

Article

Evaluation of the New European Bauhaus in Urban Plans by Land Use Occurrence Indicators: A Case Study in Rijeka, Croatia

Bojan Bilić and Krunoslav Šmit * 

Faculty of Architecture, University of Zagreb, Fra Andrije Kačića Miošića 26, 10000 Zagreb, Croatia; bojan.bilic@plan21.hr

* Correspondence: krunoslav.smit@arhitekt.hr; Tel.: +385-98-9066-641

Abstract: The aim of the research is to provide a numerical evaluation of the occurrence of New European Bauhaus (NEB) principles in urban plans, using four key indicators: GI (green infrastructure), POS (public open space), PSN (public and social needs), and UR (urban reconstruction). The initial step in the research involves determining numerical quantitative indicators with target reference values, which are then used as a measure of compliance with the vision of the NEB. Indicators are modeled based on elements embedded in urban plans and implemented in a framework for evaluating these plans. Through the analysis of collected data, a comparison is made with the set goals and values of the NEB, thus enabling the assignment of ratings for occurrence and identification of areas where improvements are needed. The research results for Rijeka point to the need for planning new green areas, maintaining and developing street networks, and increasing pedestrian and park areas. Additionally, there is a suggested need to increase content to meet public and social needs and expand areas planned for urban reconstruction. The research results emphasize the importance of monitoring and adjusting urban plans to the NEB platform to achieve sustainable and balanced urban development goals, highlighting the need for continuous improvement in the quality of urban planning.

Keywords: New European Bauhaus; urban plans; land use indicators; green infrastructure; public open space; public and social needs; urban reconstruction; Rijeka; Croatia



Citation: Bilić, B.; Šmit, K. Evaluation of the New European Bauhaus in Urban Plans by Land Use Occurrence Indicators: A Case Study in Rijeka, Croatia. *Buildings* **2024**, *14*, 1058. <https://doi.org/10.3390/buildings14041058>

Academic Editors: Barbara Gronostajska, Romuald Tarczewski and Joanna Jablonska

Received: 13 March 2024

Revised: 3 April 2024

Accepted: 9 April 2024

Published: 10 April 2024



Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

New European Bauhaus (NEB) is a platform launched in 2021, with paradigms that emphasize fundamental values, principles, and thematic axes of action [1]. NEB connects the European Green Deal with everyday lives and places; it has been announced by the European Commission as an ecological, economic, and cultural project, introducing a new context for educating architects in line with the goals set by the European Union, as previously outlined in the European Green Deal (EGD). This includes reducing gas emissions, improving the energy efficiency of buildings, designing buildings in accordance with the principles of the circular economy, utilizing renewable energy sources, promoting ecological food, and protecting biodiversity [2,3]. Attractiveness, sustainability, and inclusivity are set as fundamental values. The following core principles are affirmed: a multi-level approach, an interdisciplinary approach, and a participatory approach. The highlighted thematic axes of the NEB platform which point to the need for directing the development of cities are reconnecting with nature (“Nature in the City”), regaining a sense of belonging to the community (“Connecting People”), ensuring accessibility to public services and social facilities (“Affordability and Accessibility”), and the long-term renewal of existing urban structures (“Circular Sustainability”). The revolutionary aspect and fundamental values of the NEB have been highly praised, but the success of the initiative can only be assessed based on its approach to defining these values [4].

So far, NEB’s research has been directed towards extracting fragments within the thematic framework of the platform, while observations of the integral functioning of all

platform segments have not generally been the focus of studies. Certain fragments of NEB have been explored more than others. For instance, the thematic axis “Nature in the City” has been examined with a focus on greening the city, developing urban green corridors, and studying the phenomena of climate change in cities. The papers state that within urban environments, there are numerous disconnected green areas [5–9] that can be interconnected into an urban green infrastructure system, significantly contributing to the reduction of the scope and impact of urban heat islands, which create numerous adverse effects. In the exploration of the thematic axis “Connecting People”, the focus is on the possibilities of creating stronger connections among residents. The goal is to prevent the isolation of individual groups of citizens. This research is about a society without barriers [10] and a community that will be able to affirm the spatial standards of contemporary society and the city. The thematic axis “Affordability and Accessibility” is examined through the phenomenon of the “15-minute city”, within which the placement of public and social facilities is analyzed. In its basic form, “15-minute cities” are affirmative and desirable, but they also raise certain uncertainties, such as the creation of introverted closed systems outside the urban network. These systems require further research, and the NEB platform offers possible solutions [11,12]. The thematic axis “Circular Economy” is also evaluated with a focus on enabling the reconstruction of existing buildings and infrastructure. Extensive research has so far been conducted on models of urban renewal and regeneration [13–15].

In contemporary urban planning, cities as hubs of innovation and creativity, where aesthetics, sustainability, and social inclusivity converge, transform through the implementation of municipal projects and urban planning initiatives. To ensure the success of this process and align it with global standards of innovative and sustainable design, specialized qualitative and quantitative research is conducted to demonstrate the compatibility of project and planning solutions with the core values, principles, and thematic axes of the NEB platform. The implementation of NEB is distributed across various bodies of the European Union, with significant efforts taking place at the “Joint Research Centre European Union” [16], and exemplary practices aligned with NEB are presented within the framework of the “European Publications Office” [17]. For instance, the publication “The New European Bauhaus at the local and regional level” [18], provides justification for the project’s alignment with NEB. The “Citizen-powered data ecosystems for inclusive and green urban transitions (Urban ReLeaf)” project aims to co-create citizen-powered data ecosystems as complementary resources that support climate adaptation, urban design planning, and green infrastructure. In the “Eyes Hearts Hands Urban Revolution (EHHUR)” project, neighborhoods lead a mission to renew school buildings and parks, create new multi-purpose library buildings, restore historical centers, establish new and sustainable cultural centers, and renovate healthcare and social care districts designed to pave the way for sustainable, beautiful, and inclusive cities. In addition, numerous scientific research efforts also address the alignment of project results with NEB. For example, “L’Orto della SME” is a project to implement a self-governing center for various stakeholders within and outside the University of Turin. This project significantly contributes to NEB principles by effectively applying initiatives such as urban gardening to address issues of social inclusion, equality, and sustainable production and consumption [19].

In addition to municipal projects, a wealth of indicators is also found in urban planning documents, vividly illustrating the characteristics related to the NEB [20]. Examples such as green spaces, public areas, social facilities, or areas earmarked for urban redevelopment are crucial elements in shaping a city in line with this innovative European platform. Therefore, the focus of the work is directed towards analyzing the indicators present in urban planning documents. Additionally, the question arises of whether these indicators can be modeled to not only speak to the level of compliance with NEB but also highlight areas in urban plans that require improvement.

The goal of the research is a numerical evaluation that provides a concrete insight into the occurrence of the principles of the NEB in urban planning documents. The initial

step in the research process is to establish numerical quantitative indicators with target reference values that will serve as a measure of compliance with the NEB. Subsequently, these indicators are modeled to base their numerical data on elements embedded in urban planning documents. After determining the numerical data and modeling the indicators, the next step is their implementation into a framework for evaluating urban planning documents. This process involves analyzing the collected data from urban planning documents and comparing them with the set goals and values of the NEB. Based on the results, it is possible to assign ratings of occurrence, indicating areas where improvement or recognizing achievements are needed (Figure 1). This creates a systematic approach to aligning urban planning documents with the vision of sustainable, aesthetic, and inclusive development. Through such an approach, urban planning documents can become dynamic instruments for transforming cities in line with modern European standards and the ideas of the NEB.

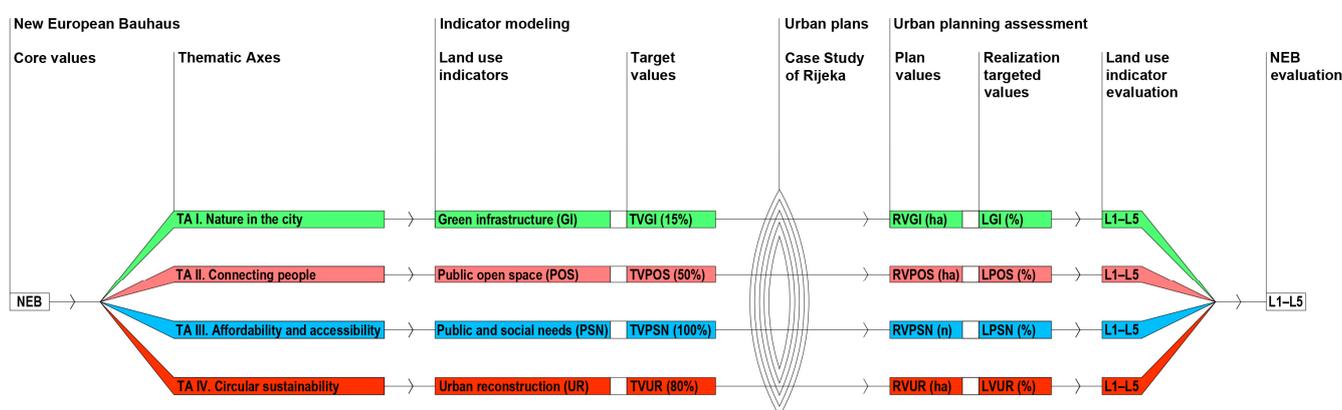


Figure 1. Research diagram. Created by the author.

2. Materials and Methods

2.1. Studied Area

The study on the occurrence of the NEB was conducted as a case study in Rijeka. Rijeka is a city located in the northwest coastal part of Croatia (Figure 2), where specific topography has resulted in the urbanization of an elongated narrow perimeter along the coastal strip to the edges of a steeply configured hilly hinterland, with pronounced spatial constraints in an area of approximately 44 km² [21]. Another characteristic of Rijeka is the presence of a significant range of valuable industrial architectural heritage that is yet to find its place in urban regeneration programs [22]. The research was conducted on urban planning documents in Rijeka that emphasize public functions and were developed after the year 2000 [23]. Based on these criteria, six urban plans within the scope of the General Urban Plan of the City of Rijeka were selected and analyzed (Figures A1–A6) [24]. Among them are the following urban plans: Rujevica [25], Kampus [26], Stari Grad [27], Delta [28], Benčić [29], and Kantrida [30] (Figures 3 and 4). These observed plans primarily focus on public facilities and are related to two projects planned for co-financing from European Union funds: Rijeka as the European Capital of Culture 2020 and the candidacy for hosting the Mediterranean Games. The urban plans of the city of Rijeka were analyzed to create a localized contextual framework for the observed issues.

Although chronologically distant, the analyzed plans contain elements of the NEB platform, and their occurrence can be assessed. It is also important to note that the research is focused on specific fragments of the city rather than the city as a whole, building on studies suggesting that targeted spatial standards should appear consistently across all parts of the city, as well as at the level of the city as a whole [31].

The strategic reference planning framework is not the subject of this research since the Regional Plan, Spatial Plan, and General Urban Plan are older-generation documents whose development began in the last century and was completed long before the emergence of

the NEB platform [32–34]. The same applies to the “City of Rijeka Development Strategy 2014–2020” and the “Report on the State of the City of Rijeka 2007–2018”—the coherence of NEB’s fundamental values in implementation and at the strategic level can only be a matter of the near future [35,36]. The strategic planning documents of Rijeka cannot be directly linked to the NEB platform due to their earlier date of creation and origin in the previous century.

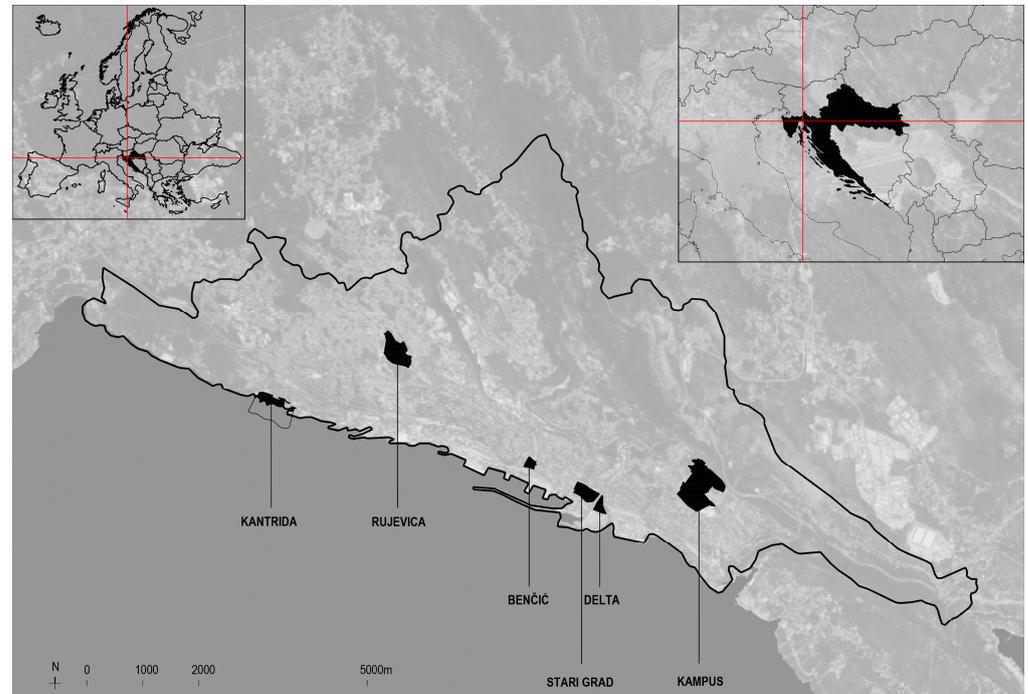


Figure 2. Schemes following the spatial distribution of urban plans with public and social programs in Rijeka (2000–2023). Created by the author.



