01.13 Planning Advice for Soil Protection 2020

Introduction

Precautionary soil protection endeavours to protect the inherent qualities of soils and their functions while also averting any detrimental impacts on them. The presentation of the individual soil functions in Maps 01.12.1 to 01.12.5, along with the soil capacity depicted in Map 01.12.6 (Faensen-Thiebes et al. 2006, SenStadtWohn 2018) forms the technical groundwork for understanding the requirements and strategies pertinent to soil protection within spatial planning processes and regulations (Faensen-Thiebes and Goedecke 2007).

For planning purposes, it is useful to provide guidance on how to assess differences in soil capacity and what should be implemented from a soil protection perspective as a result (Gerstenberg et al. 2007, 2015 and 2017).

In the present Map 01.13, information on individual soil functions is overlaid and weighted to represent the level of protection needed for Berlin's soils in relation to interventions by planning and construction projects. The map **'Planning Advice for Soil Protection'**, along with its accompanying guide outlining the underlying **vision and measures for precautionary soil protection** (Leitbild und Maßnahmenkatalog 2021, only available in German), assists soil-protection authorities in carefully evaluating interventions within environmental impact assessments or urban development planning. They aid in the efficient classification and assessment of each case and guide the formulation of potentially necessary measures to safeguard the soil. Planning decisions and processes can therefore be improved from a soil protection standpoint.

The Planning Advice Map is built on the digital data display of the FIS Broker. This platform displays detailed data, evaluations and suggested measures for the selected areas.

Statistical Base

The Map's foundation lies in the assessment of soil functions, as depicted in Environmental Atlas Maps 01.12.1 to 01.12.5. Additionally, it draws on the Soil Associations Map 01.01, which identifies soil associations at risk of material contamination, such as those characterised by war debris, sewage farms, and railway tracks.

Data from Map 01.02 (Impervious Soil Coverage) of the Environmental Atlas, which includes track gravel as impervious, was consulted to represent impervious soil coverage classes.

Methodology

Differentiated Assessment of Soil Functions

To address the dual objectives of developing a nuanced assessment of soil functions, and translating this evaluation into Planning Advice, Map 01.13 implements the following considerations and steps:

Initially, soil functions, as represented in Maps 01.12.1 to 01.12.5, are assigned varying weights. The weighting is based on their significance within Berlin's specific conditions, as detailed in the documentation of the Berlin State Soil Database (available only in German):

- It is extremely important to protect soils **that serve as archives** and those **capable of supporting near-natural or rare plant communities** due to their irreplaceable nature.
- It is generally important to protect soils that are highly capable of **regulating the water balance** and providing **buffering and filtering functions**. This importance increases in locations where both functions receive a 'high' rating.
- Soils with a 'high' **yield function for cultivated plants** should be preserved in agricultural areas.

This sets a priority based on the importance and vulnerability of soil functions.

Moreover, soils with considerable potential for material contamination, such as those found in sewage farms, are excluded from the evaluation. This is because they may be compromised in their natural functions, including regulating, filtering, buffering, and their capacity to support cultivated plants. These soils pose a potential **contamination risk** to groundwater and the food chain.

To gauge the soil's **level of protection** needed, five protection categories have been established, ranging from the highest to the lowest level. These categories help provide guidance and recommendations on how to actively address soil interventions resulting from planning and construction projects.

The level of protection for soils is represented by the following categories:

- **highest protection level**,
- **very high protection level**,
- **high protection level**,
- **medium protection level**, and
- **low protection level (soils without additional requirements)**.

All information and assessments presented here relate to soils without impervious cover, consistent with the other soil topics of the Environmental Atlas (except for that of impervious soil coverage). The extent of impervious coverage is of great importance, however. Its degree is therefore not only presented as part of the factual data but also reflected in the colour. There are three different colour shades; as impervious coverage decreases, the colour intensity of the protection category also decreases.

Impervious coverage thresholds of 5 % and 30 % were adopted. Areas falling into the category of **5 % or less** are considered to be effectively without impervious cover, interrupted only by scattered buildings, pathways etc. This category includes forests, farmland as well as meadows and pastures. Areas with impervious coverage between **more than 5 % and less than 30 %** fall into the 'moderate' category, comprising allotment gardens, single-family homes, park facilities and other open spaces, which may still feature near-natural soils. Impervious coverage **exceeding 30 %** is primarily found in residential and commercial areas as well as in traffic areas, where natural soil associations are largely absent.

Highest protection level

This category is assigned when either the 'habitat function for near-natural and rare plant communities' and/or the 'archival function for natural history' receives a 'high' rating.

This **highest protection level** covers only approx. 5 % of the evaluated area. Careful consideration should be given in potential planning processes to explore alternative sites and avoid interventions. This is because restoring the habitat function for near-natural and rare plant species is challenging, and the archival function for natural history cannot be restored (Smettan and Litz, 2006). Therefore, projects or initiatives involving interventions in soils with the highest protection level, which cannot be avoided, should **only be approved in consultation with the soil protection authority** (Leitbild und Maßnahmenkatalog (Vision and Catalogue of Measures), 2021, available only in German).

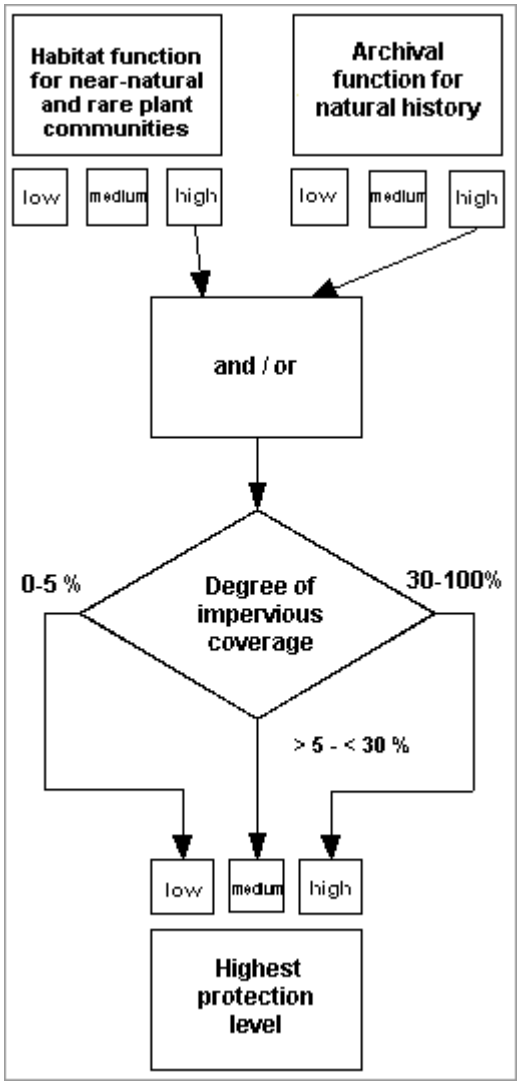

Fig. 1: Categorisation process for the 'highest protection level'

Very high protection level

The 'very high protection level' is assigned based on the following criteria:

1. Both the **'habitat function for near-natural and rare plant communities'** and the **'archival function for natural history'** receive 'moderate' ratings, or
2. the **'yield function for cultivated plants'** is rated as 'high' on areas with agricultural use (farmland, meadows and pastures or tree nursery/ horticulture), or
3. both the **'water regulation function'** and the **'buffering and filtering function'** receive 'high' ratings.

