

This research was supported by the Science Fund of the Republic of Serbia,
#GRANT No 7572



Guidebook: Urban planning and design directive for residential public open space

Deliverable 2.4.

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June 2025

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GUIDEBOOK: URBAN PLANNING AND DESIGN DIRECTIVE FOR RESIDENTIAL PUBLIC OPEN SPACE

Disclaimer

This *Guidebook: Urban Planning and Design Directive for Residential Public Open Space* was produced with the financial support of the Science Fund of the Republic of Serbia. The RePOS team, i.e. the SRO Faculty of Civil Engineering and Architecture - University of Niš and the SRO Faculty of Architecture - University of Belgrade, are solely responsible for the content of this publication, and the content does not reflect the views of the Science Fund of the Republic of Serbia.

Review

Prof. Ružica Božović, PhD

Publisher

FACULTY OF CIVIL ENGINEERING AND ARCHITECTURE – UNIVERSITY OF NIŠ

For the publisher

Prof. Slaviša Trajković, PhD, Dean

The publication of this Guidebook was approved by the Teaching and Scientific Council of the Faculty of Civil Engineering and Architecture, University of Niš, by decision No. 8/197, dated 10.09.2025.

Design and Layout: RePOS Team

Cover page: Residential neighborhood Krive Livade Niš, authors' photo

Print: Donat Graf DOO Beograd

Circulation: 10 copies

ISBN 978-86-82810-08-7

Acknowledgement



This research was supported by the Science Fund of the Republic of Serbia, #GRANT No 7572, Reclaiming Public Open Space in Residential Areas: Shifting Planning Paradigms and Design Perspectives for a Resilient Urban Future – RePOS.

For further reading on reclaiming public open spaces in residential areas, please visit the RePOS project website <https://www.repos-project.rs>

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Public open space (POS) plays a fundamental role in shaping the quality of life in residential environments, especially in multi-family housing areas. As cities grow and densify, the need for accessible, inclusive, multifunctional, resilient, and well-managed open spaces at all urban scales is becoming increasingly essential. This Guidebook on Urban Planning and Design of Public Open Space offers a comprehensive framework for understanding, planning, designing, and managing POS in residential urban settings.

This publication begins by presenting a detailed **typology of public open spaces** within multi-family residential areas, which includes various spatial categories. The typology helps to establish the foundational understanding of how POS operates across different urban scales and functions.

Beyond typology, the Guidebook explores **innovative solutions** in POS urban planning and design, drawing from international and domestic examples and best practices. Chapters are dedicated to Socio-cultural, Multifunctional, Management, Digital, and Nature-based Solutions, highlighting how innovative practices in diverse European contexts can be leveraged to respond to contemporary urban challenges and community needs.

Recognizing the complexity of POS development, the Guidebook further provides **guidelines for the application of innovative solutions**, covering institutional, planning, and design aspects. The guidelines are tailored to ensure that POSs are thoughtfully allocated, incorporate innovative solutions, offer accessibility to all, support diverse user needs, and promote people's health through a variety of recreation options and a renatured landscape.

This publication also supports decision-makers, planners and designers with a practical **toolset for (re)creating public open space**, offering structured approaches across all stages of the planning, design and implementation process. The tools are organized into three categories: (1) Planning and Design Process Tools, (2) Stakeholder-Oriented Tools, and (3) Implementation Tools, ensuring a holistic and adaptable methodology that aligns with sustainable and resilient urban development.

Ultimately, this Guidebook aims to serve as a practical and strategic resource that supports cities and communities in (re)creating high-quality, inclusive, safe, resilient and sustainable public open spaces that respond to both present needs and future aspirations.



Photo source: RePOS team

T TYPOLOGY OF PUBLIC OPEN SPACE IN MULTI-FAMILY RESIDENTIAL AREAS

Table 1. BASIC TYPOLOGY: POS types at the neighborhood level in relation to their key function

POS function	Basic criteria for division	POS type	Abbr.
1. Recreation and gathering	Scale and catchment	A) Building-oriented POS	
		▪ Immediate surroundings ¹ of multifamily residential building with unlimited access	BO1
		▪ Immediate surroundings of commercial building with unlimited access	BO2
		▪ Immediate surroundings of mix-used building with unlimited access	BO3
		▪ Immediate surroundings of public building with unlimited access	BO4
		▪ Public or commercial complex ² with limited access	BO5
		B) Common POS	
		▪ Building cluster ³ POS in an open system of spatial organization (limited or unlimited access)	C1
		▪ Building cluster POS in a semi open system of spatial organization limited or unlimited access)	C2
		▪ Building cluster POS in a closed system of spatial organization (limited or unlimited access)	C3
		▪ Sub-neighborhood POS ⁴ - compact or loose form (limited or unlimited access)	C4
		C) Neighborhood POS⁵	
		▪ Park and garden	N1
		▪ Playground area	N2
▪ Sport field area	N3		
▪ Plaza/square	N4		
▪ Multifunctional POS	N5		
2. Mobility	Function	A) Traffic	
		▪ Outer street – primary and collecting street	S1, S1a
		▪ Inner street – collecting street, residential street, pedestrian-vehicle street/ living street	S2-4
		B) Pedestrian movement	
▪ Pedestrian paths	PM		
3. Greenery – nature space	Function	A) Green buffer	G1
		B) Landscaped greenery	G2
		C) Abandoned/unorganized greenery	G3
		D) Small horticulture	G4
4. Services and utilities (potential POS)	Function	A) Parking:	
		▪ Outdoor parking lot - within/along the street or independent (close from the building or at the distance from the building)	P1
		▪ Covered parking lot – above ground or underground garage	P2
B) Infrastructure space - underground and above ground⁶	U1		

NOTES:

- 1 The term "immediate surroundings" refers to space and items that are closest to building being spoken about. The extent of those surroundings varies and depend on the urban context.
- 2 The term "complex" refers to building-oriented POS within public or commercial facilities such as schools, community centres, local authorities' institutions, business centres, shopping centres etc.
- 3 The term "building cluster" refers to a form of land development in which principal buildings and structures are grouped together on a site, thus saving the remaining land area for common open space, conservation, agriculture, recreation, and public and semi-public uses
- 4 The term "sub-neighborhood" refers to a distinct grouping of buildings and contents within a neighborhood, on a larger area and with more contents and POS compared to building cluster
- 5 The term "neighborhood POS" refers to POS managed by local authority
- 6 The term "infrastructure space" refers to service and utility facilities and areas, such as electricity substations and other similar spaces. This segment was not further elaborated in the typology.

BUILDING-ORIENTED POS (BO)

Description

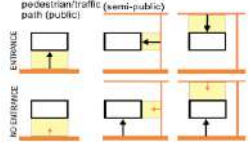








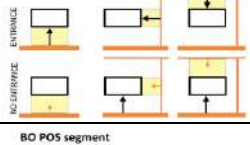







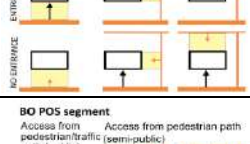







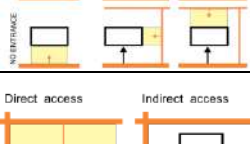












Building-oriented POS represents immediate surroundings - the space and items that are closest to residential, commercial, mix-use or public building located in the neighborhood.

It can be public, semi-public (entrance area, atrium) or semi-private (garden, small scale urban agriculture etc.). The extent and role of immediate surroundings varies from functional, social and environmental point of view and depend on the urban context.

It can have different uses and function as: entrance area, garden, sitting and gathering place, landscape greenery, green buffer, connection and movement space, etc.



Table 2. Building-oriented POS: Characteristics and varieties

Type of building-oriented POS	Criteria								
	POS position and publicity level	Size*			Materialization			Shape	
1. Immediate surroundings of multifamily residential building with unlimited access_BO1	<p>BO POS segment Access from pedestrian/traffic path (public)</p> 	< 2m	2 - 5m	> 5m	Green	Grey	Green/ Grey	Linear	Area
									
2. Immediate surroundings of commercial building with unlimited access_BO2	<p>BO POS segment Access from pedestrian/traffic path (public)</p> 	< 2m	2 - 5m	> 5m	Green	Grey	Green/ Grey	Linear	Area
					/				
3. Immediate surroundings of mix-use building with unlimited access_BO3	<p>BO POS segment Access from pedestrian/traffic path (public)</p> 	< 2m	2 - 5m	> 5m	Green	Grey	Green/ Grey	Linear	Area
					/				
4. Immediate surroundings of public building with unlimited access_BO4	<p>BO POS segment Access from pedestrian/traffic path (public)</p> 	< 2m	2 - 5m	> 5m	Green	Grey	Green/ Grey	Linear	Area
					/				
5. Public or commercial complex with limited access_BO5	<p>Direct access Indirect access</p> 	< 2m	2 - 5m	> 5m	Green	Grey	Green/ Grey	Linear	Area
		not relevant						/	

[*] Width of belonging space around the building

Photo source: RePOS team; few photos are from Google maps

Table 3. Building-oriented POS: Use

BO1_Immediate surroundings of multifamily residential building with unlimited access								
								
Entrance area - pedestrian and vehicle	Landscaped greenery	Small-scale green buffer	Sitting and gathering – formal and informal	Sitting and gathering – formal and informal	Garden (informal)	Garden (informal)	Connection and movement	Inappropriate use
BO2_Immediate surroundings of commercial building with unlimited access								
								
Entrance area – pedestrian	Entrance area – vehicle	Entrance area – supplies	Pedestrian promenade	Sitting and gathering	Sitting and gathering	Connection and movement	Landscaped greenery	
BO3_Immediate surroundings of mix-use building with unlimited access								
								
Entrance area - residents	Entrance area – use	Entrance area - vehicle	Pedestrian movement	Sitting and gathering	Outdoor extension of commercial facilities	Outdoor extension of commercial facilities	“Garage capitalism”	Landscaped greenery
BO4_Immediate surroundings of public building with unlimited access								
								
Entrance area – pedestrian	Entrance area – vehicle	Entrance area – supplies	Pedestrian promenade	Sitting and gathering	Sitting and gathering	Connection and movement	Landscaped greenery	
BO5_Public or commercial complex with limited access								
								
Entrance area – pedestrian	Entrance area – vehicle	Sitting and gathering	Sitting and gathering	Playground	Sport facilities	Education facilities	Landscaped greenery	

COMMON POS (C)

Description

Common POS refers to building cluster POS and sub-neighborhood POS.

A building cluster is a form of urban land development in which major buildings and structures are grouped together on a site, thereby creating their associated POS (building cluster POS) for a variety of uses - common open space, conservation, urban agriculture, recreation, and public and semi-public uses.

Configuration and characteristics of building cluster POS mostly depend on system of spatial organization which can be open, semi-open and closed.

Sub-neighborhood refers to a distinct grouping of buildings on a larger area. Sub-neighborhood POS can have different uses and function such as recreation and gathering - sitting, playgrounds, sport facilities, as well as connection and movement space, greenery, urban agriculture, etc.



Table 4. Common POS: Characteristics and varieties

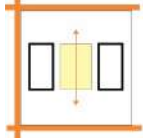
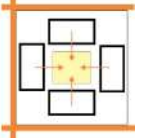







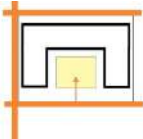
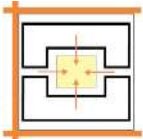







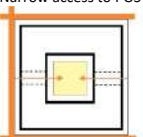
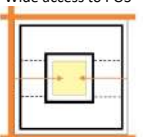





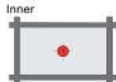





























Type of Common POS	Criteria									
	Configuration and publicity level		Size			Materialization			Shape	
1. Building cluster POS in an open system of spatial organization (limited or unlimited access)_C1	Transit POS	Focal POS	Small < 0,04ha	Medium 0,04 – 0,5ha	Large > 0,5ha	Green	Grey	Green/ Grey	Linear	Area
					/					
2. Building cluster POS in a semi open system of spatial organization limited or unlimited access)_C2	Transit/Pocket POS	Focal POS	Small < 0,04ha	Medium 0,04 – 0,5ha	Large > 0,5ha	Green	Grey	Green/ Grey	Linear	Area
					/					
3. Building cluster POS in a closed system of spatial organization (limited or unlimited access)_C3	Narrow access to POS	Wide access to POS	Small < 0,04ha	Medium 0,04 – 0,5ha	Large > 0,5ha	Green	Grey	Green/ Grey	Linear	Area
			/		/				/	
4. Sub-neighborhood POS - compact or loose form (limited or unlimited access)_C4	Inner	Outer	Small < 0,04ha	Medium 0,04 – 0,5ha	Large > 0,5ha	Green	Grey	Green/ Grey	Compact	Loose
			/			/				

Photo source: RePOS team; few photos are from Google maps

Table 5. Common POS: Use

C1_ Building cluster POS in an open system of spatial organization (limited or unlimited access)					
				/	
Sitting and gathering	Playground	Greenery	Movement and connection	Outdoor extension of commercial facilities	Abandoned or inappropriate use
C2_ Building cluster POS in a semi open system of spatial organization (limited or unlimited access)					
					
Sitting and gathering	Playground	Greenery	Movement and connection	Outdoor extension of commercial facilities	Abandoned or inappropriate use
C3_ Building cluster POS in a closed system of spatial organization (limited or unlimited access)					
	/				
Sitting and gathering	Playground	Greenery	Movement and connection	Outdoor extension of commercial facilities	Abandoned or inappropriate use
C4_ Sub-neighborhood POS - compact or loose form (limited or unlimited access)					
					
Sitting and gathering	Playground	Greenery	Movement and connection	Outdoor extension of commercial facilities	Abandoned or inappropriate use

NEIGHBORHOOD POS (N)

Description

Neighborhood POS is a public space within a residential area that provides social and recreational focal points for the community. It refers to spaces that were planned for variety of social and recreational uses, and includes: plazas and squares, parks and gardens, playground areas, sport field areas as well as different multifunctional green and built areas. They form a part of the city-wide public open space network and are usually built and managed by the public sector.



Table 6. Neighborhood POS: Characteristics and varieties

Type of Neighborhood POS	Criteria									
	Position in neighborhood and POS network		Size			Materialization			Shape	
1. Park and garden_N1	Inner	Outer	Small < 0,04ha	Medium 0,04 – 0,5ha	Large > 0,5ha	Green	Grey	Green/ Grey	Linear	Area
	Single	Interlinked								
2. Playground area_N2	Inner	Outer	Small < 0,04ha	Medium 0,04 – 0,5ha	Large > 0,5ha	Green	Grey	Green/ Grey	Linear	Area
	Single	Interlinked								
3. Sport field area_N3	Inner	Outer	Small < 0,04ha	Medium 0,04 – 0,5ha	Large > 0,5ha	Green	Grey	Green/ Grey	Linear	Area
	Single	Interlinked								
4. Plaza_Square_N4	Inner	Outer	Small < 0,04ha	Medium 0,04 – 0,5ha	Large > 0,5ha	Green	Grey	Green/ Grey	Linear	Area
	Single	Interlinked								
5. Multifunctional_N5	Inner	Outer	Small < 0,04ha	Medium 0,04 – 0,5ha	Large > 0,5ha	Green	Grey	Green/ Grey	Compact	Loose/ Linear
	Single	Interlinked								

Photo source: RePOS team; few photos are from Google maps

TRAFFIC (S)

Description

Movement considers traffic and pedestrian movement.

Traffic is the movement of transportation resources and persons in a neighborhood area, along a street.

A street is the basic unit of urban space which offers space for movement of traffic resources and pedestrians and access to different urban facilities. They differ according to rank and there are outer streets (primary and collecting) and inner streets (collective, residential and pedestrian-vehicle streets).

The regulation width and role of streets vary according to rank and may include a variety of uses and activities (vehicle movements, walking, cycling, sitting, gathering, meetings, children's play, access to residential, commercial and public buildings, etc.).



















































Table 7. Traffic: Characteristics and varieties

Type of street		Criteria									
A_ Outer street											
	Disposition within the neighborhood	Presence of two sidewalks		Presence of bicycle paths		Parking within the street		Type of greenery		Materialization	
		Yes	No	Yes	No	Yes	No	Tree-lined street	A street with bushes	Grey	Green /Grey
1.	Primary street_S1			/							
2.	Collecting street_S1a										
B_ Inner street											
	Disposition within the neighborhood	Presence of sidewalks		Presence of bicycle paths		Parking within the street		Types of greenery		Materialization	
		Yes	No	Yes	No	Yes	No	Tree-lined street	A street with bushes	Grey	Green /Grey
1.	Collecting street_S2										
2.	Residential street_S3			/							
3.	Pedestrian-vehicle street/living street_S4		not relevant		not relevant						

Photo source: RePOS team; few photos are from Google maps

Table 8. Traffic: Use

S1_ Outer street – primary street									
									
Movements – vehicles, public transport and bicycles			Pedestrian movement	Sitting	Recreation	Commercial use	Greenery	Parking	Inappropriate use
S1_ Outer street – collecting street									
									
Movements – vehicles, public transport and bicycles			Pedestrian movement	Sitting	Recreation	Commercial use	Greenery	Parking	Inappropriate use
S2_ Inner street – collecting street									
									
Movements – vehicles, public transport and bicycles			Pedestrian movement	Sitting	Recreation	Commercial use	Greenery	Parking	Inappropriate use
S3_ Inner street – residential street									
	/								
Movements – vehicles, public transport and bicycles			Pedestrian movement	Sitting	Recreation	Commercial use	Greenery	Parking	Inappropriate use
S4_ Inner street – pedestrian-vehicle street/living street									
	/								
Movements – vehicles, public transport and bicycles			Pedestrian movement	Sitting	Recreation	Commercial use	Greenery	Parking	Inappropriate use

PEDESTRIAN MOVEMENTS (PM)

Description

Movement considers traffic and pedestrian movement.

Pedestrian paths are public open spaces designed specifically for pedestrians. They provide movements away from traffic and interaction of people with each other. Pedestrian paths may be located through other public open space, independent or planned to connect buildings, other POS and streets. They can provide opportunity for urban furniture, landscaping, signage, and lighting. The width and role of pedestrian paths varies from functional and design point of view and depends on the urban context.



Table 9. Pedestrian movements: Characteristics and varieties

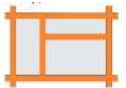








Pedestrian paths_PM	Criteria									
	Disposition within the neighborhood		Type		Size		Materialization		Shape	
	Primary paths	Secondary paths	Primary	Secondary	< 2m	> 2m	Gray	Green /Grey	Linear	Other
										/

Photo source: RePOS team; few photos are from Google maps

Table 10. Pedestrian movement: USE

PM_ Pedestrian paths								
								
Pedestrian movement			Sitting and gathering			Recreation		Informal paths

Photo source: RePOS team; few photos are from Google maps

GREENERY – NATURE SPACE (G)

Description

In this research, greenery refers to non-recreational land areas within neighborhood covered primarily with vegetation. It includes buffer greenery, landscape greenery, and other similar areas.

Greenery occurs at different spatial levels of the neighborhood, with different sizes and purposes.

It is usually accessible and available to the public.

Greenery provides various benefits such as supporting biodiversity, enhancing air and water quality, promoting mental and physical well-being, and improving the overall beauty of the neighborhood.



Table 11. Greenery-nature space: Characteristics and varieties

Type of Greenery		Criteria								
		Disposition within neighborhood		Size			Type of green		Shape	
1.	Green buffer_G1			Width (m)			Trees and shrubs	Grass	Linear	Area
				Small < 10m	Medium 10 – 30m	Large > 30m				
2.	Landscaped greenery_G2	Inner	Outer	Size			Trees and shrubs	Grass	Linear	Area
		Single	Interlinked	Small < 0,04ha	Medium 0,04 – 0,5ha	Large > 0,5ha				
3.	Abandoned/unorganized greenery_G3	Inner	Outer	Size			Trees and shrubs	Grass	Linear	Area
		Single	Interlinked	Small < 0,04ha	Medium 0,04 – 0,5ha	Large > 0,5ha				
4.	Small Horticulture_G4	Inner	Outer	Size			Fruits and vegetables	Flowers	Linear	Area
		Dispersed	Concentrated	Small < 10 m ²	Medium 10 – 50m ²	Large > 50m ²				

Photo source: RePOS team; few photos are from Google maps

PARKING (P)

Description

Parking is the action of bringing a vehicle that one is driving to a halt and leaving it temporarily, typically in an outdoor, covered or underground car park.

A parking lot is a space specially designed for all road users so that they can park their vehicles safely.

There are different types of parking lots within neighborhood – outdoor parking lots (within/along the street, separate parking lots close to the buildings, or separate parking lots the distance from the buildings) or covered car parks.

Covered parking lots are enclosed areas specially designed for parking vehicles. They are in a closed place on the ground or in the basement of a building, usually built in a form of garage. The garage can consist of one or several levels or floors.



Table 12. Parking: Characteristics and varieties

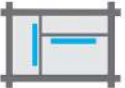








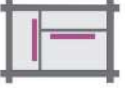
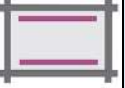







Type of parking		Criteria								
		Disposition within neighborhood		Organization and position			Materialization		Origin	
1.	Outdoor parking lot_P1	Inner 	Outer 	Within/ along the street 	Independent – close to building 	Independent – remote – (> 30m) 	Paved 	Unpaved 	Formal 	Informal 
2.	Covered parking lot_P2	Inner 	Outer 	Covered 	Above ground garage 	Underground garage 	Paved 	Unpaved 	Linear 	Area 

Photo source: RePOS team; few photos are from Google maps



Photo source: <https://www.publicspace.org/works/-/project/h250-refurbishment-of-a-green-space-in-the-neighborhood-of-gorica>

SOCIO-CULTURAL SOLUTIONS

Description

Social and cultural factors, along with planning activities related to public open spaces (POS), greatly impact the quality of life in multi-family neighborhoods. These factors can influence social inequalities and community engagement. To improve these areas, key objectives for reclaiming POS in multi-family neighborhoods can be identified:

- **Satisfaction with housing and living conditions**

The living environment is vital for individual well-being, influenced by the physical space and individuals' perceptions. Housing satisfaction depends on various factors, including physical, social and economic ones (Sirgy and Cornwell, 2002; Brown et al., 2003; Bogdanović Protić, 2016; Slavković, 2024), and symbolic. Social aspects like neighbour interactions and feelings of belonging greatly affect neighborhood satisfaction (Weidemann and Anderson, 1982; Bogdanović Protić et al., 2018). Sirgy et al. (2000) note that housing satisfaction is crucial for overall neighborhood contentment, as unmet needs may drive residents to move and contribute to area decline.

Urban regeneration projects in multifamily neighborhoods (Razavivand Fard and Gharanfali, 2019) show that overlooking

residents' social needs during design can result in negative outcomes, including a lack of identity, poor environmental quality, and resident disengagement. Such issues can also compromise POS, increasing insecurity and fostering social segregation.

- **Socio-economic status of residents**

Reclaiming POS in urban regeneration projects and new housing developments can yield significant socio-economic benefits, including: 1) increased real estate values: Improving the neighborhood's environment and perception leads to higher property values (Uitermark and Loopmans, 2013). Economic benefits are particularly evident when existing neighborhood characteristics are preserved and enhanced using Nature-based Solutions (NbS) and innovative stormwater management, such as Sustainable Drainage Systems (SuDS) (Slavković, 2024); 2) job creation: Urban regeneration or new housing projects that implement a mixed-use concept can generate new jobs.

Economic aspects such as property values, cost of living, and residents' socio-economic status play a crucial role in shaping neighborhood quality and overall satisfaction.

- **Social inclusion of residents**

Creating inclusive and diverse communities in multi-family housing involves intentional actions and planning. By embracing diversity and including the local community, sense of belonging can be fostered. Key stages to consider for resident inclusion include planning, design, construction, operation, and renewal (Research Insight, 2020).

Planning inclusive multi-family housing emphasises flexible, participatory methods that prioritise shared spaces and universal design. It involves engaging residents and the community, particularly vulnerable groups, and provides diverse, adaptable unit sizes to meet evolving needs.

Designing inclusive multi-family housing focuses on accessibility and social interaction by: 1) blending public and private spaces; 2) ensuring safety and privacy through access control; 3) integrating nature, natural light, and cultural elements to promote well-being among diverse residents.

Construction for inclusive multi-family housing involves principles and technologies that address planning and design. At the neighborhood level, this includes infrastructure that improves connectivity to schools, services, parks, and spaces that foster social interactions.

Operating inclusive multi-family housing promotes social inclusion through shared features that enhance resident interaction. Community development should continue after

construction, offering resources for activities that focus on information-sharing, skill-building, and utilising art, culture, and nature to encourage engagement.

Regenerating multi-family neighborhoods towards inclusive housing requires assessing social inclusion and well-being. Plans should include diverse tenure mixes and resolve common space conflicts for security. Effective community engagement is essential during renewal and post-construction.

- **Engagement and participation of residents**

The participatory approach strengthens community involvement in development, enabling target groups to shape sustainable initiatives. The Charter for Participation (2000) emphasizes public input in urban policy, a principle also supported by UN and EU Urban Agendas. Resident participation is key to the success and long-term maintenance of POS programs (Bogdanović Protić et al, 2020). For participation to be effective, it must go beyond formality—requiring clear goals and rules. Various tools support local governments in involving citizens (Horita & Koizumi, 2009). Local action groups and community meetings play a central role in urban regeneration, ensuring that new designs align with existing environments. Strong community input helps planners respond to real needs, while open communication builds trust and promotes acceptance of POS projects, sometimes even triggering regeneration independently (Slavković, 2024).

Delijski Vis, Niš, Serbia

The non-governmental organisation "Radne akcije Delijski Vis Niš" is dedicated to enhancing the usability and aesthetic appeal of POS within the neighborhoods of Niš, while also focusing on fostering social engagement among residents. In 2024, alongside a team of volunteers and skilled craftsmen, this organisation carried out an arrangement and renewal of an intra-block POS in the Delijski Vis neighborhood, and successfully constructed a specialised playing field for "nogotenis" (commonly known as "foot tennis") (Figure 1). This intra-block POS can be characterised as the Common POS - Building cluster POS in an open system of spatial organisation (RePOS, 2024). This area has seen considerable development in recent years as part of the organisation's broader efforts to revitalise community spaces (Radne akcije Deijski Vis Niš, 2024).

The newly established sports field is surrounded by a protective fence, a crucial feature designed to enhance the safety of both the users and the local residents. This initiative reflects the ongoing commitment of the NGO to create an inter-block sports complex that features multifunctional amenities, satisfying the diverse recreational needs of the local population.

This project was implemented through collaborative support from local government and community organisations. The Palilula City Municipality provided concrete materials for the

construction, while the Public Utility Company Parking Servis contributed paint, illustrating a strong partnership between the NGO and public institutions. In addition to constructing sports facilities, the members of "Radne akcije Delijski Vis Niš" actively engage in greening activities for the POS and host various events that are aimed at promoting community cohesion and social inclusion. These initiatives serve to strengthen community ties, encouraging residents to come together, participate in shared activities, and foster a vibrant, inclusive community spirit.



Figure 1. Sports field, realised in common POS, Delijski Vis

Photo source: <https://www.facebook.com/radnaterapija2016/>



Photo source: <https://bruitdufrigo.com/en/projets/fiche/jardin-invisible/>

MULTIFUNCTIONALITY SOLUTIONS

Description

Multifunctional solutions (MFS) are increasingly taking a central role in contemporary urban planning as a response to the challenges of sustainable development. The idea that multifunctional public open spaces (POS) can contribute to sustainable urban development is based on the assumption that they bring a broader range of ecological, social, and economic benefits to urban areas (Živković et al., 2019). Their application is particularly significant in the context of climate change and the growing developmental challenges, where POS are expected to simultaneously provide benefits for both people and nature.

The concept of spatial functionality refers to the capacity to perform a specific function; however, in contemporary understanding, multifunctionality implies the ability of a space, object, or activity to fulfill multiple functions and achieve multiple objectives simultaneously (OECD, 2001). Multifunctionality becomes a value only when it is connected to specific social, ecological, or economic objectives. In this sense, it can be observed through *spatial* and *temporal* dimensions, depending on whether multiple functions are realized

simultaneously (synchronously) or over different periods of time (diachronically) (Batty et al., 2004; Majoor, 2003).

