the following development areas were analyzed: residential (MN, MW), homestead (RM), service (U, US), industrial (P), production service areas for farms (RU), and green areas (Z), but also all their modifications, i.e., residential and service areas (MN/U, MW/U), industrial and service areas (P/U), or greenery services (U/Z), which in total constituted fifteen separate functional categories. Service areas were diverse and included both public,

commercial, craft, and religious services. Green areas, where the possibility of locating buildings was not allowed, were not included in the calculations, although an interesting observation was the setting in one of the local plans of the minimum biologically active area at the level of at least 70%, with an indication that at least 30% of the biologically active area should be tall greenery. In other cases, the provision was applied that the area of biologically active land must constitute at least 70, 80, or 90% of the area of the site. A total of 30 local spatial development plans adopted in the period from 2012 to 2022 were examined.

For the purposes of the second selection of the research area, building plots with various target purposes were selected from among several adopted and binding (as of 1 September 2023) local spatial development plans. However, only those, for which it was assumed that buildings could be located on them, were taken into account:

- multi-family housing (MW);
- detached, semi-detached and terraced houses (MN);
- trade services (U), public services (U), sports, and recreation services (US);
- industrial (P), and industrial and service (PU) buildings.

Within the functional planning zones, one of several similar plots or two of the most diverse in size, shape, and proportion were then selected analyzed (Figure 3).

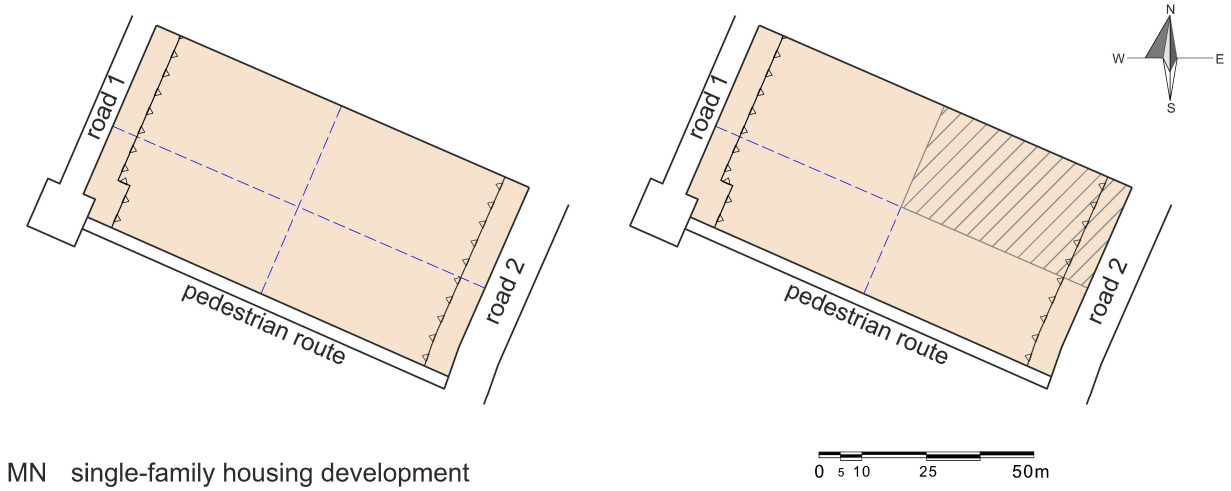


Figure 3. Diagram of site selection for research in single-family detached residential area: (**a**) functional area consisting of four building plots; (**b**) the selection of one plot to be analyzed. Source: author's study.

In the next, third stage of selection, each of the selected building plots was analyzed in four important respects, namely (Figure 4):

1. the total area of the plot (Figure 4a);
2. the area of land intended for potential development, taking into account the indicated building line (for the sake of simplicity and uniformity, defined only on the side of the road) (Figure 4b);
3. the area of land intended for potential development, taking into account both the indicated building line and the provisions of the construction law, assuming that the distance between the building and the plot boundary is required at the level of 3 m because there are no windows and doors (Figure 4c);
4. the area of land intended for potential development, taking into account both the indicated building line and the provisions of the construction law, assuming that the distance between the building and the plot boundary is required at the level of 4 m because there are windows and doors on all walls of the building (Figure 4d).