Most areas in this protection category are classified as such due to their habitat and archival function, while a smaller portion is designated for their regulation or buffering and filtering function. Very few areas are classified based on the yield function for cultivated plants.

For areas with a 'very high protection level', interventions should be avoided from a soil protection standpoint, or suitable alternative sites should be sought in accordance with other requirements. Moreover, a net loss of soil without impervious cover and soil functions are not permissible.

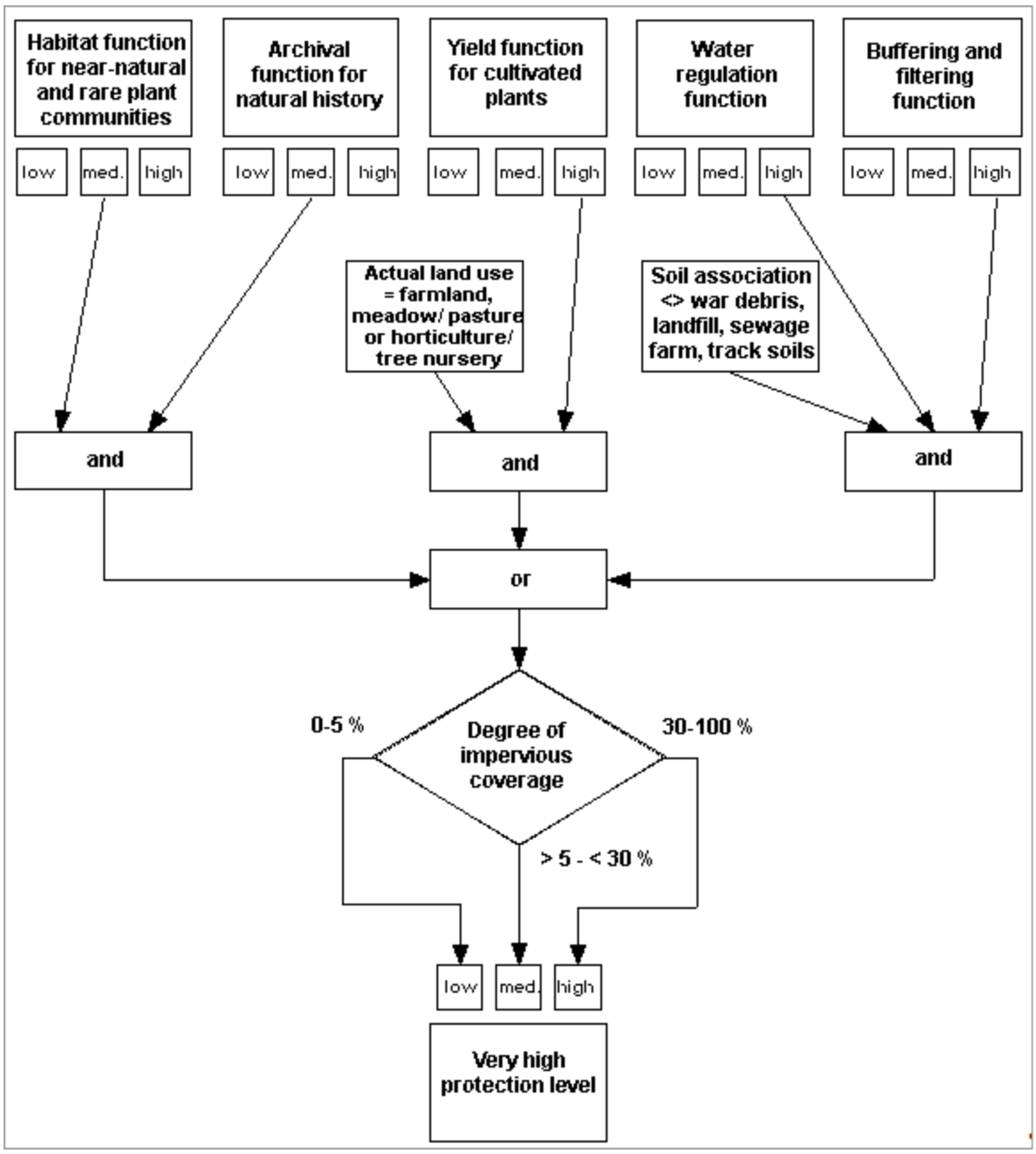

Fig. 2: Categorisation process for the 'very high protection level'

High protection level

The 'high protection level' is assigned when either the **'water regulation function**' or the **'buffering and filtering function'** receives a high rating.

The protection level is lower here compared to the 'very high protection level', as fewer soil functions are affected in this category. **Only one criterion** (either the water regulation function or the buffering and filtering function) is rated as 'high'. Despite the lower protection level, efforts should still be made **to avoid or compensate for any net loss of land and soil functions, in consultation with the soil protection authority** (Leitbild und Maßnahmenkatalog (Vision and Catalogue of Measures), 2021, available only in German).

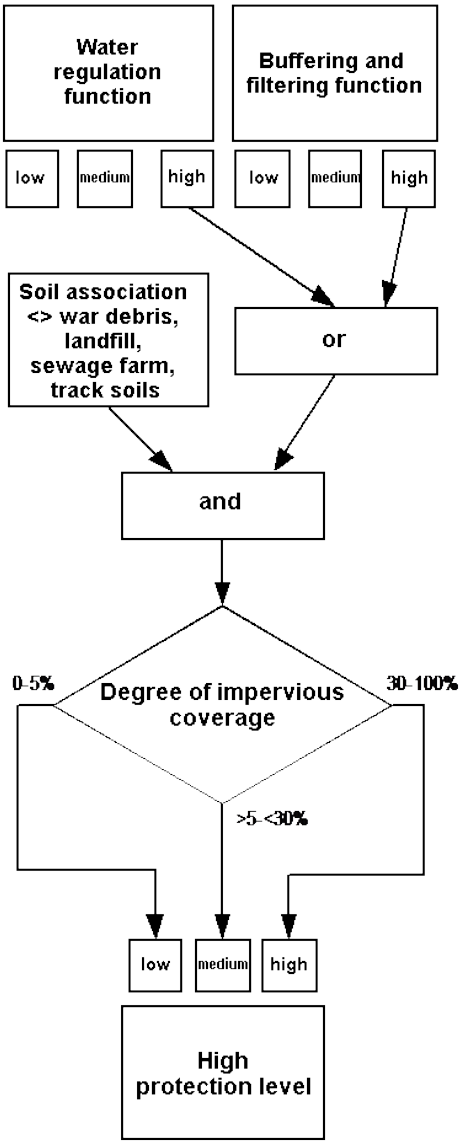

Fig. 3: Categorisation process for the 'high protection level'

Medium protection level

The 'medium protection level' is assigned when both the **'water regulation function'** and the **'buffering and filtering function'** receive 'moderate' ratings.

The moderate capacity of these functions may be improved through technical measures, such as retaining rainwater or choosing a soil cover that allows for water and air permeability. The goal is to work **with the soil protection authority to avoid a net loss of these functions and to minimise any net loss of land** (Leitbild und Maßnahmenkatalog (Vision and Catalogue of Measures), 2021, available only in German).