The multifunctionality of space can also be analyzed from the perspective of supply and demand. From the supply side, it refers to the capacity of a space or object to support the realization of different activities and the achievement of desired effects, while from the demand side it represents societal expectations regarding the quality of a given space (Huylbroeck et al., 2007).

In the practice of urban planning and design, multifunctionality is related to *use* of urban space, and is considered as an instrument for overcoming issues of spatial fragmentation, social segregation, and traffic problems, which have been identified as indicators of the ecological, social, and economic decline of modern cities (Jacobs, 1961). As a response, concepts such as "mixed land use" and "multifunctional use of space" have been developed and applied at various spatial scales, both within built structures and in open spaces (Majoor, 2003).

According to the relevant literature, four types of multifunctional land use have been identified: mixed land use, multiple land use, the combination of functions within space (horizontally and vertically), and multifunctional use of space over time (Batty et al., 2004; Haccou et al., 2007; Hoppenbrouwer & Louw, 2005; Kajtazi, 2007; Verkeer et al., 2004; Wiggering et al., 2006). The multifunctionality of public open spaces encompasses the use of both built and green areas for various activities such as recreation, education, mobility, the protection of natural habitats, urban agriculture, and community development (Waters & Smith, 2002).

In contemporary approaches to landscape planning and architecture, the concept of multifunctionality is further elaborated through the theory of ecosystem services. The landscape is defined as a space shaped by the interaction of natural and human factors (Council of Europe, 2000), and its functions include food production, climate regulation, water purification, biodiversity support, and aesthetic values (Willemen, 2010). In this context, multifunctionality refers to the capacity of a land to simultaneously provide various *services* and material and non-material benefits to society (Wiggering et al., 2006). In urban environments, multifunctional open spaces are increasingly used to address challenges posed by climate change, enabling, for example, rainwater harvesting, the reduction of the urban heat island effect, and the development of urban agriculture (Fish et al., 2016).

Well-planned and well-designed public open spaces provide multiple benefits. Ecological benefits are reflected in the improvement of the quality of the urban environment, the support of natural systems and biodiversity, and the regulation of microclimatic conditions as well as air and water quality (Kaufmann-Hayoz et al., 2007).

Socio-cultural benefits include the creation of spaces for social interaction, the preservation of local identities and cultural practices, and the support of democratic culture through the promotion of the right to the city (Đukanović & Živković, 2015; Corner, 2006). The economic benefits of public open spaces are manifested in the stimulation of local economic activities, the increase in real estate market value, and the enhancement of tourist attractiveness through the creation of high-quality and functional urban environments (Kaufmann-Hayoz et al., 2007).

Multifunctional public open spaces represent key indicators of the sustainability of urban environments. Neglected and degraded spaces signal ecological, social, and economic dysfunctions, while revitalized multifunctional spaces point to positive processes of urban transformation and sustainable development.

Thus, multifunctional solutions are not merely technical innovations in urbanism; they serve as tools for achieving a broader vision of sustainable, inclusive, and resilient cities.

Gellerup Nature Park, Aarhus, Denmark

Gellerup Nature Park in Aarhus, Denmark, represents an outstanding example of the revitalization of neglected public open spaces through a multifunctional approach that simultaneously addressed the ecological, socio-cultural, and economic aspects of sustainability. The project was developed with the aim of transforming a modernist housing estate from the 1960s, known for issues of social segregation, high crime rates, and ecological neglect, into a vibrant and inclusive urban environment (Green Cities Europe, n.d.; Landscape Architecture Europe, n.d.).

The implemented solution involved a multilayered approach in which ecological and social interventions were interconnected. At the landscape level, natural terrain morphologies with gentle slopes were introduced, along with the creation of watercourses and lakes that, in addition to their aesthetic function, serve to collect excess stormwater, representing an example of the provision of landscape services. The social component of the project was realized through the establishment of multifunctional spaces for play, recreation, relaxation, and cultural events. The multifunctionality enabled various forms of space use over time, contributing not only to social cohesion but also to economic revitalization through the attraction of visitors and the development of local entrepreneurship. An illustrative presentation of the success of the implemented

solutions can be seen in Figure 2, which shows the transformation of the space from modernist cascades to natural slopes, highlighting the functions of the new landscape and water elements (EFFEKT, n.d.).

Gellerup Nature Park demonstrates how an integrated approach based on nature-based solutions and community participation can regenerate degraded urban spaces, improve the quality of life for residents, and strengthen the resilience of neighborhoods to climate challenges (SLA Aarhus, n.d.).

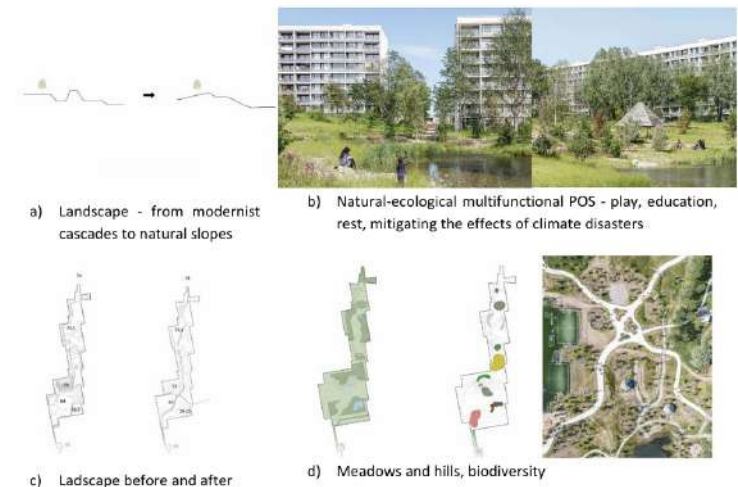


Figure 2. Multifunctional solutions for Gellerup public spaces

Source: <https://www.effekt.dk/gelleruppark>



Photo source: <https://welovebudapest.com/cikk/2024/07/23/latnivalok-es-kultura-havanna-lakotelep-tortenete-pestszenlorinc-xviii-kerulet/>

MANAGEMENT SOLUTIONS

Description

Public open space (POS) management is vital for securing the long-term provision of these areas (Randrup & Jansson, 2020). It involves a complex set of activities to balance various functions (Carmona et al., 2008) and requires a strategic, inclusive approach to ongoing planning and maintenance (Jansson et al., 2020). Dempsey & Burton (2012) emphasise it as placekeeping to ensure quality for future generations. While often viewed as the “end-phase” of development (Said & Tempels, 2023), effective POS management should include proactive strategies to mitigate the new development pressures (Slaev et al., 2022).

The management of POS has evolved into a public service in many Western countries during the 20th century. Traditionally overseen by local governments, funded through taxes, POS often suffer from underprovision and mismanagement due to limited market incentives. As the importance of POS in urban policy has increased, especially in the case of urban regeneration, funding needs have become more evident. Beside to local governments, private entities now also manage privately owned public spaces (POPS) (Stähle, 2019). New stakeholders are getting involved to address global challenges -urbanisation,

climate change, emphasising sustainable design and green infrastructure (Jansson et al., 2020).

Public sector reforms and the introduction of New Public Management (NPM) have reshaped the roles of public services (Carmona, et al., 2008; Randrup & Jansson, 2020), leading to a proliferation of agencies delivering these services. POS management is now a market issue, with contractors and private enterprises playing key roles, alongside the need to involve urban residents to enhance transparency. Stakeholders in POS management can be categorised into four groups (Carmona, et al., 2008)

1. **Private** (property owners, developers, contractors ...);
2. **Public/private** (government agencies and operators);
3. **Local government** (various sectors and services);
4. **Community** (residents and interest groups).

POS management must be increasingly considered in the light of its governance relations (Randrup & Jansson, 2020). Ownership influences POS management, with Németh & Schmid (2011) identifying four types: 1) publicly owned and operated; 2) publicly owned and privately operated; 3) privately owned and

publicly operated; 4) privately owned and operated. Carmona et al. (2008) outline POS management as four interconnected processes:

1. The **regulation** of uses and conflicts between uses;
2. **Maintenance** routines to keep public spaces in good state;
3. The **investments** into and ongoing resourcing of public space;
4. The **coordination** of interventions in POS.

Carmona et al. (2008) identify three **organisational models** addressing the issues of coordination, regulation, maintenance and investment of POS management:

- **State-centred**

In this model, public-sector institutions manage service planning and delivery with minimal external input, emphasising hierarchical structures and public service ethics (Randrup, Lindholst, & Dempsley, 2020).

- **Market-centred**

The market-centred model shifts management of POS to private entities, potentially leading to cost savings and new expertise (Carmona et al., 2008; Randrup et al., 2020).

- **Community-centred or user-centred**

This model devolves POS management to community organisations, differing from the market-centred model by focusing on quality rather than profit (Carmona et al., 2008). This model emphasises network governance and partnerships with public and private sectors (Dempsey & Burton, 2012).

Financing POS provision and management

The main challenge in financing POS management is the absence of long-term budgets at the design stage (MP4 partners, 2012). Public-sector POS is primarily funded through property and land taxes, with cities sometimes employing special taxes (CABE, 2006). As public goods, POS generate externalities and increase land values, positively affecting housing prices (Ståhle, 2019). This increased value can be partly recaptured by the public sector via **value capture (VC) tools**, including monetary options like development impact fees or in-kind contributions, which do not directly affect the municipal budget (Slaev et al., 2022).

Some of the financing models are **zoning incentive programs** and **density bonuses**, which encourage developers to include public amenities in exchange for greater development flexibility. Another model is the **Development Impact Fees (DIF)**, where developers are required to help fund public facilities (Ståhle, 2019). **Transfer of Development Rights (TDR)** is another model which allows property owners to sell development rights from low-density to higher-density areas, preserving open space while compensating owners (Nelson et al., 2012).

One of the instruments for providing public space, particularly in densely built-up areas, are **POPS**. They represent hybrid spaces supported by private developers, where the government sets access rights and regulations while the market handles funding and maintenance (Lee, 2022).

HafenCity, Hamburg, Germany

HafenCity is a new quarter being developed in the old harbour of Hamburg, along the River Elbe, and it represents Europe's largest inner-city urban development project to transform the former port area into a vibrant mixed-use urban district (HC, 2024; Lee & Scholten, 2024).

In 1993, the Corporation for Harbour and City Development was formed as a subsidiary of Hamburg Harbour and Logistics to redevelop underutilized port areas. By 1997, a special asset class was created by the municipality to manage these assets. The corporation gained control of significant public and private land, keeping its urban expansion plans confidential to prevent speculation. HafenCity, announced in 1997 as a mixed-use district, led to the corporation being rebranded in 2004 as HafenCity Hamburg GmbH. This entity operates like a private company while retaining public ownership, using government regulations to manage and develop public land, with the goal of improving the city's property markets (Bruns-Berentelg, 2020).

HafenCity is expected to house 15,000 residents, with about 25% of these being subsidised to promote social diversity (EMAF, 2024). An international competition for development was held in 1999, and the Hamburg Senate approved the Master Plan in 2000. Construction started in 2001 and is still ongoing.

Public and private open spaces represent important part of the plan from the very beginning (Figure 3), and 32% of the area is intended for buildings, 23% for traffic and 45% for public and private green spaces (HC, 2024). Privately owned public spaces (POPS) make up one-third of all open spaces in HafenCity. The development of POPS is within four stages of cooperation between the public sector, the private sector and the public: co-planning, co-designing, co-delivery and co-management, where the public participates in all phases except co-delivery.



Figure 3. Part of HafenCity with different types of POS

Photo source Google Earth

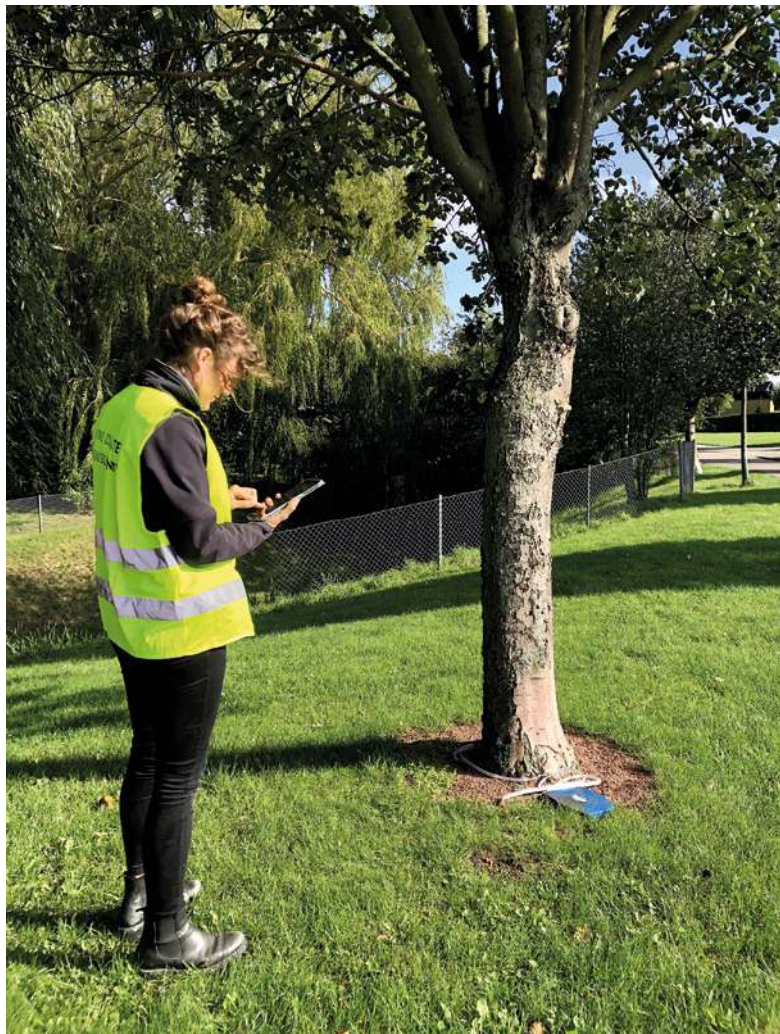


Photo source: Svännel, J., Sang, Å.O., Sang, N., Sjöman J.D. and Jansson, M. (2020). Digital systems and tools to support urban open space governance and management. In M. Jansson, & T. B. Randrup (Eds.), *Urban Open Space Governance and Management* (pp. 168-189). Routledge.

DIGITAL SOLUTIONS

Description

The concept of digital solutions (DS) in the planning and design of public open spaces (POS) has been developed as part of a broader model of smart city development, which originated in the early 21st century. The first implementations of such approaches emerged in the United States and subsequently expanded to other regions such as Europe, Asia, and Latin America (Languillon-Aussel, 2021). With the acceleration of technological advancement, digital solutions have become an integral part of planning and design practices, particularly in the context of enhancing citizen participation, spatial design, and the management of urban environments.

Although the concept of digital solutions has evolved over the past decade, the scientific literature still lacks a unified and comprehensive definition of the term. Fundamentally, digital solutions encompass a variety of tools, technologies, and methods that may be used locally (on-site) or remotely via digital networks. According to Koolen et al. (2019), digital tools can be interpreted as platforms, research instruments, or methodologies, depending on the context in which they are applied.

Erjavec and Žlender (2020) propose a classification of digital solutions based on the physical context of their use:

- **Localized solutions** – tools that are physically installed in space, such as smart benches, sensors, digital displays, and other physically integrated systems.
- **Portable solutions** – digital tools that enable users to interact with space while physically present on site, such as mobile navigation applications, augmented reality, and digital guides.
- **Remote solutions** – tools that facilitate user participation and interaction without physical presence, such as online platforms, participatory web tools, and mapping applications.

Houghton et al. (2014) introduce an additional functional classification of digital technologies according to their role in the planning process:

- **Technology for analysis of place** – includes tools for data collection and processing, such as sensors, GIS tools, design and mapping platforms, virtual and augmented reality (VR and AR), as well as environmental monitoring tools.

- **Technology in place** – encompasses digital systems that are physically embedded in space and allow users to receive real-time information or enhance their spatial experience.
- **Technology for community engagement** – enables citizen involvement in the planning process through tools such as social media, participatory mapping, and digital consultation platforms.

Digital solutions are closely connected with contemporary concepts such as digital placemaking, nature-based solutions (NBS), and digital community participation. Within the framework of digital placemaking, according to Morrison (2018), digital technologies are used to strengthen the relationships between people and the spaces they inhabit, while Fernandez de Osso Fuentes et al. (2023) emphasize that this approach contributes to social inclusion, public health, and the resilience of urban communities.

Within the concept of NBS, digital solutions are employed for the creation of databases, evaluation, and monitoring. Platforms such as Oppla, ThinkNature, and NetworkNature serve as resources for researchers, policymakers, and practitioners, facilitating knowledge exchange, solution evaluation, and strengthening cross-sector collaboration (Favre et al., 2017; Chrysoulakis et al., 2021; Tsekeri et al., 2022).

In the context of community participation, digital solutions enable the implementation of all stages of stakeholder engagement as defined by Luyet et al. (2012): information sharing, consultation, collaboration, co-decision-making, and empowerment. Digital participation tools, such as PPGIS and Maptionnaire, enable two-way communication between citizens and institutions, while simultaneously serving as instruments for mapping spatial needs and values (Toukola and Ahola, 2022).

Finally, in the domain of public space management and evaluation, digital solutions—particularly GIS tools—enable the collection, storage, processing, and visualization of spatial data in real time. These tools, especially when combined with Internet of Things (IoT) technologies, contribute to more efficient space maintenance and evidence-based decision-making (Chang, 2019; Svännel et al., 2020).

In conclusion, digital solutions represent a key component of contemporary public open space planning and management. Their successful application depends not only on technological capacities but also on institutional support, user education, and legal frameworks that ensure an inclusive and responsible approach to their use.

The City of Eslöv, Sweden

Digital participation, particularly through PPGIS, allows for the collection of spatial and perceptual data from end-users of space. A PPGIS solution was implemented in the city of Eslöv, located in southern Sweden, with a population of approximately 20,000. During the preparatory phase of the planning process, the municipality launched an online map-based survey to gather residents' ideas and opinions on the future spatial development of the area. The platform used was Maptionnaire, an interactive PPGIS tool that enabled citizens to mark locations on the municipal map such as places they frequent, areas they favor or dislike, and zones they believe should be developed or preserved. The accessibility of the tool allowed for the participation of diverse age and social groups, thereby increasing the representativeness of the collected opinions.

Over 800 responses were processed, and all data were automatically integrated into a digital map (Fig. 4). Through Maptionnaire, citizens primarily highlighted the spaces they use in everyday life and the aspects they wished to see improved—for example, pointing out the lack of green areas in specific neighborhoods or the need for safer pedestrian connections and play equipment. This information was later used in the plan revision phase, particularly with regard to preserving existing green spaces, protecting a historical orchard, and planning new bicycle and pedestrian routes that reflect the actual needs of

the local community (Svännel et al., 2020; Eslövs kommun, n.d.). The experience from Eslöv demonstrates that PPGIS should not be regarded merely as a technical innovation, but rather as an instrument for redefining the relationship between communities and institutions.

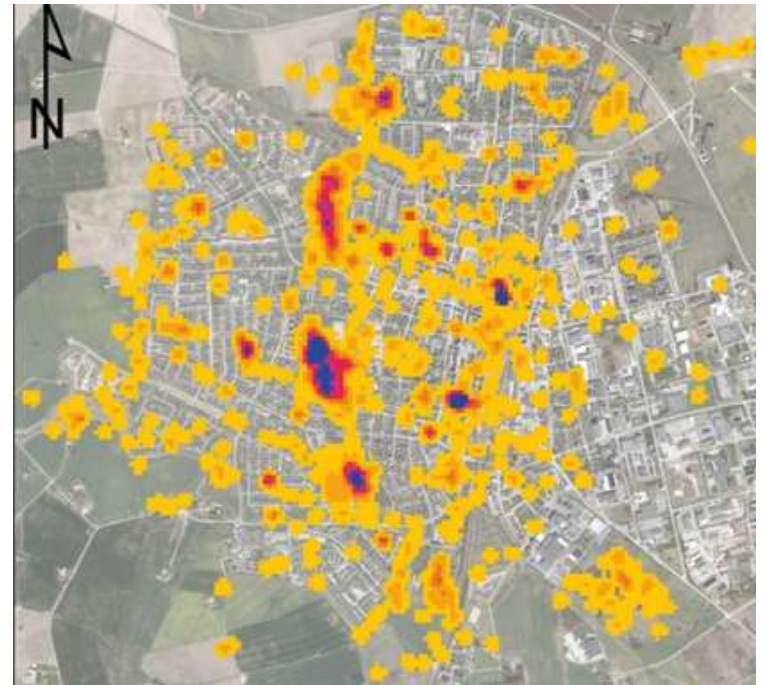


Figure 4. Map of POS use and improvement in Eslöv

Photo source: Maptionnaire, In Jansson & Randrup (Eds.), 2020.



Photo source: <https://www.nl-landskab.dk/fremtidens-gardhave>

NATURE-BASED SOLUTIONS

Description

Nature-based Solutions (NbS) is the umbrella concept of ecosystem-based approaches to address societal challenges. It is one of the "top 5" most effective strategies for reducing CO2 emissions by 2030 (IUCN, 2020). NbS is considered one of the key measures of disaster risk reduction and climate change adaptation and mitigation (NUA, 2017).

Faced with the devastating impacts of climate change in recent years, defining NbS has become a key challenge for policymakers and academic researchers. To position the EU as a leader in innovating with nature to achieve more sustainable and resilient societies, the European Commission officially defined NbS as *"Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes, and seascapes, through locally adapted, resource-efficient and systemic interventions"* (EC, 2016).

NbS are essential for creating sustainable public open spaces (POS) in multi-family residential areas. They enable the

transformation of neglected estates into vibrant, livable environments that foster community pride and social connection. By enhancing the functionality, accessibility, and aesthetic quality of POS, NbS promotes well-being and social interaction. Additionally, they support biodiversity, reduce urban heat, and contribute to ecological health and social equity. Incorporating NbS into POS design leads to more resilient, attractive, and inclusive spaces that improve residents' quality of life. For the implementation of NbS in designing (re)new POS, an approach that should be adopted is a 'case-by-case' rather than a 'copy-paste' (Sowińska-Świerkosz & García, 2022).

The multiple benefits of NbS provide the possibility of NbS to be applied in multi-family residential areas on two levels: 1) the building-based and 2) the micro-level of the area. The NbS measures that can be implemented on the building-based level are green roofs, green walls, and mini rain gardens. At the micro level, NbS are commonly applied in groups of buildings, open spaces, courtyards, etc. Due to the characteristics of multi-family areas and their urban morphology, open spaces present a

key opportunity for applying NbS and environmentally oriented urban strategies in new housing developments and inherited neighborhoods (Živković et al., 2014). The technical elements and measures of NbS are presented in Table 13.

Table 13. Technical elements and measures of NbS

		Elements/measure
Highly intensive ecosystem management or the creation of new ecosystems	Green space	Residential park Green corridor Urban garden
	Trees and shrubs	Single line street trees Boulevards Group of trees
	Soil conservation and quality management	Living fascine Revetment with cuttings Planted embankment mat
	Green built environment	Extensive/Intensive green roof Constructed wet roof Smart roof Green façades Free standing living wall Mobile vertical greening Moss wall
	Natural or semi-natural water storage and transport structures	Constructed wetland Retention/detention pond Daylighting Underground water storage
	Infiltration, filtration and biofiltration structures	Bioswale Rain garden Infiltration basin Permeable paving system Biofilter (water purification)

(Source: UNa Lab, 2022)

To realize the full potential of the benefits of NbS and to ensure the long-term environmental and social sustainability of POS in multi-family residential neighborhoods, when (re)planning POS, it is important to talk and debate with neighborhood residents from the beginning of the planning process, and to take into account local (neighborhood) and traditional knowledge. Residents' participation in the development process of a POS transformation project is key to creating environmentally and socially friendly, sustainable places.

As NbS becomes more involved in policy and is implemented through on-the-ground projects, it is crucial to have a clearer, more precise understanding of what the concept means and what is required for its successful application. To successfully apply NbS in urban areas and promote climate adaptation, it is important to establish clear criteria for measuring what is "nature-based" and to agree on how to define when a "solution" has been achieved. Therefore, the International Union for Conservation of Nature (IUCN) developed a Global Standard for Nature-based Solutions that provides users with frameworks for designing and verifying the application of NbS to achieve the desired results in solving one or more social challenges. The Standard aims "to apply, learn, and continuously strengthen and improve the effectiveness, sustainability, and adaptability of their NbS interventions" (IUCN, 2020). Criteria and indicators for evaluation of NbS according to this Standard are given in Table 14.

Table 14. Criteria and indicators for evaluation of NbS according to IUCN Standard

Criterion	Indicators
NbS effectively address societal challenges	<p>The most pressing societal challenge(s) for rights-holders and beneficiaries are prioritised</p> <p>The societal challenge(s) addressed are clearly understood and documented</p> <p>Human well-being outcomes arising from the NbS are identified, benchmarked and periodically assessed</p>
Design of NbS is informed by scale	<p>The design of the NbS recognises and responds to interactions between the economy, society and ecosystems</p> <p>The design of the NbS is integrated with other complementary interventions and seeks synergies across sectors</p> <p>The design of the NbS incorporates risk identification and risk management beyond the intervention site</p>
NbS result in a net gain to biodiversity and ecosystem integrity	<p>The NbS actions directly respond to evidence-based assessment of the current state of the ecosystem and prevailing drivers of degradation and loss</p> <p>Clear and measurable biodiversity conservation outcomes are identified, benchmarked and periodically assessed</p> <p>Monitoring includes periodic assessments of unintended adverse consequences on nature arising from the NbS</p> <p>Opportunities to enhance ecosystem integrity and connectivity are identified and incorporated into the NbS strategy</p>
NbS are economically viable	<p>The direct and indirect benefits and costs associated with the NbS, who pays and who benefits, are identified and documented</p> <p>A cost-effectiveness study is provided to support the choice of NbS including the likely impact of any relevant regulations and subsidies</p> <p>The effectiveness of the NbS design is justified against available alternative solutions, taking into account any associated externalities</p> <p>NbS design considers a portfolio of resourcing options such as market-based, public sector, voluntary commitments and actions to support regulatory compliance</p>
NbS are based on inclusive, transparent and empowering governance processes	<p>A defined and fully agreed upon feedback and grievance resolution mechanism is available to all stakeholders before an NbS intervention is initiated</p> <p>Participation is based on mutual respect and equality, regardless of gender, age or social status, and upholds the right of Indigenous Peoples to Free, Prior and Informed Consent (FPIC)</p> <p>Stakeholders who are directly and indirectly affected by the NbS have been identified and involved in all processes of the NbS intervention</p> <p>Decision-making processes document and respond to the rights and interests of all participating and affected stakeholders</p> <p>Where the scale of the NbS extends beyond jurisdictional boundaries, mechanisms are established to enable joint decision-making of the stakeholders in the affected jurisdictions</p>
NbS equitably balance trade-offs between achievement of their primary goal(s) and the continued provision of multiple benefits	<p>The potential costs and benefits of associated trade-offs of the NbS intervention are explicitly acknowledged and inform safeguards and any appropriate corrective actions</p> <p>The rights, usage of and access to land and resources, along with the responsibilities of different stakeholders, are acknowledged and respected</p> <p>The established safeguards are periodically reviewed to ensure that mutually-agreed trade-off limits are respected and do not destabilise the entire NbS</p>
NbS are managed adaptively, based on evidence	<p>A NbS strategy is established and used as a basis for regular monitoring and evaluation of the intervention</p> <p>A monitoring and evaluation plan is developed and implemented throughout the intervention lifecycle</p> <p>A framework for iterative learning that enables adaptive management is applied throughout the intervention lifecycle</p>
NbS are sustainable and mainstreamed within an appropriate jurisdictional context	<p>The NbS design, implementation and lessons learnt are shared to trigger transformative change</p> <p>The NbS informs and enhances facilitating policy and regulation frameworks to support its uptake and mainstreaming</p> <p>Where relevant, the NbS contributes to national and global targets for human well-being, climate change, biodiversity and human rights, including the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)</p>

(Source: IUCN, 2020)

Kronsberg, Hanover, Germany

Kronsberg is a residential eco-district in south-west Hannover, developed on a former greenfield site in Kronsberg Hill. Initiated in the late 1990s as part of EXPO 2000, it follows a compact, eco-friendly urban plan with a strong emphasis on high-quality POS conveniently located near housing. The project aims to accommodate 15,000 residents in an area of 150 ha. The masterplan includes three distinct neighborhoods (the central and northern neighborhoods have been completed, while the southern neighborhood is still under development) centered around a main green space. The project, initiated by the local government, followed a participatory approach with strong public involvement and collaboration between public and private actors. Community involvement included engagement in consultations, and raising public awareness (una.city).

