



RESEARCH PLAN

# OASIS FOR VITALITY

CENTRE OF ASPIRATION FOR THE RECOVERING

Inpatient rehab Centre

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# ABSTRACT

The goal of this thesis is to propose an architectural framework for designing a rehabilitation facility in Berlin to provide patients in need with the greatest possible recovery experience. It also provides much-needed follow-up treatment for Berliner patients following acute hospitalisation, eliminating the need for unnecessary and costly hospitalisations and allowing for early releases. The framework will be built around an examination of how architecture could influence the mental and physical state of recovering patients to improve their rehabilitation experience. This research will be implemented by researching the topics; Architecture, Clients, Program and Site. This will result in a design brief for a health promoting rehabilitation facility.



# INDEX

ABSTRACT	03
INTRODUCTION	06
RESEARCH QUESTION	08
RESEARCH FRAMEWORK	09
RESEARCH METHODS	10
ARCHITECTURE CONCEPT	12
DESIGN BRIEF	18
BIBLIOGRAPHY	32

# INTRODUCTION

## Thesis Topic

Changes in the aesthetic design of healthcare facilities have been shown by numerous theories to have a significant influence on patients health outcomes. Architecture has a significant influence on how people perceive things, either positively or negatively, due to its capacity for psychological manipulation. Endocrine systems, behaviour, and brain responses are all profoundly impacted by architecture. The significant impact on the body and brain emphasises how directly architecture affects general health (J.A. Golembiewsk, 2016).

Thus, from this perspective, hospital architecture should reflect the highest standards of medical care, fostering a supportive atmosphere that gives patients and employees hope. However, feelings ranging from discomfort to anxiety are frequently evoked by modern hospitals (Miller et al., 2012, p. 32).

Hospital design has changed significantly over time as a result of advances in technology and medicine. The ongoing developments have made healthcare facilities among the most expensive buildings to design, build, and maintain. Because of this, efficiency has taken centre stage in hospital design, acting as a double-edged sword to cut costs and minimise staffing needs. International Health Facility Guidelines were developed as a result of hospitals' status as essential public services. Although the goal of these guidelines is to improve healthcare delivery, hospital design has become more uniform and clinical as a result of them. While the evidence-based design

approach guarantees adherence to fundamental standards, patient comfort has frequently been compromised in the process (H. Thimbleby, 2013).

Furthermore, the idea of being admitted to the hospital carries some inherent discomfort and anxiety. Generally speaking, encounters with healthcare situations are marked by feelings of stress, anxiety, and uncertainty. A patient feels vulnerable, goes through some degree of physical discomfort, and frequently feels stressed and uncertain. Furthermore, a sick person in such a state is taken from the security of their own home and placed right away in an impersonal setting where efficiency is key. A patient experiences a loss of control over his own body, becomes unable to regulate who enters his room, and finds himself suddenly dependent on strangers. (K. Dijkstra, 2009).

A person's psychological needs are crucial in this kind of circumstance. Since stress reactions frequently lead to worse medical outcomes, they can be regarded as a clinical problem in healthcare settings. It would be naive to believe that hospital design can be specifically adapted to meet the psychological needs of patients, given the extensive research that has already been done on healthcare design in relation to patients' mental health and stringent requirements. However, a shift in design towards clinical and machine-like environments has resulted from the changing healthcare landscape, which places a greater focus on specialised hospitals that provide acute care. This thesis argues that this

trend, while effective in treating acute conditions, it overlooks the holistic well-being of patients during their recovery and rehabilitation phases (E. Miedema, 2020).

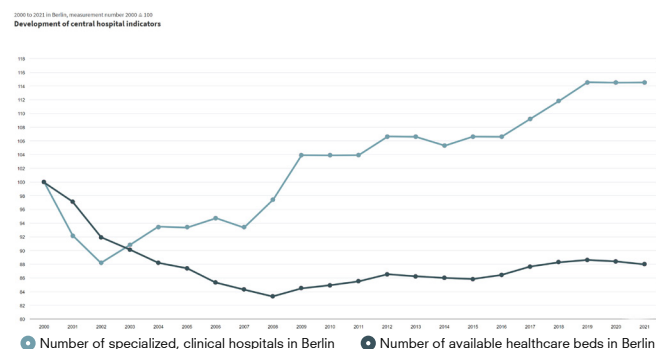
### Problem Statement

The successful coordination of follow-up care following hospital discharge is essential to ensuring positive patient experiences. This coordination is often complicated by the involvement of multiple care providers. In 2018, Sweden enacted the Care Coordination Act as a response to this challenge. The complexity of post-hospitalization care was the focus of this legislative initiative. They streamlined and improved the overall patient experience by requiring a thorough discharge planning process for patients in need of follow-up care services (D. Spangler, 2023).

There are a lot of specialised hospitals in Germany as a result of the lack of implementation of such regulation and decades-long lack of coordinated hospital planning. The health system is among the most inefficient in Europe, with the lowest nurse-to-bed ratio, as a result of specialisation and hospital fragmentation. Despite Germany's third-place staff density in Europe, this leads to a heavy workload for the staff (*Challenges for the German healthcare system in the COVID-19 pandemic and beyond, z.d.*).

Berlin's statistical data also demonstrates this trend. The number of specialised hospitals in Berlin has grown steadily since 2002, despite the fact that the total number of available healthcare beds has stayed relatively constant over time (see Fig 1). Due to this, the ratio of follow-up care beds to intensive care beds has decreased to 12,1%, which is close to a third of Germany, which already has a low ratio. Long waiting

times have been the result, which has caused unnecessary hospital admissions as well as longer than necessary lengths of stay for each patient. Furthermore, it is projected that the ageing population in Germany will increase the number of people in need of long-term care by 37% by 2055 (*Long-term care projection, z.d.*).



**Fig 1. Development of central hospitals vs available beds**  
Dec 2021. Germany: Country Health Profile. Copyright 2021 by OECD

This induced inefficiency due to the lack of provided follow-up care does not only increase the costs, but it most importantly also increases the risk of mental and physical deconditioning of patients and staff due to the clinical hospital environment. Increased LOS has been linked to worse patient outcomes and higher risks of hospital-acquired conditions like the risk of sleep deprivation & catching infections (N. England, z.d.).

# RESEARCH QUESTION

## Research Question

Based on this previously outlined problem statement, this thesis is driven by three primary objectives:

1. Provide for the best recovery rates possible, by specializing on long term, recovery care and by leveraging architecture's positive influencing potential.
2. Establish a specialised intermediate care facility to fill the gap between acute care and care at home.
3. Improve the recovery experience for patients requiring long-term follow-up care by leveraging architecture's ability to impact mental health positively.

The research aims to create an architectural framework for a recovery facility tailored to the patient's physical and psychological needs. The goal is to improve integrated follow-up care in Berlin, reduce unnecessary hospitalisations, and enable earlier discharges. The study focuses on the architectural aspects of healthcare, with a particular emphasis on rehabilitation, which has been shown to improve long-term patient outcomes. (Inpatient Rehabilitation – Northern Colorado Rehabilitation Hospital, z.d.).

In order to set up this framework, the key question this thesis tries to answer is;

*“How to design a health promoting inpatient rehabilitation centre for the recovering patient?”*

To answer this question, the thesis begins by clarifying the concept of 'health-promoting architecture.' As a result, this understanding guides the optimisation of Client, Programme, and Site considerations, paving the way for novel design strategies that address the specific needs of recovering patients.

**“HOW TO DESIGN A (1) HEALTH PROMOTING,  
(2) INPATIENT REHABILITATION CENTRE FOR THE  
(3) RECOVERING PATIENT?”**



1. Provide for the best recovery rate



2. Filling the long-term care gap



3. Provide the best recovery experience



# RESEARCH FRAMEWORK

## Theoretical Framework

In healthcare design, phrases like “healing architecture” are frequently used, but more in marketing terms than with a true comprehension of the concept. This study attempts to combine the requirements of rehabilitating patients and healthcare workers with concepts of therapeutic design, and biophilic design to truly comprehend how architecture can enhance the experience of patients requiring follow-up care.

Therapeutic architecture is based on research done for mental health facilities, and it is the latest evolution of medical architecture. The idea behind it is to create environments according to the individual users perception & psychology; by utilising concepts from human anatomy, physiology, and sensory perception. With this it seeks to establish environments which actively;

1. Reduces stress and anxiety
2. Creates an activating environment

(M. Nair, 2022).

The theory of Biophilic design adds another layer to healing architecture, by aiming to incorporate natural elements, processes, and patterns into the built environment to enhance the overall well-being of occupants. The term “biophilia” describes the natural human desire to make connections with other living things and the natural world (Zhong et al., 2022).

This study attempts to provide architectural strategies in order to design the best inpatient rehabilitation centre for the recovering patient by connecting these theories of architecture to the specific requirements of recovering patients in an inpatient rehabilitation facility.

## Relevance

Topic relevance; Healthcare facilities, are inherently stressful environments for individuals, marked by physical and emotional challenges. A person’s psychological needs are critical in this situation. It is naive to believe that hospital design can be specifically tailored to meet patients’ psychological needs. However, if done right, certain design aspects can have an profound influence in healthcare settings. A systematic review analyzing 30 peer-reviewed articles, revealed a significant and reliable effect (Dijkstra et al., 2006)

Global relevance; The question holds global relevance due to the universal nature of healthcare environments. Hospitals and healthcare facilities are present in every corner of the world, serving diverse populations with varying healthcare needs. By understanding how a therapeutic design approach can enhance mental well-being in of recovering patients, architects and healthcare professionals can implement universally applicable strategies to improve the quality of care and the well-being of patients and staff worldwide.

