RIGA TECHNICAL UNIVERSITY

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OPEN SPACE TRANSFORMATIONS IN LARGE-SCALE HOUSING ESTATES OF RIGA IN THE POST-SOCIALIST PERIOD

Doctoral Thesis

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ANNOTATION

The aim of the doctoral thesis "Open Space Transformations in Large-Scale Housing Estates of Riga in the Post-Socialist Period" is to evaluate the impact of open space transformations in the Post-socialist period in large-scale housing estates on the residential environment quality in Riga's large-scale housing estates.

The thesis comprises Introduction, three chapters, Conclusion, 262 reference sources and appendices.

Open space in large-scale housing estates forms an important part of the residential environment quality, by providing both necessary, optional and social services, and playing an important role in recreation and recovery from the everyday stress. **Chapter 1** presents an overview on open space spatial configuration principles, and the further sub-sections display variety of inhabitants' needs in relation to the residential open space, and the role of green areas in large-scale housing estates. **Chapter 2** presents the summary and analysis of transformation types in the regional context and the summary of residential environment quality notions. Author proposes an approach to evaluate impact of transformations on residential environment quality in large-scale housing estates. First, existing residential environment quality evaluation tools are summarised and analysed, then the adapted checklist is developed. Based on theoretical background common human needs in relation to the open space, as well as aspired and required open space qualities are defined. Additionally, stressors are connected to open space qualities, which need to be beware of and avoided. The developed approach includes four components: adapted open space quality evaluation tool, evaluation techniques, concept of proximity and residential satisfaction evaluation. **Chapter 3** presents situation in Riga: open space character, transformations, and their impact on the open space quality in 13 large-scale housing estates. Additionally, conducted survey results show residents' attitude in four large-scale housing estates in Riga towards possible future transformations and those, which have already happened.

Residential Environment Quality Evaluation Approach can be used for both, evaluation of the impact from transformations, which have already happened and while analysing possible consequences of future transformations and searching for alternative scenarios. Categories which describe different human needs and stressors are linked to the aspired results and results, which need to be beware of. Improvements in the open space of large-scale housing estates need to be planned as a complex process, analysing situation in the estate as a whole.

Research results are reflected in 16 articles: seven have been published in international peer-reviewed scientific journals, one currently undergoes the review process in an international peer-reviewed scientific journal; seven publications are published in the full text international conference proceedings, and one publication in the local journal. The results have been presented at international scientific conferences and at international conferences for doctoral research.

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INTRODUCTION

Open space in large-scale housing estates forms an important part of the residential environment quality, by providing both necessary, optional and social services, and playing an important role in recreation and recovery from everyday stress. The green open space is a distinctive feature of most large-scale housing estates, and by many residents is perceived as the most valuable feature [49], [127], [162], [143]. Currently, there are various transformations going on in open space. In Latvia, as a starting point of these transformations are changes in political situation in the 1990s, which has led also to transformations in land ownership, open space maintenance and management models, etc. The land reform and property denationalisation in the 1990s [257] has led to the current difficult situation, where the open space in large-scale housing estate is fragmented, owners are different, often the land being in property of private individuals including foreign citizens (or nationals), who are not interested in developing recreational open spaces. At present transformation processes are also influenced by changing economic, ecological and social factors. State and city level strategies aiming sustainable compact development, pressure from the private sector, global awareness of ecological issues, growing right to the city movement and bottom-up actions, introduction of new governance and city making collaborative models and other factors are shaping how the open space in large-scale housing estates is perceived, how it functions and develops.

The crucial aspect is the nature of transformations, as they can have both positive and negative impact on the residential environment quality. In case of the negative impact, open space transformations act as a driving motivation for residents to leave the large-scale housing estate, while remaining in the estate are only those inhabitant groups who, to different reasons, cannot afford to change their residence (e.g. ageing population, social groups with low income, etc.). On the other hand, positive improvements can contribute to the raised property value, and positive inflow of new residents. Currently, bad maintenance, lack of control, undefined spatial organisation and lack of sense of belonging fosters inhabitants' dissatisfaction. For that reason, regeneration of the outdoor environment, preservation of positive features and holistic approach to transformation processes should be among preferences to prevent degradation of estates and attract new inhabitants.

In Riga, about 60 % of residents live in large housing estates, so these areas represent an important part of the housing stock. The growing new housing market creates serious competition for large housing estates, thus, increasing the need for strategies to keep the residents interested in large-scale housing estates. As open space in large-scale housing estates now faces various transformations, it is crucial to follow the tendencies of these changes, as they can directly impact residents' decision to move or stay in the neighbourhood [49]. To prevent decay of these areas, the open space transformations should be guided in order to preserve and improve the residential environment quality.

Transformations in open space in large-scale housing estates can be divided into physical, social and legal. Physical transformations happen on different scales: micro scale (one courtyard or even smaller scale), meso scale (*microrayon* or the whole estate), macro scale (on the city structure level as, for example, when analysing the role of green open space of large-

scale housing estates in the green infrastructure (GI)). These transformations refer to urban design, natural elements and infrastracture improvements. Social transformations are related to changes in the social structure of residents, which might be related to ageing population, some people moving to other locations, also demographic changes which lead to increasing number of smaller households and decrease in family size, etc. [105]. Moreover, changes in legislation may impact various aspects, such as changes in the land use, changes in normative acts, which may influence management models, etc.

This research is focused on physical transformations in open space of large-scale housing estates. In addition to classification according to the type of transformation and scale, physical changes can be classified according to driving forces and actors involved. Transformations in open space of large-scale housing estates and the residential environment quality cannot be investigated without defining stakeholders who are directly or inderictly involved in the process of these transformations. There is a distinction between externally-led and self-organised engagement in the process of open space transformation.

On-site observations in the large-scale housing estates of Riga show various types of physical changes and various actors involved. There are both soft tactical interventions, introduction of new recreational amenities and natural elements, as well as a more remarkable impact on open space due to introduction of parking areas and new residential infill development, which influences the spatial character of the open space.

The target audience of these improvements is narrow, as wishes and needs of many other groups are ignored. This is a dangerous trend, which can lead to intergenerational conflicts [49, *137*]. Open space adjacent to the house forms an important recreation place for elderly residents and people with mobility impairments. These groups are dependent on their local environment, so the quality of open space in the neighbourhood directly impacts their quality of life [182]. Also, for children and young people positive experiences in the outdoor environment can have positive impact on their health and quality of life. Playgrounds, skate parks and school playgrounds are the constructed open spaces which society expects children and youth to use actively. These spaces are limited to certain play and have certain experiential value [37]. So, for example, according to central statistical database in *Imanta* neighbourhood 25 % (11 215 people) of residents are in the age group 65 and older, in *Purvciems, Iļģuciems* and *Jugla* this number is 23 % of total residents number in the neighbourhood [196]. In many neighbourhoods, children, teenagers and young adults in the age from 7 to 24 form about 16 % of the total number of inhabitants in the area [196]. These different groups have different needs and expectations, which also need to be met to ensure that the quality of the residential environment satisfies them.

Large-scale housing estates all around Europe are facing various forms of physical and social decline. Already at the late 20th century, some authors focused specifically on the problems and development opportunities of large housing estates [8], [46]. The open space in large-scale housing estates is often described as “marginal public space”, the territories being of less interest in regeneration strategies, and also problematic territories which often become a battleground of different users with different needs [41], [34]. There is a model of decay in post-WWII social large-scale housing estates in Europe, proposed by Dutch architect Niels

Prak and urban planner Hugo Priemus. This model looked at the process of decay as a result of social, economic and technical decline [47]. In 1993 the model was completed with the aspects of urban design (location, living environment, level of services).

Nevertheless, the problems and development in large-scale housing estates remains a topical issue. There are four paths the large-scale housing estates can follow: do-nothing, downsize, demolish and replace, or renovate [19]. After the fall of the Soviet Union and regain of the national independence in 1991, 61 % of population in Tallinn and 74 % of population in Riga lived in large housing estates. The data from 2011 showed that 58 % of population in Tallinn, 75 % - in Riga and 67 % - in Vilnius lived in this housing type [19]. For that reason, in the Baltic countries, where large-scale housing estates comprise about a half or even more of residential housing stock, demolition can be a difficult process. And thus, raising the residential environment quality appears crucial.

Previous Research

Previous research is further described according to various topics: open space in residential areas; formation of large-scale housing estates; large-scale housing estates in Riga; critique towards open space in large-scale housing estates; quality of urban life; role of public participation in planning and citizen activism, and community building. Some authors discuss changes in the open space of large-scale housing estates; however so far these studies are fragmented.

Comprehensive research on the character, features and evaluation methods of **open space** was done by various researchers. Character and features of different public open spaces and open spaces in large-scale housing estates were studied by Professor of Urban Design and the Director of Global Urban Research Unit at Newcastle University Ali Madanipour [34]. He defines public open space within large-scale housing estates as marginal due to low interest from public authorities in its regeneration, and due to the nature of these public open spaces. Matthew Carmona, Professor of planning and urban design at UCL proposed variety of public open space evaluation criteria [86], [87], [88], issues related to housing reform, privatization and denationalization has studied Richard Sendi [171], issues of insecurity in public open space were analysed by Manuel Aalbers [66]. New infill development has influence on the open space in large-scale housing estates. Development of gated communities and new private vs public open space relations were investigated by Judit Bodnar and Virag Molnar [78], an overview on development of open space in large-scale housing estates and analysis of problems were done by Stephen Hall and Alan Murie [106]. Richard Sendi, Manuel Aalbers and Marcele Trigueiro have investigated quality of life of the residents in large-scale housing estates and in particular quality of public open space, focusing on the issues affecting social interaction and social cohesion [49]. Spatial character of open space in large-scale housing estates was analysed in various studies [75], [133], [138], [191], [149]. The importance of green space was discussed by various researchers from different viewpoints. Despite the fact that not all the planned amenities were built due to budget restriction reasons, still various research results show that green open areas are considered among the most valuable features in large-scale housing estates

[49]. The explanation of originally planned sanitary-and-hygienic and ornamentally planning functions of open space in large-scale housing estates provided by Vladimir Mashinsky and Elena Zalogina [65]. Characteristic features of large-scale housing estates defined by Rob Rowlands et al. and other researchers [49], [127], [143]. Some researchers have studied spatial configuration and used *Space Syntax* methodology to analyse functionality of open space in large-scale housing estates. Sociologist William Whyte conducted great amount of research on social use in public spaces [60]. Pete Ferguson argued on strong ties between spatial configuration, accessibility and social interactions in urban spaces. Kestutis Zaleckis investigates socio-spatial aspects of Soviet era modernist urbanization [190]. Balancing urban green space and residential infill development: a spatial multi-criteria approach based on practitioner engagement was used by Maija Tiitu, Arto Viinikka, Leena Kopperoinen, Davide Geneletu [183].

The ideas behind **formation of large-scale housing estates**, reasons and local piquliarities were described and analysed by various authors: Marija Dremaite [11]. Jānis Krastiņš, Ivars Strautmanis, Jānis Dripe [26], Frank Wassenberg [255], Oresjo et al. [147], Henk Heeger [249], research in terms of RESTATE project [66], [147], [106], [143], [147], including national reports like Large housing estates in Budapest and Nyiregyhaza, Hungary. Comprehensive research on typology of housing, with some insights in the formation of the spatial organization made Philip Meuser and Dimitrij Zadorin [38].

The history, **development and current changes of large-scale housing estates** have been investigated by various researchers. Recent book *Housing Estates in Baltic Countries is* focused on the political, economic and cultural aspects which affected modernist housing estates in the Baltic countries [19]. Contributing authors touch upon ideological and socio-demographic issues which have both fostered the popularity of large-scale housing estates at the time of construction, and changes which have led to current situation. Similar approach is in the book *Housing Estates in Europe: Poverty, Ethnic Segregation and Policy Challenges* [20]. The book represents an extensive collection of research by different authors from Athens, Berlin, Birmingham, Brussels, Bucharest, Budapest, Helsinki, Madrid, Milan, Moscow, Paris, Prague, Stockholm and Tallinn [20]. The authors analyse origins, current situation, and the development trajectories of large housing estates. The collection of studies in *Mass Housing in Europe: Multiple Faces of Development, Change and Response* also focus on residential satisfaction and different aspects of large-scale housing estates through the lens of social sustainability [49]. Ronald van Kempen, Karien Dekker, Stephen Hall and Ivan Tosics have edited the collection of national studies which describe current transformations in housing etates [58]. Reflections on urban planning in post socialist countries are edited by Marina Dmitrieva and Alfrun Kliems [25]. Post-war architecture in Sweden is researched by Claes Caldenby [85].

There has been a lot of research representing **critique of large-scale housing estates and critique of open space** in partiqular. Starting from failed ideas of modernist urban planning, and then focusing on negative features of large-scale housing estates both external spacial organisation, and housing itself, social consequences, crime and vandalism were the focus of work by Anne Power [46], critiques by British architects Alison and Peter Smithson. Critique

of open space by Jane Jacobs [22], Oscar Newman [41], discussion on negative effects of density on the social fabric of neighbourhood by Ellen Van Beckhoven, Gideon Bolt and Ronald van Kempen, Oscar Newman [41], Louis Wirth [189]. Recent criticism was made by Ali Madanipour [129] and Jan Gehl [14], [15]. Critique of large-scale housing estates in Tallinn by Leo Gens, who pointed out lack of 'human scale' and thought that areas can become more people-friendly with introduction of small architecture forms, more clever organization of greenery, sculptures etc. Psychologist Mati Heidmets assumed that the living environment in large-scale housing estates lacks personality, which can be achieved by prioritizing images and introduction of landmarks [40].

As **large-scale housing estates** comprise big part of the residential housing stock **in Riga**, there are studies focusing on the origins and development trajectories of large-scale housing estates: The doctoral thesis defended by Sandra Treija [254], *Otrā Rīga* reperesents analysis of typology and features of large-scale housing estates in Riga. The book *Latvijas arhitektūra: no senatnes līdz mūsdienām* by Jānis Krastiņš, Ivars Strautmanis, Jānis Dripe, compiles research on urban development in Latvia in the second part of the 20th century [26]. Planning and development of cities has been studied by Jānis Brinķis and Oļģerts Buka [5]; doctoral thesis by Una Īle [250] is focused on the landscape quality of residential areas' courtyards in the cities of Latvia; archive materials of Latvian museum of Architecture offer various territory plans of large-scale housing estates as well as descriptive materials. Andris Roze has analysed spatial organisation of microrajoni and proposed some guidelines for further development [261, *13-14*].

Quality of urban life is a wide concept and has been investigated by various researchers in different fields. Robert W. Marans and Robert J. Stimson have summarized comprehensive research on the issues of urban quality of life and related notions like neighbourhood satisfaction, residential satisfaction etc. [36]. Objective and subjective evaluation of the quality of urban life was presented by Roderick Peter McCrea in *Urban Quality of Life: Linking Objective Dimensions and Subjective Evaluations of the Urban Environment* [252]. Robert Marans and Willard L. Rodgers studied issues related to residents' satisfaction and described findings in *Towards an Understanding of Community Satisfaction* [131]. Angus Campbell used variable of inhabitants' characteristics (age, gender etc.) to describe life satisfaction in *The Quality of American Life: Perceptions, Evaluations and Satisfaction* [6]. Harvey S. Perloff described and analysed urban environment features in *The Quality of the Urban Environment,* 1969 [45]. Charles Montgomery, through case studies in different countries analysed inhabitants' satisfaction with life in relation to urban design and planning issues [39]. David Seamon and Jacob Sowers analysed people's need for associations with significant places and the concept of placelessness [168].

Following the growing interest in citizen engagement in the process of planning and co-creation, grows also the amount of research in this field. Approaches to **public participation** in planning and design processes have been described and analysed by Nick Gallent and Daniela Ciaffi in the book *Community action and planning* [13], Patsy Healey [18], Ali Madanipour [34], Joanne Dolley and Caryl Bosman [10].

Despite the fact that variety of research was focused on privatization of open space in large-scale housing estates, on the character of open space in large-scale housing estates, as well as on residential environment quality and quality of urban life, research which would interconnect those issues so far is fragmented.

The research object is open space transformations in large-scale housing estates.

The research aim is to evaluate the impact of open space transformations in the post-socialist period in large-scale housing estates on the residential environment quality in Riga's large-scale housing estates.

Research Tasks

1. Based on literature studies summarise the background behind the formation of open space in large-scale housing estates in different cities of Europe, theoretical guidelines, aimed purpose of open space and the correspondence of the realised result.
2. Based on literature studies identify types of possible transformation processes in the open space of large-scale housing estates in different cities of Europe.
3. Identify opportunities and challenges for public participation in the process of large-scale housing estate open space transformations.
4. Summarise information on residential environment quality evaluation approaches and tools.
5. Develop an evaluation approach to assess the residential environment quality in the context of transformations.
6. Define residential environment quality of large-scale housing estates of Riga in the context of open space transformations.
7. Develop and conduct a survey in four large-scale housing estates of Riga, to define residents attitude towards transformations which have already happened and possible future transformations of open space in large-scale housing estates.

Research Methodology

Research distinguishes three interrelated aspects, which influence physical transformations in the open space of large-scale housing estates:

- Context I – physical environment of open space in large-scale housing estates;
- Context II – legal issues (regulations, ownership, management structure, etc.), city development strategies etc.;
- Actors – involved in transformation processes and management of open space of large-scale housing estates (their roles and collaboration patterns).

At first, research focuses on spatial patterns and specific characteristics of open space in large-scale housing estates. Then, the context of transformations is analysed through the prism of legal issues which are acting as drivers or barriers of different transformations. Strategical

and planning documents represent aims and approaches to reach defined objectives. Finally, research on transformations in public open space of housing estates and the residential environment quality can not be investigated without defining stakeholders who are directly or inderictly involved in the process of these transformations. There is a distinction between externally-led and self-organised engagement in the process of transformation of open space [180]. All three interrelated aspects can be investigated at different scales: micro-scale (one courtyard or even smaller scale), meso-scale (*microrayon* or the whole estate), macro scale (on the city structure level as for example when analysing the role of green open space of large-scale housing estates in the GI). Actors or stakeholders involved and influenced by transformations in open space of large-scale housing estates show numerous levels of involvement and diverse collaboration patterns varying from tactical bottom-up interventions on a micro-scale, to involvement in strategic planning and large open space redevelopment projects. In addition to planners, three other main types of institutional stakeholders have been identified by Kaiser et al. (1995): "*The market group: land owners, developers, builders, realtors, bankers. The government group: elected and appointed governmental officials who are in charge of land use analysis, land use changes etc. The third group are those who have special interest like environmental preservation, economic development, farming etc."* [23, *274*]. In addition to this, local inhabitants individually or as a part of a community group represent another type of stakeholders. Even more, analysis can include 'people' as end users of the open space with distinction between existing inhabitants and future inhabitants.

Research questions are aiming to show interrelation between these aspects and analyse how they influence transformations of open space in large-scale housing estates. Research combines quantitative and qualitative research elements. According to Newman and Benz qualitative and quantitative approaches should not be viewed as unconnected, polar opposites. On the contrary, they represent different ends on a continuum [10]. Research aim and objectives are reached using the following methods:

- Comparative analysis is used to:
  - ✓ analyse development of open space in large-scale housing estates and open space spatial configuration principles;
  - ✓ analyse scientific articles in *Science Direct* and *Scopus* data bases, using PRISMA methodology;
  - ✓ analyse residential environment quality evaluation tools [70], [81], [82], [188].
- Case study analysis – empirical research, that investigates a certain phenomenon in its natural environment, by using various data collection methods and sources [55], [62]. This research focuses on the case of open space in large-scale housing estates in Riga:
  - ✓ On-site observations and evaluation of residential environment using open space quality evaluation tool.
  - ✓ Inhabitants' surveys [102], [111], [149];
  - ✓ For case description analysis of archive materials, regulations, scientific literature, and internet sources is used.

- ✓ An experiment of introducing a community garden in open space of one selected large-scale housing estate. Urban gardening initiative realised in June 2017, with an aim to evaluate the process of getting a permission and the willingness of people to participate and maintain the garden. The method included concept development, preparation of requested documents, engagement of local inhabitants, organisation of the event together with project team and volunteers.

- The collection of quantitative data was insured by inhabitants' survey (240 respondents) with semi-open questions (to provide alternative answer opportunities in case the respondents are not satisfied with the proposed answers).
- Graphical processing and interpretaion of research results and data.

Table 1.

Overview Structure of the Thesis and the Research Questions Being Addressed in the Sections

Chapters	RQ	Tasks	Process and Methods
Chapter 1 1.1. 1.2. 1.3.	What are the characteristic features of open space in large-scale housing estates and how these features influence residential environment quality?	Based on literature studies summarise the background behind the formation of open space in large-scale housing estates in different cities of Europe, aimed purpose of open space and the correspondance of the realised result.	Comparative analysis of literature related to development of open space of large-scale housing estates and features which influence character of open space. Analysis of examples from various European cities was performed to identify typologies and characteristic features of open space in large-scale housing estates.
Chapter 2 2.1. 2.2. 2.3. Chapter 3 3.1. 3.2.	What types of transformation processes are present in the open space of large-scale housing estates and how are they influencing the residential environment quality?	Based on literature studies identify types of possible transformation processes in the open space of large-scale housing estates. Develop an approach to evaluate the impact of transformations on the residential environment quality. Define transformations of open space in large-scale hosing estates of Riga and their impact on the quality of residential environment.	Development of an approach to evaluate the impact of open space transformations on the residential environment quality. On-site observation in large-scale housing estates of Riga and mapping of results. Experiment in *Jugla* neighbourhood.

Chapter 2 2.1.	What are the new open space management models and how do they influence open space transformations in large-scale housing estates of Riga?	By analysing possible participatory budgeting and community engagement tools in Riga, define their types/models and relation to transformations of open spaces in large-scale housing estates. Using the experiment in *Jugla* neighbourhood identify opportunities and challenges for community action in a legally approved transformation of open space	Analysis of existing participatory budgeting and community engagement practices. Participation in participatory budgeting projects. Experiment in *Jugla* neighbourhood.
Chapter 3 3.3.	How do residents of large-scale housing estates in Riga use the open space and how do they perceive occured, ongoing and possible future transformations?	Develop and conduct a survey in four large-scale housing estates of Riga, to define residents' attitude towards past, ongoing and possible future open space transformations in large-scale housing estates.	Residents' survey.

Terminology

As vary terms used to describe post-World War II industrial mass construction of housing ensembles, vary also terms used in relation to the outdoor environment [11], [19], [20], [46], [49], [58], [66], [67]. In this research the term **large-scale housing estate** is used to describe large housing estates built after World War II, and which were detailly planned as coherent socio-spatial ensembles and built by industrial construction methods. They are also referred to as large housing, mass housing, high-rise housing, or social housing estates, depending on the local and national context.

Outdoor environment of large-scale housing estates is called with different terms. Literature studies showed following terms:

- Open spaces in the planned courtyards / the courtyard area;
- Open space;
- Common open and green space;
- Neighbourhood open spaces;
- Public open space;
- Open outdoor spaces;
- Courtyards;
- Inner courtyard.

The term courtyard or inner-courtyard is used while speaking about outdoor environment in large-scale housing estates in Berlin, Bucharest and Budapest. The Oxford Learners'

dictionary defines courtyards as: "*an open space that is partly or completely surrounded by buildings and is usually part of a castle, a large house, etc*." [201]. The term "common open and green space" was used in certain cases when describing open space in large-scale housing estates. However, research on the meaning of this term showed that in general it is rarely used and few resources which had this term, used it while speaking about gated communities:

"In residential communities, the common open spaces around and between buildings are limited to use by the residents (private space for their residents) and usually classified as semi-private space. However, these kinds of spaces have the characteristics of public spaces because of the large number of users... [173]"

For that reason to exclude any misunderstanding about the term "common open space" it was decided to use in this research the term '**open space**'. Further open space of large-scale housing estates is analysed as a public open space as the nature of open space in large-scale housing estates mainly corresponds to the definition of public open space:

"*... public space is defined as space to which people normally have unrestricted access and right of way. In other words, public places and spaces are public because anyone is entitled to be physically present in them. Focusing on the way of engagement in places, public space is open, publicly accessible space where people go for group or individual activities. Public space is thus a place outside the boundaries of individual or small-group control, used for a variety of often-overlapping functional purposes...*" [169].

In this research the term '**transformations**' is used in relation to urban change: the physical change in the open space of large-scale housing estates as a result of processes of unmaking and remaking the open space, driven by different actors. The context which has led to transformations is described further in the section 2.1. Open space transformations in Riga are viewed in the post-socialist period.

Scientific Novelty of Research

The Doctoral Thesis contributes to the research on open space transformations in Riga's large-scale housing estates in the post-socialist period, which has almost not been studied from the perspective of the relation between transformations and the quality of residential environment. The research has a methodological significance, as it summarises the data on existing residential environment evaluation tools, proposes classification of open spaces in large-scale housing estates, and introduces an approach for evaluation of impact from present and possible future transformations on the quality of residential environment in large-scale housing estates.

Practical Significance of the Work

This research examines an up-to-date issue of open space significance in large-scale housing estates and emphasizes the need to identify the impact of open space transformations on the residential environment quality. The research reveals the most important features related to transformations in open space.

The research reveals the connection between open space transformations and increase or decrease of the residential environment quality. The developed evaluation approach can be used to identify the impact from transformations which have already happened and the ones which may take place in the future. This allows to evaluate various scenarios and prevent decrease of the residential environment quality. Conclusions which reveal the impact of open space transformations on the residential environment quality in Riga's large-scale housing estates form a background for development of planning guidelines.

All figures, diagrams, and tables, which do not have a source, are made or developed by the author.

Approbation of the results

Results of the research have been presented at various international and local scientific conferences and published in international and local scientific journals.

Publications

1. **Korolova. A., Treija, S.** Spatial Character and Usage of Public Open Space in Large Housing Estates. *Journal of Architecture and Urbanism,* VGTU, Scopus (submitted for publication in 2021).
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1. DEVELOPMENT OF OPEN SPACE IN LARGE-SCALE HOUSING ESTATES

Open space in large-scale housing estates forms an important part of the residential environment quality, by providing both necessary, optional and social services, and playing an important role in recreation and recovery from the everyday stress. This sub-section discusses the genesis of open space in large-scale housing estates in the regional context of Baltics and Northern Europe. Despite local peculiarities, there have been certain similarities in the formation of open space. First sub-section presents an overview on open space spatial configuration principles, and the further sub-sections display variety of inhabitants' needs in relation to the residential open space, and the role of green areas in large-scale housing estates.

1.1. Genesis and Characteristics of Open Space in Large-Scale Housing Estates

Originally, open space in the large-scale housing estate followed the concept of a car-free inner zone and the idea of different functions reachable in the walking distance [38]. Despite the fact that large-scale housing estates were widely built across Europe, and there are many similarities in form and function, still studies on development of large-scale housing estates show also meaningful diversity in formation and development trajectories. Development was highly influenced by context, construction period and scale, location and connectedness, maintenance, obsolescence, population structure, stigmatisation, local economy, public space, livability [20]. It has been noticed that in Northern and Western Europe construction of large-scale housing estates lasted relatively short period of time, in comparison to this large-scale housing estates in Eastern Europe started to be built later, but also the period lasted longer. In southern Europe large impact was from the private sector.

Large-scale housing estates built in the second part of the 20th century were visualised as a solution to various urban problems at times of rapid industrialisation and urbanisation in most of Europe during the post-World War II [49]. In Eastern Europe large-scale housing estates were seen as an answer to providing home to people relocating to cities (including a workforce supporting industrialisation); in Western Europe meeting housing needs for immigrants and guest workers; and as a replacement housing when slum clearance projects were needed. In many countries, especially in Northern Europe [147] and Eastern Europe [19], [138] egalitarian housing production and housing provision became one of the central elements of the welfare state.

The idea of high widely spaced apartment blocks raised in the congres internationaux d'architecture moderne (CIAM). CIAM was formed in 1928 and worked as organisation where modernist architects discussed and promoted their ideas of urban development, space and life in the city [17]. The La Sarraz Declaration asserted that as society became more industrialised, it was vital that architects and the construction industry rationalise their methods, embrace new technologies and strive for greater efficiency. *"Urbanisation cannot be conditioned by the claims of a pre-existent aestheticism; its essence is of a functional order… the chaotic division*

of land, resulting from sales, speculations, inheritances, must be abolished by a collective and methodical land policy." [197]. The fourth CIAM Congress in 1933 *(theme: "The Functional City")* comprised analysis of thirty-four cities and considered solutions to urban problems. The conclusions were published as "The Athens Charter". According to Gregor Harbusch et al. this document remains one of the most controversial ever produced by CIAM:

"The charter effectively committed CIAM to rigid functional cities, with citizens to be housed in high, widely-spaced apartment blocks. Green belts would separate each zone of the city. The Charter was not actually published until 1943, and its influence would be profound on public authorities in post-war Europe" [197].

In 1950s acceptance of modernist ideas was very strong accross European countries. And following this, in the time period between early 1960 till mid or end of 1970 many European countries launched "million home" programmes, like well known million home programme in Sweden, but also similar programs in Hungary, Spain or France and else where [20]. The standardised grand structures of large-scale housing estates in Europe are a result of post-World War II urban growth, industrialisation and urban renewal. In many cases large-scale housing estates composed a high-density urban-industrial circle around the historic cores of cities. However other examples show large-scale housing estates being built to promote the redevelopment of inner-city neighbourhoods of slum housing.

The starting point for the formation of large-scale housing estates in the USSR can be attributed to the 1957 Communist Party Congress [19]. The turning point in Soviet architecture is thought to be the Khruschev's speech on December the 7th 1954, when he spoke at All-Union Conference of Soviet Builders, Architects and Workers in the Building Materials Industry. In 1954 the Soviet Counciel of Ministers introduced the act named The Development of Mass Production of Assembled Reinforced Concrete structural components. In 1955 came out the decree On the Elimination of Excesses in Architecture and Construction and On the Development of means to improve, industrialize and reduce the cost of cnstruction [11]. The USSR was looking at technologically more advanced Western Europe, so Khruschev's visits to Finland and in particular to Tapiola, were folloved by organized study trips to Northern Europe by Soviet architects and engineers [11, *25*]. Industrialisation has fostered employment-based migration to cities and the new housing units on vast planned districts were built on a high speed. In the time period from 1940s till 1991, with industrialisation and urbanisation processes also due to migration from other parts of the Soviet union, demand for new housing was acute, especially in capital cities of Tallinn (Estonia), Riga (Latvia) and Vilnius (Lithuania**)** [19].

In the Soviet Union the state dictated location of new buildings, regulated the free provision and usage of land and financing of construction [38, *13*]. The focus on economy and production methods was so high that the approach to urban planning was dictated by efficiency of production and the main aim of urban planners became fulfilling the guidelines [38, *145*]. The comparison of urban development plans showed the change in the time period 1950s till 1990 from neoclassical superblock to the socialist micro-district.

The basis of a housing estate was formed by the superblock. A superblock covered about 15 ha of land offering living space for approximately 6 thousand people. In addition to the

residential buildings, it included creches, kindergartens, primary school, a venue for meetings or a club, shops, children playgrounds, and a park [215]. The main idea was that everything must be reached within the walking distance. Superblocks were separated from each other with major roads. The *microrayons* (or micro-districts) were designed on significantly larger areas than the superblocks. Soviet *microrayon* comprised 10 ha to 60 ha, or maximum 80 ha of land. It followed the concept of a car-free inner zone and the idea of different functions reachable in the walking distance. Within the *microrayon* the planning unit was divided in residential groups. In general, the *microrayon* planning principles included: compass direction, topography, and the economics of the assembly crane [38, *153*]. One large-scale housing estate more often consisted of several *mikrorayons.* The size was calculated according to housing requirements estimated proportionally to the needs for workers in enterprises. Selection of sites was usually made within the general town plan for up to 25-year horizons [138].

"*The socialist city is based on different set of laws: class equality in the Soviet society, the absence of exploitation and unemployment, elimination of private ownership of land, a system of State-planned economy and demand for the best living conditions for the masses. Now the cities have undergone the transformation to become the hub of freelance and creative work, a place of equality and friendship for its inhabitants*" [138].

Detailed plans of large-scale housing estates were magnificent in size and comprised street networks, architectural elements, access and transport, as well as natural elements, and infrastructure objects including heating, sewage and water. The living space for each family was dictated by the accurate norms [138]. The task of Soviet urban planners was to consider instructions of a state developer and realise them into design of the large-scale housing estate. Social services, greenery and housing were allocated according to the standard norms of minimal individual needs.

However, the acceptance of modernist ideas was not overall. First critique of the modernist ideas appeared already in 1953. British architects Alison and Peter Smithson were advocating for belonging and sense of neighbourhood as basic emotional needs, which are hardly to reach in CIAM's ideal city which leads to isolation and segregation [197]. And the 1970 were marked out with criticism of large-scale housing estates [255]. Fast construction demand requested the use of industrialised construction technologies, which together with the lack of working forces has led to the monotonous landscape of large-scale housing estates [64].

In the Soviet Union countries socialist system as well as products of that system - urban developments, were widely criticised in 1980s at the time of Gorbachev's perestroika. But, at the beginning there wasn't the idea of modernism, the main concern was to build fast and cheap [11]. In the Soviet union countries the concept of large-scale housing estates was adapted from Western Europe. In Western Europe mass housing construction was tended to build "better future", while in the Soviet union territory "to build communism faster" [11], [221]. In Eastern Europe the main objective was fast and low-cost construction of good quality housing for working and middle-class families.

Formation of open space between building blocks was a result of various planning aspects. As mentioned before these were concept of a car-free inner zone and the idea of different functions reachable in the walking distance; compass direction, topography, and the economics

of the assembly crane, efficiency of production; services and green spaces were allocated according to the standard norms of minimum individual needs; also large green areas as a tool to ensure fresh air (sanitary-hygienic needs); widely spaces building blocks to ensure more sunlight etc.

In Western Europe open space in housing estates showed variety of design problems: the clumsy structure of the estates, the blocks and the environment and the unused open spaces and communal areas [46]. Despite the fact, that large open green spaces were considered as positive feature of large-scale housing estates, they decayed quickly as they weren't designed for specific or functionally clear uses and were open to too many users. They often were under used, badly supervised and unattractive. There was a difficulty to control the open space that belonged to no one [46, *92*]. However, result of research made by Anne Power showed also the vise versa interrelation. Not only the physical structured influenced social disorder, but also the social composition of large-scale housing estates in Germany, UK, Ireland and France has lead to decay of these areas.

Various researchers pointed out the importance of the spacial organisation on the successfully working open space and the social contacts which can be created there. "The design can be a powerful influence for bad" and vise versa design can help to reduce vandalism, graffitti, level of litter, and even more leading to reduction in stress, mental illness and crime [8, *30*]. Contemporary design inspired by Le Corbusier, reduced individuality and produced anonymous uniformity, 'confused spatial organisation' and massive scope for crime and breakdown. Among the bad design features were raised walkways, high-rise building blocks and spatial organisation of buildings. In the book "Defensible Space" Oscar Newman suggested creation of "defensible spaces", which could help residents to look after their own spaces. He promoted the idea about redesigning the housing areas, in order to raise the feeling of ownership [41].

On the over hand, in Eastern Europe the neighbourhoods which were planned to provide residents with necessary everyday services within the walkable distance from their homes, became very popular among people, despite the fact that not always all the planned services were built [38]. Large open green spaces are the characteristic features of majority of large-scale housing estates. Some data showed that green spaces usually comprised about 40-45 % of the entire open space and so the understanding of the meaning and function of these spaces was crucial. In 1967 and 1968 inhabitant surveys in Latvia showed that residents of *microrayon* did not fully use the green areas and nor were satisfied with available facilities. As a result, the areas, which already required large investments are not used in full scope [19, *168*], [127]. Still, nowadays, more than 50 years later, the situatuion remains similar: inefficient use of green space and lack of outdoor facilities.

In the Soviet urban planning reduction of individuality of the open space had the background also in ideology:

"In Soviet times, city planning was part of the production process – a 'construction job for the government'[5] *generally believed to lack artistry. Egalitarianism and a lack of differentiation across urban space were driving objectives; no residential area should be more appealing than any other because of style, size, or location.*[6] *Equality, a key ideological feature*

of socialist residential planning, was vigorously expressed in Soviet housing estates and mikrorayons through pre-defined and universal maximum (walking) distances to schools, bus stops, shops, and parks. Everyone was, in theory, meant to have comparable access to comparable assets and amenities: "within the city there should be no particular areas that attract or repel people; they should all be of standard design with equal space (per person) and amenities so that it makes no difference to people whether they live in one neighbourhood or another. The socialist neighbourhood will be characterised by equality and classlessness." [138].

Spatial organisation and the approach to the open space organisation differed in different parts of Europe. To illustrate the differences and similarities, and the spatial layouts, several large-scale housing estates from different cities in Europe were analysed. The map (Fig. 1.1.) shows geographical distribution of investigated large-scale housing estates outside Latvia. The following part illustrates briefly typologies of large-scale housing estates in Baltic countries, further comparing to some examples from Finland, Sweden, Germany and the UK. Finland and Sweden are believed to be inspiration for Soviet architects, who tried to introduce planning principles also in Baltics, thus site organisation are compared.

Figure 1.1. Location of analysed large-scale housing estates outside Latvia [By the author using [245]].

Literature studies have shown the following main types of spatial structures within large-scale housing estates: a surround-type where a square inner-courtyard is formed between apartment buildings, a semi-closed form (often U-shaped courtyards formed by building blocks or u-shaped buildings), a canyon-type formation with grand roads with apartment buildings along both sides or along one side and a parallel blades formation featuring long rows of parallel buildings [75], [133], [194], [253]. The analysed case studies allowed to find examples of these types as well as to define some additional types. It has been noticed that surround-type structure can form not only square, but also other forms of courtyard space. Surround-type configuration was quite popular and can be found in different countries of Europe with square,

rectangular, hexagonal and irregular shape inner-courtyards (Berlin, Stockholm). Other spatial organisation types include: semi-closed forms (often U-shaped courtyards formed by building blocks or u-shaped buildings), high-rise towers surrounded by or combined with long blocks, irregular (curved/croocked) open space formed by non-linear building blocks. Aditionally, it was decided to point out raised walkways as a separate type, which according to buildings' organisation can form any of previously mentioned types, but have characteristic feature of raised pathways and open space.

Analysed case studies were from Finland, Sweden, UK, Lithuania, Estonia, Latvia and Germany. In Finland appearance of large housing estates can be explained by the late and sudden urbanisation of the country after WWII [20, *216*]. Here municipalities had strong autonomy in residential planning. In the 1960s and 1970s the planning principles followed the motto "common good was now about "equal good for everyone"". The financial logic of attracting private developers, was aiming construction of greater floor space, so there is more floor space to sell and the value of land can increase. This has led to a specific urban structure, especially in Helsinki, where housing estates are high and often are located in the middle of forests and fields [20, *217*]. In Sweden post-WWII architecture was polarised between good architecture set by architects and architecture of builders and politicians [85]. In first competitions for the large-scale housing estate architects were asked to insure "intense use of the ground without in any way neglecting the demand for adequate and pleasant town plan", providing everyday use facilities and allowing children to play without necessity of crossing traffic areas. Later financial support was lowering and architects had to adapt to the new economic situation, ideas had to be transformed to more affordable ones. Additionally, it was decided to point out raised walkways as a separate type, which according to buildings' organisation can form any of previously mentioned types but have characteristic feature of raised pathways and open space (e.g. present in UK) [205]. Such planning approach can be found outside Northern Europe region in UK and Netherlands. Analysed cases in UK were quite unique, due to local circumstances. Here due to high risks of flooding, often apartments in large-scale housing estates were located on the first floor (which means second floor in many European countries).

