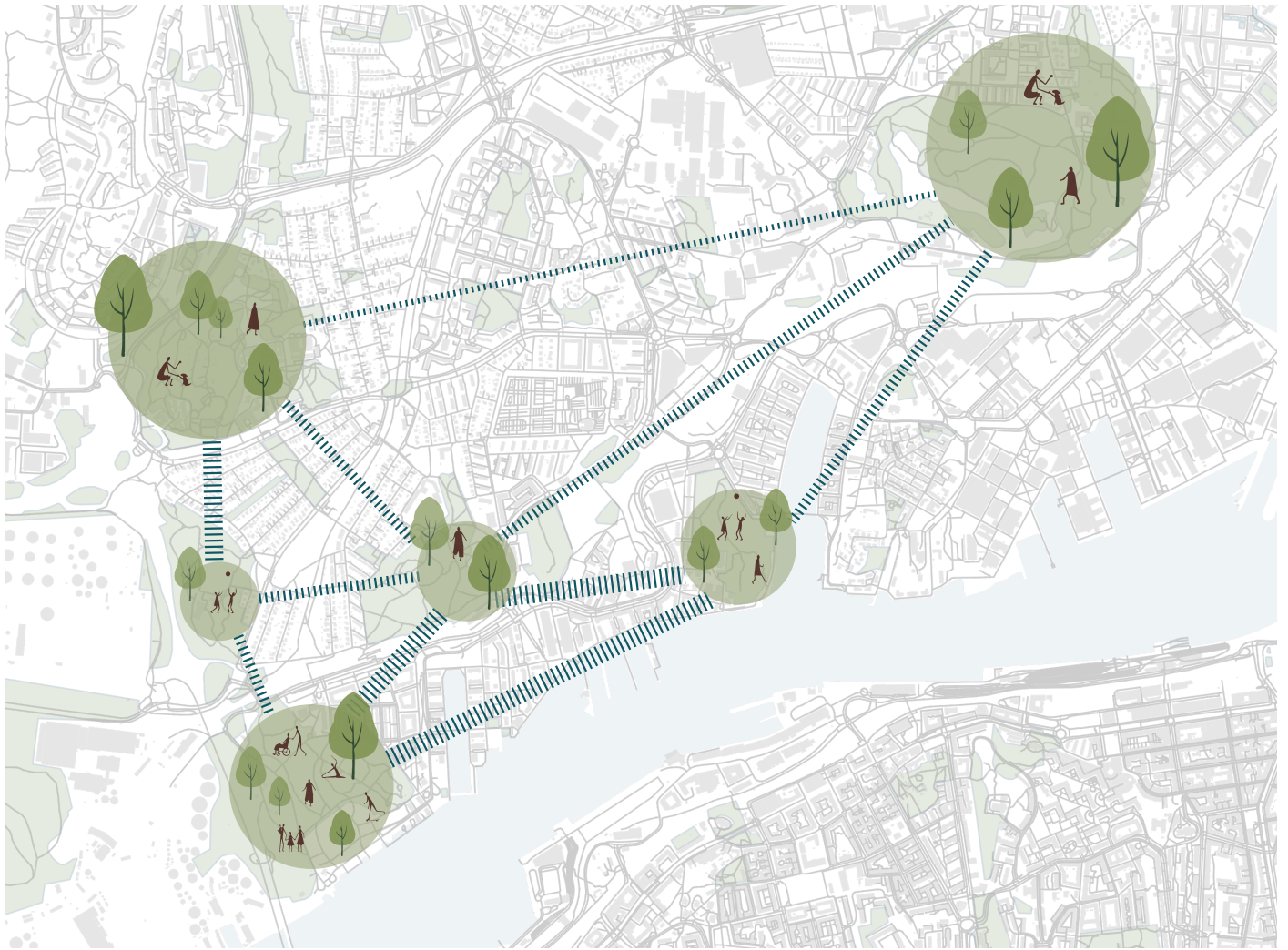


Urban Green Networks as Facilitator for Social Cohesion

An Assessment of Hisingen in Gothenburg, Sweden



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Master's Thesis 2026
Chalmers School of Architecture
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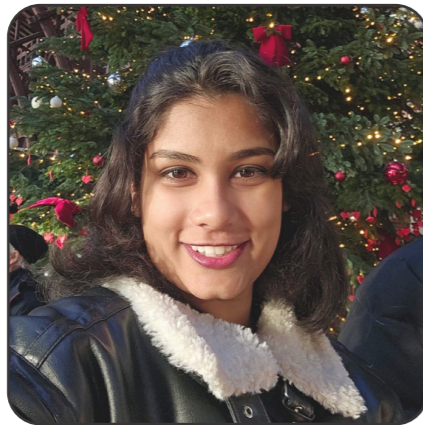
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Abstract

Urbanization is rapidly transforming cities worldwide, often leading to the shrinking and fragmentation of urban green spaces, which can intensify social inequality, stress, and ecological loss. While the environmental benefits of greenery are well documented, its role as social infrastructure that fosters belonging and interaction remains less explored.

This study examines how urban green space networks can strengthen social cohesion by fostering co-presence and interaction among diverse groups. It identifies the spatial and design qualities that contribute to these outcomes, while incorporating an urban green mobility perspective to understand how connectivity and movement between green spaces influence social engagement.

The research develops design and planning strategies to strengthen social cohesion through urban green networks. It creates a framework of spatial qualities that support social interaction, formulates design guidelines from literature and case studies, and applies them to Hisingen, from Frihamnen to Eriksberg in Gothenburg, Sweden. The study follows an iterative research-by-design approach linking theory with spatial proposals.

A mixed-method approach was used. First, literature and reference projects identified key spatial qualities for social cohesion. Second, GIS-based network analysis examined the accessibility and connectivity of green spaces in Hisingen. Third, on-site observations explored patterns of use and interaction in selected spaces. These findings informed the final design proposals.

The analysis revealed that although green spaces are widely present in Hisingen, many remain fragmented by poor connectivity, steep terrain, unclear entrances, and limited accessibility. Färjenäsparken demonstrated the strongest social potential due to its good accessibility, clear circulation, and diverse activities, while other parks showed lower potential for social interaction due to physical barriers and fewer amenities.

The design proposals apply the spatial quality framework by enhancing accessibility, connectivity, multifunctionality, and co-presence within the park network. Interventions like accessible pathways, improved pedestrian and cycling links, and multifunctional social spaces encourage interaction and everyday use among diverse groups. The study concludes that urban green spaces should be planned as an interconnected social network to strengthen social cohesion and wellbeing.

Keywords: Urban Green Network, Social Cohesion, Green Mobility, Urban spaces,

*“There are no societies, only individuals who
interact with each other”
(Jon Elster)*

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Fig 1: Bräckeberget Rastgård, Source: Author

Chapter 1: Introduction

Background and Problem Description

Aim

Research Question

Limitation/Scope

1. Introduction

1.1 Background and Problem Description

Rapid urbanization is reshaping cities across the globe, frequently resulting in the reduction and fragmentation of urban green spaces, thereby intensifying social inequality, psychological stress, and ecological degradation. (Chalmers University of Technology, 2023; Jennings & Bamkole, 2019). While the environmental and ecological benefits of greenery are widely documented, its function as social infrastructure, fostering trust, a sense of belonging, and social interaction, remains less explored. (Jennings & Bamkolwe, 2019). Insights from the literature and reference project indicate that fragmented or isolated green spaces often struggle to foster strong community ties, whereas well-connected and accessible networks tend to encourage social interaction, everyday use, and a sense of collective ownership (Barthel et al., 2021; Cardinali et al., 2024).

Green space can play an important role in fostering social interactions and promote a sense of community that is essential for social cohesion (Kim and Kaplan 2004) as well as for human health (Lengen and Kistemann 2012). Public urban green space has been shown to facilitate social networking and promote social inclusion in children and adolescents (Seeland et al. 2009; Ward Thompson et al. 2016). The quantity and the quality of greenery have been linked with improved social cohesion at the neighbourhood scale (de Vries et al. 2013) while shortage of green space has been associated with perception of loneliness and lack of social support (Maas et al. 2009a).

In socially excluded areas, urban green spaces can strengthen community connections and help people feel more included in society in four main ways. (Ward Thompson et al., 2016) First, they are free and open to everyone. Second, they create spaces where people can meet and interact. Third, they help reduce stress and mental fatigue, which may lower aggression and improve social relationships. Finally, they provide opportunities for residents to take part in voluntary and community-based activities (Kazmierczak & James, 2006). Access to natural green spaces can be especially valuable for people dealing with everyday stress and social pressures, as these spaces offer a sense of relief and perspective (Ward Thompson, 2004; CABE Space, 2005). Woodlands and other natural green areas are often seen as restorative environments that support mental recovery and relaxation (O'Brien & Tabbush, 2005; Kaplan & Kaplan, 1989, as cited in Kazmierczak & James, 2006).

At the same time, research shows that not all green spaces have the same impact. Features such as accessibility, connectivity, mixed land use, and proximity are more important for promoting social cohesion and mental health than simply the amount of greenery available (Cardinali et al., 2024). This suggests that the design and

location of green spaces matter just as much as their presence. As a result, public urban green spaces are increasingly considered important tools for improving public health and well-being by supporting stronger social connections within urban environments (Barthel et al., 2021)

I chose to investigate this theme because, although urban green spaces exist in many cities, they are often fragmented, underused, or unevenly distributed, which can contribute to social exclusion. There is also an increasing tension between urban densification and the need for accessible public green spaces. While the ecological benefits of green areas are widely studied, their role as social infrastructure — spaces that support trust, belonging, and interaction — has received less attention. This investigation therefore focuses on understanding how networks of urban green spaces can strengthen social cohesion and create shared environments that encourage interaction and community engagement.

Through this study, I aim to highlight that urban green spaces are not only environmental assets but also important forms of social infrastructure that can promote equity, co-presence, and well-being. The study also seeks to inform urban planning decisions that balance ecological sustainability with community needs, ultimately contributing to the development of a framework of spatial qualities that can strengthen social cohesion within urban green spaces.

This project aligns with SDG 11: Sustainable Cities and Communities, aiming to make cities, safe, resilient, and sustainable. It directly addresses Target 11.7, which seeks to ensure universal access to safe, accessible, and inclusive green public spaces for all, in terms of co-presence. By transforming underutilized green areas in Hisingen into social infrastructure, the project investigates how connected green space networks can foster equity and social cohesion, providing a practical model for sustainable urban development (United Nations, n.d.).

The project also contributes to SDG 3: Good Health and Well-being, particularly Target 3.4, by promoting mental and physical well-being through design strategies that encourage social interaction, a sense of belonging, and active use of space. Drawing inspiration from the Bishan-Ang Mo Kio case, it demonstrates how accessible environments can reduce stress, enhance community health, and encourage active lifestyles, including walking and cycling (United Nations, n.d.).

Finally, the project supports SDG 13: Climate Action, aligned with Target 13.1, by integrating nature-based solutions that improve urban resilience to climate-related impacts. While the focus is on social outcomes, the creation of connected green networks also strengthens urban ecological systems, contributes to climate adaptation, and demonstrates how socially responsive design can complement environmental sustainability goals (United Nations, n.d.).

Knowledge Gap

- Urban planning guidelines typically emphasize green structures for ecological benefits, often giving less attention to their role in promoting social cohesion, despite the indirect advantages.
- Most literature treats green space as individual sites (e.g., a park), not as green networks or systems across the urban fabric. It doesn't really speak to how a network of such places creates social cohesion
- Most existing studies on the relation between urban green spaces networks and social cohesion are from North America, Western Europe, and East Asia. There may be limited research in Nordic countries.
- Studies often use surveys or interviews. Very few use GIS-based spatial analysis

1.2 Aim

This study aims to understand how social cohesion develops within urban green space networks by examining their ability to foster co-presence, interaction, and equity among diverse groups. It also seeks to identify spatial and design qualities, such as connectivity, accessibility, etc, that contribute to these outcomes.

1.3 Research Question

How do spatial and design qualities of urban green space networks influence social cohesion, co-presence, and equitable access among diverse communities and how can these insights inform planning and design, as examined through the case of Hisingen?

Q1. Which spatial and design qualities make urban green space networks socially cohesive?

Q2. How do the spatial qualities contribute to the social cohesion of urban green spaces in Hisingen?

Q3. How can urban green space networks be planned and designed to ensure co-presence and equitable access across different social groups?

This research answers these questions by applying a mixed methodological approach that combines Research for Design, Research by Design, and Research on Design. First, spatial and design qualities that support social cohesion are identified through a literature review and analysis of relevant reference projects. This is followed by a GIS-based network analysis of green space connectivity and accessibility in Hisingen, complemented by on-site observations of selected green spaces. The insights from these analyses inform the development and evaluation of design proposals aimed at strengthening social cohesion.

1.4 Limitation/Scope

This research focuses on the area of Hisingen in Göteborg, specifically the corridor from Frihamnen to Eriksberg. The study examines networks of urban green spaces rather than individual parks, with a particular emphasis on the design qualities of green spaces and their potential to support social cohesion. The population considered includes park users such as local residents, nearby workers, and visitors. While the research primarily addresses social cohesion in relation to urban green spaces, ecological and economic impact, such as biodiversity, carbon sequestration, and cost-benefit considerations, are not examined in detail. Well-being aspects are acknowledged but not explored in depth, and political, governance, and long-term maintenance issues fall outside the scope of this study.



Fig 2: Färjenäsparken, Source: Author

Chapter 2: Theoretical Framework

Main Concepts
Key Theories

2. Theoretical Framework

This chapter discusses the key concepts of urban green space, green networks, social cohesion, and socially cohesive areas (Table 1), and explores how these concepts are interconnected (Figure 3). It also examines the main theories that form the foundation of this thesis, including Urban Green Spaces and Social Sustainability, Urban Green Systems, Spatial Characteristics of Green Spaces, and Social Cohesion.

2.1 Main Concepts

Concept	Definition
Urban green spaces (UGS)	<ul style="list-style-type: none"> Urban green spaces refer to areas such as gardens, parks, greenways, and other areas with grass, trees, and/or shrubs. (Jennings & Bamkole, 2019) Urban Green Space (UGS) is defined as urban land, partly or completely covered with grass, trees, shrubs, or other vegetation. Urban Green Space includes parks, community gardens, and cemeteries, but also rooftop gardens and vertical gardens, meadows, and woods. (De Haas et al., 2021)
Social Cohesion	<ul style="list-style-type: none"> Social cohesion is still defined very heterogeneously (Clarke et al., 2023; Fonseca et al., 2019), but usually refers to the ability of a community to ensure the well-being of all its members (Council of Europe, 2008). Social cohesion also refers to the level of engagement and social trust among community members (Speer et al., 2001). (Cardinali et al., 2024) Social cohesion is conceptualized as shared norms and values (Beckley, 1995), positive interactions and relationships among individuals (de Vries, Van Dillen, Groenewegen, & Spreeuwenberg, 2013), and feelings of being accepted and belonging (Forrest & Kearns, 2001) in neighborhood settings. (Wan, 2021)
Socially Cohesive Areas	Socially cohesive areas can be defined, simply, as areas with a strong sense of community, a strong attachment to place (Forrest and Kearns, 2001), and, most importantly, high levels of interaction between residents (Fletcher, 1995; Healey, 1998; Millennium Ecosystem Assessment, 2003). (Kazmierczak & James, 2006)
Green Network	Green networks are defined as a set of networks with social and ecological functions, linked into a spatially coherent entity through flows of organisms, and interacting with the landscape matrix (Xiu et al. 2016). (Xiu et al., 2017)

Table 1: Main Concepts

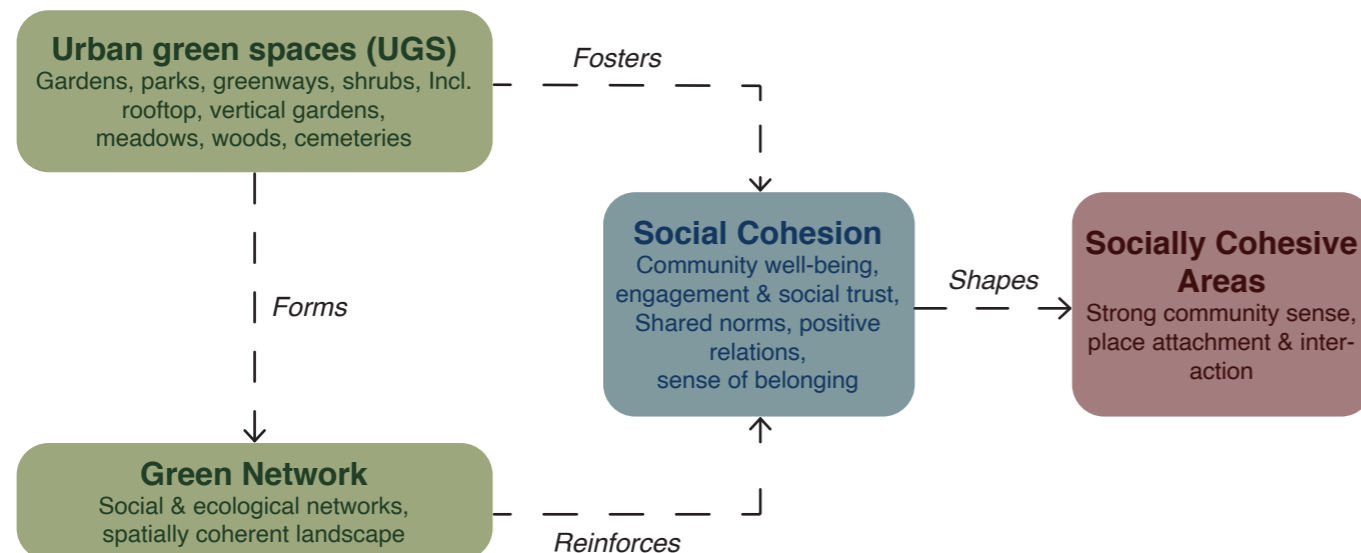


Fig 3: Connection between main concepts

2.2 Key Theories

Urban Green Spaces and Social Sustainability

Urban green spaces are becoming widely acknowledged as vital social infrastructure that supports the development of socially sustainable cities. The concept of Urban Green Commons refers to shared green spaces, such as parks, gardens, and wetlands, that are collectively managed by communities and are seen as essential for social sustainability. This idea is strongly connected to Commons Theory, inspired by the work of Elinor Ostrom, which argues that local people can better co-create rules and manage resources when they are empowered to participate. Research on social sustainability further emphasizes dimensions such as equity, inclusion, justice, social cohesion, well-being, and community, while also addressing themes of health, equity, and the spiritual dimension (Barthel et al., 2021). Several studies focus particularly on green spaces in socially excluded areas and identify mechanisms such as stress relief, voluntary involvement, and the creation of social arenas as important drivers of inclusion. In addition, studies by Kazmierczak & James explore how green spaces can be designed to support diverse cultural and social groups. Together, these studies highlight the role of urban green spaces as platforms for social interaction and inclusion, particularly when they are accessible and designed to support diverse communities.