Architectural relevance; This research holds also architectural relevance as it addresses the fundamental purpose of design strategies within healthcare facilities. Healthcare environment design profoundly influences the well-being and recovery of patients, as well as the working conditions for staff. Architects play a pivotal role in creating environments that are not only aesthetically pleasing, but also functionally effective and conducive to healing. Therefore, exploring the integration of a holistic and salutogenic design approach directly aligns with the core principles of healthcare architecture, aiming to create spaces that optimize mental well-being and ultimately contribute to improved patient and staff experiences.

# RESEARCH METHODS

For a design brief, understanding Program, Client and Site is sufficient to create an understanding of the needed information. However, in order to understand more on how architecture can influence the mental health of patients, I added the chapter Architectural concept at the beginning.

## **Architecture**

Literature Study;

A review of current literature will be done to create an understanding of the potentials and implications of the term, health promoting architecture. This will be done by looking at the theoretical framework of Salutogenic, Therapeutic and Biophilic design.

Questionnaire;

I had meeting with the lead architects of the architectural firm Gortemaker Algra Feenstra. They specialise in healthcare design, so this helped me to create a better understanding of the guiding principles of healthcare architecture.

## **Program**

Literature Study;

A review of the literature will be conducted in order to understand the requirements and guidelines for the healthcare programme for an inpatient rehabilitation hospital.

Case Study;

To determine the programmatic requirement and the size/capacity of the building, benchmarking against buildings that offer a comparable programme will be done.

## **Client**

Literature study;

Literature analysis will be done to fully grasp the unique architectural requirements of the various target audiences, including paediatrics, young adults, geriatrics and staff.

Internet search;

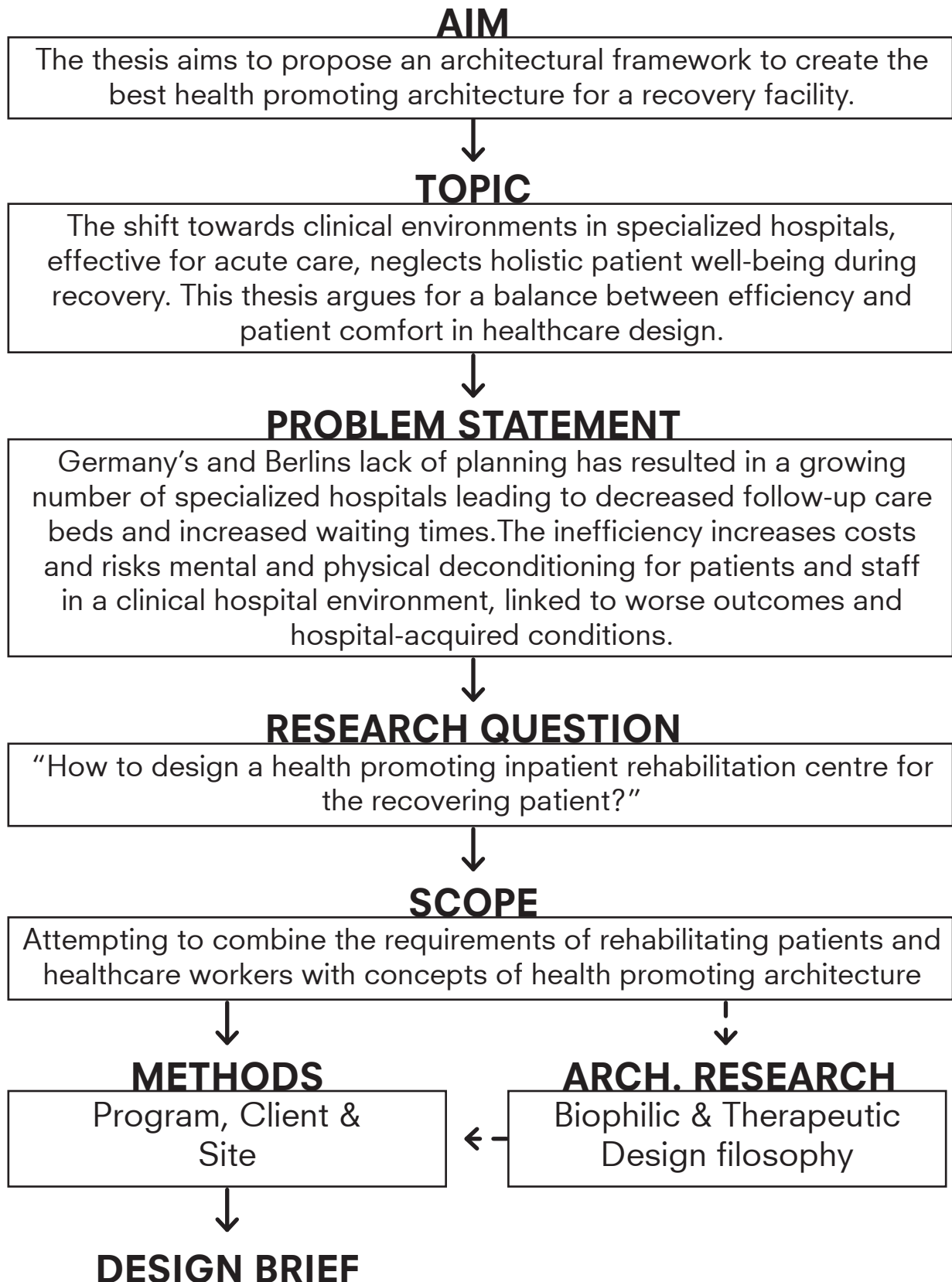
To gain an understanding of Germany's healthcare system and finances, I plan to conduct an online search on the three financial options that are currently recognised: privately owned, government-owned, and nonprofit organisations.

## **Site**

Internet search;

Due to the configuration of the Complex Projects studio, this rehabilitation centre is affiliated with a health-focused group in Berlin. An urban strategy developed around this theme will partially determine the location. An internet search will be conducted to determine the additional site requirements for rehabilitation hospitals.

# FRAMEWORK



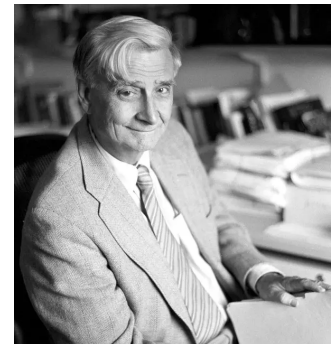
# ARCHITECTURE CONCEPT

Like previously outlined in the theoretical framework, terms like “healing architecture” are frequently used in marketing, but often without a explanation of the concept. This study aims to provide a practical framework to substantiate and clarify these terms.

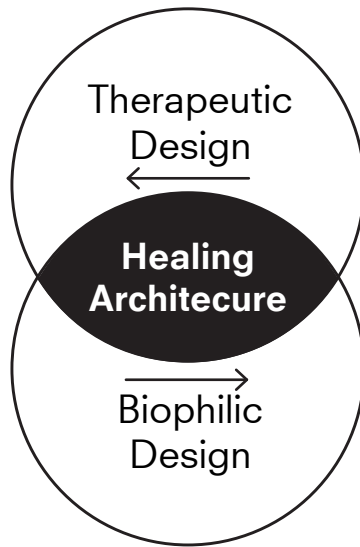
When looking into this topic, two main strategies can be found; Therapeutic and Biophilic design. These are the most commonly used terms, claiming to have positive influence of the mental state of the users of its buildings (fig 2).



**Psychologist & Architect Dr Evangelia Chrysikou - 20th century**



**Biologist Edward O. Wilson - the 1980s**



Designing spaces according to the **individuals perception & psychology;**

Aiming to:

1. Create an activating environment
2. Reduce stress and anxiety

(M. Nair, 2022)

Integrating nature into the built environment, **to leverage our innate connection with nature;**

Aiming to:

Create restorative environments for both individuals & the ecosystem

(Zhong et al., 2022).

**Fig 2. Summary overview of Healing architecture strategies**

## THERAPEUTIC DESIGN

### Reactivating

Firstly let’s explore the first goal of therapeutic design; creating an activating environment. To achieve this goal, the reactivating hospital scheme, developed by Gortemaker Algra Feenstra architects, can be implemented.

When not at therapy, patients spent considerable time inactive in their bedrooms. Rehabilitation wards could be designed to enable people with disability to explore space and to provide incentives to draw patients out of their bedrooms.

Based on this, the idea is to introduce the 8-8-8 hour rythm (Fig 3);



**Fig 3. Three times eight hour philosophy**  
Note. Based on ideas from Gortemaker Algra Feenstra architects

However, just providing space for leisure is not enough. Many factors may influence whether patients use communal spaces, including not knowing they exist or where to find them, difficulty accessing them without help, or feeling they don’t have permission to use them. To combat this, we need to provide “**draw-out-bedroom**” features, to actively nudge patients to utalize them (Fig 4).