The Baltic countries (Latvia, Lithuania and Estonia) were under the Soviet rule after the WWII. Experts point out the exceptional nature of Baltic modernism, where the Nordic modernism has played an important role in development of Baltic modernism in the Soviet period [19, *72*], still these remarks are mainly considering the architecture of mass housing and alternative house design solutions. In the 1960s as a result of an architectural competition of Socialist countries the model of the Soviet *microrayon* was proposed. This competition aimed development of new methods for grouping and arranging multi-unit apartment blocks. Standard residential construction plans were tasked to adapt to a specific building plot. General and detailed plans of *microrayons* were developed by teams of professionals from different backgrounds, like engineers, traffic specialists, landscape architects, etc. Administrative norms, instructions, density norms, all these aspects have influenced city planning. These norms have reduced the role of architects in city planning. Many scholars argue that inarguable instructions being followed in city planning in USSR resulted in 'the discipline of urban

planning has abolished itself in favour of fulfilling guidelines' [38*, 145*]. Similarly, also approach to urban design was diminished to an aim to fulfil guidelines [38, *153*].

Despite certain local peculiarities between the countries which were under the Soviet rule and the Northern Europe countries, similar urban planning solutions can be found around the analysed examples. In general, large-scale housing estate were not exclusively high-rise, still similar concepts and techniques were used in medium- and low-rise industrially build blocks, with similar results. There can be found solutions formed by five-storey building blocks, and even four-storey blocks, nine-storey linear blocks, nine- , 12- and 16 storey tower blocks. Majority of large-scale housing estates represent a mix of building blocks, often with high-rises [19], [20], [46].

Variety of large-scale housing estates in Europe were built according to the spatial organisation – building blocks organized around the courtyard forming square, rectangular or different form space. Such spatial organisation is called surround-type courtyard between apartment buildings. This kind of buildings' arrangement was introduced also in Baltics and Northern Europe. For, example *Mustamäe* in Tallinn with the plan being elaborated in a detailed planning project in 1959. *Mustamäe* comprised all key principles of a *microrayon* – large residential building blocks, kindergartens, schools and shops within the walking distance from home. Additional detailed planning projects were developed in 1960s and 1970s [138]. The spatial organisation of *Mustamäe* is one of various examples with diverse organisation of building blocks within the free-form planning, which was considered novel at the time and with freely distributed buildings allowed producing more sunlight and open space between buildings (Fig. 1.3.). One of distinctive features in variety of large-scale housing estates in Baltics are believed to be a result of the influence of Finnish and Swedish modernist residential planning. So, also *Mustamäe* shows planning of building blocks being harmoniously attuned with surrounding landscapes.

Other examples with surround-type inner square courtyards can be found also in Hellersdorf in Berlin, Germany. The work on this large-scale housing estate began in 1985, and after construction it comprised 45 000 dwellings. Due to financial scarcity part of public infrastructure and facilities were never built. The public open space which was originally planned for common activities, remained undefiened and unresolved [230].

Similarly in Riga various large-scale housing estates encorporated this approach to spatial organisation. For example detailed plan of *Jugla* large-scale housing estate developed in 1961-1970 included also surround-type courtyards. This spatial organisation was combined with several planning layout principles represented in the further text. This large-scale housing estate requires special attention as originally the area comprised various natural environments: lakes, river and forests, which made the nature of open space unique. According to the explanatory text of detailed planning project, lake *Juglas ezers* waterfront and the *Liela Jugla* river front were aimed to be used for mass recreation. Existing residential buildings of *Jugla* estate have influenced the spatial organisation of traditional *microrayon* with public buildings being located not in the center of a structure, but in closest proximity.

High-rise towers surrounded by long blocks. Also, this type of the spatial organisation can be seen in different estates across different countries. The *Pihlajamäki* estate is divided in two

areas and was constructed between 1960-1964, in Helsinki, Finland. This large-scale housing estate represented the "forest city" idea of the 1960s. It was located on a favourable spot, offering residents panoramic views. The tower blocks were surrounded by long four-storey buildings. Currently, the area is under protection as the first Finnish suburb built from prefabricated elements (Fig. 1.2.) [235]. The construction of *Munkkivuori* residential area began in the late 1950s. Similarly, as *Pihlajamäki* this area also was following "forest city" ideology. Here buildings were scattered in the territory leaving large open green spaces in between, and part of the area consists of tower blocks.

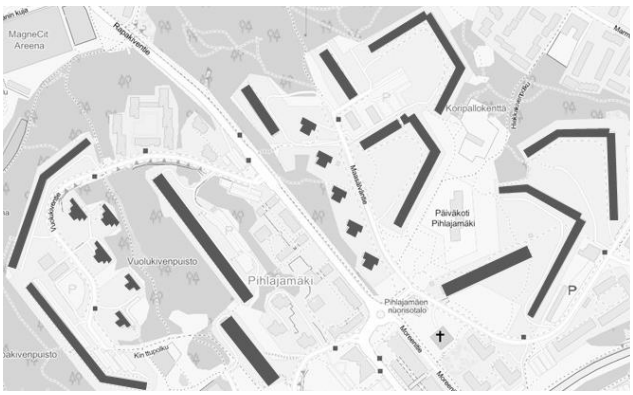


Fig. 1.2. Fragment of *Pihlajamaki* large-scale housing estate, Helsinki, Finland, 1960–1964. Spatial configuration combining high-rise towers surrounded by long blocks, and semi-closed structures [Author, based on Arcgis maps data and [235]].

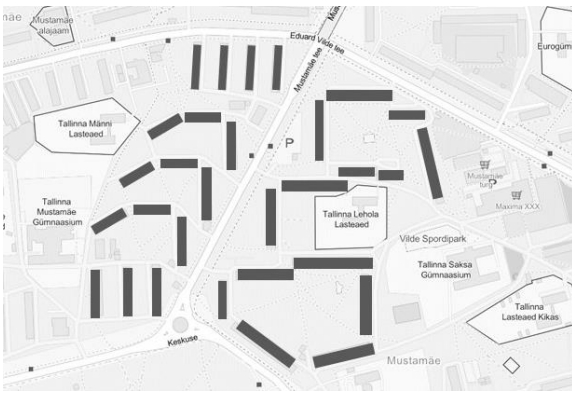


Fig. 1.3. Fragment of *Mustamäe* large-scale housing estate, Tallinn, Estonia, 1962–1973. Spatial configuration combining parallel blades, surround-type and semi-closed structures [Author based on Arcgis maps data and [138]].

The other example is *Väike-Õismäe* in Tallinn built in the 1970s. The composition of the large-scale housing estate focused on the broad encircling street, impressive when looking from above. The estate was formed by five-storey buildings, the inner part was formed by nine-storey buildings with some accents formed by 16-storey tower-type high rises [138]. Similarly in Riga this type of planning was introduced in various estates. For example, *Jugla* estate has nine- and 12-storey tower-type houses surrounded by long building blocks. Allocation of the tower-type residential buildings was dictated by the fact that part of estate is open to the river front and is also on the fringe of the city. It was decided to create here the expressive silhouette which welcomes / defines the city border.

The semi-closed open space U-shaped or similar forms open space can be seen in various estates across Europe. For example in *Tynnered* estate built from 1964 in Gothenburg. It comprised just over 1000 flats and it was decided to left the terrain almost untouched [85]. U-shaped courtyards are presented also in *Pihlajamäki* estate (Finland), in *Väike-Õismäe and Mustamäe* in Tallinn. Some examples mixed with other spatial configurations are present in various large-scale housing estates of Riga (*Ziepniekkalns, Jugla*).

The parallel blades spatial organisation is common in many parts of Europe: Poland, Hungary, Netherlands, Slovenia, Sweden etc. In Vilnius, *Žirmūnai* estate built between 1962–1964 was the first Soviet housing development to receive the USSR State Prize for urban residential design in 1968 [19]. *Žirmūnai* has buildings organised in the form of parallel blades as the leading type of spatial organisation. This type of the spatial organisation is seen in *Mustamäe* in Tallinn, *Āgenskalna priedes, Jugla* in Riga, etc.

Irregular (curved or croocked) open space formed by non-linear building blocks. *Maerkisches viertel* (1964 und 1974) in Berlin considered one of the examples of modernist large housing has large open spaces defined by curved long stripes of high blocks forming in plan kind of unfinished two or sometimes three hexagonal prismatic cells (honeycomb cells). Here major building hight varies from five- to 14-storeys, with the higher density towards the center and the fringe of the estate with 20-storey towers [143], [162]. In Riga irregular elongated open space formed by linear building blocks is seen in *Pļavnieki.* Formation of space by non-linear buildings was observed in one of the various detailed plan versions for *Ziepniekkalns,* however the realised plan didn't include any irregular buildings.

The concept of raised walkways traced in variety of large-scale housing estates in London unintentionally predefined neglect of street level space, and promoted perception of courtyard and street space as insecure area, under threat of vandalism and crime. One of such examples is *Thamesmead* estate built in the 1960s in London, UK (Fig. 1.4). It was built on marshland site near Thames, and as it was under the threat of flooding, inhabited spaces were placed starting from the 1st floor (in UK one level above the street). Entrances were reachable with elavated passage, which also provided space for walking, jogging etc. Built for up to 100 000 inhabitants with low-rise housing and point blocks. The estate was later reconstructed. *Aylesbury* estate, London, UK (1963–1977) faced the same problem, with elevated passages and access to the entrance on the first floor promoted crime and unsafety on the street level (Fig. 1.5). As well as flooding problems were faced. The concept aimed linking all areas of the estate with concrete bridges, so there would be no need to walk along the street on the ground level. Even more, the original idea aimed connection of the estate to the neighbouring area. Despite many problems, in 2001 the majority of residents voted against its demolition [239]. Similar approach can be found also in several large-scale housing estates in other European countires. For example, High-deck-siedlung in Joseph-Schmidt-Strasse Berlin-Neukoeln [223].

These raised-walkway concepts were considered good and future oriented at the time of cunstruction, but were unsuccessful as a result and were deeply critisized by Jane Jacobs and other people-friendly environment supporters. As can be notified now, large-scale housing estates of this type have been demolished or rebuilt, due to their inconformity to today's living environment standards.

Investigation showed that in general, among basic ideas of large-scale housing estates was neighbourhood which offers all the neccessary every-day life functions, provides open public space for recreation and offers good quality of environment for inhabitants and children to play safely outdoors. Still, later critiques showed that chosen planning principles did not correspond to those ideas and could not help to realise aims of better life [19], [20]. The post-war large-

scale housing estates represented ideal housing of that period; however, their quality is questionable today.

Fig.1.4. View of the open space in a council large-scale housing estate in Thamesmead, London, in 1972 [201].

Fig. 1.5. View of the open space in the Aylesbury large-scale housing Estate, Walworth, London, UK [Photo by Will Faichney].

The components of a place can be analyzed according to three main criteria: physical form, human activities and meaning or image. The criteria of a good public open space in relation to its physical form often includes clear and easy access [7], [35], clear paths which connect each other and clear orientation [15], [194] and human scale design [15], [52]. Christopher Alexander pointed out the importance of degree of enclosure. The outdoor spaces which are defined as "left over" between buildings most probably will not be used [1]. He states that there are two types of outdoor space: positive space and negative space. Shapeless space, with undefined character is considered negative. These spaces are so poorly defined as the boundaries cannot be identified. On the other hand, positive spaces provide some degree of enclosure, which can be achieved not only with buildings but also with greenery, landscape, hedges, etc. [1]. Also, outdoors people try to find a spot where they can feel their backs protected. Referring to Camillo Sitte [53] on the example of successful squares, he distinguishes two important properties: certain level of enclosure and being open to one another, so that one square leads to the next. Similarly, Nikos Salingaros and Pietro Pagliardini define two key principles of open public space design: degree of openness and degree of interiority [163]. In the open space where the place is always open to sky, important role plays the hight of buildings, as it to high extent influences the perception of open sky space. The physiological and psychological perception of interiority defined by the aspect: can a person get the feeling of being "inside" and "outside" in the environment which contains natural and built structures? It is stated that in case of high-rise building towers, all the outdoor space remains outside and exposed, so that a person feels unprotected.

According to Jan Gehl, character and intensity of outdoor activities are highly influenced by the physical space [15]. The physical structure reflects and supports the social structure. Referring to Oscar Newman he states that clear organization of public, semi-public, semi-private and private spaces strengthens natural surveillance and enables group decisions

regarding the shared problems. The graduation of open space "publicness" allows to know neighbours better and to raise collective responsibility for this public space.

There have been various attempts to classify public open space according to design, socio-cultural and political-economy perspectives. First, there have been efforts to concentrate on morphology of open space, as have approaches in archaeology [90]. Camillo Sitte categorized and designed urban squares [53], and Zucker [63] expanded this accomplishment, delineating five types: closed, dominated, nuclear, grouped, and amorphous. Krier divided all urban open space according to two types - the street and the square - and cross-referenced them with basic geometric shapes [27]. Still other studies show that a strong sense of enclosure is not always a mandatory for a public open space to be successful [86]. Artificial and natural elements, informal temporary interventions can give a public open space the new character and purpose.

Good quality public open space can be reached through interesting scene and details and the natural elements. Natural elements play an important role in provision of comfort, relaxation, and pleasant experience. Nature also supports physical activity and recovery from stress [24], [7], [14]. Urban design elements can support social activities. So, the urban design elements can welcome people to spend time outdoors and engage in individual and group activities. The provision of shade, shelter, resting points and seating, as well as natural surveillance, make open spaces more attractive to use, particularly for the ageing population. The arrangement of nature elements in residential areas encourages social activities and strengthens the bonds among inhabitants [172]. Also, playground areas which are attractive to children may support social interaction on the site. Moreover placemaking, various bottom-up activities have various benefits: allow to introduce the elements which community requires and allows to create identity of a place [34]. The more time people spend in the public open space, the more likely they will interact with each other [118]. Identity of the outdoor space positively affects neighbourhood relations [176]. A high-quality outdoor space can enhance social interaction by attracting people to come and stay for some time.

Several studies highlight the interconnection between urban trees and health. The researchers conclude that people who can see trees from their window are happier and healthier – especially in the high-density neighbourhoods. The ability of people to observe green areas from their windows proves to reduce stress and the frequency and intensity of unhealthy habits [211].

By various definitions public open space allows the free access for people, supports social interaction [60], wide range of activities both individual and in a group [160], [16], and various types of recreation [60], [35]. There are several qualities of successful places, which need to respond to the following inhabitants' needs: (1) comfort, incorporating protection from harm and the physical comfort; (2) relaxation, granting a sense of psychological ease; (3) passive engagement, with the surroundings and other residents (4) active engagement, planned or spontaneous (5) discovery, demonstrating need and wish for variety and new experiences [87].

This diversity of public open spaces addresses diverse needs and preferences of inhabitants. With the design of urban areas, it can be ensured that these diverse needs and preferences are answered in the right and most suitable location, but it doesn't mean that each public open space should necessarily offer everything for everyone. The challenge faced by planners is

understanding of this diversity and being aware that one-size-fits-all won't work to ensure successful public open space [30], [50]. Christopher Alexander describes variety of inhabitant groups and variety of activities they can perform in public outdoor room [1]. Diverse and occasional nature of these activities require delicate balance between well-defined and not too defined space. In this case any activity has a starting point to grow from, and at the same time it can develop freely.

The other approach to classification of public open space is according to human activities. Jan Gehl identified three types of the outdoor activities: necessary, optional, and social [15]. Nowadays, the necessary activities which happen regardless the weather and seasonal conditions, include walking for everyday tasks, dog walking, bicycle and car parking. The optional activities take place when people have time and wish to engage in playing, walking, or sitting for recreation, etc. It is advocated that in denser and low-quality open spaces optional activities will happen seldom. In turn, in the good quality public open spaces these activities take place frequently [15]. Social activities are characterized by inhabitants' engagement with each other: children playing, people gathering, community gardening etc. Residential satisfaction studies show that for the neighbourhood enjoyment the open space should provide opportunities for all three types of activities [33]. Important are wishes and needs of different user groups, as for example children and teenagers.

Fig. 1.6. *Tapiola* large-scale housing estate showing parallel blades formation, 2021 [Google street view pictures].

Fig. 1.7. *Lasnamee* large-scale housing estate showing parallel blades formation, 2021 [Google street view pictures].

Analysis of open space in large-scale housing estates in different European countries showed that similar spatial organisation principles were used in Northern and Eastern Europe. Baltic architects were inspired by the large-scale housing estates in Northern Europe and tried to use similar planning approaches. Still, not always the same outcome was reached. When using different scale (building hight and size of open space area) and diffrent level of landscaping, differed also the result. So, inspired by located in forest large-scale housing estates in Finland, with the similar spatial organisation of building blocks result in Estonia was undefined large outdoor environment. Important was not only interrelation between building hight and distance between houses, but also the conditions for greenery. Difference between good soil in certain Finnish estates, and poor growing conditions on the site selected for *Lasnamee*, Estonia can be seen also nowadays (Figs. 1.6. and 1.7.).

Open space can be analysed according to its spatial configuration, physical and natural elements and interrelation between those elements and the human activities. Despite the large scale of open space in large-scale housing estates, active and diverse usage still can be reached with introduction of urban design and natural elements. Similar open space spatial organisation types across Europe make it possible to search for replicable solutions, when considering raising the quality of residential environment.

1.2. Open Space in Large-Scale Housing Estates in Relation to Residents' Needs

Features of the open space in large-scale housing estate like the presence of open green space, children and adult recreation facilities, parking facilities, and their cleanliness and safety are among features which define residential satisfaction with the area [36, *267*]. This section describes the features of the open space in large-scale housing estates in relation to the necessary, optional, and social activities, and the importance of open space for residents' health, well-being, social interaction, and social cohesion.

As large-scale housing estates represented a new spatial organisation, where the traditional perimetral construction has been replaced by the free organisation of building blocks within the green environment, researchers were curious about the functionality and uses of this new type of residential open space. The greenery, which formed a large part of the open space in large-scale housing estates, was aimed to create comfortable environment for residents' recreation and to form expressive landscape. Residents' surveys in 1960s in Riga showed, that the percentage of respondents using every day the open green space is not that high (37,01% from 609 respondents). Also, the data regarding the use of active recreation equipment was similar. Thus, in general it has been concluded that inhabitants use the open space in large-scale housing estates ineffectively and for that reason they are unsatisfied with that environment [127, *174*]. Already in the second part of the 20th century it has been concluded that recreation amenities in large-scale housing estates should be developed based on analysis of demographic situation and possible recreational preferences of different inhabitant groups. One of the survey results showed that more intensive use of open space occurs in areas with the formed tree crowns. At the time of construction newly planted trees could not fulfil this feature. Nowadays, this is not an issue anymore as in both large-scale housing estates built in the 1960s and even in those completed in the 1980s many trees are more than 30 years old, with the formed tree crown. However, other threats arise, to intensive shading, and possible danger (falling trees) in times of storms.

Nowadays, the necessary activities which happen regardless the weather and seasonal conditions, include walking for everyday tasks, dog walking, but in case of residential outdoor environment also bicycle and car parking. The optional activities take place when people have time and wish to engage in playing, walking, or sitting for recreation, etc. It is advocated that in denser and low-quality open spaces optional activities will happen seldom. In turn, in the good quality public open spaces these activities take place frequently [15]. Social activities are characterized by inhabitants' engagement with each other: children playing, people gathering, community gardening etc.

Residential satisfaction studies show that for the neighbourhood enjoyment the open space should provide opportunities for all three types of activities. Wouter P.C. van Gent proposed three mechanisms through which the residents' perception of neighbourhood can originate, these are physical, social and institutional mechanisms [49, *80*]. Quality and design of the neighbourhood is of importance, as it may also influence safety, level of noise and air pollution,

traffic. Management (or upkeep) of open space impact satisfaction and can affect the decision to change the place of residence.

The analysis of the spatial configuration of large-scale housing estates in the section 1.1. has led to certain conclusions regarding the characteristics of the open space. As the first feature in most large-scale housing estates is a big amount of open green space. Many studies showed that the open public green space is among the most attractive features of the estates [49, *139*].

Studies of large-scale housing estates in Prague show the growing importance of the public open space surrounding the house for elderly. As the ability to move for daily purposes and recreation decreases, the space of activity shrinks, and people are becoming dependent on the local environment [182]. For that reason, public open space in the neighbourhood has direct impact on the quality of life of seniors, affecting their physical and social activity, and opportunity to age in place. That statement is proven by the interview data and shows very high satisfaction levels with green open space in all case study areas. The other example, in Leipzig after demolition of several building blocks due to declining number of residents, the space was upgraded [113]. New green spaces and playgrounds were created, which resulted in increasing satisfaction of local residents and their decision to stay in the neighbourhood.

Empirical studies of *Brno-Lesna* large-scale housing estate built in the second part of the 1960s in Brno is characterised by an open complex of building blocks in the green environment. Also, professionals evaluated this estate as the best socialist era estate in Brno. In addition to the green open spaces within the estate, there is also natural environment, a forest within the walking distance. Satisfaction survey data proved that presence of a green environment predicted the high satisfaction levels among residents and their positive feelings about the neighbourhood. Still, important is also the quality of these spaces, which in Brno-Lesna are characterised as clean, calm and without large transit of inhabitants [117]. Large-scale housing estate *Wohnpark Alt Erlaa* in Vienna, built in mid 1980s, defined also by large amount of greenery. Here similarly as in the case of *Brno-Lesna* residents appreciate the natural environment. Nature in the urban environment is considered crucial for the quality and perception of the large-scale housing estates [117]. In Riga green spaces provided also important everyday functions, as drying laundry, beating carpets etc. The rest of the area also functions for recreation [19, *168*]. Currently, regardless the fact, that the outdoor amenities from 1960s-1980s are mainly in the bad condition, some residents still use them for originally aimed everyday functions, like drying laundry. However, residents' surveys from the year 2013 show that many residents (66 % in *Jugla*, 87 % in *Imanta*, 74,5 % in *Ziepniekkalns* etc.) [213], [214], [216] consider the current situation of the open space in large-scale housing estates as the one that needs to be improved or the news amenities should be installed. Residential satisfaction survey conducted in 2021 in terms of this research showed that about 75 % of respondents from *Purvciems* are not satisfied with the quality of open space in estate, in *Imanta* this number is approx. 64%, in *Jugla* about 77%, in *Ziepniekkalns* 75 % [survey data 2021, by the author].

Research on large-scale housing estates from RESTATE (2004) survey in 29 large-scale housing estates from ten European countries (including from Italy, UK, Sweden, Spain, Netherlands, France, Germany, Hungary, Poland and Slovenia) showed that the provision of

green space is often considered as the most positive feature of the large-scale housing estate [49, *60*]. Green spaces were considered as the most valuable feature of the estate in 12 case studies. Findings from southern Europe cases showed higher resident satisfaction with public space and accessibility of public services, while in central Europe cases half of the respondents are satisfied with the neighbourhood, the public space, public services. In central Europe cases, problem of car parking was mentioned more often. Contrary, in western Europe inhabitants are less satisfied with green spaces and the neighbourhood in general [49, *61*]. The satisfaction with playgrounds for children showed very little percentage of satisfied respondents in all cases [49, *64*].

The subjective residents' satisfaction data is adjusted with data from variety of studies, that prove the positive influence of open green space on humans. Various research data has proven the importance of natural, green spaces for human health and well-being [24], [119], [141]. For people living in the city green spaces provide a place for recreation, leisure and contact with nature [116]. Increasing sedentary lifestyle and automatization of workforce, leads to lack of physical activity. The lack of free time directly influences opportunity for long distance travel on everyday basis, so the outdoor recreation in the close proximity to home is crucial to ensure recovery from the everyday stress.

There are the Global Recommendations on Physical Activity for Health for both adults and children [248]. According to these recommendations, children require at least 60 minutes of moderate to vigorous-intensity physical activity daily, in turn adults and seniors (aged 65>) require at least 150 minutes of the moderate-intensity aerobic activity weekly. Unfortunately, the national research data shows that approximately one third of Europeans do not meet the recommended physical activity level. Dr. Laura L. Payne states that recreational activities, especially those conducted outdoors, positively influence physical health. Moreover, those who regularly use park areas for recreational activities have fewer doctor visits, lower body mass indexes and even lower systolic blood pressures comparing to people who don't [217].

Other studies proved reduced levels of anxiety and depression for those living in territories with higher greenspace [94] More neighbourhood tree cover is associated with better health in general, lower overweight/obesity, better social cohesion, and even lesser extent to type 2 diabetes, high blood pressure and asthma [186]. This proves the hypothesis that trees are playing an important role in improving population health.

This drives to the conclusion, that open green spaces of large-scale housing estates haven't lost their importance and even more, with the increased automatization of workforces are gaining even higher significance. Time that has passed since construction of large-scale housing estates has solved the original problems of undeveloped greenery, and now the estates which have preserved the original trees, offer the pleasant environment for recreational and every day uses. For that reason, preservation, maintenance, and improvement of green zones should be prioritised when considering development of large-scale housing estates.

When creating environment where people live, it is crucial to use sociological and psychological research methods to evaluate the impact of physical environment on human psychological wellbeing [64, *47*]. One of crucial issues is that large-scale housing estates are composed of different inhabitant groups. When comparing the census data in Riga's

neighbourhoods from 2000 and 2020 certain direction of ageing population can be traced. For example, in *Imanta, Jugla* and *Ziepniekkalns* the percentage of people older than 65 has grown from 16 %, 21 % and 12 % in 2000, to 25 %, 23 % and 19 % in 2020 respectively. However, considering amount of people living in large-scale housing estates, also other age groups are represented by more than thousand people. And the occupationally active age group 18–65 is still represented by higher percentage than older people. Such tendences are observed in many European countries. For example, in various large-scale housing estates in Poland number of elderly people was increasing from 2000 to 2011 [58], [105]. Older people also confirm higher place attachment. This means that the outdoor environment should address the needs of these diverse age groups. During sociological survey in Riga's large-scale housing estates which was conducted in terms of this research, responses provided by people in the age 55–64 and older than 64, also showed their aspiration to participate in beautification and co-creation of the open public space.

As the population is ageing the elderly-friendly outdoor design solutions become increasingly important. Elderly people require safe outdoor environment to conduct everyday necessary, but also optional and social activities. The activity space can be also divided into two activity areas: the dynamic one and the static one. For example, it is recommended that the ground surface for dynamic activities should be flat and smooth. This enables older people to jog and practise exercises. For static activities it is welcome to have diverse greenery which provides shade. These two types of activities: dynamic and static should also be distanced from each other, to avoid disturbance of those who rest in the same time providing an opportunity to watch the dynamic actions. Resting and chatting activities are better to be organised in the areas where elderly people can feel others and appreciate beautiful scenery with their hearing and vision. It is important to provide an opportunity for being alone or in a small group, with the surrounding space organised in a way that elderly can feel safe [182].

The other active group of open space users are young people; thus, the organisation of outdoor environment must respond to youth activities performance and requirements. Variety of outdoor amenities, like playgrounds, football or volleyball fields, exercise equipment, provide opportunities for both active recreation and social activities [147]. Social interaction is a crucial aspect in residential neighbourhoods. The shortage of outdoor features especially for youth activities, results in less social activities. The gap on social interaction was verified by the previous studies [73], [109] to be one of the indicators for measuring quality human lifestyle and outdoor environment. In considering outdoor features as dependent variable on measuring youth activities frequency, social interaction is the independent variable in qualified the relationship between youth activities and outdoor features provision. Therefore, indicating social interaction presence by the youth is dependable with the outdoor environment availability.

Children appreciate having a diversity of places to play close to home, and their favourite places to play include parks, other open spaces, and play areas [4], [37], [73]. Different children age groups have different needs in relation to the type of play and social interaction, also physical affordances differ. Design of playgrounds can be divided according to children age in four main groups (1–3 years old children; 4–6 years old; 7–12 years old; 13 and older). Younger

children require opportunities to play alone or with the same age peers but being overlooked by adults. Play areas should provide opportunities for crawl and climb, chance to touch different materials etc. For older children (4–6) important appears the opportunity to learn sharing the play equipment and toys, develop sense of balance and motor activities. Starting from 7 years there appears a need to play in groups. Over 13 there is a need for various exercise areas, skateparks, places to play the ball, volleyball, etc.

Based on the special needs of different inhabitant groups, it becomes clear that the original idea of equality and uniformity created the open space which answers no one's needs. Spaces which might provide an opportunity for self-expression, self-organisation of environment eventually has no clear function and thus raises unsatisfaction with the open space.

Post-second world war large-scale housing estates were criticized for undesirable and unhuman design of open space, high uniformity, and large scale. Also, the lack of social control is among the negative features. Ali Madanipour mentioned the notion of "marginal public spaces", which are not on the preference list by local municipalities. Often the open space in large-scale housing estates is defined as "the place left over after planning" [49, *132*]. Richard Sendi et al. mention the plurality of public space in large-scale housing estates [49, *134*]. Public spaces vary in their functions, and so are attracting different users. There are four types of use of the public space: overused, underused, misused and not used. For that reason, extremely important is differentiation of uses and understanding of user needs. The extent to which people feel belonging and take pride in their close to home environment influences the overall satisfaction with the estate [49, *135*]. Open space encourages social contacts, and the organisation of the space plays an important role in this process. So, the design, organisation, as well as maintenance contribute to the functioning of open space as a social space and can have both positive and negative impact on social connectivity and cohesion.

It is argued that open spaces which offer certain degree of autonomy are better and more desirable than those which foster interaction among different user groups, as that might lead to conflicts. Examples from Poland showed that absence of appropriate facilities and meeting places for young families and young people, have led to intergenerational conflicts. This made clear that responding to needs of certain groups and ignorance of others can lead to conflict and dissatisfaction with large-scale housing estate [49, *137*]. Also, Sara Hadavi and Rachel Kaplan point out the importance of research focused on multifaceted people-environment relationship and diversity of use patterns in large-scale housing estates [24].

Each place has its own identity, which can be stronger or weaker of comparing different places or can change over time. The concepts of place attachment and sense of belonging are strongly connected to the place identity. Place attachment describes how people are connected to places, and through the daily interaction within certain places and connections formed within a neighbourhood, raises sense of belonging. Place attachment and sense of belonging are believed to have a positive impact on human well-being, as well as make people care about the environment.

Certain research showed that functionalist design principles failed to form inviting open spaces, which engage the senses and are remarkable. The strict zoning does not answer the problems of social interaction. Often the design of open spaces in large-scale housing estates

was criticized from the point of view of defensible space, as many aspects appear to be against the crime prevention principles. This data is also proved by case studies which show high dissatisfaction with social and physical aspect of the neighbourhood [49, *64*]. Open space design in large-scale housing estates was often too fluid, with no well-defined spaces. Due to undefined connection between common and private space, residents did not feel belonging and responsibility for the open public space [20, *61*]. Also, urban design in large-scale housing estates fostered problems of insecurity and lack of social control. Among the mentioned design problems were large, monotonous blocks, bushes alongside pavements and separate lanes for pedestrians and cars) [20].

Types of socialisation: common work for common good. This type of social processes works very well when these are led by local driving forces, and they end up when the leader stops participating. The activities created as a result of a top-down initiative last relatively short period of time and are not very well supported by users, who are the main target group [64, *52*].

Currently, participatory actions are gaining more and more awareness and support in the neighbourhoods of Riga. Various participatory budgeting tools have been introduced since 2016 and are gaining more attention since 2019 with the initiation of the new participatory budgeting program "For Riga neighbourhood development project realization". But also on a smaller scale, outdoor observation data and data from neighbourhood community groups on the social media show that people are maintaining and organising the space on their own or in small groups. This shows that common work for common good appears in large-scale housing estates and shows that certain people care about the quality of residential environment.

As large-scale housing estates are composed of several *microrayons*, forming large residential areas with a potential to organise each open space differently, with some variety in functions, raises the question of acceptable / affordable distances which would allow good functioning of open space and wise distribution of activities. Recent research in Sweden investigated required and desirable activities and amenities within 10 to 30 min walking distance from home. Results showed among immediately adjusted to home are playgrounds, trees and resting places, recycling and waste disposal, stroller and bicycle parking, and potential local meeting places. Within the 10 minutes walking distance required car parking, public transport stops, as well as different public services as healthcare, schools and grocery shops, and bigger recreation areas as parks and sport fields. City parks, universities, hospitals, cinemas etc. can be located further within 10–30 minutes [177].

Many cities experience the problem of uneven opportunities for recreation especially when considering certain social groups, such as low-income people or migrants. Relation between ecosystem services and health and well-being are among the issues considered by environmental justice. One of the dimensions proposed in relation to environmental justice is fair distribution of the benefits from ecosystems [134], [181]. Recognition of different needs and demands of all social groups is crucial. Moreover, previous research shows that walkable destinations to recreational amenities positively influence physical activity among elderly. So, provision of green spaces, walkability are associated with slower cognitive decline among elderly [98]. The 10 minutes' walking time areas are used for analysis of easily reachable green areas within the neighbourhood [207].

Both the subjective residents' satisfaction data and the objective research related to the impact of natural environment on people health and wellbeing prove the importance of the green open spaces in large-scale housing estates. Moreover, as in many cases green open space is considered as the most valuable feature of the residential area, it is crucial to preserve that component as it may determine residents' willingness to stay in the large-scale housing estate or for new residents to choose the estate as the new place of residence.

Still, it is not enough just to have green space next to your home, important is also the condition of the space: clean, calm and well-maintained areas are of high value. On the other hand, badly maintained spaces, which show vandalism, anti-social behaviour, trash are among the factors which cause residents dissatisfaction. For that reason, not only the nature itself, but also the spatial organisation and the provision of community space for different user groups within the public open space between buildings is important. Unclear nature of the environment prevents creating sense of connectivity and belonging to the place, people do not feel responsible for the outdoor areas, which causes variety of social problems. Introduction and clear spatial definition of public and semi-public / semi-private open spaces would increase residents' sense of belonging and responsibility.

Large-scale housing estates comprise diverse inhabitant groups, who have different needs in terms of recreation and socialisation. Sometimes these needs appear to be in conflict. For this reason, in order to ensure that different inhabitant groups are satisfied, recreational amenities should be planned based on analysis of the whole large-scale housing estate opportunities, to ensure fair distribution of different open space uses.

1.3. Role of Open Space of Large-Scale Housing Estates in the System of Green Infrastructure

One of the characteristic features of large-scale housing estates are large open green spaces. This feature was among highly appreaciated by inhabitants, still undefined use of this space fostered quick decay and nowadays these green areas are not used effectively. However, if maintained and retrofitted in a right way they can form a part of the cities' green infrastructure, and so contribute to the quality of urban life of local residents. It's important to have good quality green space near your place of residence. According to Urban green nation report 2010 people visit and use green space more, if it is of a good quality, and vise versa use less marginalized, decayed green areas [203].

In the second part of the 20th century society was already aware of the impact which the industrial development, growing use of private cars and growth of the city has on ecology and human wellbeing. Growing number of CO2 emissions, temperature and radiation vibrations, and higher noises have a serious impact on human physical and psychoemotional health [65, *4*]. Urban green spaces are believed to be one of the tools, to decrease those negative changes in the city. The function of green open spaces in large-scale housing estates in the second part of the 20th century can be devided in two main groups: sanitary-and-hygienic and ornamentally planning.

There can be defined seven main sanitary-and-hygienic tasks which the green spaces were aimed to reach. First of them is the decrease of dust concentration and gas pollution in the air. According to scientific data the concentration of dust and gas pollution in the urban areas with greenery is 2–3 times lower than on those territories which lack green spaces. The specific impact on the air contamination depends on the type of vegetation and its density. Following this the recommendations aimed separating open car parking spaces and traffic lanes from houses with green lanes which perform protective function [64, *10–11*]. The second one included ability of green spaces to protect the living environment from winds. Here the same, wind protection characteristics are dependent from density and orientation of the vegetation, but also from the type of the built environment. Even small scale and rare density vegetation can have an impact on wind reduction. Depending on the type, organisation and location of the green area, it can contribute to encreased wind flows. This mainly happens when the difference between the temperature in built up areas and in the green areas differs for more than 5 °C. Fourth, vegetation exposes phytoncidal substances, which are characterised with ability to kill the malignant bacteria or slow down the development of bacteria harmful to people. Vegetation has a positive impact on temperature and radiation in the city. So, in both cases during hot summers or cold winter greenery allows to maintain temperature comfortable for people. Similarly, the humidity levels are regulated by vegetation. So, for example vegetated area can increase humidity level to 30 % for the territory located in 500 m distance. Finally, vegetation can contribute to noise reduction. Little green squares and inner yards with some trees can reduce noise up to 4–7 dB, even green lawn influences noise level reduction to 5–7 phon (1 phon is equivalent to 1 deciBel at 1000 Hz) [65]. However, wrong orientation in relation to

the built environment can lead to the opposite effect, increase of noise in the areas where it needs to be reduced.

Another important function of green urban areas is ornamentally planning function. Vegetation helps to form the landscape, plan and organize specific zones, reach certain level of identity, help create human scale in the environment formed by high-rise buildings, etc. [65, *19*]. Vegetation plays an important role in organisation of recreational areas. In addition to all the positive features of sanitary-and-hygienic functions, vegetation with its appearance, sounds and smells in general positively contributes to human health.

Vegetation in large-scale housing estates was devided into several subgroups: parks, estate gardens, squares, boulevards, street plants, vegetation on the territories of cultural or everyday institutions. Each of those territories had certain requirements related to the percentage of green lawn, flower beds, pedestrian pathways and in accordance to function requirements to percentage of territory designated to garden facilities, or sport fields, or playgrounds and recreation fields etc. SNIP regulated development of vegetation in cities and other built up areas should be developed as an integrated system, taking into account the size, structure and other peculiarities of the built environment.

All through these recommendation and analysis of the positive characteristics of green spaces the central point remains the wellbeing, physical and emotional comfort of residents. Regardless the fact that ensuring health and wellbeing of residents remains crucial, today, with growing awarnes of society regarding the human impact on ecology, features of open space in large-scale housing estates can be analysed and evaluated from the other perspective: ecological sustainability. Following analysis is focused on the concept of green infrastructure and the role it can play in ensuring not only human wellbeing, but also ecological sustainability, circularity, biodiversity etc.

According to the definition of European Environment Agency (EEA) Green Infrastructure (GI) follows the principle of protection and increase of nature and natural processes by integrating them into spatial planning and territorial development. GI principles advocate for multifunctionality and aims provision of various benefits: environmental, social, health, economic, biodiversity and climate change adaptation [144], [247] Concept of GI is based on more sustainable and efficient development, smart use of resources.

In the end of 19th and early 20th century, the landscape architect Frederick Law Olmsted stated that all urban green areas, independent of their characteristics, should provide people with benefits from nature. For this reason, he considered that parks should be connected to each other and to surrounding residential areas [31]. These two ideas were in the origin of the greenway movement that, by the end of the 20th century, would evolve into the term “green infrastructure”. There are two concepts that formed the origin of this idea: (1) connecting all green spaces for the benefit of citizens, (2) preserving and linking natural areas to counter habitat fragmentation and promote biodiversity. These two concepts are very similar to the ideas developed by Olmsted and implemented in the 1880s in the revolutionary Emerald Necklace in Boston [27], [76].

GI is integrated accross different policy domains, as it touches issues of economic, social and environmental nature [204], [208]. Components of green infrastructure may include both

natural and semi-natural areas, which provide variety of ecosystem services in urban and rural areas. Urban elements of green infrastructure include such components as: green parks, green walls, gardens, grassy verges or green roofs if they are a part of an interconnected network and provide numerous ecosystem services. There exist various ways on development of GI: improving connectivity, enhancing landscape permeability, identifying multifunctional zones.

Depending on GI typology cities in Europe can be devided in eight groups: fragmented cities, green outskirts cities, natural cities, hotspot cities, green cities, green sealen cities, forest cities. So, EEA map shows that Riga with other 41 European cities like Slazburg, Tallinn or Bremen refers to green outskirt cities, but for example Nancy (FR), Nitra (SK) or Plock (PL) gained the status of green cities. Each typology is determined by share and distribution of urban green areas, degree of soil sealing, effective GI (urban hinterland), hotspot ratio, terrestrial urban blue areas, low density areas, share of urban forest and share of Natura 2000 sites [198], [236]. Green outskirt cities are characterized by high values of effective green infrastructure, high proportions of green urban areas, medium to high distribution of green urban areas and medium degree of soil sealing.