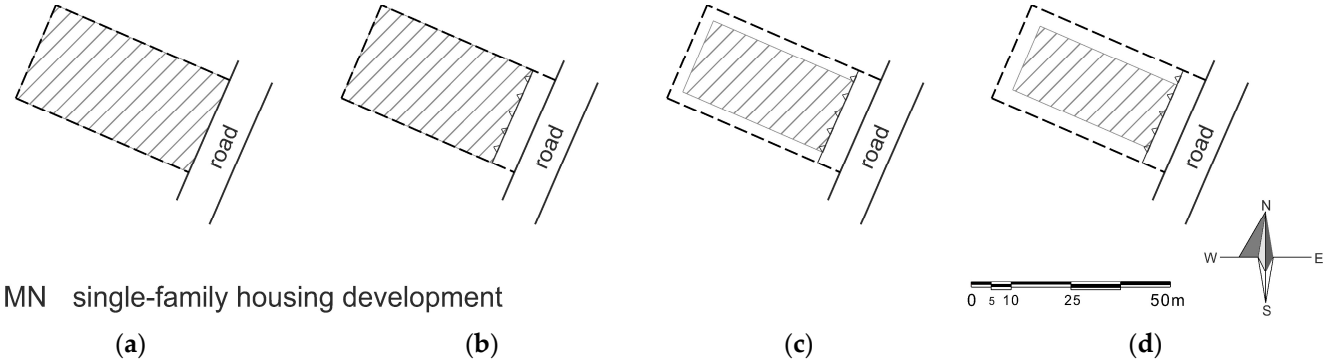


Figure 4. Diagram showing the selected building plot, which was considered from four angles: (**a**) total land area; (**b**) the area of the plot, including the building line; (**c**) the area of the land, taking into account the building line and the provisions of the construction law 3 m from the plot boundary; (**d**) the area of the land, taking into account the building line and the provisions of the construction law 4 m from the plot boundary. Source: author's study.

Bearing in mind that each building has an entrance and at least one window, it was decided that option 3 would not be considered for further study (Figure 4c).

4.2. Research Course and Results

4.2.1. The First Stage of Research

The first stage of the research consisted of comparing the values of two urban indicators: the minimum biologically active area and the maximum built-up area, determined in selected local spatial development plans for areas with various functions. A thorough exploration also allowed for us to reveal the frequency of repeatable values for selected indicators. Table 1 below summarizes the quantitative results of the analyses performed.

Summarizing the results of the analyses, it should be pointed out that for the maximum building area indicator several categories of percentage share values were distinguished—as many as sixteen (0, 5, 10, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 85, 90, and 100). For the second indicator, the minimum biologically active area of these categories, there were fourteen percentages (0, 5, 10, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80 and 90). The most frequently determined value for the indicator of the minimum biologically active area (min. B_{aa}), was 30% (46 times), and for the indicator of the maximum building area (max. B-up$_a$) was 30% (41 times). The highest minimum value for the biologically active area indicator at the level of 90% was recorded twice—for a green area (Z) and for a sports and recreation services area (US). On the other hand, the lowest value for this indicator at the level of 0% was recorded three times for the following areas: a multi-family housing development area (MW), a service area (U), and an industrial development area (P). The maximum built-up area indicator of 100% was observed a total of three times—twice for service areas (U) and once for a multi-family housing area (MW). In as many as 24 cases, the local plans included a minimum biologically active area of 25%, which, according to § 39 of the Regulation of the Minister of Infrastructure on technical conditions to be met by buildings and their location, is a complete minimum for building plots intended for multi-family housing development, health care buildings (except for clinics), and education. This provision indicates, however, that the provisions of local spatial development plans may determine a different value [17]. And so, in the analyzed plans for multi-family housing areas indicated in the regulation, this legislative minimum value was exceeded twelve times, defining the minimum values at the levels of 30 and 40%, as well as at the levels of 60 and 70% at one time.

Table 1. Quantitative results from analyses—frequency of occurrence of specific levels of values of two urban indicators: minimum biologically active area (min. B_{aa}) and maximum built-up area (max. B-up$_a$) established in selected local development plans in force.

