

A Sustainable Bredäng

Sustainable Densification of a Million Program Area in Stockholm, Sweden

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Abstract

Bredäng, a housing area in southwest Stockholm, was built between 1963 and 1965 as part of The Million Program, a Swedish government program to fix the housing shortage in the country. Bredäng is characterized by its green and blue qualities, but also by its many parking lots, poor public spaces, monotone architecture and storm water issues.

Today, the housing shortage is once again an issue, especially in Stockholm. In this thesis, I have investigated how Bredäng can be densified in a sustainable way, in order to improve the conditions of the area and contribute to the growing population of Stockholm. I have analysed the area and looked at precedents, and found a strategy to develop Bredäng in a way that would benefit its current and future residents. The strategy includes mixing building types, strengthening the block identity, increased urbanity along streets, new public plazas, storm water treatment, green roofs and sun cells. The strategy is visualized in a design proposal, containing an urban plan, a bird's eye view, zoom in-plans, sections and perspective drawings.

Table of contents

1. Introduction	6
1.1 Background	6
1.2 Objectives	7
1.3 Definition	9
1.4 Method	9
2. Analysis	9
2.1 Introduction to the Million Program	9
2.2 Overview of Bredäng	11
2.2.1 Location and topography	11
2.2.2 Demography	12
2.2.3 History	13
2.2.4 Functions	14
2.2.5 Infrastructure	15
2.2.6 Greenery	16
2.3 SWOT-analysis	17
2.3.1 Strengths	17
2.3.2 Weaknesses	18
2.3.3 Opportunities	19
2.3.4 Threats	20
3. Theory	21
3.1 Introduction to densification in Million Program areas	21
3.2 Precedents	22
3.2.1 Bijlmermeer, Amsterdam	22
3.2.2 Brøndby Strand, Copenhagen	22
3.2.3 Vivalla, Örebro	23
3.2.4 Ålidhem, Umeå	24
3.2.5 Toolbox	25
4. Strategy	25
5. Design	27
6. Conclusion	39
7. References	40
7.1 Text	40
7.2 Figures	41

1. Introduction

1.1 Background

Stockholm, the capital of Sweden, is today a very popular city to move to. In fact, Stockholm is the fastest growing city in Europe, with an expected growth of 11 % until 2020, when the city will have 1 012 488 inhabitants (chamber.se, 2016). The growth is revealed in last year's statistics: in 2015, the Stockholm region grew by 33 393 people, mostly due to high birth rates and immigration (Lansstyrelsen.se, 2016). In total, 29 381 children were born in Stockholm, 41 480 people moved to Stockholm from other parts of Sweden and 35 198 people moved to Stockholm from other countries.

The Swedish capital has a lot to gain from population growth, but with growth comes challenges. As of today, there is an imminent housing shortage in the city. In a survey done by the Housing Agency in Stockholm in 2011, more than 165 000 people claimed that they were in need of an apartment (Örstadius, 2011). And in another survey, done by the Swedish Union of Tenants in 2014, almost 69 000 young adults said they were in need of a home in the city (Bostadsbrist.nu, 2016). This puts great pressure on the city, growing quickly and at the same time dealing with housing shortage.

In the 1960s, Stockholm and the rest of Sweden was in a similar situation as today, dealing with population growth and housing shortage at the



Fig. 1. The location of Stockholm in Sweden.

same time. In response, the Swedish government introduced “the Million Program”, which aimed to build one million new dwellings between 1965 and 1974 (Boverket, 2014). The program effectively eliminated the housing shortage and increased the living standard in Swedish cities. But from the 1970s on, the Million Program became criticised for its large scale housing areas, monotone architecture, car-dominated city planning and poor outdoor environment. Subsequently, people started to move away from the areas, leaving people with low socio-economic status behind.

Today, there is a need for a new Million Program, considering the housing shortage in Stockholm and other Swedish cities. But instead of making

the same mistake as in the 1960s, there is a possibility to fix the housing shortage by building new apartments in existing Million Program areas. In addition, the conditions in these areas can be improved by building in a sustainable way.

In this thesis I will investigate how Bredäng, a Million Program area in southwest Stockholm, can be densified in a sustainable way, in order to improve the conditions of the area and contribute to the growing population of Stockholm.

Bredäng is chosen because it is the area where I grew up in Stockholm. It is a stereotypical Million Program area, which originally sparked my interest in urban planning and design. Ever since I was a child, I have reflected around what it is and what it could become.

This first chapter (Introduction) will commence by presenting the objectives, definition and method used in the thesis. Chapter two (Analysis) will give an introduction to the Million Program, present an overview of Bredäng and feature a SWOT-analysis. Chapter three (Theory) will give an introduction to densification in Million Program areas, present precedents and feature a toolbox. Chapter four (Strategy) will feature a set of diagrams that show how Bredäng can be transformed into a sustainable and attractive area. Chapter five (Design) will present plan drawings, bird's eye view, sections, and perspective drawings in order to clarify what I want to achieve. Chapter six (Conclusion) will summarize what has been presented in the thesis. Finally, chapter eight (References) will present the sources used.

1.2 Objectives

The main objective of this study is to investigate how Bredäng can be densified in a sustainable way, in order to improve the conditions of the area and contribute to the growing population of Stockholm. More specifically, the objectives can be divided into following research questions:

- What are the strengths, weaknesses, opportunities and threats in Bredäng?
- How have other Million Program areas, or similar areas, been densified in a sustainable way?
- How can Bredäng be densified in a sustainable way, in order to improve the conditions of the area and contribute to the growing population of Stockholm?



Fig. 2. The location of Bredäng in Stockholm municipality.



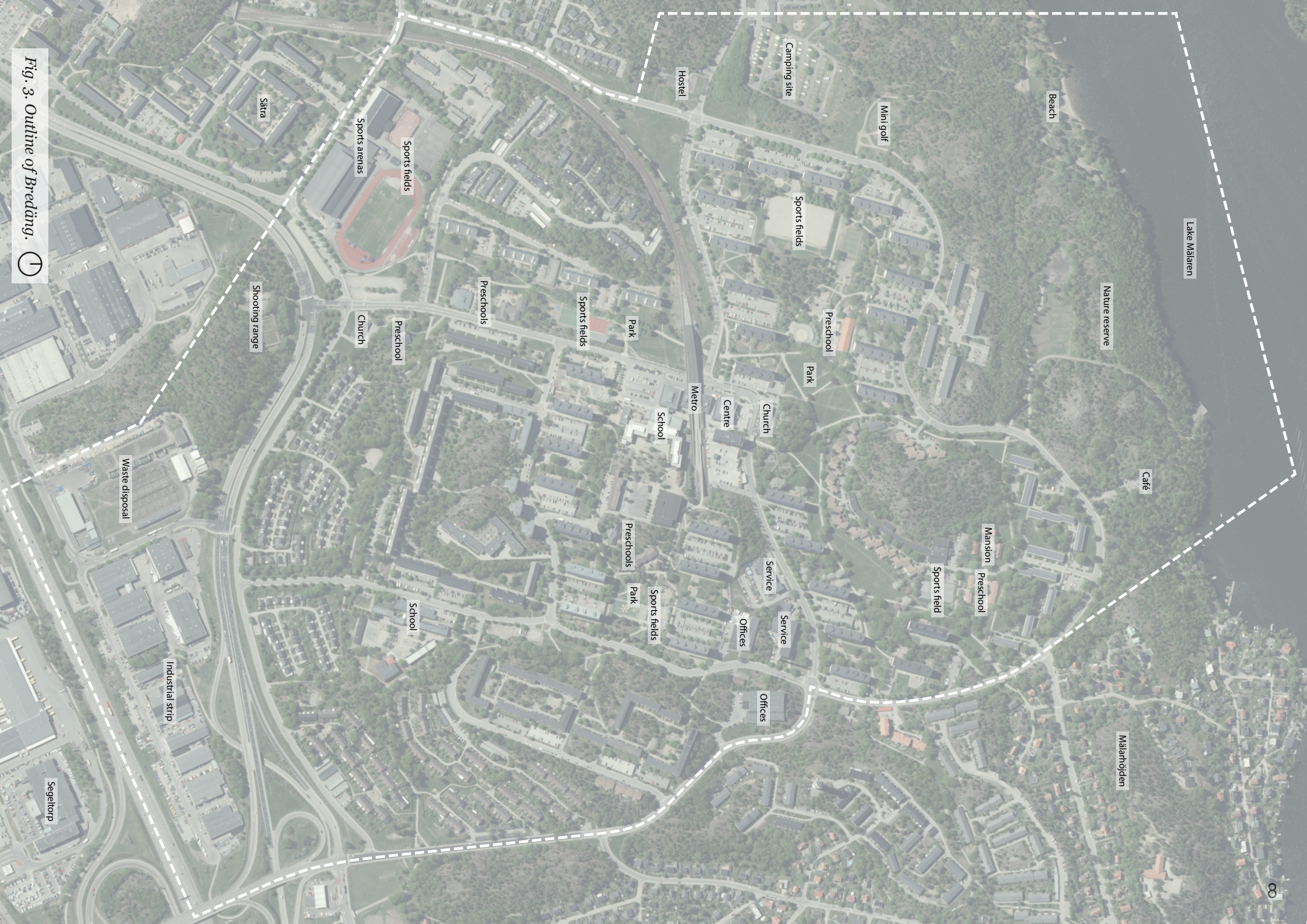


Fig. 3. Outline of Bredding. ①

1.3 Definition

This thesis concludes the two-year Master Programme in Sustainable Urban Design at Lund University. It is a 30 credit degree project written during the spring term and summer of 2016.

The work site is defined to Bredäng. The actual definition of Bredäng relates to the district boundaries drawn by the municipality of Stockholm. These boundaries contain the entire Million Program area of Bredäng, that was built between 1963 and 1965.

The theory used in the thesis is defined to four precedents where Million Program areas, or similar areas, have been densified in a sustainable way. The measures that I found interesting in these precedents have been gathered in a toolbox.

1.4 Method

I started my work in Bredäng by walking on the site to gather impressions. I soon discovered certain topics that I wanted to investigate further, including location and topography, demography, history, functions, infrastructure and greenery. The information that I gathered in this overview was then mapped in diagrams, which helped me to get a better understanding of the area.

In the next step, I needed to assess the information that I gathered in the overview. In this case, I de-

cidated to make a SWOT-analysis. The SWOT-analysis is a strategic planning tool that addresses the strengths, weaknesses, opportunities and threats of a place, company or product etc. (Ifediora, Idoko and Nzekwe, 2016). Strengths and weaknesses are of internal origin, meaning that they can be found in the overview of Bredäng. Opportunities and threats, on the other hand, are of external origin, meaning that they can be influenced by other factors. The benefit of the SWOT-analysis is that it is an easy and effective tool that uses relatively accessible data. However, it has been criticized for the possibility to jump to conclusions without critical thought, leading to misrepresented results (Koch, n.d.). In order not to jump to conclusions, I tried my best to think objectively and critically whilst doing the analysis.

The SWOT-analysis, along with the toolbox, then guided me in forming a strategy for the site.

2. Analysis

2.1 Introduction to the Million Program

The Million Program was a Swedish political decision to build one million new dwellings between 1965 and 1974 (Boverket, 2014). It came as a response to housing shortage and poor living conditions in Swedish cities all over the country. The government offered favourable financial support to municipalities that decided to build large scale housing areas. Support was also given to municipalities in need of land acquisition in order

to build new housing areas. Large scale building was motivated by cost advantages, as the price per unit could be reduced in large scale projects.