Following the concept that urban green areas are part of GI only if they are a part of an interconnected network and provide multiple ecosystem services, comes the question which type of ecosystem services do the open spaces of large-scale housing estates provide and can they be a part of a larger green network or do they form fragmented green spaces.

Ecosystem services can be devided in subgroups. In general there are several typologies of ecosystems: terrestrial, fresh water and marine. Common International Classification of Ecosystem services (CICES) includes following categories: **provisioning** (nutrition, materials, energy), **regulation and maintenance** (mediation of waste, toxics and other nuisances; mediation of flows, maintenance of physical, chemical, biological conditions), **cultural** (physical and intellectual interactions with biota, ecosystems, and land-/seascapes [environmental settings]; spiritual, symbolic and other interactions with biota, ecosystems, and land-/seascapes [environmental settings]) [200].

Categories of ecosystem services provide more detailed information on the opportunities they provide. Categories used in Millennium Ecosystem Assessment (MA), which is globally recognised, includes: food, fresh water, fibre, timber, genetic resources, biochemicals, ornamental resources, air quality regulation, water purification and water treatment, water regulation, erosion regulation, climate regulation, soil formation, pollination, pest regulation, disease regulation, primary production nutrient cycling, spiritual and religious values, aesthetic values, cultural diversity, recreation and ecotourism, knowledge systems and educational values. The Economics of Ecosystem and Biodiversity (TEEB) is based on MA and includes some updated information, like for example for cultural diversity it says, “inspiration for culture, art and design”, for water regulation “regulation of water flows, moderation of extreme events” etc. Common International Classification of Ecosystem Services (CICES) includes hierarchical system based on MA and TEEB but is suitable for accounting [204], [219].

Independently of the subgroup that is analysed, GI in general makes it possible to improve public health by providing opportunities for recreation, promote social cohesion, which is also crucial for psycho-emotional health, protect biodiversity and support local economy, help to

mitigate climate change [150]. Among the main challenges while implementing GI are: lack of public awareness, physical constraints and low attentiveness of the planning system and other legal frameworks to urban green infrastructure [150].

"*It has been proven that GI does not only promote social and ecological benefits, but also contributes a lot to economical issues. So for example, ecological restoration and rehabilitation of ecosystems such as rivers, wetlands, lakes, and woodlands, was not only ecologically and socially desirable, but also, quite often, economically advantageous. The analyzed ecosystems were estimated to provide between $ 3212–17 772 (USD) worth of benefits per ha per year, based on only five different ES (local pollution removal, carbon sequestration and storage, regulating water flows, climate regulation/cooling effects, and aesthetics, recreation and other amenities) (ibid).* " [150].

The same proof on the effect of urban green spaces on apartment prices comes from Warsaw. The literature review made by R. Trojanek, M. Gluszak and J. Tanas showed that certain relation between provision of urban green areas and property prices exists in cities of USA, Japan, China, Denmark, UK, Germany, Poland, Austria and Finland [184]. The positive impact of green spaces to the general quality of life in urban areas has been studied by various researchers and described in the previous section.

The modernist concept implies the large-scale housing estates comprised of multi-story buildings placed in extensive green areas [122]. Even more being inspired by garden-city plans and modernist housing in Finland and Sweden, architects in Baltics tried to respect local landscape and vegetation, and adapt the detailed plans in accordance with the surrounding landscape (as it was in case of *Āgenskalna priedes* in Riga or *Mustamäe* in Tallinn). The wide variety of open spaces in large-scale housing estates of Riga are present in the Figures below (Figs. 1.8, 1.9, 1.10, 1.11). These open spaces between buildings were designed to please the needs of inhabitants with well-developed roads, parking areas, pedestrian walkways, waste collection sites and vast green spaces with children's playgrounds and sport facilities. However, this approach to public open space faced certain challenges, like problems of maintenance, loss of control or safety.

According to Green Infrastructure Consultancy Services (part of The Ecology Consultancy,), who work on GI strategies, design, planning etc., large-scale housing estates offer variety of opportunities to be integrated into GI, however retrofitting of these areas is often overlooked. Currently, open spaces in large-scale housing estates can often be described as of poor character, with grass areas and some trees. Research conducted in Slovakia showed that loss of green space as a result of infill development, both residential and commercial, and provision of additional parking spaces is common to many estates in Bratislava [122]. Observation results present lack of maintenance of open green areas, as well as lack of maintenance and protection of cultural heritage values of green spaces that represent landscape architectural qualities of modernism architecture. Examples of good regeneration projects are quite rare in Bratislava. It has been noticed that maintenance problems appear in areas owned by municipality. In many cases green space adjustment to buildings is maintained by residents, however the planted greenery lacks concept and quality [122].

Fig. 1.8. *Mežciems* large-scale housing estate: open space with variety of lief trees (birch, oak, maple etc.), flowering woody plants (syringa), shrubs (philadephus) etc. which is formed by the fence of the kindergarten located between residential blocks, May 2021.

Fig. 1.9. *Jugla* large-scale housing estate, open green space with variety of lief trees and shrubs, and with vertical greening formed by climbing plants. May 2020.

Fig. 1.10. *Sarkandaugava* large-scale housing estate with variety of flowering plants being planted in front of windows. August 2019.

Fig. 1.11. *Jugla* large-scale housing estate: lake *Velnas ezers* with terrestrial weeds and brush and emergent plants, May 2020.

Recently completed research project in UK Climate Proofing Housing social estates showed opportunities of transformation of public spaces using GI elements. So, for example, integration of green roofs and rain gardens in London Borough of Hammersmith and Fulham resulted in provision of multifunctional landscape. Among the benefits are mitigation of flash floods and storage of rainwater, cooling buildings and the area in general, providing habitats for pollinators and nature, offering play and recreation opportunities for residents [210].

In the past decade a lot of attention has been paid to carbon reduction to mitigate climate change. The exterior skin and the surrounding landscape of buildings play a crucial role while adapting to climate change. Focus of the research project was on increase of biodiversity and amenity value and storm water management. As a result, project promoted integration of rain gardens, green roofs and green walls in large-scale housing estates. The approach increases landscape value for inhabitants, providing opportunities to look and contact with biodiversity.

It was stated that this approach can improve the quality of life of residents and lead to the healthier cities for everyone [209].

The question of the role of large-scale housing estate open spaces within GI is strongly connected to its ability to be a part of interconnected network. Because of urban development green spaces have become very fragmented. To reach connectivity urban green spaces should be linked to green corridors, which promote movement and dispersion [192]. Elements of urban green infrastructure and their potential to be integrated in the open space of large-scale housing estates are shown in Fig. 1.12.

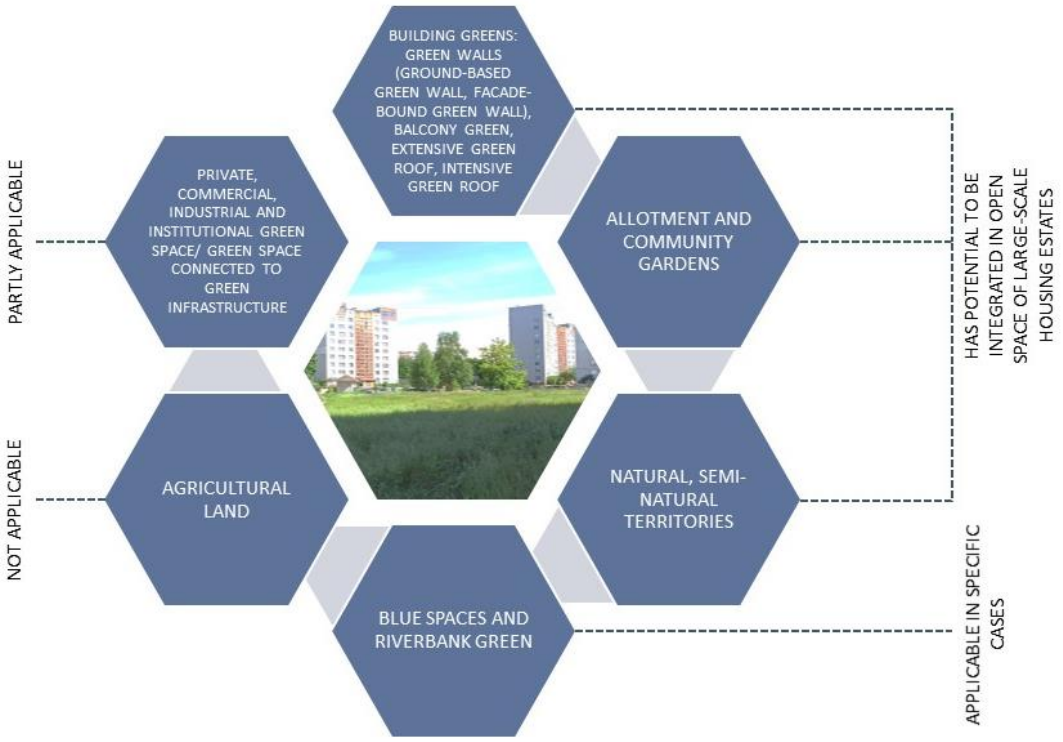


Fig. 1.12. Elements of urban green infrastructure and their potential to be integrated in open space of large-scale housing estates [adapted by author using [150]].

Many of these types of urban green spaces, for example community gardens, neighbourhood green space, green roofs and even blue spaces can be found in open spaces of large-scale housing estates, which shows that these areas might represent different types of UGI elements. According to research data communal garden are characteristic for many cities of Europe, and many community gardens are located within large-scale housing estates [150]. Only large cities actively integrate vertical greening strategies, still some examples of vertical greenery in housing estates can be found also in medium-sized cities (Example of Malmo, Fig. 1.13). First attempts of greening walls in large-scale housing estates date back to 1980s. For example in Germany green facades were introduced in the process of refurbishment and as a result of environmental movement (Fig. 1.14.) [225]. Still very important is maintenance and interest of local community to care about the green structure. Lack of residents involvement sometimes led to removal of green structures. Case of Malmo shows a positive example when a community is actively involved in co-creation and maintenance of the green facade.

Fig. 1.13. Community garden and green wall in the residential area built in the 1950s in Malmo, Sweden, July 2015.

Fig. 1.14. Green wall formed by *Dutchman's Pipe* in the large-scale housing estate in Erfuhrt-north, Germany [225].

Data gained from public participatory geographic information systems showed that residents of different cities in Europe value not only public parks and gardens, but are frequently using for recreation also green spaces like wastelands or brownfields for specific activities as walking the dog or haning around [155]. Relationship between people and nature has been studied by many researchers. In terms of GI biodiversity has been researched widely [150]. However, diversity of human society and their motivation to engage with urban nature, hasn't been studied actively.

It has been proven that land use and green space management play crucial role in expression of urban biodiversity. Here according to Green surge questionnaire data [150], majority of policy makers from 20 European cities said their city doesn't have formal urban green policies, that recognize uses, needs and values of different cultural groups.

Review of scientific papers on Science direct platform shows that in last decade much attention has been paid to retrofitting of large housing estates with the aid of increasing energy efficiency of buildings, and so promoting climate change mitigation. Variety of research related to interconnection of green infrastructure and large housing (in certain cases social housing) areas has been conducted in UK (England and Scotland) [137]. In the last decade growing importance are gaining circular approach to architecture and urban planning and a complex integration of nature-based solutions using the circularity principles. Implementation of NBS on its own addresses different issues which are crucial also for general management and maintenance of public open space in large-scale housing estates:

- Inclusive, integrated approach. Successful integration of NBS aims multi-level cross sectoral collaboration.
- Stakeholder engagement. Participatory approach allows to consider values, interests and knowledge levels of different users and so enables more sustainable solutions and inclusiveness.

- Champions and leaders. People, who can motivate, mobilise and peer their colleagues, neighbours are very important for successful and long-term place management.
- Public and private sector roles.
- "Locally-grown" solutions.
- Addressing biodiversity and social benefits.
- Valuation and funding.

In general policy should be built on the dialogue between stakeholders, must be flexible to adapt to the changing situation and emerging challenges. Nowadays, when considering public open green spaces of large-scale housing estates and their role in the GI, solutions need to be flexible and correspond to circularity principles. If previously introduction of a green wall or a community garden in the area was responding to biodiversity and societal issues, and to the climate change mitigation on default, nowadays issues of climate change and more effective use of resources are becoming a target when considering urban regeneration and introduction of NBS. Storm and wastewater treatment, reuse of materials, compost and other solutions are complementing the original positive features of NBS.

Accessibility to urban green spaces is strongly connected to location of the city, with Northern and Central Europe cities offering higher amount of green public spaces, and southern Europe cities less [174]. While assessing accessibility of public green spaces (whether the green spaces are equally distributed within the city) often is used walkability distance method. Improving the situation in neighbourhoods, general rehabilitation of public open space and increase of green space is aiming environmental justice, but often results in green gentrification.

Despite all the positive features of green open space there are also certain threats. So, one of the risks is green gentrification. Such phenomenon is observed when urban regeneration projects around new high-quality green space attract investment and then attract social groups with higher income and greater purchasing power. Growing demand promotes renovation of dwellings, and so the increase in living costs. In such situation original residents with lower income might be forced to change the place of residence [174]. However, as stated by authors green gentrification is a difficult phenomenon which can be visible only in long term studies.

Similar approaches can be seen when developers attract NGOs and local artists to make the unused, degraded space liveable. Often, when the aim is achieved, further urban regeneration project is being developed, and NGOs forced to leave.

As vast green spaces form an important part of large-scale housing estates, also nowadays estates have potential to form a part of city's green infrastructure. Still, the problem often is in undefined use of these areas. Examples from other European cities show ability to develop rich multifunctional green environment which provides variety of ecosystem services. Some solutions like introduction of sustainable urban drainage system are realised with big investments (several tens of thousands of euros and more) in perspective of five years or even longer time. Still others, like community gardening initiatives appear as fast and/or temporary solutions, where the time of approval varies depending on various factors like the land ownership, complexity of design, and support of the local community.

2. INTERRELATION BETWEEN OPEN SPACE TRANSFORMATIONS AND THE RESIDENTIAL ENVIRONMENT QUALITY IN LARGE-SCALE HOUSING ESTATES

As a starting point of transformations in public open space of large-scale housing estates were changes in the result of changing political situation, regaining of the independence in Latvia. This has led also to transformations in ownership, maintenance, and management models etc. Later more and more transformation drivers appeared. In general, currently the transformations are influenced by economic factors (related to strategies – e.g. compact development; actors – developers, land owners, who see good infrastructure of large-scale housing estates as an opportunity for new investments, profit) [257], [258], [259]; by ecological and social factors (changes in habits, care about ecology, nature-friendly lifestyles etc., strategies, legislation - green development, circular city); changes in residents' needs, demographic changes, new partnerships (public-private, public-people-private); natural changes in the public open space influenced by natural time related changes (like overgrown trees, ageing recreational and functional amenities etc.). The following section presents summary and analysis of transformation types in the regional context, summary of residential environment quality notions and quality assessment approaches, and the interrelation of these two aspects: assessment of transformations' impact on the residential environment quality.

2.1. Open Space Transformations Within Large-Scale Housing Estates of Europe

The land reform and property denationalisation in the 1990s [257] has led to the current difficult situation, where the open space in large-scale housing estate is fragmented, owners are different, often the land being in property of private and even foreign people, who are not interested in development of recreational open spaces. The current situation in large-scale housing estates can be characterised with following changes in several Central and Eastern Europe countries which are also related to situation in Latvia after regaining the Latvian Republic independency in 1991:

1. Privatisation of the majority of the former public housing stock in most Central and Eastern Europe countires in the aerly 1990s resulted in sitting tenants becoming owners of their own previously rented dwellings.
2. The land reform which resulted in situation when land on which buildings are located remains in the ownership of third party (municipality, company, individuals etc.). The restitution of property nationalised after the war to its rightful owners enabled certain individuals to regain ownership of the land on which some of the large-scale housing estates were constructed [49, *144*].
3. Costs of maintenance are high, due to large green areas and also due to low level of residents' attachment to place, which consequences in low responsibility, and disorder problems like vandalism, littering, graffiti etc.

4. Growing pressure from potential investors who are looking for spare space for new construction. Like the case of Warsaw estate Wrzeciono where new development in large-scale housing estate is characterized with high walls, forming gated community.

5. In the end of the 20th century, when in the Baltic states citizen participation in making more democratic governance was still a phenomenon, nowadays civil society and social urban movements are emerging.

These and other changes took place after the introduction of a market economy system in Eastern Europe in the early 1990s. Currently one of the major issues is the maintenance and renovation of the newly privatised flats in multi-family blocks [56].

These transformations are affected and affecting the three dimensions defined in the introduction: context I – physical environment of the public open space in large-scale housing estates; context II – legal issues (regulations, ownership, management structure, etc.), city development strategies etc.; actors – involved in transformation processes and management of public open space of large-scale housing estates (their roles and collaboration patterns).

Although the problems faced by large-scale housing estates are caused not only by complicated ownership situation. The situation where many actors (government, housing associations/companies, special service agencies) are involved in the management and maintenance issues causes low responsibility. Some local govenments consider the maintenance of public open space in large-scale housing estates to be responsibility of residents [49, *146*]. Still also considerable improvements are being made in recent years. Various large-scale housing estates across Europe introduce public open space regeneration programs, instalation of new play grounds, new approaches such as creation of "management groups" (eg. case of Bijlmer estate in Amsterdam). Such groups have function of place upkeep before, during and after regeneration projects. Several studies show that majority of residents show indiference in relation to public open space management and maintenance, and care only about their private space. Still here also some positive examples can be found, like introduction of community gardens, or upkeep and gardening in the plots under the windows and next to the building entrances (Latvia, Estonia, Sweden, Germany etc.) and even place-making initiatives, self-made sitting areas and children playgrounds etc. Examples in Riga also show that certain groups of inhabitants are actively engaged in the big celaning (*Lielā talka)* spring activities, which aims general maintenance in the open space: collecting leaves, garbage/plastic bottles, etc., cutting bushes, planting new greenery, etc.

All the political changes, and the following land reforms, economic changes, changes in management and maintenance approaches and so on, are causing different kinds of open space transformations. These transformations are led by different actors, and are going different directions, as a result leading to both the positive outcomes and also in certain cases to negative ones.

Transformation that involved privatisation of flats has also an indirect impact on the open space in large-scale housing estates. From one side privatisation of flats can influence creation of strong bonds between people and the estate. On the other side in case of rented apartments, especially in situations of short-term rent develops the situation when residents do not feel any

place attachment at all and so do not care about the public open space quality and future development.

Nature plays an important role in large-scale housing estates. Transformations in open space can be analysed in relation to the loss of green space, or to privatisation of public and green space. Towards the end of the 20th century there appeared an alternative vision of urban open space. Instead of openness it sought enclosure, and instead of a passive pictorial quality it aimed at the active provision of ecosystem services to the built environment. In case of large-scale housing estates open spaces should provide ecological benefits, functional and social space. Thus, various physical open space transformations can be analysed in relation to their influence on increase or decrease of green spaces, diversification of green spaces and access to nature.

As the problems in large-scale housing estates vary locally, depending on the context, development history, local housing market and local and national policies, vary also transformation and regeneration processes [19], [255]. While some large-scale housing estates require major renewal, others can go on with ordinary maintenance solutions. Still rising problems other time require redevelopment schemes. These schemes are dependent on the housing market situation, available finances, and capacity and willingness among involved actors. There are two basic approaches to large-scale housing estates renewal: the area-based approach and integrative approach. The area based approach implies concentrated actions in the area of large-scale housing estate, this allows visibility of improvements and provides a platform to coordinate cross-sectional efforts. Still it is pointed out that general issues of poverty or bad schooling can not be solved on a neighborhood level. In favor of the integrative approach is the fact that redevelopment of large-scale housing estates goes in hand with economic, employment, social, ethnic and environmental problems. Some countries are implementing regeneration policies on a National level, to adress larger issues. So, for example Dutch urban renewal policy aim differentiation, social mix and housing mix [255, *282*]. The other issue is sustainable urban regeneration to support ecological sustainability. Variety of research is focused on housing renewal policies. However, public open space regeneration with ecological sustainability in mind also provides variety of opportunities. In general physical improvements open ways to contact people and encourage personal improvements.

The question of regeneration of large-scale housing estates is crucial because satisfaction with the living environment can directly influence residents' decision to move. Research conducted in terms of RESTATE project identified that one third of reasons to move were because of the neighbourhood itself, as people wish to live in more quite or safer environment [66], [106], [143], [147].

Increasing innovative ways of place-making create a pathway to economic development and social sustainability, still issues of inclusion and exclusion exist, together with the question who benefits from the urban regeneration processes [61]. Private investment in urban transformation processes can increase consumption, but on the other hand it often results in greater economic disparities and increased levels of social exclusion. Also, creative and cultural-led regeneration approaches and strategies provide various opportunities [61], [44]. Public art has been recognised as a mechanism of place-making, which allows to create

meaning of the place, and doing so connects people to urban space and supports development of community.

The smaller share of private space people have in their apartments, the more dependent they are upon opportunities offered by public open space. Wealthy residents with larger amount of private space can afford "*the public open space to be purely aesthetic, while lower-income households need functional public space, which should be lived-in, experienced and dynamic*" [61, *156*].

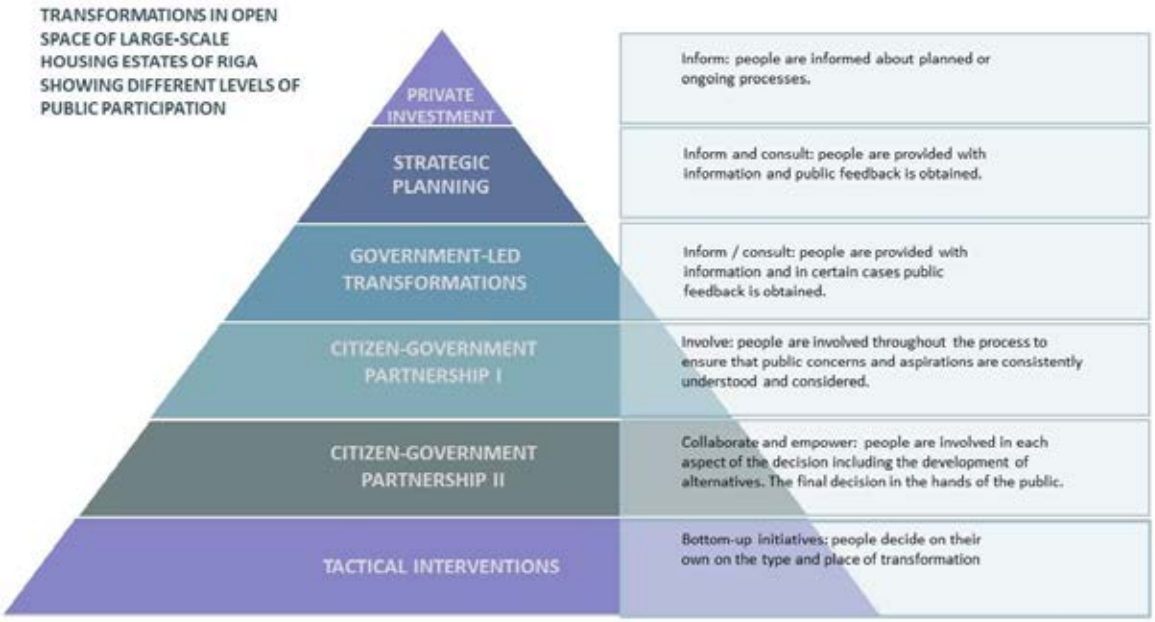


Fig. 2.1. Different levels of public participation in transformations of open space in large-scale housing estates.

Citizens play a crucial role in identifying or actively intervening in urban challenges, often providing new perspectives and solutions. Still, often public engagement is minimised to the level of "inform", when residents achieve information on development, but are not involved in decision-making (Fig. 2.1). In cases when public open space future development and opportunities for regeneration appear uncertain, citizen inputs regarding the creation or governance of urban spaces are becoming crucial. From guerrilla actions to citizen-led projects at the grass-roots level and further to citizen engagement initiatives kick-started by public authorities**,** citizen participation regularly offers paths not considered or followed by other actors. Citizens can place pressure on approaches commonly used within cities to address complex issues, while also enlarging the available pool of knowledge and resources [240]. Public open spaces in large-scale housing estates are shaped through complex interactions, both formal and informal and involved actors often show contrasting motivations.

To test opportunities and barriers for citizen-led bottom-up transformation in Riga, in terms of this research the experiment was conducted. The COST Action project TU1201 *Urban Allotment gardens in European cities – Future, Challenges and Lessons Learned* [237] allowed to participate in research activities, discussions and collect information on multi-functionality of urban gardening in improving social sustainability for people across different age and culture

groups. Based on this it was decided to use the urban gardening initiative as a tool to test the process of public open space transformation and public participation in one of Riga's large-scale housing estates.

Activists from the RTU Faculty of Architecture and LU the Faculty of Geography and Geo Sciences together with volunteers proposed to create a mobile community garden in the large-scale housing estate *Jugla,* built in the second part of the 20th century. The main aim was to promote more active use of public open space and to show local inhabitants the concept of community garden by providing a real example. The experiment comprised four phases:

1. **Project groundwork phase:**

- theoretical basis, analysis of good examples, evaluation of threats;
- preparation of plants;
- information regarding the municipal land plots in large-scale housing estates;

2. **Work with different involved actors, meetings and discussions with inhabitants:**

- meetings with Riga city council City development department representatives, with Northern executive board representatives and Riga city council Real estate department;
- submission of official letters to request permit for community garden project;
- meeting with local inhabitants in April 2017;
- consultations in Riga City Construction Board, preparation of requested documents;
- positive answers from Riga city council City development department and Northern executive board;
- Riga city council Real estate department requested collection of signatures from major part of inhabitants in surrounding houses.

3. **Realisation of the project**

- garden beds and bench from wooden pallettes;
- transportation of garden beds using the cargo bikes;
- planting the herbs and vegetable plants;
- the event and organisation of space.

4. **Observations after the event**

- the type of use and user groups.

Collection of supporting documents to receive official permit for garden establishment started in the beginning of 2017. First the Riga City Construction Board was consulted. Secondly Northern executive board was consulted, and the official letter was prepared. The aim of this letter was to explain the intent and the content of the community garden. The idea in general was supported, however there was a restriction in relation to the choice of plants: only flowers and herbs were allowed, no vegetables. When comparing this to the foreign practice it is seen that community garden in the open space of residential areas with variety of vegetables is common practice in Malmo, Berlin, Salzburg, Vienna etc. For example, in Malmo community garden and the green wall were introduced in the neighbourhood of Seved (housing

estate built in the time frame of 1940s–1950s). Community garden was created in 2010, and the green wall in 2013. The main idea was to inspire property owners to use the city space in a new way as in many areas lack of space doesn't allow to create community gardens or to grow in containers. Here the green wall includes herbs, aubergine, and strawberries, while in the community garden residents grow potatoes, tomatoes, and onions [data from the COST Action STSM conducted by the author [237]].

After supportive letter was received from the Northern executive board, further documents were requested. Supportive letter from Riga City council City development department was received shortly after positive answer from the executive board. Still, before preparing the project for Riga City Construction Board, one more approval was needed – the approval from Riga City Real estate department. Here the process was complicated, and communication resulted in request to collect signatures of the majority of inhabitants living in building blocks around the selected open space. The collection of signatures started in May 2017, however, it was a strong barrier to prepare all the document in time, as the plant seeds were growing and needed to be planted in the beginning of summer.

In parallel, local inhabitants were surveyed about their attitude towards the new community garden close to their home. The first meeting with inhabitants happened in April 2017 during the big cleaning day (*Lielā talka*). As the surveys showed, majority of people supported the idea of community garden, however not everyone understood what it will look like and how it will be managed.

Fig. 2.2. The process of placing the garden beds in *Jugla* large-scale housing estate, June 2017 [Photo: O.Trebuhina].

Fig. 2.3. Engagement of local children in initiative in *Jugla* large-scale housing estate, June 2017.

The approval process was not completed until June 2017, as there were difficulties in obtaining the approval from Real Estate Department. For this reason, the activity transformed into a guerrilla action. As it was a guerrilla action, it was decided to create a mobile community garden to ensure mobility, short-term and low-cost of the project (Figs. 2.2., 2.3.). Garden beds were created from used palettes and transported to Jugla by cargo bikes to advertise the action on the way to neighbourhood. Even being short-term, this initiative helped to engage with locals in informal way: children willing to participate and ready to share their ideas on further

development of the neighbourhood, adult women interested in getting “a small piece of greenery” under their windows and ready to discuss the future of the area, and adult men less active in participation but open for discussion. The guerrilla action proved the hypothesis of community garden being a good tool for social cohesion. However, it has been found that the approval process needs to be made easier and clearer.

Regardless location, form and the main objective, community, and allotment gardens in different cities of Europe is a strong tool to support social integration, cross-age and cross-cultural dialogue and human well-being. However, understanding of this fact in some areas does not result in easier urban gardening creation and integration processes. Examples of other cities in Europe, like Malmo, show that a community garden can be a long-term solution and help to improve the quality of living for very diverse inhabitant groups. However, in the case of Riga there are still a lot of challenges to deal with when creating a community garden. The process of integration, creation and legal acceptance of a community garden remains unclear, there is necessity to improve the approval process and make it transparent and understandable for the community.

Inhabitants’ interest to promote city gardening is proved by active involvement in community gardening initiatives in various cities across Europe, and in different gardening related initiatives in Riga. Also, Inhabitants’ Forum in Riga in 2018 showed that gardening is of interest to both those who care about ecology of our city and planet in general, and those who appreciate aesthetical quality of greenery.

Another example of urban gardening introduction in residential areas is *Lasnamae* in Tallinn (Estonia). Here the NGO is leading several initiatives, some of which are related to gardening (Figs. 2.4. and 2.5.). The community garden activity started in 2014 by the NGO Lasnaidee. The main aim of the NGO is to make the neighbourhood nice for living and more diverse. The successful creation of community garden is the result of collaboration among different actors: Lasnamae interests’ school, library Laagna and Paepealse, Tallinn department of Environment, Tallinn department for Education etc. The place works not only for gardening initiative, but also provides variety of social activities and works as a social space.

The other initiative by LasnaIdee takes place in Raadiku, new social housing constructed in 2008 (Figs. 2.6, 2.7). This example was included in the study, due to some common features in spatial organisation between this social housing and large-scale housing estates. Still, here surround-type organisation of public open space is one of positive space examples. In order to collectively increase the quality of urban life in Raadiku, NGO is collecting residents feedback on the challenges and needs of local inhabitants. Here for example in June 2017 NGO organised a neighbourhood day. The idea was similar to Latvian *Lielā Talka*, but with more diverse activities. Locals could learn how to study plants and creat their own garden plot, and common garden beds, and learn how to sort garbage / waste etc.

Fig. 2.4. Urban gardening beds in the area of new social housing Raadiku. Tallinn, October 2018.

Fig. 2.5. Community garden on the territory of Youth free time school / kindergarden area. Managed by LASNAIDEE. Tallinn, October 2018.

Here semi-public open space, such as children playground areas are defined with low fencing overgrown with green hedges (Figs. 2.6, 2.7). Doors are open, and everyone who wants can use the play area, still the hedge helps to define the level of publicness, and sense of territoriality. The area provides 6 clearly defined open spaces. Each of these spaces provides opportunities for necessary, optional and social activities with different levels of privacy. The car parking problem here doesn't exist as this is new construction with majority of parking placed underground. And only several on ground parking places.

Fig. 2.6. DIY benches surrounded by the newly planted pinetrees, to create level of privacy in the area of new social housing Raadiku, Tallinn, October 2018.

Fig. 2.7. Children playground in the area of new social housing Raadiku, Tallinn, October 2018.

The other type of transformations is connected to the infill development in large-scale housing estates. Ongoing uncontrolled urban sprawl is the problem of many cities around the world. In contrast, compact urban development is considered by many researchers to foster sustainable development. Still, also compact cities are showing certain threats to the environment, like the loss of green space and biodiversity [71]. In general, compact city is characterised by the high-density urban development, with central area revitalisation, provision

of mixed-use build-up, easy reach location of everyday activities, and well-developed public transport infrastructure [215]. The term 'compact city' is used mainly in Europe, while North America prefers the term 'smart growth', which has similar meaning of a dense and transit-friendly urban development [55]. Compact city policies aim reduction of car dependency, so promoting low emissions and reduced energy consumption; rejuvenation of existing urban areas and increasing quality of urban life.

Infill development is seen as one of possible tools to develop a compact city. Definition of infill development is broad: "infill refers to the development of vacant or underutilised sites at all scales, within existing communities and so with some supporting infrastructure already in place" [222]. Compact city paradigm often is connected to creation of more liveable, efficient and attractive urban environment in contrast to low density suburban areas. However, it can't be stated that densification always results sustainable development. A higher-density environment can also lead to higher noise and air pollution. It was suggested that in compact cities residents are more satisfied with personal relationships and perceived physical health than in lower density environment [140]. On the other hand, in a denser environment people have higher level of anxiety and lower level of emotional response.

Infill development in large-scale housing estates appears among commonly used strategies to regeneration of these estates, diversification of housing stock, and in some cases improvement of the outdoor environment and of neighbourhood image in general. However, in many cases new building blocks appear on areas where previously was open public space – green area. Infill development is being discussed in the context of privatization of public open space and gentrification. Already since 1960s many big cities in Europe and North America faced processes of gentrification [162]. The process of gentrification includes production and consumption of space for a higher income people, different from existing residents. It has been noticed that the changes in large housing estates are often driven by the private sector. Not only the transition from the state renting to private ownership, but also private landlordism influences changes in large housing estates. Redesigning, reshaping and often densification through building up open public space leads to the change in social profile of residents [162]. Still, according to various case studies densification of large housing estates can take different forms, having different impact on provision of nature and non-nature destination and changes in use patterns of local inhabitants.

As infill development is often related to replacement of open public / open green space by new residential project, the question of compensations to those, who live in surrounding buildings remains crucial. According to interviews in Finnish large housing estates, private developers may offer compensatory elements, such as improvement of the local environment, to make the new infill project more acceptable by public. Those interview in Finland also pointed out a threat, which is seen in Riga's large-scale housing estates:

"If it is mostly elderly people living in the area, it doesn't help at all to make a children's playground there […] It is not beneficial in the big picture. It must come about through interaction, and the land–use planning process is the best way to organize it [238]*."*

Compensation approach works in an attractive area and it can't be used as a regeneration approach in areas where private developers are not active, due to unattractive environment and

lesser possibilities to have profit [120]. The third approach is called *public investment planning*. According to Brindley and colleagues, it is applied in the most disadvantaged areas, where possibilities for privately initiated development are not evident and the public sector hence has to take action. Here, areas for development are selected based on the actual need, not the possibilities for initiation of market-led projects. Instead of development partners being sought in the private sector, in public investment planning the partnerships are formed within the public sector. This kind of internal cooperation between authorities is considered able to address broader issues than merely physical regeneration.

Preservation of public open space is an important spatial policy issue, especially in densely populated countries. The loss of open green space is among main threats in land-use change, as it causes green area fragmentation, loss of ecosystem services, and following this decrease in quality of urban life and threats to biodiversity and ecological issues [77], [83], [110], [121], [145], [187]. The necessity of open green space preservation is reflected in many citizen protests campaigns across Riga. The City for People Association (*Pilsēta cilvēkiem*), which was created in 2016 actively engages and promotes campaigns to protect greenery in the centre of Riga and beyond: protection of trees in the centre of the city, action against construction works in Teika etc. Activities which brought together people to water plants in *Kr.Barona* street, or guerrilla initiatives to plant new flowers and trees on *Brīvības* street, and the most recent campaign against new development on "Marss" cycling track (*Brīvības* street 207), show people interest in preservation of open green space.

The containment of urban development and the preservation of open space, alternatively termed green belt policies, constitute important themes in spatial planning in many countries [64], [116]. However, demographic and other socioeconomic developments result in land-use changes that apply increasing pressure to open space in terms of remaining area per capita and quality.

As has been argued before matters not only the quantity, but to large extent the quality of open public space. For example, green open spaces which provide various ecosystem services and are interconnected form green infrastructure. And for successful functioning of open space, it requires defined levels of privacy, with public spaces which provide social interaction and active social contacts, and semi-public and semi-private spaces, where people can be protected from active engagement.

An example of urban regeneration project of 1950s large-scale housing estate in Cologne showed opportunities of introducing different levels of publicness and privacy in the area. Spaces for active social engagement include bigger playgrounds, community space and allotment gardens [212]. The open spaces for less social contact are private gardens around the footprint of buildings, as well as spatial organisation with use of green hedges.

New aims and objectives set at the national level, changes on the city level documents are leading to greater and larger scale transformations in the urban environment. As for example change in land-use can promote preservation of green space or lead to more intensive development. Strategies set up to transfer to a more sustainable urban development can greatly influence transformations. So, in Augustenborg (Malmo, Sweden) sustainable urban drainage system (SUDS) was introduced in an urban regeneration area. The housing estate was built in

Malmo in 1950s under the Sweden's social housing policy. The neighbourhood suffered frequently from floods due to ineffective drainage system. Regeneration of Augustenborg was part of a broader initiative, where combating floods went together with aims on sustainable waste management and enhancing biodiversity. Regeneration was partly influenced by changes on the city level, with policies related to more sustainable urban development, adaptation to climate change. Introduction of SUDS included a total of 6 km of canals and water channels, and ten retention ponds, also ditches, ponds, wetlands and green roofs. It was a long-term transformation, which was initiated in 1998 and completed in 2002. Various actors were involved: city of Malmo, MKB social housing company, the Water Department, local residents and landscape architects. Financial support was provided from the Swedish government and various EU programmes. This example shows that also larger long-term transformations are possible and the involvement of various actors is important.

The Gellerup transformation in Arhus (Denmark) is one more example of a long-term transformation plan. The aim is to create new connections to the surrounding city, which include also green connections. Subdivision into smaller neighbourhood units, functions and community gathering places and attraction points in the neighbourhood. That all aims creation of identity and increasing sense of belonging of local residents.

Similarly described the action plan targeting inclusion of the public open space of large-scale housing estate in the green infrastructure in Slovakia. Approach includes first mapping of available nature resources and further introduction of NBS as a complex approach, aiming creation of interconnected network, which enables continuous movement of species. If the natural ecosystems become too small or isolated biodiversity may be lost.

Numerous researchers have advocated towards more collaborative planning already since early 1970s. This emphasis has raised debates about possibilities and difficulties how the theoretical ideas are realised and how collaborative efforts in practice have been subverted, manipulated or appeared to lack normative aims. An example from UK is the introduction of Neighbourhood Development plans (NDPs) enabled under the localism act 2011 [13, *190*]. The basic idea of NDPs is that local community has enough interest in neighbourhood planning and has also time and energy to create community-led plans. The current experience of plans being produced with minimal resources shows that such approach can be mainstreamed successfully. Such approach was connected to decentralisation of planning power, and aimed local people specifying themselves what kind of development they want in the area. This reform in the planning system was set out in Localism Act (2011) and in the National Planning policy framework (2012). One of result of such plans is the case study of new development in the neighbourhood and addressing the issue of suitable car parking provision [13]. Local inhabitants were for new development in the area, but the already difficult situation with car parking places was among challenges. As a result of Neighbourhood planning policy locals succeed to develop housing and visitor parking policy and have found solutions how to allow necessary parking places thanks to new housing development. Regardless all the positive features, there are still some threats: local authorities are pragmatic, and resource driven, so the understanding of priorities is useful, but it should be taken into account that not all desired

things can be realised. The larger scale goals may come into conflict with local aims, so it may be difficult to maintain trust, if the aims of local community cannot be realised.

The other approach used in Italy was a mixed cooperation of community input and professional knowledge. The urban square regeneration project was a result of work with various focus groups: resident associations, retailers, local employers, professional groups and children [13, *212*]. Project showed the importance of open dialogue, and necessity to make plans more understandable for community.

Currently there are several approaches (levels) to citizen-led and citizen engagement transformations of open public space:

Governing the city – this approach to urban governance is characterised with a more inclusive style, where diverse actors are involved in solving diverse urban issues and supporting cultural diversity. This bottom-up style governance requires large transformations in the management of cities [207].