No.	Destiny of Area	Urban Indicators in the Analyzed the Local Plans (MPZP)																												
		Min. Biologically Active Area [Min. B_{aa}] in %														Max. Built-Up Area [Max. B-up$_a$] in %														
		0	5	10	15	20	25	30	35	40	50	60	70	80	90	0	5	10	20	25	30	35	40	45	50	60	70	80	85	90	100
1	MN	-	1×	-	-	-	-	12×	3×	15×	6×	6×	-	-	-	-	-	-	6×	6×	15×	4×	4×	1×	5×	2×	-	-	-	-	-
2	MN/U	-	-	-	2×	-	4×	5×	7×	5×	3×	3×	-	-	-	-	-	-	-	2×	6×	4×	3×	1×	3×	6×	1×	-	-	-	-
3	ML	-	-	-	-	-	-	-	2×	-	-	-	-	-	-	-	-	-	-	-	3×	-	-	-	2×	-	-	-	-	-	-
4	MN/MW	-	-	1×	-	-	1×	2×	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1×	-	-	-	-	-	-
5	MW	1×	-	-	-	3×	4×	3×	-	1×	-	-	-	-	-	-	-	-	-	-	3×	-	-	1×	3×	2×	1×	-	-	-	1×
6	MW/U	-	-	2×	-	-	2×	3×	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3×	-	2×	2×	-	1×	-	-	-
7	MW/ZP	-	-	1×	-	-	2×	-	-	1×	1×	1×	-	-	-	-	-	-	-	-	2×	-	-	-	1×	1×		1×	-	-	-
8	RM	-	-	-	-	-	1×	4×	-	6×	1×	-	-	-	-	-	-	-	-	-	4×	-	-	-	3×	5×	-	-	-	-	-
9	RU	-	-	-	-	-	-	4×	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1×		3×	-	-	-	-	-
10	U	1×		12×	3×	5×	6×	10×	2×		1×	1×	-	-	-	-	-	-	1×	6×	5×	-	6×	-	10×	5×	5×	1×	1×	-	2×
11	US	-	-	2×	-	-	-	1×	-	2×	2×	3×	-	-	1×	1×	-	4×	-	1×	1×	-	1×	-	-	1×	-	-	-	-	-
12	P	1×	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1×	-
13	P/U	-	1×	6×	1×	1×	4×	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1×	-	-	3×	3×	6×	-	-	-
14	Z	-	-	-	-	-	-	-	-	-	1×	1×	-	1×	1×	1×	1×	-	-	1×	1×	-	-	-	-	-	-	-	-	-	-
15	U/Z	-	-	-	-	-	-	2×		1×	-	-	1×	-	-	-	-	-	-	-	1×	-	2×	-	-	-	-	-	-	-	-
	SUM	3×	2×	24×	6×	9×	24×	46×	14×	31×	15×	15×	1×	1×	2×	2×	1×	4×	7×	16×	41×	8×	20×	4×	30×	30×	10×	9×	1×	1×	3×
		193×														187×															

Explanation of symbols: MPZP—Local Spatial Development Plans, Local Plans; MN—area of single-family housing development; MN/U—single-family housing area, service area; ML—individual recreation; MN/MW—single-family housing development area, multi-family housing development area, MW—multi-family housing area; MW/U—multi-family housing area, service area; MW/ZP—multi-family housing area, arranged green area; RM—homestead development area; RU—production service area on farms, livestock farms and horticultural farms; U—service area; US—sports and recreation service area; P—industrial development area; P/U—industrial and service development area; Z—green area; U/Z—service development area, arranged green area. Source: author's study based on the analysis of planning studies [25,28,29].

On the other hand, the maximum built-up area at the lowest value among the analyzed studies—from 0 to 20%—occurred fourteen times, including in as many as six cases for single-family housing areas. In addition, one of the plans did not specify the maximum building area, even though it was possible to situate buildings on the plots in question. The nature of the buildings and development of these plots was regulated only by the maximum and minimum intensity of the development factor and the minimum biologically active area. In two local plans for MN/U areas, equal values of 30% or 35% were set for both indicators.

4.2.2. The Second Stage of Research

In the second stage of the research, only a few specific local plans were selected from the previous package of several dozen analyzed planning studies for further investigations. The aim of the next stage of research was to calculate the area values (w m^2 and ha) of the adopted urban planning indicators. The evaluation was carried out according to a strictly defined scheme. From among the selected local plans, various functional units were selected, for which the two building plots differing the most in size and proportions were selected. If there was only one building plot within one functional unit, this one plot was analyzed (this is the case, for example, in the US1 and P/U1 area).

The figure below shows a diagram of relations between the values of the two analyzed urban planning indicators at the time when an additional arrangement in the form of a building line was imposed, which certainly constitutes a certain limitation for the built-up area indicator. As a consequence, it was possible to obtain its maximum value determined in the local plan only at the expense of the remaining hardened area while maintaining the minimum value of the biologically active area indicator, which was also determined in the local plan (Figure 5).

