06.01 Actual Use of Built-up Areas / 06.02 Inventory of Green and Open Spaces
06.01.1 Actual Use / 06.02.1 Actual Use and Vegetation Cover 2020

Introduction

Berlin is a modern metropolis that continues to grow. In the last 10 years, the city has grown by some 400,000 inhabitants. Prognoses predict further growth until 2030, albeit at lower rates (cf. SenStadtWohn2019: Population Prognosis Berlin 2018-2030). Since 2017, the previous high growth rates have slowed down somewhat, with the slowest rate in 2020 due to the pandemic (cf. SenStadtWohn2019: *Bevölkerungsprognose* (Population Prognosis) Berlin 2018-2030, Amt für Statistik Berlin-Brandenburg 2021a; only in German).

The competition for space arising from population growth and the resulting increasing pressure on certain types of land use are defining the challenges urban planning is currently facing. The ever-increasing demand for affordable living, working and commercial space as well as appropriate infrastructure stands in contrast with the need for sufficient urban green space and areas for recreation. Urban green space is not only indispensable for recreational purposes in a city worth living in, but also essential for counteracting the metropolis' burdens caused by climate change and for connecting biotopes throughout the city. Last but not least, a strategic distribution of uses is crucial both for implementing the mobility goal of the "city of short distances" and for strengthening Berlin's polycentric structure (cf. SenStadtWohn 2020a: *FNP-Bericht* (Land Use Plan Report) 2020; only in German).

Knowledge of the current land use is absolutely essential in order to identify areas with competing land uses and plan the land use distribution sustainably. The impact of urban development and construction processes on the environment depends to a large extent on the type and intensity of the actual land use. For this reason, the effects on the environment, and also the natural and urban space potentials, are closely linked to uses and structures. The **actual-use and urban-structure mapping procedures of the Environmental Atlas** go back to concepts and strategies from the early 1980s, and have since become increasingly important. In terms of spatial and substantive differentiation, these maps are important especially for city-wide higher-level analyses, models and programmes in the areas of the environment, urban development and landscape planning. The content of the actual-use maps discussed here is closely linked to that of Environmental Atlas Maps "Urban Structure" (06.07) and "Urban Structure - Area Types Differentiated" (06.08), which further differentiate the actual-use mapping. Particularly for the use category "Housing", which includes a broad spectrum of urban structures, a further differentiation is of particular interest, in order to be able to derive various urban and environmental **indicators and parameters**. Since not all data required for certain calculations or plans are available, or can be collected with reasonable effort locally, an approach has been adopted that can be described as that of "urban-structure typology". Under this process, indicator values are derived on the basis of random samples, data obtained from the literature, or expert assessment, and parameters are assigned to the mapping units. Since the utilisation and urban structure have been mapped completely, these indicators can then be transferred to the entire city for many applications with a sufficient degree of accuracy.

Especially for the tasks of **urban and landscape planning**, an understanding of the actual land use is vital. Thus, an evaluation of the needs of the population for recreational opportunities near their homes requires information on the location of residential areas and of open spaces. Also, the close proximity of certain pollution sources to sensitive areas, such as commercial areas in the vicinity of housing or allotment gardens, can provide indications on existing conflicts (noise and air pollution, heavy-metal

pollution of the soil), and strategies for solutions can be developed. Similarly, without detailed knowledge of various urban structures, the development of planning concepts for adapting to climate change would not be possible.

Furthermore, the actual-use mapping data contained in the **Urban and Environment Information System (ISU)** is used in the everyday planning process, as a result of its use as a base of information for landscape care plans, environmental reports as part of the construction planning process, and for other environmental impact assessments and statements.

The maps "Actual Use of Built-Up Areas" (06.01) and "Inventory of Green and Open Spaces" (06.02) together constitute a mutually complementary **comprehensive presentation of actual land use in Berlin**, and should, in terms of their content, be considered a single map. For methodological reasons, these maps partly overlap. Therefore, beginning 2010, two additional maps ("Actual Use" (06.01.1) and "Actual Use and Vegetation Cover" (06.02.1)) are being provided, in which the information that had hitherto been separated is combined, so that the actual use is comprehensively represented across all use types. The following text always refers to all maps, unless reference is expressly made to one particular map.

Statistical Base

The data on use of built-up and non-built-up areas derive from a large number of sources which are described in a differentiated manner in the respective volumes. The basis for the categorisation and use assignment was provided by the land use maps in the **1985 Environmental Atlas** for the former West Berlin, "Actual Use of Built-up Areas" (06.01.), and "Inventory of Green and Open Spaces" (06.02), as well as the **1990, 2000, 2001, 205, 2010 and 2015** volumes published for all of Berlin (06.01 / 06.02).

In the process of updating to the version of December 31, 2020, changes in land use between 2016 and 2020 were recorded and updates to the geometry of the 1 : 5,000 Block Map (ISU5) were made. Moreover, the data base for actual-use mapping was subjected to plausibility checks on the basis of various geo-data available in the State of Berlin and updated if necessary. The Environmental Atlas Maps on Urban Structure (06.07) and Urban Structure – Area Types Differentiated (06.08) were compiled simultaneously (SenStadtWohn 2021c).

In all, the following databases were used to update and verify the actual-use mapping:

- Block (segment) area map of the Urban and Environmental Information System (ISU5), as of December, 2015
- Roadway areas of the Urban and Environmental Information System (ISU5), as of December, 2015
- Data from the Senate Department for Urban Development and Housing as well as the Senate Department for the Environment, Transport and Climate Protection:
  - Official Real Estate Cadastre Information System – ALKIS, as of March 10, 2021,
  - Official Topographic Cartographic Information System – ATKIS, as of March 16, 2021,
  - Land asset (LGV) Berlin, as of January 5, 2021,
  - Soil Associations of the Urban and Environmental Information System (ISU5), as of August 13, 2018,
  - Digital ortho-photos, aerial photography flights from 2010 through 2020,
  - Cemetery inventory, as of July 12, 2017,
  - Gardening schools, as of June 30, 2020,
  - Building age in residential development, as of December 31, 2015,
  - Green space and playground inventory, as of March 1, 2020,
  - Youth recreational centres, as of January 18, 2021,
  - Youth art schools, as of June 30, 2020,
  - Map of Berlin 1 : 5,000 (K5), as of 2010 to 2021,
  - Daycare centres, as of January 18, 2021,
  - Allotment garden inventory, as of March 1, 2020,
  - Peatlands and soil types, as of May 2015,
  - Music schools, as of June 30, 2020,
  - Schools, public, as of January 5, 2021
  - 2014 road survey, as of December 31, 2015
  - Administrative units of Berlin's forests, as of February 7, 2020,
  - Adult education centres, as of June 30, 2020
  - Housing Construction Space Information System (WoFIS), as of December 31, 2020.

- Data from external sources:
  - Building completions of the years 2012 - 2019, Statistical Office for Berlin-Brandenburg, as of December 31, 2019,
  - Statistical blocks, Statistical Office for Berlin-Brandenburg, as of May 1, 2021,
  - Digital field block register, agricultural reference plots, Ministry of Rural Development, Environment and Agriculture Brandenburg, as of September 18, 2020,
  - List of hospitals, university hospitals, specialised hospitals and private maternity hospitals in Berlin, LAGeSo (*Landesamt für Gesundheit und Soziales*), as of January 29, 2021.

Methodology

Information about actual land use is managed and processed at the **ISU (*Informationssystem Stadt und Umwelt*: Urban and Environmental Information System)** based on a **uniform spatial reference system**.

The spatial reference system is provided by the Block Map 1 : 5,000 of the Urban and Environmental Information System (ISU5), which is in turn based on the Block Map of the Statistical Office of Berlin-Brandenburg (AfS). Each statistical block is as a rule delimited by streets. The numbering and the limitation of blocks is handled by the AfS in the Spatial Reference System (RBS, only in German) of the State of Berlin (Amt für Statistik Berlin-Brandenburg 2021b).

In the ISU block map, the RBS blocks can be further subdivided. The block segments constitute the smallest reference area here, and are delimited within a statistical block according to differing land use. The minimum size of the block segments is 1 ha. This means that any area interspersed with land uses below this size will be subordinate to the predominant use of the area. The block segments are not part of the statistical block system of the RBS, but are shown only in the block map of the ISU. Thus, a total of 26,378 blocks and block segments are currently recorded (as of December 31, 2020).