A network of diverse green spaces in and around the Kronsberg district has established the spatial foundation for implementing NbS. The transverse green corridors and the green belt parallel to the development link the residential district with the adjacent countryside. Within the neighborhoods, open space involves a variety of public, semi-public, and private areas in the immediate surroundings of housing: gardens in single-family plots, neighborhood parks, and planted public areas for recreation and sports. Table 3 summarizes the multiple NbS, their strategies, and technical elements that were implemented.

Table 15. Implemented NbS in Kronsberg residential district

Strategies	Elements/measure
Nature on buildings (external)	Green roofs
Grey infrastructure featuring greens	Alley or street trees and other street vegetation Green playgrounds and school grounds
Parks and urban forests	Large urban parks or forests Pocket parks/neighborhood green spaces Green corridors and green belts
Blue infrastructure	Lakes/ponds Rivers/streams/canals/estuaries
Green areas for water management	Rain gardens Bioswales and filter strips Sustainable urban drainage systems



Figure 5. Bioswale in residential POS as an element for stormwater management in Kronsberg settlement

Photo source: <https://una.city/nbs/hannover/water-management-hannover-kronsberg>

**GUIDELINES FOR THE APPLICATION OF
INNOVATIVE SOLUTIONS IN (RE)CREATING
PUBLIC OPEN SPACE**



Photo source: RePOS team

INSUTUTIONAL AND IMPLEMENTATION GUIDELINES

Make the issue and importance of (re)creating public open spaces (POS) in both inherited and newly developed multi-family housing as “visible” as possible to the broader and professional public, through the engagement of systemic institutions and the support of formal political backing

Support awareness-raising and education:

- Conduct **awareness campaigns on the importance of ecological and inclusive POSs** among local governments, members of professional organizations, and the wider community
- **Organize workshops, seminars, and conferences on integrated, sustainable, innovative, and eco-friendly POS planning and design**
- Develop **guides, brochures, and online resources** on best practices for POS design and maintenance

Advocacy and institutional action:

- Lobby decision-makers for **increased support for POS projects** through policies, budgets, and legal frameworks
- **Collaborate** with ministries, local governments, and the non-governmental sector
- **Initiate public discussions** on the role of POS in climate adaptation and urban resilience

Motivate professional organizations at the national and local levels to promote, support, and implement integrated, sustainable, innovative and eco-friendly approaches to POSs within the strategic planning, urban planning and urban practice

Support strategic planning and participation:

- Actively engage in the **development and revision of local and national strategic and urban plans**
- Establish **collaborations** with municipalities, urban planners, architects, and landscape architects to better integrate POSs into urban policies
- Advocate for **participatory planning** and active involvement of citizens and local communities

Support standardization and recommendations:

- Develop **professional standards** and recommendations **for the planning, design, and maintenance of POSs**
 - Promote **methodologies for measuring the POS quality, quantity and accessibility**
 - Initiate and support **pilot and demonstration projects** based on sustainable, innovative and eco-friendly POS solutions, both in newly planned and in inherited multi-family neighborhoods
-

Support professional networking and knowledge exchange:

- Create **networks of experts and organizations** for the exchange of best practice examples
 - Participate in **international projects and partnerships** that promote sustainable urban planning
 - Offer **scholarships, awards, and recognition** for innovative POS projects
-

Innovate existing terminology in regulations and planning documents, align it with the terms in the strategic documents of sustainable urban development at the global and EU level and make them mandatory.

- Produce and publish **“Glossary of Urban Planning Terms”**
 - **Innovate and/or supplement the existing urban terminology** in the Law on Planning and Construction in accordance with the newly proposed
-

Introduce a new definition and a new typology of POS, define the role and functions of POS types, planning norms and standards, and make them mandatory in regulations and urban planning documents

Implement new definition and typology of POS based on the proposal developed in the RePOS project:

- Form a **working group of experts** (urban planners, architects, landscape architects, sociologists) to develop clear definitions and classifications of different types of POS, as well as their functions and characteristics
 - Conduct a **study or research** that analyzes existing POS typologies and identifies their strengths, weaknesses, and opportunities for improvement
 - Publish **guides, brochures and online resources** on the possibilities of applying new types of POS in relation to their purpose, social and environmental role and importance
-

(Re)develop standards and norms for POS planning:

- Create **mandatory technical and ecological standards** for the design and maintenance of POS, focusing on sustainability, accessibility, ecological aspects, innovative aspects and social inclusion
- Develop **normative guidelines that cover all aspects**, from the size and structure of POS to mandatory accessibility requirements, environmental protection, and climate resilience
- Develop **normative guidelines that cover the specificities of POSs in different urban contexts** such as: a) inherited multi-family neighborhoods from the socialist past, b) 'transitional' neighborhoods, and c) newly planned neighborhoods
- **Protect the modernist multi-family heritage** from the second half of the 20th century and, through legal and planning regulations, clearly define mechanisms and tools for quantitative and qualitative protection and sustainable and innovative renovation of existing POS within them
- Introduce and define **privately owned public space (POPS)**

Integrate new POS definition and typology into regulations and planning documents:

- Clearly **define POS in the Law on Planning and Construction**
- Produce and publish "**Regulation on the public open spaces, their purpose and form, standards and norms for their planning and design**" as a **supporting document** of the Law on Planning and Construction
- **Update legislative and regulatory frameworks** to make new definitions, typologies, and standards mandatory in all urban and spatial plans
- Ensure **mandatory implementation of new norms and typologies** in all POS projects developed in compliance with legal frameworks

Training and education for implementing new standards and norms:

- Organize training sessions, workshops and online courses for urban planners, architects, designers, and decision-makers on the new standards and norms for POS, as well as best practices for their implementation
- Initiate and organize public consultations, local workshops and enable citizen participation in the development of new typologies and definitions of POS, in order to ensure that new regulations respond to the real needs of the community and its local specificities

Monitoring and evaluation of implementation new standards and norms:

- Establish a **monitoring and evaluation system** to track the implementation of new POS definitions, typologies, norms, and standards in urban plans and projects and assess their effectiveness
- Gather feedback from POS users and experts to improve future urban plans and standards

Adapt and innovate existing regulatory, institutional and planning framework to enable and regulate the use of new technologies - transformation of the existing POS planning and management model towards a model that is transparent, digitally empowered, participatory and adaptable to change

Develop and operationalize strategies for smart POS:

- Adopt **national and local strategies for “smart public open spaces”** that include clear goals, indicators, and guidance for the integration of new technologies in POS
- Through the strategies, promote **adaptive planning models** that support innovation, experimentation and pilot projects

Revise and modernize the current legal framework:

- **Update urban planning laws and regulations** to explicitly recognize and regulate the role of digital and smart technologies in the planning, design, implementation, and maintenance of POS
- Introduce **data governance regulations** for POS - Legally and institutionally regulate the collection, use and management of data using various technologies without violating the right to privacy, in a manner that is responsible, public and democratically controlled

Establish institutional responsibility for POS digitalization:

- Create **interdisciplinary offices or departments** within local governments dedicated to the digital transformation of POS
- Clearly **define roles and responsibilities across institutions** (urban planning agencies, municipal services, IT departments etc.) to ensure inter-operability and effective coordination
- Develop a **single comprehensive and standardized data platform** (e.g. by using GIS technologies) to enable data interoperability and compatibility of various databases (cadastral, planning, utility services)

Build capacity and educate employees:

- Invest in **training and professional education** for public sector staff on smart technologies, data management, and digital tools (e.g., GIS, BIM, AI etc.)
- Establish partnerships with **universities and research institutions** to co-develop innovative solutions in POS planning, design and management

Introduce participatory digital platforms:

- Develop or adopt **digital platforms for participatory planning** (e.g., problem mapping, idea submission, community voting) and integrate them into formal decision-making processes
- Provide citizens with **real-time access to POS data** and usage insights, enhancing transparency and engagement

Foster inter-sectoral collaboration, alongside the appointment of an institutional leader**Appoint a lead institution at the local level:**

- Designate a **central coordinating institution** (e.g., city planning office, public agency or newly established body) with the mandate and capacity to lead inter-sectoral cooperation in the field of POS and with the authority to: a) coordinate activities between sectors; b) make strategic decisions, and c) monitor implementation and evaluate outcomes
- Clearly **define roles and responsibilities** - clarify which institution is responsible for **planning**, which for **implementation**, and which for **monitoring and reporting**
- Ensure that all actors have **timely access to information** and mechanisms for joint decision-making

Establish inter-sectoral working groups:

- Create **permanent inter-sectoral working group(s) or forum(s)** composed of representatives from relevant sectors, such as:
 - 1) urban and spatial planning; 2) city/municipal infrastructure and services; 3) IT and digital infrastructure; 4) environmental protection; 5) culture, sports, and tourism; 6) civil society and community organizations) to **provide integrated input for POS planning and development projects**

Develop a formal procedure for joint planning and decision-making:

- Define a **standardized planning procedure** that includes: a) regular cross-sector meetings; b) shared data and joint analyses; and c) a unified communication and tracking platform
- Introduce a **multi-sector impact assessment** for major projects to evaluate implications from various sectoral perspectives

Facilitate knowledge and resource sharing:

- Organize **joint workshops, training sessions, and knowledge exchanges** across sectors
- Create an **internal knowledge hub** with access to shared documents, maps, datasets, and project reports for all actors involved

Use pilot projects as models of inter-sectoral collaboration

Strengthen and implement a participatory approach to POSs planning, designing, building and maintaining

Support stakeholder involvement:

- Involve various stakeholders in the process of POS planning and designing to address their interests and needs

Mandate early and continuous participation:

- Introduce **mandatory participatory mechanisms** in all phases of POS development (planning, design, construction, maintenance)
- Clearly define the **scope of participation, specific stages** for involvement, the **tools** to be used, and the **responsibilities** of authorities and residents within this legal framework

Ensure broad, inclusive, and adapted engagement:

- Involve all residents, both **individually and through Homeowners associations**.
- Specifically target and engage **underrepresented or vulnerable groups** (e.g., elderly, children, people with disabilities)
- Adapt participation **methods and tools to be accessible to everyone**, considering different levels of education, lack of internet access, and physical abilities

Utilize diverse participatory tools and techniques:

- Employ a **wide range of methods**: public consultations, workshops, surveys, focus groups, presentations, design charrettes and forums.
- Implement participatory design processes allowing **direct community influence on POS layout and features**
- Involve residents and Homeowners associations in **gathering information, defining needs, implementation, and evaluating each phase**
- Introduce and leverage **digital and e-governance tools** (online platforms, feedback apps) for broader reach and engagement
- Implement **participatory budgeting** for involving communities in the planning and delivery of services by local government

Facilitate active resident involvement in implementation and maintenance:

- Support direct resident involvement in the **physical construction and arrangement**, as well as ongoing **maintenance** of POS

Build capacity:

- **Educate residents**, provide necessary information, and help them acquire skills needed for effective participation
- Share **successful examples of participatory POS development and revitalization** to improve communication and cooperation

Support education on innovative solutions**Educate professional:**

- Conduct education and training for local public institutions, decision-makers, urban planners and designers on **innovative solutions** (DS, MS, SCS, MFS, NBS), possibilities and limitations for their use, and modalities for adequate implementation in the specific context for POS development or revitalization
- Address potential gaps in **technical expertise** providing targeted training

Educate citizens:

- Continuous educational programs intended for **young population** (primary and secondary schools) on the importance of POS and the need to care for it (with a focus on building-based and surrounding POS)
- Educate citizens on using **digital tools and engaging in POS design and maintenance**
- Educate citizens on **the importance of their participation** in the planning and design of new or inherited POS to increase

their engagement and responsibility for the development and maintenance of POS, as well as to improve social cohesion and the quality of life in the community

- Organize educational workshops to raise awareness among residents about the importance of **innovative solutions**

Strengthen public-private partnerships

Implement PPP for new housing development:

- Establish PPP for **larger development projects** and precisely define the private investor's obligations in a contract regarding the design, construction and long-term maintenance of POS

Implement PPP for design solutions:

- Use PPP to implement **sustainable urban solutions**, such as green rooftops, which can reduce maintenance costs through long-term benefits (energy savings, pollution reduction).
- Develop PPPs for **urban greening**, where private investors co-finance NbS-integrated POS in return for branding rights or tax incentives

Implement PPP for POS maintenance:

- Establish a PPP for **maintaining POSs under the jurisdiction of local government** (e.g., common or neighborhood POS) with clear rules, regulations, and guidelines in formal agreements, including funding commitments from both parties

Develop clear agreements with defined roles:

- For all PPPs, create clear, formal agreements outlining the specific roles, responsibilities, and funding commitments of each party regarding POS provision, design, construction, management, and long-term maintenance

Clearly define the status of land and land rights in legal and regulatory terms

Determine the legal status of the land (e.g. land for regular use of the building- zemljište za redovnu upotrebu objekta) as well as the rights and obligations arising from them

Address unclear land property rights:

- **Transfer ownership** from the state to local self-government units
- **Convert usage rights** into ownership rights
- Return ownership rights through **restitution**

Establish clear land rights for POS in inherited LHEs from socialist past:

- Resolve **land ownership issues** over POS
- Update standing legislation to consider building surroundings when defining "**land for regular use of the building**", applying it to both land under and around buildings, housing built in an open system of spatial organization or in a residential complex
- Provide residents with **parking privileges** as a previously acquired right, on building-oriented POS

Identify and implement financial mechanisms for land acquisition and development of POS**Ensure funding and subsidies:**

- **Identify potential funding** from national and European funds and grants, local self-government funds, civil society associations, socially responsible companies and public-private partnerships for POS development and long-term maintenance
- **Provide necessary funding** through state and local subsidies. Define local methods for allocating subsidies to all stakeholders (private sector, NGOs, homeowners associations) for creating or regenerating POS

Introduce and implement land-based financing instruments:

- Introduce public-private and private land **value capture tools** into legislation (zoning incentive programs, density bonuses, development impact fees, transfer of development rights, tax increment financing) as instruments to provide public space
- Use **land readjustment** for allocating the land for POS
- Create **POPS** as a part of private land development through: a) incentives for developers, such as additional floor area in exchange for creating a (building-oriented) public space; or b) regulation requiring that public space (common and neighborhood POS) be provided in relation to large land development

Implement dedicated local taxation:

- Implement **levies on property** directed to fund POS management and provision, recognizing that quality POS can increase property values and create tax revenue when properties are bought and sold

Develop and use planning agreements:

- use **agreements** (e.g., agreement on joint preparation/equipping of construction land - ugovor o zajedničkom pripremanju, odnosno opremanju građevinskog zemljišta) to define **investor responsibilities for POS provision** and initial maintenance
- allow **reductions in land development contributions for investors who finance required POS construction** (e.g., neighborhood POS)
- allow **investors to build and transfer POS** (e.g., neighborhood POS) to the local self-government in exchange for contribution reductions, ensuring public purpose and long-term public management

Include specific POS conditions in building permits:

- Include **specific conditions** for POS (provision, arrangement, accessibility, maintenance) in the process of obtaining a building permit (e.g., location conditions). For **larger projects**, financial guarantees or maintenance contributions may be required

Regulate leasing:

- Establish **clear rules (rulebook) for leasing POS segments** with precisely defined permitted uses in order to avoid misuse of the POS

Mandate long-term POS management planning:

- Require a dedicated **POS management plan** for every new or revitalized residential area outlining responsibilities and resources

Develop and implement mechanisms for POSs managing and maintaining

Introduce new governance models for POS into legislation:

- **Public-private-people partnership (4P)** programs
- **Neighborhood Improvement Districts (NID) development**, with clear legal framework, including voting procedures and levies, especially for areas with mixed POS ownership

Define institutional responsibilities:

- Clear **division of responsibilities** among the public administration departments regarding POS management

Form a management structure for different POS types:

- 1) Residents/Homeowners association – **building-oriented POS and parking**
- 2) Co-management (local self-government, developers, socially responsible companies, non-governmental organizations, civil society, homeowners associations), secured with management agreements, with clearly defined roles in funding, maintenance, programming, and dispute resolution – **common POS**
- 3) Local self-government – **neighborhood POS, mobility POS and greenery POS**

Provide incentives for joint management:

- Offer **incentives** like jobs for unemployed residents, reduced local taxes (environmental, property, administrative), and tax exemptions for socially responsible companies involved in POS management

Develop funding mechanisms:

- Support and facilitate **local community fundraising and crowdfunding initiatives** (e.g., organizing local events to raise funds, launching crowdfunding campaigns to finance specific enhancements or programs, or encouraging in-kind contributions of labor, materials, or expertise from residents and local businesses)
- Form **partnerships** (e.g., with recycling companies) to generate funds for POS maintenance
- Implement **NIDs**

Data management and planning:

- Develop and maintain up-to-date **POS cadasters** integrated with GIS and property registries, including spatial, functional, legal, and management data
- Create **digital maintenance classification maps** based on POS category and function to guide funding, frequency, and type of interventions
- Collect **maintenance data** (costs, working hours, results) specific to POS features, type, and management model

Ensure POS quantity and quality monitoring

Perform regular control:

- on the **state of POS and greenery** in local communities by the communal police (hygiene, maintenance)
- on **maintenance of building-oriented POSs** by the residents, for new developments
- on **maintenance of neighborhood POSs**, mobility POSs and greenery-nature space POSs by the local self-government

Develop different tools for POS quantity and quality monitoring

PLANNING AND DESIGN GUIDELINES

Purpose of this Section of the Guidebook

This section of the guidebook outlines a comprehensive framework for developing urban planning and design guidelines specifically tailored for the creation and revitalization of Public Open Spaces (POS) within multi-family housing areas. It aims to provide a structured approach for urban designers, planners, local authorities, and community stakeholders to deliver POS that are not only attractive and functional but also embody innovative solutions grounded in principles of climate-resilience, inclusivity, smart urbanism, and co-creation. These guidelines move beyond mere aesthetic considerations, focusing on how design can fundamentally enhance the social, economic, environmental, and health aspects of urban living.

The Vision for Public Open Spaces

Our vision is rooted in the understanding that **quality public spaces are keystone elements for sustainable cities**, significantly improving the quality of life for all inhabitants. Well-designed POS are essential for building social cohesion, fostering economic vitality, promoting physical and mental health, and providing crucial environmental benefits, including climate change adaptation and mitigation. In Serbia, innovative social and cultural solutions for reclaiming POS in multi-family neighborhoods are recognized as key for fostering social cohesion and community stewardship. Public spaces are understood as being created through human interaction, communication, and cooperation within shared spaces.

Approach to Public Space Planning and Design

The design of POS in multi-family housing areas demands a **systemic and collaborative process**. This guidebook adopts an integrated and iterative approach that places people at its center, recognizing that effective and enduring public spaces are those shaped by the collective input of residents, technical experts, and local authorities. This collaborative approach

ensures that the design process is responsive to community needs and incorporates continuous learning and refinement.

Core Principles

The guidelines are built upon four fundamental principles for creating and revitalizing public open spaces:

Climate-Resilient planning and design: Designing spaces that adapt to and mitigate the impacts of climate change, such as extreme temperatures and heavy rainfall, by leveraging natural systems and sustainable practices. This also includes increasing resilience against environmental risks like flooding and soil degradation.

Inclusive planning and design: Ensuring that public spaces are accessible, safe, and welcoming for all members of the community, accommodating diverse ages, genders, abilities, and cultural backgrounds.

Smart planning and design: Developing spaces that are efficient, adaptable, responsive to user needs and environmental conditions, multifunctional and leverage data-informed insights for improved performance and long-term viability.

Co-creative planning and design: Actively involving the community in the entire design process, from problem definition to conceptualization and evaluation, fostering a sense of ownership and collective responsibility.

Urban Planning Guidelines

Key Phases of the Planning Process

This section presents the key stages in transforming the core vision and principles of Public Open Space (POS) planning into practical and implementable actions within multi-family housing neighborhoods. The planning process is structured around key phases, which are accompanied by a set of activities for creating and revitalizing POS:

1. **Contextualization phase** with pre-plan activities, which include defining the plan character (regeneration or new development, planning level) and framing the plan (problem and prerequisites, planning scope, standing regulations, actors, implementation context);
2. **Research & Analysis phase** with data collection, site analysis, mapping findings, and assessment of neighborhood and POS characteristics, which create the baseline for the intervention;
3. **Conceptualization & Scenarios phase** with generating and visualizing multiple planning scenarios (through mapping, drawings, 3D modelling, simulations), exploring different planning options, assessing social and environmental impacts, and setting the grounds for detailed planning solution;
4. **Evaluation & Decision-making phase** with assessing different planning options and comparing alternatives based on social, environmental, and functional criteria, in order to support evidence-based and context-sensitive decisions;
5. **Implementation & Monitoring phase** with post-plan delivery activities, which involve carrying out the plan (coordinating construction or improvements, ensuring compliance with the plan), and tracking plan's progress over time (monitoring use, performance and impact).

Urban planning guidelines presented in this Guidebook are organized into major two groups: 1) General Guidelines and 2) Specific Guidelines.

1) **General Guidelines** for urban planning of Public Open Space provide overarching principles that serve as a foundation for sustainable, inclusive, safe and resilient POS that enhance urban liveability and promote the overall community well-being. They are envisioned as a strategic framework that ensures that POS planning aligns with broader social, environmental and economic goals.

2) **Specific Guidelines** for urban planning are context-specific recommendations that are suited to the urban planning context in the Republic of Serbia, involving both legislation and planning framework, as well as the practice of urban planning. Specific Guidelines for urban planning are tailored for different types of urban planning documents and the established types of public open spaces. These guidelines are aligned with the core principles of POS quality, which involve climate-resilience, inclusivity, smart urbanism, and co-creation.

The following text links urban planning recommendations with potential tools that can be applied to ensure the POS quality principles are embedded. The list of tools is presented in the section *Urban planning and design toolset for (re)creating public open space*, in Figure 7. at page 121 of this Guidebook.

The full list of tools with detailed illustrations is provided as a Deliverable 2.3. of the RePOS project at the digital platform (<https://www.repos-project.rs/>).

Types of Planning Documents in the Republic of Serbia

Urban planning in the Republic of Serbia is regulated by the Law on Planning and Construction (“Official Gazette of the Republic of Serbia”, no. 72/09 - 62/23). According to Article 11 of the Law, planning documents include:

1. Spatial plans and
2. Urban plans.

Urban plans are:

- a) General Urban Plan;
- b) Plan of General Regulation;
- c) Plan of Detailed Regulation.

General Urban Plan (Article 23)

The General Urban Plan is drawn up as a strategic developmental plan, with general elements of spatial development. The General Urban Plan is adopted for a settlement established as a city, i.e. the City of Belgrade in accordance with the Act on Territorial Organization of the Republic of Serbia (“Official Gazette of the Republic of Serbia”, no. 129/07).

Plan of General Regulation (Article 25)

The Plan of General Regulation is mandatory for a settlement that serves as the seat of a local self-government unit, and it may also be adopted for other settlements within the

municipality, city, or the City of Belgrade, when this is provided for by the spatial plan of the local self-government unit.

The General Regulation Plan is the fundamental regulation plan that is directly implemented through the application of planning and construction rules across the entire scope of the planning document.

Plan of Detailed Regulation (Article 27)

The Plan of Detailed Regulation is adopted for parts of a settlement, the development of informal settlements, urban renewal zones, infrastructure corridors and facilities, and areas for which the obligation to prepare such a plan has been determined by a previously adopted planning document.

For urban renewal zones, the Detailed Regulation Plan specifically elaborates the composition or design plan and the landscape design plan.

