Transit-Oriented Development of Mindebyen:

A Sustainable Urban Living

Simen Hauge Mandt
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Figure 1 Art and seating arrangement inside Fyllingsdaltunnelen, the world's longest bicycling tunnel, which is in direct proximity to the planning area. This photo promotes the importance of sustainable mobility and social seating areas that will be key factors to the plan. (Photo: Eline Mandt, 2024).

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Written by:
Simen Hauge Mandt, group number 17

Supervisor:
Hanna Mattila, Aalborg University

With external supervision and help from Sweco Norge, avd. Stavanger and Bergen.

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Foreword

It is with pleasure that I introduce this comprehensive thesis on Mindebyen, a transformative urban development project set just outside of the city centre of Bergen, in Norway. This report is not only a planning proposal; it is an example for sustainable urban living that resonates with the global imperative of creating cities that are not only habitable but also vibrant, inclusive, and resilient.

I have embarked on a journey to reimagine Mindebyen, an area once dominated by industry and automobiles, into a dynamic residential neighbourhood that prioritize people, community, and the environment. The extension of Bybanen, Bergen's light rail system, serves as the catalyst for this transformation, offering a unique opportunity to integrate modern urban planning principles with the needs of a growing population.

This thesis is grounded in the United Nations Sustainable Development Goals and the municipality planning strategies of Bergen, reflecting a deep understanding of the challenges and opportunities that urban growth presents. My methodical approach, combining theory with practical case studies, provides a robust framework for the planning of Mindebyen. The exploration of Transit Oriented Development (TOD) and New Urbanism, through the lens of Västra Hamnen in Malmö, Sweden, and Seaside in Florida, USA, offers valuable insights into the creation of sustainable and people-centric urban spaces.

The planning proposal presented in this thesis are focused on creating a Mindebyen that is not only accessible and economically vibrant but also a place where social interaction and community bonds can flourish.

As we stand at the crossroads of urban development, facing the dual challenges of population growth and environmental sustainability, the work encapsulated in this thesis can be provided as an example of how we can plan. It demonstrates that with thoughtful planning and a commitment to sustainable principles, we can craft urban spaces that meet the needs of their inhabitants while preserving the natural and cultural heritage that define them.

It have been fun to write this thesis and I have learned a lot about the importance of planning, environmental measures, and different modes of transport. I have had great help from my supervisor, Hanna Mattila, providing me with guidance, inputs, and support.

In addition, I have had the pleasure of work with Sweco, and having the support and help from the offices in both Stavanger and Bergen. They have been a great help, providing me with examples, guiding, feedback, and access to their offices, material, templates, and computer.

Abstract

This thesis presents a comprehensive urban development plan for Mindebyen, and area situated approximately 5 km from the city centre of Bergen, Norway. Historically dominated by industry and automobiles, Mindebyen is undergoing a transformation into a dynamic residential neighbourhood, catalysed by the extension of Bybanen, Bergen's light rail system. The project aligned with the United Nations Sustainable Development Goals and the municipality planning strategies of Bergen, aiming to address the challenges of urban growth and sustainability.

The thesis adopts a planning-based approach, utilizing standard Norwegian planning methods and documents, including a planning description, mobility plan, and risk evaluation. These documents guide the creation of a functional and attractive plan for future residents and visitors. The research incorporates the theories of Transit-Oriented Development (TOD) and New Urbanism, drawing insights from the case studies in Västra Hamnen in Malmö, Sweden, and Seaside in Florida, USA, to inform the design proposal for Mindebyen.

The proposed plan emphasizes increased accessibility and connectivity through the integration of public transport, particularly the light rail system, which has significantly improved the area's linkage to Bergen's city centre. The mobility plan focuses on reducing car usage by enhancing pedestrian and cycling infrastructure, in line with Bergen's strategy for sustainable transportation and compact city development. The plan also includes mixed-use buildings, vibrant public square, and economic development initiatives to foster a sense of community and social interaction.

Environmental sustainability is a key consideration, with the plan aiming to reduce greenhouse gas emissions, improve air quality, and integrate green spaces, including the world's longest walking and cycling tunnel, Fyllingsdaltunnelen. Social and recreational spaces, such as the "City Forest", "Square", and "Playground" are designed to be accessible and promote community well-being.

In conclusion, the Mindebyen project exemplifies how thoughtful planning and a commitment to sustainable principles can transform an urban space, enhancing the quality of life for its inhabitants while preserving the environment. The introduction of Bybanen has facilitated this shift, demonstrating the potential of public transport to drive urban development towards a more sustainable and people-centric future.

Keywords: Transit-Oriented Development, New Urbanism, sustainable urban living, Bybanen, Bergen, Mindebyen, urban planning, public transportation, environmental sustainability, community development.

Content

1. Introduction

The project site for this thesis is in Minde, in Bergen in Norway. Minde is around 5 km outside of the city centre of Bergen, and today mainly consists of industry, offices, and cars. In 2022, the light rail in Bergen, Bybanen, was extended with a new route going through Minde. The introduction of Bybanen created new possibilities and new attraction to the area, which created the project Mindebyen.

Mindebyen is one of the biggest development projects in Norway with 25 planning fields. Today, in 18 of these fields there are ongoing plans and development. Inside whole planning field, there is planned for 3 037 housings. (Bergen kommune, 2024). Mindebyen is changing the area from industry and cars to housing and focus on people.

The basis of the thesis will be United Nations Sustainable Development Goals, the planning goals for the municipality of Bergen, the population and population growth in Norway and in Bergen, the planning strategy in Bergen, and the development of Bybanen and its importance to the development in Bergen.

During this thesis I will write about the method that I will use for this thesis and how research of similar areas and nearby areas are developed. The theory that will be researched is the development methods Transit Oriented Development (TOD) and New Urbanism, where some of the key points and positive sides will be used in the final design proposal. To be able to understand the theories and be able to use them in a way that will help for the final design, I have researched one area for each theory. For Transit Oriented Development I have researched Västra Hamnen in Malmö in Sweden, and for New Urbanism I have researched Seaside in Florida in USA.

In the research in Seaside in Florida, it became clear that the US and the Nordic countries have different approaches to planning. The main difference lies in the level of government involvement and spending on social welfare policies. The Nordic countries allowed for generous social welfare policies such as universal healthcare, free college tuition, and paid parental leave, while the US has a more market-oriented system where individuals are more responsible for their own welfare. (Riedl, B., Gustavsson, J., 2023). Because of this I have been sensitive to these contextual differences when researching the Seaside example.

Further on I will write a standard planning description, which is made for every plan in the planning processes in Norway. The description starts with how the planning area are today, what the planning area consists of, the topography, how the traffic and public transportation are, and investigate the surrounding plans. With this I will write about the history of Minde and how the area have changed over the years.

Figure 2 The population of Norway in the 1st quarter of 2024. (SSB, 2024).

The main part of the thesis will be the planning proposal. In this part I will write about and explain the plan, where the focus is placements of the different aspects in the plan, sizes, connections, and accessibility. There will be a big focus on the different mobilities in the planning area, to the planning area, and from the area. Because of this focus, there has also been made a mobility plan that will explain the current mobility situation and the possible future mobility.

As an addition to the plan description, there has been made a planning map, a masterplan with more design details, and sections to show the area. There has been made a mobility plan and a risk evaluation of the planning area and the proposed plan. These two are based on my work as an intern in Sweco and is from a standard template that Sweco uses in every planning case. Towards the end I will go into more details about the plan and the different areas in the proposed plan in a summary of the plan. Here I will write about why the buildings, roads, and walking and cycling paths are placed the way they are and how that impacts the planning proposal. After this I will wirite a discussion about the goals, reasons, and focuses of the plan.

In the end I will conclude the thesis by giving a final answer to the question that is going to be figured out and answered.

Residents of Norway

1st quarter of 2024

5 562 363 people

58 034 people from the same quarter the year before

Population growth in Norway

Today there is over 5,5 million people living in Norway. The largest part of the population in Norway is living in and around the larger cities, such as Oslo, Trondheim, Stavanger, and Bergen.

In recent years, Norway has had a steady population growth. The Norwegian Statistics Bureau (SSB) regularly produces population forecasts that address the expected population growth. According to these forecasts, it is assumed that Norway's population will continue to grow in the coming years, although the rate of growth may vary. The population is assumed to pass 6 million people by 2050. (SSB, n.d.).

While the population is growing, there has been an urbanization, and the households have become smaller in average, the cities needs to expand. There is a need to look towards the urban areas to be able to further grow the city and facilitate for the growing population. To be able to facilitate in the urban areas, there needs to be a good connection to the city centre. This is an important part for people working, going to school, and for the connection to shops and social activities.

Population in Bergen

Bergen is the second biggest city in Norway and has a population of over 290 000 people as of 2023. The expected population in Bergen in 2030 is 301 200 and 323 799 in 2050. (SSB, n.d.). To accommodate for this population growth, the municipality plan of Bergen is setting up for a dense urban development in and around the city centre of Bergen.

The bus connections and the light rail, Bybanen, makes the whole municipality of Bergen well connected to the city centre. This opens for more housing and more inhabitants to live and move to the urban areas outside of the city centre. The planning area, Mindemyren, is one of these urban areas that has been well connected with Bybanen and has therefor been an area for new housing development and businesses to create an area with facilities such as stores, healthcare, barber, schools, and daycare in a walkable distance.

United Nations Sustainable Development Goals

In 2015, the United Nations implemented the Sustainable Development Goals (SDGs). The Sustainable Development Goals is a universal action plan to end poverty, protect the planet, and ensure that everyone enjoy peace and prosperity by 2030. The SDGs consists of 17 goals and 169 interim goals. (United Nations, n.d.).

The Sustainable Development Goals are important for development and spatial planning because they offer a framework to meet the greatest challenges we face as a global population. They serve as a guide for governments, businesses, civil society, and individual citizens to promote integrated approaches that consider not just economic growth, but also social inclusion and environmental sustainability.

In spatial planning, the sustainable goals can particularly help with:

- Promoting the development of green, energy-efficient, and accessible cities (Goal 11).
- Ensuring that everyone has access to basic services such as water, sanitation, and clean energy (Goals 6 and 7).
- Protecting and preserving natural areas and biodiversity (Goal 15).
- Integrating climate measures into policy and planning (Goal 13).
- Supporting cities and communities in becoming more resilient to climate change and natural disasters (Goal 11).
- Promoting social justice and economic inclusion (Goals 1, 5, and 10).

Spatial planners and developers often use the goals to inform and guide their decisions to ensure that building projects and urban development contribute to the broader objectives of sustainable development. (United Nations, n.d.) The SDGs has a central part in the planning strategy for the municipality of Bergen and is an important guide for spatial planning.

Planning strategy of Bergen

The municipal spatial plan for Bergen is based on a vision that Bergen shall be an active and attractive city. Some of the focus points in the plan is The Walkable City, to be future-focused, and to focus on green areas, diversity, and to be safe.

The following 19 focus areas from the community plan provide direct guidelines for the municipal plan's land use:

- Bergen will prioritize development and service offering which will make it easier for people to walk.
- Bergen will establish good biking paths.
- Bergen will improve the blue green infrastructure.
- The municipality of Bergen will ensure urban densification.
- Bergen will have a sustainable growth which takes care of climate- and environmental issues.
- Bergen will prioritize modern environmentally friendly architecture and renewable energy.
- Bergen will facilitate social areas.
- Bergen will be an attractive city to live in, and to move to.
- Bergen will have an infrastructure which focuses on sustainable transportation.
- Bergen will further develop a compact city structure with a network of centre areas.
- The centre areas will be developed as Walkable Cities with high density and quality.
- The transportation systems and area disposition will be developed with the idea of zero growth in private cars usage.
- Bergen will take care of the mountains and seaside in the city.
- Bergen will offer good housing in varied environments.
- Everyone will have access to a safe upbringing environment and will be able to move safely.
- Everyone will have access to high quality air and water and access to quiet zones.

Figure 3 The United Nations Development Goals logo. (United Nations, n.d.).

- Bergen will take care of and further develop the historical aspects of the city.
- Bergen will take care of and further develop the city in the nature and the nature in the city.
- Bergen will strengthen the city districts as distinctive areas and societies.

The term “Walkable City” expresses the main goal for urban development in Bergen. Bergen aims to create compact centre areas, where residents have their daily destinations within walking distance from their homes. Walking and biking should be the most important forms of transportation, along with a well-developed public transport service.

The main goal for development is:

- The city must facilitate a good quality of life, with good conditions for housing, work, and leisure.
- The city must be sustainable and environmentally friendly.

Both goals can be achieved through compact urban development, following the principles of the Walkable City. A dense city of high quality provides the basis for good living environments and well-functioning commercial areas. At the same time, it will help to reduce the need for transportation and prioritize environmentally friendly modes of transport.

Development of Bybanen and its importance to the plans

Bybanen is the light rail in and around Bergen and is the second biggest mode of transport in the municipality of Bergen. The first line of Bybanen was opened in 2010 and has continued to grow. The second line opened in 2013, the third in 2016, and the newest one, the fourth line was opened in 2022. (Bybanen, 2024).

The introduction of Bybanen to Minde in 2022 made the area more available and connected to the city centre of Bergen. Following the introduction, the new light rail station Kristianborg was developed. This station is an important station for the new line, because of its natural connecting point between Bybanen and the buses.

Bybanen is the second biggest mode of transport in the municipality of Bergen with 24,3 million boarding in 2023, only beat by the buses with 57 million boardings in 2023. Line number 1 had an average of 70 000 boardings every day, and line 2 had an average of 20 000 boardings every day. (Skyss, 2024).

The light rail had the biggest growth out all modes of transport in Vestland county in 2023 with 27% growth from 2022. The main reason for this is the introduction of the new line, going to Fyllingsdalen and past the planning area at Minde. (Skyss, 2024).

Figure 4 A newly developed Bybane station, Kristianborg station. (Photo: Simen Mandt, 2024).

1.1. Method

This thesis will have a planning-based approach. I will use standard
Norwegian planning methods and documents to create the final design and plan.
The planning documents that I will use are:

- Planning description, which tells about the area today, the different factors of the plan, and how the plan is going to change and influence the area.
- Mobility plan, which tells about the mobility in the area, both how it is today and how the plan is going to change and influence the area.
- Risk evaluation, which will enlighten potential risks and threats in the planning area.

These 3 documents will create guidelines and help create a functional plan that will be vibrant and attractive for the people that will live, visit, and use the area in the future.

Other than the planning approach, the thesis will be focused on research of design and planning methods and discovery of similar projects. I will look at how an area can change, and what new options planners get when the accessibility to an urban area is increased.

The problem statement goes as follows:

How does the implementation of new public transport options change an area and how can we plan around this and take advantage of the environmental, social, and ecological benefits?

The method I am using for this thesis is a combination of theory and research. I am mainly focusing on the theory of Transit-Oriented Development (TOD) and New Urbanism to transform the project site.

The research in this thesis is about and around the project site. The research is allowing me to get to know the area, and to make better planning decisions. When we know the site and the area, it is easier to plan and make plans for the area.

The data that has been used in this thesis have mostly been collected from government, public opinions, and other project sites with similar goals. Criteria that has been set, is based on the plans for the project site. It was already set that there should be at least 150 apartments in the planning area. This set a clear indication of what the area should be in the future and impacted the final design.

When I determined the overall methodology for the thesis, the case studies and research into Transit-Oriented Development and New Urbanism had a central part. So did the spatial plans and regional plans in the municipality of Bergen.

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2. Theory and Case Studies

The theory that will be researched and used in this thesis is Transit Oriented Development (TOD) and New Urbanism. Both theories are used in planning and developing new and existing areas around the world. They are focusing on people and to connect people with each other, the nearby areas, and with nature.

During this chapter there will be researched and discovered two case studies, where the design methods have been used. For Transit Oriented Development the case study of Västra Hamnen in Malmö in Sweden will be researched, and for New Urbanism there will be done a case study of Seaside in Florida in USA.

2.1. Transit-Oriented Development (TOD)

Transit Oriented Development (TOD) is an urban development strategy that is focusing on creating vibrant, liveable, and sustainable communities. The method is focusing on high-density, mixed-use, and pedestrian-friendly neighbourhoods that is centred around high-quality public transportation. One of the main goals of TOD is to create vibrant, sustainable communities where people can live, work, and play without relying on a car, which can be a solution to the serious and growing problems of climate change. TOD opens for dense and walkable communities that could reduce driving by up to 85%, and be replaced by walking, cycling, and public transport. (TOD, n.d.).

Today there are some factors driving the development and planning trend towards Transit Oriented Development. There are changes in family structures with more singles and empty nesters. In Norway, there are over 1 million people living alone. (SSB, 2023). Some other factors is the peoples growing desire for quality urban lifestyle and more walkable lifestyles away from traffic, and the growing distaste in traffic congestion and for suburbia.

The benefits of using TOD as an urban development strategy when developing an area includes creating areas with higher quality of life with better places to live, work, and play. It creates a greater mobility in and around the area and will increase the transit ridership. With TOD and the increased public transportation, walking, and bicycling it will reduce car accidents and injuries, reduce greenhouse gas emissions, provide for a healthier lifestyle with more walking and less stress, and the increased foot traffic can give more customers for area businesses and local shops.

In TOD areas there are more affordable housing, people living there can save money by using other modes of transport than car, and the developers would save money on not having to create as many car roads.

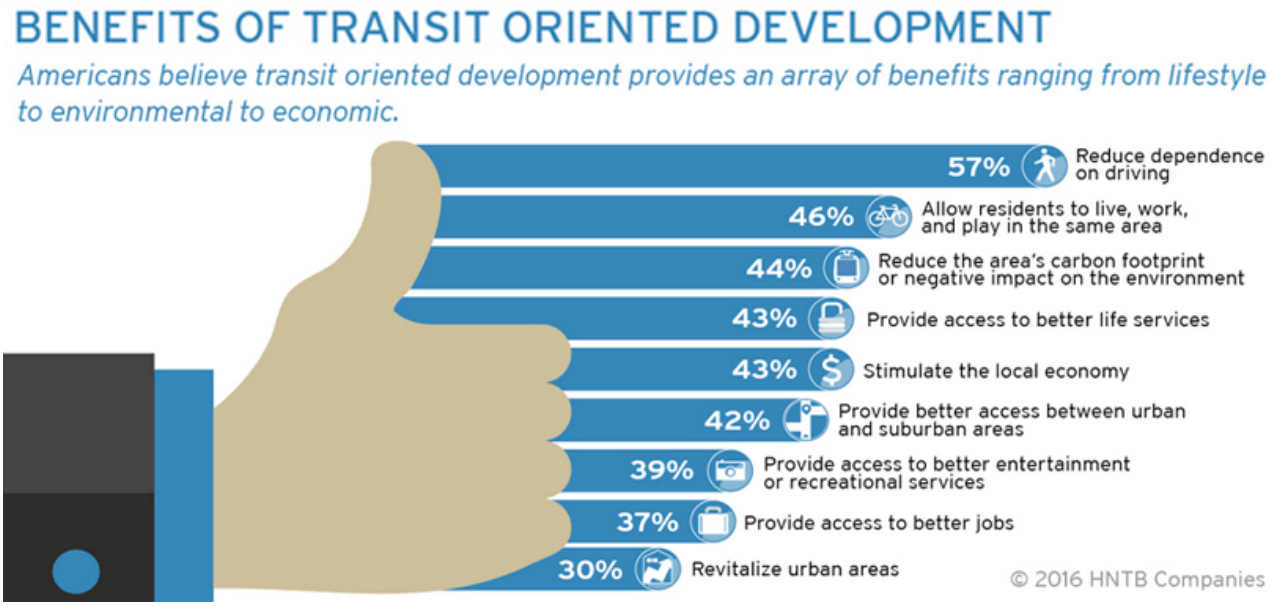


Figure 5 Benefits of Transit-Oriented Development. (The Transit Oriented Development Institute, n.d.).

”It is important to extend TOD to rural-urban regions since most Europeans live in these areas and not just in urban cores.”

- European Commision, 2020

Figure 6 Pictures of different modes of transport at the Kristianborg station in Minde in Bergen, Norway. (Photos: Simen Mandt, 2024).

Downsides to TOD

While there are many positive sides to TOD, there are also some negatives and potential downsides to the method. TODs could in some cases become too successful, which can lead to gentrification. Popular areas tends to become highly attractive and will therefor result in increased property values and higher income residents. This reflects not only the residents but also the businesses in the area, forcing them to move because of the high property values. All of this would influence the long-term residents and the current communities in the area, leading to social and cultural homogenization. (Villagomez, E., 2023).

As discussed, TOD projects are focused on different modes of transport other than cars. This focus will bring an increased pressure on the increasing infrastructure, which in some cases can be difficult to accommodate. The introduction of Transit Oriented Development rely on an upgrade or extension of the public transit in and out of the area, which is an expensive upgrade to the infrastructure. This economic investment can benefit some communities, while some lower-income communities can feel the negative impacts of this. (Villagomez, E., 2023).

TOD aims to improve quality of life for residents by offering a variety of service and amenities nearby, opportunities for social interaction, safe and attractive areas to walk, and allowing for people to save more money by using less money on transportation and living in affordable housing. Even though there some potential downsides to Transit Oriented Development, many of the challenges can be mitigated through careful planning, community engagement, and policies aimed at ensuring affordability and inclusivity.

2.2 Västra Hamnen, Malmö, Sweden

Västra Hamnen in Malmö in Sweden, also known as the Western Harbour, is known for its development which was highly inspired from Transit Oriented Development, its sustainable development, and modern architecture. The area has been transformed from an industrial brownfield site into a vibrant, sustainable neighbourhood with residential and business districts. It features mixed-use development and is well connected by public transportation, including bus lines and the city's bike-sharing program.

The district is developed with a focus on sustainability, mixed-use, public spaces, and diversity of housing. Västra Hamnen is designed to be self-sufficient in renewable energy in the form of solar panels, wind power, and biofuels. The district does also have an urban design with a focus on mixed-use developments that combine residential, commercial, and recreational spaces. There are numerous public spaces, including parks, promenades along the waterfront and public squares to encourage social interaction and outdoor activities.

As previous mentioned, TOD is largely focused on reducing the need for cars and is focusing on alternative transportation such as public transportation, walking, and bicycle. Västra Hamnen is well connected to the rest of Malmö and nearby areas via public transportation. There are bus routes and bicycle paths going in and out from the district.

In 2001, Västra Hamnen gained international attention when the district hosted the European Housing Expo, Bo01. The expo showcased innovative housing designs and sustainable technologies. Many of these designs and technologies were integrated into the permanent development of Västra Hamnen. Some of the main objectives of Bo01 were to develop a sustainable and attractive urban district, present environmental housing, and test and demonstrate new systems for sustainable urban infrastructure.

Västra Hamnen is considered a successful example of how industrial areas can be revitalized into a sustainable, attractive urban spaces. It represents a forward-thinking approach to city planning that prioritizes environmental considerations, quality of life, and the creation of a cohesive community.