13,259 of these areas correspond to the statistical units of the Office of Statistics, while 3,315, mainly large and vacant blocks from the RBS, have been subdivided into 13,119 ISU block segment areas.

Deviations between RBS blocks and ISU block areas occur particularly where areas transition to road land. All areas, irrespective of their actual use, which are subject to the legal definition of "classification according to the road law" are considered 'block-external' in the RBS system. In individual cases, this may also include areas outside the road system, such as green spaces, car parks and even buildings, provided they are located on dedicated road land. Similarly, traffic islands or median strips, for example, are generally not recorded, even if they cover a larger area. For several years now, traffic islands and median strips have not been recorded, which is a departure from the original system, where traffic medians were managed as their own blocks.

The uniform reference system of the ISU facilitates an unambiguous spatial identification of all factual data relating to blocks and block segment areas. By means of a common key, which contains, among other things, borough, block and block segment area numbers, this data is assigned to the spatial reference system. It can then be linked to other factual data, such as the Population data (SenStadtWohn 2020b), in the ISU.

The Environmental Atlas Map "Actual Use of Built-Up Areas" (06.01) and "Inventory of Green and Open Spaces" (06.02), record the actual land use in Berlin on the basis of 22 different **categories**, which are described in greater detail in the following sections. The procedure for forming the block segment level in the ISU5 map and for the determining the various land use categories is detailed in the report which documents the mapping units and the updating of the 2020 database (SenStadtUm 2021a, only in German).

Tab.1: Use categories of Environmental Atlas Maps 06.01 and 06.02	
Actual use of built-up areas	**Green and open space**
Housing area	Meadow and pasture
Mixed area	Body of water
Core area	Meadow and pasture
Commercial and industrial area, large-scale retail	Farmland
Public and special use	Park / green space
Utility area	City square / promenade
Weekend cottage and allotment-garden-type use	Cemetery
Traffic area (without roads)	Allotment garden
Construction site	Fallow area, no vegetation
	Fallow area, meadow-like vegetation
	Fallow area, mixed vegetation: meadows, trees, bushes
	Sports use
	Tree nursery / horticulture

Tab. 1: Use categories of Environmental Atlas Maps 06.01 and 06.02

The maps "Actual Use of Built-Up Areas" (06.01) and "Inventory of Green and Open Spaces" (06.02) together constitute a comprehensive representation of actual land use.

For Public and special use, Utility area, Commercial and industrial use, Mixed use with commercial character and Traffic area, it is possible to simultaneously map certain green and open space use categories, in order to also permit ascertainment of any unusual vegetation-determined character of certain areas. Thus, in addition to their actual use, these areas are also characterised in terms of the type of their vegetation cover. As a result, for some areas with these uses, there is an overlap, or **dual use,** of the two maps[1]. A sports field, for example, is marked as a Public use site in Map 06.01 and as Sports use in Map 06.02. A median strip may be recorded both as a Traffic area (Map 06.01) and a Fallow area (Map 06.02). For other uses, no dual use is allowed, since building use by definition, due to its high use intensity, either excludes parallel green use (e.g., core area use), or else may intrinsically already include a large share of green or open space (e.g., Weekend cottage and allotment garden-type area).

Dual use applies, for example:

- in the ascertainment of ecologically relevant urban stocks of ruderal vegetation or forest-like stocks on low intensity traffic areas, or commercial or utility sites,
- in the ascertainment of public and special use, which also exhibits the character of green use, such as borough horticultural offices, the field experimental fields of universities, or sports fields; or
- in the ascertainment of linear stands of vegetation along railway lines and roads.

The mapping rules for dual use are presented in detail in the report which documents the mapping units and the updating of the 2020 database (SenStadtWohn 2021a, only in German).

Since many applications may or should only handle one piece of information on usage per area, it is important to also present the information of the two use mappings in aggregate form. For most applications in the environmental area, green and open space usage is of particular interest, as it shapes the ecological nature of an area (e.g., with regard to vegetation structure and evaporation behaviour). Other applications geared towards urban planning, however, are more interested in building use (e.g., when comparing the actual-use profiles with the use proposed in the land use plan, or assessing the impact of noise on those affected). Therefore, from 2010, the use has additionally been represented in

the two maps "Actual Use" (06.01.1) and "Actual Use and Vegetation Cover" (06.02.1), in which both the uses of Map 06.01 and those of Map 06.02 are presented together. In Map 06.01.1, in case of dual use (currently 1,926 cases), the construction use is displayed, i.e. the presentation exhibits **construction priority**. By contrast, in Map 06.02.1 the presentation exhibits **green priority**, i.e., in case of dual use, green and open space use is shown. Each area may only be included once for the balancing of the shares of the individual categories in the urban area. This process ensures that the area share may be calculated separately, depending on the assessment goals.

Updating the Geometry and Usage Data

Update of the block (segment) area map of Berlin, 1 : 5,000 (ISU5)

The block boundary changes carried out between 2015 and 2020, including the current area key of the Berlin-Brandenburg Office of Statistics, have been adopted into the geometry of the ISU5. For all newly created blocks a use mapping procedure was carried out with the aid of aerial photography and other documents (see Statistical Base). Following the representation and differentiation system of the use and area classification of the Environmental Atlas, a further subdivision of the block areas into block segment areas was implemented where necessary, in order to distinguish different use- or area types from each other.

Plausibility check and comparison with various spatial data bases

In addition to the geometric update of the ISU5 block (segment area) map of Berlin, the update **as of December 31, 2020** focussed on verifying the land uses and area types of the entire database using geodata that had been recorded in recent years by the Senate Departments and other bodies for a variety of specialised tasks (see Statistical Base). The rules on the permissibility of combinations of different land uses and area types were slightly revised as part of this. Furthermore, plausibility checks were carried out for the entire database following these rules (SenStadtWohn 2021a).

The various specialised databases were either already available as ISU block (segment) area data or could be merged and compared with the ISU block (segment) area map, which then revealed individual cases for which the use data had to be verified. For example, the existing data on the Site Occupancy Index (SOI) was used to check the allocation of the blocks of the area types commercial and industrial area with dense or sparse development. The SOI indicates the share of the area covered with structural facilities, compared to the size of the lot (cf. Article 19 Para. 1 of the Federal Land Utilisation Ordinance (BauNVO)). It was therefore examined whether commercial and industrial areas have an SOI greater or less than 0.5 (corresponding to building structures covering either more or less than 50 % of the area) in accordance with their definition (sparse / dense development).

Retrospective densification and any resulting changes in **area type classification of residential, mixed and commercial uses were examined for the first time as part of the ISU5 block (segment) map update as of December 31, 2020. Furthermore, the data of the Housing Construction Space Information System (WoFIS) served as a new, valuable data basis, which provides information on planned and already implemented urban housing projects** involving **50 residential units or more**, **identifiable by lot.**

Scope of the update

The updated ISU5 block (segment) map consists of a total of 26,378 areas incl. bodies of water: 13,259 of which are main blocks and 13,119 block segments. A total of 18,862 areas with built-up use and 9,442 with green and open space use including 729 bodies of water were mapped. Thus, 1,926 areas showed dual use.

Extensive checks were carried out. In this context, areas were also identified, which were covered in more than one of these checks, as well as areas adjacent to areas under review, which were therefore also checked. Thus, the complete update results in a total of 5,846 areas, which were checked for their geometry or use. 596 block (segment) areas were assigned a new key and 506 block (segment) areas were dissolved. The use properties of 2,350 block (segment) areas and the geometry of 2,882 areas were changed. This revision covered about 16,036 ha or 20.2 % of the total block area (without roadway areas).

Independent of the use check, 301 main blocks were newly defined because of the updated statistical blocks of the RBS. As a result of the use check of these blocks, 72 block segments were subsequently newly defined.

The boundaries of 2,125 block segment areas and those of 993 block areas were geometrically adjusted in order to delineate uses with greater precision. Furthermore, 1,103 new block segment areas were formed in order to reflect the differentiation of the actual uses better.

For the first time, the check, changes and reasons for changes were documented in the geodatabase for each area that was checked.

Detailed documentation, which, in addition to the report on the current update of the actual use and urban structure mapping, also contains a presentation of the underlying concepts, mapping instructions, and a comprehensive description of all mapping units, may be downloaded at the following link:

https://www.berlin.de/umweltatlas/_assets/literatur/nutzungen_stadtstruktur_2020.pdf (SenStadtWohn 2021a, only in German).