The Million Program included all types of houses, but most were apartment buildings built in new housing areas outside of the central parts of Swedish cities (Boverket, 2005). Roughly, one third of the Million Program consists of large scale housing areas, one third consists of low scale housing areas and one third consists of villa and row housing areas. Most house facades were plastered, but prefabricated concrete structures were also common.

The new housing areas were often separated from the rest of the city by large scale traffic structures. The most important streets were usually drawn



Fig. 4. Million Program areas in Stockholm municipality.



around the housing areas, resulting in green spaces protected from car traffic. However, these streets became barriers between park space and nature, and big parking lots formed barriers between buildings and streets. Bus stops were usually placed on streets outside of housing areas, which, in combination with the long distance to the city centre, caused long commuting time.

Car traffic was usually separated from pedestrian and bike routes. Instead, bike and pedestrian routes were drawn through parks, without the protection of buildings. Consequently, it made them windy and experienced as unsafe, as motorists, bus passengers and other travellers did not move along the same routes.

Commercial service was commonly placed in a central location within the housing areas. However, the central squares often turned inward with no street connection. Overall, the isolated structure of the housing areas disfavoured commerce and entrepreneurship, causing many services to close down or to move out of the areas.

The Million Program areas quite quickly became criticized. Already in 1968, one of the biggest newspapers in Sweden, Dagens Nyheter, published the article “Tear down Skärholmen” (Wirtén, 2010). The article was a protest to the large scale housing areas, monotone architecture, car-dominated city planning and poor outdoor environment that characterized Million Program areas, in particular the area of Skärholmen. At that time, housing shortage had turned into empty apartments in many of the newly built areas.

People started to move out of the areas. Eventually, many Million Program areas became the residence of people of low socio-economic status. Today, many of these areas are described in terms of segregation, as the number of immigrants and people with little or no income have become higher than in other areas. Also, many areas are in need of renovation due to neglected maintenance and outdated energy solutions.

2.2 Overview of Bredäng

2.2.1 Location and topography

Bredäng is located in southwest Stockholm, bordering housing areas Mälarhöjden, Sättra, Segeltorp and island Fågelön in lake Mälaren. The area amounts to 213 hectares of land and 25 hectares of water (Statistikomstockholm.se, 2015). The shoreline on Lake Mälaren is 1500 metres long.

The straight line distance from Bredäng to Sergels Torg in central Stockholm is 8,5 km and the commuting time from metro station Bredäng to T-Centralen takes 20 minutes. The same distance by car takes approximately 13 minutes whereas taking the bike takes 47 minutes.

Bredäng has a relatively hilly landscape, ranging from 0 metres above sea level to 70 m.a.s.l. The biggest part is located 30 to 50 m.a.s.l, however, to the north, the landscape slopes down to the shoreline at 0 m.a.s.l. At other places, the landscape

reaches up to 65 m.a.s.l., with a highest point of 70 m.a.s.l. Many of these hills are covered with housing units, offering a great view over Bredäng and lake Mälaren. Due to the hilly landscape, some areas in the built environment are vulnerable to flooding, especially low-lying areas close to hills or other elevations of the landscape.

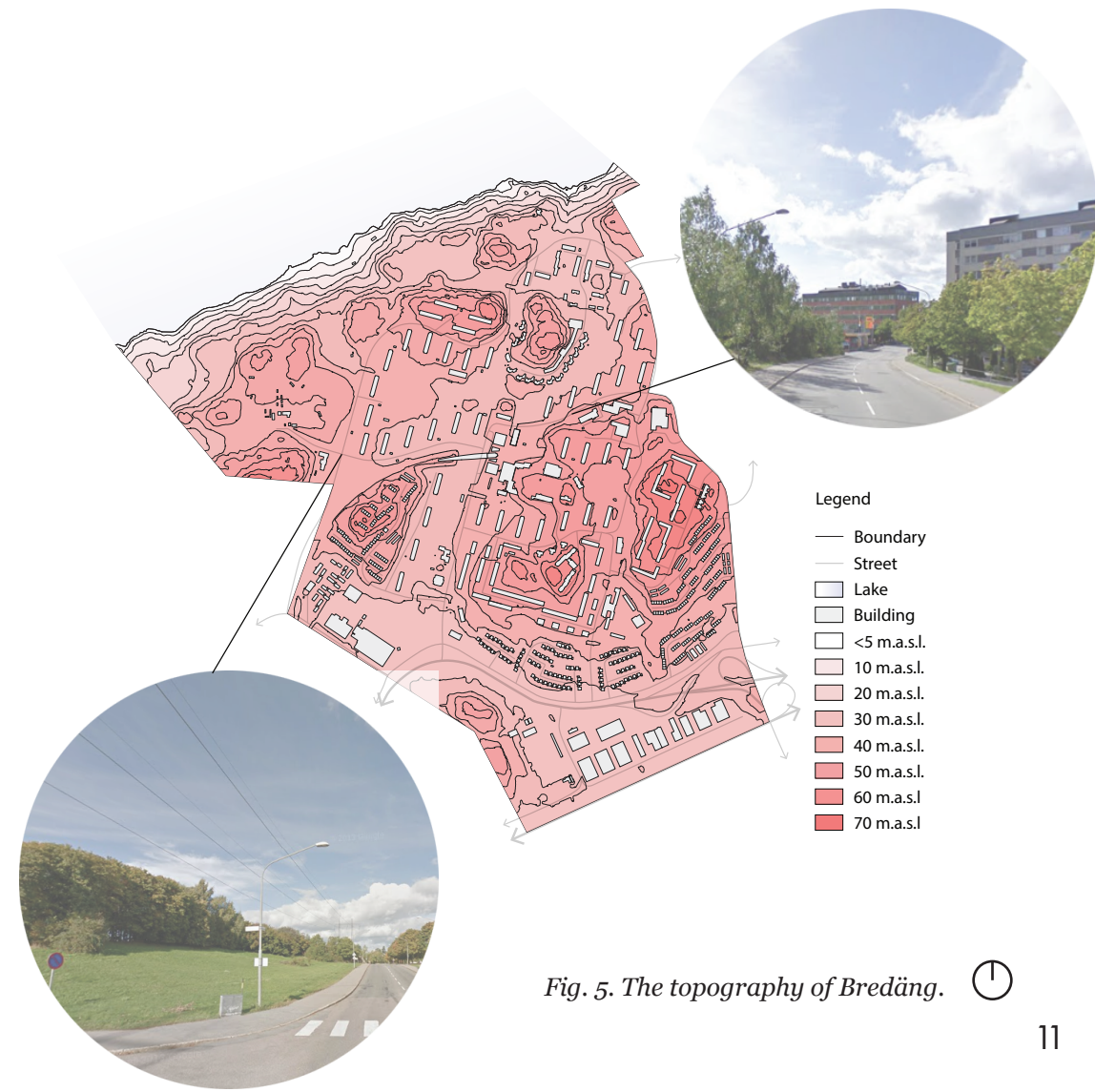


Fig. 5. The topography of Bredäng.



2.2.2 Demography

Bredäng has a population of 10 178 people, equally divided between males and females (Områdesfakta Bredäng stadsdel, 2016). The population is dominated by people 25-64 years old (54,1 %), followed by people 6-15 years old (12,6 %) and people 65-79 years old (8,7 %).

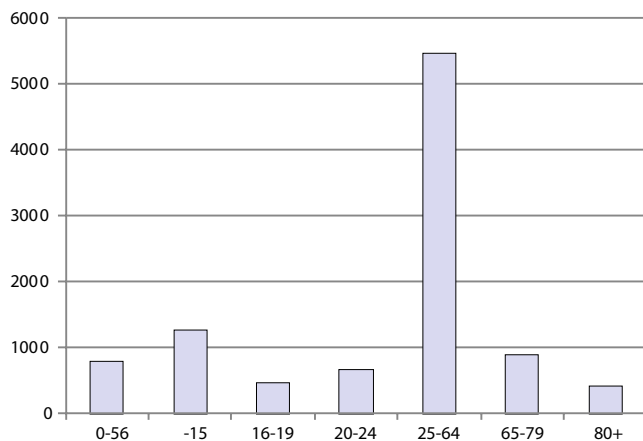


Fig. 6. Population by age in Bredäng.

The majority has a Swedish background (32,6 %), meaning that they are born in Sweden or have two Swedish parents. People with Swedish background are tightly followed by people with Asian background (31,5 %), and European background (17,5 %).

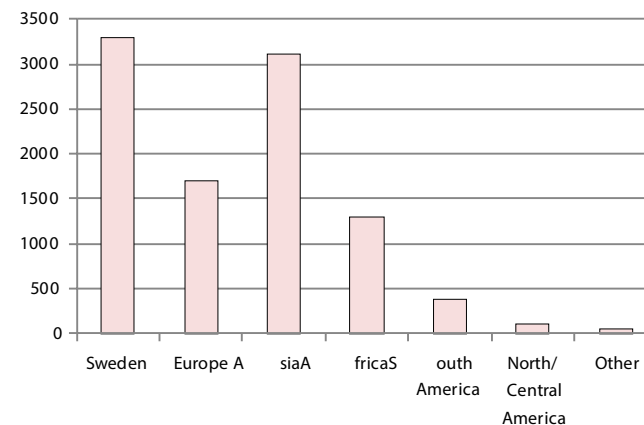


Fig. 7. Population by background in Bredäng.

When it comes to working, 65,9 % of people aged 20-64 are in employment, whereas 5,3 % are openly unemployed and 4,8 % are dependent on social welfare. Most people 25-64 years old have an education level similar to higher education (38,8 %), but equally many have an education level similar to high school. 18,2 % of people have only attended elementary school.

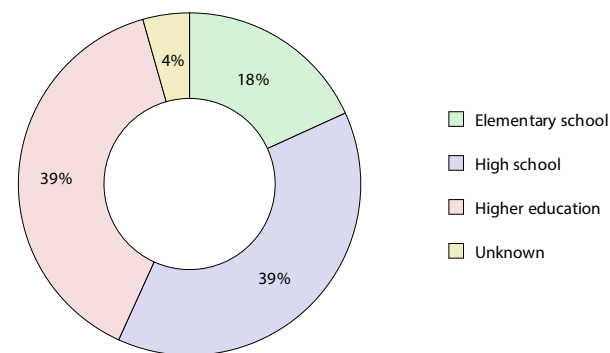


Fig. 8. Education level of people 25-64 in Bredäng.

The housing stock in Bredäng is dominated by 3 room apartments (46,2 %), followed by 2 room apartments (20,3 %) and 4 room apartments (15,3 %). The majority are private rental apartments (53 %), followed by public rental apartments (26,4 %) and condominiums (20,5 %).

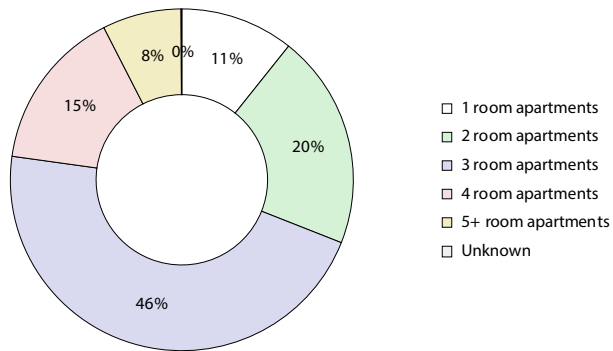


Fig. 9. Apartments by size in Bredäng.