The main takeaways from Västra Hamnen as a reference case for Transit Oriented Development includes:

- **Sustainability:** It is referenced as an eco-friendly urban development, being self-sufficient in renewable energy using solar-panels, wind power, and biofuels.
- **Proximity to Public Transport:** Västra Hamnen is well connected to public transport, such as buses, trains, and ferries. The neighbourhood is designed to encourage residents to use other modes of transports than cars.
- **Mixed-Use Development:** There is a mix of residential, commercial, and recreational spaces in close proximity. This promotes a walkable environment and easy access to amenities.
- **Pedestrian and Bicycle Infrastructure:** The neighbourhood has well-designed pedestrian and bicycle infrastructure, including sidewalk, bike lanes, and green spaces.

Figure 7 Västra Hamnen in Malmö, Sweden. (Malmö stad, n.d.).

2.3. New Urbanism

New Urbanism is a planning and development method that focuses on human-scaled urban design and is looking at the principles of how cities and towns have been built in past. The main principles are walkable blocks and streets, housing and shopping in close proximity, and accessible public space. New Urbanism came as an alternative to the post World War 2 development that was dominated by sprawling, single-use, and low-density patterns, which had shown to inflict negative economic, health, and environmental impacts on communities. (Planetizen, n.d.).

The key principles of New Urbanism include walkability, connectivity, mixed-use and mixed housing, diversity, and sustainability. New Urbanism aims to reduce car dependence and focus on walking and bicycling.

In New Urbanism development method, it is important to create pedestrian friendly environments and easily accessible public squares, schools, and commercial areas within a short walk of residences. The streets a built as an interconnected street grid network which spreads the traffic and eases walking. This can encourage more interaction and more community engagement.

”Neighborhoods should be diverse in use and population; communities should be designed for the pedestrian and transit as well as the car.”

- Congress for the New Urbanism, n.d.

There is a mix of shops, offices, apartments, and homes on the site within the neighbourhoods, within blocks, and within buildings to make sure there are a diversity of usage in the area. There are a range of different housing types, sizes, and prices in closer proximity to increase the diversity of residents in the area. New Urbanism wants to cater to a broader spectrum of the population.

New Urbanism focuses environmentally friendly practices, and the preservation of natural habitats are emphasized to create enduring and sustainable communities. Aswell as this, it is focusing on creating a sense of community and improving the overall quality of life for residents. (CNU, n.d.).

Figure 8 A uniform urban design in Alexandria, VA. (Photo: CNU. n.d.).

Figure 9 A cyclist on the streets of Habersham, SC. (CNU, n.d.).

Downsides to New Urbanism

The downsides of New Urbanism could include the affordability of the homes, office spaces, and shops. With the introduction of New Urbanism, the popularity of the area often increases and drives the property values and rents up. This could result in gentrification, where the original residents are priced out as the area becomes more desirable and expensive.

While New Urbanism aims to reduce the car dependency, not all projects are in areas with good public transportation links. The method is focusing on the walkability and connections within the area and not that much out of the area. This means that the residents may still rely on cars for commuting or accessing services outside the neighbourhoods.

There have been some critique that New Urbanism attempts to engineer interactions and community life. Some suggests that the development can feel artificial and are attempting to recreate the feeling of traditional, organically developed communities in a forced manner. New Urbanism has been influential in the development of many new communities, and its principles have been applied to existing neighbourhoods to improve them. Critics of New Urbanism argue that it can be too nostalgic, reflecting a preference for traditional architectural styles over modernism, and that it sometimes fails to address deeper issues of social equality and affordability in housing. Despite this, New Urbanism continues to impact urban planning and community design discussions. (Zhu, X., Guan, Y., Ni, M., & Ho, P., 2023).

Despite these criticisms, many of the principles of New Urbanism are seen as steps in the right direction for creating more liveable and sustainable urban environments. Planners and developers often work to address these negatives by adapting New Urbanism principles to local contexts and working to ensure developments are inclusive and sensitive to a variety of needs and perspectives.

2.4. Seaside, Florida, USA

Seaside in Florida, USA, is perhaps the most famous example of New Urbanism. Seaside is a master planned community in the Florida Panhandle that was designed with the principles of walkability, diversity of housing types, and community-centred public spaces.
The construction of Seaside started in 1981 with small seaside cabins. Before this it was an empty land where the owner would travel for vacations. The developer, Robert Davis, wanted to build a community of cabins and create a new "old town", just like the small towns Davis had researched. In the beginning they only built 2 houses and one single street with close connection to the water. As the development grew popular, more houses was established, and it grew into a community that the developer wanted it to become.

Seaside is built around a town centre in the middle and have radiating street patterns with walking paths and social areas all throughout the town. Because of the privately owned area, there are no planning rules for the area which has made it possible for many different designers and architects to come to Seaside and create something of their own. As a result of this there is a big diversity in the area with a range of different housing and housing styles in the town.

Today, Seaside has over 300 homes, restaurants, shops, and galleries, and is continuing to grow. It is a popular vacation spot and is visited of thousands of families every year. Seaside was also the main filming location of the move "The Truman Show". (Seaside, n.d.).

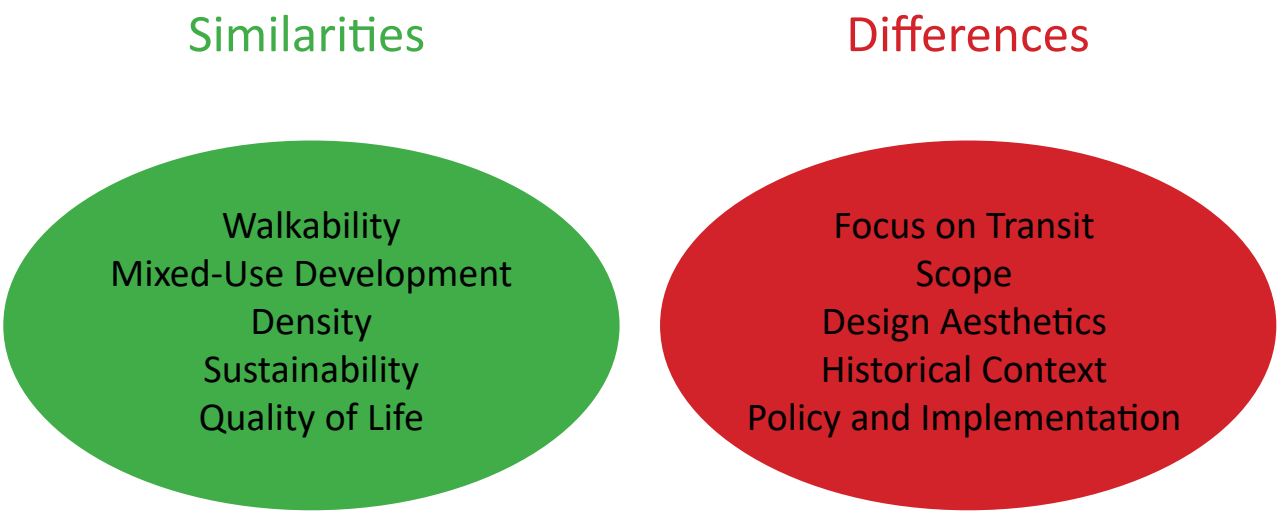
The main takeaways from Seaside as a reference case for New Urbanism includes:

- **Walkability:** Seaside is designed to be highly walkable, with a compact layout and a network of pedestrian-friendly streets and pathways.
- **Mixed-Use Development:** There is a mix of residential, commercial, and recreational spaces within close proximity.
- **Traditional Neighbourhood Design:** Seaside follows traditional neighbourhood design principles, with a central town square and streets that prioritize pedestrians over vehicles.
- **Public Spaces and Parks:** There is numerous public spaces and parks. These serve as gathering places for residents and visitors.

Figure 10 Seaside in Florida, USA. (SoWal, 2022).

2.5. Similarities and Differences

There are many similarities and differences between Transit Oriented Development and New Urbanism. These two design and development methods are very connected while also being very split.



The similarities between TOD and New Urbanism includes the focus on walkability, mixed-use development, density, sustainability, and quality of life.

Both Transit Oriented Development and New Urbanism prioritize creating pedestrian-friendly environments and mixed-use development. Both methods want to encourage other modes of transport other than cars, which makes it key to create ease accessible and diverse neighbourhoods with everything people need in a walkable distance. By creating better walking and bicycle paths and having every needed facility in a walkable distance, people would be more inclined to walk and bicycle instead of using cars. This would also help in the methods strive of sustainability and to be environmentally friendly by lowering the greenhouse gas emissions.

Quality of life for the residents of Transit Oriented Development and New Urbanism areas are important. Both methods wants to enhance their quality of life by creating a sense of community, providing easy access to amenities and services, and encourage people to walk and bicycle.

The main differences between Transit Oriented Development and New Urbanism is their focus on transit, the scope of the area, design aesthetics, historical context, and the policies and implementations.

TOD is specifically focused on the integration of high-quality public transportation in the development to ensure easy access to and from the area, whereas New Urbanism is not as focused on this. TOD are often developed and applied directly around a transit station, while New Urbanism has broader principles that could be applied to entire communities and regions.

New Urbanism could be seen as wanting to recreate the feel of pre-automobile towns and can be associated with the traditional planning principles of 19th and early 20th centuries. Transit Oriented Development has a more modern approach which arose from the need to address urban sprawl and its associated problems.

New Urbanism often emphasize traditional neighbourhoods with traditional design and architectural styles, while TODs are more flexible architectural styles and focuses more on functionality and how to connect people to transit.

In essence, TOD and New Urbanism share common goals of creating sustainable and liveable urban environments, but TOD is more specifically tied to public transit infrastructure, while New Urbanism had a broader focus on the overall form and function of communities.

21.

3. Planning description

In the following section of the thesis there will be done a planning description. The planning description is based on a standard template that Sweco Norge uses in every planning case, and is divided into three main parts:

- Description of the planning area today
- Description of the proposed plan
- The effect of the planning proposal

Between the first and second point, the historical development of the area will be explained.

3.1 Description of the planning area today

The planning area is in Minde in the municipality of Bergen. Minde is around 5 km outside of the city centre of Bergen. The light rail in Bergen, Bybanen, is moving past the planning area, and the station Kristianborg is connected to the planning area to the south. The light rail has a direct connection to the city centre of Bergen, and it takes around 25 minutes to get to the planning area.
The size of the planning area is around 65 acres.

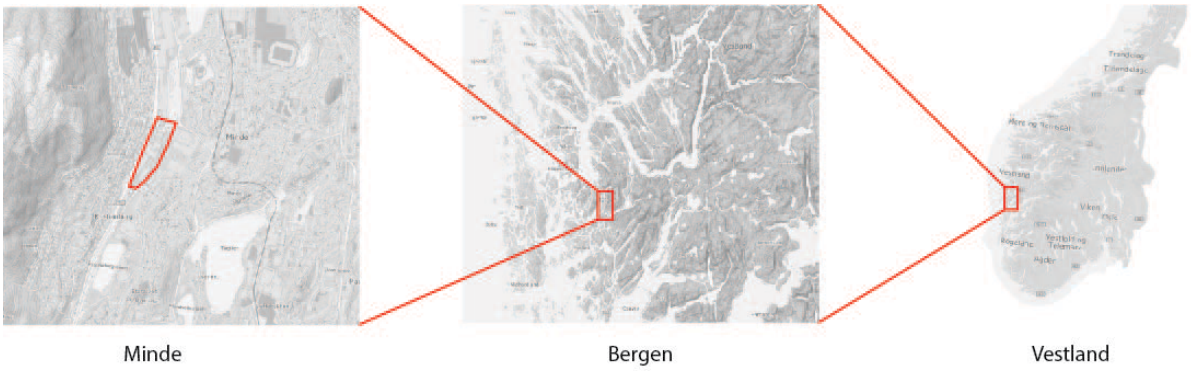


Figure 11 The placement of the planning area in Bergen, Norway. (©2024 Norkart AS/Geovekst og kommunene/NASA, edited by Simen Mandt, 2024).

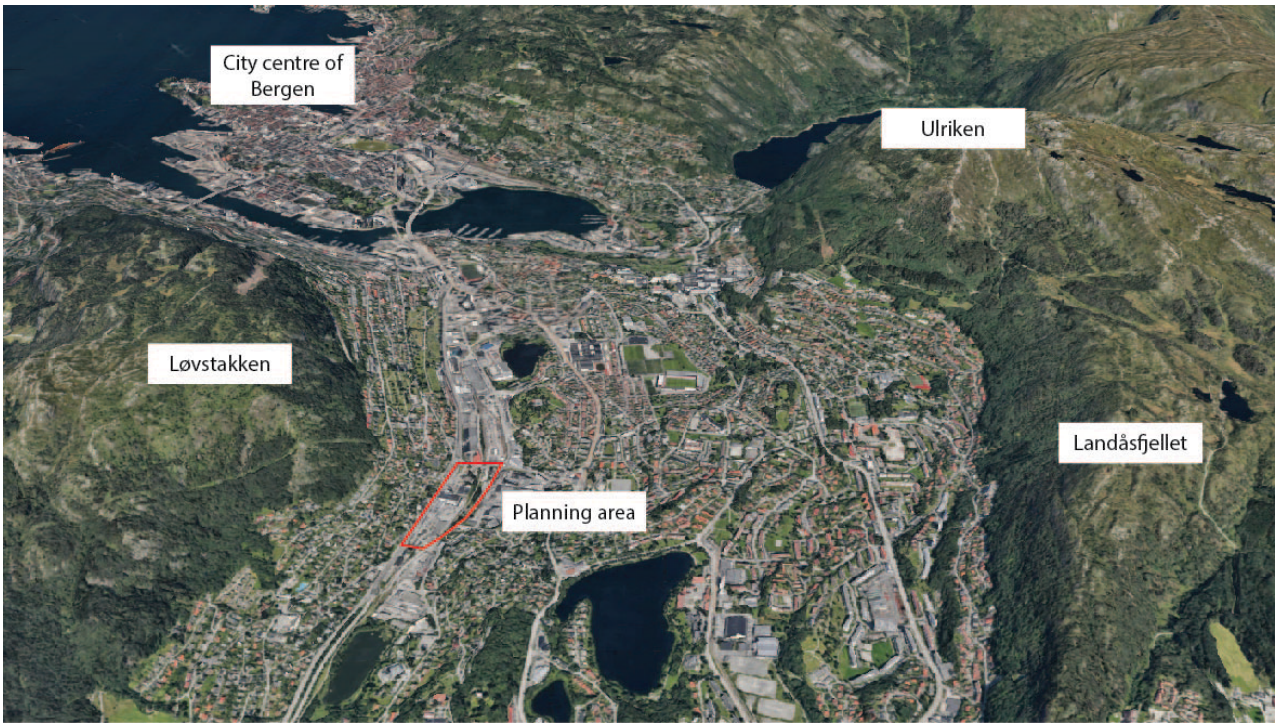


Figure 12 The placement of the planning area in Bergen. (Google Earth, edited by Simen Mandt, 2024).

Minde is in the district of Årstad in Bergen, which is to the southeast of the city centre of Bergen. Minde is located between Løvstakken to the west, Landåsfjellet to the east, and the districts Fana and Fyllingsdalen to the south.

Figure 13 The boundary of the planning area marked with black dotted line. (©2024 Norkart AS/Geovekst og kommunene/NASA, edited by Simen Mandt, 2024).

Figure 14 Pictures from the planning area. (Photos: Simen Mandt, 2024).

3.1.1 The area today

The planning area, fields S5a, S5b, and S9a, is mainly consisting of industry and parking. There are offices, used car shops, car workshop, stores such as grocery store, bike shop, jacuzzi shop, and a pizza restaurant. There is no housing inside of the project area.

The site is surrounded by the roads Fjøsangerveien and Kanalveien. In Kanalveien, the light rail tracks are located. In the bordering areas, there are an area with detached homes to west, industry, and shops in both north and south, and a big development area where new plans are ongoing to the east. The character of the area is highly influenced by the current industry.

Today, Mindemyren is under big transformations. Some of the plans are underway, and some have been completed. The old dairy factory has been demolished and are getting ready for a new combined industry and housing area. The light rail, Bybanen, have also been completed, with the surrounding roads. Along Kanalveien, a old river that used to run in the area, have been dug up.

The planning area have been affected by these changes. The building of Bybanen by the planning area have changed the driving roads and how people can get to the area. Bybanen did also bring a new station to the area, which is located to the south of the area. With these ongoing changes, there is also a change in the character of the area. The new walking- and bicycling paths, green areas, and the introduction of the light rail, Bybanen, have changed the area from being for cars and traffic, to an area for moving freely and more climate friendly transportation.

Figure 15 Pictures from the planning area. (Photos: Simen Mandt & Haakon Mandt, 2024).

3.1.2 Topography and landscape

The landscape in the area is very varied. The landscape is falling from west to east, going from 27 meter above sea level to 16 meter above sea level. From north to south the landscape is dropping in stages, going from 25 meter above sea level to 17 meter above sea level. This can be seen in the figures below.

The topography in the area is consisting by bigger buildings and parking spaces. The buildings are used for offices, shops, car sales, and car workshops. There are also a grocery store and a pizza restaurant in the area.

The buildings to the west is partly built into the terrain, as the pictures in figure 18 shows.

The parking spots are mostly filled up by the cars that is being sold in the car shops, and by the cars that is being fixed or has been fixed in the car workshop.

Figure 16 Markings in the area shows where the landscape has been measured. (©2024 Norkart AS/Geovekst og kommunene/ NASA, edited by Simen Mandt).

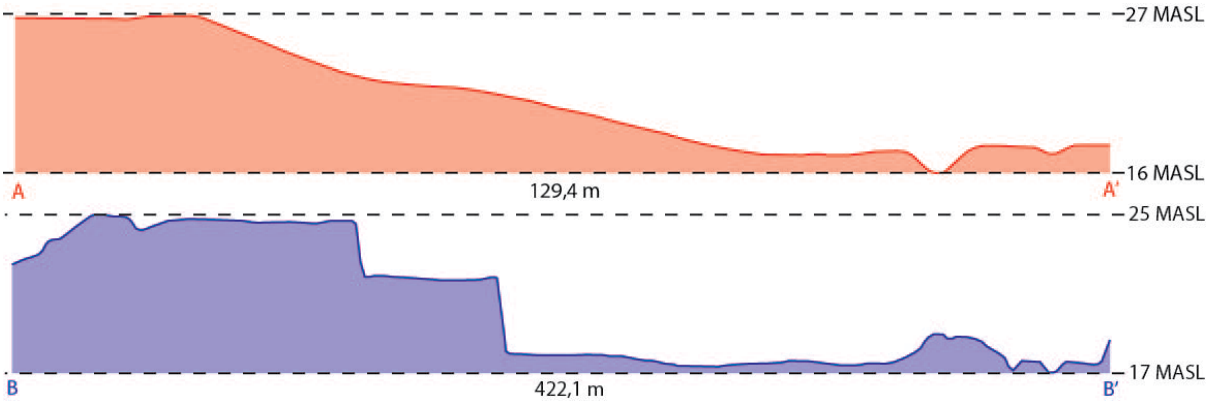


Figure 17 Height differences in the area going from the west to east (A-A') and north to south (B-B'). (©2024 Norkart AS/ Geovekst og kommunene/NASA, edited by Simen Mandt, 2024).

Figure 18 Pictures from the planning area showing some of the height differences in the area, and how the buildings are placed in the terrain. (Photos: Simen Mandt, 2024).

3.1.3 Outdoor activities and recreation

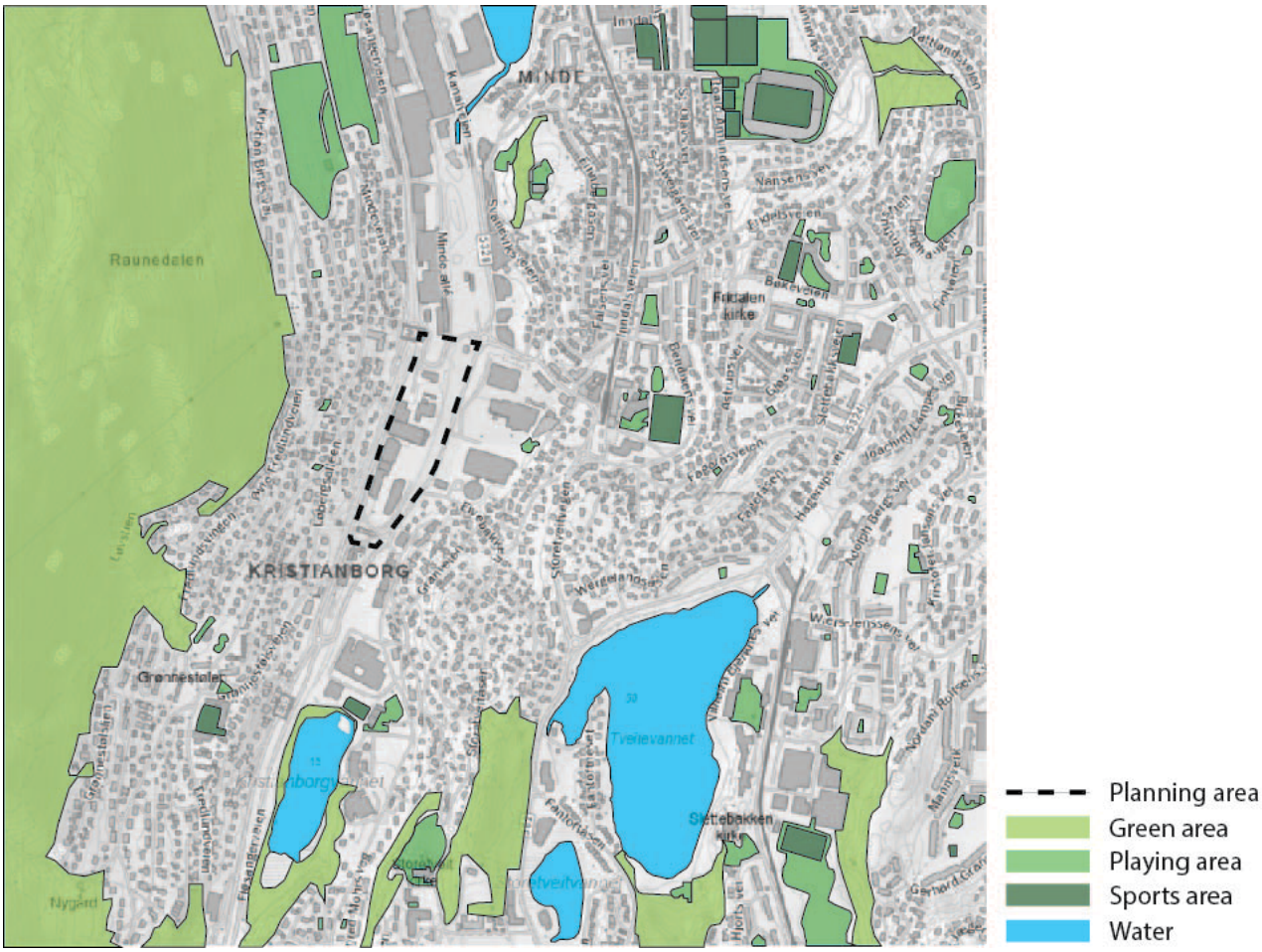


Figure 19 Outdoor activities and recreation around the planning area. (©2024 Norkart AS/Geovekst og kommunene/NASA, edited by Simen Mandt, 2024).