1. General Guidelines for Urban Planning

General Guidelines	Planning documents	Tools
Adopt unified planning approach and terminology for addressing POS in planning documents		
<ul style="list-style-type: none"> ▪ Use consistent terminology in planning documents of all levels and areas, aligned with the terminology set out in the Law on Planning and Construction, to avoid misinterpretation ▪ Use pre-developed professional standards, technical guidelines and recommendations for planning of POSs to ensure consistency and quality across projects ▪ Promote innovation-driven planning that shifts planners' approach toward the adoption and implementation of innovative solutions ▪ Require relevant institutions and stakeholders to enforce the use of innovative solutions by including them as binding requirements within planning processes ▪ Implement full life cycle planning of public open spaces (POS) throughout all phases of the urban planning process, treating POS as dynamic systems with clearly defined life cycle stages, including design, implementation, management, evaluation, and transformation 	<ul style="list-style-type: none"> ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR ▪ GUP ▪ GUP, PGR, PDR 	<p>BLOCK F. Tools</p> <p>Institutional/ Legislative Tools</p>
Harmonize and digitalize planning documents		
<ul style="list-style-type: none"> ▪ Digitalize and harmonize urban planning documents across all levels and spatial scopes, published within a single centralized, publicly accessible database ▪ Ensure alignment among plans of different spatial scales and hierarchies to enable coherent planning of POS that fall within multiple planning jurisdictions ▪ Start the application of digital solutions, such as GIS layers for POS, monitoring systems, and digital cadastral databases for green/public spaces, into all phases of urban planning, to meet the requirements of the standing Law until year 2028 	<ul style="list-style-type: none"> ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR 	<p>BLOCK H. Tools</p> <p>Institutional/ Legislative Tools</p>

Develop integrated plans for green infrastructure development		
<ul style="list-style-type: none"> Develop a Plan of General Regulation for the System of Green Areas in order to protect and improve green surfaces in urban areas, and support NbS and MFS 	<ul style="list-style-type: none"> PGR 	Institutional/ Legislative Tools
Shift planning practices toward a holistic, participatory and bottom-up approach		
<ul style="list-style-type: none"> Perform a true participatory planning approach with multiple engagement stages within all phases of the planning process Use early public hearings, regular consultations, and digital E-participation tools (surveys, e-voting, online forums) to gather resident input and ensure their continuous involvement throughout the project lifecycle Practice a bottom-up planning approach, where local knowledge and user experiences contribute to positive urban change Promote co-benefits approach to urban planning in residential areas Practice the collaborative planning approach (co-planning, co-creation, etc.) 	<ul style="list-style-type: none"> GUP, PGR, PDR GUP, PGR, PDR GUP, PGR, PDR GUP, PGR, PDR GUP, PGR, PDR 	BLOCK H. Tools Citizen Engagement Tools
Perform evidence-based planning – based on information and data gathered in the monitoring process		
<ul style="list-style-type: none"> Introduce indicators of spatial development, including POS, into strategic documents Perform regular monitoring of indicators in order to enable the adaptability of planning documents 	<ul style="list-style-type: none"> GUP GUP, PGR 	BLOCK G. Tools

Pre-plan Phase	Planning documents	Tools
Define plan character		
<ul style="list-style-type: none"> ▪ At the level of strategic planning (development strategy, General Urban Plan - GUP), define the criteria based on which the plan /project character will be determined ▪ Define the procedure for determining the type of planning document (a city planning body responsible for planning) ▪ Indicate the level of detail, phasing, revision, or an amendment for each planning document; within the legally prescribed framework 	<ul style="list-style-type: none"> ▪ GUP ▪ GUP ▪ GUP 	<p>Education/ Information Tools</p>
Frame the plan		
<p>Define a problem and prerequisites</p> <ul style="list-style-type: none"> ▪ Define the planning area (geographic, administrative, and land ownership) ▪ Identify the planning problems that that affect the development of POS (spatial, environmental, social, or infrastructural problems; inconsistencies with existing plans; possible risks and conflict areas) ▪ Define the legal and policy framework (applicable laws and regulations, existing planning documents, institutional responsibilities) ▪ Assess prerequisites and constraints (technical limitations, timeframe and budget, coordination) 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR 	<p>BLOCK A. Tools</p> <p>BLOCK C. Tools</p> <p>Education/ Information Tools</p>
<p>Define planning goals</p> <ul style="list-style-type: none"> ▪ Set planning objectives in a way that promotes the development of new POS and the preservation of existing ones ▪ Define long-term objectives that will guide the development of POS even beyond the duration of the planning period ▪ Define operational goals to be achieved in the short- and medium-term period 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR 	<p>BLOCK H. Tools</p> <p>Education/ Information Tools</p>

	<p>Develop a stakeholder engagement plan</p> <ul style="list-style-type: none"> ▪ Identify stakeholders and interest in planning (decision makers, private sector, local communities) ▪ Specify the planning phases in which particular stakeholders will participate, as well as the mode and extent of their participation 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR 	<p>BLOCK B. Tools</p> <p>BLOCK H. Tools</p> <p>Citizen Engagement Tools</p> <p>Economic Tools</p>
	<p>Frame the implementation context – legal, organizational and financial</p> <ul style="list-style-type: none"> ▪ Identify all relevant actors for the implementation of the plan and clearly define their responsibilities and obligations 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP, PGR, PDR 	<p>BLOCK B. Tools</p> <p>Citizen Engagement Tools</p> <p>Financial/ Investment Tools</p>

Phase 1: Research & Analysis		Planning documents	Tools
Enhance the processes of data collection, storage, and usage			
<p>Develop standardized frameworks for collecting various qualitative and quantitative data (type and format of the required data)</p> <ul style="list-style-type: none"> ▪ Create a standardized framework for collecting data on the physical characteristics and functions of POS ▪ Develop a standardized social and cultural needs assessment frameworks for collecting both qualitative and quantitative data on residents' demographics, social interactions, cultural practices, recreational interests, and perceptions of existing POS 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR 	<p>Education/ Information Tools</p> <p>Citizen Engagement Tools</p>	
<p>Obtain data from various sources</p> <ul style="list-style-type: none"> ▪ Require competent institutions to provide current and comprehensive data, including all information relevant to the development of POS structured in line with the defined framework appropriate to the respective planning level ▪ Request relevant data from private companies, NGOs, and citizens' associations to support informed planning and development of POS ▪ Motivate the residents and other interested parties to participate in data collection in order to gather the information based on their needs 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR 	<p>BLOCK A. Tools</p> <p>BLOCK B. Tools</p> <p>Education/ Information Tools</p> <p>Citizen Engagement Tools</p>	
<p>Use digital tools for data collection and storage to improve data accessibility and interoperability</p> <ul style="list-style-type: none"> ▪ Use digital data collection and analysis for better knowledge base ▪ Use digital modalities of citizens involvement in data collection, planning, evaluation, monitoring phases ▪ Store digital data in a manner that supports regular updating, expansion, and open access for all participants in the planning process, as well as other interested parties ▪ Align the collected digital data with national and municipal systems to enable integration and cross-sectoral analysis (e.g. accessibility of green spaces, air quality, smart parking) 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR 	<p>BLOCK A. Tools</p> <p>BLOCK B. Tools</p> <p>BLOCK C. Tools</p> <p>BLOCK H. Tools</p> <p>Citizen Engagement Tools</p>	

Improve data analysis and presentation for informed and effective POS planning			
<p>Identify and analyze relevant data to create a solid basis for informed planning and development of POS</p> <ul style="list-style-type: none"> ▪ Perform a detailed analysis of public space distribution in multi-family residential areas to identify where urban planning interventions are most needed, for providing open spaces, pedestrian links, and greenery in public spaces – to propose redistribution of POS if needed and optimize the system of POS and green areas ▪ Perform a comprehensive analysis of data regarding the physical attributes and usage of existing public open spaces to enhance their qualities ▪ Analyze the social structure as a mandatory part of the planning process to identify potentially vulnerable groups ▪ Identify local needs and opportunities of citizens involvement 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK A. Tools</p> <p>BLOCK B. Tools</p> <p>BLOCK C. Tools</p> <p>BLOCK H. Tools</p> <p>Citizen Engagement Tools</p>	
<p>Identify needs and analyze the potential for applying innovative MFS and NbS solutions</p> <ul style="list-style-type: none"> ▪ Recognise key locations for collaborative approach: overlapping confronting interests, transitory and in-between spaces, marginal spaces ▪ Identify potentials and constraints of implementing different strategies and elements of NbS ▪ Analyse relevant spatial data, including land cover, topography, hydrology, and the proximity of the site to existing green spaces in order to choose the most appropriate locations for a variety of uses and different types of NbS 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK A. Tools</p> <p>BLOCK B. Tools</p> <p>BLOCK C. Tools</p> <p>BLOCK G. Tools</p>	
<p>Use the RePOS standardized toolset for data analysis and presentation</p> <ul style="list-style-type: none"> ▪ Use digital tools for the data analysis ▪ Use digital simulations to analyze macro and microclimate conditions 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK C. Tools</p> <p>Education/ Information Tools</p>	

Prepare cartographic base layers and establish a current and comprehensive geospatial database to support planning activities			
<p>Conduct mapping of POS and their significant characteristics</p> <ul style="list-style-type: none"> ▪ Perform mapping and classification of existing POS (not just publicly owned) to create a cadaster for POS ▪ Perform a classification of open spaces in existing large housing estates into building-oriented POS, common POS and neighborhood POS. (Note: building oriented POS largely corresponds to the “land for regular use of the building” (zemljište za redovnu upotrebu objekta), which is already established in the Law on Planning and Construction) ▪ Map residents’ preferences and needs regarding POS ▪ Map existing social and cultural assets within and around multifamily housing areas – identify community groups, cultural organizations, informal social networks, local traditions, and any existing spaces or facilities that currently serve social or cultural functions ▪ Map and plan the development of public open spaces (POS) with full clarity regarding legal ownership, governance level, and functional use. In particular, distinguish between “goods of general interest” and “goods in general use,” and anticipate how these classifications impact management strategies ▪ Identify social hubs: map the centrality of spaces to identify areas that naturally invite gathering and should be arranged accordingly 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	BLOCK C. Tools	
<p>Use a current and comprehensive geospatial database with POS and green spaces</p> <ul style="list-style-type: none"> ▪ Georeferencing of spatial assessment/mapping of green coverage, types of greenery (grass, trees, shrubs, etc.), and ecological function ▪ Georeference materials for POS at the grid level ▪ Georeference urban heat islands within residential areas ▪ Georeference areas with flood issues ▪ Georeference POS segments for leasing ▪ Georeference ownership and accessibility ▪ Georeference typology ▪ Georeference user data on POS 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	BLOCK C. Tools	

Phase 2: Conceptualization & Scenarios	Planning documents	Tools
Create concepts and scenarios for the development of POS based on detailed analysis, taking into account POS typology for multi-family residential areas, established within the RePOS project, local specificities, and the implementation of innovative solutions		
<p>Ensure spatial differentiation and connectivity of POS</p> <ul style="list-style-type: none"> ▪ Ensure spatial and functional articulation between different scales of POS within residential zones ▪ Establish hierarchies and linkages between POS of different typologies — from micro courtyards to neighborhood squares — to avoid isolated or redundant interventions. Each level must have a defined spatial catchment, function, and user group, and be designed to complement the others. ▪ Establish a gradation of open space use—from private to semi-public to public—regardless of ownership status 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	BLOCK C. Tools
<p>Establish connections between different types of green areas and POS</p> <ul style="list-style-type: none"> ▪ In residential areas located on the outskirts of the city, consider the possibility of connecting POSs to a green belt or natural and artificial wetlands ▪ Identify and designate areas within POS suitable for urban agriculture through plan-based spatial analysis 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR 	BLOCK C. Tools BLOCK E. Tools
<p>Implement innovative Socio-Cultural Solutions</p> <ul style="list-style-type: none"> ▪ Recognize POS as social and cultural infrastructure that contributes to fostering inclusion, participation, identity, and a sense of belonging ▪ Promote diversity and inclusiveness by applying context-sensitive planning approaches tailored to the specific social, spatial, and environmental characteristics of different urban areas ▪ Plan and zone POS in multi-family residential areas as spaces that support daily and occasional social activities, informal gatherings, education, cultural programs, and intergenerational exchange 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	BLOCK F. Tools Citizen Engagement Tools

	<p>Implement innovative multifunctional solutions</p> <ul style="list-style-type: none"> ▪ Integrate the concept of multifunctionality—in terms of time, space, use, and service across all levels of planning ▪ Define clear multifunctional objectives that target ecological, social, and recreational needs ▪ Apply multifunctional solutions across all levels of POS—from building-based and common spaces to neighborhood—particularly where diverse groups interact, and to green POS in order to add social value ▪ Plan for multifunctionality by layering public open space uses spatially (horizontally and vertically) and temporally (simultaneously or over time), enabling diverse functions to coexist within the same area ▪ Look for adequate multifunctional solution for specific POS, taking into account different dimensions of functionality 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK C. Tools</p> <p>BLOCK D. Tools</p> <p>BLOCK F. Tools</p>
	<p>Implement innovative nature-based solutions</p> <ul style="list-style-type: none"> ▪ Address ecological issues and define the framework for applying NbS at macro and mezo spatial scales—particularly within General Urban Plans—to ensure effective implementation, especially in urban regeneration and inherited residential areas ▪ Integrate Nature-based Solutions (NbS) as a mandatory component at all stages of the urban planning process ▪ Plan a network of interconnected NbS elements within multiple POS zones to create a functional whole that enables synergistic effects and enhances climate resilience and biodiversity ▪ Align the implementation of Nature-Based Solutions (NbS) with spatial typologies and functions of POS ▪ Consider the spatial/physical requirements of NbS measures and technical elements in urban plans and urban regeneration projects ex ante, i.e., reserve land for the implementation of possible technical measures that have been previously identified through appropriate analyses 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP, PGR ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK C. Tools</p> <p>BLOCK D. Tools</p> <p>BLOCK F. Tools</p>

	<p>Integrate various innovative solutions to strengthen ecological resilience and improve the quality of user experience</p> <ul style="list-style-type: none"> ▪ Link MFS, NbS and SCS wherever possible – search for synergies 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR 	<p>BLOCK E. Tools</p> <p>BLOCK F. Tools</p>
	<p>Promote community-centered POS development and involve various stakeholders in the process of conceptualization</p> <ul style="list-style-type: none"> ▪ Introduce community-centered vision in POS planning. Involve local residents, community groups, and stakeholders in the development of a shared vision for the POS. The vision should reflect the aspirations of the community, considering the diversity of residents and their specific needs ▪ Apply a stakeholder–led approach that actively involves various stakeholders (local communities, public authorities, private investors, and non–governmental organizations), ensuring that the needs and perspectives of all parties are taken into account ▪ Engage residents early in the planning process as well as diverse stakeholders including developers, urban planners, environmental experts, and public authorities 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK H. Tools</p> <p>Citizen Engagement Tools</p>
	<p>Promote adaptability to the local context and evolving conditions</p> <ul style="list-style-type: none"> ▪ Include localized, context-specific guidelines for POS reclaiming that address social inclusion and cultural identity ▪ Apply adaptive planning approaches - allow for flexible design of POS that can be adapted over time based on community input and evolving needs, but define performance-based requirements ▪ Promote social inclusion and cohesion by closely addressing the actual needs and priorities of residents 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK C. Tools</p> <p>BLOCK F. Tools</p>

Operationalize the concept of POS development through detailed arrangement and construction rules		
<p>Define obligatory arrangement and construction rules related to POS typology and greening of POS</p> <ul style="list-style-type: none"> ▪ Provide a comprehensive elaboration of POS, addressing qualitative aspects such as spatial configuration, POS classification, vegetation types, accessibility standards, and environmental performance criteria, rather than solely quantifying open or green space percentages ▪ Define building regulations that optimize POS characteristics—such as location, size, and permeability—to support multiple functions, including recreation, microclimatic resilience, ecological connectivity, and inclusive use ▪ Recognize public open spaces (POS) as essential components of urban infrastructure, and define building and design rules with equal rigor and significance as for other infrastructure systems ▪ Introduce “sociotope” and “biotope” of special importance as restrictive for building and priority for POS enhancement ▪ Establish obligatory arrangement rules for different types of POS on the local level, which would follow their current state 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK E. Tools</p> <p>BLOCK F. Tools</p>
<p>Define precise guidelines for the use of each of the innovative solutions in regards to POS typology, as obligatory within the arrangement rules</p> <p><i>Multifunctional solutions</i></p> <ul style="list-style-type: none"> ▪ Mandate the implementation of multifunctional solutions for the development or revitalization of large neighborhood POS within multi-family residential areas ▪ Require that new residential developments incorporate POS that can adapt to diverse uses (recreation, community gathering, urban agriculture, etc.) ▪ Provide for multifunctionality of POS in urban plans by allocating other complementary uses in open space, aside from primary use 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK F. Tools</p>

<ul style="list-style-type: none"> ▪ Integrate „layers of functionality“ (spatial and temporal layering) into the rules of arrangement and rules of construction ▪ Structurally integrate multifunctionality into the morphology of urban blocks by applying open or semi-open block typologies that enable flexible, layered use of space. Promote spatial organization that supports the integration of diverse functions through visual and physical connectivity, modular zoning, and long-term adaptability <p><i>Nature based solutions</i></p> <ul style="list-style-type: none"> ▪ Employ Green factor method for using green elements relating to planted and maintained vegetation, various run-off water solutions and permeable surfaces, etc ▪ Integrate green infrastructure such as green roofs, permeable surfaces, rain gardens, and bioswales to manage stormwater, improve air quality, and reduce the urban heat island effect ▪ Prescribe criteria for linking NbS elements within and between blocks in order to create an interconnected network of NbS elements ▪ Link appropriate types of NbS (e.g. rain gardens, infiltration strips, bioswales, green walls) with POS types and functions (e.g. pedestrian zones, inner courtyards, linear corridors) ▪ Establish the share of areas that accommodate NbS elements (green and blue infrastructure and permeable pavement) within the typology of POS 	<ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	
<p>Define building regulations that enable public access to POS</p> <ul style="list-style-type: none"> ▪ Provide public access into POPS in densely built-up areas ▪ Provide public access into POPS in low-density areas, for building-oriented POS and common POS, in a share of over 50% of POS area ▪ Forbid fencing of plots and open spaces in multi-family housing neighborhoods in inherited LHEs and new developments in densely built-up areas, except for urban agriculture/ community gardens in common POS ▪ Enable fencing of plots and open spaces in multi-family housing neighborhoods in new developments in low density areas, for building-oriented POS and common POS at a defined fee for developers and higher property taxes 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK F. Tools</p>

	<ul style="list-style-type: none"> ▪ Promote spatial organization that supports the integration of diverse functions via visual and physical connectivity, modular zoning, and adaptability over time 	<ul style="list-style-type: none"> ▪ PGR, PDR 	
	<p>Ensure the protection of POS in inherited LHE through building regulations</p> <ul style="list-style-type: none"> ▪ At the level of the general urban plans identify priority multi-family areas for urban regeneration (inherited multi-family residential areas) and regulate the directions, forms and intensity of their transformation, thereby protecting existing POSs ▪ Address inherited POS from the socialist past at the neighborhood level to protect them ▪ Designate building-oriented POS, common POS and neighborhood POS in inherited LHEs, as “land in public use” that serves the buildings within that residential block (zemljište u javnom korišćenju) in Land Use Regime Plans, that does not allow restitution of seized property ▪ Zone building-oriented POS, common POS and neighborhood POS in inherited LHEs, as a spatial-functional entity with buildings in Land Use Plans, in such a way to enable the preservation and enhancement of existing green spaces, revitalization and improvement of existing POS 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK F. Tools</p>
	<p>Define specific building regulations that can significantly influence the development of certain types of POS</p> <ul style="list-style-type: none"> ▪ Designate common POSs as “community gardens” or “urban agriculture areas”, to employ residents, where needed and possible ▪ Limit the application of semi-buried garages at the level of a single unfenced plot, to avoid uneven heights of open space, which creates physical obstacles and disable pedestrian movement ▪ In newly planned residential areas, the urban plan should provide for a larger regulatory street width for the purpose of forming tree-lined streets or implementing NbS linear technical elements ▪ Define norms for POS in newly planned multi-family residential areas through a minimum percentage share of open spaces at the plot level and a minimum percentage share of POS at the level of the spatial unit – neighborhood ▪ Prescribe mandatory tree lines in mobility POSs 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK F. Tools</p>

Phase 3: Evaluation & Decision making	Planning documents	Tools
Perform the evaluation and selection of POS development scenarios using a clearly defined methodology and a predefined set of criteria, ensuring the involvement of professionals and other relevant stakeholders		
<p>Establish a comprehensive set of evaluation criteria for assessing POS development concepts and scenarios and assign appropriate weights and scoring metrics</p> <ul style="list-style-type: none"> ▪ Prioritize planning solutions that support POS development, integration of innovative solutions and green infrastructure, public access and multi-functionality of POS ▪ Define requirements for multiple, overlapping functions (ecological, social, recreational, and technical) as spatial quality criteria ▪ Prioritize solutions that emphasize the protection of POS within inherited residential areas from the socialist period 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK G. Tools</p> <p>BLOCK H. Tools</p> <p>Education/ Information Tools</p>
<p>Establish a standardized procedure for the evaluation of variant POS development concepts and scenarios</p> <ul style="list-style-type: none"> ▪ Identify stakeholders and define roles (public sector, technical experts, community representatives, private sector, NGOs, general public) ▪ Evaluate each planning scenario through technical analysis and stakeholder engagement to identify trade-offs, impacts, and feasibility ▪ Combine data-driven assessments with public and expert input to form a well-rounded basis for decision-making 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK G. Tools</p> <p>BLOCK H. Tools</p>
<p>Enhance the presentation of planning solutions to support better assessment and decision-making, and to improve the understanding of planning documents</p> <ul style="list-style-type: none"> ▪ Simulate various planning scenarios for POS, thereby assessing impacts on urban microclimates, traffic flows, and usage patterns ▪ Enhance the visual and graphic presentation of planned solutions for POS to support spatial development and foster dialogue between institutions and citizens in the urban planning 	<p>PGR, PDR</p> <ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR 	<p>BLOCK E. Tools</p> <p>BLOCK G. Tools</p> <p>BLOCK H. Tools</p>

	<p>and design process</p> <ul style="list-style-type: none"> ▪ Quantify the benefits and values of greenery in POS to support urban planning and design in the planning process, apply software for quantifying the benefits and values of greenery in POS, particularly trees (for supporting spatial development – process of urban planning and design) ▪ Provide better presentation of the planning documents to all the users regardless of their profession, age and education 	<ul style="list-style-type: none"> ▪ PGR, PDR ▪ PGR, PDR 	
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Post-plan Delivery Activities: Implementation & Monitoring		Planning documents	Tools
Establish the mechanisms for implementing planning solutions			
<p>Define the documents and strategies that need to be developed to ensure the implementation of the plan</p> <ul style="list-style-type: none"> Develop an action plan that defines short-, medium-, and long-term priorities, responsible parties, timelines, and funding sources Establish a monitoring and evaluation framework that defines key performance indicators and provides mechanisms for tracking progress and adjusting implementation as needed Mandate the development of Environmental and Social Impact Assessments for all large-scale projects 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> GUP, PGR GUP, PGR, PDR GUP, PGR 	<p>Institutional/ Legislative Tools</p>	
<p>Link planning documents with administrative mechanisms for implementation</p> <ul style="list-style-type: none"> Plan with recognition of ownership and governance complexity across POS categories Mandate that developers clearly articulate how their POS design will accommodate a diverse range of activities and user groups. This requirement could be integrated into the standard documentation required for obtaining building permits 	<p>PGR, PDR</p> <ul style="list-style-type: none"> PGR, PDR PGR, PDR 	<p>Institutional/ Legislative Tools</p>	
<p>Define options and funding sources for land acquisition to ensure the availability of land for POS</p> <ul style="list-style-type: none"> Incentive zoning: Identify locations where it is possible to achieve a density bonus, i.e. a higher floor area ratio in exchange for providing quality POPS. Additionally, different ratio can be established depending on POS type or features Provide developers and property owners incentives to include common POSs and neighborhood POSs in their development plans for new housing developments, in exchange for additional floor area 	<p>PGR, PDR</p> <ul style="list-style-type: none"> PGR, PDR PGR, PDR 	<p>Financial/ Investment Tools</p> <p>Economic Tools</p>	

	<p>Assign management responsibilities in line with the POS typology</p> <ul style="list-style-type: none"> ▪ Define which types of POS are under the jurisdiction of local authorities (common POS, streets, buffer greenery, for example) and which are under private investors or Homeowners associations (building surrounding POS, for example) ▪ Clarify responsibilities and define activity leaders for POS management and maintenance on both public and other construction land, including newly developed and revitalized POS ▪ Propose POS management strategies that define long-term management models for each POS zone, including clearly defined responsibilities for management and maintenance, oversight mechanisms, and funding sources 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR 	<p>Institutional/ Legislative Tools</p> <p>Economic Tools</p>
<p>Establish clear mechanisms for monitoring and enforcing the implementation of planning documents</p>			
	<p>Define a comprehensive set of indicators for monitoring the implementation of planning documents</p> <ul style="list-style-type: none"> ▪ Include real-time monitoring of environmental quality (air, noise) and green coverage as part of planning performance indicators — especially in multi-family residential areas ▪ Implement post-occupancy evaluations of newly developed or renovated POS in multifamily housing areas to gather direct feedback from residents on the usability, satisfaction, and overall impact of these spaces 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR 	<p>BLOCK G. Tools</p>
	<p>Determine responsibilities for monitoring the implementation of the plan</p> <ul style="list-style-type: none"> ▪ Develop an action plan for the development of POS that clearly defines stakeholders, responsibilities, the implementation timeline, and mechanisms for post-implementation monitoring 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP, PGR, PDR 	<p>Economic Tools</p>
	<p>Ensure public participation in the monitoring and reporting of implementation and /or deviations from adopted planning solutions</p> <ul style="list-style-type: none"> ▪ Inform the public about planning solutions and the importance of their implementation ▪ Educate the population to monitor the implementation of the plan ▪ Provide mechanisms for citizen participation 	<p>GUP, PGR, PDR</p> <ul style="list-style-type: none"> ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR ▪ GUP, PGR, PDR 	<p>Citizen Engagement Tools</p> <p>Education/ Information Tools</p>

2. Specific Guidelines for Urban Planning

The following table defines specific guidelines which are outlined with different types of planning documents, typology of POS and neighborhood types.

2.1. Neighborhood types

Inherited multi-family neighborhoods from the socialist past

Large housing estates built mainly between the 1950s and 1980s in socialist countries, designed to provide mass housing with basic services for urban populations, featuring standardized apartment blocks, high-rise structures and high densities.

Newly planned neighborhoods

Yet undeveloped residential areas designed through the formal urban planning processes, featuring organized layouts, modern infrastructure, and integrated services to support growing urban populations.

“Transitional” neighborhoods

Residential areas built after the fall of socialism, typically during the 1990s and 2000s, characterized by market-driven development, fragmented planning, and varying construction quality, reflecting the shift from state-led to private investment in housing.

2.2. POS typology

Recreation and gathering

- A. Building-oriented POS - the immediate surroundings of multi-family residential buildings, public buildings, or commercial/mixed-use complexes, with either unlimited or limited access. They are at the smallest spatial scale and directly interact with the building's users.
- B. Common POS - building cluster POS in open, semi-open, or closed systems of spatial organization, with either limited or unlimited access. They are shared areas between residential blocks or sub-neighborhoods, serving the immediate community of a cluster of buildings.
- C. Neighborhood POS - larger public spaces serving the broader neighborhood, such as parks, gardens, playgrounds, sport fields, plazas, and squares, often having a designated public function.

Mobility considers traffic and pedestrian movement

- A. Traffic - movement of transportation resources and persons in a neighborhood area, along a street. Streets differ according to rank and may include a variety of uses and activities (vehicle movements, walking, cycling, sitting, etc.).

- B. Pedestrian movement - Pedestrian paths are public open spaces designed specifically for pedestrians.

Greenery – nature space refers to non-recreational land areas within neighborhood covered primarily with vegetation, and it includes:

- A. Green buffer – strip of vegetation (such as trees, shrubs, or grass) that serves as a barrier or transition zone between different land uses.
- B. Landscaped greenery – planned, designed and maintained greenery created to enhance aesthetics, functionality, and environmental quality.
- C. Abandoned/unorganized greenery.
- D. Small horticulture – the cultivation of fruits, vegetables, flowers, and ornamental plants in open spaces around and between buildings.

Services and utilities (potential POS)

- A. Parking - outdoor and covered parking lots
- B. Infrastructure space.

