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Sustainable landscape plan for Moa in Ålesund municipality, with focus on nature based solutions, biodiversity, recreation and resilience

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Abstract

This thesis focuses on defining a strategic landscape plan for the Moa district in Ålesund municipality, Norway. Using nature-based principles to promote resilience to climate change. The plan emphasizes on biodiversity, and blue-green infrastructure, while also providing green areas and recreational spaces. The study examines the municipality's existing plans for the area, analyses strengths and weaknesses, and develops a plan that aligns with the United Nations' sustainability goals and the European Union's mission for climate-neutral cities which are presented in the municipality plans for future development.

The main research question posed in this thesis is: "How can the SDGs and EU's plans for sustainable cities support an alternative development scenario for the Moa district in Ålesund municipality?"

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Introduction

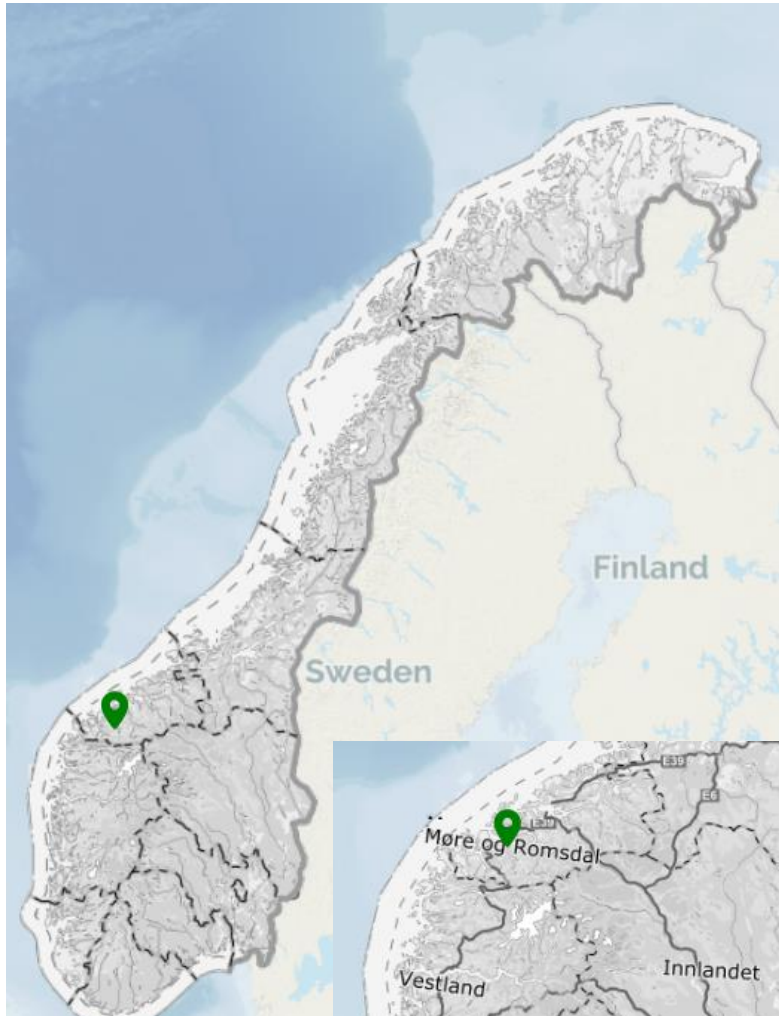


Figure 1: Map showing the location of the focus area. (Base map: Topografisk norgeskart, gråskalert)

Moa is a district in Ålesund municipality, Norway. The area has over time been heavily densified. The district is at a point now where there is a need for a strategic landscape plan. This thesis will investigate how this can be achieved by using known-to-work nature-based principles. The plan will promote resilience to climate change focusing biodiversity, blue green infrastructure while also providing and improving spaces for recreational use. Ålesund has many rainy days, and rivers in the area have increased water flow from melting during Spring. We will look at what plans the municipality has for the study area, analyse existing strengths and weaknesses, and produce a strategic plan for how the UNs sustainability goals and EU's mission for climate neutral cities can be used to set this district up for completing the goals set.

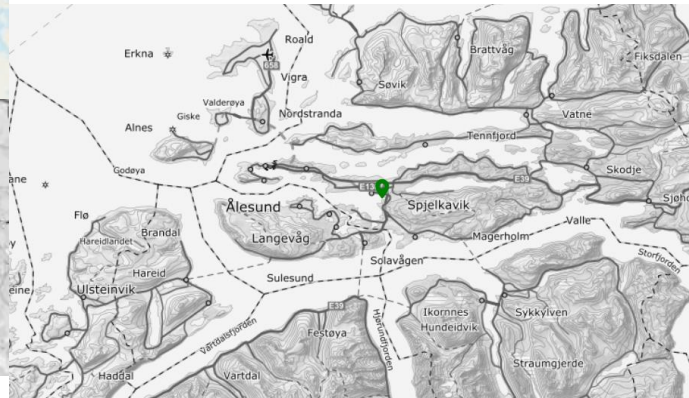


Figure 2: Showing the focus areas placement in Ålesund municipality (Base map: Topografisk norgeskart, gråskalert)



Figure 3: Focus area. (Base map: norgebilder)

General information about Ålesund municipality



Figure 4: Map showing Ålesund municipality and its location in Norway. (Base map: Google Earth.)

In Ålesund municipality (608 Square km) are some of the most important fjord-systems in Sunnmøre.

The largest inhabited islands, all of which have mainland connections are (from the west) Hessa (4 square kilometre), Aspøya (0.5 square kilometre), Nørve (5 square kilometre) and Uksenøya, and further Tørsla (1.5 square kilometre) and Humla (0.9 square kilometre) in Åsefjord south of Uksenøya (John Stokkan, 2023).

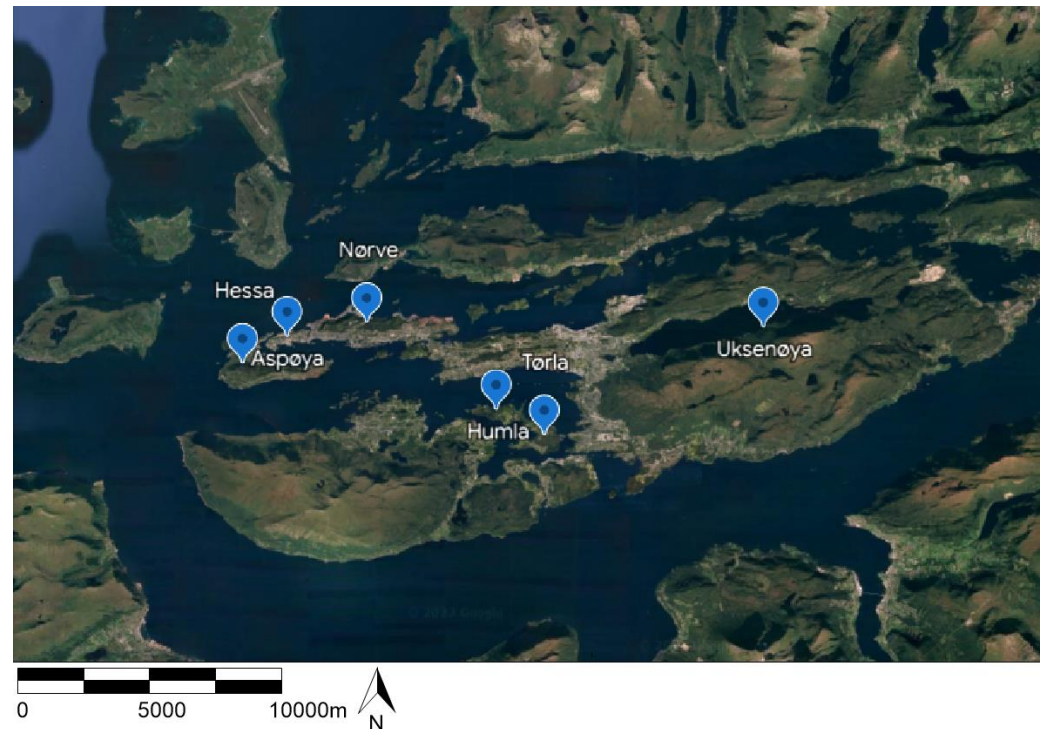


Figure 5: Locations of the five islands that make up Ålesund city and the focus area. (Base map: Google Earth)

Bedrock

Most of the municipality has gneiss as bedrock affected by the Caledonian mountain range fold. This structure of bedrock creates many elongated islands with an east-west direction, often with steep sides to the north and west and a gentler side towards the east (John Stokkan, 2023).

Landscape types

Climate

The normal precipitation in Ålesund for a year is 1368mm, the climate in the area is heavily affected by the surrounding ocean and freshwater. Ålesund has in total 113 days of sun which leaves 252 rain days in a year (John Stokkan, 2023).

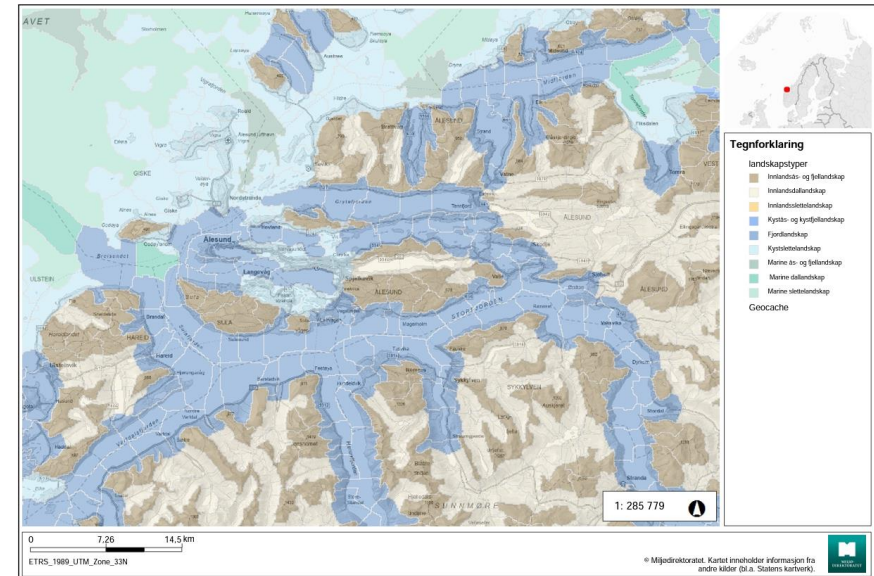


Figure 6: Shows the mixture of landscape types in Ålesund municipality. (Map taken from Miljødirektoratet)

Ålesund municipality is mostly registered as fjord-landscape, highlighted blue in the map above. The lighter blue is coastal plain landscape, with different scales of “wave exposure.” Brown and beige are inland mountain landscape and inland valley landscape (Miljødirektoratet).

History of the site:

Moa, a heavily densified area in Ålesund municipality, has over the past 60 years through a process of transformation and urban densification that determined the loss and fragmentation of historical farms and forested areas.

The district today is characterized by the presence of malls and commercial activities that defined Moa as one of the biggest five shopping districts in Norway. This transformation occurred at the detriment of the nature and wildlife of the zone. Located within the shopping mall, my focus area 'Moa gard' is about eight square kilometres larger. Back in the early 1900, when it was bought by the municipality the area was 200.000 square kilometres. The existing farmlands were used to provide food, and work opportunities to the less fortunate people living there. During the past century, Aalesund municipality developed quite few plans for the area that were slowly implemented after the second world war, when the area opened to industrial developments. The first two factories established in the area were "Stokke" and "Spjelkavik skofabrikk" at the end of the 1970s, as a part of a more elaborated industrial proposal for Moa. In 1972 the first department store was opened, and shortly after came "Moa Butikksenter" (1983), "Moa Syd" (1991) and "Moagård" (1995) which were then later connected and became the big shopping centre we can see in the mid-2000s ("Moa Gard," 1933).



Figure 7: Development of moa from (top) 1957-2020. (Base maps: Norgebilder)

Development of Moa:



Figure 8: Picture taken from norgebilder. (Ortofoto Norgebilder, 1957)

Moa district in 1957, was mostly used for agriculture and had spread housing.



Figure 9: Picture taken from norgebilder. (Ortofoto Norgebilder, 1968)

In 1968, densification started, and the agriculture has been greatly reduced in the area. First industries were planned to be built in the area.



