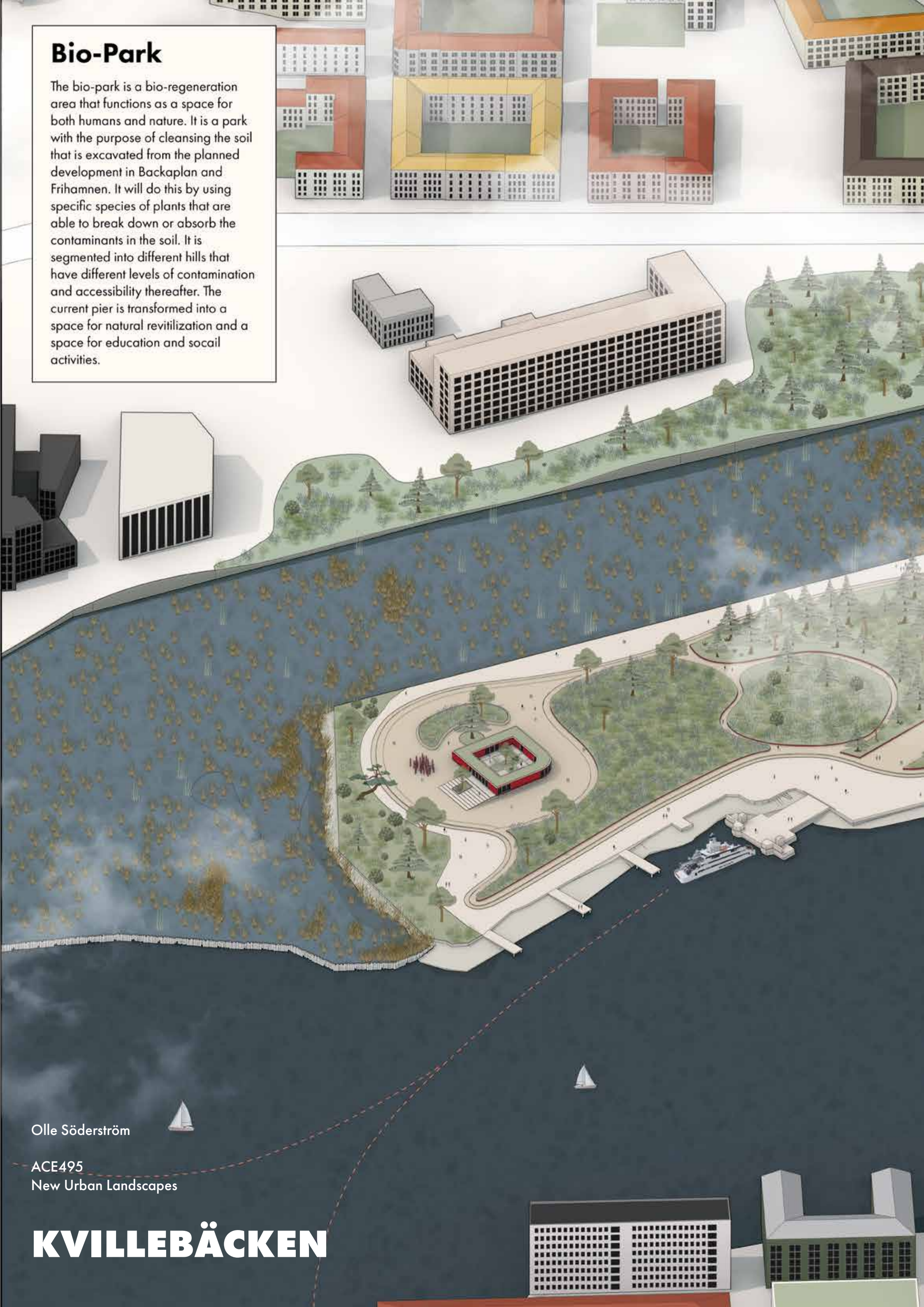


Bio-Park

The bio-park is a bio-regeneration area that functions as a space for both humans and nature. It is a park with the purpose of cleansing the soil that is excavated from the planned development in Backaplan and Frihamnen. It will do this by using specific species of plants that are able to break down or absorb the contaminants in the soil. It is segmented into different hills that have different levels of contamination and accessibility thereafter. The current pier is transformed into a space for natural revitalization and a space for education and social activities.



Olle Söderström

ACE495
New Urban Landscapes

KVILLEBÄCKEN

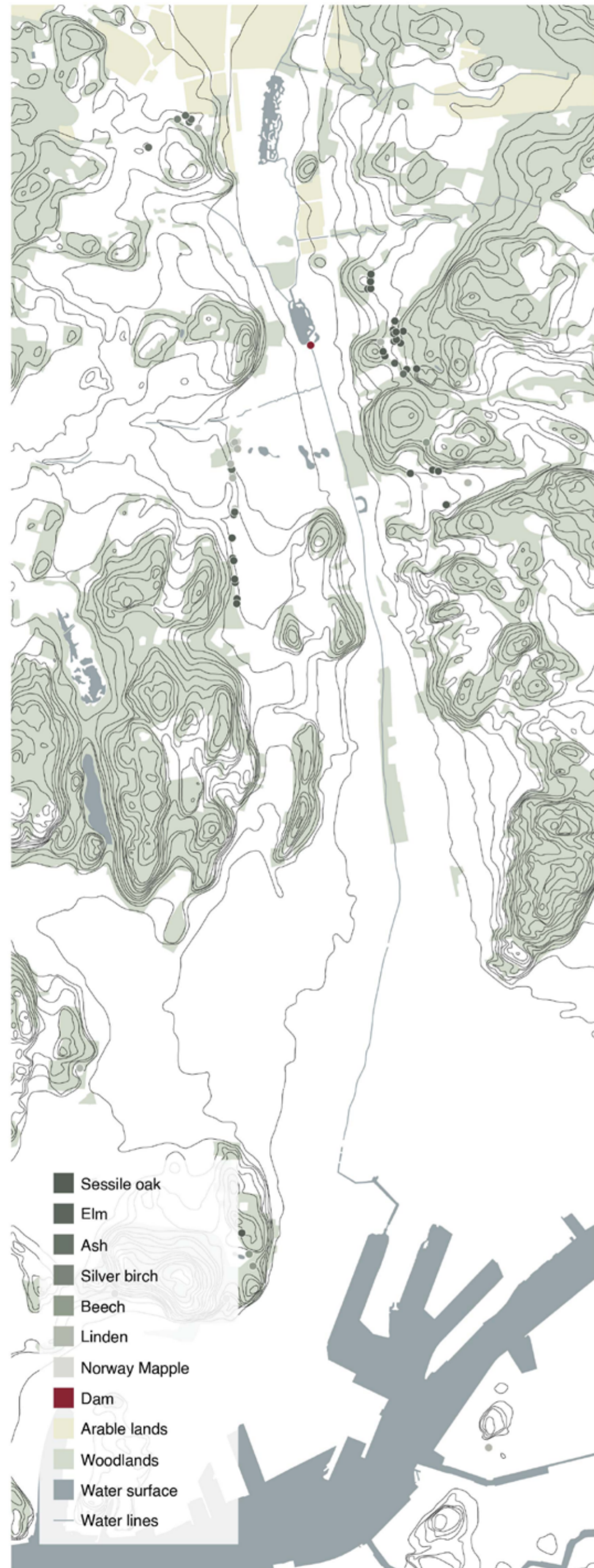
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An analysis of Kvillebäcken and its surroundings.

A look at the blue and green structures around Kvillebäcken and possible strategies to strengthen both the blue and green corridors.

Based on the strategies the area has been segmented into different zones and interventions. The focus will be on two areas: the urban park with its flooding and contamination situation, and Kvillepiren as a bio-regeneration zone.



Wetland

01. Hökålla

- High value natural area with protected bird species (100+), aquatic plants, bat, frog, lizard and fish species;
- The wetland emerged after the creation of a dam;
- No ornamental vegetation, only spontaneous;
- Network of ditches around arable lands.

Interface

02. Lillhagen

- The stream becomes a small canal until it meets Göta Älv;
- The landscape progressively changes for a highly managed nature;
- The natural landscape is still present scarcely in the thin riparian buffer;
- Ornamental trees are founded in the golf course, along the stream and in the gardens of nearby home's gardens;
- Then, the river goes completely in the golf course and lost its natural riparian buffer.

Lawn

03. Aröd

- The golf course ends and gives way for a natural riparian buffer along the river;
- Vegetation can be found 30m on both sides of the river;

Natural riparian forest and linear open park

04. Backaplan

- We enter now in a denser built area: the riparian buffer becomes thinner and is part of a longitudinal city park;
- Ornamental trees have been recently planted. As part of a landscape architecture project, species have been carefully considered.

Mineral and linear open park

05. Kvilletorget**06. Jubileumsparken****07. Frihamnen**

Mineral

01. Hökålla

Silver Birch



Aspen



Sessile Oak



Alder



Norway mapple



Cherry



Apple tree



Rowan



Goat Willow



Juniper



Yew



Hawthorn



Scots pine

02. Lillhagen

Lombardy Poplar



Ash



Norway Spruce



Silver fir



Douglas fir



Larch



Black pine

03. Aröd

- Going back to a natural riparian buffer, species such as aspen, alder, norway mapple, silver birch and goat willow can be found here.