The area is in close distance to several green areas, playing areas, and sports areas. There are several hiking paths in Løvstakken and green areas around the close by waters Kristianborgvannet and Tveitevannet.

Inside the planning area, there are no green or blue elements. The whole planning area are consisting of asphalt and concrete buildings.

The ongoing transformation of Mindemyren and the introduction of Bybanen and the main bicycle path has implemented some blue and green elements to the planning area. On the border between the planning area and Bybanen, a part of the old river that uses to go between Solheimsvatnet and Kristianborgvannet have been rediscovered and implemented in the area.

In recent times, several old rivers that had been put into tubes underground have been dug out and resurfaced as open canals or rivers. There are several reasons for this, some of them are rainwater regulation, increased wildlife, and more blue and green factors to the area.

3.1.4 Traffic and Public Transportation

Figure 20 Exsisting driving roads and entery roads to the planning area which is marked. (©2024 Norkart AS/Geovekst og kommunene/NASA, edited by Simen Mandt, 2024).

Today, the car traffic is surrounding the planning area. The main mode of transport is cars, which reflects the usage of the area. The function inside the planning area is mainly focused on cars with the used car shops and the car workshop.

Road:	Traffic volume:	
Fjøsangerveien	31 600 - 40 000	AADT
Kanalveien	3500	AADT
Minde Allé	9000	AADT

Table 1 Traffic volume on the bordering roads measured in annual average daily traffic (AADT). (Statens vegvesen, n.d).

Accident category:	Amount:
Car	52
MC/Moped	12
Bicycle	8
Pedestrian	4
Total	**77**

Table 2 Number of traffic accidents on the bordering roads. (Statens vegvesen, n.d.).

There are 3 roads surrounding the area, Fjøsangerveien, Kanalveien, and Minde Allé. Fjøsangerveien is a part of the main entrance road to the south in Bergen, and Kanalveien has recently been reduced with the introduction of Bybanen. In 2022, the new light rail line going from the city centre of Bergen to Fyllingsdalen opened. This line goes through Mindemyren and there was built a new station called Kristianborg. This station is a combined light rail station and bus stop. The bus stop is in Fjøsangerveien while the light rail station us underneath this road. The bus stop and station are connected by a built-in staircase with a connected elevator.

Route	From	To	Frequency
Bybanen			
2	Bergen sentrum	Fyllingsdalen terminal	8 times per hour
Bus			
14	Bergen bus station	Fyllingsdalen terminal	Monday - friday: 2-6 times per hour* Saturday: 1-2 times per hour* Sunday: 1 time per hour
51	Bergen bus station	Birkelandsskiftet terminal	Monday - friday: 1-6 times per hour* Saturday: 1-2 times per hour* Sunday: 1 time per hour
67	Bergen bus station	Søråshøgda	Monday - friday: 2-4 times per hour* Saturday: 1 time per hour Sunday: 1 time per hour
82	Grønnestølen	Wergeland	Monday - friday: 1-2 times per hour* Saturday: 1 time per hour Sunday: 1 time per hour
600	Bergen bus station	Halhjemsmarka	Monday - friday: 2-7 times per hour* Saturday: 1-4 times per hour* Sunday: 1 time per hour

Table 3 Public transport departures from Kristianborg station. (Skyss, n.d.).

** Depends on the time of the day, some times are more frequent than others.*

Figure 21 Pictures of the Kristianborg station and bus stop on the planning area. (Photos: Simen Mandt, 2024).

This high frequency in public transit and the high traffic volume results in a high amount of traffic noise. The traffic noise has in not been an issue because of the usage of the planning area, but this could become an issue for the future and the plans that are being made.

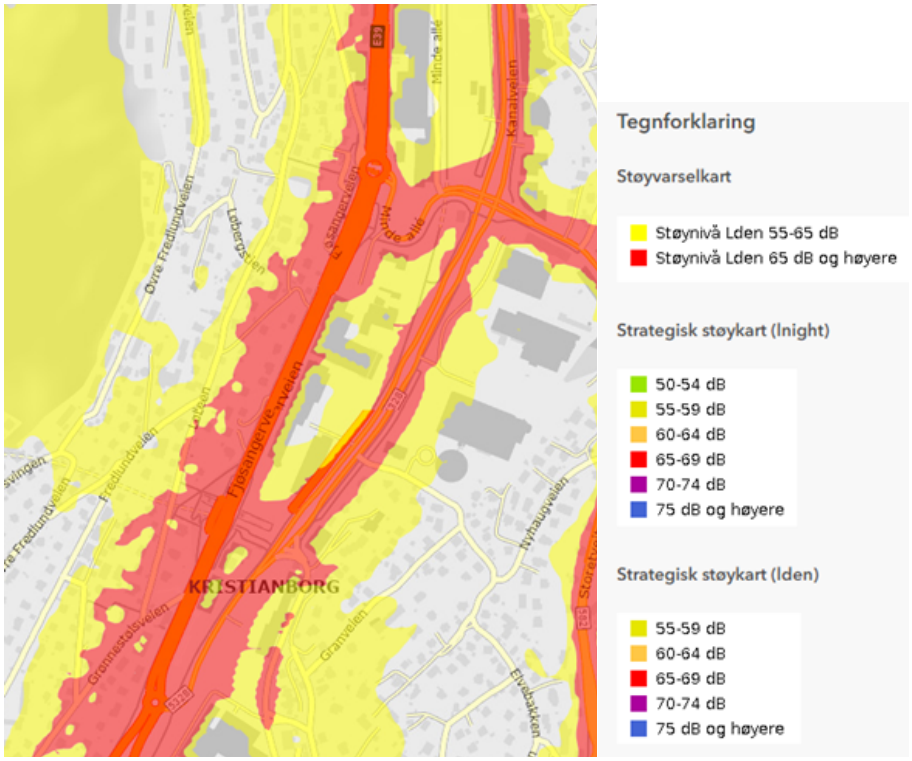


Figure 22 Traffic noise in and around the planning area. (Statens vegvesen, n.d.)

3.1.5 Surrounding Plans and Area Regulations

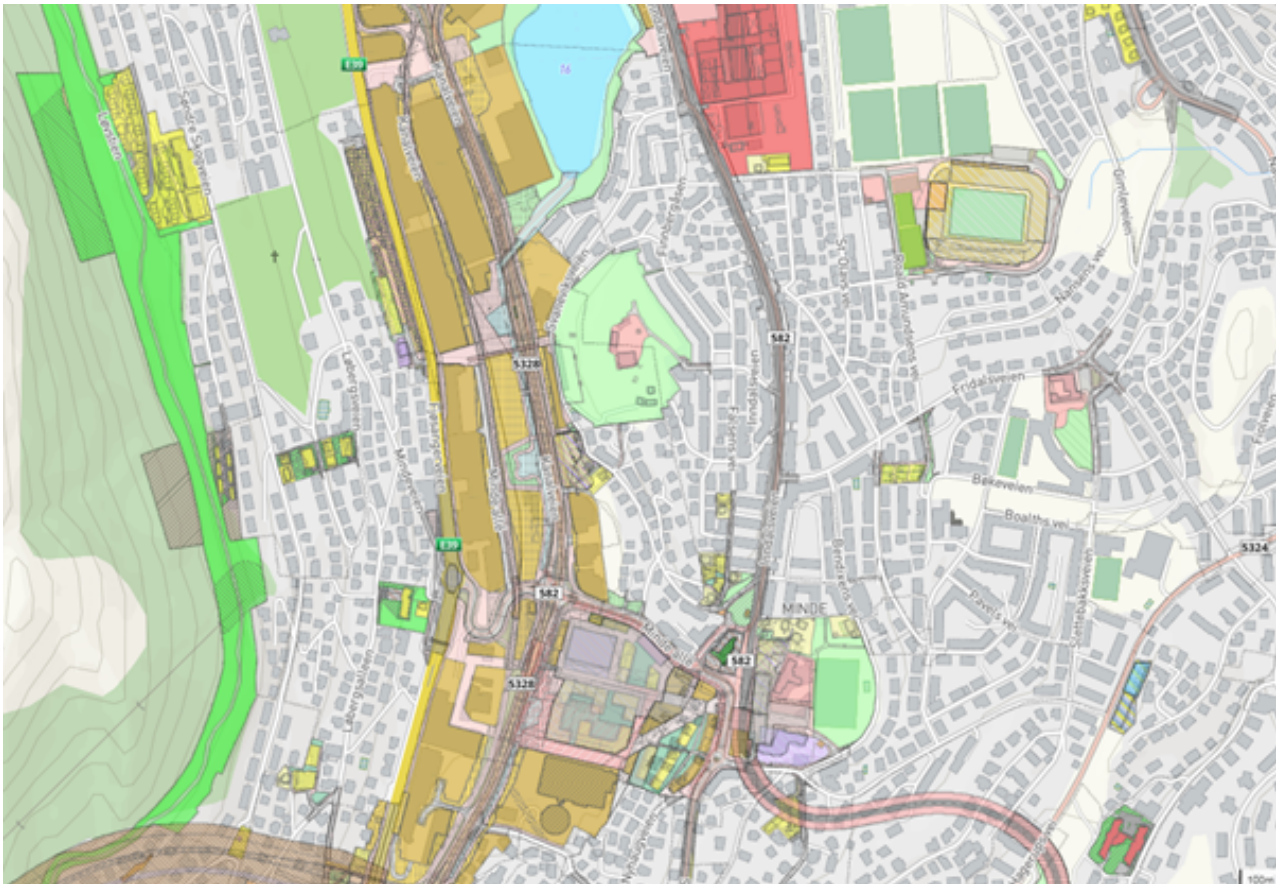


Figure 23 Current regulation plans in the area. (©2024 Norkart AS/Geovekst og kommunene/NASA).

In 2014, the area regulation plan for Mindemyren was decided. The plan says that the public infrastructure will improve the accessibility of the area and facilitate high utilization within the planning area for workplaces, housing, and business.

The main goals for the area regulation plan are to facilitate 23 000 jobs and 3000 residents. The plan wants to promote a future identity for the area. The goals and possibilities of the plan can be summarized in 3 main points:

- **Urban Transformation:** The area has a high degree of freedom. This provides opportunities to organize buildings, land use, and outdoor spaces in such a way that urban qualities emerge. Real urban quality will depend on maintaining varied land use, spatial sequences, architectural quality, good meeting places, and recreational areas.
- **Network:** A more and intricate travel pattern requires that the public transport offer is differentiated. At Mindemyren, a good connection of several urban tram lines, buses, and a main bicycle rout can be established. This generally strengthens the use of public transport but will also enhance the attractiveness of the area surrounding the transport hub.
- **High Utilization:** The area is suitable for a high degree of utilization in terms of landscape form and public transport accessibility. A concentration of workplaces in an urban context provides the best foundation for services and retail that also benefit residents and the general public.

(Bergen kommune, 2021).

There are no active plans for the planning area, but there are active plans surrounding the planning area. Some of these are:

- **Bergensmeieriet, fields S8/S10:** The regulation plan was decided in May 2022. The plan facilitates for 600 housing, 13 000 m2 commercial area, and a public square. This area will consist of around 80% housing and 20% commercial.
- **Minde allé 27, 43, 49 og Fjøsangerveien 90, field S11:** A big planning area which includes a park, housing in east, and commercial in west and south. This area will consist of around 80% commercial and 20% housing.
- **Kanalveien 117 A-B og 119, field S3 and S4:** The plan will facilitate 34 000 m2 commercial area and around 32 housing in S3, and around 115 housing in S4. S3 will consist of 95% commercial and 5% housing, while S4 will consist of 100% housing.
- **Kanalveien 92-98 m.fl., field S6:** This plan consists of 6 buildings with commercial on the ground floor and a public square. This will consist of around 95% housing and 5% commercial.

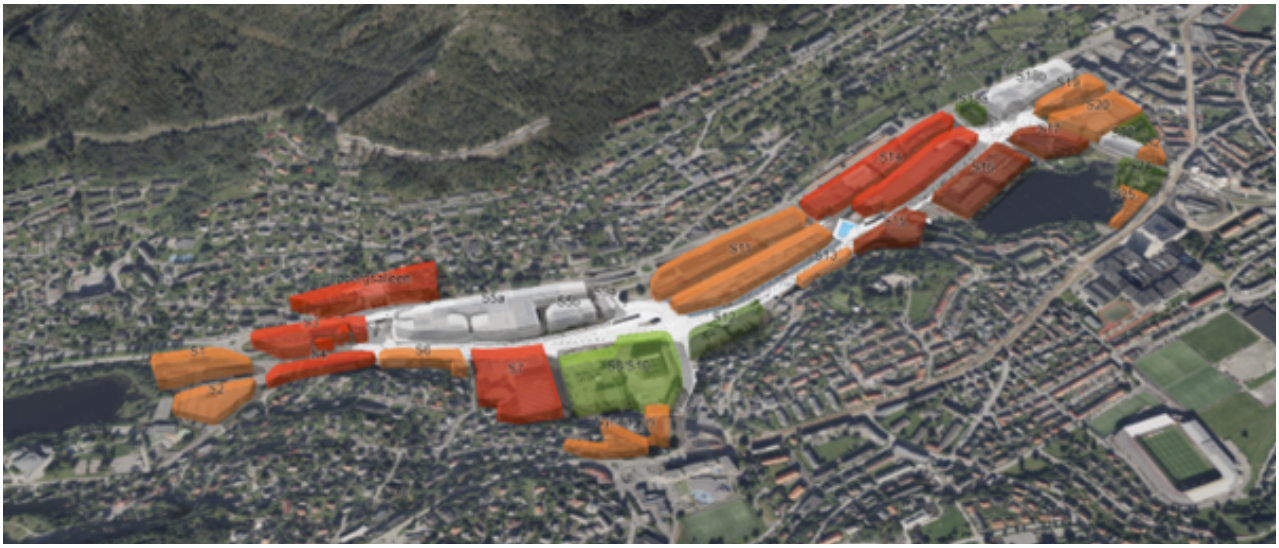


Figure 24 Ongoing planning in Mindebyen. (Bergen kommune, 2024).

4. Historical development

The planning area is called Mindemyren, which is directly translated to Minde Moor or Minde Bog. Minde used to be a wetland in between the two waters, Solheimsvatnet and Kristianborgvannet. As already mentioned, there used to be a river going between the two waters, which is now being dug up and resurface.

Årstad used to be a municipality of its own and had a close connection to Bergen. From the 1850's and the industrialization, this connection grew even stronger. The strong regulations in the city and the limited space, pushed the industrial business such as fabrics and workshops to the nearby areas such as Årstad. This industrial business was important for the city of Bergen, which made the connection and communication between Bergen and Årstad better. This resulted in a railway and tram between the areas.

The industrial expansion led to a quick population growth in Årstad. The population grew from around 1400 people in 1865, to around 4700 in 1900, to over 10 000 in 1914. People in Bergen also started to look outwards to the districts, such as Årstad, for new areas to develop new housing. There was a population growth in Bergen, which led to Bergen having to expand. There was limited space in the city, and it was both spacious and cheaper to build in the districts. (Bergen byarkiv, 2015).

In 1893 started the conversation about making Årstad a part of Bergen. The industrialization and the new development had impacted infrastructure. The infrastructure, renovation, streetlights, quality of water, and health was much poorer in Årstad than what it was in Bergen. The people in Årstad meant that this was because of the industrialization and that the city of Bergen was to blame. For many years nothing happened, mostly because of poor economics in Bergen. (Bergen byarkiv, 2001).

In 1908 the economics in Bergen started to grow. New houses were being built, which led to the municipality realizing that there was not enough space in the city, and that they needed to expand to be able to grow as a city and to be able to grow economically. Finally, July 1st, 1913, The Storting (the Norwegian Assembly) decided to merge Bergen and Årstad. This happened July 1st, 1915. (Bergen byarkiv, 2015).

Figure 25 Bergensmeieriet 11.08.1964. (Widerøe's Flyselskap A/S. Widerøesamlingen, Universitetsbiblioteket i Bergen).

Figure 26 The old NRK building in Mindemyren. (Mindemyren, 2015).

In 1939 the biggest dairy factory in Bergen merged and created a big factory called Bergensmeieriet. This factory was in Minde. In the 1950s, Bergensmeieriet had between 80 and 90 outlets in and around the city centre of Bergen. (Arkivest, 2020). From 1992, the biggest dairy factory in Norway, Tine, moved in to Bergensmeieriet, where they produced dairy products until they moved to a new facility at Flesland in 2019. (Advansia, n.d.).

In 1991, NRK Hordaland moved into their new offices in Mindemyren. (NRK, 2001). NRK Hordaland was NRK's district office in Hordaland, that used to be a county in the west of Norway until they merged with Sogn og Fjordane to create Vestland county. After the merger of the counties, the district offices merged as well, and moved to Førde. NRK is a Norwegian state-owned broadcasting company. (NRK, 2009).

5. Description of the proposed plan

The purpose of the plan is to develop the area from an area with offices, industry, and cars, to an area for housing, walking, and social spaces.

In the planning proposal it is facilitated for at least 200 apartments, divided in 7 apartment buildings. Most of the buildings will be places to the east or the west in the planning area to reduce noise from the traffic coming from Fjøsangerveien and Kanalveien.

The buildings BB1 – BB3 will be places to create a big common recreational area in the middle. The buildings will act as a noise wall from the traffic, and as a divider to the parking area P1 and business in FOR1. BB1 – BB3 will have three storeys which is 3 meters tall and consist of at least 70 apartments.

The placements of the buildings B/F1 – B/F4 will create a square in the middle. B/F2 and B/F4 will be placed to the west and will block noise from Fjøsangerveien, B/F1 and B/F3 will be placed to the east and partly to the north to block noise from Kanalveien and to block normal traffic from KV2 to be able to get into the square.

All the buildings B/F1 – B/F4 will have an open facade on the first floor where facilities, shops, cafes, and so on will be places. This will create a vibrant square outside, where there are places multiple areas where people can stay, sit down, play, and relax. B/F1 – B/F4 will have four storeys, where the first floor will be 5 meters tall, and the floors above will be 3 meters tall. The three floors will consist of at least 130 apartments.

There is a big height difference going from the east to the west. This will be solved by placing the buildings BB1, B/F1, and B/F3 inside the ground making the first floor partly under the ground, while the apartments above will have a view to both the east and west.

Zoning purpose	**Size (m2)**	**Comments**
Buildings and facilities		
Residential housing - block housing	3 953	
Retail shops	2 554,7	
Outdoor recreational area	8 850,5	
Resident/retail	7 101,6	
Transport facilities and technical infrastructure		
Driveway	777,7	
Square	1 756,3	
Pedestrian/bicycle path	2 235,8	
Pedestrian street	4 502,4	
Other road land - green space	6 524,5	
Main bicycle network	2 772,6	
Parking	1 287,4	Most of the parking will be done under ground. Parking size under the ground is 4 375,4 m2.
Green infrastructure		
Blue/green infrastructure	1 950,3	
Sum	**44 266,8**	

Table 4 Zoning purposes and their sizes in the planning proposal.


AVG1
AVG2
AVG3
AVG4
AVG5
AVG6
AVG7
AVG8
AVG9
AVG10
KV1
KV2
KV3
P1
P2
FOR1
FOR2
BB1
BB2
BB3
BG1
BG2
BG3
HS1
HS2
UTE1
UTE2
UTE3
UTE4
UTE5
UTE6
UTE7
UTE8
GT1
GT2
GT3
B/F1
B/F2
B/F3
B/F4
GG1
GG2
GG3
GG4
GG5
GG6
GG7
GG8
GG9
GG10
GS

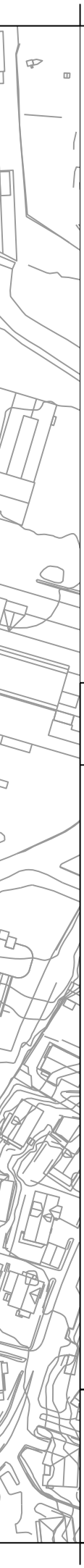


Figure 27 Spatial planning map. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt, 2024).

