

ADAPTABLE BUNDESTAG BUILDING



RESEARCH PLAN AND DESIGN BRIEF
COMPLEX PROJECTS
ING. J.C.L. LEROY GÖRES

2024

COMPLEX PROJECTS
Bodies & Buildings Berlin
AR3CP100

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ABSTRACT

Abstract

The Bundestag is the German federal parliament and with its 736 representatives it is the biggest freely elected parliament in the world (Mayer, 2021). The size of the Bundestag fluctuates every election term because the German voting system works with overhang and levelling representatives (Federal Ministry of the Interior and Community, N.D.).

The range of possible mandates varies from 598 to over 1,000 members, highlighting the considerable variability and uncertainty in the system (Vehrkamp, 2021). With more than 7 employees per representative (Bundestag, 2022), the Bundestag can fluctuate with over 3.000 employees per election term.

This gives the obvious problem that it is very difficult for the Bundestag administration, to know how many facilities are needed. In the Bundestag, there is a forced use of home office, wooden container offices, and temporarily built offices, to try to facilitate the Bundestag (Ismar, 2021). This is also a problem on the sustainable side because temporary facilities are not sustainable and energy inefficient.

These problems are also true for any proposed designs for a new parliament building for the Bundestag. So, to counter these problems, a new Bundestag parliament building should be able to adapt to the change of users per election term.

Some questions that arise when looking at the possible solution of adaptability are: how are architectural elements related to this and how can the program best be used? How can digitalisation play a role and is it may be possible to have programmable and adaptable floorplans or room uses? How will the cyber security be accommodated for possible digital meetings? And how can all this adaptability help in sustainability?

The research and design question that follows out of these questions: *How to design the adaptable Bundestag parliament of the future to sustainable facilitate the fluctuating number of members?*

To answer the research question and come to a conclusion/final design, the research into the client will be done by gathering information through internet, interviews, and written questions. For the site the main research methods will be mapping information and site visits. And for the program the research will be done by case studies on other federal parliamentary lower house buildings. Because the Bundestag is idiosyncratic in its fluctuating size, the comparisons will be in square meter per employee.

The final goal is to design a new sustainable Bundestag parliament building that is adaptable in use and program, and not negatively affected by the fluctuating number of members of the Bundestag.

Keywords

- Adaptable building use
- Hybrid building use
- Sustainable program use
- Parliament building
- Bundestag

INDEX

Abstract

P. 05

01 INTRODUCTION

P. 08

Thesis Topic/introduction

P. 09 P.

Problem statement

10

Research question and sub-questions

P. 12

02 RESEARCH FRAMEWORK

P. 14

Theoretical framework

P. 15

Relevance

P. 16

03 RESEARCH METHODS

P. 18

Research methods

P. 19

04 DESIGN BRIEF

P. 22

Client

P. 23 P.

Site

25

Program

P. 66

Energy

P. 70

Group

P. 70

05 DESIGN BRIEF RESULT

P. 74

Masterplan from client and site

P. 76

Massing from site and program

P. 78

06 BIBLIOGRAPHY

P. 84

Bibliographical References

P. 85 P.

Figures

86

INTRODUCTION

01



Thesis Topic/Introduction

The Bundestag is the German federal parliament and in its current 20th term it is with 736 representatives the biggest parliament in the German history (Bundestagsverwaltung, 2023) and the biggest freely elected parliament in the world (Mayer, 2021).

The Bundestag is also the only federal body that is directly chosen by the German people. It is the successor of the earlier Reichstag parliament body and met for the first time in 1949. Since then, the size of the Bundestag changed every election term, but the minimum size is 598 representatives (Bundestagsverwaltung, 2023). The variety of the Bundestag size every election term has to do with the German voting system and the system of overhang and leveling representatives (Überhangmandate und Ausgleichsmandate) (Federal Ministry of the Interior and Community, N.D.).

The Bundestag has multiple functions, including, being the chief legislative body on the federal level, electing the German Chancellor (Kanzler), and composing the yearly budget that the government can work with (Bundeshaushalt) (Bundestag, N.D.).

The plenary hall of the Bundestag is in the old Reichstag building and the Bundestag has been meeting there since 1999. Besides the Reichstag building the Bundestag mainly works and functions out of 8 other buildings with a total floor area of over 450.000 m² and with more than 6.000 offices, to accommodate its almost 10.000 employees (Bundestag, 2023). The Old Reichstag building is partly because of its famous history also the most visited parliament building in the world with over 2 million yearly visitors (Bundestag, N.D.).



Figure 01: The plenary room (Plenarsaal) of the Bundestag, located in the old Reichstag building. On the top left the German eagle. This symbol is also the architectural element of this research.

Problem statement

As mentioned in the introduction the size of the Bundestag is not solely determined by the results of the second vote but is also significantly influenced by how voters split their first votes (Bundestag, 2021). As a result, the Bundestag's size can vary widely depending on these behaviours, making it somewhat unpredictable. The range of possible mandates varies from 598 to over 1,000 members, highlighting the considerable variability and uncertainty in the system (Vehrkamp, 2021).

The representative in the Bundestag cannot handle their mandated tasks alone. That is why each of them currently has 23.205 euros available per month for employees who support them in carrying out their parliamentary work and on average every representative of the Bundestag has 7,2 of these employees (Bundestag, 2022).

Knowing the fact that the number of representatives of the Bundestag can change in over 400 members and that every member has more than 7 employees, results in the fact that the size of the Bundestag can fluctuate with over 3.000 employees per election term. This number is an extreme case, and normally the number is lower, for example in 2017, when the Bundestag grew with 624 employees, because of the election results (Bundestagsverwaltung, 2023). But it shows and highlights the fact that the size of the Bundestag uncertain is and that the change of employees quite considerable is.

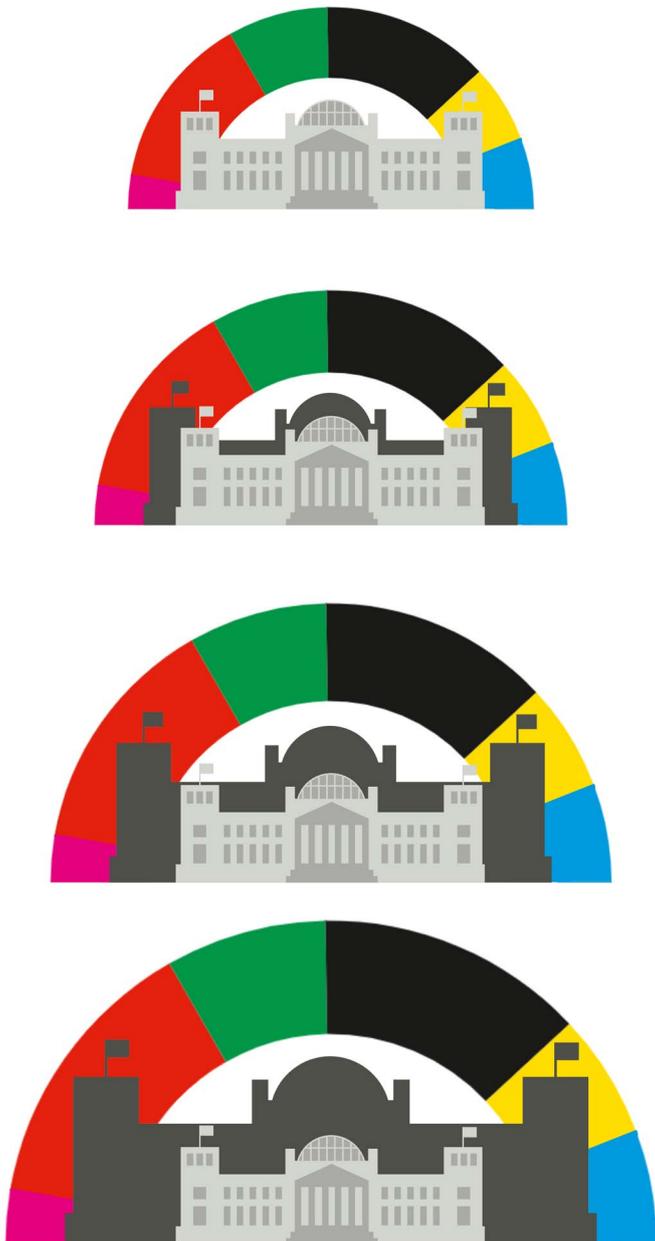


Figure 02: Illustration showing the standard, L, XL, and XXL Bundestag, all different in size.

Jobs/Departments	Employees	XXL
Abgeordnete	736	963
Scientific staff	1.958	2.562
Secretaries	841	1.100
Clerks	917	1.200
Auxiliary staff	1.436	1.879
Total for Abgeordnete	5.887	7.703
Director Department	49	
Parliament and MP Department (P)	1.170	
Foreign Relations, Europe and Analysis Department (A)	480	
Information and Documentation Department (I)	340	
Digitization Department (D)	180	
Construction and Infrastructure Department (B)	190	
The central Department (Z)	840	
Total for Bundestag administration	3.249	
Extra staff	718	
Total for Extra staff	718	
Current bundestag employees	9.854	11.670

Figure 03: Table showing the current size of the Bundestag and how this would grow with almost 2.000 employees in a Bundestag XXL.

This gives the obvious problem that it is very difficult for the Bundestag administration, or a designer for a future Bundestag parliament building, to know how many offices, meeting rooms, conference rooms, facilities, etc. are needed.

Problem statement

Even though this looks like an obvious problem, the solution is not. The problem could be solved by changing the voting system, but this means changing the German constitution, and this will probably not happen, because a lot of the political parties' profit from this voting system.

So, a legislative solution is unlikely and therefore the problem must be solved by making sure that there are always enough and not too many facilities after each election. But in reality, this is not the case because of the earlier mentioned uncertainty and unpredictability of the voting results. For example, in the current term of the Bundestag, there is a forced use of home office, wooden container offices, and temporarily built office buildings, to try to facilitate the employees of the Bundestag (Ismar, 2021).

This is also a problem on the sustainable side, because quickly building new, and sometimes even temporary, offices and other facilities to accommodate the problem is not sustainable and energy inefficient. The same can be said for planning ahead for a worst-case scenario and building a large number of offices and facilities in advance, and then only using a small part of them when the voting results do not reflect this worst-case scenario.

These problems are also true for any proposed designs for a new parliament building for the Bundestag. So, to counter these problems, a new Bundestag parliament building should be able to adapt to the change of users per election term.

German election system

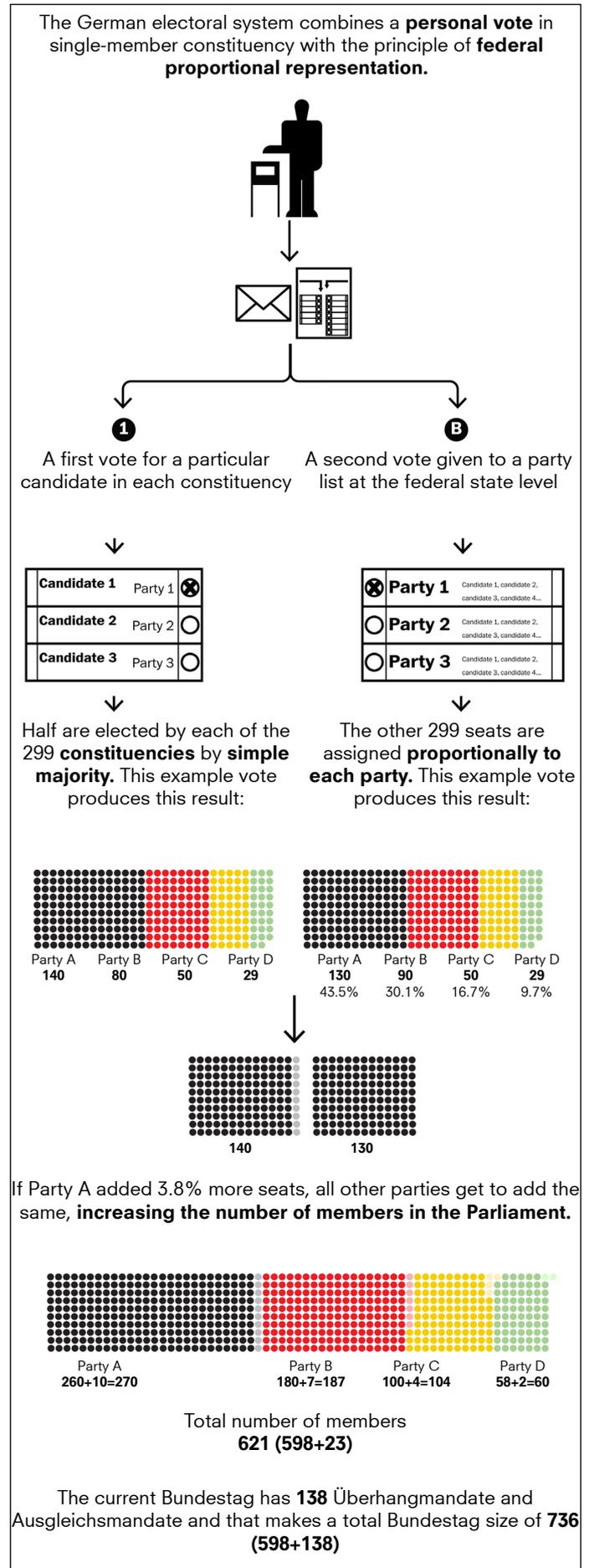


Figure 04: Flowchart explaining the German election system and how the Bundestag can fluctuate in size.

Research question

Through the research into the problem, it became clear that an adaptable parliament building could maybe be a possible solution for the problem. It could be an interesting topic to do research on and this research would then mainly be focused on the use and program of the parliament, as these are important parts of adaptable building use. The proposed idea for this project is to design a new adaptable parliament for the Bundestag, so that the politics is not impeded by facilitatory problems.

Some questions that arise when looking at the problem and possible solutions of adaptability are: how are architectural elements related to this and how can the program best be used in this case? And on a technical level there will also be some questions and challenges such as how can digitalisation play a role and is it maybe possible to have programmable and adaptable floorplans or room use like on a stage in a theatre? There will also be challenges on safety and security for adaptable building use in a parliament. And questions like how the cyber security will be accommodated for possible digital meetings. Also, very important in this time and age, how can all this adaptability help in sustainability? And finally, how do an adaptable parliament and transparency of democracy go together?

All the questions result in the following main research and design question: *How to design the adaptable Bundestag parliament of the future to sustainable facilitate the fluctuating number of members?*

To make this complex research topic of a new adaptable Bundestag parliament feasible, the research is divided in the following topics: architectural considerations, technological solutions, sustainability measures, public engagement & democratic transparency, and legal, security & safety aspects. The sub-questions that are needed to give a good answer to the main research and design question are:

Sub-questions

Architectural considerations:

- What architectural elements can be implemented to accommodate a variable number of parliament members?
- How can the physical layout/ program of the Bundestag be designed to ensure flexibility and adaptability in use?

Technological solutions:

- What role can movable or programable floorplans play in designing an adaptable parliament?
- How can digital systems and communication technologies such as holograms be integrated to enhance the functionality of the adaptable Bundestag?

Sustainability measures:

- How can the adaptable Bundestag contribute to energy efficiency and other sustainable goals?

Public engagement and democratic transparency:

- What measures can be taken to ensure that an adaptable Bundestag remains accessible and democratically transparent to the German people?

Legal, security and safety aspects:

- What legal, (cyber)security and safety challenges may arise in an adaptable parliament?

This project aims to answer the research question by doing academic research into the topics of the sub questions and answering these sub questions by written and designed research methods. The final goal is to design a new sustainable Bundestag parliament building that is adaptable in use and program, and not negatively affected by the fluctuating number of members of the Bundestag.



Figure 05: The „Flagge der Einheit“ (Flag of Unity) in front of the Reichstag building. It is a symbol and stands for the unification of Germany as a monument on the Platz der Republik.

RESEARCH FRAMEWORK

02



Theoretical framework

The concepts that are clearly central and critical to this research topic are “adaptable building use”, “flexible building use” and “sustainable building use”. These three concepts are defined and discussed on the hand of existing theories and literature reviews in the following part of this research plan.

“From an architectural design perspective, a broad distinction can be made between two strategies for making architecture flexible. A building can be flexible by being designed so that physical changes can be made after completion, or through using a building for different purposes. The former has been termed simply ‘flexibility’, the latter ‘adaptability’” (Groák, 1992).

“When buildings are designed to be adaptable, on the other hand, the flexibility lies at the level of the layout of the building. The building is capable of different social uses but remains unchanged” (Groák, 1992).

Using these definitions, the concept of adaptability means using a building for different purposes. For this research the definition will be more specific of not using a whole building for a different purpose but using certain rooms like a plenary hall for a different purpose.

“A paper by (Larsson, 1999) examines adaptable office buildings, and assumes that the environmental benefits are largely related to two factors: the annualized reduction in embodied and replacement energy, and the annualized reduction in solid waste generation from renovation and demolition.

Using data from research studies that document the quantities of embodied energy and demolition energy used by office buildings, Larsson estimates an equivalent reduction in two categories of environmental loadings: 15% reduction in air emissions, and 15% reduction in demolition solid waste.” (iea-ebc, 2001)

This research by Larsson shows that adaptable buildings can help in the sustainable building use. For this research into an adaptable Bundestag the information that adaptability can help with sustainability is important because the research question asks to design a sustainable adaptable Bundestag.

The three key concepts that are now described are important for the research because the current research done in these topics mainly focuses on buildings in general and not on specific rooms in buildings. This will be done in the research into an adaptable new Bundestag building.

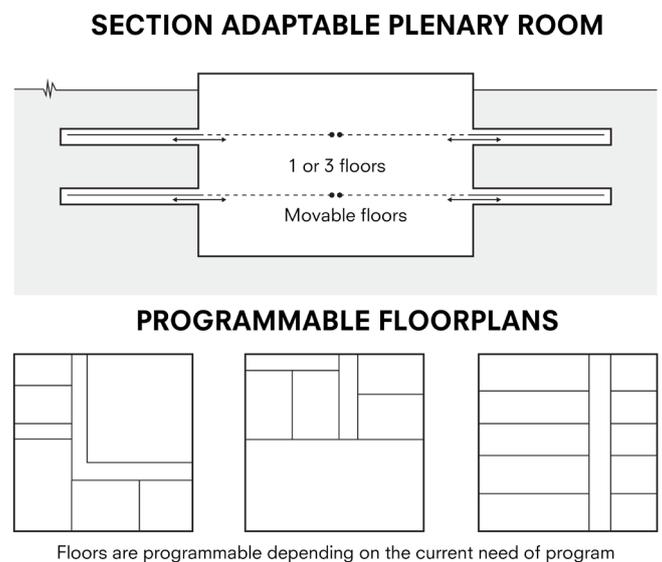


Figure 06: Diagram showing a possible way to have an adaptable plenary hall with multiple programmable floorplans.

Relevance

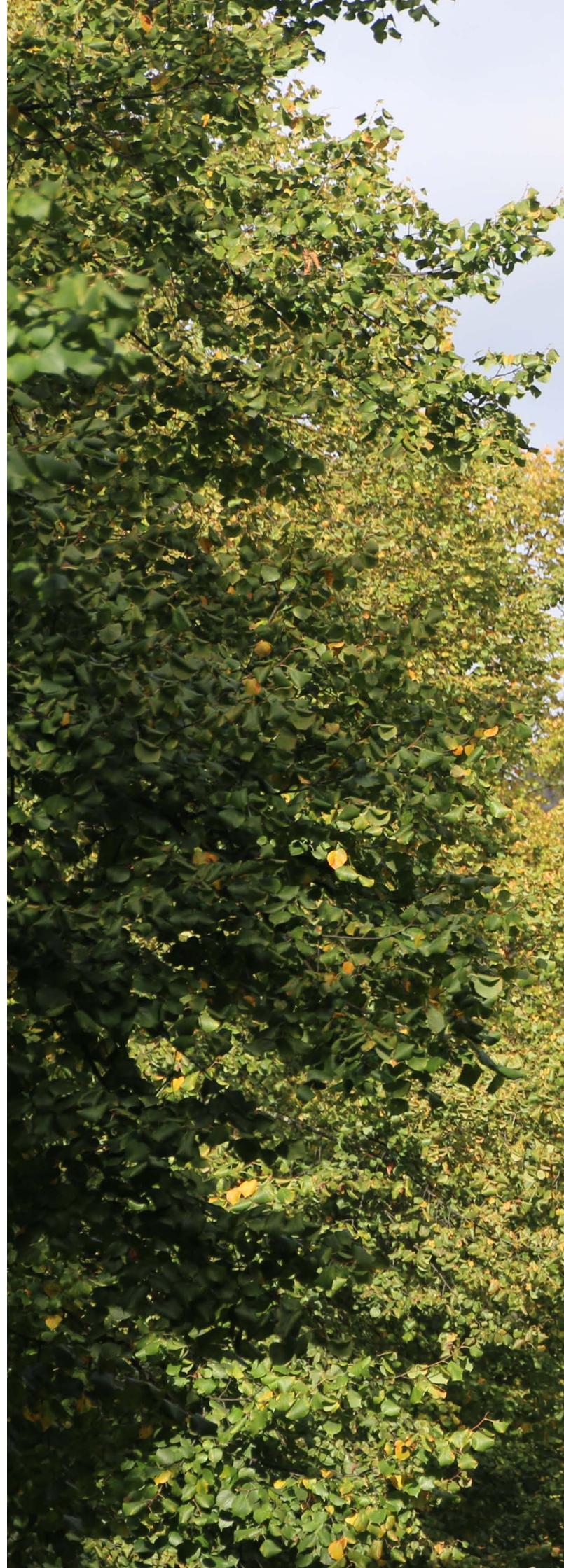
The relevance of this research and design can be sub divided in sustainable, democratic, and architectural relevance. The main topic is relevant, because the problem is a real problem in the Bundestag and a problem that has real consequences. Next to that the current Bundestag administration is not able to sustainable solve the problem (Ismar, 2021), thus research into how dis could be done is important.

Looking at the 3 subdivisions it can be stated that this research can help in achieving sustainable goals by making sure that the most efficient adaptable Bundestag will be designed. With this it is possible to construct less and use less of the building area than in traditional ways. Both reducing construction and building size could result in high savings in energy and materials. Also, the fact that the hybrid use of a building is related to commuting to and from a building could help in energy use reductions.

On the area of democratic processes this research is also relevant, because if there is nothing done, a worst-case scenario of “the Bundestag of a thousand” can play out that would really harm the functioning of the Bundestag an thereby harm the democratic system of Germany (Vehrkamp, 2021).

Lastly on the architectural topic this research is relevant to possible future designs because it can help in realizing environmental goals that architects must work with, and it could be used for similar building types like offices. This environmental aspect fits in the Energy aspect of group 9 in the BBB Complex Projects graduation studio.

Figure 07: *The Reichstag with the German flag photographed through trees. representing architecture, democracy, and sustainability.*





RESEARCH METHODS

03



Research methods

Client

The client of this research and design project will be the Bundestag, the parliamentary federal body of Germany (Bundestag, N.D.). Because it is a democratically chosen and by the constitution transparent political body it releases as much relevant information about itself and how it does function to the public. So, there is a lot of information accessible about the structure of the client, their many different roles, etc. This information will mainly be gathered through internet research, but for (not yet) digitalised information also interviews with employees, written questions and visits to archives are methods that will be used to come to conclusions for the design and research.

Program

The program will be mainly researched by different kinds of case studies of the different buildings and programs of the current Bundestag, but also of other federal parliamentary lower house buildings in the world. Because the Bundestag is idiosyncratic in its fluctuating size compared to other parliaments, there will be calculated and researched with square meter per employee/user instead of using averages. In this way other case studies can be used to get to conclusions for the Bundestag program. There will also be research done into the political workings of the Bundestag and the German election system. Lastly, also internet research methods will be used to gain information about future technologies that are related to adaptable and hybrid building use to make conclusions for the Bundestag program.

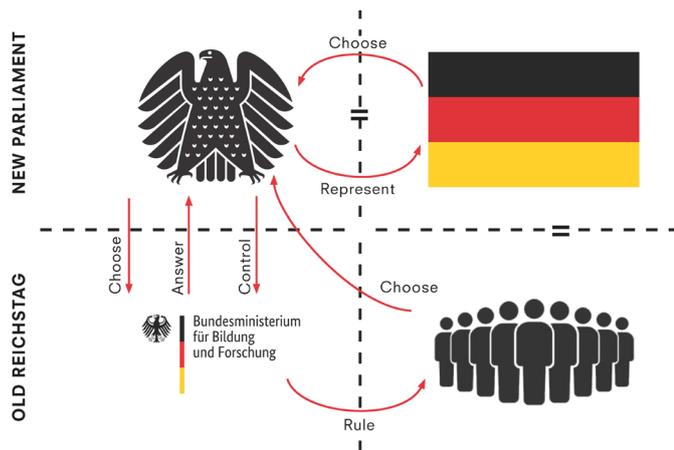


Figure 08: The client is the Bundestag, which is chosen by the German people. So, in a way the German people are the clients and the Bundestag will be the user of the building.

Site

For the site the main research methods will be mapping information from multiple publicly available sources such as internet sites from the municipality of Berlin (Bundesland Berlin, N.D.). Also, fieldwork and site visits will be used to further investigate and understand different sites to come to conclusions for the research and design.