Figure 10: Picture taken from norgebilder.(Ortofoto Norgebilder, 1982)

In 1982, industries started to be established in the north and centre of the district, factories like “Stokke” and “Spjelkavik skofabrikk” can be seen in the middle of the map.



Figure 11: Picture taken from norgebilder.(Ortofoto Norgebilder, 1989)

In 1989, industry keeps blooming in the area and housing areas of workers are established. Fast densification with little planning for the future development of the area.

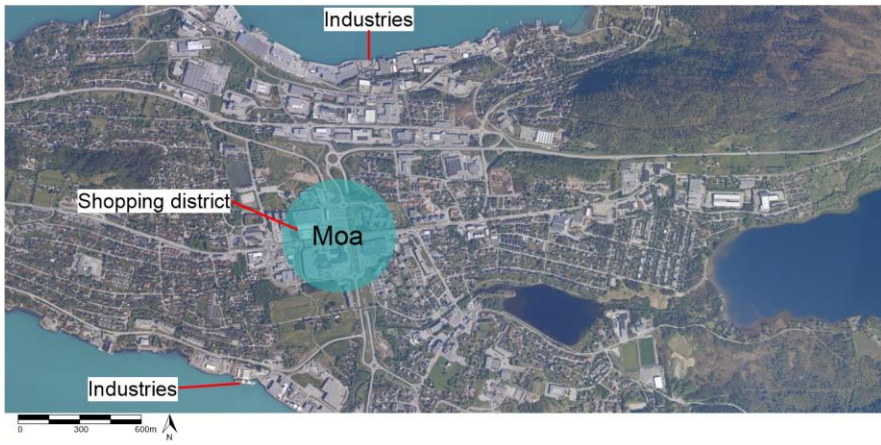


Figure 12: Picture taken from norgeibilder. (Ortofoto Norgebilder, 2006)

In 2006, shopping district is established in the middle and industries who are located both south and north of the area expanded along the coastline.

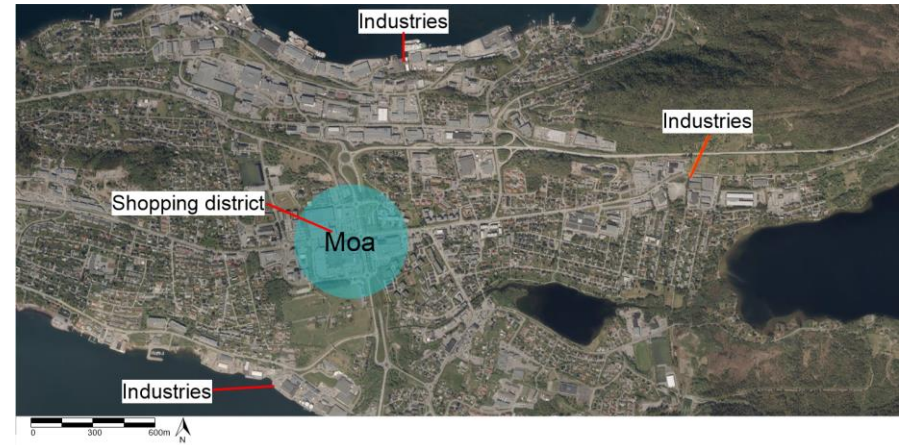


Figure 13: Picture taken from norgeibilder. (Ortofoto Norgebilder, 2020)

In 2020, the area has been heavily densified, and the industries have taken control of both coastlines north and south. Aswell as expending to the east.

Current land use



Figure 14: The map highlights forests and green components that are found in the focus area.

Forrest and green components are still a major part of the district and if taken into consideration in future development the biodiversity and connectivity could be strengthened.

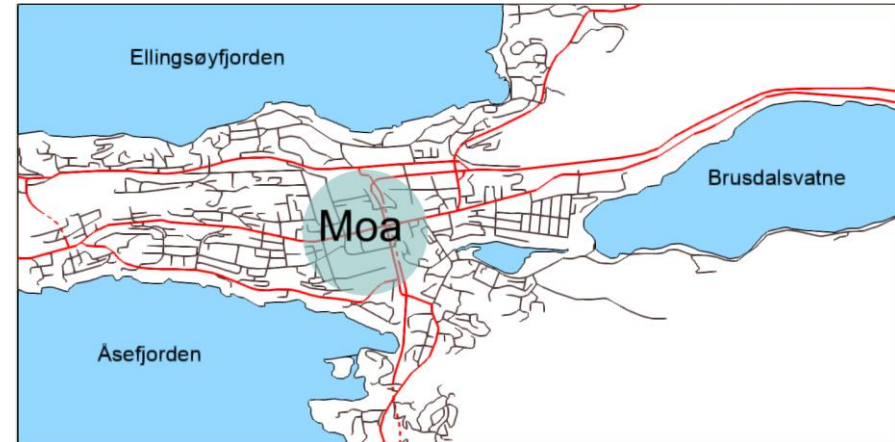


Figure 15: The road network that connects all the different areas of the focus area.

The Road-network in Moa is crucial, being the main connection point between Ålesund city and the rest of the municipality. These road-networks are well developed and take a big focus in the development plans of Moa.



Figure 16: Highlighting the different types of water bodies, swamps/wetlands and rivers.

The focus area is located between Ellingsfjorden and Åsefjorden which are important for both transport of goods and tourist ships. The area has also two freshwater bodies, Brusdalsvatne and Lillevatne.

Brusdalsvatne is regulated for drinking water purposes and provides water to most of the district (Municipality, 2023). The municipality is also considering using Lillevatne for similar purposes in the future. The two freshwater bodies are connected by a river that ends in Åsefjorden. There are also many small creeks running from the nearby mountains into these waterbodies, creating both bogs and swamps.

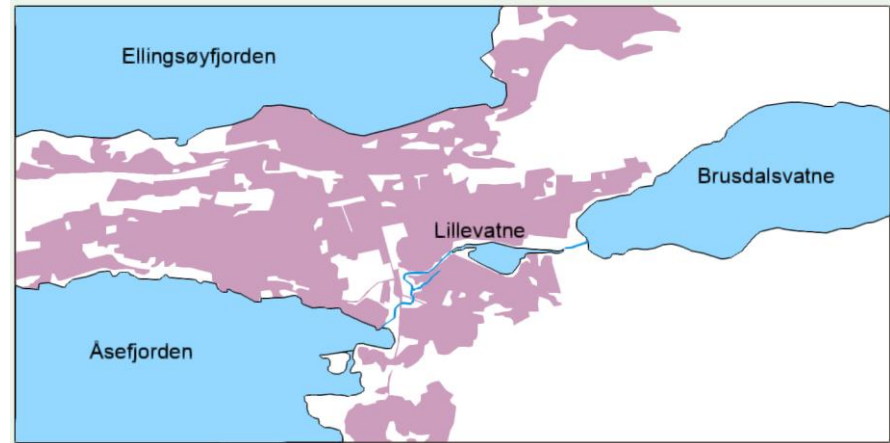


Figure 17: Urban space distribution in the focus area.

Urban space has over time developed and densified to a point that it will soon cut off the connectivity of the forest reducing the chance for migration of animals between the different patches.

Moa is a popular place for urban densification since it has good connectivity to the other areas in the municipality. So, the trend of densification is unlikely to change in the future.



Figure 18: This map shows how all the different layers make up the composition of Moa.

The overlay of the previously analysed layers highlights the fragmentation in the green elements and the importance played by the road infrastructures. Moreover, numerous green patches are indirectly connected through and by the road system and there is a competition for space between urban densification and green presence.

Commercial district map and infrastructure

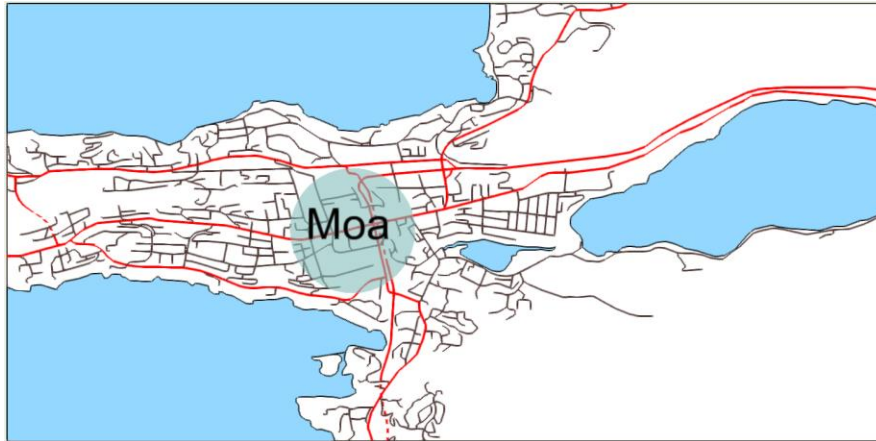


Figure 19: Shows how the infrastructure is connecting around the commercial district.

Moa's focus for development is the commercial area marked by the circle. Highly developed since the 1960's, becoming one of Norway's biggest shopping malls systems.

Connectivity in the focus area:



Figure 20: Road Network, Red are the main roads, green are walkways meant for pedestrian and bicycles that are not connected to the main road system.

The thesis study area is well connected by all main roads, with a great presence of cars. Nonetheless, most of the main streets have walkways along them so connectivity for pedestrians/bicycle is good. but the amount of "green walkways" is low. In total there are two green walkways that lead out from the shopping district, one leading to the south towards the recreational park by the fjord. While the other one leads out to the north and towards the kindergarten. Most of the green walkways are connected to Spjelkavik and Lillevatne.



Figure 21: This image shows the big greenspaces that are connected to the main roads. (Google, 2022a)

Most of the road network in Moa have greenspaces requiring high maintenance. Those areas are heavily used in winter to store the snow collected from the streets.



Figure 22: High maintenance green that is well kept by the municipality. (Google, 2022b)

The main roads connecting the shopping district have well maintained greenspaces connected to them, but all of them are mostly grass creating a monocultural landscape.



Figure 23: Here you can see the high upkeep the municipality puts into these spaces. (Google, 2022c)



Figure 24: Highlight's the green pathways in the focus area. Most of them connect to an area called Spjelkavik.

In the area there are pathways that are not connected to main or side roads. Most of them function as a green link to the urban areas being equipped with playgrounds and green spaces.



Figure 25: Bland and vast open greens kept short with no character or purpose are the view you have when you walk along most of the green walkways.



Figure 26: Some areas of the green walkways have great connection to the nearby forests.

The green walkways run through several green patches that today lack a strategy and appear in a state of abandonment. The pathways follow along the rivers, and lead to either Lillevatne or the beach down at Åsefjorden.



Figure 27: Here you can clearly see the mixture of upkeep, and how this interferes with the experience along the path.

Rivers and waterbodies:

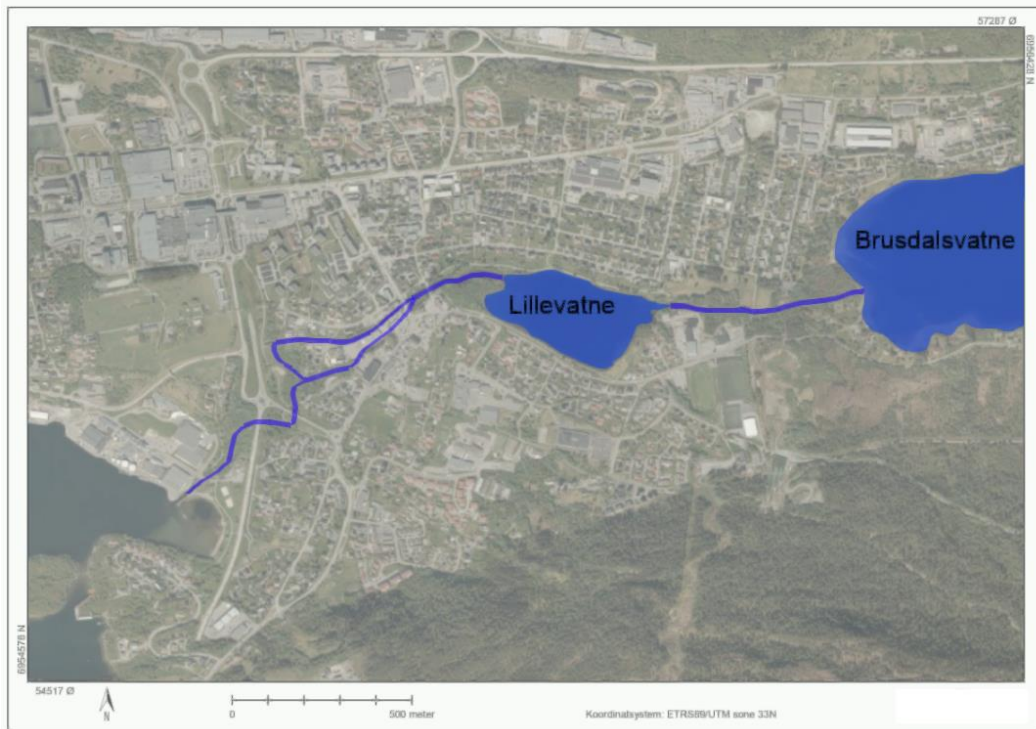


Figure 28: Highlighting the freshwater rivers that flow through the urban space.