General Urban Plan			
POS type	Inherited multi-family neighborhoods from socialist past	Newly planned neighborhoods	“Transitional” neighborhoods
General	<ul style="list-style-type: none"> ▪ Incorporate the preservation and enhancement of POS within neighborhoods into priority strategic programs, and define institutional, financial, and temporal elements for their implementation (in line with the SDG and current strategies related to urban greening, e.g. the 3-30-300 strategy, etc.) ▪ Include the preservation and enhancement of POS within neighborhoods as indicators of urban development ▪ Map and classify neighborhoods according to specific criteria (e.g. period of construction, number of floors, density, centrality), and identify characteristic types of POS ▪ Define criteria for decision-making regarding the development of POS within neighborhoods through Plans of 	<ul style="list-style-type: none"> ▪ Incorporate the provision of new Public Open Spaces (POS) into priority strategic programs, and define institutional, financial, and temporal elements for their implementation ▪ Include the provision of POS in new residential zones as indicators of urban development ▪ Differentiate between: <ol style="list-style-type: none"> (1) existing POS — their preservation, function, and capacity; and (2) the provision of various types of POS for new residential development (POS development should be planned in parallel with residential development, and new residential areas should not rely on existing POS) ▪ Define criteria for decision-making regarding the development of new residential 	<ul style="list-style-type: none"> ▪ Recognize “transitional neighborhoods” as a distinct type of multi-family housing and define development goals and guidelines for them ▪ Include the provision of POS on publicly owned land in transitional neighborhoods among priority programs ▪ Define mechanisms for the creation of POPS on privately owned land

	<p>General Regulation (PGR), Plans of Detailed Regulation (PDR), Urban Projects (UP), or competition-based solutions</p>	<p>areas through Plans of General Regulation (PGR), Plans of Detailed Regulation (PDR), Urban Projects (UP), or competition-based solutions</p>	
<p>All neighborhood types</p>			
<ul style="list-style-type: none"> ▪ Introduce neighborhood-level population density as a mandatory/restrictive urban planning parameter in plans ▪ Introduce the share of different types of green/open spaces per capita at the neighborhood level as a mandatory urban planning parameter in plans 			
<p>Recreation and gathering</p> <p>A) Building-oriented POS B) Common POS C) Neighborhood POS</p>	<ul style="list-style-type: none"> ▪ Define general guidelines for the development of neighborhoods taking into account the characteristics of POS, their preservation, and improvement (different guidelines depending on the presence or absence of certain types of POS, the ratio of POS area to the number of apartments, etc.) ▪ Define guiding rules of arrangement and building rules — establish a hierarchy of public spaces, promote multi-functionality of spaces, and NbS ▪ Provide POPS in inherited densely built residential complexes from the post-socialist period 	<ul style="list-style-type: none"> ▪ Guide future residential development with POS as a mandatory element (a mandatory type of POS for a specific spatial area or number of residents in new residential developments) 	<ul style="list-style-type: none"> ▪ Prevent all forms of construction and any other appropriation of open spaces for private use within inherited “transitional” neighborhoods, irrespective of land ownership

<p>Mobility</p> <p>A) Traffic B) Pedestrian movement</p>	<ul style="list-style-type: none"> ▪ Include the improvement of public transport, bicycle and pedestrian traffic among priority strategic programs, and define institutional, financial, and temporal elements for their implementation ▪ Recognize inherited multi-family neighborhoods from the socialist past as “completed” units built according to Detailed Urban Plans, where further expansion of the street network is neither necessary nor permitted ▪ Guide the transformation of the existing street network — promote walking, explore possibilities for greening street corridors, and introduce bicycle traffic 	<ul style="list-style-type: none"> ▪ Plan street corridors as elements of traffic connectivity as well as components of green infrastructure (links between nodes), based on studies of greenery and traffic ▪ Guide the development of the street network — promote integrated transport and define mandatory dimensions and cross-sectional elements (greenery, pedestrian, and bicycle paths) for newly designed streets ▪ Recognize pedestrian routes on privately owned land as an integral part of the city-wide pedestrian network, and define guiding design rules to be incorporated into lower-level plans (PGR, PDR) 	<ul style="list-style-type: none"> ▪ Recognize pedestrian routes on privately owned land as an integral part of the city-wide pedestrian network, and define guiding rules of arrangement and building rules to be incorporated into lower-level plans (PGR, PDR)
<p>Greenery – nature space</p> <p>A) Green buffer B) Landscaped greenery C) Abandoned/ unorganized greenery D) Small horticulture</p>	<ul style="list-style-type: none"> ▪ Identify different types of greenery in residential areas as elements of green infrastructure. Network all existing green spaces, identify “gaps” in the green infrastructure, and propose solutions 	<ul style="list-style-type: none"> ▪ Identify and preserve existing zones of high-quality greenery with ecological significance in new developments, as well as elements of blue infrastructure 	<ul style="list-style-type: none"> ▪ Define greening as one of the development goals for transitional neighborhoods

<p>Services and utilities (potential POS)</p> <p>A) Parking B) Infrastructure space</p>	<ul style="list-style-type: none"> ▪ Identify areas under “parking development pressure” (streets, residential neighborhoods) and consider ways to reduce pressure: <ul style="list-style-type: none"> (1) The potential of the specific area to solve parking issues without further occupation of Public Open Spaces (POS), through participation models involving residents, private owners, and city authorities (e.g. underground, semi-buried, above-ground garages); and (2) The potential of surrounding areas for parking redistribution, especially city-owned locations where commercial garages could be built with preferential parking permits for residents ▪ Include parking facilities (surface parking lots, multi-story underground and above-ground garages) as public-use facilities that may be publicly or privately owned, and provide guidelines for their planning in PGR and PDR 	<ul style="list-style-type: none"> ▪ Establish parking zones based on the degree of motorization relative to city zones (e.g. in central urban areas, allow parking for only one vehicle per residential unit; in peripheral zones, allow provision for two or more vehicles) ▪ Emphasize the integration of residential units and parking spaces — limit the development of on-street parking within the street cross-section in newly planned residential areas ▪ Promote the digitalization and integration of data related to the number of residential units, parking spaces, and registered vehicles ▪ Encourage the implementation of modern parking provision strategies, such as shared parking and similar innovative approaches 	<ul style="list-style-type: none"> ▪ Identify areas under “parking development pressure” (streets, residential neighborhoods) and consider ways to reduce pressure: <ul style="list-style-type: none"> (1) The potential of the specific area to solve parking issues without further occupation of Public Open Spaces (POS), through participation models involving residents, private owners, and city authorities (e.g. underground, semi-buried, above-ground garages); and (2) The potential of surrounding areas for parking redistribution, especially city-owned locations where commercial garages could be built with preferential parking permits for residents ▪ Include parking facilities (surface parking lots, multi-story underground and above-ground garages) as public-use facilities that may be publicly or privately owned, and provide guidelines for their planning in PGR and PDR
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	<ul style="list-style-type: none"> ▪ Define criteria for determining the location and capacity of public parking facilities ▪ Consider modern parking provision strategies (such as shared parking, etc.) 		<ul style="list-style-type: none"> ▪ Define criteria for determining the location and capacity of public parking facilities. Consider modern parking provision strategies (such as shared parking, etc.)
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Plan of General Regulation			
POS type	Inherited multi-family neighborhoods from socialist past	Newly planned neighborhoods	“Transitional” neighborhoods
General	<ul style="list-style-type: none"> Identify neighborhoods for which further elaboration is planned through a PDR or Urban Project (UP), or through the launch of design competitions followed by PDR /UP elaboration Identify and map neighborhoods for the application of population density at the neighborhood level as an urban planning parameter (delineate boundaries, develop an atlas, etc.) 	<ul style="list-style-type: none"> Provide for the development of new residential areas through PDR or through design competition proposals followed by PDR elaboration 	<ul style="list-style-type: none"> Identify LHE for which further elaboration is planned through a PDR or Urban Project (UP), or through the launch of design competitions followed by PDR /UP elaboration Identify and map neighborhoods for the application of population density at the neighborhood level as an urban planning parameter (delineate boundaries, develop an atlas, etc.)
Recreation and gathering A) Building-oriented POS B) Common POS C) Neighborhood POS	<ul style="list-style-type: none"> Designate POS within neighborhoods as a separate land use category Define rules of arrangement and building rules for the adopted POS subtypes (building-oriented POS, common POS, neighborhood POS) 	<ul style="list-style-type: none"> Provide detailed guidelines for further elaboration through PDR and design competition solutions, which include the obligation to establish different types of POS depending on the characteristics of residential development (location in the city, centrality, area, planned number of residents, etc.) 	<ul style="list-style-type: none"> Define undeveloped spaces within transitional neighborhoods as POPS (Privately Owned Public Spaces), regardless of ownership status (e.g. private property of investors, joint ownership of all unit owners within a building, etc.)

	<ul style="list-style-type: none"> ▪ Define the building-oriented POS and the residential building as a single entity and zone them accordingly ▪ For neighborhoods elaborated through the PGR: define detailed rules of arrangement and building rules, including the obligation to establish different POS subtypes, depending on the characteristics of the residential area ▪ For neighborhoods elaborated through the PDR / UP / design competition solutions – provide detailed guidelines for further elaboration based on the characteristics of the residential area 	<ul style="list-style-type: none"> ▪ Define criteria for the classification into POS subtypes (building-oriented POS, common POS, neighborhood POS) ▪ Define general rules of arrangement and building rules for the adopted POS subtypes (building-oriented POS, common POS, neighborhood POS) ▪ Establish guidelines for elaboration through PDR and UP to ensure connectivity and functionality of spaces developed through different planning documents (continuity of POS spatial and design coherence of urban planning solutions, etc.) ▪ Condition new construction with simultaneous POS development ▪ Propose models for the efficient provision of POS 	<ul style="list-style-type: none"> ▪ Establish binding rules of arrangement and building rules for different types of POPS (building-oriented, common, neighborhood), as well as implementation mechanisms, with the aim of long-term improvement of spatial quality and usability
<p>Mobility</p> <p>A) Traffic B) Pedestrian movement</p>	<ul style="list-style-type: none"> ▪ Assess opportunities and ensure spatial capacity for the improvement of the existing street network (e.g. greening, introduction of bicycle traffic, etc.) 	<ul style="list-style-type: none"> ▪ Plan the new street network to integrate multiple functions - traffic connectivity, recreation, and social interaction, by including bicycle and pedestrian zones, green infrastructure elements, etc. (SCS, MFS, Nbs) 	<ul style="list-style-type: none"> ▪ Analyze street cross-sections and adjust them to the required service level—repurpose “excess” space for street greening and enhancement of pedestrian pathways

	<ul style="list-style-type: none"> ▪ Graphically designate streets planned for transformation and define detailed rules of arrangement and building rules for each street type – promote the use of Nature-based Solutions (NbS) and multifunctionality ▪ Identify and interconnect primary pedestrian routes – establish a network of primary pedestrian corridors 	<ul style="list-style-type: none"> ▪ Through design and construction regulations for transport infrastructure, as well as planning guidelines for further development of new residential areas, promote pedestrian movement and connectivity 	<ul style="list-style-type: none"> ▪ Define comprehensive measures to establish a cohesive network of pedestrian pathways within POPS
<p>Greenery – nature space</p> <p>A) Green buffer B) Landscaped greenery C) Abandoned/ unorganized greenery D) Small horticulture</p>	<ul style="list-style-type: none"> ▪ Define rules of arrangement and building rules that protect and enhance existing greenery and ensure opportunities for additional greening 	<ul style="list-style-type: none"> ▪ Plan green areas on land designated for public and other uses as an integrated system of interconnected spaces, rather than as individual, isolated plots (ensuring spatial and functional connectivity, ecological functions, accessibility, etc.) 	<ul style="list-style-type: none"> ▪ Define rules of arrangement and building rules that protect and enhance existing greenery and ensure opportunities for additional greening
<p>Services and utilities (potential POS)</p> <p>A) Parking B) Infrastructure space</p>	<ul style="list-style-type: none"> ▪ Develop a detailed typology of public parking spaces (surface parking, parking garages) and define appropriate rules of arrangement and building rules ▪ Determine locations for public parking spaces in accordance with the criteria defined by GUP 	<ul style="list-style-type: none"> ▪ Address parking for new residential developments at the broader neighborhood level (public garages, parking lots), define rules of arrangement and building rules, and propose implementation models (e.g. PPP) 	/

Plan of Detailed Regulation			
General	<ul style="list-style-type: none"> ▪ Increase the level of detail in PDR, following the example of previous Detailed Urban Plans (DUP) – include landscape design, greening plan, urban furniture, paving details, etc. ▪ Apply the Neighborhood Plan principles within the legally regulated content of the Detailed Regulation Plan ▪ When selecting regeneration scenarios for inherited multi-family neighborhoods from the socialist past and transitional neighborhoods or new development scenarios, utilize multi-criteria analysis 		
POS type	Inherited multi-family neighborhoods from socialist past	Newly planned neighborhoods	“Transitional” neighborhoods
Recreation and gathering A) Building-oriented POS B) Common POS C) Neighborhood POS	<ul style="list-style-type: none"> ▪ Conduct detailed zoning of POS within inherited multi-family neighborhoods from the socialist past ▪ Define detailed rules of arrangement and building rules based on the local context and the needs of residents, following SCS principles ▪ Provide a visual representation of the planned area, including the pedestrian circulation network, materials used, greening strategies, and other relevant features ▪ Designate common POSs as “community gardens” or “urban agriculture areas” to employ residents, where possible 	<ul style="list-style-type: none"> ▪ Zone the area to allocate different subtypes of POS ▪ Define detailed planning and construction regulations for each POS subtype ▪ Emphasize multifunctionality and the integration of NbS through building rules ▪ Prescribe the share of minimum surface area with permeable pavement 	<ul style="list-style-type: none"> ▪ Define detailed rules of arrangement and building rules for the regeneration of transitional neighborhoods (differentiation of POS subtypes, minimum share of permeable paving surfaces, share of green areas, etc.) ▪ Consider the local context and the needs of the population for a specific type of POS

	<ul style="list-style-type: none"> Establish the share of areas that accommodate NbS elements (green and blue infrastructure and permeable pavement) within the typology of POS 		
Mobility A) Traffic B) Pedestrian movement	<ul style="list-style-type: none"> Promote integrated street design instead of fragmenting mega-blocks and introducing new vehicular streets 	/	<ul style="list-style-type: none"> Promote pedestrian connectivity, vehicular traffic reduction, and consolidation of residential blocks where feasible
Greenery – nature space A) Green buffer B) Landscaped greenery C) Abandoned/ unorganized greenery D) Small horticulture	<ul style="list-style-type: none"> Define rules of arrangement and building rules that protect and enhance existing greenery and ensure opportunities for additional greening 	<ul style="list-style-type: none"> Plan green areas on land designated for public and other uses as an integrated system of interconnected spaces, rather than as individual, isolated plots (ensuring spatial and functional connectivity, ecological functions, accessibility, etc.). Increase the share of green surface per housing complex and prescribe compact forms of greenery 	<ul style="list-style-type: none"> Define rules of arrangement and building rules that protect and enhance existing greenery and ensure opportunities for additional greening
Services and utilities (potential POS) A) Parking B) Infrastructure space	/	<ul style="list-style-type: none"> Assess parking needs at the level of the planning area, not at the level of individual buildings Promote multifunctionality of parking spaces and the application of NbS (green roofs on garages, sports fields, etc.) 	/

Urban Design Guidelines and Principles

Methodology Framework

This section outlines the critical phases for translating the foundational vision and guiding principles of Public Open Space (POS) design into tangible, actionable interventions within multi-family housing areas. The design process follows a series of key phases, ensuring a structured yet flexible approach to POS creation and revitalization (Figure 6):

- 1. Pre-Design Activities:** This initial phase involves defining the project's character, understanding and framing the context, cultivating vision, recognizing key actors, and establishing prerequisites and challenges.
- 2. Data Gathering, Assessment, and Analysis:** This phase focuses on collecting information, performing site analysis, mapping findings, and identifying challenges and opportunities to form a knowledge base and rationale for intervention.
- 3. Conceptualization of POS Development Scenarios and Interventions:** This phase consists of 2 steps: 1. conceptual design and 2. detailed design. It involves translating ideas into initial design recommendations, proposing solutions, and visualizing how they could be integrated into the space.

It also focuses on refining the conceptual designs into detailed, actionable guidelines and technical proposals, ensuring principles of climate-resilience, inclusivity, smart design, and co-creation are embedded.

- 4. Evaluation of POS Project Options** in order to inform selection of POS planning/design proposal for delivery
- 5. Post-plan/project Delivery Activities:** Implementation and Monitoring of the design and a continuous process of evaluation to ensure that the public spaces meet their intended goals and adapt to changing needs.

The overarching aim is to ensure that the resulting POS are not only attractive and functional but also embody climate-resilience, inclusivity, smart urbanism, multifunctionality, and co-creation, profoundly enhancing the social, economic, environmental, and health aspects of urban living. This integrated and iterative methodological framework places people at its core, acknowledging that effective and enduring public spaces are shaped by the collective input of residents, technical experts, and local authorities and ensures that the design process incorporates continuous learning and refinement.

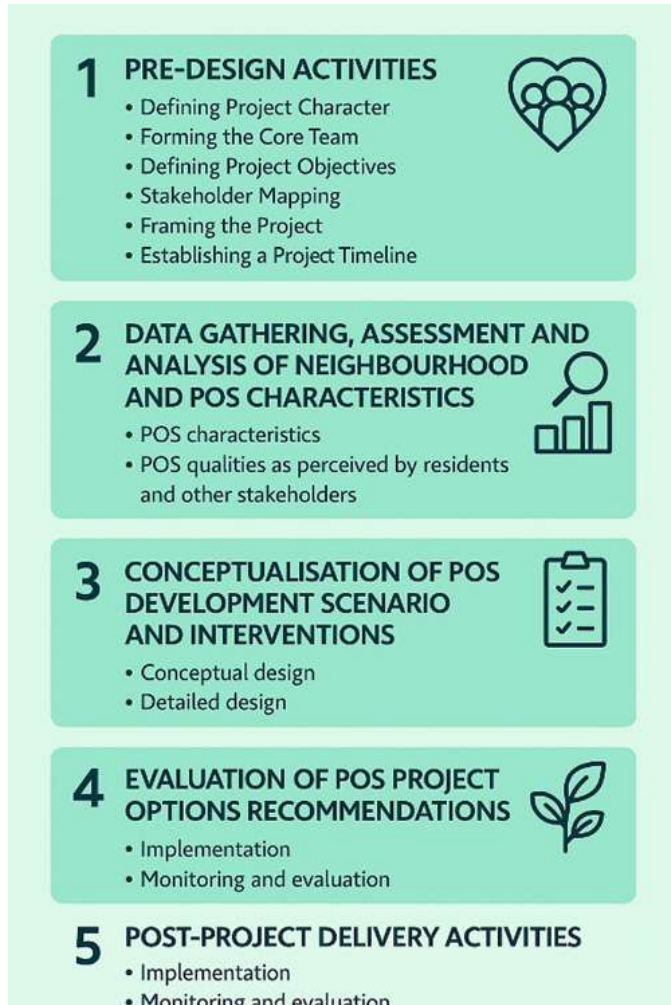


Figure 6. Key phases of design process of public open space

Source: RePOS team

1. Pre-design Project Activities

Effective public space design begins with clear objectives and a well-defined collaborative structure:

Defining Project Character: Interventions can be defined as either regeneration of existing POS or the new development of POS. In the case of new development of POS, maximization of guideline should be sought, while in the urban design for regeneration of existing POS resident’s participation should be highlighted to ensure that POS are deeply rooted in the aspirations and needs of the community, fostering a sense of shared ownership and long-term sustainability. Other guidelines that should be mandatory either for POS regeneration or new POS are going to be highlighted in the following text.

Forming the Core Team: Establish a multidisciplinary team including urban designers, landscape architects, and community engagement specialists.

Defining Project Objectives: Clearly articulate the purpose of the POS intervention, whether it is regeneration or new development, and the desired outcomes related to climate-resilience, inclusivity, smart features, and co-creation.

Stakeholder Mapping: Identify all relevant actors, including residents, housing associations, local authorities, and NGOs. Understand their influence and interest to develop a strategic engagement plan. This generates a graphic representation of the social and institutional structure.

Framing the Project: Define the prerequisites, challenges, and opportunities within the legal, organizational, and financial context of the multi-family housing area.

Establishing a Project Timeline: Develop a realistic timeline for all activities, considering available budget and expertise.

The tools that can be used in this phase are: BLOCK A. Desk-Research Tools; BLOCK B. Field-Research Tools; BLOCK C. Mapping and Spatial Analysis Tools; BLOCK G. Assessment and Evaluation Tools; BLOCK F. Regulatory tools for neighborhood and POS development; BLOCK H. Planning and Design Collaboration Tools; Education/Information Tools; Citizen Engagement Tools; Financial/Investment Tools.

2. Data Gathering, Assessment and Analysis of Neighborhood and POS Characteristics

This phase is crucial for informed design decisions, focusing on collecting and analysing information about the existing conditions of the POS and its surroundings to form a knowledge base. The primary objective is to **highlight specific challenges and opportunities inherent in the public open space and its surrounding multi-family residential neighborhood**, thereby forming a solid and informed basis for subsequent design interventions.

The data collection involves both off-site (secondary) information obtained through desk research and on-site (primary) information gathered through field research and direct community engagement:

1. POS characteristics - expert research that includes reviewing historical maps, updated satellite images, land-use and mobility maps, urban legal frameworks (e.g., urban planning regulations, building codes), demographic statistics, crime and accident data, climate information, historical, political, and cultural backgrounds, as well as relevant literature, ongoing studies, and insights from news and social media.

2. POS qualities as perceived by residents and other stakeholders - community engagement and needs assessment exploring to identify experience of the space through the eyes of daily users. Active community involvement is paramount for co-

creating public spaces that genuinely reflect local needs and preferences, leading to greater longevity and a sense of ownership. It should be mandated in urban design for regeneration of existing POS. These activities focus on gathering direct input from residents and other stakeholders:

- Systematically gather views and opinions from a large number of people on specific topics related to POS perception, Structured around the five dimensions of public space quality (use and user, accessibility, amenities and furniture, comfort and safety, green environment).
- Conduct structured interviews with selected individuals who possess specific expertise or knowledge about the site or neighborhood. This can include local leaders, long-term residents, or specialists.
- Organize small, structured discussions with carefully selected groups of participants to gather in-depth opinions, perceptions, and ideas about specific issues related to urban or community development, such as the need for new public open spaces or specific ecological measures.
- Conduct structured processes, in-person or online, where policymakers or planners present proposals and collect feedback from a target group before making final decisions. This ensures that new or redeveloped POS reflect the needs, values, and priorities of the local community.

- Support collective thinking and collaborative learning among participants, through discussing specific topics, sharing insights, and building upon previous conversations, encouraging the generation of new ideas and co-creation of solutions.

Once collected, this diverse dataset is processed through the "Analysis and Problem Definition" activity. This activity involves curating and organizing all collected data into five thematic categories, which reflect a comprehensive understanding of public space quality:

- **Use and User:** Analysing who uses the space, how they use it, and what activities take place.
- **Accessibility:** Assessing physical access for all users, including pathways, ramps, and connections to broader urban system.
- **Amenities and Furniture:** Evaluating the presence, condition, and suitability of seating, lighting, waste management, play equipment, and other urban furniture.
- **Comfort and Safety:** Examining factors such as microclimate (heat, shade, wind), perceived security, noise levels, and overall pleasantness of the environment.
- **Green Environment:** Assessing the quantity, quality, and diversity of vegetation, stormwater management, and ecological features.

The tools that can be used in this phase are given in the section *Urban planning and design toolset for (re)creating public open space*, in Figure 7. at page 121 of this Guidebook.

3. Conceptualization of POS Development Scenarios and Interventions

Building upon the insights gained from the "Analysis and Problem Definition" phase, in this phase initial design recommendations are proposed, and their integration into the public open space is visualized. The process of urban design creation consists of 2 steps: 1. conceptual design and 2. detailed design. This phase focuses on translating the identified challenges and opportunities into creative, actionable design concepts that align with the core principles of the Guidebook: climate-resilience, inclusivity, smart design, and co-creation. The feasibility of these recommendations within the existing context – considering factors like budget, regulatory constraints, and community capacity – is also assessed.

The conceptual and detailed design development phase should be based on General and Specific Guiding Principles and recommendations.



Photo source: RePOS team

I General Guiding Recommendations for Urban Design of POS

The design of public open spaces in multi-family housing areas should adhere to core principles that ensure they are resilient, smart, intelligent, and deeply connected to their communities. These principles translate directly into design features and considerations.

General Guiding Recommendations

Climate-Resilient Design Recommendations

Designing public spaces with climate change in mind, by leveraging natural systems and sustainable practices:

Improve thermal comfort and reduce urban heat island (UHI) effect:

- Strategic Tree Planting: Incorporate diverse, climate-appropriate native tree species for shade and evapotranspiration, focusing on areas with high solar exposure and seating zones.
- Water Features: Introduce fountains, splash pads, or misters to contribute to evaporative cooling, ensuring they are designed for universal accessibility and safety.
- Permeable Surfaces: Utilize perforated or permeable pavements for pathways and plazas to reduce heat absorption and allow for water infiltration. This should be mandatory in urban design of new POS.
- Space Orientation: Design or reorient spaces to maximize desirable shade during peak heat hours and minimize direct heat exposure.

Manage surface water effectively and prevent flooding (NbS Principles):

- NbS: Implement features like rain gardens, bioswales, and permeable pavements to manage stormwater runoff on-site, reducing strain on conventional drainage systems.
- Infiltration Systems: Design dedicated areas for water infiltration to recharge groundwater.
- Rainwater Harvesting: Integrate systems for collecting and reusing rainwater for irrigation or other non-potable uses
- Environmental Risk Mitigation: Utilize natural contours and vegetation to control erosion and runoff, and design spaces to temporarily accommodate water storage during extreme rainfall events.
- In urban design for regeneration of existing POS, existing greenery should be preserved where possible and unobtrusive designs in heritage contexts should be applied. Parking lots should be reconfigured with permeable surfaces and shading.

Enhance ecological systems and support biodiversity:

- Diverse Vegetation: Prioritize native trees, shrubs, and groundcovers to support local fauna, improve air quality, and enhance carbon sequestration.
- Green Roofs and Walls: Integrate green roofs and green walls on adjacent buildings where feasible to increase green coverage, improve thermal performance, and manage rainwater.
- Urban Agriculture and Community Gardens: Design spaces that allow for urban agriculture and community gardens, fostering local food production and community engagement.

Inclusive Design Recommendations

Ensure that public spaces are accessible, safe, and welcoming for all members of the community, accommodating diverse ages, genders, abilities, and cultural backgrounds:

Implement universal design principles to ensure unhindered movement and access for children, the elderly, handicapped, and disabled users:

- Wide and Unobstructed Pathways: Provide wide, smooth, and unobstructed pathways for pedestrians and wheelchairs, with tactile pavements at crossings for visually impaired users.
- Gentle Ramps: Incorporate gentle ramps with appropriate inclinations and handrails instead of stairs where possible.
- Safe Crossings: Ensure adequate and clearly marked pedestrian crossings.
- Alternative Mobility: Consider bike lanes and bike racks to support cycling and reduce reliance on cars.

Accommodate diverse activities and user groups:

- Varied Recreational Structures: Include inclusive playgrounds for children (e.g., accessible swings, sensory play), outdoor exercise equipment for adults, and quiet seating areas for the elderly.
- Flexible Spaces: Design spaces that can host both formal and informal activities (e.g., community events, markets, or casual gatherings).
- Seating Options: Provide primary and secondary seating options (e.g., benches with backrests and armrests, movable chairs) in various configurations to encourage rest and social interaction.

Create secure, comfortable, and positive sensory environments:

- Effective Lighting: Implement strategic lighting (natural and artificial) with appropriate quantity, design, and distribution to ensure visibility and deter crime, especially at night.
-

- **Natural Surveillance:** Design spaces with clear sightlines and active building frontages to increase perceived safety.
- **Soundscapes:** Manage soundscapes to reduce noise pollution and enhance pleasant natural sounds.
- **Maintenance:** Ensure regular maintenance and waste management to keep spaces clean and well-cared for, reducing perceptions of insecurity or neglect.
- **Covered Areas:** Provide covered areas from rain and heat to enhance comfort across seasons.

Design spaces that facilitate social interaction and community bonding:

- **Gathering Points:** Create inviting gathering points that encourage spontaneous interaction.
- **Cultural Elements:** Incorporate elements that reflect local culture and identity, such as public art or historical markers, articulated by residents. It should be mandatory for regeneration of existing POS.

Smart Design Recommendations

Create spaces that are multifunctional and that integrate efficiency, adaptability, and responsiveness to user needs and environmental conditions, and leverage data-informed insights for improved performance and long-term vitality, even without explicit reliance on complex technologies:

Create spaces that can evolve and be reconfigured:

- **Modular Elements:** Design with modular elements, such as movable furniture or flexible play structures, that allow for different layouts and uses. It should be mandated for new POS creation.
- **Multi-functional Zones:** Define zones that can shift from day-time recreation to evening events, or from quiet contemplation to active play, based on community programming and demand.
- For regeneration of existing POS, transform monumental and non-functional areas (concrete plateaus, surplus parking lots) into green or multifunctional areas; integrate new facilities for different age groups (children, youth, elderly); Maintain and strengthen spatial qualities such as tree-lined streets, passages, viewpoints.

Optimize natural resource use and minimize environmental impact:

- **Design strategies for climate control:** Strategic shading and wind channeling, to reduce reliance on artificial means.
- **Energy-Efficient Elements:** Integrate solar-powered lighting or automated irrigation systems that respond to real-time weather conditions.
- **Waste Management:** Design for efficient waste sorting and composting, including clearly marked bins.

Enable continuous improvement based on user patterns and environmental performance:

- Observability: Design spaces whose performance can be easily observed and assessed (e.g., clear sightlines for monitoring use, readily visible conditions of amenities) to inform future adjustments.
- Reconfigurable Elements: Design elements that are easy to reconfigure or upgrade based on feedback from community use and maintenance observations.

Enhance connectivity and information flow:

- Clear Signage: Design clear signage for navigation and information (e.g., historical facts, park rules).
- Future Digital Integration: Consider design that allows for the future integration of digital information points (e.g., public Wi-Fi zones, QR codes for local history or events) without being dependent on them immediately. This is especially recommended for urban design of new POS.
- Physical Connections: Prioritize seamless physical connections to broader urban systems and public transport.

Utilize insights from data to inform design decisions and improve POS performance:

- Develop POS with considerations for aspects that could be measured or optimized, such as optimizing light exposure, green area distribution, or connectivity.
- Design with an understanding of how spatial analysis can guide decisions for efficient and high-quality spaces.