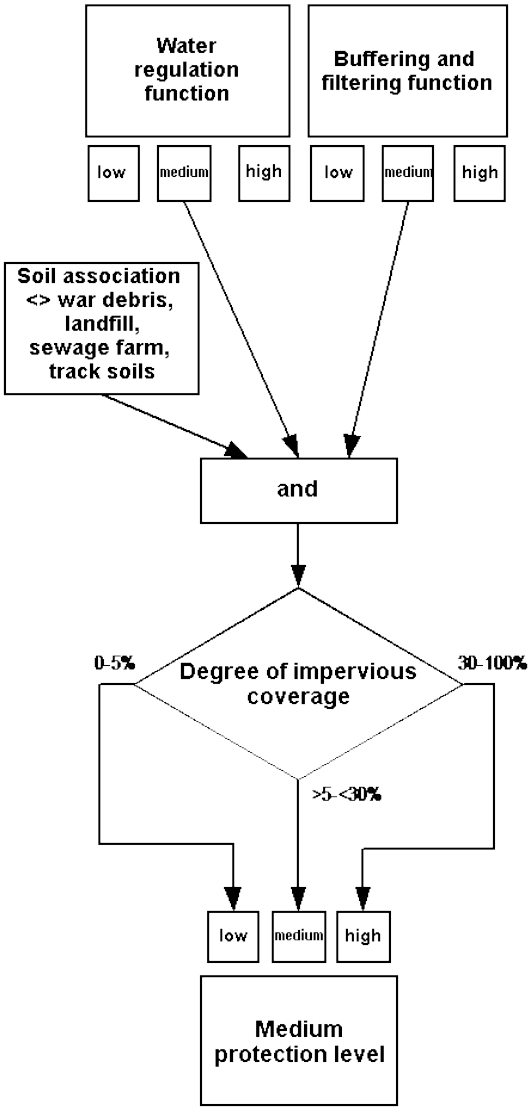

Fig. 4: Categorisation process for the 'medium protection level'

Low protection level (soils without additional requirements)

The remaining soils are classified as having a 'low protection level'.

Only the **general legal requirements for soil protection** apply here without any additional specific requirements. These general requirements are outlined in the Federal Soil Protection Law of 1998 (BBodschG), the Federal Soil Protection and Residual Waste Ordinance of 1999 (BBodSchV), the Berlin Soil Protection Law of 2004 (Bln BodSchG), the Building Code of 2017 (BauGB), and the Vision and Catalogue of Measures of 2021 (Leitbild und Maßnahmenkatalog, available only in German).

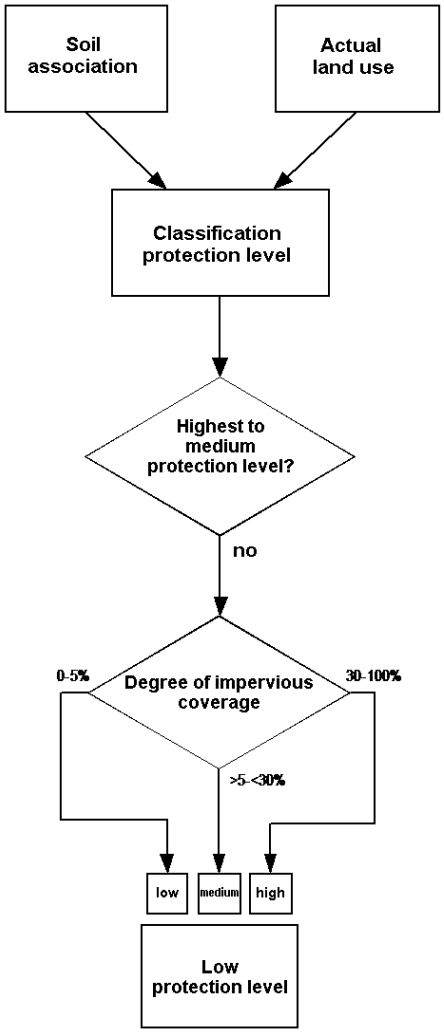

Fig. 5: Categorisation process for the 'low protection level'

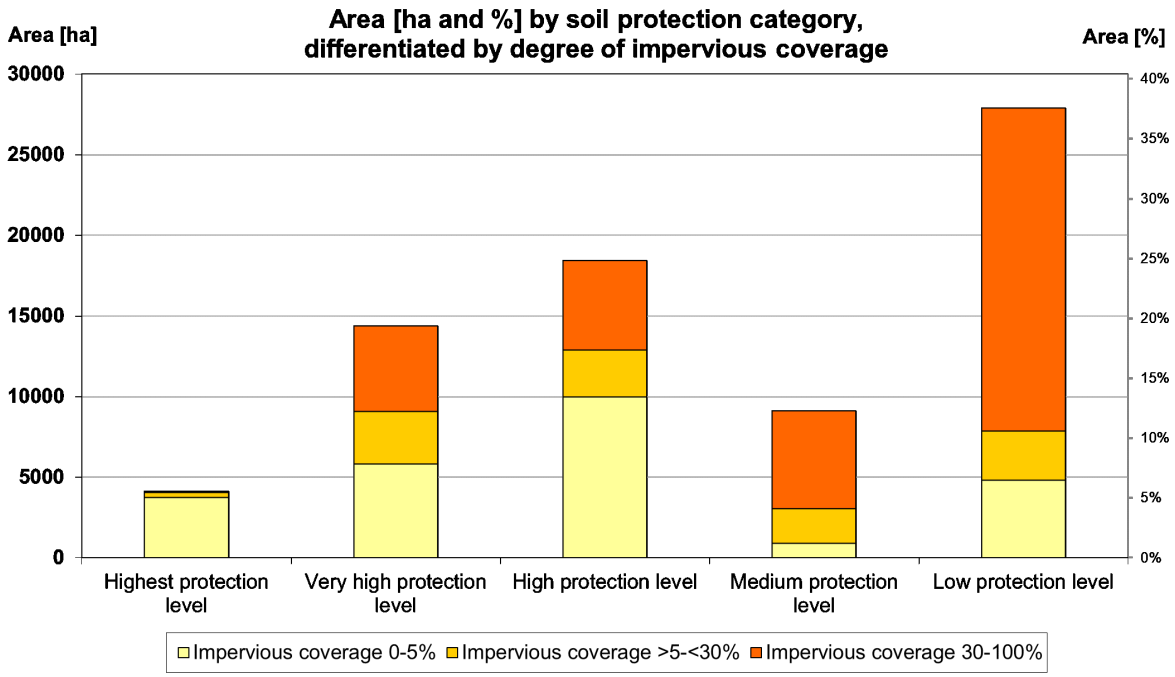

Fig. 6: Area [ha and %] by soil protection category and degree of impervious coverage (excl. streets and bodies of water)

Fig. 7: Total area [ha] and actual area [%] without impervious cover by soil protection category