Two streams cross the area linking Brusdalsvatnet and Lillevatnet before to flow into the Fjord. The rivers and water bodies play a great role for the urban life around, being the main access to recreational nature.



Figure 29: The amount of registered floodplain for Lillevatnet and the rivers connecting to it. Here you can also clearly see that Brusdalsvatnet does not have any floodplains since its regulated already.

The flood map on the right, shows that most of the flood comes from the rivers leading out from Lillevatnet. Brusdalsvatnet is regulated for drinking water purposes and hence does not have an area of flood risk. There are upcoming plans from the municipality to regulate both water bodies for drinking water facilities (NVE, 2008).

Recreational facilities and greenspaces for Moa:



Figure 30: You can clearly see how the greenspaces along the road network would be able to provide green corridors as well.

While being densified over the years there are still many greenspaces remaining in Moa. The map to the left highlight's the greenspaces owned by the municipality. They have the potential to shape a green corridor that could connect the patches of green elements and the remaining forests bordering the area.

Defining

Research question and goal setting

As blue-green infrastructures become increasingly more popular in urban development, and densification is an ever-growing factor for already dense areas. The thesis presents an alternative plan for the area and districts close to Moa, with the focus on connectivity and accessibility of greenspaces and to recreational areas, while also aiming to complete some or all the existing goals from both the “UNs sustainability goals” and “EU’s mission for climate neutral cities.”

Therefore, in this thesis I pose the main research question:

How can the SDGs and EUs plan for sustainable cities enforce alternative development scenarios for the Moa district in Ålesund municipality?

Method and materials

A. Literature review:

Reports, archival documents, municipal plans and databases have been investigated to understand the spatial, socio-cultural and economic conditions of the Moa district while identifying threats and potential for its future development. Some theories have been identified to guide in the analysis and design proposal.

B. Observational analysis

The field trip to Moa district was done on an early spring day. Bigger distances between the different focus areas were done by car, while the most important areas were inspected by foot. The focus of this trip was to get a feeling for how far the distances between greenspaces are and what standard these were in.

The field work was conducted on weekdays and weekend to achieve an understanding of the users' behaviour.

Moreover, I took pictures of areas that needed improvement or had great potential. Observations helped to find out the existing potential and weaknesses of the existing and identify which parts of the case area are attractive to users.

C. Spatial data: GIS

Maps and data were analysed and used through GIS to get a better understanding of the several spatial layers of this district.

Municipality Plans:

Arealplan for development in Ålesund, was used to identify the projects approved by the municipality together with the state of construction and planning.

Artsdatabanken and NIN, were used to get a general base about animal life and nature types for the focus area.

Theoretical Framework

UN- The sustainable development goals

Un's sustainable development goals (SDGs) were adopted by the UN in 2015 as a global call to action to end poverty, protect the planet and ensure that all people can enjoy peace and prosperity by 2030 (UN, 2015).



Figure 31 Roadmap of all the different SDGs provided by the UN.

SDGs are 17 main points that we should aim towards if we want our planet to be safe for humankind, animals, and fauna. These goals are intertwined and action on one goal affects the outcomes in others. The focus is that development should and must be balanced between social, economic and environmental sustainability (UN, 2015).

SDGs are relevant to this thesis because they provide a global goal and pinpoints of what direction development globally should take in many different spectres. The most relevant for city development are

3 6 11 13 14 15. Below is a short description of the six different SDG's and how each of them can help with development plans for Moa. Each SDG has many more points than the once listed below but not all those goals are relevant for development in Moa, Norway (UN, 2015).

6 Clean water and sanitation

More than 40 percent of the world's population is affected by water scarcity, a number likely to rise as temperatures rise. Despite improvements in water sanitation since 1990, every continent is experiencing dwindling supplies of drinking water (UN, 2015).

Drought and desertification are already worsening water stress in more and more countries. At least one in four people are expected to suffer recurring water shortages by 2050 (UN, 2015).

Ecosystems related to water need to be protected and restored (UN, 2015).

11 Sustainable cities

It is estimated that more than half of us live in cities. In 2050, two thirds of the world's population -- 6.5 billion people -- will live in urban areas. We cannot achieve sustainable development unless we transform the way urban spaces are built and managed (UN, 2015).

Mega-cities are on the rise in the developing world, because of rising populations and migration, and slums are becoming increasingly common (UN, 2015).

To make cities sustainable means creating career and business opportunities, safe and affordable housing, and building resilient societies and economies. This involves investment in public transport, creating green public spaces, and improving urban planning and management (UN, 2015).

13 Climate action

Climate change is affecting every country in the world. The amount of greenhouse gas emissions has increased by more than 50 percent since 1990. Our climate system will undergo long-term changes because of global warming, and if we do not act now, we will experience irreversible consequences (UN, 2015).

Every year, climate-related disasters cause economic losses. Geophysical disasters, 91 percent of which are climate-related, have killed 1.3 million people and left 4.4 billion injured between 1998 and 2017 (UN, 2015).

Providing support to vulnerable regions will directly contribute to Goal 13 as well as the other Sustainable Development Goals. National development strategies should also address disaster risk reduction, sustainable natural resource management, and human security. Using existing technology and strong political will, it is still possible to limit the increase in global mean temperature to two degrees Celsius above pre-industrial levels, aiming at 1.5°C, but urgent and ambitious actions will be required (UN, 2015).

14 Life below water

Oceans drive the global systems that keep the Earth habitable for humans based on their temperature, chemistry, currents, and life. The management of this vital resource is vital for humanity at large, as well as for counterbalancing the effects of climate change (UN, 2015).

Coastal and marine biodiversity provide livelihoods to more than three billion people (UN, 2015).

About 30 percent of the carbon dioxide humans produce is absorbed by the oceans, and ocean acidification has increased by 26 percent since the industrial revolution. Every square kilometre of ocean contains an average of 13,000 pieces of plastic litter, most of which come from land-based sources (UN, 2015).

In addition to addressing the impacts of ocean acidification, the SDGs aim to sustainably manage and protect marine and coastal ecosystems from pollution. Increasing conservation and sustainable use of ocean-based resources can also mitigate some of the challenges our oceans face (UN, 2015).

15 Life on land

We depend on the earth as much as the ocean for our sustenance and livelihoods. Humans rely on agriculture as an important economic resource since 80 percent of their diet comes from plants. Over 30 percent of the Earth's surface is covered by forests, which provide

habitats for millions of species, clean air and water, and are essential to climate change mitigation (UN, 2015).

Forests are being lost every year at a rate of 13 million hectares, and drylands are being desertified at a rate of 3.6 billion hectares. Biodiversity is still at risk despite 15 percent of land being protected (UN, 2015).

Taking immediate action is essential to protect natural habitats and biodiversity that are part of our common heritage, as well as mitigating and preparing for climate change. (UN, 2015)

EU Mission: Climate-Neutral and Smart Cities

What are EU Missions?

In some of our greatest challenges, EU Missions offer new opportunities for bringing concrete solutions. Achieving tangible results by 2030 is one of their ambitious goals.

As well as putting research and innovation in a new role, they will engage citizens through new forms of governance, collaboration, and engagement (EU, 2021).

What this EU Mission deals with:

The European Green Deal's goal of climate neutrality by 2050 relies heavily on cities. Despite occupying only 4% of the EU's land, they are home to 75% of its citizens. In addition, cities consume more

than 65% of the world's energy and account for more than 70% of global CO2 emissions (EU, 2021).

The mitigation of climate change is heavily dependent on urban action, so cities need to accelerate their green and digital transformations. European cities can substantially contribute to the Green Deal target of reducing emissions by 55% by 2030 and, in more practical terms, to offer cleaner air, safer transport and less congestion and noise to their citizens (EU, 2021).

Aims of the Mission

The Cities Mission will involve local authorities, citizens, businesses, investors as well as regional and national authorities to

1. Deliver 100 climate-neutral and smart cities by 2030.
2. Ensure that these cities function as experimentation and innovation hubs to enable all European cities to follow suit by 2050.

As foreseen in its implementation plan, the Cities Mission takes a cross-sectoral and demand-led approach, creating synergies between existing initiatives and basing its activities on the actual needs of cities (EU, 2021).

Patch matrix

The patch-matrix-corridor model was presented by Forman and Godron. This model presents landscape through three basic elements: patch, matrix, and corridor. (picture) The model explains how landscape is made up of patches of habitats connected by corridors, forming networks of regional connectivity. These networks are placed inside the matrix which is a dominant background land cover. The optimal landscape in this model would be one with both large and small patches since both play different roles as habitats. Big patches often provide major ecological roles while smaller patches can act as steppingstones for dispersal and provide for heterogeneity. (Richard & Godron, 1981)

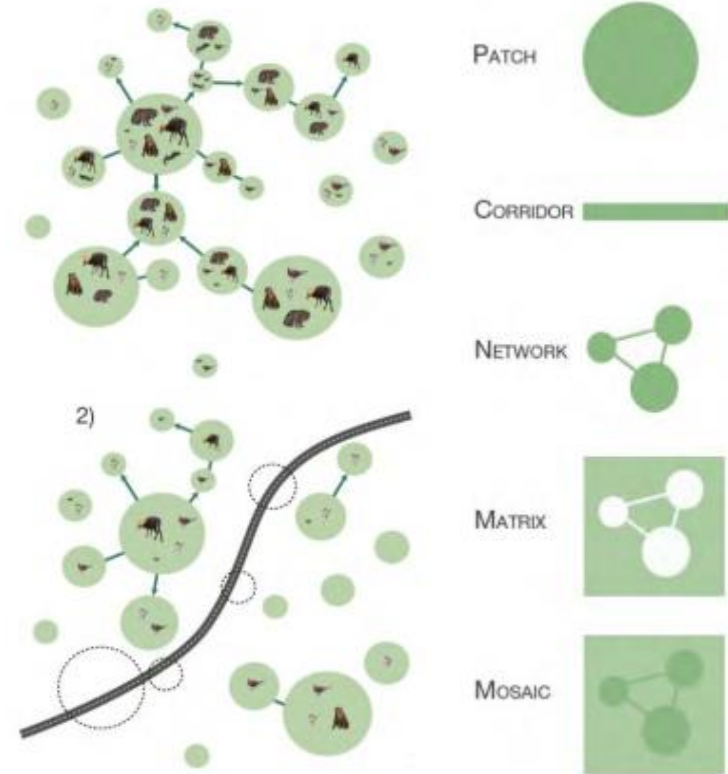


Figure 32: Shows how human interaction of building for example a road interferes with the connectivity of the network.

Figure 33: Explains the different elements the theory breaks nature into, and how they interact with each other.

Biophilic playgrounds

Biophilic playgrounds are nature-inspired playgrounds designed to create a connection between children and the natural world. This concept was inspired by “biophilia,” which suggests that humans have an affection for nature. The focus of these playgrounds is to incorporate natural elements, materials, and features to provide a rich and engaging environment for play. Biophilic playgrounds often include elements such as trees, rocks, water features, natural textures, plants, and wildlife habitats. The aim is to create a sensory-rich experience and to promote active and imaginative play by encouraging children to explore and interact with nature. These playgrounds have been shown to offer numerous benefits, some of these are:

- improved physical and mental well-being.
- increased creativity.
- increased cognitive development.

(Canan Cengiz, 2019)



Figure 34: example of biophilic playgrounds, here you can see part of the biophilic playground created in **Ang Mo Kio Linear Park**.(Cheekiemonkie, 2021)



Figure 35: Concept map of the biophilic playground: **HortPark**. Provides insight in how open nature design without borders and walkways creates an opening for imaginal play in nature-like environments.(Cheekiemonkie, 2021)

Moa

The Municipality of Ålesund's plans for future development:

Ålesund municipality set several goals for its sustainable development considering the major challenges it will have to face in the near future. They are quality of life for the residents, sustainable environment and competitiveness.