Figure 3. Ambiences in the scope of urban plans. Created by the author.



Figure 4. Cartographic representations of the use of urban plan areas at the same scale [25–30].

2.2. Determining Numerical Reference Values and Modeling Indicators

Numerical quantitative indicators were established. It is crucial to emphasize that the indicators were chosen with the possibility of determining a target value, providing a clear direction for achieving alignment with the goals of the NEB. The target value was identified through the analysis of previous research (Table 1). Each thematic axis is represented by an indicator that is modeled to express its urbanistic aspect based on data from urban planning documents, enabling precise recognition both numerically and graphically. This integration allows for a systematic analysis of individual thematic axes and their aspects within urban planning documents. Furthermore, the importance of this approach lies in its ability to provide a comprehensive view of the NEB in urban planning. The modeled indicators not only offer insights into each thematic axis but also enable the analysis of the integral occurrence of all aspects of this innovative approach to urban transformation.

Table 1. Numerical quantitative indicators from previous research. Created by the author.

Study	Indicator	Quantification
The theory of land use in urban planning [37]	Green areas in urban plans	13–17%
A green infrastructure planning framework [38]	Green infrastructure areas	15%
“European green deal”: EU biodiversity strategy for 2030 [2,39]	Urban areas used for green infrastructure	15%
“UN Habitat”: Guidelines to Achieve Quality Public Spaces [40]	Urban areas with green infrastructure along with a broader spectrum of facilities	20–30%
A proposal for Green Norm 2.0: analyses of European cities and towns [41]	Areas of greenery in cities	15–26 m ² /inhabitant
Study of green Infrastructure of the City of Rijeka [42]	Green areas in a populated part of the city	3–5 m ² /inhabitant
“UN Habitat”: Global Public Space Toolkit [43]	Areas used for common goods (pedestrian traffic areas, meeting places, squares, and parks)	50%
“UN Habitat”: Developing Public Space and Land Values [44]	Accessibility of areas for social cohesion	5 min (400 m)
The “15-minute city”: urban planning concept [12,31,45,46]	Accessibility to the daily needs of residents (housing, work, food, health, education, culture, and leisure)	15 min (1200 m)
Research on the impact of building construction on climate change [47–49]	Decarbonization of already built buildings	80%

Nature in the city: The first thematic axis of the NEB—“Reconnecting with Nature”—expresses the importance of establishing green urban corridors, combating climate change, proper waste management, and natural solutions to improve the community’s quality of life. The synergy of these elements in the context of architectural and urban designs is crucial due to the ambition to use spatial projects to reverse the negative trends of global warming, reduce the effects of urban heat islands, and improve the health of individuals and society as a whole. Previous research has established criteria and standards for the types and distribution, as well as the extent of green areas for the entire city, each of its areas, each fragment, or urban intervention. The research material proves that an increased extent of green infrastructure contributes not only to the quality of life and the health of citizens but also to the overall social and economic prosperity [50,51]. In earlier studies [37], standards and criteria were established regarding the relation between the purpose of specific land in the city area, and the values in the domain of the percentage of green areas (13–17%). New research is also being conducted indicating that approximately 15% of the total surface area is recommended for the implementation of green infrastructure in the centers of urban areas [38]. The European Union, through the “European Green Deal” platform (EU Biodiversity Strategy for 2030), envisions that 15% of urban areas should be designated for green infrastructure [2,39]. “UN-Habitat” proposes that, to achieve a good quality of life, 20–30% of urban areas should have green infrastructure along with a broader spectrum of facilities [40]. Based on analyses of European cities and towns, recommendations are given for green area values per inhabitant, for example, in Germany, 15 m²/inhabitant, in Denmark, 22 m²/inhabitant, or in Romania, 26 m²/inhabitant. Simultaneously, the World Health Organization (WHO) sets a minimum standard of 9–11 m² of greenery per inhabitant [41]. In the analysis of green infrastructure in Rijeka [42], it is emphasized that 47.40% of natural and 1.92% of landscaped green areas of public use are registered outside populated areas, in contrast to the parts of the city within the populated area where there is less greenery, and the obligations of strategic spatial plans to achieve a level of greenery of 3–5 m²/inhabitant are not sufficient for the implementation of European platforms NEB and EGD [1,2]. From the conducted analysis, it can be concluded that to achieve “reconnection with nature,” it is important to preserve existing areas and develop

new areas that have characteristics close to the original nature, which is achieved through the development and upgrading of planning solutions with green infrastructure. It has been shown that targeted green infrastructure standards are expressed in various ways, most commonly through the percentage of green surface area relative to the scope of the intervention, or through the required green surface area per inhabitant. As the purpose of the research is to improve urban plans, the “Green Infrastructure” (GI) indicator was designed and modeled on data from urban plans on land use, where green infrastructure can be recognized as the proportion of existing and planned green areas. Also, based on the conducted analyses, the target value of the indicator in urban plans can be a share of 15% of the surface area designated for green infrastructure, as proposed by the European Union’s Green Deal (Table 2).

Table 2. Designing indicators of thematic axes of the New European Bauhaus. Created by the author.

Indicators of Thematic Axes in Urban Plans (TA I-IV.)	Goals	Parameters	Units	Target Value
TA I. Nature in the city: “green infrastructure” (GI) indicator	Determining the contribution of the urban plan to achieving connection with nature.	Using land for green infrastructure. Occurrence of areas for natural greenery.	%	15%
TA II. Connecting people: “public open space” (POS) indicator	Determining the contribution of the urban plan to achieving connection among people.	Using land for public open spaces. Occurrence of areas for streets, squares, and parks.	%	50%
TA III. Affordability and accessibility: “public and social needs” (PSN) indicator	Determining the contribution of the urban plan to meeting public and social needs.	Using land for public and social needs. Occurrence of all types of public and social facilities of a 15-min city.	%	100%
TA IV. Circular sustainability: “urban reconstruction” (UR) indicator	Determining the contribution of the urban plan to achieving long-term, lifelong, and integral management.	Using land for urban reconstruction. Occurrence of areas for reconstruction of buildings.	%	80%

Connecting people: The second thematic axis of the NEB—“Regaining a Sense of Belonging”—emphasizes the importance of improving shared spaces and meeting places, different models of connecting people, and establishing a higher level of social cohesion. The aim is to create a local platform for social cohesion by accentuating and developing those functions that contribute to improving the quality of life in the community. Research indicates that cities function efficiently, justly, and sustainably only when private and public spaces function as a symbiotic relationship, all with the goal of improvement and enhancement of interaction. What is good for private spaces is also good for public spaces. Quality public spaces generate equality, although it has been drastically reduced in recent decades [52]. There is a growing trend away from monofunctional urban areas towards hybrid complexes and blocks. Urban neighborhoods need to be sustainable, and that is achieved through a quality balance between different functions, appropriate density, and avoiding monofunctionality by having specialized blocks covering only 10% of an area [7,53]. Research by “UN-Habitat” indicates that the path to quality urbanization involves complete social integration and no segregation, where 50% of urban land should be dedicated to common goods: squares, streets, and parks, in a rough ratio of 60% squares and streets to 40% green areas [54,55]. It is also essential to have a high-quality network of pedestrian and vehicular communications, which should serve common goods. Examples of designing public spaces within urban multipurpose complexes have been studied, indicating that a public open space has a particular effect on developing positive emotions and a sense of unity among different social groups of users [43]. Research shows

that to ensure a “proximity economy” with a different spectrum of necessary facilities, it is important that spaces of social cohesion be within a 5-minute walking distance, or a maximum of 400 m away [44]. The analysis conducted suggests that “connecting people” can be facilitated by the development and improvement of areas that become the spatial framework for the affirmation of social cohesion. “Regaining a sense of belonging to people and places” can be achieved within purposefully designed open public spaces. Open public space, as a common good, includes streets, squares, and parks. As the purpose of the research is to improve urban plans, the “Public Open Space” (POS) indicator was designed and modeled on data from urban plans on land use, where open public space can be recognized as the proportion of planned pedestrian areas. As a target value to be achieved in urban plans, a share of 50% of the surface area designated for public open space, as proposed by “UN-Habitat”, can be used (Table 2).

Affordability and accessibility: The third thematic axis of the NEB—“Places People Need Most”—primarily focuses on the necessity of fostering inclusivity of people and spaces within the community, specifically through the improvement of affordability, accessibility, and availability of spatial solutions for all users. The importance of social inclusivity (of people and places) is highlighted, emphasizing sustainable and attractive spatial designs, as well as the decentralization of social cohesion facilities, while avoiding all forms of spatial segregation through barrier-free physical or social interventions without boundaries. It is especially crucial to create a social and spatial framework that protects the most vulnerable groups and individuals. Previous research has dealt with the phenomenon of social integration programs based on affordability and inclusivity. Closest to this theme are considerations of the “15-minute city”, presenting an urban planning model that promotes a human-oriented and ecologically sustainable urban future. The central idea is the concept of designing and reshaping cities so that all residents, regardless of age, background, and abilities, can access their daily needs (housing, work, food, health, education, culture, and leisure) within a 15-minute walking distance in all parts of a city [31]. The network and arrangement of these programs have been analyzed through affirmative and desirable systems based on a 15-minute accessibility [12]. The conducted research speaks to a society without barriers [10], a community that will know how to affirm spatial standards not only for the “15-minute city” but also for the modern society and city. The concept of the “15-minute city” is not always a “one-size-fits-all” idea and it uses long-established principles of urban planning improved by participatory models. Numerical values of the reach of necessary facilities have always been explored under the platform of inclusivity and sustainability [56]. Different contexts carry different topographies, so research on the city of Rijeka examines models of a sustainable and inclusive “15-minute city” not based on generic geometric forms [57]. The NEB “calls on all of us to imagine and build a sustainable and inclusive future,” where inclusivity is defined as “encouraging a dialogue across cultures, disciplines, genders and ages” [4,45]. The research aims to answer the question of where and how we should live in the future to achieve ecologically sustainable, socially inclusive, and healthy and attractive development of urban areas [46]. The analysis shows that achieving “affordability and accessibility” requires the decentralization of municipal functions, which, through their even dispersion, enhances the quality of life by enabling uniform and balanced access to housing, work, food, health, education, culture, and leisure. Based on the conducted research, it can be determined that the “places people need most” include facilities that allow meeting public and social needs. Since the goal of the research is to improve urban plans, the “Public and Social Needs” (PSN) indicator was designed, which was shaped by data from urban plans on land use, where one can recognize the contribution of areas for public and social purposes to the improvement of public and social needs within a 15-minute walking radius (1200 m). As a target value to be achieved in urban plans, the occurrence of all types of public and social facilities in the “15-minute city” can be used (Table 2).

Circular sustainability: The fourth thematic axis of the NEB—“Long-term, Lifelong, and Integral Management”—focuses on topics related to the circular economy, the impor-

tance of material and building reuse, prioritizing reconstruction over new construction, brownfield interventions, and the extensive application of digital transition. It emphasizes that circular and sustainable design and architecture should become the standards of the time ahead. In previous research, the circular economy has been analyzed with a focus on enabling the reconstruction of existing buildings and infrastructure. Local and global models of urban renewal and regeneration, with a particular emphasis on brownfield interventions in urban environments, have been extensively explored [58,59]. Research, based on assessments, highlights that approximately 80% of the buildings that will exist in 2050 have already been built. This result stems from research conducted on an area of 6.6 billion square meters in 143 countries. It shows that reducing carbon emissions is a key component in preventing irreversible climate change. Addressing the decarbonization challenge would lead to achieving a 75% reduction in annual carbon through real estate [47–49]. Additionally, research within the NEB promotes initiatives in the context of sustainability of nature and construction, architecture, and infrastructure. It emphasizes that the climate crisis and the COVID-19 pandemic have increased the need for new approaches, expanding the concept of smart cities to smart territories, considering societal participation and overall inclusivity [53]. In the domain of sustainable development, papers have explored the development strategies of cities and their circular sustainability [60]. Moreover, the topics of previous research have also focused on determining the experiences and applicability of using urban sustainability indicators [39,61]. Research leads to the conclusion that achieving a circular economy requires a significant reduction in carbon emissions, which is contributed by affirming the reconstruction, remediation, and renovation of the existing building stock, i.e., reducing the construction of new buildings. It is emphasized that the planning of new buildings and construction areas should be avoided. As this research aims to improve urban plans, the “Urban Reconstruction” (UR) indicator was designed and modeled based on data from urban plans on land use, where existing buildings that are retained and renovated can be recognized as the share of areas planned for urban remediation and reconstruction. As a target value that needs to be achieved in urban plans, a share of 80% of the area for urban reconstruction can be used, as suggested by research on the impact of buildings on reducing carbon emissions (Table 2).