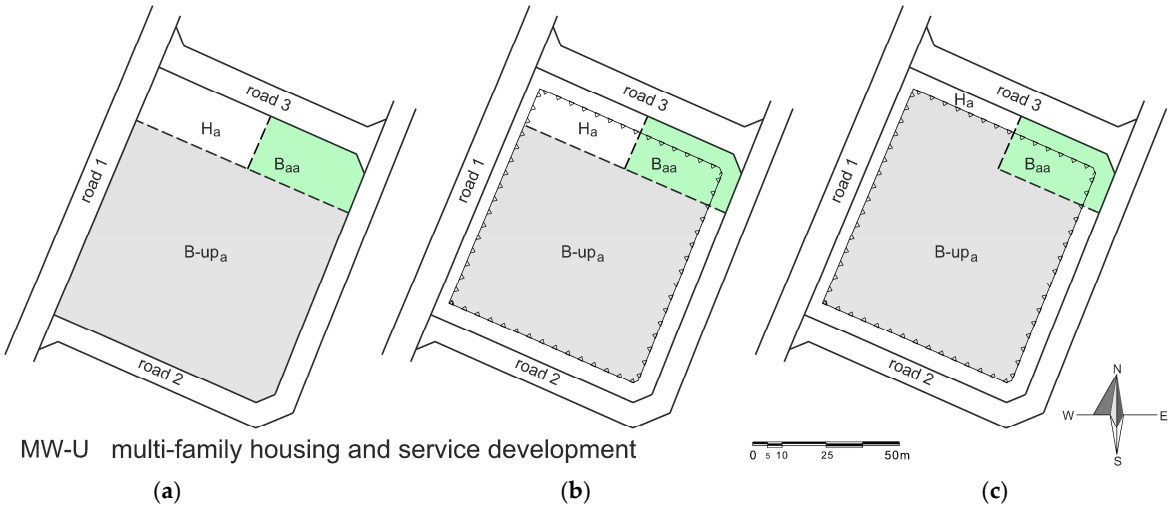


Figure 5. Diagram of the relations between the values of urban planning indicators within a building plot: (**a**) relations of max. built-up area (B-up$_a$)—grey color, to min. area of biologically active area (B$_{aa}$)—green color; (**b**) introduction of an additional restriction in the form of a building line; (**c**) change in max. size of the built-up area (B-up$_a$) at the expense of the hardened area (H$_a$)—white color, while maintaining the previously assumed minimum biologically active area (B$_{aa}$) and taking into account the building line. Source: author's study.

For the sake of simplicity and transparency in the research, for the area marked MW-U presented above, it was assumed that the so-called green roofs were not planned to be implemented, so it did not occur that the built-up area was, at least in part, biologically active at the same time.

The diagrams below (Figure 6) the show selected building plots for further analysis. They deliberately represent the diverse functions of the sites from a selection of adopted and existing local plans.

Table 2 presents the quantitative results of the analyses carried out for fifteen selected building plots, which represent eight single land uses, namely: US1—sports and recreation service area, MW/U1—multi-family housing area, service area, MN3 (sz)—terraced housing, MN14 (w)—single-family housing, MN21 (b)—semi-detached housing, MN/MW1—single-family housing development area, multi-family housing development area, U1—service area and P/U1—industrial and service development area. The analyses concerned the calculation of the size of the area of two urban planning indicators: the minimum biologically active area and the maximum building area (w m^2 and ha), which were determined for each of the plots in the selected local plans (as a % share).

The schematic drawings presented above (Figure 6a,b) are a direct connection to the results presented in Table 2.

Each of the plots was analyzed separately under three conditions:

1. taking into account the total area of the plot—without additional arrangements (WAAA);
2. taking into account the building line (BL);
3. taking into account building lines and building regulations (BL + CLAR) at the same time.

The obtained results showed that it was not always possible to determine the shares of both indicators adopted in the local plans, especially in the case of approach No. 3, when the imposed restrictions on the building lines and the provisions of the construction law strongly limited the area of plots in their parts intended for development.