Map Description

Each mapping unit for the Actual Use of Built-Up Areas and for the Inventory of Green and Open Spaces is described separately below.

The Categories for the Map "Actual Use of Built-Up Areas" (06.01)

Block areas are shown as **Housing areas** if they are primarily or fully used for residential purposes. Certain residentially-related service enterprises, utilities and green spaces in the neighbourhood are also included. Based on the settlement structure of the city, residential areas include all types of urban areas, from the dense inner-city areas to the open housing estates at the periphery of the city.

The **Mixed use area** may be similar to primarily residential areas in appearance. However, the housing is more strongly interspersed with commercial and service enterprises (department stores, offices, etc.), cultural facilities and small businesses. In exceptional cases, housing may account for as much as two thirds of the area, but as a rule, commercial, service enterprises and other businesses predominate.

In some cases, Mixed use areas are characterised by a high share of retail enterprises, tradespeople, or small businesses, or extensively used commercial space and the associated sheds, workshops or warehouse/ storage areas, while residential use is clearly secondary, and accounts for only one third or at most half of such an area. Mixed use areas with sparse development still contain a small number of large fallow areas. Due to the continuing pressure to build, however, this number is expected to drop even further.

Areas with high use intensity and density are presented as **Core use areas**. They are found exclusively in the central areas of the inner city, and in the main borough centres. These are areas of particular importance for commercial, private and public services, and for cultural and scientific institutions. To some extent, higher-level public facilities, especially federal administrative offices, embassies, etc. in inner-city areas are assigned to this category.

Structurally, major differences are apparent between various parts of the city. The spectrum ranges from block structures of the Wilhelminian period to high-rise buildings built in recent decades. In general, these areas are characterised by high urban density and a high degree of imperviousness.

The characteristics of a **Commercial and industrial**, **large-scale retail area** include large industrial buildings, warehouses and storage/ parking areas. The housing share is subordinate, with around one third at a maximum. This category also includes railway freight yards and commercial areas on railway land, waterside lots of a clearly commercial character (shipyards, boatyards, etc.), as well as large-scale retail and other space-consuming commercial operations, including the parking facilities belonging to them. Disturbance due to noise and other emissions may be classified as moderate to very high.

Sites of the **Public use** category include cultural, university and research, health care, administrative, security and law-enforcement facilities, religious institutions such as churches, daycare centres and other youth recreational centres, schools and sports facilities. A few children's playgrounds and retirement homes are also included in this category.

Special use areas include such areas as the Olympic Stadium and the *Messegelände* trade fair complex, as well as large restaurants in recreational areas oriented toward group tours.

The category **Utility area** includes areas of technical infrastructure including power, gas, water and district heating facilities as well as waste removal and sewage disposal facilities. The Central Bus Station (ZOB), and the bus and tram depots are also assigned to this category.

Public roadways are generally not included in the use mapping process. The **Traffic areas** as described here therefore include primarily railway lands and private roadways. Moreover, traffic islands and median strips also count as Traffic areas, if they are included in the block maps. "Green spaces associated with traffic areas" – i.e., along roadways and railway lands – are also assigned to this category in the mapping process, albeit as dual use areas as part of Green and open spaces.

Freight railway stations and commercial areas on railway land are, by contrast, not counted as traffic areas, but are rather assigned to the category "Commercial and industrial area, large-scale retail".

Parking spaces including parking garages were only considered to be traffic areas if they occupy an entire block. Parking areas with ascertainment sizes exceeding one hectare, but which are located within a single block in combination with other uses (e.g. residential use), are not separated off by a block segment partition, but are rather assigned to the dominant use.

The Traffic area category also includes railway lines and operating facilities of the subway (U-Bahn), the urban railway (S-Bahn), the long distance railway and the tram system, and also parts of the underground/ subway lines which are outside of the tunnels in open cuts.

Weekend cottages are by definition not permanently inhabited, and are primarily used for recreation. This category also includes areas with **allotment-garden-type use**, which are not contained in the "[Berlin Allotment Gardens](#)" dataset (SenStadtWohn 2020d, only in German).

Compared to a single-family home area with residential use, these blocks are generally characterised by a smaller structural volume and a smaller-scale subdivision of the lots. Compared with Allotment garden areas however, they are more densely built-up, and the lots are generally larger.

Areas classified as **Construction sites** are those with a typical construction site character, as a rule, with open ground. Once the foundations and first floor of the new building are discernible, it is classified according to its planned use.

Categories of the Map "Inventory of Green and Open Spaces" (06.02)

The category **Forest** includes all wooded areas which appear clearly in aerial photography as forest stands. Besides the wooded areas of the Berlin forests, this includes reforested former sewage farms and other areas with forest-like vegetation.

Not included in this category are forest-like parks, such as parts of the Großer Tiergarten or the Volkspark Klein-Glienicke, which is part of the parkland inventory of Berlin. Such areas have been assigned to the use category Park / green space and to the area type Forest.

Body of water includes all natural bodies of water, e.g. rivers, lakes, and also canals, retaining and seepage basins of the Berlin Water Authority (BWB), provided they are recognisable as water surfaces (or as water engineering structures).

The category **Meadow and pasture** includes meadows, pastures and enclosures used for agricultural purposes, and also experimental areas used by the universities for similar purposes, and former sewage fields, regardless of how the products of these fields are used.

Farmland includes areas identified as being used for agricultural purposes. It differs from the category Meadow and pasture in that the farmland is periodically ploughed, sown, fertilised and harvested.

To determine the use of Meadow and pasture and Farmland, the database of the digital field block register was analysed. The use categories Meadow and pasture and Farmland may alternate over the course of only a few years in the same area. For these two agricultural use categories, it is therefore particularly important that the mapping process reflect the current state of knowledge.

The category **Tree nursery / horticulture** includes both the acreage of private tree nurseries and garden centers, and of borough garden centers and city horticultural schools. These are areas with predominantly outdoor cultivation. Facilities with purely indoor operations are rather assigned to the category Commercial and industrial use.

Block areas with borough garden centres, horticultural schools, the work yards of the horticultural offices, and certain research facilities, such as the Institute for Crop Research of the Humboldt University Berlin, but also experimental areas of federal institutes such as the Federal Biological Research Centre for

Agriculture and Forestry (BBA), are mapped as dual use together with Public use / special use. Due to their high demand for space, tree nurseries and horticultural facilities are largely located on the outskirts of the city.

In addition to those facilities listed in the Green-Space Information System (GRIS) (SenUVK 2020) maintained by the Senate Department, the category **Park / green space** includes other green spaces, if they are similar in appearance to a publicly accessible park facility and are apparently subject to regular maintenance gardening. Thus, for example, well maintained green spaces associated with traffic areas along roads and motorways are assigned to this category, albeit as dual purpose areas with traffic use. Smaller, public-square-like green spaces and playgrounds are also mapped as a Park / green space, provided they are less than approx. one third impervious; otherwise they fall under the category of City square / promenade. Blocks of the use category Park / green space are also generally assigned to the area type Park / green space. Very extensive parks and recreational facilities characterised almost exclusively by extensively maintained or non-maintained wooded or meadow-like areas are in some cases assigned to the area types Forest or Fallow area (e.g., the Volkspark Klein-Glienicke). Some special facilities that may not be accessed for free, such as the Botanical Gardens or Zoologischer Garten or Tierpark Friedrichsfelde, are mapped as a Park / green space, but with the dual purpose assignment as Public use / special use. Other public facilities, too, may be associated with green facilities. These parklands are then not delimited separately, even if their size exceeds the ascertainment limit of one hectare. They may be mapped as dual purpose areas, in order to also connote their predominantly "green" character.

By contrast however, private outdoor facilities, playgrounds, etc. in residential areas are not mapped as a Park / green space, since they are part of the character of the residential use of those areas, and the open space structure of these blocks is further differentiated in the area type assignment (see comments on the Environmental Atlas Maps "Urban Structure" (06.07) and "Urban Structure – Area Types Differentiated" (06.08)).

City squares / promenades are the public spaces of urban living. City squares serve as places of sojourn for leisure and recreational purposes, as meeting areas, market places etc., and are often located in front of railway stations and other representative public buildings.

Promenades are spacious pathways that provide pedestrians and cyclists with space for movement away from road traffic. Promenades may also include some more highly impervious median strips, provided they are not used as parking lots. Squares and promenades generally have a higher degree of imperviousness than parks and green spaces.

