



06.05 Availability of Public, Near-residential Green Spaces

Overview

Densely built-up urban space is characterised by high structural exploitation of land and a low proportion of open space. In the inner city and in the densely built-up outskirts, only few open spaces are available for recreational purposes in green surroundings. The large near-urban recreational areas are located on the outskirts of town or further outside the city, and many recreation-seekers have to cover longer distances to reach them.

Especially within the densely built-up areas, **public green spaces** offer regeneration and physical/emotional adjustment, a place for leisure activities and sports. They thus assume an important role for the recreation of the people (cf. BMUB 2017, p. 15: "Green and open spaces must fulfil a wide range of overlapping uses and cope with different use intensities").

Varying requirements with regard to attainability, size, equipment and design, in accordance with the different recreational needs should be met.

For instance, the maximum acceptable length of time for reaching a green space on foot is 15 minutes. Good attainability of a green space is an important criterion for open-space leisure for less mobile sections of the population, such as senior citizens or children. Furthermore, the accessibility of green spaces on foot is intended indirectly to reduce motorised traffic.

This analysis predominantly considers the recreational qualities of near-residential green spaces, which is reflected in the evaluation of the "availability of green space". At the same time, however, we may assume that green spaces provide further secondary benefits over and above their recreational qualities. The availability of near-residential green space therefore also plays an important role in balancing the climate, creating a pleasant residential atmosphere and experiencing urban biodiversity. The demands of recreation seekers on the **size** of a green space and the multiplicity of its **equipment and design** increase with the length of time spent there. Thus, larger parks with an abundant array of use possibilities are much frequented on weekends. For instance, groups with children prefer non-regulated park areas, such as open green spaces, while senior citizens tend to prefer more orderly, generously equipped areas.

Regarding the existing situation, a distinction is made between near-residential and near-development green spaces, which are assigned to an open space category depending on area size.

The type **near-residential** open space is associated with the immediate residential area, its intake area being limited to 500 m. It can be reached in a short time (approx. 5-10 min. by foot), and with slight effort, and serves predominantly for short-term and after-work recreation. Because of its proximity to housing, this type of open space has a particular significance for less mobile sections of the population, such as children, senior citizens and handicapped persons. Near-residential green spaces are also of high value for employed persons, who can use their free time for a short stay outdoors. As a rule, green spaces of small size (as little as 0.5 ha) suffice for the demands of short-term and after-work recreation.

The type **near-development** open space, which includes all green spaces of over 10 ha, is also designed to serve the need for half-day and all-day recreation. Higher demands are associated with it, both in terms of size and of equipment diversity. Near-development green spaces of more than 50 ha in addition assume the function of superior-quality open spaces with multi-borough significance for the recreation of the Berlin population (e.g. the Großer Tiergarten, Volkspark Wuhlheide). The intake area of near-development open spaces ranges from 1,000 to 1,500 m, depending on the size of the facility. Fundamentally, a near-development open space should always also fulfil the function of a near-residential open space (cf. Tab. 1 for the breakdown).

In Berlin, the analysis of the **availability** of open spaces to the population is based on the following standard values:

- near-residential open space: 6 m² per inhabitant (m²/inh.),
- near-development open space: 7 m²/inh.

Tab. 1: Breakdown of the Berlin Open and Green Spaces			
Type of open space	Near-residential open space	Near-development open space	
Minimum size	0.5 ha	10 ha (neighborhood park)	50 ha (borough park)
Guideline	6 m ² / inh.	7 m ² / inh.	7 m ² / inh.
Intake area	500 m	1,000 m	1,500 m

Tab. 1: Breakdown of the Berlin open and green spaces

In ascertaining the availability of near-residential public green spaces, those facilities were considered usable which meet the respective minimum requirements with regard to area size, area shape, accessibility and noise/air pollution (cf. Methodology).