Climate and great variation in demographics and living conditions are examples of the challenges the municipality must deal with.

With this as a background, Ålesund municipality must prioritize environmental strategy in accordance with the green shift. A public health strategy that addresses today's and tomorrow's living conditions challenges (Municipality, 2020).

Development of services and innovations to meet future demographic challenges and facilitate business innovation. Those goals are based on the UN's Sustainable Development Goals, which will be incorporated into the social plan.
(Municipality, 2020)

Approved plans of municipality:

Three new houses southwest of Moa shopping centre. (Municipality, 2023)

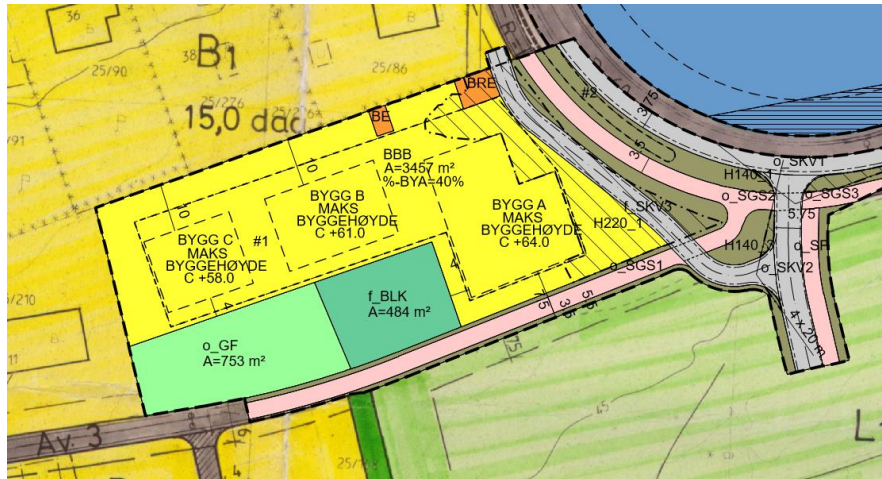


Figure 36: Shows the "Regulating plan" for the future development that has started construction recently. (Municipality, 2023)



Figure 37: How the building site looks today. The existing forest was completely cut down and removed to prepare the area for construction.

Extension of existing blocks close to Moa shopping mall.

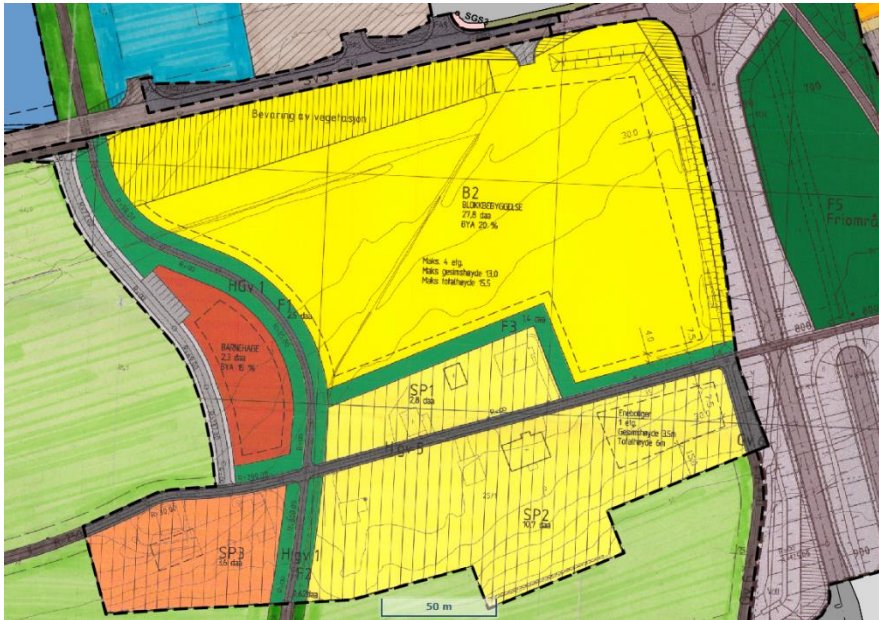


Figure 38: Shows the extension of the existing block-housing. The area was prior a part of the golf court that is connected to Moa. (Municipality, 2023)



Figure 39: How the area looks today viewed from the roundabout at the top corner of the Regulation plan. Area is a mixture of forest and golf court.

Tofthagen:

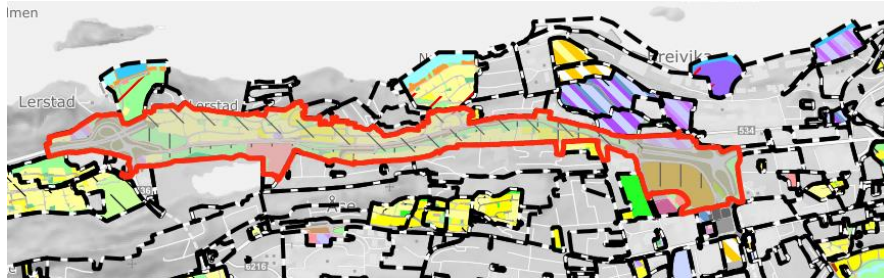


Figure 40: Regulation plan of the whole new main road that is planned in phases. Where the first phase is Tofthagen, here shown in the bottom right corner. (Municipality, 2023)

This project was planned in 2014 and focuses on a free view line for the road, and some smaller housing and greenspaces along the road. One of the bigger projects connected to this plan is to repurpose a greenspace (Grassland close to the main road) to be a housing area. This site will consist of single housing and a playground with a “green walkway.”

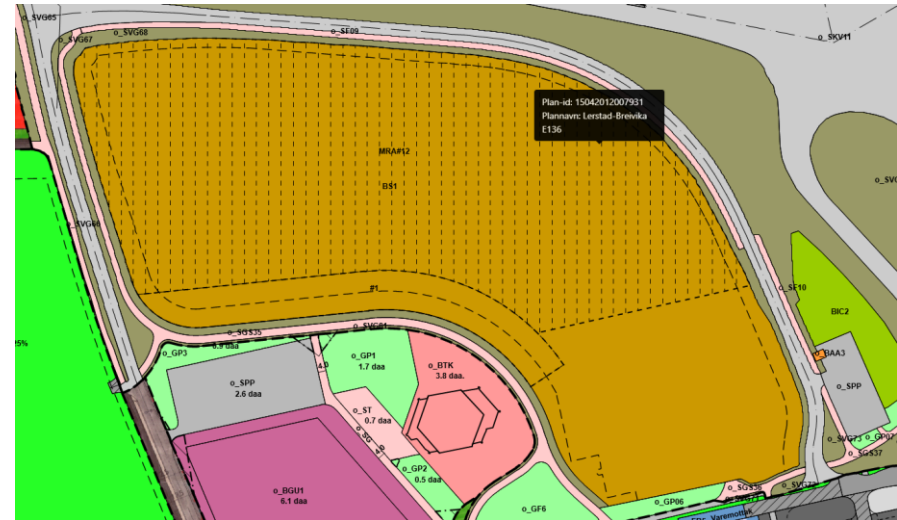


Figure 41: Focus plan for Tofthagen, shows that there are plans for green walkways, but no detailed plan for this is available for the public yet. (Municipality, 2023)

New settlement on previous greenspace north of Moa shopping centre. part of the Tofthagen project.



Figure 42: The area where the first phase is starting, loss of open wild greenspaces and forest areas, are the main concern for this build site.



Figure 43: Removal of the natural substrate to make space for the utility's necessities for households.



Figure 44: Clear cutting and flattening of the natural topography.

Focus points in Moa:



Figure 45: Overview map of the different points of interest for this Thesis. Yellow: Building sites, Teal: Green parks, Blue: Playgrounds and areas with potential for change, Purple: area where there are green walkways and Pink: areas where there is possibility for extension of the existing corridor that passes through the industrial district.

This map shows the different focus points of my whole study area, this being: greenspaces, playgrounds, building sites, “green walkways,” potential areas for change and the corridor leading through the densified industrial district.

Focus area: Lillevatne



Figure 46: Focus area 1 Lillevatne and the greenspaces connected to it. arrows show locations of interest, described after.

This area is one of Moa's main greenspaces for recreational practices, it has pathways along Lillevatne on both sides acting as a corridor for both humans and animals, this space also houses the only training park registered on maps. Moreover, it is also one of few spaces in the whole focus area that provides seating and recreational swimming possibilities.

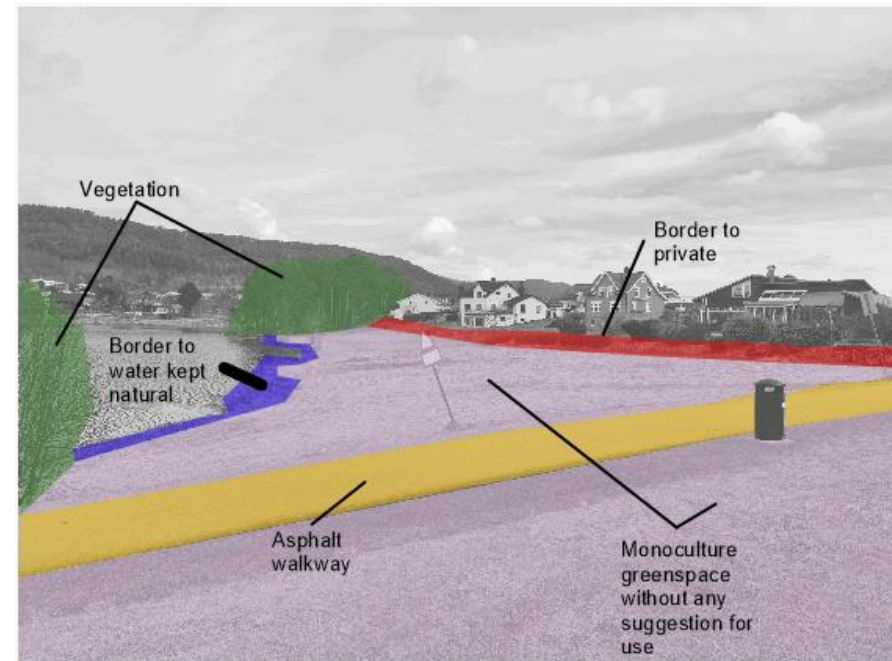


Figure 47: Analysis of the existing space.

While The area is one of the two most used greenspaces there is still room for improvement. The space marked in pink is monocultural grass lands kept short. The space even though it makes up a lot of the prime estate around Lillevatne provides no way to invite for use for passing citizens.



Figure 48: Situational picture of the pathway north of Lillevatne. picture taken by anonymous, uploaded to google-maps.

The pathways along the river are placed a few meters away from the border of Lillevatne and are made of gravel, which allows rainwater to infiltrate and find its natural way to the lake. The path around Lillevatne to the north also works as a border between private gardens and recreational space (As shown in the right). Since the path leaves the border of the waterbody untouched the flora which needs shallow waters to thrive is untouched and thereby creates a natural riverbank, which needs minimal maintenance and provides shelter for both insects and animals.

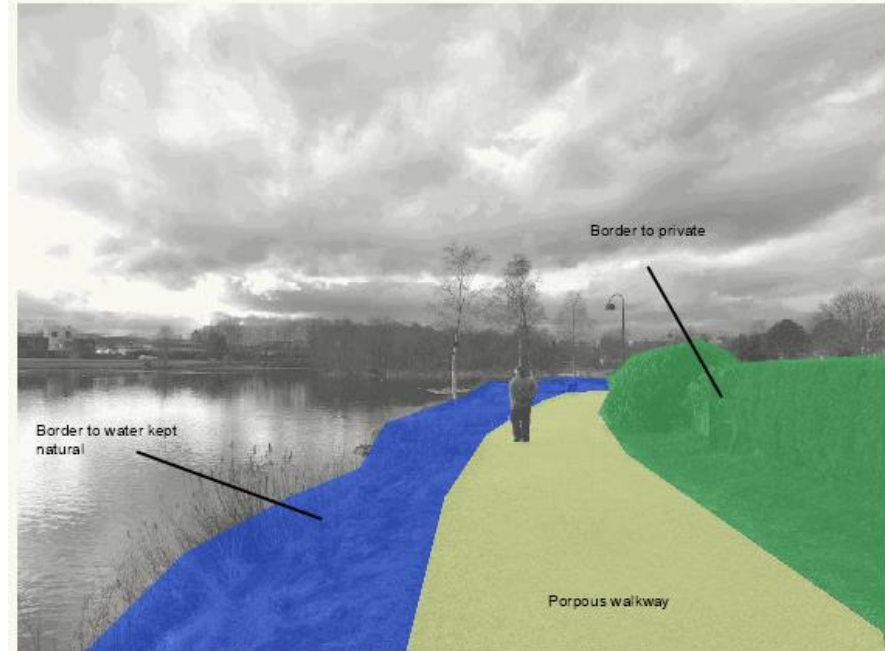


Figure 49: Highlighting pros and cons of the current situation.