Sector	Use	Rooms/program	m2	
Politics	Debating	Plenary room	1,820 m ²	
		Committee rooms	3,750 m ²	
	Working	Boardrooms	2,400 m ²	
		Hearing room	600 m ²	
		Offices Representatives	9,000 m ²	
		Offices Scientific staff	22,500 m ²	
		Offices Secretaries	9,000 m ²	
		Offices Clerks	10,800 m ²	
		Offices Auxiliary staff	16,200 m ²	
		Offices Parties	840 m ²	
		Library	8,200 m ²	
		Archiv	2,800 m ²	
Meeting	Reading room	1,200 m ²		
	Conference hall Bundestag	300 m ²		
	Conference hall Parties	1,500 m ²		
	Conference halls	5,400 m ²		
	Lobby areas	2,000 m ²		
	Walking halls	21,585 m ²		
	Offices for former Bundestag	180 m ²		
	Offices Astenenats	1,620 m ²		
	Administrative	Working	Offices	13,500 m ²
			Office gardens (DZ arch)	16,200 m ²
Meeting		Front office	1,500 m ²	
		Meeting places	2,880 m ²	
Visiting		Conference halls	6,000 m ²	
		Visitor area	1,200 m ²	
Public		Broadcasting	Water records	900 m ²
			Media rooms	900 m ²
		Securing	Press	1,050 m ²
			TV Studio	900 m ²
	Eating	Offices	720 m ²	
		Security rooms	480 m ²	
	Rest	Offices	540 m ²	
		Cafeteria	5,500 m ²	
Restaurant		800 m ²		
Kitchens		300 m ²		
Utility	Powering	Meeting places	1,440 m ²	
		Cafes	1,200 m ²	
	Storing	Director office	420 m ²	
Site	Maintaining	Fitness rooms	1,600 m ²	
		Utility rooms	14,390 m ²	
	Parking	Emergency power rooms	250 m ²	
		Storage rooms	7,195 m ²	
	Recreating	Server room	450 m ²	
Interacting		Cleaning rooms	7,195 m ²	
		Facility rooms	28,780 m ²	
		Parking garage	- m ²	
		Public area	- m ²	
		Public park	- m ²	
		Walking routes	- m ²	
			215,045 m ²	

Figure 09: Program breakdown of the Bundestag. This breakdown shows the sectors of: Politics, Administration, Public, Facility and Utility.



Figure 10: Collage made for this research plan of BBB Complex Projects. The collage shows the old Reichstag, an AI image of a future Bundestag parliament, Hologram debating, etc.



DESIGN BRIEF

04



Client

The client of the new adaptable Bundestag will be the German people, because they choose the Bundestag, pay for the Bundestag and are represented by the Bundestag. The German people will also in a way partially use the building when some of them decide to visit the debates.



DAS DEUTSCHE VOLK

MAIN FINANCIERS

DEM DEUTSCHEN VOLKE

The real users of the new adaptable Bundestag will be the employees of the Bundestag.



DER DEUTSCHE BUNDESTAG

MAIN CLIENT

USERS

Client



Bundesministerium
für Bildung
und Forschung

MINISTRY FOR EDUCATION AND RESEARCH

PORTFOLIO OF CULTURE

CLIENT FOR THE OLD REICHSTAG

The employees of the current Bundestag consist out of 736 chosen representatives and their 5.151 assistances. These assistances are for example: Scientific staff, Secretaries, Clerks, PR-managers, speech writers, and auxiliary staff. The number of representatives and their assistances can fluctuate around 3.000 per election term, so an adaptable program is needed. Next to this fluctuating political part of employees the Bundestag also has around 3.900 administrative and faciliatory staff. These employees are for example: Directors, managers, and workers in the 7 administrative departments, Lawyers, Cooks, Cleaners, etc. They also have their own police force for the security of the Bundestag and its buildings. In total the number of employees of the Bundestag is almost 10.000.

Jobs/Departments	Employees	XXL
Abgeordnete	736	963
Scientific staff	1.958	2.562
Secretaries	841	1.100
Clerks	917	1.200
Auxiliary staff	1.436	1.879
Total for Abgeordnete	5.887	7.703
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Digitization Department (D)	180	
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Total for Bundestag administration	3.249	
Extra staff	718	
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Current bundestag employees	9.854	11.670

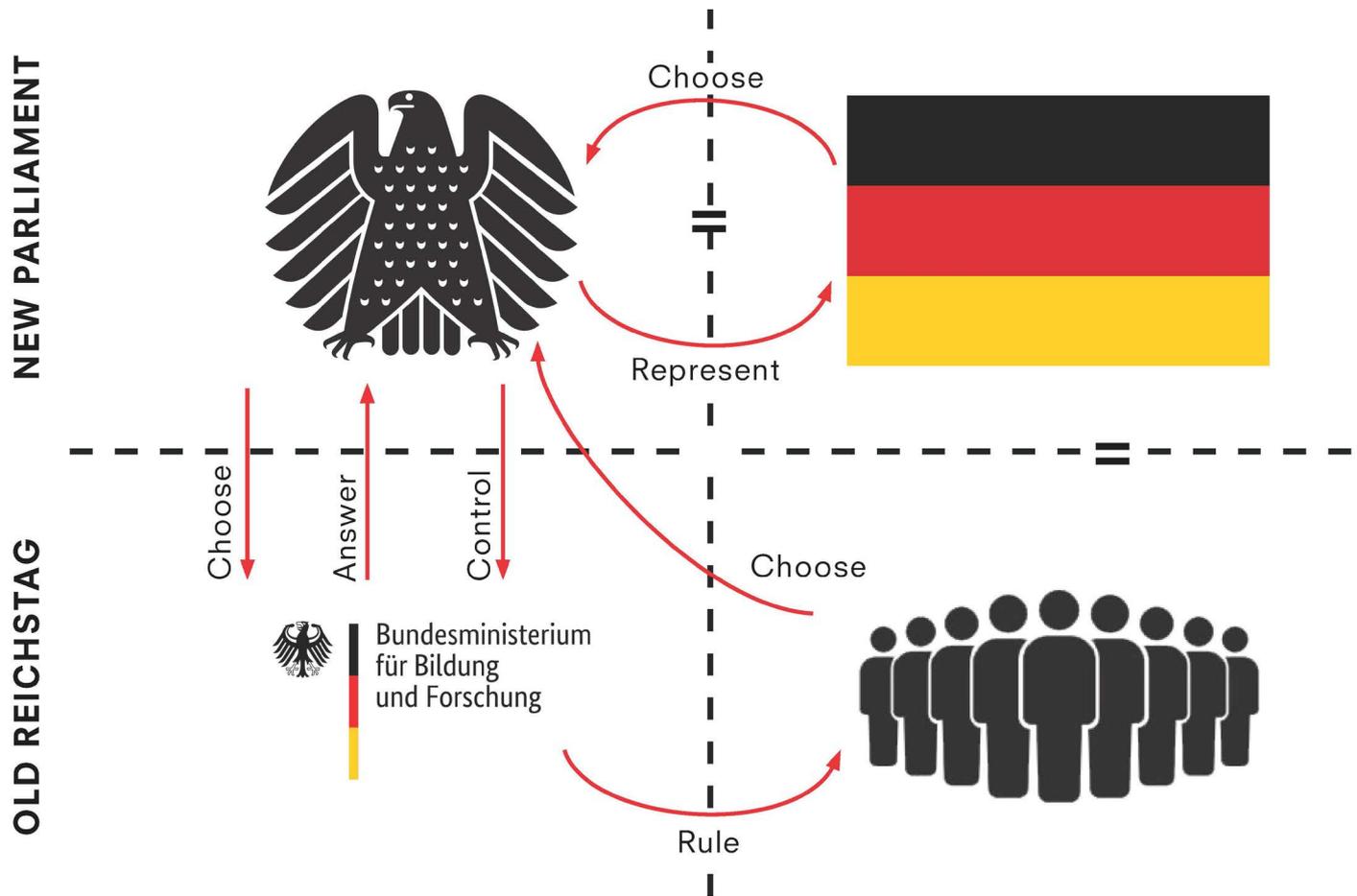


Figure 11: The client is the Bundestag, which is chosen by the German people. So, in a way the German people are the clients and the Bundestag will be the user of the building.

INTERESTS:

Modernization and Efficiency:

The Bundestag is likely interested in a new parliament building that incorporates modern design and technology to enhance the efficiency of legislative processes. This may involve advanced communication systems, sustainable energy solutions, and flexible spaces to accommodate the fluctuating member amount.

Symbolism and Tradition:

The Bundestag might seek a design that balances modernity with a respect for tradition. The new building should symbolize the German nation that it represents.

Accessibility and Inclusivity:

The client may emphasize the importance of creating a space that is accessible to all citizens. Inclusivity in design could reflect the Bundestag's commitment to democratic representation.

Security and Safety:

Ensuring the safety of parliamentarians, staff, and visitors is important.

STAKES:

National Identity:

The Bundestag's choice of a new parliament building directly contributes to Germany's national identity. The design and construction process will be closely scrutinized by the public, and the success of the project will impact the perception of the Bundestag as a symbol of German democracy.

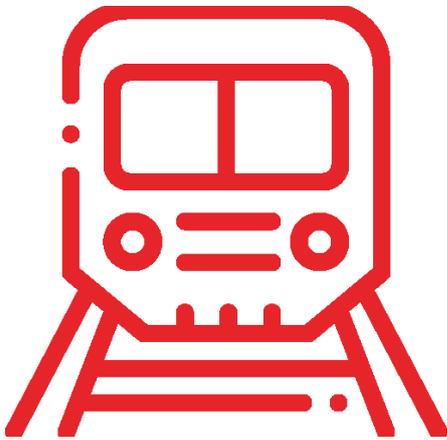
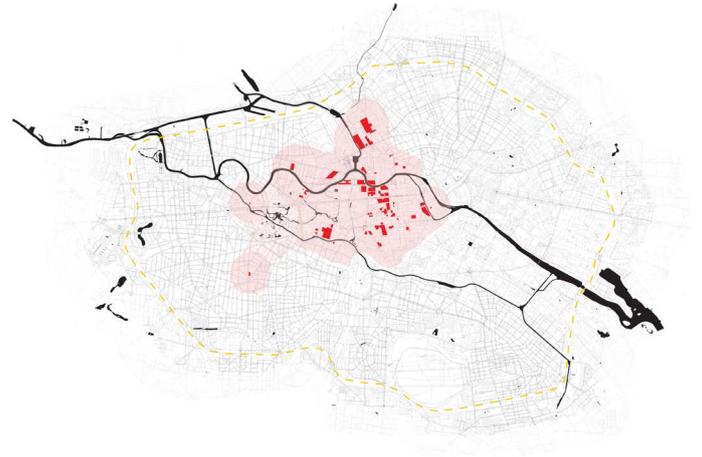
Public Perception:

The public's perception of the new parliament building will influence the Bundestag's standing. A successful project that aligns with public expectations and values will enhance the institution's reputation, while any controversies or shortcomings may lead to public scrutiny.



Rule 1: Government district

The location should be in close proximity to other government buildings and institutions, stimulating collaboration and efficiency in government operations.



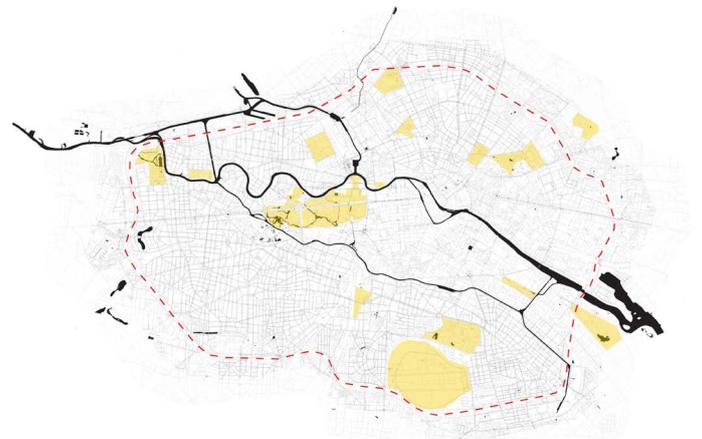
Rule 2: Public transportation

The site should be well-connected to public transportation networks to ensure easy access for parliamentarians, government officials, and the public.



Rule 3: Landmark visibility

The location should allow for the construction of a building that becomes a prominent landmark, easily recognizable and associated with the German Parliament.



Site

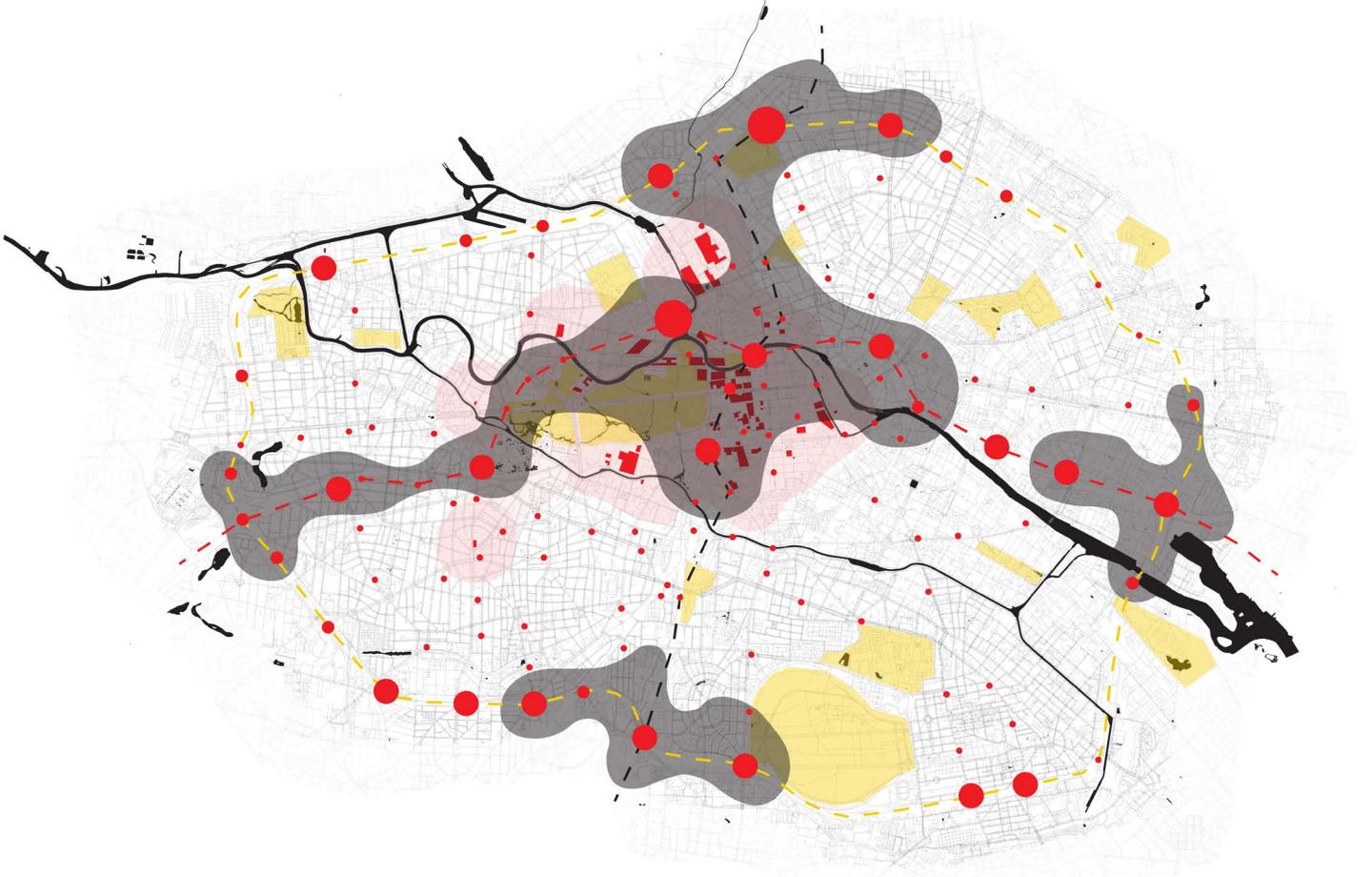


Figure 12a: Map showing the areas that follow the personal site requirements of: being near the political district, being near public transport and being located on an open site.



Figure 12b: Map showing the areas that follow all the site rules

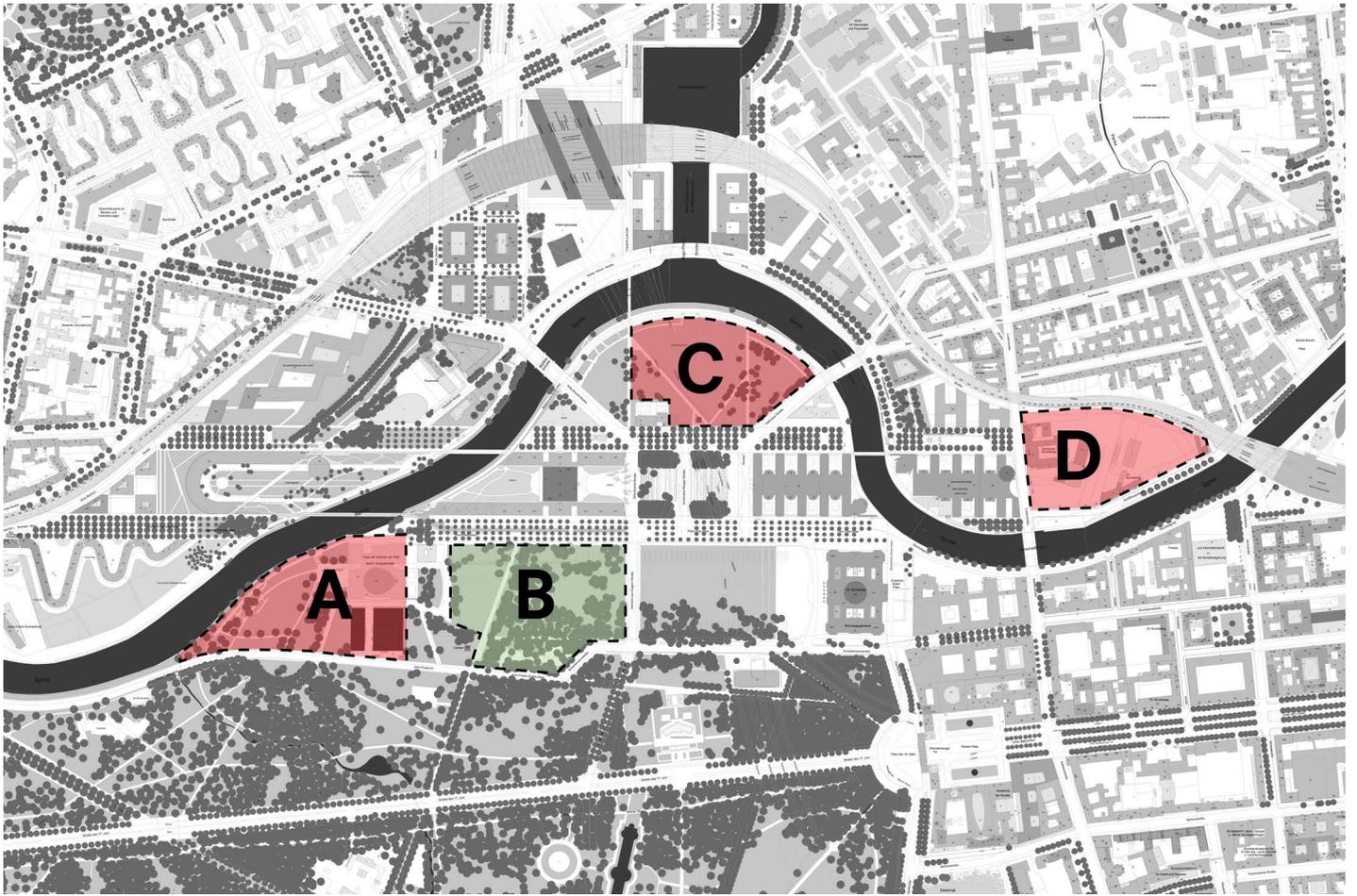


Figure 12C: Chosen site





PARLIAM



COMMENT

Site







Because the Bundestag has 10.000 employees and they should work together with the other political buildings the personal site requirements are: being near the political district, near large public transport and on an open site. These requirements are mapped in figure 12.

The chosen site is the park that is not directly in front of the old Reichstag but one park further. This park is the Skulpturenpark and has the temporary Tipi am Kanzleramt. The idea is to remove as less trees as possible, so form follows trees and that gives a buildable plot of around 36.000 m².

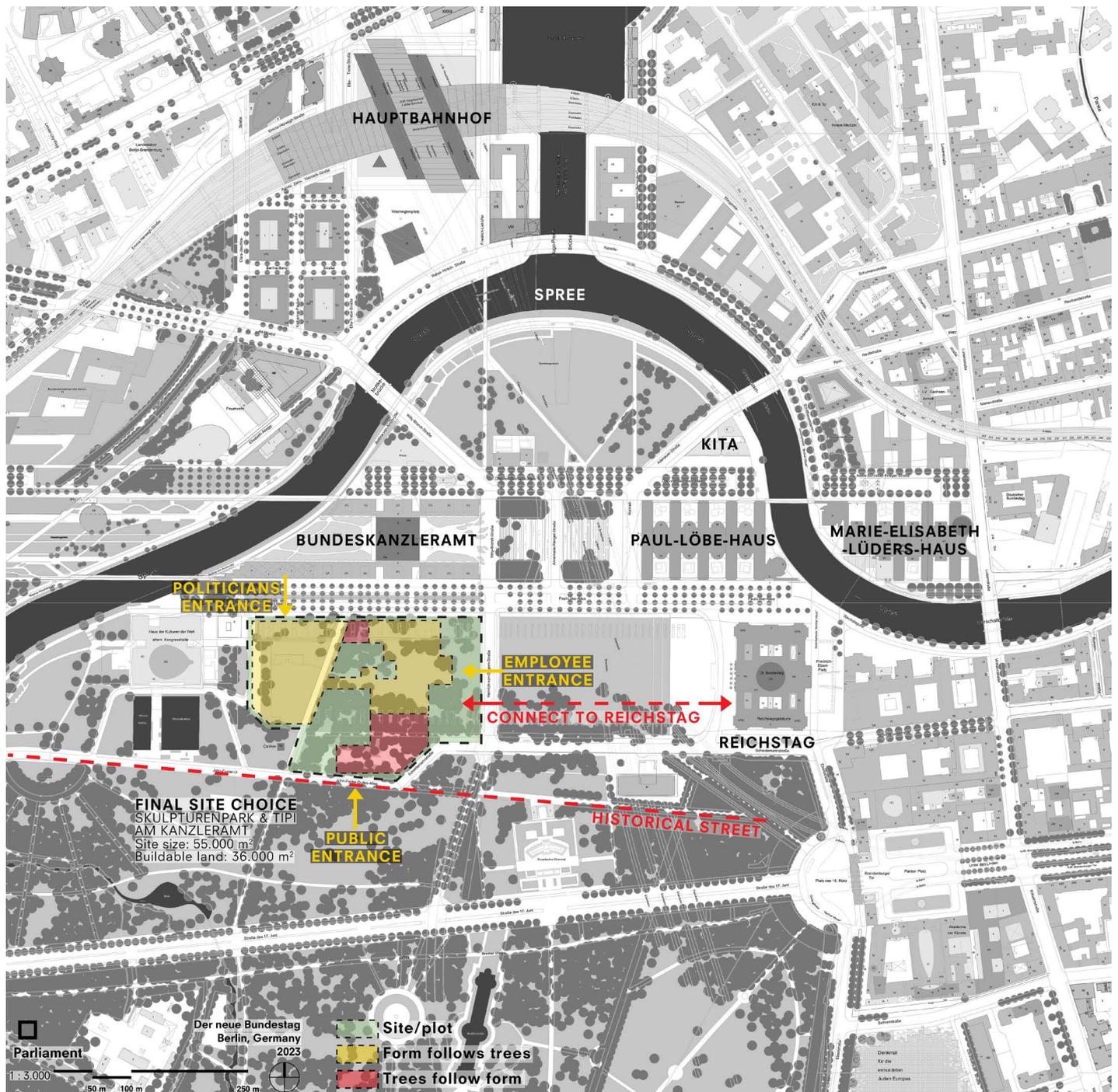
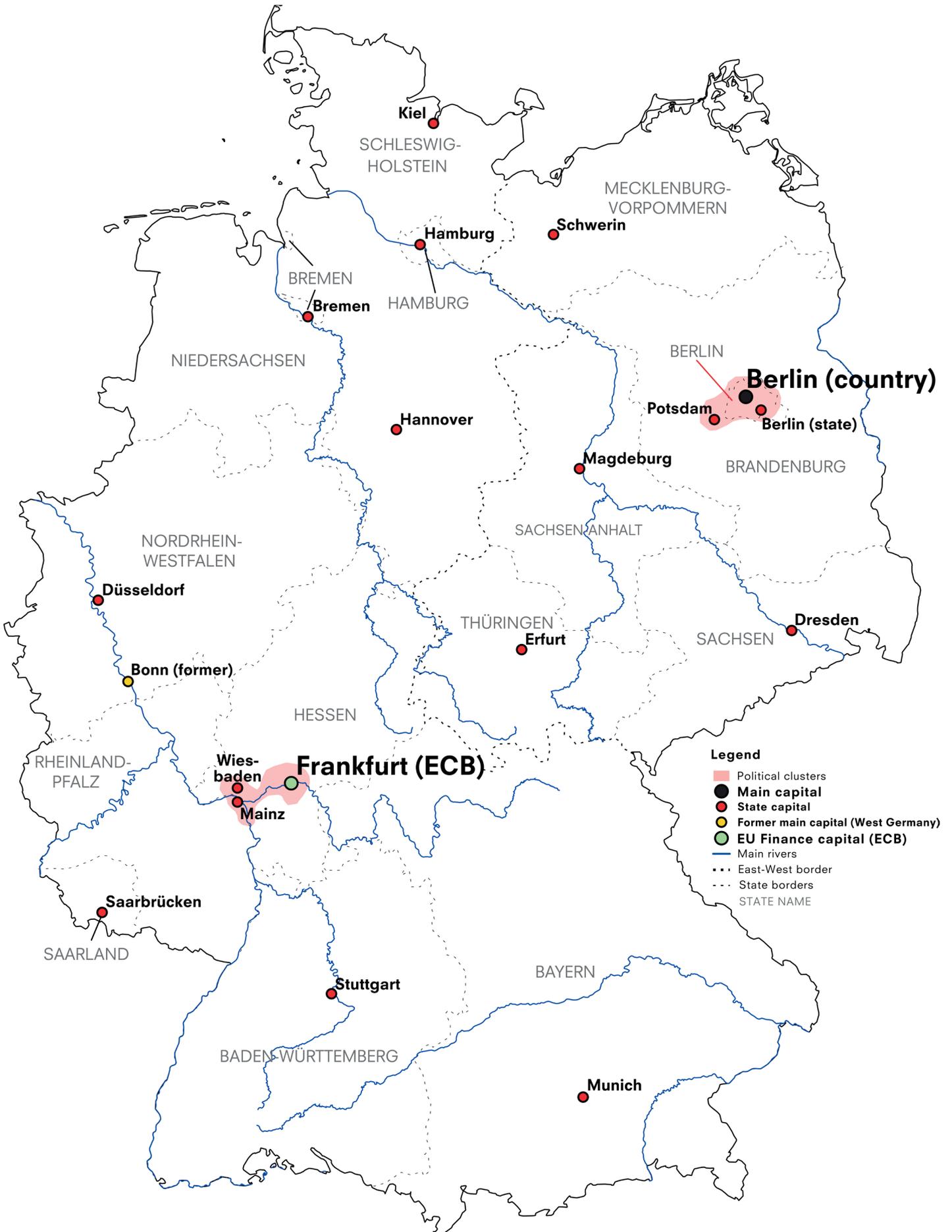