A **Cemetery** includes both areas currently used for burial purposes and former cemeteries, provided they are still recognisable as such.

The data on the inventory of cemeteries in Berlin (SenStadtWohn 2017, only in German), available from the appropriate Senate Department, forms the basis for the scope of these areas. Memorials, such as the Soviet War Memorial at the edge of the Großer Tiergarten, on the other hand, are not assigned to the area type Cemetery, although they are recorded in the Berlin inventory of cemeteries; they are mapped as Public and special use, and assigned to the area type Culture.

However, cemeteries are not generally considered areas of Public and special use. Only when usually small-scale blocks are largely occupied by a church building, and the surrounding cemetery is only a subordinate feature will a dual use as Public and special use be assigned, in which case the block is then assigned to the area type Church. However, if a church or chapel is located on a large cemetery only in a subordinate function, no dual use is assigned.

Structurally, cemeteries differ from one another mainly in terms of their stock of trees. While older park cemeteries and forest cemeteries are essentially characterised by their very old stocks of trees, many newer cemeteries are still largely without larger trees.

For the category **Allotment garden**, the data base on Berlin's Allotment Gardens (SenStadtWohn 2020d) maintained by the appropriate Senate Department forms the basis for the classification and delimitation of the same. It records the allotment gardens with appropriate use, as defined by the Federal Allotment Garden Law.

Other areas with similar use characteristics are classified as Weekend cottages and allotment-garden-type use.

A **Fallow area** is an area that is not in use or maintained at the time of recording, on which variegated stands of vegetation can often develop undisturbed, which is, however, subject to great pressure of use and change.

A distinction is made between a **Fallow area free of vegetation** on the one hand, which includes mostly excavations, soil or rubble dumps, or demolition areas, where no vegetation has yet taken root, due to the fact that their utilisation has only recently been abandoned. In some cases, the site conditions ensure that no vegetation will enter the area for some time. These may be brownfields where little vegetation grows due to the very high degree of imperviousness, or else sand dunes and beaches, on which spontaneous growth of vegetation occurs only very slowly, due to a lack of nutrients, or due to regular disturbances.

Another category of fallows is **Fallow area with predominantly meadow-like vegetation**. On open brownfield sites, a vegetation of ruderal perennials and grasses often establishes itself during the first few years. Especially on nutrient-poor sites, this vegetation can remain relatively constant over the course of several years. In general, however, unstable conditions prevail.

All fallow areas which cannot be clearly assigned to one of the other fallow or forest categories are mapped as **Fallow area with mixed vegetation – meadows, trees, bushes**. The development of vegetation on a fallow site depends on many conditions, such as the abiotic site conditions, the initial vegetation and anthropogenic influences, so that on long-fallow sites, various successional stages often alternate within a small area.

If, on the other hand, an area is covered almost entirely with trees, it will be assigned to the category Forest.

The category **Sports use** includes both covered and uncovered sports facilities. All sports use areas are at the same time mapped as Public and special use.

Uncovered sports facilities are outdoor facilities used for sports, physical activity and leisure activities. These include not only sports fields, outdoor swimming pools and beaches, but also riding, golfing, archery and water sports areas. The latter are characterised by small dockyards, boat and club houses, parking lots etc., with a high proportion of green space. Clearly commercial water sports areas (dockyards, boat-building facilities, etc.) are assigned to the category Commercial and industrial use. Some fairly extensively used beaches (without changing rooms, kiosks, etc.) are assigned to fallow or forest categories.

Covered sports facilities include primarily those housed in halls, such as indoor pools and ice skating rinks, and also stadiums and multipurpose halls, in which non-sporting events such as concerts may also be held.

Use Distribution for Berlin

The following tables and figures show the **shares of all use types** in relation to the total area of **Berlin**. It should be noted that **1,926 areas** have both a land use category of built-up areas (nos. 10 through 90) and of non-built-up areas (nos. 100 through 200).

With this approach, major potential green and open space areas can be displayed on other use areas. This applies particularly to Public and special use sites, Utility areas, Commercial and industrial areas and Traffic areas. These areas are shown on both maps, i.e. differently (cf. the explanations of dual use in the Methodology section).

Since for the evaluation of area shares, each area can only be considered once, both cases– **green priority and construction priority** – have been calculated separately.

The calculations are based on the area size data of the ISU. The block and block segment areas were calculated using the Geographic Information System (YADE) based on the ISU5 block segment map. It should be noted here that area calculations using other geographic information systems may deviate slightly from the area sizes provided here.

Table 2 presents the area shares, both in absolute numbers and percentages, for different use categories of the total area of Berlin.

Tab 2: Area shares of various use categories of the total area of Berlin								
Use		No. of blocks in case of green priority	No. of blocks in case of construction priority	No. of dual-use blocks	Area size [ha] in case of green priority	Area size [ha] in case of construction priority	Distribution [%] in case of green priority	Distribution [%] in case of construction priority
					see 1)			
10	Housing area	11,760	11,760	0	24,062	24,062	27.0	27.0
70	Weekend cottage and allotment-garden-type use	270	270	0	851	851	1.0	1.0
21	Mixed area	1,054	1,071	17	2,268	2,311	2.5	2.6
30	Core area	261	261	0	407	407	0.5	0.5
40	Commercial and industrial area, large-scale retail	1,146	1,267	121	4,840	5,288	5.4	5.9
50	Public and special use	1,538	2,353	815	3,766	6,767	4.2	7.6
60	Utility area	127	171	44	569	751	0.6	0.8
80	Traffic area (without roads)	719	1,648	929	1,286	2,568	1.4	2.9
90	Construction site	61	61	0	97	97	0.1	0.1
100	Forest	2,848	2,742	106	16,095	15,634	18.1	17.5
121	Meadow and pasture	370	368	2	1,522	1,517	1.7	1.7
122	Farmland	224	222	2	2,042	2,033	2.3	2.3
130	Park / green space	2,325	1,729	596	5,971	5,246	6.7	5.9
140	City square / promenade	213	107	106	110	60	0.1	0.1
150	Cemetery	192	189	3	1,122	1,121	1.3	1.3
160	Allotment garden	735	727	8	3,123	3,108	3.5	3.5
171-173	Fallow area	1,227	662	565	3,739	1,930	4.2	2.2
190	Sports use	518	0	518	1,812	0	2.0	0.0
200	Tree nursery / horticulture	61	41	20	289	221	0.3	0.2
110	Body of water	729	729	0	5,415	5,415	6.1	6.1
	Roads				9,726	9,726	10.9	10.9
100-200	Total green and open spaces	8,713	6,787	1,926	35,826	30,870	40.2	34.6
10-80	Total built-up area	16,936	18,862	1,926	38,147	43,103	42.8	48.4
	Total without roads	**26,378**	**26,378**	**1,926**	**79,387**	**79,387**	**89.1**	**89.1**
	Total Berlin incl. bodies of water and roads				**89,114**	**89,114**	**100**	**100**
Rounding differences may occur between the totals shown and the totals of the individual values.								
The calculations are based on the area size data of the ISU and were carried out in YADE-GIS. Area calculations in other geographic information systems may deviate slightly from the area sizes provided.								
1) 1926 areas have been assigned to a use category of built-up areas (10 to 80) as well as to a use category of non-built-up areas (100 to 200).								