Figure 50: Vast open greenspace, kept low and hard borders towards the forest.

At a short distance East from Lillevatne there is a greenspace that has been recently managed by the municipality as a monocultural green area. The vegetation is spread out in small groups of trees that looks like a remaining of the past forest use of the zone, This vegetation creates a lot of horizontal borders for both animals and humans. Creating something like a border of what is nature and what is recreational space. This makes these spaces feel locked in and disconnected from the nearby nature and increases citizen's separation from nature.



Figure 51: The training park was hard to spot, no vegetation to create privacy for users either.

In the same recreational space, there is a quiet newly established training park called “Tufteparken.” This park is placed in this vast open space without any vegetation around leaving it quite open to the public eye, which might be a reason for the lack of use during my observations. The exercise equipment placed here is nearly invisible to the potential users who don't know about the park beforehand. The path that leads from Lillevatne continues past this park and goes over to a forest/hiking path before connecting to Brusdalsvatne.

Playgrounds:



Figure 52: Locations of the different playgrounds provided to the citizens.

In the central part of the area close to the shopping malls and connected by several green pathways are a total of four playgrounds and one park.



Figure 53: Overview picture of "Riverside playground". Shows how neglected this playscape is compared to the greenspaces around the main roads.

The first playground whilst having the biggest area and a great placement appeared unused by the community during my observations. This is understandable considering its state of conservation. The equipment here is outdated, unstable or has been left vandalized or broken. The space itself has great potential; it is sheltered from the main road by green hills reducing the noise pollution by a great deal. During my observation I could nearly not hear any of the main road traffic.

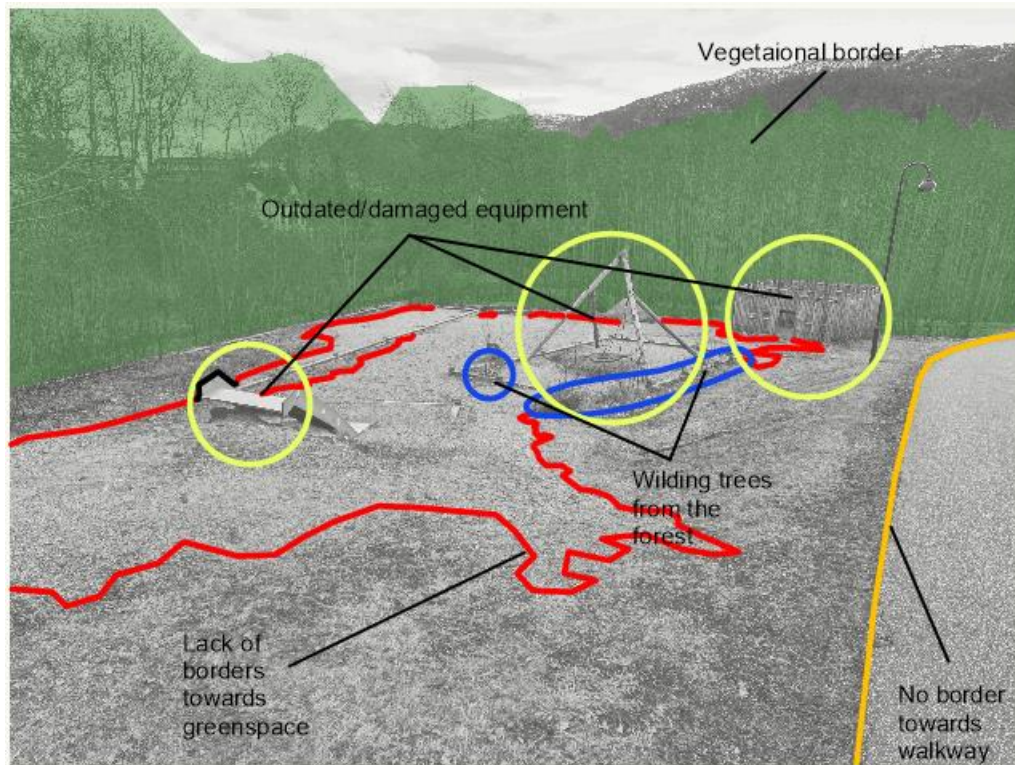


Figure 54: Spatial analysis of "Riverside Playground"

As shown in the picture the area has started to overgrow from the nearby greenspace, the play-equipment is old and not safe for use (Both the slide and the swing have loosened).

The walkway that borders it, has no proper trim towards the playground making it porous. Wilding trees have started to grow multiple places in the play area.

The potential for this area is big considering it has a prime estate along the walkways used by local citizens to move towards the shopping district.

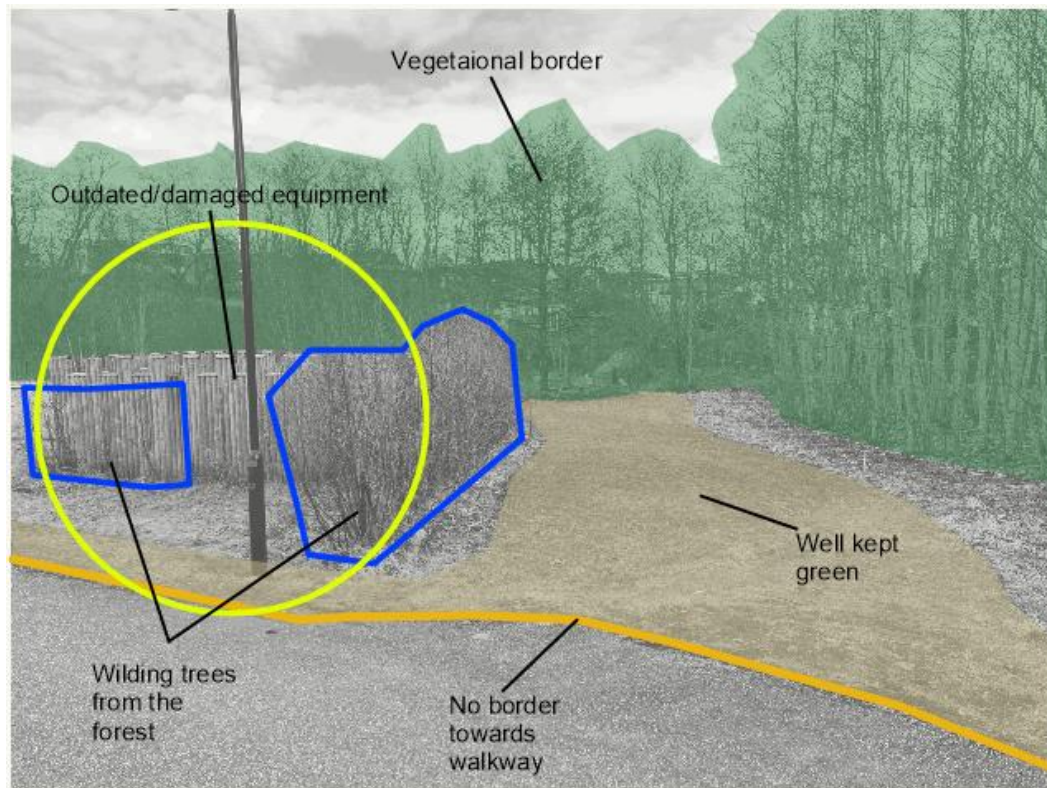


Figure 55: Spatial analysis of the other half of the "Riverside Playground".

Based on my observational analysis, maintenance around the playground is kept up, so accessibility to the playground is still high. The area appears to necessitate a new design that could enhance the value of the location together with the presence of the high trees bordering the playground.

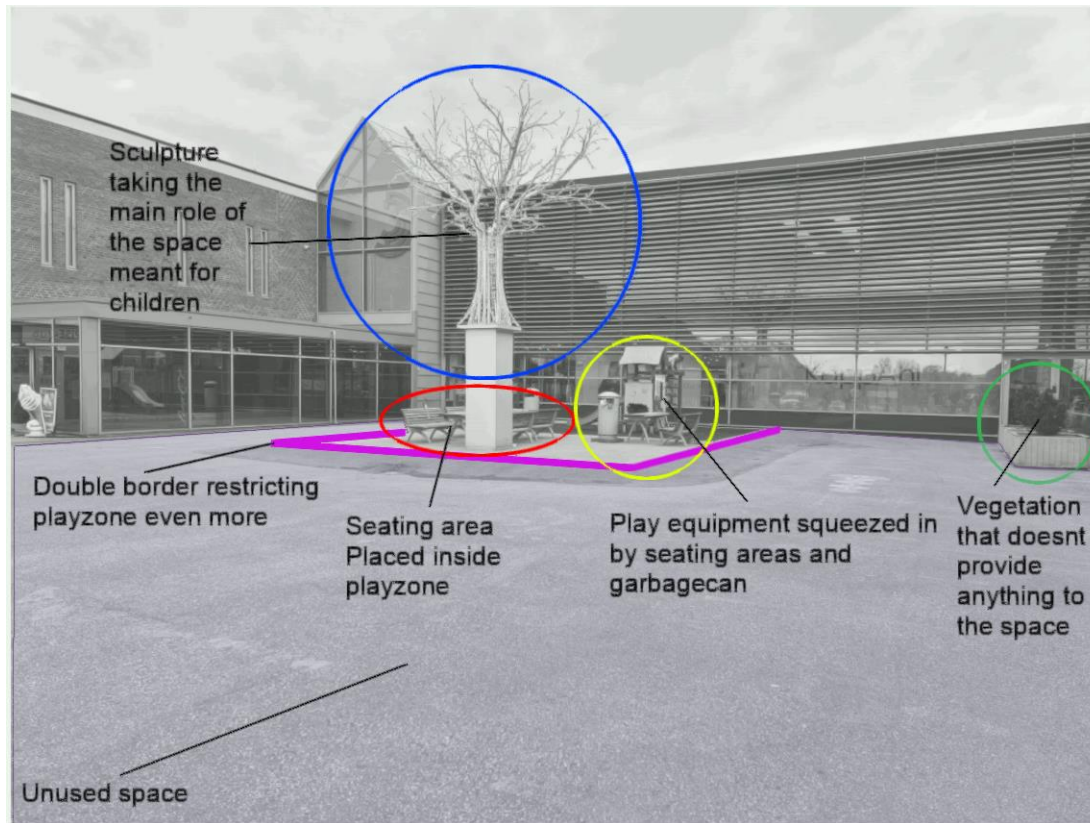


Figure 56: Spatial analysis of the "Moa centre park". This area has alot of foot traffic but near to no users.

Playground number 2. is placed by the shopping malls, it has a lot of potential considering the location and the number of users who pass by. Yet this space is tucked away and has no real function as a playground besides providing a slide. There is a giant sculpture placed directly in the centre, mostly used during wintertime as Christmas decoration. Vegetation while not being completely absent, is lacking with only two small bushes in plant pots. There is no connection between the shopping space and the outside area even though this location would be perfect to create a safe environment for play whilst waiting for the next bus or while their guardian is quickly shopping for something.