Tegnforklaring

Reguleringsplan PBL 2008

§12-5. Nr. 1 - Bebyggelse og anlegg

- BB — Residential development - apartment buildings
- FOR — Stores
- UTE — Outdoor recreational area
- B/F — Residential/commercial

§12-5. Nr. 2 - Samferdselsanlegg og teknisk infrastruktur

- KV — Driving lane
- GT — Lane
- GS — Pedestrian/cycle path
- GG — Pedestrian path/area/zone
- AVG — Other road space - green area
- HS — Main bicycle network
- P — Parking

§12-5. Nr. 3 - Grønnstruktur

- BG — Blue/green infrastructure

Linjesymbol

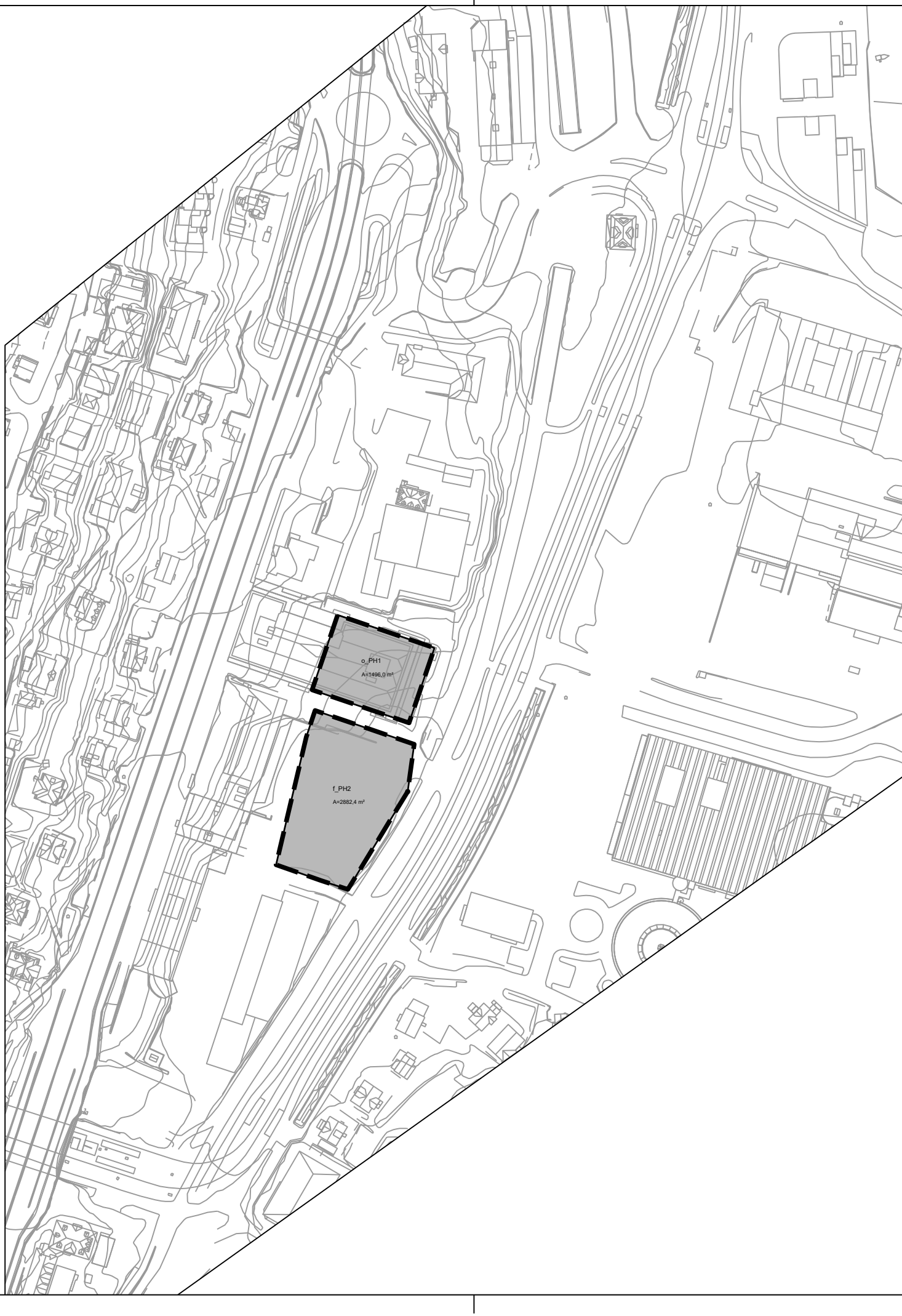
- Plan boundary
- Purpose boundary
- Boundary limit
- Buildings included in the plan
- Buildings that are expected to be removed
- Regulated parking area
- Tunnel

Equidistance: 1m

Map scale: 1:2000

0 25 50m

N


o_PH1
A=1496,0 m²
f_PH2
A=2882,4 m²

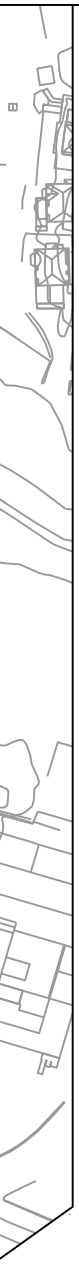


Figure 28 Spatial planning map of the under ground parking. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt, 2024).

Tegnforklaring

Reguleringsplan PBL 2008

§12-5. Nr. 2 - Samferdselsanlegg og teknisk infrastruktur

PH — Parking garage/facility

Linjesymbol

- Plan boundary
- Puropse boundary

Ekvidistanse: 1m

Kartmålestokk: 1:2000

0 — 50.0 — 100m

N

5.1 Description

5.1.1 Building Heights

Sector	Maximum eaves height	Maximum gross floor area (GFA) (m2)	Maximum number of floors
BB1	+ 36	768	3
BB2	+ 34	616	3
BB3	+ 34	672	3
FOR1	+ 32	546	1
FOR2	+ 26	1496	1
B/F1	+ 33	1456	4
B/F2	+ 32	1231	4
B/F3	+ 33	768	4
B/F4	+ 31	787	4

Table 5 Building heights and number of floors in the planning proposal.

5.1.2 Degree of Utilization

The building area (area regulated for construction and facilities) is 13 609,3 m2. In the proposed plan, a maximum utilization is ensured at 8 340 m2. This corresponds to a site utilization of 61% gross floor area (BRA).

The degree of utilization is in accordance with the guidelines in the municipality plan, which recommend between 30% and 120% gross floor area (BRA) in outer densification zones. (Bergen kommune, 2019). To ensure high-quality densification, the focus has been on securing a good living environment for new residence. The proposed density is set to incorporating quality requirements set in higher-level plans.

5.1.3 Value Creation and Employment

The value that the proposed plan gives is the new housing, green areas, good and safe walking and cycling paths, social areas, seating areas, and the new industries and shops.

In the plan, the new facilities, cafes, and shops will bring many new jobs to the area. The plan will create new jobs, allowing new residents to work in the same area where they live, and have a walkable distance to their jobs.

Figure 29 Proposed plan. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt, 2024).

5.1.4 Traffic Solution

There has been made a mobility plan for the planning proposal, which is included in the appendix.

The main take-away is that the mobility plan for Mindebyen Fields in Bergen aims to reduce car usage and promote sustainable travel modes. The plan includes improvements to pedestrians and cycling infrastructure, as well as enhancements to public transportation services. The goal is to increase walking, cycling, and public transportation usage, while decreasing reliance on cars. The plan also includes provisions for parking, with an emphasis on providing more spaces for bicycles compared to cars. Overall, the plan aims to create a more sustainable and accessible are for residents and visitors.

Additionally, the area benefits from Fyllingsdaltunnelen, the world's longest walking and cycling tunnel, which enhances connectivity for pedestrians and cyclists. The goal is to shift away from car usage and towards more sustainable travel modes within the planning area.

5.1.5 Accessibility

The accessibility within the planning area is well-supported by existing infrastructure. The area has good connectivity through public transit, cars, and bicycles. It is located 5 km from Bergen's center and benefits from the Kristianborg station, which provides frequent light rail and bus service. The presence of Fyllingsdaltunnelsen also provides accessibility for non-motorized traffic. Moreover, there are nearby schools and kindergartens within a 15-minute walking distance. Overall, the planning area is designed to provide convenient and accessible transportation options for residents and visitors.

The planning area has access for special traffic, such as emergency vehicles and delivery of goods, from both Fjøsangerveien and Kanalveien. These vehicles will be able to use the walking paths which is dimensioned for bigger vehicles to be able to drive on them. This will only be able to do on special occasions, all other traffic will be blocked. For normal traffic to the area, both visitors and inhabitants, there will be access to the area in o_KV1 and o_KV2 which is both leading directly to parking areas and garages.

5.1.6 Solution for Motorists

There is no car roads inside the planning area but the walking and cycling paths are designed to be used as driving roads for special traffic such as emergency vehicles, delivery of goods, garbage trucks, and for inhabitants moving in or away from the apartments.

The planning proposal includes several entrances for vehicles within the planning area. These entrances includes from Minde Allé in the north and Kanalveien in the east, which will provide access for personal vehicles. Alongside these entrances, parking spaces are planned to accommodate both private parking and visiting parking. The entrance from Kanalveien leads to underground parking garages.

In addition to the main entrances, there are two entrances from Fjøsangerveien. These entrances will be partially blocked off and will only be accessible to emergency vehicles, delivery trucks, garbage trucks, and for special occasions such as moving in or out of the apartment buildings.

The drivable entrances from Fjøsangerveien are designed to ensure that emergency vehicles have good access to the entire planning area. These entrances are strategically places to facilitate efficient emergency response.

Overall, the planning proposal includes a network of drivable roads in and around the area, with designated entrances for vehicles to ensure accessibility and functionality within the planning area.

Figure 30 Illustration to show existing driving roads and where the entrance points for personal vehicles and special vehicles are. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt, 2024).

5.1.7 Parking Solution

The parking in the area is mostly solved in parking garages to get as many cars as possible away from the landscape and away from the social areas. The municipality of Bergen has demands of how many parking lots there should be per housing. For this area there needs to be at least 1 parking spot per home. In addition to this, there is also demands of how many parking spots there needs to be for a grocery store.

The garages will be located under the grocery store in FOR2 and under ground under BB7, f_UTE3, and o_GG7. Under FOR2 the garage will be used for visitors, customers, and for the people living there. The second garage will be for the people living in BB4 – BB7.

The bike parking in the area is both in the garages for the people living in the area, and several areas on the ground. Around the city forest, the square, and along the main bicycle lane there will be many parking spots for the bikes.

There will be 120 car parking spaces, and 300 bicycle parking spots in the planning area.

The main reason to choose to include cars and parking areas for cars is the planning strategy in the municipality of Bergen. It is also important to facilitate for people who needs a car to get around, for people visiting to do shopping, and people moving in to and from the area. This helps create an inclusive area where everyone can be and where everyone is welcome.

In Norway there were 689 169 electric cars registered in the end of 2023, which is 24% of all cars in Norway. This is a big change from 2016, when there was only 97 532 electric cars registered. (SSB, 2023).

There are several reasons for people to buy and drive electric cars in Norway, these are:

- **Government incentives:** The Norwegian government promotes electric cars by exempt the buyers from import taxes and VAT, reduce or free the tolls, let them drive in bus lanes, and offering free parking.
- **Charging infrastructure:** Norway has invested in building a network of charging stations, decreasing the distance between each charging station.
- **Financial benefits:** In Norway there are lower operation costs compared to fossil fuel vehicles. Electricity is cheaper than gasoline or diesel, and electric cars require less maintenance.

(Recharge, n.d.).

Electric cars is a part of the environmentally friendly change that this area wants to promote and be a part of. There will be a focus on these electric cars, offering designated areas where they can park and recharge their cars. By doing this, the area invites more people to use electric cars over fossile fuel cars and will still promote environmentally friendly modes of transport even though there are many car parking areas in the proposed plan.

Figure 31 Charging station in Gaupne, a small township in the west of Norway.
(Photo: Luster kommune, 2022).

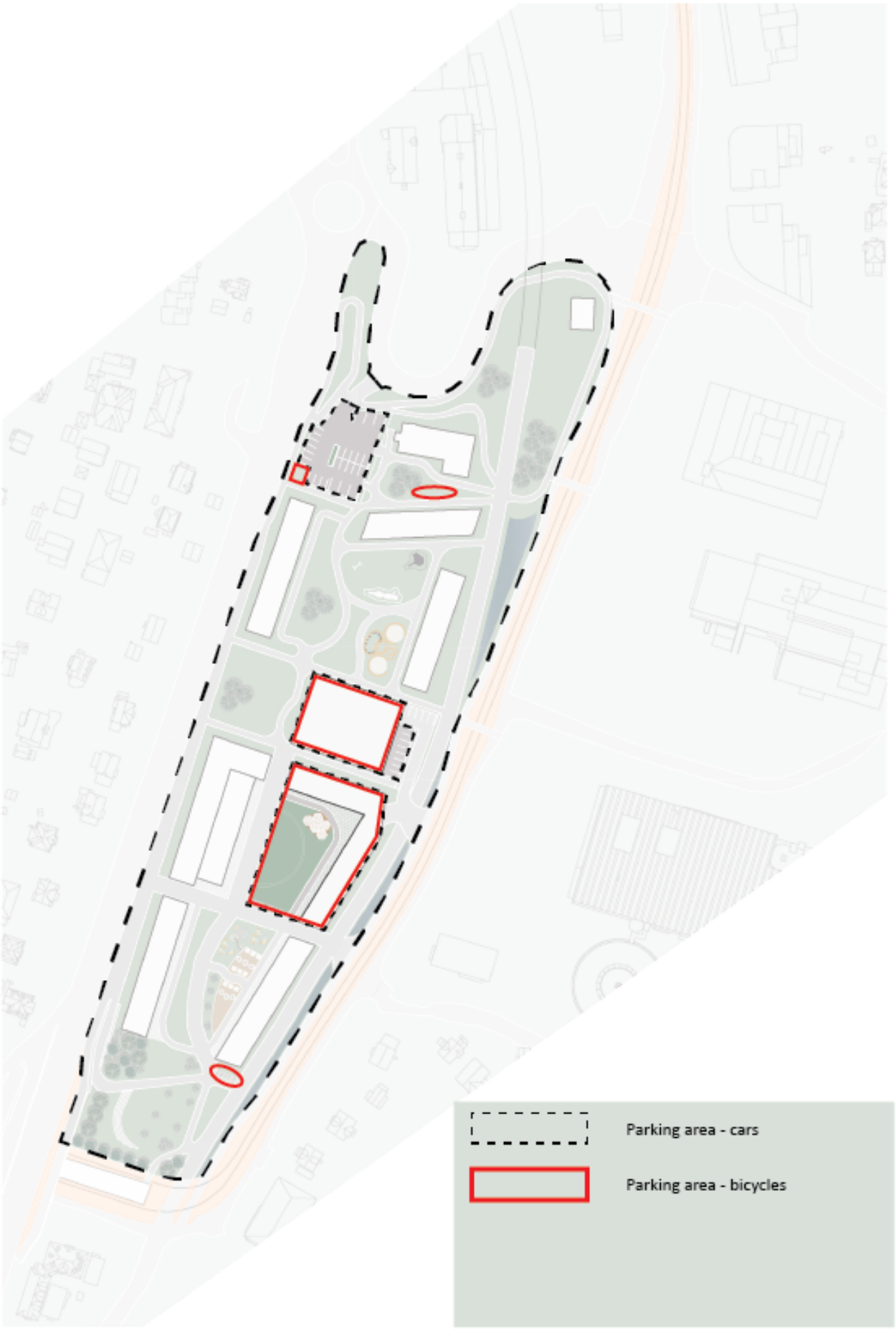


Figure 32 Placements of the car and bicyle parking in the proposed plan. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt, 2024).

5.1.8 Private Outdoor Recreational Area

The planning proposal facilitates for private outdoor recreational areas in balconies. Every apartment will have their own private balcony that is faces towards East, West, or South to ensure that every balcony will have sunlight during the day. The balconies will be dimensioned to be at least 10 m2.

5.1.9 Common Outdoor Recreational Area

In the planning proposal it is regulated around 8 175 m2 common outdoor recreational area. Inside these areas there will be established walking paths to ensure safe access to the housings and important functions, social areas for the inhabitants and visitors, and green areas.

By the Bybane station it will be established a “city forest” with recreational areas, social areas, options to sit down, and an area for temporary use. This area could be used for food trucks, social meetings, gatherings, or anything else. The “city forest” will include a form of amphitheatre with a staircase where people can sit, it will also include trees that is combined with benches, and open area for these temporary and recreational uses.

The buildings in BB4 – BB7 is placed around a common outdoor recreational area. This area will be common for both visitors and inhabitants.

5.1.10 Technical Infrastructure

The planning area has walking and bicycle paths both inside and on the outside which can be used as drivable roads for emergency vehicles and staging areas for fire engine during a fire.

In the west in the planning area, along the road Kanal-veien, the old river has been dug out and resurfaced and creates an open canal. The landscape is falling towards this open canal and will the main source for stormwater management.

Figure 33 Examples of integrated seeting combined with the trees and how these works as dividers when many people use the area. This is from the main train and bus station in Stavanger, Norway. (Photos: Simen Mandt, 2024).

Figure 34 Outdoor recreational areas in the proposed plan. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt, 2024).

5.1.11 Solution for Pedestrians and Bicycles

The solution for pedestrians and cyclists inside the planning area includes various measures to enhance their mobility and safety. The planning proposal emphasizes the creation of excellent pedestrian and cycling paths that are integrated with existing routes, such as Fyllingsdaltunnelen along Kanalveien. These paths aim to provide convenient and accessible routes for pedestrians and cyclists to navigate within the area.

Additionally, the plan focuses on improving the overall infrastructure to support non-motorized modes of transportation. This includes the development of well-designed pedestrian walkways and dedicated cycling lanes. The aim is to create a safe and comfortable environment for pedestrians and cyclists, encouraging them to choose walking or cycling as their preferred means of travel.

By prioritizing pedestrian and cycling infrastructure, the plan aims to increase the share of walking and cycling in the modal split. This will not only promote sustainable travel options but also contribute to reducing congestion and improving the overall liveability of the area.

Figure 35 Examples of how walking paths and bicycle facilities is formed on public transit stations. The bicyle facilities are from the train station in Hirtshals, Denmak, while the walking path is from the bus station in Kristiansand, Norway. (Photos: Simen Mandt, 2024).

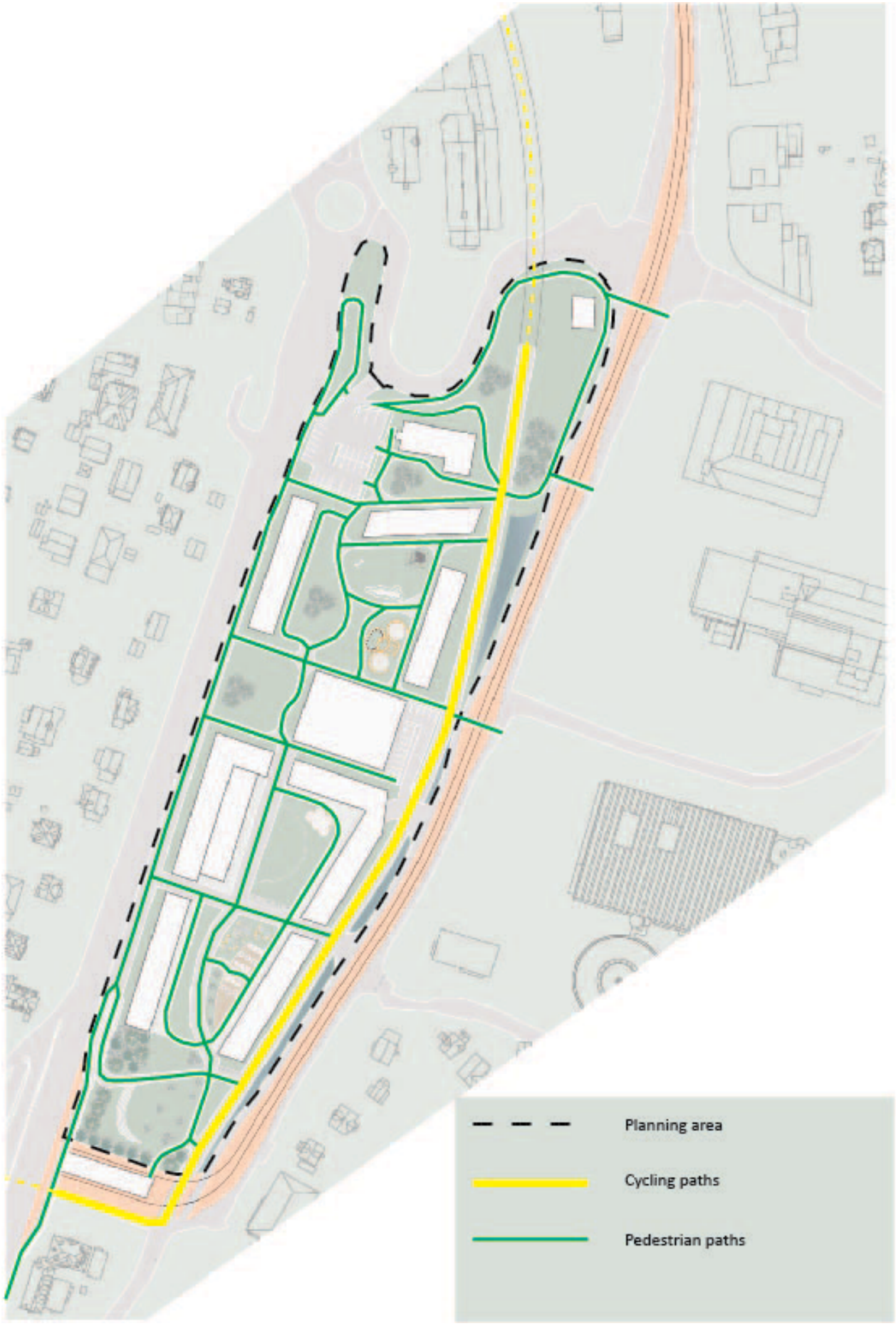


Figure 36 Pedestrian and bicycle paths through the proposed plan. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt, 2024).

5.2 Effects of the Planning Proposal

5.2.1 Overall Plans

The planning proposal is largely taking care of the vision that the municipal spatial plan for Bergen has. The planning proposal is facilitating for social areas, focused on sustainable transportation, improving the blue green infrastructure, establishes biking and walking paths, and it is strengthening the city district as a distinctive area and society.

5.2.2 Climate

With 200 apartments there is a demand from the municipality that there should be at least 8 000 m2, or 40 m2 per apartment, of common outdoor recreational area, where maximum 50% can be on the roof or a balcony. During spring equinox, half of the common outdoor recreational area will have at least 4 hours of sunlight.

The buildings are placed in a way that will allow sunlight to get into the common outdoor recreational areas that is in the centre, surrounded by the apartment buildings. Building placements will also act like wind covers for wind coming from North, West, and East.

A wind rose for Bergen shows that there is most wind coming from East and West, and some from North. (Meteoblue, 2024).

5.2.3 Noise

The area is located between Fjøsangerveien and Kanalveien. Fjøsangerveien is a main access road to the city centre of Bergen, and therefor generates a lot of traffic, which are generating a lot of noise. The light rail, Bybanen, is moving in the middle of Kanalveien, splitting the road in two. The introduction of Bybanen has reduced the traffic in Kanalveien but has increased the noise coming from this road.

Today the noise level inside the planning area is 65 dB around the roads, and up to 55-65 dB inside the area.

To be able to have an area with less noise pollution from the roads, the buildings on the area are placed along the roads, making a wall to reduce the noise levels in the middle where there are common outside recreational areas and squares are.