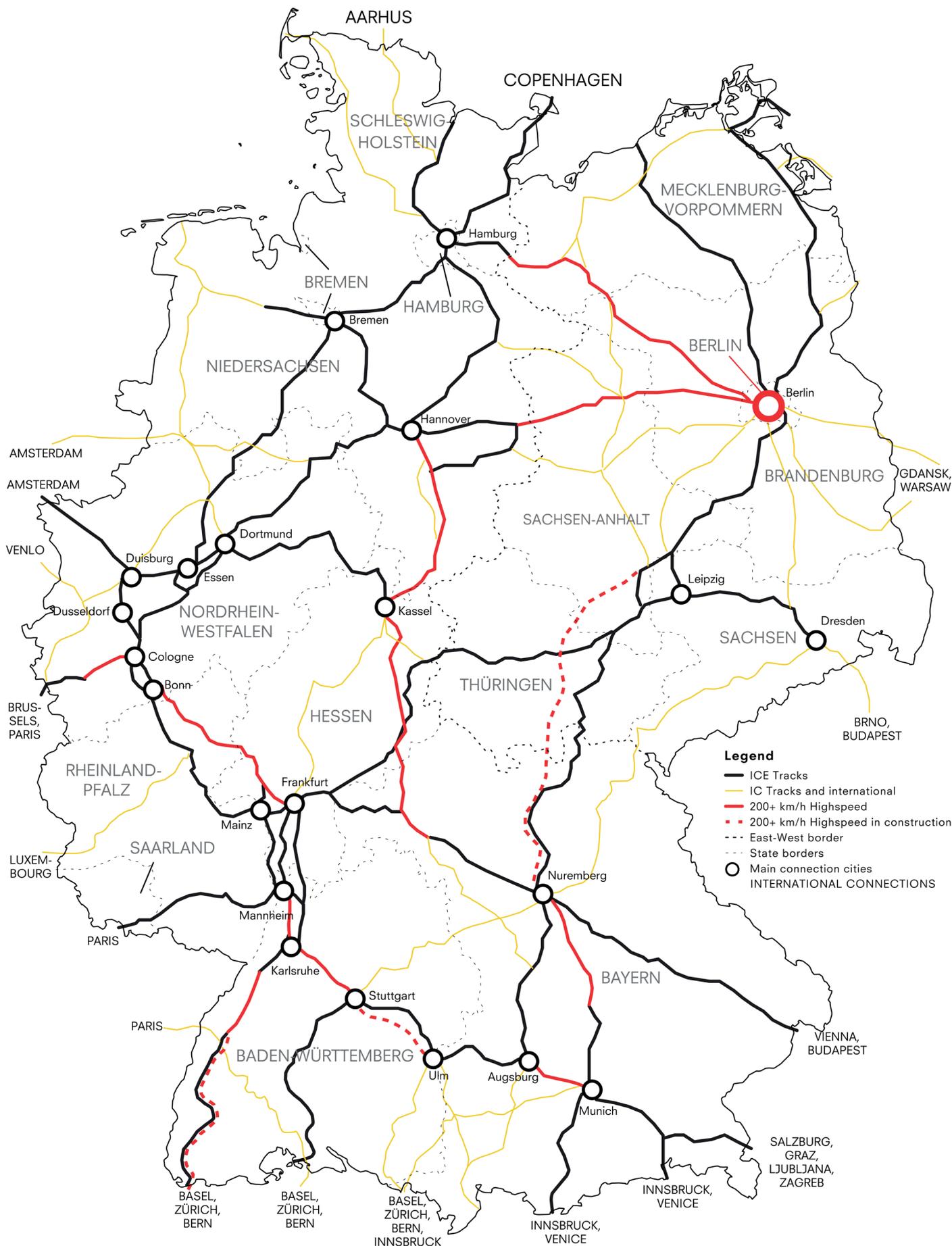
Figure 13: The chosen site: The Skulpturenpark and the Tipi am Kanzleramt. This location is near the old Reichstag and the buildable land should follow the existing trees.

Site

XL-Scale: Government, political and burocratic cities/areas in Germany

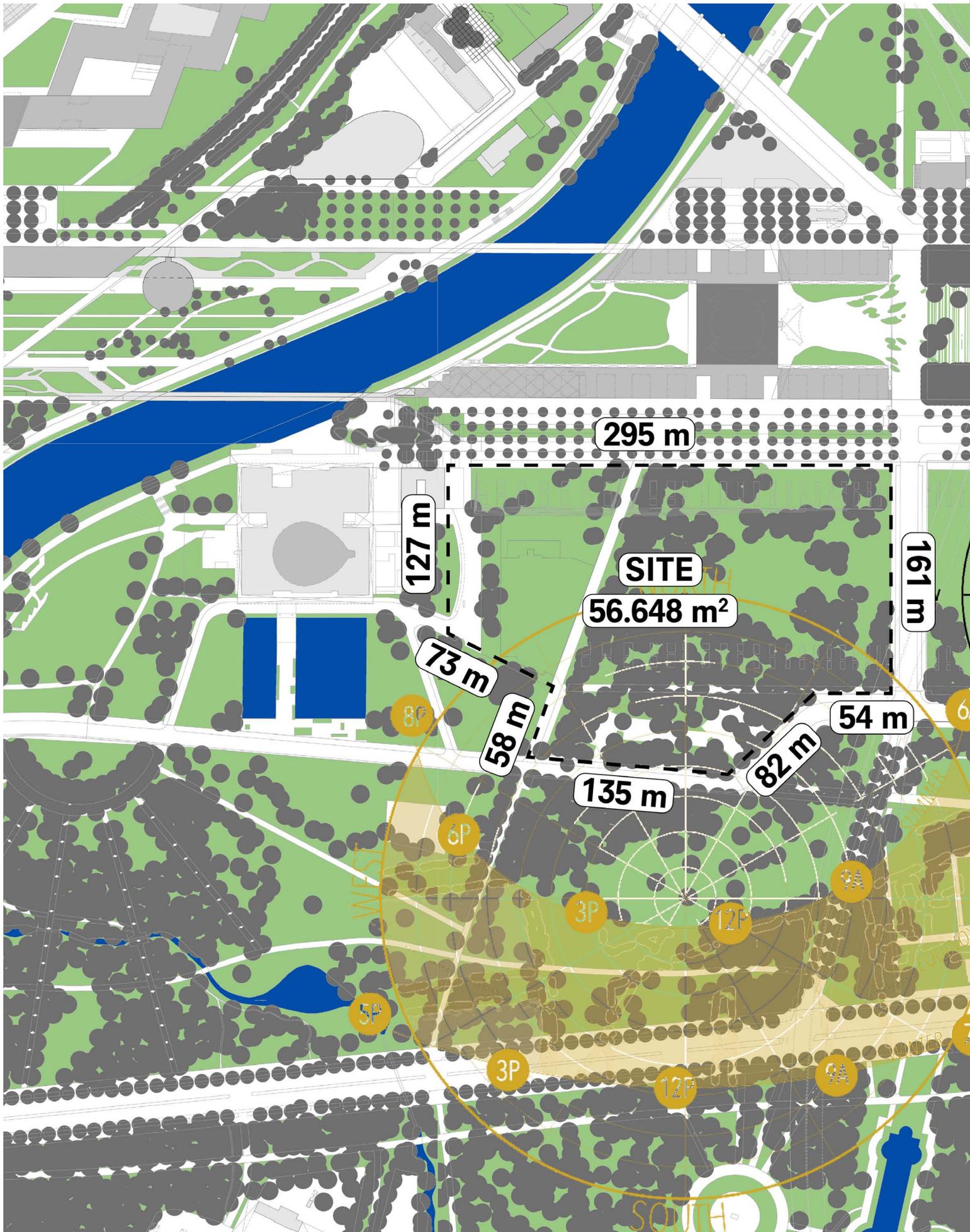


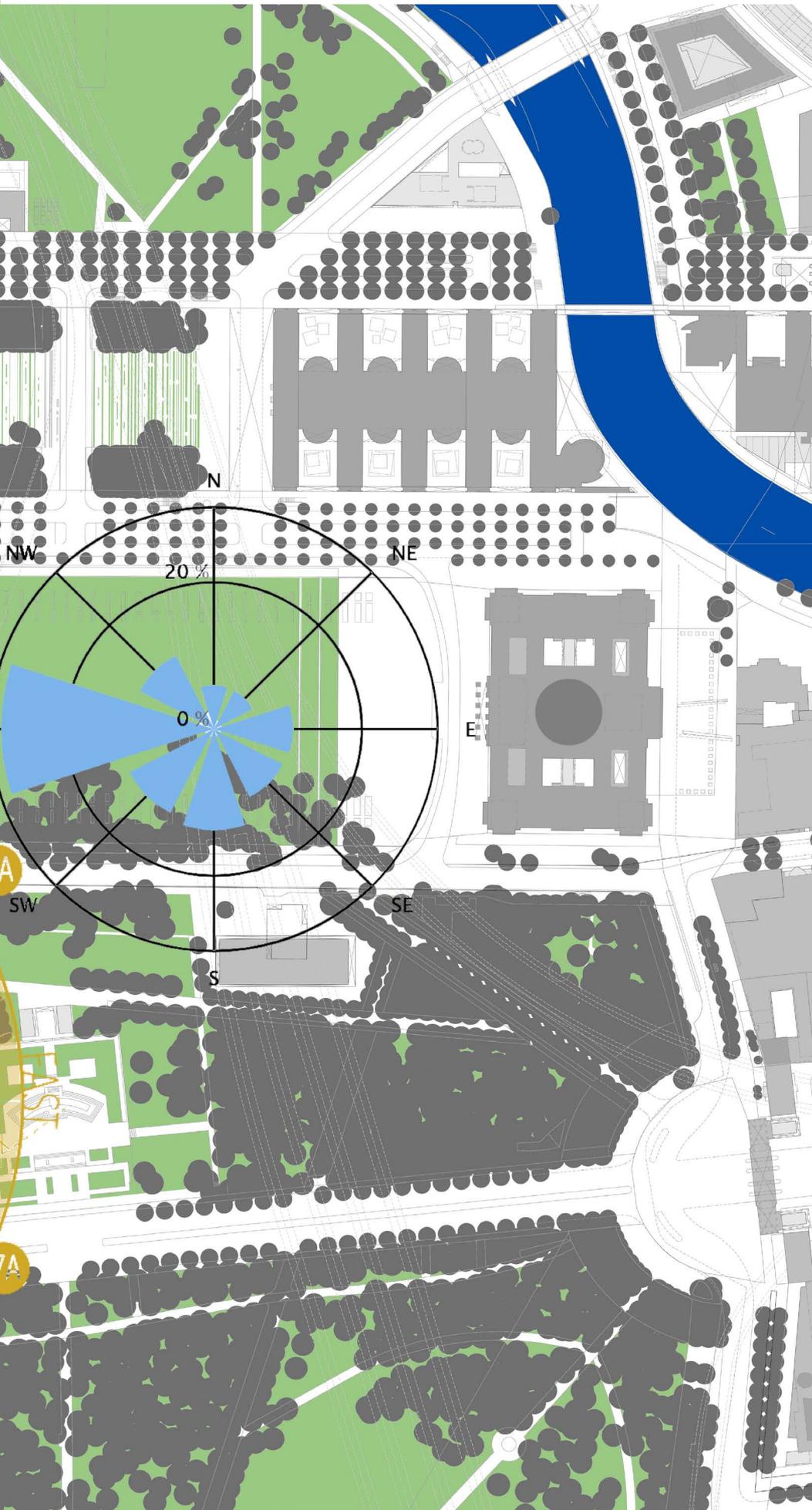
XL-Scale: Large scale public transportation lines and traffic connections