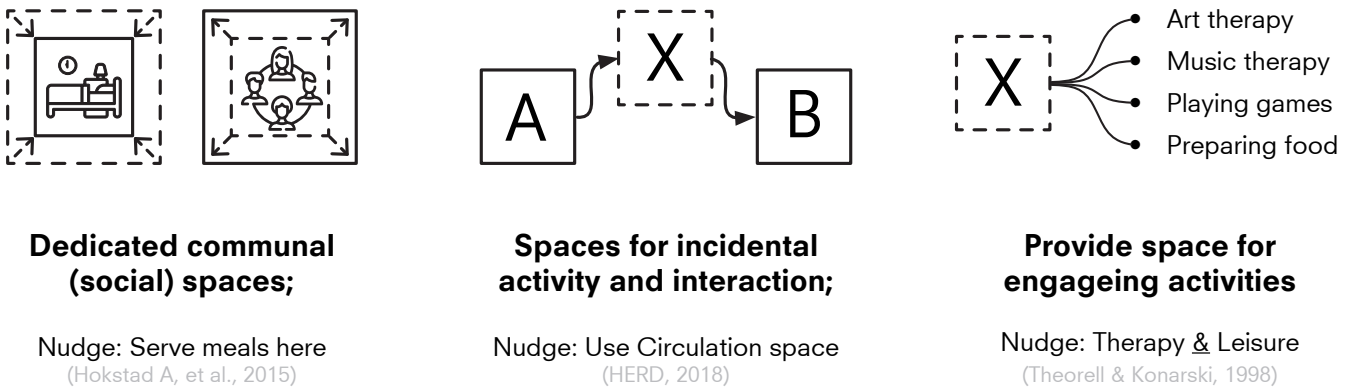


Fig 4. "draw-out-bedroom" features

The first priority is to provide multiple communal spaces, an abundance of therapeutic areas, outdoor access, and space for active family involvement in patient therapy. Patient rooms should be used solely for sleeping, with all other activities, including meals, concentrated in communal areas. Patients are encouraged to be more active by reducing the size of their rooms and emphasising communal areas.

Furthermore, the goal is to use open spaces like hallways and circulation areas for incidental activities and interactions. It is important to note that this approach is based on employee encouragement rather than simply incorporating activity opportunities into the building. Providing spaces for engaging activities such as art, music, dance, painting, and drama therapy has the potential to improve social and mental health, boost self-esteem, and foster a sense of community. Integrating these activities into therapy sessions encourages patients to take full advantage of the available space.

#### Stress reducing

The second aim of therapeutic design is to be stress reducing. The main way to achieve this is by stimulating the senses of patients. If done right, this can take patients mind off of their negative emotions.

Four key senses can be considered here;

1. Scent is an important consideration; the scent of natural wood, scented plants, herbs, and other elements create a connection to nature. It also helps overcome the scent associated with healthcare facilities.
2. Light is also an important consideration. It may seem obvious that all-natural daylight is preferable, but a recent study discovered that 92% of patients found sunlight to be pleasurable and calming. Whereas 62% of employees found sunlight to be a nuisance and unfavourable.
3. Natural colours have a calming effect on patients. However, for elderly patients, higher contrast provides a greater sense of safety.
4. Finally, natural sounds and classical music have been shown to be calming in stressful environments.

All in all these are some important considerations to be made. However, they mostly point towards using natural senses, which links nicely into biophilic design.

## BIOPHILIC DESIGN

### What?

Now, what exactly does “biophilic design” refer to? Biophilic design is an innovative approach that recognises the innate human connection to nature. It aims to evoke the tranquillity and vitality of nature by strategically incorporating elements like natural light, greenery, and natural materials.

In this pursuit, the design philosophy recognises the profound impact of our surroundings on both mental and physical health. According to research, spending time in nature can reduce stress, improve cognitive function, and contribute to a general sense of well-being. As a result, biophilic design aims to incorporate nature’s rejuvenating qualities into the built environment. (Zhong et al., 2022).

In addition to the individual benefits, biophilic design promotes a broader environmental consciousness. It recognises the interdependence of human habitats with the larger ecosystem. It aspires to create spaces that not only nurture their occupants but also benefit the planet’s health by incorporating sustainable practices and green technologies.

Essentially, biophilic design seeks to create a symbiotic relationship between the built environment and the natural world, benefiting both the well-being of individuals and the ecosystem, rather than just aesthetics.;

### Strategies

There are various levels, but the most direct and effective strategy is to integrate nature. As demonstrated in the introduction, biophilic design entails more than simply placing some planted pots inside a building. For this research, I narrowed it down to four main categories to incorporate into the

design: 1. plants, 2. material, 3. water, and 4. garden.

1. Plant design involves more than just arranging potted plants. It is critical to keep four key qualities in mind (Fig 5).

- It must be fully integrated with the building so that it is both sustainable and easy to maintain.
- To be as beneficial as possible, it must be experience-based for patients. Touching and interacting with nature improves the perceiver’s emotional state, may block or reduce troubling thoughts, and promotes beneficial changes in physiological systems such as reduced blood pressure and stress hormones” (Ulrich 1999, 49).
- It should also be designed to increase biodiversity, attracting more insects and thus birds to your garden and outdoor spaces. This will provide additional positive distractions for the patients. (C.Y Chang et al., 2005)
- Last but not least, it is important to focus on native species for it to be as sustainable as possible.

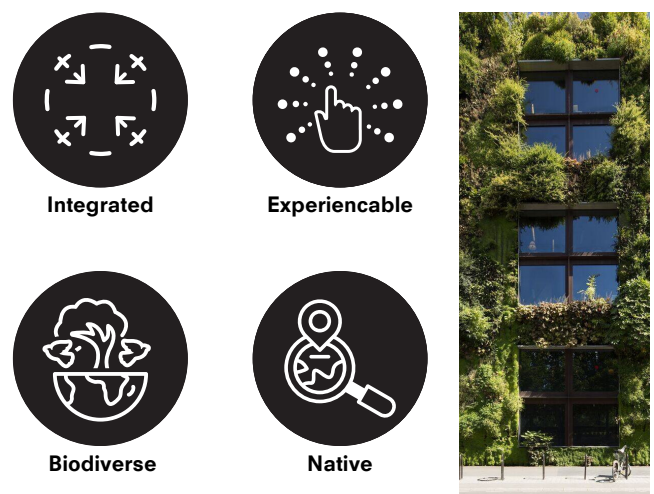


Fig 5. Important qualities for nature integration

2. Natural materials, such as timber, are widely used, and studies have shown that they have numerous health benefits. Research linked wooden panels to lower blood pressure and heart rate (Park et al., 2007). To make this as effective as possible, rough and unfinished textured surfaces should be allowed, which links back to the therapeutic concept of stimulating the senses.



Fig 6. Important qualities for timber integration

3. Water elements play an important role in Terrapin Bright Green's 14 biophilic principles, which are defined as 'a condition that enhances the experience of a place through the seeing, hearing, or touching of water'. A garden water feature within the patient's hearing range or a rain chain in place of standard guttering can help provide this connection (Browning et al, 2014);

Prioritise a multi-sensory water experience for the best results. However, it is important to remember that high volume, high turbulence water features can cause discomfort, affect humidity levels, or reduce acoustic quality, so proximity may influence appropriateness.

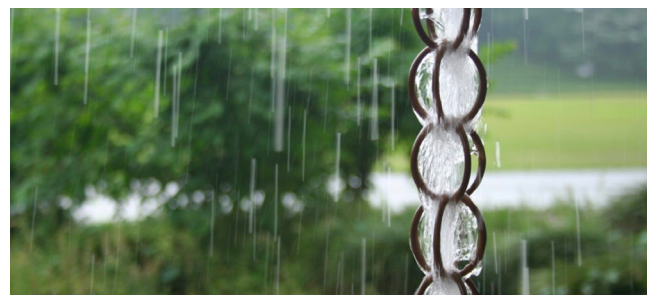
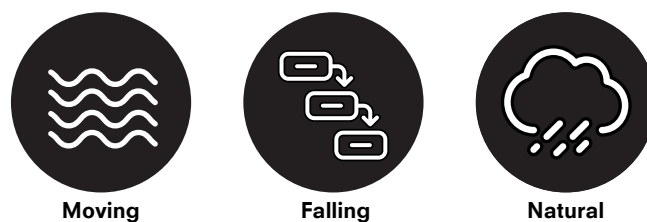


Fig 7. Important qualities for water integration

4. Garden design is another implementation that has a variety of therapeutic benefits. It is important to note that there are two types of gardens: therapeutic and enabling gardens.

Firstly, the therapeutic garden. This should provide a sense of control. Patients are deprived of control due to scheduling and physical limitations. To achieve this;

- It should always be easily accessible from main areas.
- It must allow for a variety of social interactions.
- Encourage physical activity by offering varying length paths.
- Must be a place of respite. A pavement-to-nature ratio of at least 30% to 70% is recommended to encourage engagement with nature.



The other garden type is the enabling garden. Therapeutic benefits come from activities and exercise led by a therapist.

Ideas for engaging activities include:

- Physical therapy; Engaging muscles by weeding, watering, and repotting plants.
- Physical therapy; walking on a variety of surfaces and grades to regain balance and ambulation abilities.
- Speech therapy; involves cognitive activities such as scanning for, describing, and comparing plants to engage the brain.

The enabling garden can be smaller, but it must be separate from the therapeutic gardens. Because otherwise, the 'escape' will remind the patients about therapy.