2.3. Assessment and Evaluation of NEB Occurrence through Land Use Indicators

The implementation of numerical indicators in the evaluation of urban plans involves a systematic analysis of collected data on land use and accessibility to social needs. It is important to note that measuring the degree of goal fulfillment refers to how close each indicator’s value is to the reference target value. The percentage of goal fulfillment then serves as the basis for assigning compliance ratings. This rating is expressed through five levels, namely L1 (0–20%), L2 (21–40%), L3 (41–60%), L4 (61–80%), and L5 (>80%), providing a clear picture of the level of compliance for each indicator. Each level, from L1 to L5, indicates how close the indicator value is to the target value. In this way, the evaluation enables the precise identification of areas where improvement is needed or where high levels of compliance have been achieved.

Four different indicators were used to assess NEB occurrence in urban plans, namely, GI, POS, PSN, and UR. Their use can indicate areas that need improvement or recognition of achievements. The overall representation of the GI, POS, PSN, and UR indicator values forms the NEB indicator, providing an integrated view of the state of NEB occurrence in urban plans.

GI indicator (Figure 5, Table 3): In the case study, based on data from urban plans, the GI indicator is recognized as the land area used for protective greenery, city parks, children’s playgrounds, gardens, and resting areas (planning code Z). They are read on the graphical annex to the spatial plan “Land Use and Purpose of Surfaces” [25–30]. The procedure is as follows: 1. calculation of PA (ha); 2. calculation of TVGI = $0.15 \times PA$ (ha); 3. calculation of PVGI (ha); 4. calculation of LGI = $(PVGI/TVGI) \times 100$ (%); and 5. assignment of ratings L1–L5, where PA is plan coverage area, TVGI is target value—15%

land use for GI in PA, PVGI is total land use for GI, LGI is percentage of target value fulfillment, and L1–L5 is GI occurrence rating based on goal fulfillment percentage.



Figure 5. GI indicator, land used for green infrastructure. Created by the author.

Table 3. GI indicator, land use evaluation. Created by the author.

GI Indicator	Rujevica	Kampus	Stari Grad	Delta	Benčić	Kantrida
PA (ha)	19.4	44.4	9.7	3.9	3.6	7.9
TVGI (ha)	2.9	6.7	1.5	0.6	0.5	1.2
PVGI (ha)	1.0	7.6	0.1	3.0	0	0.6
LGI (%)	34.5	113.4	6.7	500.0	0	50.0
Rating (L1–L5)	L2	L5	L1	L5	L1	L3

POS indicator (Figure 6, Table 4): Based on the data from urban plans, the POS indicator is recognized as the land area used for pedestrian traffic surfaces—streets, squares, promenades, bicycle lanes (planning code U), open recreational areas (planning code R), as well as areas for protective greenery, city parks, children’s playgrounds, gardens, and resting areas (planning code Z). They are read on the graphical annex to the spatial plan “Land Use and Purpose of Surfaces” [25–30]. The procedure is as follows: 1. calculation of PA (ha); 2. calculation of TVPOS = $0.5 \times PA$ (ha); 3. calculation of PVPOS (ha); 4. calculation of LPOS = $(PVPOS/TVPOS) \times 100$ (%); and 5. assignment of ratings L1–L5, where PA is plan coverage area, TVPOS is target value—50% land use for POS in PA, PVPOS is total land use for POS, LPOS is percentage of target value fulfillment, and L1–L5 is POS occurrence rating based on goal fulfillment percentage.

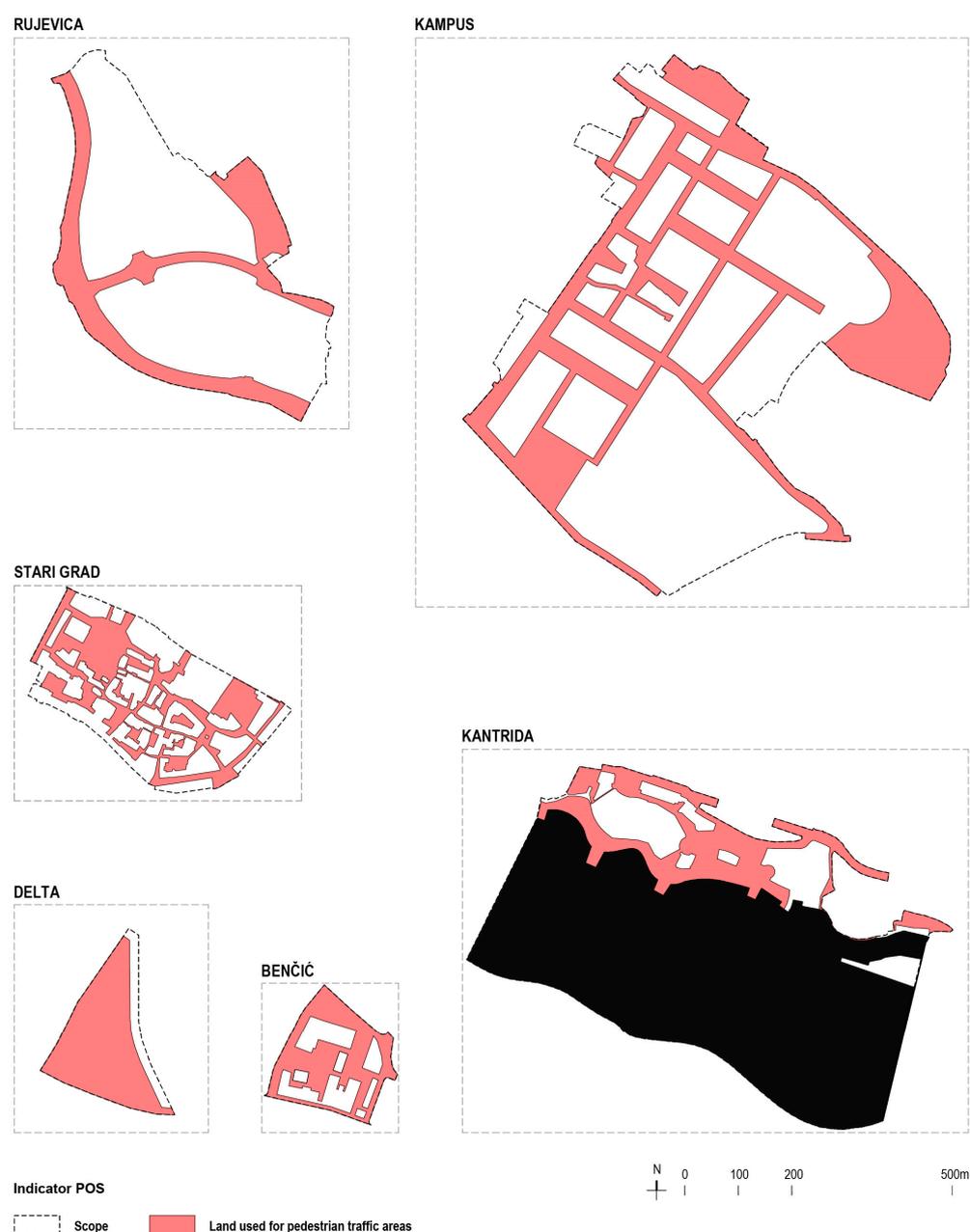


Figure 6. POS indicator, land used for pedestrian traffic areas. Created by the author.

Table 4. POS indicator, land use evaluation. Created by the author.

POS Indicator	Rujevica	Kampus	Stari Grad	Delta	Benčić	Kantrida
PA (ha)	19.4	44.4	9.7	3.9	3.6	7.9
TVPOS (ha)	9.7	22.2	4.9	2.0	1.8	4.0
PVPOS (ha)	5.1	14.5	3.9	3.4	2.3	4.6
LPOS (%)	52.6	65.3	79.6	170.0	127.8	115.0
Rating (L1–L5)	L3	L4	L4	L5	L5	L5

PSN indicator (Figure 7, Table 5): In urban plans, the PSN indicator is recognized as the accessibility of land used for nine types of public and social purposes: administrative (planning code D1), social (planning code D2), health (planning code D3), preschool (planning code D4), primary school (planning code D5), secondary school (planning code D6), higher education (planning code D7), cultural (planning code D8), and religious (planning code D9). They are read on the graphical annex to the spatial plan “Land Use and Purpose of Surfaces” [25–30]. The procedure is as follows: 1. calculation of TVPSN = 9 (n); 2. calculation of PVPSN (n); 3. calculation of LPSN = (PVPSN/TVPSN) × 100 (%); and 4. assignment of ratings L1–L5, whereby TVPSN is target value—9 required types of PSN, PVPSN is planned value—number of realized types of PSN, LPSN is percentage of target value fulfillment, and L1–L5 is PSN occurrence rating based on goal fulfillment percentage.

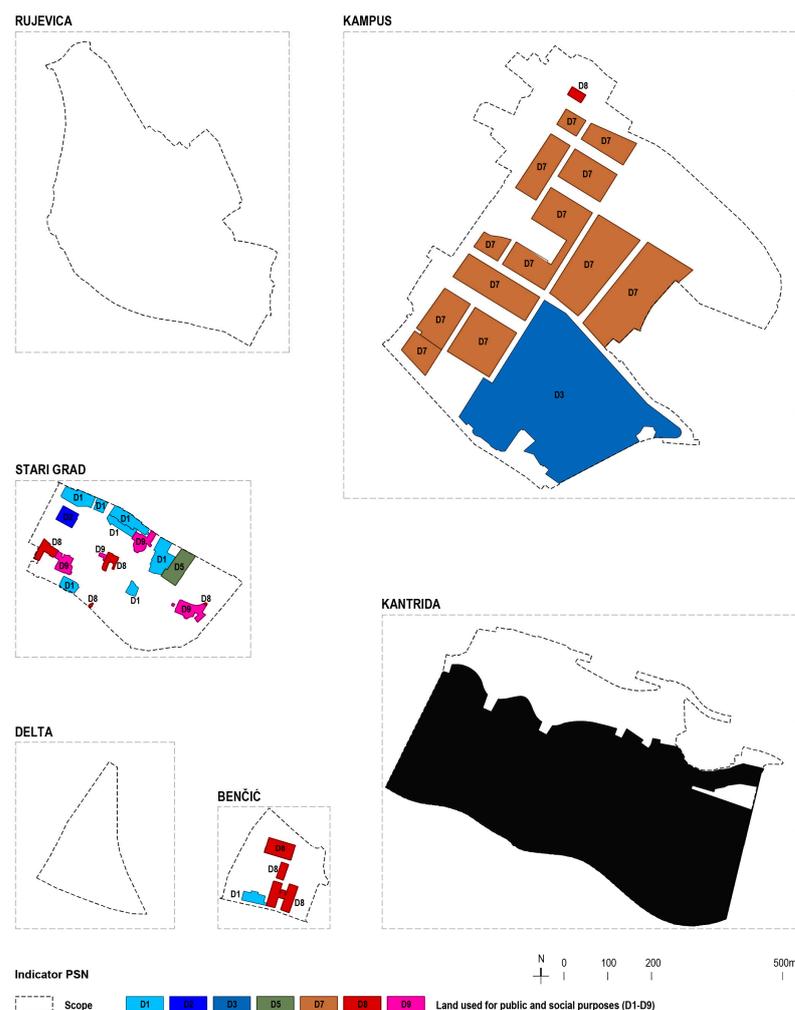
**Figure 7.** PSN indicator, land used for public and social purposes. Created by the author.

Table 5. PSN indicator, land use evaluation. Created by the author.

PSN Indicator	Rujevica	Kampus	Stari Grad	Delta	Benčić	Kantrida
TVPSN (n)	9	9	9	9	9	9
PVPSN (n)	0	3	5	0	2	0
LPSN (%)	0	33.4	55.6	0	22.2	0
Rating (L1–L5)	L1	L2	L3	L1	L2	L1

UR indicator (Figure 8, Table 6): Based on the data from urban plans, the UR indicator is recognized as the land area used for “maintenance, remediation, and reconstruction.” They are read on the graphical annex to the spatial plan “Land Use Forms and Construction Methods” [25–30]. The procedure is as follows: 1 calculation of PA (ha); 2. calculation of TVUR = $0.8 \times PA$ (ha); 3. calculation of PVUR (ha); 4. calculation of LUR = $(PVUR/TVUR) \times 100$ (%); and 5. assignment of ratings L1–L5, where PA is plan coverage area, TVUR is target value—80% land use for UR in PA, PVUR is total land use for UR, LUR is percentage of target value fulfillment, and L1–L5 is UR occurrence rating based on goal fulfillment percentage.