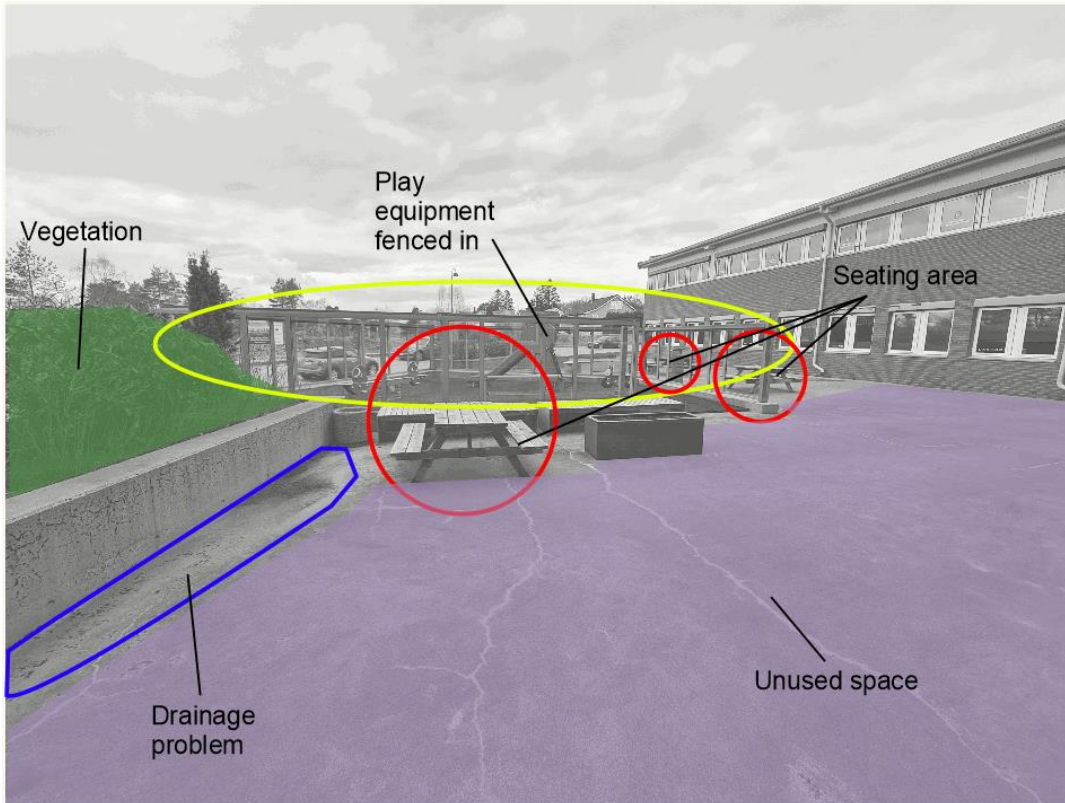


Figure 57: Spatial analysis of the "Dentist playground". Area has no concept, and it is hard to tell if the space is a playground or a seating area.

The third playground is placed to the southwest border of the shopping malls. It is completely walled in by plexiglass walls and is extremely small considering the area around not having any other use. The vegetation here is still not an asset to the space but more of an addition to the space. This area shows some problems with surface water pooling up. The area has some seating areas, but the use of this space is minimal. During my observations, this playground was never used.

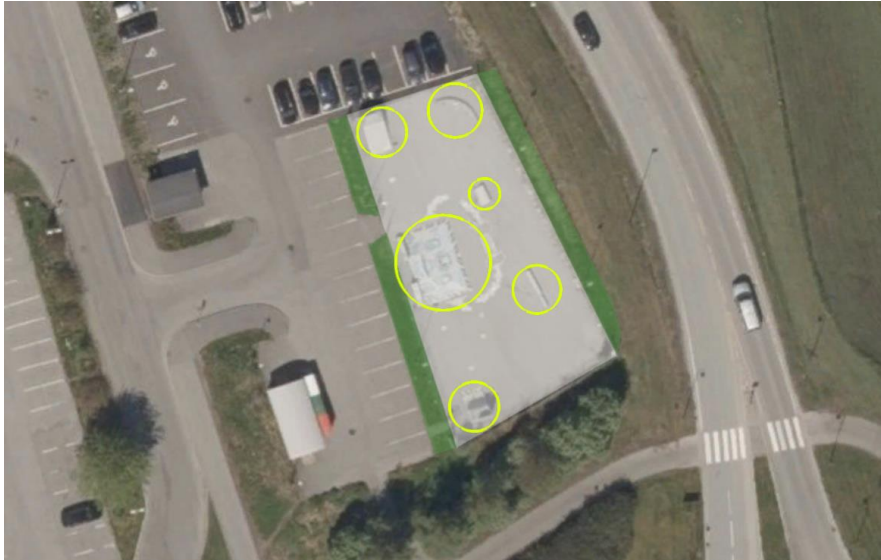


Figure 58: Skatepark located north of Moa shopping mall. High amount of user's minimal space provided. Is the only skatepark before you reach the city of Ålesund.

The fourth and last playground of interest is a skatepark located nearby the shopping mall. This park was used a lot during my observations even though it has minimal space and equipment. It is located right next to a bigger parking space; hence it has little possibility for expansion. This is the only skatepark I found outside of Ålesund city, so the potential for use of this park is probably high considering the distance to the next one.



Figure 59: Situational picture of the current skatepark, shows how the park is walled in parking lots. Most of these parking spots are unused now after the change of use of the nearby buildings.

The park has some areas of vegetation outside of the fenced skating space. This vegetation is kept low for the most part, besides from some tree's places south of the skatepark.



Figure 60: Entrance of the Beach Park from the green walkways.

The park close to the fjord in the south of the focus area provides one of the most used greenspaces by the youth, here you find maintained green spaces with seating areas, sport activities like volleyball and a beachfront where you can go swimming. This greenspace shows that even though most of the other playgrounds/parks are lacking in design or/and maintenance, the ones that are well maintained are used by the community.



Figure 61: Overview of the Beach Park. this park was renewed in the early 2000s.

Red listed species:

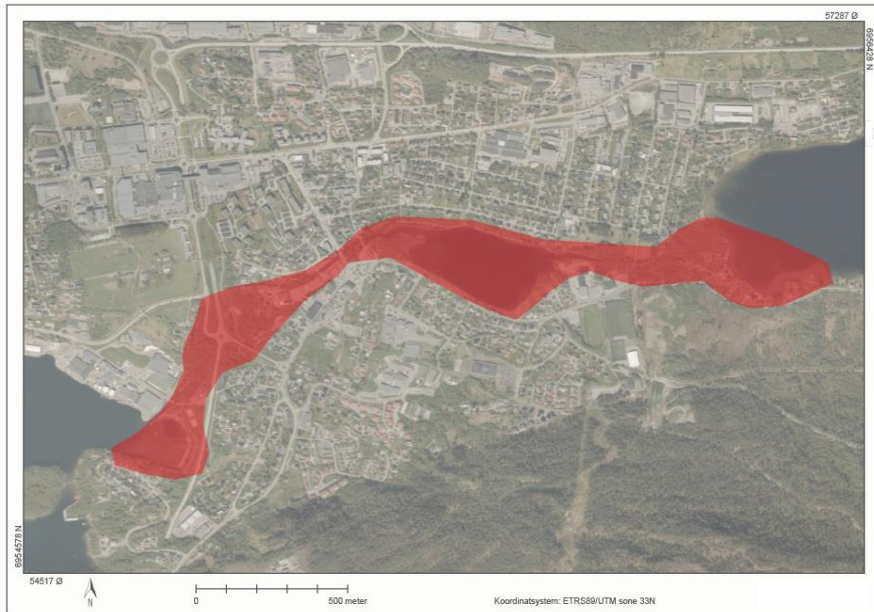


Figure 62: Area for endangered Duck habitats, most of the area is already half urbanized. The duck uses the blue greenspaces for shelter. (Base map: generated by Artsdatabanken)

Little Grebe - *Tachybaptus ruficollis*



The Little Grebe inhabits a wide range of small and shallow wetlands usually less than 1 m deep with rich vegetation and high densities of aquatic invertebrates, generally avoiding waters with large predatory fish. Suitable habitats include small lakes, ponds, the sheltered bays and vegetated shores of larger freshwater, alkaline or saline lakes and reservoirs, slow-flowing rivers, canals, flood-plain oxbows, coastal brackish lagoons, seasonally inundated areas, swamps, gravel pits, sewage lagoons and rice-fields. Outside of breeding season it is common on more open waters and is occasionally observed along the coast in estuaries or sheltered bays protected from strong wave action. When moulting, the species requires rich feeding areas.”

“Breeding site the nest is a floating platform of aquatic plant matter anchored to emergent vegetation, submerged branches or bushes close to the edge of shallow wetlands. Management information In France it was found that the presence of aquatic macrophytes was the most important factor in attracting the species to new artificial habitats” (International, 2023).

Hooded Gull - *Chroicocephalus ridibundus*



CR

The Hooded Gull briefly breeds inland and shows a preference for shallow, calm, temporarily flooded wetland habitats with lush vegetation. It forms nesting colonies on the margins of lakes, lagoons, slow-flowing rivers, deltas, estuaries and on tussocky marshes, but may also nest on the upper zones of saltmarshes, coastal dunes and offshore islands in more coastal areas. The species will also use artificial sites such as sewage ponds, gravel- and clay-pits, ponds, canals and flood lands and may nest on the dry ground of heather moors, sand-dunes, beaches and stony islets. *Non-breeding* During the winter the species is most common in coastal habitats and tidal inshore waters, showing a preference for inlets or estuaries with sandy or muddy beaches, and generally avoiding rocky or exposed coastlines. It may also occur inland during this season, frequenting ploughed fields, moist grasslands, urban parks, sewage farms, refuse tips, reservoirs, ponds and ornamental waters, and roosts on sandy and gravel sites or on inland reservoirs.

Breeding site the nest is a rough construction of vegetation based on a shallow scrape and placed on a floating mat, in broken reeds, on a hummock, or sometimes on dry, grassy or sandy ground. The species shows a strong preference for nesting near vegetation. It usually nests in dense colonies with neighbouring nests placed an average of 1 m apart (International, 2023).

Green corridor north side of the study area



Figure 63: Map of the Green corridor that stretches thinly through the industrial district north in the focus area.

The existing green corridor in the industrial area up north, should be kept “as it is” to provide a way of species migration.

There is potential to widen the some of the spaces to better organize the green corridor.



Figure 64: (1) The existing composition of the corridor is very nature like, and has at many areas been untouched, this provides great potential for this corridor.



Figure 65: (2) Some of the corridors have been reduced, and flattened out, for human use, these areas are monocultural and create hard borders for animals to cross.



Figure 66: (3) Some of the corridor has been clearcut, something that injures the potential of animal movement greatly.

Most of this corridor is poorly kept and is barely used by workers. This could be changed to provide a better greenspace for both animals and humans.

Weaknesses and strengths of the district:

The shopping district in Moa is the centre of the district, and most of the citizens daily life revolves around this area. It is well connected by main roads and walkways, but most of the paths are placed along the main roads, leaving little to no way for citizens to walk anywhere without the heavy pollution and noise from cars. The map below shows the walkways which are not connected to the road network.



Figure 67: The green walkways what connect most of the playgrounds and parks to the urbanized part of Moa. Taking into consideration that the groups that seek these spaces are mostly Elderly, children and families with toddlers the existing greenspaces should provide mixture of “controlled greenspaces” (areas where its safe for the youngest to freely explore.) and spaces where it’s possible to sit down talk or eat while enjoying a different view then the urban space. (Base map: Norgebilder)

There is a lack of greenspaces for the citizens who live in this district since most of the municipal greenspaces are undeveloped forest areas and walkways along the Lillevatnet. There are also several soccer courts and a golf court. Along the river flowing from Lillevatnet to the beach front down south of the study area is a pathway that is heavily used.

Concept / design

Looking at the different spatial uses of the focus area, it appears that urban and greenspaces still have the same weight in the area. But the trend of densification will in the next years make urban space the matrix for this area, making it the main landscape factor.

To strengthen the value and presence of the existing green areas, the thesis uses the patch-matrix-corridor model.



Figure 68: Green blue elements found in focus area.

The above map highlights the existing green and blue elements, mostly forests and grasslands, and the poor connectivity between these elements. The thesis proposes to strengthen the north-south green corridor while also improving the east-west connection consisting mostly of steppingstones.