04. Backaplan

Weeping Willow



Red oak



Elm



Linden



White beam



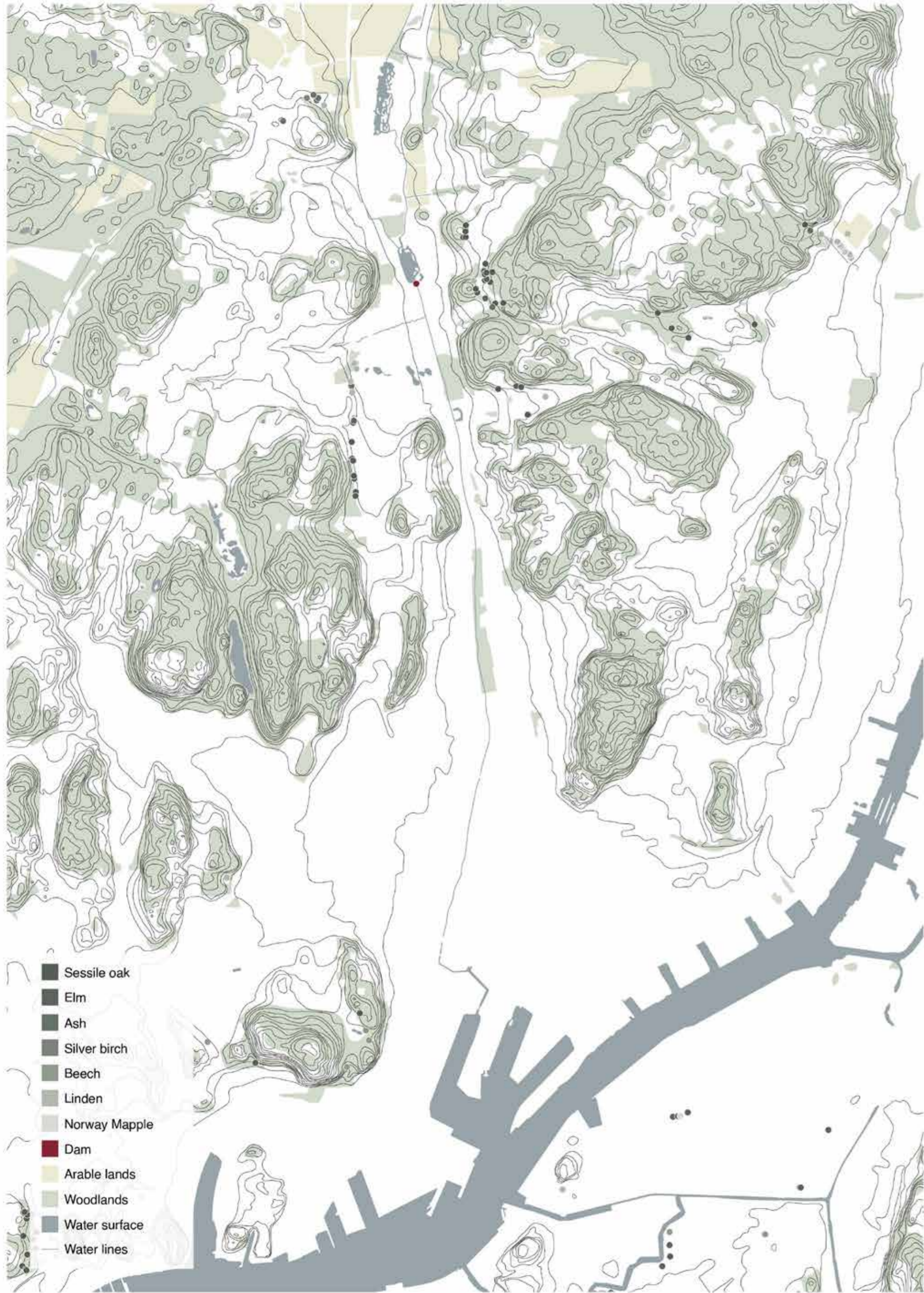
Bald cypress

05. Kvilletorget

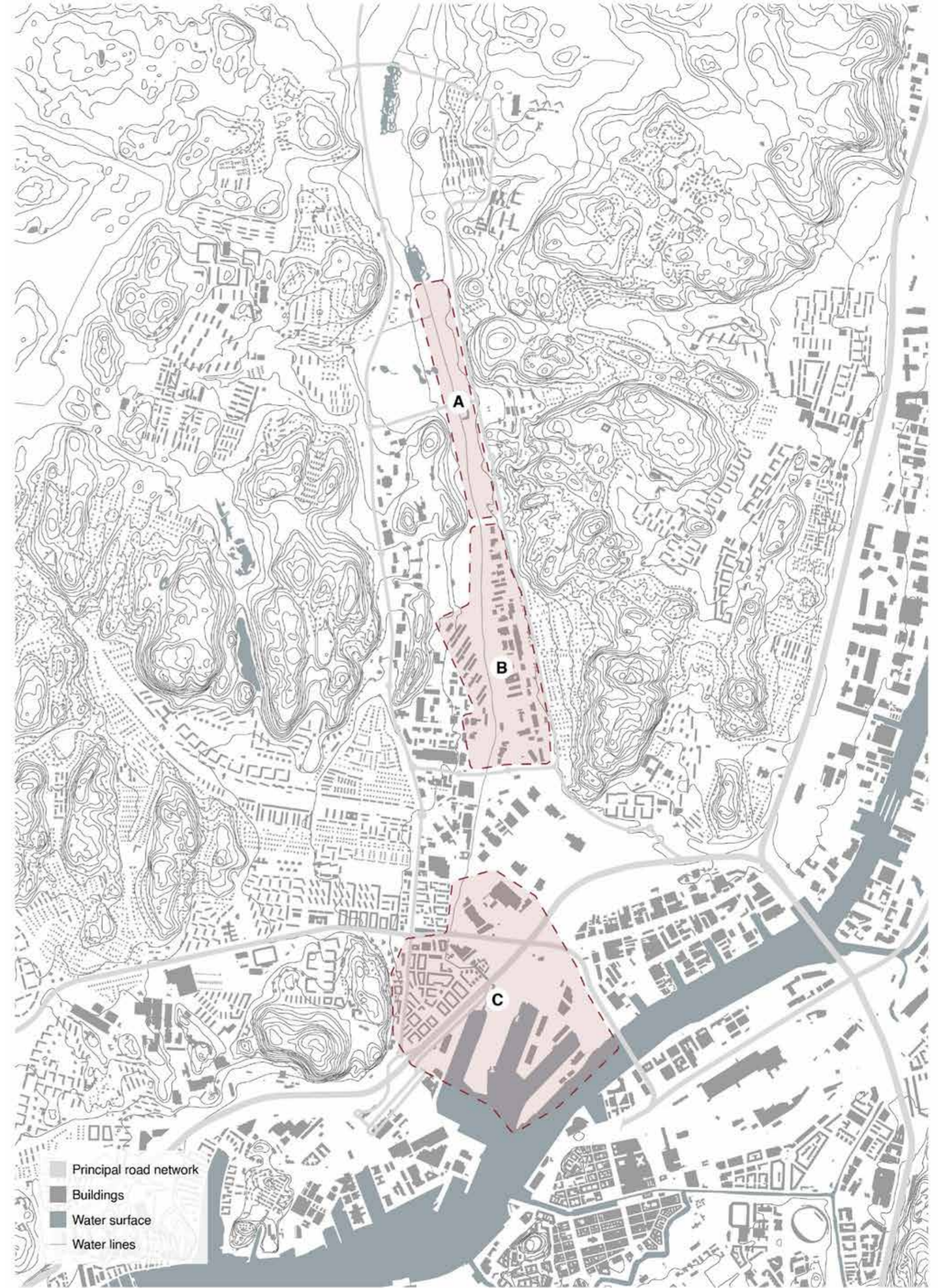
- Parts of the river are underground as roas network intensifies;
- Coppiced trees are found along the way close to the oldest buildings;
- As we approach towards Göta Älv the river gets thicker.

06. Jubileumsparken

- This park is connected to the point where Kvillebäcken meets Göta Älv;
- Local shoreline-inspired flora are found;
- It is the only significant green space in the area.



Biodiversity
Scale 1:20000



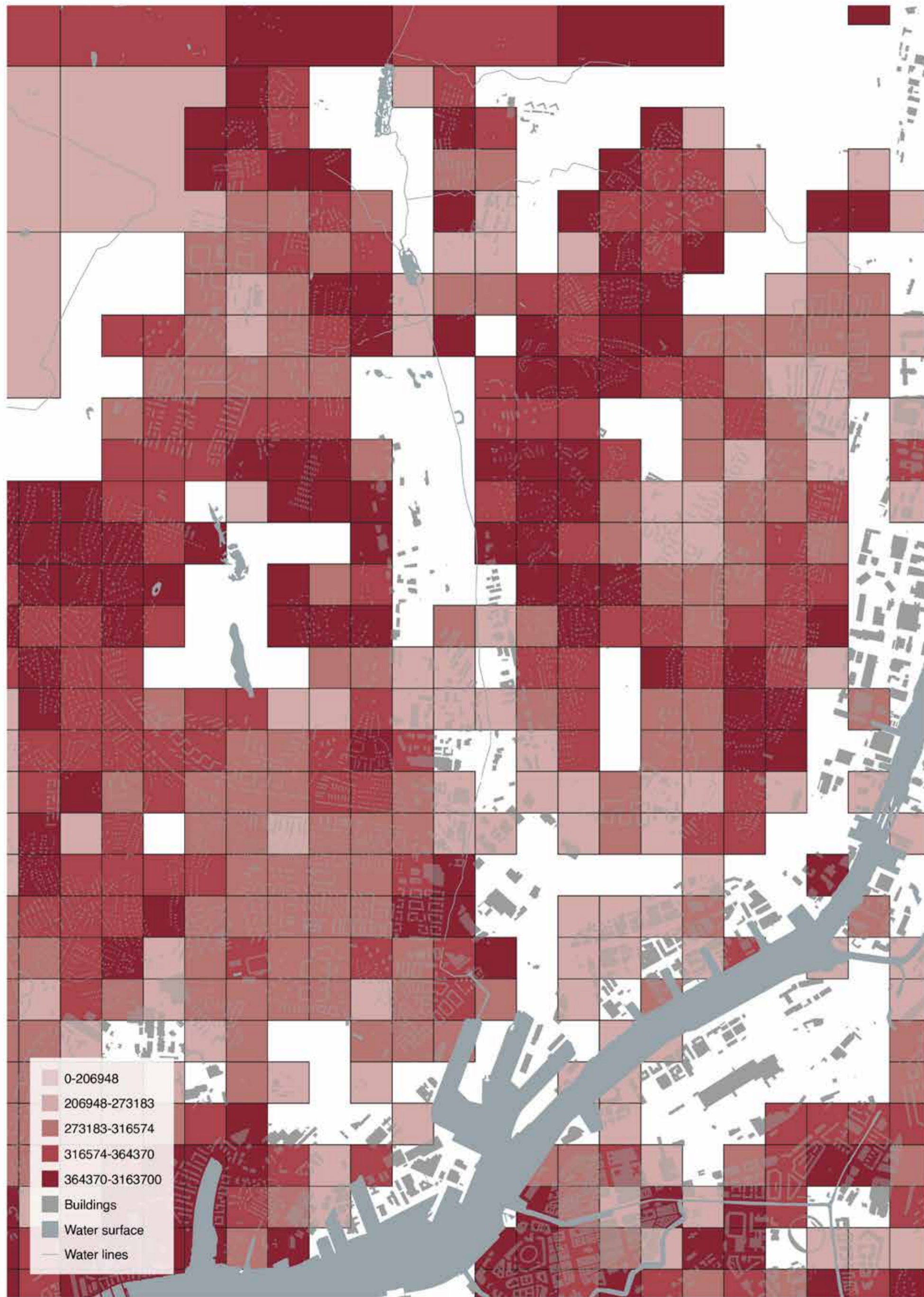
Areas of interest
Scale 1:20000



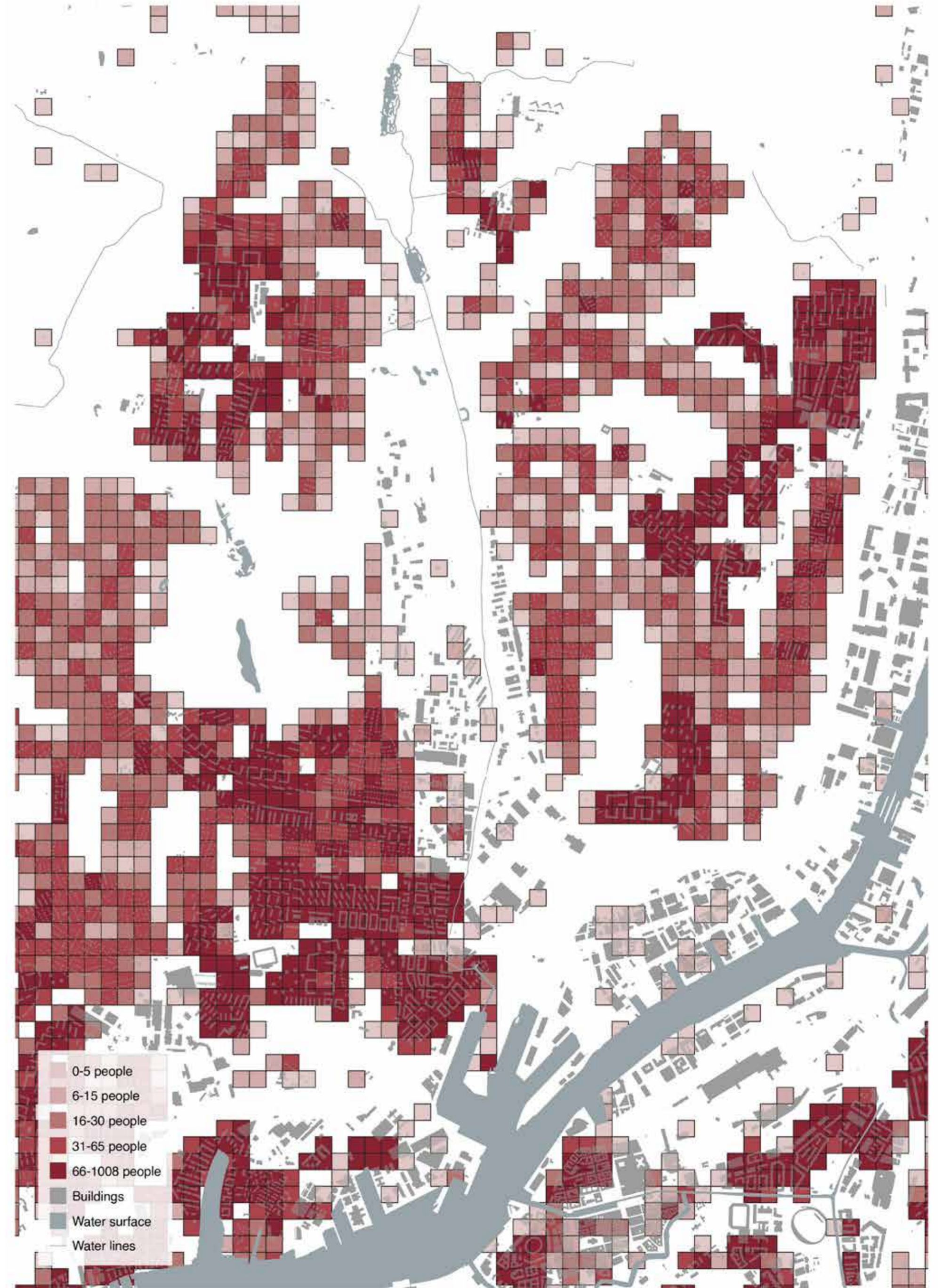
Infrastructure and public transports
Scale 1:20000