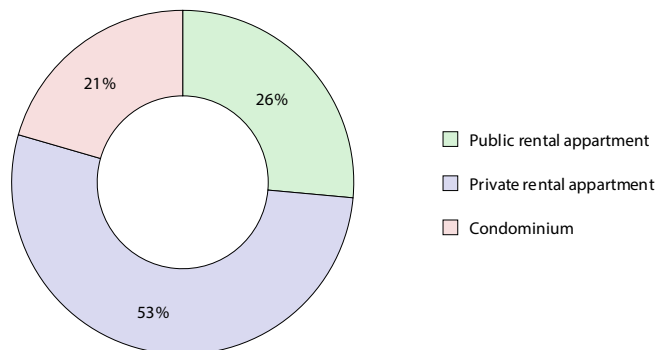


Fig. 10. Apartments by ownership in Bredäng.

In general, the demography of Bredäng differs in comparison to the average of Stockholm municipality. 67,4 % of the residents in Bredäng have a foreign background, as compared to 31,5 % in Stockholm municipality. 38,8 % of the Bredäng residents have attended higher education, as compared to 56,9 % in Stockholm municipality. 65,9 % of the residents in Bredäng are in employment, as compared to 78,1 % in Stockholm municipality. When it comes to housing, 46,2 % of the stock in Bredäng consists of 3 room apartments, as compared to 24,5 % in Stockholm municipality.

2.2.3 History

For several hundred years, the area of Bredäng was an agricultural landscape with merely a few cottages (Söderström, 2003). It was not until the 1960s that the area changed, as it became the first housing area of the Million Program project. The area was named after the cottage Bredäng, which in the early 1960s burnt to the ground. The remaining cottages, Jakobsbergs gård (built in the 1750s) and Lyran (built in the 1860s), were integrated in the new plan over the area.

Already in 1952, there were plans of developing the areas of Bredäng, Sättra, Skärholmen and Vårberg. After years of negotiation between municipality, private landowners and developers, the latter gained the right to 45 % of the total land area. The final plan was ready in 1960, and the municipality of Stockholm acquired the land in 1961. The municipal planner was named Josef Stäck.

On September 1, 1962, construction of the new housing area of Bredäng began. At first, streets were laid out for excavators and other vehicles to navigate. The building process was rationalized, which meant that, for instance, prefabricated building elements were delivered directly from concrete factories. Even the work process was rationalized by the use of shortwave radio communication etc.



Fig. 11. The historical layers of Bredäng.



Between 1963 and 1965, 3 900 mostly three-room apartments were built. The municipal housing company Svenska Bostäder accounted for most of the new apartments. In 1965, the metro station and commercial centre were inaugurated, including 15 stores such as groceries, banks, hairdressers, pharmacy and post office. Between 1965 and 1967, 300 terrace and row houses were built in the western and southern parts. In the 1970s, industry and office buildings were added along Södertäljevägen in the south, and daycares were added in existing residential areas. In the 1990s, three tower blocks and new terrace houses were built, along with a track and field arena. From 2000 until today, two new daycares, a student housing area and six new apartment buildings were added.

2.2.4 Functions

Bredäng is built around a centre, which contains a metro station, a school, a church, mixed use facilities and parking lots. The buildings in the centre distinguish themselves from the rest of Bredäng by their materials. They have a mix of red tile, wood and copper plate with elements of concrete. Also, groundcover, staircases, barriers and the metro viaduct are made of concrete. Quite nearby, there are a couple of car service facilities and office buildings.

Outside of the centre, at a distance of maximum 500 meters from the metro station, is large scale housing. These houses are standing in parks, along with daycares, sports fields and children's playgrounds. The large scale buildings are placed

in an identical north-south orientation in order to optimize sunlight (Andersson, 1997). There is 50 metres of space in between each building, every other space serving as a parking lot and every other space serving as a courtyard with a children's' playground. In total, there are 36 of these houses, eight to nine stories tall and almost identically

designed. The facades consist of light grey fair-faced plaster, sometimes with a darker window strip. The balconies are made of concrete and the roof tops are flat, except for raised engine rooms for elevators.

On the outskirts of Bredäng, low scale housing, including two to three-story apartment buildings, row houses and villas, dominates. These buildings are more varied in design, using more materials than plaster and warmer colours. Other buildings on the outskirts include a camping site and a mini golf course in the northwest, an industry and office strip in the south, a track and field arena in the southwest and a school in the southeast.

2.2.5 Infrastructure

The streets follow the landscape in Bredäng, giving them somewhat of a winding structure. Generally, the streets encircle houses in parks, as opposed to the block structure that is commonly found in the inner city of Stockholm. The streets are differentiated, meaning that a few primary streets branch into several secondary streets that lead to the housing units. Some of these secondary streets form cul-de-sacs as they penetrate through green space.

Parking lots are either placed in between buildings or as a forecourt between building and street. Large scale buildings have 1,2 parking spaces per apartment, which was the standard when the houses were built. A couple of parking lots are located nearby the track and field arena in the southwest.

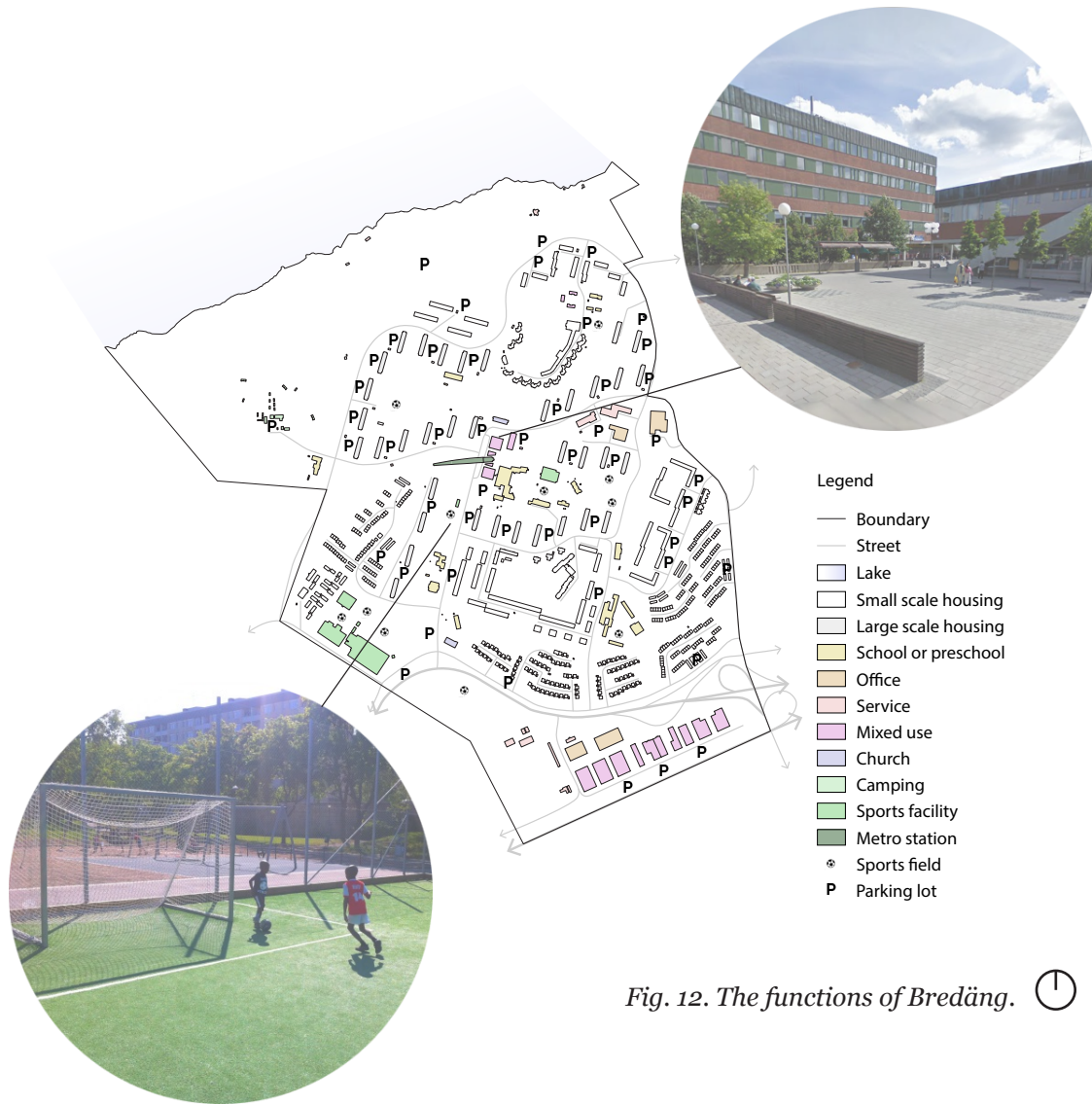


Fig. 12. The functions of Bredäng. ⌚

The most trafficked streets are Bredängs allé and Bredängsvägen, both connecting to freeways to the south. Another important street is Ålgrytevägen, that connects Bredäng to Björksätravägen in Sättra and Mälardalsvägen in Mälardalen.

The freeway Skärholmsvägen connects Bredäng to the big shopping centre in Skärholmen. Just

south of Skärholmsvägen is another freeway, Södertäljevägen, that is part of European route E4, which passes from north to south through Sweden.

There are 17 bus stops covering Bredäng, which is unusual for a Million Program area. A total of three bus lines service the area, of which one goes to the city centre.

Bredäng is full of pedestrian and bike pathways that cross through park space. Most of these go through Bredängsparken and the nature reserve, in the case of the latter, most go all the way to the shoreline.

2.2.6 Greenery

Bredäng is practically covered in green space. In fact, greenery is one of the things that characterizes the housing area. In the north, the nature reserve Sätterskogen faces the shoreline, with beach Mälardalsbadet as one of the most famous attractions. The nature reserve is protected by law and functions as a recreational area for whoever that wants to take a stroll in nature. Even though the nature reserve is forest-like in general, there are more forests in Bredäng. Actually, forests are scattered all over the housing area, sometimes right next to buildings.

The housing area also has three big parks. The biggest, Bredängsparken, spreads across a space that is surrounded by 21 large scale buildings. It contains a children's playground, a wading pool,



Fig. 13. The infrastructure of Bredäng.



urban farming and several sports fields among others. The other two parks are almost as rich in places for activities. In the original plan for Bredäng, parks were strategically placed as meeting places for the residents.



- Legend
- Boundary
 - Lake
 - Building
 - Hard surface
 - Beach
 - Park
 - Green space
 - Nature reserve
 - Forest

Fig 14. The greenery of Bredäng.



2.3 SWOT-analysis

2.3.1 Strengths

- The nature reserve is a recreational part of Bredäng, containing meadows, mountains, forests, streams and beaches. The routes are meandering along the terraced landscape and outdoor gyms and activity spaces are placed in strategic locations.
- The beach is very vibrant during summertime, offering yellow sand, green meadows and glimmering water. Nearby are cafeterias, an outdoor gym and a diving tower. It is a meeting place for people from all over Stockholm.
- The western part of Bredängsparken is an attractive place, offering both peaceful meadows and vibrant playgrounds and sports fields. During summertime, both outdoor theatres and festivals appear in the park.
- The many sports fields that cover Bredäng offer meeting places for all types of people. There are basketball courts, football fields, a skateboard park, a tennis court, an ice hockey rink and an area for track and field among others.
- Some of the green courtyards are very detailed, with meandering walkways, bike parking, trees, shrubs, flower plantations, playgrounds and art. These have recently been refurbished by the municipal housing company.

- Public transport is highly accessible in the area. The metro station has a strategic position in the middle of Bredäng, whereas bus stops are placed evenly along the streets. The metro is going in two directions while three bus lines are operating in the area.