## HEALTH PROMOTING DESIGN - SUMMARY

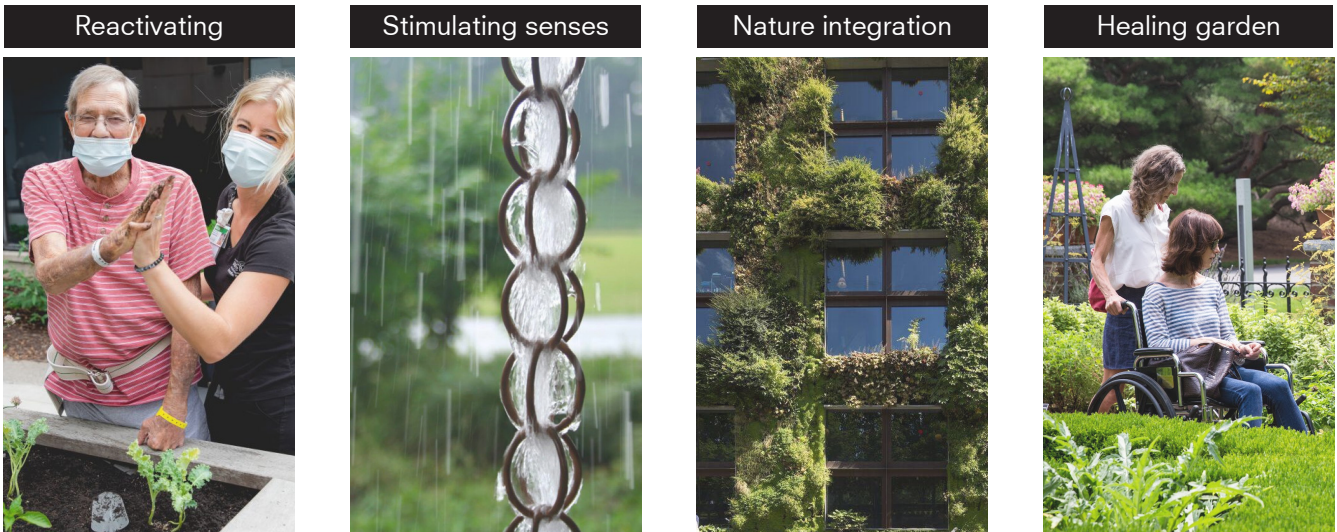


Fig 8. Health promoting architecture guidelines - summary

# DESIGN BRIEF - client

Based on the previously outlined architectural concept, the purpose of this design brief is to provide guidelines and provide relevant information for the inpatient rehabilitation centre's design project. Three primary subjects form the basis of it: Client, Program and Site.

## Client

The client will be examined first in order to determine who and with whom this project will be developed. The client is divided into three groups: organisations (1), occasional users (2), and main users (3).

### 1. Organisation.

To make the project possible, funding and expertise organisations must be defined (Fig 10).

It is recommended to collaborate with a private hospital organisation and a municipal

hospital for expertise and knowledge. Private clinics are well known for providing patient-centered nursing care. They also frequently operate within smaller specialised clinics that meet the requirements of an inpatient rehabilitation facility. A fitting organisation would be BDPK, Bundesverband Deutsche Privat Kliniken e.V., which is known for its willingness to innovate.

Working with a government-backed hospital can help add more specialised expertise as they have a large budget for research and expansion into long-term care. This is due to a reform of Germany's Long-Term Care System in 2018, during which the state increased its annual budget for long-term care by 20%. A fitting organisation is Vivantes, Berlin's largest municipal hospital group.

Financially, collaborating with the Federal

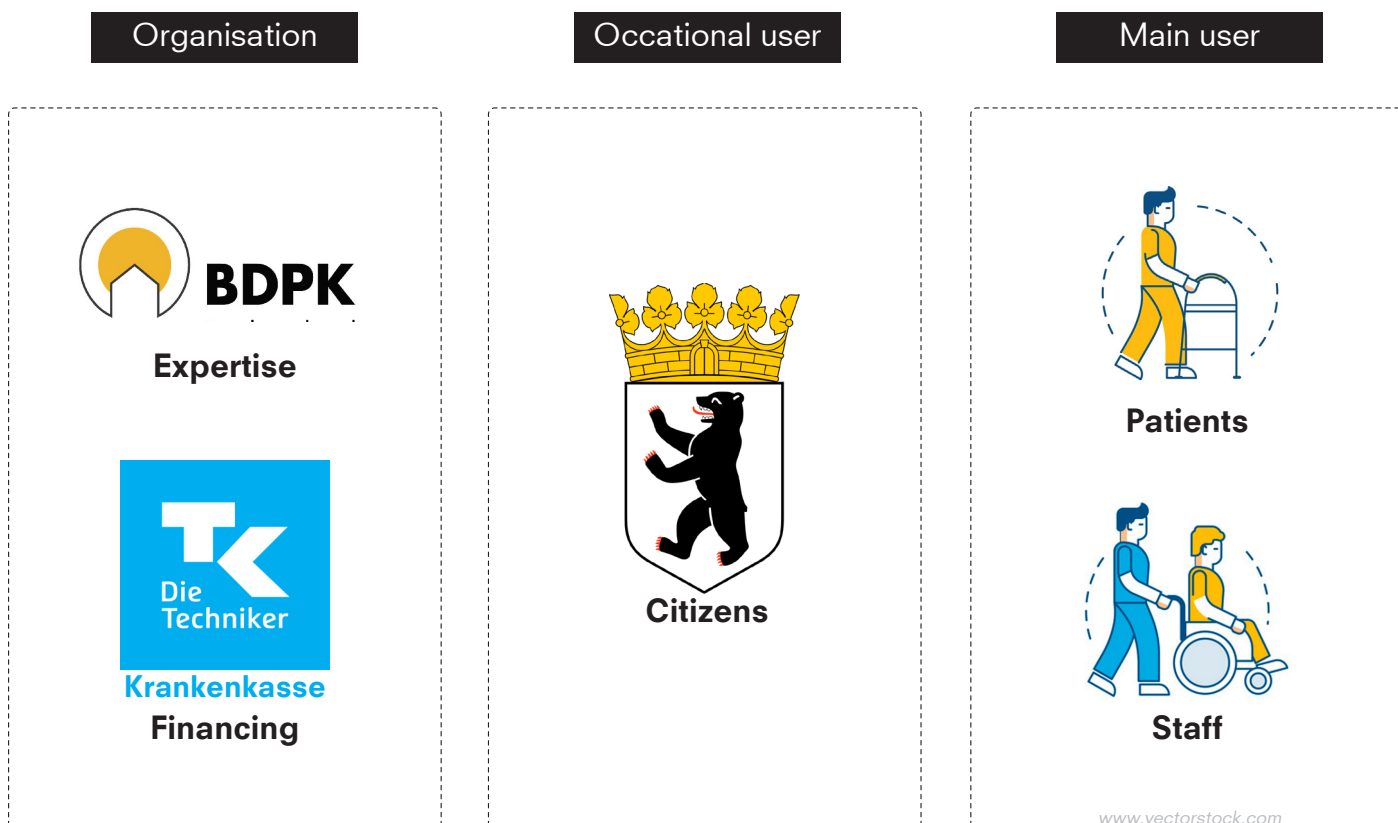


Fig 9. Client groups



Fig 10. Organisational clients; Private, Government & Insurance collaboration

Ministry of Health and a health insurance company is beneficial. This is because the German government devotes Europe's third-largest percentage (11.3%) of its health budget to mental healthcare (CBS, 2015). A government budget for additional costs will be associated with the specialised focus on health-promoting architecture, thereby improving patients' mental health.

A similar incentive exists for insurance companies, as they must cover up to 100 days of inpatient rehabilitation in Germany. So, if the architecture and specialisation of this rehabilitation centre improve recovery rates, health insurance companies such as Die Techniker (TK) will benefit.

So, for organisational clients, a collaboration between a private clinic organisation (BDPK), the government, and an insurance company (TK) is recommended.

## 2. Occasional User

Citizens, as occasional users, also play an important role in this project. This is due to the widespread importance of mental health, as modern cities are highly stimulated. The busy Berliner has little space or time to rest. As a result, one of the project's goals is to create an escape oasis for citizens to recharge their minds.

## 3. Main user

Finally, the primary user. Here, two groups are important: the staff and the patients.

For the staff, a multidisciplinary team of licenced experts is available, tailored to the three main stages of the patient's recovery journey.

- First, a rehabilitation doctor will diagnose each patient individually in order to create a personalised rehabilitation plan. This will be based on the patient's medical condition.
- Nurses will then be able to provide the necessary healthcare to all patients, allowing for a smooth and early hospital discharge.
- The third component of rehabilitation is therapists, who are experts in providing the best, personalised & effective rehab for each patient.

Patients are divided into three groups too: paediatrics (kids), (young) adults, and geriatrics. Geriatrics account for half of the facility's capacity because they are the most vulnerable group and require the most extensive rehabilitation. The other half is split evenly between children and young adults. This specific age division of the patients is important because they all require specialised care, with sometimes conflicting qualities. More about this in the programme section.

## Healing gardens

This specialised focus is particularly evident in the design of healing gardens. To make the healing gardens as therapeutic as possible, each patient must be able to use them however they see fit. There are some contrasting needs. Given this, five tailored healing gardens will be included in the rehabilitation facility programme. The tailored guidelines will be explored in more detail here, which is largely based on a lot of practical research within the book, *'Therapeutic Landscapes: An Evidence-Based Approach to Designing Healing Gardens and Restorative Outdoor Spaces'* (Marcus, C. C., & Sachs, 2013).

### 1. Paediatric

- Secure the area to prevent children from wandering off.
- Design attributes in the garden suitable for smaller scales to accommodate parents accompanying their children.
- Include a playground for healthy siblings, enabling parents to focus on their sick child.
- Space out play features to cater to cautious, shy, or disabled children. Avoid central, integrated play components that may unsettle certain kids.
- Incorporate interactive elements like water features, telescopes, and rearrangeable pebbles.
- Introduce geography to encourage exploration.

### 2. (Young) adults

- It is critical to provide opportunities to reclaim control. It should be up to them to choose where to sit, wander & stare and who and what one wants to interact with. Include things like moveable furniture etc.
- Young individuals are self-conscious, thus they may need semi-private areas.

Provide topography that can interrupt lines of sight.

- Create something that will provide social support. Provide seating for both one-on-one and large group interactions.