Site

S-Scale: Parks, open spaces, and water



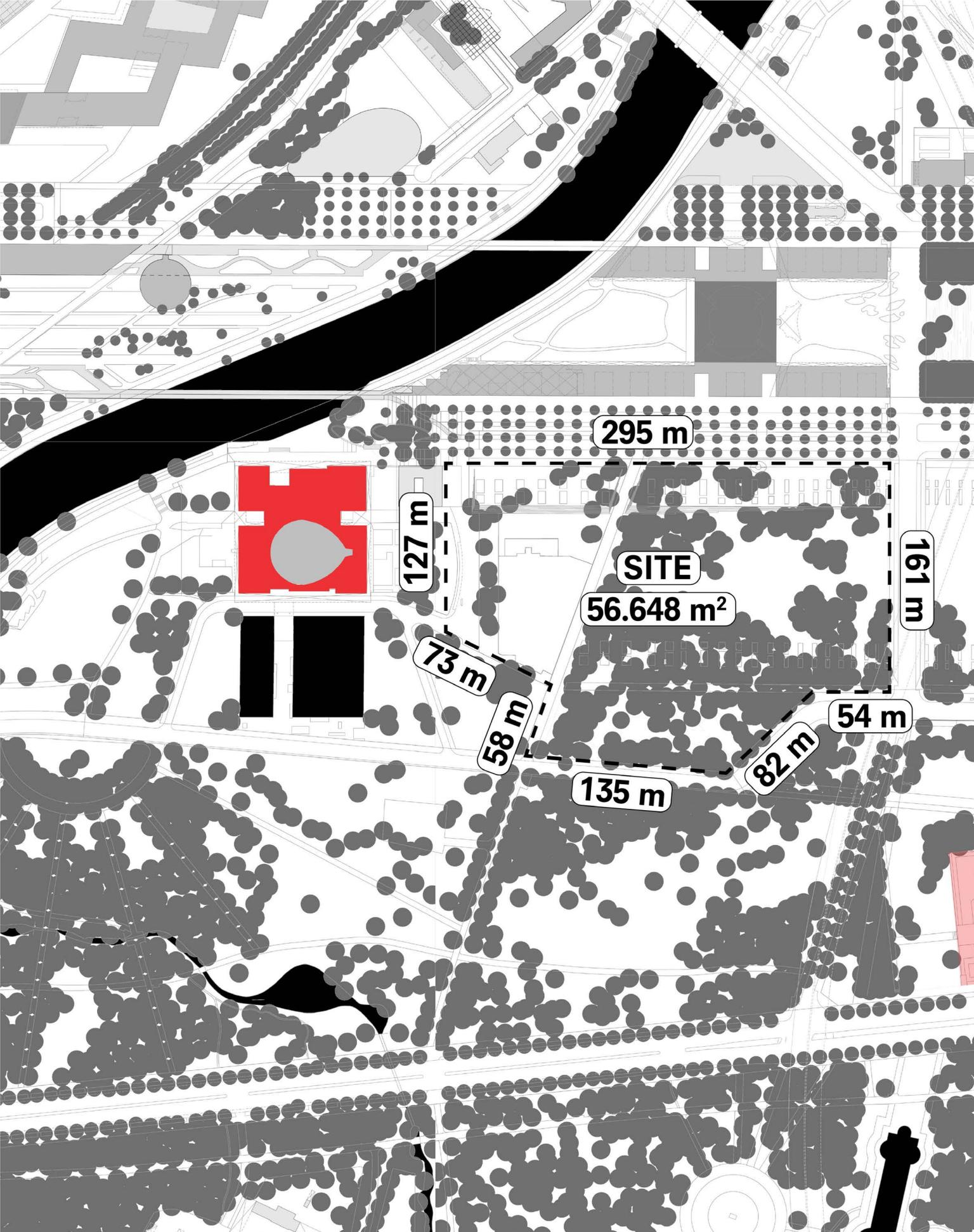


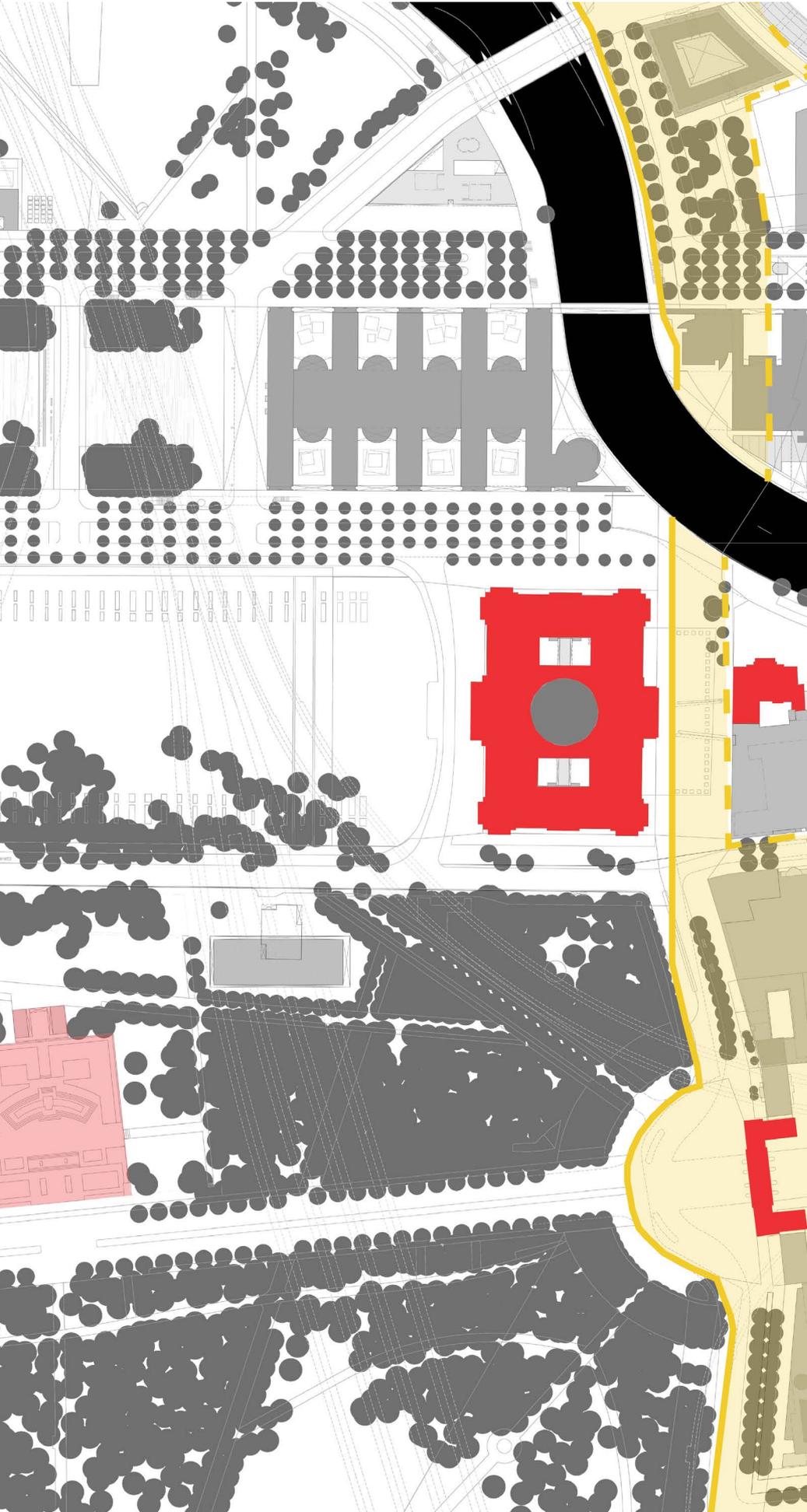
Legend

-  Water
-  Open spaces
-  Site boundaries

Site

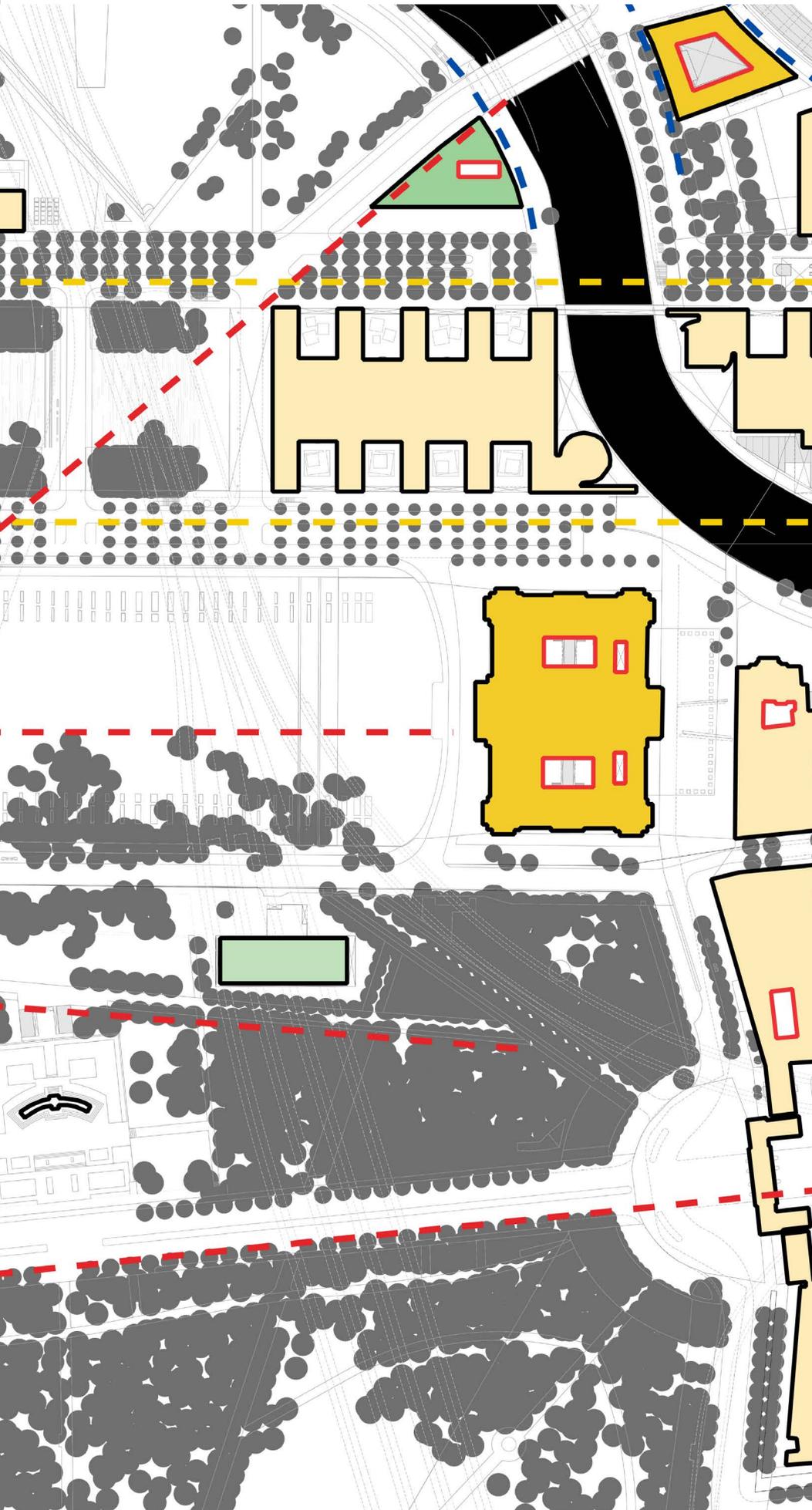
S-Scale: History and heritage





Legend

-  Monuments
-  Former Berlin Wall
-  Site boundaries

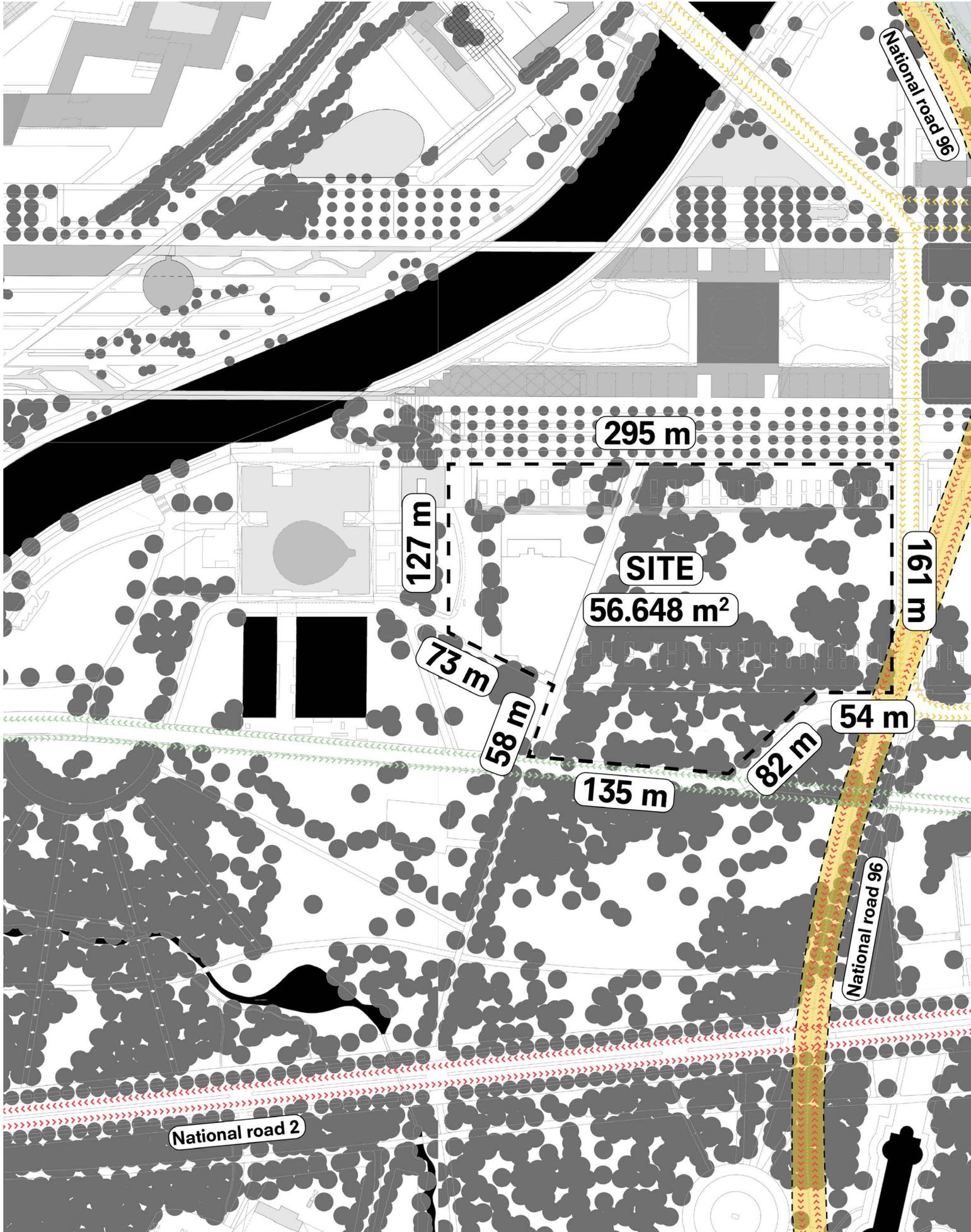


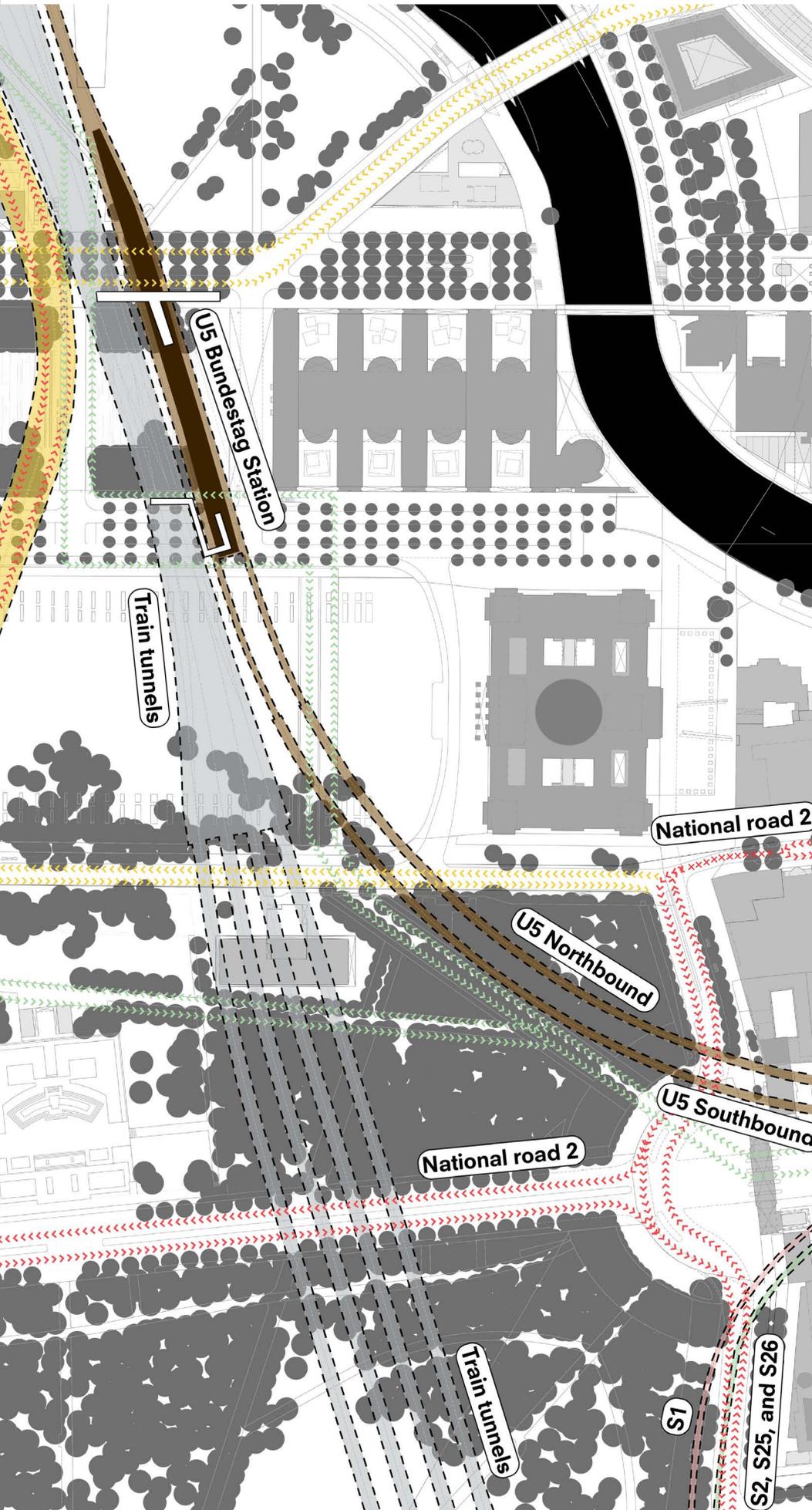
Legend

- 0-10 meters
- 10-20 meters
- 20-30 meters
- 30-40 meters
- Courtyards
- Form follows river
- Site boundaries
- Sightlines
- Democratic ribbon

Site

S-Scale: Public transportation, traffic, pedestrian, and tunnels



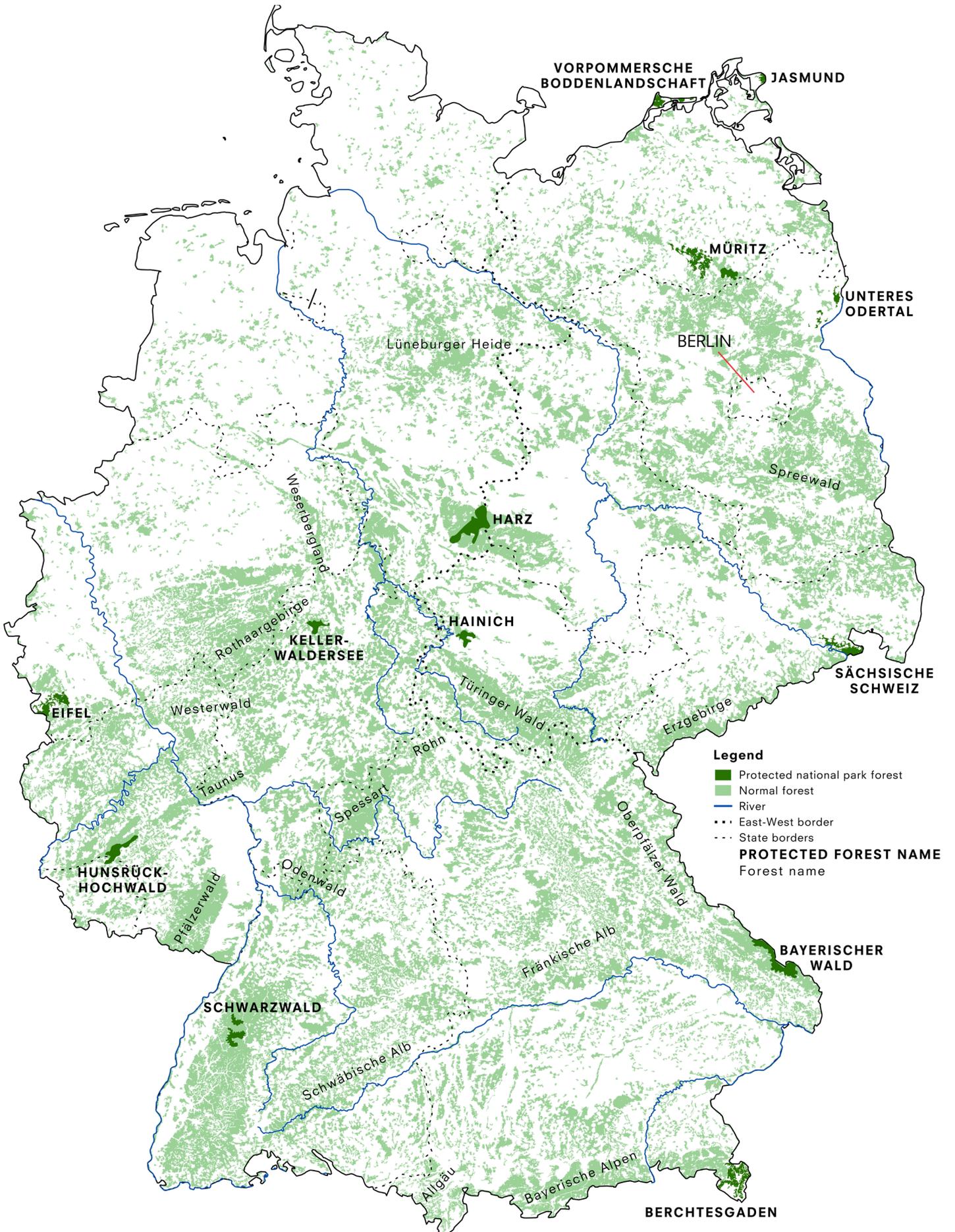


Legend

- U5 U-Bahn
- Train tunnels
- Road tunnels
- S1 S-Bahn
- S2- S-Bahn
- Site boundaries
- National road
- Main traffic
- Pedestrian traffic

Site

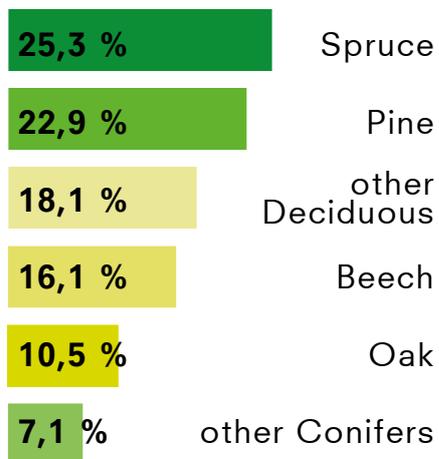
XL-Scale: Trees and forests in Germany



Total forest area in Germany



Main tree types in Germany



Legend

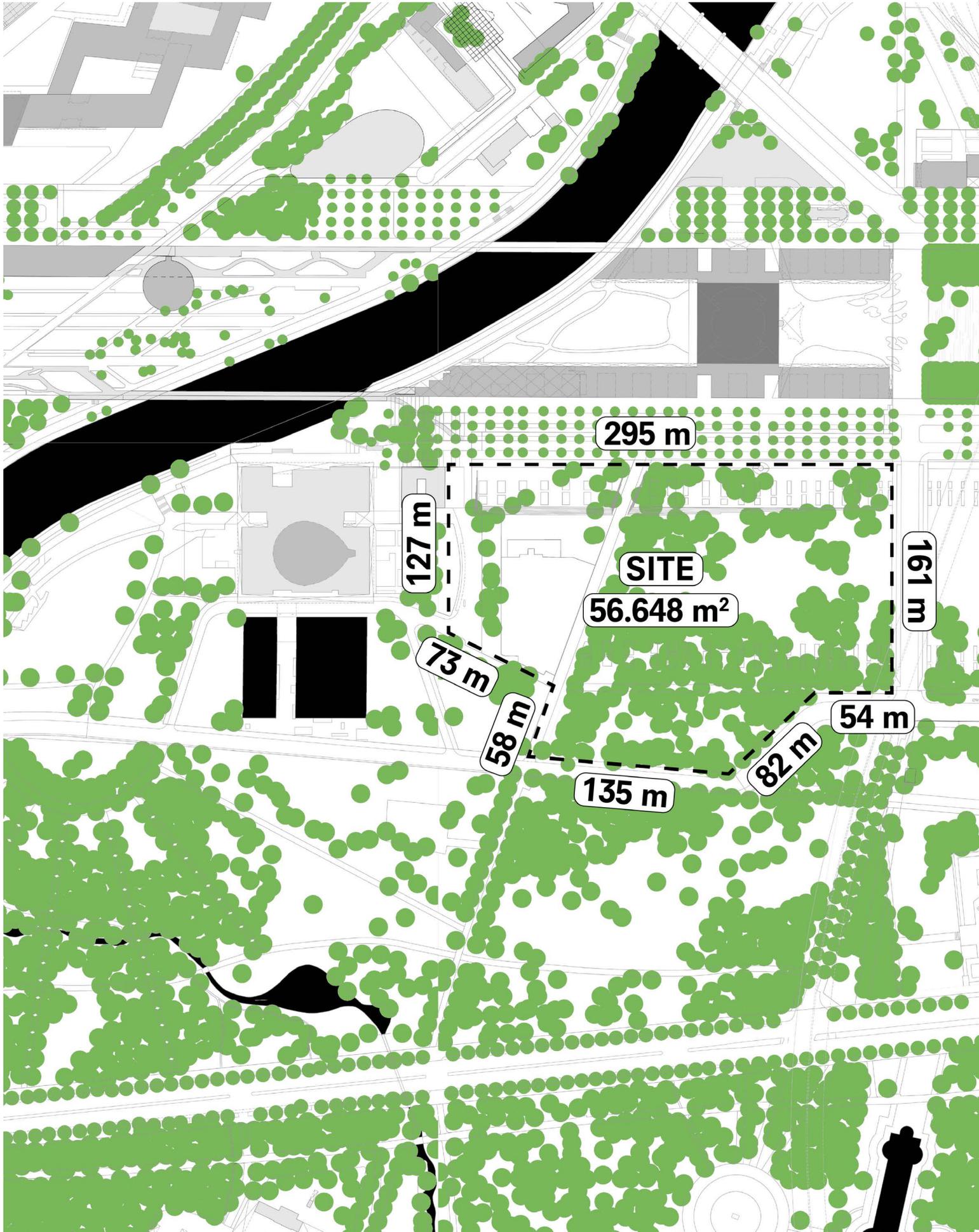
- Protected national park forest
- Normal forest
- Main river
- East-West border
- State borders

PROTECTED FOREST NAME

Forest name

Site

S-Scale: Trees in area around the site





Legend

- Water
- Trees
- Site boundaries

Site

SITE-Scale: Trees on the site





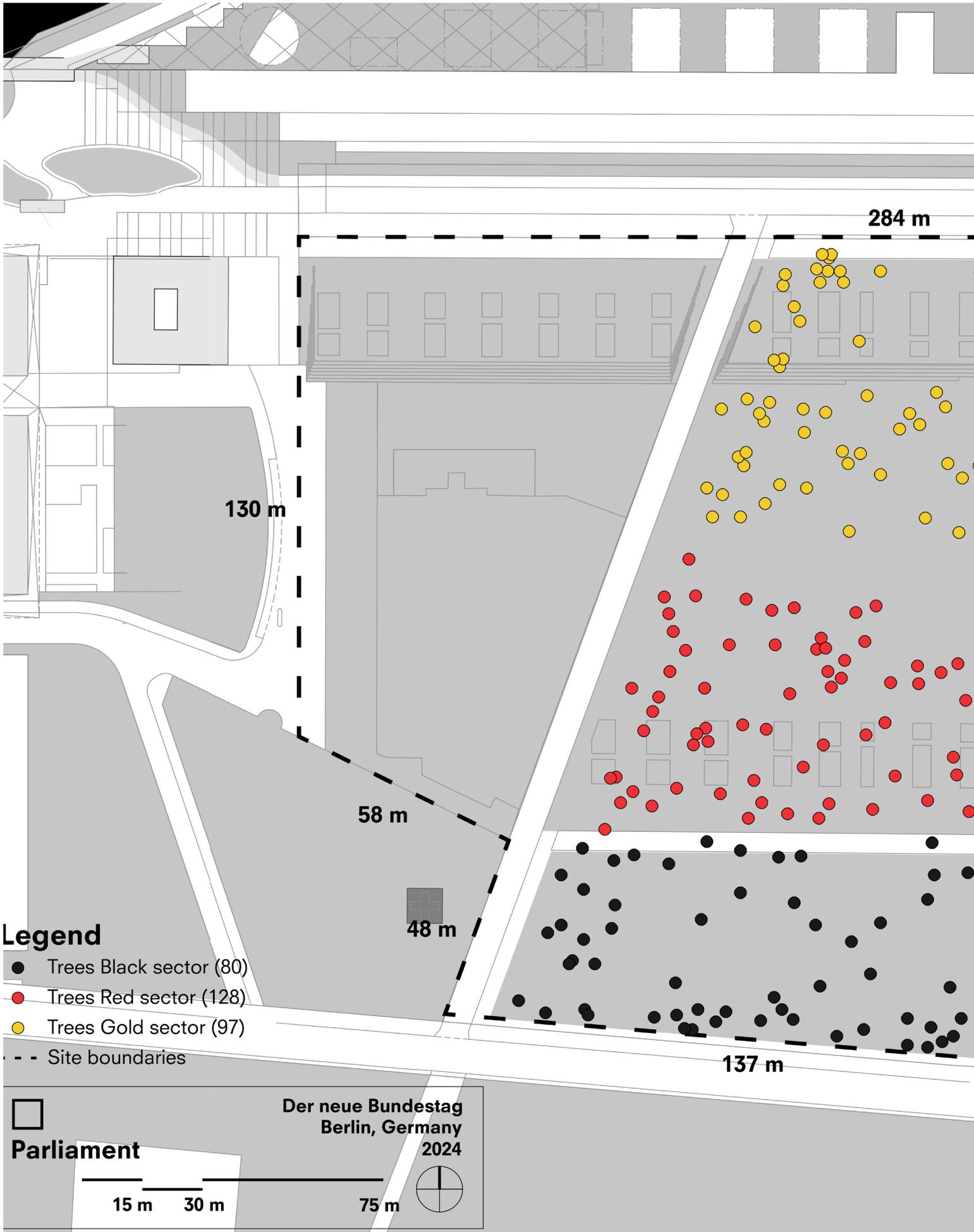
Legend

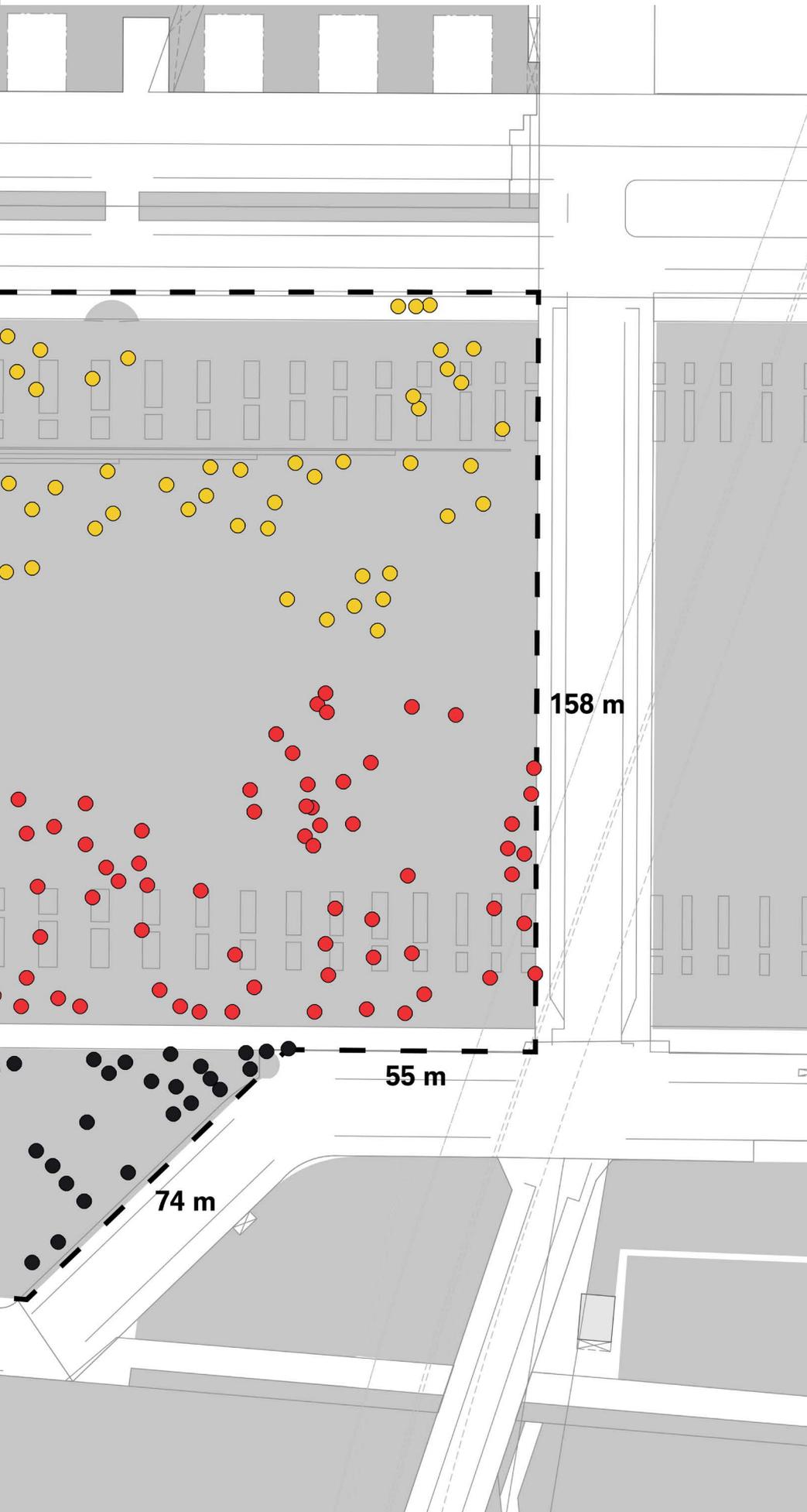
● Trees

--- Site boundaries

Site

SITE-Scale: All the trees in 3 sectors on the site (305 trees)





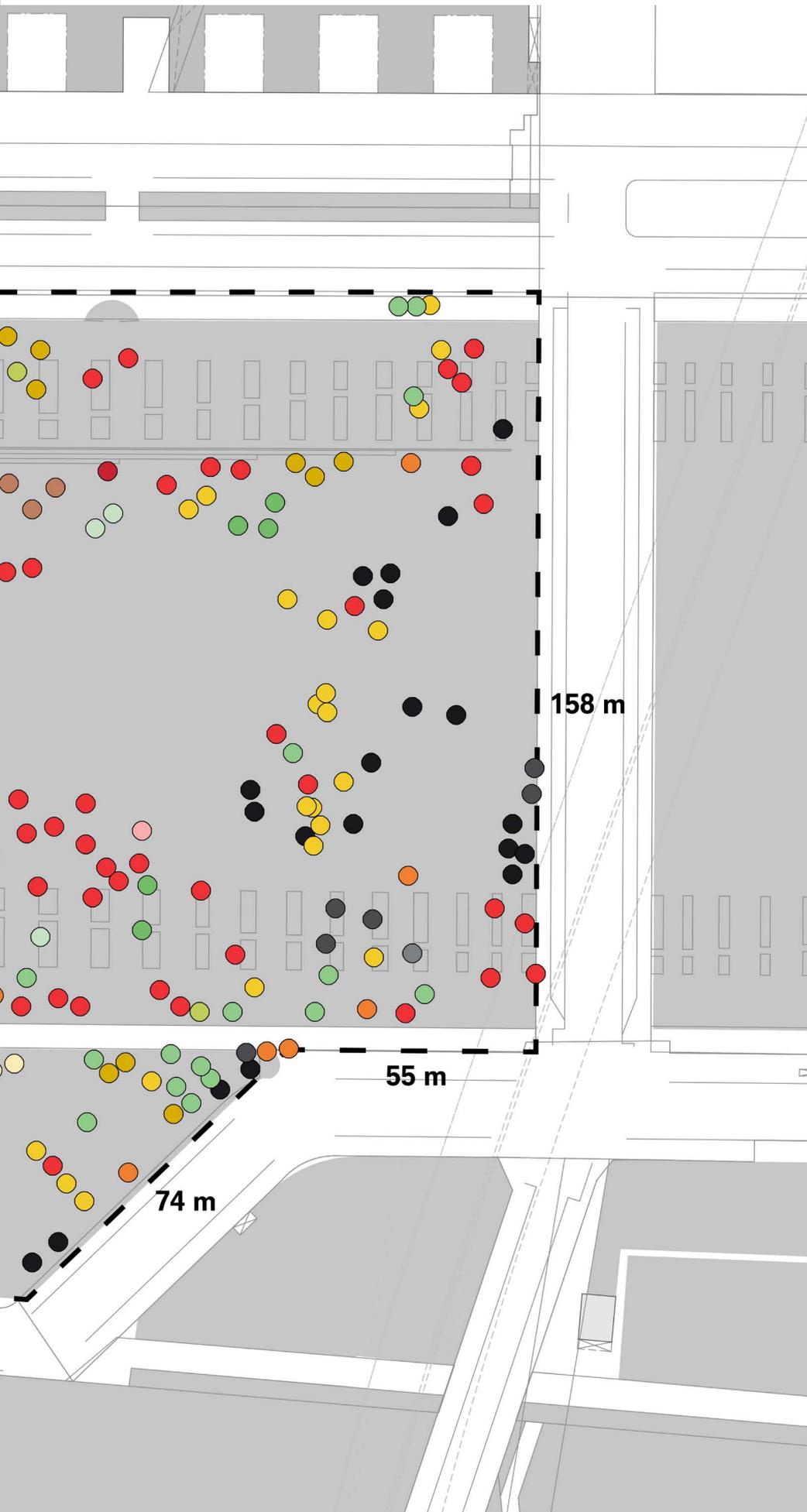
Legend

- Trees Black sector (80)
- Trees Red sector (128)
- Trees Gold sector (97)
- Site boundaries