Integrate energy-efficient and low-maintenance features into POS design:

- Utilize solar-powered lighting where appropriate to ensure safety and comfort without excessive energy consumption. This should be mandatory in urban design of new POS.
- Implement waste management systems that are easily accessible and support recycling.
- Improve pedestrian pathways, cycling routes, and public transportation connections to enhance access to public open spaces.

Co-creative Urban Design

Genuinely embody community ideas and values:

- Community-Preferred Aesthetics: Incorporate community-preferred aesthetics, materials, and features into the design, as articulated through workshops and surveys.
 - Local Identity: Design elements that celebrate local identity and history as articulated by residents.
-

- **Feedback Integration:** Clearly demonstrate how feedback from workshops and discussions has shaped the design's form and function.

Encourage and facilitate ongoing community involvement in maintenance and evolution:

- **Easy Maintenance:** Design elements that are easy for community groups to maintain (e.g., manageable garden plots, robust materials, accessible repair points).
- **Flexible Programming Spaces:** Integrate flexible spaces for community programming that residents can activate themselves.
- **Community-Led Initiatives:** Consider designating areas for community-led initiatives like urban gardening or public art projects.

Maintain transparency and ensure adaptable proposals:

- **Understandable Visualizations:** Develop visualizations and models that are easily understood by non-professionals to facilitate feedback.
- **Incremental Implementation:** Design solutions that can be implemented incrementally or in phases, allowing for adjustments based on early feedback and community capacity.

These recommendations should be mandatory in urban design regeneration projects for regeneration of existing POS.

II Specific Guiding Recommendations for Urban Design of POS

Understanding the different types of Public Open Spaces (POS) and their characteristics is fundamental for effective urban design. The basic typology categorizes POS at the neighborhood level in relation to their key function of recreation and gathering, distinguishing between Building-oriented POS, Common POS, and Neighborhood POS. Each type has specific design implications to maximize its potential for social interaction, environmental benefit, and community well-being.

Specific Guiding Recommendations

A. Building-oriented POS

Definition: These are the immediate surroundings of multi-family residential buildings, public buildings, or commercial/mixed-use complexes, with either unlimited or limited access. They are at the smallest spatial scale and directly interact with the building's users.

Apply the following design principles:

- **Functionality:** Design should prioritize direct accessibility and immediate daily use by residents, such as entrance areas, small green spaces, and pedestrian pathways.
- **Greening and Microclimate:** Integrate green elements like small gardens, planters, and façade greenery to enhance the aesthetic and provide microclimate benefits. In cases where ground-level green areas are limited, green roofs and facades on adjacent buildings can significantly increase green coverage and improve thermal performance.
- **Safety and Comfort:** Ensure adequate lighting around building entrances and pathways to enhance safety. Provide comfortable seating options that allow for informal gathering and rest, respecting privacy where necessary.
- **Challenges:** In contexts like social housing, urban design projects have often focused on economical construction and maximum space utilization, leading to insufficient POS, primarily green areas, often usurped by parking spaces. This negatively affects social integration and a sense of community identity. Design must proactively address these challenges to ensure liveable immediate surroundings.

B. Common POS

Definition: These spaces refer to building cluster POS in open, semi-open, or closed systems of spatial organization, with either limited or unlimited access. They are shared areas between residential blocks or sub-neighborhoods, serving the immediate community of a cluster of buildings.

Apply the following design principles:

- **Multifunctionality:** Design common POS to support a variety of uses, maximizing their utility for residents. This includes providing spaces for walking, running, cycling, playing, and gathering.
- **Social Cohesion:** These spaces are crucial for fostering social interaction and community cohesion. Design should encourage spontaneous encounters and organized community activities.

- **Green Infrastructure:** Incorporate significant green areas that offer both ecological benefits and recreational opportunities. This can include small parks, landscaped zones, and areas for passive recreation.
- **Accessibility and Connectivity:** Ensure clear and safe pedestrian pathways within the common POS that connect to surrounding buildings and adjacent neighborhood-level POS. Address potential conflicts between pedestrian and vehicular traffic.
- **Challenges:** A lack of a unifying concept for public space development across different urban blocks, especially when developed by various investors, can lead to minimal POS provision with prioritization of parking over green areas. Design must counter commercial pressures to ensure adequate and high-quality common POS.

C. Neighborhood POS

Definition: These are larger public spaces serving the broader neighborhood, such as parks, gardens, playgrounds, sport fields, plazas, and squares, often having a designated public function.

Apply the following design principles:

- **Multifunctionality and Identity:** Design neighborhood POS to accommodate diverse functions (park, cultural, educational, sports, commercial) that complement each other and create a unique identity for the space.
- **Universal Accessibility:** Emphasize universal accessibility for all users, including people with disabilities, ensuring pathways, facilities, and entrances are designed for unhindered movement.
- **Ecological Enhancement:** Prioritize the integration of nature-based solutions (NbS) at this larger scale. This includes creating urban biotopes, wetlands, and ecological habitats, as well as promoting large-scale tree planting for air quality improvement and carbon sequestration. recreation in an ecologically healthy environment.
- **Social and Cultural Hubs:** Design these spaces to be central gathering places for the community, capable of hosting public events, cultural manifestations, children's fairs, and exhibitions.
- **Safety and Security:** Implement urban design principles to enhance safety, such as turning neglected and unlit areas into functional public spaces to reduce crime risk, and ensuring well-lit, busy areas for citizens' sense of security.
- **Challenges:** Despite their importance, neighborhood POS can suffer from a lack of systematic implementation of urban renewal initiatives and insufficient funding for long-term maintenance. Over-reliance on public utility companies for maintenance, with limited budgets, can lead to neglect and poor condition. Design must consider long-term management models and potential partnerships to ensure sustainability.

III Relevant Issues for Conceptual and Detailed (Re)Design of POS

Development Scenarios and Interventions in this phase should be considered through various lenses, respecting relevant principles and recommendations.

A. Conceptual Design. Development and intervention scenarios should be considered through the following different aspects:

- **Project Character:** Interventions can be defined as either regeneration of existing Public Open Spaces (POS) or the new development of POS
- **Approach to Implementation:** Scenarios can lean towards top-down approaches, where planning is driven by authorities, or bottom-up approaches, where community-led initiatives influence design and development.
- **Addressing Specific Problems and Opportunities:** Each scenario should be designed to tackle identified issues such as insufficient green areas, safety concerns, lack of recreational facilities, or poor connectivity, while also capitalizing on assets like existing mature trees or strong community groups.
- **Tailoring to POS Typology:** Interventions should be developed with consideration for the specific type of POS, whether it is a Building-oriented POS, Common POS, or

Neighborhood POS, as each has distinct design implications and challenges.

- **Prioritization over Time:** The prioritization process should involve two key steps and considerations: 1. Determining factors for prioritization and 2. Development of a phased action plan.

In order to spatially represent where specific interventions are proposed, a BASE MAP should be created. It visually illustrates where specific design changes can and should take place, identifying suitable areas for new features or improvements based on the preceding analysis. This map serves as a crucial visual aid for internal team discussions and for communicating proposals to stakeholders. It should indicate:

- **Existing Features to be Retained/Enhanced**
- **Areas for Climate-Resilient Interventions**
- **Zones for Inclusive Design Elements**
- **Locations for Smart Design Features**
- **Sites for Co-created Elements**
- **Areas of Conflict/High Intervention**
- **Connectivity Improvements.**

B. Detailed Design Development. After choosing the final scenario, refining the conceptual designs into detailed should be refined with actionable guidelines and technical proposals. In this phase it should be ensured that the **core principles of climate-resilience, inclusivity, smart design, and co-creation are deeply embedded in every aspect of the physical space:**

- **Site-Specific Adaptation:** General design principles must be adapted to the unique microclimates, social dynamics, and physical constraints of the specific multi-family housing area. Existing features such as mature trees, existing pathways, or community gathering spots identified as strengths during the analysis should be retained/enhanced.
- **Materiality and Surfacing:** Use of durable, sustainable, and permeable materials for pathways, plazas, and other surfaces to support stormwater management and reduce heat absorption. Consideration should also be given to local material sourcing to reduce environmental impact.
- **Vegetation and Green Infrastructure:** The selection of climate-appropriate and biodiverse plant species that provide maximum shade, improve air quality, and support local ecosystems should be worked out in detail. Planting densities, layering, and irrigation methods (e.g., rainwater harvesting integration) should be specified and specific designs for green roofs, green walls, and urban agriculture plots should be specified. These areas should be chosen

based on factors like sun exposure, existing drainage issues, and soil conditions.

- **Furniture and Features:** Define dimensions, materials, and placement of inclusive seating (such as benches with backrests and armrests, or movable chairs) that accommodate diverse users. Designs for accessible play equipment for all ages and abilities should be specified, alongside detailed waste management systems that are easily accessible and support recycling. Energy-efficient lighting should be included to ensure safety and comfort without excessive energy consumption, and the integration of inclusive and aesthetically pleasing water features like drinking fountains or splash pads.
- **Sites for Co-created Elements:** Proposed locations for community gardens, public art installations, or spaces specifically designed for community-led activities.
- **Connectivity and Movement:** Detailed plans for universal pathways should be created in order ensure seamless pedestrian and cycling access and visual link various POS elements including clear signage and tactile indicators. Strategies for integrating public transport links where relevant are also outlined should be also provided.
- **Maintenance and Management:** Propose clear maintenance schedules and responsibilities, potentially involving

community organizations for co-management of green spaces or other amenities. Ensures the long-term quality and functionality of the public spaces.

The tools that can be used in this phase are given in the section *Urban planning and design toolset for (re)creating public open space*, in Figure 7. at page 121 of this Guidebook.

4. Evaluation of POS Project Options Recommendations

The "Evaluation of POS project options" is a crucial phase in the public open space (POS) design process, serving to inform the selection of a POS planning/design proposal for delivery. It aims to analyse and assess existing or proposed POS characteristics and to compare alternative solutions in a way that facilitates decision-making for the future development of multi-family housing area. This phase should involve:

- **Assessment based on predefined vision and criteria:** The evaluation should be guided by a previously established vision for neighborhood area development, along with specific criteria and indicators for quality assessment. This aims to measure how well urban design proposals align with key quality criteria.
- **Comparison of alternative options:** Various POS proposals should be compared and ranked based on a variety of indicators. The selection of a single preferred option, ranked options, a short list for further appraisal, or a characterization of acceptable/unacceptable possibilities should be performed.
- **Mediating stakeholder interests:** In the context of participatory planning, the planner's role is to mediate among diverse stakeholder interests, as different local communities and stakeholders may favour different design alternatives based on their specific interest. It should be

mandatory in urban design projects for regeneration of existing POS.

The tools that can be used in this phase are given in the section *Urban planning and design toolset for (re)creating public open space*, in Figure 7. at page 121 of this Guidebook.

5. Post-project Delivery Activities (Realization and Monitoring)

This final phase involves the **implementation** of the design and a continuous process of **evaluation and monitoring** to ensure that the public spaces meet their intended goals and adapt to changing needs. **Post-project delivery activities phase consists of two steps: 1. Implementation and 2. Monitoring and evaluation.**

1. Recommendations for the implementation step are:

- Provide careful execution of plans for permeable surfaces, green infrastructure, and the installation of urban furniture.
- Overseeing the construction and landscaping process, ensuring strict adherence to the developed design guidelines and technical specifications.
- For larger projects, a phased implementation approach may be considered, prioritizing interventions based on the action plan and available budget, allowing for adaptability and learning from earlier phases.

2. Monitoring and Evaluation steps should include:

- Observing user patterns.
- Assessing the effectiveness of climate-resilient features (e.g., stormwater absorption).

- Evaluating accessibility.
- Gathering feedback on safety and comfort. should be mandatory in urban design projects for regeneration of existing POS.
- Repeating data collection activities from earlier phases, such as counting users and gathering community feedback on enjoyment, inclusiveness, meaningfulness, safety, and comfort.
- Conducting a comparative analysis (before and after) to highlight improvements in key indicators.
- Community Feedback Mechanisms: Continuing to engage the community post-implementation to gather their perceptions and experiences through follow-up surveys, interviews, or community forums. This should be mandatory in urban design projects for regeneration of existing POS.
- Learning and Adaptation: Identifying lessons learned and areas for further refinement or adaptation to promote continuous improvement for future POS projects. Successful interventions should inform future urban design projects, contributing to broader sustainable urban development.

The tools that can be used in this phase are:

Step 1. Implementation: BLOCK E. Environmental and Social System Behaviour and Performance - Assessment and Simulation Tools; BLOCK F. Regulatory tools for neighborhood and POS development; Education/Information Tools; Institutional/Legislative Tools.

Step 2. Monitoring and evaluation (Post-occupancy): BLOCK E. Environmental and Social System Behaviour and Performance - Assessment and Simulation Tools; BLOCK G. Assessment and Evaluation Tools; BLOCK H. Planning and Design Collaboration Tools; Citizen Engagement Tools.

**URBAN PLANNING AND DESIGN TOOLSET
FOR (RE)CREATING PUBLIC OPEN SPACE**



Photo source: RePOS team

Introduction

Planning and designing public open spaces (POS) that are attractive, functional, and inclusive requires knowledge, skills, creativity, collaboration, and constant feedback from various stakeholders. Public open space planning and design builds upon prerequisites and knowledge base in order to define the project purpose and to guide decisions in different phases of the design process. POS prerequisites are initiated by the client (private or public) and influenced by the natural and cultural conditions of the site. Specific social, cultural, economic and environmental characteristics and relations of a site need to be recognized, in order to help urban planners and designers form the knowledge base and define a framework for the planning and design.

POS planning and design links knowledge and action through systemic process that in general has several key steps: (1) Defining the problem; (2) Understanding the context and developing a rationale for intervention that takes into account summary analysis on economic and social context, built form, land use, movement, environment, public realm, and perceptual and cultural factors; (3) Summarizing development opportunities and constraints; (4) Conceptualizing, and (5) Evaluating planning or design options.

During the urban planning and design process, different activities should be performed within three key phases:

1. **Data gathering, assessment and analysis of neighborhood and POS characteristics** at system and/or singular location level – that form knowledge base and rationale for intervention (goals, objectives, principles, performance quality standards);
2. **Conceptualisation of POS development scenarios and interventions** expressed by regulating, mapping, drawing/3Dmodeling/visualising POS characteristics and performances (social and environmental) assessment and simulation. POS planning and design relates to: creating the urban structure at the system level, establishing connections between the broader system and individual sites, and developing detailed elements at site level.
3. **Evaluation of POS plan/project options** in order to inform selection of POS planning/design proposal for delivery.

Before starting to work on these three main types of activities, it is also necessary to perform Pre-plan/project activities, which include: a) Defining plan/project character (POS regeneration/new development; Plan/program/pilot project; POS system/element...), and b) Framing the plan/project (defining a problem and prerequisites, recognising actors, framing the implementation context – legal, organisational, financial...).

In addition, after choosing the POS plan/project option, it is also necessary to perform Post-plan/project delivery activities, such as realization and monitoring.

Following abovementioned logic of performing urban planning and design process, three general sets of urban planning and design tools are recognised to help (re) creating POS. These are:

1. PLANNING AND DESIGN Process Tools for (Re)Creating POS
2. STAKEHOLDERS-Oriented Tools for (Re)Creating POS
3. IMPLEMENTATION Tools for (Re)Creating POS






Photo source: RePOS team;

The use of tools according to activities in key phases of the planning and design process																			
	BLOCK A. Desk research tools – secondary data		BLOCK B. Field research tools – primary data			BLOCK C. Mapping and spatial analysis tools		BLOCK D. Drawing, 3d modelling, and visualisation tools		BLOCK E. Environmental and social system behaviour and performance – assessment and simulation tools				BLOCK F. Regulatory tools for neighborhood and POS development		BLOCK G. Assessment and evaluation tools		BLOCK H. Planning and design collaboration tools	
	1	Datasets and databases																	
	2	Google Earth																	
	3	Internet, news and social media, and AI-based tools																	
	1	Observation tools																	
	2	Survey tools																	
	3	Interviews																	
	4	Exploratory walks																	
	1	GIS-based tools																	
	2	Space Syntax tools																	
	3	Specialised mapping tools																	
	1	CAD - tools																	
	2	3D modelling tools																	
	3	Visualisation and Rendering tools																	
	1	Microclimate and environmental performance assessment and simulation tools																	
	2	Green spaces and ecosystem services assessment and modelling tools																	
	3	Sustainable Urban Drainage Systems (SUDS) tools																	
	4	Permeable surface and infiltration systems planning and design tools																	
	5	Green roofs and green walls planning and design tools																	
	6	Mobility simulation and assessment tools																	
	7	Use and behaviour models and simulation tools																	
	8	Environmental risks assessment and planning tools																	
	1	Rules of arrangement																	
	2	Building rules																	
	3	Land use zoning																	
	4	Performance zoning																	
	5	Design code																	
	1	POS quality assessment tools (check-list, index, diagram)																	
	2	SWOT analysis tool																	
	3	Multicriteria analysis																	
	4	Better Evaluation Rainbow Framework																	
	1	Online platforms																	
	2	Online meetings, webinars, and workshops																	
	3	Interactive tools																	
	4	Cloud-based platforms																	
1. PHASE Data gathering, assessment and analysis of neighborhood and POS characteristics																			
2. PHASE Conceptualisation of POS development scenarios and proposals																			
3. PHASE Evaluation of POS plan/project options																			

Figure 7. The use of tools according to activities in key phases of the planning and design process





PLANNING AND DESIGN PROCESS TOOLS

Table 16. Planning and Design Process Tools

BLOCK A. DESK RESEARCH		
Tool	Description	Illustration
Datasets and databases	Datasets and databases are collections of different kind of data provided in digital or analogue form by different institutions. Data relevant for POS planning and design are provided by relevant organisations that are in charge for collection, organisation and managing on specific thematic datasets (statistical data, ownership or green space cadastre, thematic atlases...). Besides that, new ICT technologies enable formation of Integrated data store/platforms where great variety of relevant data is stored available for different proposes in POS planning and design.	
Google Earth	Google Earth is a web and computer program that has the capacity to explore cities from an axonometric viewpoint (from the perspective of a low-flying plane). The program maps the Earth by superimposing satellite images, aerial photography and GIS data onto 3D globe. It has the ability to view areas in 3D, calculate distance, and to identify POS changes through time. It can be used for different purposes and easily interact with GIMP, SketchUp and other programs.	
Internet, news and social media, and AI-based tools	Internet, social media and AI-based tools can be used for collection, systematization and review of a variety of data available in digital form. While internet search engines provide links to different sources of factual information and help collect literature reviews, on-going studies, legal forms, articles, and social media enable collecting information on peoples' opinions and attitudes towards neighborhood POS. Besides that, AI based tools maybe used not only to collect and systematize but also to synthetize information on specific issues related to POS characteristics and values.	


BLOCK B. FIELD RESEARCH TOOLS – primary data



Field research tools are used for gathering on-site information on residential POS and its users in order to help planners and designers understand the context and systemize the knowledge on neighborhood and POS characteristics and values.

Tool	Description	Illustration
Observation tools	Observation is used to track and record on maps and diagrams POS characteristics, as well as movements, use and interaction of people with urban spaces and the built environment of the neighborhood. For applying observation method different tools can be used to support main activities. It includes the formation of the observation <i>plan and notebook</i> to help plan and note information. Observations on POS characteristics and people behaviour (patterns of movement and gathering in POS) <i>are recorded by counting, photographing, mapping, or a combination of these techniques and tools.</i>	
Survey tools	Survey is a systematic way of determining the views and opinions of a large number of people on a particular topic by using structured questions or a standardised questionnaire. Survey tools are used to get statistical information from and by the community about their perception and opinion of the specific POS and the whole neighborhood POS system. Tools for this activity include defining a representative sample, forming a questionnaire and consent form and, in case of digital survey, using on-line platforms (e.g., Google Forms, SurveyMonkey, Typeform). Digital surveys are	
Interviews	Interviews are used to gather data about specific aspects of the site that require specific expertise or knowledge from selected people. Interviews are based on selection of people to be interviewed, and conducted through open-ended, close-ended or mixed questionnaires with structured questions that include consent form. Plan, recording and documentation on conducting interview are tools for delivering this activity properly.	
Exploratory walks	Exploratory walks are used for getting to know and experience public space through the eyes of daily users by walking and exploring the neighborhood together. These activities are best performed by using a list of questions, performing adequate selection of inhabitants, planning, conducting, mapping and recording characteristics and citizens opinions on guided routes, while using different media (photo, video, audio, citizens' maps, photographs and video...)	

BLOCK C. MAPPING and SPATIAL ANALYSIS TOOLS



Mapping is the activity or process of creating a picture or diagram that represents something. In relation to urban space, it refers to linking social or environmental information to specific urban locations. For POS planning and design, this localisation and overlapping of information is of special importance to perform spatial analysis in order to help understanding the current situation and to guide decisions on its future development. Besides variety of thematic maps and analysis that can be performed, complex representation and understanding of space is nowadays upgraded by developing GIS-based tools as well as variety of plug-ins and software that supports specific spatial analysis methods, such as Space syntax.

Tool	Description	Illustration
GIS-based tools	<p>Geographic Information System (GIS) is a computer system that displays and analyses geographically referenced information. It uses data that is attached to a unique location and has the ability to <i>store, design, manage, analyse, visualise and map</i> different categories of data. This tool has many different versions and used for various purposes, in form of ArcGIS, QGIS, PVGIS, PPGIS, PGIS, etc. platforms. For POS planning and design of special importance are:</p> <ul style="list-style-type: none"> • <i>ArcGIS and QGIS</i> platforms that enable mapping of land use, infrastructure, and socio-economic patterns, topography, vegetation, and infrastructure, and can be used for mapping and analysing urban ecosystems, identifying potential sites for implementing NBS (e.g. permeable pathways, stormwater management systems, ...) in multifamily housing POS locations. • <i>PGIS/PPGIS</i> platforms combine Participatory Learning and Action (PLA) methods with geographic information systems (GIS). Different geo-spatial information management tools and methods can be combined (such as sketch maps, participatory 3D modelling (P3DM), aerial photography, satellite imagery, and global positioning system (GPS) data) to represent peoples' spatial knowledge in the forms of (virtual or physical) two- or three-dimensional maps used as interactive vehicles for spatial learning, discussion, information exchange, analysis, decision making and advocacy. 	

<p>Space Syntax tools</p>	<p>Space Syntax analysis is a method used to study how the layout of urban spaces — streets, buildings, parks, plazas — affects how people move, interact, and use cities or environments. In neighborhood planning and design, it becomes a valuable tool for identification of how different types of residential POS areas and paths are integrated and used. Key tools that support Space Syntax analyses are:</p> <ul style="list-style-type: none"> • <i>The Qgis Space Syntax Toolkit</i> is a QGIS plug-in for spatial network and statistical analysis. It provides a front-end for the depthmapX software within QGIS. • <i>PST (Place Syntax Tool)</i> PST is an open-source tool for performing spatial analyses. It combines the space syntax description of the urban environment with conventional descriptions of attraction into a combined accessibility analysis tool. It is currently available as a plugin for QGIS, an open-source GIS software. • The Space Syntax OpenMapping project is a spatial layout model of Great Britain with pre-processed measures of spatial accessibility for cities/towns/villages, which can serve as a role model for other countries and cities. 	
<p>Specialised mapping tools</p>	<p>In order to map and analyse diverse local spatial information relevant for (re)creating POS in multifamily housing areas, variety of specialised digital mapping tools are available that range from general to specific. To name just a few:</p> <ul style="list-style-type: none"> • <i>Google Maps overlay</i> is a visual layer that can be placed on top of the standard Google Maps base layer to add custom content or enhance the map with more information (routes, areas, points of interest, satellite imagery, terrain, boundaries, customized data, etc.). • <i>Green Infrastructure Mapping Tool</i> is a specialized tool for mapping, planning and design green infrastructure. • <i>Story Map in Arc GIS</i> is a tool for creating digital stories and presentations that incorporate dynamic geographic information system (GIS) work and external content. By combining maps, 3D scenes, multimedia, and other content, these tools help to create interactive narratives that raise awareness, influence opinions, or drive change. Depending on the embedded tools, a StoryMap can support citizen participation, although it's not a direct citizen engagement platform. 	

BLOCK D. DRAWING, 3D MODELING, and VISUALISATION TOOLS

Drawing, 3D modelling, and visualisation tools allow for representation of existing or planned POS and their integration with urban environment. They are used to create detailed plans/designs, 3D models and visualisations of existing POS, but they also enable planners and designers to visualize and test different planning/design options and scenarios for future residential POS (re)creation at both system and site location level. Besides that, they allow for presentation and testing different aesthetic and cultural POS qualities.

Tool	Description	Illustration
CAD - tools	<p>Computer-aided design (CAD) software is used to precisely draw and model design elements of built and open spaces at different spatial scales. Most popular software tools used in urban and landscape design for different purposes are:</p> <ul style="list-style-type: none"> • <i>CityCAD</i> is a software that helps urban planners and designers test design ideas early on and gives tools for doing city analyses, allowing for in-depth understanding of strategic planning concepts. • <i>VizTerra</i> is a software with a simplified interface allowing designers to quickly create landscape plans with a CAD program. • <i>Archicad</i> is a professional BIM software that meets all digital-delivery criteria and offers a simple design environment and precise BIM administration. It is an effective tool for bringing architects and engineers together in a shared model, thanks to advances in the Integrated Design workflow. 	
Visualisation and Rendering tools	<p>Visualisation and Rendering tools are used to add textures, colours, shadows, and movements to urban space as well as POS design. In this way they help create ambiances that are visually appealing and that communicate the idea of POS (re) creation to all stakeholders in planning and design process. Most popular tools used in urban and landscape planning and design are:</p> <ul style="list-style-type: none"> • <i>Lumion</i> software helps architects and urban planners create appealing 3D architectural simulations. It enables fast generation of high-quality 3D renders, whether of large or small projects. • <i>Enscape</i> is an AI-powered visualization tool that helps architects and designers to quickly generate and refine visual concepts directly within design software. It offers real-time visualization, which processes changes to the design model in real-time. It provides collaborative tools, which allow users to view the latest version of the 3D rendering and annotate it. • <i>GIMP</i> is a GNU Image Manipulation Program that lets users edit three-dimensional computer images. GIMP includes various tools for manipulating photos, adding text to images, and stacking visual content on maps. • <i>Photoshop</i> is a software that helps in creating highly visual landscape renderings in perspective or plan view. • <i>VR and AR</i> are tools that create immersive simulations of POS, allowing community members to virtually explore different design options and provide real-time feedback. 	

3D modelling tools

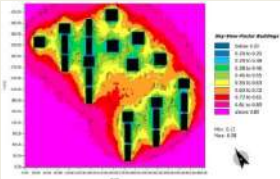
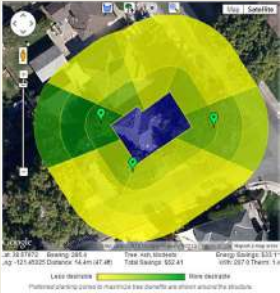
3D modelling is the process of creating 3D objects, including urban spaces, by using specialized software. These models can be staged with other visual effects to create entire scenes for still imagery or animation. They are of special importance for urban planning/design process where professionals use them to analyse the relationship between urban form and social and environmental characteristics, as well as for developing visions and testing solutions and development scenarios. Variety of digital 3D modelling tools are used in urban and landscape planning and design, including:


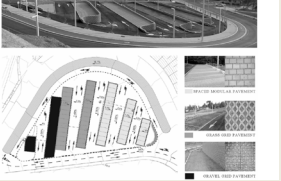

- *ArcGIS CityEngine* software is a procedural 3D city generator for creating and iterating on urban environments and scenarios by using either synthetic or real-world geographic information system (GIS) data. Urban planners and architects, can use it to create unique 3D city models that combines GIS capabilities with collaborative tools. This software makes it possible to import, prepare, and analyse several data sources in a single step, before displaying the final 3D city model in real time.
- *3D City Planner* is a comprehensive platform for urban design, development, and real estate planning. It can be used to design, analyse, and optimize cityscapes, simulate future developments, and understand the impact of projects in real-time. 3D Cityplanner empowers planners and designers to make data-driven decisions with ease and precision, which is of special importance for both creation of new urban neighborhoods as well as for improving the existing ones.
- *Point Cloud* is a technology for three-dimensional urban space modeling and analysis. Point clouds are collections of large number of tiny points, where each one is representing a precise location in 3D space. In relation to POS planning/design, it can be used for variety of purposes. For example, the Point Cloud technology enables accurate measurement of distances between buildings and nearby public spaces, providing insight into their accessibility. Based on this data, it is possible to analyze which residential zones have adequate connectivity to open spaces and which are spatially isolated. It also allows for developing design solutions based on accurate landscape situation.
- *Sketchup* is an intuitive, effective 3D design software tool for visualizing buildings, neighborhoods, and cities. It allows users to sketch 3-dimensional forms quickly and accurately, ranging from basic forms, such as tree houses, to complex, energy-efficient structures.
- *Rhinoceros* is primarily used for 3D modelling, but it also has 2D drafting capabilities. Its comprehensive set of tools (transform tools, points and curves choices, floor choices, and mesh instruments) enable users to create any sort of surface.
- *Grasshopper* is a visual programming environment tightly integrated with Rhino's 3D modelling tools. It is a parametric modelling tool which, via a visual programming interface (that runs inside Rhino), allows the dragging and placement of components onto a canvas. It uses variety of plug-ins to help support environmental design and modelling.