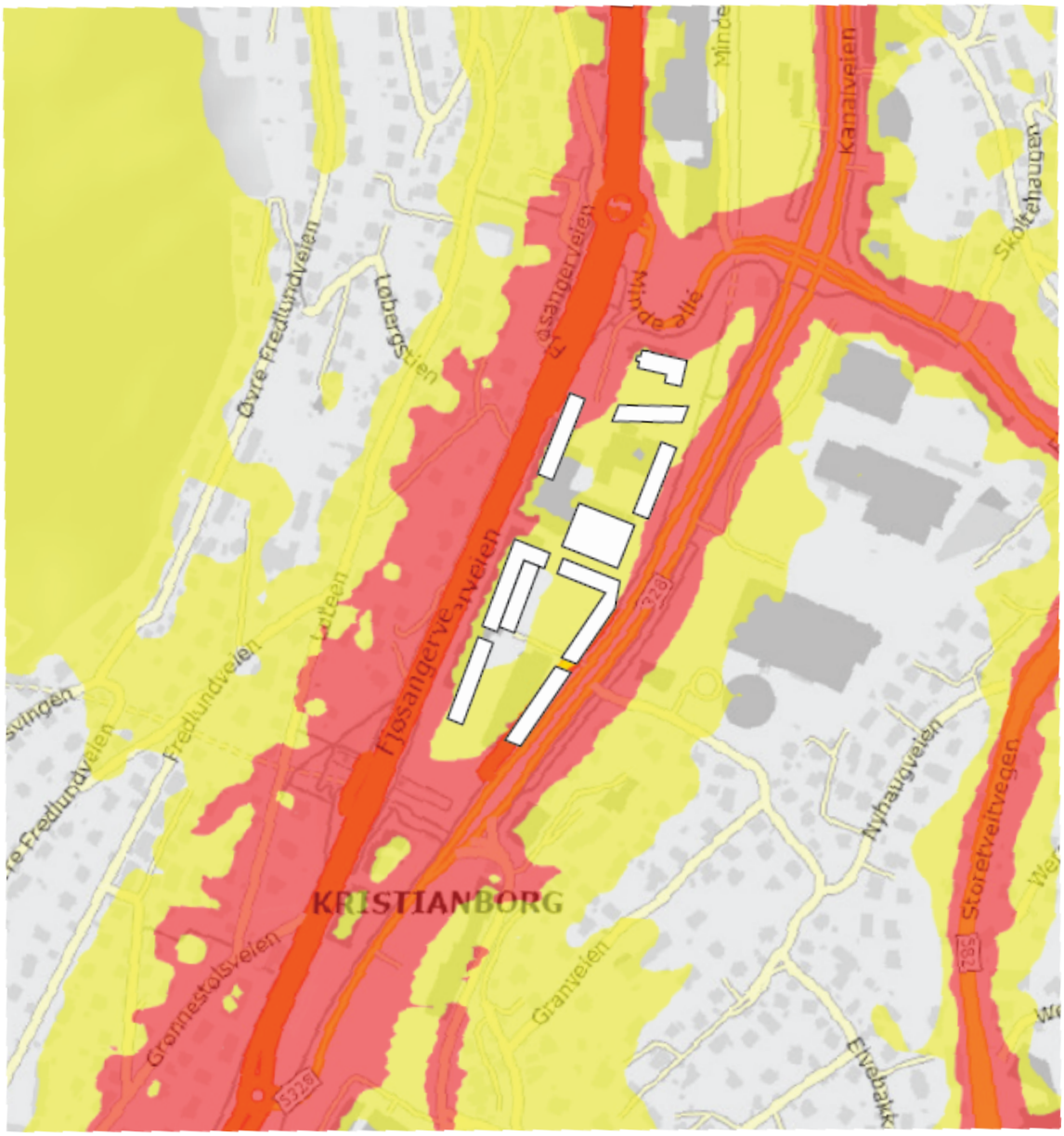


Figure 37 Illustration showing how the buildings are placed to create a wall for the traffic noise coming in to the area. (Statens vegvesen, n.d., edited by Simen Mandt, 2024).

5.2.4 Universal Design

There are challenges connected to universal design in the planning proposal because of the landscape and height differences in the area. Alle the walkable roads will have an angle of maximum 8%, which will make them universal for everyone walking, people in wheelchairs, and for strollers. They will also be able for emergency vehicles to drive on.

All housing in the planning proposal will be apartments that is accessible by elevators to all floors. The apartments will be in one story. This means that all the housing in the area will have a universal design.

5.2.5 Children and Young People's Interests

Inside of the planning area there are several recreational areas, free play areas, areas
where children and young people can play, and areas where they can socialize and relax. These areas can be seen in the illustration of outdoor recreation and local environment.

Inside the planning area there are good walking paths. These will be safe with no motorized vehicles and will be well lighted during the night. The walking paths will make a safe walking area within the area and through the area.

In the mobility plan, the access to nearby kindergartens and schools are explained. There are one school and three kindergartens within a 15-minute walking distance, where there is needed to cross a road to get to it. Other than this crossing, there is safe walking paths to these kindergartens and school.

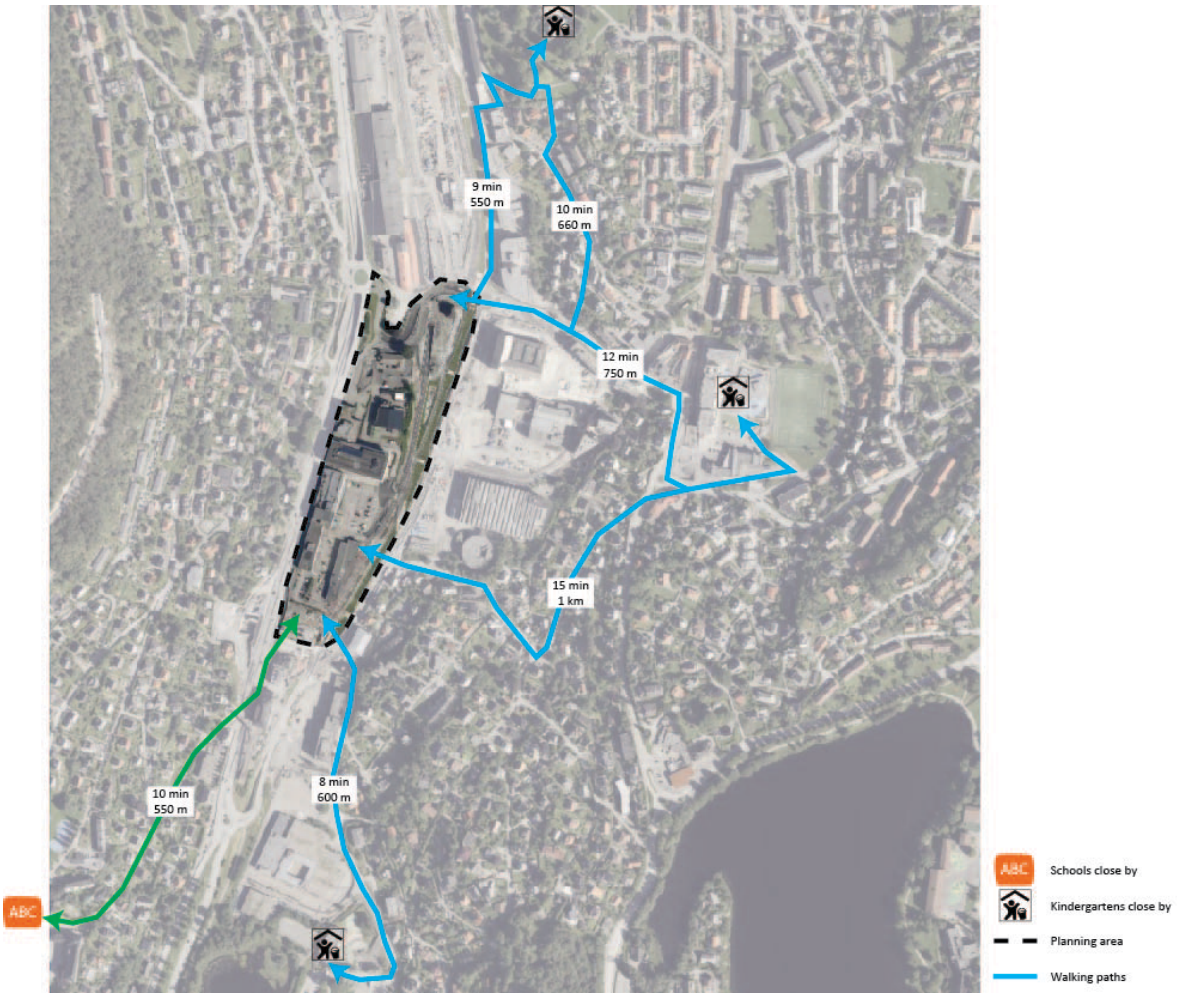


Figure 38 Distance to close-by schools and kindergartens. (©2024 Norkart AS/Geovekst og kommunene/NASA, edited by Simen Mandt, 2024).

5.3 Masterplan

Figure 39 (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt, 2024).

5.3.1 ”City Forest”

The ”City Forest” in the Mindebyen plan is envisioned as a park-like areas that focuses on green elements, plants, and trees, providing a natural environment for residents and visitors. It is designed to offer various seating options, including a plateau with amphitheatre-style stairs integrated into the terrain. Planter boxes with trees will be strategically placed to serve both as greenery and as benches for additional seating. The area beneath the stairs is intended to be a versatile open space that can accommodate activities, events, and temporary structures such as food trucks and gatherings.

The “City Forest” is situated near the Kristianborg light rail station and is part of a larger urban development that emphasizes social areas, recreation, and connectivity, creating a vibrant community space outside of the city centre of Bergen.

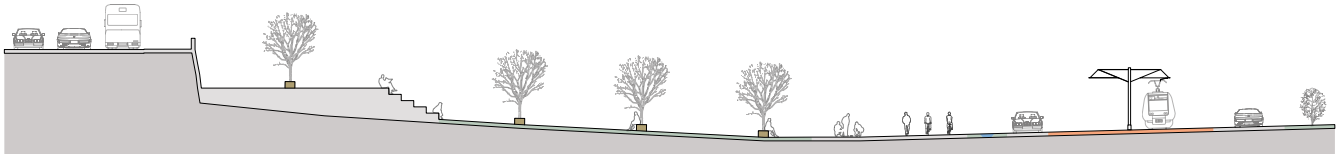


Figure 40 Section A-A', ”City Forest”. (From Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt, 2024).

Reference Photos

Figure 41 Example of a plateau with amphitheatre-style stairs integrated into the terrain. (Pintrest, n.d.).

Figure 42 A temporary food truck for the open space beneath the stairs. (Photo: Stine Kjølby Christensen, 2017).

Figure 43 Plant boxes with trees that serves both for greenery and benches. (Photos: Simen Mandt, 2024).

5.3.2 ”Square”

The “Square” in Mindebyen is planned to become a vibrant and inclusive central area that acts as a small city centre outside of Bergen’s city centre. It is surrounded by buildings with mixed usage, where the ground floor feature open facades containing facilities, cafes, and shops. The design aims to foster movement, social interaction, and a sense of community.

The “Square” is strategically placed to reduce noise from the nearby highly trafficked road in Fjøsangerveien and light rail in Kanalveien, with buildings to the west and east acting like a noise barrier. These buildings also integrate into the steep terrain, utilizing the landscape to create a flat square that receives ample sunlight throughout the day.

Within the “Square”, there are numerous seating and activity areas, continuing the theme of social spaces from the adjacent “City Forest”. A natural pathway leads from the Kristianborg station into the “Square”, providing open areas and seating along the way. The “Square” is designed to be a lively and social hub that encourages people to gather, relax, and enjoy the amenities offered by the surrounding commercial spaces.

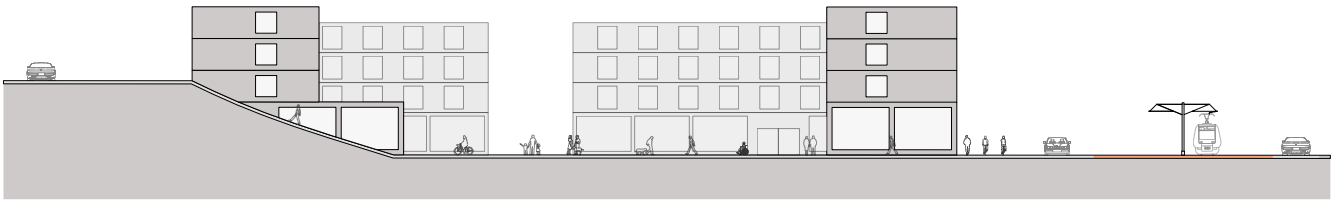


Figure 44 Section B-B’, ”Square”. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt, 2024).

Reference Photos

Figure 45 Mixed-use building with cafe in the first floor and apartments over. (Photo: Simen Mandt, 2024).

Figure 46 Seating and walking in Tøyen torg in Oslo, Norway. (Photo: Damian Heinisch, 2018).

Figure 47 Natural pathways in Bærum, Norway. (Photo: Britt Glosvik, 2022)

Figure 48 Seating places within the walkable city paths. (ITDP, 2020).

Figure 49 Picture showing how the existing buildings are built into the terrain. (Photo: Haakon Mandt, 2024).

Figure 50 Walking paths at the bus station in Kristiansand, Norway. (Photo: Simen Mandt, 2024).

5.3.3 ”Playground”

The ”Playground” is envisioned as a large recreational space designed to cater various activities. It is equipped with larger play equipment, an obstacle course, and bars suitable for both play and working out. This area is distinct from the “Square” to allow from different activities to occur in separate spaces. Despite this separation, the “Playground” is well-integrated with the rest of the planning area through natural walking paths, ensuring easy access and connectivity. The design of the ”Playground” aims to provide a fun and engaging environment for residents and visitors of all ages.

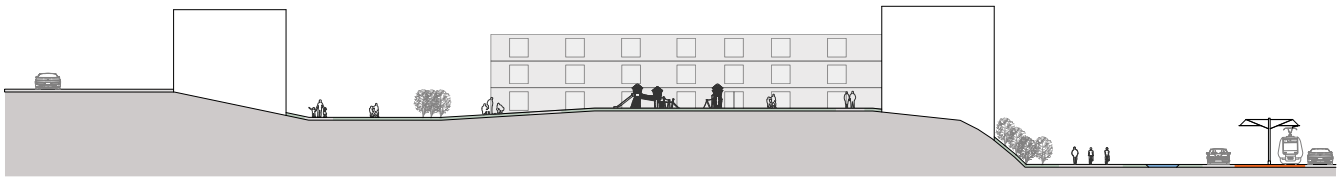


Figure 51 Section C-C', ”Playground”. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt, 2024).

Reference Photos

Figure 52 Example of bigger playground equipment for the ”Playground”. (Duncan & Grove, n.d.).

Figure 53 Example of fitness equipment called a Tuftepark, from Playa de Mogan, Gran Canaria. (Tufteparken, n.d.).

5.3.4 ”Terrain”

Movement throughout the three main areas – “City Forest”, “Square”, and “Playground” – is designed to be fluid and accessible for different modes of transport. The “City Forest” will offer activities and seating, leading into the “Square”, and eventually to the large “Playground”. Along this path, there will be several bicycle parking spots to accommodate for various modes of transportation. Car parking is strategically placed away from the main areas of play, stay, and recreation to promote pedestrian-friendly environment. Most of the parking areas are located under ground.

The terrain from north to south drops in stages, from 25 meters above sea level to 17 meters above sea level.

Overall, the movement is designed to be seamless and encourages the use of sustainable transportation options, while also providing necessary amenities for those using personal vehicles.

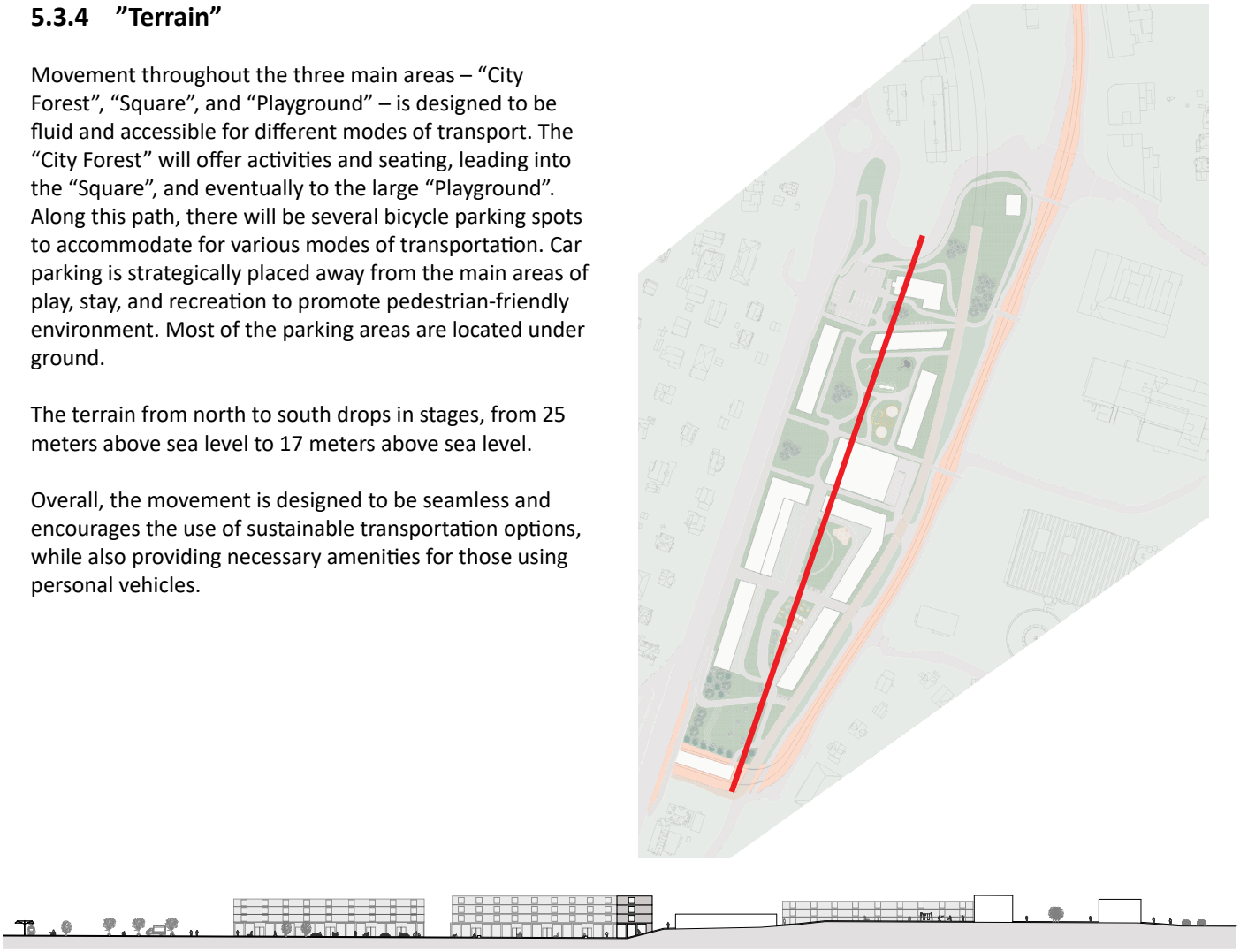


Figure 54 Section D-D’, ”Terrain”. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt, 2024).

Reference Photos

Figure 55 Photos of how the terrain is varied in the planning area today. (Photos: Simen Mandt, 2024).

6. Summary

The vision for Mindebyen is to cultivate a community-centric urban space where social interaction, recreation, and convenience converge. I envision a neighbourhood that attracts people to live, explore, engage, and delight in their surroundings. The design strategy is to create a cohesive urban fabric that offers all essential amenities within a short, pedestrian-friendly distance.

The Heart of Mindebyen: Kristianborg Station and the Urban Green

At the southern gateway of the plan lies the Kristianborg station, a new station for the Bergen light rail system, Bybanen. This station, which opened on November 21, 2022, has become an important mobility hub within the region, connecting Bybanen and the bus system. Adjacent to the station, the plan proposes the “City Forest”, a verdant green area that invites relaxation and interaction amidst plantings and trees. This space will feature an amphitheater with terraced seating and planter boxes that double as benches, fostering a sense of community and connection to nature.

Figure 56 Example of a small outdoor amphitheatre. (Pintrest, n.d.).

The Dynamic Square: A Hub of Activities and Commerce

Progressing into Mindebyen, the “Square” emerges, encircles by mixed-use buildings. The ground floors of these buildings will have open facades, housing cafes, shops, and facilities that breath life into the square. This plaza is designed to be a microcosm of the city centre, offering a lively atmosphere for economic and social exchange. The strategic placement of building along the main thoroughfares serves a dual purpose: creating a sound barrier from traffic noise and integrating with the natural topography to maintain a level square with much sunlight.

Figure 57 Mixed-use building with a cafe on the first floor and apartments above it. (Photo: Simen Mandt).

The Marketplace and Playful Spaces

Central to the plan is a sizeable grocery store that caters not only to local residents but also attracts visitors from beyond the neighbourhood. Further into the planning area, a secondary square unfolds, featuring a large “Playground” equipped with play structures and fitness installations. This recreational area is designed to be a separate yet connected space, offering diverse experiences for all ages.

Figure 58 Tufteparken in Playa de Mogan, Gran Canaria. An example of play and fitness installations that could be in the area. (Tufteparken, n.d.)

Connectivity and Mobility Throughout Mindebyen

The design ensures that the “City Forest”, “Square”, and “Playground” are linked by intuitive pathways, encouraging exploration and movement throughout the area. These paths will be complemented by strategically places bicycles parking to support various modes of transportation. While the focus is on pedestrian and public transport, car parking is integrated into the plan, recognizing the necessity for vehicle access for certain residents and visitors.

In summary, the plan is a forward-thinking approach to urban development that prioritizes social spaces, recreation, and a compact city centre experience. It is a neighbourhood that is not just a place to reside but a destination to enjoy.

7. Discussion

The main question for the thesis have been *"How does the implementation of new public transport options change an area and how can we plan around this and take advantage of the environmental, social, and ecological benefits?"*. This question have been in the centre of the planning process and the considerations involved in developing Mindebyen. In this chapter, I will discuss this question and write how an area can change based on what have been done in the proposed plan for Mindebyen.

The implementation of new public transport options can significantly change an area by improving accessibility, reducing reliance on personal vehicles, and fostering economic development. Planning around new public transport can take advantage of these changes to create more sustainable, vibrant, and connected communities. The planning proposal illustrates changes and planning strategies, some of these are:

1. **Increased Accessibility and Connectivity:** The introduction of Bybanen, the light rail system in Bergen, to Minde has made the area more accessible and connected to the city centre. The new Kristianborg station serves as a natural connecting point between Bybanen and buses, enhancing the public transport network. This increased accessibility can lead to a rise in property values, attract new businesses, and make the area more desirable for residents and visitors.

2. **Reduction in Car Usage:** The mobility plan for Mindebyen fields aims to reduce car usage by improving pedestrian and cycling infrastructure and enhancing public transportation services. This aligns with the broader planning strategy of Bergen, which includes a focus on sustainable transportation and the development of a compact city structure with a network of centre areas. There is still a need for planning for car parking because of the use of the area and the planning guidelines of the municipality of Bergen. Even though the area focuses on public transport, there will be a need for parking for residents and visitors that wants to or needs to use a car.

3. **Economic Development and Urban Regeneration:** Mindebyen is transforming from an industrial area focused on cars to a housing area with a focus on people. This shift is facilitated by the extension of Bybanen, which has increased the attractiveness of the area for development. The plan includes mixed-use buildings with facilities, cafes, and shops to create a vibrant "Square" that acts as a small city centre outside of the city centre, promoting economic activity and social interaction.

4. **Transit Oriented Development (TOD):** The planning approach incorporates TOD principles, which focus on creating dense, walkable communities centred around high-quality public transport. This is evident in the design of the "City Forest" and "Square" near the Kristianborg station, where activities and seating areas are integrated with natural walking paths, encouraging residents to use public transport and non-motorized modes of travel.