Investing in the city – Participatory budgeting (PB) is an approach where people can collectively decide on allocation of city budget. Promoting public participation in urban processes has long been a key issue in discussions about urban governance. This is aimed at recognising people's voices in addressing urban challenges and city-making, which are viewed as a crucial element to accomplish urban development in a more effective, sustainable, and inclusive way.

Planning the city – Participatory planning is an urban planning paradigm which gives a priority to community involvement in the planning processes. Experts play the role of facilitators, giving people an opportunity to diagnose problems, chart the course of action and search for a solution.

Making the city – The 'Maker Movement' group is a recent phenomenon that supports do-it-yourself practices and promotes knowledge sharing [240], with a focus on education, play, and community building. This trend is characterised with the bottom-up initiatives. Activities vary from low-cost solutions, use of recycled materials, to computer programming and new digital technologies for prototyping.

It has been argued that traditional planning processes are facing challenges, as they lack the knowledge and diversity of preferences defined by different actors. The all-inclusive urban regeneration model might by quite challenges, due to limited resources, for that reason the types of cooperation differ in different cases and locations [13, *177*]. For example, in UK efforts to promote participatory approaches were made already in 1960s, however at that time it resulted in consultation or otherwise limited inclusion, which was later viewed with scepticism.

The role of partnership and citizen empowerment in urban politics has increased in the course of last decades [72]. Citizen involvement has fostered dialogue between different stakeholders as well as the development of community-led instrument for urban management.

Participatory budgeting (PB) has become one of the tools for engaging the wider population in urban development issues. The Right to the City is the basic setting of urban communities. It is also based on the Leipzig Charter on sustainable European cities (Europa, 2007) [220], which states that functional and well-designed urban spaces, infrastructure and services are a

task that must be jointly addressed by the state, regional and local authorities, citizens and businesses.

Participatory budgeting (PB) is considered one of the most successful participatory tools in recent decades. Generally, the nature of the PB can be defined as a mechanism through which citizens decide or contribute to decisions made at local level about the use of all or the part of the public resources available [114]. This is a tool which fosters education and engagement of people in the government operations. As a method of demonstrating real civic participation it is implemented by municipalities in many countries, which means that the understanding of the PB and the tools used vary depending on location. Also, Europe comprises different models of PB, but each model allows citizens to participate in the adoption of the municipal budget either directly or through different PB representatives (NGOs, community groups, etc.). Direct participation, also known as participatory democracy or consultative democracy, which involves an association of unelected citizens, is very important.

In case of neighbourhood regeneration participatory actions are of special importance, as they can strengthen sense of community, sense of belonging to the neighbourhood and can foster greater interest in community life, quality of public spaces and regeneration processes. Participatory planning and co-creation can increase the efficiency of regeneration proposals and help to create spaces, which will be used by local inhabitants [123]. As sustainable development is the main goal of many cities, then ensuring public participation in urban regeneration is crucial while searching for effective long-term solutions.

Since 2016, the city of Riga is launching a funding program called “Neighbourhood’s initiative to promote public participation and strengthen the sense of community” (The Riga City Council Department of Education, Culture and Sport, 2018 [228]). In terms of this program the city organises 4 contests each year to fund projects by neighbourhood community associations and other related NGO’s or institutions. There are no strict guidelines for project types or topics, as the main aim is support of more liveable and inhabitant friendly neighbourhood development and community building. Absence of specific guidelines makes it interesting to follow up the trends of funded projects, making it possible to find out what types of projects the city is ready to accept.

As soon as the contest call has been published, the neighbourhood association is submitting the project, and then the Riga City Council Committee is evaluating the submissions (Fig. 2.8). Finally, approved project authors are receiving financial support to realize their ideas.

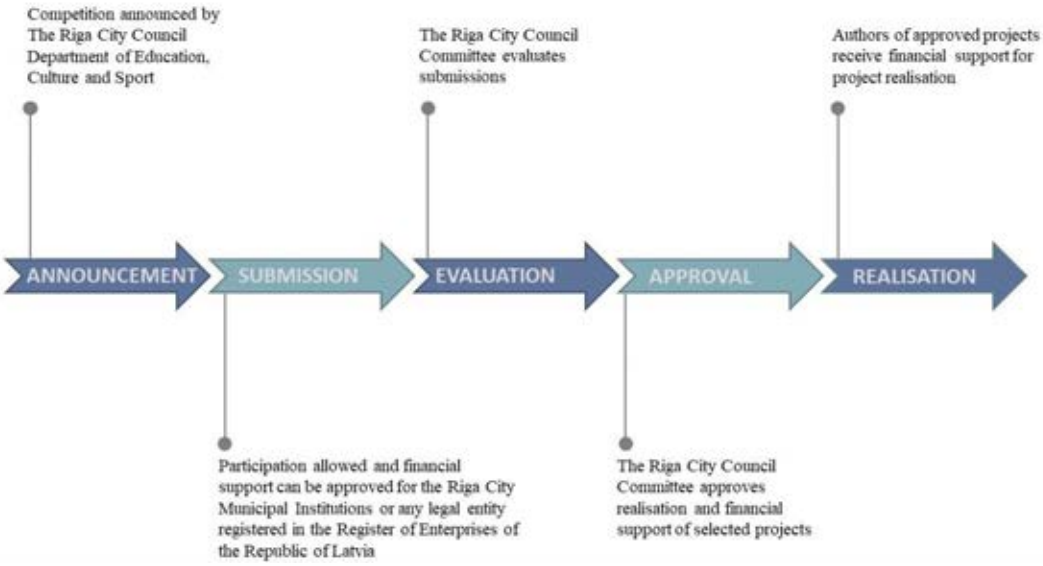


Fig. 2.8. The process of community project budgeting in the "Neighbourhood's Initiative to Promote Public Participation and Strengthen the Sense of Community".

The analysis of this participatory budgeting tool was focused on identification of activities which foster transformations in physical environment. It was noticed that activities approved in the areas of large-scale housing estates are mainly focused on events: like neighbourhood celebrations, sport events, competitions etc. Just few examples, like beautification and flowering of public open space in *Sarkandaugava*, were more related to some physical interventions.

In 2019, the Riga City Council launched a new participatory budgeting pilot program called "For Riga neighbourhood development project realisation" [226], [218]. The main aim is to foster neighbourhood regeneration and creation of identity, while supporting local inhabitant participation in the development of the area. The submitted projects should meet the following criteria:

- the project territory should be publicly available, which means it should be in the property of the city or under municipal jurisdiction;
- the project should be linked to infrastructure development in the neighbourhood and should have long-term and social value [218].

Here the participatory process differs from the one described before (Fig. 2.9). After the project call is open, any neighbourhood association or other NGO can submit their proposal. Then, the projects that meet the criteria are open for public voting, each resident having only one vote. The second evaluation stage includes the committee evaluation. The contest committee consists of municipality representative − Executive Director of Riga *Ziemeļu* (northern) executive board, representatives from the association "Riga Neighbourhood Association", as well as representatives from the Riga City Council Finance Department, City Development Department, *Pārdaugava* Executive Board, *Austrumu* Executive Board, *Ziemeļu* Executive Board. The Committee is considering the results of public voting, but it also

evaluates other issues and realisation opportunities, and then decides on support. Financial support is given to the responsible executive board (depending on location of the neighbourhood) and projects are accomplished / led by the executive board [218]. According to the public seminar data, executive board representatives are expecting active participation of the project authors during the fulfilment phase.

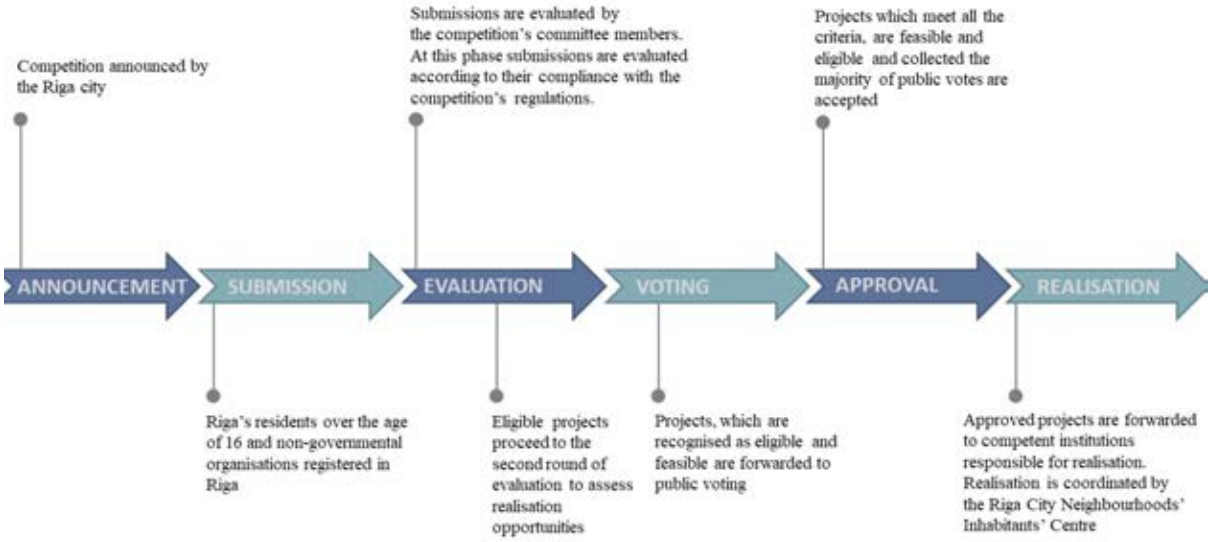


Fig. 2.9. The process of participatory budgeting pilot project in "For Riga Neighbourhood Development Project Realisation".

In 2020 the Riga City Council City Development department has launched a project *"Daudzfunkcionālas publiskās ārtelpas attīstība Rīgas pilsētas apkaimēs*" which aims to engage different actors: students, professional architects, and landscape architects, and local residents in the development of proposals and realisation of public open space regeneration projects in different neighbourhoods of Riga. In 2020 one of chosen areas was located in *Zolitūde* large-scale housing estate (Fig. 2.9). Students from RTU Faculty of Architecture and RISEBA participated in meetings with local community, conducted on-site observations to understand the needs and wishes of local community. The feedback from residents formed the basis of students' proposals (Figs. 2.10., 2.11). After the final student presentation and the evaluation of works by jury, the proposals have been displayed to public, for voting. The next steps will include development of detailed proposals by professionals and realisation of certain parts of the project proposals depending on the available budget, which is 600 000 EUR for all three territories in general.

Fig. 2.10. Public presentation of proposals for the transformation in open space of *Zolitūde* large-scale housing estate, July 2020.

Fig. 2.11. Public presentation of proposals for the transformation in open space of *Zolitūde* large-scale housing estate, July 2020.

When initiating transformations in public open space of large-scale housing estates, multiple complex uses, roles and audiences should be recognised. These areas have a potential to be a part of green infrastructure, support biodiversity, provide various functional and social services. Still there is a need for changes in policies, and innovative approach to public-private partnership.

Regardless the scale, type and the actors behind the transformation in the public open space, there is always a way to support nature / green environment. In that case transformation should be seen not as a result, but as a process which needs continuous engagement of different actors.

The crucial role of community engagement and the potential which participatory budgeting tools offer have been acknowledged by many countries in Europe. In Riga participatory urban regeneration and participatory budgeting tools are a relatively new approach, which can be described also by considerably later introduction of the citizen participation in transition to making more democratic governance in Baltic states. Analysis of geographical distribution of formal participatory budgeting activities showed certain injustice. It is clear that some neighbourhood associations, like those in *Čiekurkalns*, *Sarkandaugava* or *Maskavas forštate* are more active and successful, and so the strengthening of community and identity as well as urban regeneration activities happen more often and processes are faster and with wider public participation. Whereas other neighbourhoods have only one or no projects realised in the course of four years (2016–2019).

The types of projects and activities showed that currently small-scale urban interventions can not compete with sports and social inclusion oriented activities within the program "Neighbourhood's initiative to promote public participation and strengthen the sense of community". And the budget of the program "For Riga neighbourhood development project realisation" requires thinking in large-scale because of the budget set for one project (50 000 euro in 2021). Still budgeting of small-scale fast solutions would allow slow but sensitive improvement of the quality of urban life. Moreover, allowing more projects to be financed might solve the question of current fragmented allocation of supported projects.

The project *"Daudzfunkcionālas publiskās ārtelpas attīstība Rīgas pilsētas apkaimēs*" might foster improvements in open space of large-scale housing estates, however the choice of

territories would require more detailed criteria for inclusion. Based on comments from the Riga City Council City development department the territories for this pilot action have been chosen according to land ownership, choosing municipality-owned land. But such criteria might be too general when considering the best place for urban regeneration. Riga's large-scale housing estates still have variety of land owned by municipality, and more detailed selection criteria which would show interrelation between type of open public space – current state – aspired and beware transformations – analysis of existing opportunities nearby, may help to foster more holistic and consistent approach.

2.2. The Concept of Residential Environment Quality and Its Evaluation Methods

When considering quality of open space in large-scale housing estates it is important to understand variety of concepts. Review of various concepts aims identification of the most suitable notion in terms of this study. Identification of the most suitable concept allows to collect, analyse and compare currently available evaluation tools. Quality of life, quality of urban life, quality of urban environment, residential environment quality and quality of place correlate with each other, notions overlap having certain similar aspects, but at the same time have certain differences. All these notions include aspects of the environment where people live and focus on variety of features which influence residents' health, social and economical well-being, and general satisfaction with life. So, it is crucial to choose the right one in meaning and scale, as it directly impacts methods of undarstanding and evaluating the quality. Further in this chapter follows description and analysis of different notions, as s result leading to the most suitable for evaluation of outdoor space in large housing estates.

Quality of life in the broad meaning can be defined as one's satisfaction with surrounding human and physical conditions, conditions that are scale dependent and can affect the behaviour of individual people, groups of people and economic units. Various research findings have proven that built, natural and socio-cultural dimensions of the environment form important components of the quality of life or so called subjective well-being of people residing in specific area [36], [252]. Thus, the fundamental assumption is that urban environments can be designed to improve the level of residents' satisfaction with their lives.

Philosophers spoke about the "good life" for thousands years. The topic of the quality of life has been researched from various perspectives already since 1960s and the focus of studies varies between different disciplines: psychology, sociology, geography, planning, etc. [252, *2*]. So, for example the European statistics offers quality of life data based on evaluation of such factors as health, education, environment, housing conditions or employment [229]. And this meaning is too broad and leads to the understanding that in case of the outdoor environment of large housing estates the notion of the quality of life should be discussed with the specific focus on the neighbourhood environment.

Urban quality of life (or in some sources quality of urban life) has been defined by Robert W. Marans and Robert J. Stimson as a narrowed term which aims to illustrate the interrelation and the dynamics between the physical features of the urban environment. Their definition represents a complex notion which can be described as a network, not a linear relationship [96], [131]. Already, in 1975 Marans and Rodgers proposed the model of satisfaction with residential environment. Campbell et al. suggested that satisfaction with life in general can be viewed through satisfaction with different life domains, as for example satisfaction with housing, neighbourhood or broader region. Each life domain then consists of different urban characteristics, as for example perceived crime or noise etc.; all together satisfaction with different characteristics forms the general satisfaction with domain and contributes to the general satisfaction with life.

Despite the fact that the definition of Marans and Stimson has been narrowed to: human satisfaction with different urban attributes such as transportation, public spaces, recreational opportunities, land use patterns, population and building densities, accessibility of basic goods, services and amenities, still it also looks at a broad social aspects which include health, security and safety, education and social integration [96]. Moreover, due to lack of a clear definition which would be approved by everyone, there are variety of perspectives to look at this notion. So, McCrea et al. included in the concept of the urban quality of life satisfaction with regional services such as health, education and the costs of living [136].

The other related notion is **the quality of the urban environment**. Among the first literature dealing with the quality of urban environment and its impact on quality of life was set of papers in the book "The Quality of the urban environment" edited by Harvey Perloff [45]. In this book Perloff states that growing interest in the quality of urban environment is evolving from the growing concerns about quality of natural environment and development of urban communities. Recent growing interest in sustainable development and wish to combat climate change, has influenced also the increase of researcher interest in environmental quality of life [51], [158].

The chapters in the "The Quality of the urban environment" aim to provide a better understanding of the natural resource elements in the urban environment. Authors proposed to rethink the basic concept of natural resources, to have greater relevance to current situation, services and functions. Discussion is focused on the general idea that natural resources need to be valued, preserved and protected, so that we can proceed with sustainable development [46]. Following this, it is clear that also the term "the quality of urban environment" is broad and has no clear single definition.

In Environmental Psychology the Theory of Place includes the notion of residential satisfaction. Here the residential satisfaction is defined as "the experience of pleasure or gratification deriving from living in a specific place" [48]. Residential satisfaction and neighbourhood attachment concepts are used to evaluate residential environment quality. Studies on **residential environment quality** can include different scales as home, neighbourhood and the city. Those studies are focused on the relationship between inhabitants and their residential environment [79]. **Perceived residential environment quality** is the series of scales which evaluate three main aspects: spatial, functional and human [81]. Research by Mirilia Bonnes et al. proved the importance of the fourth aspect: the context features (neighbourhood lifestyle, environmental health/pollution, upkeep/care). There have been various versions of the **Perceived residential environment quality** (PREQ) scales [79], [80], [81]. The Residential Satisfaction scale completed with the fourth aspect comprises 126 items, which are grouped in 4 general and 11 specific content areas [82]. These 4 general groups include: architectonic and town planning features (building characteristics, infrastructure, nature elements), social relations features, punctual and non-punctual services (educational, cultural recreation, commercial etc.), context features (lifestyle, maintenance, pollution).

In current doctoral research the notion should be chosen having in mind the idea, that focus of research is the public open space within large-scale housing estates. Residential environment quality appeared to be the closest notion in relation to large-scale housing estates. Still, the full

variety of features used in original scales for Perceived Residential environment quality should be narrowed to the **residential quality of place.** Following this idea, also the notion of quality of place has been analysed further.

The Quality of Place, the term coined by Richard Florida, consists of what's there, who's there and what's going on in a place. "*The quality of place is all of those features of physical environment and qualities of life that make a location a desirable, competitive, and economically vibrant place to live. Quality of place is associated with the built environment and expressed in urban revitalization of older cities and new urbanism in suburban and rural locations. It also includes the quality of architecture and the quality of transportation, housing, neighborhoods, and all the cultural amenities and recreation venues and programs of interest to present and future residents. Also included is the natural and outdoor recreational assets and tourism features"* [99].

Different qualities of the built environment are related to the value of place. The quality of the place delivers the place value, and the value defines the quality. There are certain qualities that have an impact on health, social, economic and environmental outcomes. Based on that M. Carmona formulates the ladder of place quality, which includes four types of place quality: the ones which should be avoided, beware, aspired and required [195]. These place qualities have been defined based on systematic review of international studies and according to these studies the ones which should be avoided showed a very negative impact on health, social, economic and environmental outcomes. The other position "beware" has the remark about not very clear evidence of outcomes, while the aspired qualities have strong relation to positive outcomes. Finally, required qualities are fundamental to create a high-quality urban environment [195, *12-13*]. Research provides a very good guidance for high quality urban developments, still it doesn't provide more detailed information on the preferred amount of different features and makes it difficult to evaluate existing developments or propose certain improvements.

The question arises which place qualities are important for the residential environment and especially in case of large-scale housing estates. This question is difficult to answer, as the nature of the outdoor environment in large-scale housing estates is undefined, in some cases the open space can be defined as public open space, in other cases certain areas can be defined as semi-public or semi-private. According to Malone, not every public space should satisfy everyone and should be suitable for every occasion [130]. On the opposite, the research on public spaces in London confirmed the idea about importance of different characters of public spaces, which are affected and adapted to different uses [195], many urban places are neither clearly public or private [34].

Set of basic criteria is quite similar in studies about public spaces, pedestrian friendly environment etc. So, different aspect of protection, comfort and delight are described by Jan Gehl in *Cities for people* [14]; Jon Lang and Nancy Marshall set the criteria of basic requirements, comfort, safety and security, belonging and esteem, experiential aesthetics [28, *263*]. The required principles offered by M. Carmona include: greenness, mix of uses, low levels of vehicular traffic, pedestrian and cycling friendly environment, compact interconnected patterns and connection to a public transport network. The aspired principles

correlate very much with crime prevention through environmental design and include variety of aspects which aim promotion of safe and secure environment. Deriving from this, it has been decided to use the concept of Perceived residential environment quality looking at it through the prism of place quality.

Residential satisfaction or neighbourhood satisfaction is often studied to assess the general quality of urban life. Complexity of the meaning of quality of urban life, results in the complexity and variety of assessment approaches used to define neighbourhood or residential satisfaction. Also, criteria used in evaluation tools may differ [36, *233, 252*]. Assessment of the quality of a certain setting requests definition of indicators and must foresee and include changes in time. Also, subjectivity of people perceptions requests design of model frameworks to collect and analyse data. Subjective assessment of residential environment quality is often studied through relationship between urban environment characteristics and inhabitants' subjective evaluation. Behavioural indicators are one more type of data, which might be of interest while investigating quality of urban life. Such terms as quality of life, well-being, satisfaction, and happiness are often very similar and are used within the similar context by researchers from different fields, like policy makers, planners, politicians, sociologists, environmental professionals etc. Development of various well-being, happiness and satisfaction evaluation approaches resulted also in development of quantitative scales to measure quality of urban life.

Marans has elaborated the model "neighbourhood satisfaction", which shows possible relationships between residents' feelings and neighbourhood characteristics. Here objective indicators such as housing density, traffic counts or distances to recreation areas are compared to subjective responses about crowding, noise, friendliness of neighbours etc. A conceptual model developed by Marans and Mohai in 1991 indicates relationship between the environmental and urban amenities and community quality, individual activities, physical health and satisfaction with the neighbourhood [36, *9–13*]. Here environmental resources include natural recreation resources and the quality of the ambient environment. Urban environment includes man-made recreation resources and cultural resources.

Previously identified as the most suitable notion to use in case of large-scale housing estates was residential environment quality. Perceived residential environment quality indexes are a set of criteria, evaluating how people perceive the quality of urban residential environment. Regardless the fact that it is a subjective residents' evaluation, the general grouping of environmental dimensions according to important factors can be taken as basis for objective checklist. 11 significant topics include: (1) architectural and town-planning space, (2) organization of accessibility and roads, (3) green areas, (4) people and social relations, (5) punctual social-health-assistance services, (6) punctual cultural-recreational services, (7) punctual commercial services, (8) non-punctual (in-network) services (transportation), (9) lifestyle, (10) pollution, and (11) maintenance/care [73]. Still the residential environment quality indexes proposed by Bonnes and Bonaiuto [79], [80], [81], [82], [100] are not the only ones used for assessment of the neighbourhood space quality. Big amount of research is focused on relations between the built environment and human health [24]. Some built environment audit tools focus on interrelation between land-use, access to amenities, space

patterns, traffic safety, aesthetics, open space maintenance and inhabitants wish and ability to be physically active [154]. Other studies investigate the impact of physical environment on opportunity of disabled people to use public open space for daily activities [157]. Big amount of research addresses issues of elderly people in the built environment, and the role of certain indicators in assuring quality of urban life for ageing population [161]. Certain literature addresses issues of mental health and health in general [70], [188]. Walkability and bike ability of the neighbourhood have been the topic of interest of many researchers, so variety of tools are exploring the impact of built environment attributes on these aspects [146]. Social scientists use audit tools to measure interdependence of physical environment attributes and residents' fear of crime and perception of safety in the area [151], [153]. Here CPTED checklist has been often incorporated to evaluate the existing situation and develop guidelines for territorial improvement. The objective evaluation tools often include independent observation measures or geographic information system, or the combination of both.

Schaefer-McDaniel with colleagues has defined three main approaches used to document the physical characteristics of the built environment [166], [167]: (1) resident surveys that give subjective accounts of the perceived environment, (2) administrative data including those derived by censuses, crime reports, etc., and (3) direct observation by outside evaluators (including by use of audit instruments).

The use of direct observation may help to overcome certain shortcomings of approaches which use administrative data or resident surveys. For example, direct observation using the checklist / audit tool enables to overcome subjective evaluation typical for surveys. Also, it helps to cope with shortcoming in use of administrative data, which does not include certain aspects of public open space quality: level of maintenance, presence of disorder, individual activities as gardening etc.

Additionally, in case of public open space in large-scale housing estates distribution of functional and social services should be analysed on the large-scale housing estate level, considering recommended distances, measuring accessibility of recreational, necessary and natural features. The courtyard in the large-scale housing estate doesn't exist on its own, it is connected to other public open spaces of the estate and can function as a uniform structure. Thus, also now evaluation can be conducted not only on one courtyard scale but considering the system of public open spaces and their relation to each other. After defining necessary, optional and social activities, the optimal distances may help to define fair distribution of public open space amenities.

The approach of 15-min which in the literature is referred as 15– or 20–min city or 15– or 20–min neighbourhood seems to be a fairly popular model for the spatial and functional organization of the neighbourhood, but also the city at large. In fact, very recently due to the global pandemic crisis, this model has gained great momentum.

The study by Sola and Vilhelmson on the understanding of proximity concept shows a common vision of 35 planners of various competences from three western Swedish municipalities. As a result of a workshop professionals came to a common vision of activities and amenities citizens need in direct proximity to their home, in 10 minutes walking distance,

and 30 minutes distance. As a result children play areas were defined as the activity recommended near home.

Such model has been acknowledged by participants as a good tool for discussing potential consequences of diverse planning approaches. It also can help when making decision on municipality's introduction of activities and services.

The closest notion in relation to the public open space in large-scale housing estates is residential environment quality. The notions of quality of life and quality of urban life are to broad and can't be attributed to the physical transformation processes in public open space. For this reason existing residential environment evaluation tools are compiled and analysed. Still, for more precise evaluation of public open space place qualities should be integrated into the final evaluation model. Residential environment quality related to transformations in public open space of large-scale housing estates needs to be analysed in connection to place qualities, as the scale of transformations varies.

Evaluation of transformations in public open space must include on-site observations as it helps to overcome certain shortcomings presented by administrative data: bottom-up activities, level of maintenance, presence of disorder. Combination and comparison of objective (eg. on-site observation) and subjective (survey) evaluation tools is desirable as these approaches complement each other. Finally, the concept of proximity needs to be included, as each public open space in the large-scale housing estate can't answer all the diversity of needs of different inhabitant groups. Thus, those transformations which already happened or are planned to imrpove the residential environment quality need to be evaluated using proximity to home approach.

2.3. Evaluation of Impact of Open Space Transformations on Residential Environment Quality

Quality of urban life, place quality, residential environment quality and other related issues have concerned various researchers. For that reason, variety of evaluation tools exist. As described before the notion of residential environment quality relates most closely to the open public space in large-scale housing estates. Still, it should be carefully narrowed in order to focus on open place qualities. This section presents a narrowed evaluation checklist criteria suitable for evaluation of residential environment quality related specifically to public open space and to draw interrelation between open public space transformations and assessment indicators. As a result, proposing a revised tool to examine associations between public open space transformations and residential environment quality in large-scale housing estates.

Following the systematic review of the review and research articles in Science direct and Scopus databases was undertaken using the PRISMA methodology. After systematic review of 1183 articles, 22 built environment assessment tools were identified for further deeper analysis. Transformations in public open space of large-scale housing estates happen on different scales and often are a result of bottom-up tactical interventions. These changes are often unofficial and can't be tracked through official webpages or geographical information system. Following these transformations is possible only through the on-site observations. Thus, the first factor for selection of tools was inclusion of direct on-site observations in the urban environment. The second factor for selecting evaluation tools for the deeper analysis was quantitative vs qualitative studies. Quantitative methods underline objective measurements. Quantitative research focuses on gathering numerical data. The last factor for the tool selection was that studies were conducted in developed countries, as defined by the United Nations (2012), as developed and developing countries may have varying physical environment characteristics and needs. Studies that used only geographic information system (GIS) or only administrative data without also using a neighbourhood audit instrument were excluded. Measures in the form of participatory surveys and measures of the social environment were also excluded (unless they also included direct observations of the physical environment).

In total after review of selected review and research articles, 22 built environment assessment tools were identified for the first round of the deeper analysis (Table 2.1). The tools are represented in the Table below. After the deeper analysis, part of the tools were included into the second round of analysis, still the other part was excluded from the further investigation as they didn't correspond to the factors mentioned above. There were following reasons for exclusion: to narrow or to broad evaluation approach, the tool is a slightly modified version of another tool (in this case only one version was left), the tool doesn't include criteria for direct observation.

Table 2.1.

Evaluation tools selected for the first round of analysis

Nr.	Assessment tool	Reference	Included	Excluded	Reason for exclusion
1	PREQIs (Perceived residential environment quality)	[80]	∨		-
2	The Residential Environment Assessment Tool (REAT)	[93]	∨		-
3	Residential Environment Assessment Tool (REAT 2.0)	[242]	∨		-
4	European Common Indicators	[208]		∨	General recommendations on public / accessibility of public open areas in relation to citizen satisfaction, percentage from different case studies
5	Revised Block Environmental Inventory (RBEI)	[152]		∨	Decided to relate to the original tool BEI
6	Block environmental inventory (BEI)	[151]	∨		-
7	The Irvine-Minnesota Inventory (IMI)	[202]		∨	Doesn't include on-site observations
8	The University of Maryland Urban Design Tool	[244]		∨	Doesn't include on-site observations
9	Analytic Audit Tool	[194]		∨	Excluded due to many features not applicable to housing estates
10	Systematic Pedestrian and Cycling Environmental Scan (SPACES)	[227]		∨	Too narrow
11	Public Open Space Desktop Auditing Tool	[95]		∨	Doesn't include on-site observations
12	several manuals for CPTED	[241]	∨		
13	The RESIDential Environments (RESIDE)	[243]		∨	Too broad. But in general, incorporates also CPTED principles, no need to include
14	BESSC	[84]	∨		-
15	BEAT	[70]	∨		-
16	SSO: – systematic social observation	[165]		∨	Too broad including industrial, commercial and residential areas, focused on disorder / safety issues
17	Residential environment liveability (REL)	[175]	∨		-
18	RESS	[68]		∨	Based on subjective evaluation data
19	Environmental quality Index	[206]	∨		-
20	COURAGE in Europe built environment instrument	[157]	∨		-
21	SOS Senior's outdoor survey	[161]	∨		-

22	the University of Miami Built Environment Coding System (UMBECS)	[178]		V	Doesn't include on-site observations

The following Table presents summary and analysis of residential environment assessment tools, which were selected for deeper analysis after the first round of exclusion. In total 11 evaluation tools were analysed and are described below (Table 2.2).

Table 2.2.

Built environment evaluation tools

Title	Author, year	Spatial scale: definition of geographic unit	Analytical framework and study design	Nr. of topics (domain)	Number of items (sub-domain)	Description
Built Environment Site Survey Checklist (BESSC)	Weich, S., Burton, E., Blanchard, M., Prince, M., Sproston, K., & Erens, B., 2001	Neighbourhood.	25 questions with fixed responses and two questions requesting measurements	4	27	Comprises the items from national housing surveys: The housing attitudes survey (department of the environment, 1994), Hosing in England (office for national statistics 1997), British social attitudes (SCPR, 1997).
Residential Environment Assessment Tool (REAT)	F. Dunstan, N. Weaver, R.Araya, T.Bell, S.Lannon, G.Lewis, J.Patterson, H.Thomas, P.Jones, S.Palmer, 2001	A postcode unit. This contained on average 17 domestic households, although 20% contained 30 or more.	The instrument produces a score, subdivided into subscales reflecting the four dimensions, which is designed to give a measure of the physical condition of the area. Including a set of photographs.	5	28	A survey instrument, known as the Residential Environment Assessment Tool (REAT), based on observations in 51 different residential areas within a borough in South Wales.
Residential Environment Assessment Tool (REAT 2.0)	-	-//-	-//-	4	18	A survey instrument, to be completed by an independent observer, to produce a contextual measure of a neighbourhood, reflecting both physical aspects and also the extent to which residents have established territoriality over the area.
Built Environment Assessment Tool (BEAT)	Araya et al. 2007	Neighbourhood	Assessment checklist	4	81	Assessment checklist with one or several answer choices

PREQ	Bonnes M., et al. 1997	Neighbourhood	Assessment checklist	11	126	PREQ is a set of indicators, measuring how people perceive the quality of their urban residential environment, notably the neighbourhood.
Block environment inventory	Perkins, Meeks, and Taylor, 1992	Residential block	Inventory	3	16	It is an inventory of specific features of residential and non residential properties.
Residential environment liveability (REL)	Skalicky, Čerpes, 2019	Residential environment	Objectives, values, criteria and indicators			The criteria system to assess residential environment quality, which focuses on liveability, is of general application.
Urban studies – an environmental quality Index (geography fieldwork)	Field studies council: bringing environmental understanding to all	-	A sliding scale of quality (like 1 to 5) to represent less good to good.	4	13 positions	An environmental quality survey uses an observer's judgements to assess environmental quality against a range of indicators.
COURAGE in Europe built environment instrument.	Collaborative Research on Ageing in Europe Project www.courageproject.eu https://www.maturitas.org/article/S0378-5122(11)00399-9/fulltext	Outdoor area, no specific unit	Checklist, and the self-reported questionnaire;	-	128	The outdoor checklist, and the self-reported questionnaire.
SOS Senior's outdoor survey	Susan Rodiek, Center for Health Systems & Design, Texas A&M University, College Station, TX, 2014	Outdoor area, no specific unit	Rating 60 environmental features on a 1–7 scale.	5	60	The Seniors' Outdoor Survey (SOS Tool) to help users evaluate outdoor areas and indoor–outdoor connections.
CPTED principles	O.Newman, Term defined by C.R.Jeffery in 1970s	Outdoor area, no specific unit	Questions	4	-	Four main principles with guidelines on how to reach CPTED

The Table 2.2. represents general data on selected tools including authors and short description. The indicators of tools were summarised in the Appendix 1, to find overlapping of similar indicators, which when were selected for the new residential environment assessment tool. Identified common domains and subdomains allowed to determine following important aspects:

- housing type;
- recreation space (children recreation space, recreation space/recreation opportunities, sitting spaces / sitting choices/availability of sitting/ comfort/ additional amenities, social space, temporary uses/shared use of space);
- amenities (general: trash bins, shelters etc.);
- natural elements (trees, purposively planted trees or vegetation, view to natural elements, view to man planted vegetation, mix of vegetation, reachable plants, colours etc.);
- territorial functioning (some sort of external beautification, garden boxes, name plates, window boxes, amenities for birds or cat houses etc.);
- presence of disorder (which is characterised with dilapidated land; existence of litter on the street, evidence of vandalism, stray dogs, abandoned cars, broken windows/boarded windows, abandoned properties);
- maintenance of the open space;
- condition of pavement;
- car parking (type of parking, illegal parking, distribution of cars).

After the most important / common domains were identified, the next step included analysis of the Place quality features derived from M. Carmona study which includes analysis of 271 empirical research studies [195]. Of the 271 studies, 38 % derived from the USA and 34 % from the UK. Other significant contributors to the evidence base included other European countries (notably The Netherlands), Australia, China, South Korea and Canada. He grouped the qualities of the place into four sections: required, aspired, beware and avoid. To justify positive and negative factors, while analysing interrelation between the selected indicators from Built environment assessment tools and the features identified by M. Carmona, additional theoretical background was incorporated (Fig. 2.12). The common human needs as defined by John Zeisel were included into the final model. According to behavioural approach to urban design six common human needs exist:

1. Security, the need to feel safe
2. Social interaction, the need for sociopetal environments that facilitate social interaction
3. Privacy, the ability to regulate the amount of contact with others
4. Identity, the relationship between self and environment encapsulated in the notion of sense of place.
5. Convenience, the ease of accomplishing tasks at the domestic, neighbourhood, city scales

6. Clarity, the need for ease of movement and legible environment
7. Comfort and rest.

Safety and security are one's feelings but not the characteristics of an urban environment. The feeling of safety in public open space of large-scale housing estates is of great importance, as it directly influences the intensity of space use. Despite the fact, that safety and security are not characteristics of physical space, physical elements and spatial organisation have an impact on the sense of safety. To ensure the public open space is safe and secure it should be well-maintained, clear and readable. According to CPTED principles sense of safety and security can be reached by introduction of lightening, cameras and security men. Provision of natural surveillance makes people feel safer. Places which are actively used are perceived as safe as well [241].

In public open space fears of crime may raise from lack of lightening, dangerous people, isolated places which are rarely used and are not seen from windows [241]. Unsafe and hazardous surfaces, and undesired waste may lead to the fear of injury.

Public open space is considered socially successful when it offers an opportunity for people to meet friends and interact with strangers [35]. As inhabitants' composition of large housing estates comprise variety of age groups and also different social, and ethnic groups public open space must be appropriate for activities to occur individually or in groups and meet different needs. Public pen space must be inclusive for different users: elderly and young people, male and female, rich and poor, disabled and able-bodied [86], [87]. Socialization is supported not only by active, but also by passive engagement. For example, elderly people can watch children playing or younger people doing sports or gardening, and so they are involved in the socialization process. Sense of social belonging can be supported through co-design and co-creation of public open space [86], [87]. Moreover, engagement in co-creation processes supports place attachment and careful attitude towards the place.

The sense of belonging to the place is connected to the sense of ownership and supports more responsible attitude of residents towards the space [3]. Moreover, sense of belonging to the place has proven to bring psychological benefits to people. Sense of belonging can be achieved through community actions and events, as well as through unique character of space reached with DIY design and space organisation, and using elements related to people's memory [124]. Thus, landmarks, images, festivals, neighbourhood days are treated as means to define the sense of place and establish **its identity**.

Community participation in the processes of co-design and co-development of public spaces enhances people's sense of place and helps to meet the diverse needs of users [185]. Also, public participation in organisation and transformation of their environment raises the sense of collective responsibility.

Convenience, the ease of accomplishing tasks at the domestic, neighbourhood, city scales. This notion is related to accessibility. Walking easily and ensuring visual communication within the public open space and with surrounding open spaces. Movement of people with special needs, ensuring proximity of necessary functions.

There are three types of accessibility to open spaces: physical, visual, and symbolic. Physical access is ensured by linking the space with surrounding environment and avoiding

physical barriers. Visual access is accomplished through visibility and visual communication between users and space. Signs, landmarks, landscape elements, and meaningful features form the symbolic access. Accessibility in the public open space is crucial and is achieved by providing walking easily opportunities, giving access to people with special needs, ensuring visual communication, providing suitable parking [35], also the frequency of using open spaces depends on proximity of the sites that users come from.

Comfort and rest are basic needs in public open spaces. Without achieving them, we cannot imagine how the rest of the needs and requirements can be met [8]. Basically, the level of comfort in the space can be determined by how long people stay and how much time they spend in the space. Relaxation is an advanced state of rest, preceded by psychological comfort [7]. Physical characteristics of space have certain impact on the sense of relaxation [164]. Passive interaction and relaxation are similar actions, although relaxation is achieved by a person being separate from the environment while passive interaction is ensured also when people observe surrounding environment. Entertainment incorporates passive, spontaneous, and organized activities and engagements that take place in open spaces.

Protection from environmental conditions such as sun, rain and wind, influences the sense of comfort in public open space. Protection from and access of sun are key factors in space use [86].

Comfort in open space is achieved through its delight, beauty, attractiveness, diversity, complexity, spaciousness, efficiency, maintenance, and cleanliness [7]. Amusement is reached when wide range of activities for diverse inhabitant groups, regardless their age, gender and economic background, is provided [170]. Equipment of green space, pattern, shape, color, texture raise aesthetic performance of a place. Finally, cleanliness and maintenance of the space in general, and all elements and equipment positively influence the level of aesthetic performance in the space. The pleasing design, landscapes, green and blue structures are all elements of attraction for passive and active recreation within space [7]. Relaxation can be also achieved through passive participation, such as watching birds, observing sunset, and watching movement and activities of others.