### 3. Geriatric

- Provide raised garden beds and other gardening tools to encourage them to get involved with nature and allow them to use their talents from the past.
- Elderly people primarily utilise the garden as a retreat. As a result, their garden must be designed primarily for seclusion and exclusive usage.
- Provide an interactive view, since the elderly like seeing various events such as mail delivery and people coming and departing.
- To avoid becoming overwhelmed, create a basic, straightforward garden plan visible from the garden entrance, with a simple looping, circular or figure-eight walk. Additionally, create clearly defined boundaries for legibility.
- Elderly people adapt to changes in temperature and light less easily than younger people. So make sure that any garden entry has a patio/transition space to the outside.

### 4. Staff

- Create a separate garden for employees, with easy access from the breakroom.
- Maintain a visual connection to monitor patients while restricting access to them.

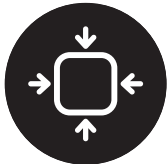
### 5. Public

- To reduce potential confrontations, create a separate garden for the public rather than combining it with the patient garden.
- Aim to provide a clear line of sight from key indoor spaces for distractions and safety.

Paediatric Young Geriatric Staff Citizens



Closed off



Small scale



Separated play



Interactive



Paediatric Young Geriatric Staff Citizens



Regain control



Self conscious



Social support



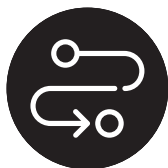
Paediatric Young Geriatric Staff Citizens



Raised beds



Privacy



Clear layout



Entry transition



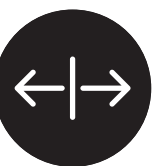
Paediatric Young Geriatric Staff Citizens



Near breakroom



No patient access



Separated



Sight from indoors



Fig 11. Guidelines summary for tailored therapeutic gardens

# DESIGN BRIEF - Program

Four distinct projects at three different scales have been analysed to generate an initial understanding of the required programme. The programmes have been divided into five categories: Patient care, Patient Accommodation, Support & Staff, Recreation & Leisure and Circulation (see fig 2);

1. Extra large (300 beds, 40.000 m<sup>2</sup>); SOCSO Rehabilitation Centre
2. Large (114 beds, 20.000 m<sup>2</sup>); Sheltering Arms Institute
3. Medium (84 beds, 15.000 m<sup>2</sup>); 165 REHAB
4. Medium (60 beds, 14.000 m<sup>2</sup>); Rehab centre Groot Klimmendaal

The primary takeaways from this were that there are various approaches to approaching an inpatient rehabilitation facility; however the common element was the separation and orientation between the patient care & accommodation. While the patient rooms in every project faced the

outdoors and nature, for the majority of them there was no direct access to the outdoors from the rooms.

From this analysis, an average square metre per patient could also be determined. Based on an average large capacity for 150 patients and an average floor area of 158,5 m<sup>2</sup> per patient, a preliminary gross floor area estimation resulted in a GFA of 24.000 m<sup>2</sup> (Fig 13).

Following that, a general programme bar

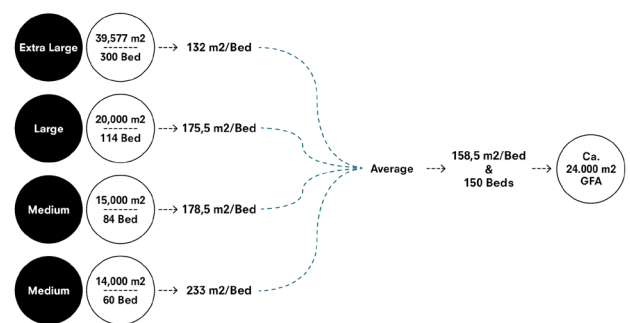


Fig 13. Analysis of square metres per patient

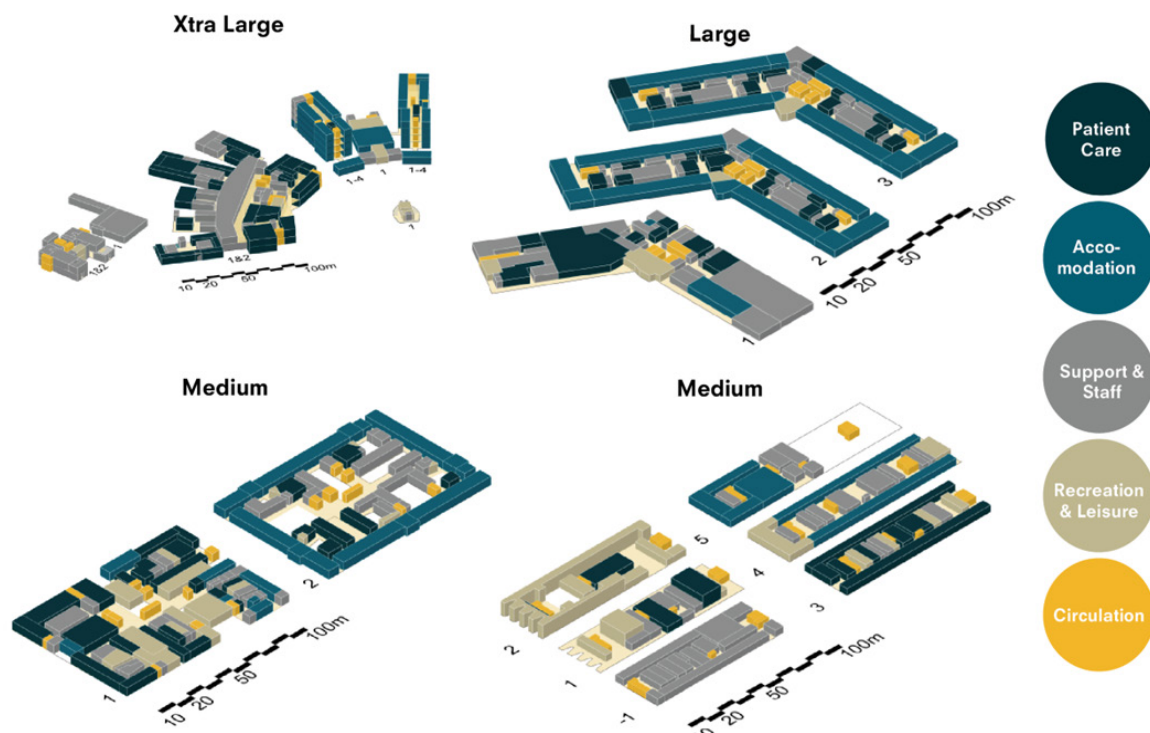


Fig 12. Analysis of program of reference projects

could be generated, and the key spaces and individual programme could be retrieved from the analysis (Fig 14).

However, because the project also aims to promote health, this programme had to be adjusted. This was done following personalised patient demands and the Therapeutic & Biophilic design guidelines. Additional projects were evaluated to provide a better knowledge of the required space. The adjustments can be viewed on the following pages, but in short:

- Care domain has been increased by 4% to accommodate a playful treatment pool plus an educational space for the

children. For young adults, more space is required to conduct vocational therapy, while the elderly require more nursing care.

- The accommodation has been increased by 1% due to the additional room for family stays with children.
- A new category has been introduced to provide space for biophilic interventions and the five tailored healing gardens.
- The leisure domain has been expanded by 6% to include areas for children to play, as well as more communal areas and room for engaging activities.