Tab. 2: Area shares of various use categories of the total area of Berlin, area sizes based on the ISU5 block (segment) area map, as of December 31, 2020

Area size in case of construction priority

Body of water
5415 ha
6.1 %

Roads
9726 ha
10.9 %

Other green and
open space
15236 ha
17.1 %

Built-up area
43103 ha
48.4 %

Meadow and pasture
15634 ha
17.5 %

Area size in case of case of construction priority

Fallow area
1930 ha
2.2 %

Sports use
0 ha
0.0 %

Tree nursery /
horticulture
221 ha
0.2 %

Allotment garden
3108 ha
3.5 %

Cemetery
1121 ha
1.3 %

City square /
promenade
60 ha
0.1 %

Park / green space
5246 ha
5.9 %

Farmland
2033 ha
2.3 %

Meadow and pasture
1517 ha
1.7 %

Forest
15634 ha
17.5 %

Area size in case of construction priority

Housing area
24062 ha
27.0 %

Weekend cottage and
allotment-garden-type
use
851 ha
1.0 %

Mixed area
2311 ha
2.6 %

Core area
407 ha
0.5 %

Commercial and
industrial area, large-
scale retail
5288 ha
5.9 %

Public and special use
6767 ha
7.6 %

Utility area
751 ha
0.8 %

Traffic area (without
roads)
2568 ha
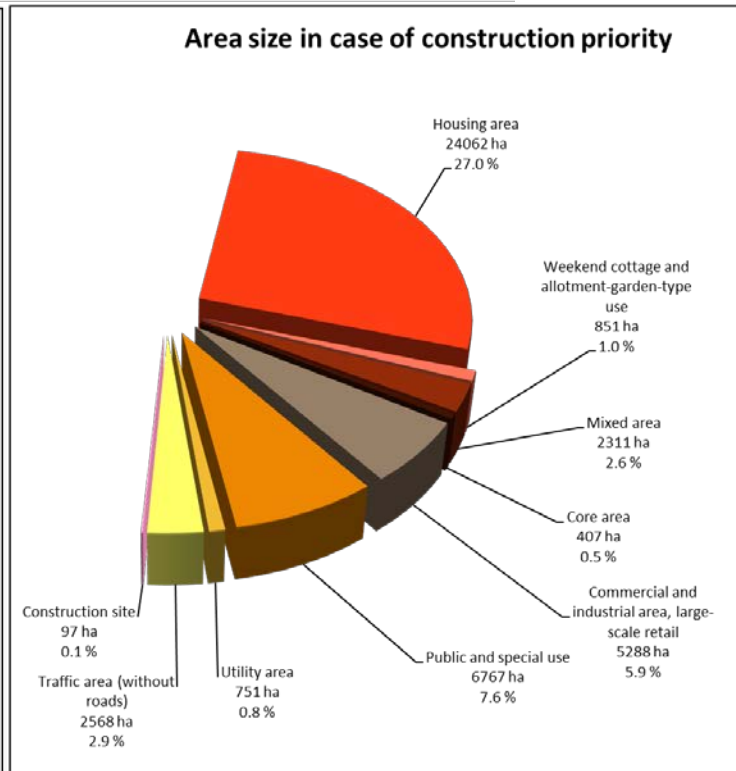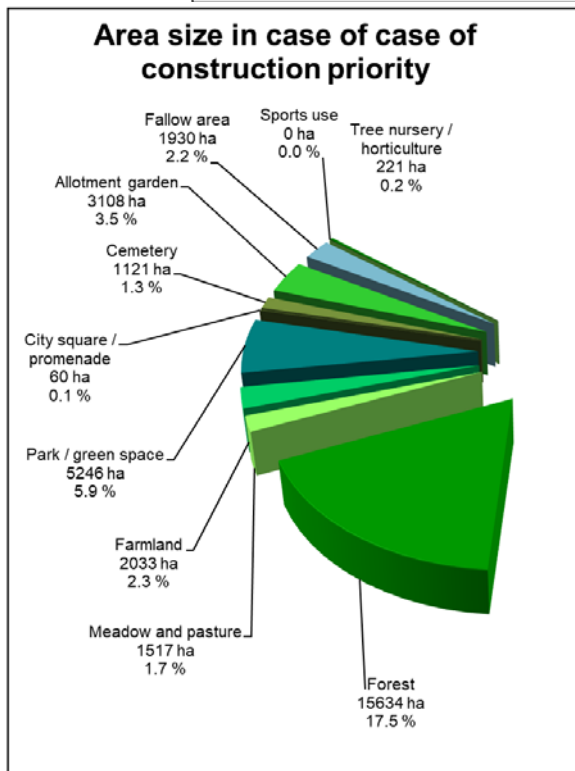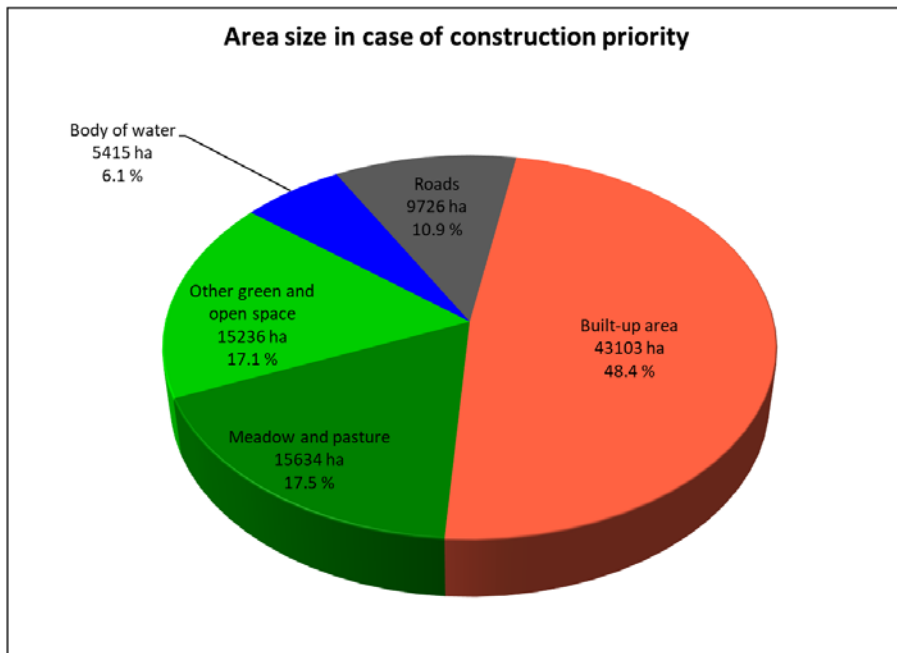2.9 %

Construction site
97 ha
0.1 %

*Fig. 1 a+b: Shares of various use categories of the total area of Berlin,
area sizes based on the ISU5 block (segment) area map, analysis based on construction priority, as of
December 31, 2020*

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Area size in case of construction priority green and open spaces

- Allotment garden 3108 ha 10.1 %
- Fallow area 1930 ha 6.3 %
- Tree nursery / horticulture 221 ha 0.7 %
- Cemetery 1121 ha 3.6 %
- City square / promenade 60 ha 0.2 %
- Park / green space 5246 ha 17.0 %
- Forest 15634 ha 50.6 %
- Farmland 2033 ha 6.6 %
- Meadow and pasture 1517 ha 4.9 %

Area size in case of construction priority built-up area

- Utility area 751 ha 1.7 %
- Traffic area (without roads) 2568 ha 6.0 %
- Construction site 97 ha 0.2 %
- Public and special use 6767 ha 15.7 %
- Commercial and industrial area, large-scale retail 5288 ha 12.3 %
- Core area 407 ha 0.9 %
- Mixed area 2311 ha 5.4 %
- Weekend cottage and allotment-garden-type use 851 ha 2.0 %
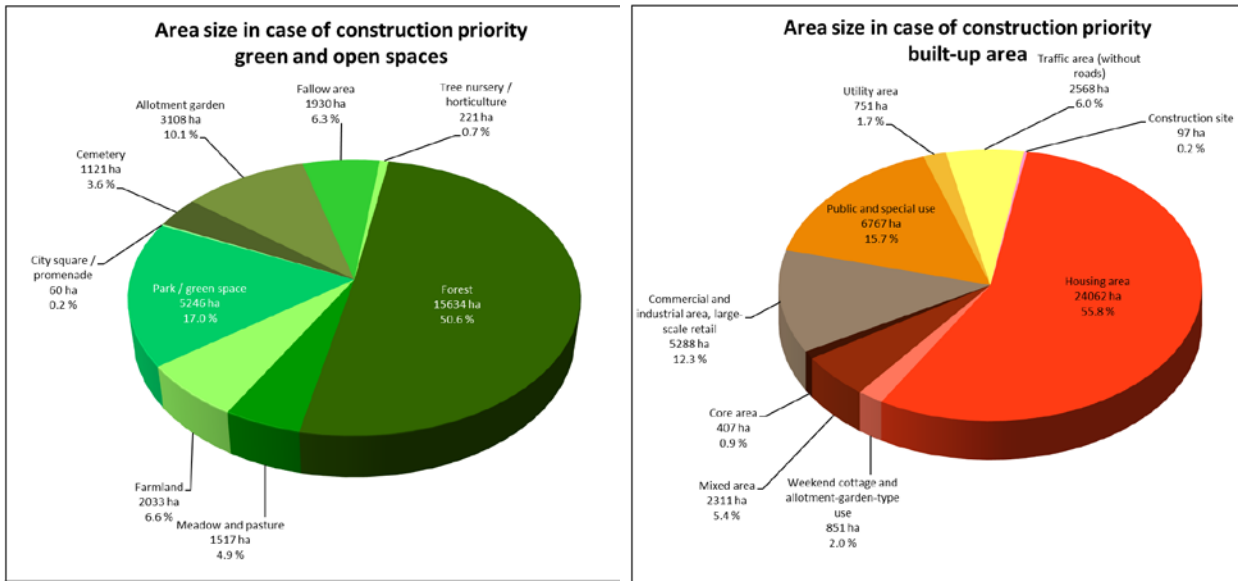- Housing area 24062 ha 55.8 %