Social-Ecological Urbanism and Urban Green Systems

Although green spaces support social sustainability, their impact also relies on how well they are incorporated into wider urban systems. The concept of social-ecological urbanism offers a framework for understanding the connections between ecological processes, urban design, and social life. According to social-ecological urbanism (SEU) (Marcus et al., 2019), ecology and urban design are closely linked in order to support the development of resilient and sustainable cities (Berghauser Pont et al., 2022). Within this framework, green spaces are understood as systems in which cities function as continuous landscapes where institutions, urban design, and ecological systems work together. Furthermore, the concept of resilience highlights urban nature as a stakeholder in cities rather than something that exists only for human use. The framework also introduces the concept of the topodiverse city, which emphasizes avoiding urban sprawl and overcrowding while providing diverse neighborhood spaces, similar to the idea of the 15-minute city (Berghauser Pont et al., 2022). This perspective emphasizes that green spaces should not be viewed as isolated parks but as interconnected systems embedded within urban form and governance structures.

Spatial Characteristics of Green Spaces and Social Cohesion

In addition to wider theoretical perspectives, a number of studies examine how the design and physical qualities of urban green spaces affect social cohesion and well-being. Cardinali et al. (2024) investigate the complex relationships between green space characteristics, social cohesion, and mental health outcomes, particularly focusing on the mediating role of social cohesion. Their study highlights the importance of specific green space characteristics and their proximity in fostering social cohesion. Similarly, Jennings & Bamkole (2019) propose a framework linking green space exposure to enhanced social cohesion. The framework emphasises daily interactions in green spaces as catalysts for trust, belonging, and mental health, and it is particularly useful for understanding how spatial qualities such as accessibility and visibility foster social ties. In addition, Wan (2021) presents findings on how the physical characteristics, perceptions, and usage patterns of green spaces influence social cohesion. The study also introduces a model showing how design elements interact with human behaviour and demonstrates how spatial qualities can promote inclusion and interaction.

These studies collectively show that the spatial qualities of green spaces, such as accessibility, connectivity, inclusivity, and multifunctionality, play a significant role in encouraging social interaction and strengthening social cohesion. These spatial characteristics form the basis for the analytical framework used in this research.

Overall, the reviewed literature shows the significant role of urban green spaces in promoting social cohesion, inclusion, and well-being in cities. While theory highlights the social and ecological value of shared green spaces, research also shows how specific spatial characteristics influence everyday interactions and community building. Based on these insights, this research identifies a set of spatial qualities that will be further examined through case studies and spatial analysis.



Fig 4: View from Sörhallsberget, Source: Author

Chapter 3: Methodology

Spatial and Design Qualities Toolbox
Geospatial Analysis of the Study Area (Hissingen)
Observation
Design
Evaluate Design

3. Methodology

The methodology of this thesis integrates Research for Design, Research by Design, and Research on Design into a structured five-step process (Figure 5). It begins with the identification of spatial and design qualities using a toolbox approach, followed by a geospatial analysis of the study area, Hisingen. The process then moves through stages of observation and design development, and concludes with the evaluation of the final outcomes.

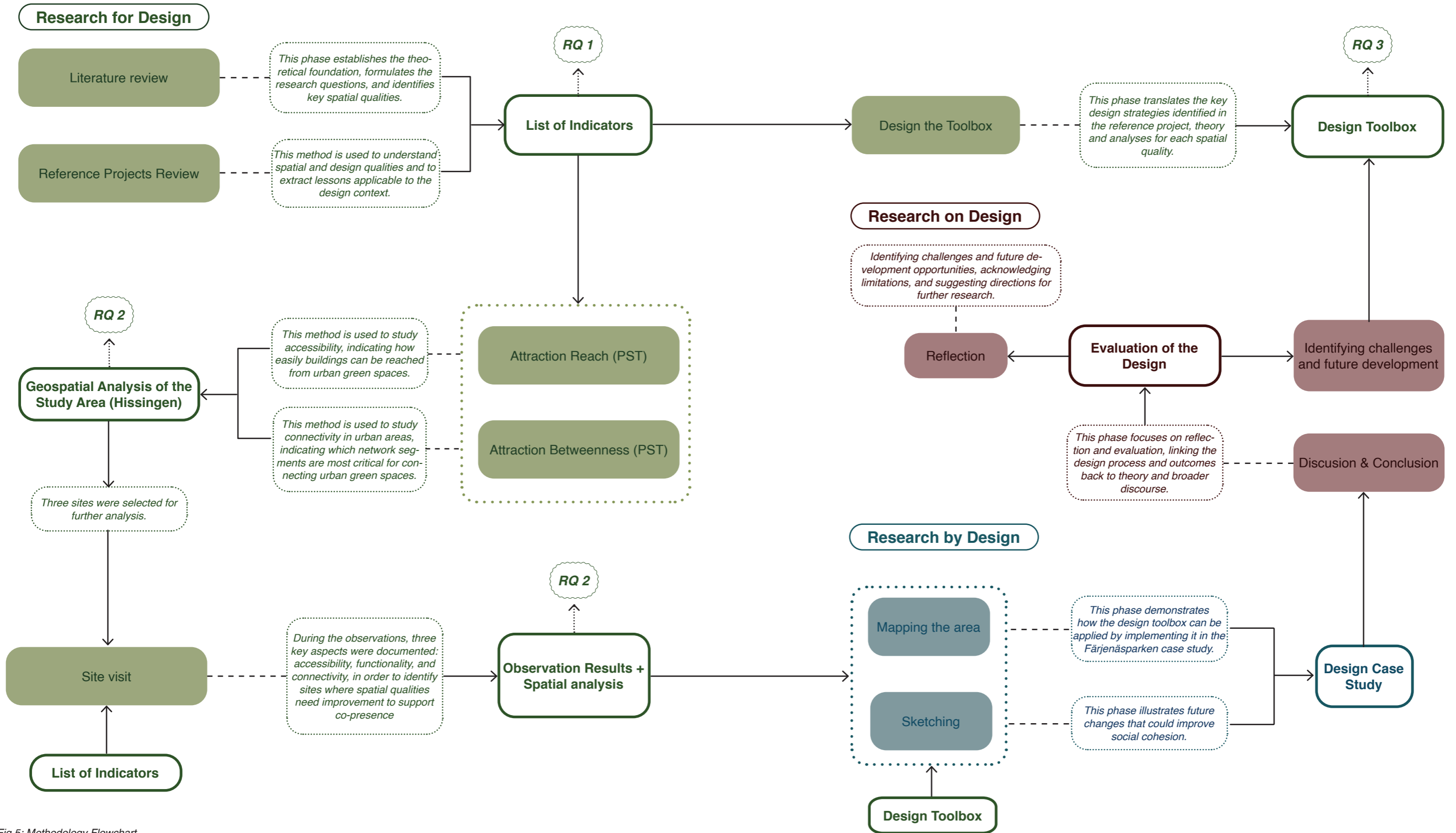


Fig 5: Methodology Flowchart

3.1 Spatial and Design Qualities Toolbox

Research for Design informs the design process by gathering knowledge, theories, and inspiration to guide decisions. A literature review establishes the theoretical foundation, while the analysis of literature and reference projects is used to identify the spatial and design qualities, as well as the indicators, that form the framework. Reference project analysis, along with literature review, are used to understand spatial and design qualities and to extract lessons applicable to the design context. The main qualities derived from this literature are accessibility, connectivity, multifunctionality, and co-presence. This process contributes to the development of a toolbox of spatial qualities that support social cohesion in urban green spaces, as well as indicators to evaluate them and the design strategies.

3.2 Geospatial Analysis of the Study Area (Hisingen)

This toolbox is then applied to the site context using geospatial analysis with the support of QGIS. Spatial analysis examines environmental flows and spatial relationships to identify potential zones for intervention that enhance connectivity between built and natural systems. Site visits provide direct observation and documentation of environmental conditions, and also help to see what activities people do in the space, and spatial needs to inform co-presence and context-sensitive design goals. Areas requiring transformation are subsequently identified.

The overall analysis was conducted using the PST plugin in QGIS. The Place Syntax Tool (PST) is a network-based spatial analysis method used to study accessibility and connectivity in urban areas. It enables the calculation of measures such as Attraction Reach and Attraction Betweenness, which indicate how easily destinations can be reached from origins and which network segments are most critical for connecting them. PST can incorporate different network types, barriers, and distance thresholds to simulate walking or driving accessibility (Stavroulaki et al., 2024). In this study, the main methods used were Attraction Reach, Comparison Maps, and Attraction Betweenness.

The spatial quality accessibility is measured using Attraction Reach. Attraction Reach measures the total number of destinations accessible from each origin within a specified network distance (Stavroulaki et al., 2024) Here, the origins were defined as parks, and the destinations were primarily buildings, with public transport stops included in one instance. The network used for this analysis included non-motorized roads both with and without stairs, allowing assessment of accessibility under different network conditions. The non-motorized street network was retrieved from OSM (OpenStreet

Map contributors, 2026). while the remaining GIS layers in QGIS were provided by the university for the ACE425 Master's thesis preparation. (Chalmers Technical University, 2025)

Accessibility

Analysis A: The network analysis was performed with parks defined as origins and buildings as destinations. The analysis used the non motorized road network, including stairs, with a 1.5 km network radius representing walking distance.

Analysis B: The network analysis was performed with parks defined as origins and buildings as destinations. The analysis used the non motorized road network, including stairs, with a 3 km network radius representing cycling distance.stairs.

Analysis C: The network analysis was performed with parks defined as origins and buildings as destinations. The analysis used the non motorized road network, excluding stairs, with a 1.5 km network radius representing walking distance.

Analysis D: The network analysis was performed with parks defined as origins and public transportation stops as destinations. The analysis used the non motorized road network, including stairs, with a 1.5 km network radius representing walking distance.

Along with this, a topographic map was created to identify slopes and hilly regions within the different parks and surrounding areas. This was important in order to assess whether these green spaces are accessible, as people with mobility impairments cannot use stairs or navigate steep gradients. Therefore, public stairs were excluded from the analysis to ensure that accessibility reflects real, barrier-free movement through the landscape.

Connectivity

To study connectivity, Attraction Betweenness was used, measuring which streets or paths lie most frequently on the shortest routes between origins and destinations, thereby identifying network segments critical for connecting to attractions. The analysis used the non motorized road network, where we specifically measured which paths lie most frequently on the shortest routes connecting parks and green areas.

Multifunctionality

Multifunctionality is initially assessed using Google Maps and OpenStreetMap to identify the locations of different functions functions within parks and green areas and analyze the distribution and variety of activities across Hisingen. These functions are then further evaluated within the selected parks through on-site observation.

Co-presence

Evaluating the extent to which accessibility, connectivity, and multifunctionality are achieved helps assess the co-presence of the area.

3.3 Observation

After analyzing all the networks, two or three urban green spaces of interest are selected for a more in-depth study. Site visits are then conducted to observe how these spaces are used. During the visits, observations focus on identifying users of the space across different gender groups (male and female) and age groups, as well as documenting the types of activities taking place, available facilities, and missing amenities. The routes identified through the attraction betweenness analysis are also examined to determine whether they contain greenery along the paths. Observations are carried out at different times to capture variations in use, including weekdays and weekends, and during the morning, afternoon, and evening. All collected information is systematically documented in a tabular format.

During the observations, three key aspects are documented: accessibility, functionality, and connectivity.

Accessibility

Accessibility observations focus on the presence of multiple entrances, walkable access, pavement conditions, barriers, slope conditions, wheelchair accessibility, and the availability and quality of stairs and ramps.

Connectivity

Connectivity observations examine the overall movement network within and around the parks, including frequently used routes identified through attraction betweenness analysis, the presence of green corridors, surrounding greenery, continuity of the green network, and the quality of walking and cycling infrastructure.

Multifunctionality

Multifunctionality is assessed by observing the activities taking place in different areas of the sites, including the type of activity, the age group involved, and the number of people participating, while also identifying different activity zones within each park.

Co-presence

In the end, the three sites are compared to assess where co-presence is achieved and where design strategies can be introduced to strengthen social cohesion. When accessibility, connectivity, and multifunctionality are achieved, there is strong potential for co-presence.

3.4 Design

Research by Design generates new knowledge through the act of designing, where ideas are explored and tested on one of the 3 sites. Sketches support concept development and exploration of spatial relationships, while mapping integrates data from QGIS, site visits, and user studies into design-oriented maps that visualize spatial potentials. These tools enable iterative testing of design

interventions. Sketches and illustrations are created to demonstrate how the site-specific design strategies would appear in real life if implemented, and how they could foster co-presence, thereby enhancing social cohesion and indirectly improving the well-being of people who visit the space.

3.5 Evaluate Design

Finally, Research on Design focuses on reflection and evaluation, connecting the design process and outcomes back to theory and broader discourse. The evaluation involves assessing the design project using the spatial quality toolbox derived from the literature and case studies, in order to determine how well it aligns with the established criteria. Based on these insights, revisions are made to refine the design and strengthen the alignment between theory, data, and outcomes. The process concludes with identifying challenges and future development opportunities, acknowledging limitations, and suggesting directions for further research.



Fig 6: Bräckeberget Rastgård , Source: Author

Chapter 4: Findings

**Spatial and design qualities for social cohesion
in urban green spaces and networks**

Literature Review
Reference Projects

List of Indicators

Design Strategies Toolbox

4. Findings

This chapter is organized into three main parts. The first part identifies and defines the spatial qualities that contribute to social cohesion in urban green spaces through a literature review (Table 2) and analysis of reference projects. From this review, a set of indicators is established to assess each spatial quality. The second part applies these indicators to analyze the spatial qualities of Hisingen using space syntax analysis. Three sites are then selected for in-depth observation to further examine these same qualities on the ground. The third and final part synthesizes the conclusions drawn from both the analytical and observational methods. This overall process is illustrated in Figure 5. This chapter is therefore structured to move from understanding key spatial qualities, to analyzing them in context, and finally translating the findings into practical design strategies

4.1 Spatial and design qualities for social cohesion in urban green spaces and networks

Literature Review

Title	Aim	Methods	Key Findings	Relevance to thesis
Examining green space characteristics for social cohesion and mental health outcomes: A sensitivity analysis in four European cities (Cardinali et al., 2024).	This study investigates which types and characteristics of urban green spaces are associated with social cohesion and mental health, while also identifying the proximity required for these relationships to occur.	Survey data from 1,365 individuals across four European cities: Nantes, Porto, Sofia, and Høje-Tastrup.	<ul style="list-style-type: none"> • Accessible greenery within a distance of 900–1400 m was linked to stronger social cohesion and improved mental health outcomes. • Accessible green spaces within 900–1500 m, green corridors within 300–800 m, and mixed-use green spaces within 700–1100 m were found to be particularly effective. • Important spatial qualities included accessibility, connectivity, proximity, and multifunctionality. • Green spaces integrated into everyday walking routes encouraged greater social interaction. • Visual exposure to greenery alone, disconnected lawns, single-use parks, and inaccessible green spaces had minimal impact on social cohesion. 	Highly relevant to Q1 and Q2 because it provides measurable spatial indicators for identifying socially cohesive green spaces. The distance thresholds can directly inform QGIS network analysis in Hisingen
Building Social Resilience Through Parks and Common Recreational Spaces (Sia, Kua & Ho, 2019)	This paper examines how parks and recreational spaces contribute to social resilience by promoting community interaction, well-being, and social cohesion.	Case study of Singapore, reviewing public park systems, community initiatives, and recreational spaces that encourage social interaction	<ul style="list-style-type: none"> • Parks encourage physical activity, social interaction, and engagement with nature. • Well-planned networks of public green spaces increase opportunities for community interaction. • Neighbourhood parks play a particularly important role in high-density residential areas. • Playgrounds promote interaction between children and parents. • Large events hosted in parks help strengthen broader community connections. • Community gardening initiatives were found to enhance social relationships and neighbourhood ties. 	Useful for Q2 because it explains how green spaces create social cohesion through activities and shared experiences.