- Bredäng has a big and diverse population, consisting of nearly 10 000 residents coming from all over the world. In addition, many of these people are young which opens up for a productive and vibrant community.

2.3.2 Weaknesses

- The important streets close to the centre - Stora Sällskapetets väg, Bredängs allé and Bredängsvägen - lack urbanity. Most buildings on these streets are not facing the streets, instead, the streets are connected to parking lots and underused park space. Furthermore, the streets lack detail such as bike lanes, bio swales and tree plantations etc.

- There are many parking lots in Bredäng, which is a misuse of space. Many of these parking lots are half empty, both during day and evening. Also, the parking lots are an environment that is both regarded as unattractive and unsafe.

- There are several strips of underused green space, often adjacent to streets. These green spaces are misused, unattractive and could be used for better purposes.

- There are weak entrances both to the centre and to Bredängsparken, especially from Bredängs allé. The street and the centre is separated by a concrete wall and parking spaces, making it impossible to cross the street and enter the centre for a long stretch. Where the wall ends, it is possible to enter the centre, but not without passing a parking lot to the south and a rundown square to the

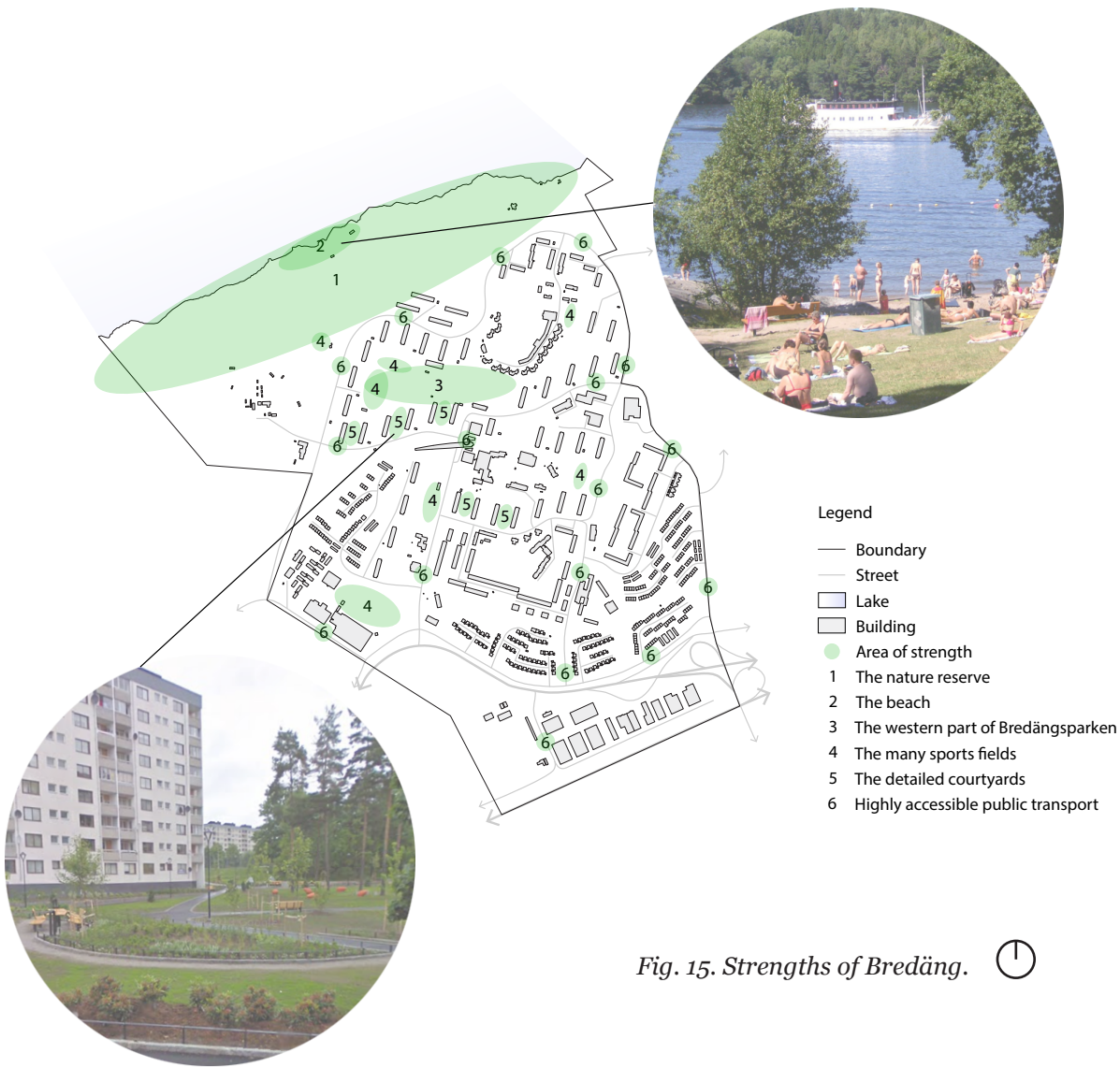


Fig. 15. Strengths of Bredäng. ⌚

north. The park, on the other hand, has entrances through a tunnel and from a hidden and rundown pathway that connects to Bredängs allé and the square.



Fig. 16. Weaknesses of Bredäng.



- The public space outside of the centre and parks is poor. There is barely no commercial activity along streets and no plazas to stop and meet. For such a big and populous housing area as Bredäng, there should be more qualitative public spaces along the streets.

- The hilly topography in combination with hard surfaces makes certain areas vulnerable to storm water. This is true for low-lying areas close to hills or other elevations of the landscape.

- The architecture in Bredäng is generally monotone, lacking detail and giving an expression of uniformity. The colours are often greyish and dull, making the built environment unattractive.

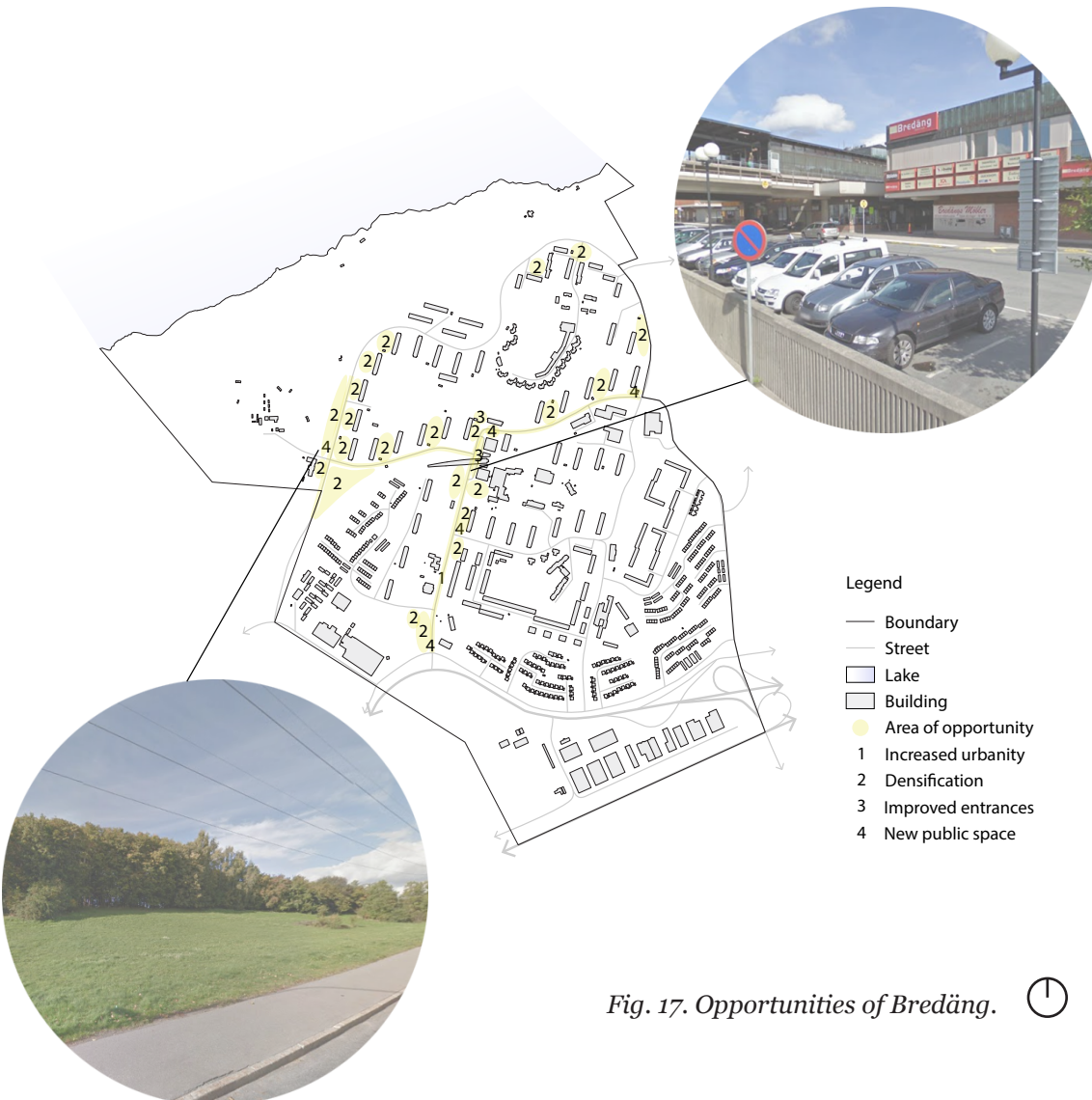
2.3.3 Opportunities

- The important streets - Stora Sällskapetets Väg, Bredängs allé and Bredängsvägen - could all get increased urbanity. This includes new buildings facing the streets, with active ground floors and opportunities for commercial activity. It also includes more detailed streets, with bike lanes, bio swales and new trees etc.

- The redundant parking lots and underused green spaces can be developed in order to produce more dwellings. It also gives an opportunity to create more attractive environments along streets and on courtyards.

- Improved entrances to the centre and Bredängsparken can improve walkability and help inte-

grate the two vital public spaces with the rest of Bredäng. This would give the street Bredängs allé access to the commercial activity of the centre. The entrance to Bredängsparken can be improved and connected to the square and the centre in a better way.



- Legend
- Boundary
 - Street
 - Lake
 - Building
 - Area of opportunity
 - 1 Increased urbanity
 - 2 Densification
 - 3 Improved entrances
 - 4 New public space

Fig. 17. Opportunities of Bredäng.



- New public spaces can be formed where there is a need for storm water treatment. For example, local plazas with commercial activity can be combined with rain water mirrors and places to sit in the sun. Such plazas can be placed in strategic locations where there is need for collecting storm water, e.g. low-lying areas that easily flood, combined with the need for commerce.

- New buildings can be designed to contrast the existing, monotone architecture. Such design includes placement, height, form, colour, outdoor environment and tenure.

2.3.4 Threats

- The hilly topography is a threat to new development, as it makes densification an obstacle or even impossible in certain areas.

- Densification on parking lots takes away parking space and could in that way upset car-owning residents.

- Densification could trigger a process of gentrification, which means that people with a higher socio-economic status move in, whereas people with a lower socio-economic status cannot afford to stay.