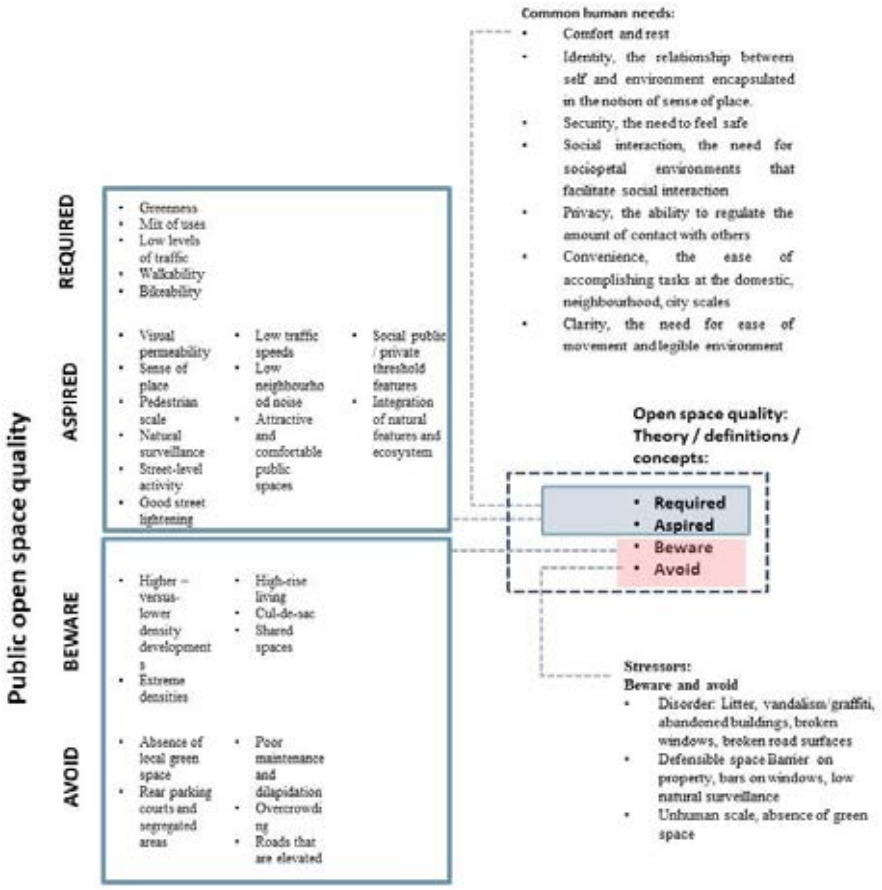


Fig. 2.12. Common human needs connected to required/ aspired qualities and stressors connected to qualities, which need to be avoided/ beware of [based on [36], [43], [195].

The disorder indicators were of strong value, the stressors as illustrated by M.Pacione were analysed [43]. As identified by M.Pacione, there are at least five theoretical perspectives which aim explaining the influence of urban environment on residents. These theories are based on principles of human ecology [189], subcultures [12], environmental load [139], behavioural constraints [29], and behaviour settings [2]. Each of the theories help to understand certain aspects of urban life and together form a general picture.

The stressors which objectively can be measured by incivilities (litter, vandalism/graffiti, abandoned buildings etc.) and defensible space (barrier on property, bars on windows etc.). Adapted checklist is a part of the residential environment quality evaluation approach. Evaluation techniques include on-site observations, analysis of digitally available data, mapping and analysis with incorporation of GIS, residential satisfaction studies using surveys, questionnaires and interviews. Finally, the concept of near home functions and functions reachable in ten-minute walking distance form the basis for proximity and accessibility analysis. The conceptual model of the impact from open space transformations on residential environment quality is below (Fig. 2.13):

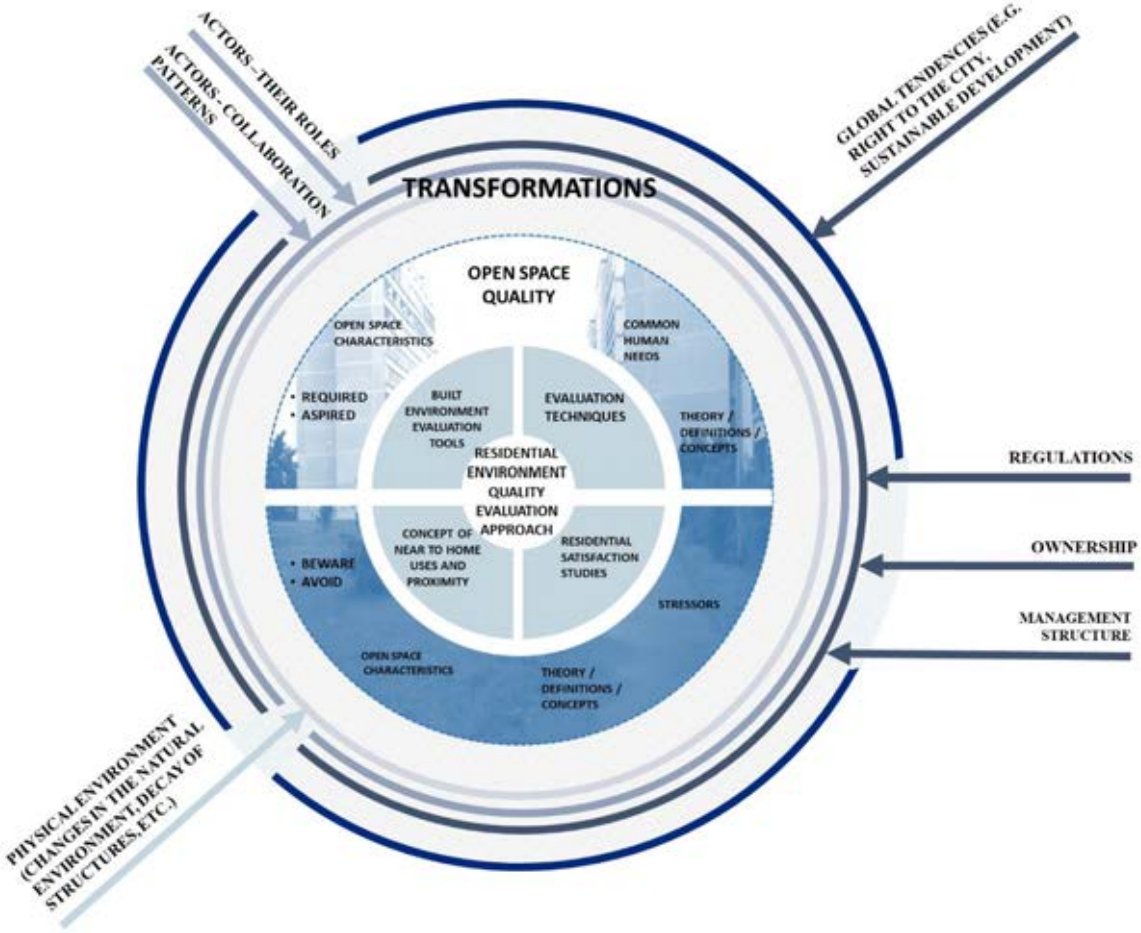


Figure 2.13. Development of the residential environment quality evaluation approach – a conceptual model.

Different types of public open space transformations in large-scale housing estates were identified in the section 2.1. These are:

- self-made: outdoor furniture, barriers, gardening/landscaping, signs, other non-classified structures (e.g. cat houses), street art;
- infrastructure: surfacing, waste collection, lightening;
- residential Infill development: individual houses, housing complexes, infill development with infrastructure;
- outdoor furniture (passive recreation);
- recreation facilities (active recreation);
- car parking;
- bike parking.

Main domains identified from comparative analysis of selected built environment assessment tools have different physical environment features which characterise that domain. Also, common human needs and stressors have physical environment attributes which support or discourage them. The aim of created checklist is to follow up the trajectory of transformations. The following checklist allows to identify positive and negative features of

public open space transformation, and so the tendencies their create: raising or decreasing the open space quality.

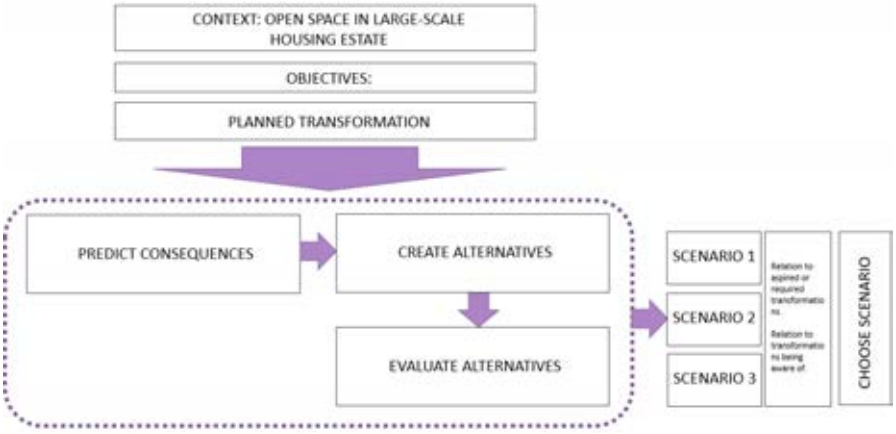


Fig. 2.14. The model of using the evaluation tool for assessment of future transformations and their impact on the residential environment quality.

As discussed previously, the infill development can have both positive, or negative impact on the residential environment quality. If correlated with stressors defined by M. Pacione, gated communities create barriers, which work as stressors. It is also of importance, what kind of open public space is created, after the open space is reshaped by introduction of a new development. Also contrast between building qualities appeared in the built environment assessment tools as a negative feature. On the other hand, infill development which offers opportunities for more and diverse recreational, social space for both residents within and outside the new project, increase the quality. Place making activities prove territorial functioning, show residents attachment to place, are considered by CPTED principles to work as crime prevention strategy and so are evaluated as of positive transformation. Gardening initiatives also help to promote place attachment, sense of ownership, work as beautification tool, and as a social space, and work to increase biodiversity and provide ecosystem services, so is defined as positive transformation. Infrastructure works relate to maintenance, and so are considered among the crucial ones, to determine place quality. Recreational amenities in general are a positive feature, still it is important to analyse the components of transformations, to avoid focus on one specific group and ignorance of other groups. In several built environment assessment tools, diversity, availability of choices, general availability (amount), and comfort are defined as additional factors. For that reason, diversity in recreation opportunities, diversity and availability, comfort of sitting areas are valued as additional points. Vegetation may work also to increase / define the levels of privacy, and help to create enclosure, semi-private or semi-public space.

The evaluation approach can be used not only for evaluation of present state, but also for evaluation of future transformations and alternative scenarios (Fig. 2.14). When where is an objective for specific transformation, its consequences can be analysed using the approach. The same approach can be used when considering alternative scenarios and the consequences of those alternatives.

3. RESIDENTIAL ENVIRONMENT QUALITY IN LARGE-SCALE HOUSING ESTATES OF RIGA IN THE CONTEXT OF OPEN SPACE TRANSFORMATIONS

Variety of transformations which take place in the open space of large-scale housing estates have different impact on residential environment quality. That impact can be evaluated according to human needs in the open space, still certain modifications may have different influence when present in different circumstances. This section presents situation in Riga: open space character, transformations and their impact on the residential environment quality as well as residents' attitude towards possible future transformations and those, which already happened.

3.1. Characteristics of Open Space in Large-Scale Housing Estates

Following the analysis of various spatial configurations of open space in large-scale housing estates, detailed plans of large-scale housing estates in Riga were investigated. Analysis showed various spatial configuration types: a surround-type structure with not only square, but also rectangular, hexagonal and irregular shape inner-courtyards; a semi canyon-type formation; a parallel blades formation; semi-closed forms (often U-shaped courtyards formed by building blocks or u-shaped buildings), high-rise towers surrounded by or combined with long blocks, Irregular (curved/croocked) open space formed by linear or non-linear building blocks (Figs. 3.1.–3.4.). Analysis of spatial organisation was conducted using the detailed plans of large-scale housing estates.

Variety of large-scale housing estates in Europe were built according to the spatial organisation – building blocks organized around the courtyard forming square, rectangular or different form space. Such spatial organisation is called surround-type courtyard between apartment buildings. This kind of buildings' arrangement was introduced also in large-scale housing estates of Riga. For example, detailed plan of *Jugla* large-scale housing estate developed in 1961-1970 included also surround-type courtyards. This spatial organisation was combined with several planning layout principles represented in the further text. High-rise towers surrounded by long blocks: also, this type of the spatial organisation can be seen in different estates across different countries. *Jugla* estate has 9- and 12-storey tower-type houses surrounded by long building blocks (Fig. 3.1). Allocation of the tower-type residential buildings was dictated by the fact that part of estate is open to the river front and is also on the fringe of the city. It was decided to create here the expressive silhouette which welcomes / defines the city border. Also, *Imanta* large-scale housing estate presents surround-type configuration combined with other configuration types (Fig. 3.2). According to the detailed plan explanatory notes the spatial configuration of *Imanta* was impacted by certain autonomy of estate in relation to the city structure, long period of construction (1970s–1980s) and necessity to arrange the first stage of construction for the factory. Here the boulevard in the shape of an arc creates the main unifying element. The individually designed 12- and 16-

storey high-rise towers were aimed at creating unique *Imanta* estate identity, which would differ this estate from others built in Riga in the same period.

Similarly also semi-closed open space structures (U-shaped or similar forms) can be seen in *Jugla, Imanta, Ziepniekkalns, Ķengarags* (Fig. 3.4). Parallel blades in case of *Jugla* estate form the leading type of spatial organisation. Irregular (curved or croocked) open space formed by non-linear building blocks seen in *Pļavnieki.* Spatial organisation facing the street on one or both sides, seen in *Mežciems, Purvciems* (Fig. 3.3).

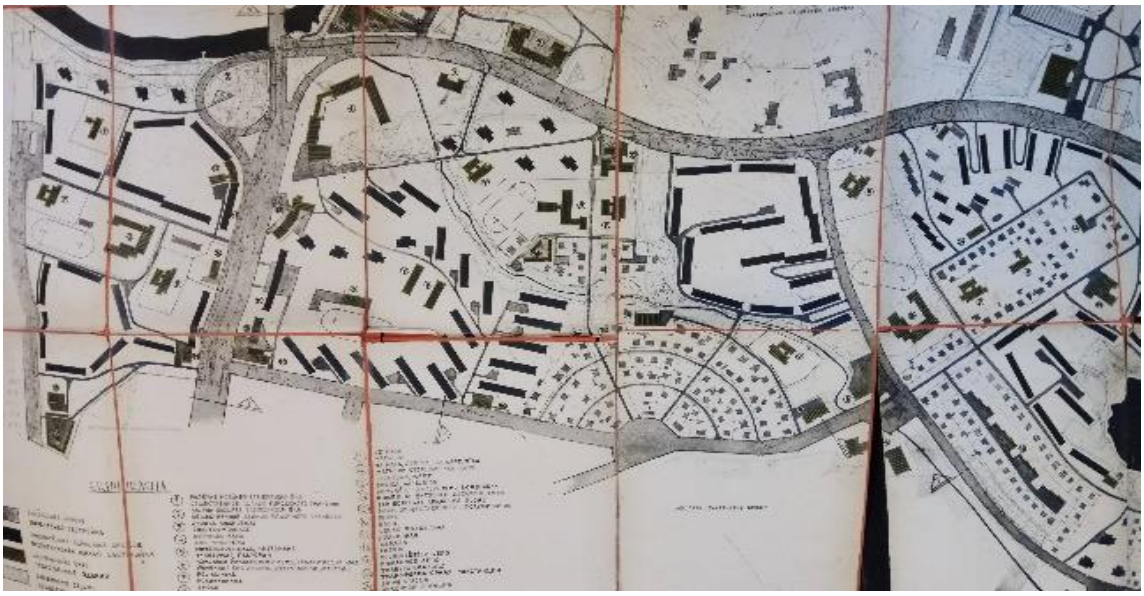


Fig. 3.1. Fragment of the detailed plan *Lielā Jugla* large-scale housing estate (showing the combination of parallel blades, high-rise towers, surround-type structures and semi-closed forms) [262].

Fig. 3.2. *Imanta* large-scale housing estate (showing surround-type, semi-closed, high-rise towers and the combination of parallel blades and surround-type structures) [262].

Fig. 3.3. Fragment of *Purvciems* large-scale housing estate detailed plan (showing the combination of parallel blades, surround-type structures which form hexagonal courtyards and semi-closed forms) [262].

Fig. 3.4. Fragment of *Kengarags* large-scale housing estate detailed plan (showing surround-type, semi-closed structures and high-rise towers) [262].

Following this, the approach chosen to classify open space is according to its physical structure or the pattern. Here the idea of positive and negative spaces was chosen (Table 3.1.). "*There are two fundamentally different kinds of outdoor space: negative space and positive space. Outdoor space is negative when it is shapeless, the residue left behind when buildings – which are generally viewed as positive – are placed on the land. An outdoor space is positive when it has a distinct and definite shape, as definite as the shape of a room, and when its shape is as important as the shapes of the buildings which surround it"* [1]. Certain open spaces in large-scale housing estates already form or after certain regeneration processes can represent positive spaces (Table 3.1.). Still important is the height of buildings and the open space ratio. Christopher Alexander justifies necessity of building height restrictions. He advices to set up the four-storey limit in residential neighborhoods, to insure comfortable living. High buildings promote crime and destroy social life. Such advice is explained by the connection between building windows and the open public space, which break down above four stories. However, it is stated that five and even six storey building height may work in case of clever spatial organization.

The other open space type is public open space formed by parallel blades typology. Such spaces are enclosed from two sides and can be described by the linear pattern. For example, in the path shape pattern it is advised to make a bulge in the middle and narrow the ends. Such organization is recommended to allow creation of the "space to stay" not just the space to pass through. But this is not the case of large-scale housing estates with typology of parallel blades where the open space dimension remains unchangeable.

The most extreme is spatial organization of high-rise tower blocks. According to Salingaros and Pagliardini this is the most damaging geometry for the open public space. In this case all the space remains outside, stealing from people the feeling of protection.

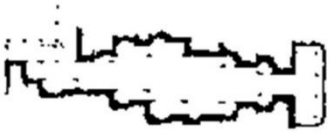
"Linked to the skyscraper there is always the false idea of liberating open space and leaving room for green, and that the skyscraper, with its surrounding space, represents the solution against small traditional buildings that consume the land. Nothing is further from the truth, and this is a serious misconception. The open space around the isolated building, whether it's high or low, is useless." [163].

However, as tower blocks are usually surrounded or mixed with other building types, the open public space may be defined and enclosed to a certain extent, unless the surrounding structure is placed in a way that space gets even more spread and undefined.

Following this the six types of spatial structures and the seventh (combination of various structures) were related to the three types of patterns according to Ch. Alexander (Table 3.1.).

Table 3.1.

Pattern Types and Their Relation to Open Space Spatial Organisation in Large-Scale Housing Estates

Pattern types as defined by Ch.Alexander	 Positive space with some degree of enclosure by Ch. Alexander [1].	 Path shape by Ch. Alexander [1].	 Undefined (negative) space by Ch. Alexander [1].
Map view examples	 Public open space which have potential to create positive space within large-scale hosing estates.	 Example of "path shape" spatial organization in *Jugla* large-scale housing estate formed by parallel blades.	 *Jugla* large-scale housing estate: spatial organisation combining tower blocks and parallel blades.
Eye-level view examples	 Open space eye-level view in *Jugla* large-scale housing estate, May 2020.	 "Path shape" open space in *Jugla* large-scale housing estate, May 2020.	 Open space eye-level view *Jugla*, May 2020.

Still, these three types of patterns require also sub patterns in order to proceed with on-site observation. It was supposed that for the type and intensity of usage, allocation of building entrances plays a crucial role. Certain urban design elements are necessary to support optional

and social activities. On site observations were conducted in 2017, and later in 2020 with observational sheets and the site plan of chosen open space. The information was collected on the type of activity and type of users. Based on spatial organisation six types of public open space were identified:

- Public open space which creates or has potential to create "positive space" with some recreational amenities present;
- Path shape public open space with building entrances facing it;
- Path shape public open space with one building entrance facing it;
- Path shape public open space facing building backyard (no entrances);
- Undefined public open space (often formed by the mixture of spatial organisations, like combination of parallel blades from one side and semi-closed open space on the other side) with some recreational amenities present;
- Undefiened public open space (with high-rise building blocks) with some recreational amenities present.

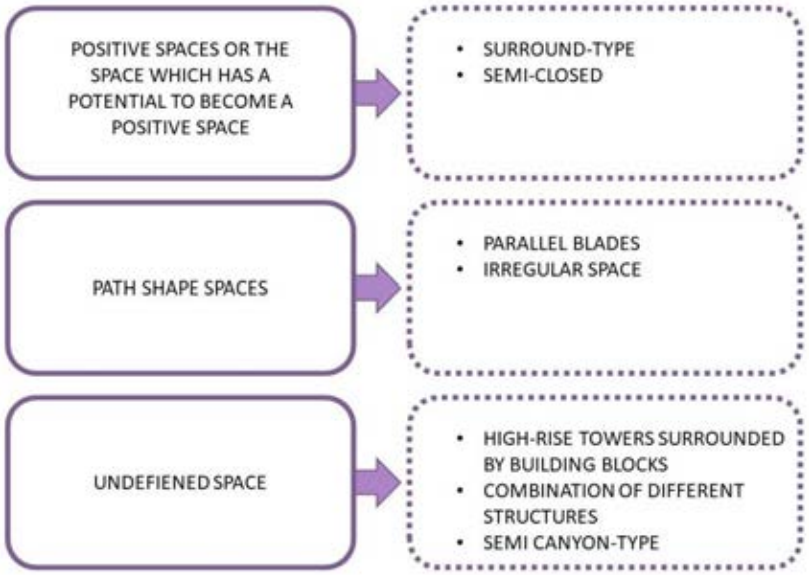


Figure. 3.5. Grouping of spatial configurations according to open space patterns.

Open spaces of different spatial configuration were chosen in one large-scale housing estate – *Jugla*. This ensures that the composition of inhabitants is similar in all observed cases. The other requirement was similar level of outdoor recreation amenities. All selected cases had some original and some self-made amenities. The hight of buildings is five-storeys in all cases excluding the high-rises (nine-storey), all path shape open spaces have similar area (about 4200 m^2). Surround-type and undefined space have similar area as well (about 10 000 m^2). Construction of *Jugla* large-scale housing estate took place in 1961–1970. This means that the trees (birches, linden, maples, etc.) which were planted when the estate was constructed, now have large crowns, which together with variety of bushes, green lawn and self-made garden beds form the green appearance of the estate. Thus, also all selected public open spaces have green lawns, variety of trees and bushes distributed in the space. Observation was conducted

on working days, during the daytime. All the necessary, optional and social activities were fixed.

First, comparison between public open spaces of different spatial configuration, but similar amenities aimed testing the hypothesis about the impact of spatial character on the type of use. Secondly, comparison was between public open spaces of the same character, but with different level of amenities: path shape open space faced by the backyard facades (no entrances) with no paths or amenities, only greenery; path shape open space with entrance from one side, path going through and benches; path shape open space with entrances from both sides, and paths from both sides with green area in between, a bench and a sand box, self-made slide.

The hypothesis before on-site observations supposed surround-type courtyards which already are or have a potential to create positive space, work mainly for social and optional activities. The pathway and undefined public open space work mainly as a transit zone.

However, observation results showed that surround-type courtyards play an important role also for walking through, making short cuts to some everyday destinations. Moreover, poor provision of urban design elements prevents the potentially positive space to support optional and social activities. On the other hand, path shape open spaces which offered sitting amenities, or small playgrounds had individuals using them. The existence of street furniture encourages peoples' use of public space including social interaction [7], [14]. Undefined open space which was formed as a result of the space left over between parallel blades spatial configuration and large scale semi-closed open space showed active optional and social activities. Here provision of urban design elements consists of self-made benches and self-repaired original swings, climbing frames and a sand box. Undefined open space which resulted from the high-rise towers surrounded by long blocks, appeared to work mainly as a transit area. Moreover, no self-made amenities were present in this type of spatial configuration. Comparing different spatial organisation types, with similarly poor recreation amenities, the active social and optional activities happened in the public open space which does not provide car parking opportunities. Here the undefined open space is faced by the building backyards, so the car parking is organised on the other side of the building blocks.

Table 3.2.

Examples of different spatial configurations and activities in the open spaces of *Jugla* large-scale housing estate

Site layout (with red rectangles showing which side of the building has entrances)	Type of spatial configuration	Entrances facing the public open space	Provision of amenities	Main activities	Other activities
	Surround-type	Yes	Self-made swings, 3 sand boxes (2 in a bad condition), bench next to the sand box	As a transit zone, car parking	Recreation (use of self-made children's swing and sand box), car cleaning, recreation on a lawn
	Undefined (Nr. 1)	No	Self-made swings, benches (tires). Sand box, climbing frame	Recreation: passive (sitting alone or in a group, drinking, watching children playing, dogs walking), active (children playing, running around), as a transit zone	Feeding cats, birds; Cycling, children playing ball
	Parallel blades (Nr. 3)	From one side	bench	Transit, car parking	Recreation passive - sitting
	Parallel blades (Nr. 2)	From both sides	Sand box, self-made bench and self-installed slides	Transit, car parking	Recreation passive – sitting, children playing on a small playground with sand box and slides
	Parallel blades (Nr. 4)	No	None	None	None
	High-rise towers surrounded by long blocks	From various sides	Original amenities from one side (various climbing frames), a bench from the other side	As a transit	walking dogs, sitting

Large-scale housing estates in Riga represent various types of spatial configuration. These configurations can be divided into 3 main patterns: Positive spaces or the space which has a potential to become a positive space, path shape and undefined space. Public open space with similar characteristics: spatial configuration, building hight, may function differently due to provision of amenities for necessary, optional and social activities and depending on the allocation of building entrances, which may encourage more active pedestrian and car flows.

Comparison of the three different spatial configurations showed that spatial structure has certain impact on the usage. Path shape public open space appeared to be among most unsuccessful solution, comparing to the analysed positive space and undefined space formed by combination of structures created by 5-storey building blocks. This type of public open space was used mainly as a transit for both pedestrians and cars. Also, undefined open space created by high-rise towers showed almost no optional and social activities. Moreover, if comparing to other cases, only this spatial configuration did not have any self-made recreational amenities.

Still, the usage of public open space isn't influenced exclusively by the spatial configuration. Comparison between the same path shape spaces with different level of amenities showed that provision of amenities ensures certain uses. Still transit remains the main activity, except for the open space with no paths and amenities. This kind of approach might play a crucial role in provision of quite backyards and offering pleasant views from the window. This issue might appear the most important for well-being of elderly and people with disabilities.

Open space which according to spatial configuration has a potential to work as a positive space loses this opportunity due to undefined function and unclear uses. Poor provision of urban design elements prevents the potentially positive space to support optional and social activities. In the level of social and optional activities crucial appeared separation from the car parking and car movement. Similarly, poorly equipped open spaces with self-made recreational amenities were used differently. Undefined open space was classified as a negative space which can't function for social activities. However, the analysed undefined open space, which is faced by the building backyards and is separated from car flows and parking showed more diverse and active social and optional activities comparing to the surround-type courtyard which was supposed to have the potential to work as a positive space. Here it can be assumed that two buildings with entrances facing the open space, the car parking and the shared pedestrian-car road along the building facades with entrances provoked the use for a transit as the main activity.

3.2. Open Space Quality Transformations in Large-Scale Housing Estates

The developed residential environment evaluation tool to measure existing situation and the impact of transformations on the quality of the open space has been tested in large-scale housing estates in Riga. Assessment was conducted in 13 large-scale housing estates [42], inventory done for open space areas in the mentioned large-scale housing estates (Fig. 3.6),

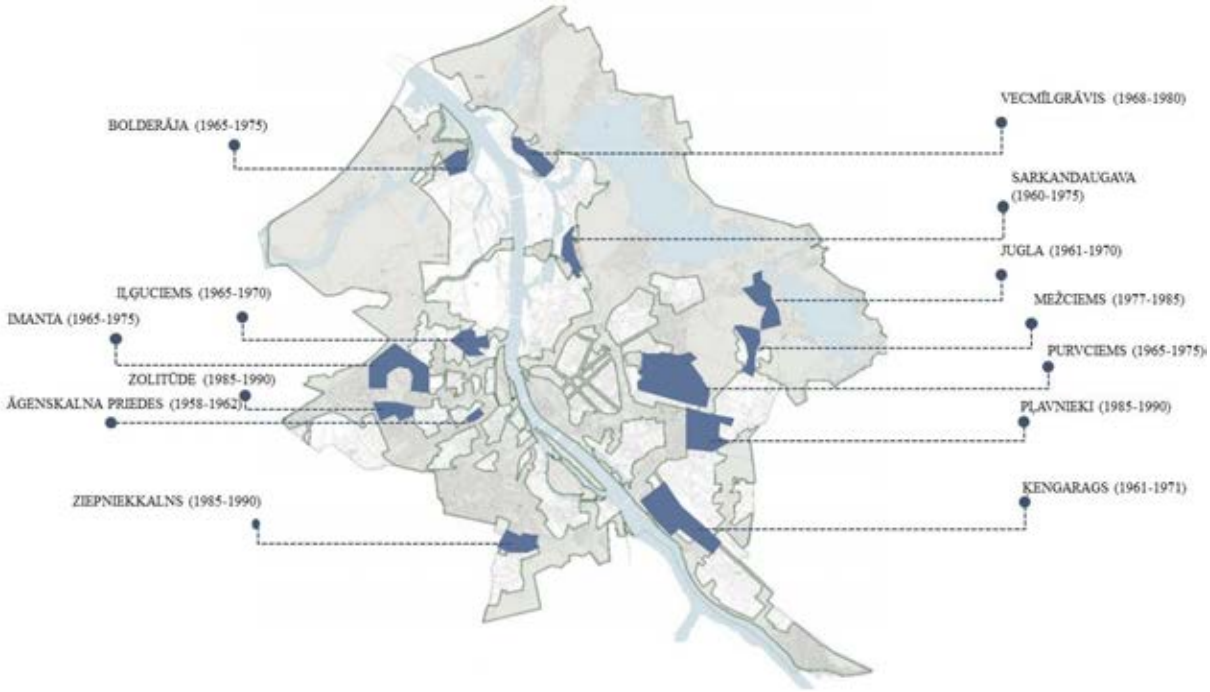


Fig. 3.6. Location of large-scale housing estates in Riga showing name and period of construction.

As a result it was possible to track the type and amount of transformation processes in large-scale housing estates, which have different characteristics in terms of construction period, scale, density, open space type, land devision etc. Transformations were tracked in relation to the human needs:

1. Comfort and rest;
2. Social interaction, the need for sociopetal environments that facilitate social interaction;
3. Privacy, the ability to regulate the amount of contact with others;
4. Security, the need to feel safe;
5. Clarity, the need for ease of movement and legible environment;
6. Convenience, the ease of accomplishing tasks at the domestic, neighbourhood, city scales;
7. Identity, the relationship between self and environment encapsulated in the notion of sense of place.

And the presence of disorder, which negatively influences the quality of open space.

Comfort and Rest: Ensuring Needs of Different Inhabitant Groups / Activities. Transformations related to the comfort and rest are presented by various opportunities for passive and active recreation provided by the introduction of urban design and natural elements. Variety of sitting choices, play areas, exercise areas and protection from environmental conditions are amongst those insuring the need for comfort and rest. The situation with recreational spaces formed by amenities for sitting varies in different neighbourhoods. So in *Jugla* and *Ziepniekkalns* there is noticed constant lack of sitting amenities. Probably, for that reason in Jugla variety of self-made sitting places exist: tires original and coloured, chairs from home, log of wood, plywood plates etc. On the opposite in *Zolitūde* variety of old but in good condition sitting amenities are present. In certain open spaces of Ķengarags, Imanta, Iļģuciems are installed variety of new benches, still the distribution within one neigbourhood is fragmented. For example, in *Ķengarags* part of open spaces has new recreational amenities, and the other part remains with old broken benches, which fosters people to introduce DIY design (Figures 3.7 and 3.8). Often, the broken benches remain on their places, and the new features are installed in different location, which makes greater contrast between old/broken and the new. The reason for this in certain cases is land ownership – new benches are installed on municipal land, but the privatly owned territories remain with degraded broken amenities.

Fig. 3.7. *Zolitūde* large-scale housing estate: children playground and tyres as self-made benches, July 2020.

Fig. 3.8. *Jugla* large-scale housing estate: self-installed wooden bench for passive recreation, May 2020.

New fully equiped recreational spaces for children and exercise area for adults exist in each neighbourhood, but in particular open spaces. Usually these new amenities are located in the surround-type or semi-closed open spaces or on the fringe outside the estate. The graphical information presents an overview of activities and amenities residents have in direct proximity to their home, in 10 and 15 minutes walking distance. Not each open space within the large-scale housing estate needs to be equiped with amenities for the diversity of inhabitant groups presented in the area. Still as defined by Sola et al. [177] certain basic amenities like small children play areas, sitting amenities, parking facilities (car, bicycle), waste disposal areas, should be located near home. Then, larger children play areas, excersice areas and other recreational amenities can be located in the ten-minutes walking distance.

Proximity analysis allows to figure out geographical distribution of various amenities and define the areas which require special attention. For example, in *Jugla* large-scale housing estate three complex recreational areas with children's playgrounds and exercise amenities for youth and adults have been built, and the geographical distribution of these recreational structures allows to reach them in a maximum of ten-minute walking distance. In *Mežciems* multifunctional recreational amenities for different user age groups have been created on a fenced territories adjacent to schools, thus residents, who live closer to *Malienas iela* need to spend more than 15 minutes walking to reach these amenities. In *Āgenskalna priedes* large-scale housing estate there are three children playgrounds reachable in five minutes walking distance, but no exercise facilities for youth and adults have been installed in the estate. In *Ziepniekkalns,* one complex play and excersize area for children and adults has been placed in *Ēbeļmuižas park* and the other in *Ozolciema* open space. Smaller, but still fully equiped children play grounds are located 1). behind the vending kiosks on *Valdeķu* street, 2). next to municipal housing on *Dižozolu* street, and 3). next to cooperative housing on *Ozolciema* street, 4) Valdeku 68 k-2. Other open spaces have old play amenities, which are partly broken and decayed.

Fig. 3.9. Fenced multifunctional active recreation space on the school territory in *Purvciems* large-scale housing estate. June 2021.

Fig. 3.10. Fenced multifunctional active recreation space on the school territory in *Mežciems* large-scale housing estate. May 2021.

In recent years sports and active recreation fields have been developed on the secondary school territories in several large-scale housing estates of Riga. The new active recreation territories have been ordered by Riga City council Property department and realised by professional constructing companies [233]. In some cases transformations have affected also the territories adjastent to school territory. So, in case of *Imanta* large-scale housing estate in addition to the school's outdoor space, also 3 200 m^2 of open space adjastent to school has been transformed and now supports multifunctional active recreation. Similarly also in *Purvciems*, *Mežciems*, *Jugla, Pļavnieki* and *Ķengarags* school territories were developed (Figs. 3.9. and 3.10). This initiative provides an opportunity for diverse active recreation of different age groups, with exercise amenities, futball field, basketball field, tenniss etc. Specific amenities

are installed in the children play area with structures suitable for 0.5 till 5 years old children, variety of structures for children starting with the age of 2 or 3. Still certain restrictions exist. These fenced territories have specific working hours which change depending on the study time or during school vacations. Thus, for example in *Mežciems* multifunctional active recreation territory (Fig. 3.10.) is publicly available from 7 AM till 10 PM (in the period from 1 June till 31 August). In the period from 1 September till 31 May public availability on working days is limited to 5 PM till 8 PM and from 8 AM till 8 PM during weekends, natinal and school holidays. Similar restrictions are present in other examples.

In the results of the study related to the proximity concept in Sweden children play areas were defined as the activity recommended near home. Similar acknowledgments related to the distance to recreational space and children play areas come from World Health organisation reports [248]. It is stated that "having areas for play in the immediate vicinity from home is of huge importance. Children with closely located play areas / park playground are more likely to have healthy weight [248]. Following this it may be assumed, that some smaller scale children play areas are necessary in direct proximity to home.

In the beginning of the 2020, the new safety requirements for playgrounds and recreation areas were approved. These requirements are related to public children's playgrounds outdoors and indoors. Before that, the normative acts didn't have specific safety requirements, which currently are clearly defined and regulate also children's playgrounds in the open space of large-scale housing estates. According to this, all playgrounds must be evaluated by July 2021. Responsible are residents of the estate or the housekeeper, if the following authority has been granted. This process aims repair, change or removal of unsafe unmatching amenities. This allows to suppose that old often broken recreation structures will be removed from the open space. However, in some cases this may cause dissatisfaction as in certain cases local inhabitants adjust old broken recreational structures with self-made elements, and most probably feel attachment to those places. It is important to follow up introduction of new recreational amenities especially on the sites where old structures were combined with self-made ones.

Fig. 3.11. *Ziepniekkalns* large-scale housing estate, new children playground in Ozolciema iela open space, October 2020.

Fig. 3.12. *Ziepniekkalns* large-scale housing estate, exercise amenities in Ozolciema iela open space, October 2020.

Demand for comfort and rest is often answered with the self-made recreational amenities. Besides self-made benches, also self-made, self-installed amenities for active recreation are

present: small plastic slides, swings, which are fastened to tree branches or old swing frames, which have already lost their original details.

The domain of natural elements has strong connection to the comfort and rest. It supports recovery from stress and general well being of residents. Natural elements were proved to be of importance and encrease the quality of residential environment in all analysed open spaces. As defined by M.Carmona the required features include the presence of trees and grass, and the aspired ones integrated natural features and diverse ecosystem. Riga's large-scale housing estates are mainly rich with natural elements, and almost each analysed open space contained more than three types of trees and different types of bushes.

Certain open space in case of parallel blades spatial layout does not have any amenities, and moreover does not have any pathways, which makes clear that the active use of this space was not intended. These are the spaces in "the backyard", which do not provide entrances to buildings. However, such spaces may have great importance when ensuring connectivity of green zones, in summer may have certain noise reduction effect, and have positive impact on air quality. Many studies prove that even seeing greenery from the window improves people health and wellbeing. So, for those with limited mobility, such pleasant view from windows might be the major opportunity to stay connected with nature.

As many other cities in Europe, also Riga Development strategy until year 2030 sets compact development among its aims [232]. New apartment houses or housing complexes are often developed inside or on periphery of large-scale housing estates, which allows the use of existing infrascturcture: public transport, educational, health and shopping facilities, parks etc. Infill development in large-scale housing estates is the phenomena occuring in many European cities.

In Riga division of land parcels and ownership allows developing construction within open space of large-scale housing estate. Infill development in large housing estates often causes variety of threats, like creation of gated communities and social segregation. Moreover, privatisation of public open green space and housing densification often raises dissatisfaction within the existing community. According to LBN 211-15 "Dzīvojamās ēkas" distance between the longitudinal facades should be at least 15 m for 2- till 3-storey houses and at least 20 m for 4-storey and higher buildings [256]. Between the end facades with windows, or between end facade with windows facing the longitudinal facade at least 10 m. These regulations were developed based on minimal requirements to ensure insulation and psychilogical comfort of residents. Still those minimal distances in case of new developments raise unsatisfaction of local residents in certain cases.

Thus the question of compensation to prevent negative attitude and unsatisfaction of local inhabitants is very important. Infill development is included in the section comfort and rest as in many cases adjastened territory of these new developments has also certain recreation amenities or new natural elements.

New residential development is present in each neighbourhood, still only in 9 estates new housing has been developed as infill, in the courtyards or on perimeter next to existing buildings. In some neighbourhoods, new residential construction is quite intensive, but all development is outside the large-scale housing estates. So, in *Zolitūde* there is no infill

development, but construction on periphery next to the estate is active, with already 5 housing complexes (with number of houses varying from 2 to 6 in one complex) being built. *Bolderāja* is characterised with very active construction of municipal housing both inside, and on periphery where according to original plans construction was planned but wasn't realised.