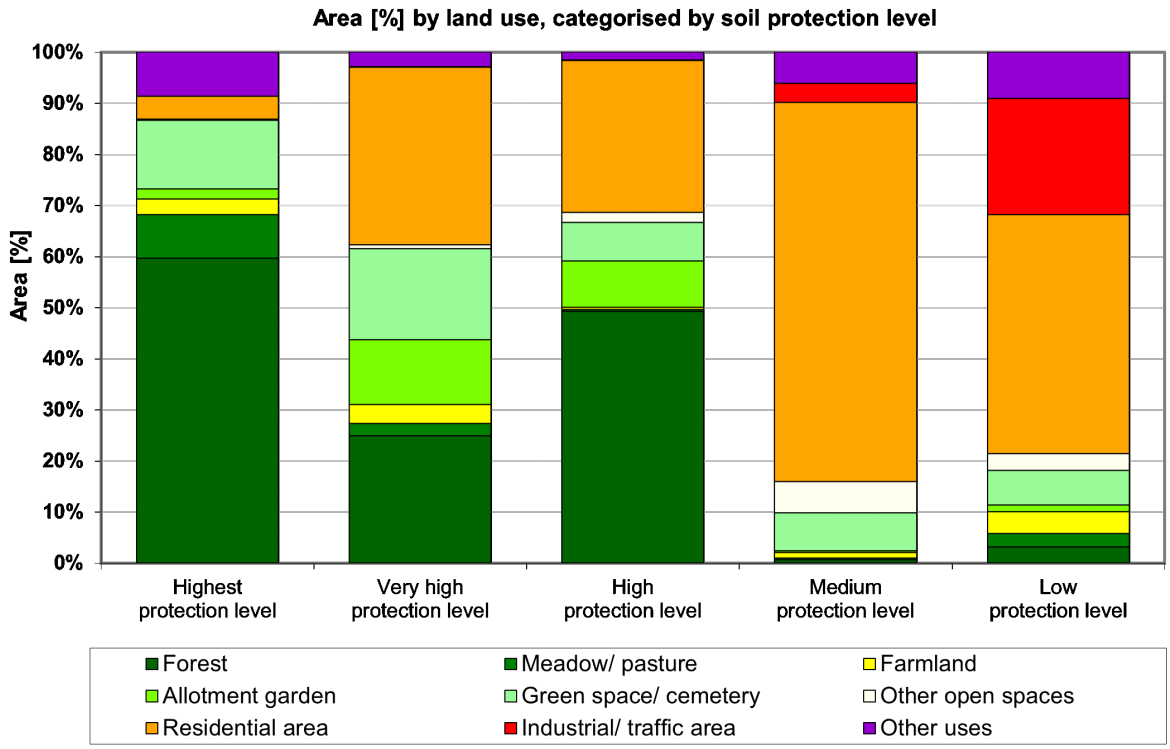

Fig. 8: Area [%] by land use, categorised by soil protection level

Soil protection category	Area		Of which without impervious cover		Impervious coverage class					
					0 – 5 %		> 5 – < 30 %		30 – 100 %	
	[ha]	[%]	[ha]	[%]	[ha]	[%]	[ha]	[%]	[ha]	[%]
Highest protection level	4,139	6	4,044	98	3,726	90	329	8	83	2
Very high protection level	14,364	19	11,687	81	5,817	41	3,277	23	5,270	37
High protection level	18,450	25	15,337	83	9,966	54	2,911	16	5,573	30
Medium protection level	9,103	12	5,502	60	886	10	2,172	24	6,045	66
Low protection level	27,879	38	15,413	55	4,832	17	3,036	11	20,012	72
Total	**73,934**	**100**	**51,984**	**70**	**25,227**	**34**	**11,725**	**16**	**36,982**	**50**

Tab. 1: Area balance of the soil protection categories (excl. streets and bodies of water)

Advice for Implementation in Planning Practice

The planning advice for soil protection outlines the essential requirements and guidelines relevant to each soil protection category. While primarily geared towards **development planning**, their principles can also be adapted for other spatial projects and planning endeavours. For methodological reasons, the map legend presents a simplified version of the advice. More detailed information for each specific area is available in tabular format through the factual data display of the FIS Broker. Terms used here, such as ‘avoidance’ and ‘compensation’ are not legal terms but rather directives pertaining to soil protection. It is important to note here that the evaluated soil functions only consider those **parts** of the blocks that are **without impervious cover**.

The factual data display includes the soil protection category, the soil association and land use underlying the assessment, the ratings for each of the five soil functions (from Maps 01.12.01 to 01.12.05) as well as the degree of impervious coverage. The planning requirements table, however, which is available for each individual area, is particularly useful.

Structure and contents of the planning requirements table:

- Row 1 lists the **soil protection category**.
- Row 2 describes the overall soil protection **goal**.
- Row 3 summarises the **classification criteria** (cf. Methodology, first section). The information in the rows that follow are based on these key soil functions.
- Row 4 details **avoidance and reduction measures** that should generally be pursued. It does not differentiate between avoidance and reduction since their distinction might vary depending on the context and the perspective of the parties involved. The main focus is on preventing interventions in soils that need to be protected rather than getting caught up in semantic differences.
- Row 5 offers suggestions for **compensatory measures**, ideally **tailored to specific functions**. Initially, it mentions requirements that can be conditionally imposed based on Building Code (BauGB) regulations.
- Row 6 may include additional **measures**, from a soil protection perspective, to address significant impacts on soil functions.
- Row 7 contains any **other relevant notes** or explanations.

Very high soil protection level	
Protection goal and planning assessment	Prioritise avoiding interventions. Give preference to alternative sites or optimise planning. Prioritise avoiding net loss of land without impervious cover and soil functions.
Assessment criteria (affected soil functions)	**high' water regulation function AND 'high' buffering and filtering function**
Avoidance and mitigation measures	■ Use soils of lower protection value. ■ Minimise (additional) impervious soil cover. ■ Utilise already impervious/ built-up areas or rehabilitated segments. ■ Reduce land consumption (e.g. space-saving construction, shortening of routes, optimised development, placing garages and ancillary structures close to roads). ■ Designate construction windows. ■ Avoid low-density building types (single-story houses, single-family homes, etc.). ■ Adjust the project to the terrain relief to minimise soil displacement. ■ Reduce the designation of roads and parking spaces. ■ Utilise the most permeable surface types possible (depending on use). ■ Exclude parking spaces and garages outside buildable plot areas according to Art. 12 BauNVO. ■ Exclude ancillary structures outside buildable plot areas according to Art. 14 BauNVO. ■ In built-up areas with existing building rights: protect soils without impervious cover by limiting building development (Benchmark: GRZ 0.3 according to Art. 19 Para. 4 BauNVO).
Function-related compensation (may be specified in the development plan, possibly at a site other than the intervention location)	■ Fully or partially remove impervious soil cover. ■ Retain and use rainwater. ■ Promote rainwater percolation (using e.g. using infiltration-trench systems and trench systems). ■ Utilise the most permeable paving types possible (depending on use). ■ Implement roof greening (in individual cases).
Measures (generally not specified under BauGB, may be regulated through urban development contracts)	■ Expand the depth of the rootable soil layer to up to 2 metres. ■ Rewet formerly groundwater-influenced sites. ■ Restore/ reclaim anthropogenic raw soils. ■ Apply lime according to conditions as needed (depending on the pH value). ■ Perform mechanical and biological deep loosening incl. subsoil improvement as needed.
Other notes	Coordinate with the responsible soil protection authority.

Tab. 2: Example of a planning requirements table in the Geoportal Berlin

Map Description

The map illustrates areas classified into five soil protection categories. Each protection category is further differentiated by varying colour intensities, indicating the degree of impervious coverage, 0 % to 5 %, more than 5 % to less than 30 % and 30 % to 100 %. The soil associations are referenced by their corresponding numbers in the following sections. For a description of the soil associations, please refer to Table 7 of Map 01.01.

Highest protection level

The highest protection category primarily covers **near-natural areas** featuring rare plant communities or remarkable remnants of the ice age on the city's **outskirts**.