Fig. 1: Shares of various use categories of the inventory of green and open spaces, and of the total built-up area of Berlin, area sizes based on the ISU5 block (segment) area map, analysis based on construction priority, as of December 31, 2020

In terms of the absolute area of all **Berlin boroughs** [in ha], the following overview emerges:

Tab. 3: Use distribution in the boroughs (in case of construction priority)																									
			Construction use									Roads	Green and open space use													Body of water
Bezirke	Total area [ha]	Total block area without roads [ha]	Housing area [ha]	Weekend cottage and allotment-garden-type use [ha]	Mixed area [ha]	Core area [ha]	Commercial and industrial use, large-scale retail [ha]	Public and special use [ha]	Utility area [ha]	Traffic area (without roads) [ha]	Con-struction site [ha]	Roads [ha]	Forest [ha]	Meadow and pasture [ha]	Farm land [ha]	Park, green space [ha]	City square / prome-nade [ha]	Ceme-tery [ha]	Allot-ment garden [ha]	Fallow area [ha]	Fallow area, no vege-tation [ha]	Fallow area, meadow-like vege-tation [ha]	Fallow area, mixed vegetation: meadows trees, bushes [ha]	Tree nursery / horti-culture [ha]	Body of water [ha]
Mitte	3,947	3,177	826	9	318	128	232	706	36	110	11	770	14	0	0	467	23	86	68	8	2	0	6	0	136
Friedrichshain-Kreuzberg	2,040	1,614	568	0	201	22	145	242	7	74	1	425	0	0	0	159	9	48	10	0	0	0	0	0	128
Pankow	10,315	9,257	2,587	375	246	11	578	629	32	212	2	1,057	1,037	559	1,175	497	1	186	493	518	3	72	443	3	116
Charlottenburg-Wilmersdorf	6,469	5,541	1,362	20	299	54	189	632	34	258	0	928	1,565	0	0	307	8	73	305	156	7	18	131	24	255
Spandau	9,189	8,482	2,092	157	99	11	734	881	175	112	20	707	1,597	328	318	512	2	84	209	269	7	67	196	42	837
Steglitz-Zehlendorf	10,263	9,235	3,087	23	275	14	220	834	33	199	0	1,027	2,490	17	2	515	1	121	214	132	1	4	128	0	1,058
Tempelhof-Schöneberg	5,305	4,524	1,925	1	184	18	711	414	25	174	7	781	57	4	44	507	5	117	245	48	1	20	27	7	29
Neukölln	4,493	3,888	1,868	26	174	10	314	315	32	83	27	606	0	31	19	371	2	111	400	17	0	1	16	20	68
Treptow-Köpenick	16,773	15,650	3,073	89	160	15	709	694	134	343	10	1,124	6,879	165	44	417	2	77	455	365	13	67	285	23	1,994
Marzahn-Hellersdorf	6,182	5,285	2,655	16	91	66	475	358	82	216	5	897	80	45	51	643	4	46	149	230	2	78	151	4	70
Lichtenberg	5,213	4,600	1,386	11	118	38	533	609	126	202	14	613	19	239	249	390	2	71	294	159	0	20	139	73	67
Reinickendorf	8,926	8,134	2,632	125	146	21	448	452	35	587	0	792	1,894	130	131	460	0	101	266	27	0	2	25	25	655
Total	**89,114**	**79,387**	**24,062**	**851**	**2,311**	**407**	**5,288**	**6,767**	**751**	**2,568**	**97**	**9,726**	**15,634**	**1,517**	**2,033**	**5,246**	**60**	**1,121**	**3,108**	**1,930**	**36**	**348**	**1,546**	**221**	**5,415**

The calculations are based on the area size data of the ISU and were carried out in YADE-GIS. Area calculations in other geographic information systems may deviate slightly from the area sizes provided.

1926 areas have been assigned to a use category of built-up areas (10 to 80) as well as to a use category of non-built-up areas (100 to 200).

For the purpose of this analysis, the construction use was taken into account for areas with dual use (construction priority).

Tab. 3: Area shares of various use categories of the total area of Berlin [in ha], area sizes based on the ISU5 block (segment) area map (in case of construction priority), as of December 31, 2020

A presentation of the distribution of use types among the **boroughs** in absolute terms in ha, and in relative terms in % of the area of the borough, is shown in Figures 3 and 4.
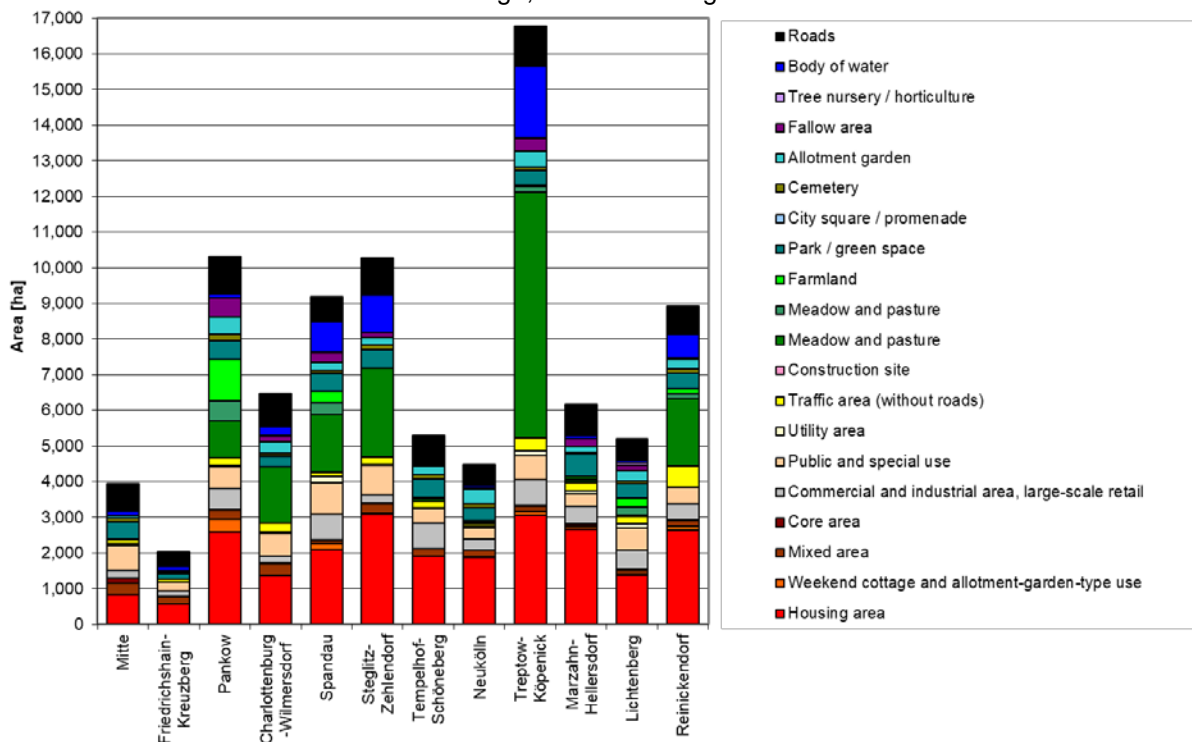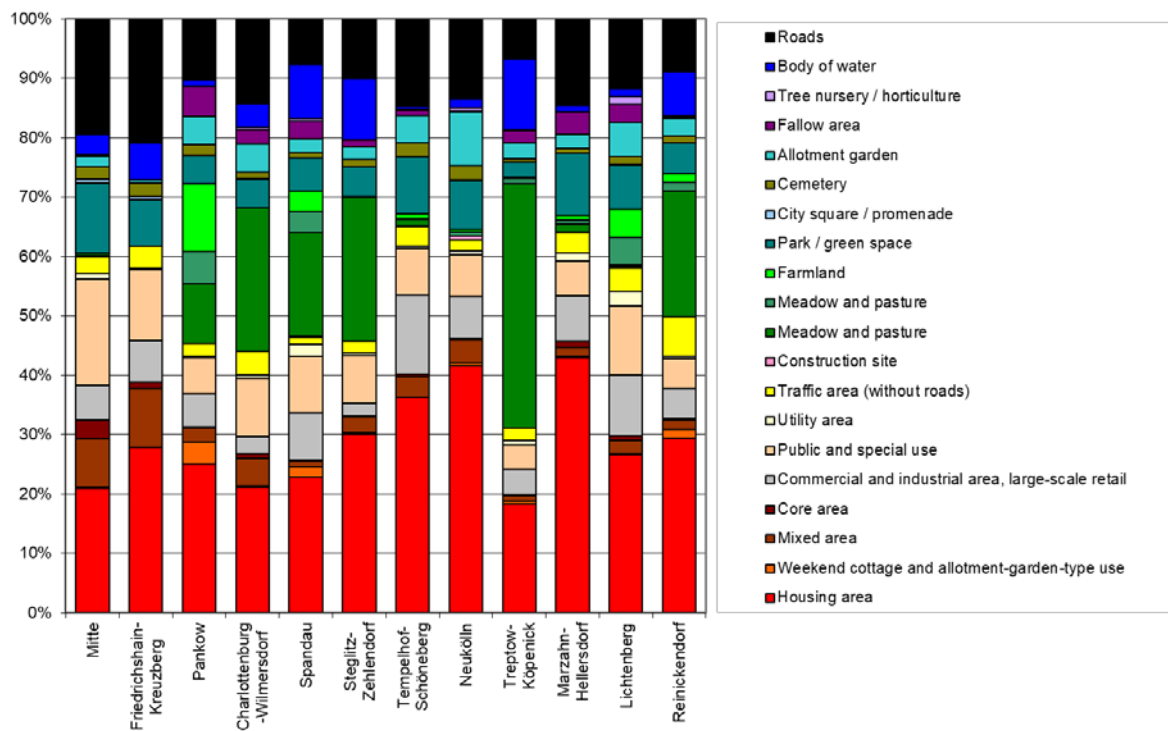