Site

SITE-Scale: All tree types on the site (15 main types)



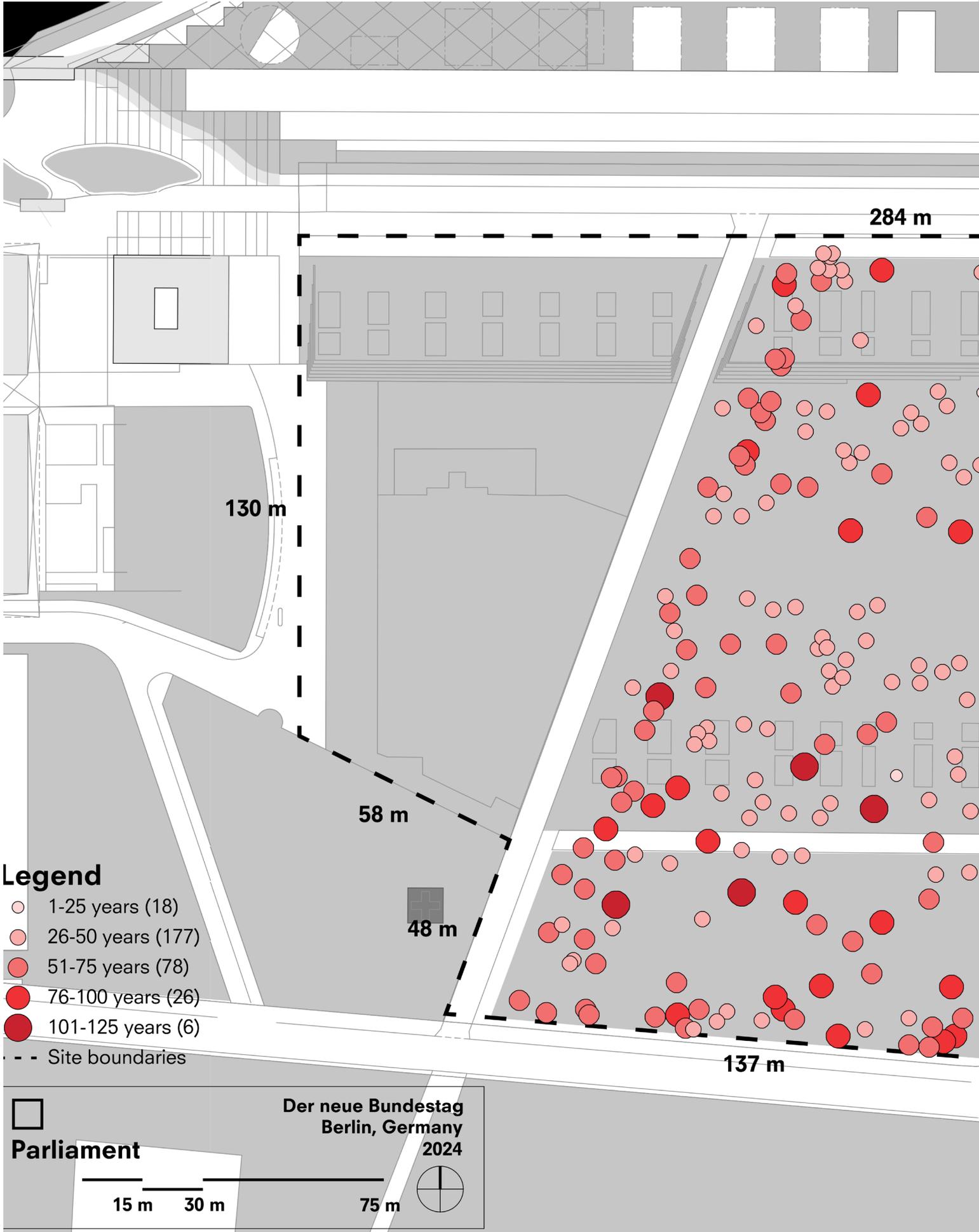


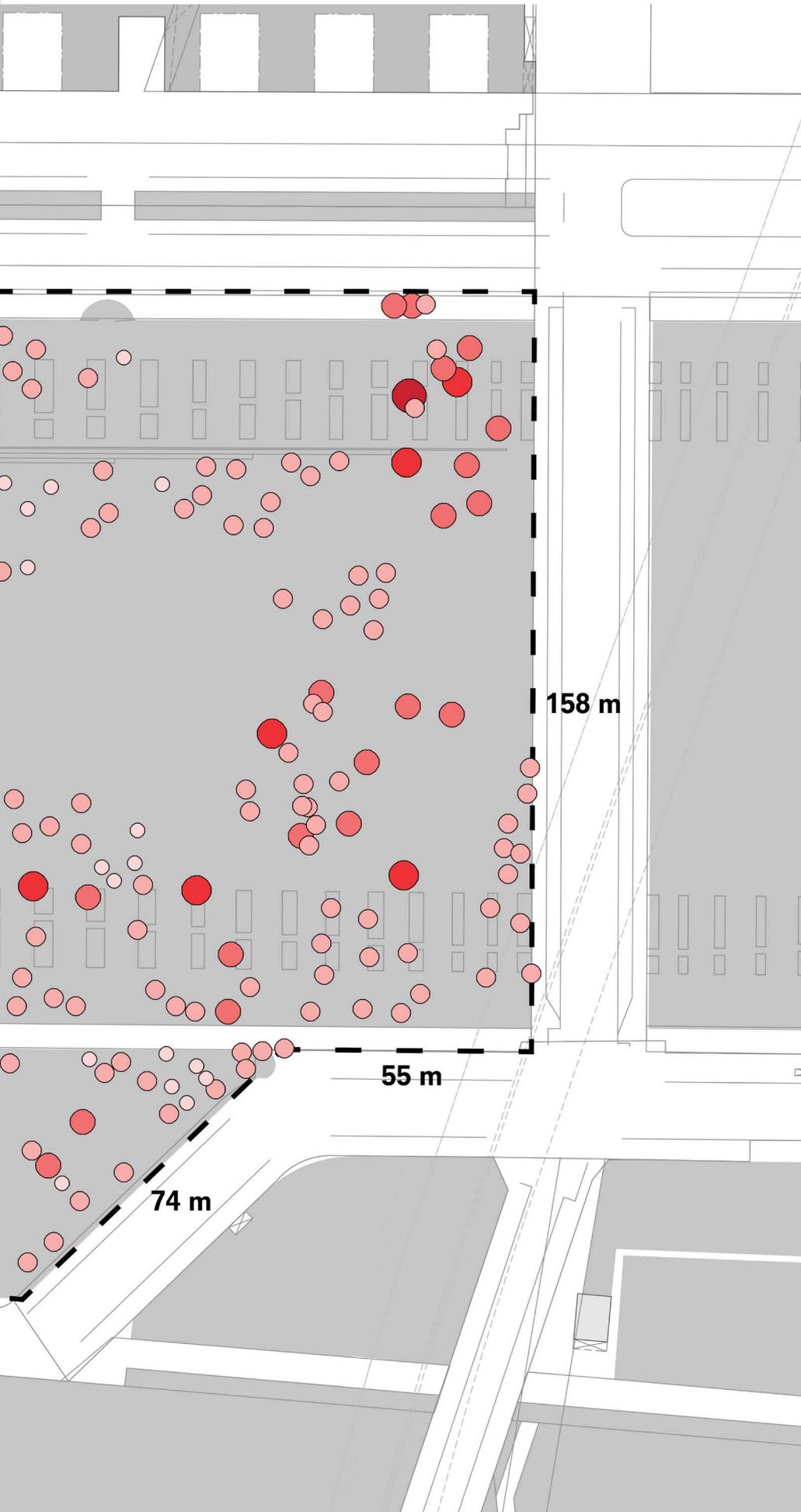
Legend

- Linden (34)
- Sweetgum tree (8)
- Tree of heaven (6)
- Bluebell tree (1)
- Maple (129)
- Serviceberry (1)
- Jap. pagoda tree (15)
- Hornbeam (46)
- Black locust (12)
- Wingnut tree (5)
- Oak (33)
- Katsura tree (3)
- Chestnut tree (7)
- White mulberry (3)
- Ash (2)
- Site boundaries

Site

SITE-Scale: Age map of trees on the site (1-125 years)



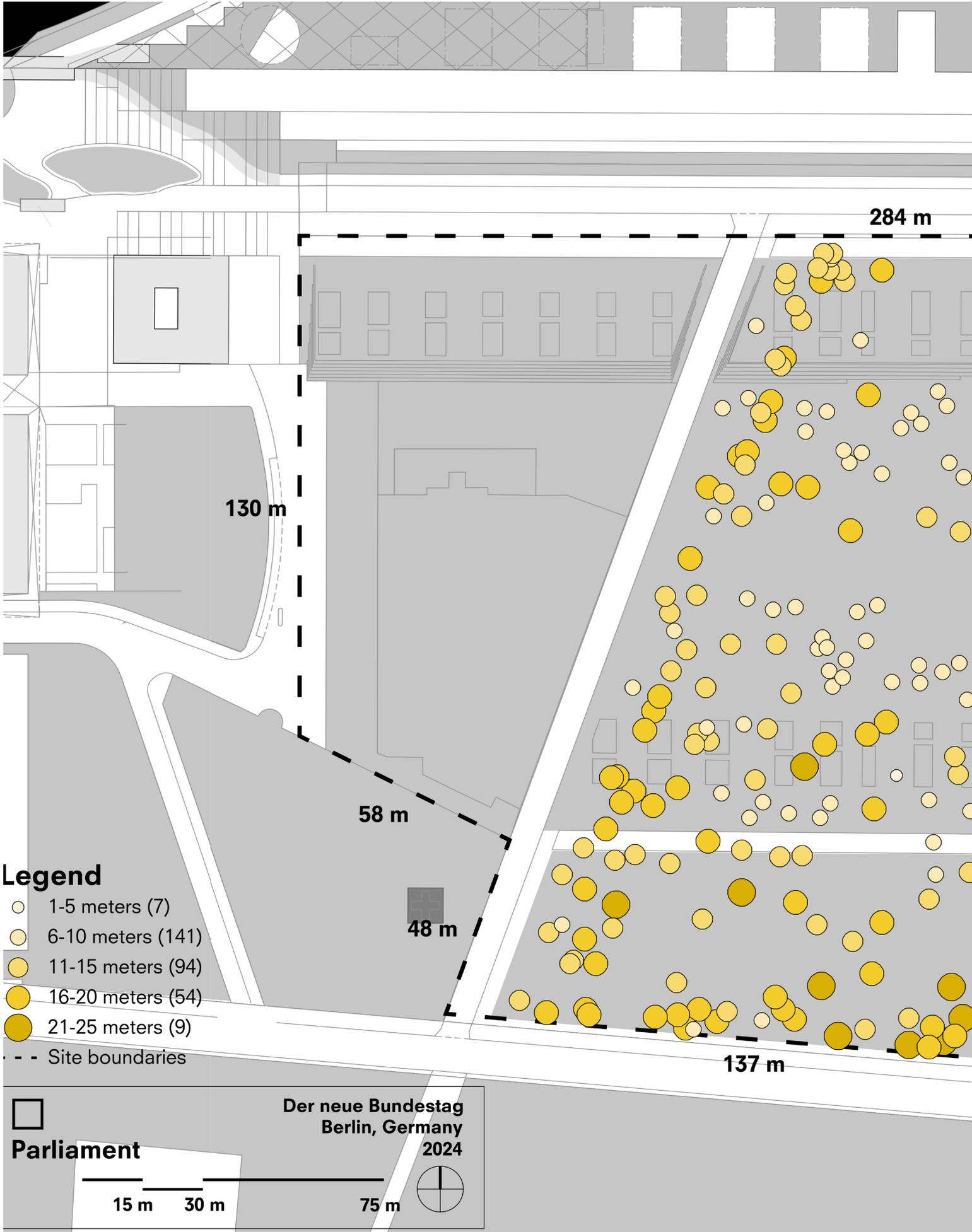


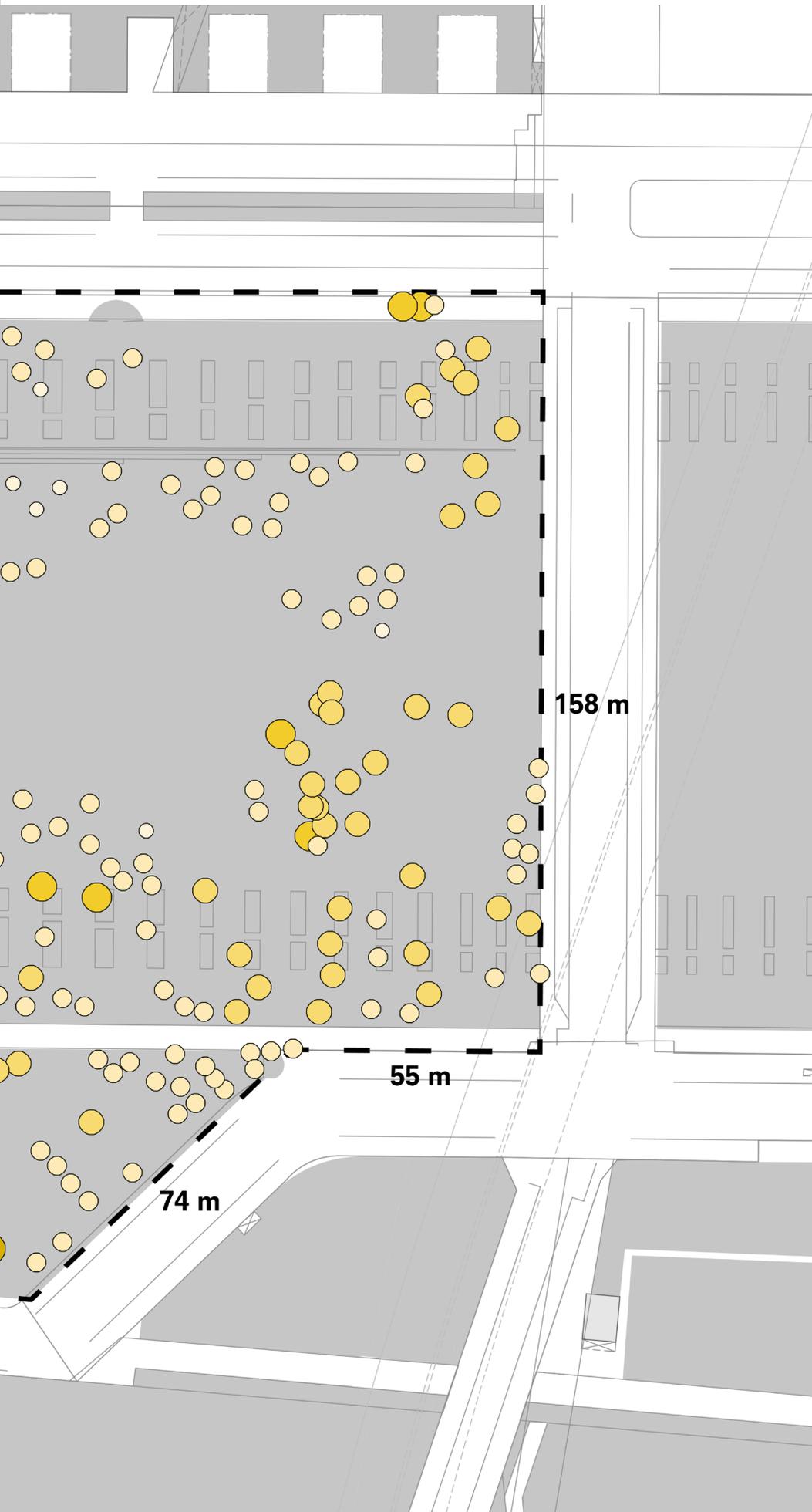
Legend

- 1-25 years (18)
- 26-50 years (177)
- 51-75 years (78)
- 76-100 years (26)
- 101-125 years (6)
- Site boundaries

Site

SITE-Scale: Height map of trees on the site (1-25 meters)





Site

SITE-Scale: Tree score map



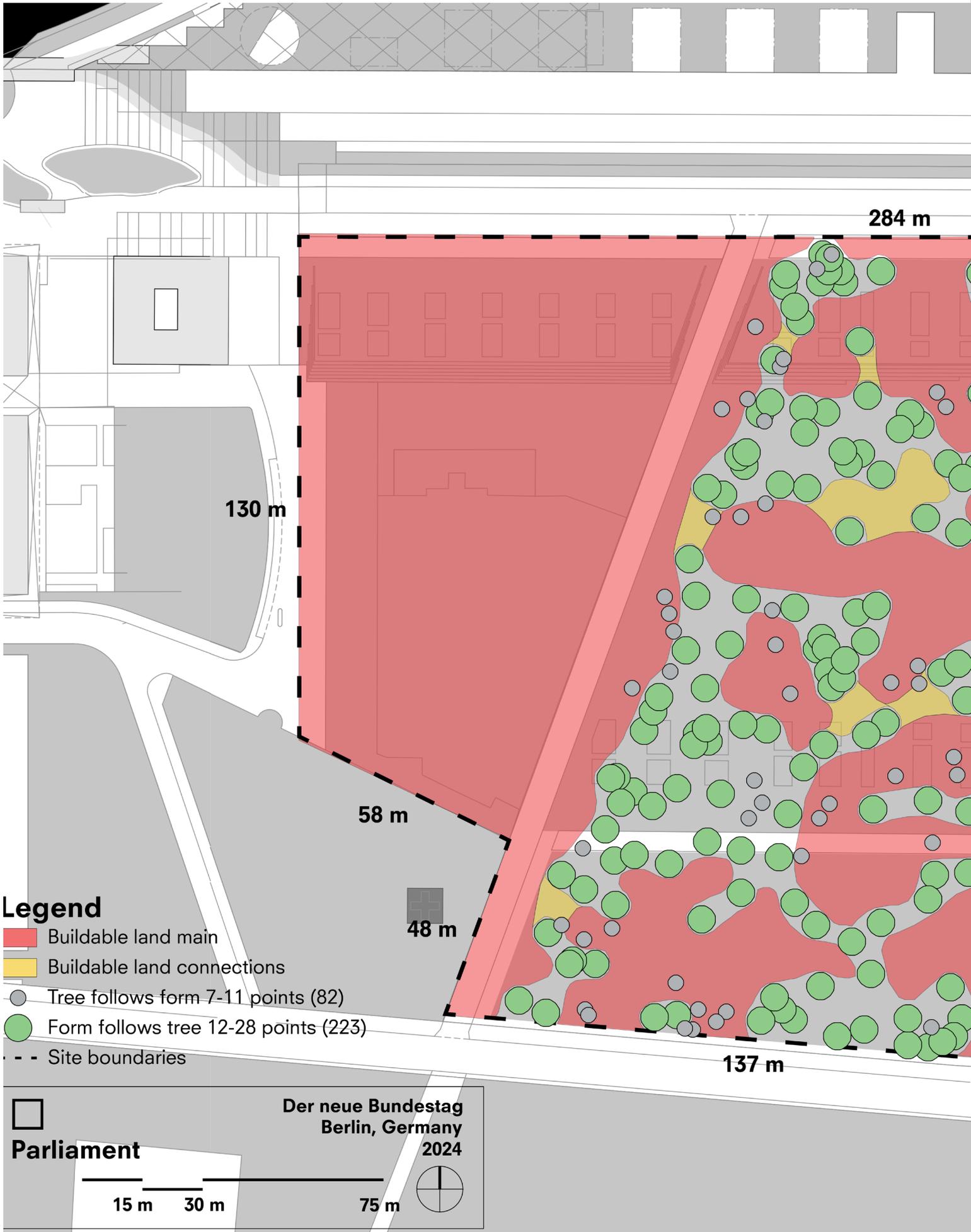


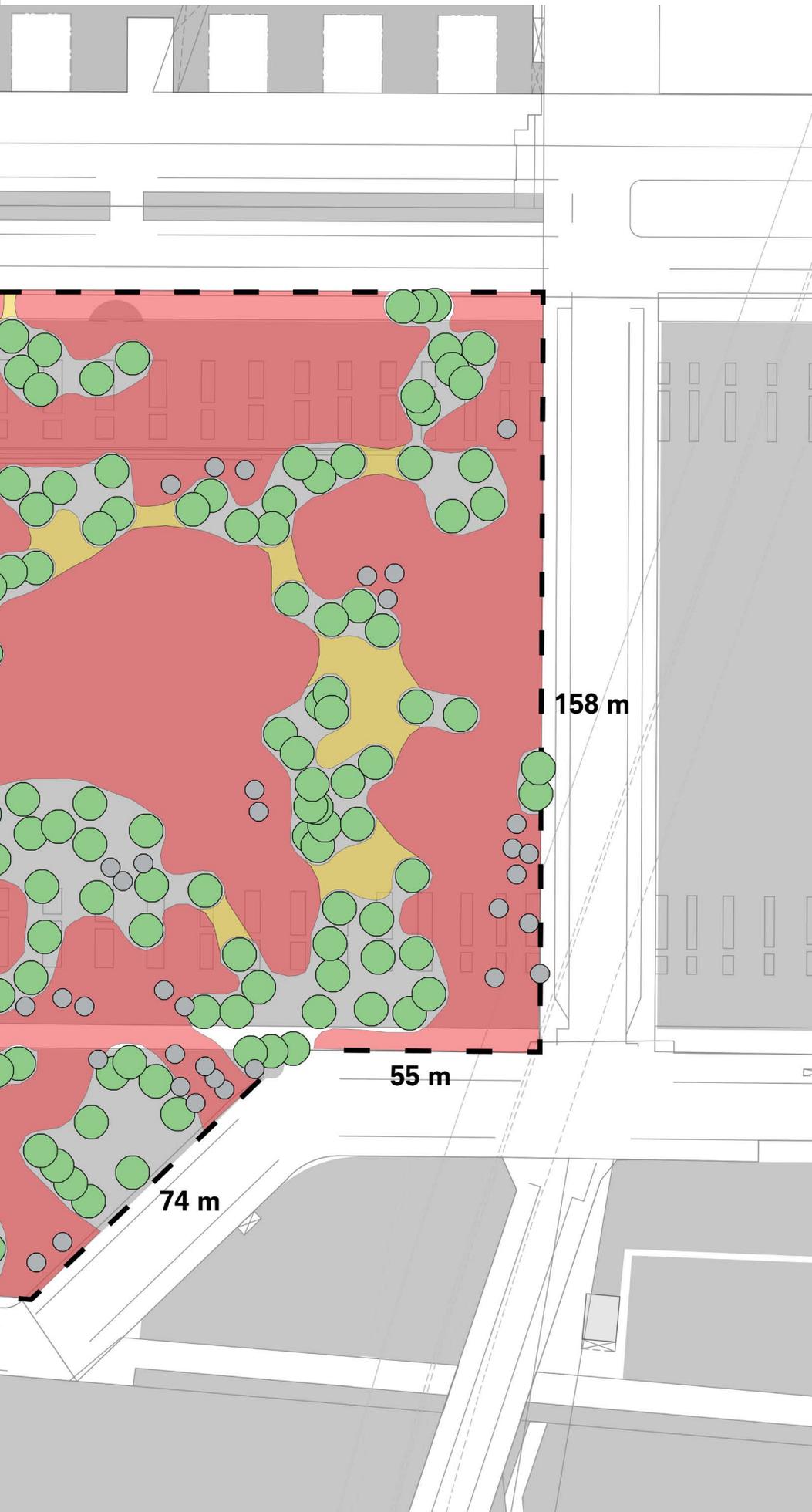
Legend

- Tree follows form-
7-11 points (82)
- Form follows tree-
12-28 points (223)
- Site boundaries