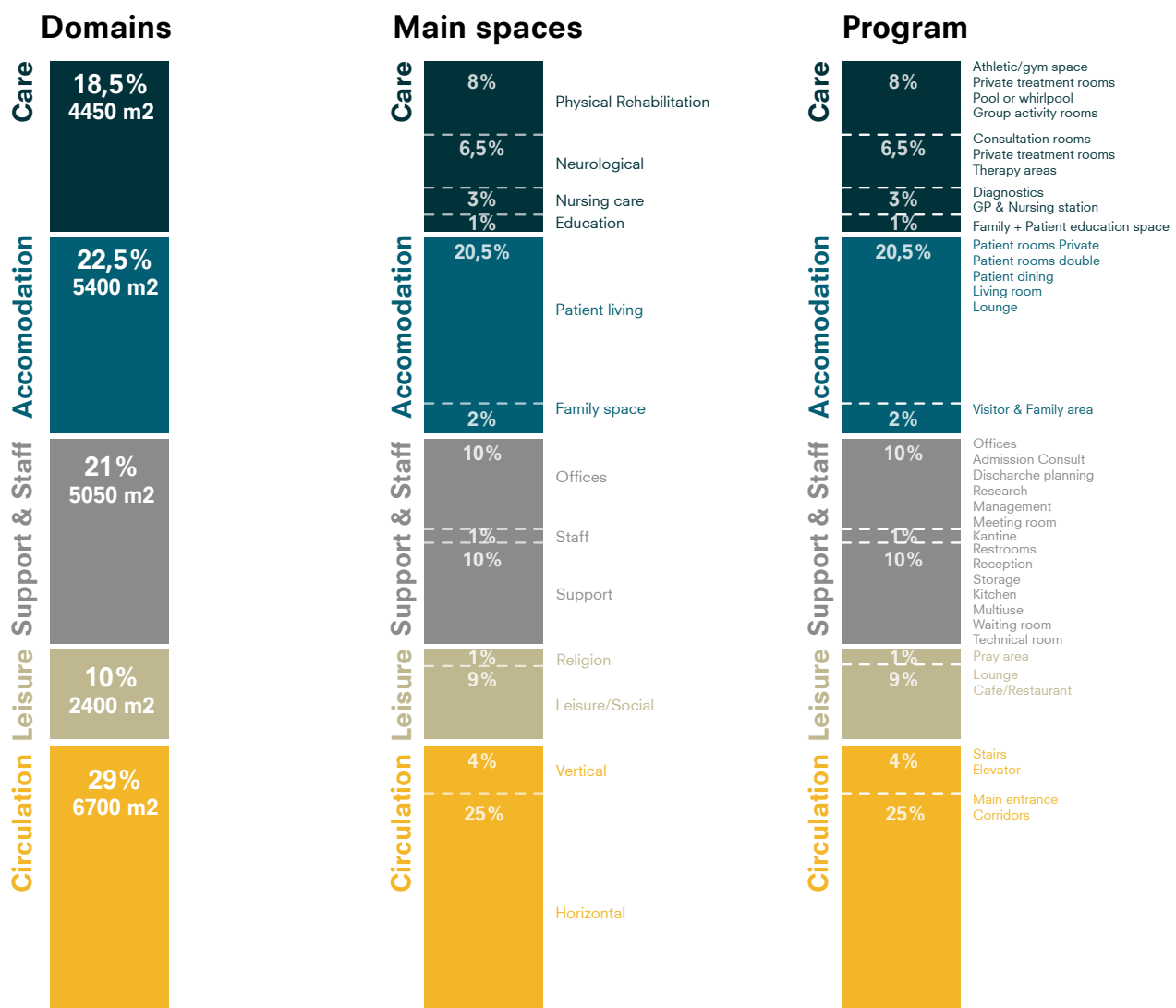


Fig 14. Average program bar with main spaces and specific program

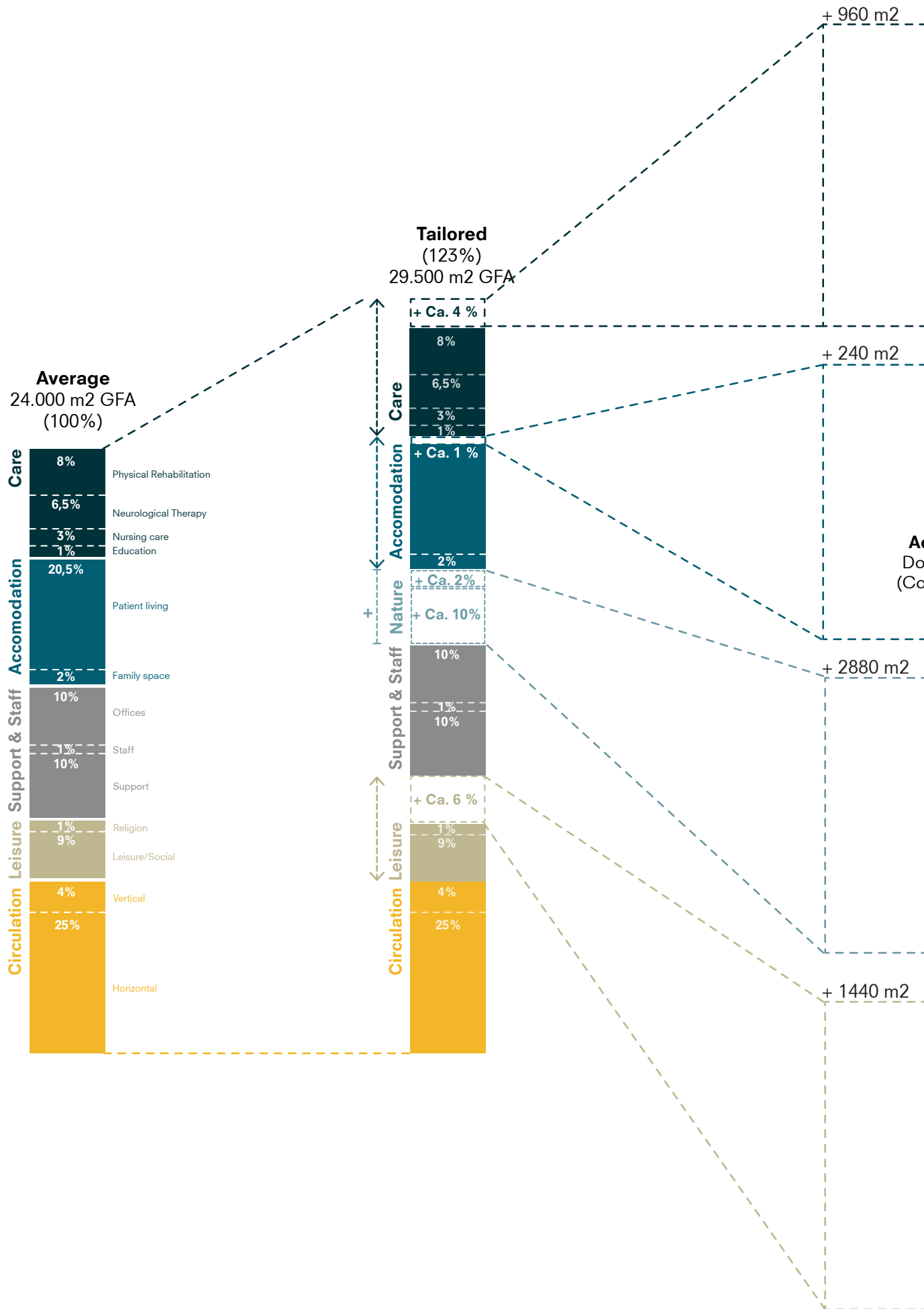


Fig 15. Tailored program





**Playfull Therappool**

Smaller sized and colourfull  
+ Ca. 0,7 %

**Educational support**

To reduce school delays  
+ Ca. 0,8 %



**Vocational therapy**

Therapy mimicking work environments  
to simulate common life  
+ Ca. 2%



**Additional nursing care**

Tailored to geriatric issues like delirium,  
falls, immobility, and incontinence  
+ Ca. 0,5%



**Additional space for family stays**

Double rooms and extra living rooms  
(collab with Ronald Mcdonald House)  
+ Ca. 1 %



**Mostly private rooms**

Improved privacy and sleep quality  
+ Ca. 1 %



**Reactivating**

Smaller patientrooms due to reduced  
time spend there. Also to nudge the  
patients to take more action  
- Ca. 1%



**Biophilic nature integration**

Green facade  
Vegetation  
Water  
+ Ca. 2 %



**Healing gardens**

5 times (Tailored)  
+ Ca. 10 %



**Play and Phantasy areas**

Spaces are tailored to be playful  
+ Ca. 0,5 %



**Space for engaging activities**

Tailored towards specific needs of  
patient groups  
+ Ca. 3 %



**Additional focus on communal areas**

Tailored towards bringing patients  
together  
+ Ca. 2,5 %

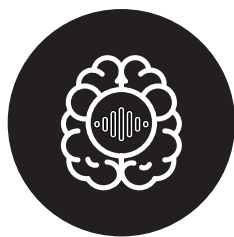
# DESIGN BRIEF - site

The final section of this design brief is about finding the right location for the project. As previously stated, the project's location was set in Berlin. To narrow down to a single site, certain criteria have been set and must be met;



**Near Noise stimulated area**

**Berlin**  
**XL**



**Within an highly environmentally stimulated area**

The first requirements that have been set (XL), were to identify areas that were highly stimulated. Noise, air, and heat stimulation have been analysed and mapped out. By then overlaying these maps, the highest stimulated areas have been defined (Fig 16). The reason for locating the building in a highly simulated area is that providing an 'healing oasis' is most important in these types of environments. For patients and citizens.



**Fig 16. Highest stimuli areas in Berlin**



**Direct access to Acute Hospital**

**Areas**

**L**



**In or close to an underused brownfield**

The second set of requirements (L) seeks to narrow down towards the most suitable site for the inpatient rehab facility within these highly stimulated areas. The requirement to be close to an acute hospital is to facilitate easier patient transfer and discharge while also providing easy access to emergency services when needed. Furthermore, an underutilised brownfield has been chosen so that the biophilic design strategy benefits both patients as well as the local ecosystem. After locating all hospitals near nature, three potential sites have been found, fitting all the current requirements, see below;