The degree of availability (in m²/inh.) in a residential area is calculated on the basis of spatially-defined intake areas, and derived from the size of the facility in relation to the number of inhabitants in the intake area. Residential areas outside the defined intake areas are considered as basically non-provided.

The **construction structure of the residential buildings** constitutes a further criterion for the evaluation of open space availability (cf. Methodology). If deficits exist in the availability of public green spaces, it can be assumed that private/ semi-public open space will compensate in part for the need for public areas. In fact, the availability of open spaces in single-family-dwelling developments with private yards is better than in densely-inhabited pre-WWII apartments. In block developments of the Wilhelminian period, there is very little possibility for a sojourn in private open space, since that is limited to the courtyard. The building structure is thus an indicator for the available share for private open space and/or need for public open space. Only a combination of the calculated degree of availability and the existing building structure provides a differentiated picture of the actual situation.

The quality of the equipment of a green space was not considered in the availability analysis. The number of users and the type of user groups the facility can satisfy, mainly depends on the equipment. In areas with poor availability of green space, increased pressure is generated upon available facilities, which often involves major impairment of the quality of the public space, and limitation upon the usefulness of such green spaces.

Statistical Base

The information on the availability of near-residential public green spaces was ascertained with the aid of a GIS-based procedure of the Senate Department for the Environment, Transport and Climate Protection, under which the following digitally available basic information is used and processed as described below:

- [Population Density](#) (Environmental Atlas 06.06, 2018)
- [Traffic Volumes](#) (Environmental Atlas 07.01, 2014)
- [Inventory of Green and Open Spaces](#) (Environmental Atlas 06.02, 2015)
- [Urban Structure / Urban Structure – Area Types Differentiated](#) (Environmental Atlas 06.07 / 06.08, 2015)
- [Green-Space Information System \(GRIS\)](#), (WFS) retrieved on October 12, 2020
- Kompensationsflächenkataster aus Kompensationsinformationssystem (KIS) [Cadastre of compensation areas from the compensation information system], as of 2020
- [LOR \(lebensweltlich orientierte Räume, Bezirksregionen und Planungsräume\)](#) [LEA, living environment areas, boroughs and planning areas, only in German], as of 2019.

The basis for the analysis of the stock of green space is provided by the entirety of green spaces in the area of the city with recreational qualities. Information on **size and location** of each green space is taken from the Green-Space Information System -as of December 31, 2019 (retrieved on October 12, 2020), as well as the cadastre of compensation areas. The **number of inhabitants** (as of December 31, 2018) of the blocks and block segment areas (Environmental Atlas Map Population Density 06.06, 2018) were used in order to be able to ascertain the availability of green space for the city's population.

The information on the respective **building structure types** of the residential blocks is based on the Map Urban Structure (06.07, 2015) and Urban Structure – Area Types Differentiated (06.08, 2015).

For further data analysis, the living environment areas, boroughs and planning areas (as of 2019) are used as spatial units.

Methodology

The **analysis of the stock of green space** covered all green spaces in the area of the city with recreational qualities.

This analysis includes the green spaces and playgrounds presented in the Green-Space Information System (GRIS). It also involves both green spaces created as part of compensatory measures, such as the Rudow-Altglienicke landscape park, and areas maintained by Grün Berlin GmbH, such as the Britzer Garten and the Gärten der Welt in Marzahn. The grounds of the “Prussian Palaces and Gardens Foundation Berlin-Brandenburg”, such as the Schlosspark Charlottenburg are part of this, too. Berlin’s forest areas (open space type within the meaning of [Urban Structure, Map 06.08](#)) are also relevant in this context, as they provide at least some of the qualities that near-residential green spaces offer.

The Botanischer Garten, Zoologischer Garten and Tierpark Friedrichsfelde are not included in this availability analysis, as they are neither freely accessible public green spaces, nor are they public green spaces with affordable entrance fees.