Title	Aim	Methods	Key Findings	Relevance to thesis
Relax Underneath the Trees and Read a Book’: Exploring Social Sustainability in Parks Through the Lens of Young People (Ziaesaeidi, P., 2025)	This study explores how young people’s preferences for park environments contribute to socially sustainable park design and identifies park characteristics that promote social interaction, inclusion, and well-being.	Qualitative study using art-based and visual survey methods	<ul style="list-style-type: none"> • Social sustainability in parks depends on inclusive and multifunctional design. • Young people preferred spaces that combine recreation, social interaction, and access to nature. • Preferred features included diverse playgrounds, informal green areas, multifunctional recreational spaces, and formal pathways. • Clear pathways, visible entrances, and open sightlines improved accessibility and comfort. • Isolated exercise equipment was less preferred because it encouraged solitary use. • Parks offering diverse activities encouraged longer visits and stronger social interaction. 	Highly relevant to Q2 and Q3 because it helps identify which specific park design elements foster inclusion and interaction among different user groups.
The role of urban green spaces in improving social inclusion (Kazmierczak & James, 2006)	This paper examines whether urban green spaces can help create socially cohesive communities in socially excluded areas and improve quality of life through greater social inclusion.	Literature review	<ul style="list-style-type: none"> • Green spaces promote social inclusion through four key mechanisms: <ul style="list-style-type: none"> • providing free and accessible public amenities • creating spaces for social interaction • offering stress relief and restoration • enabling voluntary participation • High-quality green spaces require accessibility, safety measures, cleanliness, biodiversity, and visually appealing design. • Socially excluded neighbourhoods often have limited access to quality green spaces. • Poorly maintained parks may encourage anti-social behaviour and reduce usage. • Safety concerns, particularly among women, can significantly affect park use. 	Highly relevant to Q2 and Q3, especially your focus on inclusion across age, gender, and cultural groups.
Urban green commons for socially sustainable cities and communities (Barthel et al., 2021)	This paper develops an understanding of urban social sustainability through the concept of urban green commons, focusing on how shared use and collective governance of green spaces contribute to social sustainability.	Cross-disciplinary co-writing	<ul style="list-style-type: none"> • Urban green commons include community gardens, shared courtyards, urban farms, and community-managed parks. • These spaces promote repeated social interactions through shared activities such as gardening and maintenance. • Social cohesion is strengthened through participation and collective governance rather than physical access alone. • Community ownership and involvement in decision-making foster stronger trust and belonging. • Green commons are less effective when governance is exclusionary, land tenure is unstable, or institutional support is weak. • These spaces function as social infrastructure that supports inclusion and community bonding. 	Highly relevant to Q2 and Q3, especially your focus on inclusion and equitable access.

Title	Aim	Methods	Key Findings	Relevance to thesis
The Relationship between Social Cohesion and Urban Green Space: An Avenue for Health Promotion (Jennings & Bamkole, 2019)	This paper develops a conceptual framework explaining how urban green spaces contribute to social cohesion and improve public health outcomes.	Literature review	<ul style="list-style-type: none"> Urban green spaces encourage positive social interactions that strengthen social cohesion and well-being. Key design factors include proximity, park quality, open layouts, sidewalks, transport accessibility, shaded areas, and functional playgrounds. Organised activities and recreational opportunities help foster community connections. Activities such as walking, cycling, gatherings, and recreation strengthen neighbourhood relationships. Both physical design and programmed activities influence social cohesion outcomes. 	Highly relevant to Q1, Q2, and Q3 because it provides a strong theoretical foundation linking green spaces to social cohesion.
Underlying relationships between public urban green spaces and social cohesion: A systematic literature review (Wan et al., 2021)	This study identifies how different characteristics of urban green spaces influence social cohesion.	Literature review using Mixed Methods Appraisal Tool (MMAT)	<ul style="list-style-type: none"> Social cohesion is shaped by physical characteristics, user perceptions, and patterns of use. Green spaces bring people together and create informal opportunities for interaction. Repeated casual encounters in parks help build stronger social connections. Parks act as neutral spaces where diverse social groups can interact. Tree cover, perceived greenness, and safety positively influence park use and interaction. Frequent visits to green spaces improve well-being, reduce stress, and strengthen community resilience. 	Extremely relevant to Q1 and Q2 because it synthesizes the exact spatial and experiential variables are being studied (accessibility, connectivity, and usage).

Table 2: Literature Review

Reference Projects

The High Line, New York City, USA

Size- 2.33 km
Location- New York City, USA

The High Line (Figure 7 and 8) transforms industrial infrastructure into a connected public space that supports recreation, cultural activity, and social interaction. Through walking paths, seating areas, and art installations, it encourages everyday use and community engagement. It has become a significant example of placemaking and urban revitalization, attracting diverse users and fostering a sense of ownership. Originally an abandoned elevated railway line, the project reimagines obsolete infrastructure into a linear urban public park. It serves as a model of adaptive reuse and urban regeneration. (Cilento, 2009).



Fig 7: High Line, New York City. (Dan S. Nguyen, n.d.). CC0

Accessibility

- Multiple, evenly distributed entry points along the park edges
- Entrances aligned with the urban grid, improving ease of access
- Strong integration with public transport nodes and

pedestrian flows
 • Access is designed as an experiential journey, not just functional movement

Connectivity

- Continuous linear park connecting multiple neighborhoods
- Transforms a former infrastructural barrier into a connector
- Incorporates activity nodes (seating, art, pauses) to maintain engagement along movement routes



Fig 8: Map of the High Line. (M & OpenStreetMap contributors, 2017). CC BY 2.0

Multifunctionality

- Overlays multiple uses: movement, leisure, and social interaction
- Hosts events, exhibitions, and community programs
- Flexible spaces that adapt to different uses over time

Co-presence

- Attracts diverse user groups through varied programming and spatial design
- Encourages both formal and informal activities
- Supports place-making, fostering a shared sense of belonging

Bishan-Ang Mo Kio Park, Singapore

Size- 620, 000 m²
Location- Singapore

The park (Figure 9 and 10) demonstrates biophilic urban design by integrating wetlands, green landscapes, and water systems. It functions as both ecological infrastructure and a social space, supporting daily activities such as jogging, cycling, tai chi, and community gatherings. It is a strong example of how environmental and social systems can coexist in urban settings. A former concrete drainage canal was transformed into a naturalized river system integrated within a public park. The project combines ecological restoration with urban social infrastructure. (Schaefer, 2014).



Fig 9: Before and after aerial view of Kallang River, Bishan Park, Singapore. (Pagodashophouse, 2011). CC BY-SA 3.0

Accessibility

- Multiple entry points distributed along park edges
- Reduced separation between street and park (soft, permeable boundaries)
- Removal of hard edges improves physical and visual access
- Public transport access within walking distance (e.g., bus stops within 5 minutes)

Connectivity

- Integrates water systems with green corridors into a unified network
- Connects ecological and social spaces seamlessly
- Includes activity nodes (seating, gathering areas) along pathways to enhance user engagement

Multifunctionality

- Combines flood management, recreation, and ecological restoration
- Supports diverse everyday activities (sports, leisure, social interaction)
- Flexible landscape that adapts to environmental and social needs over time

Co-presence

- Designed for all age groups and social backgrounds
- Encourages daily, informal use by local communities
- Promotes social cohesion through shared public space

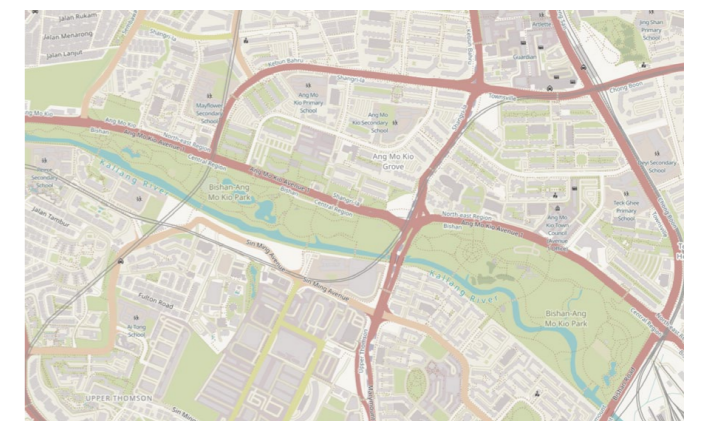
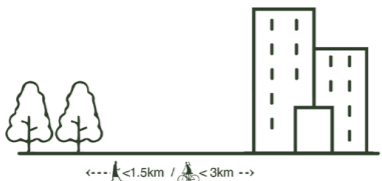
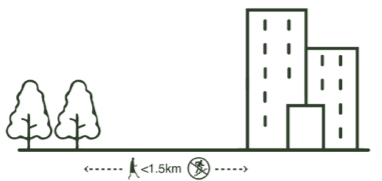








Fig 10: Location of Bishan-Ang Mo Kio Park, Singapore. (OpenStreet-Map contributors, 2025). ODbL

4.2 List of Indicators

This Table 3 combines the key spatial and design qualities identified from literature and reference projects that promote social cohesion within urban green spaces. The spatial qualities identified are **accessibility, connectivity, multifunctionality, and co-presence**. The table also outlines the different indicators used to measure these spatial qualities, along with the methods of observation used for assessment. These indicators are primarily evaluated through two approaches: geospatial analysis and direct observation of spatial qualities during site visits and field studies. This serves as a practical guide to assess, plan, and design green space networks that foster co-presence, interaction, and equitable access for diverse urban communities.

Definition/Source	Indicators	Assessment Method
A. ACCESSIBILITY		
Green or vegetated areas that can be reached by walking through the street network, not just seen. Cardinali et al. (2024)	A1. If people can access UGS on foot within 900–1500 m radius via quality sidewalks 	Analysis A: Attraction reach from the park to the building within 1.5km walking range, using the full network Analysis B: Attraction reach from the parks to buildings within a 3 km cycling range, using the full network
Kazmierczak and James (2006)	A2. adequate physical access: presence of stairs and ramps 	Analysis C: Attraction reach from the parks to buildings within a 1.5 km walking range, using the full network, but removing stairs Site Observation- Noting whether the areas have stairs and ramps leading to main activity areas
Boverket (2022)	A3. slopes around the range - 1:20 ($\approx 5\%$) -8.3 % (1:12) 	Slope analysis- elevation of land Site Observation- Noting areas with un-walkable slopes
Friends of the High Line (n.d.)	A4 The park with multiple entrances 	Site Observation- Recording the number of entrances
National Parks Board (2026)	A5. Public transport within 5 min walk that is 400m (speed of a healthy adult 4.8 km/hr) 	Analysis D: Attraction reach from the parks to public transportation stops within a 400 m walking range, using the full network Site Observation- Noting whether public transport stops are present and whether they are in use

Definition/Source	Indicators	Assessment Method
B. CONNECTIVITY		
A continuous green mobility network that allows movement through connected green infrastructure. Cardinali et al. (2024)	Area of green corridors (greenery along the roads that connects different zones) reachable within network distances (300–800 m). Corridors were manually connected across interruptions. 	Attraction Betweenness identifying key connecting streets between parks, using the non- motorized road network, including stairs Site Observation- Assessing the presence of green corridors, surrounding greenery, continuity of the green network, and the quality of walking and cycling infrastructure
C. MULTIFUNCTIONALITY		
The diversity of different activities available in green spaces. Cardinali et al. (2024)	Types of Activities & Programs <ul style="list-style-type: none"> • Active: walking, cycling, jogging, sports ($\approx 60\%$ usage) • Passive: relaxation, reading, sitting in shaded areas • Social: gatherings, picnics, barbecues, meetings ($\approx 10\%$ usage) • Flexible open spaces for temporary uses and events • Cultural and public programs: Historical walking tours, dance performances, art exhibitions and installations • Educational events (families, children, adults) 	Site Observation- Noting down different activity zones and the programs within each park
Provision of facilities for all social groups. Kazmierczak and James (2006)	User Groups & Activity Distribution <ul style="list-style-type: none"> • Children & families: playgrounds, picnics, gathering spaces • Youth & individuals: active recreation (jogging, cycling, walking) • Adults & elderly: fitness areas, shaded seating, socialising • Social & group activities: open lawns, sheltered spaces • Cultural & community use: plazas for Tai Chi, events, gatherings, field trips • Program intensity: low medium / high activity zones 	Site Observation- Recording the age groups involved and the number of people participating in each activity



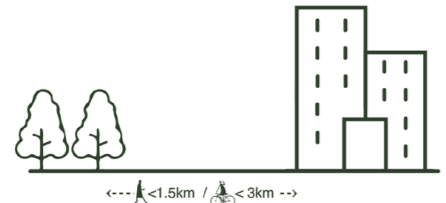
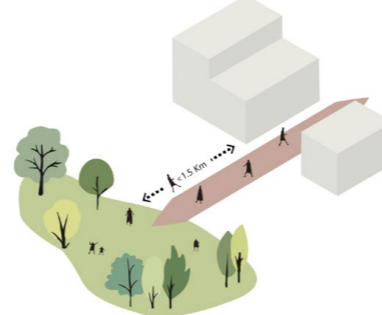



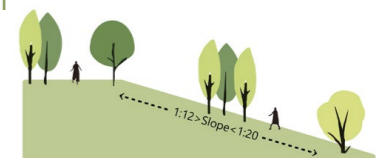



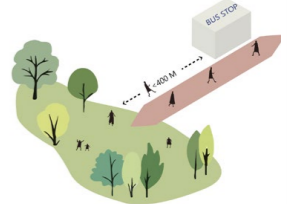

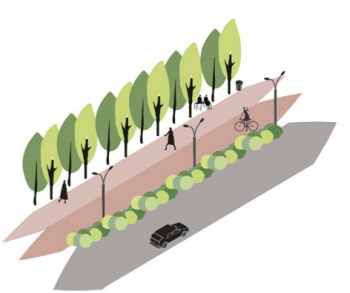


Definition/Source	Indicators	Assessment Method
Parks should support a wide range of activities, from physical play to social gatherings and personal relaxation. Ziaesaeidi (2025)	<p>Spatial & Physical Elements Supporting Use</p> <ul style="list-style-type: none"> • Open park design encouraging recreation and social interaction • Shaded areas for comfort and relaxation • Functional playgrounds for children and families • Fitness corners for adults and elderly • Open lawns and sheltered areas for group interaction • Movable furniture and informal seating clusters • Interactive elements and street games • Cafés and semi-public community spaces 	Site Observation- Noting how many of these elements are present and assessing their condition
D. CO - PRESENCE		
Co-presence is the quality of a space that allows everyone, regardless of age, background. Ziaesaeidi (2025)	<p>Co-presence can be achieved when the spatial qualities mentioned above are met.</p> 	Evaluation of previously stated indicators

Table 3: List of Indicators

4.3 Design Strategies Toolbox

This section presents a general toolbox of design strategies (Table 4) for each spatial quality that supports social cohesion within urban green spaces. This phase translates the key design strategies identified through reference projects, the theoretical framework, and spatial analyses into practical design approaches.

Indicators	Design Strategy
A. ACCESSIBILITY	
<p>A1. If people can access UGS on foot within 900–1500 m radius via quality sidewalks, Cardinali et al. (2024).</p> 	<ul style="list-style-type: none"> • Improving pedestrian routes to parks (building to the park entrance). 

Indicators	Design Strategy
<p>A2. adequate physical access: presence of stairs and ramps, Kazmierczak and James (2006).</p> 	<ul style="list-style-type: none"> • If only stairs is present add ramp (with adequate slope) to access the same area. • Barrier-free design. 
<p>A3. slopes around the range - 1:20 ($\approx 5\%$) to 1:12 (8.3%), Boverket (2022)</p> 	<ul style="list-style-type: none"> • Moderate slopes to main access areas. 
<p>A4 The park with multiple entrances Friends of the, High Line (n.d.)</p> 	<ul style="list-style-type: none"> • Increase number and distribution of entrances along park edges visibility and legibility of entrances. 
<p>A5. Public transport within 5 min walk that is 400m (speed of a healthy adult 4.8 km/hr), National Parks Board (2026)</p> 	<ul style="list-style-type: none"> • Improve walkability to the current public transport • Include signage, light, • More public transport stop next to park entrances • More park entrances near the bus stops 
B. CONNECTIVITY	
<p>Area of green corridors (greenery along the roads that connects different zones) reachable within network distances (300–800 m). Corridors were manually connected across interruptions. Cardinali et al. (2024)</p> 	<ul style="list-style-type: none"> • Continuous green network linking parks, streets, and open spaces • Transform streets into green corridors (tree-lined, vegetated paths) • Walkability + cycling infrastructure between green spaces • Wide enough roads • Lights and signage good crossing • Resting place for people 
C. MULTIFUNCTIONALITY	
<p>Types of Activities & Programs</p> <ul style="list-style-type: none"> • Active: walking, cycling, jogging, sports ($\approx 60\%$ usage) • Passive: relaxation, reading, sitting in shaded areas • Social: gatherings, picnics, barbecues, meetings ($\approx 10\%$ usage) • Flexible open spaces for temporary uses and events • Cultural and public programs: Historical walking tours, dance performances, art exhibitions and installations • Educational events 	<ul style="list-style-type: none"> • Active (sports, jogging, cycling) • Passive (relaxation, reading, sitting) • Social (gatherings, picnics, events) • Flexible open spaces for temporary uses/events • Cultural and public programs- Events, workshops, exhibitions 

Indicators	Design Strategy
<p>User Groups & Activity Distribution</p> <ul style="list-style-type: none"> • Children & families: playgrounds, picnics, gathering spaces • Youth & individuals: active recreation (jogging, cycling, walking) • Adults & elderly: fitness areas, shaded seating, socialising • Social & group activities: open lawns, sheltered spaces • Cultural & community use: plazas for Tai Chi, events, gatherings, field trips • Program intensity: low medium / high activity zones 	<ul style="list-style-type: none"> • Program intensity map: low / medium / high activity spaces • User-group diagram: children / youth / elderly / families / individuals 
<p>Spatial & Physical Elements Supporting Use</p> <ul style="list-style-type: none"> • Open park design encouraging recreation and social interaction • Shaded areas for comfort and relaxation • Functional playgrounds for children and families • Fitness corners for adults and elderly • Open lawns and sheltered areas for group interaction • Movable furniture and informal seating clusters • Interactive elements and street games • Cafés and semi-public community spaces 	<ul style="list-style-type: none"> • Movable furniture • Open lawns • Street games • Informal seating clusters • Interactive elements • Cafés • Community uses- semi-public space 
<p>D. CO - PRESENCE</p>	
<p>Co-presence can be achieved when the spatial qualities mentioned above are met.</p>	<p>Co-presence can be achieved when the spatial qualities mentioned above are met.</p> 

Table 4: Design Strategies Toolbox

These spatial qualities are assessed in the case study area (Hisingen) in the following chapter primarily through attraction reach and attraction betweenness analyses, complemented by site observations. Each indicator is evaluated based on its presence and the quality of its implementation.