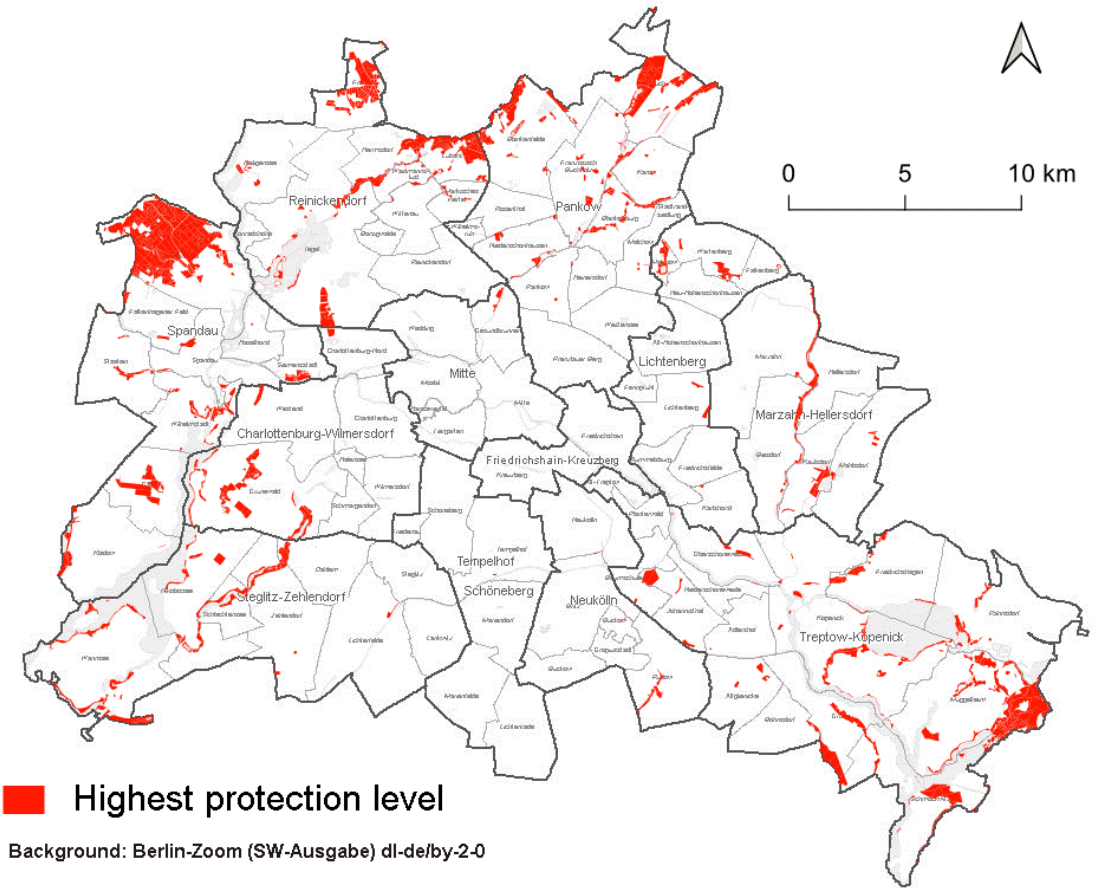

Fig. 9: Areas designated as 'highest protection level'

The highest protection category encompasses large, contiguous areas in the Spandauer Forst on valley sand with mesotrophic/ eutrophic histosols (1250, 1240) and oligotrophic transitional histosols (1200). These **groundwater locations** are associated with calcaro-gleyic cambisols, gleysols, eutro-gleyic dystric cambisols and calcaric gleysols (1150, 1231, 1210, 1220). The soil association that occupies the largest portion of this category (1200) is found in Schmöckwitzwerder (Schwarze Berge) in southeast Berlin.

Other sites near groundwater associated with the highest protection level include the Tegeler Fließ, featuring rare dystric gleysols, calcaro-dystric histosols, and eutrophic fluvi-eutric histosols (1180, 1280). The same is true for the soil association characterised by stagno-gleyed cambisol - gleysol - dried eutric histosol on valley sand (1164) in the Bucher Forst. Lastly, in Müggelheim, specifically in the Gosener and Müggelheimer Wiesen, dried eutric histosols in a valley sand lowland (1260) are also assigned the highest protection level. In the southwest of Berlin, in Kladow, areas with dried eutric-histosols containing fossil gleysols and dystric cambisols in meltwater channels around the Groß Glienicker See have been assigned the highest protection level (1290). Additionally, other areas situated at the edge of the Grunewald chain of lakes, such as the Pechsee and the Teufelssee (Grunewald) feature dried eutric transitional histosols, stagnic gleysols, fossil gleysols and dystric cambisols (1290, 1300). Also part of this category are areas in the Tegel Airport and Jungfernheide region, with fluvic soils (1320). In this protection category, the drained fluvisols with thick lime mud of Teerofen (1310) stand out in particular.

Smaller areas with eutric histosols and gleysols are located at the edges of water bodies such as the Krumme Lake in Grünau und Schmöckwitz, the Neuer Wiesengraben in Köpenick, the Krumme Laake in Müggelheim, the Fredersdorfer Mühlenfließ in the Rahnsdorfer Forst, the Lietzengraben and Seegraben in Buch (all 1231), and the Wuhle in Marzahn-Hellersdorf (1270). The groundwater-influenced soil associations in the Havel lowlands in Tiefwerder (1320), in the Königsheide in Johannisthal, and the fluvisols in Heiligensee also deserve mention.

Examples of areas in the highest protection category, with a primary emphasis on the **archival function**, include the ice-age-characterised arenic dystric cambisols associated with the podzoluvisols of the Frohnauer Forst (1080), and the arenic dystric cambisols associated with luvisols in Gatow (1130), which are used as farmland.

This protection category encompasses a total area of 4,139 hectares. Of this, 3,726 hectares (90 %) have less than 5 % impervious cover, 329 hectares (8 %) exhibit between more than 5 % and less than 30 %, and 83 hectares (2%) more than 30 % impervious cover. This protection category accounts for 6 % of the total assessed area, an actual 4,044 hectares (98%) of which are without impervious cover (cf. Fig 6, Fig. 7 and Tab.1).

As expected, areas with less than 5 % impervious cover dominate within this protection category. The proportion of areas that are more than 5 % impervious is small, amounting to 10 % (cf. Fig. 6 and Tab. 1).

These areas are predominantly **forests**, but they also include **parks and green spaces; mixed meadows, bushes and trees; residential areas,** and **farmland** (cf. Fig. 8). Most of these areas have already some form of legal protection. The highest level of protection is provided by nature conservation law through the designation of formal protected areas.

Very high protection level

This protection category highlights all areas **rated as 'high'** for their **yield function,** their **water regulation function** or their **buffering and filtering function**. Areas with 'moderate' ratings as sites for rare plants or their **archival function** also fall into this protection category.