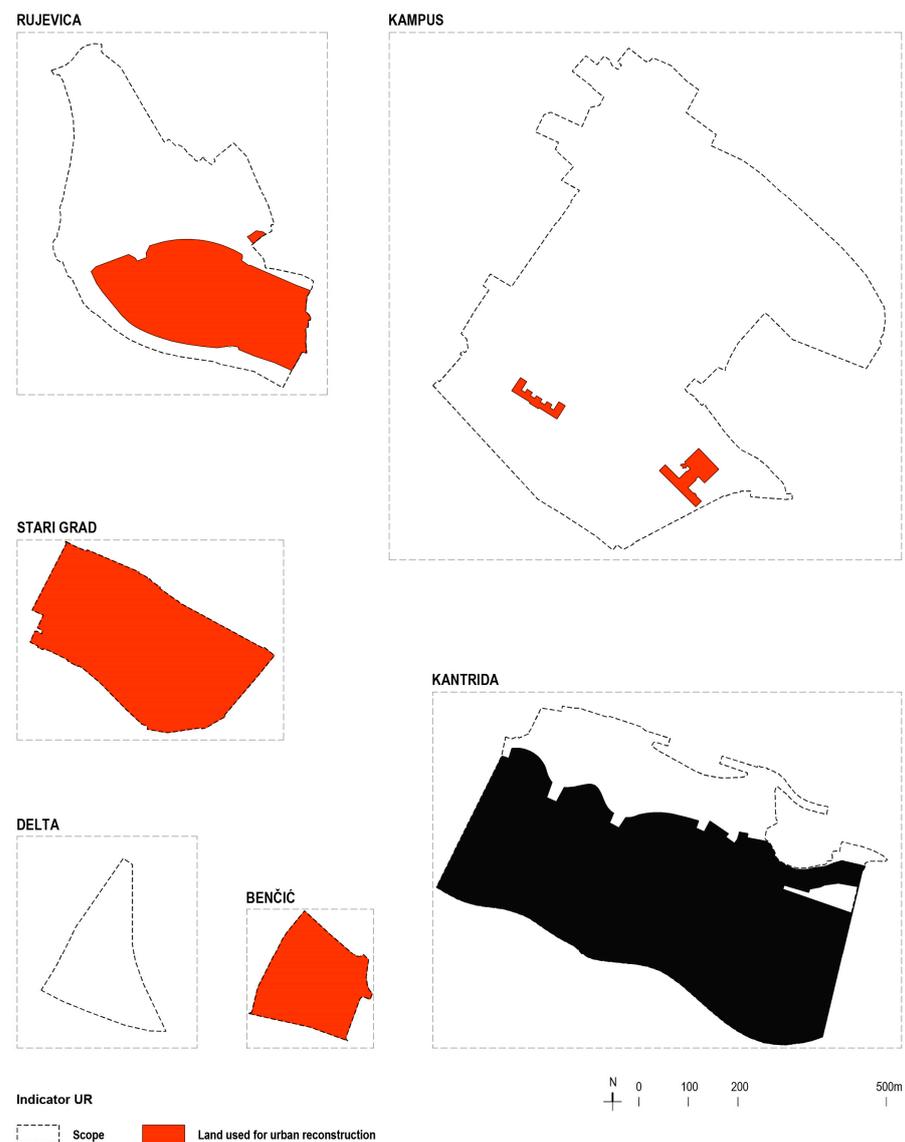
**Figure 8.** UR indicator, land used for urban reconstruction. Created by the author.

Table 6. UR indicator, land use evaluation. Created by the author.

UR Indicator	Rujevica	Kampus	Stari Grad	Delta	Benčić	Kantrida
PA (ha)	19.4	44.4	9.7	3.9	3.6	7.9
TVUR (ha)	15.5	35.5	7.8	3.1	2.9	6.3
PVUR (ha)	7.0	0.7	9.7	0	3.6	0
LUR (%)	44.2	2.0	124.4	0	124.4	0
Rating (L1–L5)	L3	L1	L5	L1	L5	L1

NEB indicator (Tables 7 and 8): It is used to assess the overall NEB compliance of urban plans, consisting of the overall average rating of all four indicators. The procedure is as follows: 1. calculation of LGI, LPOS, LPSN, LUR; 2. calculation of $(LGI + LPOS + LPSN + LUR)/4$; and 3. assignment of ratings L1–L5, whereby LGI is rating of GI occurrence, LPOS is rating of POS occurrence, LPSN is rating of PSN occurrence, LUR is rating of UR occurrence, and L1–L5 is rating of NEB occurrence.

Table 7. NEB indicator, land use evaluation. Created by the author.

NEB Indicator	Rujevica	Kampus	Stari Grad	Delta	Benčić	Kantrida
LGI	L2	L5	L1	L5	L1	L3
LPOS	L3	L4	L4	L5	L5	L5
LPSN	L1	L2	L3	L1	L2	L1
LUR	L3	L1	L5	L1	L5	L1
Average rating	2.3	3.0	3.3	3.0	3.5	2.5
Rating (L1–L5)	L2	L3	L3	L3	L4	L3

Table 8. An overview of all indicator ratings. Created by the author.

Ratings	Rujevica	Kampus	Stari Grad	Delta	Benčić	Kantrida	Rijeka Average
GI indicator	L2	L5	L1	L5	L1	L3	L3
POS indicator	L3	L4	L4	L5	L5	L5	L5
PSN indicator	L1	L2	L3	L1	L2	L1	L2
UR indicator	L3	L1	L5	L1	L5	L1	L3
NEB indicator	L2	L3	L3	L3	L4	L3	L3

3. Results and Discussion

3.1. Planning New Natural Green Areas

The research analyzed the contribution of urban plans to achieving connectivity with nature, measured based on land use for green infrastructure (Figure 5). The way in which plans deviate from the target value was measured, which was set at 15% of the area for natural greenery (Table 3).

Plans were grouped into two categories based on the degree of goal fulfillment (Figures 9–11). The first group consists of plans where the degree of goal fulfillment is greater than 80%, which is valorized with the rating L5. These include Kampus with 113.4% and Delta with a 500% degree of target value fulfillment. In these plans, green areas play a significant role in shaping urban environments. Kampus comprises a group of university buildings located in the peripheral urban area within landscaped greenery, while Delta is situated in an exclusive city park without other urban amenities. Therefore, the share of green areas in these plans is far above 15% of the total plan area.

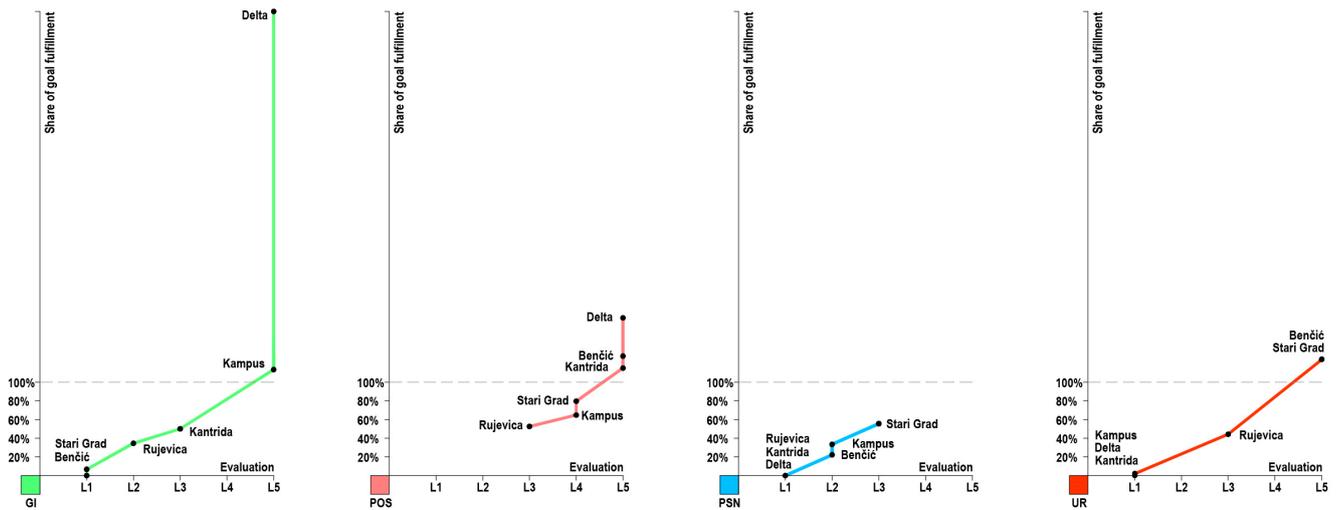


Figure 9. Distribution of GI, POS, PSN, UR plan values, and indicator ratings. Created by the author.

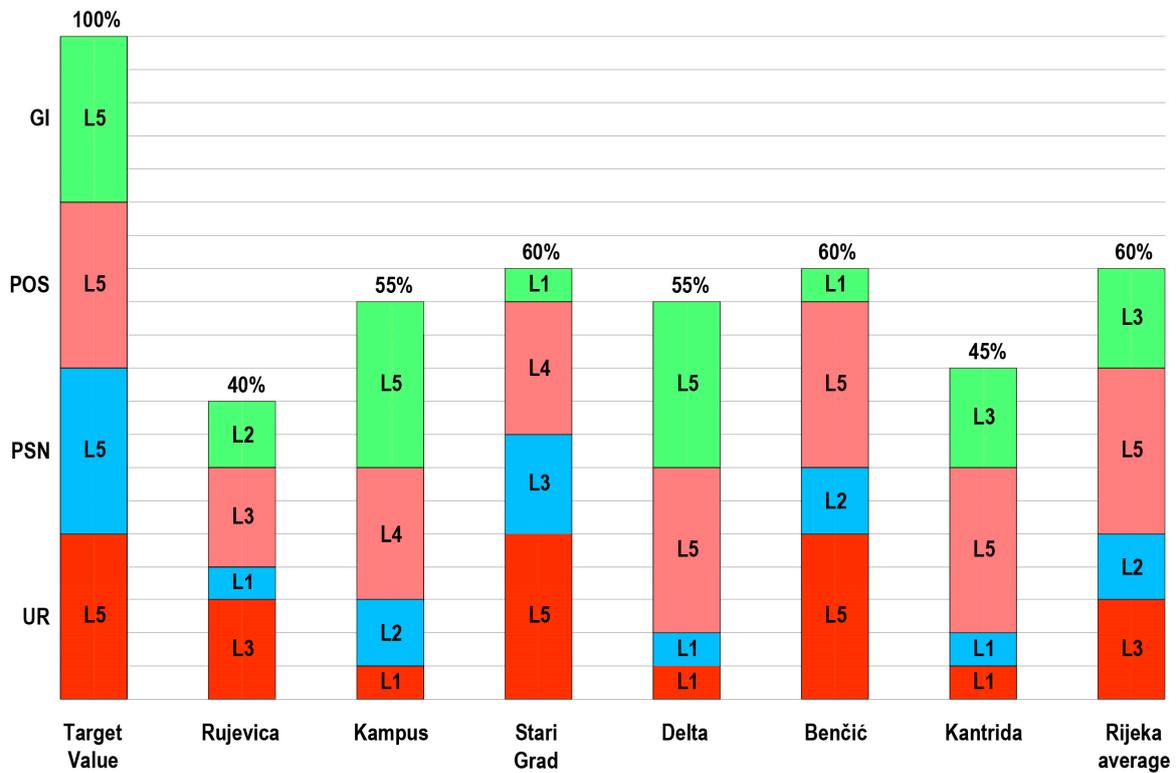


Figure 10. Fulfillment of targeted goals by GI, POS, PSN, and UR indicators. Created by the author.

The second group consists of plans that either have no or only a symbolic share of green infrastructure, rated with L1 (0–20%) goal fulfillment. These include Stari Grad with 6.7% goal fulfillment and Benčić, which completely lacks green infrastructure elements. These plans focus on areas undergoing urban transformation, such as the historic center with a densely built structure without park areas (Stari Grad) and the urban transformation of a former industrial area, also without existing park areas (Benčić). New green areas within these areas are not planned.

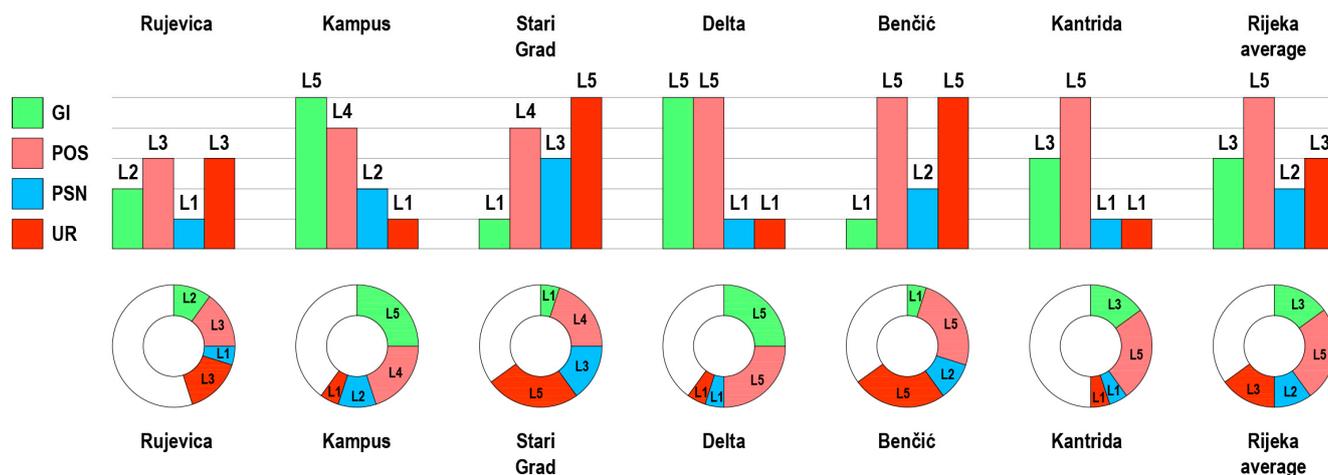


Figure 11. GI, POS, PSN, and UR indicator ratings. Created by the author.