**1. Tempelhof-Schöneberg**



**2. Friedrichshain**



**3. Kaulsdorf**

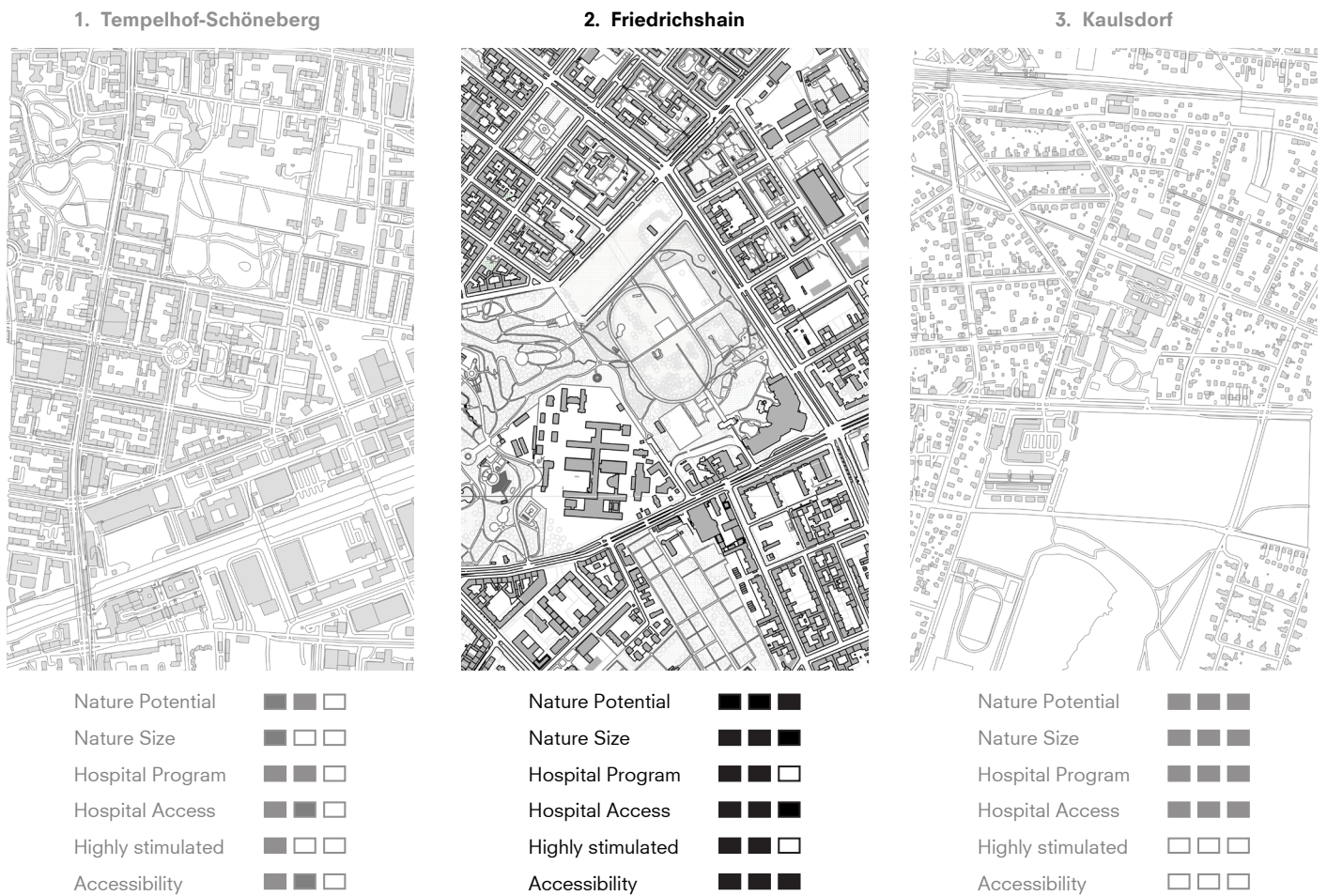


Fig 17. Potential site comparison and valuation

In order to find which one is best fitting, the three potential sites have been analyzed and graded based on;

- Opportunities of the Brownfield
- The site's size needing to allow for therapeutic gardens with ample room for growth.
- Amount of the hospital program being focussed on acute rehabilitation patients for the most benefitting potential.
- Ease of access to the hospitals for convenience
- How much the area is highly stimulated
- How easily visitors can access the site.

After this analysis, it becomes apparent that the site Tempelhof-Schöneberg is too small

to accommodate all the program, while also not being in too much of a stimulated area.

And while Kaulsdorf has quite a lot of potential, the fact that it is way east of the city centre, results in bad accessibility and also not being in a highly stimulated area.

As the site Friedrichshain fits all requirements quite well, this is clearly the winner and the most fitting site within Berlin for the inpatient rehabilitation facility to be designed.



Fig 18. Neighbourhoods near site

Further analysis has been done to improve the understanding of the selected site. First of all, the property is situated between two significant neighbourhoods. The one to the north is Prenzlauer Berg, a 1900-established neighbourhood primarily inhabited by middle-class residents. However, Friedrichshain, a completely different neighbourhood to the right, is home to Berlin's epicentre for the techno and nightlife scenes. Numerous potential citizens are therefore in need of a break from their hectic work schedules or from going out to parties (Fig 18).

As the site is located near the city centre, it is very easily accessible by car, public transport, bike or by walking. The main access routes are summarized in diagram (Fig 19). Key access points are;

- Cycling: From south-west through the park
- By car; From the north via an access road
- Public transport: From the North-East via numerous busstations.

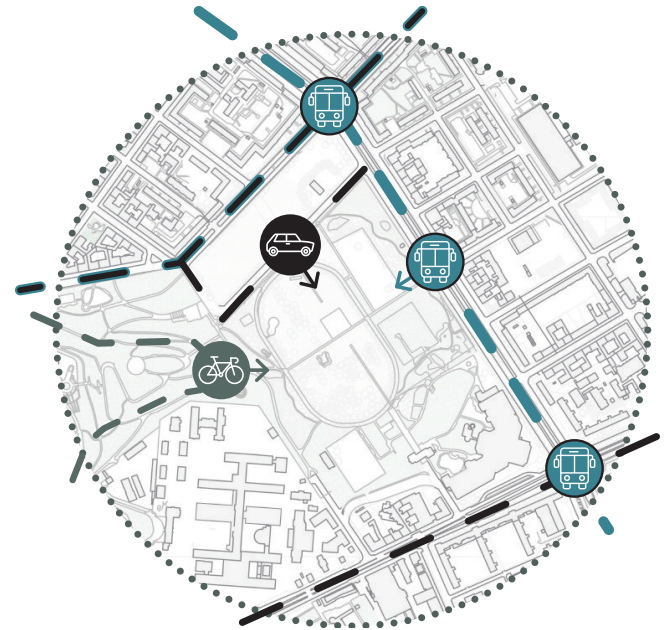


Fig 19. Main access routes to site

For the site itself, there are three main area's of interest (Fig 20); The plot, the park and the hospital site. The area's are quite large, with the plot being Ca. 120.000 m<sup>2</sup>, the park being Ca. 520.000m<sup>2</sup> and the hospital site being Ca. 100.000 m<sup>2</sup>.

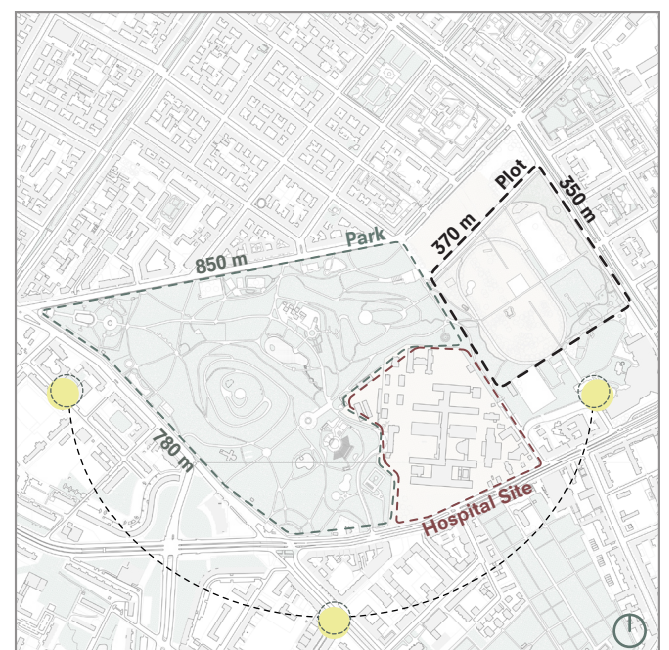


Fig 20. Three main area's of interest

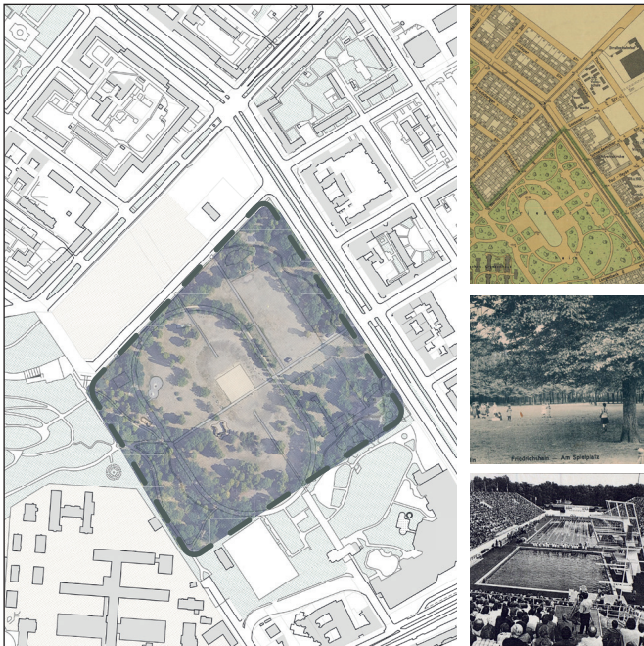


Fig 21. Plot history

### Plot History

The plot itself has quite an interesting history, with the result of it becoming the underused brownfield known today;

- Originally, next to the site was a representative residential area with around 1,500 apartments & a community park alongside; New Grove.
- The actual site itself pre WW2 was a 250 m long and 100 m wide playground in the oval shape.
- The playground was used by schools four afternoons a week. It was only open to the general public on the other days from 3 p.m. until dark.
- However, during WW2, the site was used to build trenches and bunkers. These were bombed in 1944, resulting in huge amounts of rubble.
- After WW2, a large sports facility was built, where many international matches have been held. It has been demolished in 1999, due to lack of use and maintenance.
- After that, the area has been mostly unused, providing a lot of potential benefits for the neighbourhood and the ecosystem.