BLOCK E. ENVIRONMENTAL AND SOCIAL SYSTEM BEHAVIOUR AND PERFORMANCE - ASSESSMENT and SIMULATION TOOLS

Assessment of the existing or proposed built and open spaces of multifamily housing refers to identifying how they affect environmental and social systems behaviour and performance. These tools help establish the relation between POS characteristics and environmental and social systems, and can be used to test different design options and development scenarios in relation to: pedestrian flow and/or gathering, recreational use, microclimate and environmental performances, green space and ecosystem services, water management, environmental risks.





Tool	Description	Illustration
Microclimate and environmental performance assessment and simulation tools	<p>Microclimate and environmental performance assessment and simulation tools are used to establish a link between the POS characteristics with key microclimate factors at different spatial scales. In POS planning and design key software tools are:</p> <ul style="list-style-type: none"> • <i>ENVI-met</i> is a microclimate modelling program that analyses the influence of green areas on temperature, humidity and air quality in urban areas. • <i>Urban Weather Generator (UWG)</i> is a software for simulating climate conditions in urban environments, specifically related to the effects of green roofs and vegetation on thermal conditions. 	
Green spaces and ecosystem services assessment and modelling tools	<p>Green spaces and ecosystem services assessment and modelling tools are used to establish link between specific residential POS characteristics with key benefits green spaces may provide to both people and nature. In POS planning and design key software tools are:</p> <ul style="list-style-type: none"> • <i>Biodiversity Impact Assessment (BIA)</i> is a tool for assessing the impact of urban development on biodiversity, which helps in the planning and implementation of NBS in order to increase biological diversity. • <i>i-Tree</i> is a software for quantifying the benefits and values of trees in urban spaces. It helps analyse the ecological services provided by trees and other plant elements in urban environments, including pollution reduction, temperature regulation and carbon dioxide absorption. • <i>InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs)</i> is a software that allows designers to quantify and evaluate the ecological services provided by different types of green spaces in urban areas. • <i>ARIES (Artificial Intelligence for Ecosystem Services)</i> is an AI-based tool for analysing and mapping ecosystem services in urban environments. 	

<p>Sustainable Urban Drainage Systems (SUDS) tools</p>	<p>Sustainable Urban Drainage Systems (SUDS) are approaches to manage surface water that take account of water quantity (flooding), water quality (pollution), biodiversity (wildlife and plants), and amenity. As a part of POS system, they can contribute to the sustainable development, as well as to the quality of life and the overall neighborhood environmental quality. In POS planning and design key software tools are:</p> <ul style="list-style-type: none"> • SWMM (Storm Water Management Model) is a software for simulating stormwater behaviour in urban areas. It is used for designing and analysing SUDS systems. • XPSWMM is an extended version of SWMM that includes advanced features for simulating water quality and stream behaviour. • SUSI (Sustainable Urban Stormwater Infrastructure) is a software tool for planning sustainable stormwater management systems. 	
<p>Permeable surface and infiltration systems planning and design tools</p>	<p>Permeable surface and infiltration systems planning and design tools are used to simulate behaviour, quantify and evaluate benefits from applying the specific POS planning/design solution. In POS planning and design key software tools are:</p> <ul style="list-style-type: none"> • Pavement Drainage Simulator (PDS) is a tool that helps designers in planning and simulating permeable surfaces for urban areas. • Hydraflow Storm Sewers is a software for modelling drainage systems, including permeable surfaces and other aspects of stormwater management. 	
<p>Green roofs and green walls planning and design tools</p>	<p>Green roofs and green walls design tools are used to analyse and evaluate performances and benefits from urban greenery of the specific POS planning/design solution or scenario. In POS planning and design key software tools are:</p> <ul style="list-style-type: none"> • <i>Green Roof Benefits Calculator</i> - uses the IGNITION nature-based solutions evidence base and open-source cost data to provide a high-level estimate of the potential benefits from adding a green roof. It also estimates the potential benefits to the building owner and users, and society as a whole, such as improved air quality, reduced heat stress, rainwater storage and carbon sequestration. • <i>Green Roof Performance Calculator (GRPC)</i> is a tool for analysing and evaluating the performance of green roofs, including their ability to absorb water, reduce heat and improve air quality. • <i>Vegetated Roof Calculator</i> is a green roof design and analysis software that allows designers to select appropriate types of vegetation for specific climate conditions. 	

<p>Mobility simulation and assessment tools</p>	<p>Mobility behaviour of residents is directly linked to the health and functionality of the neighborhood, and it is directly influenced by the way POS elements and communication channels are planned and designed at system and detailed level. In POS planning and design key software tools are:</p> <ul style="list-style-type: none"> • <i>Urbano</i> is an urban design tool for mobility modelling and simulation in Rhinoceros and Grasshopper. This allows users to create contextual models that may be used for a variety of purposes, from simple visualization and site study to comprehensive mobility simulations with loaded street grids. It supports topography and lets one create site models with 3D terrain, buildings, and streets with a single click. This urban design tool was created to make it easier to establish walkable neighborhoods. • <i>Streetmix</i> is an online interactive street design platform that connects people with a creative and competent workforce to swiftly create cityscape designs. Streetmix is being created and intended for use by urban planners, governmental and commercial organizations, as well as bicycle and foot traffic users, to make cities more accessible to everyone. 	
<p>Use and behaviour models and simulation tools</p>	<p>Behaviour simulation refers to the replication of various modes of pedestrian activities within a spatial environment by using simulation models to facilitate the exploration of behaviour patterns. Use and behaviour simulation tools are used to assess the quality of POS in relation to their <i>functionality and sociability</i>. These tools help planners and designers gain better understanding of urban built environments. They enable planners and designers as well as decision-makers to anticipate potential issues in the future and address early challenges in urban development and design. Use, movement and dynamic accessibility models can provide neighborhood planners with the evaluation of the social consequences of their designs, meet the requirements of new residents moving into the neighborhoods, and elevate the quality of life (QoL) for existing residents. Besides Space Syntax, a variety of behavioural models and simulation tools maybe used in POS planning and design, such as Multi-agent system model, Social Force Model, Activity-based models and others.</p>	
<p>Environmental risks assessment and planning tools</p>	<p>Environmental risks assessment and planning tools are used to help planners and designers calculate and evaluate resilience of the POS neighborhood system in relation to diversity of environmental risks. For example, <i>Urban Footprint</i> analyses demographic, economic, and environmental datasets to inform planning decisions. The <i>Resilient Decision Intelligence Platform</i> assesses risk and makes data-driven decisions with the most powerful urban, climate, and community resilience decision intelligence platform.</p>	

BLOCK F. REGULATORY TOOLS for neighborhood and POS development

Space regulation at neighborhood or singular location level refers to defining areas, characteristics and rules for specific built structures and public open spaces. Assuming that the POS quality depends on its relationship with built structures as well as with other open spaces, it is necessary to view the neighborhood as system and provide its regulation accordingly.

Tool	Description	Illustration
<p>Rules of arrangement</p>	<p>Rules of arrangement in planning documents provide norms and standards to regulate how specific locations are designed, materialized and equipped in relation to surrounding places. At the strategic or conceptual POS design level, different rules for permanent or temporary arrangement or equipment of specific areas may be defined.</p>	
<p>Building rules</p>	<p>Establishing building rules ensures high-quality spaces, and in cases of fragmented land ownership, defines internal building lines, as well as distinguishes spaces for building tenants from those designated for public use. At strategic or conceptual POS design level, different rules for permanent or temporary built structures in specific areas may be defined.</p>	
<p>Land use zoning</p>	<p>Land use zoning in planning documents is a method and tool used by the government to classify parcels of land and regulate the physical development or use of certain parcels of land. At strategic or conceptual POS design level functional zoning can be used as a tool to guide how certain area would be used and equipped for that purpose.</p>	
<p>Performance zoning</p>	<p>Performance zoning adjusts permitted development to reflect site conditions and potential neighborhood impacts. In performance zoning, natural features are identified, mapped and protected from development, (such as existing POS) so that the remaining areas can then be developed at a density permitted by the zoning ordinance. Performance zoning regulations may prescribe mandatory POS provision as part of commercial facilities within large housing areas/zones/ neighborhoods.</p>	

<p>Design code</p>	<p>Design code refers to template and rules of placement and design detail for lot, building and open space design.</p>	
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BLOCK G. ASSESSMENT and EVALUATION TOOLS

Assessment and evaluation tools are used to analyse and evaluate the existing or proposed POS characteristics and to compare the alternative solutions in a way that facilitates decision-making on the future development of the multifamily housing area. Evaluation is based on a previously defined vision for neighborhood area development and criteria and indicators for quality assessment. The purpose of using these tools is to identify the benefits and to measure the level of urban design proposal that fits the key quality criteria. In the context of participatory planning at the neighborhood level, it is assumed that local communities and different stakeholders may favour different design alternatives in relation to their specific interest, and the role of the planner is to mediate public participation.

Tool	Description	Illustration
<p>POS quality assessment tools (checklist, index, diagram)</p>	<p>Varieties of POS quality assessment tools exist in the form of diagrams, indexes and check-lists that are based on specific POS quality model criteria. A checklist is an assessment tool that lists the specific criteria for the different aspects of social and environmental quality of the neighborhood, which individual POS should demonstrate. Checklists usually feature statements or questions about the POS environment's performance of each criterion. The checklist supports collaborative planning approach and encourages different stakeholders to work together to address the quality of life or environmental quality impacts of plans and design proposals. Checklists can be used by planners, designers or developers, to screen and scope the social and environmental impacts of development proposals or to help identify and address the impacts of plans and development proposals. They can also be used by neighborhood forums, community groups, housing associations or residents to assess their neighborhood POS or to comment on major planning applications, and in this way, help foster community engagement. In current POS planning and design key assessment tools are:</p>	





- “Place diagram tool” (PPS) – Project for Public Spaces suggests that to be successful, POS generally share the following four qualities: they are accessible; people are engaged in activities there; the space is comfortable and has a good image; and finally, it is a sociable place: one where people meet each other and take people when they come to visit. PPS developed The Place Diagram as a tool to help people in judging any place, good or bad.
<https://www.pps.org/article/grplacefeat>
- “The Site-specific Assessment” (UN-Habitat) – “Consists of a series of activities and tools to understand the quality of public spaces and influence, through a participatory process, the design of the site. The assessment focuses on a selected open public space and its five minutes walking radius (equivalent to 400-meter distance) referred in the document as the ‘walkable radius’. The guideline supports the user on how to gather the right data and what information is needed within the selected area in order to come up with adequate design and planning solutions”.
<https://unhabitat.org/public-space-site-specific-assessment-guidelines-to-achieve-quality-public-spaces-at-neighborhood>
- “The Place standard tool” (NHS Scotland and Architecture Design Scotland) – “Provides a simple framework to structure conversations about place”. It allows residents to think about the physical elements of a place (such as buildings, spaces, and mobility and transport links) as well as the social aspects. The tool allows POS planning and design stakeholders to consider all the elements of a place in a methodical way. This tool pinpoints the assets of a place as well as areas where a place could improve.
<https://www.ourplace.scot/tool>
- “Great public space toolkit” (NSW) – This tool can assist in evaluating what is working well and what could be improved in neighborhoods’ public spaces. The tool takes people through a series of questions to analyse the quality of a public space or transport hub precinct. Results from completed evaluations will add to evidence base and can be used to inform future planning, design and investment and to improve public spaces for everyone. They can help inform place planning, project scoping and briefs, grant applications or document changes in a public space over time as a before and after survey.
<https://www.movementandplace.nsw.gov.au/design-principles/guides-and-tools/great-public-spaces-toolkit>
- “Twelve Quality Criteria” (Gehl studio) – This tool is developed to research how public spaces are experienced by their users, and is structured around three themes: protection, comfort and enjoyment. Participants survey the selected public space and assess whether it lives up to the criteria for inviting people to come and stay. A three-point scale is usually used for POS assessment.
https://issuu.com/gehlarchitects/docs/twelve-quality-criteria_gehl



<p>SWOT analysis tool</p>	<p>SWOT analysis is a technique used with a purpose to identify strengths, weaknesses, opportunities, and threats of the public space and its walkable radius. It assesses internal and external factors as well as current and future potential and is designed to facilitate a realistic, fact-based, data-driven look at the strengths and weaknesses of the specific POS project proposal/intervention. An element or a feature of the public space may increase or limit its quality, acting as an internal or external force. A component is classified under one of these categories depending on its positive/negative and internal/external connotations.</p>	
<p>Multicriteria analysis</p>	<p>Multi-criteria analysis (MCA) is an approach to assess complex issues and projects. In POS planning/design process it can be used to determine overall preferences among alternative options, where the options may accomplish several objectives. MCA provides techniques for comparing and ranking different outcomes of POS proposals, based on a variety of indicators. Therefore, in order to perform MCA, it is necessary to specify desirable objectives and to identify corresponding attributes or indicators. The measurement of indicators is based on the quantitative analysis (through scoring, ranking and weighting) of a wide range of qualitative impact categories and criteria. Different environmental and social indicators may be specified, along with economic costs and benefits. Key MCA output may be: a single most preferred option, ranked options, short list of options for further appraisal, or characterization of acceptable or unacceptable possibilities.</p>	
<p>Better Evaluation Rainbow Framework</p>	<p>“Better Evaluation Rainbow Framework” is a planning tool that can be used to plan an evaluation or to locate information about particular types of POS development or design options. It organises options into 34 different evaluation tasks, grouped by 7 colour-coded clusters to make it easier to choose and use appropriate methods, strategies or processes. The model for making choice should be agreed upon among all stakeholders at the very beginning of the participatory evaluation process. Procedure includes 7 main phases: (a) MANAGE an evaluation or evaluation system, (b) DEFINE what is to be evaluated, (c) FRAME the boundaries of an evaluation, (d) DESCRIBE activities, outcomes, impacts and context, (e) UNDERSTAND CAUSES of outcomes and impacts, (f) SYNTHESISE data from one or more evaluations, (g) REPORT AND SUPPORT USE of findings.</p>	




BLOCK H. PLANNING AND DESIGN COLLABORATION TOOLS





A collaboration tool helps people in POS planning or design process to communicate, discuss and exchange knowledge and ideas, as well as to co-create, present and rearrange planning and design proposals during POS (re)creation process. Designing a public space involves collaboration between different professions and dialogue with multiple actors, such as clients, authorities, contractors, and users. Different tools and technologies can help planners and designers engage and involve stakeholders throughout the design process, from ideation to implementation.



Tool	Description	Illustration
Online platforms	Online platforms, such as websites, blogs, and social media, can be used to share design progress and updates, and invite comments and suggestions.	
Online meetings, webinars, and workshops	Online meetings, webinars, and workshops can be organised on-line or in vivo to facilitate communication and coordination among team members and partners. These tools can help to build trust and consensus among stakeholders, and foster a sense of ownership and belonging in public space.	
Interactive tools	Interactive tools, such as digital games, apps, and kiosks, can be used to encourage participation and co-creation in POS design.	
Cloud-based platforms	Cloud-based platforms enable real-time collaboration with other team members during the planning and design phase, and beyond.	

STAKEHOLDERS-ORIENTED TOOLS

Table 17. Stakeholders-oriented tools - Education/Information and Citizen engagement tool


Education/Information Tools		
Tool	Description	Illustration
Community Meeting	Information and education tools are essential for building awareness, capacity, and engagement among stakeholders involved in the planning, design, and implementation of public open space in residential areas. These tools facilitate knowledge transfer, promote best practices, and empower residents, professionals, and decision-makers to make informed choices, while aligning POS projects with community needs, policy frameworks, and sustainable development goals. Community Meetings of the housing associations can serve as a powerful tool for informing and educating residents on innovative solutions, thus facilitating the implementation of POS in residential neighborhoods. These gatherings enable residents to actively participate in the planning, design and management processes, ensuring that the resulting spaces reflect the community's needs and preferences.	
Quality Standards	Quality Standards for implementing POS in residential neighborhoods are tools that provide measurable benchmarks for urban planners, developers, and municipalities to ensure that open spaces are not only available but also accessible, functional, and beneficial to community well-being. These standards are often integrated into local planning policies and development guidelines to ensure consistent implementation across neighborhoods.	
Digital Platform	Digital Platforms serve as educational tools, information repositories, and knowledge hubs to facilitate the implementation of POS in residential neighborhoods and promote innovative solutions. Digital platforms' knowledge hubs effectively integrate specific resources and tools, providing urban practitioners with a tailored content to improve their knowledge and skills. European digital platforms that support POS implementation involve Portico Platform Knowledge Hub, Capacity4dev Platform Urban Knowledge Hub, and JPI Urban Europe Knowledge Hub. In Serbia, RePOS digital platform serves for educating stakeholders, disseminating information, and fostering collaboration for POS implementation.	

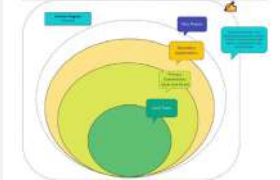



<p>Urban Design Framework</p>	<p>An Urban Design Framework (UDF) is a strategic planning document that outlines the vision, principles, and guidelines for the physical development of urban areas, integrating various aspects such as land use, transportation, public spaces, and urban form to create cohesive and sustainable environments. In the planning, design and implementation of POS within residential neighborhoods, UDF guides future growth, provides comprehensive guidelines, facilitates stakeholder engagement, and enables informed decision-making, thereby ensuring community well-being.</p>	
<p>Guidebook</p>	<p>Guidebooks serve as instructional tools that offer an overview and general guidance on a subject, often to familiarize users with concepts, policies, or environments. In urban planning and design of POS, guidebooks provide overarching strategies, principles, and best practices. They are instrumental during the initial stages of project development, offering insights into policy frameworks, community engagement, and sustainable design principles.</p>	
<p>Manual</p>	<p>Manuals serve as instructional tools that provide detailed, step-by-step instructions on how to operate a product, system, or perform specific tasks. In urban planning and design of POS, manuals translate concepts into actionable plans, by providing detailed, task-specific instructions for the implementation of POS projects. They are essential during the execution phase, offering technical specifications, design standards, and maintenance procedures.</p>	
<p>POS Typology</p>	<p>POS Typology serves as a multifaceted educational and informational tool in urban planning, design and implementation of POS. Spatial POS Typology, used in residential neighborhood planning and design, is a classification system that categorizes POS based on spatial characteristics such as size, function, accessibility, and relationship to surrounding urban fabric. Management POS Typology is instrumental for implementing POS in residential neighborhoods, and classifies POS based on management-related attributes such as ownership and governance, maintenance responsibilities, funding mechanisms and community engagement.</p>	





Dissemination Material	Dissemination Materials are effective tools for raising awareness, educating residents, and fostering community engagement concerning POS in residential neighborhoods. They include a variety of documents such as posters, brochures, flyers, catalogues, and newsletters. Dissemination Materials bridge the gap between planners and the community, fostering a collaborative environment for urban development.	
Email Notifications	Email Notifications from the local government body to Housing Associations on planned activities can effectively serve as an education and information tool for implementing public open space in the residential neighborhood. Email Notifications are a practical and low-cost tool, which helps to raise awareness, build understanding, and foster readiness for deeper civic participation in POS planning and implementation. They disseminate relevant information about planned activities and decisions related to POS, enabling the residents to stay informed through regular updates. They may include explanations of POS concepts and links to guidebooks, planning documents, or digital platforms.	



Citizen Engagement Tools


Citizen engagement tools are methods used to actively involve communities in planning and decision-making, when providing public open spaces in residential neighborhoods. These tools support inclusive participation by enabling residents to share insights, express needs, and contribute ideas, and help to build a shared understanding between stakeholders. By fostering collaboration, these tools ensure that planning, design and use of POS reflect community priorities.





Tool	Description	Illustration
Participatory Planning Framework	Participatory Planning Framework is a structured approach that actively involves community members in the planning, design, and implementation of public open spaces, and emphasizes collaboration between residents, planners, local authorities, and other stakeholders. The framework provides a long-term process for involving stakeholders, and is used for guiding participation. The tool encompasses clearly defined protocols for participatory planning, involving timelines for community engagement, mandatory participatory methods such as workshops, focus groups, public debates, and e-participation, as well as mechanisms for collecting and integrating feedback after implementation.	



Stakeholders' Mapping	<p>Stakeholders' Mapping is a tool used to identify, analyse, and strategically involve all relevant actors in the planning and implementation of public open space in residential areas (e.g., residents, housing associations, local authorities, developers, NGOs). This tool generates a graphic representation of the social and institutional structure of the context in which the planning and design processes takes place, to help the team define how to engage with each stakeholder, and define actors that guide the process. It helps ensure inclusive participation, clarify roles and responsibilities, and supports effective collaboration by recognizing each stakeholder's interests and influence in the project.</p>	
Participatory Appraisal	<p>Participatory Appraisal in urban planning and design refers to a set of interactive methods and techniques used to actively involve community members in analyzing their own living conditions, identifying issues, and proposing solutions for urban development. This participation approach gains a rapid, in-depth understanding of a community by using visual techniques, models, ranking, discussions, mapping or community inventory, and is facilitated by trained experts. It is useful for diagnosing problems and informing plans. In planning public open space in residential areas, the tool is useful for allowing local residents and stakeholders to share and record the key aspects of their life.</p>	
Survey	<p>Survey is a systematic way of determining the views and opinions of a large number of people on a particular topic by using structured questions or a standardised questionnaire. Survey tools are used to get statistical information from and by the community about their perception and opinion of the specific POS and the whole neighborhood POS system. Tools for this activity include defining a representative sample, forming a questionnaire and consent form and, in case of digital survey, using on-line platforms (e.g., Google Forms, SurveyMonkey, Typeform). Digital surveys are particularly effective for engaging a large number of people. Besides initial place assessment, survey for can also be used for post-occupancy analysis.</p>	
Interview	<p>Interviews are used to gather data about specific aspects of the site that require specific expertise or knowledge from selected people. Interviews are based on selection of people to be interviewed, and conducted through open-ended, close-ended or mixed questionnaires with structured questions that include consent form. Plan, recording and documentation on conducting interview are tools for delivering this activity properly.</p>	

<p>Community Planning Forum</p>	<p>Community Planning Forums are tools for two-way citizens' participation and joint dialogue, where planners, stakeholders, and citizens can discuss about or comment on planning projects. Forums enable informal dialogue and encourage mutual understanding between different stakeholders in the process of plan development and implementation. They can be organized in-person or online. When implementing POS in residential neighborhoods, Community Planning Forum supports citizen engagement through open dialogue, local input from residents, and collaborative decision-making, thus becoming a valuable tool for building trust.</p>	
<p>Community Workshop</p>	<p>Community Workshop is a closed, in-person meeting involving small groups of stakeholders who collaborate on a specific task or problem. It is a two-way participation tool used at various stages of the planning process to identify conflicts, guide future actions, and produce visible results through collective input. In the context of public open space implementation, workshops support collaborative planning and design, allowing citizens, planners, and other stakeholders to exchange ideas and co-create solutions. They can be thematically focused or address broader topics.</p>	
<p>E-participation Platform</p>	<p>E-participation Platforms are tools for two-way participation that allow local governments, planners, and developers to engage with residents online throughout various stages of POS implementation, from planning and design to feedback and monitoring. In the creation and improvement of POS in residential contexts, this tool for engaging citizens facilitates the collaborative planning/design processes, and ensures the space meets the needs of residents, especially in diverse and multi-generational communities. E-participation Platforms are <i>strategic approaches to digital spatial participation</i>, such as CitizenLab and GIS-based platforms PPGIS and PGIS.</p> <ul style="list-style-type: none"> • CitizenLab (now GoVocal) is an e-participation platform for two-way communication through which governments can connect with citizens to generate ideas for solving public problems or to seek their input for decision-making. • Public Participation GIS (PPGIS) is a tool that uses GIS technology to help the general public (everyday citizens) get involved in government planning, policy-making, and community decision-making, thus gaining a broad public input. • Participatory GIS (PGIS) is a citizens' involvement and empowerment tool that focuses on marginalized groups. 	 

<p>Participatory Mapping Platform</p>	<p>Participatory Mapping Platforms are tools used to conduct participatory mapping or spatial engagement, which allow local residents to mark important points in their communities on maps, create and share maps with information and suggestions from the community. They are <i>technical tools</i> or software platforms that support development strategies, such as Maptionnaire, ArcGIS Online, Google My Maps, or OpenStreetMap.</p> <ul style="list-style-type: none"> • Maptionnaire is an easy-to-use citizen engagement PPGIS platform that enables city planners to easily collect local insights and make GIS-backed decisions for creating liveable spaces. • ArcGIS Online is a cloud-based mapping and analysis solution, which combines the power of GIS with interactive public input, and is used to make maps, analyse data, and share and collaborate. • Google My Maps is a web-based mapping tool by Google that allows users to collaboratively create, share, and annotate maps, and is often used to create custom maps to embed in projects. • OpenStreetMap is an editable map of the whole world that is being built by volunteers and released with an open-content license. 	
<p>Participatory Discussion Platform</p>	<p>Participatory Discussion Platforms allow citizens to discuss, propose solutions, and vote on the best ideas. These platforms can be especially useful for wider online participation, such as Pol.is and MindMixer.</p> <ul style="list-style-type: none"> • Pol.is is a real-time system for gathering, analyzing and understanding what large groups of people think in their own words, enabled by advanced statistics and machine learning. • MindMixer is a virtual town hall for community engagement, where participants can learn, engage, and contribute feedback at their convenience. 	
<p>Participatory Budgeting Platform</p>	<p>Participatory Budgeting Platform tool allows citizens to participate in decision-making regarding budgets for various projects in their community. Citizens can propose projects, and then vote on which projects will be funded. Such platforms include Balancing Act or Decidim.</p> <ul style="list-style-type: none"> • Balancing Act is an easy-to-use online tool for citizens to learn about public budgets and the decisions that public officials must make while creating them. Platform is designed to engage citizens in the financial decision-making processes of local governments. • Decidim is Barcelona's first digital democracy tool, where citizens can participate in municipality budgeting. 	