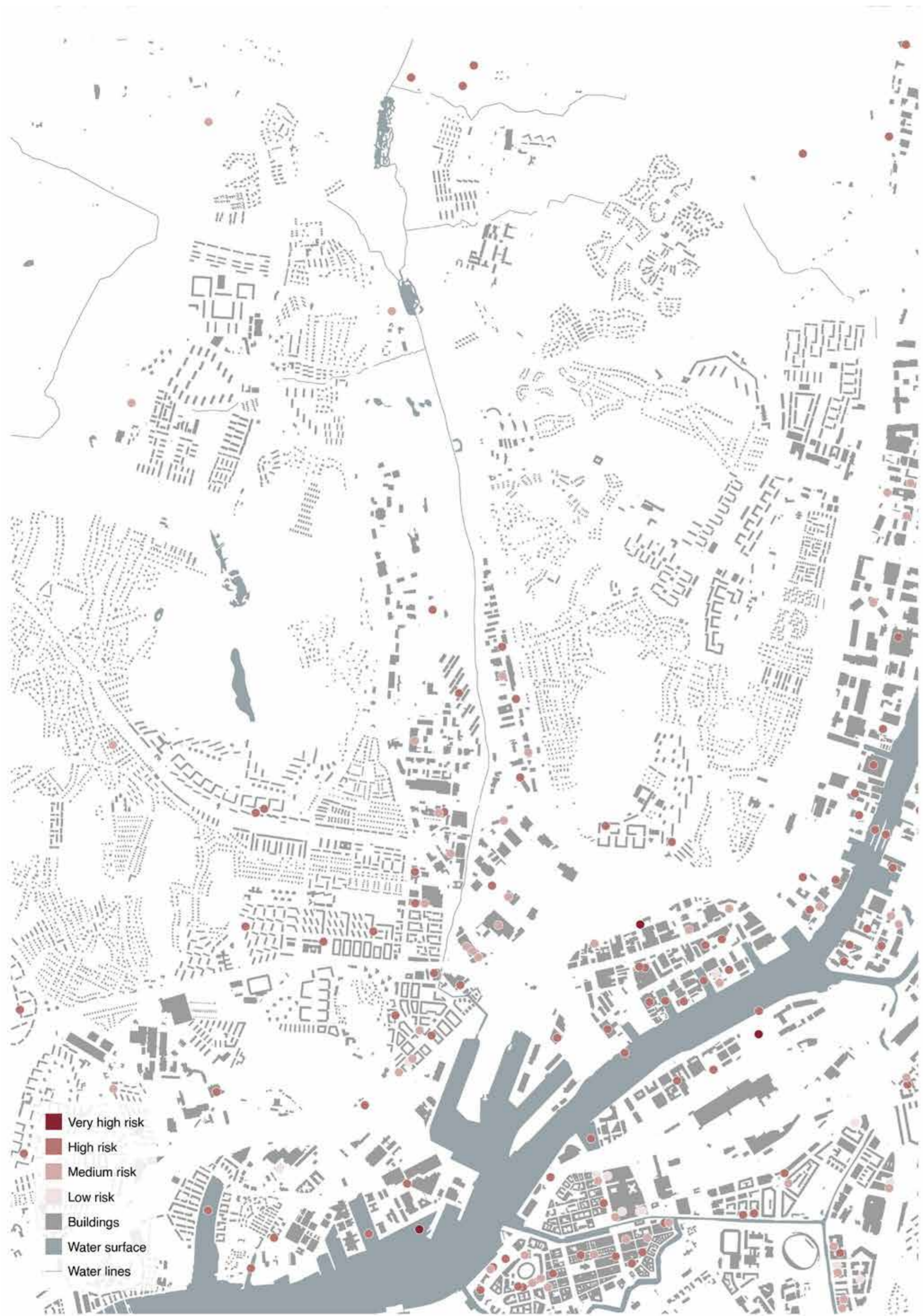
Traffic volume
Scale 1:20000



Population's median income
Scale 1:20000



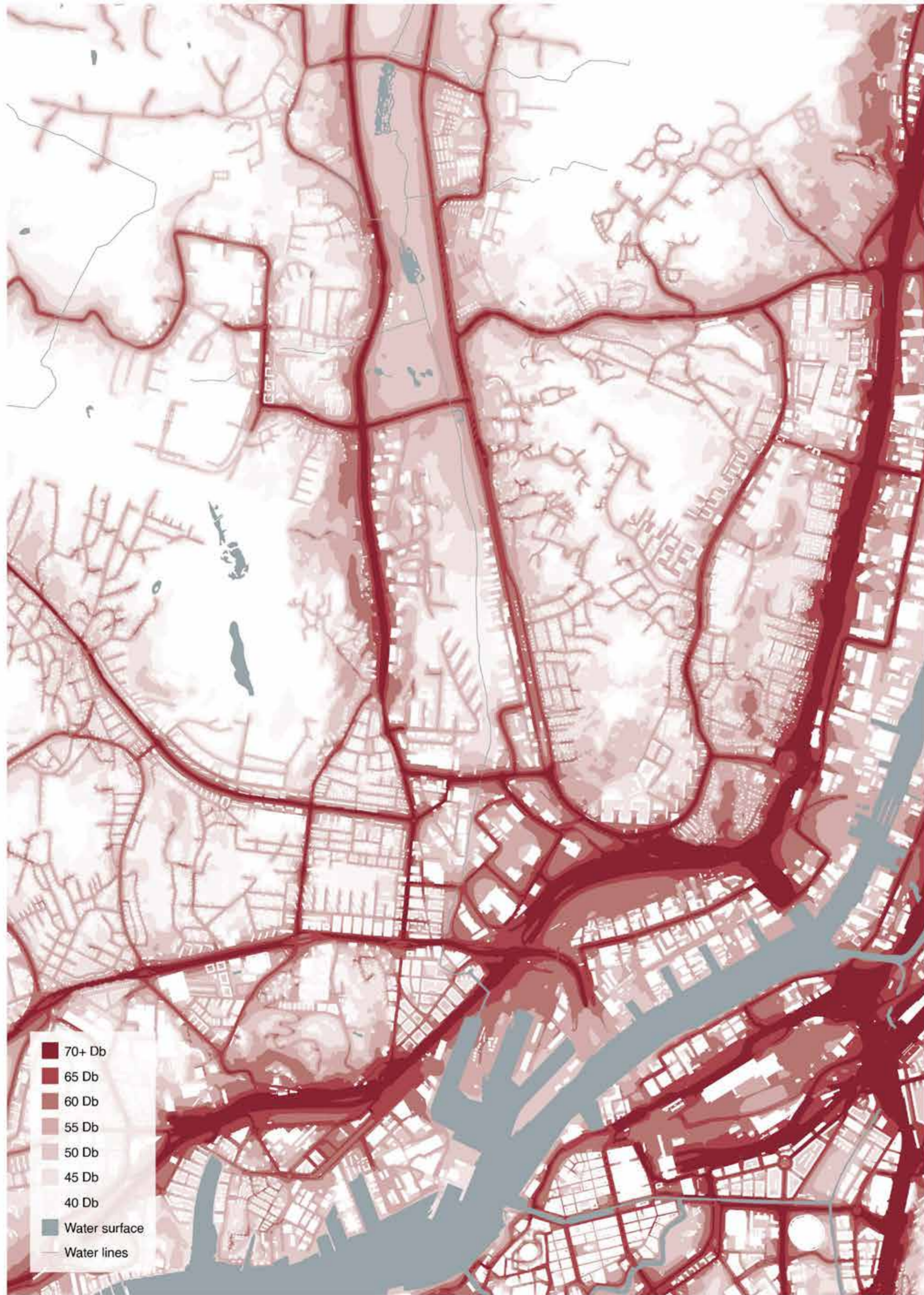
Population 100x100m grid
Scale 1:20000



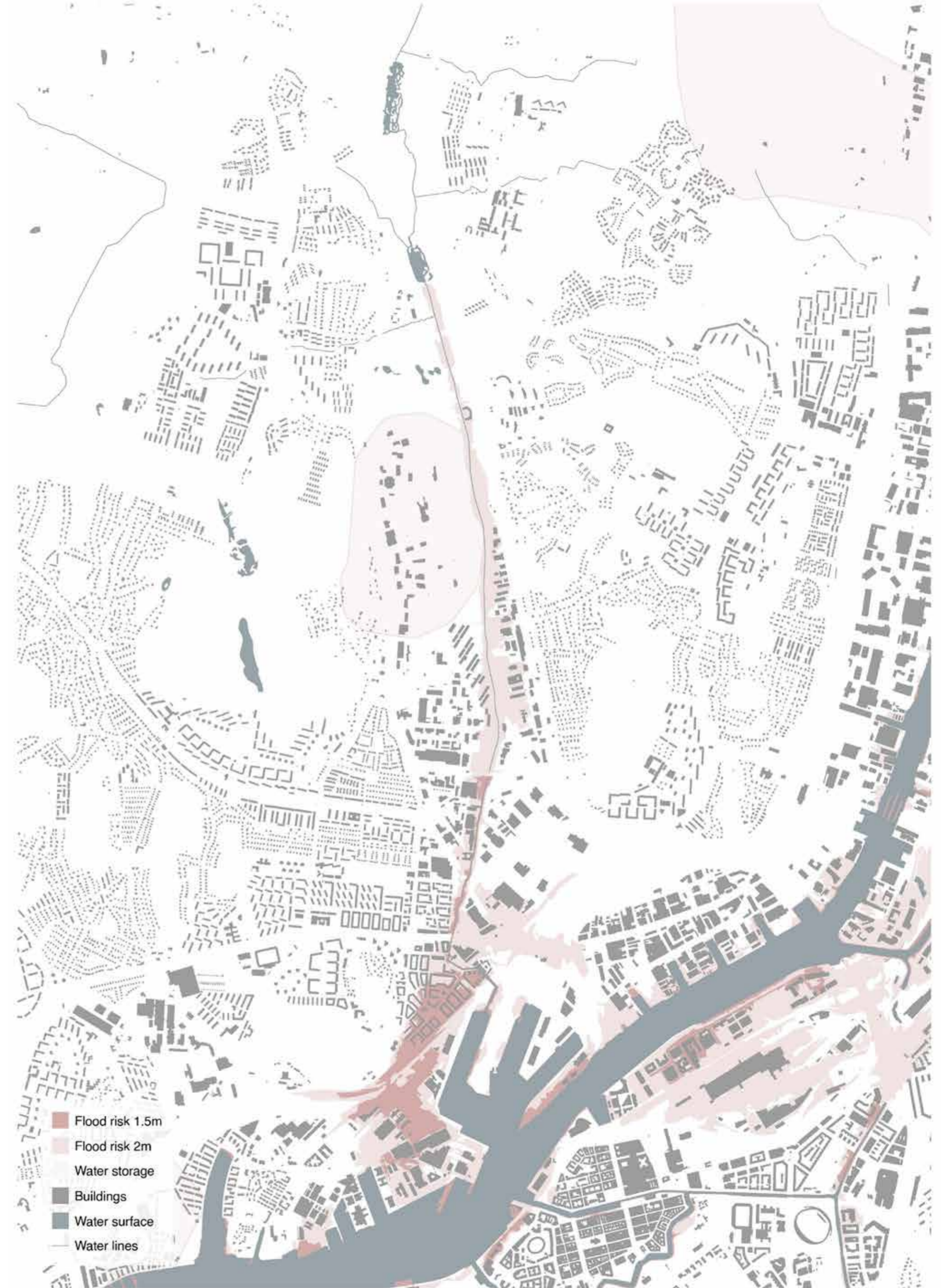
Land contamination
Scale 1:20000



Building functions
Scale 1:20000



Noise pollution
Scale 1:20000



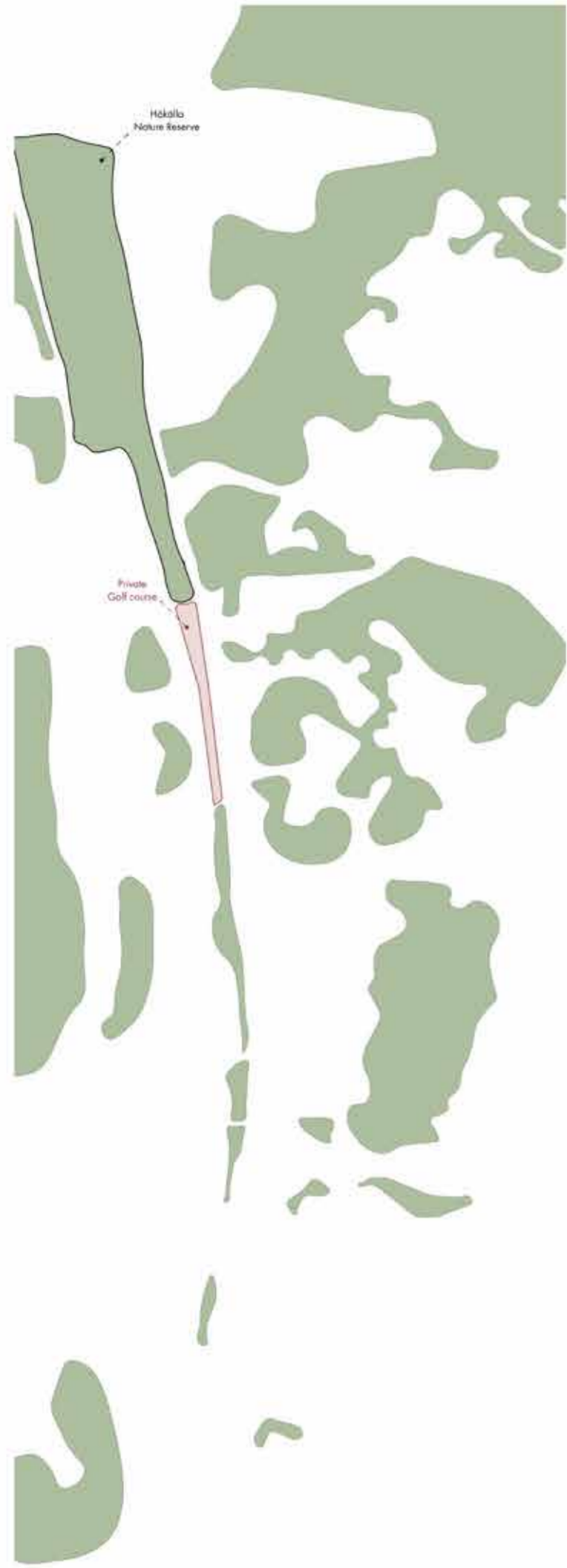
Floodrisk and ground water storage
Scale 1:20000



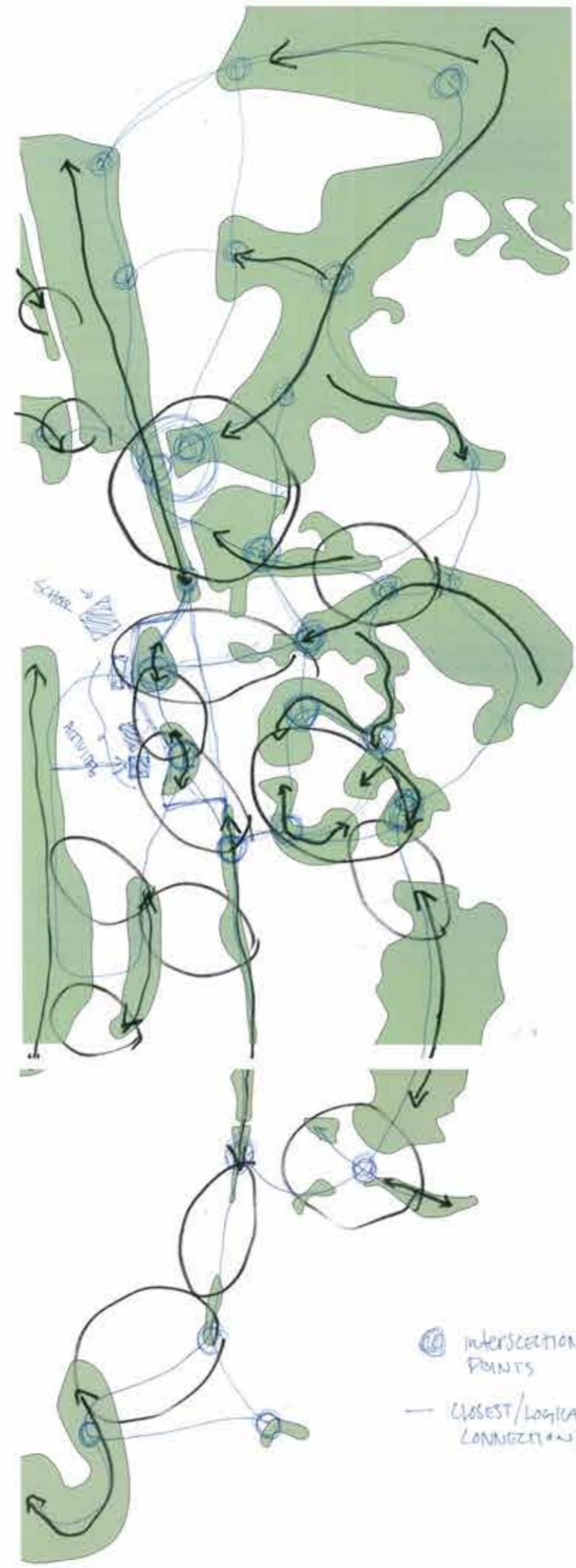
Air pollution (light: low pollution; dark: high pollution)
Scale 1:20000