Fig 11: Färjenäsparken , Source: Author

Chapter 5: Site Analysis

Context Introduction
Space Syntax Analysis- Accessibility
Space Syntax Analysis- Connectivity and Multifunctionality
Observations (site visit)

5. Site Analysis

5.1 Context Introduction

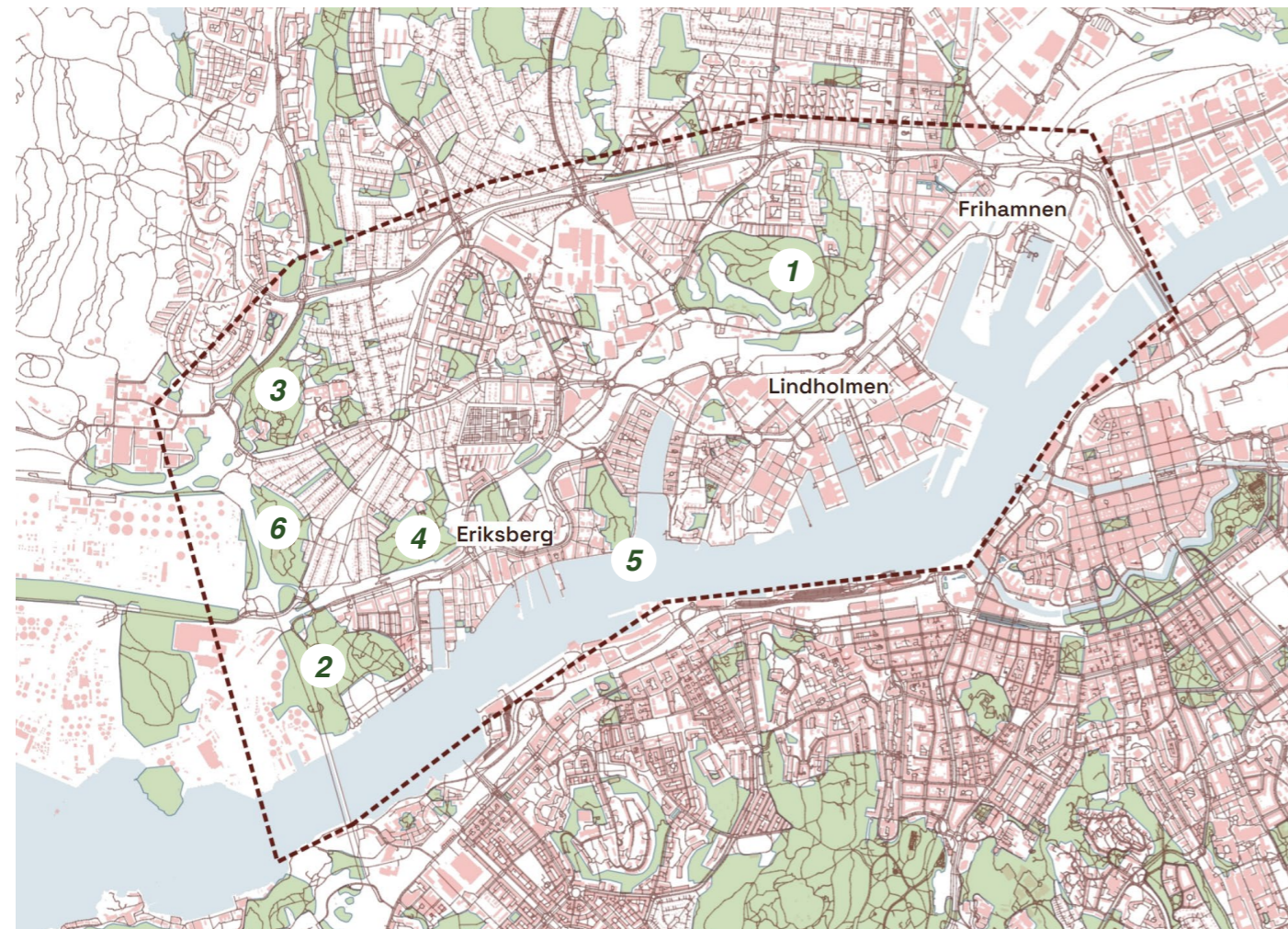


Fig 12: Study Area

- 1. Keillers Park
- 2. Färjenäsparken
- 3. Bräckeberget Rastgård
- 4. Krokängsparken
- 5. Sörhallsberget
- 6. Football Park

Context Introduction

The project is located in the Hisingen region of Göteborg, along the Göta älv, and includes the districts of Frihamnen, Lindholmen, and Eriksberg (Figure 12). The study area covers approximately 8 km² (2.83 mi²) and was selected due to its ongoing urban development, high industrial density, and significant residential neighborhoods, which provide a rich context for examining the relationship between urban growth and public green spaces. Historically, the area was closely connected to shipbuilding activities (Figure 13), and remnants of this industrial heritage are still visible today. At present, the urban environment is diverse and mixed-use, consisting of residential neighborhoods, university campus areas, industrial zones, company offices, and several public green parks. The study focuses on park users, including local residents, nearby workers, and visitors from other locations, in order to analyze how people interact with these green spaces and to develop strategies that enhance social connections and community engagement.



Fig 13: Shipbuilding at Lindholmen Shipyard, Gothenburg. Adapted from *Fartygsbygge vid Lindholmen* by Sjöfartsmuseet Akvariet, n.d., Wikimedia Commons. Public domain.

5.2 Spatial Analysis: Accessibility

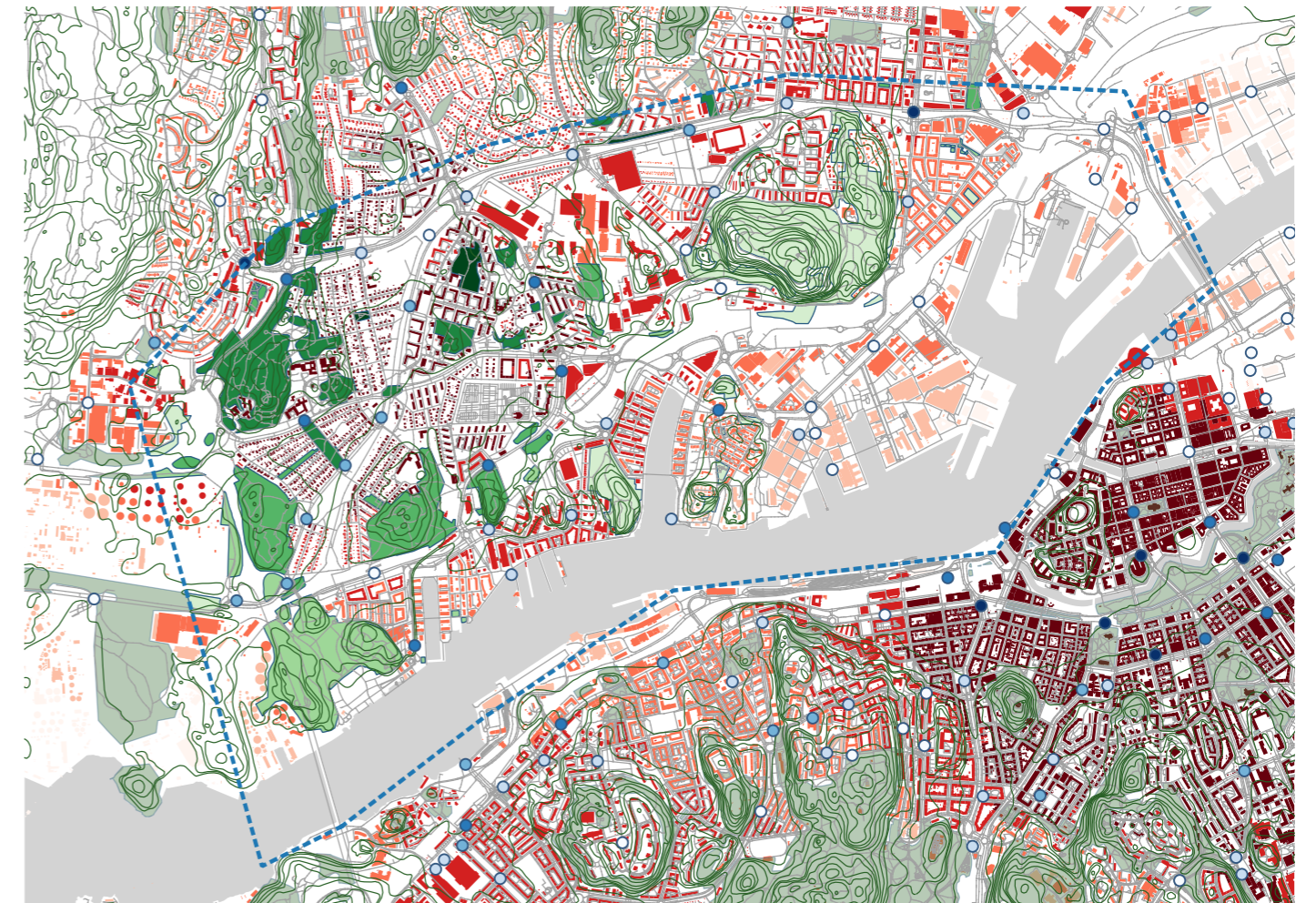


Fig 14: Accessibility mapping

Major parks were selected to assess accessibility based on their varying sizes. The selected parks were Keillers Park, Färjenäsparken, Bräckeberget Rastgård, Krokängsparken, Sörhallsberget, and the Football Park.

- Analysis A:** Shows which UGS are accessible to the most buildings within a 1.5 km walking distance. (see Figure 14)
- Green space 3, 4, and 6 can reach a higher number of buildings within walking distance 1.5 km, indicating more people can access the UGS
 - Green space 2 shows lower accessibility compared to Green space 3, 4, and 6.
 - Green space 1 and 5 have the lowest accessibility, which may be influenced by the presence of steep slopes.

Analysis B: Shows which UGS are accessible to the most buildings within a 3 km cycling distance. (see Appendix) Even when the travel distance is increased to 3 km, representing cyclists, the overall accessibility pattern remains largely unchanged.

Analysis C: Shows which UGS are accessible to the most buildings within a 1.5 km walking distance, when stairs are removed from the network (see Appendix) The accessibility pattern for differently abled (users unable to use stairs) also remains similar across the areas.

Slope Analysis: Keillers Park, Krokängsparken, and Sörhallsberget are located on hilly terrain, while the Football Park is relatively flat. Färjenäsparken and Bräckeberget Rastgård have a mix of steep and flat areas.

Analysis D: Shows which public transport stops are accessible to the most UGS within a 400m walking distance. (see Figure 14)

Figure 14 also shows building connectivity to green spaces. Buildings near the waterfront, particularly in Lindholmen, have comparatively lower access to UGS.

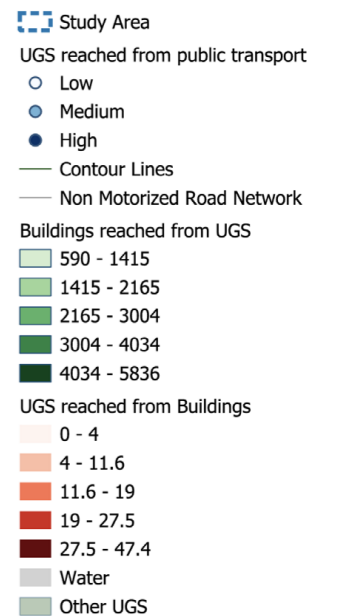


Fig 15: Legend for fig 14

5.3 Spatial Analysis: Connectivity and Multifunctionality

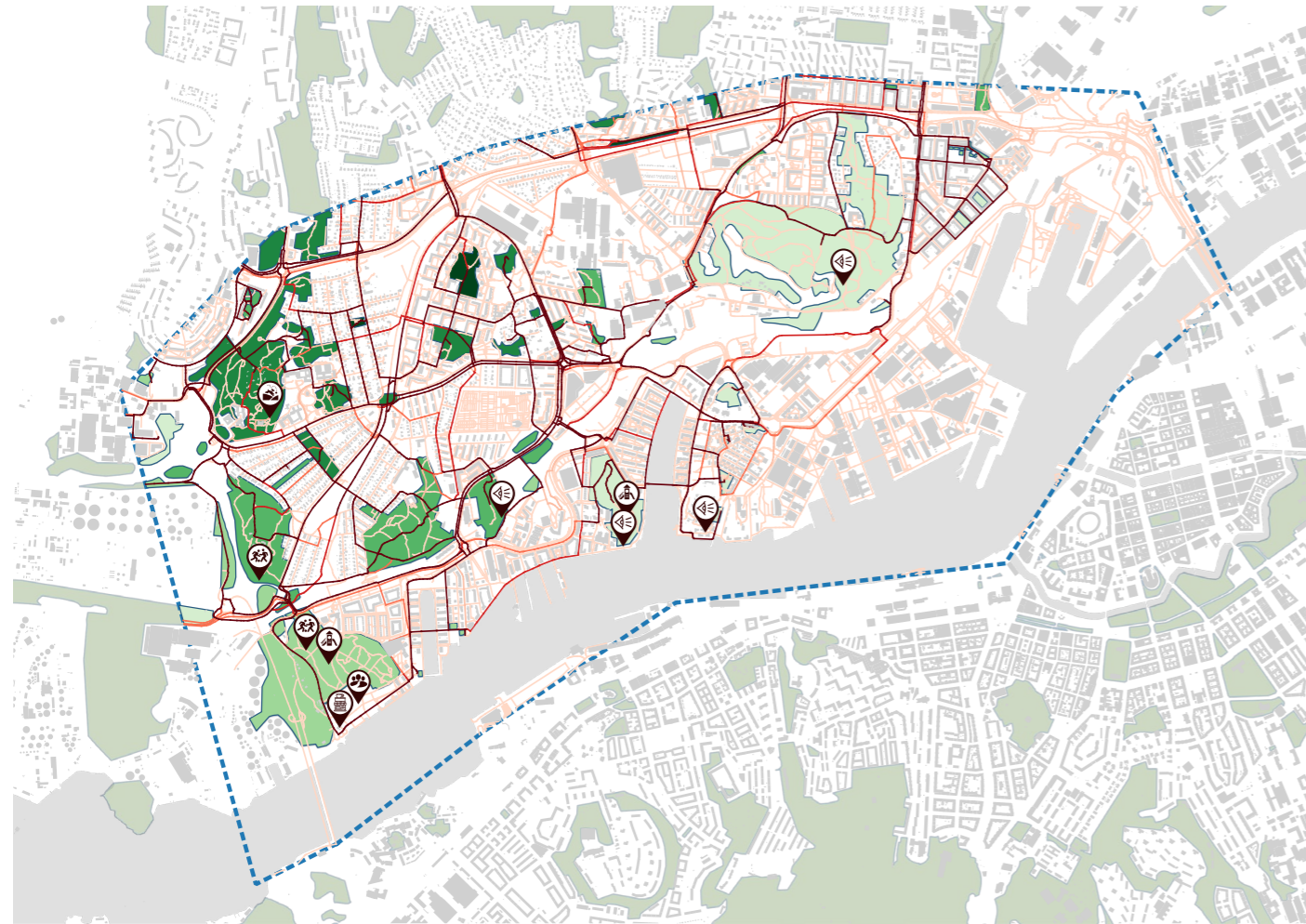
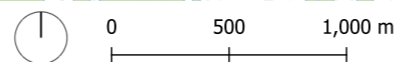


Fig 16: Connectivity and Multifunctionality mapping



Connectivity

The red-colored roads represent the main routes that connect different urban green spaces (UGS). Green spaces 3, 4, and 6 form a strong network, indicating that they play an important role in connecting surrounding UGS. In contrast, the riverfront area shows fewer connecting routes between green spaces compared to the areas located further inland. Additionally, green space 1 appears relatively isolated from the rest of the UGS network in terms of connectivity. (see Figure 16)

Multifunctionality

- Färjenäsparken is the most multifunctional park in the network, offering a playground, football ground, open lawn, viewpoints, and a café (see Figure 16).
- Sörhallsberget includes viewpoints and a playground and Bräckeberget Rastgård mainly consists of a small dog park.
- The Football Park provides a larger football ground compared to the one in Färjenäsparken.
- The remaining parks are mostly located on higher hills and primarily offer trekking paths and viewpoints.
- From a network perspective, the parks show a good level of multifunctionality, but the distribution of activities is uneven.
- Several parks (e.g. Keillers Park and Sörhallsberget) have similar functions focused on recreation, walking, and informal green space, creating functional overlap rather than diversity.
- In contrast, some parks provide more distinct and complementary functions, such as sports facilities, waterfront access (Färjenäsparken), or quieter natural environments (Bräckeberget Rastgård).
- Overall, multifunctionality exists across the system but is not evenly or strategically distributed, resulting in a partially diverse but unbalanced network of urban green spaces.