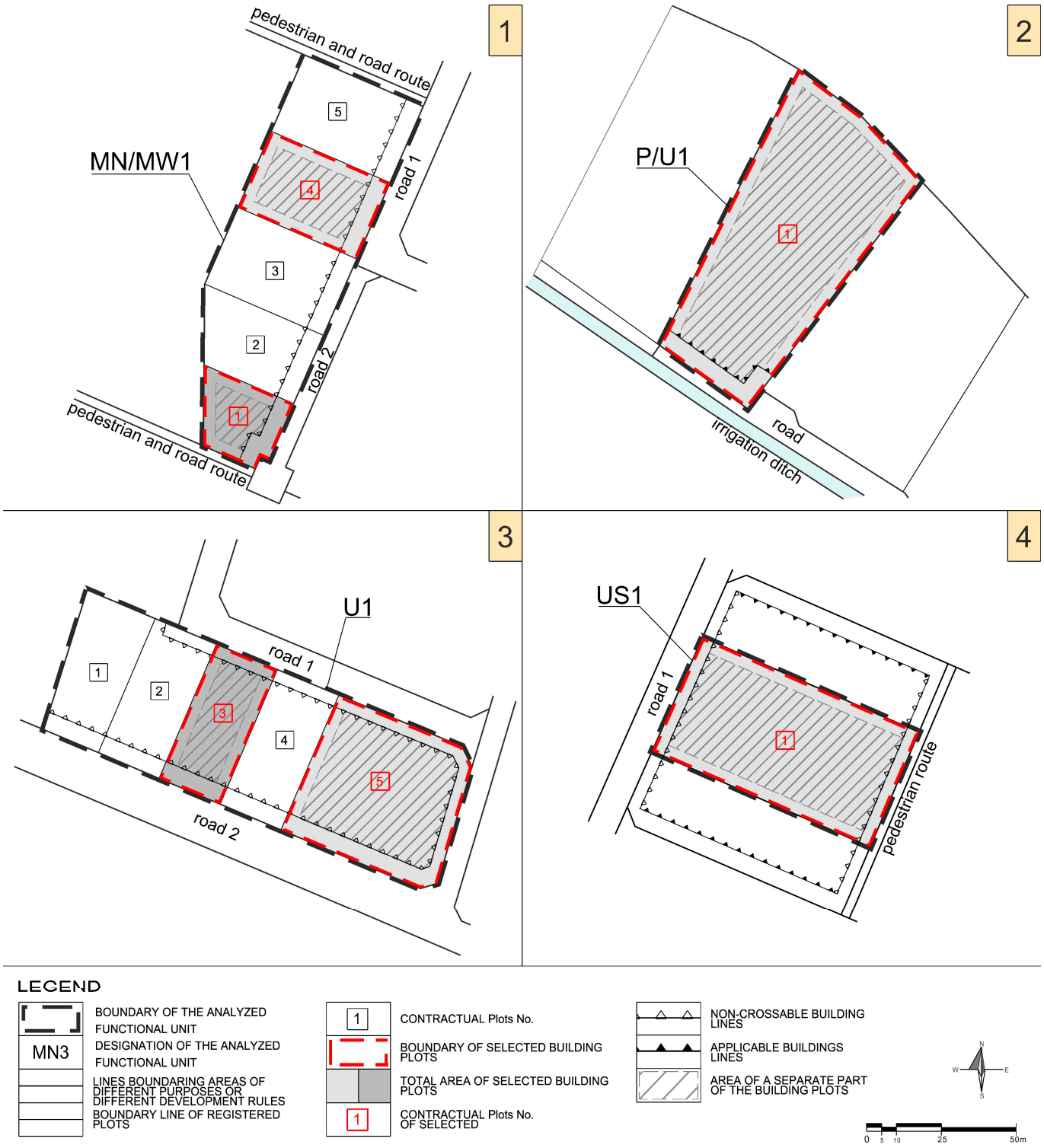
The first doubt is the fact that within one functional unit (e.g., MN/MW1) two highly differentiated functions were juxtaposed—single-family residential development and multi-family residential development, for which the values of urban planning indicators were the same.

The second doubt concerns the fact that the same functional unit was represented by two separate plots, the total areas of which differed significantly from each other, and the restrictions on development in the form of building lines and construction law regulations were the same. As a consequence, after deducting the area that should have been excluded from the built-up area, the remaining space oscillated between 272 m^2 in one case and 661.76 m^2 in the other. The planning arrangement for the area in question assumes the possibility of allocating a maximum of half of the building plot (50%) as a built-up area, both for the construction of a single-family and multi-family residential building. Assuming that the total area of the first plot is 674.05 m^2, and the second is 1206.60 m^2, then, taking into account the other development conditions, the remaining maximum areas for development are 136.03 m^2 and 330.88 m^2, respectively.