The plan for Rujevica is rated L2 (20–40% target value fulfillment). The plan's specificity lies in its sports function with a football stadium, camp, and all accompanying facilities, where no areas for publicly accessible green infrastructure were planned.

The plan for Kantrida achieved 40–60% goal fulfillment with 15% of greenery planned in that area, earning it a rating of L3. This area has a specific topography with the terrain steeply descending to the sea. Along with a new city pool, the main spatial intervention is a collector street in the form of a serpentine. Most of the green infrastructure is formed around this roadway as surrounding space that cannot be used for other purposes. This is suitable for creating areas for natural greenery, although it may not be suitable for urban use.

In conclusion, the research indicates that, on average, green infrastructure has a target value fulfillment rating of L3 (40–60%). Therefore, the share of these areas should be increased by 20–40% to achieve the targeted 15% share of green spaces in plans (Figure 10). Additionally, an insight into the qualitative characteristics of green infrastructure suggests that among these planned uses, there are parts that, although planned, have not been put to use. The obtained results regarding green areas in urban plans align with previous studies on the green infrastructure of the city of Rijeka [42]. Furthermore, it was found that the Spatial Plan and the General Urban Plan of Rijeka foresee only 3–5 m² per inhabitant [33,34], which is significantly less than the European average of 15–26 m² per inhabitant [41,62]. This disparity can be explained by the high density of buildings resulting from the extremely confined urban territory and challenging topographic conditions. The need to increase the size and quality of natural green areas within populated areas is also determined in research studies conducted in the EU. The topics of green infrastructure and natural models with elements of urban integration have been the focus of recent research, both methodological and focused on the selection of correct, optimal, and consistent urban indicators and symbols (building density versus untouched “biological” environment), which represent the basic assumption of the sustainability of the NEB [20], as well as through studies that record the importance of the inclusion of natural elements of greenery and water in the living environment, whether it is about contemporary trends [63], or the recognition of similar approaches in the not-so-distant past [64].

3.2. Maintenance and Development of Street Networks with an Increase in Pedestrian and Park Areas

The research determined the contribution of urban plans to connecting people, expressed through the analysis of land use for public open spaces (Figure 6). It measured how planned values deviate from the target value, set at 50% of the surface area used for streets, squares, and parks (Table 4).

Similarly to the previous analysis, plans were grouped into two categories based on the degree of goal fulfillment (Figures 9–11). The first group consists of plans where the

degree of goal fulfillment is greater than 80%, valorized with the rating L5. These include Kantrida with 115.0%, Benčić with 127.8%, and Delta with a 170% degree of goal fulfillment. Kantrida achieved this result with an extensive coastal pedestrian area along the sea for beaches and recreation, as well as a network of roadways. Benčić's result is high due to a pedestrian zone formed around all public buildings within the plan's scope, while Delta involves an area designated for a monofunctional city park.

The second group consists of plans with goal fulfillment ranging from 50 to 80%, with ratings L3 and L4. Plans in this group include Rujevica (53.6%), Kampus (65.3%), and Stari Grad (79.6%). Stari Grad approaches the target value due to its extensive pedestrian street network within the historically densely built structure of the city center. Kampus has a wide functional road network, but with planned pedestrian areas, recreational, and park areas, it falls short of the target value. Rujevica is the least close to the targeted value, as it has a minimized road network and lacks pedestrian and parking areas, failing to meet the targeted values.

Nevertheless, an overall analysis shows that, on average, POS has a target value fulfillment rating of L5 (more than 80%). Therefore, the share of these areas needs to be maintained to retain the targeted 50% of POS (Figure 10). It is noticeable that the greatest contribution is achieved where planned public pedestrian zones, public parks, and public areas along the seafront are situated. Where these are not planned, the targeted values are not fulfilled. In the broader historical city center area, examples of squares and pedestrian areas that are practically taken over by cars and used as inappropriate parking lots show little or no contribution to social cohesion. Additionally, in the case of Rijeka, it is necessary to transform roads into tree-lined city avenues, with protective greenery and bicycle lanes to make a greater contribution to the development of POS, especially in situations where other elements of POS are not planned. Overall, the research suggests that planning new pedestrian and park areas is necessary along the roads. Previous studies propose a ratio of pedestrian and park areas to be 40:60 [54,55]. The improvement of existing spaces and planning of new public open spaces (POS) is the focus of more recent research studies that, through realized projects developed on the principles of NEB, investigate how public spaces influence social cohesion [19], and how inclusive "smart cities" models can also create "smart territories" [53]. Several basic principles of the NEB [63] have been integrated into some studies, using the example and coordination of processes within several different territories: Rome, Madrid, and Brussels.

3.3. Achieving a More Even Distribution of Areas for All Types of Public and Social Needs

The study examined the contribution of urban plans to improving public and social needs, measured based on the analysis of land use for public and social needs (Figure 7). The deviation of plans from the target value, set at 100% occurrence of all types of public and social facilities in a "15-minute city", was determined (Table 5).

Plans can be grouped into two categories based on the degree of goal fulfillment (Figures 9–11). The first group consists of plans where there is a contribution to achieving the target goal. The goal fulfillment rating of L3 was recorded in Kampus and Stari Grad, with 44.5% of target value fulfillment, while Benčić (L2) recorded 22.2% fulfillment of the PSN indicator target value.

Kampus achieved the result with three different types of PSN content: areas for health purposes (D3), for higher education (D7), and for cultural purposes (D8). The specificity of Kampus lies in the monofunctional concentration of 13 similar high-education facilities, reducing its contribution to the "15-minute city" as the plan focuses on a narrow range of public and social needs. Stari Grad achieved the result with five different types of PSN content: areas for administrative (D1), social (D2), elementary school (D5), cultural (D8), and religious purposes (D9). Stari Grad also shows concentrations of similar purposes, with administrative purposes (D1) appearing seven times, cultural purposes (D8) recorded four times, and religious purposes (D9) concentrated at four locations. While there is no monofunctional concentration, it is still directed towards only three types of PSN, and the

plan does not contribute to the creation of a “15-minute city” in five segments of public and social needs. The urban plan Benčić achieves the concentration of one type of PSN, with land use planned for cultural purposes (D8) at four locations. This plan is another example of monofunctional concentration aimed at multiple satisfaction of only one type of PSN, without contributing to the fulfillment of the other eight segments of PSN.

The second group consists of plans where there is no recorded contribution to achieving the goals. These plans lack public and social facilities of the “15-minute city.” These include Rujevica (L1), Delta (L1), and Kantrida (L1). In Rujevica, a football stadium is planned without additional facilities for PSN; Delta is a public park without additional facilities for PSN, and Kantrida is an area along the seafront also planned without additional facilities for PSN.

In summary, the research determined that, on average, PSN has a rating of L2 with 20–40% target value fulfillment, indicating that a significant increase in the occurrence of different types of public and social facilities by 60–80% is necessary. This could contribute to a more even distribution of all types of PSN in the city (Figure 10). There is also an observation of the concentration of a large number of similar contents, encouraging the formation of monofunctional spaces in the city. By reducing the repeated occurrence of the same types of facilities, space can be freed up for the integration of missing or deficient types of PSN in urban areas, promoting affordability and accessibility of spaces for public and social needs in the city. In terms of enabling the functioning of a “15-minute city,” attention should also be paid to the 15-minute walking radii, as such accessibility of neighborhood reach within 1200 m [11,56,57] is not provided everywhere, indicating an uneven decentralization of central municipal functions. Additionally, indicators of the city’s approach to groups requiring special care highlight the accumulation of public and social facilities in the city center (Stari Grad) over several years. While it may create the appearance of a good state, it is in fact called into question due to insufficient spatial and safety standards that are currently unsatisfactory, as well as the absolute traffic congestion in the broader city center. Balanced models of the location of public functions and their appropriate decentralization have been the subject of more recent studies, where, on the basis of NEB, and on the principles of social, ecological, and cultural sustainability, a deep transformation of society is sought [53], or where social inclusion, with the necessary interdisciplinary nature, is set as the basis of an interesting experiment in Turin [19]. In order to fully understand the theme of PSN, it is particularly important to understand that the NEB platform affirms the theme of distribution and decentralization of certain city functions [65,66], primarily to enable the sustainable development of the community and society.

3.4. Increase in Areas for Urban Reconstruction of the City

The study assessed the contribution of urban plans to achieving long-term, lifelong, and integral management, measured based on the analysis of land use for urban reconstruction (Figure 8). The deviation of plans from the target value, set at 80% of the area planned for building reconstruction, was determined (Table 6).

The plans show a polarized grouping into two categories: one with plans that have achieved target goals, and the other with plans that have not contributed to goal fulfillment (Figures 9–11). Stari Grad and Benčić both received an L5 rating with the same percentage of target value fulfillment (124.4%). Stari Grad and Benčić are parts of the city developed in earlier historical periods, having an existing built structure and characteristics typical of brownfields. The entire areas within the scope of urban plans are designated for urban reconstruction. The plans determine the renewal of existing buildings, plan their new uses, reactivate surrounding public open space, and modernize existing urban infrastructure networks.

The other half, with an L1 rating, includes Kampus with 2% goal fulfillment, along with Delta and Kantrida, which completely lack recorded contributions to achieving target values. Kampus and Delta were undeveloped and inactive areas within the city area before the urban plan was adopted, showing characteristics typical of greenfields, although

they are, in fact, brownfields. The plans determine the construction of new buildings for university purposes (Kampus) and the development of a new public city park (Delta). Kantrida, although primarily a residential area of higher quality, has a part of the area designated for reconstruction. The new swimming pool complex was built on parts of the old structure, so the plan includes the demolition and removal of existing buildings and the construction of an entirely new structure for sports facilities. Therefore, there is no recorded contribution towards circular sustainability and reducing the carbon footprint in the area.

Outside the grouping into halves, the urban plan for Rujevica has an L3 rating with 44.2% fulfillment of the target value of 80% of the area planned for urban reconstruction. In this area, a part of the plan is designated for the urban reconstruction of existing sports facilities, while the other part consists of previously inactive city areas planned for the construction of a football stadium.

The research recorded an average rating of L3 (40–60%), and to achieve 80% of the area planned for urban reconstruction, an increase of 20–40% of these areas needs to be achieved (Figure 10). What is recognized in urban plans is the importance of industrial architectural heritage, but it is also acknowledged that the areas planned for urban reconstruction of the city need to be increased while decreasing the use of new greenfields or the complete removal of previously built brownfield structures. It can be concluded that, at the time of initiating the development of the studied urban plans, awareness of the importance of building and material reuse was not sufficiently developed. It is certain that a certain part of the buildings of the former military barracks (Kampus) could have been reconstructed, renovated, and repurposed for university programs. Simultaneously, brownfield areas (Benčić and Stari Grad) recognized the importance of architectural heritage and within the existing frameworks of reconstruction interventions, exceptional spaces were created that fully meet contemporary standards of architectural excellence [56,57]. Architectural excellence in all its segments, as well as its achievement through the application of the NEB platform, has been analyzed through several recent studies [67,68]. At the same time, the topics of urban reconstruction and the circular economy, as well as accompanying digitalization according to the NEB model, are in the focus of scientific review. All this has been analyzed in several recent studies that deal with the concrete principles and starting points of the platform, primarily with the aim of affirming the necessary extent of the sustainability of the economic and ecosystem within urban units [3], as well as within those that set new criteria and standards in determining density, the type and distribution of individual city functions [65,66], and also on the principles of sustainability.

3.5. Urban Plans with Programs for Public and Social Functions in Rijeka (Tables 7 and 8, Figures 10–13)

Rujevica received an L2 rating (average 2.3) based on the NEB indicators, with ratings for PSN (L1), GI (L2), POS (L3), and UR (L3). It represents an area with significant spatial potential that can be considered once depleted, and possibilities for improvement through plan amendments are questionable and very uncertain, given the lack of ambition for implementing themes related to the public interest.