3. Theory

3.1 Introduction to densification in Million Program areas

As mentioned in chapter 1.1, there is a need of new dwellings in Stockholm and other Swedish cities, due to housing shortage and a growing population. Instead of adding new housing areas on the outskirts of cities, similar to the Million Program, there is a chance to densify in existing Million Program housing areas. By doing so, there is an opportunity to build in a sustainable way, opposite to the ideals that characterized the Million Program. A sustainable densification can be performed in many ways. The word “sustainability” implies that something aims to satisfy the needs of our generation, without compromising the needs of future generations (Elvingson, 2016). It can be described in terms of social, environmental and economic dimensions. When it comes to sustainable densification in a Million Program housing area, the aim is to turn an area where these dimensions function poorly, into an area that is sustainable from a social, environmental and economic point of view. How this is carried out is different from case to case.

In order to find inspiration for the case in this thesis, I have chosen to look at four precedents, where Million Program areas, or similar areas, have been densified or developed in a sustainable way. The precedents have been chosen due to their sustainability focus, with two Swedish examples and two international examples.

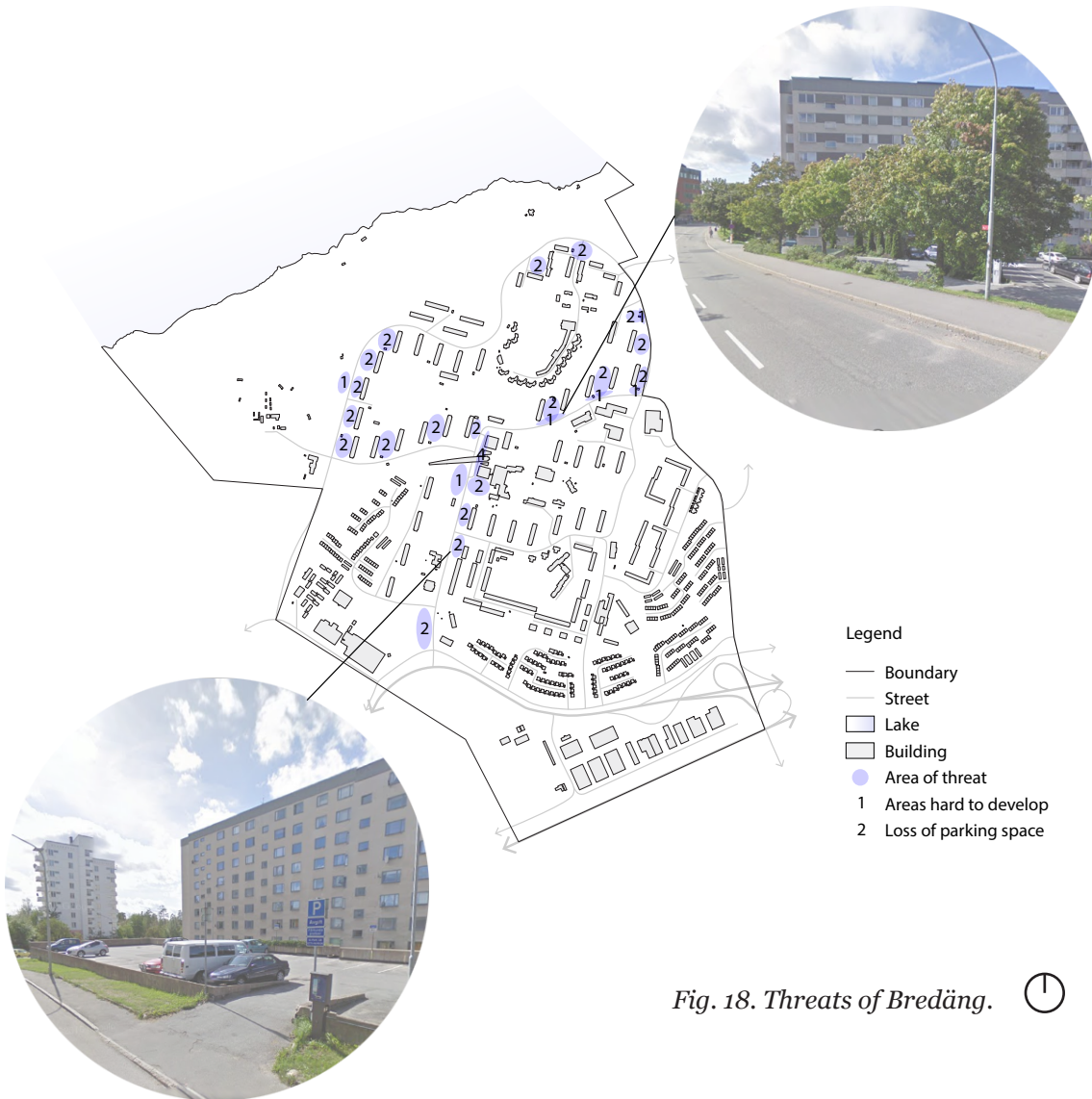


Fig. 18. Threats of Bredäng.



3.2 Precedents

3.2.1 Bijlmermeer, Amsterdam

Bijlmermeer is a large scale housing area outside of Amsterdam that was built in the late 1960s (Stewart, 2008). It was planned for 40 000 dwellings as well as 40 000 new jobs. However, the jobs and amenities never came and it remained in a gradual process of decline for nearly 30 years. In 1992, an aircraft crashed into two of the buildings in Bijlmermeer. Consequently, the City of Amsterdam started a renewal process of the area, replacing and refurbishing some of the buildings. The city also introduced rapid transport and promoted a large commercial district adjacent to the housing area.

In 2002, the City completed a master plan to set the framework for more changes in the housing area. The key principles were mixed use, differentiation of building types and cohesion, which were new features in an area that was monofunc-

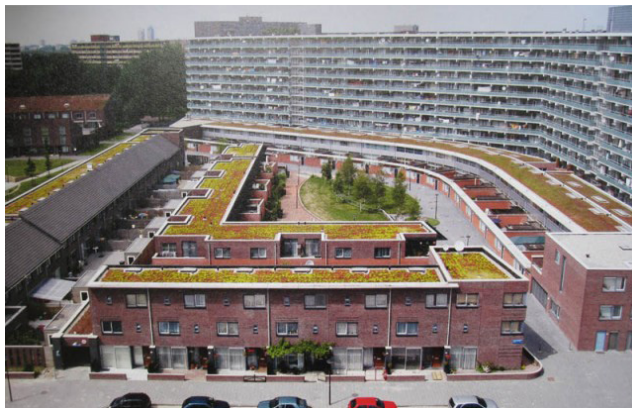


Fig. 19. New low-rise with green roof in Bijlmermeer.

tional, sprawled and dominated by tower blocks.

Interventions included areas of mixed use set up close to metro stops and other nodes, new buildings that framed boulevards, courtyards and plazas etc. Most new buildings were low-rise in order to vary the building typologies and adapt to the human scale. Green roofs and facades were introduced to both existing buildings and new ones. The public realm was improved in terms of way finding, paving patterns and street furniture. The previous two levels of traffic, separating pedestrians and cyclists from motorists and other travellers, was turned into one level for all types of traffic.

3.2.2 Brøndby Strand, Copenhagen

Brøndby Strand is the largest post-war housing area in Copenhagen, completed in 1973 (McLachlan, 2016). It consists of about 2,900 apartments and 8 000 residents in a variety of typologies arranged along a strip by the coast. The area is characterized by a strict segregation of pedestrians, cyclists and car-users on different levels. In 2014, the City of Copenhagen announced a competition in order to renew the area. The architecture firm BCVA won, proposing a transformation of buildings, urban space, traffic and landscape.

The project, that is being built in 2016, aims to break the isolation of the area and develop a design that works well with the neighbouring park and surroundings. An essential part of this is to create a pathway for pedestrians and cyclists,



Fig. 20. New plaza in Brøndby Strand.

stretching through the housing strip. The pathway will function as a public space for residents and visitors to get from one place to another, meet and hang out. There will be four plazas, designed to create social spaces with different identities. New buildings are proposed along the way to create a dense and varied urban environment. Facades will be differentiated and detailed, in order to break the monotony of the area. There will be an opportunity to extend either the kitchen or the living room with a balcony. Also, building isolation will reduce the energy consumption.

The pathway will also be integrated with storm water treatment ponds on one side and the park on the other side. In practice, rain water will run from the pond, across the pathway and all the way down to the sea. It is an attempt to create an aesthetic, socially and environmentally sustainable experience.

3.2.3 Vivalla, Örebro

Vivalla is a Million Program housing area in Örebro that was built in the late 1960s (Örebro-

Bostäder AB, 2014). It consists of approximately 2 400 apartments and 7 000 residents. In the last decades, the area has had issues with unemployment, insecurity and negative environmental impact. In order to cope with the situation, the municipal housing company ÖrebroBostäder AB (ÖBO) started the project “Mitt Gröna Kvarter” in 2011. “Mitt Gröna Kvarter” was a pilot project that aimed to rebuild, develop and densify a part of Vivalla, consisting of 123 apartments in two-story buildings, in a sustainable way. The goal was to apply the pilot project to all of Vivalla, if it turned out well. ÖBO involved residents in both planning the project and executing it on site.

The main strategy of the project was to strengthen the block identity on the site by adding a new street pattern and clarifying the difference between public and private space. In order to do this, two buildings were removed to make room for courtyards, and four building entrances were turned to make room for courtyards and new streets. In order to encourage people to remain in the area, the project introduced new building typologies and new tenures. A four-story tower building was added along with 24 row houses, new green spaces and new venues.

Other interventions included a smaller wind turbine and 200 square metres of sun cells in order to produce renewable energy. LED street lights and isolation of existing buildings, active concrete that breaks down air pollutants and organic substances, a car and bike pool and accessible recycling containers were introduced to reduce the environmental impact of the area. Green roofs



Fig. 21. Defined courtyard in Vivalla.

and walls, reduced hard surfaces and increased permeable surfaces, including reinforced grass on parking space, was constructed to store storm water and increase the aesthetic qualities on the site. And in order to treat storm water, open ponds and rain water storage for irrigation were created, as well as an art installation that demonstrates real time consumption of water by sound.

3.2.4 Ålidhem, Umeå

Ålidhem is a Million Program area in Umeå that was built between 1966 and 1973 (AB Bostaden et al., 2014). It consists of about 3 900 apartments and 6 000 residents. It has had problems with insecurity and high energy consumption levels within the area. When an entire block burnt down in 2008, the idea to the project “Hållbara Ålidhem” was born. The aim of the project was to reduce energy consumption in the area, create a safer and more pleasant outdoor environment and transform Ålidhem into a sustainable hous-

ing area. The project site consists of 405 existing apartments and 137 newly built apartments.

On the plot where an entire block burnt down, new buildings with low energy consumption were built. The buildings were thoroughly isolated, installed with modern technology to save energy and sun cells on roofs and balconies to produce energy. Sun cells were also installed on existing buildings on site, forming one of Sweden’s biggest sun cell plants. Existing courtyards and parks were renovated and a conservatory, serving as a meeting place, was built. The area also received LED street lights and a new recycling station.

The project also included a country road that formed a barrier in the area. The road was turned into a city street, and surrounding underused green space was turned into park space. Existing trenches were filled in and new trees were plant-



Fig. 22. Roof solar panels and renovated courtyard in Ålidhem.

ed, big rocks were left as natural elements. A new bike route was placed along the street and 30 new row houses were built at an intersection. All bus stops along the street received weather protection. The street is subject to further densification in the near future.

3.2.5 Toolbox

In the precedents above, I found some interesting interventions that can be implemented in my strategy for a sustainable densification of Bredäng.

In the case of Bijlmermeer, I was inspired by the act of adding low-rise buildings to an area dominated by high-rise buildings, in order to vary the building typologies and adapt the area to the human scale. I was also inspired by the act of bringing all types of traffic together in one level, or street, and the act of introducing green roofs and facades to both existing buildings and new ones.