Ground saturation
Scale 1:20000



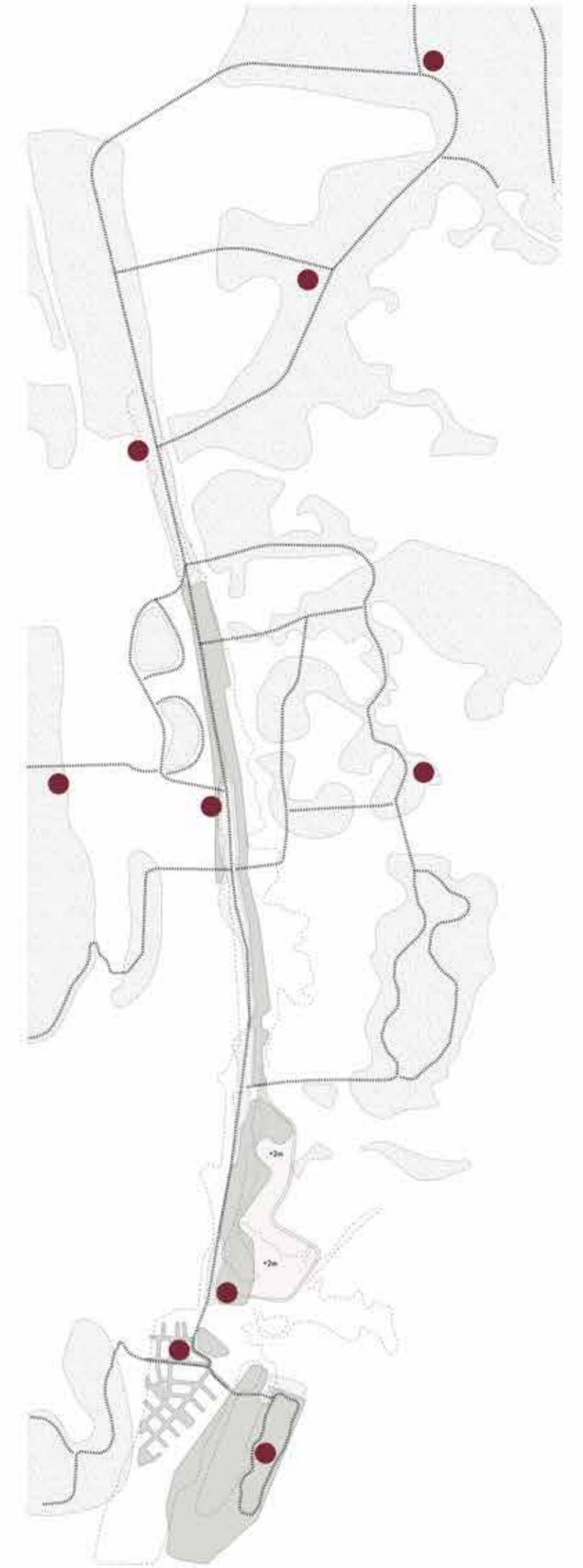
CURRENT



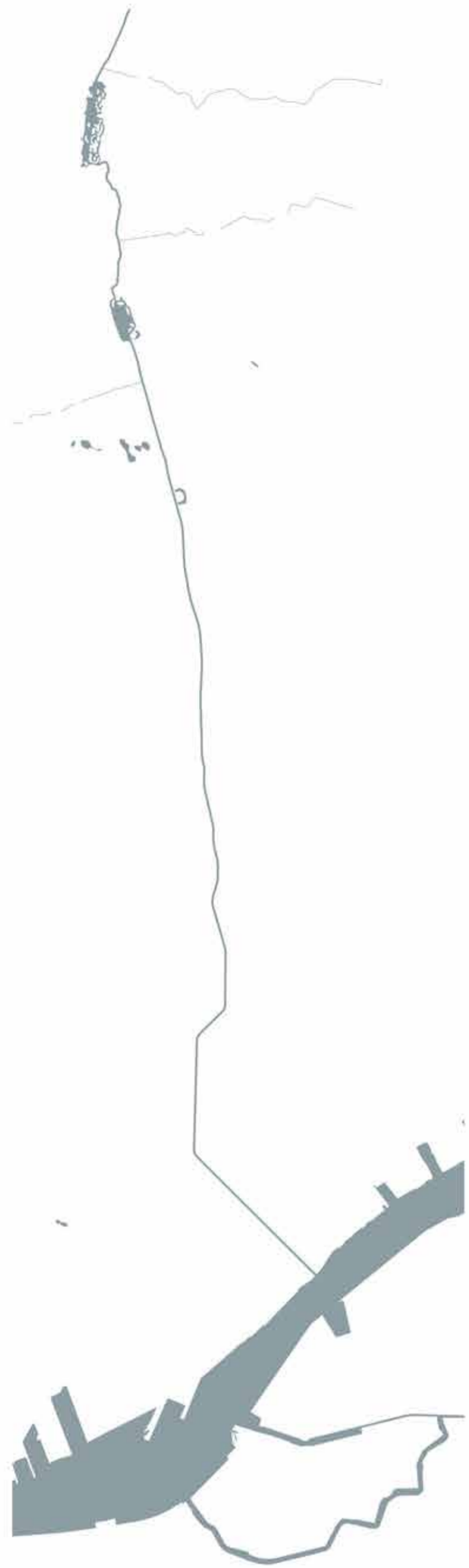
POSSIBLE CONNECTIONS



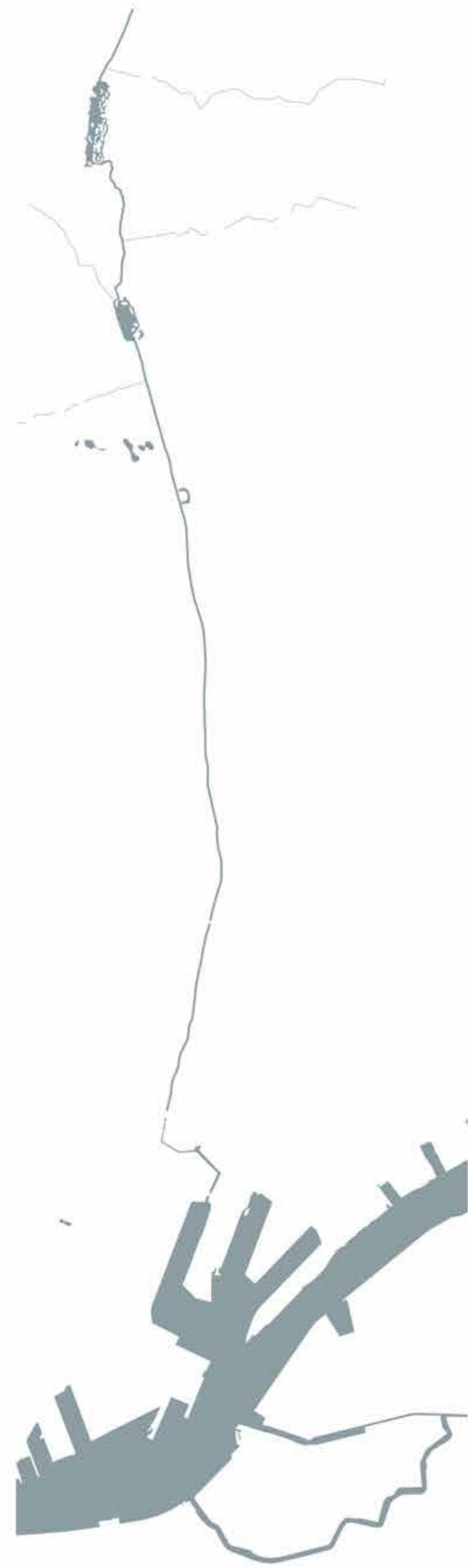
NEW GREEN LAYER



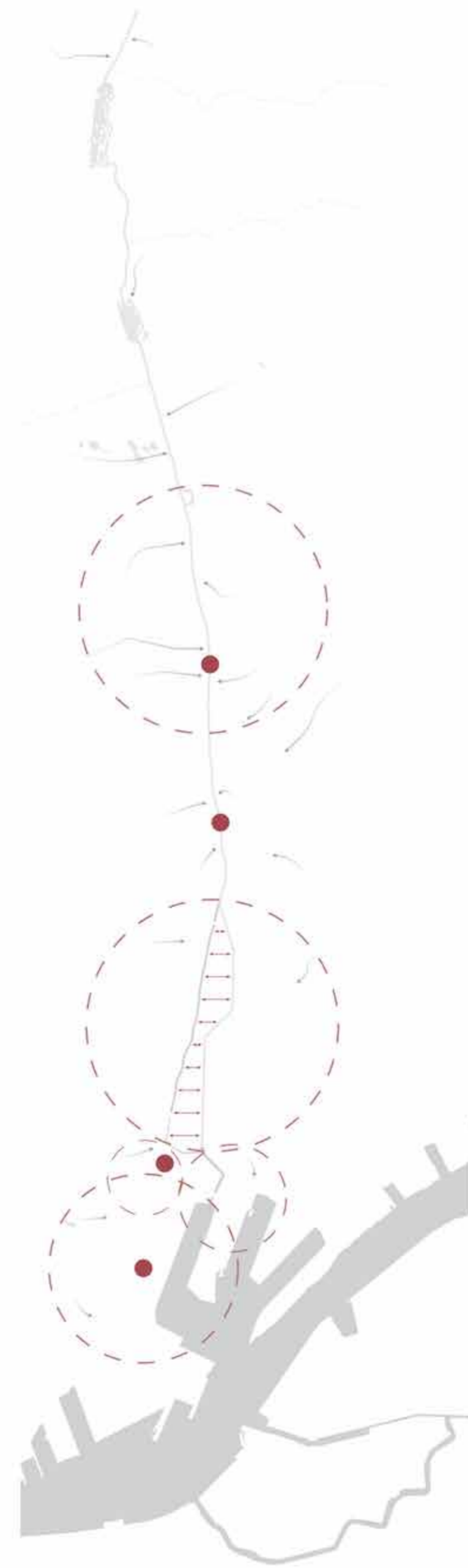
NEW CONNECTIONS AND POINTS OF INTEREST



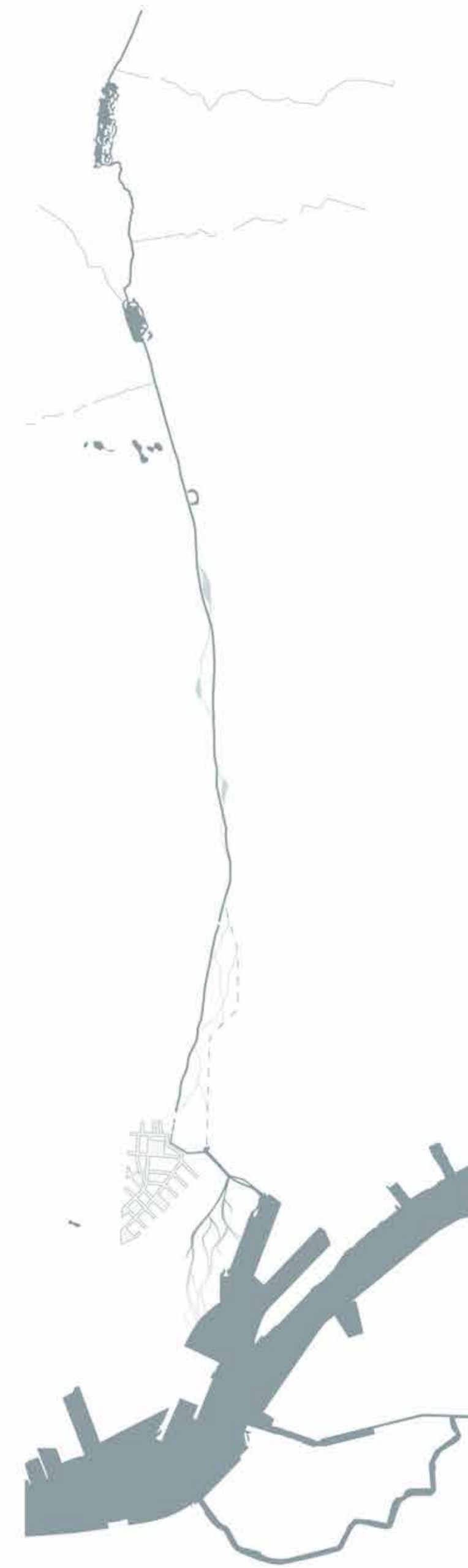