Table 2. Quantitative analyses results– recalculation of real area values (in m^2 and ha) of two urban indicators: min. biologically active area (min. B_{aa}) and max. built-up area (max. B-up_a) set out in the applicable local development plans for previously selected functional units—from No. 1 to No. 8 (in %).

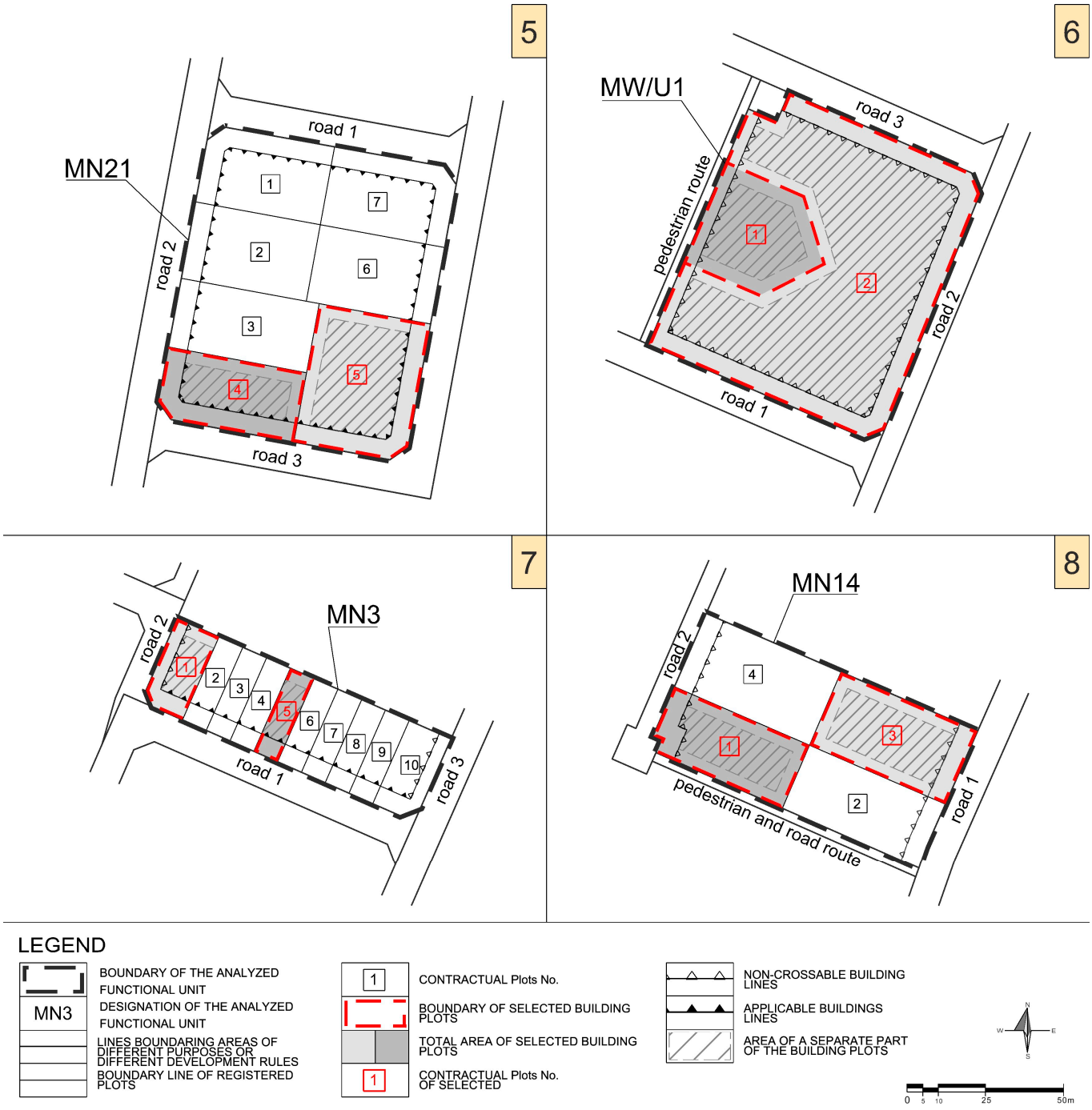
No.	Function (Purpose of Area)	Plot No. (According to Figure 6)	Conditions resulting from Planning and Legal Provisions	Plot Size (m^2, ha)	Values of Urban Indicators in the Local Development Plan			
					Min. Biologically Active Area [Min. B_{aa}]		Max. Built-up Area [Max. B-up_a]	
					(%)	(m^2; ha)	(%)	(m^2; ha)
1	MN/MW1	1	WAAA	674.05; 0.0674	10	67.41; 0.0067	50	337.03; 0.0337
			BL	505.28; 0.0505		-		252.64; 0.0253
			BL + CLAR	272.06; 0.0272		-		136.03; 0.0136
		4	WAAA	1206.60; 0.1207		120.66; 0.0121		603.30; 0.0603
			BL	1039.17; 0.1039		-		519.59; 0.0520
			BL + CLAR	661.76; 0.06617		-		330.88; 0.0331
2	P/U1	1	WAAA	4575.01; 0.4575	20	915.00; 0.0915	60	2745.00; 0.2745
			BL	4307.54; 0.4307		-		2584.52; 0.2584
			BL + CLAR	3398.26; 0.3398		-		2038.95; 0.2038
3	U1	3	WAAA	1085.87; 0.1085	10	108.58; 0.0108	50	542.93; 0.0542
			BL	864.33; 0.0864		-		432.16; 0.0432
			BL + CLAR	552.21; 0.0552		-		276.10; 0.0276
		5	WAAA	2573.50; 0.2573		257.35; 0.0257		1286.75; 0.1286
			BL	1898.92; 0.1898		-		949.46; 0.0949
			BL + CLAR	1742.30; 0.1742		-		871.15; 0.0871
4	US1	1	WAAA	3316.64; 0.3317	0	-	90	2984.98; 0.2985