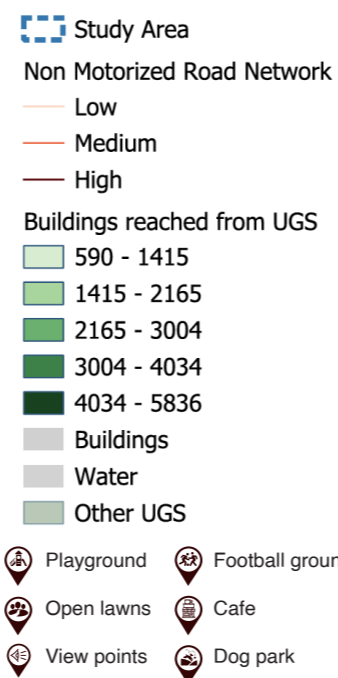


Fig 17: Legend for fig 16

Conclusion of Site Selection and QGIS-Based Spatial Analysis

After completing the analysis, three focus areas were selected for further investigation: **Bräckeberget Rastgård, Sörhallsberget, and Färjenäsparken**. These sites were chosen because each represents a distinct performance category in relation to accessibility, connectivity, and functionality, allowing for a comparative understanding of different spatial conditions (see Appendix)

Bräckeberget Rastgård was identified as a high-performing site because it scored strongly across most accessibility indicators. It offers good pedestrian access through routes both with and without stairs, ensuring multiple movement options for users. The site also demonstrates strong cycling connectivity and shows a decent level of multifunctionality, making it an example of a well-connected and relatively accessible landscape.

Färjenäsparken was selected due to its role as a multifunctional and socially active site. It recorded the highest level of multifunctionality among the analysed areas, supporting a wide range of activities and social interactions. While its accessibility is moderate—not the strongest but not the weakest, it presents an interesting case where diverse usage patterns contribute significantly to the site’s value.

In contrast, Sörhallsberget was identified as a low-performing site because of its weak accessibility. The area is likely affected by steep terrain and slope-related challenges, which may limit movement and connectivity. Its multifunctionality remains relatively neutral, making it important to understand how physical constraints impact the overall user experience.

To develop a deeper understanding of these sites, all three locations were visited during both a weekday and a weekend. These site visits will focus on observing variations in spatial qualities, accessibility, connectivity, and functionality across different times and user patterns. The findings from these observations was systematically documented in a table (refer to Appendix for the observation table).

Finally, based on the comparative analysis and field observations, one site was selected for the design intervention. The final design proposal was focused on the site where spatial qualities are most lacking and where strategic improvements can create the greatest impact.

5.4 Observation (Site Visit)

The observations were conducted on both a weekday and a weekend to understand the different types of users and activities taking place across the selected sites. The weekday observation was carried out on 27/03/2026 (Friday) in two sessions: 11:30 AM–2:00 PM and 3:15 PM–5:30 PM. The weekend observation took place on 28/03/2026 (Saturday) during 11:30 AM–2:00 PM and 3:30 PM–5:30 PM. These time slots were selected to capture variations in usage patterns throughout the day. (see Figure 21)

During the observations, three key aspects were documented: accessibility, functionality, and connectivity. Accessibility observations focused on the presence of multiple entrances, walkable access, pavement conditions, barriers, slope conditions, wheelchair accessibility, and the availability and quality of stairs and ramps.

Connectivity observations focused on the overall movement network within and around the parks. Frequently used routes, identified through attraction betweenness analysis, were observed along with the presence of green corridors, surrounding greenery, continuity of the green network, and the quality of walking and cycling infrastructure.

Functionality was assessed by observing the activities taking place within different areas of the sites. The type of activity, the age group involved, and the number of people participating in each activity were recorded. Different activity zones within each park were also identified.

The collected observations were then mapped and compared across the three selected parks.(refer to Appendix for the observation table).



Fig 18: Bräckeberget Rastgård



Fig 19: Sörhallsberget



Fig 20: Färjenäsparken

A. Accessibility

- A1, A2,
- A3- slope
- A4- Entrance
- A5- Public transport

B. Connectivity

- Green corridor - present
- Green corridor - needs improvement

C. Multifunctional

- C1. Activity area/zones
 - Playground
 - Open lawns
 - Sitting area
 - View points
 - Football ground
 - Skating area
 - Open Gym
 - Garden
 - Cafe
 - Dog Park
- C2. Activities
 - Running
 - Jogging
 - Walking dogs
 - Playing with dog
 - Children playing
 - Walking
 - Sitting
 - People strolling with babies

Fig 22: Legend for fig 21

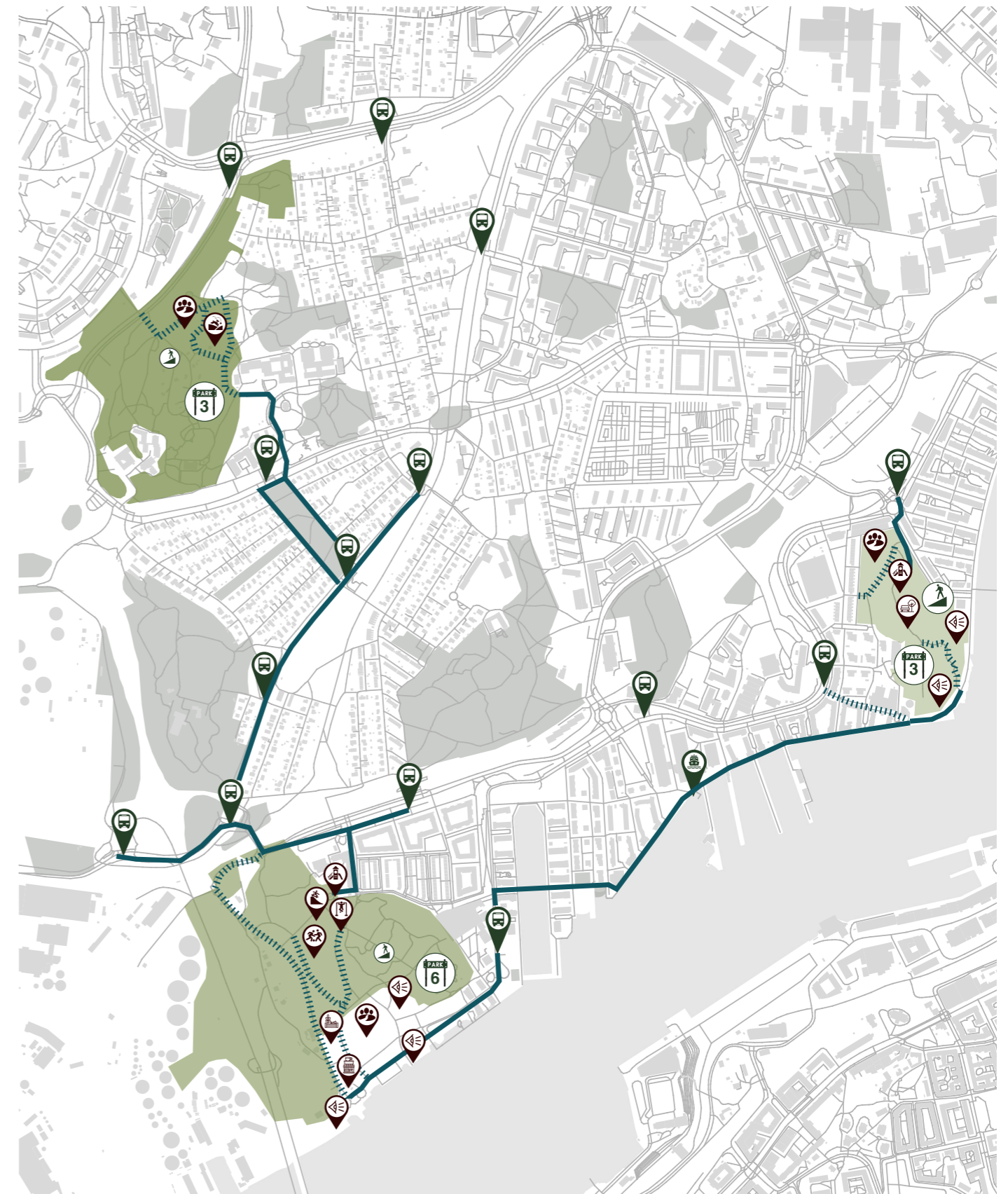


Fig 21: Spatial quality assessment map of the three parks

Sörhallsberget

Accessibility

Has relatively strong pedestrian accessibility within walking distance (1500m) and for cycling distance (3000m).
 Stairs are present but are not continuous and without a ramp, located mainly near entrances.
 Slopes are steep in several areas (above 8.3%) making movement possible but difficult.
 Contains a mix of paved and gravel pathways, with better paving in lower areas.
 No public transport stop within 400m.
 Has 3 entrances, but one entrance is less visible and lacks clarity.

Improvement: *Improve staircase, add resting spots/seating, improve entrance visibility, add better transit signage.*

Connectivity

The main route has the lowest slope among all entrances, making it comparatively easier to access.
 Connected to nearby residential areas.
 First half of the path is flat.
 Functions as a green corridor connection.
 Wide gravel pathway allows walking and cycling.
 Greenery exists around the route but lacks formal planning.

Improvement: *Strengthen green corridor, add seating, improve pathway quality.*

Functionality

This park already has strong recreational functions: Playground, Open lawns, Seating areas, Viewpoints/platforms, Walking trails, Rope sliding area Firewood area. Some recreational spaces are underutilized. Rope/firewood areas need activation.

Friday Morning: Main activities included dog walking, walking, and trekking, with a few children using the playground. (3 Children, 10 Youth, 16 Adults, 5 Elderly)

Friday Evening: Main activities were children playing and people sitting/relaxing. (7 Children, 2 Youth, 7 Adults, 3 Elderly)

Saturday Morning: The main activity was playing with dogs in the lower park. (2 Youth, 2 Adults)

Saturday Evening: Main activities included children playing, adults spending time with children, and a few people walking dogs. (8 Children, 2 Youth, 10 Adults, 7 Elderly)

Improvements: *Add open gym near playground, improve hill activity zones, add more viewpoints, small event space*

Co - Presence

Serves families, dog owners, and recreational users. Scenic viewpoints attract broader users. Steep terrain limits elderly and disabled access.

Improvements: *More accessible paths, rest areas, better inclusive circulation design, stairs with ramps beside them especially near entrances.*

A. Accessibility

A1, A2, A5- Public transport



A3- slope/ hilly area A4- Entrance

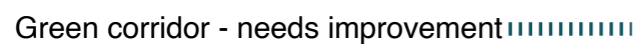


Quality of walkway



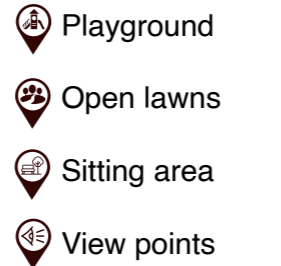
B. Connectivity

Green corridor - present



C. Multifunctional

C1. Activity area/zones



C2. Activities

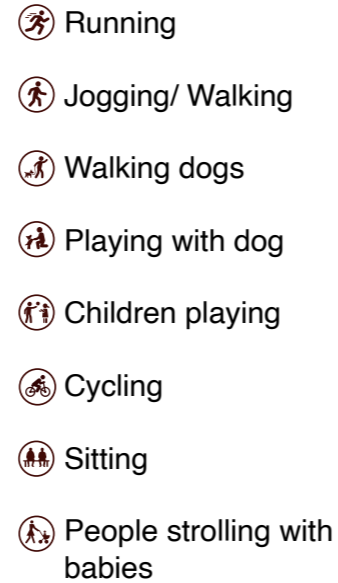


Fig 23: Map of Sörhallsberget

Fig 24: Legend for fig 23

Bräckeberget Rastgård

Accessibility

Lowest accessible area
 No formal stairs.
 Natural trails are steep, uneven, rocky, and muddy.
 Not wheelchair accessible.
 No public transport nearby.
 Has 3 entrances, but all are poorly marked.
 Google Maps reportedly misdirects users.

Improvement: Add signage, define entrances, introduce gravel/paved paths

Connectivity

Main road connects housing areas.
 Highway connection exists.
 Forest trails remain unpaved.
 Strong natural green network.
 No formal cycling/walking routes.

Improvement: Add pathways, improve circulation routes, possibly widen paths where necessary

Functionality

This park remains highly natural with limited built functions: Open lawn, Broken football post, Small dog park Fenced area, Bench, Small shack

Friday Morning: Very low usage was observed. (1 Adult, 1 Elderly)

Friday Evening: The main activity remained dog walking. (2 Elderly)

Saturday Morning: Main activities included walking dogs and playing with dogs. (4 Adults, 2 Elderly)

Saturday Evening: The main activity was dog walking. (1 Elderly)

Improvements: Preserve natural quality, Minimal intervention, Improve existing fenced area if needed

Co - Presence

Currently mainly serves dog owners.
 Limited accessibility excludes many users.

Improvements: Improve accessibility while preserving natural character, avoid overdevelopment.

A. Accessibility

A1, A2, A5- Public transport



A3- slope/ hilly area A4- Entrance



Quality of walkway

Good quality
 Needs improvement
 Small pathways



B. Connectivity

Green corridor - present



Green corridor - needs improvement



C. Multifunctional

C1. Activity area/zones

Open lawns

Sitting area

Dog park

C2. Activities

Jogging/ Walking

Walking dogs

Playing with dog

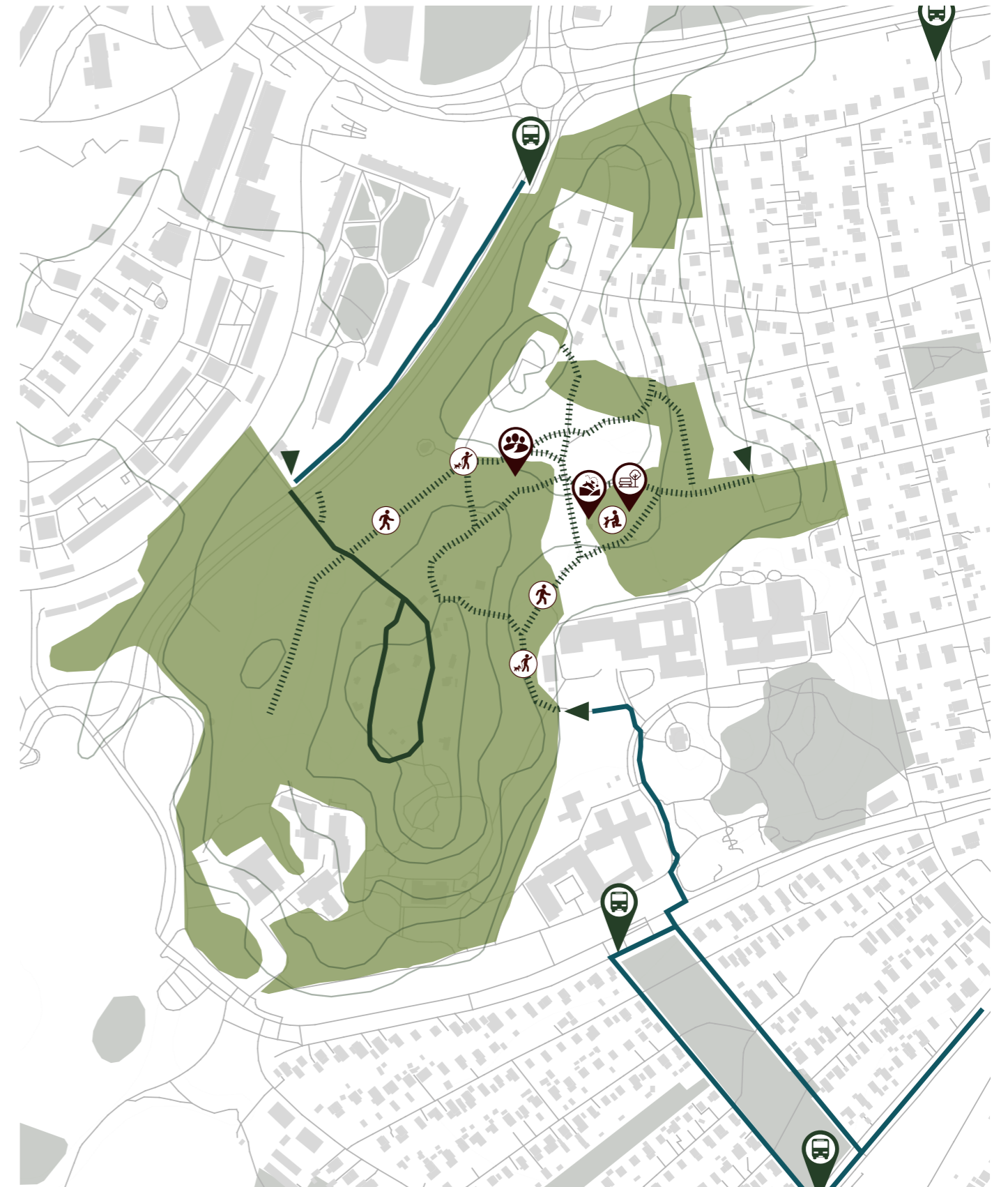


Fig 25: Map of Bräckeberget Rastgård

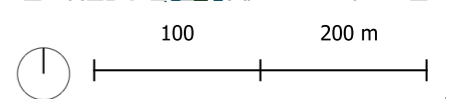


Fig 26: Legend for fig 25

Färjenäsparken

Accessibility

Strong accessibility
 No stairs on site.
 Slopes are moderate but still exceed ideal accessibility gradients.
 Some flatter areas exist.
 Wheelchair movement is difficult because pathways are not properly paved.
 Has 6 entrances.
 Lower park has better paving.
 Connection between upper and lower park is muddy.