1865



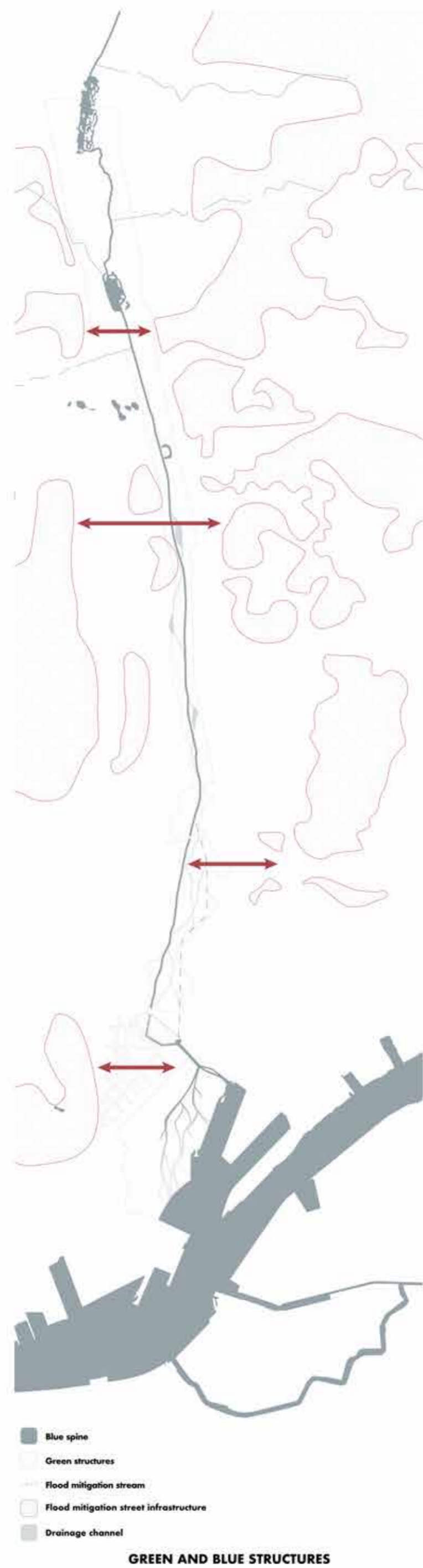
Current situation



Connections

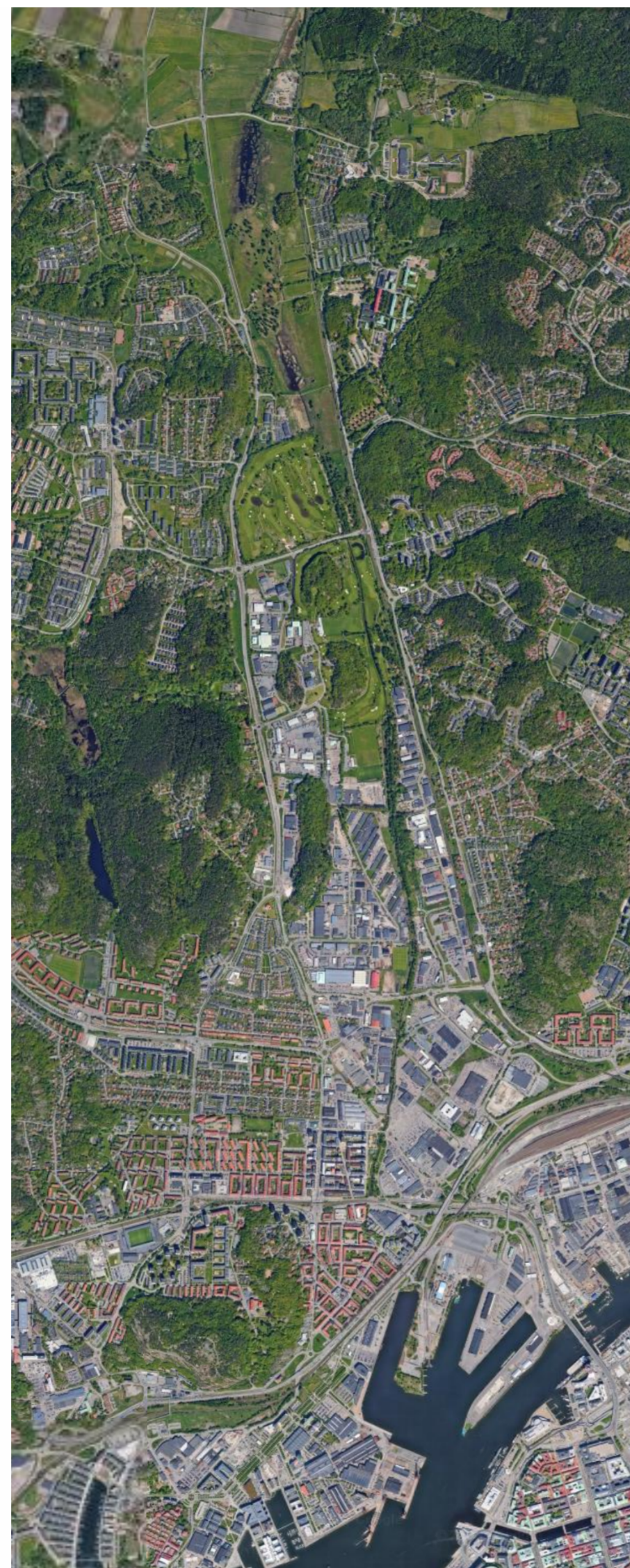
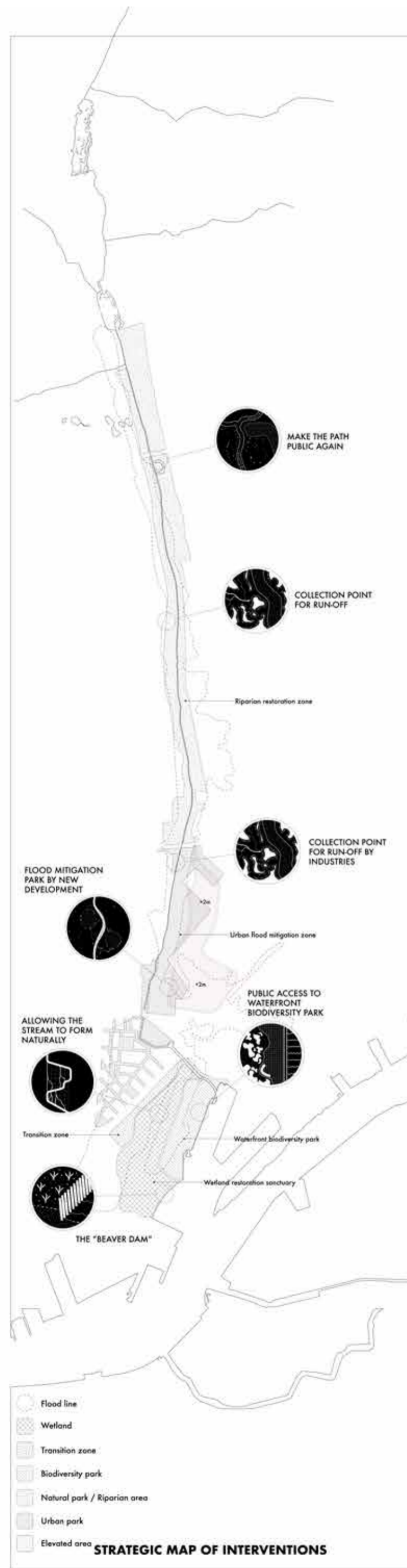


New blue structure



Analytical maps: what was the conclusion from the analysis of the green and blue structures around Kvilebäcken?