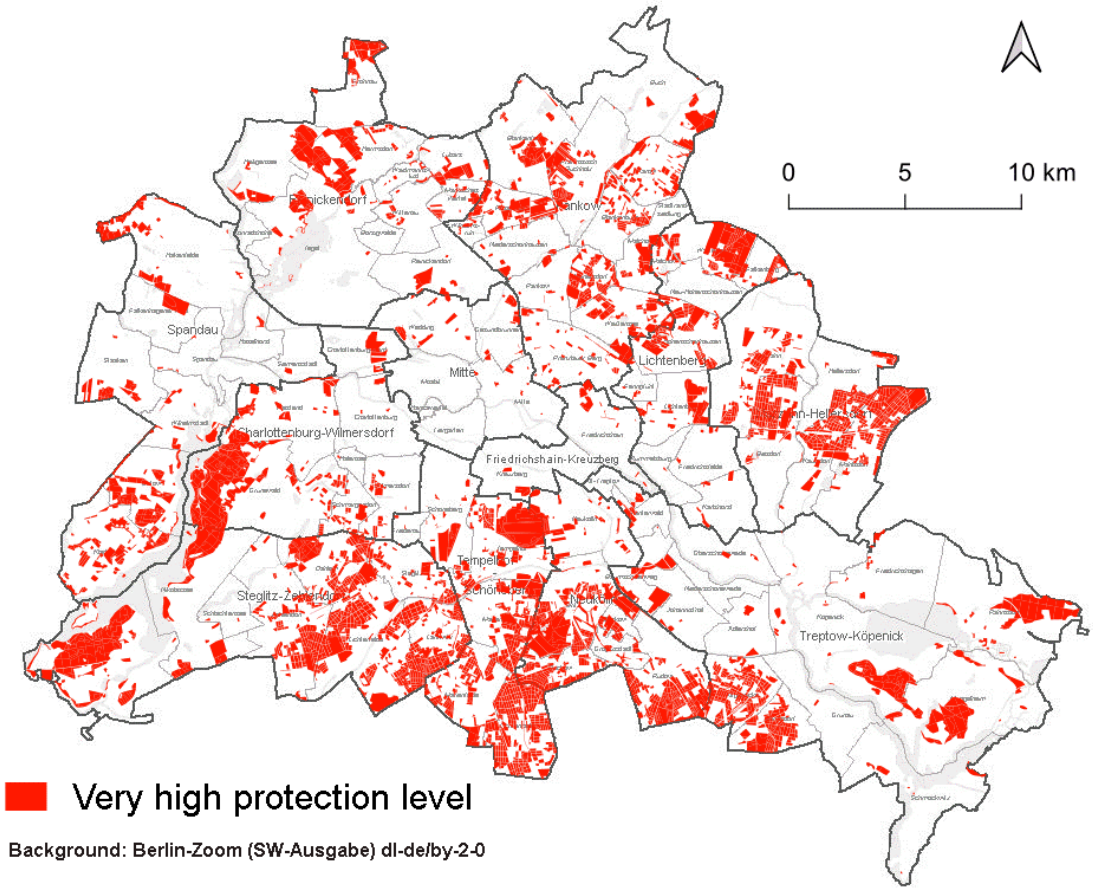

Fig. 10: Areas designated as 'very high protection level'

Large continuous areas falling under this category, whether without any impervious cover or minimally impervious, are situated at the end moraines and push moraines. These areas feature the Soil Association dystric cambisol - regosolic cambisol - colluvial cambisol (1040), and can be found in Grunewald, on the Schäferberg, Seddinberg, Müggelberge, and in Gatower Heide. The slopes of these moraines are characterised by the Soil Association dystric cambisol - regosol - colluvial cambisol/ gleysol (1060), which runs along the Havel, the Griebnitzsee and the Müggelberge.

The fluvioglacial meltwater channels winding through Grunewald are associated with the Soil Association dystric cambisol - chromic cambisol - colluvial cambisol (1050). Two common soil associations with a great need for protection are those featuring dune-sand with spodo-dystric cambisol - podzol/ dystric cambisol - colluvial dystric cambisol (1090, 1100) in the Tegeler Forst, Rahnsdorf,

Frohnau, Düppel and Müggelheim. At Müggelheim, these soils are partially mixed with the mentioned associations of end and push moraines.

Other areas in this category feature eutrophic fluvi-eutric-histosol - fluvic histo-humic gleysol - eutro-gleyic dystric cambisol (1280) in the Tegeler Fließ and dried fluvi-eutric histosol (1260) in the Gosener Wiesen. Small, scattered areas can be found on the Barnim Plateau with sandy sink fills, e.g. in Malchow and Wartenberg. The soil associations present here include dystric cambisol - colluvial cambisol (1072) and dystric cambisol - luvisol - dried eutric-histosol (1022). Other soil associations with a very high protection level are situated in the borough of Spandau (1030).

Areas in this protection category with a medium degree of impervious coverage, ranging from more than 5 % to less than 30 %, are concentrated on the Barnim and Teltow plateaus with boulder clay or boulder marl. Such areas are predominantly recorded on the outskirts of open single-family home settlements, or in parks and allotment gardens such as in Lichterfelde, Britz, Rudow, Bohnsdorf, Mahlsdorf and Kaulsdorf. The Soil Association consisting of luvisol - arenic cambisol (1010) makes up about half of these areas.

This protection category encompasses a total area of 14,364 hectares. Of this, 5,817 hectares (41 %) have less than 5 % impervious cover, 3,277 hectares (23 %) exhibit between more than 5 % and less than 30 %, and 5,270 hectares (37 %) more than 30 % impervious cover. This protection category accounts for 19 % of the total assessed area, an actual 11,687 hectares (81 %) of which are without impervious cover (cf. Fig 6, Fig. 7 and Tab.1). The main types of land use in this protection category are **forests, residential areas, allotment gardens,** and **parks and green spaces** (cf. Fig. 8).

High protection level

This category, comprising soils with a high protection level, is determined by their **'high' capacity** to regulate the **water balance** or to **filter and buffer substances**.

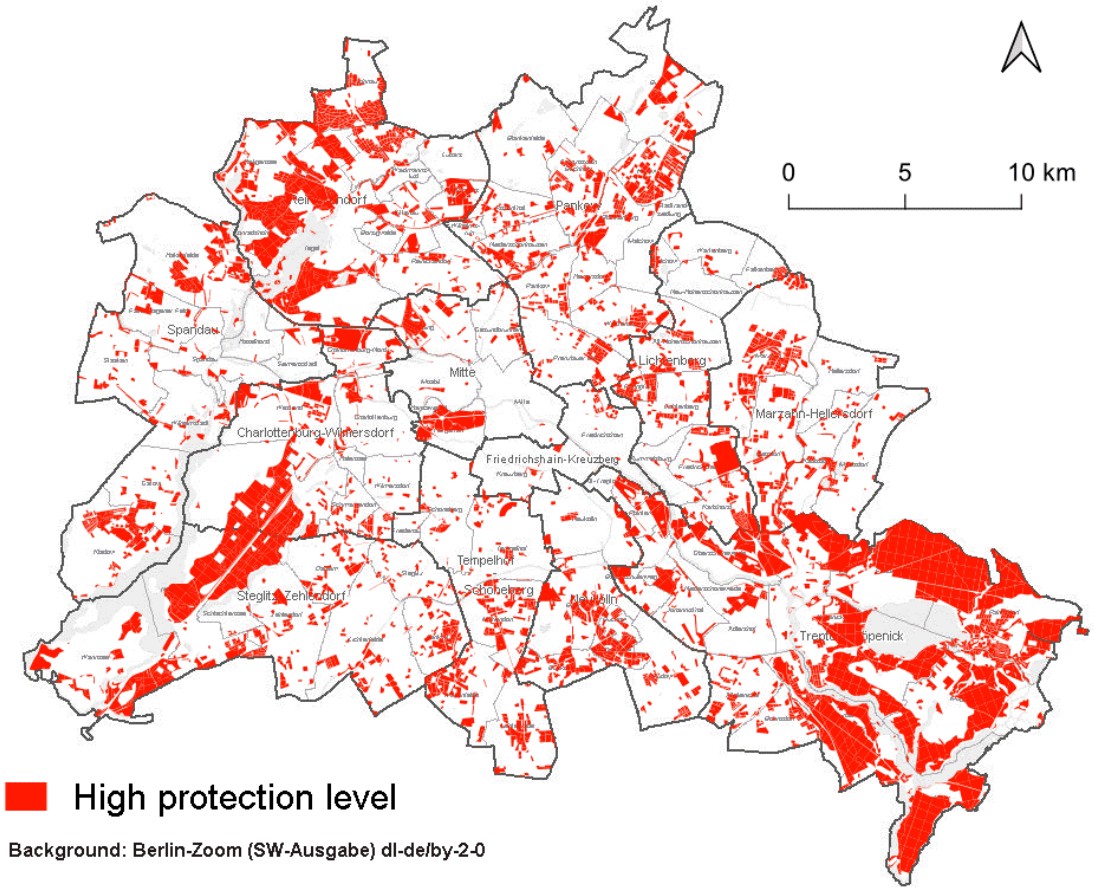

Fig. 11: Areas designated as 'high protection level'