Improvement: Improve slopes, create accessible pathways, pave upper-lower connection

Connectivity

Path connecting upper and lower areas is undefined.
 Muddy routes discourage usage.
 Strong green-to-blue connection toward waterfront.
 Greenery surrounds pathways.
 No dedicated cycling lanes.

Improvement: Create defined paths, improve cycling infrastructure, better waterfront connection

Co - Presence

Highly inclusive because it attracts many user groups.
 Families, athletes, children, elderly people all use it.

Improvements: Improve comfort through seating/shade, better wheelchair accessibility

Functionality

This park has the most functions among all three parks: Playground, Football field, Skating area, Basketball court, Open gym, Open lawns, Garden, Café, Seating areas, Viewpoints, Walking/cycling paths

Friday Morning: Main activities included walking and spending time at the café.(8 Children, 5 Youth, 39 Adults, 28 Elderly)

Friday Evening: Main activities were walking and children playing.(12 Children, 6 Youth, 19 Adults, 9 Elderly)

Saturday Morning: Main activities included kids playing football, spending time at the café, and using the playground.(21 Children, 7 Youth, 20 Adults, 12 Elderly)

Saturday Evening: Main activities included football, playground activities, and walking.(28 Children, 21 Youth, 24 Adults, 24 Elderly)

Improvements: Add BBQ area, event space, winter activities, more seating, shaded areas

Conclusion

Färjenäsparken was selected for further improvement due to its strong accessibility, multifunctionality, and ability to attract diverse user groups. With six entrances and a variety of amenities, it performs well overall; however, issues such as poor wheelchair accessibility, weak connections between the upper and lower park areas, and a lack of seating and shaded spaces highlight opportunities for improvement. The following chapter presents site-specific design strategies to enhance social cohesion in the park.

A. Accessibility

A1, A2, A3- slope/ hilly area A4- Entrance A5- Public transport



Quality of walkway

Good quality (solid green line)
 Needs improvement (dashed green line)
 Small pathways (thin solid green line)

B. Connectivity

Green corridor - present (thick solid green line)
 Green corridor - needs improvement (thick dashed green line)

C. Multifunctional

- C1. Activity area/zones
 - Playground (playground icon)
 - Open lawns (grass icon)
 - Sitting area (chair icon)
 - View points (glasses icon)
 - Football ground (football icon)
 - Skating area (skateboard icon)
 - Open Gym (gym icon)
 - Garden (garden icon)
 - Cafe (cafe icon)
- C2. Activities
 - Running (runner icon)
 - Jogging/ Walking (jogger icon)
 - Walking dogs (dog icon)
 - Playing with dog (dog and person icon)
 - Children playing (children icon)
 - Cycling (bicycle icon)
 - Sitting (chair icon)
 - People strolling with babies (person with stroller icon)



Fig 27: Map of Färjenäsparken

Fig 28: Legend for fig 27



Fig 29: View from Sörhallsberget, Source: Author

Chapter 6: Design Study and Implementation

Design Site Introduction
Urban Scale Strategies
Specific Design Strategies
Local Qualities

6. Design Study and Implementation

This chapter explores the urban- and local-scale design strategies proposed for Färjenäsparken based on the developed toolbox, illustrating how the site could evolve if these interventions were implemented. It begins with an introduction to the site through a SWOT analysis, followed by an overview of design strategies at the urban scale. The chapter then examines site-specific design interventions tailored to Färjenäsparken, highlighting the local qualities they aim to strengthen. Finally, it discusses how these qualities can be implemented and envisions the future transformation of the site. Together, these strategies are intended to enhance existing qualities, introduce missing ones, and create a more co-presence environment that fosters stronger social cohesion and improves overall well-being.

6.1 Design Site Introduction

Färjenäsparken

Färjenäsparken (Area- 121,811 m²) has one of Hisingen's largest playgrounds, an outdoor classroom, a 1,400-meter exercise loop, a football field, a skate park, a street basketball court, and viewing and picnic areas with barbecue facilities. During 2021 through 2023, Färjenäsparken was expanded into a park for recreation, activities and varied greenery he boardwalk has become part of the park, which now reaches all the way down to the river (Göteborgs Stad, n.d.)

Location - Färjenäsparken is located on Hisingen next to Norra Älvstranden (the north bank of the Göta River), between Älvsborgsbron and Eriksbergs gantry crane.

SWOT Analysis

Strength

Accessibility

- Presence of multiple entrances and good overall access network

Connectivity

- The often used north-south path and eastern access paths improve connectivity, with further enhancement offering strong potential for integration into the wider green network.

Multifunctionality

- The park already supports active and passive activities. Social activities are present but limited.
- Different user groups: children, youth, elderly, families, and individuals.
- Some areas include spatial and physical elements, though these are not available throughout the entire park.

Co-presence

- Strong social use in certain areas - higher activity in the lower park and the playground areas

Threats

Accessibility

- Shared informal paths for walking and cycling: can lead to safety issues and reduced user satisfaction.

Multifunctionality

- Continued underuse of key areas (especially waterfront & upper park)
- Seasonal inactivity (winters)
- Environmental wear and tear- pathways - outdoor seating and garden space

Weaknesses

Accessibility

- Steep slopes and difficult terrain- exceed comfortable walking gradients (>8.3%)
- Lack of wheelchair accessibility (especially lawn areas)- Paths are unpaved, uneven, and not suitable for wheelchairs
- Lack of defined pathways and cycling lanes- Movement relies on shared, informal, or muddy trails

Connectivity

- Disconnection between upper and lower park
- Weak linkage to waterfront - connections are indirect and underdeveloped

Multifunctionality

- Lack of winter and seasonal adaptability
- Lack of seating or shelter

Opportunities

Accessibility

- Add defined circulation systems
- Wheelchair-accessible routes

Connectivity

- Create a strong vertical connection (upper park-lower park - waterfront) to aid in overall connection of the network

Multifunctionality

- Introduce multifunctional and seasonal programming
- Activate underused lawn areas- undefined space into functional zones.

Co-presence

- Improve co-presence and universal design
- Resting nodes

6.2 Urban Scale Strategies

The following images illustrate the main urban-scale strategies for improving accessibility, connectivity, and functionality to foster co-presence within the site. These strategies are derived from the site analysis and are based on the design strategies outlined at the end of the previous chapter. As site-specific interventions, they are further explained in detail in the (See Table 5).



Fig 30: Accessibility



Fig 31: Connectivity



Fig 32: Multifunctionality- Old Functions



Fig 33: Multifunctionality- New Functions



Fig 34: Multifunctionality- Winter Functions

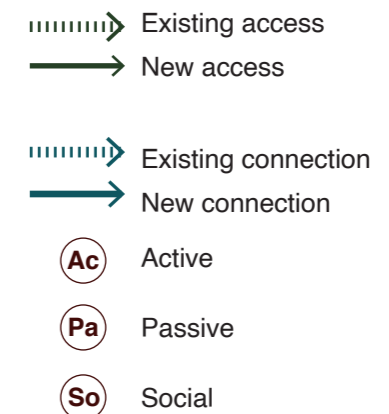
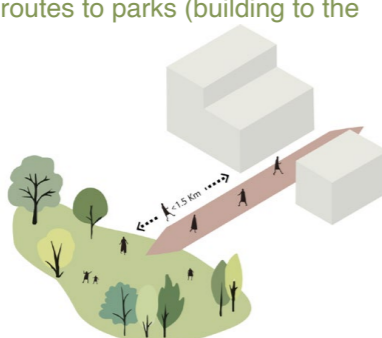





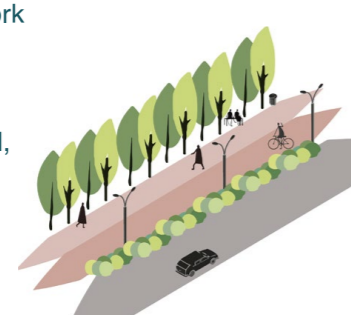
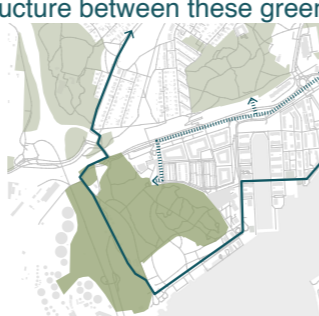


Fig 35: Legend for Urban Scale Strategies

6.3 Specific Design Strategies

The table 5 outlines the different site-specific design strategies for the three indicators that can be implemented to improve social cohesion in Färjenäsparken. These strategies are further illustrated through maps and perspective sketches that showcases how the site could evolve in the future.

Design Strategy	Site Specific Strategy
A. ACCESSIBILITY	
<ul style="list-style-type: none"> Improving pedestrian routes to parks (building to the park entrance). 	<ul style="list-style-type: none"> Improve the street entrance to the park on the left side near the over bridge Create a paved connection linking the upper park to the lower park. 
<ul style="list-style-type: none"> If only stairs is present add ramp (with adequate slope) to access the same area. Barrier-free design. 	<ul style="list-style-type: none"> Create a barrier-free, paved connection linking major functions, particularly within the central lawn area. Ensure wheelchair access to the water. 
<ul style="list-style-type: none"> Moderate slopes to main access areas. 	<ul style="list-style-type: none"> Improve steep areas by introducing ramps (gentle slopes) and accessible pathways, and create alternative looped routes. 
B. CONNECTIVITY	
<ul style="list-style-type: none"> Continuous green network linking parks, streets, and open spaces Transform streets into green corridors (tree-lined, vegetated paths) Walkability + cycling infrastructure between green spaces Wide enough roads Lights and signage good crossing Resting place for people 	<ul style="list-style-type: none"> Enhance inter-park connectivity by upgrading the south-to-north connection and improving connections to parks located on the east side Green corridors (tree-lined, vegetated paths) Walkable + cycling infrastructure between these green spaces Wide enough roads Lightings Signage Good crossing Resting place for people 




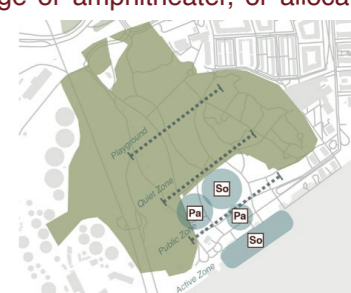

Design Strategy	Site Specific Strategy
C. MULTIFUNCTIONALITY	
<ul style="list-style-type: none"> Active (sports, jogging, cycling) Passive (relaxation, reading, sitting) Social (gatherings, picnics, events) Flexible open spaces for temporary uses/events Cultural and public programs- Events, workshops, exhibitions 	<ul style="list-style-type: none"> Addition of a sauna and glasshouses as a winter activity. Keeping the lawn open and free of barriers to increase multifunctionality. Adding a BBQ area. 
<ul style="list-style-type: none"> Program intensity map: low / medium / high activity spaces User-group diagram: children / youth / elderly / families / individuals 	<ul style="list-style-type: none"> Introduce winter activity options, such as a greenhouse café, sauna, and retaining slopes for snowboarding. Add a multipurpose stage or amphitheater, or allocate space for such facilities. 
<ul style="list-style-type: none"> Movable furniture Open lawns Street games Informal seating clusters Interactive elements Cafés Community uses- semi-public space 	<ul style="list-style-type: none"> Activate the waterfront. Add steps to improve access to the water. Create shaded areas that offer protection from sun, wind, and snow. Install benches along pathways

Table 5: Specific Design Strategies

6.4 Local Quality

Accessibility



-  •New pathways
-  •Access to water



Fig 38: Accessibility Strategies

Local Design Strategies

- Improve the street entrance to the park on the left side near the over bridge
- Create a paved connection linking the upper park to the lower park.
- Create a barrier-free, paved connection linking major functions, particularly within the central lawn area.
- Ensure wheelchair access to the water.

Connectivity












-  • Green corridors (tree-lined, vegetated paths)
- Walkable + cycling infrastructure between these green spaces
- Wide enough roads
- Lightings
- Signage
- Good crossing
- Resting place for people








Fig 39: Connectivity Strategies

Multifunctionality

Existing Activity Area

-  Playground
-  Open lawns
-  Sitting area
-  View points
-  Football ground
-  Skating area
-  Open Gym
-  Garden
-  Cafe
-  Dog Park

New Activity Area

-  **Social**
 - Open-air events such as cultural festivals, exhibitions, or concerts.
-  • Water front development
-  **Passive**
 - Shaded seating area
-  **Flexible Spaces**
 - Spaces that can be used in both summer and winter.
-  **Network Design Strategies**
 - Active and passive spaces are primarily integrated within the existing network.
 - No additional active zones have been introduced.
 - Social, passive, and flexible spaces have been added to strengthen social cohesion within the green network.

Co-presence

- These changes in the three spatial qualities have made the network of green spaces more socially cohesive.
- Co-presence can be achieved when the spatial qualities discussed above are effectively addressed.