In the case of Brøndby strand, I was enthused by the addition of different plazas to an area that lacks public spaces for people to meet and hang out. The public space was also integrated with storm water treatment ponds, which created an aesthetic, socially and environmentally sustainable experience. Architecture-wise, I was inspired by the measure to differentiate and detail new facades, in order to break the monotony of the area.

In the case of Vivalla, I liked the idea to strengthen the block identity on the site and thus clarifying the difference between public and private

space, which can be unclear in a Million Program area. I also liked the acts of installing sun cells, LED street lights, reducing hard surfaces and increasing permeable surfaces. And like the case of Brøndby strand, open ponds were used to treat storm water and to add social and aesthetic qualities to the site, which I admired.

In the case of Ålidhem, I was inspired by a number of acts. Like the case of Vivalla, I liked the instalment of sun cells on roofs and balconies of both new and existing buildings on site. I liked the act of turning a car-oriented country road into a detailed city street, integrating all types of traffic. I also liked that bus stops were given weather protection, which can be beneficial in order to encourage sustainable transport.

4. Strategy

The strategy is based on findings in the analysis chapter and the theory chapter. I have discovered six measures that could transform Bredäng into a more attractive and sustainable area.

Mixing building types is a way to offer more diversity in an area that is monotone in terms of the built environment. Adding low-rise next to high-rise is way of adapting to the human scale. Offering buildings with a variety of height, form, colour, outdoor environment and tenure can vitalize the area and give it identity and character.

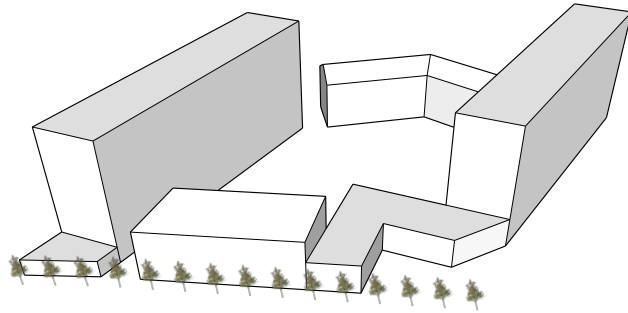


Fig. 23. Mixing building types.

Strengthening the block identity is vital to differentiate between public and private space. It makes it easier to navigate in a housing area, uses space in a more effective way and creates a sense of community for the people that live on the block.

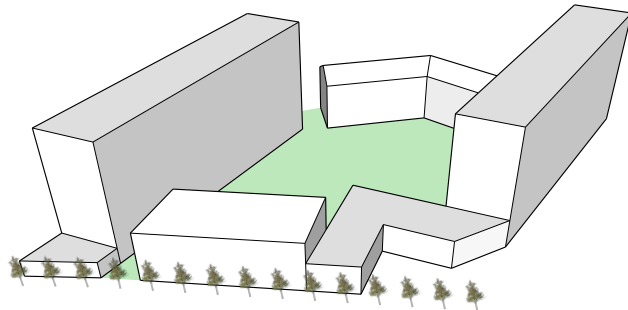


Fig. 24. Strengthening the block identity.

Increased urbanity along streets is an important factor to activate the public space. The most important streets can benefit from new buildings that frame them, which allows for public ground floors, eyes on the street, new meetings and experiences and by extension a sense of safety in the area.

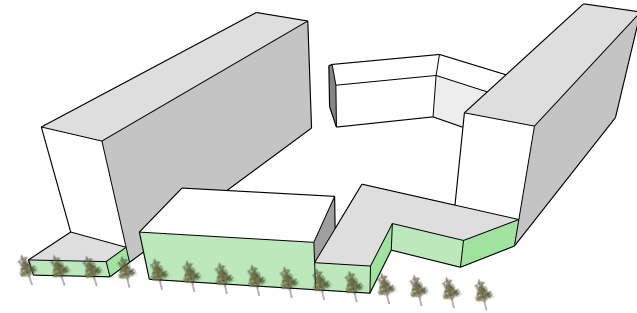


Fig. 25. Increased urbanity along streets.

New public plazas is another way to activate the public space in an area that lacks urban spaces to meet and hang out. Public spaces are vital for an area, especially from a social sustainability point-of-view. The new plazas can be placed in strategic locations on space that is currently underused park space or parking lots. It can be formed as pop up-spaces, framed by new buildings that attach to the courtyards.

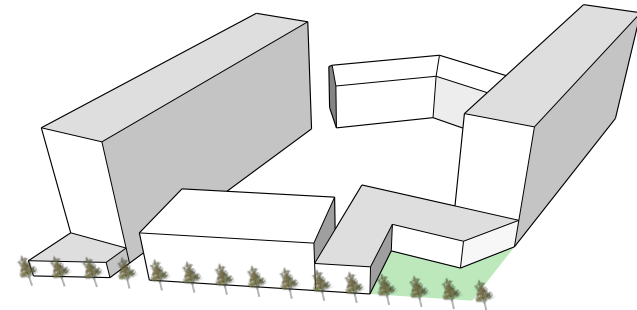


Fig. 26. New public plazas.

Storm water treatment is beneficial in an area with a diverse and hilly topography. Measures include bio swales, that collect and transport storm water, and rainwater mirrors, that store it. These mea-

sure take care of storm water before it causes any damage. Besides, it provides ecosystem services as well as beautiful, green streets that offer harmony to people.

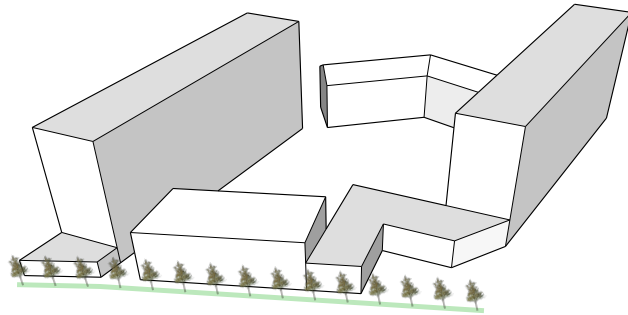


Fig. 27. Storm water treatment.

Green roofs and sun cells are a way of using buildings to store storm water, reduce energy consumption and produce new energy. With these measures, a housing unit can practically be self-sustained, which is beneficial from an environmental point-of-view. In addition, it can be a beautiful element in the urban environment.

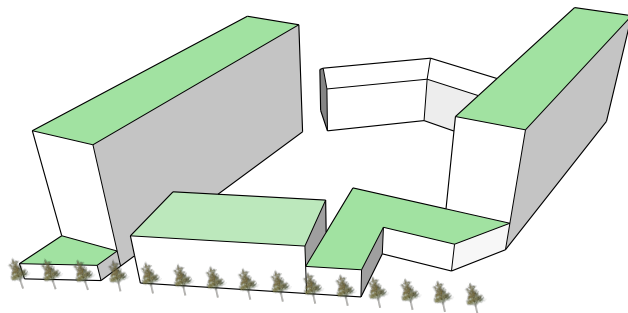


Fig. 28. Green roofs and sun cells.

5. Design

The strategy is implemented in a design proposal, showing how the different measures can form an attractive and sustainable Bredäng. The design proposal consists of an urban plan, a bird's eye view, zoom in-plans, sections and perspective drawings. Zoom in-plans and sections are presented in both existing situation and proposal.

The purpose of the design proposal is not to produce a certain number of apartments, but rather to add a new layer of buildings with integrated aspects of sustainability. However, I have estimated the total amount of new housing to approximately 1 250 apartments for 2 500 people.

The focus of the proposal is on new buildings rather than existing ones, even though the outdoor environment and some existing roofs have been worked with. This is part because the built environment of Bredäng is classified as culturally valuable by the City of Stockholm, and part because alterations to existing buildings might raise rents and upset residents.

The new buildings are planned and designed in order to display how the different strategy measures can be implemented. This means that, for instance, a building's energy efficiency is no more important than the life that is created outside of the building. What is more important is the holistic approach, meaning that a number of aspects and measures work together for a better whole in Bredäng.

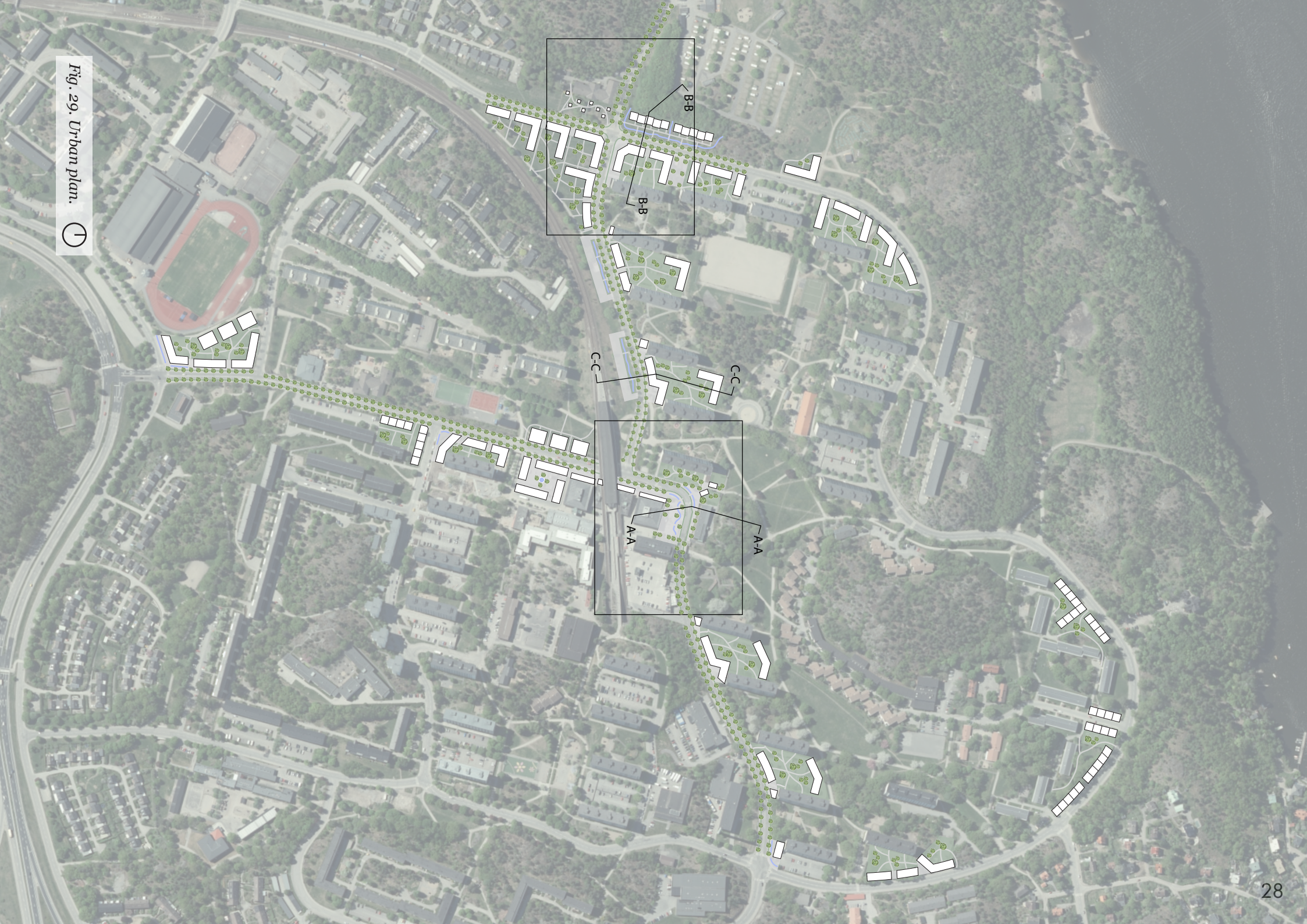


Fig. 29. Urban plan.