			BL	2982.16; 0.2982		-		2683.94; 0.2684
			BL + CLAR	2411.74; 0.2412		-		2170.56; 0.2171
5	MN21 (b)	4	WAAA	1003.43; 0.1003	60	602.05; 0.6020	30	301.03; 0.0301
			BL	645.11; 0.0645		-		193.53; 0.0193
			BL + CLAR	439.39; 0.0439		-		131.81; 0.0131
		5	WAAA	1615.62; 0.1615		969.37; 0.0969		484.68; 0.0484
			BL	1175.95; 0.1175		-		353.78; 0.0352
			BL + CLAR	915.26; 0.0915		-		274.57; 0.0274
6	MW/U1	1	WAAA	1142.46; 0.1143	10	114.25; 0.0114	80	913.97; 0.0913
			BL	1007.64; 0.1008		-		806.112; 0.0806
			BL + CLAR	677.25; 0.0677		-		541.80; 0.0542
		2	WAAA	5997.43; 0.5997		599.74; 0.0059		4797.94; 0.4798
			BL	4483.68; 0.4484		-		3586.94; 0.3587
			BL + CLAR	4040.32; 0.4040		-		3232.26; 0.3232
7	MN3 (sz)	1	WAAA	413.27; 0.0413	30	123.98; 0.0124	60	247.96; 0.0248
			BL	242.49; 0.0242		-		145.49; 0.0146
			BL + CLAR	200.13; 0.0200		-		120.08; 0.0120
		5	WAAA	240.69; 0.0241		72.207; 0.0072		144.41; 0.0144
			BL	190.89; 0.0191		-		114.53; 0.0115
			BL + CLAR	157.66; 0.0158		-		94.60; 0.0095
8	MN14 (w)	1	WAAA	1012.12; 0.1012	50	506.06; 0.0506	40	404.85; 0.0405
			BL	864.00; 0.0864		-		345.60; 0.0345
			BL + CLAR	491.75; 0.0492		-		196.70; 0.0197
		3	WAAA	1209.43; 0.1209		604.72; 0.0605		483.77; 0.0484
			BL	1056.48; 0.1056		-		422.59; 0.0423
			BL + CLAR	655.00; 0.0655		-		262.00; 0.0262

Explanation of symbols: WAAA—Without any additional arrangements; BL—Taking into account the building lines; BL + CLAR—Taking into account the building lines and construction law regulations. Source: author's study.