Round Table	<p>Round tables are in-person, two-way participation tools that bring together residents, professionals, and public authorities to discuss issues and seek mutually agreed solutions. They promote equal dialogue among stakeholders and are especially useful when implementing plans or projects that require collaboration between the public, private, and civil sectors.</p>	
Focus Group	<p>Focus Group in participatory planning is a small, structured discussion with a carefully selected group of participants, aimed at gathering in-depth opinions, perceptions, and ideas about a specific issue, project, or policy related to urban or community development. Smaller groups of residents (with different social and demographic characteristics) can be invited to participate in discussions on specific issues, such as the need for new public open spaces or specific ecological measures.</p>	
Public Consultation	<p>Public consultation is a two-way citizen engagement tool, conducted in-person or online, that involves gathering opinions from a target group on a particular topic. It is a structured and often formalized process where policymakers or planners present proposals and collect feedback before making final decisions. Public consultations can address both general and specific issues, depending on the goals of the initiative. In residential developments, public consultation ensures that new or redeveloped public open spaces reflect the needs, values, and priorities of the local community.</p>	
Public Insight	<p>Public insight is a tool of the formal participation procedure in the planning process that allows the public to review and comment on concept and draft plans. It ensures transparency, legitimacy, and helps resolve conflicts by inviting meaningful feedback. By making planning documents and proposals accessible, it enables citizens to understand, respond, and contribute to improving urban plans and projects.</p>	
Open Space Technology	<p>Open Space Technology (OST) is a participatory planning technique that provides a space for discussion and creative learning between people. OST promotes active discussion to address the concerns and problems shared in a local community, allowing participants to determine the topics they will discuss. Participants freely gather around topics that interest them most, and everyone has the opportunity to contribute through presentations and discussions. This is a flexible tool that allows for spontaneous formation of topics and grouping of participants based on interests, and is particularly effective in managing complex and potentially conflicting situations.</p>	






<p>World Café</p>	<p>World Café is a citizen engagement method that supports collective thinking and collaborative learning. In this approach, participants rotate among tables, discussing specific topics, sharing insights, and building upon previous conversations. It encourages the generation of new ideas, the expansion of perspectives, and the co-creation of solutions. In urban planning, the method helps stakeholders exchange knowledge and experiences, build trust, and reach consensus on community priorities. The informal, café-style setting fosters open dialogue and participatory decision-making.</p>	
<p>Crowdsensing Mobile Application</p>	<p>Crowdsensing Mobile Application is a means of collecting people’s surrounding information via mobile sensing devices. In residential neighborhoods, it serves as one-way citizen participation tool that enables residents to contribute data and observations about their environment, without necessarily engaging in direct dialogue with decision-makers. Such applications include StreetComplete, Mobile Citizen and SeeClickFix.</p> <ul style="list-style-type: none"> • StreetComplete is a crowdsensing app that allows users to add information about streets and surroundings, such as missing pedestrian crossings or inadequate street-level infrastructure. • Mobile Citizen is a mobile application that enables citizens to report on a problem in their community, such as potholes, graffiti, leaking water hydrants, etc. The request can contain photos, GPS coordinates, the address of a problem and comments. • SeeClickFix is a mobile application that allows residents to report non-emergency neighborhood issues, such as illegal dumping or damaged public space amenities. Municipalities use the collected data to identify maintenance needs and improve public space conditions. 	 
<p>Exhibition Panels</p>	<p>Exhibition Panel is a visual tool for two-way participation that enables residents to view, understand, and comment on proposed plans and projects in the community. It can be organized in-person or in a virtual format. Beyond informing, exhibition panels encourage all stakeholders to engage with the planning/design process. Interactive digital platforms such as Social Pinpoint or CoUrbanize allow plans/projects to be posted online.</p> <ul style="list-style-type: none"> • Social Pinpoint is a digital platform that facilitates meaningful and accessible engagement opportunities that bring a community together. • CoUrbanize provides a platform for urban developers to facilitate community engagement outside of public meetings in an accessible way. 	

Urban Games	<p>Urban Games allow participants to simulate planning processes and make decisions on urban issues in a virtual environment. Citizens can experiment with different scenarios through the game and see how various decisions impact their community. One such tool is UrbanSim, an advanced urban simulation and 3D visualization platform that uses open data to help users explore, gain insights into, and develop and evaluate alternative plans to improve their communities. It models the interactions between land use, transportation, the economy, and the environment to support better decision-making for building better cities.</p>	
Street Audit	<p>Street Audits is a community-based assessment of an area's pedestrian safety, accessibility, and comfort. Citizens walk through neighborhoods to identify issues like poor infrastructure, unsafe streets, or lack of pedestrian paths. The process focuses on elements such as wheelchair access, green spaces, and safe walking or biking routes, helping to inform urban planning and improve public safety and accessibility.</p>	

IMPLEMENTATION TOOLS





Table 18. Implementation tools - Institutional/Legislative, Financial/Investment, and Economic Tools





Institutional/Legislative Tools		
Institutional and legislative tools provide a structured framework for the planning, provision, and management of public open spaces in residential neighborhoods, helping to secure land for public use. These tools ensure that POS is integrated into urban development through legal mandates, strategic planning, and collaborative mechanisms, while securing that POS meets regulatory standards, aligns with broader urban planning goals, and reflects local needs.		
Tool	Description	Illustration
City Ordinance	City Ordinance is a tool that regulates the management and community-led maintenance of POS through provisions in local laws. City Ordinances, such as on Communal Order or on Maintenance of POSs and Green Infrastructure, enable shared maintenance responsibility and arrange the lease of POS segments. City Ordinance can prescribe that either citizens maintain GI themselves, or Public Utility Company/private company maintains them for a fee.	
Building Permit	Building Permits can serve as a crucial control tool to ensure that new residential developments include POS. Cities and municipalities can condition the approval of building permits on developers providing a specific amount or percentage of POS, based on local planning regulations or zoning laws. They can require developers to dedicate land within or near the site for public use, or pay a fee-in-lieu of land, used by the city to fund the acquisition or improvement of POS elsewhere.	
Neighborhood Plan	Neighborhood Plan is an effective tool for the detailed planning of POS at the neighborhood level, enabling communities to shape the development and enhance public spaces to meet local needs and aspirations. Neighborhood Plans are aligned with the strategic and general urban plans, but focus on specific parts of a city to implement strategic projects or detailed interventions, particularly in areas of urban extension, regeneration, or densification. Such plans involve detail planning of greening, landscaping, furnishing, paving, etc.	

Concept Plan	<p>Concept Plan is a preliminary planning tool that outlines the general vision for developing a site or area. It is often used to illustrate proposals at various scales, from street and open space development projects to city-wide or regional initiatives. Concept plans are particularly useful at the beginning of a project and during community consultations, as they help stakeholders visualize potential developments before more detailed plans are created. It is a valuable tool for integrating POS and green spaces from the earliest planning stages.</p>	
Plan of General Regulation of Green Areas System	<p>Plan of General Regulation of Green Areas System is a strategic urban planning tool used to systematically integrate POS into residential neighborhoods. It provides a comprehensive framework for the development, management, and preservation of green spaces within urban areas, by strategically allocating green areas, integrating green spaces with urban infrastructure, incorporating ecological and social considerations, and establishing regulatory framework.</p>	
Public Competition	<p>Public competitions are an effective tool for planning and design of POS that is of particular importance to the city. By inviting architects, urban planners, and designers to submit proposals, municipalities can harness innovative ideas that enhance community engagement, environmental sustainability, and urban liveability.</p>	
Land Readjustment	<p>Land readjustment is a tool for rational use and arrangement of construction land that transforms existing cadastral plots in the area into construction plots, along with resolving the property-legal relations that arise in this process. In multi-family residential developments, land readjustment can be used to obtain POS by pooling land parcels from multiple owners, reconfiguring them into a more efficient layout, and allocating a portion of the readjusted land for public use in line with POS typology. Each owner receives a smaller but more valuable plot, while the community benefits from shared POS.</p>	
Privately Owned Public Spaces (POPS)	<p>Privately Owned Public Spaces are areas that are owned and maintained by developers or property owners, but are legally required to be open and accessible to the public. Although provided by private actors, POPS are actually hybrid spaces and a form of co-production: while the market is responsible for funding, providing, and maintaining POPS, the government determines the public's right to access and establishes regulations for the use of space. POPS is particularly a convenient instrument to provide POS in densely built-up areas, typically provided in exchange for zoning incentives.</p>	

Financial/Investment Tools




Financial/investment tools for providing public open space in residential contexts refer to strategies and mechanisms for collecting, allocating, and directing financial resources from both public and private sources toward the development, maintenance, and enhancement of POS. These tools involve direct financial contributions rather than indirect market influences, and provide predictable and accountable funding streams that are crucial for ensuring POS implementation.



Tool	Description	Illustration
Employment Subsidies	Subsidies for employment of local residents in urban agriculture within POSs are financial incentives provided by local governments or organizations to encourage the hiring of local people to work in urban farming projects situated in parks, vacant lots, or community gardens. These subsidies aim to create jobs for low-income residents, promote local food production, activate underused public spaces, and strengthen social ties and local economies.	
Developer Compensation	Developer Compensation tool is used when developers cannot provide the required POS within their own development site. Instead, one of the following arrangements is made: (1) the developer is required to transfer part of another land parcel (off-site) to public ownership for use as open space, or (2) the developer pays a financial equivalent (compensation fee, or “payment in lieu” fee) to the city, which is then used by the municipality to acquire, develop, or maintain POS elsewhere.	
Direct Purchase or Redemption of Land	Direct Purchase or Redemption of Land refers to when a government or public authority buys private land through negotiation or compulsory acquisition, for the purpose of creating public spaces and amenities. This is a convenient instrument to provide public space in new residential developments planned in larger areas/zones.	
Development Impact Fee	Development Impact Fee is a tool that obliges developers to pay a fee, set by local governments, to cover all or part of the costs of providing public spaces and facilities for new or proposed developments. The local government charges a fee based on the expected impact of the development (e.g., number of housing units or floor area).	

<p>Environmental Tax</p>	<p>Environmental Tax is prescribed for residential land use for property owners, as well as entrepreneurs and companies operating in that residential neighborhood, which is then used for POS development and arrangement, thus promoting sustainable urban development.</p>	
<p>Land Leasing</p>	<p>Land Leasing is a financial tool that can be used by municipalities to support the implementation and maintenance of public open spaces in residential neighborhoods by leveraging the increased land value resulting from public infrastructure and urban development. It involves granting long-term or fixed-term use rights to publicly owned land through lease agreements. In return, lessees (typically private companies or housing associations) provide periodic payments or rent to the municipality. These revenues can be directly reinvested into the provision of nearby POS, ensuring that the benefits of land value appreciation are redistributed for community use.</p>	
<p>European Union (EU) Funds</p>	<p>The European Union provides several funding instruments designed to support the development of POS in residential areas, through projects focused on sustainability, social inclusion, urban regeneration, and community well-being.</p> <p>(1) European Regional Development Fund (ERDF) – Main fund for urban infrastructure and regeneration; (2) European Social Fund Plus (ESF+) – Focuses on social inclusion and local employment; (3) European Urban Initiative (EUI) – Main purpose is to test and scale innovative solutions to urban challenges; (4) LIFE Programme - EU’s fund for environment and climate action; (5) Horizon Europe (Mission: Climate-Neutral and Smart Cities) – Research and innovation funding; (6) Interreg (European Territorial Cooperation) – Cross-border cooperation among regions.</p>	
<p>Neighborhood Improvement Districts (NIDs)</p>	<p>Neighborhood Improvement Districts are a self-taxing funding mechanism for a limited period of time whereby property owners within a defined geographic area agree to levy an additional fee (often via a special assessment), and dedicate the collected funds to improving and maintaining POS, amenities, and services within that area, supplementing what is provided by the local government. Property owners within the proposed area vote to establish a NID, after which the local government formally approves it.</p>	

Economic Tools

Economic tools for providing public open space in residential contexts refer to mechanisms that influence market behaviour and stakeholder decisions through financial means rather than direct regulation. These tools aim to encourage or facilitate the development, maintenance, and accessibility of public open spaces in urban areas by altering cost-benefit dynamics for developers, municipalities, or property owners.

Tool	Description	Illustration
User Fee Waivers or Reduction	Municipalities reduce or waive utility fees and service charges for residents, such as local administrative tax in the area of communal services and utilities, or prescribe exemption from real estate taxes. These funds are then allocated for POS arrangement.	
Tax Incentives for Business	Reduction of income tax, exemption from VAT, or exemption from local environmental tax are tools that enable socially responsible companies and entrepreneurs to contribute to POS arrangement, and that encourage investors to develop POS and green infrastructure.	
Zoning Incentive Programs	Zoning Incentive Programs are a broad category of tools that offer developers various benefits or relaxations (e.g. increased floor area ratio, increased building height, reduced parking requirements, or flexible land use rules) in exchange for public benefits, such as POS, affordable housing and cultural or community facilities. A frequently used type of zoning incentives are density bonuses, which provide developers and property owners incentives to include public amenities such as streets or parks in their development plans, in exchange for additional floor area.	

<p>Transfer of Development Rights</p>	<p>Transfer of development rights is a tool that allows property owners in specific areas to sell the development rights from their land (<i>sending area</i>) for use on a different site (<i>receiving area</i>) where higher development densities are acceptable. The sending site is then preserved as open space, often repurposed as POS. The funds generated from these transactions are used to compensate owners in sending areas for the reduced property value resulting from lower permitted densities.</p>	
<p>Preliminary Financial Plan Template</p>	<p>Preliminary Financial Plan Template is an effective tool for POS implementation that aids in aligning funding sources, stakeholder responsibilities, and long-term maintenance strategies, and is applied especially during the early planning and decision-making stages. A financial plan may include: (1) capital costs (land, design, permits, materials, labour), (2) operational costs (maintenance, staff, waste management), (3) revenue sources (taxes, fees, public-private partnerships), (4) funding gaps and mitigation strategies, and (5) timeline and phasing of investments.</p>	

LIST OF ABBREVIATIONS

AI	Artificial Intelligence	P	Parking
AR	Augmented Reality	PDR	Plan of Detailed Regulation
ARIES	Artificial Intelligence for Ecosystem Services	PDS	Pavement Drainage Simulator
BIA	Biodiversity Impact Assessment	PGIS	Participatory GIS
BO	Building-oriented POS	PGR	Plan of General Regulation
C	Common POS	PLA	Participatory Learning and Action
CAD	Computer-aided Design	PM	Pedestrian Movement
DIF	Development Impact Fees	POPS	Privately Owned Public Spaces
DS	Digital Solutions	POS	Public Open Space
DUP	Detailed Urban Plan	PPGIS	Public Participation GIS
EU	European Union	PPP	Public Private Partnerships
G	Greenery–nature space	PST	Place Syntax Tool
GIS	Geographic Information System	P3DM	Participatory 3D Modelling
GPS	Global Positioning System	QoL	Quality of Life
GRPC	Green Roof Performance Calculator	S	Traffic
GUP	General Urban Plan	SCS	Socio-Cultural Solutions
InVEST	Integrated Valuation of Ecosystem Services and Tradeoffs	SuDS	Sustainable Drainage Systems
IoT	Internet of Things	SUSI	Sustainable Urban Stormwater Infrastructure
IUCN	International Union for Conservation of Nature	SWMM	Storm Water Management Model
MCA	Multi-criteria Analysis	SWOT	Strength, Weaknesses, Opportunities, Threats
MFS	Multifunctionality solutions	TDR	Transfer of Development Rights
MS	Management Solutions	UDF	Urban Design Framework
N	Neighborhood POS	UHI	Urban Heat Island
NbS	Nature-based Solutions	UN	United Nations
NIDs	Neighborhood Improvement Districts	UP	Urban Project
NPM	New Public Management	UWG	Urban Weather Generator
OST	Open Space Technology	VC	Value Capture
		VR	Virtual Reality

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SOURCE OF ILLUSTRATIONS IN THE CHAPTER URBAN PLANNING AND DESIGN TOOLSET FOR (RE)CREATING PUBLIC OPEN SPACE

Table 16. Planning and Design Process Tools

BLOCK A. DESK RESEARCH TOOLS – secondary data

Datasets and databases

<https://experience.arcgis.com/experience/1552081c2b1741fbb38a6725da80a010/page/London's-Landscape/>

Google Earth

<https://cesium.com/blog/2022/10/04/uzuflycreates-ultra-high-def-city-scale-3d-modelscesium/>

Internet, news and social media, and AI-based tools

<https://medium.com/aino-world/introducingthe-aino-ai-plugin-for-qgis-enhancing-spatialdata-analysis-8cf3b9e66da1>

BLOCK B. FIELD RESEARCH TOOLS – primary data

Observation tools

<https://www.repos-project.rs/news/reposteam-members-doing-research-on-the-fieldwithin-the-housing-estate-on-the-zoran-%C4%91in%C4%91i%C4%87-boulevard-inni%C5%A1>

Survey tools

<https://www.brighton-hove.gov.uk/librariesleisure-and-arts/parks-and-greenspaces/future-our-parks-and-open-spaces>

Interviews

<https://landezine.com/nature-based-climateadaptation-wins-scandinavia-biggestarchitecture-award/>

Exploratory walks

<https://urbinat.eu/articles/2075/>

BLOCK C. MAPPING and SPATIAL ANALYSIS TOOLS

GIS-based tools

<https://www.repos-project.rs/maps>

Space Syntax tools

<https://spacesyntaxopenmapping.netlify.app/#10/55.9496/-3.2561>

Specialised mapping tools

https://www.researchgate.net/publication/225639295_An_Exploratory_Cartographic_Visualisation_of_London_through_the_Google_Maps_API

BLOCK D. DRAWING, 3D MODELING, and VISUALISATION TOOLS

CAD - tools

<https://www.aecbytes.com/feature/2024/GraphisoftInnovate2024.html>

Visualisation and Rendering tools

<https://czwg.com/projects/residential-andmixed-use/oaklands>

3D modelling tools

<https://rhinolands.com/project/bioclimate-regeneration-project-in-haidari-greece/>

BLOCK E. ENVIRONMENTAL AND SOCIAL SYSTEM BEHAVIOUR AND PERFORMANCE - ASSESSMENT and SIMULATION TOOLS

Microclimate and environmental performance assessment and simulation tools

<https://solarlits.com/jd/6-42>

Green spaces and ecosystem services assessment and modelling tools

<https://solarlits.com/jd/6-42>

Sustainable Urban Drainage Systems (SUDS) tools

https://19january2021snapshot.epa.gov/sites/static/files/201902/documents/epaswmm5_1_manual_master_8-2-15.pdf

Permeable surface and infiltration systems planning and design tools

<https://www.sciencedirect.com/science/article/abs/pii/S0301479717309441>

Green roofs and green walls planning and design tools

<https://ignitiongreenroofbenefitscalculator.greatermanchester-ca.gov.uk/default.chtml>

Mobility simulation and assessment tools

https://www.researchgate.net/publication/325538685_Urbano-_A_New_Tool_to_Promote_MobilityAware_Urban_Design_Active_Transportation_Modeling_and_Access_Analysis_for_Amenities_and_Public_Transport

Use and behaviour models and simulation tools

https://www.goudappel.nl/sites/default/files/2024-11/cvs_214_nederlands_loopstromenmodel_inzicht_in_en_be%C3%AFnvloed_en_van_voetgangersstromen.pdf

Environmental risks assessment and planning tools

<https://urbanfootprint.com/>

BLOCK F. REGULATORY TOOLS for neighborhood and POS development

Rules of arrangement

<https://blog.urbanfile.org/2021/11/08/milanoarredo-urbano-finalmente-il-manuale-per-lospazio-pubblico/>

Building rules

https://www.stadtplanungsamtfrankfurt.de/bauweise_und_berbaubare_grundst_cksfl_che_5765.html?psid=v3ufqqkqfp7pimsn0v99dqrvo5

Land use zoning

<https://www.beoland.com/gup-beogradac.html>

Performance zoning

<https://climateadapt.eea.europa.eu/en/metadata/casestudies/berlin-biotope-area-factor-2013-implementation-of-guidelines-helping-tocontrol-temperature-and-runoff>

Design code

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1083852/NMDC_M_E_final_report_v5.pdf

BLOCK G. ASSESSMENT and EVALUATION TOOLS

POS quality assessment tools (check-list, index, diagram)

<https://www.ourplace.scot/>

SWOT analysis tool

<https://medium.com/digital-blue-foam/futureproof-neighborhoods-gpt-powered-swotanalysis-for-urban-design-planning-6ff7b361b3d4>

Multicriteria analysis

<https://repository.corp.at/647/>

Better Evaluation Rainbow Framework

<https://www.betterevaluation.org/sites/default/files/Rainbow%2520Framework.pdf>

BLOCK H. PLANNING AND DESIGN COLLABORATION TOOLS

Online platforms

<https://decide.madrid.es/>

Online meetings, webinars, and workshops

<https://interreg-danube.eu/projects/beready/news/over-100-participants-from-13-countries-discussed-solutions-to-counteracturban-heat-islands>

Interactive tools

<https://fixmystreet.bristol.gov.uk/reports/Bristol?zoom=4&lat=51.46154&lon=-2.55695>

Cloud-based platforms

<https://www.proofhub.com/articles/cloudbased-project-management-software>

Table 17. Stakeholders-oriented tools - Education/Information and Citizen engagement tool

Education/Information Tools

Community Meeting

<https://theconversation.com/how-madrids-residents-are-using-open-source-urban-planning-to-create-shared-spaces-and-build-democracy-79717>

Quality Standards

<https://www.camden.gov.uk/documents/20142/4823269/Public+open+space+CPG+Jan+2021.pdf/Obaca4c3-1aef-1b03-248fec47d7a73c92?t=1611580573399>

Digital Platform

<https://portico.urban-initiative.eu/urbanstories/european-urban-initiative/rejuvenate-city-approaching-neb-through-placemaking-burgas>

Urban Design Framework

<https://www.brighton-hove.gov.uk/sites/default/files/2021-07/UDF%20SPD%20high%20res%20Jun%2021%20%281%29.pdf>

Guidebook

<https://unhabitat.org/global-public-space-toolkit-from-global-principles-to-local-policies-and-practice>

Manual

https://www.epa.gov/sites/default/files/2021-04/documents/green_streets_design_manual_feb_2021_web_res_small_508.pdf

POS Typology

<https://www.repos-project.rs/pdf/postypology.pdf>

Dissemination Material

https://propolab.f-as.pl/wp-content/uploads/2018/08/broszura_propolab_wroclaw_2018.pdf

Email Notifications

<https://budideoplana.rs/>

Citizen Engagement Tools

Participatory Planning Framework

https://www.uclg-cisd.org/sites/default/files/Freiburg_2010_en_final.pdf

Stakeholders' Mapping

https://gogreenroutes.eu/fileadmin/user_upload/Resources/GoGreenRoutes_D3_2_Stakeholder_mapping_report.pdf

Participatory Appraisal

https://humancities.eu/wp-content/uploads/2019/03/02_challenging_city_scale_interior_screen.pdf

Survey

<https://www.brighton-hove.gov.uk/libraries-leisure-and-arts/parks-and-greenspaces/future-our-parks-and-open-spaces>

Interview

<https://landezine.com/nature-based-climate-adaptation-wins-scandinavia-biggest-architecture-award/>

Community Planning Forum

<https://eaststreetarts.org.uk/article/mlgb-neighborhood-forum-a-new-era/>

Community Workshop

<https://www.cike.sk/en/workshop-urbanspace-mapping-and-common-planning-with-zuzana-tabackova/>

E-participation Platform

<https://www.mdpi.com/2220-9964/10/9/581>

<https://www.govocal.com/casestudies/copenhagen-proposals-12000-residents-participate>

Participatory Mapping Platform

<https://www.maptionnaire.com/>

<https://www.mdpi.com/2220-9964/8/6/253>

Participatory Discussion Platform

<https://compdemocracy.org/Casestudies/2022-Austria-Klimarat/>

Participatory Budgeting Platform

<https://participedia.net/case/decidimparticipatory-budgeting-in-barcelona>

Round Table

<https://www.ppag.at/round-table-at-theaedes-architecture-forum/>

Focus Group

https://www.architektur.tudarmstadt.de/urbandesign/udp/udp_news_de/tails_106624.en.jsp

Public Consultation

<https://southleedslife.com/public-consultationon-residential-district-of-aire-park/>

Public Insight

<https://www.planningforreal.org.uk/projects/maidstone-borough-council-creating-a-neighborhood-action-plan-for-park-wood/>

Open Space Technology

<https://www.hft-stuttgart.com/research/news/dialogforum-region-stuttgartzukunftsstadt>

World Café

<https://www.flickr.com/photos/worldcafeeurope/albums/72157657879406929/>

Crowdsensing Mobile Application

<https://street-complete.en.aptoide.com/app>

<https://jcitytimes.com/the-sidewalksee-clickfix-couldnt-fix-a-personal-history/>

Exhibition Panels

<https://www.courbanize.com/casestudies/how-a-suburban-mall-redevelopmentovercame-political-opposition>

Urban Games

<https://www.urbansim.com/405-sherbourne>

Street Audit

<https://www.transport.gov.scot/publication/community-street-audit-evaluation-evaluatingsixteen-community-street-and-school-routeaudits-across-scotland-final-road-safetyreport/>

Table 18. Implementation tools - Institutional/Legislative, Financial/Investment, and Economic Tools

Institutional/Legislative Tools

City Ordinance

<https://comune-info.net/scuoleaperte/praticare-linfracordinario/>

Building Permit

<https://zuidas.nl/en/theme/public-space/>

Neighborhood Plan

<https://westminster.moderngov.co.uk/documents/s47839/Appendix%20%20-%20Pimlico%20Neighborhood%20Plan%20Regulation%2016.pdf>

Concept Plan

<https://iprpraha.cz/assets/files/files/581addabac7fb2722667f1a3dfca1a9f.pdf>

Plan of General Regulation of Green Areas System

<https://xdn.tf.rs/2021/04/10/1004pokrivalice-45-blok5-830x0.jpg>

Public Competition

<https://www.theurbanist.org/2023/04/13/copenhagens-superkilen-a-model-for-culturallydiverse-public-spaces>

Land Readjustment

https://urbanitarian.com/masterplans_post?id=399

Privately Owned Public Spaces (POPS)

<https://www.hamburg-tourism.de/sehenerleben/hamburg-maritim/ueberseequartier/>

Financial/Investment Tools

Employment Subsidies

<https://www.uia-initiative.eu/en/uiacities/milan>

Developer Compensation

<https://www.across-magazine.com/lovtmunich-district-development-in-munichswerksviertel/>

Direct Purchase or Redemption of Land

<https://www.gabarcelona.com/blog/superblocks/>

Development Impact Fee

<https://www.batiactu.com/edito/zac-clichybatignolles---le-projet-devoile-aux-riv-33174.php>

Environmental Tax

<https://www.risa-hamburg.de/projekte/projekte-detailansicht/trabrennbahn-farmsen>

Land Leasing

<https://www.city-guide-stockholm.com/en/experiences-to-live/rest-andrelaxation/article-tantolunden-parkimmersion-in-the-heart-of-stockholm-sallotment-gardens-7.html>

European Union (EU) Funds

<https://link.springer.com/article/10.1007/s10901-021-09864-7>

Neighborhood Improvement Districts (NIDs)

<https://doi.org/10.1080/17535069.2016.1212087>

Economic Tools

User Fee Waivers or Reduction

<https://oppla.eu/casestudy/28829>

Tax Incentives for Business

<https://una.city/nbs/hamburg/green-roofshamburg>

Zoning Incentive Programs

<https://www.neighborhoodguidelines.org/quality-program-malmo-sweden>

Transfer of Development Rights

<https://www.tandfonline.com/doi/full/10.1080/14649357.2023.2239215>

Preliminary Financial Plan Template

<https://ebbsfleetgardencity.org.uk/governance>

CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

711.4/.7(035)

712.25(035)

GUIDEBOOK: Urban planning and design directive for residential public open space : deliverable 2.4. / prepared by RePOS Team. - Niš : University of Niš, Faculty of Civil Engineering and Architecture, 2025 (Beograd : Donat Graf). - 163 str. : ilustr. ; 17 x 24 cm

Nasl. izvornika: Водич за урбанистичко планирање и пројектовање јавног отвореног простора у стамбеним подручјима. - Na vrhu nasl. str.: Project:Reclaiming Public Open Space in Residential Areas: Shifting Planning Paradigms and Design Perspectives for a Resilient Urban Future - RePOS. - Tiraž 10. - List of abbreviations: str. 153. - Bibliografija: str. 154-157.

ISBN 978-86-82810-08-7

а) Градови - Просторно планирање б) Јавни простори – Урбанистичко планирање

COBISS.SR-ID 176129801