5. **Environmental Benefits:** By prioritizing sustainable modes of transport and reducing car dependency, the plan contributes to lower greenhouse gas emissions and improved air quality. The focus on green areas and the integration of the world's longest walking and cycling tunnel, Fyllingsdaltunnelen, into the mobility plan further emphasize the commitment to environmental sustainability.

6. **Social and Recreational Spaces:** The planning proposal includes the creation of social areas and recreational spaces such as the "City Forest", "Square", and a large "Playground". These areas are designed to be accessible by walking and cycling paths, promoting a sense of community, and enhancing the quality of life for residents.

To plan around and take advantage of these benefits, the thesis suggests employing a planning-based approach that includes a detailed masterplan with design elements, a mobility plan, and a risk evaluation. This approach is guided by the theories Transit Oriented Development and New Urbanism and consider case studies. The planning should aim to create a vibrant and attractive space for future residents and visitors, with a focus on social areas, recreation, and making facilities accessible within a walkable distance.

The plan is focusing on taking the best from the theories Transit Oriented Development and New Urbanism and finding ways to avoid the problems. One common problem for both the theories are gentrification, which will not be a problem for this plan, seeing that there is no residents in the area that can be pushed away. The current businesses and offices are heavy reliant on cars, which would be more suitable for a different area with better accessible for cars.

TOD and New Urbanism have been accused of being too narrow minded and not seen how they impact the areas and transit systems around, which could lead to strain on infrastructure and neglect. This plan is a part of bigger plan, both for the development and the transit system. The plan is an extension of the character and facilities that is already in place and will be a part of the bigger Mindebyen plan.

There will still be parking spaces and available for car traffic. This is to accommodate for the planning strategies of the municipality of Bergen and for the people needing a car to get around. This could be for elderly, people with disabilities, people moving to or from the area, or people visiting from far away. The parking spots will be focused for electric cars to keep the environmentally friendly consepts of the proposed plan.

In summary, the implementation of new public transport options like Bybanen in Bergen has facilitated a shift towards a more sustainable, accessible, and economically vibrant area in Minde. The planning around this new transport infrastructure has taken advantage of the increased accessibility to create a mixed-use, pedestrian-friendly environment that aligns with the principles of TOD and New Urbanism, ultimately aiming to improve the quality of life for residents and contribute to the city's sustainable development goals.

Figure 59 Pictures of Fyllingsdalstunnelen, and the connectivity with Kristianborg station. (Photos: Eline Mandt, 2024)

8. Conclusion

The Mindebyen project in Bergen, Norway represents a transformative approach to urban development and to integrating new public transportation systems into urban development. This thesis has examined the profound impact that the extension of Bybanen, the light rail system in Bergen, has had on the Minde area. By leveraging the principles of Transit Oriented Development (TOD) and New Urbanism, the planning strategies outlined here shows how areas can be developed with focus on sustainable, accessible, and economically vibrant communities.

The project site is part of a big development project that is already underway. Some of the other fields are well underway and others have just started by demolishing the old industry. Other than Bybanen, one of the most notable changes are the resurfacing of the old river running through the area. This reclaimes the old identity to Minde and it improves both the blue and green infrastructure and helps with dealing with stormwater and rainwater.

The introduction of Bybanen had catalysed a shift in Minde, transitioning from an industrial and car-centric zone to a residential neighbourhood that places people, community, and environmental considerations at the forefront. With the introduction of Bybanen, came world's longest bicycle tunnel, Fyllingsdalstunnelen. This tunnel further improved the connectivity between the City centre of Bergen and the urban areas. The light rail system and the bicycle tunnel has not only bridged the gap between Minde and the city centre of Bergen but has also improved the urban connectivity, fostered economic growth, and enhanced the quality of life for residents.

This thesis has highlighted the multifaced benefits of new or improved public transport infrastructure, including improved accessibility, reduced car dependency, and the promotion of economic development through urban regeneration. The planning proposal for Mindebyen had been crafted with a vision of creating a mixed-use, pedestrian-friendly environment that encourages social interaction and community engagement. The inclusion of social and recreational spaces, such as the "City Forest", "Square", and "Playground", further underscores the commitment to fostering vibrant communal areas.

The planning approach adopted in this thesis in both comprehensive and forward-thinking. It encompasses a detailed masterplan with design elements, a mobility plan, and a risk evaluation, all of which are informed by the theories of TOD and New Urbanism. The case studies of Västra Hamnen in Malmö, Sweden, and Seaside in Florida, USA, have provided valuable insights that have been adapted to the Norwegian context, ensuring that the planning proposal is sensitive to the unique characteristics of Mindebyen.

Moreover, the thesis has addressed potential challenges such as gentrification, ensuring that the development of Mindebyen remains inclusive and beneficial to all stakeholders. The planning proposal is not an isolated endeavor but part of a larger vision for the city of Bergen, aligning with the municipality's goals and strategies for sustainable and compact urban development.

The proposed plan consists of 200 apartments and facilities, shops, cafes, social areas, playgrounds, and organic walking and bicycle paths to ensure that all the peoples needs will be in a walking distance. The close connection to public transport will allow people to easily travel to and from the area to the city centre of Bergen and all it's facilities.

In conclusion, the Mindebyen project exemplifies how thoughtful urban planning, underpinned by sustainable development goals and a commitment to public transportation, can reshape the fabric of an area. The findings of this thesis can be implemented into other urban areas battling with growth and sustainability challenges, demonstrating that it is possible to harmonize the needs for a growing population with environmental stewardship and social well-being. As Bergen continues to evolve, the Mindebyen project will be looked at for future development initiatives.

Figure 60 Pictures from the planning area today, showing the Fyllingsdalstunnelen and the Kristianborg light rail station, the resurfaced river, and how these all interact with each other. (Eline Mandt & Haakon Mandt, 2024).

9. Sources

1. Bergen kommune. (January 11, 2024). *Mindebyen i 3D*. Available at: https://storymaps.arcgis.com/stories/c1b0fd57c2b243be929d73bdc8263f85 (Accessed: May 20, 2024).
2. Riedl, B., & Gustavsson, J. (August 23, 2023). *Why the U.S. can't be Nordic. City Journal*. Available at: https://www.city-journal.org/article/why-the-u-s-cant-be-nordic (Accessed: May 20, 2024).
3. Statistisk sentralbyrå. (n.d.). *Fakta om befolkningen – hvor mange bor det i Norge?*. SSB. Available at: https://www.ssb.no/befolkning/faktaside/befolkningen (Accessed: March 15, 2024).
4. Statistisk sentralbyrå. (n.d.). *Kommunefakta – Bergen (Vestland)*. SSB. Available at: https://www.ssb.no/kommunefakta/bergen (Accessed: March 15, 2024).
5. United Nations. (n.d.). *The 17 goals | sustainable development*. Available at: https://sdgs.un.org/goals (Accessed: March 15, 2024).
6. United Nations Development Programme. (n.d.). *Sustainable development goals.* UNDP. Available at: https://www.undp.org/sustainable-development-goals (Accessed: March 15, 2024).
7. Bergen kommune. (June 19, 2019). *KPA 2018 – Kommuneplanens arealdel.* Available at: https://www.bergen.kommune.no/api/rest/filer/V11761909 (Accessed: March 18, 2024).
8. Bybanen. (n.d.). *Vi er Bybanen AS*. Available at: https://www.bybanen.no/vi-er-bybanen/bybanen-as/ (Accessed May 10, 2024).
9. Skyss. (January 26. 2024). *Aldri før har fleire reist kollektivt enn i 2023*. Available at: https://www.skyss.no/omskyss/nyheitsportal/aldri-f%C3%B8r-har-fleire-reist-kollektivt-enn-i-2023/ (Accessed: April 20, 2024).
10. Transit Oriented Development Institute. (n.d.). *Transit Oriented Development.* TOD. Available at: http://www.tod.org/ (Accessed: April 3, 2024).
11. European Commission. (August 17, 2020). *Transit Oriented Development (TOD) for Inclusive and Sustainable Rural-Urban Regions.* Available at: https://cordis.europa.eu/project/id/956030 (Accessed: May 27, 2024)
12. Villagomez, E. (July 24, 2023). *S1O1S: Explaining Transit-Oriented Development: Benefits and Drawbacks.* Spacing. Available at: https://spacing.ca/vancouver/2023/07/24/s101s-explaining-trainsit-oriented-development-benefits-and-drawbacks/ (Accessed: May 20, 2024).
13. Malmö stad. (n.d.). *Västra Hamnen.* Available at: https://malmo.se/Stadsutveckling/Stadsutvecklingsomraden/Vastra-Hamnen.html (Accessed: April 3, 2024).
14. Visit Sweden. (March 11, 2022). *Västra Hamnen, Malmö.* Available at: https://visitsweden.com/where-to-go/southern-sweden/malmo/vastra-hamnen-malmo/ (Accessed: April 3, 2024).
15. P2infohouse. (August 24, 2001). *Malmö: Bo01, city of Tomorrow: European Building Exhibition and Sustainable.* Available at: https://p2infohouse.org/ref/24/23390.htm (Accessed: April 3, 2024).
16. Planetizen. (n.d.). *What Is New Urbanism?*. Available at: https://www.planetizen.com/definition/new-urbanism (Accessed: April 4, 2024).
17. Congress for the New Urbanism. (n.d.). *The Charter of New Urbanism.* CNU. Available at: https://www.cnu.org/who-we-are/charter-new-urbanism (Accessed: May 27, 2024).
18. Congress for the New Urbanism. (n.d.). *What is New Urbanism?.* CNU. Available at: https://www.cnu.org/resources/what-new-urbanism (Accessed April 4, 2024).
19. Zhu, X., Guan, Y., Ni, M., & Ho, P. (June 21, 2023). *Place-making of "new nostalgic space" in urban development: The case of Lane 1192 in China.* Available at: https://www.sciencedirect.com/science/article/abs/pii/S0016718524000496 (Accessed: April 4, 2024).
20. Seaside. (n.d.). *About.* Available at: https://seasidefl.com/about/ (Accessed: April 4, 2024)
21. SoWal. (December 18, 2022). *The Story of Seaside, Florida.* Available at: https://sowal.com/story/the-story-of-seaside-florida (Accessed: May 20, 2024).
22. Statens Vegvesen. (n.d.). *Trafikkmengde.* Vegkart. Available at: https://vegkart.atlas.vegvesen.no/#kartlag:topo4/@-31437,6730607,15/hva:!(id~540)~/splash:changelog (Accessed: March 15, 2024).
23. Statens Vegvesen. (n.d.). *Trafikkulykke.* Vegkart. Available at: https://vegkart.atlas.vegvesen.no/#kartlag:topo4/@-31510,6730508,15/hva:!(id~570)~ (Accessed: March 15, 2024).
24. Skyss. (n.d.). *Rutetabell.* Available at: https://www.skyss.no/ (Accessed: March 15, 2024).
25. Statens Vegvesen. (n.d.). *Støysoner for riks- og fylkesvegar.* Vegkart. Available at: https://kart-vegvesen.maps.arcgis.com/apps/instant/sidebar/index.html?appid=e3635512dfa24b7f9b97687a0c68d888&locale=en (Accessed: March 15, 2024).
26. Bergen kommune. (March 10, 2021). *Mindemyren- Bakgrunn for områdereguleringsplanen*. Available at: https://www.bergen.kommune.no/hvaskjer/tema/mindemyren/planer/offentlig-omradereguleringsplan (Accessed: March 15, 2024).
27. Bergen byarkiv. (July 1, 2015). *Historier fra en bydel – Årstad.* Available at: https://www.bergenbyarkiv.no/aarstad/archives/arstad-herred-innlemmes-i-bergen/6497 (Accessed: March 29, 2024).

28. Bergen byarkiv. (February 2, 2001). *Bergen byleksikon – Årstad (bydel og tidligere kommune).* Available at: https://www.bergenbyarkiv.no/bergenbyleksikon/arkiv/1407643 (Accessed: March 29, 2024).
29. Bergen byarkiv. (January 25, 2001). *Bergen byleksikon – Vestlandsmeieriet.* Available at: https://www.bergenbyarkiv.no/bergenbyleksikon/arkiv/1423821 (Accessed: March 29, 2024).
30. ArkiVest. (March 4, 2020). *Bergensmeieriet.* Available at: https://www.arkivest.no/2020/04/1771/ (Accessed: March 29, 2024).
31. Advansia. (n.d.). *Advansia er med på laget når Tine bygger Norges mest moderne og fremtidsrettede meieri på Flesland.* Available at: https://www.advansia.no/prosjekter/tine-meieri-i-bergen (Accessed: March 29, 2024).
32. NRK. (October 15, 2001). *NRK Hordaland historie.* Available at: https://www.nrk.no/vestland/nrk-hordalands-historie-1.190220 (Accessed: March 29, 2024).
33. NRK. (May 8, 2009). *NRK sine distriktskontor.* Available at: https://www.nrk.no/informasjon/nrk-sine-distriktskontor-1.6631072 (Accessed: March 29, 2024).
34. Meteoblue. (2024). *Simulated historical climate & weather data for Bergen.* Available at: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/bergen_norway_3161732 (Accessed: May 21, 2024).

9.1. Figure sources

1. Eline Mandt, 2024
2. Statistisk sentralbyrå. (2024). *Fakta om befolkningen - hvor mange bor det i Norge?.* Available at: https://www.ssb.no/befolkning/faktaside/befolkningen (Accessed: May 25, 2024).
3. United Nations. (n.d.). *Communications materials.* Available at: https://www.un.org/sustainabledevelopment/news/communications-material/ (Accessed: March 15, 2024).
4. Simen Mandt, 2024
5. Transit Oriented Development Institute. (n.d.). *Transit Oriented Development.* TOD. Available at: http://www.tod.org/ (Accessed: April 3, 2024).
6. Simen Mandt, 2024
7. Malmö stad. (n.d.). *Västra Hamnen.* Available at: https://malmo.se/Stadsutveckling/Stadsutvecklingsomraden/Vastra-Hamnen.html (Accessed: April 3, 2024).
8. Congress for the New Urbanism. (n.d.). *What is New Urbanism?*. CNU. Available at: https://www.cnu.org/resources/what-new-urbanism (Accessed April 4, 2024).
9. Congress for the New Urbanism. (n.d.). *What is New Urbanism?*. CNU. Available at: https://www.cnu.org/resources/what-new-urbanism (Accessed April 4, 2024).
10. SoWal. (December 18, 2022). *The Story of Seaside, Florida.* Available at: https://sowal.com/story/the-story-of-seaside-florida (Accessed: May 20, 2024).
11. ©2024 Norkart AS/Geovekst og kommunene/NASA, edited by Simen Mandt. (2024).
12. Google Earth, edited by Simen Mandt. (2024).
13. ©2024 Norkart AS/Geovekst og kommunene/NASA, edited by Simen Mandt. (2024).
14. Simen Mandt, 2024
15. Simen Mandt & Haakon Mandt, 2024
16. ©2024 Norkart AS/Geovekst og kommunene/NASA, edited by Simen Mandt. (2024).
17. ©2024 Norkart AS/Geovekst og kommunene/NASA, edited by Simen Mandt. (2024).
18. Simen Mandt, 2024
19. ©2024 Norkart AS/Geovekst og kommunene/NASA, edited by Simen Mandt. (2024).
20. ©2024 Norkart AS/Geovekst og kommunene/NASA, edited by Simen Mandt. (2024).
21. Simen Mandt, 2024
22. Statens vegvesen. (n.d.). *Støysoner for riks- og fylkesvegar.* Available at: https://kart-vegvesen.maps.arcgis.com/apps/instant/sidebar/index.html?appid=e3635512dfa24b7f9b97687a0c68d888&locale=en (Accessed: March 15, 2024).
23. ©2024 Norkart AS/Geovekst og kommunene/NASA
24. Bergen kommune. (March 10, 2021). *Mindemyren- Bakgrunn for områdereguleringsplanen*. Available at: https://www.bergen.kommune.no/hvaskjer/tema/mindemyren/planer/offentlig-omradereguleringsplan (Accessed: March 15, 2024).
25. Universitetsbiblioteket i Bergen. (August 11, 1964). *Bergen Meieri.* Available at: https://marcus.uib.no/instance/photograph/ubb-w-f-143645.html (Accessed: May 27, 2024).
26. Mindemyren. (September 11, 2015). *190 millioner.* Available at: https://mindemyren.com/tag/nrk/page/2/ (Accessed: May 27, 2024).
27. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt. (2024).
28. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt. (2024).
29. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt. (2024).
30. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt. (2024).
31. Luster kommune. (June 7, 2022). *Elbil og ladestasjon.* Available at: https://www.luster.kommune.no/elbil-og-ladestasjon.392707.nn.html (Accessed: May 28, 2024).
32. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt. (2024).
33. Simen Mandt, 2024
34. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt. (2024).
35. Simen Mandt, 2024

36. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt. (2024).
37. Statens vegvesen. (n.d.). *Støysoner for riks- og fylkesvegar.* Available at: https://kart-vegvesen.maps.arcgis.com/apps/instant/sidebar/index.html?appid=e3635512dfa24b7f9b97687a0c68d888&locale=en (Accessed: March 15, 2024). Edited by Simen Mandt. (2024).
38. ©2024 Norkart AS/Geovekst og kommunene/NASA, edited by Simen Mandt. (2024).
39. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt. (2024).
40. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt. (2024).
41. kenmclaren3. (n.d.). *Garden Amphitheater.* Pintrest. Available at: https://no.pinterest.com/pin/2674081021223695/ (Accessed: May 28, 2024).
42. Stine Kjølby Christensen. (March 3, 2017). *Amerikansk fænomen hitter: Bo har Aalborgs første Foodtruck.* Available at: https://migogaalborg.dk/amerikansk-faenomen-hitter-bo-har-aalborgs-foerste-foodtruck/ (Accessed: May 28, 2024).
43. Simen Mandt, 2024
44. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt. (2024).
45. Simen Mandt, 2024
46. Damien Heinisch. (2018). *Tøyen torg - Oslo.* Available at: https://www.arkitektur.no/prosjekter/landskap/toeyen-torg/ (Accessed: May 28, 2024).
47. Britt Glosvik. (September 27, 2022). *Demenslandsby: - Målet er et så alminnelig liv som mulig.* (Available at: https://www.kommunal-rapport.no/eldreomsorg/demenslandsby-malet-er-et-sa-alminnelig-liv-som-mulig/146471!/ (Accessed: May 28, 2024).
48. Institute for Transportation & Development Policy. (October 15, 2020). *Pedestrians First Tool Guides Cities on the Path to Walkability.* Available at: https://itdp.org/2020/10/15/pedestrians-first-tool-guides-cities-on-the-path-to-walkability/ (Accessed: May 28, 2024).
49. Haakon Mandt, 2024
50. Simen Mandt, 2024
51. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt. (2024).
52. Duncan & Grove. (n.d.) *Playground Equipment.* Available at: https://duncanandgrove.com/ (Accessed: May 28, 2024).
53. Tufteparken. (n.d.). *Tufteparken Playa de Mogan - Radisson Blu Resort & Spa, Gran Canaria.* Available at: https://www.tufteparken.no/ (Accessed: May 28, 2024).
54. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt. (2024).
55. Simen Mandt, 2024
56. kenmclaren3. (n.d.). *Garden Amphitheater.* Pintrest. Available at: https://no.pinterest.com/pin/2674081021223695/ (Accessed: May 28, 2024).
57. Simen Mandt, 2024
58. Tufteparken. (n.d.). *Tufteparken Playa de Mogan - Radisson Blu Resort & Spa, Gran Canaria.* Available at: https://www.tufteparken.no/ (Accessed: May 28, 2024).
59. Eline Mandt, 2024
60. Eline Mandt & Haakon Mandt, 2024

9.2 Table sources

1. Statens Vegvesen. (n.d.). *Trafikkmengde.* Vegkart. Available at: https://vegkart.atlas.vegvesen.no/#kartlag:topo4/@-31437,6730607,15/hva:!(id~540)~/splash:changelog (Accessed: March 15, 2024).
2. Statens Vegvesen. (n.d.). *Trafikkulykke.* Vegkart. Available at: https://vegkart.atlas.vegvesen.no/#kartlag:topo4/@-31510,6730508,15/hva:!(id~570)~ (Accessed: March 15, 2024).
3. Skyss. (n.d.). *Rutetabell.* Available at: https://www.skyss.no/ (Accessed: March 15, 2024).
4. Simen Mandt, 2024
5. Simen Mandt, 2024

10. Appendix

10.1 Mobility Plan

Detailed zoning of Mindebyen Fields S5a, S5b, and S9a

Municipality of Bergen

Content

1. Introduction

For the planning proposal of Mindebyen fields S5a, S5b, and S9b there is made a mobility plan. The main purpose of the mobility plan is to analyse the possibility of reduced car use and to provide guidelines for the design and choice of solutions with the goal of reducing the car share and increasing the use of environmentally friendly modes of travel such as walking, cycling, and public transport. The mobility plan is divided into the following 4 parts:

- Description of the planning area
- Transport services around the planning area
- Current and future modal split
- Proposed plan and measures

2. Planning Area

The planning area are in Minde in the municipality of Bergen, around 5 km outside of the city centre of Bergen. The size of the planning area is around 65 acres and is surrounded by areas dominated by old industry and offices which is under development to becoming areas for housing. There is a good connectivity to the area with public transit, cars, and bicycles. Kristianborg is a station for both the light rail (Bybanen) and buses and is bordering to the planning area in the north.