Fig. 3: Area shares of various use categories of the total area of Berlin in ha,
area sizes based on the ISU5 block (segment) area map (in case of construction priority)

Fig. 4: Area shares of various use categories of the total area of Berlin in %,
area sizes based on the ISU5 block (segment) area map (in case of construction priority), as of
December 31, 2020

Land use distribution changes in comparison to the previous edition

A **comparison** with the figures of the 2015 edition reveals several pointers in how use has changed in Berlin, which allows for more general trends in urban development to be deduced. Hence, growth of 370 ha in block areas with residential use demonstrates increased residential construction activity, which may be explained predominantly by the actual developments since 2015. It is important to note here that the additional subsequent small-scale densification within a block or block segment area of the same use category is not shown at block or block segment level.

The decrease in fallow areas of approx. 706 ha (Green use 171, 172, 173) is due to two reasons. On the one hand, this reflects the land consumption of these areas for the construction of new buildings. On the other hand, during the use check and the comparison with the digital field block register, numerous previous fallow areas were assigned to the green space category. This is the case, as these areas are currently fallow but are recorded in the digital field block register and thus have the status of farmland. As a result, there is an increase in green space (plus 140 ha).

The growth of areas in the category "Weekend cottage and allotment-garden-type use" by 59 ha may be explained by rededication to large extents. Especially in the eastern boroughs, various former allotments lost their status according to the Federal Allotment Garden Law due to rededication. Hence, the increase in "Weekend cottage and allotment-garden-type use" can be explained by the decrease of 111 ha in the use category "Allotment garden". However, two thirds of the decrease in "Allotment gardens" is based on use changes in residential and commercial areas.

The significant decline in the "Utility area" category by 143 ha is due to a change in the mapping rules and not to an actual change in use. For example, the BVG depots and the Central Bus Station (ZOB) were no longer assigned to the category "Other traffic areas" but mapped as "Utility area".

These methodological changes mentioned, which were implemented during the use mapping of the current update, and which are not based on actual use changes, render it difficult to compare the use shares as of December 31, 2020 with those of the previous mapping of December 31, 2015. The Housing Construction Space Information System (WoFIS), which has been available for several years and was available as a data source for the first time, also allowed a more comprehensive mapping of current housing construction projects than previously possible. This complicates a direct comparison of both versions further. A tabular comparison of the two land use mappings is therefore not provided.

With regard to the development of the inventory of green and open spaces, the Environmental Atlas map "Open-Space Development" (06.03) was updated parallel to the land use mapping (SenStadtWohn 2021d). It presents the decreases and increases in green space up until August 2020 (date of the aerial photography data).

Description of Map "Actual Use of Built-Up Areas" (06.01)

The Map "Actual Use of Built-up Areas" (06.01) shows the different use categories by their shares of the built-up area of Berlin and their distribution throughout the city area (as of December 31, 2020). Figure 5 further illustrates the distribution of the construction use shares for the built-up area of each borough.

More than the half of the built-up area of Berlin is used for housing. Commercial and industrial areas and Public and special uses account for 12 % and 16 %, respectively – a relatively large share of the built-up area of Berlin. They are followed by Traffic areas, excluding roadways that are not part of the block (segment) map, with 6 %, followed by Mixed-use areas**,** with approx. 5 %. For Berlin as a whole, Core areas, Utility areas, Weekend cottage and allotment garden-type use areas take up very little space. Block (segment) areas mapped as Construction sites are included in the current map. With a total of 97 ha, they also occupy only a very small area, which is subject to constant change, however, as construction progresses and new construction sites appear.

Characteristic structures may be identified in the **distribution of the use categories** of built-up areas within the urban area. Thus, purely residential or commercial areas exist on the outskirts much more frequently than within the City Rail Circle Line; the Mixed and Core area use categories are more heavily represented in the latter. Compared to other metropolises, however, Berlin continues to have a remarkable proportion of areas used entirely or predominantly for residential purposes, even near the city centre. In the borough of Friedrichshain-Kreuzberg, for example, the share of blocks and block segments with residential use is more than 40 % of the built-up area, while it drops to more than 30 % in Mitte, mainly due to other uses in the borough.

Commercial areas are particularly concentrated along waterways, railway lines and main roads, due to the more favourable transport conditions. One often finds Mixed areas and scattered Core areas in the old village centres in various parts of the city as a result of evolved structures and Berlin's polycentric layout. Particularly characteristic is, however, the concentration of the Core Areas in both the western city centre around Kurfürstendamm / Tauentzienstraße, and in the eastern city centre area of Alexanderplatz / Friedrichstraße, as well as at Potsdamer Platz. Public use areas are distributed throughout the entire urban area relatively evenly. Utility areas occur mainly on the outskirts, frequently in the vicinity of commercial areas.