Site

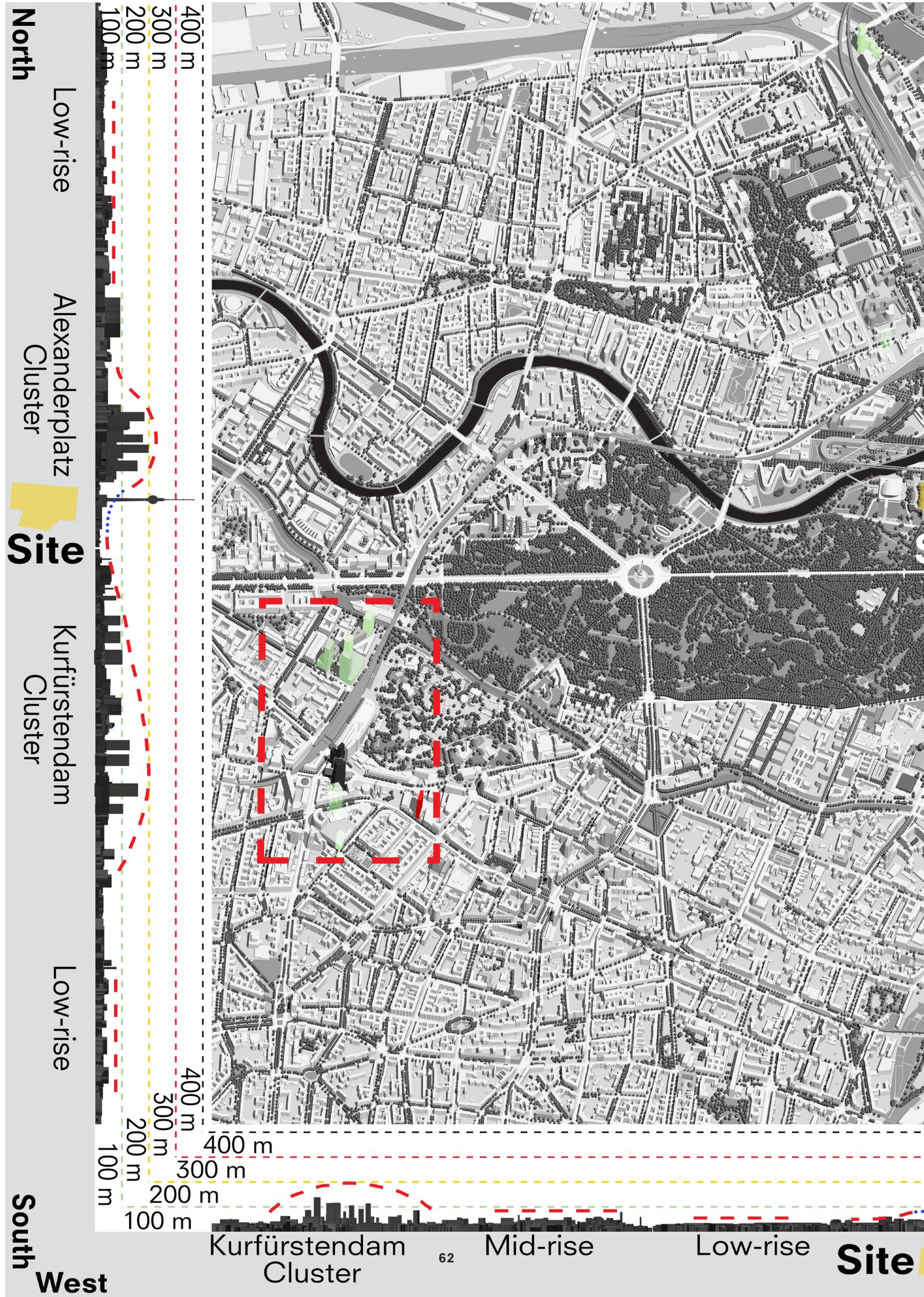
SITE-Scale: Buildable area

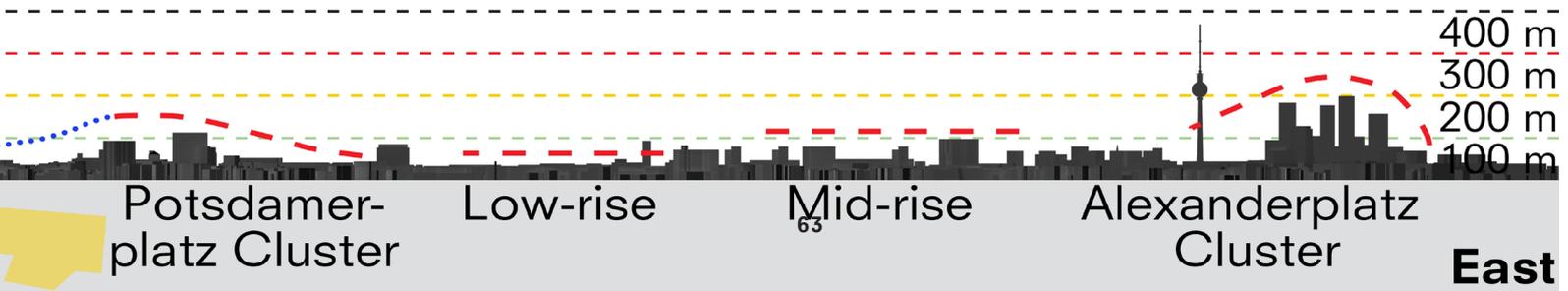




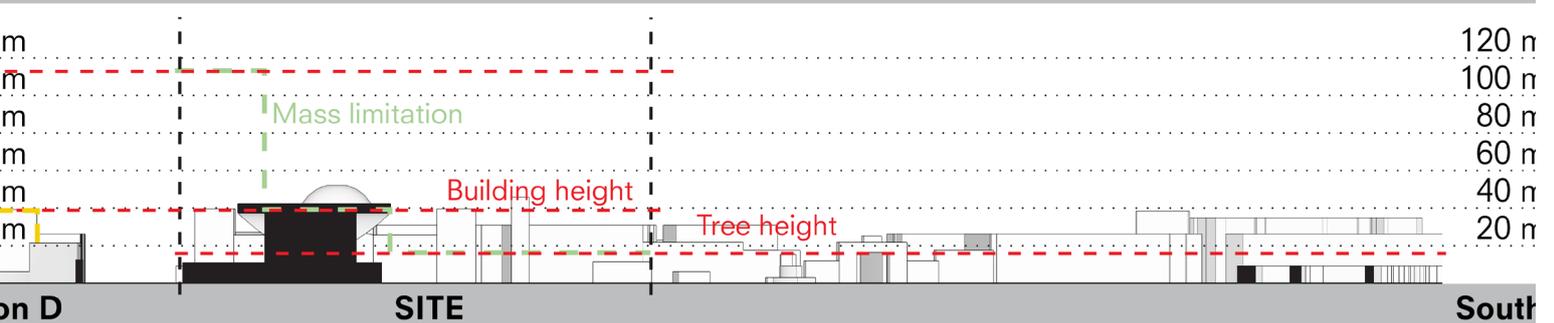
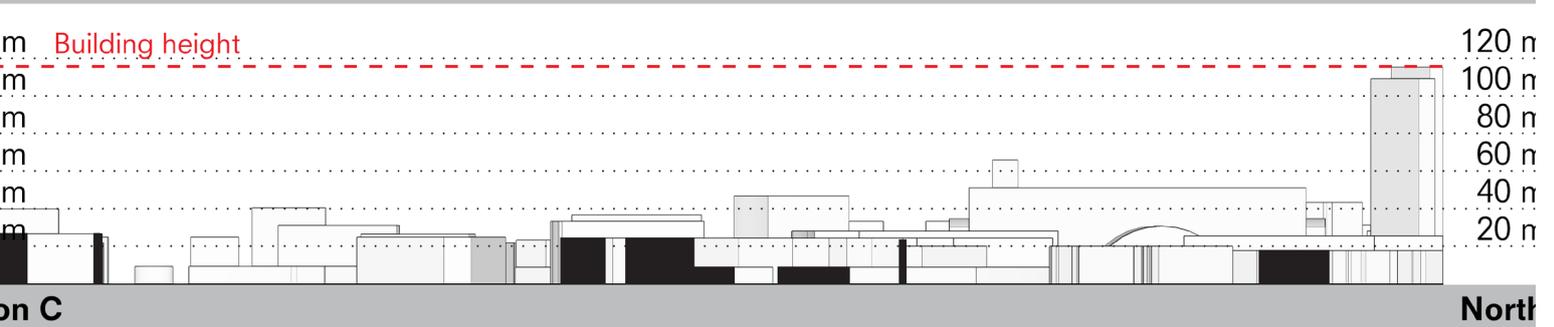
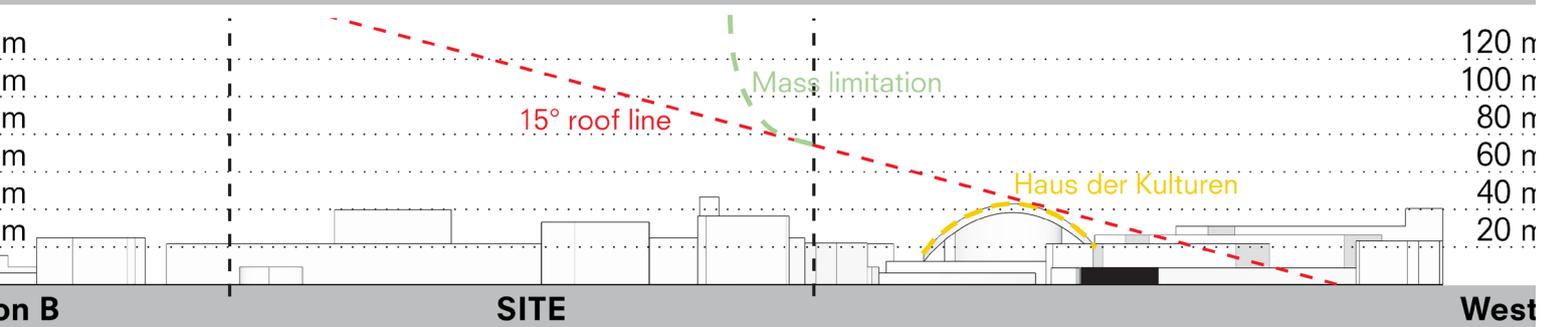
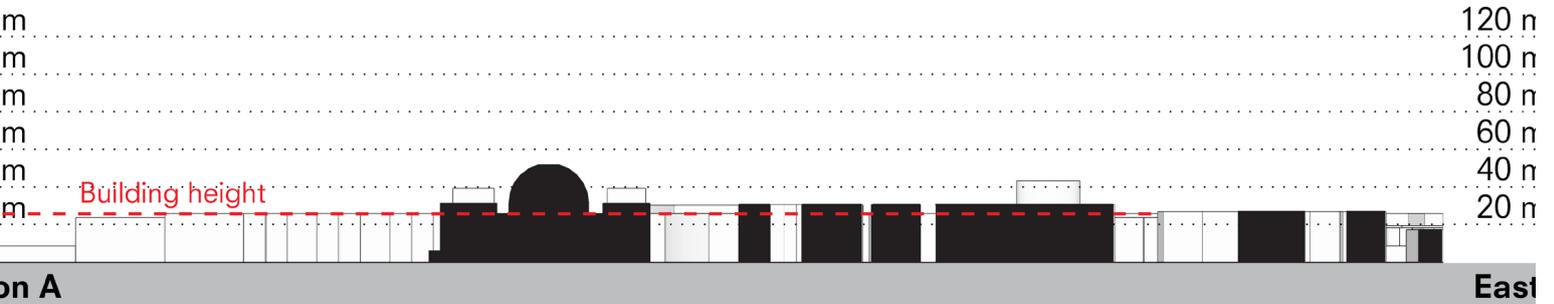
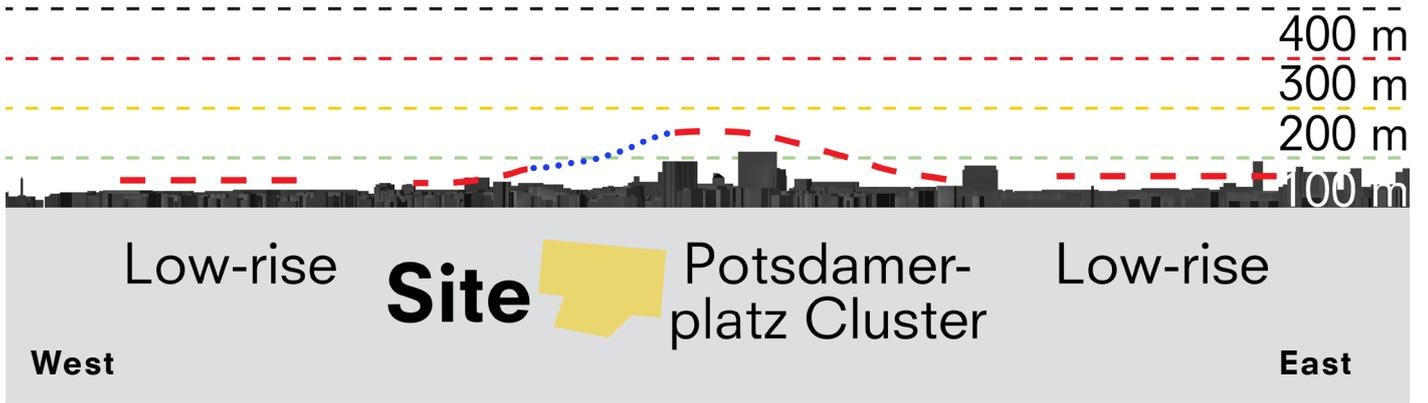
Legend

- Buildable land main
- Buildable land-connections
- Tree follows form-7-11 points (82)
- Form follows tree-12-28 points (223)
- Site boundaries





Urban concept city scale



Program

For the program of the new adaptable Bundestag it is important to look at the existing program and employees. With almost 10.000 employees in 8 buildings with around a total of 450.000 m², every employee has 45 m². This is quite a lot, especially if you consider that the number of employees can fluctuate, so some election terms there will be the need of many more times this 45 m² and in some election terms a lot of these 45 m² will be vacant. This is not sustainable, so for the program of the new adaptable Bundestag the first program bar in figure 14 is made with all unnecessary program removed, like art galleries, exhibition spaces, etc. Only the core political, administrative and faciliatory program is kept and this comes down to 379.861 m². On the next program bar hybrid office, meeting and debating use by holograms is calculated into the program, which can remove almost half of the offices and meeting rooms.

This results in a reduction of 35,1%, 113.334 m² of program with hybrid use. Next to this hybrid program bar is the adaptable program bar that reduces another 6,2%, 23.482 m². This is done by making certain less used rooms like the plenary hall adaptable to facilitate another program as well. The last program bar in figure 14 also includes the fact that some of the offices can stay in some of the existing buildings. The total new program of the new adaptable Bundestag will be 223.045 m².

In figure 15 the program breakdown of the new adaptable Bundestag is shown with clear emphasis on the distinction between politics, administration, and facilities. This is also visible in figure 17 in the grouping of the program in the program relation diagram on the next page.

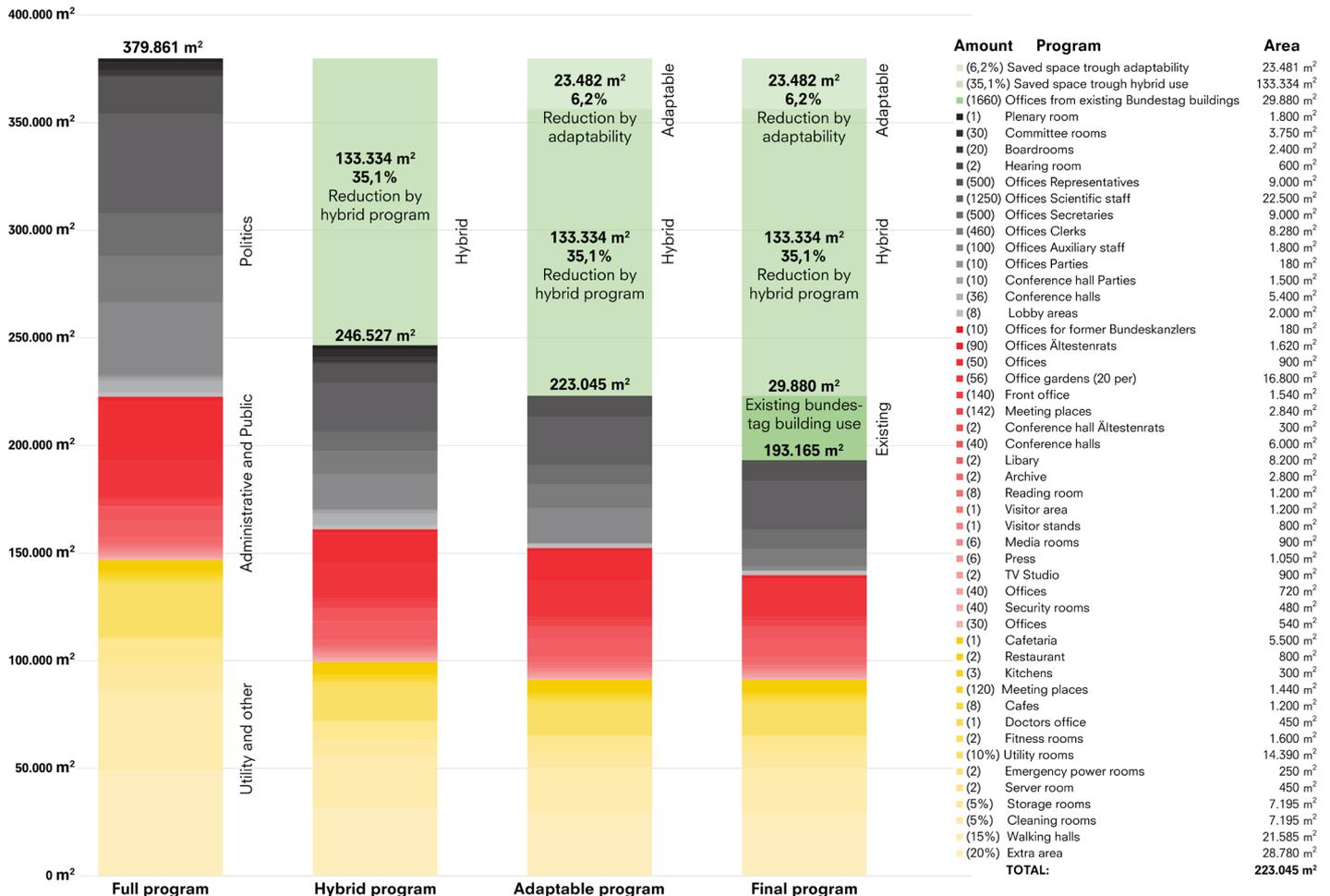


Figure 14: The proposed program for the new adaptable Bundestag. The program shows the program bar and also how adaptability and hybrid building use can reduce a lot of building area.

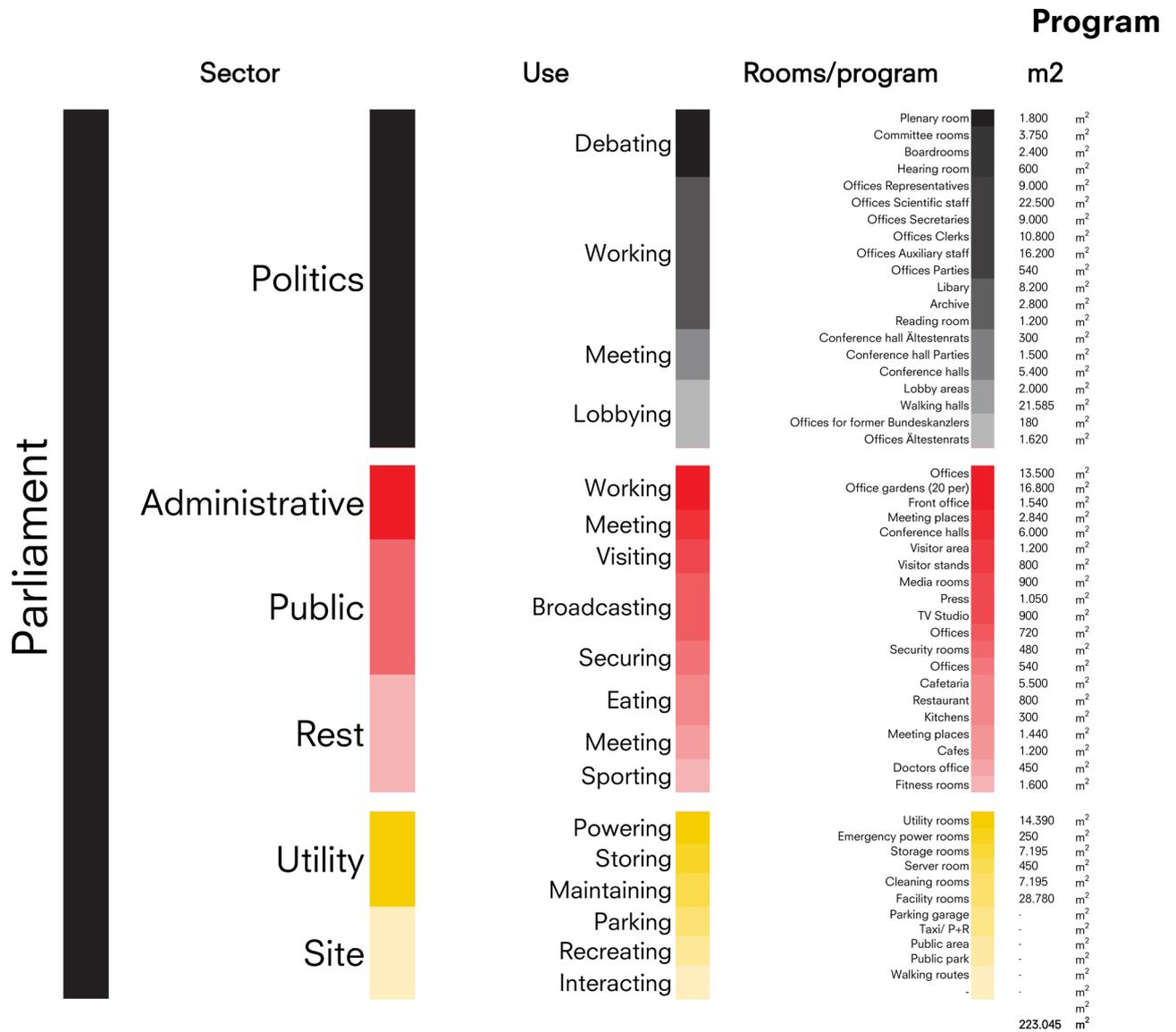


Figure 15: Program breakdown of the new adaptable Bundestag. This breakdown shows the sectors of: Politics, Administration, Public, Facility, Utility and Site.

Amount	Program	Area
(6,2%)	Saved space trough adaptability	23.481 m ²
(35,1%)	Saved space trough hybrid use	133.334 m ²
(1660)	Offices from existing Bundestag buildings	29.880 m ²
(1)	Plenary room	1.800 m ²
(30)	Committee rooms	3.750 m ²
(20)	Boardrooms	2.400 m ²
(2)	Hearing room	600 m ²
(500)	Offices Representatives	9.000 m ²
(1250)	Offices Scientific staff	22.500 m ²
(500)	Offices Secretaries	9.000 m ²
(460)	Offices Clerks	8.280 m ²
(100)	Offices Auxiliary staff	1.800 m ²
(10)	Offices Parties	180 m ²
(10)	Conference hall Parties	1.500 m ²
(36)	Conference halls	5.400 m ²
(8)	Lobby areas	2.000 m ²
(10)	Offices for former Bundeskanzlers	180 m ²
(90)	Offices Ältestenrats	1.620 m ²
(50)	Offices	900 m ²
(56)	Office gardens (20 per)	16.800 m ²
(140)	Front office	1.540 m ²
(142)	Meeting places	2.840 m ²
(2)	Conference hall Ältestenrats	300 m ²
(40)	Conference halls	6.000 m ²
(2)	Library	8.200 m ²
(2)	Archive	2.800 m ²
(8)	Reading room	1.200 m ²
(1)	Visitor area	1.200 m ²
(1)	Visitor stands	800 m ²
(6)	Media rooms	900 m ²
(6)	Press	1.050 m ²
(2)	TV Studio	900 m ²
(40)	Offices	720 m ²
(40)	Security rooms	480 m ²
(30)	Offices	540 m ²
(1)	Cafeteria	5.500 m ²
(2)	Restaurant	800 m ²
(3)	Kitchens	300 m ²
(120)	Meeting places	1.440 m ²
(8)	Cafes	1.200 m ²
(1)	Doctors office	450 m ²
(2)	Fitness rooms	1.600 m ²
(10%)	Utility rooms	14.390 m ²
(2)	Emergency power rooms	250 m ²
(2)	Server room	450 m ²
(5%)	Storage rooms	7.195 m ²
(5%)	Cleaning rooms	7.195 m ²
(15%)	Walking halls	21.585 m ²
(20%)	Extra area	28.780 m ²
	TOTAL:	223.045 m²

Figure 16: The total program list of the new adaptable Bundestag. The total program size is 223.045m². Which would have been 379.861m² when there was no adaptable and hybrid program.

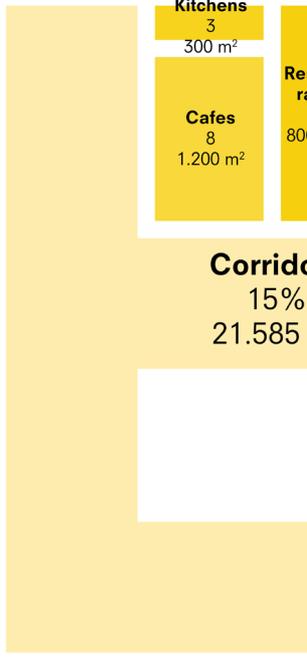


Figure 17: Program relation diagram for the new adaptable Bundestag. This diagram shows the grouping of different program topics.