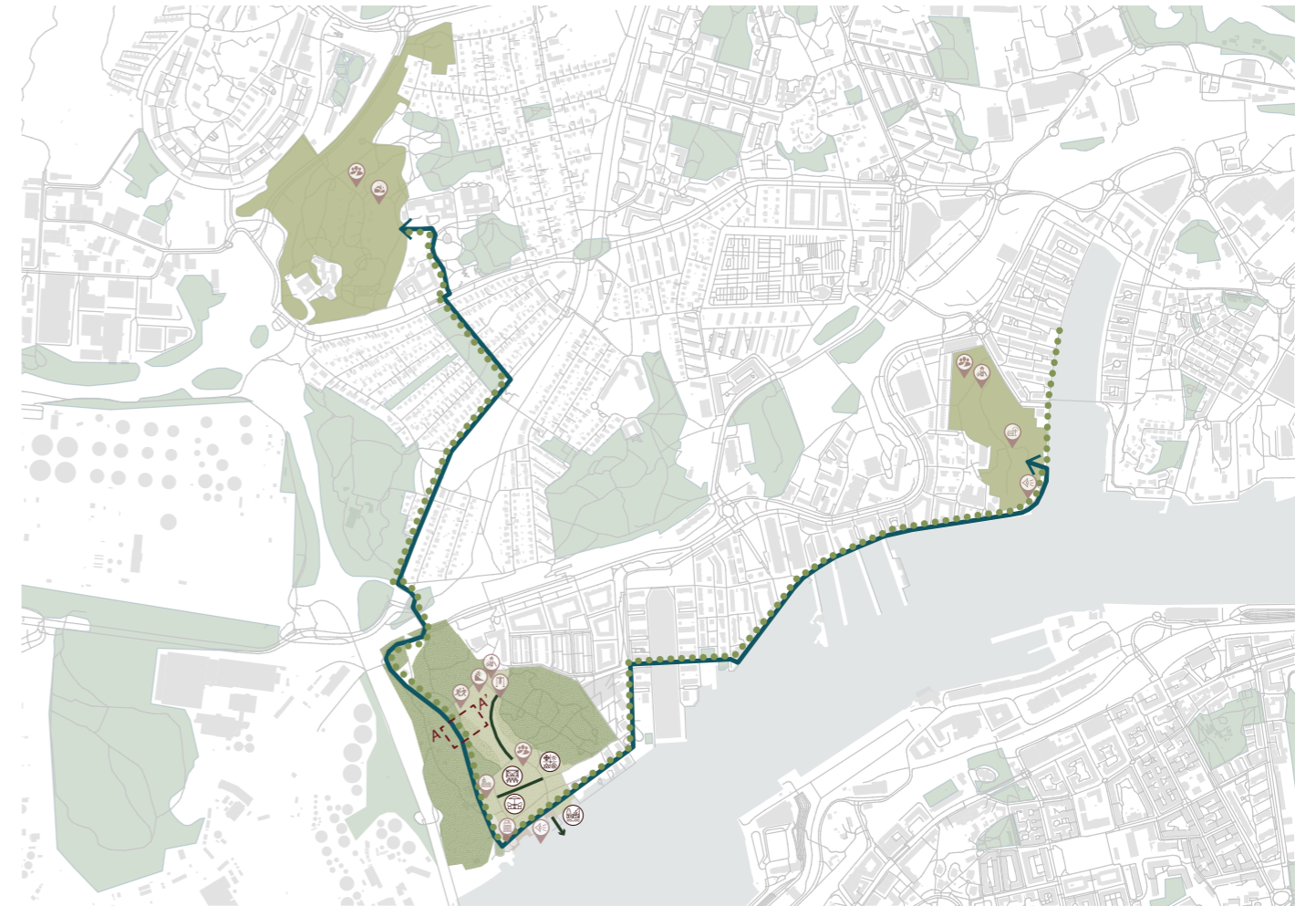


Fig 36: Site map showing the applied strategies at Färjenåsparken

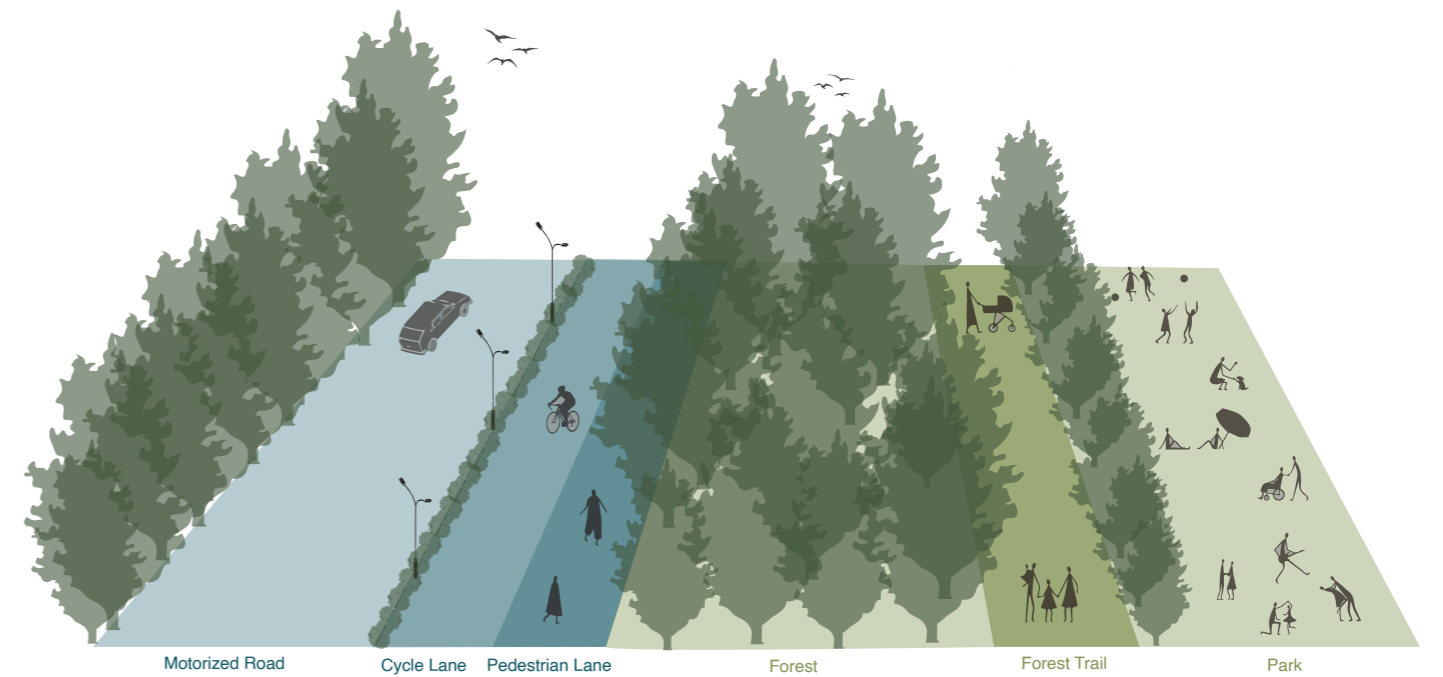
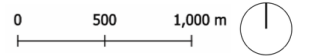


Fig. 37: Section AA' illustrating the proposed road improvements to enhance connectivity.



Fig 40: Bräckeberget Rastgård, Source: Author

Chapter 7: Discussion and Conclusion

Addressing the research questions
Evaluating the Design Strategies
Limitations
Implications for Municipalities and Planning Practice
Future Research

7. Discussion and Conclusion

7.1 Addressing the research questions

Research Question 1 sought to identify which spatial and design qualities contribute to socially cohesive urban green space networks. The literature review and reference project analysis identified accessibility, connectivity, and multifunctionality as the key spatial qualities. These qualities were translated into a list of indicators and assessment methods, forming the basis of the design toolbox. The findings suggest that co-presence, understood as the ability of diverse social groups to share and use public space, can be achieved when these spatial qualities are present and work together.

The analysis showed that accessibility, connectivity, multifunctionality and co presence were the most important spatial qualities contributing to socially cohesive green spaces. Rather than one quality being more important than another, it was the combination of all three that created a stronger design within the region. Accessible routes, strong connections between spaces, and opportunities for diverse activities together supported greater social interaction and usability.

Research Question 2 examined how these spatial qualities contribute to social cohesion in Hisingen. To address this question, the indicators identified through the literature review were applied through geospatial analysis and site observations. Accessibility was assessed using attraction reach analysis, connectivity through attraction betweenness, while multifunctionality was evaluated through observations of activities, facilities, and user groups. The results demonstrated how variations in these qualities influenced the social performance of different urban green spaces.

At the network scale, the urban green space system in Hisingen demonstrates both strengths and limitations in supporting social cohesion. Overall, most neighbourhoods have good access to urban green spaces, with the majority of parks being reachable through the pedestrian and cycling network. The network also offers a diverse range of functions across the six analysed green spaces, providing opportunities for recreation, social interaction, and everyday use. However, the distribution of these qualities is uneven. While Färjenäsparken provides the greatest variety of functions and activities, some areas experience weaker accessibility due to steep topography, particularly Sörhallsberget and Keillers Park. Connectivity within the green network is also fragmented in certain locations, especially along the waterfront connection between Färjenäsparken and Sörhallsberget, and along the north–south connection between Färjenäsparken and Bräckeberget Rastgård. These gaps reduce the continuity of the network and highlight opportunities for strengthening connections between key green spaces.

Bräckeberget Rastgård was identified as a high-performing site because it scored strongly across most accessibility indicators. The area provides good pedestrian access through routes both with and without stairs, offering multiple movement options for users. It also demonstrates strong cycling connectivity and a reasonable level of multifunctionality, making it an example of a well-connected and relatively accessible landscape.

Färjenäsparken was selected due to its multifunctional and socially active character. It recorded the highest level of multifunctionality among the analysed sites, supporting a wide range of activities and social interactions. Although its accessibility was moderate rather than exceptional, the park presents an important example of how diverse usage patterns can significantly contribute to the social value of a green space.

In contrast, Sörhallsberget was identified as a low-performing site because of its weak accessibility. The steep terrain and slope-related challenges appear to limit movement and connectivity within the area. Its multifunctionality remained relatively neutral, highlighting how physical constraints can negatively influence the overall user experience.

Research Question 3 explored how urban green space networks can be planned and designed to ensure co-presence and equitable access across different social groups. This question was addressed through the development of the design toolbox, which linked the identified indicators with design strategies. The toolbox provides a transferable framework that can be applied beyond the Hisingen case study to assess existing green spaces, identify shortcomings, and guide future interventions. Färjenäsparken was used to test and demonstrate the practical application of the toolbox, with site-specific interventions directly derived from the proposed design strategies.

The proposed design interventions for Färjenäsparken focused on improving accessibility, connectivity, multifunctionality, and co-presence. Accessibility improvements included the introduction of defined circulation systems, wheelchair-accessible routes, and stronger physical connections between major functional areas. Particular attention was given to improving access between the upper park, lower park, and waterfront.

Connectivity was strengthened by creating clearer internal links within the park as well as improving external connections through the surrounding street network. The connection between Färjenäsparken and Bräckeberget Rastgård was especially important in establishing a broader green network.

To improve multifunctionality, underused lawn areas were transformed into functional social spaces supporting both active and passive recreation.

Proposed additions included BBQ areas, event spaces, seasonal programming, and waterfront activation to encourage diverse forms of use throughout the year.

Inclusive design strategies included wheelchair access, resting nodes, seating areas, and shaded spaces to improve comfort and usability for a wider range of users. This creates co-presence.

Overall, the findings suggest that green spaces should not be treated as isolated parks but as an interconnected social infrastructure. The study demonstrates that accessibility, connectivity, and multifunctionality can be systematically assessed through indicators and translated into design strategies through the design toolbox. While the toolbox was tested in Färjenäsparken, its structure is intended to support planning and design decisions in other urban green spaces seeking to improve social cohesion, co-presence, and equitable access.

The study also indicates that connectivity may be more important than park size, and that multifunctional spaces are more successful in attracting diverse user groups.

7.2 Evaluating the Design Strategies

The proposed design strategies were developed using the spatial quality framework consisting of accessibility, connectivity, multifunctionality, and co-presence. The interventions aimed to improve pedestrian and cycling movement, strengthen internal and external park connections, and create more diverse opportunities for social interaction.

Accessibility was improved through ramps, paved pathways, multiple entrances, and barrier-free design elements. Connectivity was enhanced by linking the upper and lower park areas with the waterfront and surrounding street networks, supported by a clearer circulation system for walking and cycling.

Multifunctionality was strengthened through the addition of social, recreational, and seasonal activities, including BBQ areas, event spaces, winter programming, and the activation of underused waterfront and lawn areas. Inclusive design improvements such as seating, resting nodes, and wheelchair-accessible routes further contributed to usability for a broader range of users.

The design proposals align with the theoretical framework, site analysis, and observational findings developed throughout the study. However, since the interventions remain conceptual and have not been implemented in reality, their actual effectiveness cannot yet be fully evaluated. The strategies are informed by reference projects that have successfully supported social cohesion in similar contexts, suggesting their potential relevance for the study area.

The design implementation also provided an opportunity

strategies proved flexible enough to generate site-specific interventions for Färjenäsparken. Most proposed interventions could be directly linked to the existing toolbox categories. For example, improved entrances, paved routes, wheelchair access, and ramps emerged from the accessibility strategies, while improved park-to-park connections, green corridors, cycling infrastructure, lighting, signage, and resting places were derived from the connectivity strategies. Similarly, interventions such as BBQ areas, event spaces, waterfront activation, and flexible open lawns could be traced back to the multifunctionality strategies.

At the same time, the implementation process revealed opportunities to further refine the toolbox. While multifunctionality included a diversity of activities and user groups, the design process highlighted the importance of providing activities across different seasons. The addition of winter-oriented interventions, such as a greenhouse café, sauna, and the retention of slopes for snow-based activities, demonstrated that year-round usability is an important aspect of social cohesion. As a result, seasonal programming could be incorporated as an explicit multifunctionality strategy within the toolbox. This would encourage designers to consider not only different user groups and activities, but also how urban green spaces remain active and accessible throughout the year.

The case study also demonstrated that the toolbox can be applied beyond Färjenäsparken. The framework provides a structured process for assessing green spaces, identifying deficiencies, and translating findings into design interventions. However, further applications in different parks and urban contexts may reveal additional considerations and contribute to the continued refinement of the toolbox. In this sense, the toolbox should be viewed as an iterative framework that can evolve through repeated testing and implementation.

At the same time, the balance between ecological and social goals remains unresolved. The study did not evaluate how the proposed interventions may affect local ecosystems or wildlife habitats. Additional concerns include funding feasibility and long-term maintenance, particularly regarding community participation and whether residents would be willing to engage in activities such as maintaining community gardens.

7.3 Limitations

This study primarily focused on social cohesion and did not include a detailed ecological or economic analysis. Although well-being aspects were acknowledged, they were not explored in depth. Governance, policy, and long-term maintenance issues were also outside the scope of the research.

The observational analysis was limited to selected parks and specific time periods, which may not fully represent broader usage patterns. In addition, no surveys or interviews were conducted, limiting the understanding of user perceptions and experiences.

The proposed design interventions remain conceptual and were not tested or implemented in real-life conditions. Seasonal variations were only partially considered due to the limited observation period, meaning that changes in park use across different seasons were not fully captured.

7.4 Implications for Municipalities and Planning Practice

The findings suggest that municipalities should plan green spaces as interconnected networks rather than isolated parks. Accessibility and connectivity should play a central role in planning decisions, with attention given to walking distances, green corridors, and public transport access.

Planning strategies should prioritize multiple entrances, barrier-free design, and strong pedestrian and cycling infrastructure to improve accessibility for diverse user groups. Continuous green corridors connecting neighbourhoods can strengthen both mobility and social cohesion.

Parks should also be designed with multifunctional programs that support active, passive, social, and cultural activities. Underused areas such as lawns and waterfronts can be activated to encourage broader community use throughout the year.

The study further highlights the value of using geospatial analysis, such as Attraction Reach and Betweenness analysis, to support decision-making and evaluate accessibility and connectivity. More broadly, green spaces should be understood as social infrastructure and shared community spaces that contribute to interaction, co-presence, and everyday social life.

The assessment table developed in this study can also serve as a practical framework for municipalities and planners to evaluate and design green spaces based on accessibility, connectivity, multifunctionality, and co-presence

7.5 Future Research

Future research could explore how participatory design approaches may strengthen community involvement in the planning and maintenance of green spaces. Additional studies could also examine how ecological performance and biodiversity considerations can be better integrated into socially cohesive park design.

Long-term behavioural studies would help evaluate how users interact with green spaces over time, while gender- and safety-focused analyses could provide deeper insight into co-presence and perceptions of security within public spaces.



Fig 41: View from Sørhallsberget, Source: Author

Chapter 8: Bibliography

Reference List
List of Images

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8.2 List of Images

Fig 7: Dan S. Nguyen. (2020). High Line [Photograph]. Wikimedia Commons. <https://commons.wikimedia.org/w/index.php?curid=89088130>

Fig 8: M & OpenStreetMap contributors. (2017). High Line map 2017 [Map]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:High_Line_map_2017.jpg

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Fig 9: Pagodashophouse. (2011). Before and After Aerial View of Kallang River [Photograph]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Before_and_After_Aerial_View_of_Kallang_River.jpg

Fig 10: OpenStreetMap contributors. (2025). Bishan-Ang Mo Kio Park map [Map]. OpenStreetMap. <https://www.openstreetmap.org/search?query=Bishan-Ang+Mo+Kio+Park>