Kampus was assessed with an L3 rating (average 3.0) based on the NEB indicators, with ratings for UR (L1), PSN (L2), POS (L4), and GI (L5). The plan emphasizes the importance of decentralizing central municipal functions since most universities have been relocated from the already overcrowded city center, thereby achieving architectural excellence at a very high level. Monofunctionality with higher education facilities is recognized in Kampus, along with the almost complete absence of the theme of reconstruction and remediation. Although it is, in fact, a brownfield intervention, Kampus was planned as a greenfield from the start, regardless of the fact that it was an abandoned barracks with buildings that could have been repurposed to a greater extent into university facilities.

Stari Grad was assigned an L3 rating (average 3.3) based on the NEB indicators, with ratings for GI (L1), PSN (L3), POS (L4), and UR (L5). Stari Grad is characterized by a large number of existing POS areas that are not used appropriately, numerous encroachments on

pedestrian areas, and some areas not even allocated for planned purposes. A diverse range of public facilities simultaneously generates various traffic problems, and spatial standards of most buildings are insufficient or unsuitable for contemporary use. Given its central location and the level of protection of architectural heritage, most buildings can only be renovated and reconstructed.

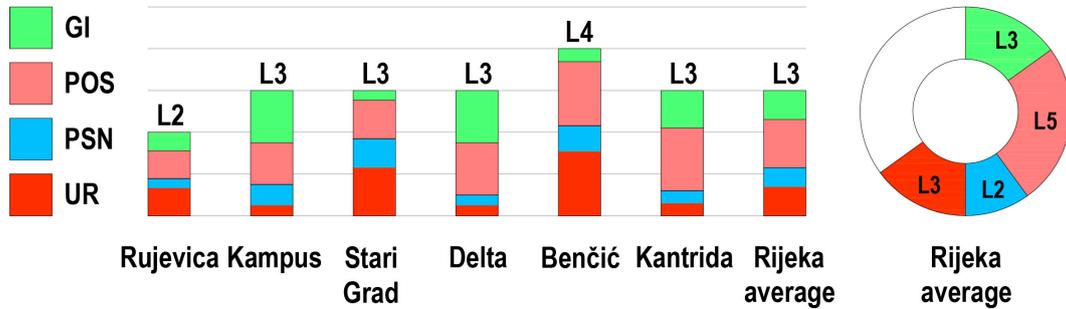


Figure 12. NEB indicator ratings. Created by the author.

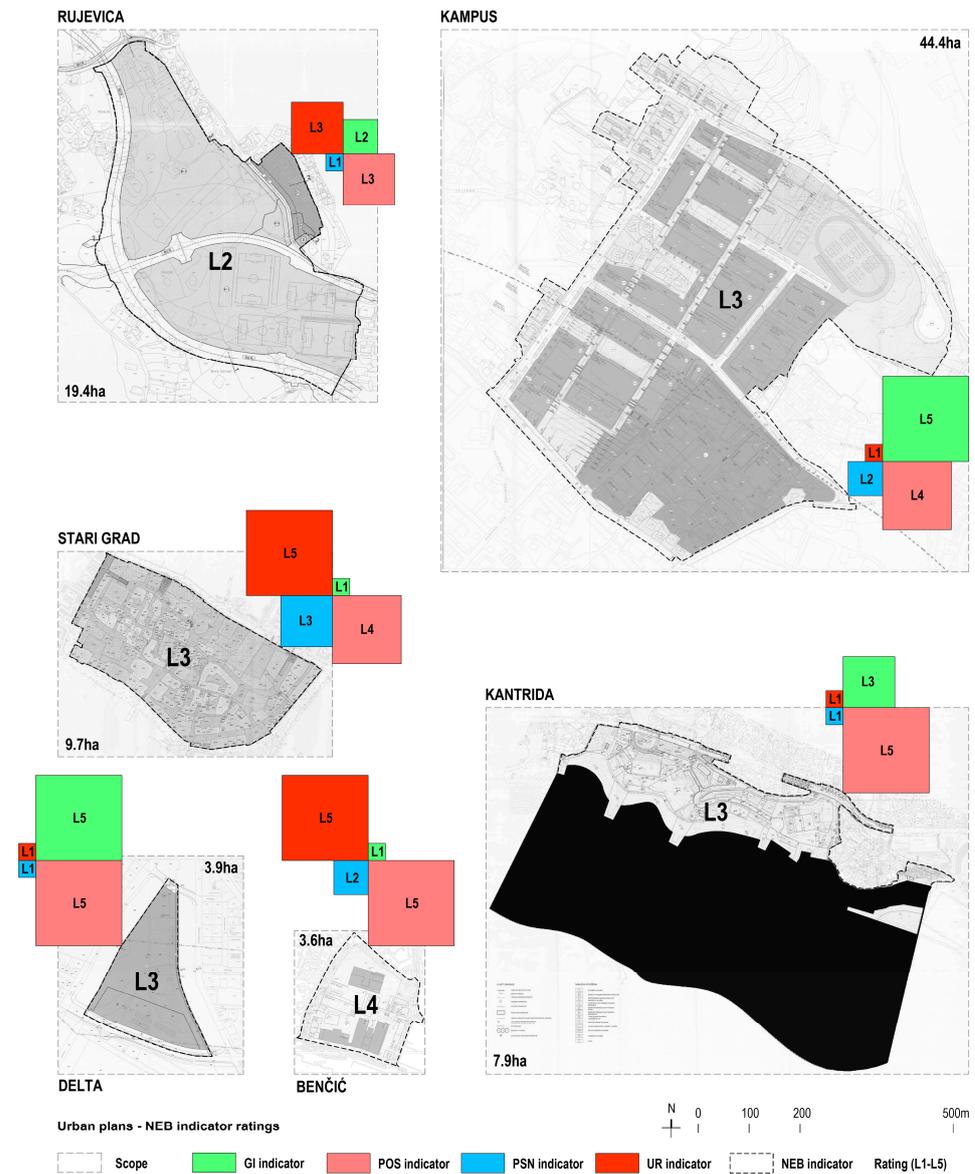


Figure 13. NEB indicator ratings on maps of urban plans. Created by the author.

Delta was rated L3 (average 3.0) based on the NEB indicators, with ratings for PSN (L1), UR (L1), GI (L5), and POS (L5). Delta has specific characteristics of planning with two poles—it excels in GI and POS but is deficient in themes of PSN and UR, stemming from its exclusive monofunctional use as a public park.

Benčić received an L4 rating (average 3.5) based on the NEB indicators, with ratings for GI (L1), PSN (L2), POS (L5), and UR (L5). The results stem from the fact that urbanization and realization of this area required the application of the highest European standards, given its central role in the Rijeka ECoC 2020 program. The only lacking segment in this plan is GI, which is due to the fact that it is a brownfield intervention in a densely built city core and former factory halls repurposed into an urban “art quarter”. On the other hand, a high level of reconstruction and reuse was achieved, and the undeveloped space was incorporated into the broader city center’s POS system through quality urban equipment interventions.

Kantrida was assigned an L3 rating (average 2.5) based on the NEB indicators, with ratings for PSN (L1), UR (L1), GI (L3), and POS (L5). The planning area was broadly considered through the functioning of the new city pool in interaction with residential areas. Considering that the plan covers a large area of public city beaches, recognized as significant social assets, POS received the best valorization, while the valorization of PSN and UR was insufficient since these themes are not the focus of planning intentions in this area.

The overall achieved rating of NEB occurrence in the studied urban plans can be assigned an L3 rating at the level of the City of Rijeka. It is undeniable that the studied urban plans, each in its part, represented procedural and professional progress with achievements marked by urban planning and architectural excellence (parts of Kampus and Benčić). However, the overall context (topography and slow realization) reduces the rating that could be higher if the available spatial frameworks were broader (the city is confined to only 44 km²), which is reflected in the traffic infrastructure, tree lines, bicycle lanes, and pedestrian paths. Simultaneously, the city administration is very slow in deciding on interventions in the arrangement of public pedestrian areas, leaving them largely unfinished or unrealized, often encroached upon by various forms of “temporary” interventions that permanently mar the integrity of the central urban area.

3.6. Implications of Research Results

All analyzed plans were developed before the emergence of the EGD and NEB platforms (9, 10, 11). However, regardless of this, the conducted analyses indicate that guidelines for improving the practice of spatial planning can be found within these platforms. The areas for implication of the research results in Rijeka can be expanded by enhancing the application of the fundamental principles of NEB (transdisciplinary, multilevel, and participatory approach) in urban planning processes.

The specificities of each area suggest that for its complete understanding, especially in the context of climate change phenomena and the peculiarities of social cohesion elements, it is necessary to expand professional teams with a full affirmation of the principles of transdisciplinarity [69,70]. Simultaneously, it can be assumed that the foundational analyses of each location are not possible without the application of the multilevel approach, which achieves synergy of all stakeholders through a “bottom-up” planning model [71,72]. Acceptance of urban projects and plans cannot be expected without improving existing forms of participation by introducing innovative inclusive models that enable citizen participation from the beginning to the end of urban transformation [73,74]. Furthermore, the foundational and programmatic valorization of each area, especially in the case of “brownfield” interventions, can also be expected only through the application of a multilevel approach that will encourage all interested stakeholders to enable better articulation of project tasks and fuller realization of urban projects and plans through synergistic action [75,76].

3.7. Limitations and Future Works

The research is crucial for making informed and well-founded decisions in the urban planning process. It is important to emphasize that the obtained results have their limitations, which arise from the specificity of the research focus. These limitations should be taken into account to properly interpret the results and draw relevant conclusions. Primarily, the research focuses exclusively on indicators of NEB thematic axes' occurrence, and these indicators are derived from the analysis of existing spatial planning documentation. This approach is also based on the available data, which, in a relatively short time since the appearance of the NEB platform (2021), finds the basis for the analysis of the success of the application precisely in the urban indicators. Considering the universal similarity or almost the sameness of these indicators, the possibility of further application is possible in all EU member states. In addition to land use indicators in urban plans, indicators can be designed for other urban interventions, which can also be the subject of further research. This method's specificity may limit the breadth of the analysis, omitting some problematic areas that may not be represented in the investigated documents but are important for a complete understanding of the urban space. They may be the subject of further research. Additionally, the research relies on available plans and documentation, and their accuracy and completeness may vary. Furthermore, limitations may arise due to the dynamism of the urban environment. Rapid changes in the city, such as new projects or demographic shifts, can result in certain discrepancies between current analyses and actual conditions on the ground. Despite these limitations, the research results provide valuable insights into the state of urban planning in Rijeka, with which the same model of indicator selection and design can be transferred to another area—of course with a complete understanding of the different context and legislative framework. It is important to recognize the research context to understand the extent to which the results can be applied and to encourage further research that includes a broader spectrum of factors and improves the accuracy of analyses.

4. Conclusions

This research utilized four indicators to assess the NEB in urban plans from various perspectives. The indicators used were GI (green infrastructure), POS (public open space), PSN (public and social needs), and UR (urban reconstruction). Among other things, the indicators were selected with the aim of identifying the tools with which the urban planning can confront some of today's biggest challenges: growing climate change, dealing with the dystopian elements of the post-COVID society, and the affirmation of urban renewal at the expense of extensive and invasive new construction. The study provides insights into the characteristics of the investigated urban plans in Rijeka. The results indicate the need for planning new natural green areas (on average by 20–40%), especially in parts of the city with densely built structures, to achieve 15% green infrastructure coverage. There is an emphasis on the need to maintain and further develop street networks, with an increase in pedestrian and park areas, to contribute to achieving 50% of public open spaces. The new approach to green infrastructure in its full application on the NEB platform should result in a significant reduction of heat islands within cities, thereby making a strong contribution to the fight against climate change. The affirmation of new models of social inclusion, developed on the improved scope, format, and content of public open spaces (POS), represents a strong contribution to social cohesion, so necessary in the post-pandemic era. On the same track, this research suggests a need for a significant increase in the occurrence and diversity of facilities to meet public and social needs (on average by 40–60%) for a more even distribution of the "15-minute city". There is a highlighted need for a more intensive increase in areas planned for urban reconstruction (on average by 20–40%) to approach an 80% remediation and reuse of existing buildings. The research, together with the analyzed materials, confirms that many city spaces have been unnecessarily quickly skipped over in urban development that hastily diverted from potent brownfield locations (many of which have the potential of exceptional social benefit for the community) to undeveloped

peripheral areas. Based on the analysis of the four land use indicators in the researched urban plans, the need to increase (on average by 40–60%) the fulfillment of the NEB goals can be determined, with the highest emphasis on the distribution of public and social needs and the least on the formation of public open space. The results show that using indicators to assess these four thematic areas will provide a more comprehensive understanding of the occurrence of characteristics of the NEB, which can be crucial for further improving the quality of urban planning for city development, but also to successfully combat today's biggest challenges. The research also highlights the importance of continuous monitoring and adjustment of urban plans to the NEB platform to achieve sustainable and balanced urban development goals.