Scientific staff
1.250
22.500 m²

Offices Representatives
500
9.000 m²

Conference halls
36
5.400 m²

Conference halls
100
3.750 m²

Hearing room
2
1.800 m²

Offices Parties
10
1.80 m²

Offices Auxiliary staff
100
1.800 m²

Offices Secretaries
500
9.000 m²

Offices Clerks
460
8.280 m²

Boardrooms
20
2.400 m²

Conference hall Parties
10
1.500 m²

Lobby areas
8
2.000 m²

Office
30
540 m²

Security
40
480 m²

Canteen
1
5.500 m²

Extra area/lobby/atriums
20%
28.780 m²

Plenary room
1
1.800 m²

Visitor stands
1
800 m²

Corridors
15%
21.585 m²

Visitor area
1
1.200 m²

Emergency power rooms
2
250 m²

Server room
2
450 m²

Doctors office
1
450 m²

TV Studio
2
900 m²

Media rooms
6
900 m²

Meeting places
120
1.440 m²

Fitness rooms
2
1.600 m²

Press
6
1.050 m²

Offices
40
720 m²

Reading rooms
8
1.200 m²

Offices Ältestenrats
90
1.620 m²

Archive
2
2.800 m²

Front office
140
1.540 m²

Offices
50
900 m²

Ältestenrat
2
300 m²

Offices for former Bundeskanzlers
10
180 m²

Utility rooms
10%
14.390 m²

Corridors
15%
21.585 m²

Library
2
8.200 m²

Conference halls
40
6.000 m²

Office gardens
(20 per)
56
16.800 m²

Meeting places
142
2.840 m²

69

Energy requirements

The new adaptable Bundestag should not only follow current German standards for sustainability but should go further than that. The idea is that the building will become a symbol and example for the German nation to inspire and promote sustainable buildings. So, the new Adaptable Bundestag will not only be energy neutral but produce and store energy for its surrounding. It should be built as much as possible from renewable materials and construction methods. And finally, its energy consumption by commuting from its users should be reduced.

Group requirements

The Energy group of the Complex Projects Bodies & Buildings Berlin has made a vision for a self-sustainable Berlin by 2030. Because the adaptable Bundestag is part of the Energy group, it should follow this vision. The vision is still a work in progress, but for site related choices the group already made three site requirements.

Group requirements

The first site requirement is building on existing potential, which means that the building should be located on a site that already exist and can be retrofitted. Examples include on parking lots, on bare lands, near water and railways, near industry and in existing buildings as re-use. This will make sure that urban sprawl is reduced, and that construction is made more efficient.

The second group site requirement is related to production of energy and states that the building can only be built on a site where geothermal power is possible. The third group site requirement is that the building should be close to public transportation. The definitive proximity is determined by the importance/ use of the building.

The adaptable Bundestag site will be close to the river Spree, near the Hauptbahnhof and on land where geothermal power is possible, so following all the group site rules.



Figure 18: The old Reichstag building with the iconic text of “Dem Deutschen Volke”. This means “Of the German people”, which shows that the parliament is not a ruler but a servant.

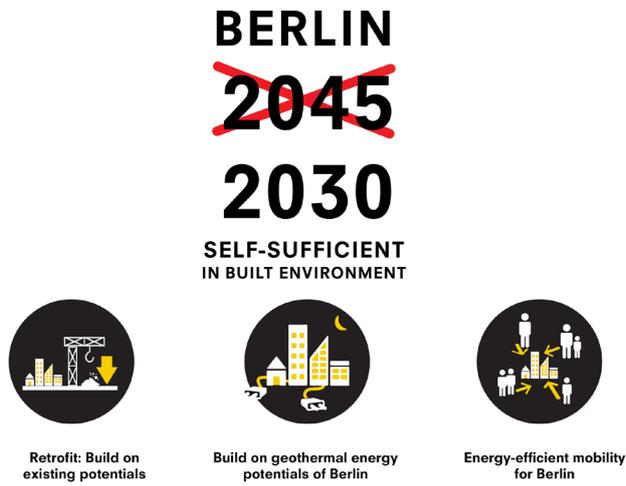


Figure 19: The groups ambition to make Berlin a self-sufficient city by 2030.

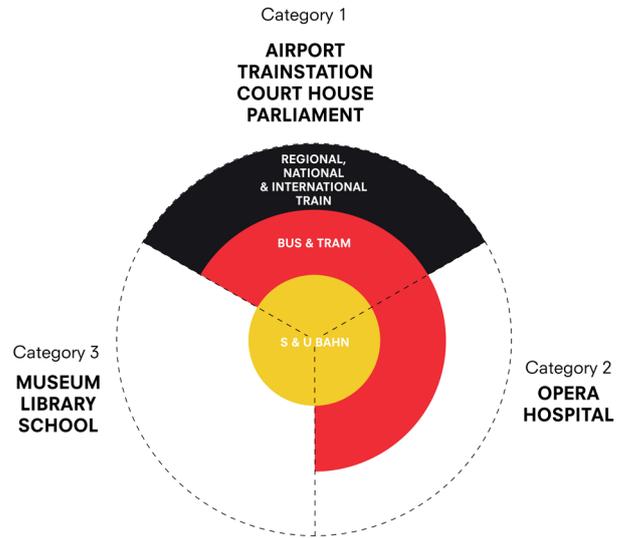


Figure 20: Group site rule 3: Location near public transport according to importance.

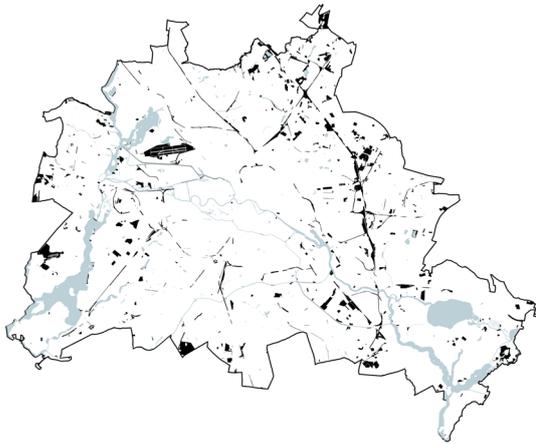


Figure 21: Group site rule 1: Build on existing potentials for Berlin.

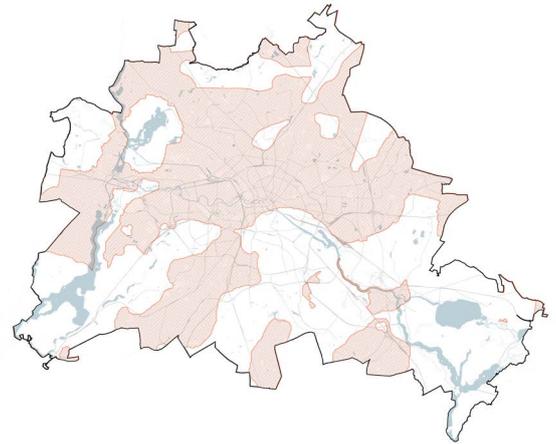


Figure 22: Group site rule 2: Location in the areas with geothermal power availability.

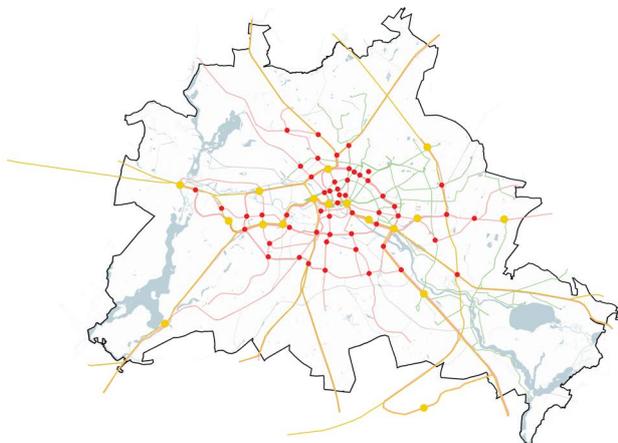


Figure 23: Group site rule 3: Location near public transport according to importance.

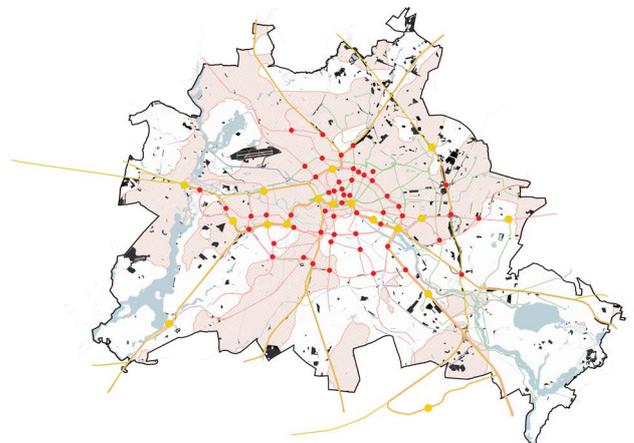


Figure 24: The final total group site requirements map with the 10 locations.

Energy requirements

Construction of buildings

R.1
Construction site accessible from water or rail



complex projects

R.2
Build on brownfield to prevent urban sprawl



complex projects

R.3
Build on parking lot



complex projects

R.5
Use electric vehicles and machines for construction processes



complex projects

R.6
Use energy surplus for construction



complex projects

R.7
Use prefabricated building elements



complex projects

R.8
Reuse building



complex projects

R.9
Compact building



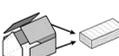
complex projects

R.56
Energy efficiency optimization with BIM technology



complex projects

R.64
Mass timber building



complex projects

Energy usage of buildings

R.4
Compact building



complex projects

R.10
Minimise facade surface



complex projects

R.11
Passive building to minimize heating/cooling



complex projects

R.13
Use residual heat from the grid



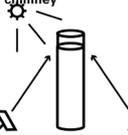
complex projects

R.20
Underground isolation



complex projects

R.21
Use of solar updraft chimney



complex projects

R.24
Programmable thermostats



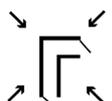
complex projects

R.25
occupancy sensors



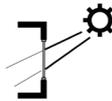
complex projects

R.27
little unused space as possible



complex projects

R.28
Windows and doors with high thermal resistance



complex projects

R.29
Optimizing building orientation with sun



complex projects

Optimal use of windows to absorb solar heat is South +/- 20 degrees.

R.31
Solar panels



complex projects

R.33
Geothermal energy



complex projects

R.34
Low-flow fixtures, reduces water consumption



complex projects

R.36
reflective roof, to help heat absorption



complex projects

R.37
Use of surface water as a source for heat and cold



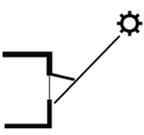
complex projects

R.40
Ground heat, as a source for heat and cold



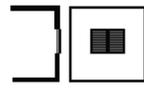
complex projects

R.41
Sun screens



complex projects

R.42
Shutters, to close a building when it is not in use



complex projects

R.43
Green environment around building to reduce heat stress



complex projects



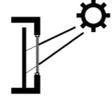
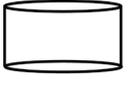
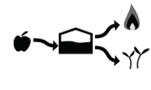
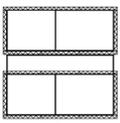
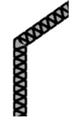
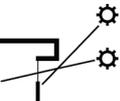
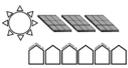
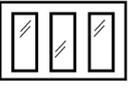
Group requirements



Personal requirements

Energy usage of buildings

Transportation to buildings

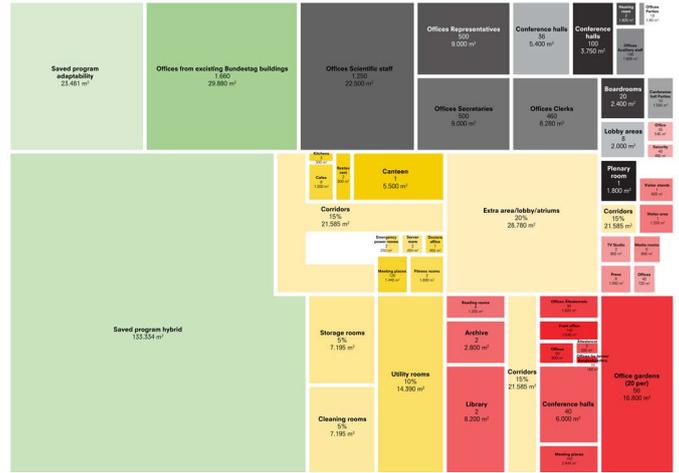
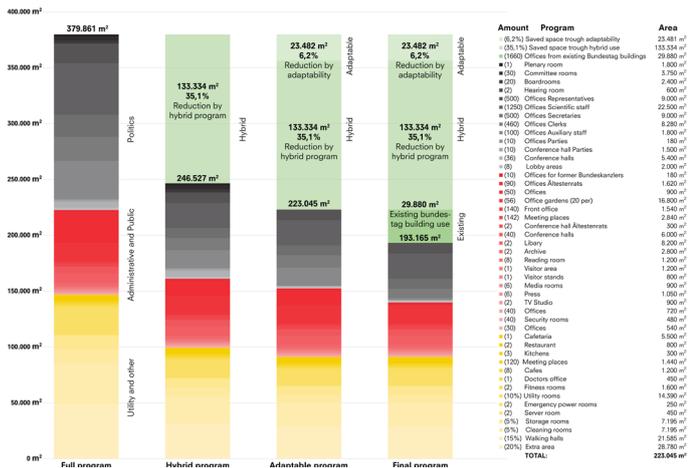
<p>R.12 Use renewable sources</p>  <p>complex projects</p>	<p>R.45 Use as little glass as possible on the north facade</p>  <p>Lots of heat loss and little chance of heating up</p> <p>complex projects</p>	<p>R.46 Drum wall, heavy wall behind the glass that absorbs heat</p>  <p>complex projects</p>	<p>R.14 Discourage use of car by reducing carparks</p>  <p>complex projects</p>	<p>R.15 Improve pedestrian and cycle paths</p>  <p>complex projects</p>	<p>R.16 Multi-functional usage to prevent peaks</p>  <p>complex projects</p>	<p>R.17 Position public buildings near mobility nodes</p>  <p>complex projects</p>
<p>R.22 Self regulating building climate. Greenhouse effect in a building.</p>  <p>complex projects</p>	<p>R.47 build with mass, church effect to retain temperature</p>  <p>complex projects</p>	<p>R.48 Compact building, as much volume as possible with as little facade .</p>  <p>Round volume is the ideal shape</p> <p>complex projects</p>	<p>R.18 Prevent urban sprawl</p>  <p>complex projects</p>	<p>R.50 Build electric car conversions stations</p>  <p>complex projects</p>	<p>R.51 Anerobic digestors to turn food waste to gas</p>  <p>complex projects</p>	<p>R.52 Turning car parks to battery banks</p>  <p>complex projects</p>
<p>R.26 smart building management systems (BMS)</p>  <p>complex projects</p>	<p>R.49 Grouping rooms with same heat requirement, insulating them within the building</p>  <p>complex projects</p>	<p>R.53 Use materials with better thermal performance</p>  <p>complex projects</p>	<p>R.63 Community re-use and repair centre</p>  <p>complex projects</p>	<p>R.65 Adjust bike parking in building regulations to encourage biking</p>  <p>complex projects</p>	<p>R.66 Provide shared mobility options</p>  <p>complex projects</p>	<p>R.69 Design large storage spaces for local goods supply</p>  <p>complex projects</p>
<p>R.30 Windows that capture sunlight during the winter while minimizing exposure in the summer.</p>  <p>complex projects</p>	<p>R.54 Solar chimney to improve natural ventilation</p>  <p>complex projects</p>	<p>R.55 Recycled insulation material</p>  <p>complex projects</p>	<p>R.67 Limit office space to encourage work from home</p>  <p>complex projects</p>	<p>R.70 Compact program building reduce transportation needs</p>  <p>complex projects</p>	<p>R.71 Provide an all-day program/counter balance with nearby buildings to minimise peaks</p>  <p>complex projects</p>	<p>R.72 Transform tradition stations to P+R stations to reduce car use</p>  <p>complex projects</p>
<p>R.35 Green roof, to help heat absorption</p>  <p>complex projects</p>	<p>R.57 Green roof & facade</p>  <p>complex projects</p>	<p>R.58 Habitable solar photovoltaics on unused mechanical roof</p>  <p>complex projects</p>	<p>R.73 Provide the amount of e-car charging poles</p>  <p>complex projects</p>	<p>R.74 Continuous walking and riding experience to stimulate walking and riding</p>  <p>complex projects</p>		
<p>R.39 Tidal movements turbines to generate electricity</p>  <p>complex projects</p>	<p>R.59 Sludge to energy production inside the building's toilet system</p>  <p>complex projects</p>	<p>R.60 Thermal zoning in buildings for precise heating/cooling control</p>  <p>complex projects</p>				
<p>R.44 Optimal facade, window ratio</p>  <p>South 30-50 percent glass to absorb heat. More glass actually causes more heat loss</p> <p>complex projects</p>	<p>R.61 Use of energy-efficient lighting technologies</p>  <p>complex projects</p>	<p>R.62 Solar panel facade and Solar shading</p>  <p>complex projects</p>				

DESIGN BRIEF RESULT

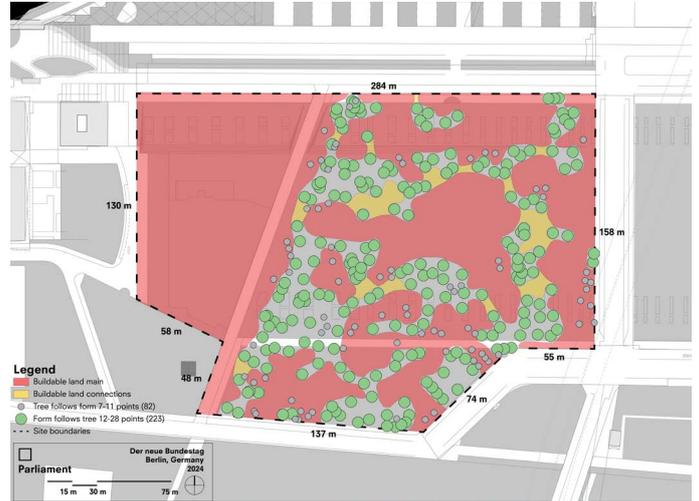
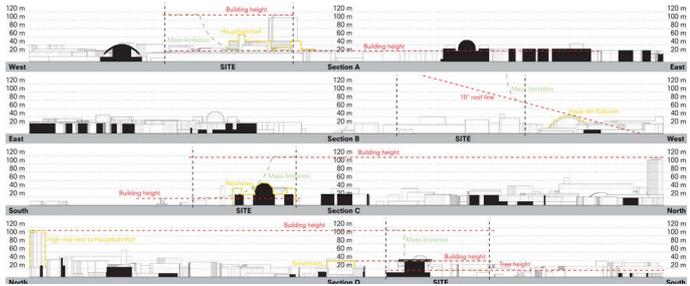
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PROGRAM