Table 3.3.

Types of residential infill development projects in Riga large-scale housing estates

(By the author using on-site observations and data available in 2019)

Large-scale housing estate	Year of large-scale housing estate construction	Number of infill develop-ment	Type of infill development			Public functions on the ground floor	Outdoor recreation amenities accessible only for residents of the infill project	Public recreation amenities access-ible for all
			Fenced	Partly closed	Open			
Āgenskalna priedes	1958-1962	1	-	1	-	-	1	-
Sarkandaugava	1960-1975	1	-	-	1	-	-	-
Jugla	1961-1970	0	-	-	-	-	-	-
Ķengarags	1961-1971	3	3	-	-	1	2	-
Imanta	1965-1975	6	4	-	2	1	3	2
Purvciems	1965-1975	10	2	3	5	1	4	4
Bolderāja	1965-1975	2	-	-	2	-	-	2
Iļģuciems	1965-1970	2	1	-	1	-	1	-
Vecmilgrāvis	1968-1980	1	1	-	-	-	1	-
Mežciems	1977-1985	1	1	-	-	1	1	-
Pļavnieki	1985-1990	7	3	3	1	2	4	2
Zolitūde	1985-1990	0	-	-	-	-	-	-
Ziepniekkalns	1985-1990	5	-	-	5	-	-	1

The analysis of infill development in large-scale housing estates in Riga shows that it's a popular type of residential development, still some neighbourhoods show much more intensive infill growth, while others do not have any infill development at all. This situation can be explained by several aspects, as the tendency to develop new construction in neighbourhoods with originally higher real estate prices, and also impact of courtyard land devision, which in certain cases makes development of new housing easier.

Analisys of the provision of public functions and recreation opportunities showed:

- Integration of some public functions in new projects appeared not that popular, with only five projects having public functions on the ground floor;
- Children playground are the most popular outdoor active recreation facility;
- Recreation facilities for other inhabitant groups are usually limited to benches and opportunities to observe the green or built environment around;
- Some other types of active recreation, like large chessmen or ping pong playing facility have been observed on fenced elevated territories, which are accessible only by residents of infill project.

The fact that almost half of analysed infill projects offer closed outdoor recreation facilities intended for use only by residents of infill projects, proves the theoretical data about people with higher income and their perception of public space. The outdoor environment is seen as dangerous or simply annoying or uncontrollable, and so the gated community becomes a solution, to ensure more comfortable living conditions. However, about 1/3 of analysed projects offer also open type recreation environment, which shows that tendencies are quite different.

Despite the fact that there are different open space user groups observed in large-scale housing estates, new infill development with open outdoor facilities focuses mainly on provision of children playgrounds.

Social Interaction: Active and Passive Engagement in Social Activities. Social interaction is closely related to the transformations which support comfort and rest. A high-quality outdoor space can enhance social interaction by attracting people to come and stay for some time. The more time people spend in the open space, the more likely they will interact with each other [118]. Social activities allow to create neighbourhood contacts and trust in neighbours.

Additionally, to urban design elements, which can encourage active social engagement (playing together, doing sports together), or passive engagement (watching other people doing sports, playing etc.). Landscaping and natural elements can act as a tool for more diverse activities (Figs. 3.13., 3.14.). Unfortunately, open space in large-scale housing estates is in general flat, and landscaping is rarely present.

Fig. 3.13. Recreation in *Ziepniekkalns* large-scale housing estate, using the landscape for sledding. Winter, 2021.

Fig. 3.14. View of the flat landscape in large-scale housing estate *Jugla*. Winter, 2021.

Privacy: The Ability to Regulate the Amount of Contact with Others. Often this is the most critical issue in open space of large-scale housing estates. According to residents' survey results lack of privacy and lack of more quiet places in the open space of large-scale housing estates restricts certain uses: eg. reading a book or working outdoors. On-site observations showed that sitting amenities are often located next to the entrance doors (eg. *Jugla, Ķengarags*), next to children play areas or exercise facilities, or somewhere in the middle of the open space overlooked from all sides and also from windows. Rare cases of recreation spaces where the amount of interaction with others can be regulated were observed in

Ziepniekkalns (landscaped territory next to the cooperative house), in *Ķengarags* (old partly broken sitting amenities, but covered with large bushy greenery which covers the views from all 4 sides), in *Mežciems* self-made recreation place hidden behind luxuriant bushes, in *Iļģuciems* and *Sarkandaugava*, where some recreational amenities are due to relief differences located on a raised level and so separated from the main car/pedestrian flows. Thus, there is almost no place for quite recreation and place, where the amount of social contact can be minimised.

Security and Safety: Impact Form the Main Stressors in Open Space of Large-Scale Housing Estates. This need has been investigated in relation to transformations which comprise road /path surface improvements, lightening, clear sightlines. Presence of stressors/disorder was analysed as a feature preventing feeling of safety and security. In general the main stressors or the indicators of disorder are broken pathways/ paths and roads with holes and cracks, which have been among disorder elements in majority of open spaces in *Imanta, Iļģuciems, Zolitūde, Ziepniekkalns, Sarkandaugava, Mežciems, Āgenskalna priedes.*

Improvements of road surfaces are directly connected to the transformations initiated by proprety owners. Every year, within the framework of the open space revitalization program, the Riga City Council repairs the access roads between the quarters and puts the adjacent territories in order. Priority are roads with easement or heavy traffic. However, it should be understood that the municipality repairs only those roads that are under the control of the municipality. Priority is also given to roads leading to educational and medical institutions. If roads and sidewalks cross private property in the open space of the estate, the owner is responsible for their technical condition.

Also vandalism in form of graffiti and tags has been among main disorder elements in all neighbourhoods. As the third most often noticed indicator was lack of car parking places, which resulted in illegal parking on green or pathway zone. Here it is crucial to conduct observation in the evening during working days, as during the day and in the end of a week problem might seem “not existing”. The same is related to lightening, the real situation can be measured only in the evening. Littering in all neighbourhoods appears mainly only around waste containers, with just some exceptions when empty bottles are near to sitting amenities, or in large open spaces with undefined function, which work mainly as transit zones and areas for dog walking (eg. In *Ziepniekkalns*).

According to the Broken window theory visible signs of anti-social behaviour, crime and vandalism create an environment which provokes further anti-social behaviour. Certain studies which focused on relations between objectively measured incivilities and fear of crime showed that this relationship depends on the overall situation in the neighbourhood. Social and physical incivilities had moderate influence on perceived fear, and mostly in neighbourhood with undefined/unstable future [151], [153]. This may mean that in case the large-scale housing estate is undergoing regeneration, the above-mentioned signs of vandalism/graffiti will not have major impact on people perceived fear of crime. Many researchers have argued that physical disorder contributes to residential mobility, as it reduces residential satisfaction with neighbourhood. Also, certain studies identify correlation between perceived neighbourhood disorder and health, depression, psychological distress etc.

Convenience: Identification of Necessary Activities in the Open Space. Necessary activities, which means ease of accomplishing tasks at neighbourhood level, are those like car and bicycle parking and waste disposal. Drying clothes remains topical in certain neighbourhoods, so original drying structures are still usable (In *Jugla, Vecmilgrāvis, Iļģuciems*). In some cases, like in *Āgenskalna priedes* residents hang drying cord between the trees.

Fig. 3.15. Drying laundry in the open space of *Ilguciems*, June 2020.

Fig. 3.16. Drying laundry in the open space of *Jugla,* June 2020.

Convenience is strongly related to the ease of movement in the neighbourhood. Unfortunately, environmental accessibility is among the weakest issues in almost all large-scale housing estates of Riga. In *Sarkandaugava* landscaping and original path surface plates which were deformed by the tree roots create paths which appear unusable for people with disabilities and dangerous in general in case of bad lightening. Even after road surface renovation and installation of new surfaces adjusted to the building entrances, level changes remain (eg. *Ķengarags*). In some cases, new pedestrian path surfacing which was introduced within the new residential infill development transforms the pathway into inaccessible. For example, in case of *Imanta* infill development pavement was used. Birch tree roots have damaged the pavement surface.

Despite discussions related to the quality of residential environment, also nowadays the whole open space areas are transformed into car parking. E.g. *Ziepniekkalns* shows the transformation of the open space comparing autumn 2020 and spring 2021 (see figs. 3.17, 3.18)

Waste collection solutions in many studied cases appeared to provoke disorder. Open waste collection containers, often located in the centre of the open space may cause disorder as the area around them is often being littered. Variety of more or less successful solutions for waste collection can be found in new residential projects in Riga. Still some new projects have traditional open view waste container solutions. Examples from other countries in Europe show waste collection conteiners are often hidden under the wooden shelter, sometimes wooden shelter overgrown with greenery, behind concrete walls, and walls with greenery, behind metal fences, or hedges. Examples from Sweden, Gothenburg and Malmo show solutions of kiosks / small buildings, which may have several functions: waste collection, place to keep working tools, toilet, etc.

Fig. 3.17. Open space in Ziepniekkalns, unfenced green area in October 2020.

Fig. 3.18. Open space in Ziepniekkalns, fenced territory still green, but transformed into car parking in April 2021.

Identity. The relationship between self and environment encapsulated in the notion of sense of place. Sense of community and attachment to place play an important role in ensuring well-being of different inhabitant groups: the elderly, adolescents, individuals of different nationalities, and residents either of high- or lower income [112]. The feeling of belonging is related to good mental health. For that reason, it is argued that feeling oneself as a part of community is crucial for inhabitants regardless their age, gender or nationality.

Territorial functioning or bottom-up initiatives, citizen activism is one of the most important aspects in large-scale housing estates. Territorial functioning shows people attachment to place, displays their care about the outdoor environment, in certain cases also helps to identify semi-public space. All these characteristics are crucial for territorial reinforcement.

Moreover, these signs of personalisation and more direct signs of protection, may give a non-verbal message of control, and separation from outsiders. It is expected that potential offender if being or crossing the territorial boundaries, will get “the message” that neighbours can call police, or take other measures to protect that territory. Teritorial reinforcement is one of the Crime Prevention through environmental design strategies. According to Perkins et al. the breakdown of the social surveillance are expected to happen in “gaps” between territorial boundaries.

Citizen led initiatives have been observed in all 13 large-scale housing estates in Riga. The most common is beautification of the territory adjastent to the building (Figs. 3.19, 3.20). Garden beds are created in front of the house and in the “backyard”. Short interviews with inhabitants in Imanta showed that creation of flower beds in front of windows is not only beautification tool, and person’s individual wish to do gardening, in certain cases it functions as a directly “prevention” strategy, to prevent dog littering, and people walking just in front of windows.

The most crucial and common problems which prevent raising the residential environment quality are unsatisfactory level of environmental accessibility, lack of privacy or the opportunity to regulate contact with others and also monotonous recreation opportunities. Certain transformations like the new infill development or the road surface repair hasn’t solved

the issue of inaccessible environment. This means that those transformations decreased the quality of residential environment.

Recreational amenities are often exposed and overlooked from all sides. From one side, according to the crime prevention through environmental design principles, this allows to feel safe. From the other it limits certain level of privacy.

Fig. 3.19. Self-made flower beds in *Ķengarags*, September 2020.

Fig. 3.20. Self-made flower beds in *Bolderāja*, October 2019.

Currently open spaces are gradually adjusted with children's playgrounds and exercise areas, with benches. However, solutions are often standardised and don't create any identity of a place. Here involvement of locals in co-design and co-creation might solve the issue of monotonous standard solutions.

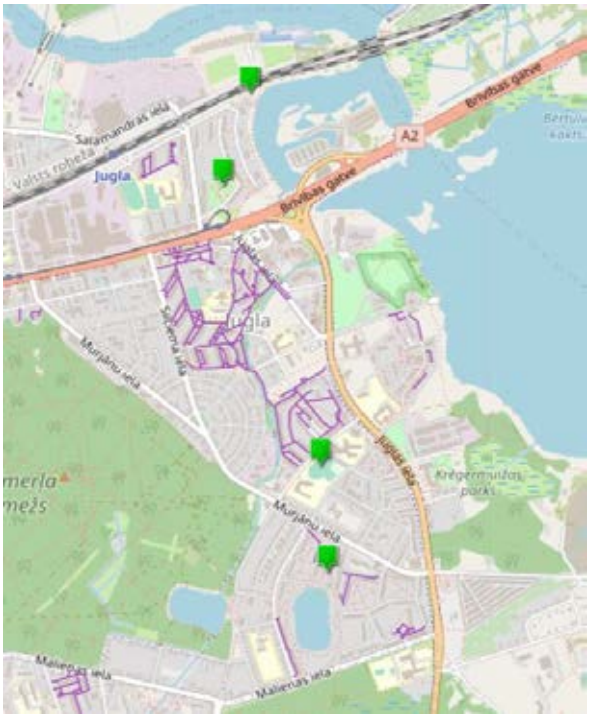


Fig. 3.21. Map showing renovated road surfaces and distribution of new children playgrounds in *Jugla* large-scale housing estate.

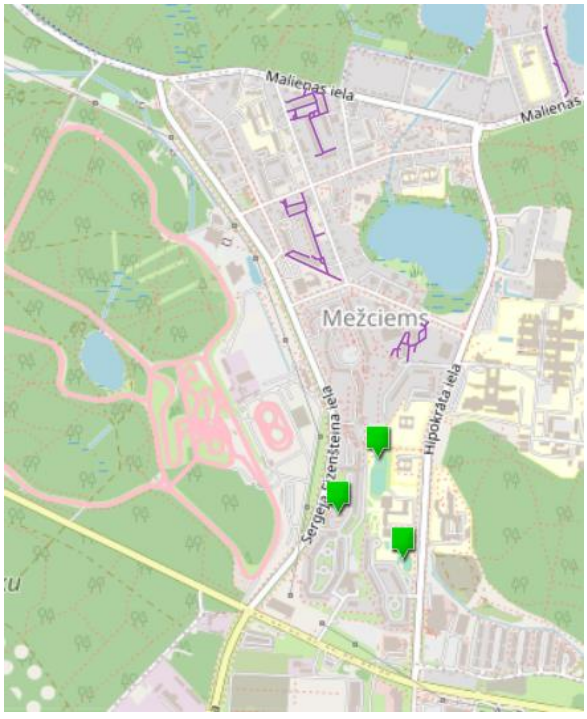


Fig. 3.22. Map showing renovated road surfaces and distribution of new children playgrounds in *Mežciems* large-scale housing estate.

Transformations aimed at road surface improvement and introduction of new recreational amenities are fragmented (Figs. 3.21, 3.22). The main reasons for this is the fragmented land division with different ownership, and also necessity of house residents to make collective decisions. It is seen through all large-scale housing estates that in case there is lack of some amenities, inhabitants prefer to act individually with guerrilla initiatives instead of fostering legal transformations with collective involvement. Exclusion is a growing tendency of installing prohibitive parking signs on the collectively owned territory adjusted to a certain house. This is a result of battles for car parking places when inhabitants of a certain building in that way are ensuring certain amount of parking places in front of their house.

Although Riga's large-scale housing estates show variety of problems, like unsatisfactory level of environmental accessibility, lack of and monotonous recreation opportunities, lack of privacy, current transformations solve only part of these problems. Thus, an analysis of current situation and inhabitants' needs is crucial before introducing transformations.

3.3. Correlation Between Residential Opinion and Open Space Transformations

Residential satisfaction surveys allow to complete objective evaluation data with subjective residents' assessment. There are two main approaches in the satisfaction studies: general satisfaction and assessment of satisfaction with various aspects of the residential environment [92], [128]. The satisfaction of a resident can vary depending on many factors; for instance, the standard of comparison individuals have in mind when responding to questions on residential satisfaction and various aspects of the environment (e.g., based on the way these are used by the resident; [102], [111] for a discussion on why residential satisfaction usually proves to be relatively high across various conditions). Therefore, it is unlikely that a single question about satisfaction with the residential environment could be an accurate measure of what residents really think about their environment [149]. It is important to assess subjective evaluation towards various aspects, and to collect general data on respondents, which may highlight interrelation between individuals' characteristics and certain assessments.

Based on the literature review about large-scale housing estate residential satisfaction studies and survey methods, online residents' survey has been carried out. The target respondents were residents of large-scale housing estates in Riga (from *Jugla, Imanta, Purvciems, Ziepniekkalns*). These neighbourhoods were selected as representing different construction periods and different scales.

The aim of the survey was to find out how satisfied are housing estates' inhabitants with the open space in their estate, how do they use open space and what is their attitude towards various present, ongoing transformations, and towards possible future transformations. In this case the question about satisfaction with the open space allows to suppose the link between current uses and level of satisfaction.

Questionnaires were developed in two languages: Latvian and Russian, to ensure respondents chose the most convenient way and understand all the questions. The Likert-type scale was used to measure respondents' satisfaction with various components of the open space, and to rate the attitude towards present and possible transformations. The sample size was calculated taking confidence level set up to 85% and the margin error to 10%.

The survey consists of 12 questions related to general satisfaction with the open space in the large-scale housing estate, and satisfaction with specific attributes (present allowances, present and possible transformations), and 12 general questions, which contained also questions about the period of residence in the estate, the place of residence, the ownership of land etc. Some questions were adapted from the surveys "Residents' survey about life in the neighbourhood" conducted by SIA "Aptauju Centrs" in 2013 [213], [214], [216]. However, majority of questions were developed specifically for this study, as the focus is on transformations in open space.

Questionnaire Pilot Testing. Questions were tested within a small group of 10 people from different age groups and gender. The aim was to evaluate the structure of the survey, questions and proposed answers. As a result, the structure of the survey was adjusted, as well as certain answer options were transformed and added.

Questionnaire Adjustment. In addition, according to the opinion of experts in sociology and anthropology, questionnaires were completed with the questions about the more precise place of residence and questions about NIMBY (not-in-my-backyard concept). Also, the question about new residential infill development in the open space of large-scale housing estates was restructured.

Questionnaire was completed by 240 respondents; genders were divided as follows – 168 women and 72 men. All defined inhabitant groups have been represented (<18, 18–24, 25–34, 35–44, 45–54, 55–64, >65). The most active involvement was from the three age groups 25–54. Majority of respondents live in large-scale housing estate more than 5 years, with about 70% living in estate more than 10 years. Majority of respondents are owners of the flat, where they live. More than 60 % of respondents in all estates, where the survey was conducted have higher education.

Results are divided in three main sections: current state and use of open space in large-scale housing estates, attitude towards transformations which already happened. Attitude towards possible transformations, wishes and needs.

Majority of respondents are totally unsatisfied or more unsatisfied with the open space in the estate. About 75% of respondents from *Purvciems* are not satisfied with the quality of open space in the estate, in *Imanta* this number is approx. 64 %, in *Jugla* about 77 %, in *Ziepniekkalns* 75 %. This data can't be compared directly to the survey conducted in 2013 [213], [214], [216], which focused on the whole neighbourhood (not only large-scale housing estates), still some parallels can be made. Already in 2013 answering questions about features that need improvement, people mentioned courtyards' amenities.

Now in 2021, the most often use of open space is car parking, on the second place is walking, walking the dog, and walking with children or grandchildren. The open space is rarely used for reading, as a picnic place (for eating, drinking) (Fig. 3.23). Also, respondents with children under 18 mentioned that they don't use open space for recreation or use it 1–3 times a week.

Among the main reasons for not using the open space in large-scale housing estate: people mention unsatisfaction with spatial organisation, unsatisfied with the amount and variety of recreational choices and unsatisfied with maintenance, as well as a reason mentioned "are spending free time in other nature territories (parks, forests, lake side etc.)". The most desired additional features in case of recreational amenities like benches and playgrounds already exist, would be flower beds, meadow flowers, grill place, sheltered space as protection from environmental conditions, pergolas with growing plants and also landscaping.

Mentioning transformations noticed during the last 10 years respondent mentioned more often repair of road/path surfaces, installed new signs (also signs for easier orientation), and bottom-up activities of residents - self-made garden beds / self-grown flowers. Over 90 % of respondents would like to see new trees and flower beds, would like to see ensured environmental accessibility for people with disabilities, and installed separate dog waste bins.

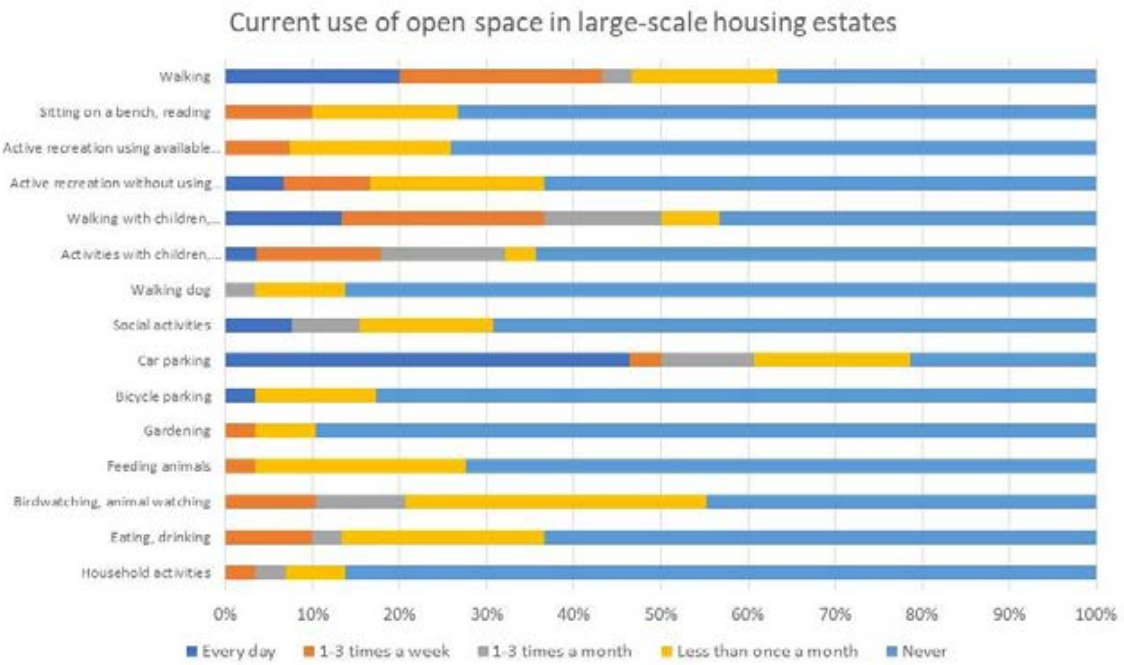


Fig. 3.23. Current use of open space in large-scale housing estates, general data from all 4 estates, total number of respondents 240 [survey conducted by the author in 2021].

Question about desirable and undesirable transformations included in answers the concept of NIMBY, which means not in my backyard. This phenomenon describes how communities stand against any developments in close proximity to their place of residence, regardless the positive or negative outcome is generated. As main reasons appear lack of trust, fear of changes and fear of newcomers/new users of place. The phenomena can be also attributed to the phenomena when in general idea of certain development is accepted, still realisation should take place in other location. When considering general improvements like new children's playgrounds, benches, etc. in relation to the NIMBY concept about ¼ of respondents supported creation of new benches and benches with tables, children play areas, terraces for recreation, new parking areas in close proximity, but don't want it in their "backyard" (Fig. 3.24). This might be connected to the wish to have quieter outdoor environment and more pleasant outdoor views (in case of car parking). Also, majority of respondents have negative attitude towards new infill development, and in their "backyard" in particular.

Maintenance of green areas (grass cutting) appeared to be among satisfactory features, in turn road and path maintenance and repair is on the lower level. On-site observations also showed fragmented character of road maintenance. This issue was explained in the section 3.2., road repair is directly connected to the land ownership. In current case of land division, ownership, and management model the problem is hard to solve.

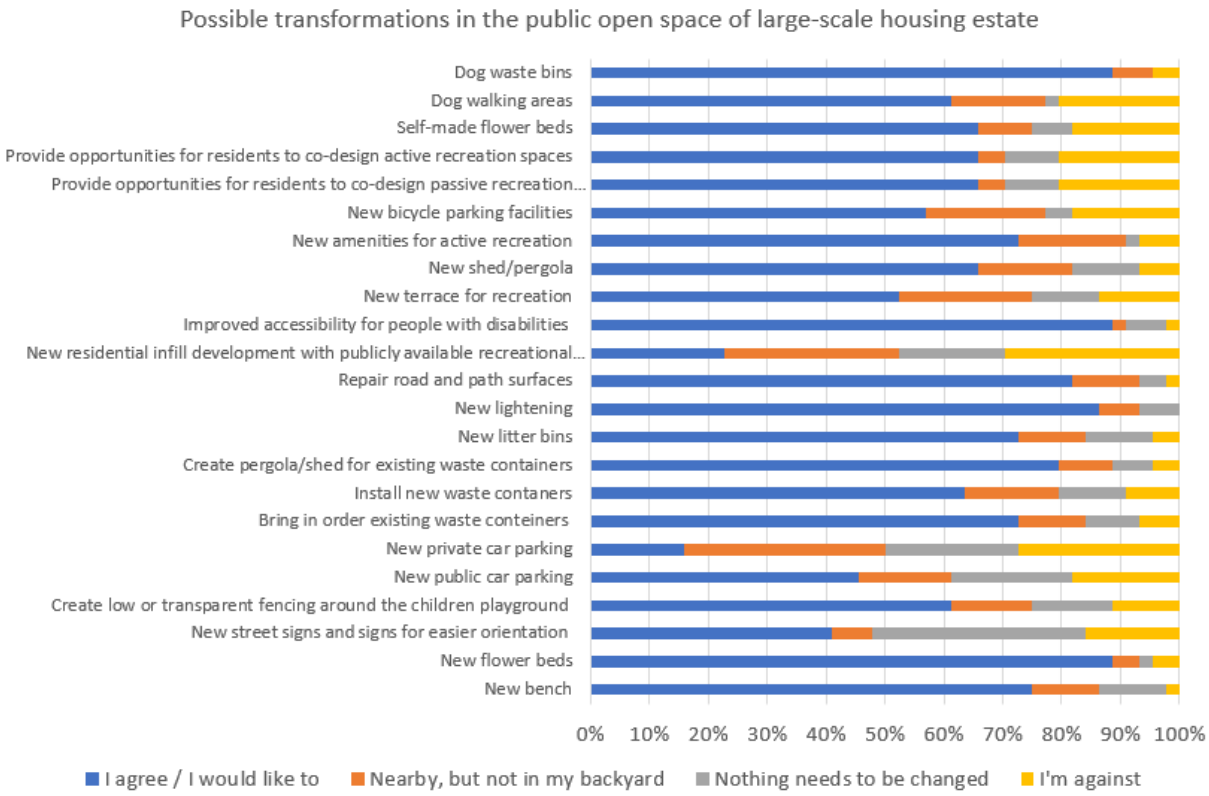


Fig. 3.24. Residents' attitude towards possible future transformations, general data from all 4 estates, total number of respondents 240 [survey conducted by the author in 2021].

Infill development trend is seen in almost all large-scale housing estates. Respondents were asked to evaluate how certain infill development features would make new construction more acceptable or completely unacceptable. Here introduction of new greenery, sitting amenities, play areas and public parking was among preferences. New residential development cannot exceed five-storeys and can't be a private house, also building should be located far enough from existing houses. Negative attitude towards residential infill development higher than five-storeys and private housing was similar in all four large-scale housing estates. So, despite the fact that in *Ziepniekkalns* large-scale housing estate is formed mainly from nine- and ten-storey long building blocks, also here respondents don't want to see high-rise infill projects. Larger part of respondents would also prefer unfenced territories (Fig. 3.25). If comparing this data to the current situation and transformations which already happened, it is seen that these wishes are not identified and so are hardly taken into account. Residential infill development often exceeds five-storeys and is often fenced or partly closed, in worst cases having semi-public open space (open only to residents of that residential building) being raised on a different level and so according to CPTED creating unpleasant environment outside the infill project.

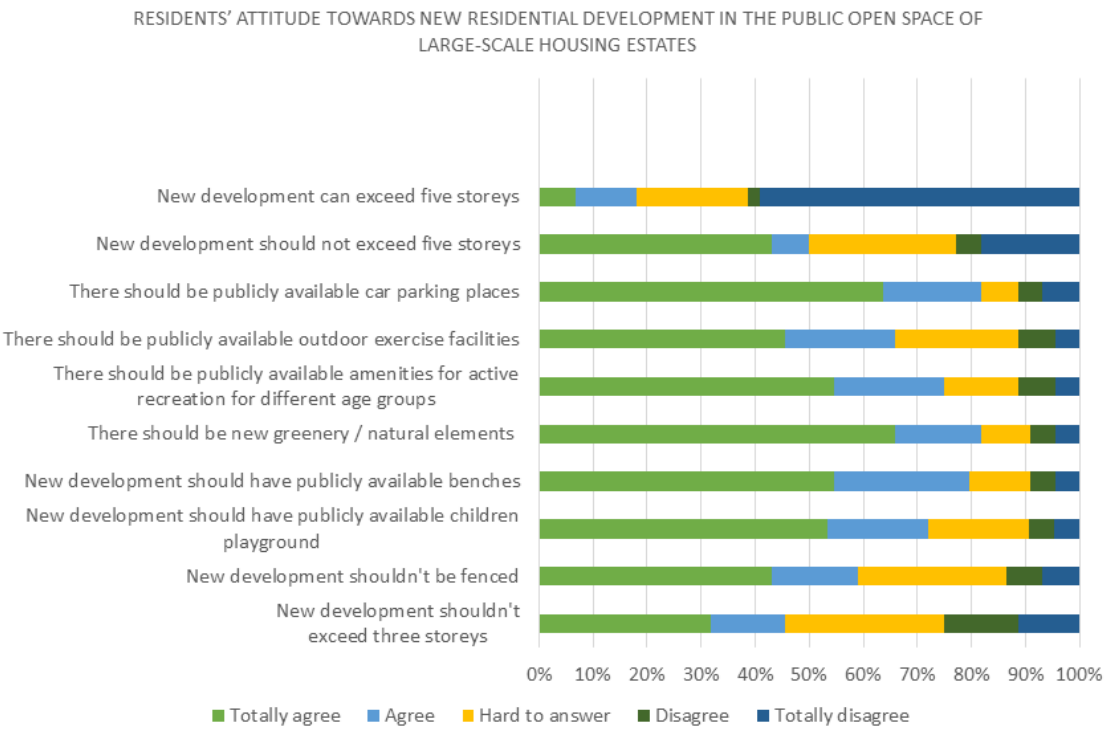


Fig. 3.25. Features, which would make the new residential infill development acceptable by local inhabitants, general data from all 4 estates, total number of respondents 240 [survey conducted by the author in 2021].

Majority of respondents are ready to engage in co-creation, planning and big cleaning days, as well as cooperate with municipality. Still others don't want to engage in any neighbourhood activities at all (Fig. 3.26). This data shows that there are opportunities for more active engagement of residents in co-design and co-creation processes. Also number of positive answers allows to state that in case of new maintenance models, when local community / neighbourhood's association is responsible for community garden or green wall maintenance, were would be a group of locals, who would support the idea and engage. Some respondents who don't support introduction of new natural elements, in contrast support creation of new flower beds or new plants if the local community is engaged in creation or co-creation. In general, residents support engagement of local inhabitants in co-creation of urban amenities. Less positive responses gained wish of respondents to provide financial or material support to foster improvements in the open space, as well as distribution of information from city council. Opinion regarding unique style and identity of each open space was split in almost equal parts: with half of respondents seeking for unique style, and the others considering this unnecessary.

Answers related to the feeling of safety and security have proved the CPTED principles. Here half of respondents mentioned following stressors, which make them feel unsafe and potentially prevent use of open space or make the necessary use uncomfortable. These features are: lack of lightening, disorder/litter, areas which are not overlooked from windows,

overgrown trees and bushes which hide the views, areas where it is difficult to orient, fenced territories, and territories which are not used actively.

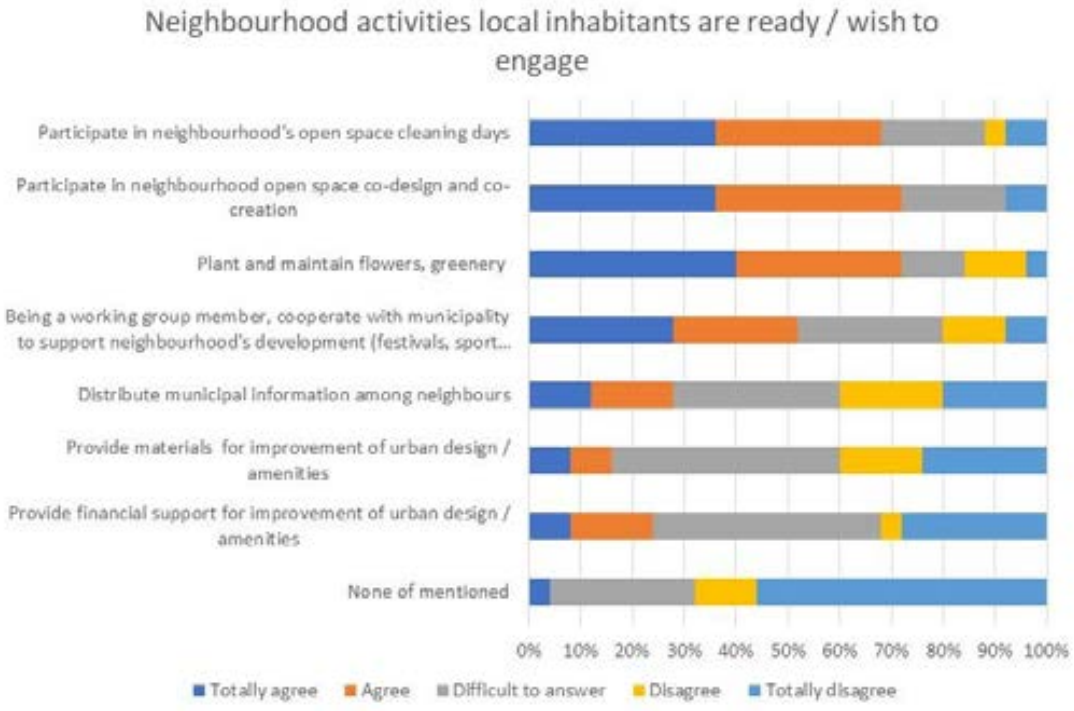


Fig. 3.26. Neighbourhood activities local inhabitants are ready to engage, general data from all 4 estates, total number of respondents 240 [survey conducted by the author in 2021].

In general survey data supports the previously gained data about importance of greenery in large-scale housing estates. Regeneration visions which aim inclusion of large-scale housing estates in the green infrastructure, by creating diverse interconnected nature-based solutions is the way how future of estates could answer social and ecological needs. Positive influence of greenery was proved with variety of answers pointing out wish for new greenery, garden beds, meadow flowers etc. Also, in case of infill residential environment, presence of new greenery was pointed out as a feature, which would compensate the negative effect from open space area decrease.

CONCLUSIONS

1. **Spatial organisation** of open space in large-scale housing estates **is similar** in the Baltics and Northern Europe. Therefore, replicable solutions can be adapted for raising the quality of residential environment. In addition to similarities in spatial allocation of buildings and open space scale, successful adaptation of solutions requires similarities in building scale, quantity and quality of greenery, soil characteristics and other factors.
2. Residents of large-scale housing estates represent **diverse groups with diverse needs** and wishes in terms of recreation and socialisation. Sometimes these needs appear to be in conflict. Planning of recreational amenities on the large-scale housing estate level guarantees interconnection and accessibility of services. This ensures that different inhabitant groups are satisfied with the residential environment quality.
3. **Vast green spaces** appear a distinctive feature of large-scale housing estates, thus, also in the third decade of the 21st century, estates have potential to form a part of city's **green infrastructure**. Examples of other European cities show the ability to develop rich multifunctional green environment which provides a variety of ecosystem services. Some solutions, like introduction of sustainable urban drainage system, are realised with big investments in perspective of five years or even longer time. Still, others, like community gardening initiatives, appear as fast and / or temporary solutions, where the time of approval varies depending on various factors, such as land ownership, complexity of design, and support of the local community.
4. Transformations which take place in open space of large-scale housing estates **vary in type, scale and are generated by variety of driving forces**. While these driving forces have different objectives, their collaboration results can lead to high-quality transformations, which answer the needs of all involved actors.
5. Guidelines and the **good practice guidebooks** are used in many cities across Europe to support both experts and other involved actors in their decision-making and to avoid common problems. Guidebooks address a wide variety of issues, like recommendations on technical solutions or approaches and steps of public involvement in co-design and co-creation processes. Sharing knowledge is crucial when ensuring the same mistakes are not made.
6. Various residential environment quality evaluation tools exist, and such tools **comprise diverse criteria** for quality evaluation. However, these tools do not address the impact of transformations on the residential environment quality in open space of large-scale housing estates. Inclusion of on-site observations and more specific criteria is among crucial aspects in the evaluation of the impact from transformations.
7. Residential environment quality evaluation approach, which has been developed within the framework of this research, comprises an adapted open space quality

evaluation checklist, recommendations on proximity of different functions to home, summary of evaluation techniques and residential satisfaction studies related to open space quality and transformations. Residential environment quality evaluation approach can be used for both evaluation of **the impact from transformations,** which have already happened, and analysis of **possible consequences of future transformations** and search for alternative scenarios. Categories which describe different human needs and stressors are linked to the aspired results and results to be aware of. Improvements in the open space of large-scale housing estates need to be planned as a complex process, analysing the estate situation as a whole.

8. Spatial configuration and building height have certain impact on open space use. 'Undefined space' formed by nine-storey or higher tower blocks, appeared among the most unsuccessful solutions. In their turn, the analysed 'positive space' and 'undefined space' formed by structure combinations of five-storey building blocks, appeared to support social activities. Thus, **pattern analysis is essential before new transformation is introduced**, so that even if the open space gets smaller, the quality increases.
9. Development and improvement of the territory adjusted to the house and being in collective ownership of residents is largely dependent on the **wishes and active engagement of those residents.** Currently visible results of this collective decision-making in relation to open space transformations are seen in relation to car parking. Any other initiatives such as recreational amenities and new natural elements appear mainly as bottom-up guerrilla initiatives, thus the quality and safety cannot be regulated.
10. Although Riga's large-scale housing estates feature a variety of problems, such as unsatisfactory level of environmental accessibility, lack of and monotonous recreation opportunities, lack of privacy, the current transformations can solve only part of the identified problems. Thus, an analysis of current situation and inhabitants' needs is crucial before introducing any transformations.
11. New **residential infill development having more than five-storeys** has a negative impact on the quality of open space in large-scale housing estates by destroying the human scale. Thus, restrictions on the building height are crucial also in cases where existing buildings are more than five storeys tall and new construction is allowed to be higher.
12. **Land ownership often becomes a barrier for more balanced transformations** – in case of improvements in the open space of large-scale housing estates. New public-private partnership models are a precondition of successful involvement of all parties and a guarantee of their motivation.