The following criteria were used to ascertain green spaces with recreational qualities:

Area size

Facilities for **near-residential recreation** must have a minimum size of 0.5 ha, to make type-specific use possible. For green spaces bisected by streets, the resulting segments are considered only if one of them is larger than 0.5 ha. However, smaller areas can also be included, provided that they directly border on other green spaces, and are thus located in the context of the green network structure.

Moreover, it is assumed that green spaces, which are greater than 10 ha and are assigned to the “**near-development**” category are needed and visited by residents living nearby, in the manner of near-residential use. Therefore, for the purposes of this analysis, these larger facilities have also been assigned intake areas, and calculated accordingly.

Accessibility

Unhindered accessibility to the green space must be guaranteed. **Obstacles** include railway lines, large bodies of water, and motorways.

Environmental stresses

Noise pollution and air pollution diminish the recreational value of spending time outside. Since detailed measurements and/or prepared data regarding the air quality in green spaces was not available at the time of compilation, the pollution factor is limited here to the element of traffic noise.

For green and open spaces, German Industrial Standard (DIN) 18005, 5.87, Sound Protection and Urban Development for Urban Development Planning, specifies a limit of 55 dB (A). With free acoustic propagation, this limit can be reached on a city street with a speed limit of 50 km/h even at a vehicle load of 2,000 motor vehicles per day. Main thoroughfares are, as a rule, burdened with far more than 10,000 motor vehicles per day (cf. [Environmental Atlas Map Traffic Volumes, 07.01, 2014](#)). This corresponds to a noise pollution of more than 60 dB (A), and frequently more than 70 dB (A). Patchy vegetation in green spaces provides no noise buffer. A reduction of the noise can be ascertained solely at increasing distance from the source of the noise. Due to the location of many green spaces on heavily travelled streets, a large number must be considered heavily noise-polluted, and would therefore be classified as unsuitable for recreation. As a minimum requirement, it was stipulated that at least a part of the open space had to be unaffected by major environmental stresses. This criterion was further specified to indicate that an open space on a heavily-travelled street, with a noise level of more than 70 dB (A), would only be classed as suitable for recreation if it had a minimum depth of 100 m from the street, or a minimum size of more than 1 ha. Minimum size and/or depth should guarantee that a visit to the open space would be possible at a distance from the street.

Ascertainment of Intake Areas

Each green space with recreational qualities is assigned an intake area because Berlin's standard values for the "availability of green space" define a combination of area size (m²/inh.) and accessibility (max 500m). The intake areas must be characterised by residential use (population threshold: 10 inh./ha). Green spaces in the neighbouring State of Brandenburg are not taken into account. For smaller facilities, the centre is chosen as the point of origin of the radius; for larger spaces, the entrance area was used (approx. 100 m inside the open space). The intake area calculated for near-residential green space, for a distance of between 300 and a maximum of 500 m around that green space, only takes complete blocks and block segments into account.

Since the accessibility of a green space can be reduced by existing barriers, these will be addressed next. Barriers include e.g. rivers and canals, railroad lines, airports and motorways. If such barriers exist around a green space, the intake area is corrected.

Forest areas are also assigned an intake area because it is assumed that the edges of forests can to some extent assume the functions of a near-residential open space. Inhabited blocks in an intake area of 500 m from forest areas are categorised as having green space available in the city of Berlin.

Recreational use of agricultural areas is possible only to a limited degree, and only in some parts of the area; however, in the Berlin portion of the Barnim region, the areas accessible by footpath are included in the assessment. For this recreational area, the agricultural segments, including fields, meadows and pastures, are part of the park landscape.

Calculation of the Degree of Availability

According to the standard value or benchmark applicable in Berlin, the availability of public green spaces to the population at a level of 6 m² or more of near-residential open space per inhabitant is considered sufficient. In a quantitative analysis step, the green space available in the respective intake area (in m²) is expressed in relation to the number of inhabitants in the area. The resulting ratio (m² of green space per inhabitant) provides information on the public green space available per person for the intake area in question. This value (m² of green space per inhabitant) is then categorised into four levels: good availability (standard value is met), reduced availability (standard value is met by 50 per cent and more), poor availability (standard value is met by less than 50 per cent) and no availability (less than 0.1 m² per inhabitant) (cf. Landschaftsprogramm Artenschutzprogramm – Begründung und Erläuterung [Landscape programme protection of species programme – explanation and commentary], SenStadtUm 2016, p.91).