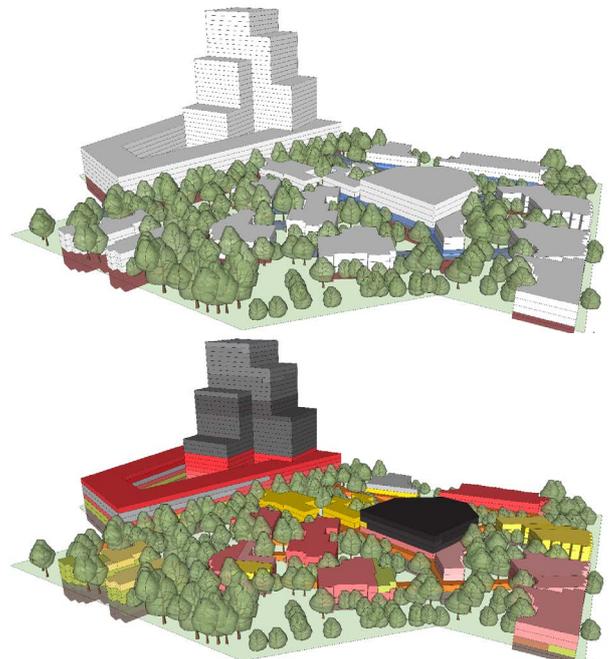


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SITE

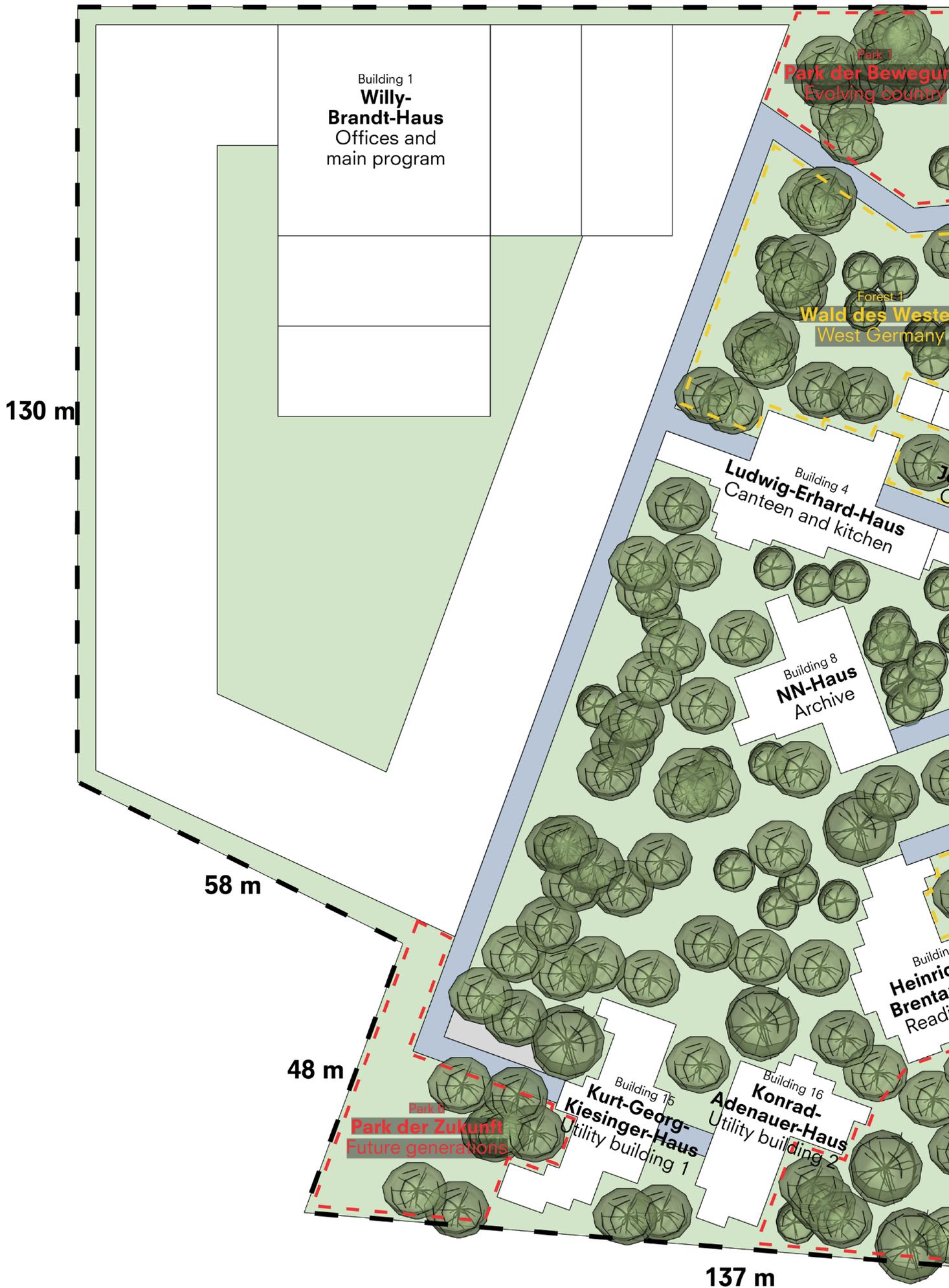


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MASTERPLAN AND MASSING

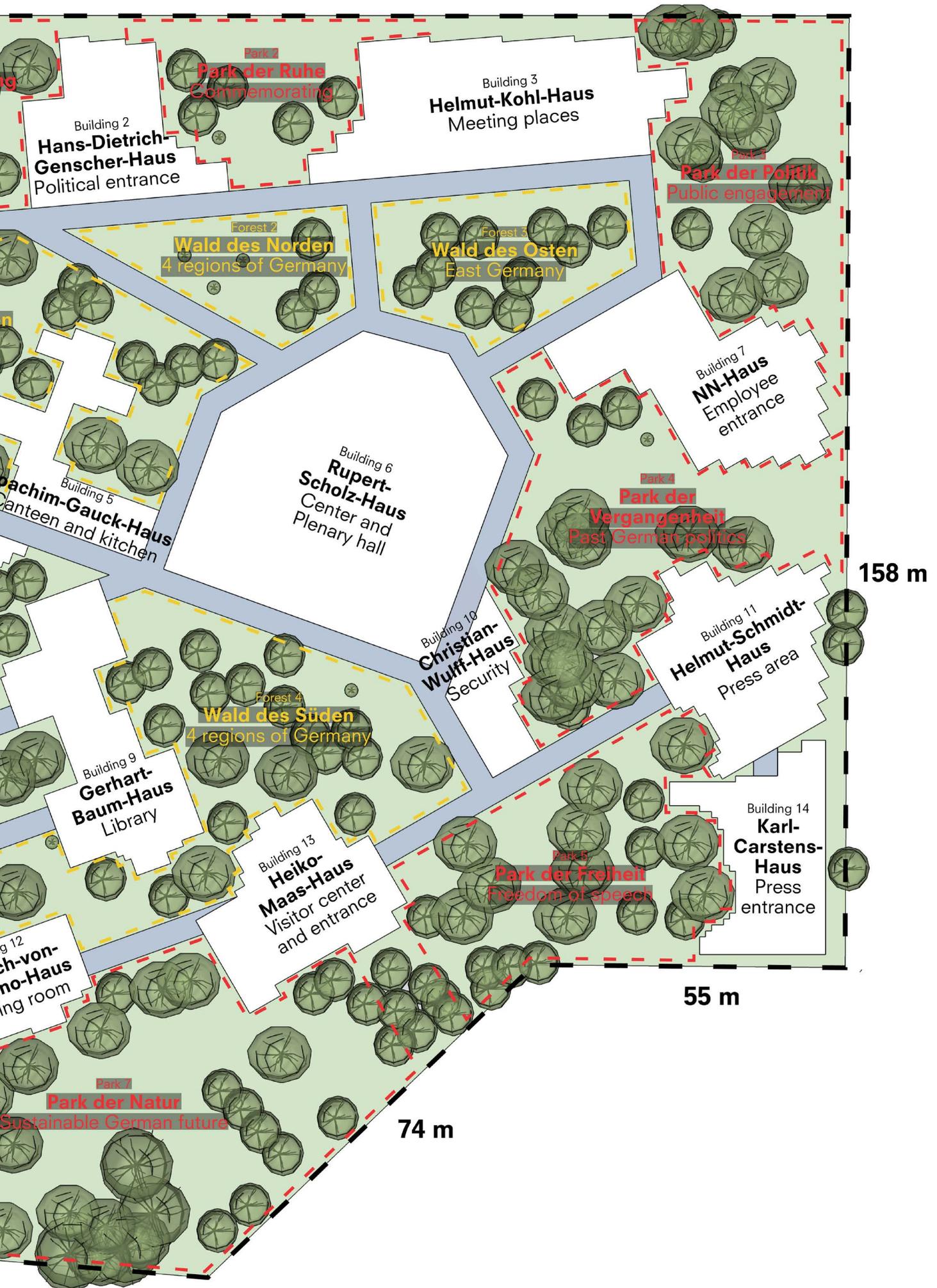


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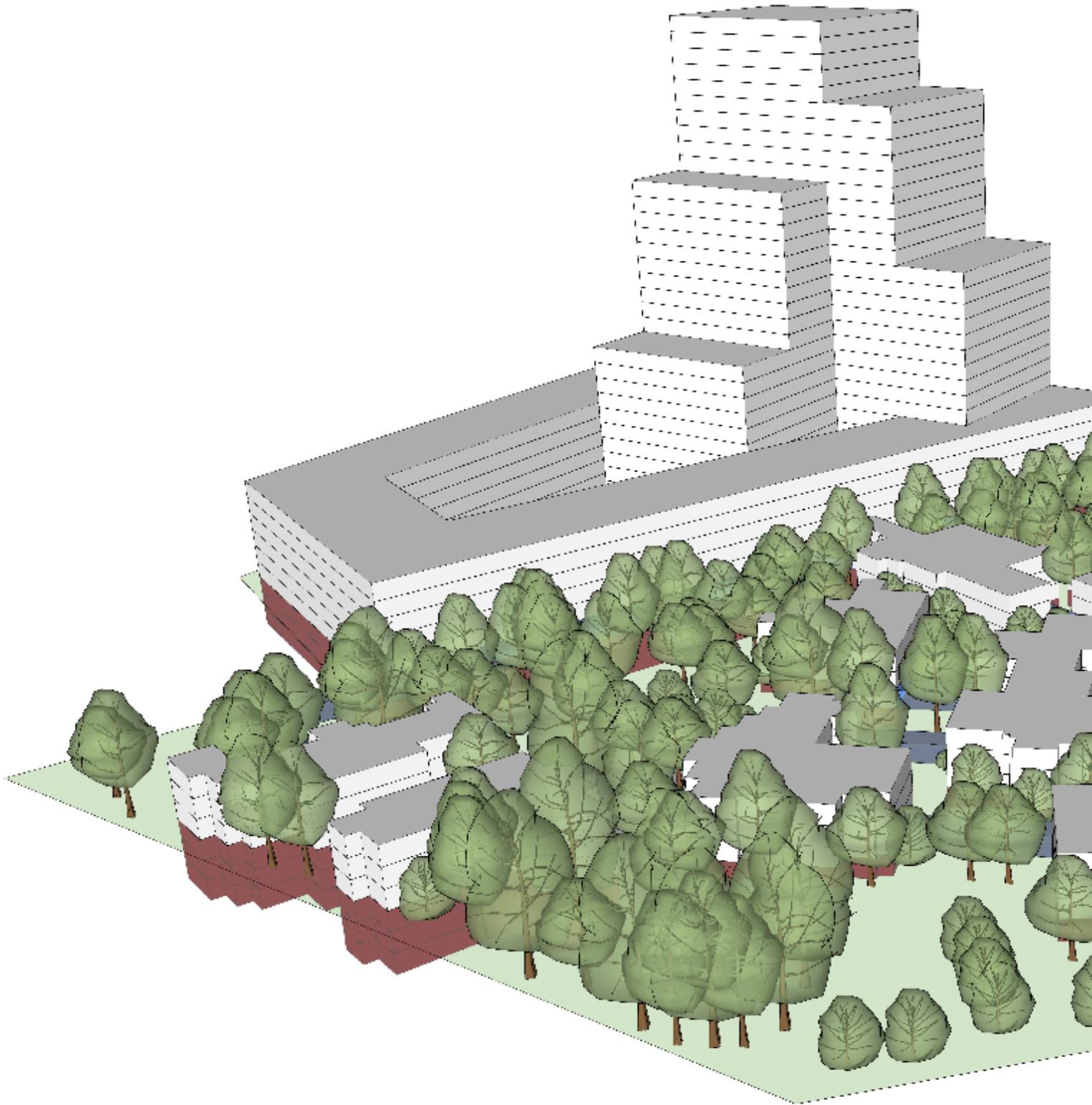


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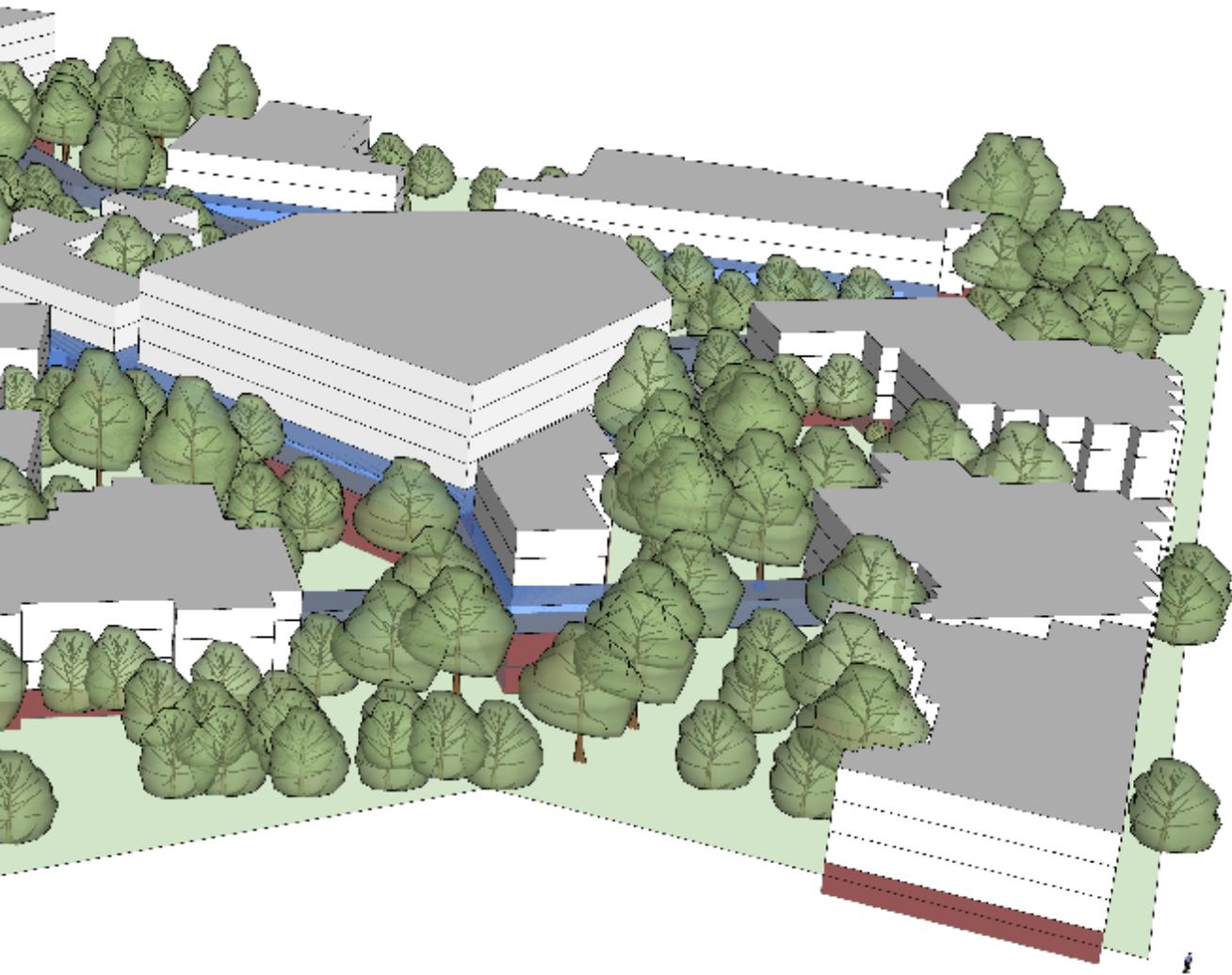
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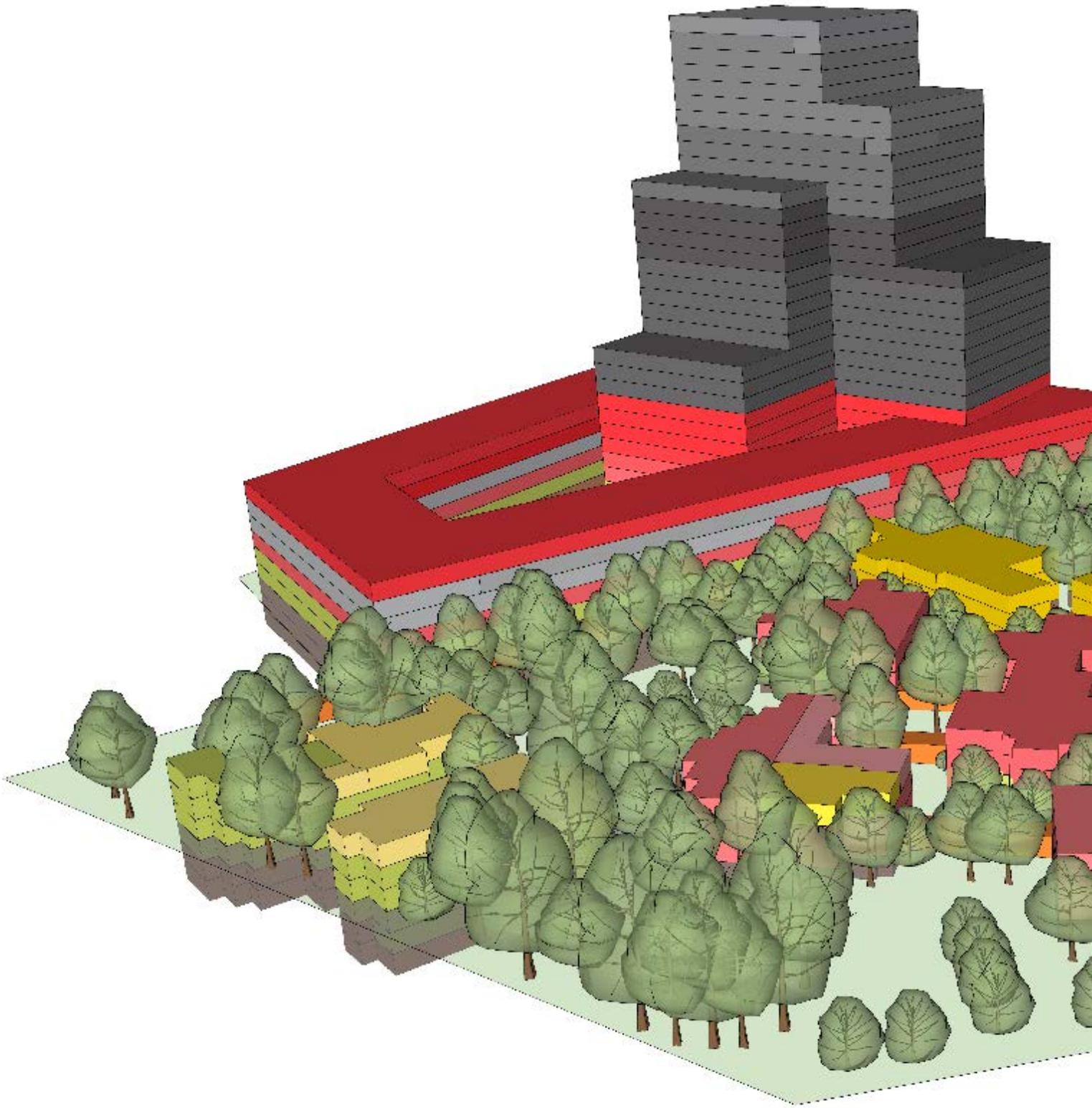
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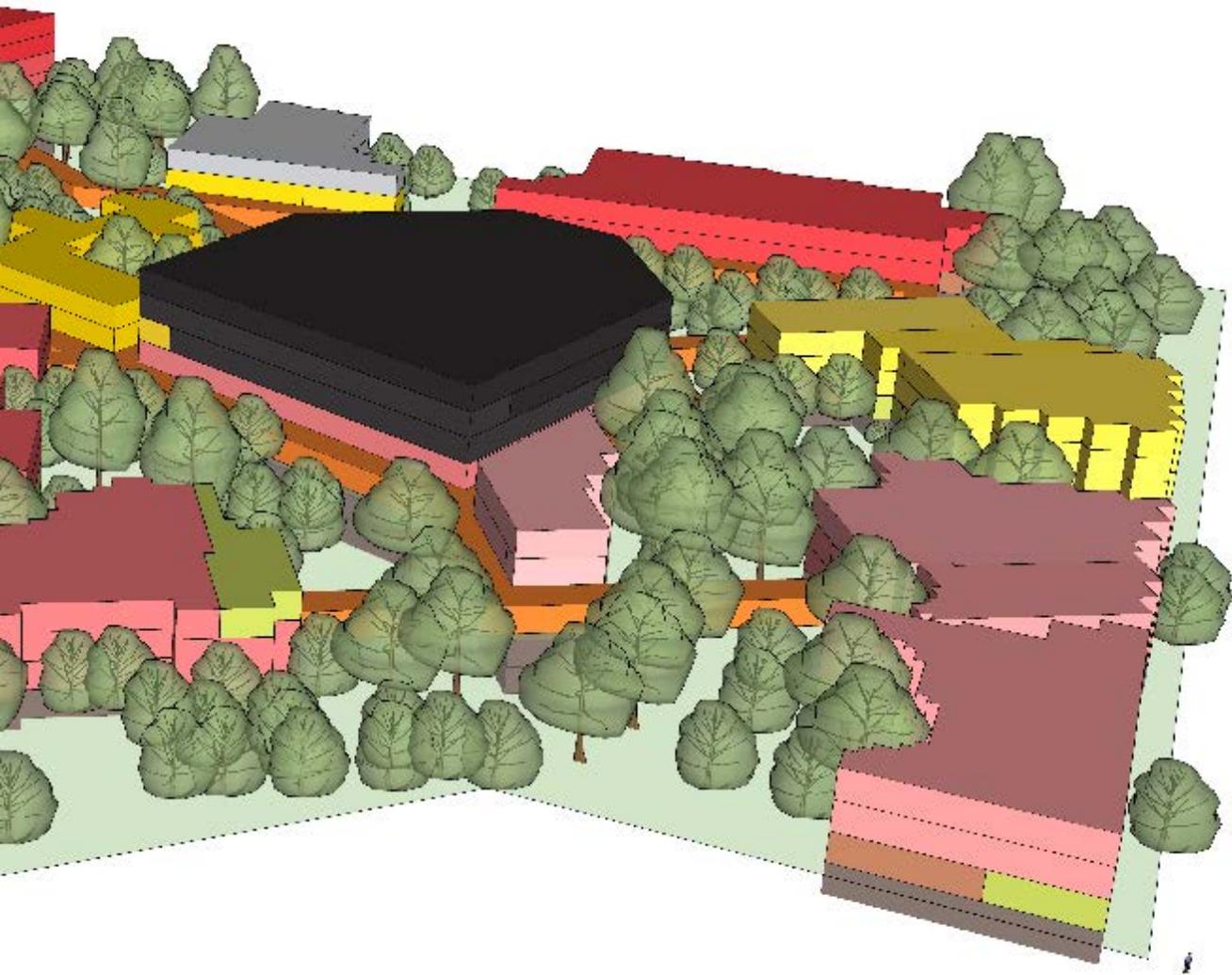
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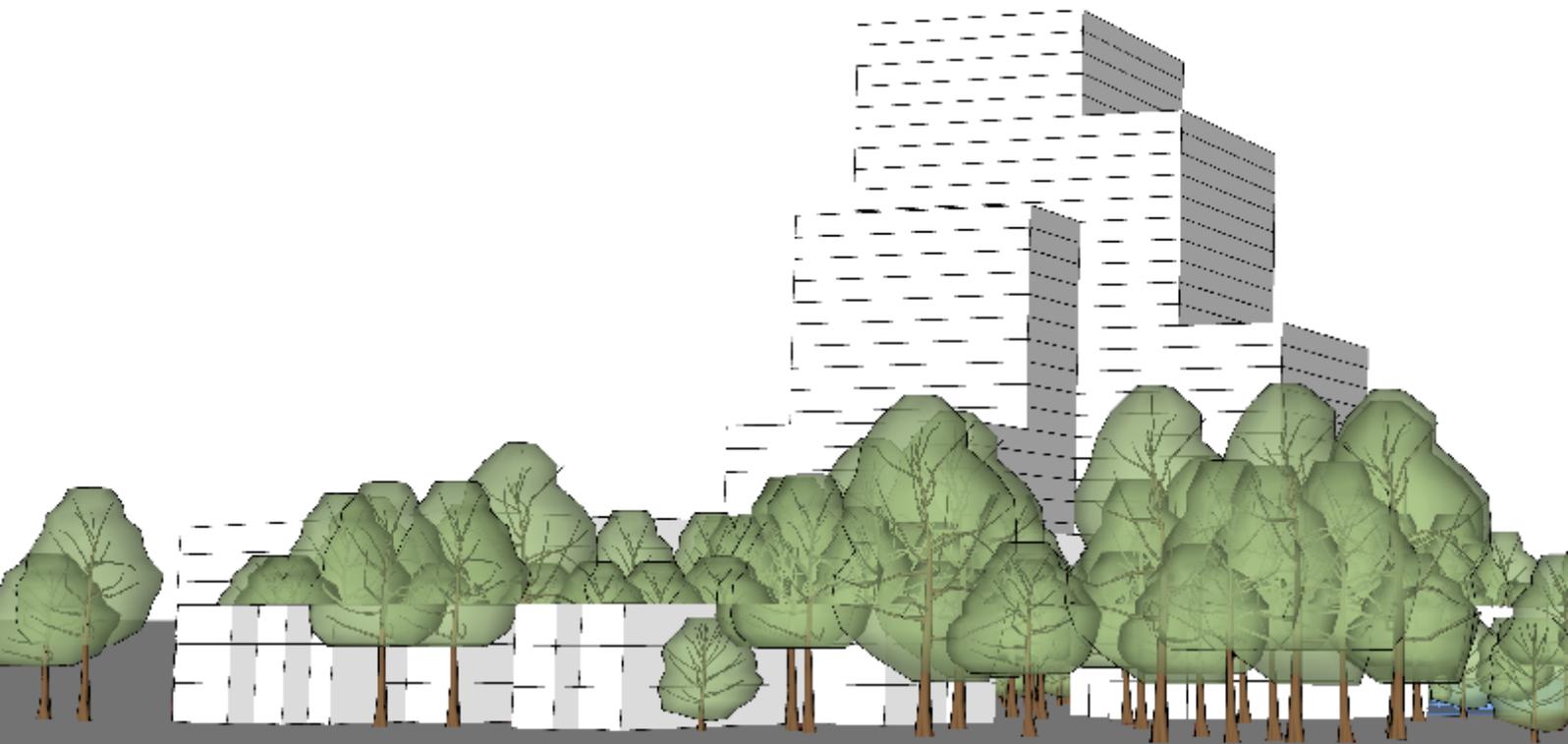
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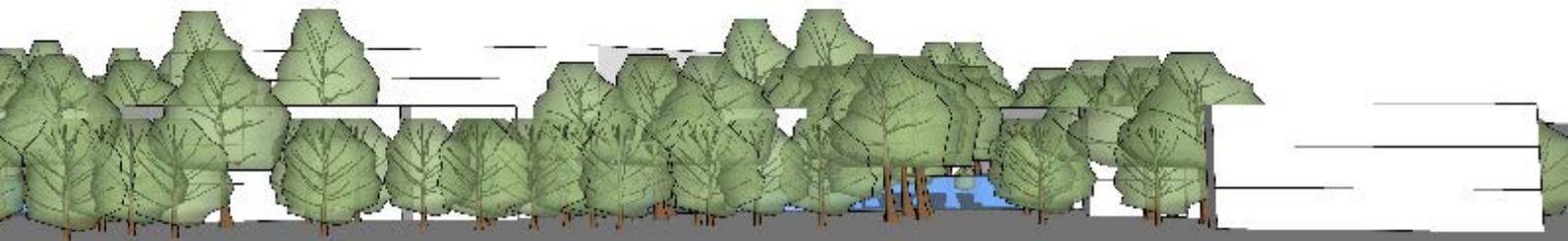
Massing from site and program



Massing from site and program



Massing from site and program



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06



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Figures

Figure 01: The plenary room (Plenarsaal) of the Bundestag, located in the old Reichstag building. On the top left the German eagle. This symbol is also the architectural element of this research. *Bundestag. (N.D.). Plenum_adler. Retrieved from Bundestag: https://www.bundestag.de/resource/image/586442/16x9/1460/822/c4d0daa35d0907ae17dad8dc17b627fd/6E82B5F106F53086556D14714CB242BC/plenum_adler.jpg*

Figure 02: Illustration showing the standard, L, XL, and XXL Bundestag, all different in size. *Created by Autor ing. J.C.L. Leroy Göres.*

Figure 03: Table showing the current size of the Bundestag and how this would grow with almost 2.000 employees in a Bundestag XXL. *Created by Autor ing. J.C.L. Leroy Göres.*

Figure 04: Flowchart explaining the German election system and how the Bundestag can fluctuate in size. *Created by Autor ing. J.C.L. Leroy Göres.*

Figure 05: The „Flagge der Einheit “(Flag of Unity) in front of the Reichstag building. It is a symbol and stands for the unification of Germany as a monument on the Platz der Republik. *Photographed by Autor ing. J.C.L. Leroy Göres.*

Figure 06: Diagram showing a possible way to have an adaptable plenary hall with multiple programable floorplans. *Created by Autor ing. J.C.L. Leroy Göres.*

Figure 07: The Reichstag with the German flag photographed through trees. representing architecture, democracy, and sustainability. *Photographed by Autor ing. J.C.L. Leroy Göres.*

Figure 08: The client is the Bundestag, which is chosen by the German people. So, in a way the German people are the clients and the Bundestag will be the user of the building. *Created by Autor ing. J.C.L. Leroy Göres.*

Figure 09: Program breakdown of the Bundestag. This breakdown shows the sectors of: Politics, Administration, Public, Facility and Utility. *Created by Autor ing. J.C.L. Leroy Göres.*

Figure 10: Collage made for this research plan of BBB Complex Projects. The collage shows the old Reichstag, an AI image of a future Bundestag parliament, Hologram debating, etc. *Created by Autor ing. J.C.L. Leroy Göres.*

Figure 11: The client is the Bundestag, which is chosen by the German people. So, in a way the German people are the clients and the Bundestag will be the user of the building. *Created by Autor ing. J.C.L. Leroy Göres.*

Figure 12: Map showing the areas that follow the personal site requirements of: being near the political district, being near public transport and being located on an open site. *Created by Autor ing. J.C.L. Leroy Göres.*

Figures

Figure 13: The chosen site: The Skulpturen park and the Tipi am Kanzleramt. This location is near the old Reichstag and the buildable land should follow the existing trees.

Created by Autor ing. J.C.L. Leroy Göres.

Figure 14: The proposed program for the new adaptable Bundestag. The program shows the program bar and also how adaptability and hybrid building use can reduce a lot of building area.

Created by Autor ing. J.C.L. Leroy Göres.

Figure 15: Program breakdown of the new adaptable Bundestag. This breakdown shows the sectors of: Politics, Administration, Public, Facility, Utility and Site.

Created by Autor ing. J.C.L. Leroy Göres.

Figure 16: The total program list of the new adaptable Bundestag. The total program size is 223.045 m². Which would have been 379.861 m² when there was no adaptable and hybrid program.

Created by Autor ing. J.C.L. Leroy Göres.

Figure 17: Program relation diagram for the new adaptable Bundestag. This diagram shows the grouping of different program topics.

Created by Autor ing. J.C.L. Leroy Göres

Figure 18: The old Reichstag building with the iconic text of "Dem Deutschen Volke". This means "Of the German people", which shows that the parliament is not a ruler but a servant.

Photographed by Autor ing. J.C.L. Leroy Göres.

Figure 19: The groups ambition to make Berlin a self-sufficient city by 2030.

Created by the CP BBB Energy group (09)

Figure 20: Group site rule 3: Location near public transport according to importance.

Created by the CP BBB Energy group (09)

Figure 21: Group site rule 1: Build on existing potentials for Berlin.

Created by the CP BBB Energy group (09)

Figure 22: Group site rule 2: Location in the areas with geothermal power availability.

Created by the CP BBB Energy group (09)

Figure 23: Group site rule 3: Location near public transport according to importance.

Created by the CP BBB Energy group (09)

Figure 24: The final total group site requirements map with the 10 locations.

Created by the CP BBB Energy group (09)