To understand the different aspect of the valley more thoroughly, different analysis were made in regards to green and blue structures. This was done in both a historical context (when possible), current scenario and what a future scenario could look like. The most prominent change that has occurred historically with Kvilebäcken is a re-direct if the stream somewhere after the 1860's. This was most likely done to accommodate for the new industrial landscape that started to expand from the Frihamnen harbors in the early 20th century. This has also had a few consequences when looking at flooding risks in the area. It is the area that is between the new and old path of the stream that poses one of the higher flooding risks along with the area closest to the mouth of Kvilebäcken.



Current context of Kvillebäcken

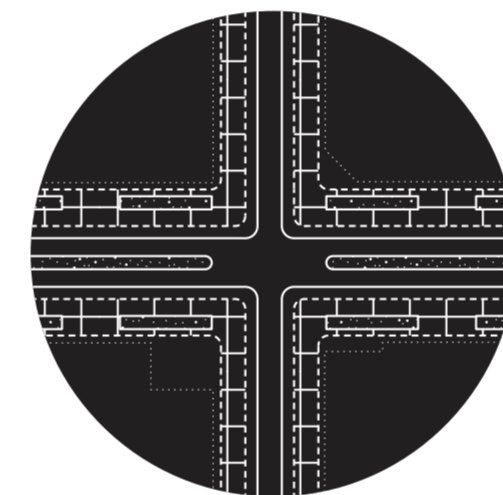
The current context of Kvillebäcken poses many different challenges in regards to accessibility, flooding, bio-diversity, pollution, and privatization of the stream. Through an analysis of the current context via site visits and gathering information from the GIS maps. An analytical map with different strategies and interventions has been developed to highlight the different areas and what their main challenges are.



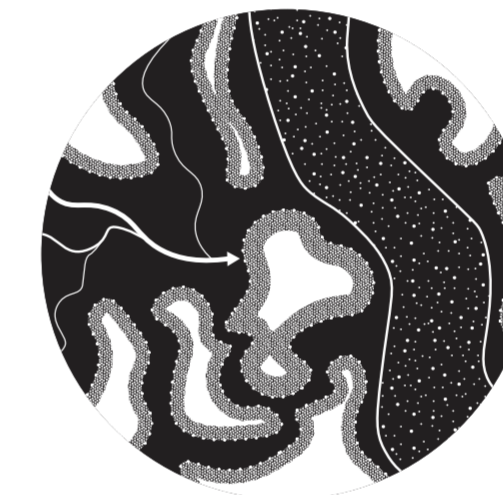
DE-PRIVATIZATION



URBAN FLOOD MITIGATION



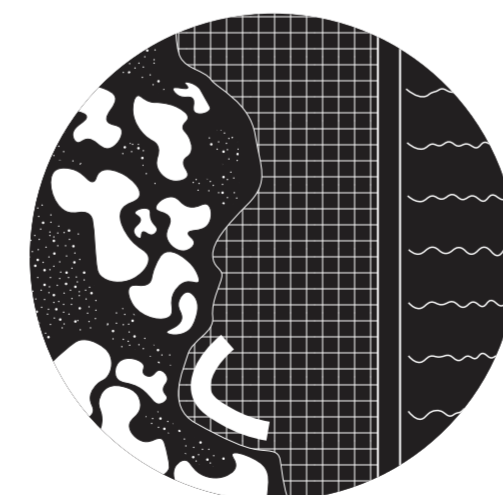
PERMEABLE STREETS



COLLECTION POINTS



SEMI-PERMEABLE DAM



TRANSFORMATION OF KVILLEPIREN



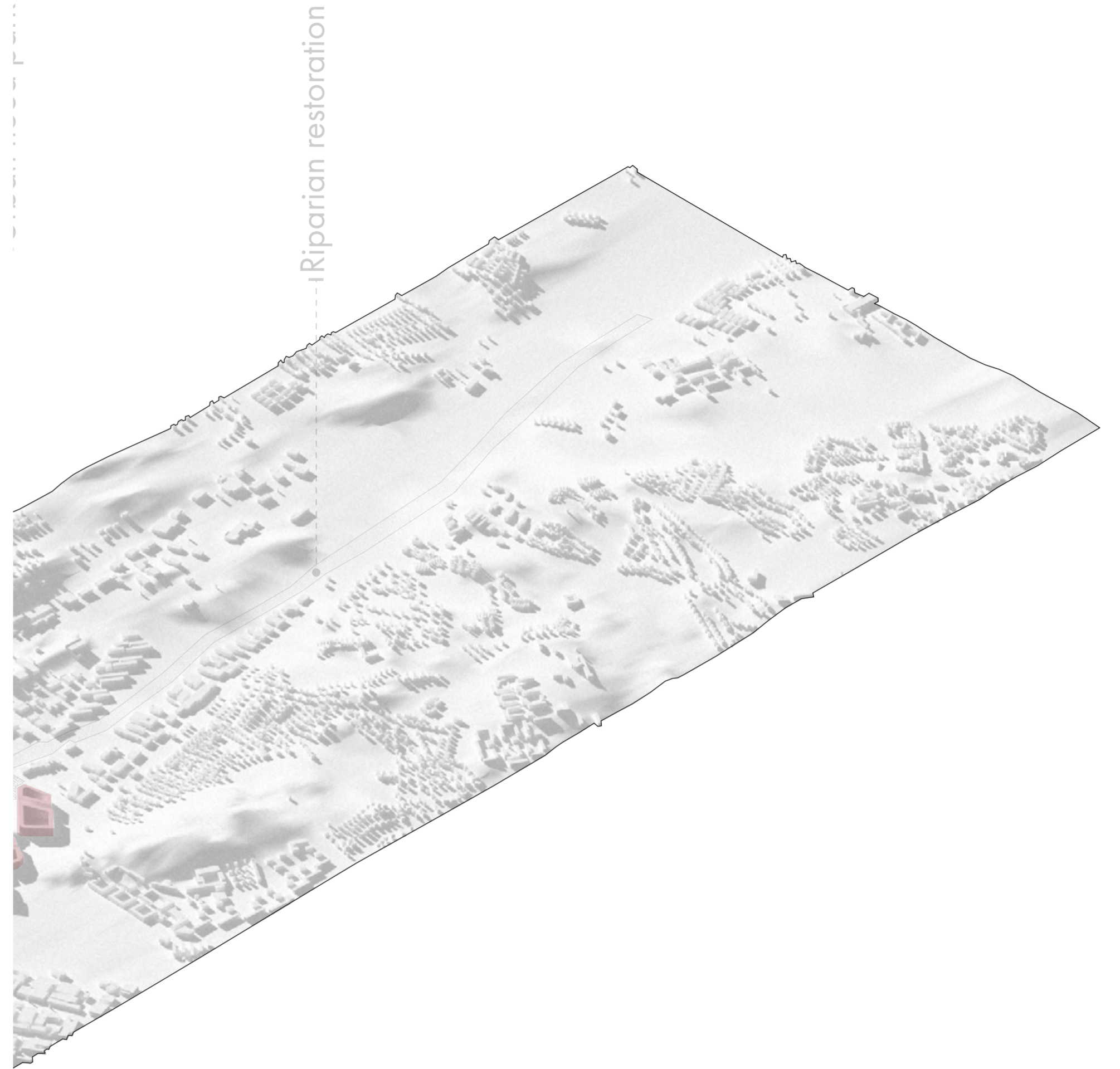
WETLAND SANCTUARY

Strategies

During the analytical process, several strategies were developed as a method to develop different intervention in the landscape. In the northern most part it has mostly to do with a riparian restoration strategy to minimize the flooding risks when there are high water flows in the stream. There is also a large section of the stream that is privatized which would be re opened to a public connection. An analysis was made to find where the rain run-off collects and where to implement strategic collection points to minimize the risks of flooding. In the south around Backaplan, A strategy to combat flooding was made that include permeable streets and an urban flood mitigation park that utilizes to streams path from 1860's as a diversion path if there are high flows of water in the stream. At the southern most park close to Frihamnen, a strategy of wetland restoration, and the creation of a bio-park was made to combat the high flooding risks in the area and a way to handle polluted soil.



Kvillebäcken river valley and surrounding context



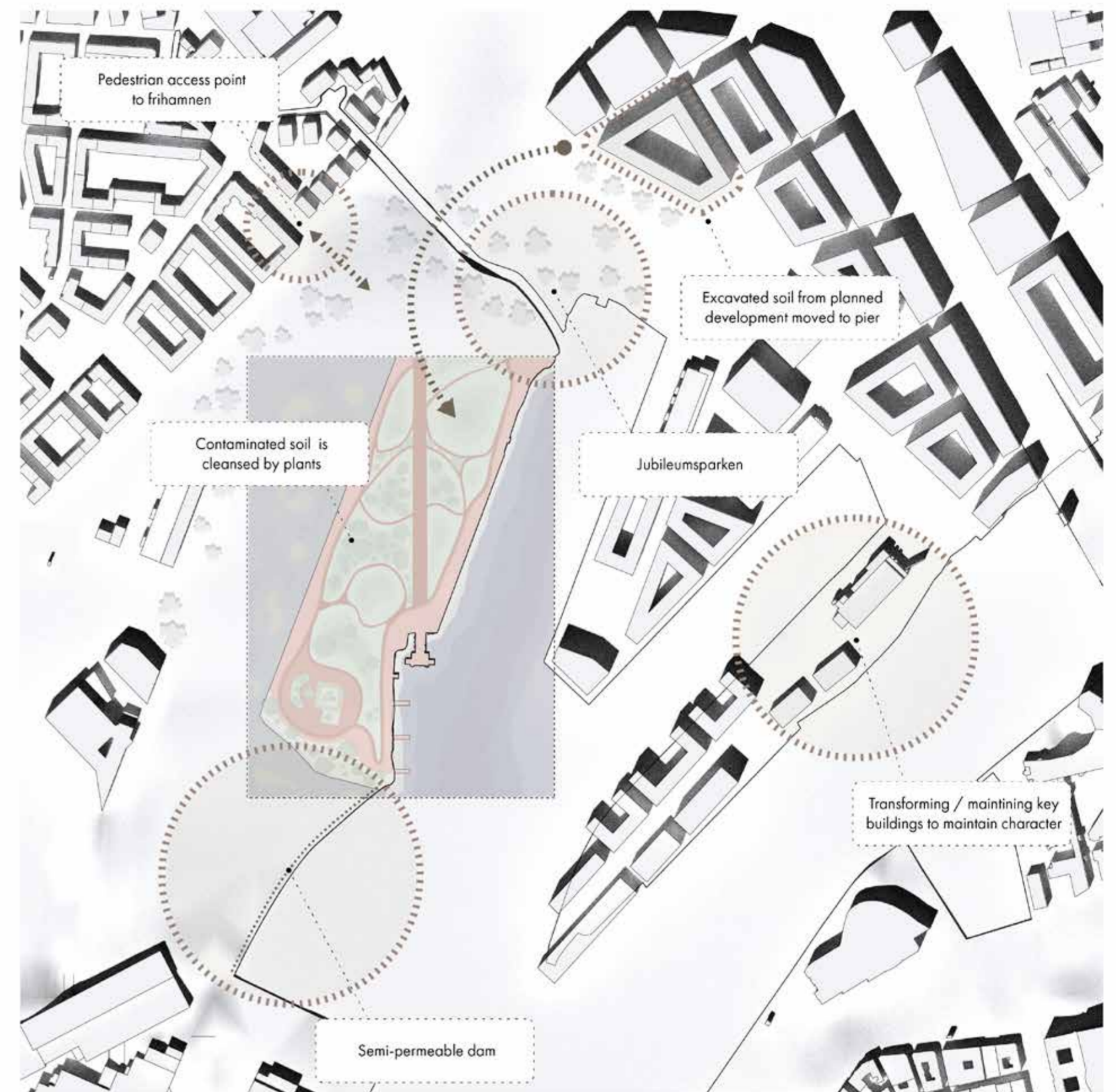
Urban flood park with surrounding context