o+Park



Fig 42: Sörhallsberget, Source: Author

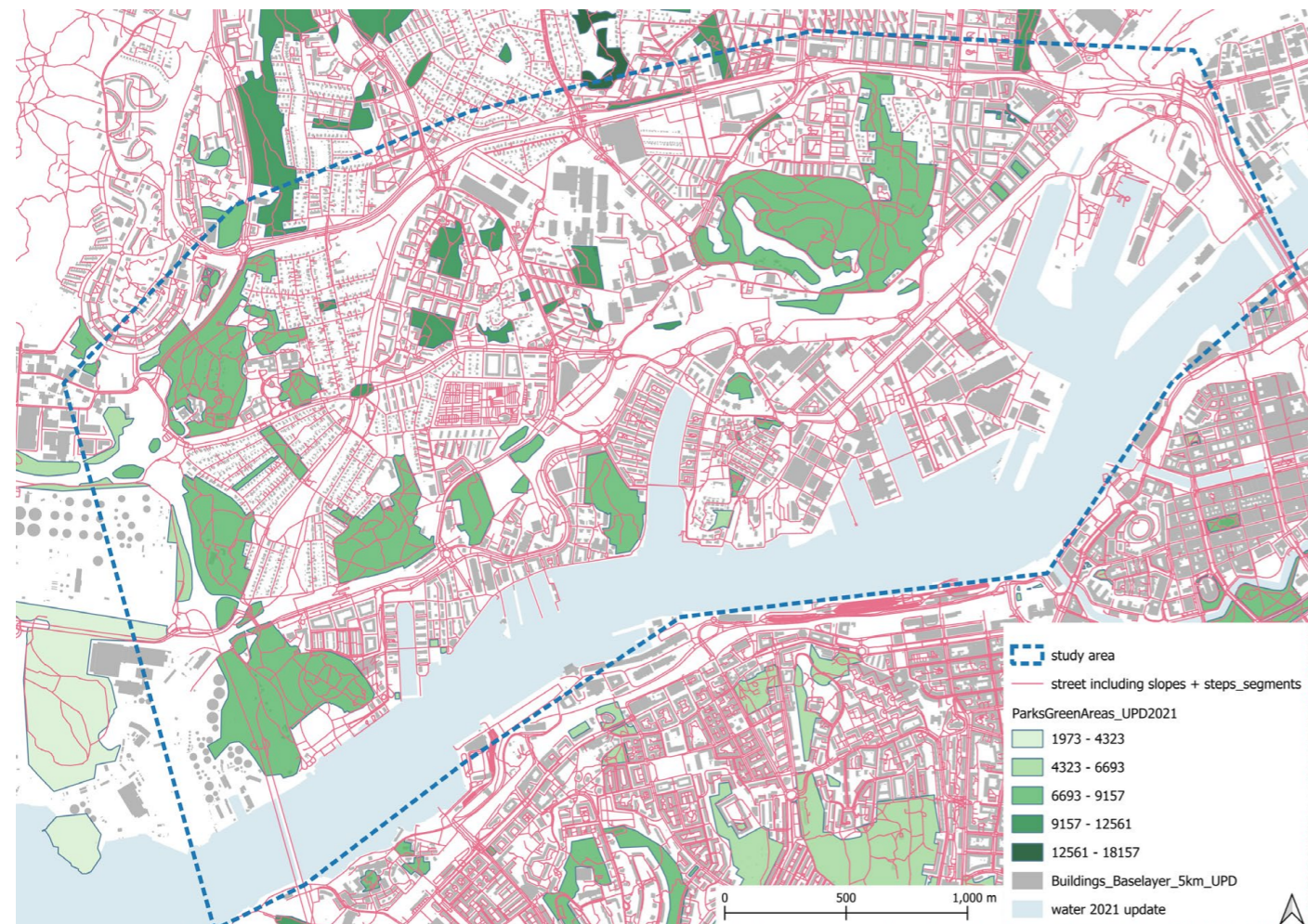
Chapter 9: Appendix

9. Appendix

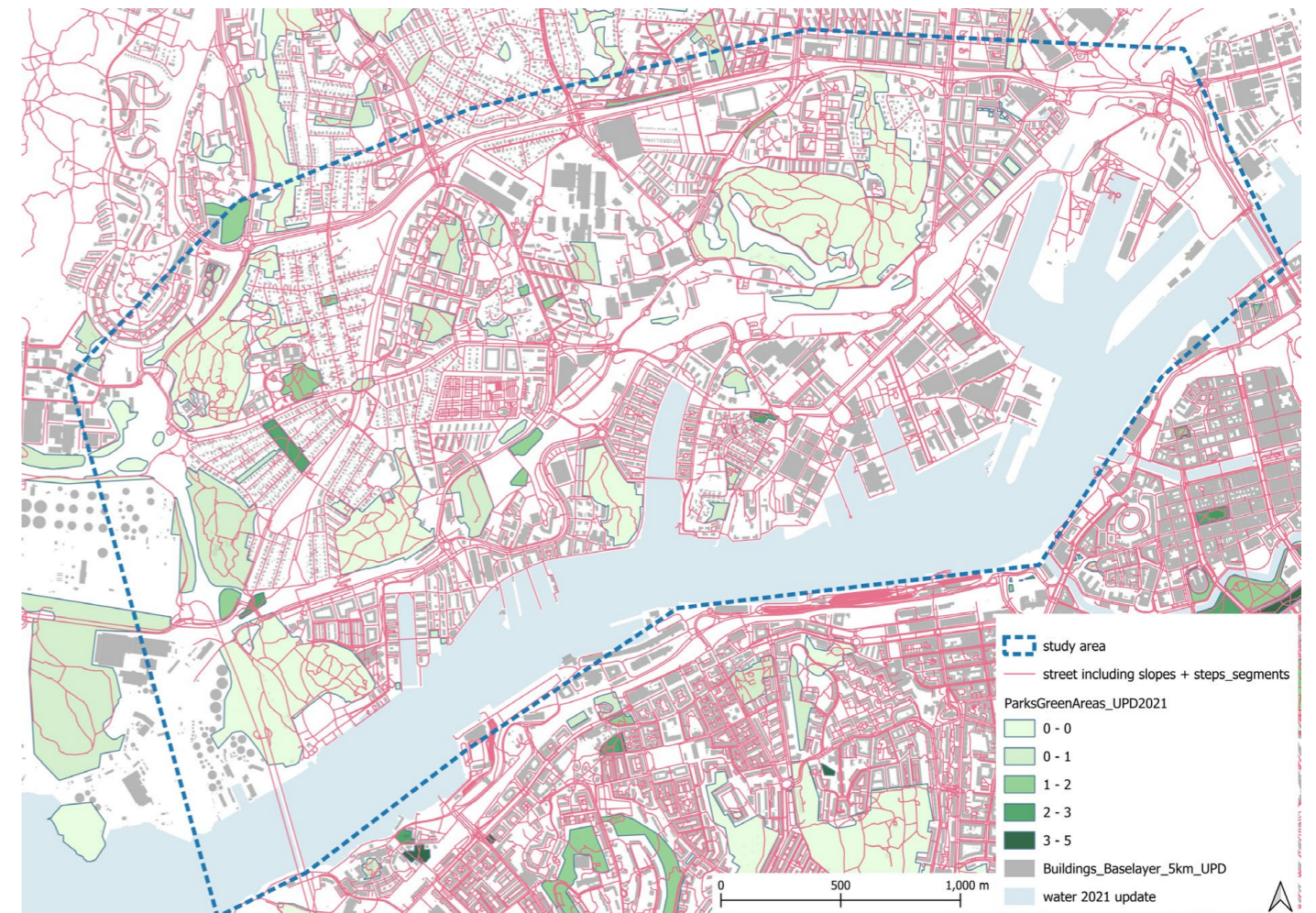
9.1 Use of Ai

I have mainly used AI tools such as Microsoft Copilot, Grammarly, and ChatGPT to improve the grammar and clarity of my writing. These tools have also helped me understand the main ideas within a research field and better grasp concepts from my studies. When reading literature reviews, I sometimes use AI to explain sentences or sections that I find difficult to understand. Additionally, AI has assisted me in learning how to use software such as QGIS. Overall, I use AI as a support tool to refine the texts I write and improve the clarity and quality of my work.

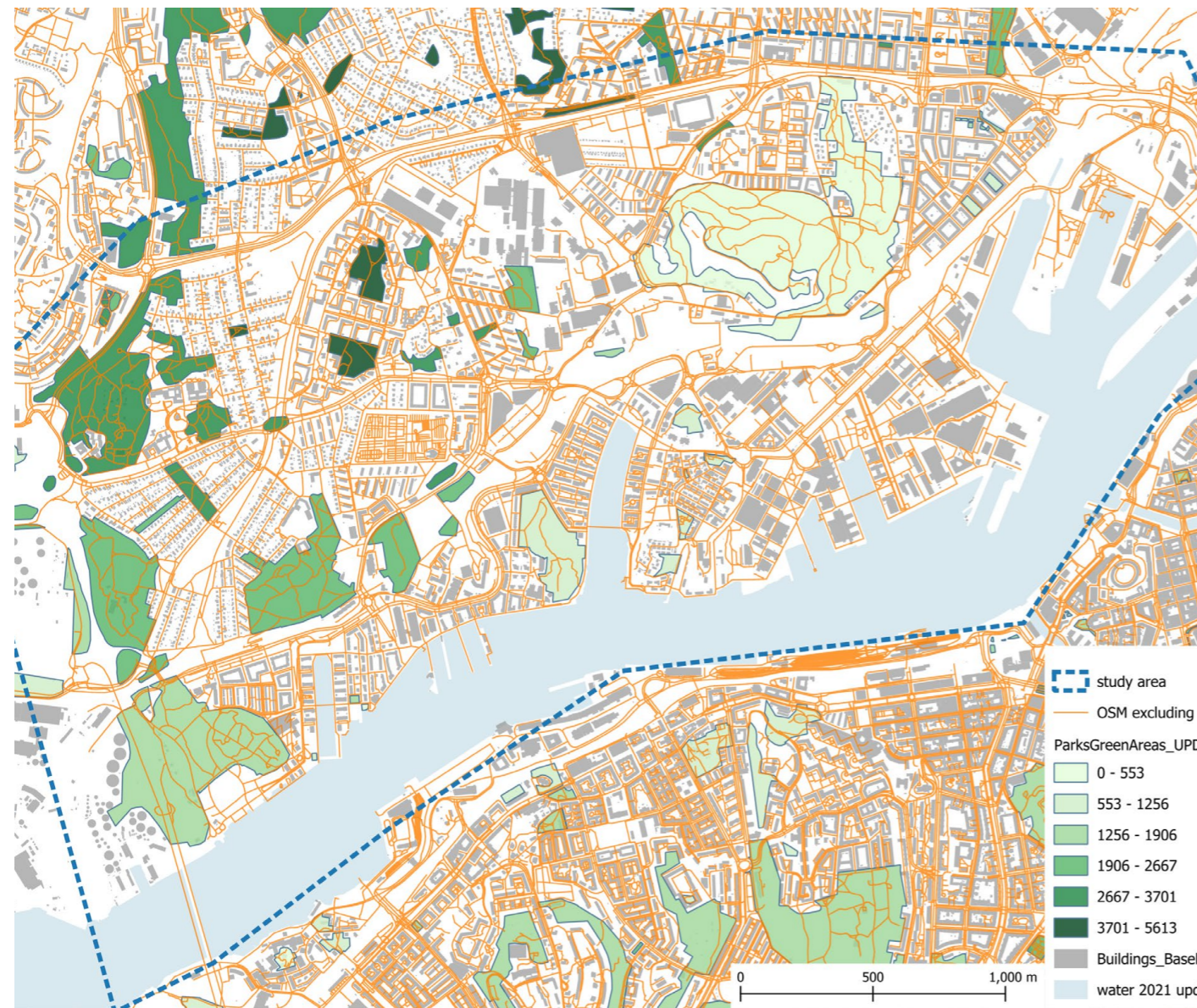
9.2 GIS Analysis: Attraction Reach



Attraction reach from parks to buildings within a 3 km cycling range, using the non motorized road network, including stairs.



Attraction reach from parks to public transportation stops within a 400 m walking range, using the non motorized road network, including stairs.



Attraction reach from parks to buildings within a 1.5 km walking range, using the non motorized road network, excluding stairs

9.4 Site Selection

Spatial Quality	Indicators	Keillers Park	Färjenäs parken	Bräckeberget Rastgård	Krokängs parken	Sörhallsberget	Football park
A. Accessibility	Network A: walking, with stairs	1352	1580	3210	2600	1161	2408
	Network B: cycling, with stairs	9036	7119	8270	7554	6955	7276
	Network C: walking, with outstairs	0	1580	3157	2575	1141	2394
	Network D: Public transportation stops	0	0	0	0	0	1
	Slope Analysis	High slope	Medium slope	Medium slope	High to medium slope	High slope	Low to medium slope
C. Multifunctionality	Variety of activities present	neutral	(++)	(+)	neutral	neutral	(+)

* (+) is the number of function

B. Connectivity: Attraction Betweenness



Figure: Keillers Park



Figure: Färjenäs parken



Figure: Bräckeberget Rastgård



Figure: Krokängs parken



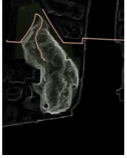

Figure: Sörhallsberget

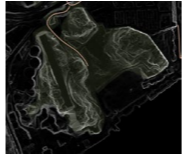





Figure: Football park

9.3 Table from Site Visit

This Excel sheet shows the observations done for site visit (<https://docs.google.com/spreadsheets/d/1FEDW8VE-w9UT7BrocBKWUP5PZUOxy-dt5WHeCZ-4QsIU/edit?usp=sharing>)

Spatial quality	Indicators	Sörhallsberget Present/Absent /Value	Remarks	
A. Accessibility	A1. If people can access UGS on foot within 1500 m radius	1161		
	A2. If people can access UGS on cycle within 3000 m radius	6955		
	A3. adequate physical access- availability of stairs,	1141	stairs present - not continuous - near entrance decent quality	
				
	A4. slopes around the range - 1:20 (=5%) - 1:12 (8.3%) A5. Public transport within 5 min walk that is 400m (speed of a healthy adult 4.8 km/hr)	walkable but hard 0	high slope, more than 8.3 %	
	A6. The park with multiple entrances	Present - 3 entrances	1 - name board - more slope 1- next to park- less slope 1- less visible - just a path up the hill	
	A7. Quality of walkway- pavement, barriers?	some paved roads - some gravel filled roads lower area is paved well	paved roads- decent quality - Accessibility appears to be lower than expected despite the high density of surrounding buildings. This may be due to a potential QGIS analysis error and should be re-evaluated for accuracy. - Stairs: Improve design and add seating for better usability. - Slope: Make more walkable or retain for exercise use. - Public Transport: Add clear signage from nearby bus stop. - Entrance: Enhance visibility of the third entrance.	
CONCLUSION				
				
	B1. Area of green corridors (greenery along the roads that connects different zones) reachable within network distances (300-600 m). Corridors were manually connected across interruptions.		the lowest slope compared to all the 3 entrances, but slope is still more than 8.3%, no stairs in this route could be used for cause it is connected to the residential area, and first half the route is flat	
B. Connectivity	B2. Green corridor- Trees along both/one sides	For the route shown in B1	Absent	
	B3. Greenery - present in near vicinity		Present	
	B4. Continuous green network		Present	
	B5. Walkability - how many lanes?- quality		1 lane	
	B6. Cycling - how many lanes?- quality		same as walkway	
	CONCLUSION			
Strengthen the area as a green corridor connecting the residential zone to the park, with seating and greenery integrated along the path.				
C. Multifunctional	C1. Activity area/zones	Playground	Present	at the base of the hill- good quality
		Football ground	Absent	
		Skating area	Absent	
		Basketball court	Absent	
		Open Gym	Absent	
		Open lawns	Present	at the base of the hill - good quality - uninterpreted
		Open plazas (with stage)	Absent	
		Garden	Absent	
		Cafe	Absent	
		Barbecue space	Absent	
	C2. Activities	Sitting	Present	on top and bottom of the hill
		walking	Present	on top and bottom of the hill
		running	Present	on top of the hill
		jogging	Present	on top and bottom of the hill
		cycling	Absent	
		exercising	Present	on top of the hill
		exercising(gym)	Absent	
		walking dogs	Present	on top and bottom of the hill
		playing with dog	Present	on bottom of the hill
		children playing	Present	on bottom of the hill
	Other area	watching kids play football	Absent	
		playing with kids	Present	on bottom of the hill
		people playing specific sport	Absent	
		People strolling with babies	Absent	
		sight seeing	Present	on top of the hill
		sight seeing in car	Absent	
		bbq	Absent	
		events	Absent	
		In cafe	Absent	
		socializing	Present	on top and bottom of the hill
Other activities	Commuting (carry stuff)	Present	very few - The area already has good activity zones. - Consider adding an open gym near the playground for parents. - Enhance hill activity zones which currently has rope slides and a firewood area. - Add a few more viewpoint platforms for experience and safety. - Optionally, include a small stage for open-air theater, keeping in mind the ground is often used by dogs.	
	CONCLUSION			
	D. Inclusive Design			
	Inclusivity is achieved when all of the above spatial qualities are met			

Present/Absent	Remarks	Bräckeberget Rastgård Present/Absent	Remarks
1580		3210	
7119		6270	
1580	no stairs on site	3157	
			
walkable slope	moderate slope, but more than 8.3 %, there are some flat areas, wheelchair accessible but hard to push without proper paved pathways	walkable slope	The trail has a moderate slope, it is steep and/or flat with natural forest ground. It is unpaved, uneven, and not suitable for wheelchair access.
0		0	
Present - 6 entrance	2- name board - (mainly in the upper park area) 2 in the middle and 2 in the bottom	Present - 3 entrance	1 - no sign, no arrows - random path 2 - no signs, random path from a housing neighbourhood 3 - same situation as one - but wider road - google map showed wrong way no signage for any entrance
some paved roads, connection between the upper and lower part is muddy way. No specific roads	paved roads- good quality	no pavement	not paved, random pathway, muddy and rocky
CONCLUSION			
- Mend slopes in certain areas of the park. - Add wheelchair-accessible pathways in the lawn area - Create a paved connection from the upper park to the lower park.			
- Pave paths (or at least use gravel) for easier access. - Define park entrances with clear signage or boards.			
			
	The path that connects upper and lower park, there isn't a defined or paved pathway, it was muddy and surrounded by grass. But a lot of people don't use this path		This is the main path that leads to the housing on top, connected from the highway, only the main road is paved, the path to the forest is unpaved
Present	it is not a street lined with trees, but it has forest on both sides leading to the lower water area,	Present	middle of the forest - leading to housing
Present	surrounded by greenery	Present	forest on both sides
Present - kinda	a green network that leads you to a blue network	Present	but not a planned network - natural
Absent - 0 lane	Muddy trail	Present- 1 road	not great - road to access the houses
Absent - 0 lane	Muddy trail - Create well-defined pathways and cycle lanes within the park. - Improve connectivity from the upper park to the lower park and onward to the waterfront.	Present- 1 road	not great - Introduce designated paved pathways and cycle paths. - Widen roads where necessary. - Some tree removal may be required-
Present	smaller kids playground(sandy area) play area with equipments	Absent	
Present	good	Absent	
Present	good	Absent	
Present	good	Absent	
Present	good	Absent	
Present	decent- bit muddy and no pathways	Present	dried up grass land - with a broken football post
Absent		Absent	
Present - not good	not in use - dried plants	Absent	
Present	inside and outside seating	Absent	
Absent- not defined		Absent	
Present	movable and immovable seating	Present	one fenced area with a bench and a shack
Absent		Absent	
Present	multiple view points	Absent	
Present	same as walking path - good	Absent	
Present	same as cycling path - good	Absent	
Absent		Absent	
drive in view points	decent - i dont think its designed to be like that	very small dog park	one fenced area with a bench and a shack
Present		Absent	
Present	more people in the lower park	Present	1 person
Present	more people in the lower park- mostly in the evening	Absent	
Present		Absent	
Present	more people in the lower park	Absent	
Present	mostly in the evening	Absent	
Present	more people in the lower park	Present	8 people
Present	more people in the lower park	Present	2 people
Present	more people in the upper park	Absent	
Present	mainly in the evening - they dont have place to sit	Absent	
Present		Absent	
Present	Football(kids), swedish game (grandpa)	Absent	
Present		Absent	
Present	mainly in the evening	Absent	
Absent		Absent	
Present	good number of people	Absent	
Present	in multiple areas - mainly cafe, near football field	Absent	
Professional photography of the area	only 1 person with professional camera		
CONCLUSION			
- Add a BBQ area and winter activity options. - Add small stage for events - Activate the water front a little - Provide shaded spots protecting from sun, wind, and snow. - Install benches along pathways and near the football ground for parents.			
- Preserve the natural feel, avoid adding too many new functions since nearby areas provide facilities. - If needed, enhance the existing fenced area.			
MIGHT BE BETTER TO AVOID DOING A LOT OF DEVELOPMENT TO THIS AREA			