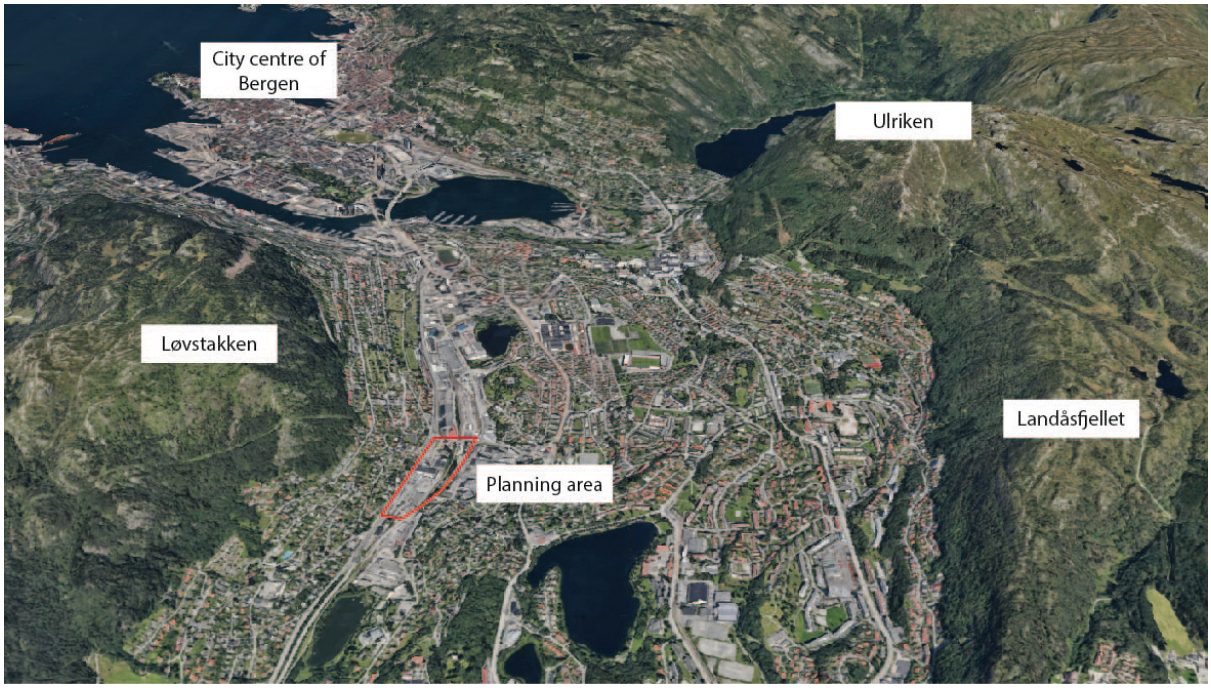


Figure 1 The area's location marked in red. (Google Earth, edited by Simen Mandt).

2.1 Current Situation

The planning area is mainly consisting of industry and parking. There are offices, used car shops, car workshop, stores such as grocery store, bike shop, and a jacuzzi shop, and a pizza restaurant. The facilities in the area are highly depended on cars, which is reflected for parking spaces. There is no housing in the area today.

Figure 2 Current situation on the planning area. (Photo: Simen Mandt).

3. Transport Services Around the Planning Area

3.1 Walking and Bicycling

The accessibility for soft traffic such as walkers and bicyclers is very good. On April 15, 2023, Fyllingsdaltunnelen, the world's longest walking and bicycling tunnel, was opened in Bergen, and is a part of the new walking and bicycling path going from city centre of Bergen to Fyllingsdalen. The planning area are at the end of this tunnel, and the path is continuing alongside the area. This path is 7,8 km long in total, and it takes around 15 minutes to bicycle the whole path. (Visit Bergen, n.d.).

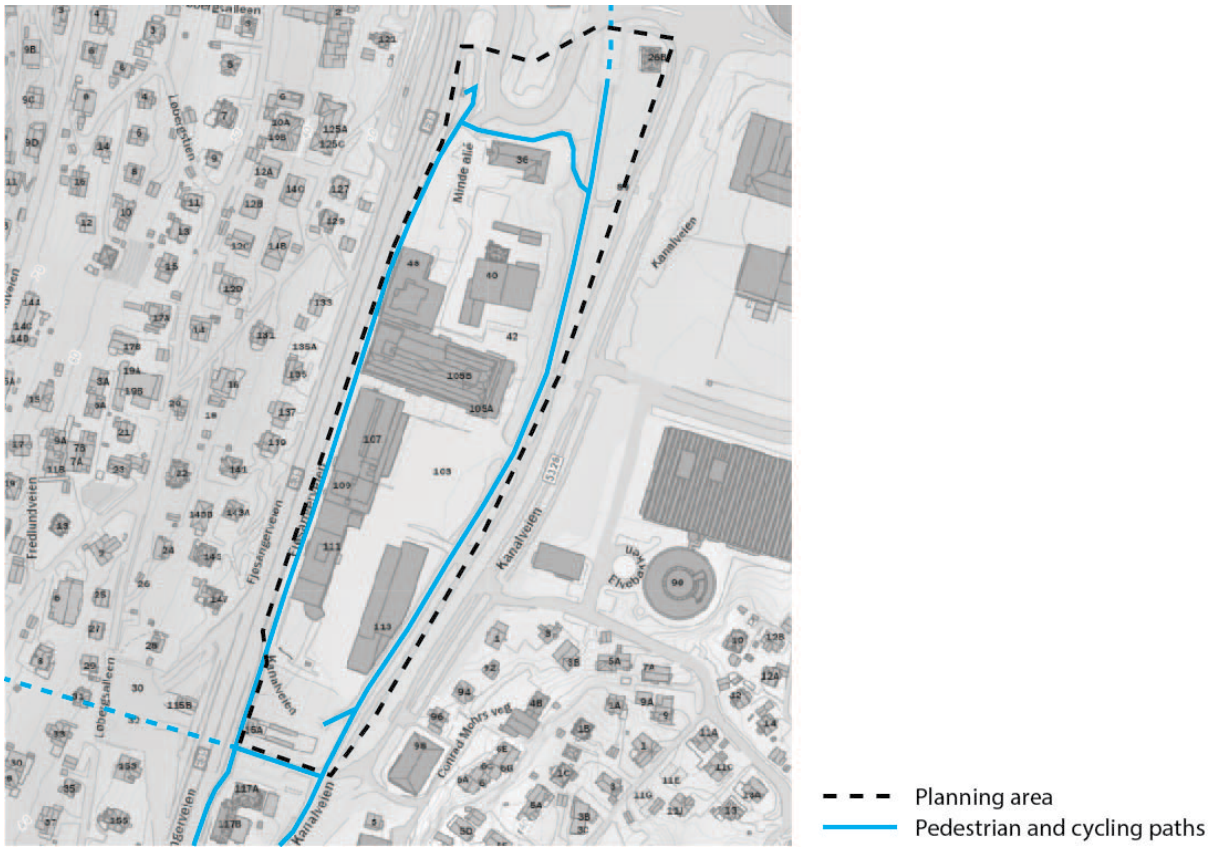


Figure 3 Existing route for vulnerable road users. (©2024 Norkart AS/Geovekst og kommunene/NASA, Meti, edited by Simen Mandt).

3.2 School and Kindergartens Route

There are 1 school and 3 kindergartens close by to the planning area, all within 1 km and 15 minutes walking.

Minde elementary school is around 550 meters away from the planning area and around 10 minutes of walking. To get to this school people need to cross the main road, Fjøsangerveien.

Kristianborg kindergarten is around 600 meters away and around 8 minutes of walking. There are good walking paths to get to this kindergarten. To get to the kindergartens Minde and Leaparken there are two different walking paths. The roads to Minde kindergarten the roads are around 1 km and 750 meters away or up to 15 minutes of walking. The roads to Leaparken kindergarten the roads are up to 660 meters away, or up to 10 minutes of walking.

The illustration underneath shows the walking paths, distance, and walking time to the school and kindergartens.

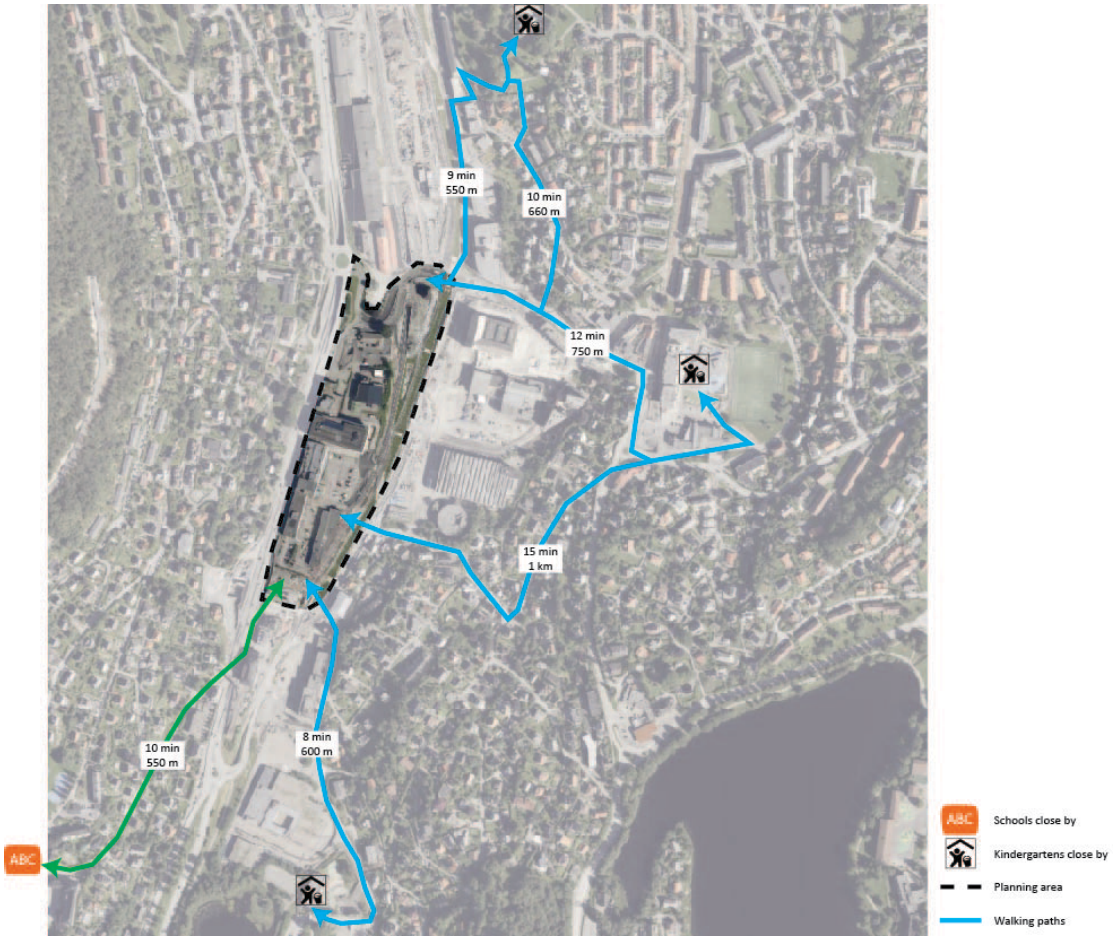


Figure 4 Paths, distances, and walking time to the close by schools and kindergartens. (©2024 Norkart AS/Geovekst og kommunene/NASA, Meti, edited by Simen Mandt).

3.3 Public Transport

The planning area has good connectivity for both light rail (Bybanen) and buses. The station Kristianborg is a station for both Bybanen and for buses and is on the edge of the planning area in the north.

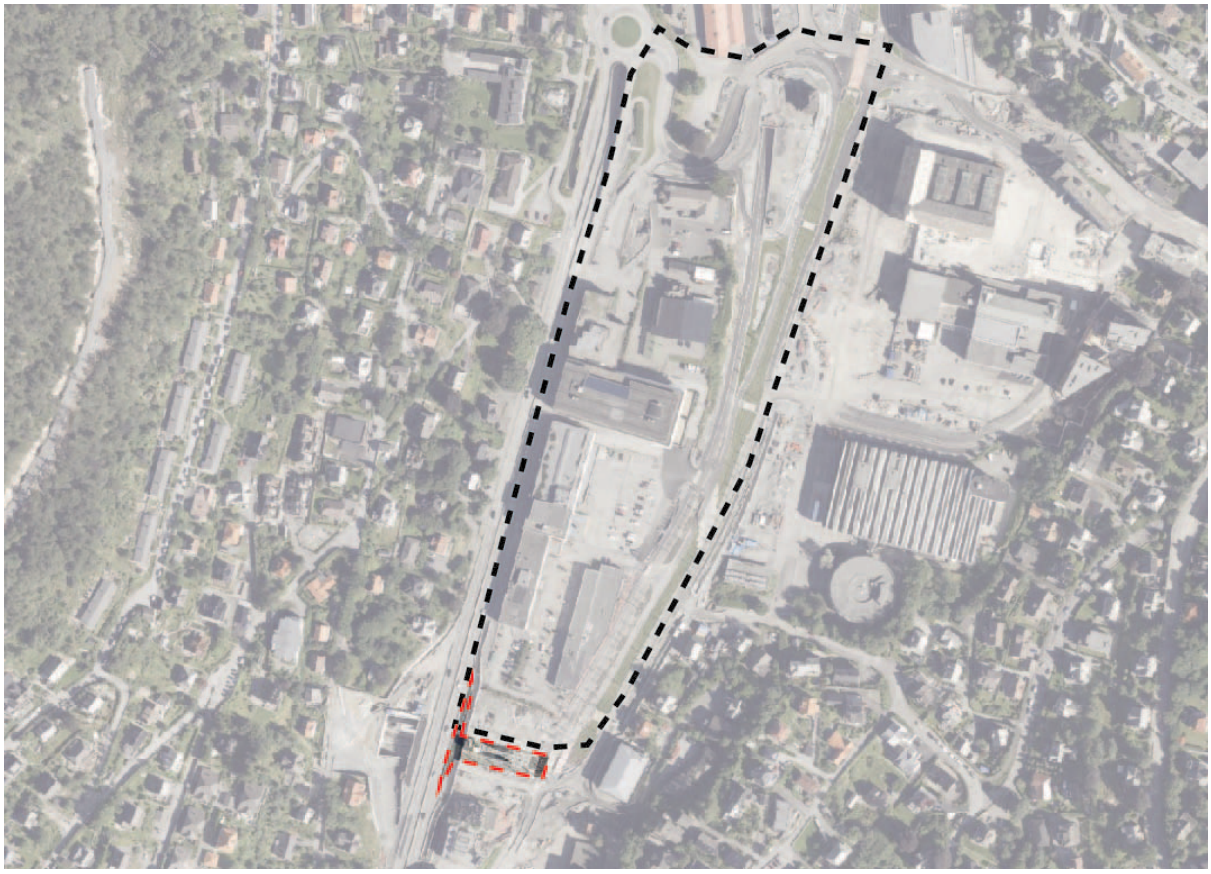


Figure 5 The figure is showing where the Kristianborg station is found. Kristianborg is marked in red, the planning area in black dots. (©2024 Norkart AS/Geovekst og kommunene/NASA, Meti, edited by Simen Mandt).

Light rail accessibility from Kristianborg:

Route	From	To	Frequency
2			8 times per hour

Table 1 Light rail accessibility from Kristianborg station. (Skyss, n.d.).

Bus accessibility from Kristianborg:

14	Bergen bus station	Fyllingsdalen terminal	Monday - friday: 2-6 times per hour* Saturday: 1-2 times per hour* Sunday: 1 time per hour
51	Bergen bus station	Birkelandsskiftet terminal	Monday - friday: 1-6 times per hour* Saturday: 1-2 times per hour* Sunday: 1 time per hour
67	Bergen bus station	Søråshøgda	Monday - friday: 2-4 times per hour* Saturday: 1 time per hour Sunday: 1 time per hour
82	Grønnestølen	Wergeland	Monday - friday: 1-2 times per hour* Saturday: 1 time per hour Sunday: 1 time per hour
600	Bergen bus station	Halhjemsmarka	Monday - friday: 2-7 times per hour* Saturday: 1-4 times per hour* Sunday: 1 time per hour

Table 2 Bus accessibility from Kristianborg station. (Skyss, n.d.).
** depends on the time of the day, some of the times are more frequent than others.*

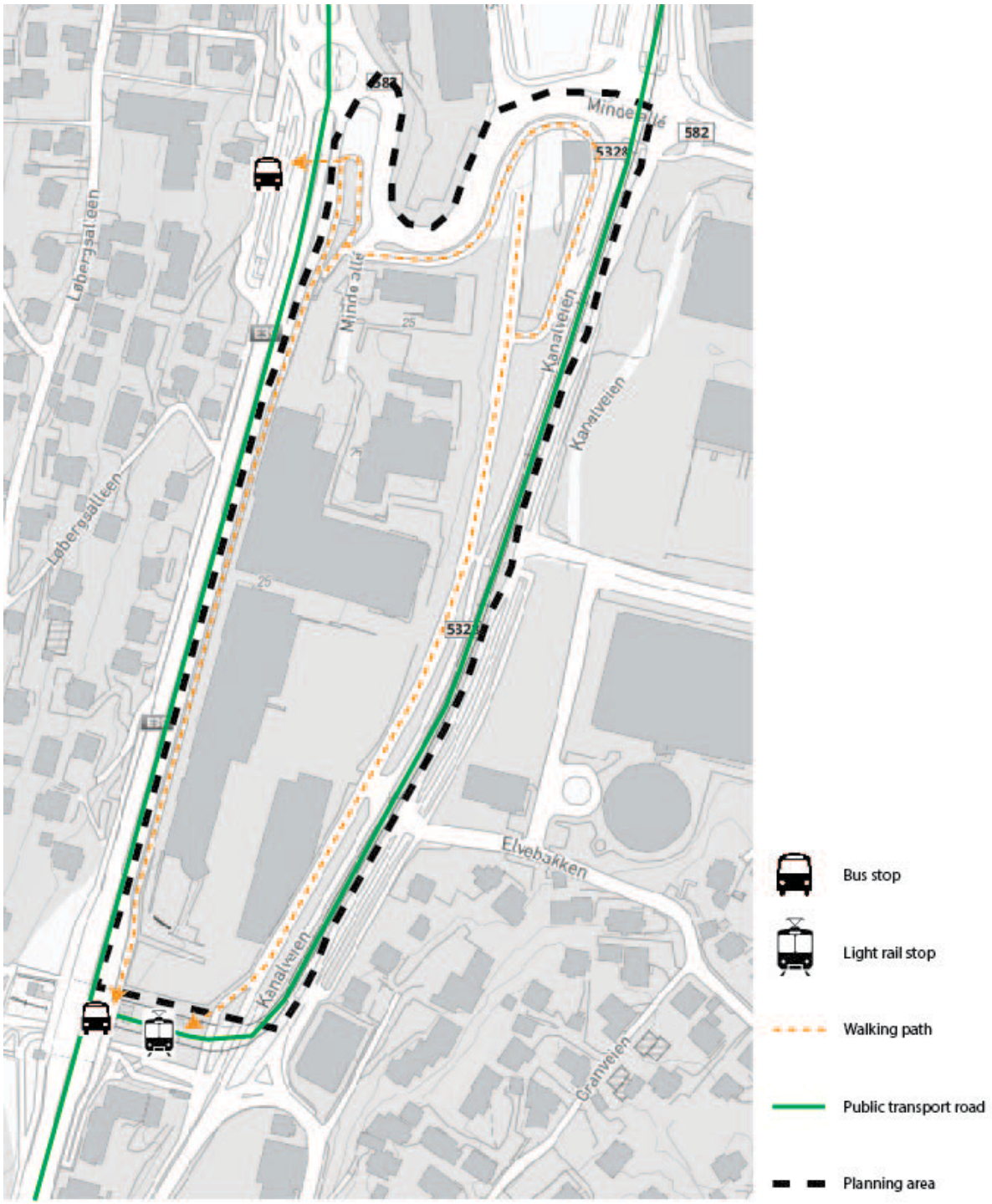


Figure 6 Public transport routes, bus stops, and Kristianborg station near the planning area, and footpaths to these. (©2024 Norkart AS/Geovekst og kommunene/NASA, Meti, edited by Simen Mandt).

3.4 Cars

The planning area are available for cars from the roads Kanalveien and Minde Allé. Both roads have a speed limit of 50 km/h. Apart from these access points, the area is cut off for cars by trees, plants, and green areas.

Figure 7 Map showing the driving roads around the planning area and entry roads to the area. (©2024 Norkart AS/Geovekst og kommunene/NASA, Meti, edited by Simen Mandt).

According to The Norwegian Public Roads Administration (Statens Vegvesen), the traffic volume on the roads surrounding the planning area is as following:

Road:	Traffic volume:	
Fjøsangerveien	31 600 - 40 000	AADT
Kanalveien	3500	AADT
Minde Allé	9000	AADT

Table 3 Traffic volume on the surrounding roads. (Statens Vegvesen, n.d.).

3.4.1 Traffic Accidents

According to The Norwegian Public Roads Administration, there are many traffic accidents registered around the planning area. In total there are 77 accidents registered. None of the registered accidents are inside the planning area, and most of them are in Fjøsangerveien. This is because this is the biggest road with the biggest AADT.

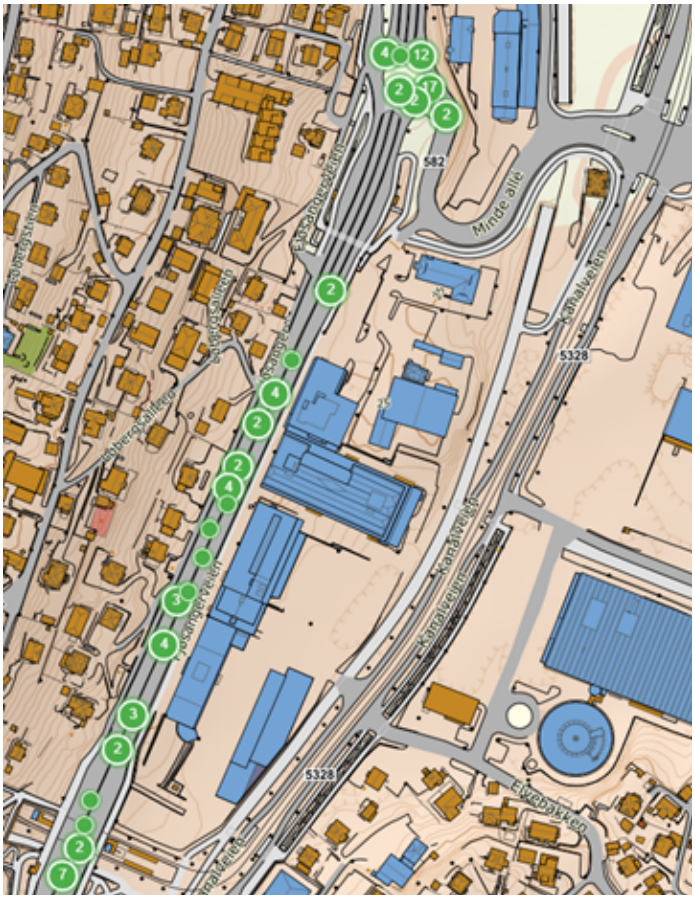


Figure 8 Registered traffic accidents around the planning area. (Statens vegvesen, n.d.).

Accident category:	Amount:
Car	52
MC/Moped	13
Bicycle	8
Pedestrian	4
Sum	**77**

Table 4 Traffic accidents around the planning area. (Statens vegvesen, n.d.).

3.5 Ongoing plans in the area

There are no ongoing plans in or around the area. In 2022 the new route for Bybanen opened. This changed the driving road in Kanalveien, making the road less available and less drivable.

3.6 Summary of the planning area's accessibility

The planning area are bordering to the light rail station and bus stop, Kristianborg, which will connect the area to the city centre of Bergen. There is also a particularly good connection for walking and bicycling by the world's longest walking and bicycle tunnel, Fyllingsdaltunnelen.
There are frequent buses and light rails going to and from the area, making the area accessible. And there is also a good connection by cars.