Author Contributions: Conceptualization, B.B. and K.Š.; methodology, B.B. and K.Š.; investigation, B.B. and K.Š.; writing—original draft preparation, B.B. and K.Š.; visualization, B.B. and K.Š. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: The data presented in this study are available in the article.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. Urban Plans with Public and Social Programs in Rijeka (2000–2023)

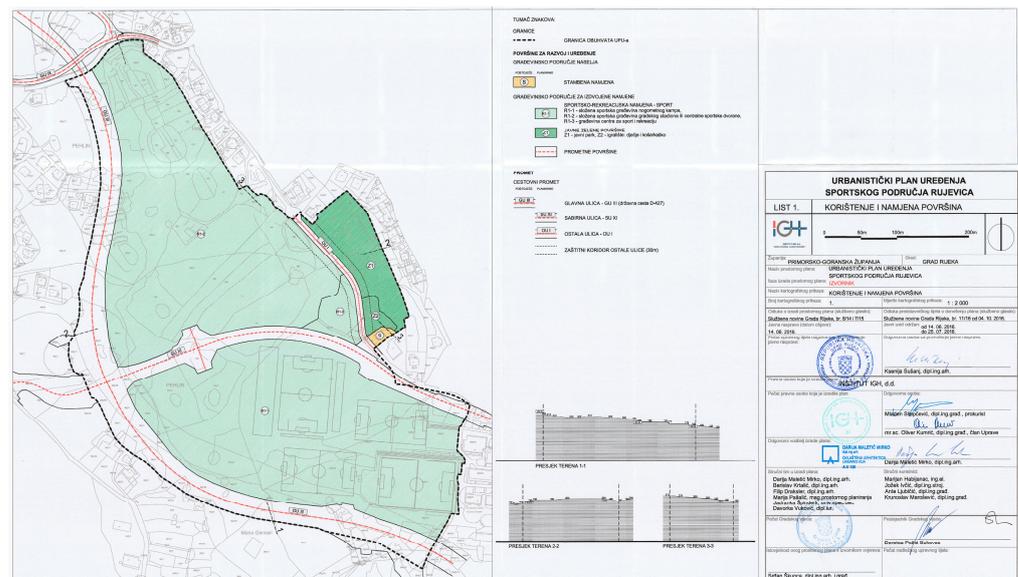


Figure A1. Urban plan of Rujevica [25].

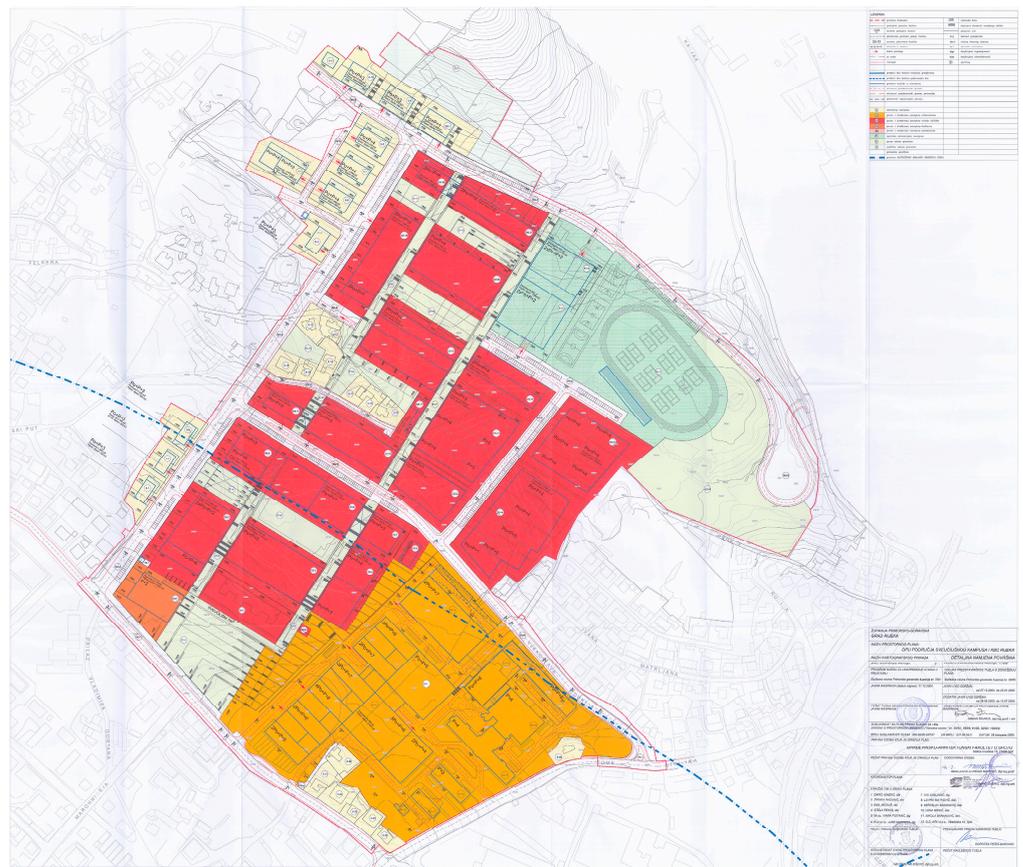


Figure A2. Urban plan of Kampus [26].

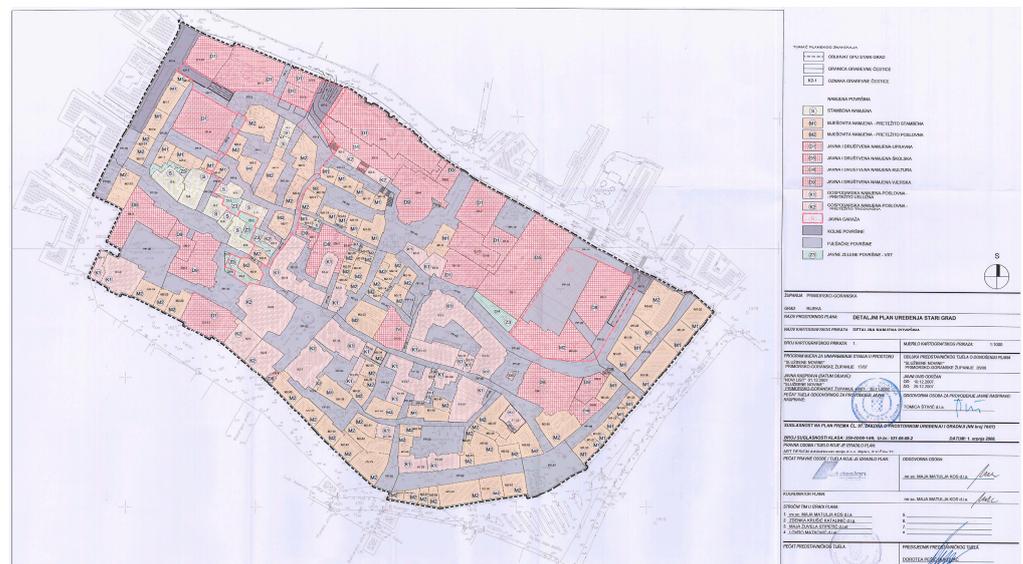


Figure A3. Urban plan of Stari Grad [27].

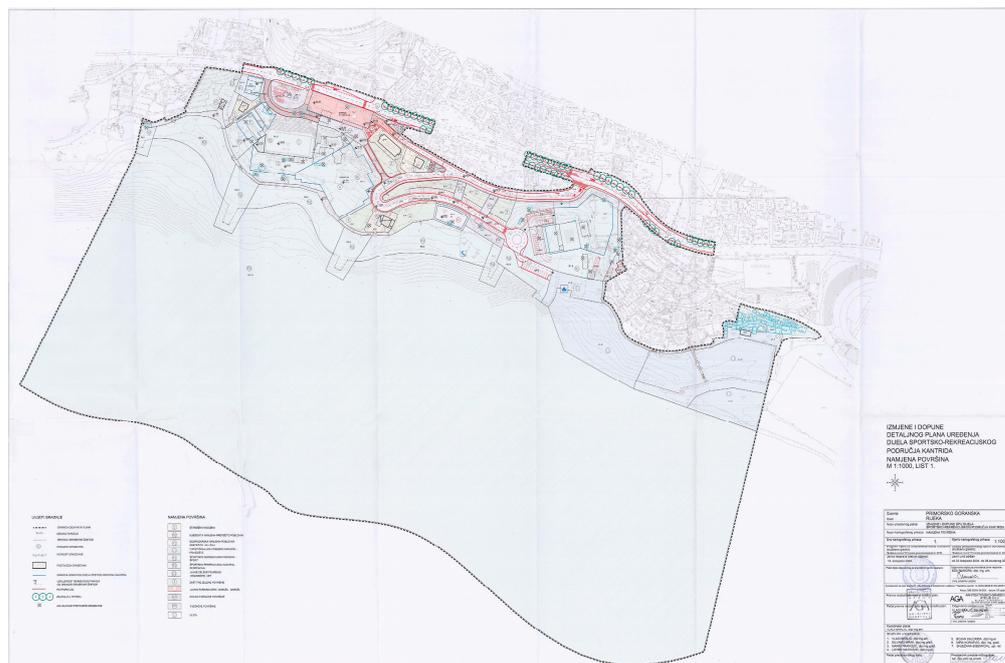


Figure A6. Urban plan of Kantrida [30].

References

1. European Commission. New European Bauhaus Beautiful, Sustainable, Together. Available online: [https://new-european-bauhaus.europa.eu/system/files/2021-09/COM\(2021\)_573_EN_ACT.pdf](https://new-european-bauhaus.europa.eu/system/files/2021-09/COM(2021)_573_EN_ACT.pdf) (accessed on 3 March 2024).
2. European Commission. The European Green Deal. 2019. Available online: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en (accessed on 3 March 2024).
3. Sadowski, K. Implementation of the New European Bauhaus Principles as a Context for Teaching Sustainable Architecture. *Sustainability* **2021**, *13*, 10715. [CrossRef]
4. Hu, M.; Świerzawski, J.; Kleszcz, J.; Kmiecik, P. What Are the Concerns with New European Bauhaus Initiative? Vernacular Knowledge as the Primary Driver toward a Sustainable Future. *Next Sustain.* **2023**, *1*, 100004. [CrossRef]
5. Escobedo, F.J.; Giannico, V.; Jim, C.Y.; Sanesi, G.; Laforteza, R. Urban Forests, Ecosystem Services, Green Infrastructure and Nature-Based Solutions: Nexus or Evolving Metaphors? *Urban For. Urban Green.* **2019**, *37*, 3–12. [CrossRef]
6. Kabisch, N.; Korn, H.; Stadler, J.; Bonn, A. *Nature-Based Solutions to Climate Change Adaptation in Urban Areas*; Springer: Berlin/Heidelberg, Germany, 2017.
7. Ahern, J. Infrastructure for Cities. The Spatial Dimension. In *Cities of the Future. Towards Integrated Sustainable Water and Landscape Management*; IWA Publications: London, UK, 2007; pp. 267–283.
8. Nastran, M.; Kopal, M.; Eler, K. Urban Heat Islands in Relation to Green Land Use in European Cities. *Urban For. Urban Green.* **2019**, *37*, 33–41. [CrossRef]
9. Alizadeh, B.; Hitchmough, J. A Review of Urban Landscape Adaptation to the Challenge of Climate Change. *Int. J. Clim. Chang. Strat. Manag.* **2019**, *11*, 178–194. [CrossRef]
10. Lalović, K.; Sentić, I.; Živojinović, I. Urban and Regional Planning for Sustainability. In *Climate Action. Encyclopedia of the UN Sustainable Development Goals*; Springer: Cham, Switzerland, 2020; pp. 851–862. [CrossRef]
11. Pozoukidou, G.; Chatziyiannaki, Z. 15-Minute City: Decomposing the New Urban Planning Eutopia. *Sustainability* **2021**, *13*, 928. [CrossRef]
12. Barbieri, L.; D’Autilia, R.; Marrone, P.; Montella, I. Graph Representation of the 15-Minute City: A Comparison between Rome, London, and Paris. *Sustainability* **2023**, *15*, 3772. [CrossRef]
13. Droste, C.; Lelevrier, C.; Wassenberg, F. Urban Regeneration in European Social Housing Areas. In *Social Housing in Europe II*; LSE London: London, UK, 2008; pp. 163–196.
14. Fainstein, S.S. *The Just City*; Cornell University Press: Ithaca, NY, USA, 2011.
15. Matković, I.; Jakovčić, M. Brownfield Spaces and Their Regeneration. *Prostor* **2019**, *27*, 348–359. [CrossRef]
16. Joint Research Centre European Union. Available online: https://commission.europa.eu/about-european-commission/departments-and-executive-agencies/joint-research-centre_en (accessed on 3 March 2024).
17. Publications Office of the European Union. Available online: <https://op.europa.eu/en/home> (accessed on 3 March 2024).
18. European Committee of the Regions; Errico, B.; Bisogni, F.; Levi, T. *The New European Bauhaus at the Local and Regional Level*; European Committee of the Regions: Bruxelles, Belgium, 2023. Available online: <https://data.europa.eu/doi/10.2863/327283> (accessed on 3 March 2024).