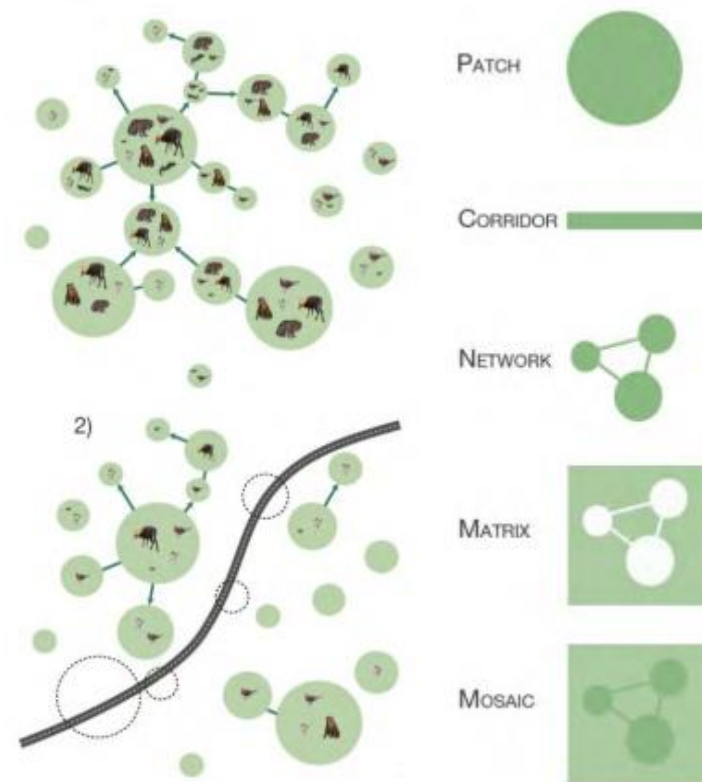


Figure 69: Explanation of the basics of the patch-matrix-corridor model and how human intervention interact with it.

Since Ålesund municipality aims for sustainable development and focuses on the UN's SDGs. The thesis focuses on the below six goals



Figure 70: The SDG's that would meet the development plans of the municipality of Ålesund.

By increasing the resilience of the corridors and improving the connectivity between greenspaces the animal life that traverses the city will have better habitats and capacity to move and migrate between the different connected spaces. The focus is on strengthening the existing fauna in the area by using local trees and flowers to create an environment in the corridors that simulates the surrounding nature. These new/improved greenspaces would also be beneficial for the community living in the district. Since the amount of non-urban walkways is quite low in Moa. The citizens and wildlife would both be able to use these corridors/steppingstones to travel from A to B.

Moa has four water bodies and three rivers together with some wetlands, as shown in the map below.



Figure 71: Waterbodies that are in the focus area.

While regulating water bodies does heavily affect wildlife it does not mean that these areas cannot be beneficial for humans and nature.

Most wildlife that relies upon water bodies. has their main habitats at the water border. Artsdatabanken, the national knowledge bank for biological diversity established in 2005. Which has the main task is to provide society with independent, up-to-date and easily accessible information about the biological diversity in Norway, Norwegian species and habitat types.

They show that the area around Lillevatne is still used as hecking grounds for many endangered birds. The municipality has established a green walkway around Lillevatne, these pathways are of two different types. the one that follows the northside and goes both down to the fjord in south and Brusdalsvatnet is a great example of how pathways that traverse close to water fronts should be executed. while the pathway at the south side of Lillevatne is not up to the same standard.

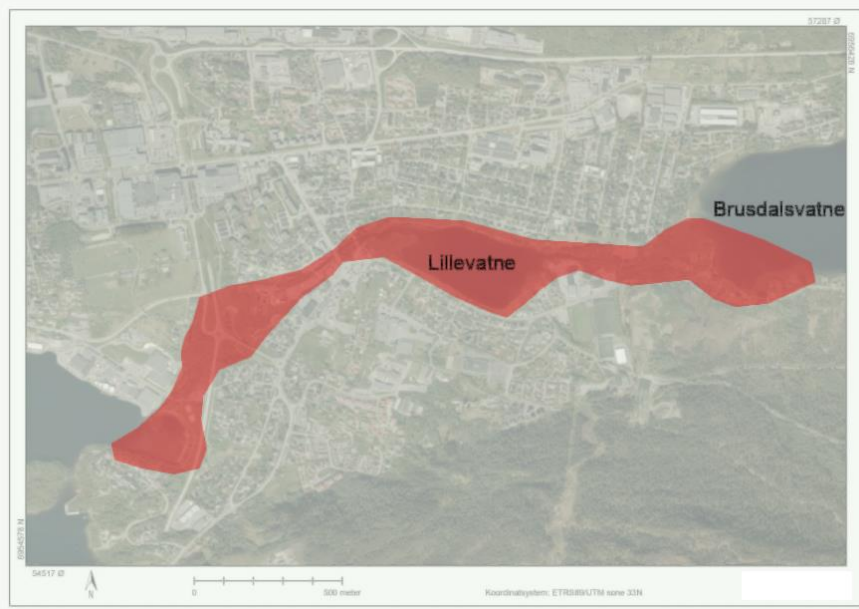


Figure 72: Borders for area are provided by Artsdatabanken and are an estimate of the area used as hecking grounds for the birds. So, it is possible to find specimens outside of the border, hence, to secure the species sustainable future an extended border is suggested.

The quality of the waterfront, forests and nearby habitats can be enhanced by utilizing the design used on the path that follows along the northern side of Lillevatne. This is achieved by comprehending the reasons behind its effectiveness. By applying this design to the other walkways that are meandering through the focus area, substantial improvements can be made.

The municipality states that: “Climate and great variation in demographics and living conditions are examples of the challenges the municipality must deal with.”

By securing the water bodies and rivers found in Moa will provide a natural mechanism for absorbing and channelling the expected surface water expected in urban areas in the future. The plan to regulate the water bodies would be beneficial since controlling the water levels will reduce the risk of flood-related harm to river and water-bank ecosystems.

Moa has many schools and kindergartens but the lack of quality of playgrounds that are not connected to schools or kindergartens is dire. As shown in the map below there are a total of five playgrounds, one training park, several open unused greenspaces and one seafront park spread around in the district.



Figure 73: Highlighting the spread of existing greenspaces and playgrounds. Blue: Playgrounds/beach park and Pink: Greenspaces and training park.

Most areas that are kept open for recreational use or play are deserted and act more like a barrier segregating both nature and humans. Every open space provided by the municipality is monocultural greenspaces levelled out and clear cut into forest areas. Thereby creating what is called hard borders, which prohibits wildlife to move from one patch to another.

The proposal is to re-introduce the local vegetation to improve both the habitats and the quality of greenspaces for citizens.



Figure 74: Clear cut and monoculture greenspaces.

The vegetation here is spread out in small groups that look like they were from when this area was deforested and a few planted groupings of bushes and trees along the road that connect to the nearby urban space. This vegetation creates a lot of horizontal borders for both animals and humans. Creating something like a border of what is nature and what is recreational space. This makes these spaces feel locked in and disconnected from the nearby nature and increases the distance for citizens to nature.



Figure 75: The other playgrounds are also neglected or have lack of concept.

The improvement of playgrounds and the introduction of Biophilic Play playscapes in certain areas would be a good basis for inviting the citizen back into using these areas for what they are thought for.

Biophilic playscapes:

Biophilic playscapes are playgrounds that include natural elements like water, plants, stones and so on. and topography to provide opportunities for open ended play and supports the creative discovery of nature for children.

By using this approach to give the open monocultural areas a more diverse use for humans and inviting back the seasonal changes of the local nature into urban spaces. These types of playscapes would break up the flat topography of these spaces while also providing habitats for critters and insects (Canan Cengiz, 2019).

Moa is one of the main connection points for the city of Ålesund and therefore has many heavily trafficked roads going through it. These main roads are marked as red in the map below.

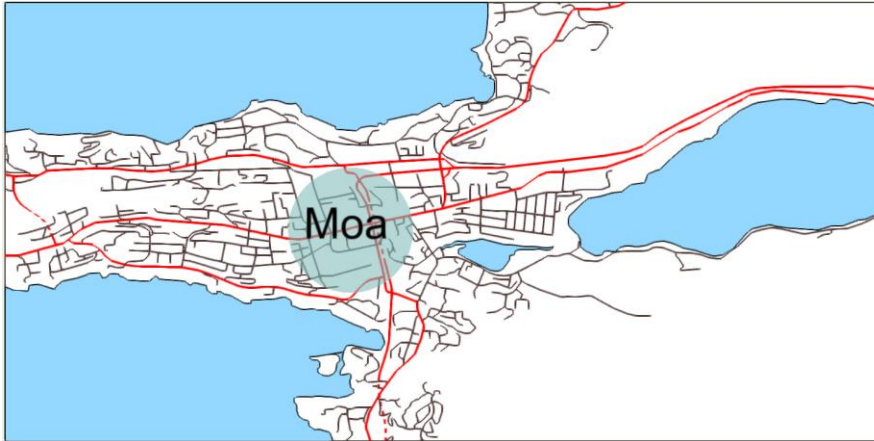


Figure 76: Shows all the roads found in the focus area.

While there is little to be done with these main roads there are still trenches and small greenspaces at their borders.



Figure 77: Shows the space kept free from shrubs and trees to create the Freeview during spring and summer, while being used to store snow during autumn and winter. Picture taken from Google Street View. (Google, 2022e)

These are often kept intact for snow cleaning during the winter season. But these spaces have an unused potential.



Figure 78: Shows the greenspaces that relate to the road network. Picture taken from Google Street View. (Google, 2022d)

The municipality uses a lot of resources for keeping the grass in these spaces low. Instead of doing this the municipality could change these monocultural and high maintenance greenspaces into meadows with local flowers.

This would create steppingstones/corridors for wildflowers, insects and small critters. On top of that, meadows while being expensive at first would reduce the upkeep cost the municipality has, since these spaces would only need to be cut 2-3 times a year and clippings would not have to be transported away since the clippings of meadows are what seeds them for next season.



Figure 79: Picture taken from an area where meadow establishing is under progress, still cutting the edges to roads and pathways to not hinder the use of the road. Taken by me.

This would also greatly change the view for many of the walkways that are directly connected to these roads. Creating a colourful seasonal changing environment for pedestrians using these to traverse the district.

Moving this to an urban context can be found difficult but a similar idea was done in the project “Innerer garten Leutschenbach, Zürich” designed by Mavo Landschaften and built in 2021.

Innerer Garten Leutschenbach, Zürich by Mavo Landschaften finished in 2021.

The project focuses on the transformation from a purely industrial zone to a residential area and what it means for the open space structures of the urban fragments.



Figure 80: Map from Inner Garten Leutschenbach, Zürich. Shows how they managed to find unused spaces and create a connected greenspace. (Landschaften, 2012)

Using the little space along the road to connect the urban space, Mavo Landschaften created a shared greenspace focusing on the residents' needs and ideas.



Figure 81: The finished park created an area that nearly blocks out most of the city and provides a much-needed greenspace in heavily densified urban space. (Landschaften, 2012)

Bringing forth a greenspace that created a fine mesh of passageways adapted to the new use and supplementing the existing range of open space typologies with local fauna.

The green corridor:

The project proposes to introduce local tree species and shrubs together with a mixture of meadow seeds to strengthen the core space of the corridors and animals with shelter. The newly recovered connection will improve the area biodiversity.

By using the different greenspaces that are connected to the well-established road network. It is possible to create a natural view for both pedestrians and drivers. While also bringing the nature back into the urban space.



Figure 82: Northern part of the suggested corridor thru the industrial district. Green: steppingstones or well-established habitats/corridors Yellow: areas that are unclear of future development but would play a major role to upkeep connectivity. Orange: low quality patches/corridors that would have to be improved upon to create new better suited corridors/steppingstones. (Base map: Norgebilder)

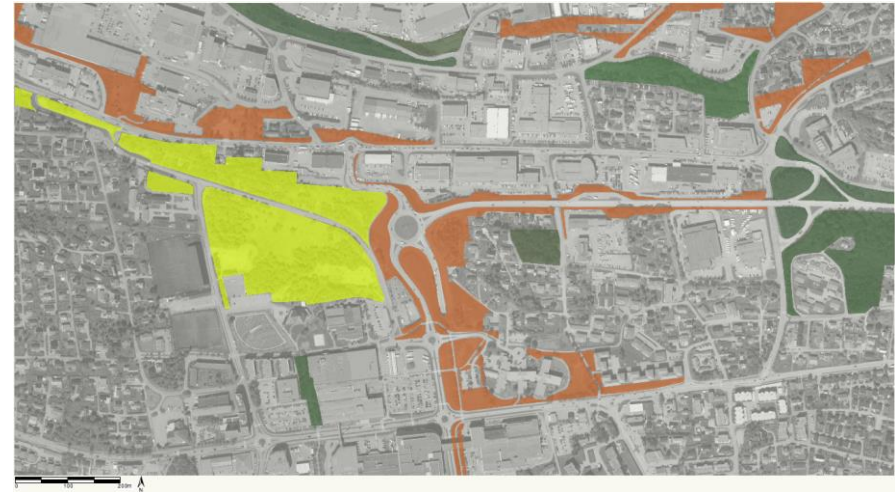


Figure 83: Zoom in the shopping malls area. (Base map: Norgebilder)



Figure 84: The corridor leading from south to north in full size. (Base map: Norgebilder)



Figure 85: Lower corridor that leads from south to north and east. The green corridors leading towards the east is already mostly established and my suggestion would be to start with the concept here. (Base map: Norgebilder)



Figure 86: The far eastern part of the focus area has already great connectivity with wild forest habitats. Connecting the eastern part of the focus area to the southern would be greatly beneficial for securing the endangered bird species that use most of this space as hecking grounds. (Base map: Norgebilder)



Figure 87: Concept design of the first phase implementation of the green corridor strategy. (Base map: norgebilder)



Figure 88: Closeup of the biggest change to create connectivity. (Base map: Norgebilder)



Figure 89: Example of how the improved biodiversity of the green connecting elements along the main roads' infrastructure could look like.