The described structures are also reflected in a comparison of the distribution of the land use categories within the boroughs (cf. Fig. 5).
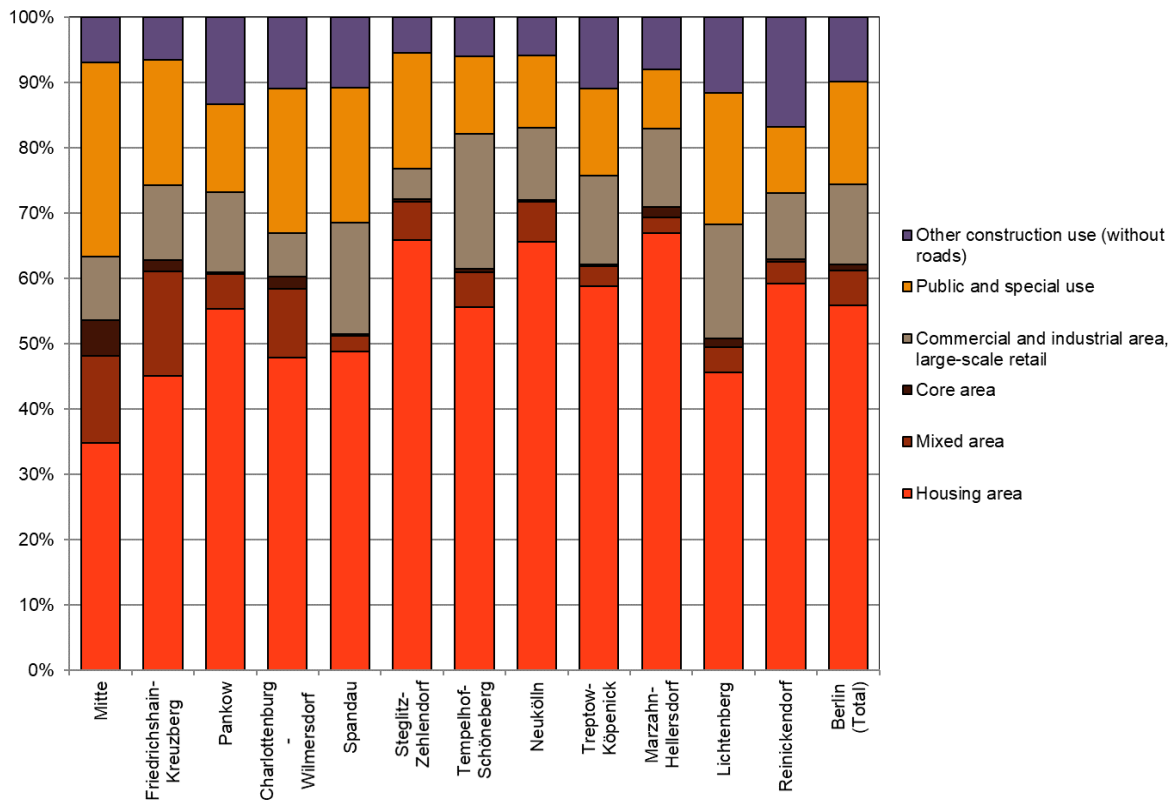

Fig. 5: Shares of selected use categories in the built-up areas of all Berlin boroughs,
area sizes based on the ISU5 block (segment) map (for areas with dual use, i.e. green space and construction use, the latter was taken into account – construction priority), as of December 31, 2020

Examples for the characteristic use distribution on the outskirts are the boroughs of Marzahn-Hellersdorf and Neukölln, with 67 % and 66 % residential use and 12 % and 11 % industrial / commercial use, respectively, while in the borough of Mitte, the borough's central functions are reflected by its shares of only 35 % Housing area, but more than 5 % Core area use and approx. 13 % Mixed area use, as well as a high share of Public use facilities (30 %).

As the Core area use around Kurfürstendamm, Breitscheidplatz and Tauentzienstrasse is distributed across three boroughs in the western city centre – Charlottenburg-Wilmersdorf, Schöneberg-Tempelhof and Mitte – the primary function of this area is less clearly reflected in the distribution of uses in the first two boroughs (Core area shares of up to 2%).

Besides the borough of Mitte, the **inner city boroughs** of Friedrichshain-Kreuzberg and Charlottenburg-Wilmersdorf have relatively low shares of purely residential or primarily residential blocks, with 45 % and 48 % respectively. **Mixed areas** are characterised by a varying share of residential space that fluctuates greatly locally. This coexistence of housing, commerce and manufacturing, also known as the 'Berlin mix', remains most apparent in the boroughs of Mitte and Friedrichshain-Kreuzberg. They are the boroughs with by far the largest shares of Mixed use (13 % and 16 %).

With the lowest share of commercial use (5%) in the entire city, Zehlendorf-Steglitz stands out as a **residential borough** with a share of 66 % of residential use.

Description of Map "Inventory of Green and Open Spaces" (06.02)

The Map "Inventory of Green and Open Spaces" (06.02), shows the different use categories and their shares of Berlin's non-built-up areas and how they are distributed across the city.

The largest share of the Inventory of Green and Open Spaces is located on the **outskirts** of the city, including particularly the large wooded areas of the Grunewald and Düppel forests in the southwest, the Spandau and Tegel forests in the northwest, and the large forest areas in the borough of Köpenick in the southeast of Berlin. Forests account for 38 % of all Green and open spaces. Bodies of water account for 13 % (cf. Fig. 6).

Areas used for agricultural purposes, which account for almost 9 % of the inventory of open space, are found particularly in the north-eastern area (Pankow and Weißensee). Other agricultural areas are located on the remaining outskirts. **Allotment gardens**, which account for some 8 % of the open space inventory, are found almost exclusively outside the City Rail Circle Line, albeit still in the vicinity of the city centre in some cases. Often, they are located near canals, rivers and railway lines. The currently unused **fallow areas** are distributed throughout the entire urban area, particularly along railway lines and bodies of water. They account for some 9 % of the total open space. The few remaining **Tree nurseries** and **horticultural areas** are found predominantly on the outskirts, while areas of the categories **Sports use, Cemetery**, and **Park and green space** are located throughout the entire urban area.

The area size of the open spaces increases as one moves from the inner city area toward the outskirts. Moreover, in the **outer areas of the city**, the various categories of open space are often located adjacent to one another, and thus form larger contiguous open systems, while the various open areas in the **inner city** usually occur in isolation, and are surrounded by built-up areas. In the inner-city boroughs, the inventory of open space is dominated by parks.
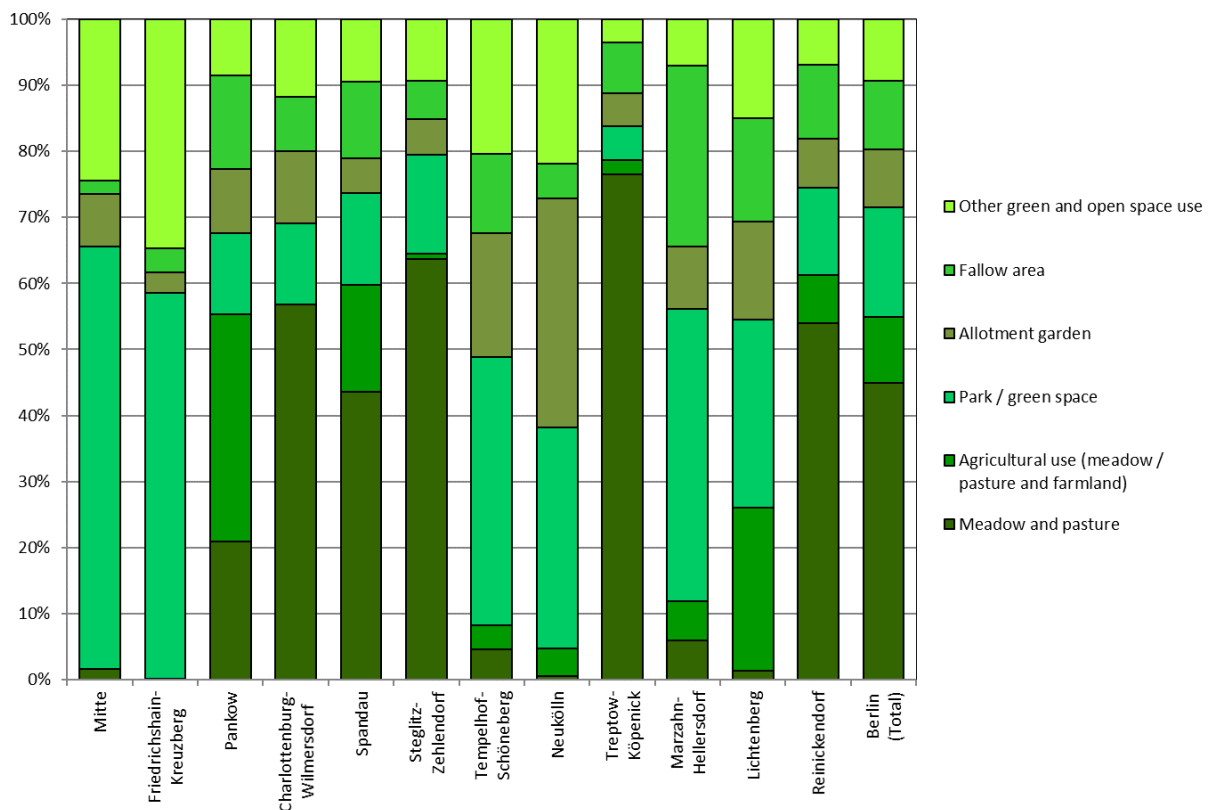

Fig. 6: Shares of selected use categories of green and open spaces in the Berlin boroughs, area sizes based on the ISU5 block (segment) area map (for areas with dual use, i.e. green space and construction use, the first was taken into account – green priority), as of December 31, 2020

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