For the calculation, all blocks are included in which more than ten inhabitants live per hectare. This so-called **population threshold** is established for the planning process to ensure that the automated analysis also considers the population living in areas with structure types with predominantly commercial, services, trades and industry, and those with "other uses", without however including individuals, those living in industrial areas for caretaking or security purposes. In this way, more inhabited blocks can be included, especially in inner-city locations with key metropolitan use types, or mixed-use areas (cf. Figure 2).

Provision with Private Green Space

Private and semi-public areas can compensate for a lack of public green space. For this reason, the structure of residential buildings is used to determine the overall availability of green space: it is an indicator for the supply of private open spaces. Single-family housing developments, for example, have yards. In the block edge development of the Wilhelminian period, on the other hand, it is difficult to spend time in semi-private green spaces, other than in courtyards or on balconies. In order to ascertain not only the availability of public green areas to the population, but also that of **private green/ open space**, the urban structure recorded in the Environmental Atlas (cf. Statistical Base) was divided into three structure type categories, each assigned different proportions of private open space (high – medium – low, cf. map legend). Examples of these respective types include single-family home areas, areas with row-house developments, and in contrast to these, the inner city residential blocks of the Wilhelminian period.

Deduction of the Housing Type

The building structure is examined as an indicator for the available share of private open space. Areas with different building structures, but with comparable shares of private/semi-public open spaces, are lumped together, and classified into three categories (cf. Fig. 1):

- **Extremely slight share of private/ semi-public open spaces**
This involves predominantly areas of closed block development (before 1918), including all preservation-oriented reconstructed blocks integrated into this building structure. In addition, core and mixed areas are counted in this category.
- **Slight to medium share of private/ semi-public open spaces**
All building structures which display large quadrangles or strips of green space (development from the '20s and '30s and/or from the '50s and '60s), and the large estates with generous green spaces between the buildings belong to this category. Furthermore, the redeveloped apartment blocks of the '60s and beyond also include closed block development which was decored completely, and thus has larger open spaces. The compact, high-rise developments of the '90s are also included here.
- **Medium to high share of private/ semi-public open spaces**
This category includes all open development (for instance single-family or row-house development), and also the low density single-family housing developments of the '90s. to a large extent, the buildings have their own gardens, so that the share of private green space is very high.

Housing Types Based on Shares of Private/ Semi-Public Green Spaces

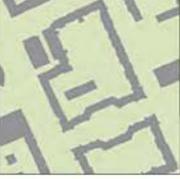
	Closed block developments (before 1918), including integrated blocks with preservation-oriented rehabilitation	Extremely slight share of private/ semi-public open spaces
	Core areas	
	Mixed areas	
	20 th century free row developments with large green quadrangles	Slight to medium share of private/ semi-public open spaces
	De-cored blocks of redevelopment areas and compact, high-rise developments of the '90s	
	Large estates with generous green spaces between the buildings	
	Single-family housing developments and low-density residential developments of the '90s	Medium to high share of private/ semi-public open spaces
	Row-house developments and low-density residential developments of the '90s	

Fig. 1: Examples of various building structure types

In relation to the 16 urban structure types, defined by the Environmental Atlas (cf. Statistical Base), the three categories shown in Figure 2 are then divided into the structure types with predominantly residential use, those with predominantly retail, service, commercial and industrial use, and those with other uses.