4. Current and Future Modal Split

Today, there are no housing in the area. There are offices, businesses, and stores, which will generate traffic going to and from the area.

In 2020, the municipality of Bergen published a mobility plan for area plans for Fyllingsdalen and Spelhaugen created by Asplan Viak. In this plan they have researched the modal split in the area, travels within the area, and travels going to and from the area.

Because of the proximity Minde got to Fyllingsdalen, I have chosen to use the data from this report.

Mode of transport	Walking	Bicycling	Car, driver	Passenger	Public transport	Other	Sum
Modal split	20%	2%	55%	7%	14%	2%	100%

Table 5 Current modal split in the Bergen area. (Onarheim & Sigurdson, 2020).

In the report there has been estimated a potential travel volume for 2035. This estimation was based on two scenarios. These were:

1. 50% growth in population and workplace inside of the planning area.
2. 100% growth in population and workplace inside of the planning area.

Mode of transport	Modal split (2020)	Number of trips (2020)	Modal split (50% growth)	Number of trips (50% growth)	Modal split (100% growth)	Number of trips (100% growth)
Walking	20%	11 000	27%	25 000	31%	38 000
Bicycle	2%	1 000	10%	9 000	10%	12 000
Driving	55%	30 000	32%	30 000	25%	30 000
Passenger	7%	4 000	9%	8 000	10%	12 000
Public transport	16%	8 000	19%	18 000	21%	25 000
Other	2%	1 000	3%	3 000	3%	4 000
Total	**100%**	**55 000**	**100%**	**93 000**	**100%**	**121 000**

Table 6 Number of internal and external trips per day with the modal split of 2020 and the future modal split (2035), distributed by the two scenarios for growth. External trips (in and out of the area) is around 75% of the trips. (Onarheim & Sigurdson, 2020).

Mode of transport	Modal split (2020)	Number of trips (2020)	Modal split (50% growth)	Number of trips (50% growth)	Modal split (100% growth)	Number of trips (100% growth)
Walking	20%	8 250	27%	18 750	31%	28 500
Bicycle	2%	750	10%	6 750	10%	9 000
Driving	55%	22 500	32%	22 500	25%	22 500
Passenger	7%	3 000	9%	6 000	10%	9 000
Public transport	16%	6 000	19%	13 500	21%	18 750
Other	2%	750	3%	2 250	3%	3 000
Total	**100%**	**41 250**	**100%**	**69 750**	**100%**	**90 750**

Table 7 Number of external trips per day with the modal split of 2020 and the future modal split (2035), distributed by the two scenarios for growth. (Onarheim & Sigurdson, 2020).

5. Proposed Plan and Planned Measures

The purpose of the planning proposal is to develop the area from an area with offices, industry, and cars, to an area for housing, walking and social spaces.

The planning proposal is facilitating for 200 apartments, divided on seven apartments buildings.

Figure 9 Illustration plan for the planning proposal. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt).

5.1 Solution for Pedestrians and Cyclists

Today there is exceptionally good walking and bicycling paths around the area, with Fyllingsdaltunnelen going along Kanalveien. The planning proposal is facilitating for walking paths that will be connected to the existing walking and bicycle paths. The walking paths will create a good walkthrough through the planning area and connect the area with several entrance points.

The figure underneath shows how people will be able to move inside the planning area and how these paths will be connected to the existing paths.

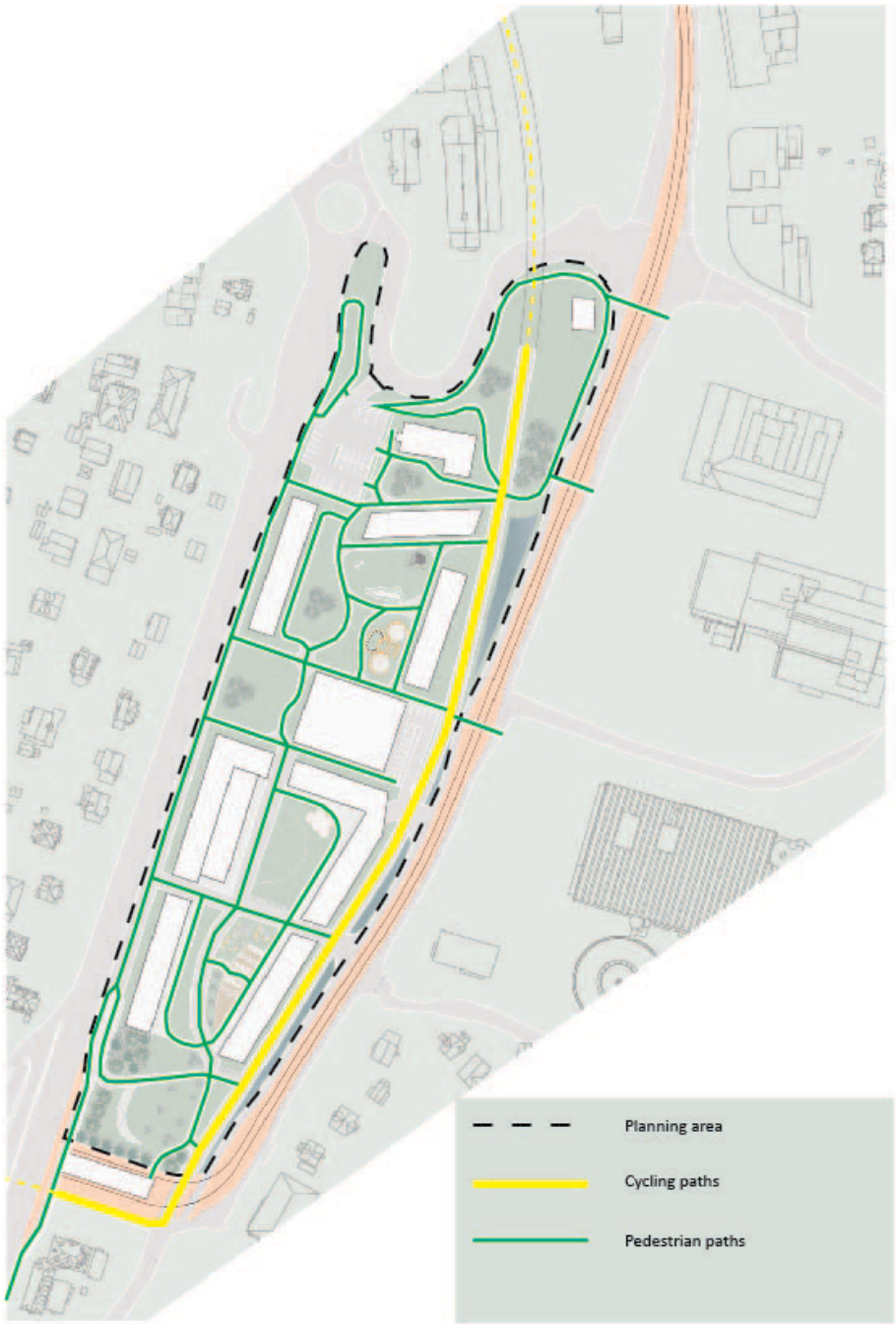


Figure 10 Pedestrian and cycling paths through the planning area. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt).

5.2 Solution for Motorists

The planning proposal is facilitating for vehicle entrance on different point. For personal vehicles there are entrances going from Minde Allé in the north and Kanalveien in the east. By the entrances there are planned for parking, both private parking and visiting parking. The entrance from Kanalveien is leading to the parking garages underground.

From Fjøsangerveien, there are two more entrances. These entrances will be partly blocked of, and will only be available for emergency vehicles, delivery of goods, garbage trucks, and for better access to the apartment buildings on special occasions such as people moving to or away to the apartment.

There are drivable entrances from Fjøsangerveien. These entrances are there to make sure emergency vehicles will have good access to the whole planning area.
The figure underneath shows the drivable roads in and around the area and shows where the entrances are found.

Figure 11 Illustration to show existing driving roads and where the entrance points for personal vehicles and special vehicles are. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt).

5.3 Parking Solution

The planning area is located inside the area BY2 in the municipality plan for the municipality of Bergen. Inside this zone it is demanded that there should be at least one parking spot per 100 m2 of residential units, which includes parking for visitors.

For the retail shops it is demanded that there should be ten parking spots per 1000 m2 of business.

Inside the planning area, at least 10% of the parking spots should be for handicap parking. Bergen is demanding that there should be a minimum of 2,5 bicycle parking spots per one hundred m2 of residential units and 12 per 1000 m2 of business.

5.3.1 Bicycle

	Minimum square meters per residential unit	Parking requirements per 100 m2	Total parking spaces
Planning proposal	12 000	2,5	300

Table 8 Requirements for bicycle parking.

In the planning proposal it is established one hundred bicycle parking spots. These are places in close connection to the apartment building, the different activity areas, and the main bicycle lane. The remaining two hundred parking spots will be in the parking garages alongside the car parking. These parking spots will be for the people living in the apartments.

5.3.2 Car Parking

Location of parking
In the planning proposal there are facilitated for parking spots for residents, guests, and customers by two the main entrances to the area. There are also planned for two parking garages. The first parking garage is located under the grocery store and is meant for residents, guests, and customers. The second garage is found underneath the mixed retail and resident building B/F2 and is mainly for residents but could be for some guest parking.

Number of parking spaces
The planning proposal is facilitating for one parking spot per 100 m2 of residential unit.

The municipality of Bergen wants to reduce the use of cars and that is why there is only 1 parking spot per 100 m2 of residential units. In this area most people will have to rely on public transport, bicycle, and walking to get to and from the planning area.

	Minimum square meters per residential unit	Parking requirements per 100 m2	Total parking spaces
Planning proposal	12 000	1	120

Table 9 Requirements for car parking.

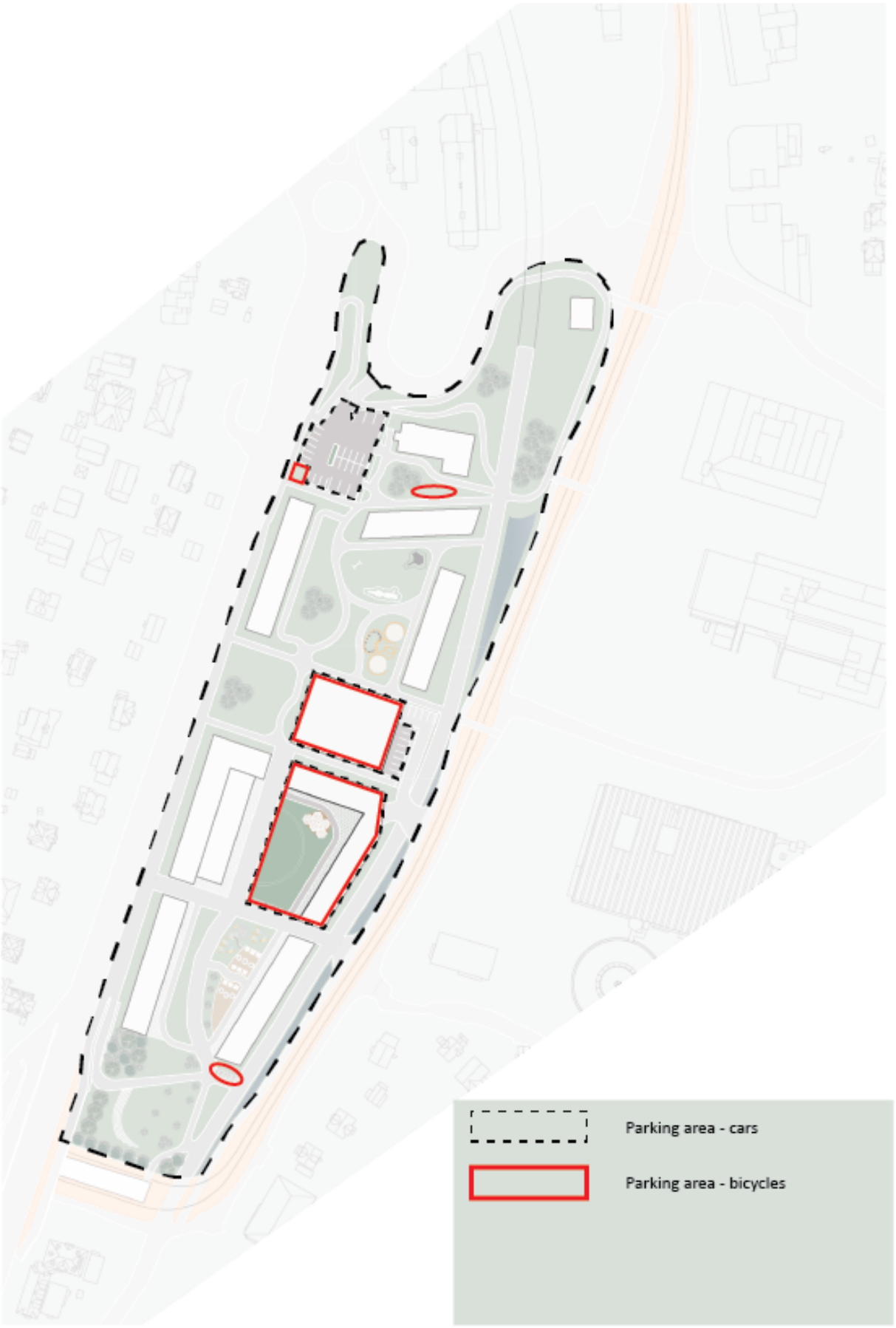


Figure 12 Placements of the car and bicycle parking on the planning area. (Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten, edited by Simen Mandt).

6. Estimated Future Modal Split

6.1 Baseline Information - Person Trips

As a basis for the modal split, the number of person trips generated by the proposed plan has been examined more closely. To calculate how many person trips are generated by the proposed plan, we need to look at how many residential units will be set up, and how many people are expected to live in each unit on average.

The proposed plan makes provisions for a maximum of 200 residential units. According to municipality facts from Statistics Norway (SSB), there are 2,02 persons per residential unit in Bergen municipality. (SSB, n.d.). Since the plan makes provisions for smaller residential units, it is assumed in this report that there at 2,0 per residential unit. The national travel behaviour survey from 2023 shows that each person makes an average of 2,6 trips per day. (Statens Vegvesen, n.d.). In these calculations, it is assumed that each person makes an average of 2,5 trips per day.

200 residential units * 2,0 persons * 2,5 person trips = *1000 person trips.*

6.2 Future Modal Split

The planning area is found approximately 5 km from the city centre of Bergen. There is good accessibility for pedestrians and cyclists to important destinations in the area. There is also good accessibility for motorists in the planning area. Public transport is bordering to the planning area, and the frequency of the service is good, which means that accessibility by public transport is good.

The municipality has looked at the potential for changing travel habits in the districts. With the introduction of the light rail, Bybanen, and the walking and bicycle tunnel, Fyllingsdal-tunnelen, Minde are considered to have the potential to achieve an increase in the number of environmentally friendly travel habits.

In the calculations for the estimated modal split of the proposed plan, the potential future modal split of 2035 with a population growth of 100% has been used. The planning proposal is turning the area from 0 residential units into 150, with good connections with walking, cycling, and public transport. Therefore, it is expected a substantial change from the situation today.

Mode of transport	Today's situation (percent)	After development (percent)	After development (number of trips per day)
Walking	20%	31%	310
Cycling	2%	10%	100
Driving	55%	25%	250
Passenger	7%	10%	100
Public transport	16%	21%	210
Other	2%	3%	30
Total	**100%**	**100%**	**1000**

Table 10 Estimated modal split for the proposed plan.

7. Sources

1. Mandt, S. (2023). Mobilitetsplan – Detaljregulering for Ravperleveien 1, gnr. 14 bnr. 13. Sweco Norge AS avd Stavanger. Available at: https://www.arealplaner.no/stavanger1103/arealplaner/1887 (Accessed: 28 April 2024)
2. Google. (2014, July 23). Google Earth. Available at: https://earth.google.com/web/@60.36654698,5.34355254,31.38594956a,3580.52116261d,35y,0.00000001h,60.00451814t,0r/data=OgMKATA (Accessed: 28 April 2024).
3. Visit Bergen (n.d.). Verdens Lengste tilrettelagte gang- og sykkeltunnel åpnet i Bergen. Available at: https://www.visitbergen.com/om-oss/baerekraft/verdens-lengste-gang-og-sykkeltunnel-i-bergen (Accessed: 28 April 2024).
4. Skyss. (n.d.). Rutetabellar og kart. Available at: https://www.skyss.no/reise/rutetider/ (Accessed: 28 April 2024).
5. Statens Vegvesen. (n.d.). Trafikkmengde. Vegkart. Available at: https://vegkart.atlas.vegvesen.no/#kartlag:topo4/@-31437,6730607,15/hva:!(id~540)~ (Accessed: 28 April 2024).
6. Statens Vegvesen. (n.d.). Trafikkulykke. Vegkart. Available at: https://vegkart.atlas.vegvesen.no/#kartlag:topo4/@-31510,6730508,15/hva:!(id~570)~ (Accessed: 28 April 2024).
7. Onarheim, S., & Sigurdson, M. S. (2020, September 30). Mobilitetsplan for områdeplaner for Fyllingsdalen og Spelhaugen. Bergen kommune. Available at: https://www.bergen.kommune.no/api/rest/filer/V461275 (Accessed: 28 April 2024).
8. Statistisk sentralbyrå (n.d.). Kommunefakta – Bergen (Vestland). SSB. Available at: https://www.ssb.no/kommunefakta/bergen (Accessed: 28 April 2024).
9. Nasjonal Reisevaneundersøkelse 2023 – nøkkeltallsrapport. Statens vegvesen. (n.d.). https://www.vegvesen.no/fag/fokusomrader/nasjonal-transportplan/den-nasjonale-reisevaneundersokelsen/reisevaner-2023/nasjonal-reisevaneundersokelse-2023---nokkeltallsrapport/ (Accessed: 28 April 2024).
10. (©2024 Norkart AS/Geovekst og kommunene/NASA)
11. Copyright Statens Kartverk, Geovekst and municipalities. For the use of maps in printed and digital publications, contact Bergen kommune, Plan og Bygningsetaten.

10.2 Risk evaluation

	Factors being surveyed	Relevant to the measure	Comments
NATURE RISK			
Avalanche hazard/landslides/ **Unstable ground (snow, ice, rocks, clay, soil, and bedrock)**	Is the area prone to snow or rockslides?	No	The map-based guide from NVE shows that the area is within a small hazard zone for snow avalanches, but it is so small that natural features or building will prevent this from getting into the planning area.
	Is the area geotechnically unstable? Is there a risk of landslide/ settlement in adjacent areas with mass displacement, permanent or temporary groundwater lowering, etc.?	Yes	Map from NGU shows that the planning area consists of fill material (anthropogenic material). The area is partially within the cautionary zone for quick clay landslides, which means that there is a potential risk, but it is small enough that it will not be further assessed.
Flood/flash	Is the area prone to tidal flooding/sea level rise?	No	Not relevant for this site.
	Is the area prone to river/ stream flooding? (Enclosed stream?)	Yes	The planning area is located within a cautionary zone for floods, but by excavating the old river, this will mitigate the potential flooding.
	Can drainage lead to flooding in downstream areas?	No	
Extreme weather	Could the areas be particularly exposed to increased wind/extreme rainfall?	No	The planning area is located in Bergen, which is highly susceptible to heavy rainfall, but it will not increase the risk for the project.
Forest/heath fire	Is the area exposed to forest or heath fires?	No	Not relevant for this site.
Regulated water	Is there open water nearby, with a specific risk of unsafe ice or drowning?	No	There is a small river that has been dug up in recent times but will not be big enough to cause risks.
Terrain formations	Are there terrain formations that pose a special hazard? (Cliffs, etc.)	No	There is a drop from the main road to the light rail station and the “City Forest”, but there is no reported accidents here.
Radon	Is there a risk of high levels of radon?	Yes	Parts of the planning area are within an area with a high level of caution for radon.

Table 1 Risk evaluation for nature risks at the planning area.

	Factors being surveyed	Relevant to the measure	Comments
TRAFFIC RISK			
Accident locations	Are there known accident hotspots on the transportation network in the area?	No	There is no known accident hotspots near the planning area.
Dangerous goods	Is there transportation of dangerous goods through the area?	No	
	Is there loading/unloading of dangerous goods in the area?	No	
Vulnerable road users	Are there specific hazards associated with the use of the transportation network for pedestrians, cyclists, and motorists within the area? (e.g., crossing roads, poor visibility, complex traffic conditions, low lighting, high speed/speed limit?) - To daycare/school - To sports facilities - To community facilities - To shops - To public transport	Yes	
Accident on nearby transportation routes	Will unintended incidents that may occur on nearby transportation routs pose a risk to the area? - Incidents on roads - Incidents on railway - Incidents on waterways/rivers - Incidents in the air	Yes	

Table 2 Risk evaluation for traffic at the planning area.

	Factors being surveyed	Relevant to the measure	Comments
BUSINESS RISK			
Previous use	Is the area (sea/land) affected/contaminated by previous activities? - Industrial activities, including waste disposal? - Military facilities, underground facilities, barbed wire barriers? - Mines, open pits, rock dumps, etc.? - Agriculture/horticulture?	No	The previous activities in the area consisted of parking, car industry, offices, and shops. These would not affect or contaminate the future use.
Businesses at risk of fire an explosion	Are there nearby businesses that may pose a risk to the project?	No	Nearby areas are consisting of offices, shops, and housing.
	Will the project increase the risk of fire and explosions?	No	
Hazardous material spills or other acute pollution	Are there nearby businesses that may pose a risk of chemical spills or other pollution?	No	Nearby areas are consisting of offices, shops, and housing.
	Will the project increase the risk of fire and explosion?	No	
High voltage	Are there overhead power lines or underground cables running through the area?	No	There is no overhead power lines or underground cables.
	Is there a specific risk of climbing associated with these power lines?	No	

Table 3 Risk evaluation for businesses at the planning area.

Sources:

1. Mandt, S. (2023). Risiko- og sårbarhetsanalyse – Detaljregulering for Ravperleveien 1, gnr. 14 bnr. 13. Sweco Norge AS avd Stavanger. Available at: https://www.arealplaner.no/stavanger1103/arealplaner/1887 (Accessed: May 13, 2024).

2. Norwegian Water Resource and Energy Directorate. (n.d.). Kartbasert veileder for reguleringsplan. NVE. Available at: https://nve.maps.arcgis.com/apps/MapSeries/index.html?appid=66271d2e94014aff80fc065a18ad1f50 (Accessed: May 13, 2024).

3. Geological Survey of Norway. (n.d.). Løsmasser. NGU. Available at: https://geo.ngu.no/kart/losmasse_mobil/ (Accessed: May 13, 2024).

4. Geological Survey of Norway. (n.d.). Radon aktsomhet. NGU. Available at: https://geo.ngu.no/kart/radon_mobil/ (Accessed: May 13, 2024).

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