Current Context of Kvillepiren

Current Situation

The current situation on Kvillepiren and its surroundings is a mixed bag. On the pier there are currently several buildings with temporary building permits that will end in about 10 years. After that there are no plans for what the future of the pier will be. If nothing is done then the buildings will be removed and the pier will revert to an empty landscape with no function in relation to its surroundings. It does pose a lot of opportunities in regards to making it a public function when taking Jubileumsparken and the plans to create several high density residential and office building in Frihamnen into account. Within that future context it becomes a central part of the area while also remaining on the edge so it does not disturb any flows in regards to infrastructure. It is located close to Lundbyleden which is a has a very high traffic flow and noise pollution, therefore it would also create a larger separation between the residential functions of the area and the road. Therefore, it seems that a public or natural function that is not as sensitive to noise is the most reasonable approach to the area.



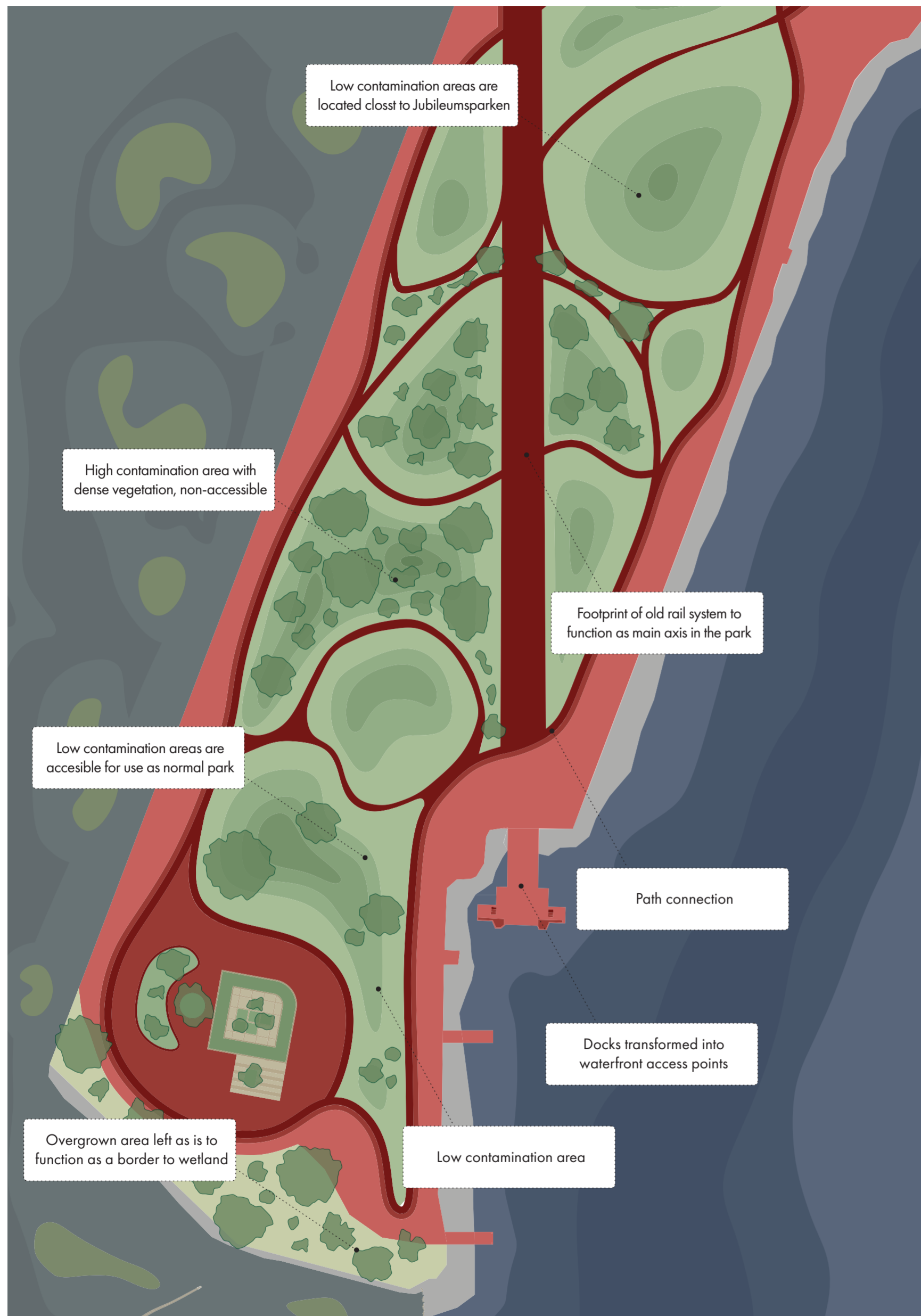
Bio-park: connections and site context
Scale 1:5000 (A3)

Bio-park

The bio-park located on Kvillepiren is an exploration of how to handle the contaminated soil that will be excavated when Gothenburg starts developing the areas around Backaplan and Frihamnen in 2035.

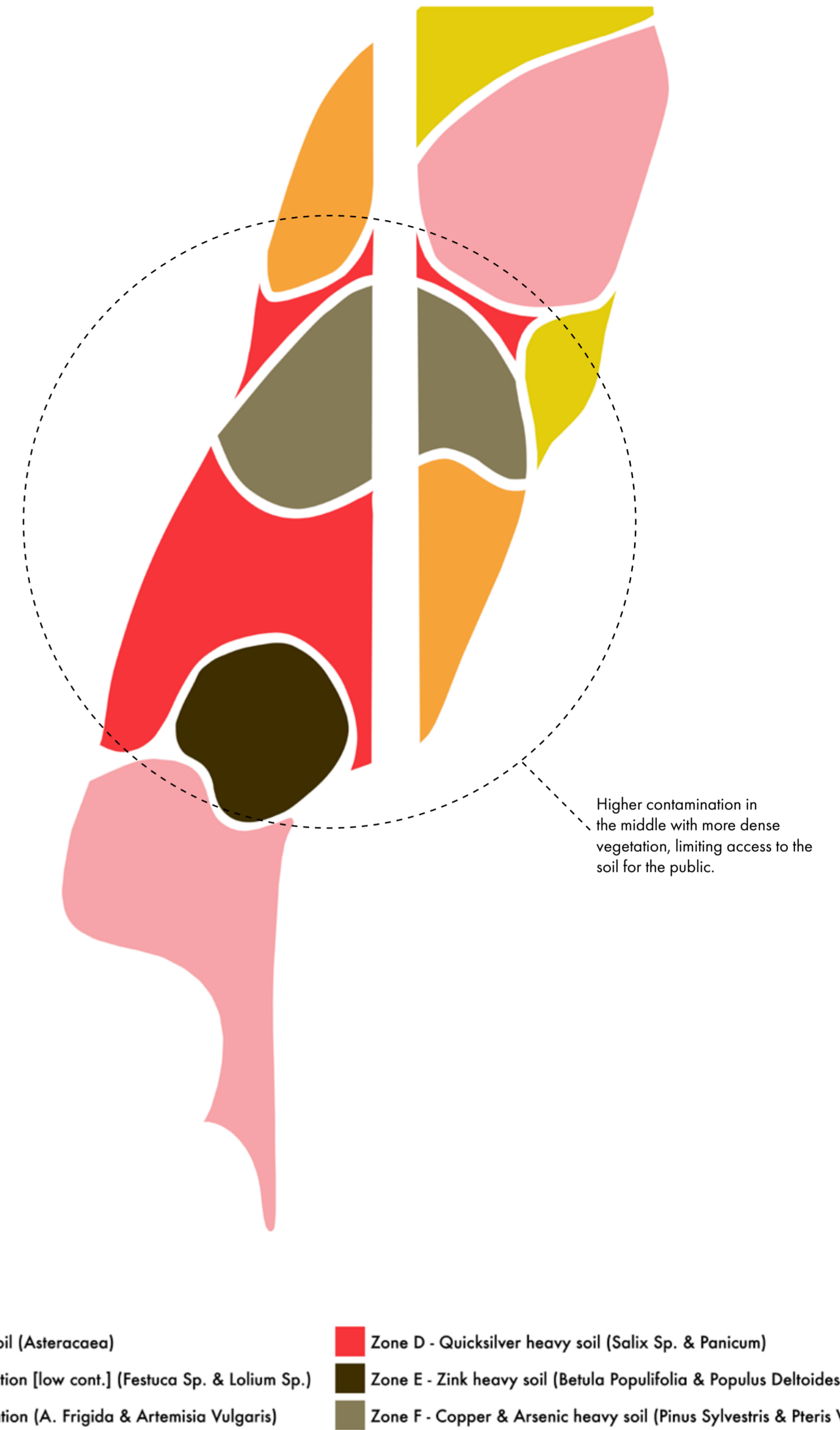
At the moment there are temporary building permits on the site, with no clear plans as to what is next. Therefore, the park aims to function as a bio-regeneration area with the restored wetlands as its closest neighbor, instead of simply exploiting the area for building purposes.

It is divided into different cleansing zones with the zones closest to the most public areas being the least contaminated, and the areas in the middle will have a higher contamination with more dense vegetation.