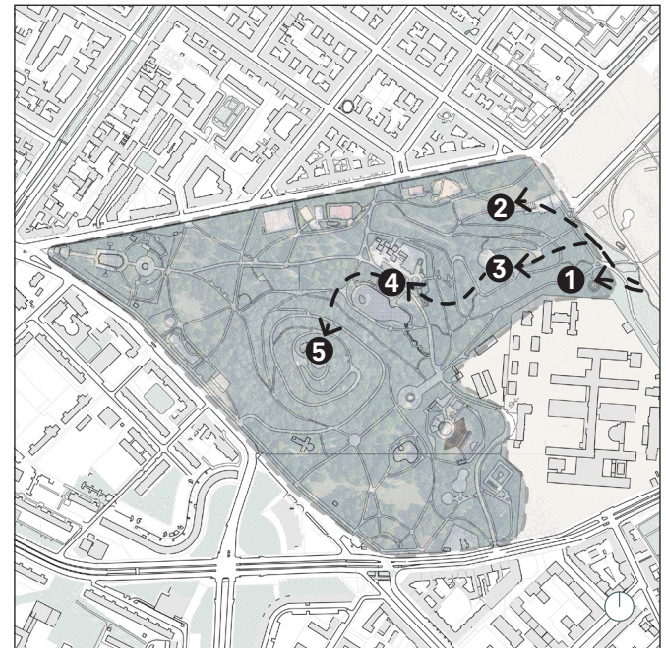


Fig 22. Volkspark Friedrichshain

- 1 Scent garden
- 2 Sculpture park
- 3 Small rubble hill
- 4 Pond with creek
- 5 Rubble mountain



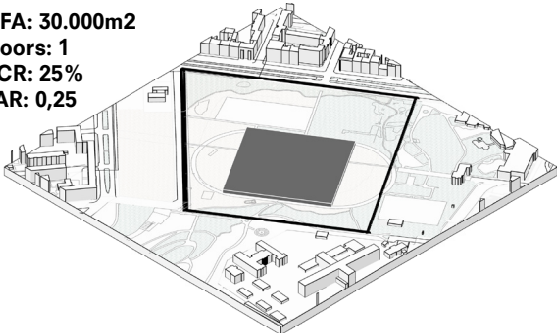
### Volkspark Friedrichshain

The park next to the site is Berlin's oldest public park, and is known as the park for the people due to a lot of social functions. It additionally offers a lot of therapeutic potential, as patients can explore beyond the plot site when their physical conditions allow it. The scented garden, sculpture park, and so on can be great motivators for patients to be more physically active.

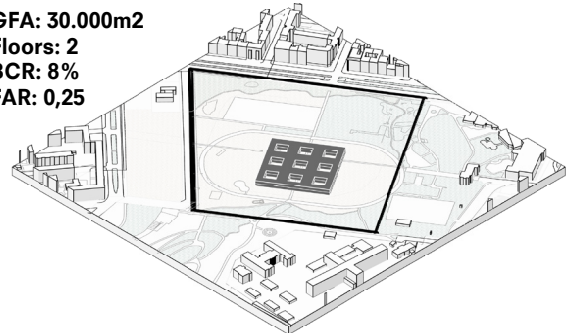
### Hospital site

The helipad on the plot's side is the most notable feature of the hospital site. This will result in unwanted noise, so some sort of sound barrier must be implemented. Furthermore, hospital patients should have easy access to the healing gardens in order to encourage them to use them whenever possible.

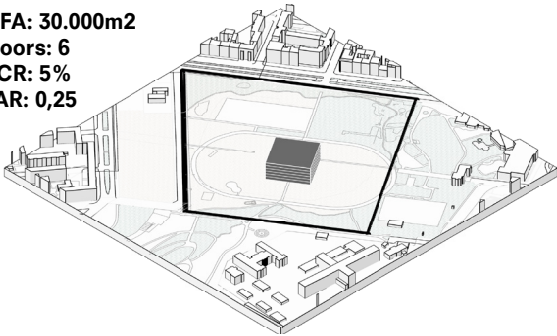
**GFA: 30.000m<sup>2</sup>**  
**Floors: 1**  
**BCR: 25%**  
**FAR: 0,25**



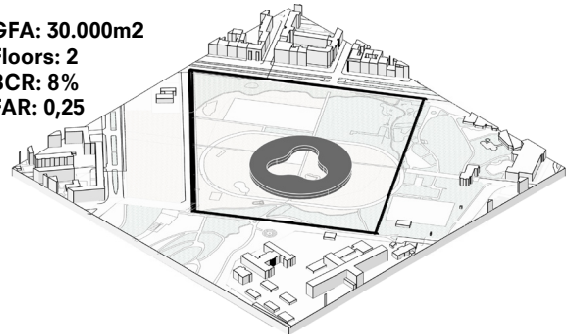
**GFA: 30.000m<sup>2</sup>**  
**Floors: 2**  
**BCR: 8%**  
**FAR: 0,25**



**GFA: 30.000m<sup>2</sup>**  
**Floors: 6**  
**BCR: 5%**  
**FAR: 0,25**



**GFA: 30.000m<sup>2</sup>**  
**Floors: 2**  
**BCR: 8%**  
**FAR: 0,25**



**Fig 23. GFA massing options**

### Massing

To get a base understanding of what is possible on the site, a few massing options have been explored. Here it becomes apparent that the site is quite large for its GFA, so there is quite some potential for an open design, fitting to the ambition to provide for five separate healing gardens.

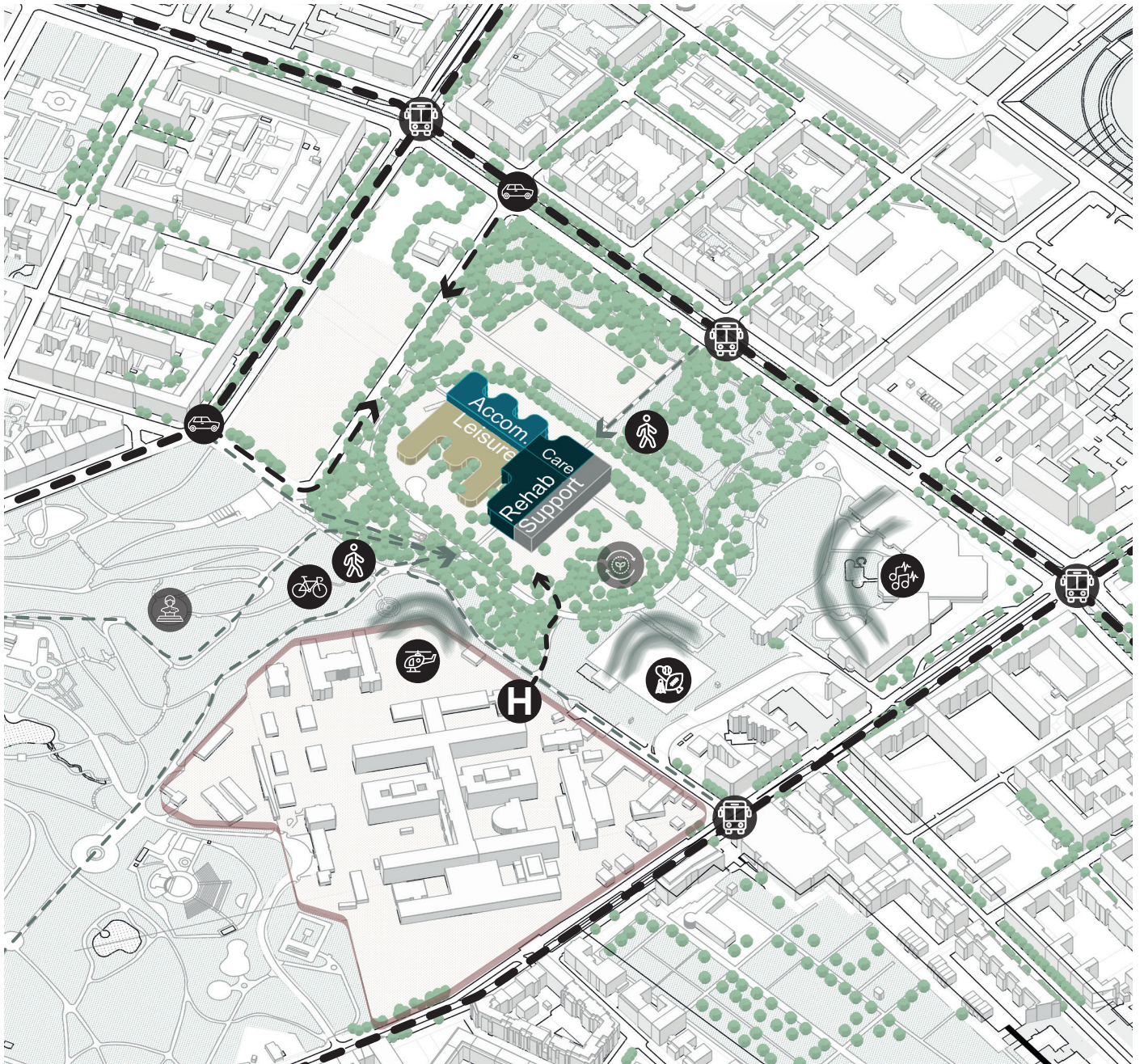
### Conclusion

Based on research conducted into health-promoting architecture and inpatient rehabilitation facilities, a few goals for the site have been established as guidelines influencing the potential massing options;

- First, the goal is to not cut any trees on the site in order to benefit the ecosystem as much as possible, which aligns with the biophilic design philosophy.
- Second, the design must be opened up to the park in order to fully realise its therapeutic and biophilic potential.

- Third, an inviting and easy connection with the hospital must be established in order to facilitate easy patient transfers and to provide patients from the hospital with the opportunity to benefit from the healing gardens when their physical condition allows.
- Finally, a natural sound barrier should be built to minimise noise intrusion from emergency services and the medical helicopter.

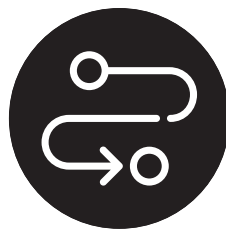
Figure 23 depicts an initial programmatic massing based on these ambitions. However, more research is required to optimise it and capitalise on its full potential. However, that is precisely the goal of the following semester: to create a design based on the established expertise through the development of this Design Brief.



No cutting trees



Open up to park



Hospital connection



Natural sound barrier

Fig 23. Site ambitions and initial massing option

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