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APPENDICES

Appendix 1

Indicators in Residential Environment Evaluation Tools

INDICATORS	BUILT ENVIRONMENT ASSESSMENT TOOLS										
	REAT (2.0)	REAT	REL (Residential environment liveability)	BESSC	PREQ	BEI (Block environmental inventory)	CPTED	COURAGE	SOS	BEAT	environmental quality index
Housing type (detached/ semi-detached, flats/ mixed)	■			■		■				■	
Construction period											
Housing density		■		■							
Housing scale			■							■	
Buildings' aesthetic pleasantness					■						
Buildings' aesthetic contrast					■						
Building excessive and repetitive volume					■						
Access to dwelling / number of dwellings per entrance/ number of dwellings per area				■							
Prevention of urban sprawl			■								
Regeneration of brownfields			■								
Proximity of everyday life amenities			■								
Derelict /unused land / dilapidated land		■		■		■					■
Road type	■										
Traffic safety / speed limit / traffic control			■							■	■
Road layout	■				■	■					
Internal practicability of roads					■						
External connections					■						
Accessibility of public transport/ use of bicycle and walking			■	■	■						
Intersection geometry / control / characteristics of crossing										■	
Condition of pavement		■						■	■		■
Number of cars parked/type of parking / illegal parking	■	■		■						■	■
Recreational space for children	■			■			■				
Recreational space / recreation opportunities		■		■			■	■	■		
Sitting spaces / sitting choices / available sitting / sitting comfort / sitting amenities - tables							■	■	■		■
Social space							■	■	■		
Temporary uses/ shared use of space			■								
Amenities (trash bins, shelters, benches, bicycle racks, drinking fountain, public telephone etc.)										■	■
Maintenance of shared areas		■	■		■	■	■		■		■
Maintenance on macro-level (public services and spaces)					■		■				
Micro-upkeep (on private spaces)					■		■				
Natural surveillance	■			■			■		■		
People observed outside						■					
Existence and type of natural elements (tree lined road, purposively planted trees, purposively planted vegetation, view to natural elements, view to man-made greenery)	■	■		■		■				■	■
Pleasant hardscapes (fountain, art, sculpture etc.)										■	
Mix of vegetation, reachable plants, colors, viewscapes									■		
Existence of litter on the streets	■	■				■				■	■
General condition of public space	■										
Evidence of vandalism/graffiti	■	■		■		■				■	
Stray dogs		■								■	
Dog litter		■								■	
Broken windows/ boarded windows		■		■						■	
Abandoned cars		■				■				■	■
Vacant properties		■								■	
Abandoned properties		■		■						■	■
Lack of green areas					■					■	
Threatening people					■					■	
Intrusiveness/intolerance.					■					■	
Light pollution			■								
lightening						■					
Existence of neighbourhood watch signs	■	■		■		■	■			■	
Type of the space immediately outside front doors (private/shared – clear barriers/without clear barriers)	■			■							
Barrier around property						■					
Outside visibility						■	■				
Gated and closed						■					

Access control											
Security bars on windows											
Private garden space											
Private balcony/ terrace											
Distinction between private/public space; hierarchy of open space											
Functional division of space (garden/parking/ recreation)											
Environment enables leisure and social activities											
Lively and controlled public space											
Protection of private space and interaction with public space											
Orientation in space											
Level of barrier defining defensible space											
Natural surveillance / opportunity to see clearly first floor windows, entrances											
Trees in front garden that are seen from roads											
Trees along street											
Commercial areas in front											
Industrial areas in front											
Schools nearby / Inadecuacy of educational services											
Pubs nearby / Inadecuacy of cultural activities and meeting places											
Surgery / Adequacy of social and health services											
Inadequacy of sport services											
Newsagent											
Senate center											
library											
Houses with purposively planted vegetation											
Level of maintenance (building/roof/façade/entrance)											
Maintenance of front garden											
Some sort of external beautification											
Territorial functioning (garden boxes, name plates, window boxes etc.) / amenities for birds and animals (bird houses, cat houses)											
Sign of a dog											
Involvement of residents in the residential environment											
Presence of social relationships											
Awareness, participation and education / active role of residents											
Rain water harvesting											
Waste recycling											
On-site reuse of building materials											
Instruments reducing noise											
Instruments reducing heat											
Universal design											
Walking friendly / promoting walking/ cycling											
Pedestrian and vehicular entrances to the area											
Lack of opportunities											
quiet											
pollution											

Aptauja par pagalmu kvalitāti Ziepniekkalna dzīvojamā rajonā

Cienījamais respondent!
Es esmu Rīgas Tehniskās universitātes studente un studiju ietvaros veicu pētījumu par pagalmu kvalitāti Rīgas dzīvojamos rajonos. Aptaujas anketas mērķis ir noskaidrot iedzīvotāju vērtējumu par pagalmu kvalitāti dzīvojamos rajonos, pagalmu izmantošanas veidus un attieksmi pret dažādām pārmaiņam ārtelpā.
Aptauja ir anonīma un rezultāti tiks izmantoti apkopotā veidā.
Aptaujas aizpildīšanas aptuvenais ilgums ir 15 minūtes.

Ļoti priecāšos par Jūsu atsaucību!

* Nepieciešams

Pagalms - koplietošanas ārtelpas teritorija, kas piekļaujas Jūsu mājai un ir paredzēta rekreācijai un saimniecisko vajadzību nodrošināšanai.

1. 1. Vai Jūs apmierina Jūsu mājas pagalma kvalitāte? *

Atzīmējiet tikai vienu variantu.

- Pilnīgi apmierina
- Drīzāk apmierina
- Ne apmierina/ne neapmierina
- Drīzāk neapmierina
- Pilnīgi neapmierina

Pagalma teritorijas izmantošana

2. 2. Kā Jūs izmantojat savas mājas pagalma teritoriju? (Lūdzu, sniegt atbildi katrā rindā) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Katru dienu	1-3 reizes nedēļā	1-3 reizes mēnesī	Retāk nekā reizi mēnesī	Nekad
Pastaigām					
Sēdēšanai uz sola, lasīšanai					
Aktīvai atpūtai, izmantojot ierīkotu labiekārtojumu (piemēram, bumbu spēlēm, vingrošanai un tml.)					
Aktīvai atpūtai, neizmantojot labiekārtojumu (piemēram, skriešanai, soļošanai, spēlēm ar bumbu, badmintona spēlēm un tml.)					
Pastaigām ar bērniem, mazbērniem					
Aktivitātēm ar bērniem, mazbērniem, izmantojot bērnu laukumu labiekārtojumu					
Pastaigām ar mājdzīvnieku					
Sociālām aktivitātēm (tiekos / pavadu laiku kopā ar draugiem, kaimiņiem, ģimeni)					
Automašīnas novietošanai					
Velosipēda novietošanai					
Dārzkopībai, puķu audzēšanai vai tml. (arī puķu audzēšanai zem savas mājas logiem)					

Dzīvnieku barošanai (baroju kaķus, kaijas, utt.)					
Dzīvnieku, putnu novērošanai					
Pārtikas un/vai dzērienu lietošanai					
Saimnieciskām aktivitātēm (piemēram, veļas žāvēšanai).					
Cits					

3. Ja uz iepriekšējo jautājumu Jūs atbildējāt "Cits", lūdzu, paskaidrojiet kā Jūs izmantojat pagalmu?

4. 3. Ja Jūs neizmantojat pagalmu, lūdzu, paskaidrojiet kāpēc? (Lūdzu, sniegt atbildi katrā rindā) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Pilnīgi piekrītu	Daļēji piekrītu	Grūti pateikt	Daļēji nepiekrītu	Pilnīgi nepiekrītu
Man trūkst brīvā laika	◯	◯	◯	◯	◯
Brīvo laiku pavadu citās dabas teritorijās (parkā, mežā, pie ezera un tml.)	◯	◯	◯	◯	◯
Brīvo laiku pavadu pilsētas centrā	◯	◯	◯	◯	◯
Brīvo laiku pavadu citās apkaimēs	◯	◯	◯	◯	◯
Mani neapmierina labiekārtojuma klāsts un pieejamība (piemēram, trūkst soliņi, nav daudzveidības)	◯	◯	◯	◯	◯
Mani neapmierina apsaimniekošanas līmenis (nesakopts zāliens, nesakopti ceļi)	◯	◯	◯	◯	◯
Jūtos nedroši	◯	◯	◯	◯	◯
Izmantoju sezonāli (piemēram, tikai vasarā)	◯	◯	◯	◯	◯
Mani neapmierina pagalma organizācija (piemēram, trūkst klusākas telpas, kur palasīt grāmātu)	◯	◯	◯	◯	◯

Ideālā pagalma telpa

5. 4. Iedomājaties, ka pagalmi jau ir tikuši sakārtoti un ir nodrošinātas gan pasīvās, gan aktīvās atpūtas iespējas, sakārtotas atkritumu konteineru vietas, risināts jautājums ar autostāvvietām utt. Par kādām papildu funkcijām vai labiekārtojumu Jūs sapņotu? (Lūdzu, sniegt atbildi katrā rindā) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Pilnīgi piekrītu	Daļēji piekrītu	Grūti pateikt	Daļēji nepiekrītu	Pilnīgi nepiekrītu
Mākslas objekti	◯	◯	◯	◯	◯
Krāšņas puķu dobes (košumdārzs jeb daiļdārzs)	◯	◯	◯	◯	◯
Dabiskas pļavas	◯	◯	◯	◯	◯
Grāmatu apmaiņas punkts	◯	◯	◯	◯	◯
Āra grila vieta	◯	◯	◯	◯	◯
Dārziņš (neliels koplietošanas dārziņš, kur katram ir sava individuālā dobe)	◯	◯	◯	◯	◯
Siltumnīca	◯	◯	◯	◯	◯
Šūpuļtīkli	◯	◯	◯	◯	◯
Kāpšanas siena	◯	◯	◯	◯	◯
Ūdenstilpe ar labiekārtojumu krastā (piemēram, sekls kanāls)	◯	◯	◯	◯	◯
Strūklaka	◯	◯	◯	◯	◯
Izteiksmīgāks reljefs	◯	◯	◯	◯	◯
Pergola/ dārza arka ar vīteņaugiem	◯	◯	◯	◯	◯
Nojume karstam vai lietainam laikam	◯	◯	◯	◯	◯
Cits	◯	◯	◯	◯	◯

6. Ja uz iepriekšējo jautājumu Jūs atbildējāt "Cits", lūdzu, precizējiet par kādām funkcijām Jūs sapņotu?

7. 5. Kā sekojoši laika apstākļi ietekmē pagalma izmantošanu? (Lūdzu, atzīmējiet atbildi katrā rindā). *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Ļoti ietekme, neizmantoju pagalmu	Ietekme, tomēr izmantoju pagalmu	Neietekme, izmantoju pagalmu	Neizmantoju neatkarīgi no laika apstākļiem, taču šis faktors ir svarīgs	Grūti pateikt
Saulainā un karstā laikā (temperatūra ap 30°C)	◯	◯	◯	◯	◯
Lietus laikā, kad ārā ir silts	◯	◯	◯	◯	◯
Nokrišņu laikā, kad ārā ir auksts	◯	◯	◯	◯	◯
Sausā un vēsā laikā (temperatūra ir ap 0°C vai zemāka)	◯	◯	◯	◯	◯
Vējainā laikā, kad ārā ir silts	◯	◯	◯	◯	◯
Vējainā laikā, kad ārā ir auksts	◯	◯	◯	◯	◯
Laikā, kad ir slidens	◯	◯	◯	◯	◯
Laikā, kad uzsnidzis sniegs	◯	◯	◯	◯	◯
Diennakts tumšajā laikā vasarā	◯	◯	◯	◯	◯
Diennakts tumšajā laikā	◯	◯	◯	◯	◯

rudenī / ziemā

Pārmaiņas pagalma teritorijā

8. 6. Kādas pārmaiņas notikušas Jūsu pagalmā pēdējo desmit gadu laikā? (Lūdzu, atzīmējiet atbildi katrā rindā) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Notika, uzskatu to kā pozitīvu	Notika, uzskatu to kā negatīvu	Nenotika	Grūti pateikt/ nezinu
Tika ierīkots jauns soliņš				
Tika ierīkota jauna soliņu grupa vai soliņi ar galdiem, piknika vieta				
Tika ierīkots jauns bērnu laukums				
Tika ierīkoti jauni apstādījumi				
Tika izveidotas puķu dobes				
Tika izveidots zems dzīvžogs vai caurspīdīgs žogs ap bērnu laukumu				
Tika ierīkota publiski pieejama autostāvvieta				
Tika izveidota privātā/ maksas autostāvvieta				
Tika ierīkotas jaunas atkritumu konteineru vietas				
Tika sakārtotas esošās atkritumu konteineru vietas				
Tika izbūvēta nojume atkrituma konteineriem				
Tika uzstādītas jaunas atkritumu urnas				
Tika izveidots jauns apgaismojums				

Tika veikts piebraucamo ceļu, gājēju ceļu remonts				
Pagalmā tika uzcelta jaunbūve ar publiski pieejamu labiekārtojumu				
Pagalmā tika uzcelta nožogota jaunbūve bez publiski pieejama labiekārtojuma				
Tika nodrošināta vides pieejamība (vietās, kur ir ceļu līmeņu maiņa)				
Tika izveidotas jaunas ielu norādes, citas zīmes, kas palīdz orientēties				
Tika ierīkota vaļēja terase (nav saistīta ar ēku)				
Tika ierīkota nojume atpūtai (patverumam no nokrišņiem un saules)				
Tika uzstādīts jauns labiekārtojums aktīvai atpūtai (piemēram, āra trenažieri, vingrošanas laukums)				
Tika izveidotas velosipēdu stāvvietas, velosipēdu glabāšanas nojumes				
Tika sakārtots esošais labiekārtojums aktīvai atpūtai				
Iedzīvotāji paši izveidoja / papildināja aktīvas atpūtas vietu				
Iedzīvotāji paši izveidoja / papildināja pasīvas atpūtas vietu				

Iedzīvotāji paši stāda puķes, ierīko dobes				
Tika ierīkots pastaigu laukums suņiem				
Tika ierīkotas atsevišķas atkritumu urnas suņu ekskrementiem				
Cits				

9. Ja uz iepriekšējo jautājumu Jūs atbildējāt "Cits", lūdzu, paskaidrojiet kādas pārmaiņas notikušas?

10. 7. Vai Jūs vēlētos, lai pagalmā notiktu sekojošās pārmaiņas? (Lūdzu, atzīmējiet atbildi katrā rindā) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Jā, vēlētos	Atbalstu tuvākajā apkārtnē, bet tikai ne savā pagalmā	Ir labi kā ir (pietiek ar esošo)	Neatbalstu vispār
Tiktu ierīkots jauns soliņš	◯	◯	◯	◯
Tiktu ierīkota soliņu grupa, soliņi ar galdiņiem	◯	◯	◯	◯
Tiktu ierīkots jauns bērnu laukums	◯	◯	◯	◯
Tiktu izveidoti jauni apstādījumi	◯	◯	◯	◯
Tiktu ierīkotas jaunas puķu dobes	◯	◯	◯	◯
Tiktu izveidotas jaunas ielu norādes, citas zīmes, kas palīdz orientēties	◯	◯	◯	◯
Tiktu izveidots zems dzīvžogs vai caurspīdīgs žogs ap bērnu laukumu	◯	◯	◯	◯
Tiktu izveidota publiski pieejama autostāvvieta	◯	◯	◯	◯
Tiktu izveidota maksas autostāvvieta	◯	◯	◯	◯
Tiktu sakārtotas esošās atkritumu konteineru vietas	◯	◯	◯	◯
Tiktu izveidota jauna atkritumu konteineru	◯	◯	◯	◯

vieta				
Tiktu ierīkota nojume atkritumu konteineriem				
Tiktu ierīkota jaunas atkritumu urnas				
Tiktu izveidots jauns apgaismojums				
Tiktu veikts piebraucamo ceļu, gājēju ceļu remonts				
Tiktu uzcelta jaunbūve pagalmā ar publiski pieejamu labiekārtojumu				
Tiktu nodrošināti vides pieejamības risinājumi (gajēju ceļu līmeņu starpības pielāgošana, pandusi pie ieejam dzīvojamos namos un tml.)				
Tiktu ierīkota vaļēja terase (nav saistīta ar ēku);				
Tiktu izveidota nojume atpūtai (patverumam no nokrišņiem un saules)				
Tiktu izveidots labiekārtojums aktīvai atpūtai (piemēram, ārā trenažieri, vingrošanas laukums)				
Tiktu izveidots labiekārtojums aktīvai atpūtai (piemēram, spēlēm ar bumbu)				

Iedzīvotāji paši izveidotu/ vai aktīvi piedalītos pasīvas atpūtas vietas izveidē				
Iedzīvotāji paši izveidotu / vai aktīvi piedalītos aktīvās atpūtas vietas izveidē				
Iedzīvotāji paši stādītu augus, paši veidotu puķu dobes				
Tiktu veidots pastaigu laukums suņiem				
Tiktu ierīkotas atsevišķas atkritumu urnas suņu ekskrementiem				
Cits				

11. Ja uz iepriekšējo jautājumu Jūs atbildējāt "Cits", lūdzu, paskaidrojiet kādas pārmaiņas Jūs vēlētos?

12. 8. Vai Jūs apmierina pagalma apsaimniekošanas kvalitāte? (Lūdzu, atbildiet katrā rindā) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Pilnīgi apmierina	Drīzāk apmierina	Ne apmierina/ne neapmierina	Drīzāk neapmierina	Pilnīgi neapmierina
Apstādījumu, zaļās zonas apsaimniekošana (zāles pļaušana, lapu vākšana utt.)	◯	◯	◯	◯	◯
Piebraucamo ceļu apsaimniekošana (ceļu segumu remonts)	◯	◯	◯	◯	◯
Gājēju un piebraucamo ceļu apsaimniekošana arī sniega, apledojuma gadījumā	◯	◯	◯	◯	◯
Atkritumu konteineru apsaimniekošana	◯	◯	◯	◯	◯
Apgaismojuma kvalitāte, apsaimniekošana	◯	◯	◯	◯	◯

13. 9. Iedomājaties, ka jūsu apkaimē kādā pagalmā tiks būvēta jauna dzīvojama māja, jo pagalma teritorija pieder citiem īpašniekiem. Kādiem, Jūsuprāt, būtu jābūt nosacījumiem, lai jaunā apbūve tiktu akceptēta no apkārtējo namu iedzīvotāju puses? (Lūdzu, atbildiet katrā rindā) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Pilnīgi piekrītu	Drīzāk piekrītu	Grūti pateikt (ne piekrītu / ne nepiekrītu)	Drīzāk nepiekrītu	Pilnīgi nepiekrītu
Apbūvei jābūt līdz 3 stāviem	◯	◯	◯	◯	◯
Jaunai apbūvei nav vēlams žogs	◯	◯	◯	◯	◯
Jābūt bērnu laukumam, kas pieejams visiem	◯	◯	◯	◯	◯
Jābūt soliņiem, kas pieejami visiem	◯	◯	◯	◯	◯
Jābūt jauniem apstādījumiem	◯	◯	◯	◯	◯
Jābūt labiekārtojumam aktīvai atpūtai dažāda vecuma grupām, kas pieejams visiem	◯	◯	◯	◯	◯
Jābūt āra trenažieriem, kas pieejami visiem	◯	◯	◯	◯	◯
Jābūt papildus autostāvvietas vietām, kas pieejamas visiem	◯	◯	◯	◯	◯
Apbūvei jābūt līdz 5 stāviem	◯	◯	◯	◯	◯
Apbūve drīkst būt virs 5 stāviem	◯	◯	◯	◯	◯
Jaunajai apbūvei jāatrodas pietiekoši	◯	◯	◯	◯	◯

tālu no esošās apbūves					
Drīkst būvēt savrupmājas					

14. 10. Kāda veida Ziepniekkalna attīstības aktivitātēs Jūs būtu gatavs iesaistīties? (Lūdzu, atbildiet katrā rindā) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Pilnīgi piekrītu	Drīzāk piekrītu	Grūti pateikt (ne piekrītu/ ne nepiekrītu)	Drīzāk nepiekrītu	Pilnīgi nepiekrītu
Iesaistīties apkaimes sakopšanas talkā	◯	◯	◯	◯	◯
Iesaistīties pagalma labiekārtošanas aktivitātēs	◯	◯	◯	◯	◯
Stādīt / kopt puķes, apstādījumus	◯	◯	◯	◯	◯
Piedalīties apkaimes biedrības aktivitātēs (apkaimes svētkos, sporta aktivitātēs utt.)	◯	◯	◯	◯	◯
Piedalīties darba grupā, sadarboties ar pašvaldību Ziepniekkalna attīstības jautājumu risināšanā	◯	◯	◯	◯	◯
Izplatīt pašvaldības informāciju citiem iedzīvotājiem	◯	◯	◯	◯	◯
Sagādāt materiālus labiekārtojuma darbiem	◯	◯	◯	◯	◯
Sniegt finansiālu atbalstu apkaimes labiekārtošanai	◯	◯	◯	◯	◯
Nevienā no šīm	◯	◯	◯	◯	◯

15. 11. Vai Jūs vēlētos, lai pagalmi apkaimē atšķirtos viens no otra (ar labiekārtojuma veidu un stilu, materiāliem, krāsu, apstādījumu organizāciju utt.)? *

Atzīmējiet tikai vienu variantu.

- ◯ Notekti vēlētos
- ◯ Drīzāk vēlētos
- ◯ Grūti pateikt
- ◯ Drīzāk nevēlētos
- ◯ Noteikti nevēlētos

16. 12. Vai Jūs jūtaties droši pavadot laiku pagalmā, šķērsojot pagalmu tranzītā un kas ietekme drošības sajūtu? (Lūdzu, atbildiet katrā rindā) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Jūtos droši	Jūtos nedroši, cenšos neizmantot pagalmu	Jūtos nedroši, taču izmantoju pagalmu	Neietekmē drošības sajūtu	Grūti pateikt
Diennakts gaišajā laikā					
Diennakts tumšajā laikā, ja gājēju ceļi ir labi apgaismoti					
Diennakts tumšajā laikā, ja pagalms un gājēju ceļi nav apgaismoti, vai apgaismojums nav pietiekošs					
Vietās, kur ēkas apzīmētas ar graffiti un tegiem					
Vietās, kur izmētāti atkritumi, pudeles un tml.					
Vietās, kur pagalms nav pārskatāms no māju logiem					
Vietās, kur ir biezi saauguši apstādījumi					
Vietās, kas robežojas ar nožogotām teritorijām					
Vietās, kur ir grūti orientēties					

Vietās, kur skatus aizsedz ēkas, žogi un tml.)					
Vietās, kuras nav aktīvi izmantotas					
Vietās, kur pagalma teritorijai nav skaidru robežu					

Vispārīgā informācija

17. Kāds ir Jūsu dzimums? *

Atzīmējiet tikai vienu variantu.

- Vīrietis
- Sieviete

18. Kāds ir Jūsu vecums? *

Atzīmējiet tikai vienu variantu.

- līdz 18 gadiem
- 18 - 24 gadi
- 25 - 34 gadi
- 35 - 44 gadi
- 45 - 54 gadi
- 55 - 64 gadi
- 65 gadi un vairāk

19. Cik ilgi Jūs dzīvojat šajā apkaimē? *

Atzīmējiet tikai vienu variantu.

- ◯ Mazāk nekā vienu gadu
- ◯ 1 - 5 gadus
- ◯ 6 - 10 gadus
- ◯ Vairāk nekā 10 gadus

20. Kāda ir Jūsu mājas pagalma zemes īpašuma piederība? *

Atzīmējiet tikai vienu variantu.

- ◯ Zeme pieder apkārtējo namu iedzīvotājiem
- ◯ Zeme pieder pašvaldībai
- ◯ Zeme pieder fiziskai personai
- ◯ Zeme pieder juridiskai personai
- ◯ Nezinu pagalma īpašuma piederību

21. Kurā Ziepniekkalna apkaimes daļā Jūs dzīvojat? *

Atzīmējiet tikai vienu variantu.

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ Citūr

22. Vai Jums ir bērni, mazbērni, kuri dzīvo kopā ar Jums? *

Atzīmējiet visus atbilstošos variantus.

- [ ] Man ir bērni, kas ir jaunāki par 18 gadiem un mēs dzīvojam kopā
- [ ] Man ir mazbērni, kas ir jaunāki par 18 gadiem un mēs dzīvojam kopā
- [ ] Cits

23. Vai Jūsu mājsaimniecībā ir cilvēks ar īpašām vajadzībām? *

Atzīmējiet tikai vienu variantu.

- ( ) Jā
- ( ) Nē

24. Kāda tipa mājā Jūs dzīvojat? *

Atzīmējiet tikai vienu variantu.

- ( ) Pirmskara daudzdzīvokļu mājā
- ( ) Pēckara daudzdzīvokļu mājā (piemēram, 119., 467., 103., 602. sērija un tml.)
- ( ) Ēkā, kas celta pēc 1991. gada
- ( ) Privātmājā /rindu mājā
- ( ) Cits

25. Kāda ir Jūsu dzīvokļa piederība? *

Atzīmējiet tikai vienu variantu.

- ( ) Esmu dzīvokļa īpašnieks
- ( ) Dzīvoju īrētā dzīvoklī
- ( ) Cits

26. Kāda ir Jūsu izglītība? *

Atzīmējiet tikai vienu variantu.

- ◯ Pamata
- ◯ Vidējā vai vidējā profesionālā
- ◯ Augstākā

27. Kāda ir Jūsu nodarbošanās? *

Atzīmējiet visus atbilstošos variantus.

- ☐ Augstākā vai vidējā līmeņa vadītājs
- ☐ Speciālists, ierēdnis, nestrādā fizisku darbu
- ☐ Speciālists, strādnieks, strādā fizisku darbu
- ☐ Savs uzņēmums, individuāls darbs
- ☐ Skolnieks
- ☐ Students
- ☐ Mājsaimniece, bērna kopšanas atvaļinājums
- ☐ Pensionārs
- ☐ Bezdarbnieks
- ☐ Cits

28. Kāds ir Jūsu ienākumu līmenis uz vienu cilvēku mājsaimniecībā? *

Atzīmējiet tikai vienu variantu.

- ◯ Līdz 430 eiro mēnesī
- ◯ no 430 līdz 700 eiro
- ◯ virs 700 eiro mēnesī
- ◯ nav atbildes

Google Veidlapas

Исследование качества дворов в жилом районе Зиепниеккалнс

Добрый день!
Я студентка Рижского технического университета и в данный момент провожу исследование качества дворов в жилых районах Риги. Цель анкеты - выяснить, как население оценивает качество дворов в жилых районах, типы использования дворов и отношение к различным изменениям.
Опрос является анонимным, и его результаты будут использоваться в обобщенном виде.
Примерная продолжительность заполнения анкеты – 15 минут.

Буду очень благодарна, если сможете уделить свое время заполнению анкеты!

* Nepieciešams

Двор - общая открытая территория, которая примыкает к вашему дому и предназначена для отдыха и хозяйственных нужд.

1. 1. Устраивает ли Вас качество дворового пространства? *

Atzīmējiet tikai vienu variantu.

- Полностью устраивает
- Скорее устраивает
- Трудно сказать
- Скорее не устраивает
- Абсолютно не устраивает

Использование территории двора

2. 2. Как Вы используете двор вашего дома? (Пожалуйста, дайте ответ в каждой строке) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Каждый день	1-3 раза в неделю	1-3 раза в месяц	Реже раза в месяц	Никогда
Для прогулок	◯	◯	◯	◯	◯
Для посиделок на скамейке, чтения	◯	◯	◯	◯	◯
Для активного отдыха с использованием благоустройства (например, игры с мячом, гимнастика и т.д.)	◯	◯	◯	◯	◯
Для активного отдыха без использования благоустройства (например, бег, ходьба, игры с мячом, игры в бадминтон и т.д.)	◯	◯	◯	◯	◯
Для прогулок с детьми, внуками	◯	◯	◯	◯	◯
Для занятий с детьми, внуками, с использованием детских площадок.	◯	◯	◯	◯	◯
Для прогулок с домашним животным	◯	◯	◯	◯	◯
Социальная деятельность (встречи / времяпрепровождение с друзьями, соседями, семьей)	◯	◯	◯	◯	◯
Для парковки	◯	◯	◯	◯	◯
Для велосипедной парковки	◯	◯	◯	◯	◯

Для садоводства, цветоводства и т.п. (также для выращивания цветов под окнами вашего дома)					
Кормление животных (кормлю кошек, чаек и т.д.)					
Для наблюдения за животными и птицами					
Использую двор как место для приема пищи, распития напитков					
Для хозяйственной деятельности (например, сушка белья).					
Другое					

3. Если на предыдущий вопрос вы ответили «Другое», объясните, пожалуйста, как вы используете двор?

4. 3. Если вы не пользуетесь двором, объясните, почему? (Пожалуйста, дайте ответ в каждой строке) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Полностью согласен	Скорее согласен	Трудно сказать	Скорее не согласен	Абсолютно не согласен
Не хватает свободного времени	◯	◯	◯	◯	◯
Свободное время провожу на других природных территориях (парк, лес, у озера и т.д.)	◯	◯	◯	◯	◯
Свободное время провожу в центре города	◯	◯	◯	◯	◯
Свободное время провожу в других районах	◯	◯	◯	◯	◯
Меня не устраивает ассортимент и наличие благоустройства (например, отсутствие скамеек, отсутствие разнообразия)	◯	◯	◯	◯	◯
Не устраивает уровень обслуживания (неухоженный газон, неухоженные дороги)	◯	◯	◯	◯	◯
Во дворе чувствую себя не безопасно	◯	◯	◯	◯	◯
Использую сезонно (например, только летом)	◯	◯	◯	◯	◯
Не устраивает организация двора (например, нет более тихого и спокойного	◯	◯	◯	◯	◯

места, чтобы почитать книгу)

Мой идеальный двор

5. 4. Представьте, что дворы уже обустроены и предусмотрены возможности как для пассивного, так и для активного отдыха, обустроены места для мусорных контейнеров, решен вопрос со стоянками и т.д. О каких дополнительных функциях или удобствах вы бы мечтали? (Пожалуйста, дайте ответ в каждой строке) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Полностью согласен	Скорее согласен	Трудно сказать	Скорее не согласен	Полностью не согласен
Арт-объекты	◯	◯	◯	◯	◯
Декоративные клумбы, цветники	◯	◯	◯	◯	◯
Полевые и луговые цветы и травы	◯	◯	◯	◯	◯
Пункт обмена книгами	◯	◯	◯	◯	◯
Место для гриля	◯	◯	◯	◯	◯
Небольшой сад или огород, где у каждого есть своя грядка	◯	◯	◯	◯	◯
Теплица	◯	◯	◯	◯	◯
Гамак	◯	◯	◯	◯	◯
Стена для скалолазания	◯	◯	◯	◯	◯
Благоустроенный водоем (например, неглубокий канал)	◯	◯	◯	◯	◯
Фонтан	◯	◯	◯	◯	◯
Наличие более выраженного рельефа	◯	◯	◯	◯	◯
Садовая арка / навес с вьющимися растениями	◯	◯	◯	◯	◯
	◯	◯	◯	◯	◯

Навес для жаркой или дождливой погоды					
Другое					

6. Если на предыдущий вопрос вы ответили «Другое», укажите, о каких функциях вы бы мечтали?

7. 5. Как следующие погодные условия влияют на использование двора? (Отметьте ответ в каждой строке). *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Очень влияет, не использую двор	Очень влияет, однако использую двор	Не влияет, использую двор	Не использую двор, однако этот фактор влиял бы на использование	Трудно сказать
В солнечную и жаркую погоду (температура около 30 ° C)					
Во время дождя, когда на улице тепло					
Во время дождя, когда на улице холодно					
В сухую и прохладную погоду (температура около 0 ° C или ниже)					
В ветреную погоду, когда на улице тепло					
В ветреную погоду, когда на улице холодно					
Когда скользко					
Во время					

снегопада					
В темное время суток летом					
В темное время суток осенью/ зимой					

Изменения во дворах

8. 6. Какие изменения произошли в вашем дворе за последние десять лет? (Пожалуйста, отметьте ответ в каждой строке) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Произошло, рад изменениям	Произошло, считаю это негативным изменением	Не произошло	Трудно сказать / не знаю
Поставили новую скамейку				
Поставили несколько новых скамеек или скамейки со столами				
Построена новая детская площадка				
Посажены новые деревья, кустарники, цветы				
Сделаны клумбы с цветами				
Вокруг детской площадки создали невысокую изгородь или прозрачный забор.				
Создана общественная автостоянка				
Создана частная / платная автостоянка				
Установлены новые пункты с мусорными контейнерами				

Приведены в порядок старые мусорные контейнеры				
Построен навес для мусорных контейнеров				
Поставлены новые мусорные урны				
Проведено новое освещение				
Выполнен ремонт дорог и тротуаров				
Во дворе построено новое здание с общедоступным благоустройством				
Во дворе построено новое здание с забором вокруг, и благоустройство доступно только жильцам новостройки				
Обеспечена доступность окружающей среды для людей с ограниченными возможностями (в местах смены уровня дороги).				
Поставлены новые уличные знаки и другие указатели для ориентации в пространстве				
Установлена открытая терраса				

для отдыха (не примыкающая к зданию)				
Установлен навес для отдыха (укрытие от осадков и солнца).				
Установлены новые объекты для активного отдыха (например, тренажеры под открытым небом, спортивная площадка).				
Созданы велосипедные стоянки и навесы для хранения велосипедов				
Приведено в порядок существующее благоустройство для активного отдыха				
Жители сами создали / дополнили место активного отдыха				
Жители сами создали / дополнили зону пассивного отдыха				
Жители сами сажают цветы, делают грядки				
Создана площадка для выгула собак				

Установлены отдельные урны для собачьих экскрементов				
Другое				

9. Если на предыдущий вопрос вы ответили «Другое», объясните, пожалуйста, какие изменения произошли?

10. 7. Хотели бы вы, чтобы во дворе произошли следующие изменения? (Отметьте ответ в каждой строке) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Да, хотел бы / хотела бы	Поблизости - да, но только не у меня во дворе	Хорошо так, как есть / все устраивает	Не поддерживаю вообще
Поставили новую скамейку	◯	◯	◯	◯
Поставили несколько новых скамеек или скамейки со столами	◯	◯	◯	◯
Построили новую детскую площадку	◯	◯	◯	◯
Посадили новые деревья, кустарники, цветы	◯	◯	◯	◯
Сделали клумбы с цветами	◯	◯	◯	◯
Поставили новые уличные знаки и другие указатели для ориентации в пространстве	◯	◯	◯	◯
Вокруг детской площадки создали невысокую изгородь или прозрачный забор.	◯	◯	◯	◯
Создали общественную автостоянку	◯	◯	◯	◯

Создали частную / платную автостоянку				
Приведены в порядок старые мусорные контейнеры				
Установлены новые пункты с мусорными контейнерами				
Построили навес для мусорных контейнеров				
Поставили новые мусорные урны				
Провели новое освещение, поставили новые фонари				
Выполнили ремонт дорог и тротуаров				
Во дворе построили новое здание с общедоступным благоустройством				
Обеспечили доступность окружающей среды для людей с ограниченными возможностями (в местах смены уровня дороги).				
Установили открытую террасу для отдыха (не				

примыкающая к зданию)				
Установили навес для отдыха (укрытие от осадков и солнца).				
Установили новые объекты для активного отдыха (например, тренажеры под открытым небом, спортивная площадка).				
Создали велосипедные стоянки и навесы для хранения велосипедов				
Чтобы жители сами участвовали в благоустройстве мест для пассивного отдыха				
Чтобы жители сами участвовали в благоустройстве мест для активного отдыха				
Чтобы жители сами высаживали растения, делали цветочные клумбы				
Создали площадку для выгула собак				

Установили отдельные урны для собачьих экскрементов				
Другое				

11. Если вы ответили «Другое» на предыдущий вопрос, поясните, какие изменения вы хотели бы видеть?

12. 8. Довольны ли вы качеством обслуживания дворов? (Пожалуйста, ответьте на каждую строчку) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Полностью устраивает	Скорее устраивает	Трудно сказать	Скорее не устраивает	Абсолютно не устраивает
Озеленение, уход за зелеными насаждениями (покос травы, сбор листьев и т. д.)	◯	◯	◯	◯	◯
Обслуживание проезжей части (ремонт дорожного покрытия)	◯	◯	◯	◯	◯
Обслуживание пешеходных и подъездных дорог также при снегопаде, обледенении	◯	◯	◯	◯	◯
Обслуживание мусорных контейнеров	◯	◯	◯	◯	◯
Качество освещения, обслуживание	◯	◯	◯	◯	◯

13. 9. Представьте, что в одном из дворов вашего района будет построен новый жилой дом, потому что территория двора принадлежит другим владельцам. Как вы думаете, какими должны быть условия, чтобы новостройка была принята жителями близлежащих домов? (Пожалуйста, дайте ответ в каждой строке) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Полностью согласен	Скорее согласен	Трудно сказать	Скорее не согласен	Абсолютно не согласен
Новостройка должна быть не выше 3-х этажей	◯	◯	◯	◯	◯
Желательно, чтобы вокруг новостройки не было забора	◯	◯	◯	◯	◯
Должна быть общедоступная детская площадка	◯	◯	◯	◯	◯
Должны быть общедоступные скамейки	◯	◯	◯	◯	◯
Должно быть новое озеленение	◯	◯	◯	◯	◯
Должно быть создано общедоступное благоустройство для активного отдыха для всех возрастных категорий	◯	◯	◯	◯	◯
Должны быть общедоступные тренажеры на открытом воздухе	◯	◯	◯	◯	◯
Дополнительные общедоступные парковочные места	◯	◯	◯	◯	◯
Новостройка должна	◯	◯	◯	◯	◯

Новостройка должна быть не выше 5 этажей					
Новостройка может быть выше 5 этажей					
Новое здание должно быть достаточно далеко от существующей застройки					
Можно строить частные дома					

14. 10. Какого рода деятельностью по развитию Зиепниеккалнса вы хотели бы заниматься? (Пожалуйста, дайте ответ в каждой строке) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Очень хотел бы	Скорее хотел бы	Трудно сказать	Скорее не хотел бы	Точно не хотел бы
Участвовать в субботнике	◯	◯	◯	◯	◯
Участвовать в благоустройстве двора	◯	◯	◯	◯	◯
Высаживать, ухаживать за цветами, растениями	◯	◯	◯	◯	◯
Участвовать в мероприятиях организованных общиной района (праздники, спортивные мероприятия и т.д.)	◯	◯	◯	◯	◯
Сотрудничать с муниципалитетом в решении вопросов развития Зиепниеккалнса	◯	◯	◯	◯	◯
Делиться информацией из муниципалитета с другими жителями района	◯	◯	◯	◯	◯
Предоставить материалы для работ по благоустройству	◯	◯	◯	◯	◯
Оказывать финансовую поддержку для благоустройства района	◯	◯	◯	◯	◯
Ни в одном из выше перечисленных	◯	◯	◯	◯	◯

15. 11. Вы бы хотели, чтобы дворы района отличались друг от друга (типом и стилем благоустройства, материалами, цветом, организацией озеления и т. д.)? *

Atzīmējiet tikai vienu variantu.

- Определенно хотел бы
- Скорее хотел бы
- Трудно сказать
- Скорее не хотел бы
- Абсолютно не хотел бы

16. 12. Чувствуете ли вы себя в безопасности, проводя время во дворе, пересекая двор по пути куда-то, и как разные факторы влияют на чувство безопасности? (Пожалуйста, дайте ответ в каждой строке) *

Katrā rindiņā atzīmējiet tikai vienu variantu.

	Чувствую себя безопасно	Чувствую себя не безопасно, стараюсь не использовать двор	Чувствую себя не безопасно, но приходится использовать двор	Этот фактор не влияет на чувство безопасности	Трудно ответить
В светлое время суток	◯	◯	◯	◯	◯
В темное время суток, когда двор хорошо освещен	◯	◯	◯	◯	◯
В темное время суток, когда двор и дорожки не освещены или освещения не достаточно	◯	◯	◯	◯	◯
В местах, где дома, заборы разрисованы граффити	◯	◯	◯	◯	◯
В местах, где разбросан мусор, бутылки и т.д.	◯	◯	◯	◯	◯
В местах, где двор не виден из окон домов	◯	◯	◯	◯	◯
В местах заросших кустами, густой зеленью	◯	◯	◯	◯	◯
В местах, граничащих с	◯	◯	◯	◯	◯

огороженными территориями					
В местах, где сложно ориентироваться					
В местах, где территория не просматривается из-за зданий, заборов					
В местах, которые не используются активно, где нет людей					
В местах, где нет четких границ территории двора					

Общая информация

17. Какого Вы пола? *

Atzīmējiet tikai vienu variantu.

- Мужчина
- Женщина

18. Каков Ваш возраст? *

Atzīmējiet tikai vienu variantu.

- еще нет 18
- 18 - 24 года
- 25 - 34 года
- 35 - 44 года
- 45 - 54 года
- 55 - 64 года
- старше 65

19. Как давно Вы живете в этом районе? *

Atzīmējiet tikai vienu variantu.