Structure Types with Predominantly Residential Use			Share of private or semi-public open spaces
	1	Wilhelminian-period block development with wings and rear buildings (until 1918)	low
	2	Wilhelminian-period block-edge development with few wings and rear buildings	
	3	Wilhelminian-period block-edge development with major changes	
	4	Block-edge and row development of the 1920s and 1930s	medium
	5	Row development since the 1950s	
	6	Postwar high-rise development	
	8	Residential development of the 1990s and later	
	10	Low buildings with yards	high
	11	Villa development with park-like gardens	
	12	Development with yards and semi-private greening	
	13	Village-like development	
Structure Types with Predominantly Retail, Service, Commercial and Industrial Use			Threshold value: 10 inh./ha
	14	Development with predominantly retail and service use	low
	15	Sparse development with predominantly commercial and industrial use	
	16	Dense development with predominantly commercial and industrial use	
Structure Types with Other Uses			medium
	17	Development with predominantly public and special use, construction site or non-street traffic area	
	18	Public facility and special-use area with sparse or no development; green and open space	
	100	Body of water	high

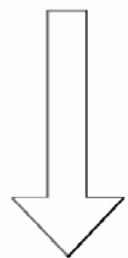


Fig. 2: Shares of private and semi-public open space within the urban structure types from the Environmental Atlas (cf. Statistical Base)

Map Description

The map displays the green spaces, forests and residential areas. Depending on the availability of public green spaces and the local share of private or semi-public open spaces within blocks/block segment areas, a total of 12 colour classes are distinguished (cf. matrix in the legend, Fig. 3). The range extends from the combination of “good availability of public green spaces and a high share of private or semi-public open spaces” to the combination of “no availability of public green spaces and a low share of private or semi-public open spaces”.

Tab. 2: Availability of near-residential green spaces in 2020, by borough

Borough	Berlin Population	Inh. not included < 10 inh./ha	Inh. with good availability	Inh. with reduced availability	Inh. with poor availability	Inh. without availability	Misc. effective green space [m ²]	Share of inh. without availability
Mitte	383,454	1,027	59,693	76,328	106,815	139,591	5,072,420	37%
Friedrichshain-Kreuzberg	289,120	356	28,344	93,767	52,994	113,659	1,682,131	39%
Pankow	406,937	4,216	139,961	58,995	80,355	123,410	5,106,297	31%

Charlottenburg-Wilmersdorf	341,327	1,699	62,393	49,126	103,982	124,127	3,129,329	37%
Spandau	243,080	1,900	180,353	27,853	15,923	17,051	5,553,564	7%
Steglitz-Zehlendorf	308,077	2,071	211,463	15,964	39,087	39,492	3,384,963	13%
Tempelhof-Schöneberg	351,429	1,413	106,239	58,903	96,120	88,754	5,196,724	25%
Neukölln	330,783	1,028	117,118	61,818	65,902	84,917	3,799,258	26%
Treptow-Köpenick	269,678	3,158	168,734	43,259	32,713	21,814	4,556,804	8%
Marzahn-Hellersdorf	268,732	954	212,240	30,681	21,568	3,289	6,728,166	1%
Lichtenberg	290,493	1,481	146,056	62,205	55,442	25,309	6,483,859	9%
Reinickendorf	264,826	1,575	137,567	45,443	56,150	24,091	4,690,386	9%
Berlin	3,747,936	20,878	1,570,161	624,342	727,051	805,504	55,383,901	22%

Tab. 2: Availability of green spaces with recreational qualities, by borough (referring to the respective planning areas (PLR)), Source: VAG Report 2020 *gesamstädtische Versorgungsanalyse Grünflächen [Availability analysis for the urban availability of green spaces]*

The table shows the populations of the boroughs of Berlin as used for the calculation process; their total populations; the number of residents not considered, i.e., in the blocks with population numbers below the threshold of 10 inh./ha. The remaining columns distinguish between the four degrees of availability ranging from “with good availability” to “without availability” and the inhabitants that fall into these categories (cf. Calculation of the Degree of Availability). “Inhabitants without availability” refers to those people, who, according to the availability analysis, do not have access to suitable and public green space close to their homes.