A notable feature is a large expanse of land without impervious cover along Müggelsee, the Dahme, Seddinsee, and Crossinsee, where the entire forest area on valley sand with dystric cambisol - stagno-gleyed cambisol - gleyic cambisol (1160) meets these criteria. In addition, there are smaller areas with

an acidic soil association of drifting sand with spodo-dystric cambisol - stagno-gleyic dystric cambisol (1190). These dune-sand and valley-sand soil associations with a high protection level can also be found in the Tegeler Forst and Jungfernheide. Another large continuous area is formed by meltwater sands over glacial sands, predominantly comprising the forested areas of Grunewald with the Soil Association dystric cambisol - colluvial cambisol (1070). Smaller areas without impervious cover are located primarily in the north, south and west of Berlin on the Teltow and Barnim plateaus. The most common soil association here is luvisol - arenic cambisol of boulder marl (1010). The soils of the former Tempelhof airport on boulder marl with calcaric regosol + loose lithosols + regosol (2489) also fall under this protection category.

Areas with a moderate degree of impervious coverage (less than 30 %) in this category typically consist of scattered fragments. The predominant Soil Association dystric cambisol - stagno-gleyed cambisol - eutro-gleyic cambisol (1160) features medium and fine sands running through the glacial spillway. Additionally, soils composed of glacial sands on moraine surfaces featuring dystric cambisol - colluvial cambisol (1170) in Charlottenburg, particularly in areas utilised for allotment gardens, also meet these criteria. Other soil associations include drifting sands consisting of spodo-dystric cambisol - stagno-gleyed dystric cambisol (1190) in Schmöckwitzwerder, Wedding and Heiligensee as well as ground moraines with luvisol - arenic cambisol of boulder marl (1010) in Bohnsdorf, Britz and Hermsdorf.

Soils with a high level of protection and a high degree of impervious coverage (30 % to 100 %) are mostly found in fragmented areas, especially in areas designated for residential use, allotment gardens and weekend cottages. Apart from the dominant Soil Association 1160, these areas are primarily comprised of aggraded soils characterised by regosol + calcaric regosol + hortisol (2483, 2485, 2486, 2484). Examples of designated areas include the Zoologischer Garten, allotment gardens in Britz and Französisch Buchholz, and residential areas in Hermsdorf, Heiligensee, Biesdorf, and Mahlsdorf.

This protection category encompasses a total area of 18,450 hectares. Of this, 9,966 hectares (54 %) have less than 5 % impervious cover, 2,911 hectares (16 %) exhibit between more than 5 % and less than 30 %, and 5,573 hectares (30 %) more than 30 % impervious cover. This protection category accounts for 25 % of the total assessed area, an actual 15,337 hectares (83 %) of which are without impervious cover (cf. Fig 6, Fig. 7 and Tab.1). The main types of land use in this protection category are **forests,** followed by **residential areas, farmland,** and **allotment gardens** (cf. Fig. 8).

Medium protection level

This category, comprising soils with a medium protection level, is determined by their **‘moderate’ capacity** to regulate both the **water balance** and to **filter and buffer substances**.

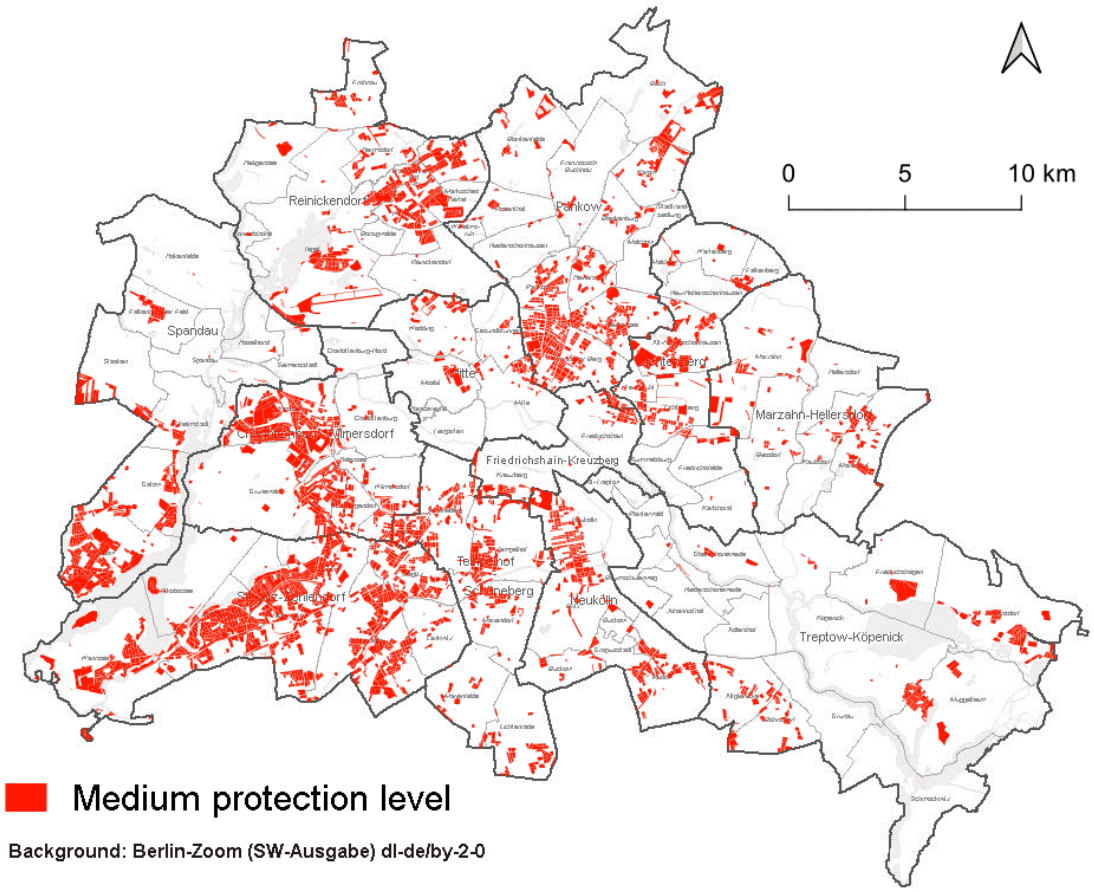

Fig. 12: Areas designated as 'medium protection level'

Small parcels predominantly make up the areas with a moderate degree of impervious coverage, ranging from more than 5 % to less than 30 %. Along the stretch that meanders from Wannsee, through Nikolassee, Zehlendorf, to Westend, the prevailing Soil Association is that of dystric cambisol - colluvial dystric cambisol (1070). The same Soil Association is also found in areas such as Hasenheide, Viktoriapark, and the Landschaftspark Rudow-Altglienicke. The loosely built-up areas of Kladow and Gatow are characterised by dystric cambisol - luvisol - colluvial cambisol (1020), while dystric cambisol - colluvial cambisol (1030) prevails in Dahlem. A large portion of this category represents residential areas on the Teltow and Barnim plateaus, which feature partially aggraded soils. These soils consist of regosol + calcaric regosol + hortisol (2483 – 2486) and calcaric regosol + loose lithosols + regosol (2487 – 2489, 7777).