- Меньше года
- 1 - 5 лет
- 6 - 10 лет
- Больше 10 лет

20. В чьей собственности Ваш двор? *

Atzīmējiet tikai vienu variantu.

- Земля в собственности жителей окрестных домов
- Земля в собственности города
- Земля принадлежит частному лицу
- Земля принадлежит юридическому лицу
- Не знаю кому принадлежит земля

21. В какой части Зиепниеккалнса Вы живете? *

Atzīmējiet tikai vienu variantu.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- В другом месте

22. Есть ли у Вас дети, внуки, которые живут с вами? *

Atzīmējiet visus atbilstošos variantus.

- [ ] У меня есть дети младше 18 лет и мы живем вместе
- [ ] У меня есть внуки младше 18 лет и мы живем вместе
- [ ] Другое

23. Есть ли в вашей семье человек с особыми потребностями? *

Atzīmējiet tikai vienu variantu.

- ◯ Да
- ◯ Нет

24. В каком доме вы живете? *

Atzīmējiet tikai vienu variantu.

- ◯ Довоенная постройка, многоквартирный дом
- ◯ Послевоенная постройка, многоквартирный дом (например, 119, 467, 103, 602 серия и т.д.)
- ◯ Многоквартирный дом построен после 1991 года
- ◯ Частный дом / рядный дом
- ◯ Другое

25. Тип владения жильем? *

Atzīmējiet tikai vienu variantu.

- ◯ Являюсь владельцем
- ◯ Живу в съемном жилье
- ◯ Другое

26. Ваше образование *

Atzīmējiet tikai vienu variantu.

- ◯ Начальное образование
- ◯ Среднее образование (Гимназия, лицей, средняя школа, училище)
- ◯ Высшее образование (Институт, университет)

27. Каков род Вашей деятельности? *

Atzīmējiet visus atbilstošos variantus.

- ☐ Руководитель высшего или среднего звена
- ☐ Специалист, государственный служащий, не занимающийся физическим трудом
- ☐ Специалист, рабочий, занимающийся физическим трудом
- ☐ Собственная компания, индивидуальная работа
- ☐ Школьник
- ☐ Студент
- ☐ Домохозяйка и/или в отпуске по уходу за ребенком
- ☐ Пенсионер
- ☐ Не работаю
- ☐ Другое

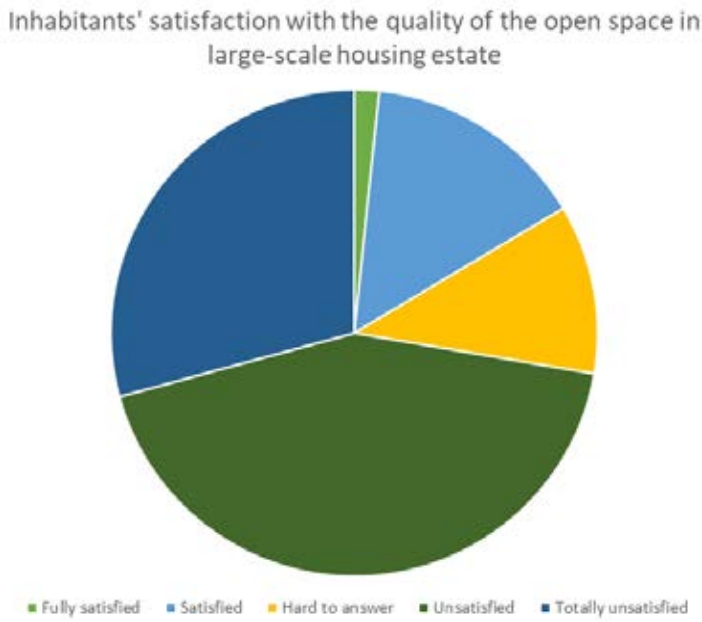
28. Каков ваш уровень дохода на человека в семье? *

Atzīmējiet tikai vienu variantu.

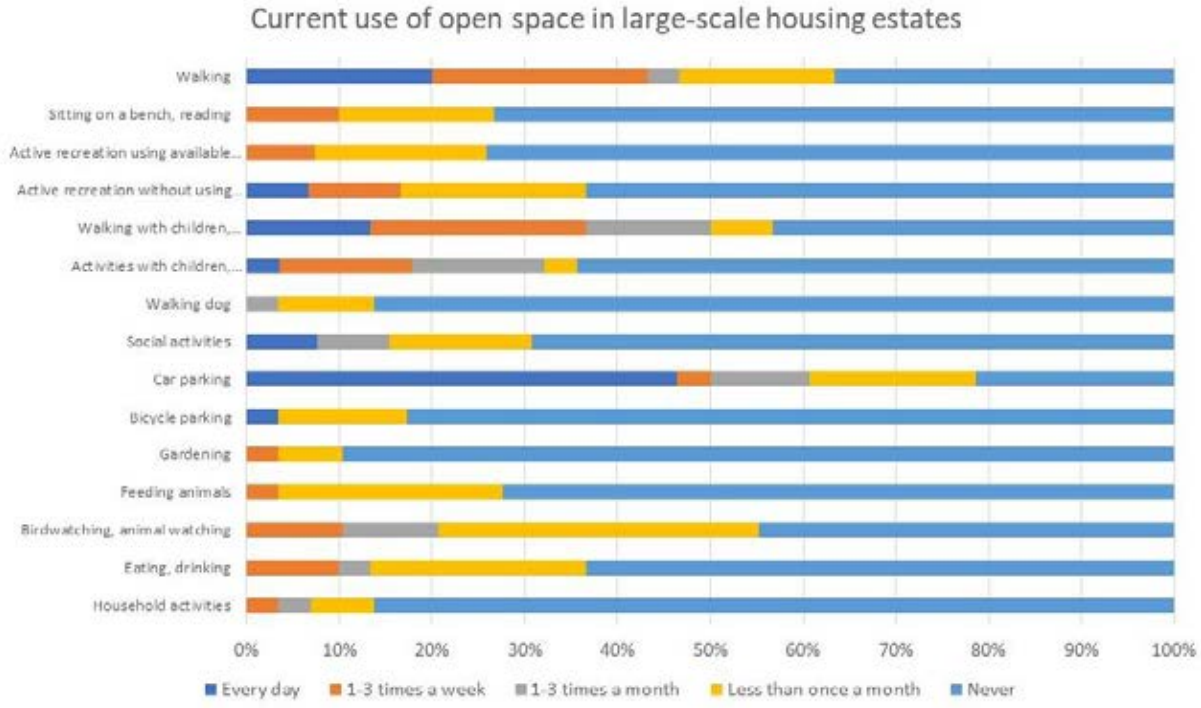
- ◯ До 430 евро в месяц
- ◯ от 430 до 700 евро в месяц
- ◯ Свыше 700 евро в месяц
- ◯ Нет ответа

Inhabitants' survey results (general data from all 4 estates, total number of respondents 240 [survey conducted by the author in 2021]).

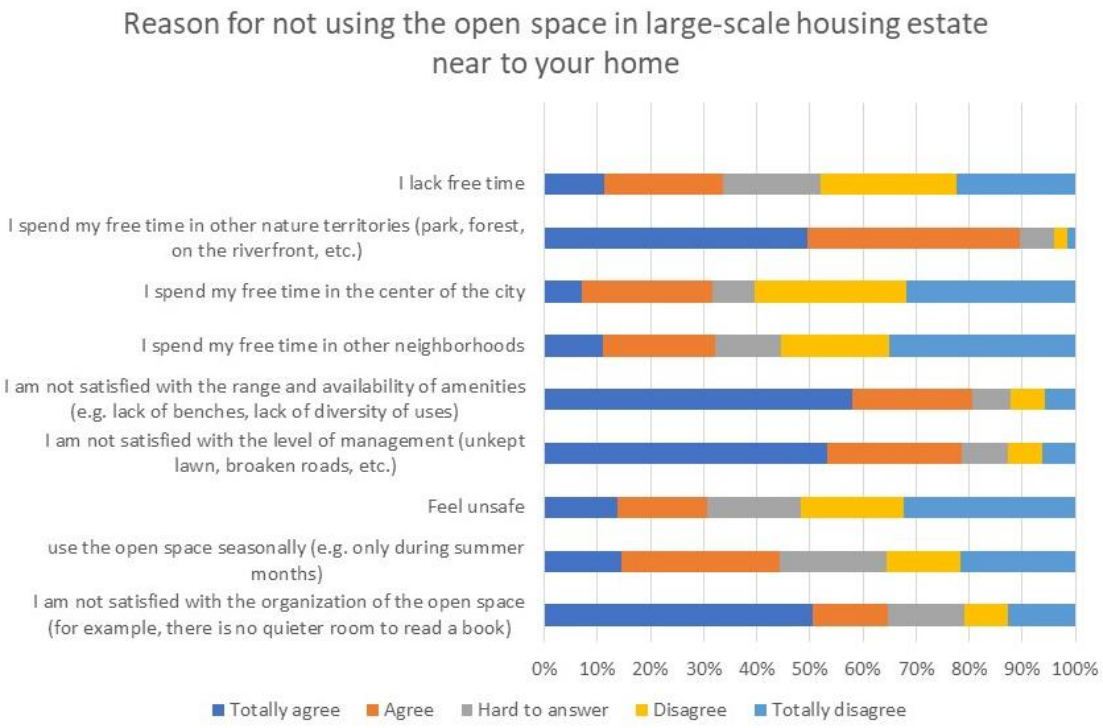
Question 1: Are you satisfied with the quality of the open space in large-scale housing estate?



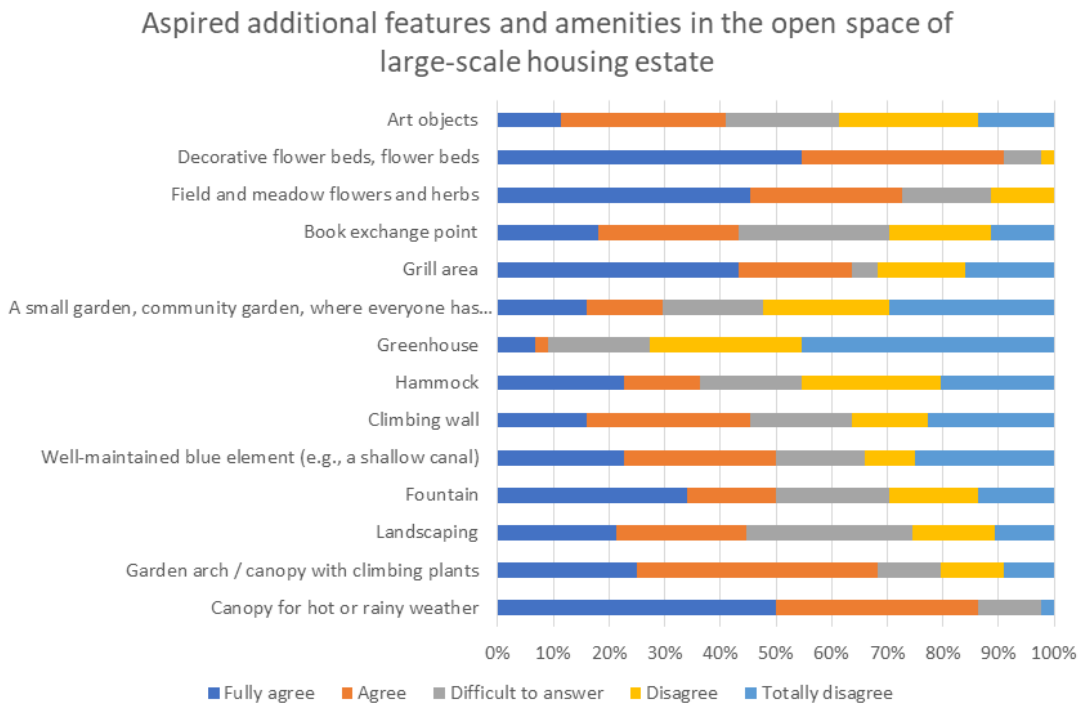
Question 2: How do you use the open space next to your home?



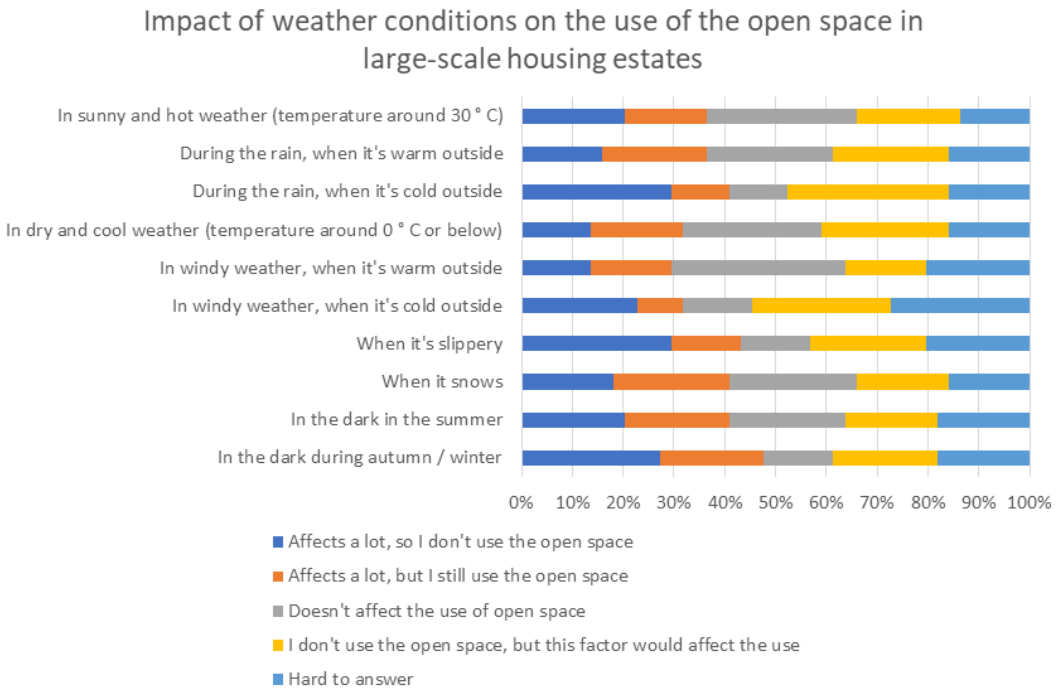
Question 3: If you don't use the open space next to your home, please explain the reason.



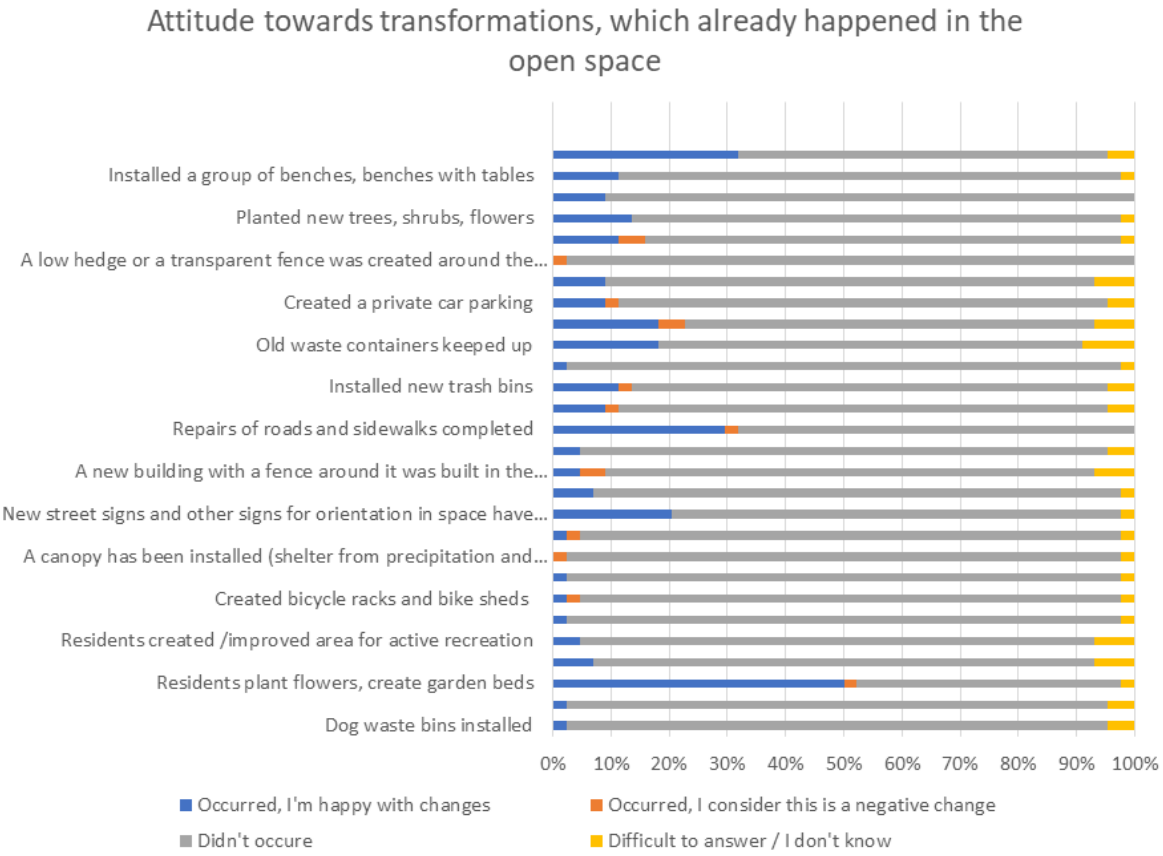
Question 4: Imagine that open spaces in large-scale housing estate have already been equipped and there are opportunities for both passive and active recreation, waste collection sites have been arranged, the issue of parking has been resolved, etc. What are the additional features or amenities you are dreaming of?



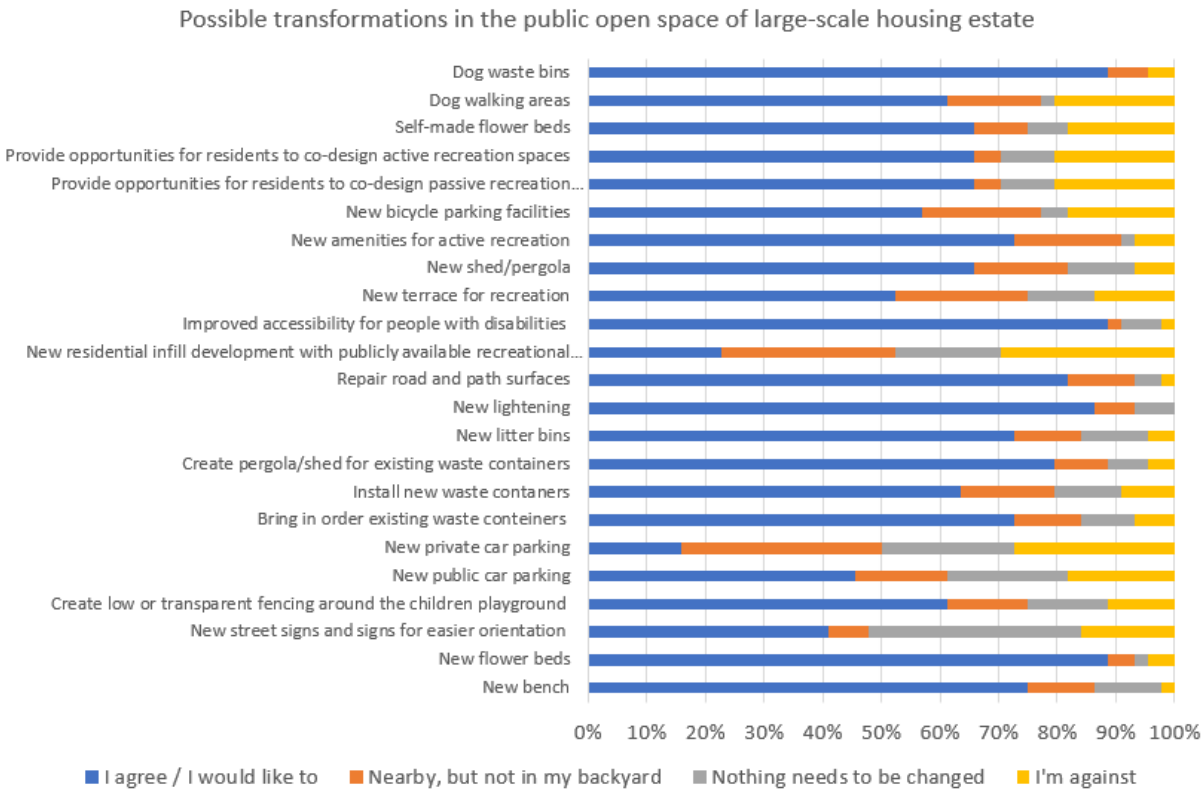
Question 5: How do the following weather conditions affect the use of the open space?



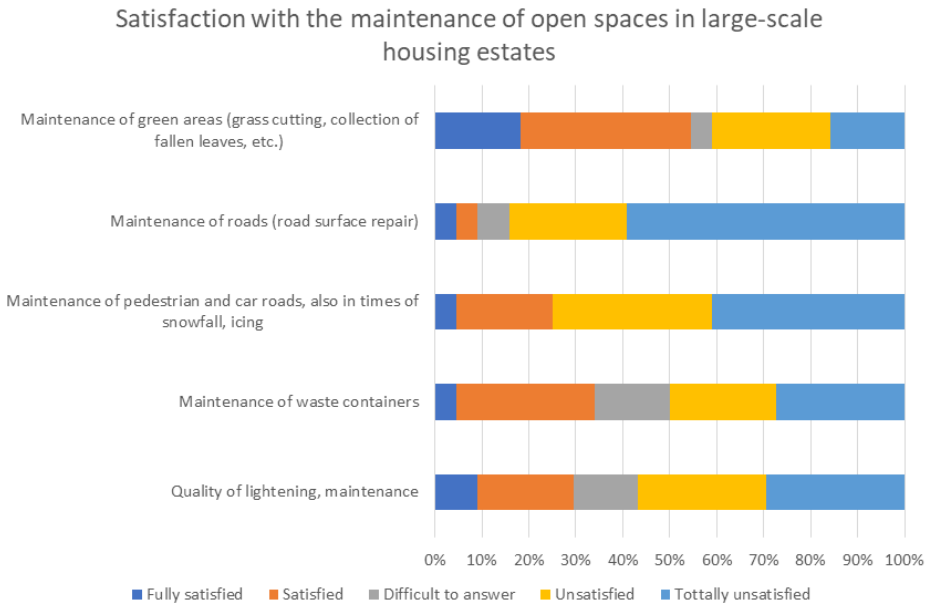
Question 6: What changes have occurred in the open space next to your home over the past ten years?



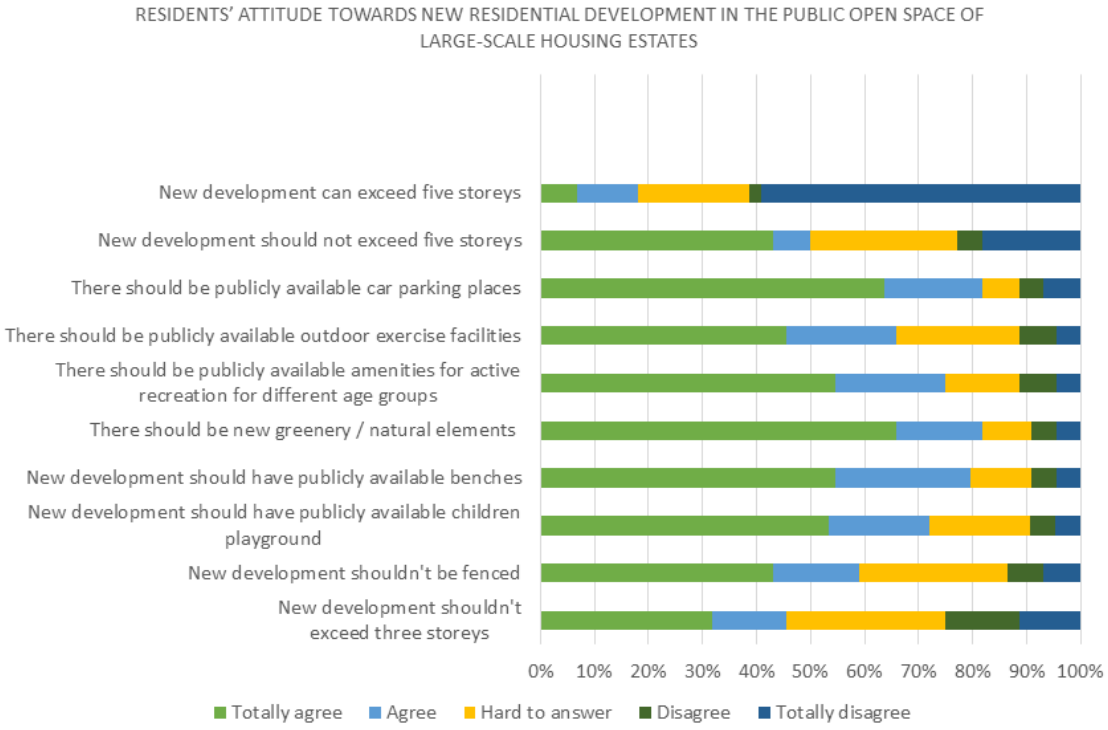
Question 7: Would you like the following changes to take place in open space in large-scale housing estate?



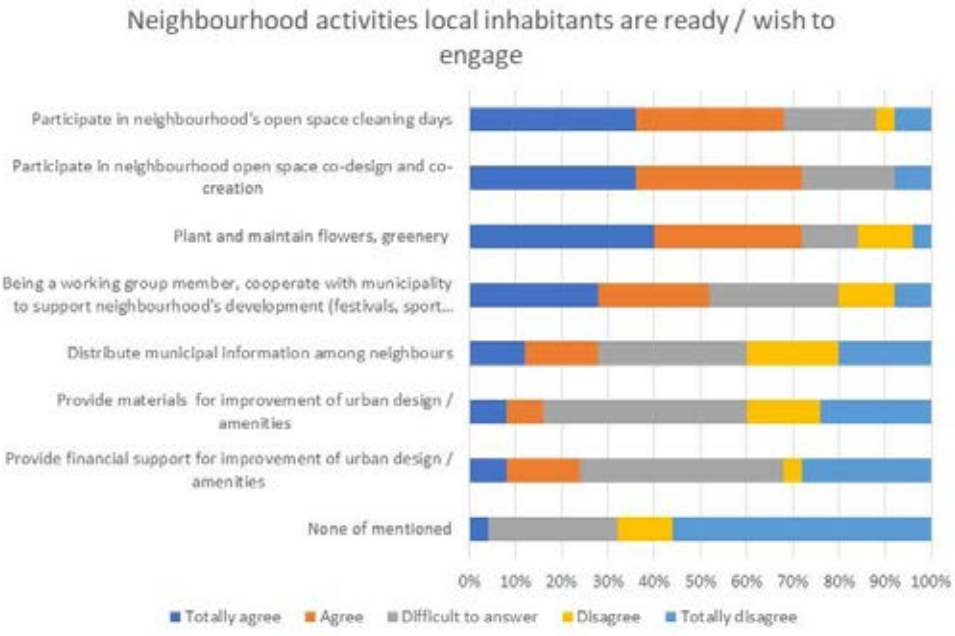
Question 8: Are you satisfied with the maintenance of open spaces in large-scale housing estates?



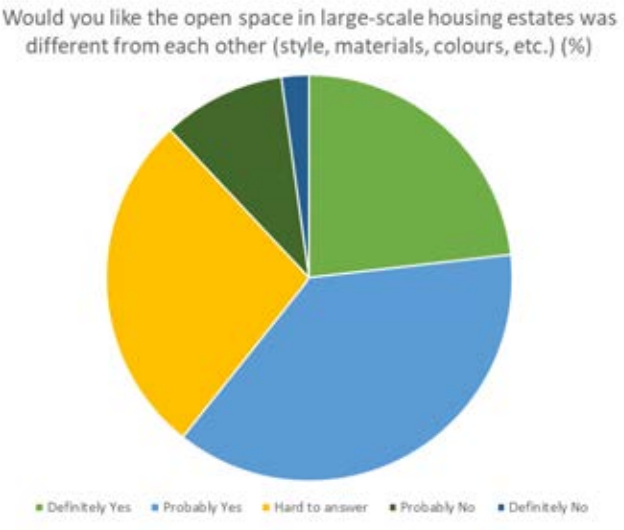
Question 9: Imagine that a new residential building will be built in one of the courtyards of your area, because the territory of the courtyard belongs to other owners. What do you think should be the conditions for a new building to be accepted by residents of nearby houses? (Please give an answer on each line)



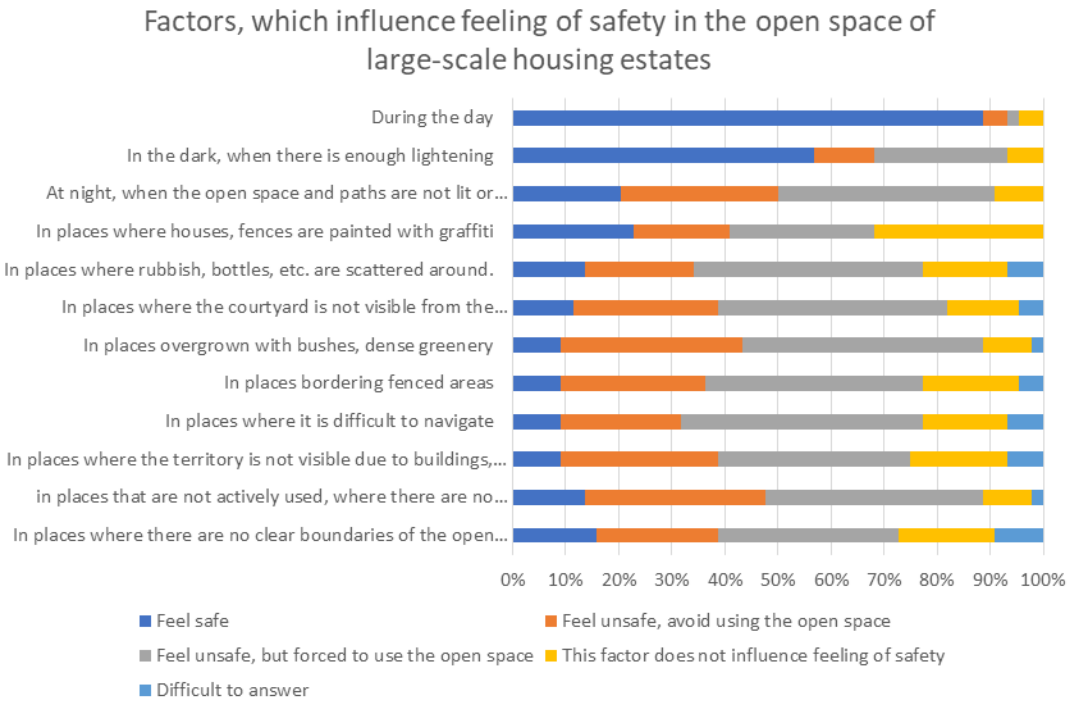
Question 10: What kind of neighbourhood development activities would you like to be engaged in?



Question 11: Would you like the open spaces of the estate to differ from each other (type and style of landscaping, materials, color, organization, etc.)?



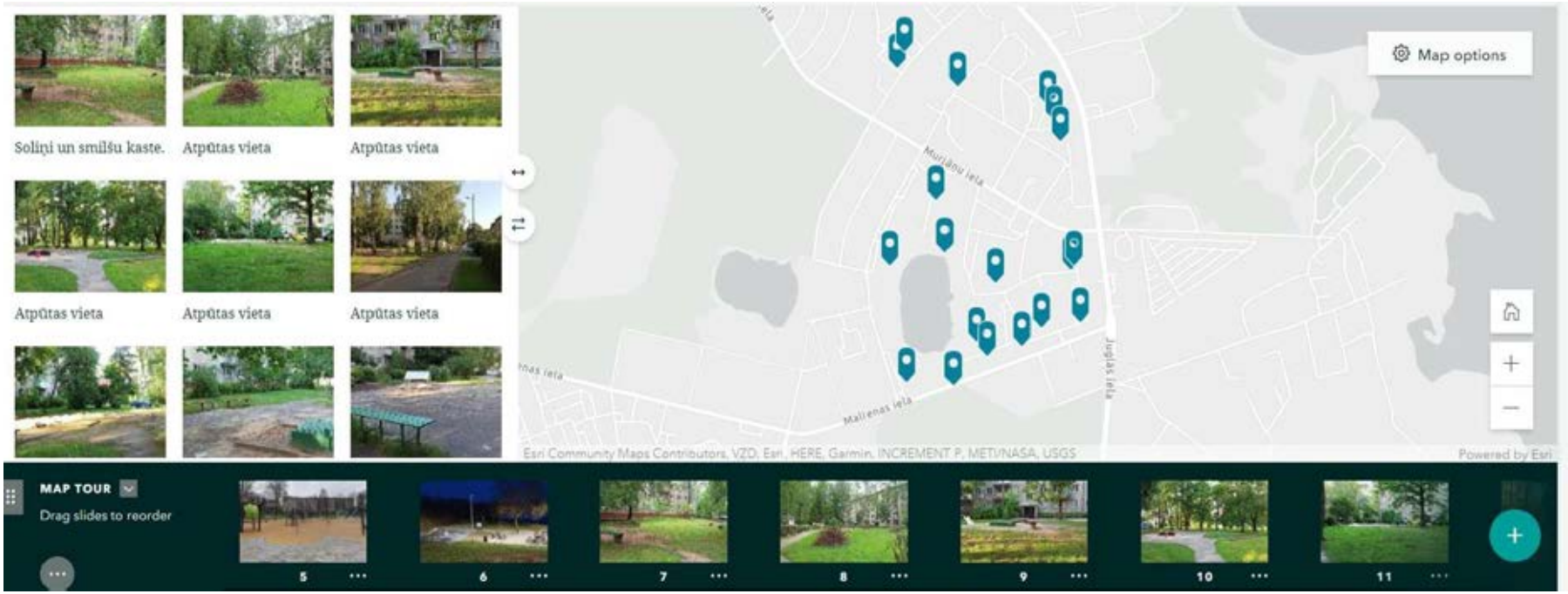
Question 12: Do you feel safe while spending time in the open space, crossing the open space on your way somewhere, and how do different factors affect your sense of security?



PRINCIPLE OF THE RESIDENTIAL ENVIRONMENT QUALITY EVALUATION APPROACH

I On-site observation and evaluation using the adapted checklist		II Mapping of results using the on-site observation data and online data (if aplicable, administrative data, green infrastructure data etc.) using ArcGIS or other service.	III Based on mapping results make conclusions regarding availability/ variety and distribution	IV Based on results and conclusions plan further transformations or evaluate proposed transformations
Examples of open space evaluation and eye-level view pictures				
Jugla				
	On-site observation using the checklist		Analysis of distribution and proximity of various transformations and open space components As a result a large-scale housing estate picture showing whether distribution of recreational opportunities, natural elements as well as infrastructure maintenance is insured in a fair way and is not fragmented. Proximity analysis including 5, 10 and 15 minute distances.	General recommendations on adjustent to home functions, recommended walking time to certain recreational amenities as well as interconnection between infrastructure and natural elements. Connection to residents' survey data results.
	On-site observation using the checklist			
	On-site observation using the checklist			
	On-site observation using the checklist			

Additionally on-site observation results are collected using ArcGIS Storymaps.



ADAPTED RESIDENTIAL ENVIRONMENT QUALITY EVALUATION CHECKLIST

EVALUATION CHECKLIST			TYPE OF SPATIAL CONFIGURATION BEFORE TRANSFORMATION	TYPE OF SPATIAL CONFIGURATION AFTER TRANSFORMATION	PRESENCE		TRANSFORMATION (V –related to the feature, N – not related);																
							Self-made																
					Present in good consition	Present, but needs maintenance, repair	Street furniture	Barriers	Gardening / landscaping	signs	other	Stret art	surfacing	Waste collection	lightening	Infill development	Infill development + infrastructure	Recreation areas	Outdoor Furniture	Car parking	Bike parking	Nature elements
Positive space																							
Path shape																							
Undefined space																							
PRESENCE OF TRANSFORMATION																							
EVALUATION CRITERIA																							
NEEDS	**Comfort and rest**	Sitting amenities																					
		Different types of sitting furniture																					
		Benches with backs																					
		Variety of choices in shadow, in sunny area																					
		Additional amenities: tables, shelters																					
		Provision of semi-public or semi-private space																					
		Sitting amenities surrounded by bushes / green hedges																					
		Sitting amenities surrounded by low fencing																					
		street furniture / children play areas Fully equipped (present climbing, sliding amenities)																					
		Present only some elements (sand box or one climbing amenity)																					
		Exercise areas for youth and adults																					

		Public green space different types of trees, shrubs																					
		flower beds or gardens																					
		Grass, some trees and shrubs																					
		Community garden																					
		green wall																					
	Security and safety	Pavement in good condition																					
		Paths and housing entrances are accessible for all user groups (accessible level changes)																					
		Neighbourhood watch signs																					
		lighting elements																					
		Area has enough car parking opportunities; also bike parking is provided																					
		Area has enough car parking opportunities;																					
		Car parking area has integrated greenery																					
		Cars do not block access on paths or green areas																					
	Convenience	Each house entrance has litter bins, also litter bins are located near sitting amenities, and children playgrounds																					
		Some litter bins are located near sitting amenities, and children playgrounds																					
		Big waste containers are located in the courtyard and are visually hidden using wooden shelter, green																					

		hedges or similar solution																					
	Social interaction	Sitting amenities with views open on active recreation or facing other activities (playgrounds, actively used paths etc.)																					
		Phisical settings for common activities																					
		Phisical settings for individual activities																					
	Identity	Unique and distinctive design																					
		Landmarks																					
		Distinctive features that support creation of mental images																					
		Community involvement in design and creation																					
	Privacy	Visual protection from crowds (with landscaping, natural elements																					
		Visual protection from crowds (with artificial elements, eg. Canopy)																					
	Clarity	Watch signs																					
		Physical access																					
		Visual access																					
NEEDS		**TOTAL SCORE COMMENTS / DISCRIPTION**																					
STRESSORS	**Disorder**	Some Litter (beer bottles, cans, plastic etc.																					
		graffiti or tags on building facades																					
		Dereliction (Brocken windows, boarded windows, broken glass)																					
		Brocken pathways, roads																					
		Parking places are not enough, some cars are seen on illegal places like																					

		grass land or pedestrian roads																					
		the whole public open space is transformed to parking																					
		Big waste containers are located in the courtyard and are open view type																					
		No litter bins. The waste containers are hidden in buildings																					
		Territorial Fencing																					
		High-rise development over five stories																					
STRESSORS		**TOTAL SCORE** **COMMENTS / DISCRIPTION**																					

Alisa Koroļova received architect's qualification and a Master's degree in Architecture from Riga Technical university. She is a researcher and an assistant in study work with the Faculty of Architecture of Riga Technical university (RTU). Since 2015, she has been Deputy Managing Editor of the scientific journal of RTU "Architecture and Urban Planning". Since 2020, the journal has been indexed in *Scopus* database. Since 2016, she has participated in organisation of RTU International Scientific Conference section "Architecture and Urban Planning" as well as Baltic Conferences for Young Researchers and guest lectures. She participated in the international cooperation project COST Action TU1201 *Urban Allotment Gardens in European Cities – Future, Challenges and Lessons Learned* (2012–2016). Currently, she is an MC member and a working group "Built environment" member in the COST Action CA17133 *Implementing Nature-Based Solutions for Creating a Resourceful Circular City* (2018–2022), and an MC member in the COST Action CA18204 *Dynamics of Placemaking and Digitization in Europe's Cities* (2019–2023). She is a researcher in Taiwan-Latvia-Lithuania cooperation project "Up-to-date Information Systems in Urban Regeneration'' (2020–2022) and in the Nordplus Adult 2021 project *Urban Garden Specialist* (2021–2023). Since 2016, she has published her research results in international and local scientific journals and presented papers at various international and local scientific conferences.