Fig. 30. Bird's eye view.

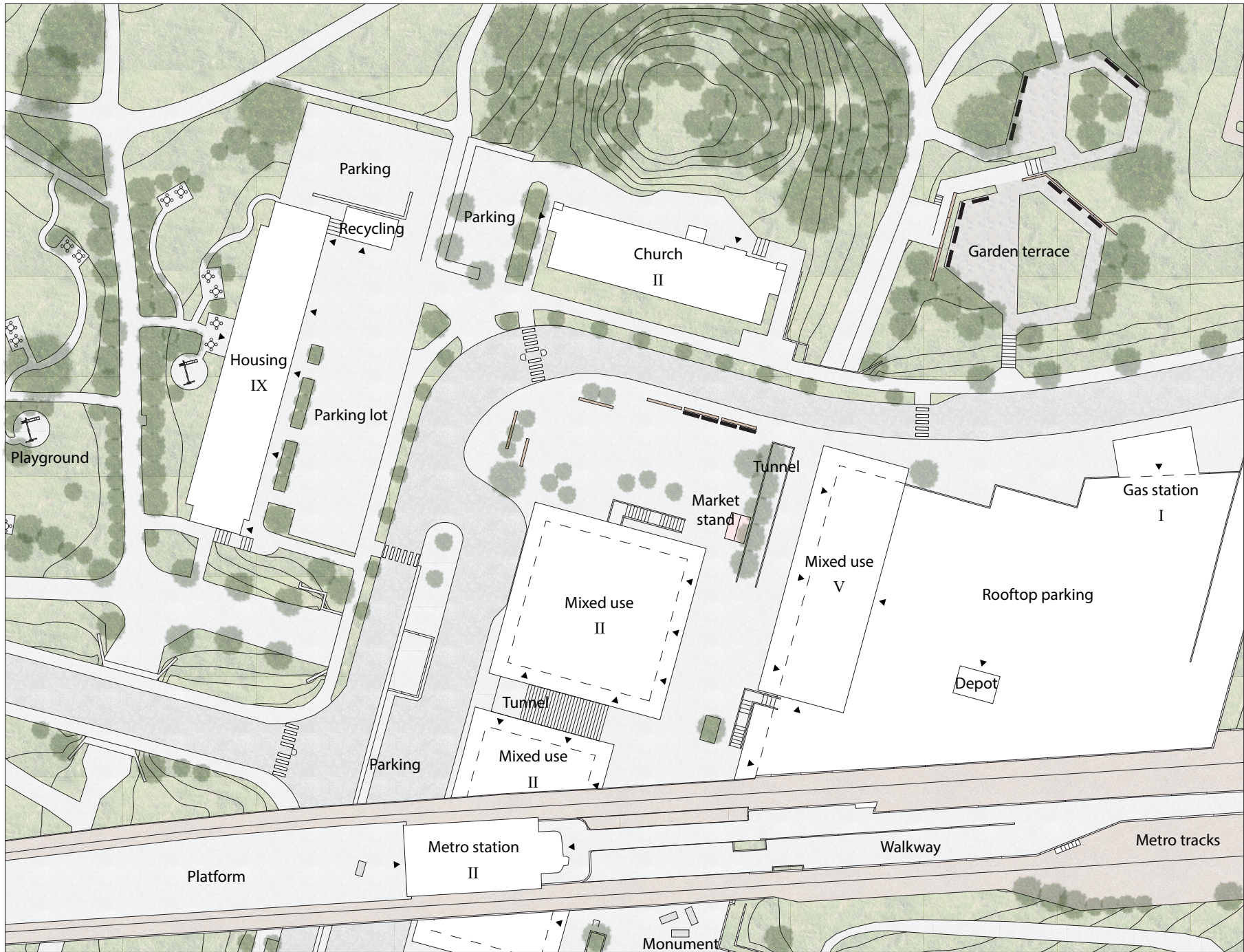



Fig. 31. Zoom in plan A (existing situation). 

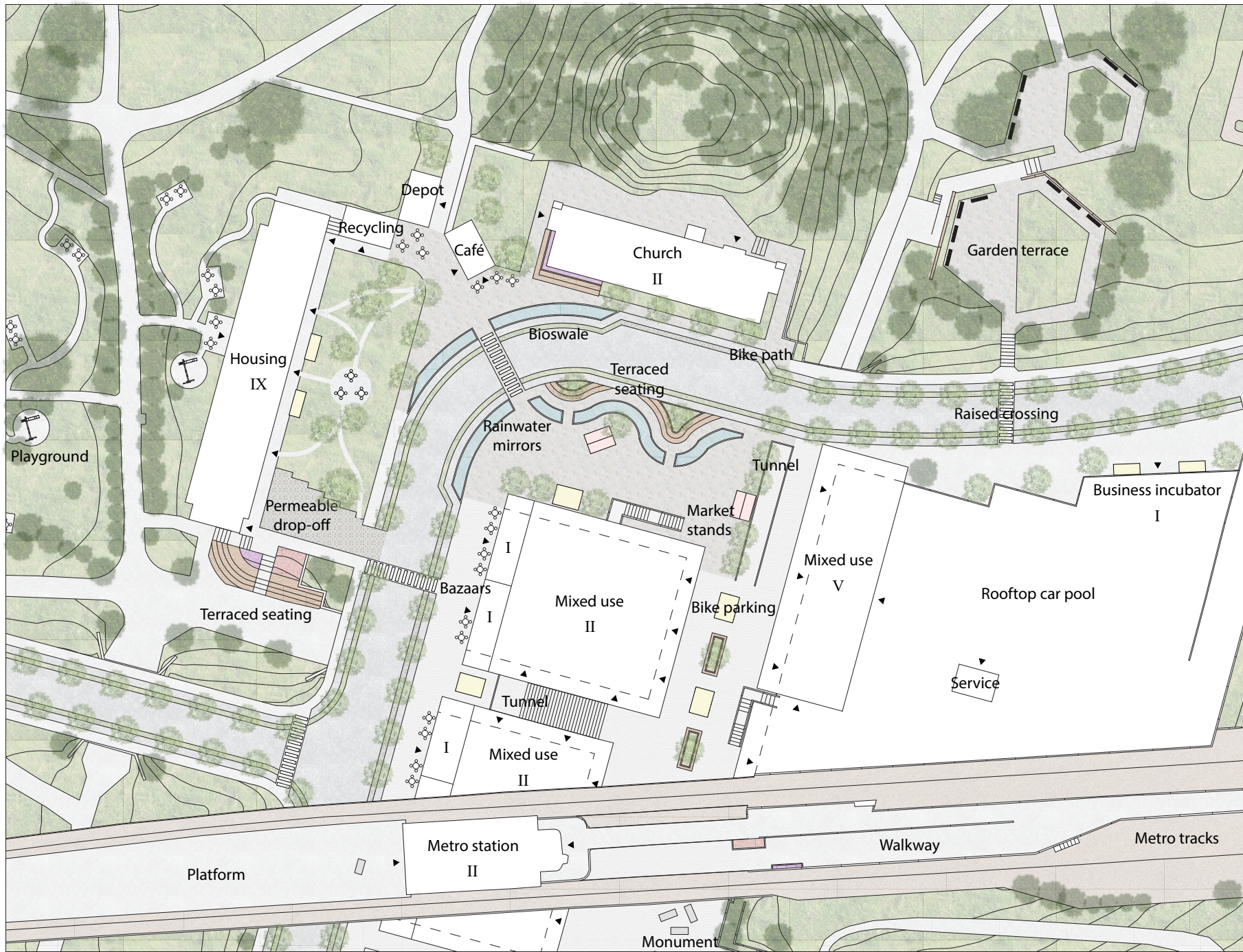


Fig. 32. Zoom in plan A (proposal). 

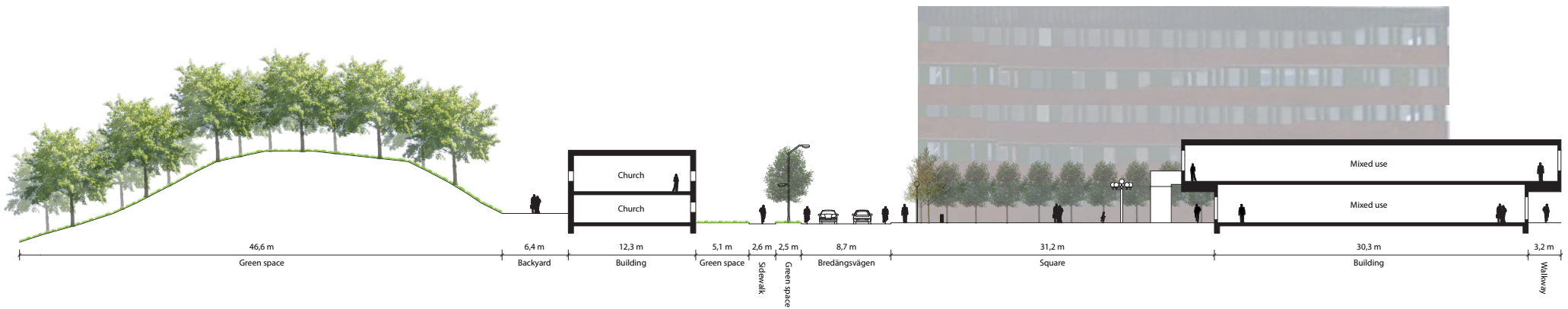


Fig. 33. Section A-A (existing situation).

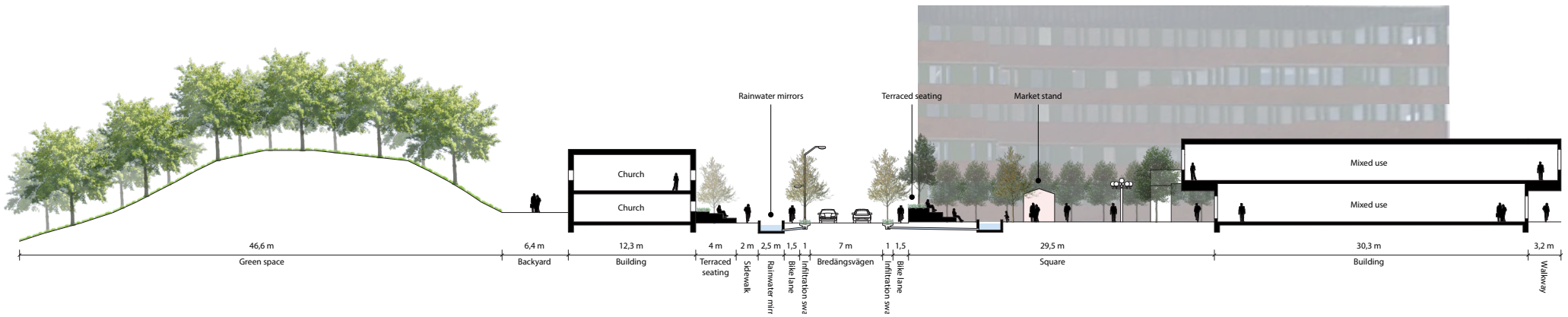



Fig. 34. Section A-A (proposal).



Fig. 35. Zoom in plan B (existing situation). 