19. Torchia, D.; Fresta, J.; Corazza, L.; Certomà, C. New European Bauhaus for a Circular Economy and Waste Management: The Lived Experience of a Community Container Garden at the University of Turin. *Sustainability* **2023**, *15*, 914. [CrossRef]
20. Andrzejewska, A.K. Determining Urban Indicators in Local Plans—As One of the Sustainable Assumptions of the New European Bauhaus? *Buildings* **2024**, *14*, 100. [CrossRef]
21. Cadastral Records and Land Registers. Available online: <https://oss.uredjenazemlja.hr/map> (accessed on 3 March 2024).
22. Geoportals of Cultural Property of the Republic of Croatia. Available online: <https://geoportals.kulturnadobra.hr/geoportals.html#/> (accessed on 3 March 2024).
23. Spatial Planning Information System. Available online: <https://ispu.mgipu.hr> (accessed on 3 March 2024).
24. Geoportals of the City of Rijeka. Available online: <http://gis.rijeka.hr/gis/> (accessed on 3 March 2024).
25. Urban Plan for the Rujevica Sports Area. Available online: https://zavod.pgz.hr/planovi_i_izvjesca/registar-prostornih-planova (accessed on 3 March 2024).
26. Detailed Urban Plan of the University Campus and the University Hospital Center in Trsat. Available online: https://zavod.pgz.hr/planovi_i_izvjesca/registar-prostornih-planova (accessed on 3 March 2024).
27. Detailed Urban Plan of Stari Grad. Available online: https://zavod.pgz.hr/planovi_i_izvjesca/registar-prostornih-planova (accessed on 3 March 2024).
28. Detailed Urban Plan of Central City Park Delta. Available online: https://zavod.pgz.hr/planovi_i_izvjesca/registar-prostornih-planova (accessed on 3 March 2024).
29. Detailed Urban Plan of the “Benčić” Area. Available online: https://zavod.pgz.hr/planovi_i_izvjesca/registar-prostornih-planova (accessed on 3 March 2024).
30. Detailed Urban Plan of the Sports and Recreation Area Kantrida. Available online: https://zavod.pgz.hr/planovi_i_izvjesca/registar-prostornih-planova (accessed on 3 March 2024).
31. Moreno, K. Definition of the 15-Minute city: What Is the 15-Minute City? 2021. Available online: https://www.researchgate.net/publication/362839186_Definition_of_the_15-minute_city_WHAT_IS_THE_15-MINUTE_CITY (accessed on 3 March 2024).
32. Regional plan of the Primorje—Gorski Kotar County. Available online: https://zavod.pgz.hr/planovi_i_izvjesca/registar-prostornih-planova (accessed on 3 March 2024).
33. Spatial Planning of the City of Rijeka. Available online: https://zavod.pgz.hr/planovi_i_izvjesca/registar-prostornih-planova (accessed on 3 March 2024).
34. General Urban Plan of the City of Rijeka. Available online: https://zavod.pgz.hr/planovi_i_izvjesca/registar-prostornih-planova (accessed on 3 March 2024).
35. Development Strategy of the City of Rijeka 2014–2020. Available online: <https://www.rijeka.hr/wp-content/uploads/2013/09/Strategija-razvoja-Grada-Rijeke-za-razdoblje-2014.-%E2%80%932020.-godine.pdf> (accessed on 3 March 2024).
36. Report on the State of the City of Rijeka 2007–2018. Available online: <https://www.rijeka.hr/izvjesce-o-stanju-u-prostoru-grada-rijeka-za-razdoblje-2007-2018-godine/> (accessed on 3 March 2024).
37. Marinović-Uzelac, A. *Teorija Namjene Površina u Urbanizmu*; Tehnička Knjiga: Zagreb, Croatia, 1989.
38. Chen, H.; Wang, N.; Liu, Y.; Zhang, Y.; Lu, Y.; Li, X.; Chen, C.; Liu, Y. A green infrastructure planning framework—guidance for priority, hubs and types. *Urban For. Urban Green.* **2022**, *70*, 127545. [CrossRef]
39. Shen, L.Y.; Jorge Ochoa, J.; Shah, M.N.; Zhang, X. The Application of Urban Sustainability Indicators—A Comparison between Various Practices. *Habitat Int.* **2011**, *35*, 17–29. [CrossRef]
40. UN-Habitat; Martinuzzi, C.; Lahoud, C. *Public Space Site-Specific Assessment: Guidelines to Achieve Quality Public Spaces at Neighbourhood Level*; Public Space Programme: Nairobi, Kenya, 2020. Available online: https://unhabitat.org/sites/default/files/2020/07/final_pssa_v.1_reviewed_compressed.pdf (accessed on 3 March 2024).
41. Green Cities Europe. A Proposal for Green Norm 2.0, Methods and Tools for More and Better Urban Nature. 2021. Available online: <https://thegreencities.eu/wp-content/uploads/2020/10/Green-norm-2.0-29032021.pdf> (accessed on 3 March 2024).
42. Study of Green Infrastructure of the City of Rijeka. Available online: <https://www.rijeka.hr/wp-content/uploads/2021/03/Studija-zelene-infrastrukture-Grada-Rijeke.pdf> (accessed on 3 March 2024).
43. Barrie, H.; McDougall, K.; Miller, K.; Faulkner, D. The social value of public spaces in mixed-use high-rise buildings. *Build. Cities* **2023**, *4*, 669–689. [CrossRef]
44. UN-Habitat; Stahle, A. Developing Public Space and Land Values in Cities and Neighbourhoods, Urban Planning and Design Branch/Urban Economy and Finance Branch. 2018. Available online: <https://unhabitat.org/sites/default/files/download-manager-files/Discussion%20Paper%20-%20Developing%20Public%20Space%20and%20Land%20Values%20in%20Cities%20and%20Neighbourhoods.pdf> (accessed on 16 September 2023).
45. Albrechts, L.; Barbanente, A.; Monno, V. Practicing Transformative Planning: The Territory-Landscape Plan as a Catalyst for Change. *City Territ. Archit.* **2020**, *7*, 1. [CrossRef]
46. Gehl, J. *Cities for People*; Island Press: Washington, DC, USA, 2010.
47. Cushman & Wakefield. Decarbonizing Existing Real Estate Vital to Addressing Climate Change, Businesswire. 2022. Available online: <https://www.businesswire.com/news/home/20221118005322/en/Cushman-Wakefield-Finds-Decarbonizing-Existing-Real-Estate-Vital-to-Addressing-Climate-Change-Defines-Business-Case-for-Net-Zero-Buildings> (accessed on 3 March 2024).
48. UKGBC. Climate Change Mitigation. 2024. Available online: <https://ukgbc.org/our-work/climate-change-mitigation/> (accessed on 3 March 2024).

49. Royal Institute of British Architects. RIBA 2030 Climate Challenge. 2021. Available online: <https://www.structuraltimber.co.uk/news/riba-updates-the-2030-climate-challenge/> (accessed on 3 March 2024).
50. Xue, C.; Jin, C.; Xu, J. Inequality in urban green space benefits: Combining street greenery and park greenery. *PLoS ONE* **2022**, *17*, e0273191. [[CrossRef](#)] [[PubMed](#)]
51. Tong, M.; She, J.; Tan, J.; Li, M.; Ge, R.; Gao, Y. Evaluating Street Greenery by Multiple Indicators Using Street-Level Imagery and Satellite Images: A Case Study in Nanjing, China. *Forests* **2020**, *11*, 1347. [[CrossRef](#)]
52. UN-Habitat. SDG Indicator 11.7.1, 2021. Available online: <https://unstats.un.org/sdgs/metadata/files/Metadata-11-07-01.pdf> (accessed on 3 March 2024).
53. Rosado-García, M.J.; Kubus, R.; Argüelles-Bustillo, R.; García-García, M.J. A New European Bauhaus for a Culture of Transversality and Sustainability. *Sustainability* **2021**, *13*, 11844. [[CrossRef](#)]
54. UN-Habitat; Garau, P. Global Public Space Toolkit: From Global Principles to Local Policies and Practice. United Nations Human Settlements Programme, 2016. Available online: <https://www.local2030.org/library/82/Global-Public-Space-Toolkit--From-Global-Principles-to-Local-Policies-and-Practice.pdf> (accessed on 3 March 2024).
55. Acioly, C.; Madhuraj, A. City and Public Space: Urban Transgressions, Revolution and Prosperity. Available online: https://claudioacioly.com/sites/default/files/2020-02/128%202019_Acioly%20%20Madhuraj_Public%20Space%20Prosperity%20%20Revolution_Draft%20paper.pdf (accessed on 16 September 2023).
56. Logan, T.; Hobbs, M.; Conrow, L.; Reid, N.; Young, R.; Anderson, M. The x-minute city: Measuring the 10, 15, 20-minute city and an evaluation of its use for sustainable urban design. *Cities* **2022**, *131*, 103924. [[CrossRef](#)]
57. Wang, S. A comparative study of two urban planning models: The linear city model and the 15-minute city model. *Appl. Comput. Eng.* **2023**, *25*, 276–279. [[CrossRef](#)]
58. Kurtović Folić, N.; Perović, S. Brownfield Regeneration—Imperative for Sustainable Urban Development. *J. Croat. Assoc. Civil. Eng.* **2012**, *64*, 373–383. [[CrossRef](#)]
59. Conrad, A.; DeTroy, S.E.; Dross, M.; Eckert, K.; Meilinger, V.; Schröder, A. Advancing the New European Bauhaus: Sustainable Mobility and Resilient Urban Spaces for a Better Quality of Life—The AdNEB Project. *elni Rev.* **2022**, 26–29. [[CrossRef](#)]
60. Katurić, I.; Šmit, K.; Hajdinjak, I.; Kranjec, K. Razvojne strategije kao čimbenik održivog razvoja gradova. *Prostor* **2019**, *27*, 78–87. [[CrossRef](#)]
61. Verma, P.; Raghubanshi, A.S. Urban Sustainability Indicators: Challenges and Opportunities. *Ecol. Indic.* **2018**, *93*, 282–291. [[CrossRef](#)]
62. De la Barrera, F.; Reyes-Paecke, S.; Banzhaf, E. Indicators for Green Spaces in Contrasting Urban Settings. *Ecol. Indic.* **2016**, *62*, 212–219. [[CrossRef](#)]
63. Mariano, C.; Rossi, F. RivEr/Generation_LAB-Linking Resilience with Inclusiveness in the Urban-Built Environment of Rome. *Sustainability* **2023**, *15*, 4774. [[CrossRef](#)]
64. Gierko, A. Learning from the Past: Urban Landscape Transformation Praxis on the Example of Interwar German Housing Estates. *Buildings* **2024**, *14*, 900. [[CrossRef](#)]
65. Krajewska, J. Development and Sustainability: A Case Study of the Industrial Park EURO-PARK Kobierzyce in Poland. *Buildings* **2024**, *14*, 862. [[CrossRef](#)]
66. Ilkovičová, L.; Ilkovič, J.; Meziani, J. Industrial Clusters in Slovakia-Urban Development. *Buildings* **2023**, *13*, 2506. [[CrossRef](#)]
67. Nowakowski, P. Beauty and Utility in Architecture, Interior Design and in the New European Bauhaus Concepts. *Buildings* **2024**, *14*, 870. [[CrossRef](#)]
68. Jaglarz, A. Perception of Color in Architecture and Urban Space. *Buildings* **2023**, *13*, 2000. [[CrossRef](#)]
69. Gotal, M. Epistemology of interdisciplinarity. *Diskrepancija* **2013**, *12*, 66–79.
70. Pinson, D. Urban Planning: An ‘Undisciplined’ Discipline? *Futures* **2004**, *36*, 503–513. [[CrossRef](#)]
71. Yoos, J.; James, V. The Multilevel Metropolis. *Places J.* **2016**, *2016*, 160518. [[CrossRef](#)] [[PubMed](#)]
72. Semeraro, T.; Nicola, Z.; Lara, A.; Sergi Cucinelli, F.; Aretano, R. A Bottom-Up and Top-Down Participatory Approach to Planning and Designing Local Urban Development: Evidence from an Urban University Center. *Land* **2020**, *9*, 98. [[CrossRef](#)]
73. Čaldarović, O.; Vukić, J.; Jukić, T. Small scale urbanism and social sustainability—Interdisciplinary study of public space in Zagreb. *Sociol. I Prost.* **2019**, *57*, 213.
74. Gauthier, M.; Simard, L.; Waaub, J.P. Public Participation in Strategic Environmental Assessment (SEA): Critical Review and the Quebec (Canada) Approach. *Environ. Impact Assess. Rev.* **2011**, *31*, 48–60. [[CrossRef](#)]
75. Della Spina, L.; Lorè, I.; Scrivo, R.; Viglianisi, A. An Integrated Assessment Approach as a Decision Support System for Urban Planning and Urban Regeneration Policies. *Buildings* **2017**, *7*, 85. [[CrossRef](#)]
76. Mitić-Radulović, A.; Lalović, K. Multi-Level Perspective on Sustainability Transition towards Nature-Based Solutions and Co-Creation in Urban Planning of Belgrade, Serbia. *Sustainability* **2021**, *13*, 7576. [[CrossRef](#)]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.