Inner City Areas

The map shows the detailed situation of availability of green space, by block. As is to be expected, an especially poor situation exists with respect of the availability of green space in the **inner city areas** with block development from the Wilhelminian period.

Generally, closed block development prevails in these inner city neighbourhoods. Core areas characterized by a low level of private and/or semi-public open spaces also have high structural density. In these areas, serious **open-space deficits** exist, both in the private and in the public sector.

In the inner city, small green spaces isolated from one another prevail. They are often designed as city squares, and can thus come nowhere near to covering the need for near-residential green space caused by high population density.

Outlying Boroughs

In the **outlying boroughs**, the situation is generally **better**. The available green spaces are frequently large; in some cases, forest areas are directly adjacent to residential areas. Due to the less dense development structure, the population density is considerably lower.

As a rule, the level of private green space is relatively high in the outlying boroughs, because of the prevailing single-family and/or row house development, so that deficits in public open space are partially compensated.

The situation is different for the **major residential estates** at the **outskirts** of the city, which are characterized by tower high-rises or chains of high-rises. While in Marzahn and Hellersdorf, the open areas of the Wuhle valley and the Hönow chain of ponds largely provide availability of green space, considerable deficits exist in the Märkisches Viertel and Gropiusstadt areas. The shortage of public green spaces there means that an undersupply exists, despite large residential courtyards and connections to the Lübars Recreational Park and the Rudow Grove, respectively.

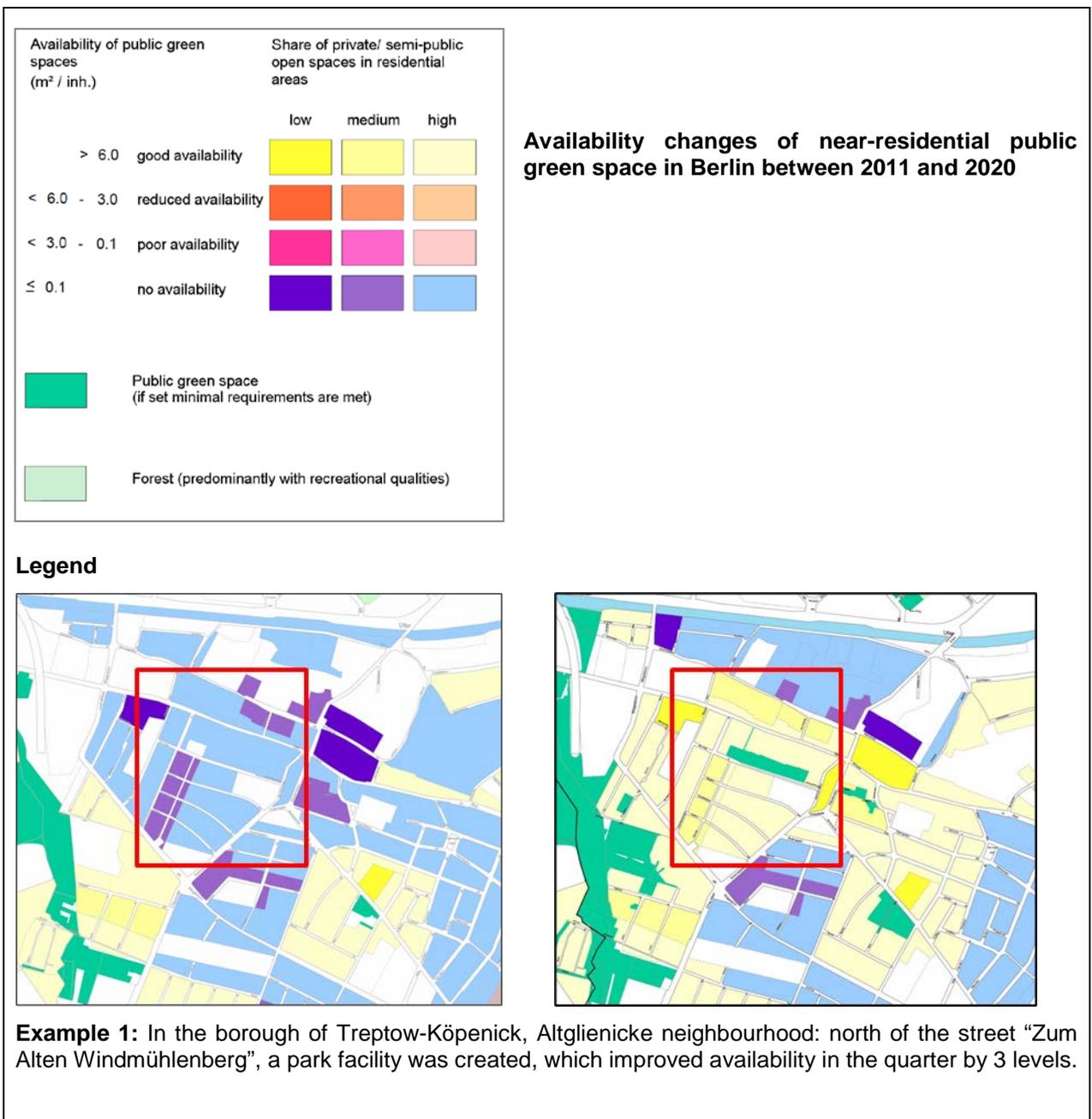
Availability development between 2011 and 2020