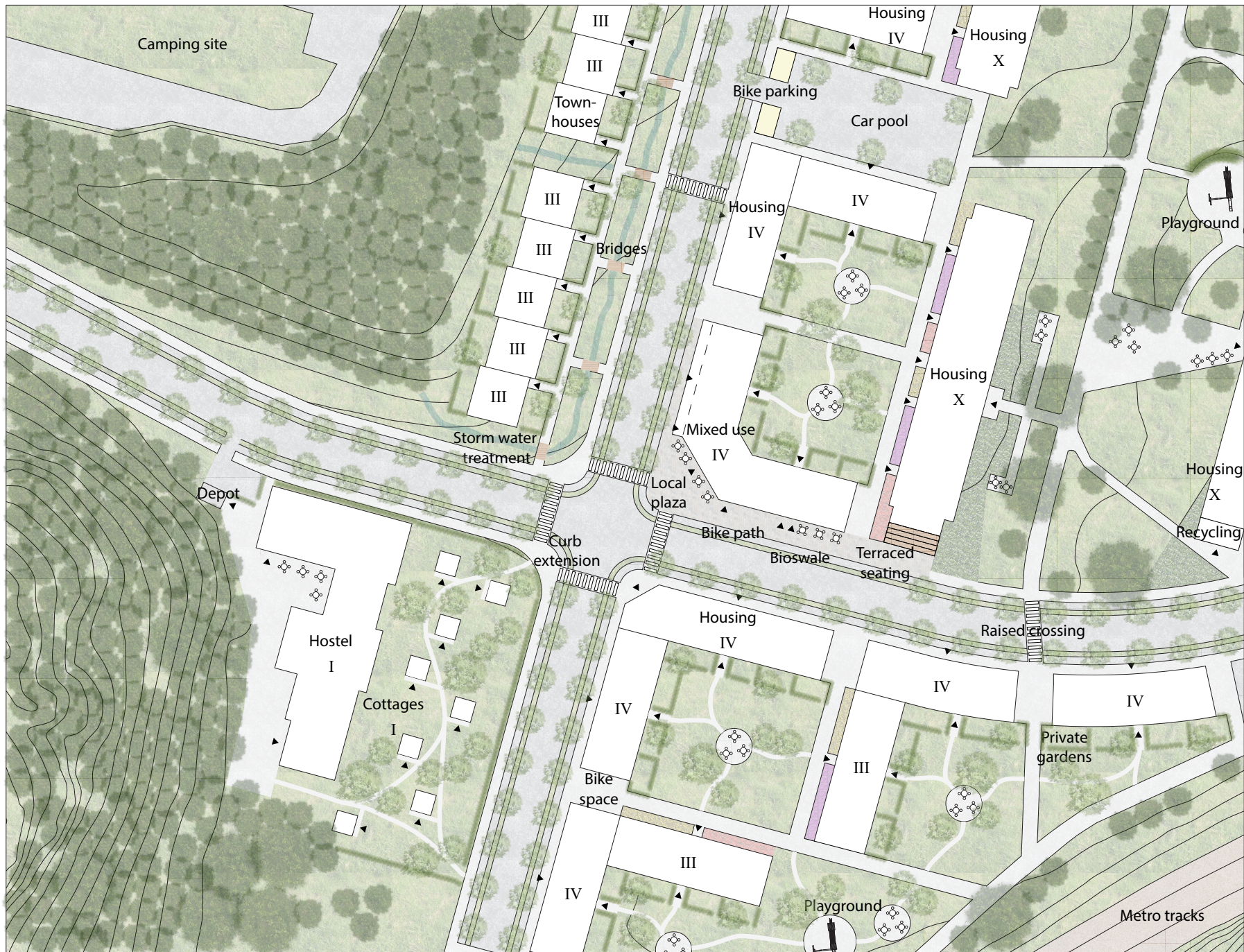


Fig. 36. Zoom in plan B (proposal). 

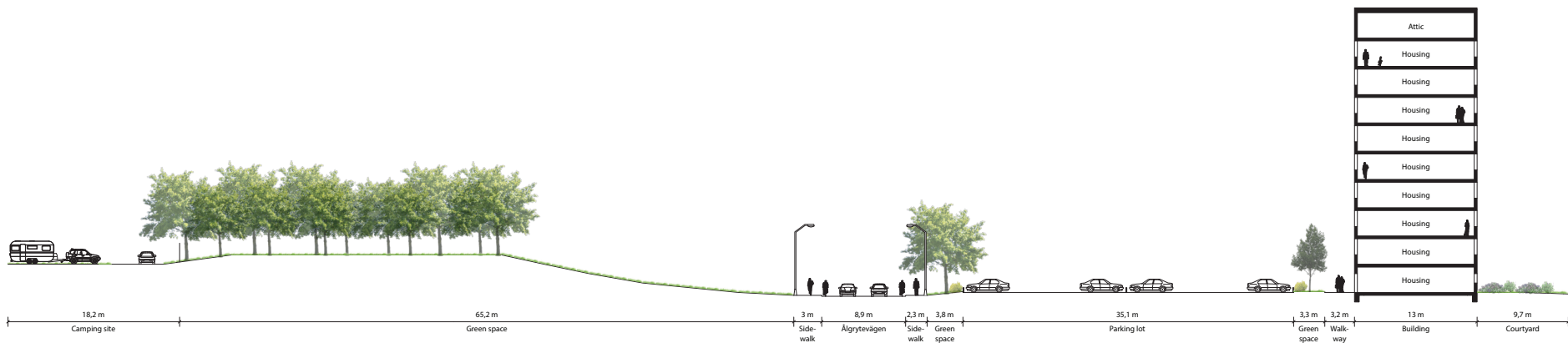


Fig. 37. Section B-B (existing situation).

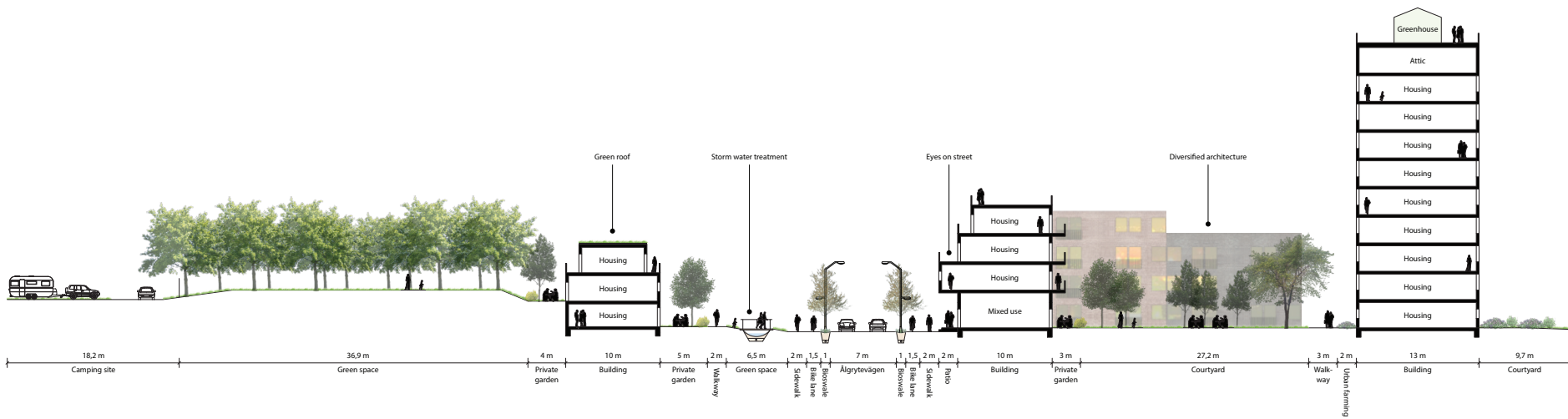


Fig. 38. Section B-B (proposal).



Fig. 39. Section C-C (existing situation).

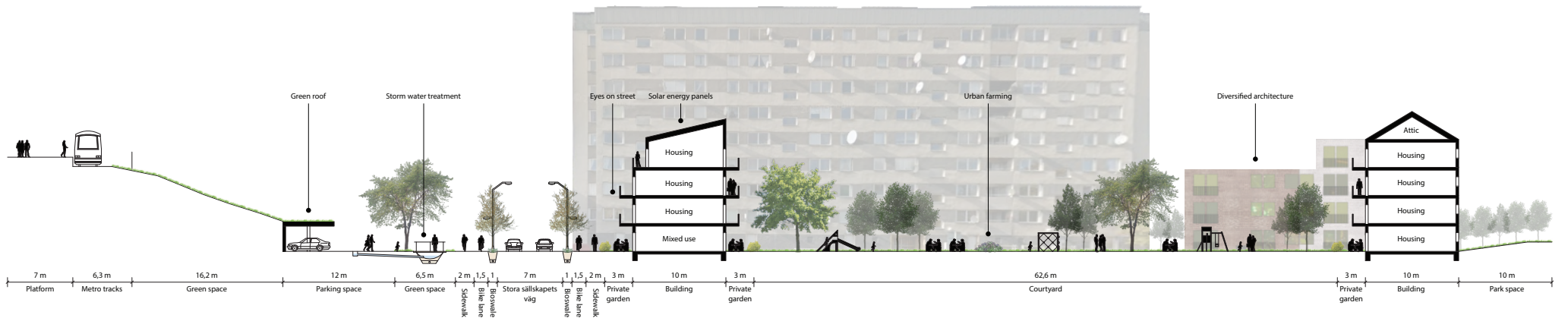


Fig. 40. Section C-C (proposal).



Fig. 41. Perspective drawing 1.



Fig. 42. Perspective drawing 2.

6. Conclusion

In this thesis, I have analysed the strengths, weaknesses, opportunities and threats of Bredäng. I have also looked at how other Million Program areas, or similar areas, have been densified in a sustainable way. The answers have guided me in forming a strategy, understanding how Bredäng can be densified in a sustainable way, in order to improve the conditions of the area and contribute to the growing population of Stockholm. I have found that the measures of mixing building types, strengthening the block identity, increased urbanity along streets, new public plazas, storm water treatment, green roofs and sun cells all can contribute to achieving the goal. The physical implication of these measures can be found in the design proposal in the previous chapter.

I would like to adress that this thesis project is one way to transform Bredäng into an attractive and sustainable area. There are also other interesting aspects that could be studied further.

One of the most vital steps in developing an existing housing area is to listen to the people. This has not been carried out in this thesis, as the research has been defined to analyses and precedents. I still want to adress that participatory planning is a crucial step in sustainable development.

Another interesting aspect is to study how Bredäng can relate to its surrounding neighbourhoods in a better way. Such a study could aim to understand how to, for instance, bridge the gaps between Bredäng and neighbouring Mälärhöjden. This has

not been studied in this thesis, as I have chosen to focus on other issues. But such aspect could easily be researched in another thesis project.

Finally, I would like to adress that Bredäng is just one of several Million Program areas in Stockholm and in Sweden. Densification in Bredäng might improve the conditions in the area and contribute to the growth of the city, but in a greater perspective, more Million Program areas need to be developed in order to make a change. In this case, my project could act as a pilot project on how to densify a Million Program area in a sustainable way.

7. References

7.1 Text

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7.2 Figures

Fig. 1. Own work.

Fig. 2. Own work. Map source: The City of Stockholm.

Fig. 3. Own work. Map source: The City of Stockholm.

Fig. 4. Own work. Map source: The City of Stockholm.

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Fig. 19. Archined, (2013). [image] Available at: <http://www.failedarchitecture.com/the-story-behind-the-failure-revisioning-amsterdam-bijlmermeer/> [Accessed 6 Oct. 2016].

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Fig. 23. Own work.

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