Most areas in this protection category have a high impervious cover, ranging from 30 % to 100 %. These are primarily concentrated on the Barnim and Teltow plateaus, located in the southern and northern parts of the city. They can be found mainly in densely built-up areas such as Steglitz, Gropiusstadt in Neukölln, Prenzlauer Berg, Marzahn, Pankow, Lichtenberg, or the Märkisches Viertel in Reinickendorf. The soil associations have been significantly shaped by human activity, with sandy aggradations forming the parent material from which the soils have developed. Consequently, the prevailing soil types are underdeveloped A – C soils, such as loose lithosols, regosols, calcaric regosols and humic regosols (2490, 2483 – 2489, 7777).

Permeable or largely permeable areas with 0 % to 5 % impervious cover are only minimally represented within this category (cf. Fig. 6).

This protection category encompasses a total area of 9,103 hectares. Of this, 886 hectares (10 %) have less than 5 % impervious cover, 2,172 hectares (24 %) exhibit between more than 5 % and less than 30 %, and 6,045 hectares (66 %) more than 30 % impervious cover.

This protection category accounts for 12 % of the total assessed area, an actual 5,502 hectares (60 %) of which are without impervious cover (cf. Fig. 6, Fig. 7 and Tab.1). Unlike the preceding categories, which were dominated by areas with impervious cover below 30 %, this category is mainly characterised by areas with a high degree of impervious coverage, ranging from 30 % to 100 %. These regions are

primarily situated within residential areas on the plateaus, with some even located within the City Rail Circle Line (cf. Fig. 6 and Tab. 1).

In general, areas assigned to this protection category are located in **residential areas** (cf. Fig. 8).

Low protection level (soils without additional requirements)

The majority of soils and soil associations with a 'low protection level' in Berlin are subject only to **general soil protection requirements**.

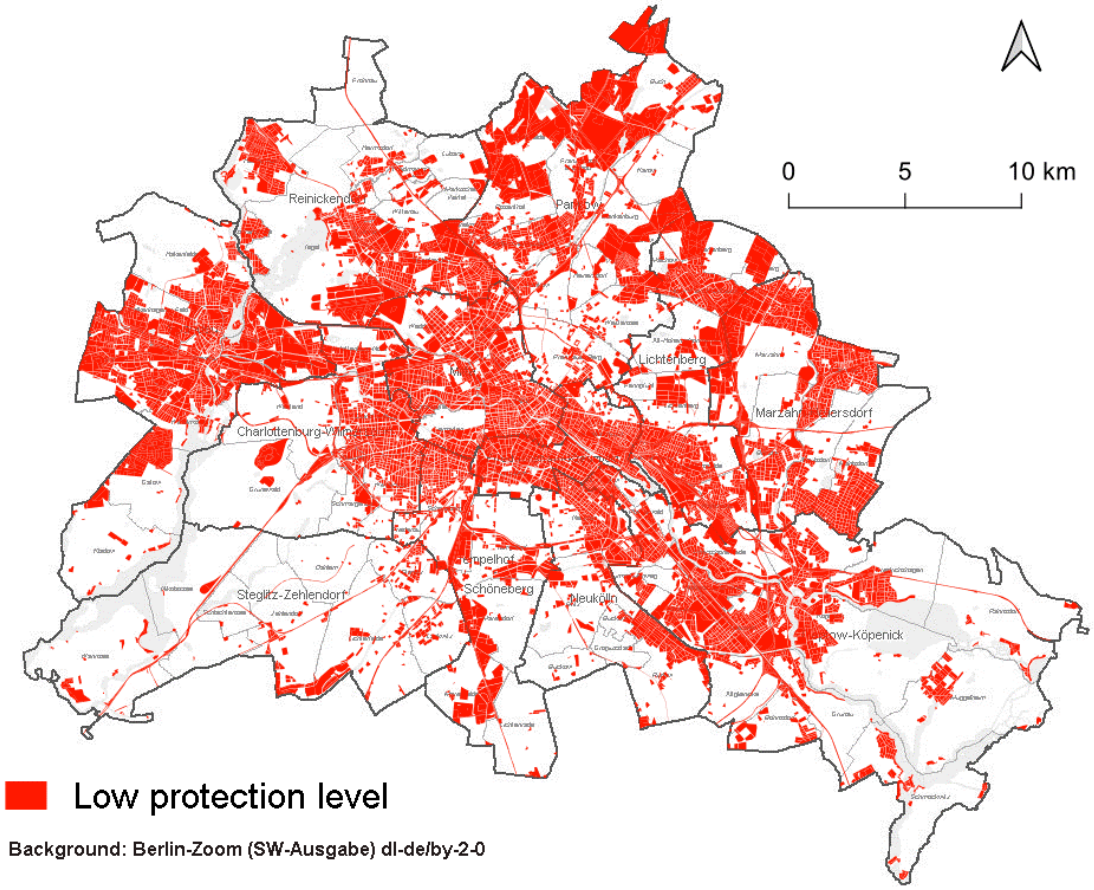

Fig. 13: Areas designated as 'low protection level'

These soils often form extensive, contiguous complexes, primarily in densely built-up areas with a high degree of impervious coverage (2482 – 2489, 7777), especially within the city centre (2490, 2500). Industrial sites along the Spree in Treptow and along the Spree and Havel in Spandau as well as in Lichtenberg, Neukölln, Tempelhof, and Reinickendorf (2540), also fall into this category. Human activity has significantly shaped the soil associations in these areas, which have largely developed from sandy aggradations. A common feature is their relatively short pedogenesis, resulting in underdeveloped A – C horizons. These areas are mainly composed of loose lithosols, regosols and calcaric regosols.

Areas with a low degree of impervious coverage in this category mostly consist of former sewage farms comprising regosols, luvic regosols, dystric-eutric regosols, and gleyic regosols (2560, 2580, 2590) in the northeast of Berlin, with a few scattered in Gatow. The same applies to war debris hills (2510), landfills (2530), former industrial areas (2540) and railway tracks (2470). These areas have not been designated for protection due to their potential or actual contamination.

This protection category encompasses a total area of 27,879 hectares. Of this, 4,832 hectares (17 %) have less than 5 % impervious cover, 3,036 hectares (11 %) exhibit between more than 5 % and less than 30 %, and 20,012 hectares (72 %) more than 30 % impervious cover. This protection category accounts for 38 % of the total assessed area, an actual 15,413 hectares (55 %) of which are without impervious cover (cf. Fig 6, Fig. 7 and Tab.1). Soils with a low protection level are largely located in **residential and industrial areas as well as fallow areas and locations designated for public service and other special uses**. A high proportion of **farmland** received a 'low' rating because of its

previous use as sewage farms. Due to existing contamination, these areas cannot advance to a higher protection category.

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