Berlin’s population is growing; since 2010 this has led to a significant increase in its number of inhabitants by around 380,000. On December 31, 2020, Berlin had some 3,769,000 inhabitants. Berlin’s population, however, has not been growing evenly across the individual boroughs. Increases rather vary between more than 50,000 additional inhabitants in Mitte or Pankow as compared to about 17,000 in Steglitz-Zehlendorf (Statistical Office of Berlin-Brandenburg 2020).

If these new inhabitants are not provided with access to newly built parks as part of compensatory measures, the availability of near-residential public green spaces in the boroughs decreases to a some extent. Densification measures within blocks also reduce the share of private and semi-public open spaces in residential areas.

To avoid misinterpreting the data, one needs to be careful, however, when comparing the availability analyses across different periods of time and when drawing conclusions regarding the improvement or deterioration of the availability. This is necessary primarily because there are differences in the datasets the analyses draw on. For example, the digitised green space data fluctuates somewhat in regards to space and time, without any “actual” change having occurred, i.e. without a perceptible actual loss or gain of green space. Reasons for this include a change in the recording principles (digitisation regulations for a professionally and technically correct structure) of the GRIS data, as well as a change in the green space maintenance structures in the boroughs managed via GRIS. Intake areas, just like green spaces, may need to be adjusted over the years, following, for example, alterations in the urban space or adjustments of the underlying structure. It is therefore important that the datasets generated initially provide information for the relevant point in time and that an additional investigation into potential causes of change are required for a comparison between datasets.

In the following, a few examples of changes are provided in which “technical causes” could be ruled out for an improvement or deterioration in the availability. They demonstrate how a new park or an increase in population may improve or deteriorate the availability of green space.





Example 2: In the borough of Mitte, availability dropped by 1 category, based on an increase of the population density in the area of the Panke, east of Chausseestraße and west of the S-Bahn line.



Example 3: Based on increased population numbers, due to, for example, the old hospital grounds “Am Urban” being repurposed for residential use, availability dropped by 1 level in the blocks north of Urbanstraße in the borough of Friedrichshain-Kreuzberg, comparing the years 2011 and 2016.



Example 4: The availability development of the blocks along the Senftenberger Ring in the Märkisches Viertel in the borough of Reinickendorf dropped by 1 level between the years of 2011 and 2020. This was caused by an increased population density in the adjacent high-rise buildings.

Fig. 3: Availability development of near-residential public green spaces between 2011 and 2020

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