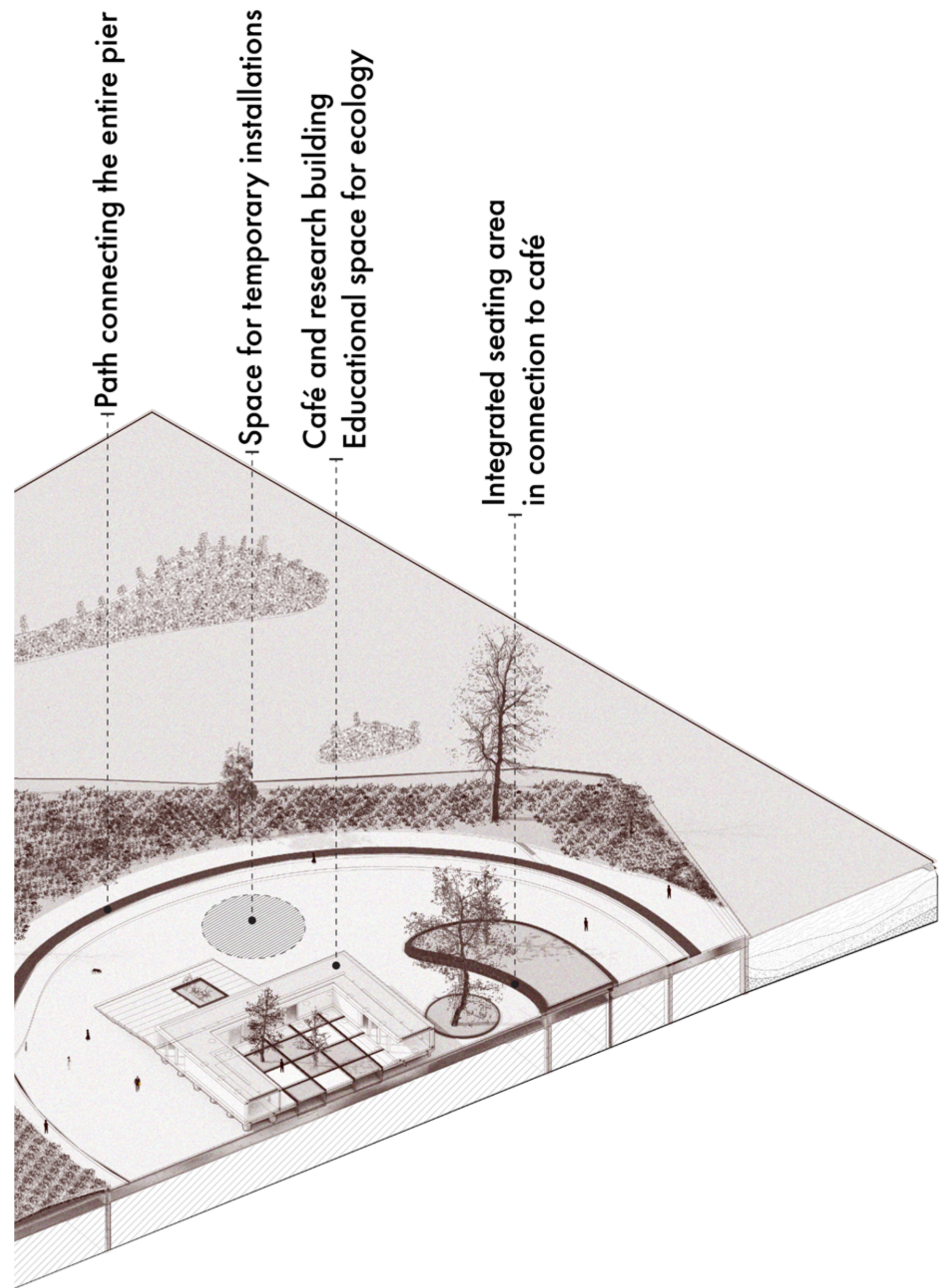
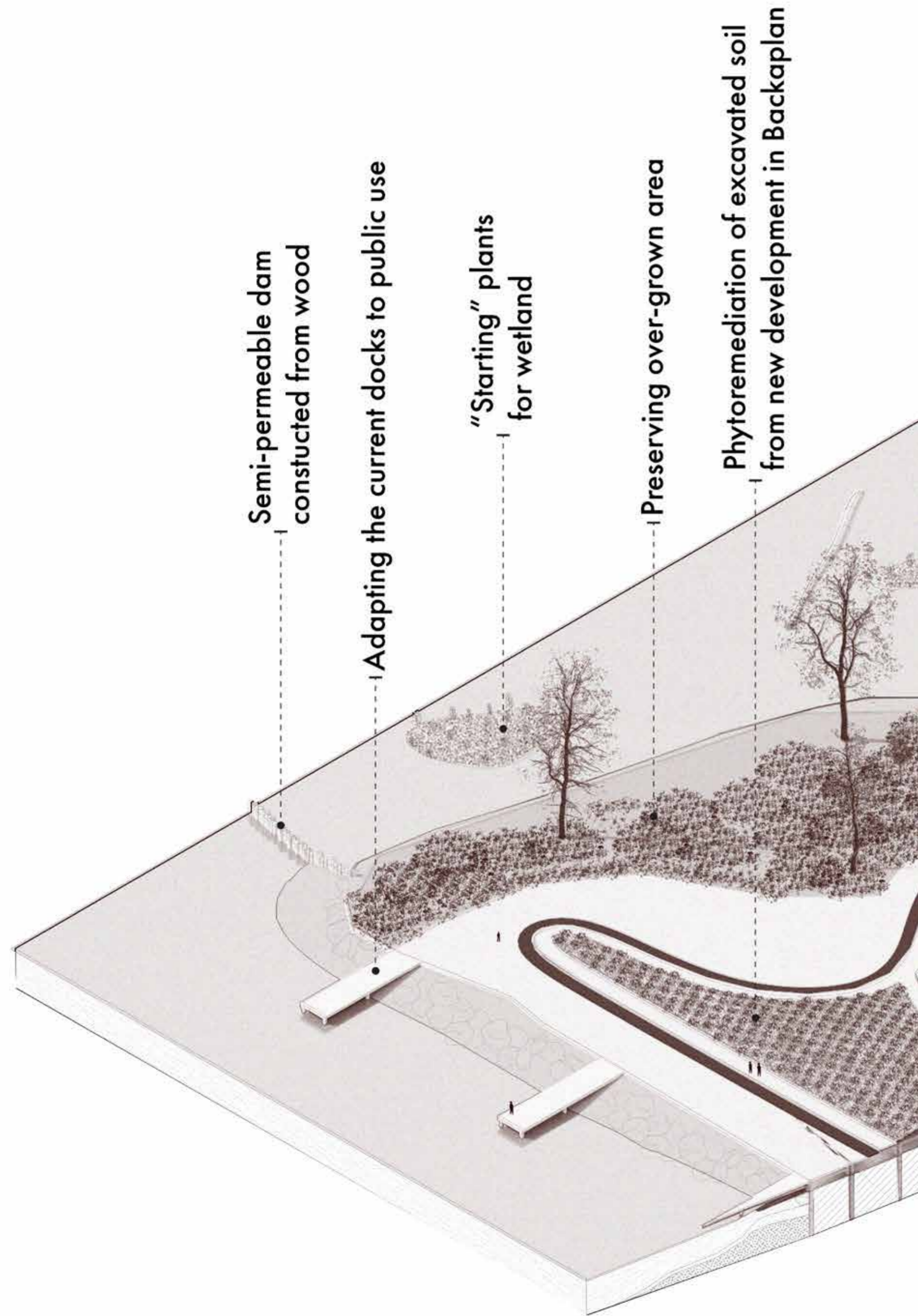


1:1500 (A3)
Site plan

Kvillepiren
Bio-Park



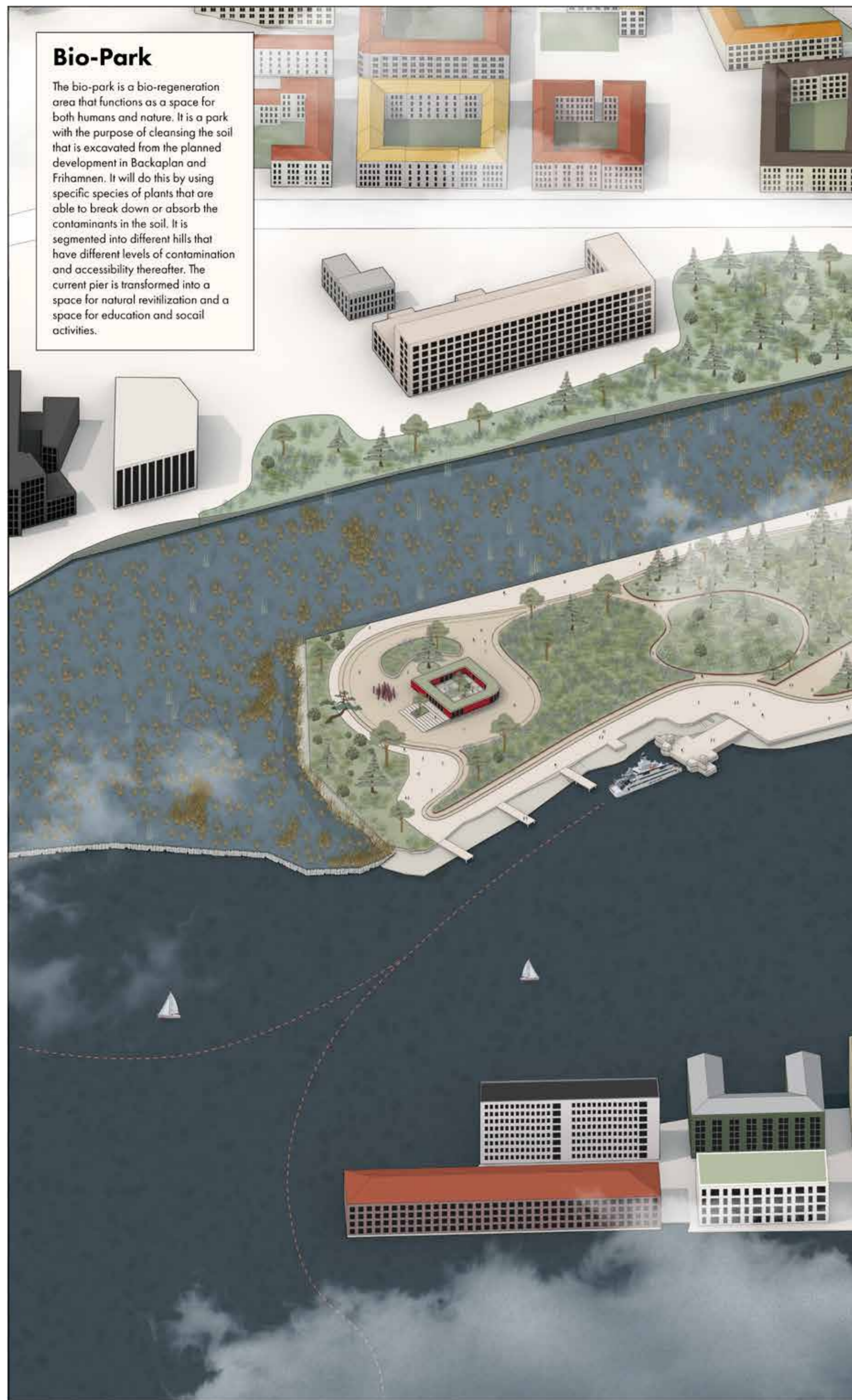
- Zone A - Lead heavy soil (*Asteraceae*)
- Zone B - Rhizodegradation [low cont.] (*Festuca Sp.* & *Lolium Sp.*)
- Zone C - Oil contamination (*A. Frigida* & *Artemisia Vulgaris*)
- Zone D - Quicksilver heavy soil (*Salix Sp.* & *Panicum*)
- Zone E - Zink heavy soil (*Betula Populifolia* & *Populus Deltoides*)
- Zone F - Copper & Arsenic heavy soil (*Pinus Sylvestris* & *Pteris Vittata*)



Bio-park on Kvillepiren
Scale 1:500 (A2), 1:250 (A0)

Bio-Park

The bio-park is a bio-regeneration area that functions as a space for both humans and nature. It is a park with the purpose of cleansing the soil that is excavated from the planned development in Backaplan and Frihamnen. It will do this by using specific species of plants that are able to break down or absorb the contaminants in the soil. It is segmented into different hills that have different levels of contamination and accessibility thereafter. The current pier is transformed into a space for natural revitalization and a space for education and social activities.



Strengths

- Biodiversity
- Wetland area functions as a large carbon sink
- Allows for more public functions in the area
- Becomes an area that focuses on nature as a main component in urban development
- Building allows for educational / research opportunities for schools or those interested in different ways to achieve bio-regeneration.

Weaknesses

- Dependent on other developments for soil
- Location is a little "off" if the new development does not take place
- Wetland area might not be possible to make as large as proposed
- Large area and project that would include a large funding process to complete.

Opportunities

- Increase the distribution of knowledge regarding different methods to increase biodiversity and cleansing in urban environments by including an education / research building. By adding the function of a café to the building it could attract more people to visit the park.
- A unique park that has no equivalent in Gothenburg makes it an interesting place to visit.
- Creating a solely public park in an area that is otherwise planned to be of high density allows for more space for flora and fauna in an urban environment.

Threats

- The surrounding area of Frihamnen is still vulnerable to flooding risks in certain areas.
- If the sea level rises above 2/2.5 meters, then there is a risk of the water coming into contact with the contaminated soil that is being restored on the pier.
- There needs to be a system that handles the run-off from the soil restoration hills that minimizes the water from entering Götaälv.

Reflection

The project has a large potential in regards of biological systems and restoration. With a large focus on the natural aspects, it focuses on how to improve how nature relates to the way that urbanization is taking place in Gothenburg. Today, the natural aspect of development are often given a low priority when compared to exploitation for high density new development. This approach focuses on giving the nature a dignified amount of area to actually make the impact of it more prominent in the landscape. It prioritizes the natural aspects before those of high density urbanization. Economically it's not a reasonable project as it has no monetary gain as a park, but ecologically and environmentally it will compensate by creating a system for soil cleansing, a carbon sink in the wetland, and opportunities to create a center for knowledge distribution with the establishing of a research and educational facility that would study the effects of the restored wetland and the impact of the soil restoration process on the pier.