The green corridor part of the project would be suggested to split into multiple phases. This to not shock the local citizens with the change of maintained greens to a more wild and natural space.

First phase of the green corridor, creating a natural connection between the two patches of forest right south of Moa. To improve the connectivity of the existing green pathways as well as the habitats of the birds living around this area.

Playgrounds and parks:

With the intent of blending the play area with the surrounding green habitat, the design proposes to create green hedges versus the river stream to protect children from falling into the water. Moreover, principles of biophilic playground have been used to boost cognitive exploration while gather for the natural environment.

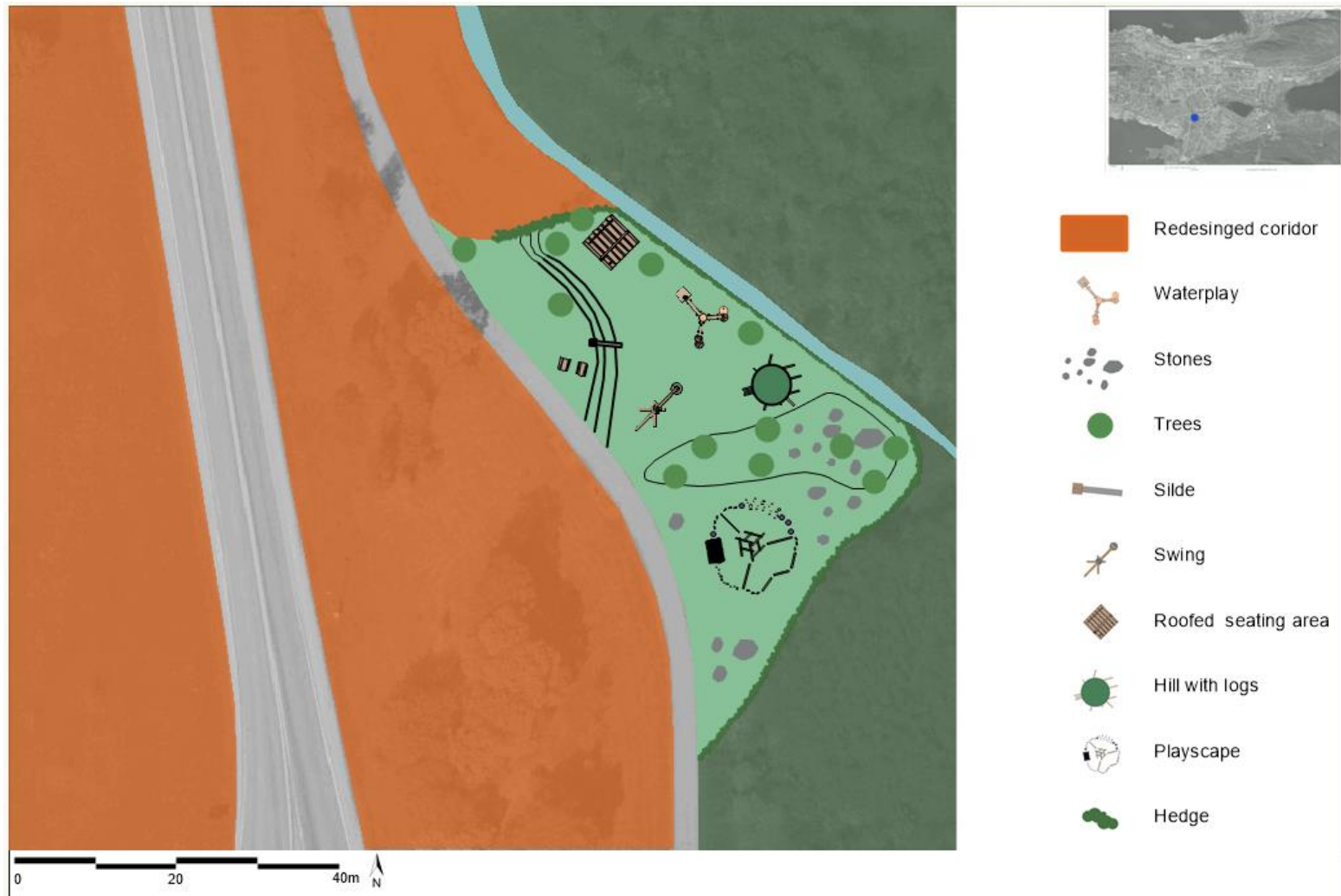


Figure 90: Redesign of the "Riverside playground" using biophilic playground concepts. (Base map: Norgebilder)



Figure 91: Concept for a more private Training Park as well as connecting the space more to the natural habitats that surrounds them thus making movement for both humans and animals easier. (Base map: norgebilder)

The design proposal for this area aims at removing all the elements creating disconnection and creating a more natural feeling while still providing play and recreational uses.

This new space would be greatly beneficial to the nearby kindergartens and preschools. Providing them with an alternative outdoor space where children could interact with the local nature and get to know it.



Figure 92: Moa shopping mall, heavy densified but still possibilities for connectivity to the corridor. (Base map: Norgebilder)

The design proposes to bring nature back in this concrete based location. Whilst the connectivity might be minor because of the use of space for parking, it still gives birds a more natural way to traversing the urban space.



Figure 93: Close up of the new playscape placed in between the shopping malls. (Base map: norgebilder)

The idea behind this playscape is to introduce as much as possible of nature into this confined space. Thus, creating a natural playscape that is inviting. The green element will invite children to enjoy the shade the changes in topography and colourful ambiance.

The hills also provide seasonality since they can be used for sledding during the winter half of the year.

The monument is moved away from the centre of the playscape but is kept well visible, since it has sentimental weight for local citizens. But now it is not the focus of this space anymore, the focus here is now the green.



Figure 94: Overview of the "Dentist playground". (Base map: Norgebilder)

This space is in an area under housing development and densification. The design proposes preserving and boosting the surrounding forest to recreate the connection that was interrupted by the road. My suggestion is that after the buildings have been finished that the municipality tries to reintroduce as much of the original forest habitat as possible. Since the space prior to being regulated as housing was one of few steppingstones close to the shopping malls of Moa.

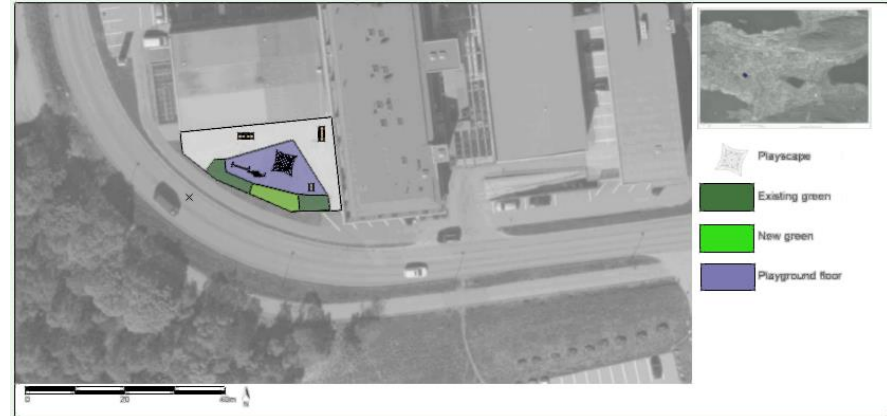


Figure 95: Close up, of the dentist playground. concept might differ depending on the development around. (Base map: norgebilder)

Even though the development is under process I suggest that the green part of this place is extended and connectivity to the forest across the road is kept.



The new greenspace located on the southeast side of Lillevatne, now connects with a new path to the northern side of the lake. Also, the space is given some biophilic playscapes to encourage families to use the new space for recreational purposes.

Figure 97: New greenspace southeast of Lillevatne. (Base map: norgebilder)

The new skatepark will have more space by removing some of the parking spaces. These parking spaces are not as used since the nearby building on the left side has changed from being an indoor swimming pool and cinema to only an indoor swimming pool, reducing the need of parking spaces located right outside.

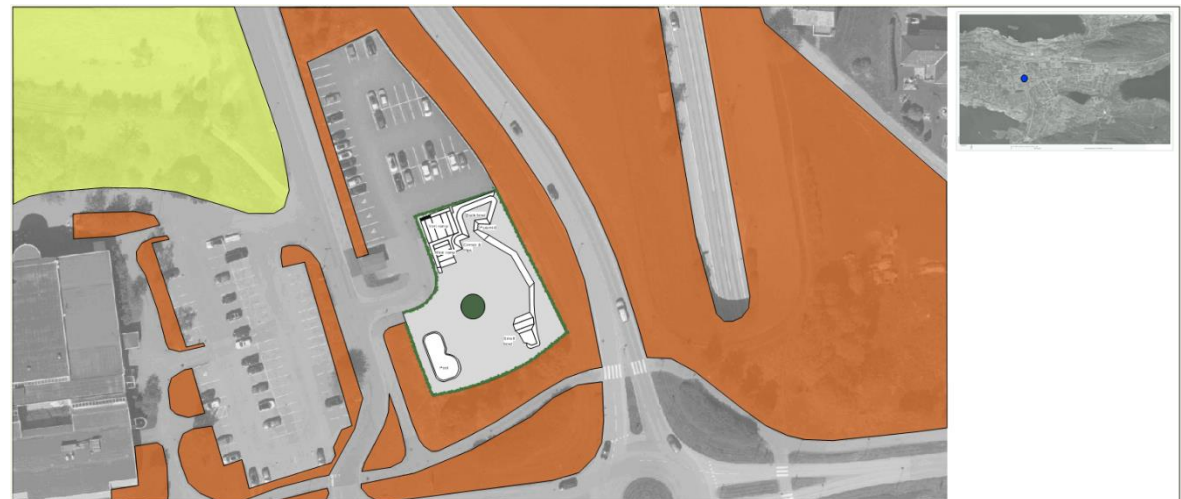


Figure 96: The new skatepark design, can be connected to the green corridor at a later phase.

Conclusion

The district of Moa is at the breaking point of major loss of biodiversity, in this thesis we took a deep dive into the development of the district from the early 1950's until today. We also looked into what the municipality of Ålesund has planned in the future and what goals they want to aim for in the future.

These goals are aligned with both the UN's SDGs and the EU's goals for climate neutral cities. My proposal used the main point of both of these concepts and with the help of analysis and studying of maps, plans and data found for the focus area. Developed a strategic landscape plan that aims to strengthen the biodiversity and resilience of the focus area. The proposal's goal was to mix both the need of urban space and greenspace, and creating a concept that provides benefits for both citizens who live in the focus area as well as the nature that surrounds it.

By reestablishing the connectivity of the greenspaces, species movement would be improved greatly, whilst also creating recreational spaces. The use of biophilic playgrounds would enhance the connectivity of the youngest citizens to the nature that surrounds them,

To implement this plan, I suggest that the plan is done in phases where the first phase would be to reconnect the southern forest in the focus area to the waterbodies Lillevatne and Brusdalsvatne. By doing so the endangered bird species found in the close proximity of these waterbodies would be greatly secured. Whilst also giving the citizens enough time to adjust to the different look of the now neatly kept monocultural greenspaces.

By reintroducing nature into these greenspaces, the border between urban and nature is made more diffuse creating a more inviting atmosphere that would invite for exploration and learning towards local nature. By "upgrading" the existing neglected playgrounds areas that now have little to no users, would create areas where families, schools and kindergartens could travel to and explore local nature in a secure space.

The more "wild" and natural greenspaces that are connected to the road network would in early phases be expensive to establish but would in the long run reduce the cost of maintenance for the municipality of Ålesund. Also, since the late 2020's farmers have had problems with hay production to feed their animals. The meadows suggested would be able to be cut and used as animal feed if there ever was a shortage in Ålesund.

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