(**a**)

Figure 6. *Cont.*



(**b**)

Figure 6. Diagrams of selected functional units from among the selected adopted local plans, with an indication of the building plots subjected to analysis: (**a**)—from No. 1 to No. 4; (**b**)—from No. 5 to No. 8. Numbers from 1 to 8 correspond to the numbering (No.) used in Table 2. Source: author's study.

The third case concerns single-family residential buildings in a terraced layout, where, taking into account all the restrictions resulting from the regulations and provisions of the local plan, the maximum built-up area for one of the plots can be at the level of 94.60 m^2.

Another questionable issue is the determination of the minimum biologically active area in relation to a building plot as part of the designation of the area for a multi-family residential area with services, where one of the plots has a total area of 1142.46 m^2 and

the other almost four times as much, i.e., 5997.43 m^2. Converting 10% of each of them, which, according to the provisions of the local plan, is the minimum biologically active area, we obtain areas of 114.25 m^2 and 599.74 m^2, respectively. Unfortunately, practice shows that investors see the required minimum share of biologically active area as the maximum. On the other hand, surprisingly, for the US1 area (sports and recreation service area) a minimum share of biologically active area of 0% was assumed. Therefore, the underestimation of the minimum level of biologically active areas in planning studies allows for the implementation of a really small share as green and permeable areas on individual building plots.

Of course, it can be assumed that the building plots may be merged and re-divided, which would improve the real size of the acreage for the adopted urban indicators; however, this procedure is extremely rare in Poland. In addition, you never know whether two adjacent plots of land will be bought by two separate investors who will try to carry out the construction project in accordance with the applicable provisions of the local plan, even though, as research has proven, sometimes they are unrealistic or even harmful to the space.

5. Final Conclusions and Summary

The use of appropriate proportions between developed, including built-up areas, and biologically active and naturally valuable areas allows for a sustainable shaping of the urban environment [27] (p. 63). The conducted and herein presented research results show that the arrangements of local spatial development plans are of great importance for the quality of shaping space. They have appropriate tools in the form of urban indicators, with the help of which space management can be more or less sustainable.

The legitimacy of determining urban planning indicators concerning individual functional areas in the development of local spatial development plans is obvious. The necessity to define the principles of land development and management is one of the basic goals of these planning studies. However, the discussion on the application of the most optimal share values of the maximum built-up area and the minimum biologically active area is still open.

The conducted research revealed improperly made planning decisions in selected local plans, which defined the values of selected urban indicators in relation to separate functional zones. The values of some indicators were either overstated, understated, or inadequate to the function of the area or the size of the plot. In addition, the determined urban planning indicators, combined with other applied planning arrangements and taking into account the provisions of the construction law, did not allow for the rational development of specific building plots. A major drawback of many of the analyzed planning provisions is the lowering of the value of the minimum biologically active area indicator, while at the same time the possible maximum built-up area is much higher. Failure to apply reasonable urban planning indicators at the level of the local plan results in the deterioration of the living conditions of residents as a result of environmental degradation. Investors dealing with residential or commercial construction strive to maximize profits and minimize costs. If they are given the opportunity to apply a minimum biologically active area ratio of 5% on a given plot, they will probably use exactly that number, and the remaining area of the plot will be designated for residential or service buildings and will be paved, for example, for paid parking spaces. Therefore, the presented study shows that the definitions of urban indicators by designers are not always adapted to spatial and social needs.

Certainly, any attempt to define the surrounding space with respect for its natural environment is in line with the assumptions of the New European Bauhaus. The NEB initiative is interdisciplinary, combining the issues of spatial functionality, sustainable development, new technologies, art and culture, beauty, environmental protection, as well as uniting individual communities [30]. A special place among these activities is the shaping of space at the local level. Sustainable management of space at the municipal

level provides an opportunity for the rational management of development. The use of proper, optimal, and consistent urban indicators for individual functional areas is an opportunity to achieve one of the basic, sustainable assumptions of the New European Bauhaus. Based on the Habitat Agenda in relation to the promotion of sustainable urban structures, especially the Indicator 12, "Estate planning", defined and described in the "Urban Indicators Guidelines", strongly focuses on effective planning, which determines the good development of urban centers and constitutes effective urbanization [31].

Environmental protection, the development of buildings in dense areas that have already been invested into, and the preservation of existing open areas will certainly also contribute to reducing the negative effects of climate change. In addition, well-designed, aesthetically pleasing spaces, respecting nature and culture, and taking into account social needs and expectations, will provide a solid, durable and model foundation for future generations.

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