

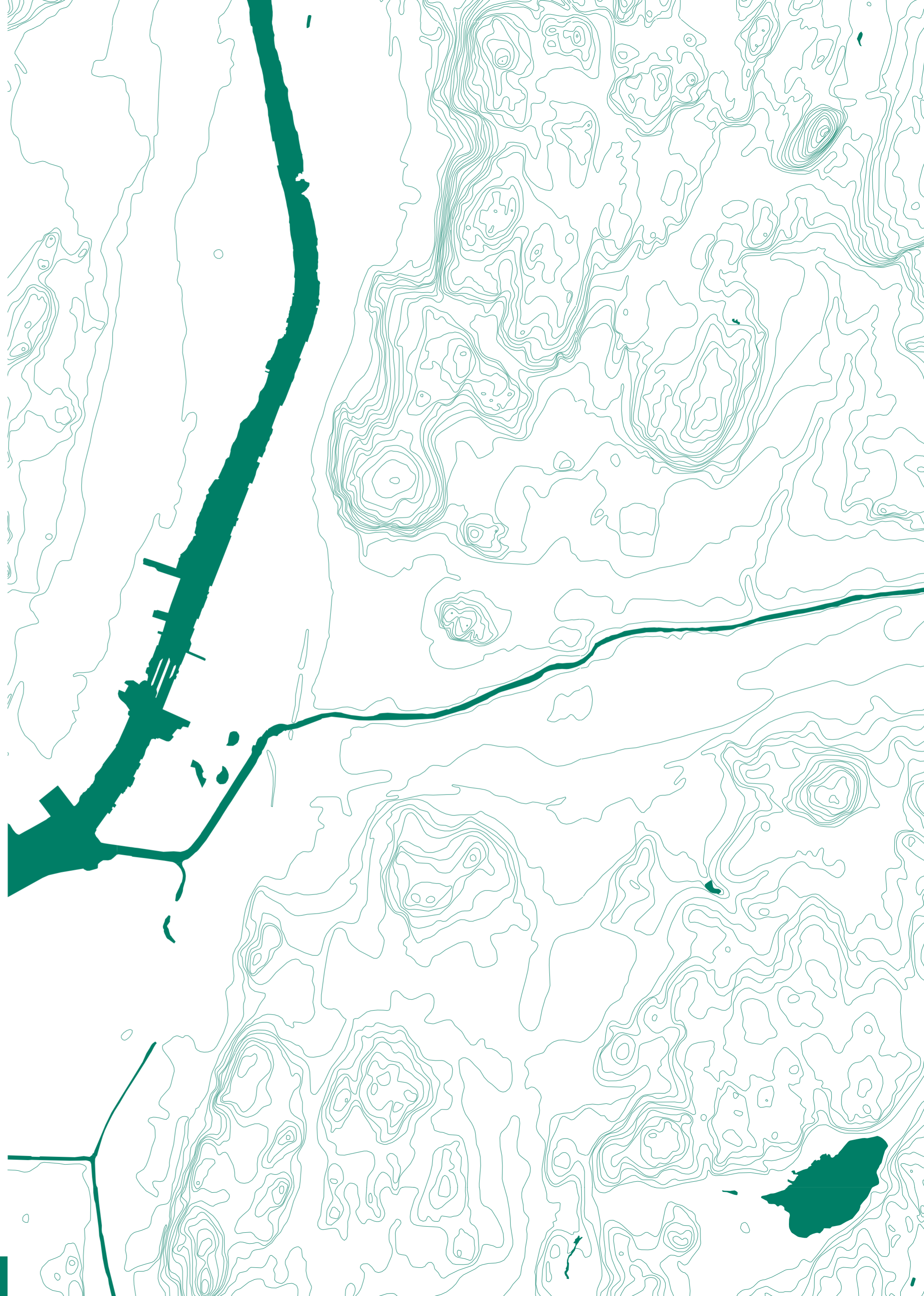
MARIEHOLM'S WETLAND
a Sävån river valley investigation

While creating this booklet, we wanted to portray a complete and coherent image of the S ave n river valley and visualize a suitable future for it. A one, in which S ave n one day will play a vital role as a green-blue corridor in a continuously developing urban setting. Initiating with careful and meticulous analyses, followed by strategies and testing our ideas through model making, we developed a future image of S ave n which is hopefully compelling and promising.

Table of contents

01.	introduction	4
02.	context and river valley analysis	10
03.	landscape strategies	18
04.	case studies	32
05.	Marieholms wetland	40

_01 introduction



the industrialized river valley of Sävån

Sävån is a comparatively small river in the urban context of Gothenburg, with a diverse character signified by contrasting conditions of the surroundings. The river outlet into Göta Älv is a historic marshland, now occupied by industry and infrastructure prone to flooding. Upstream, the conditions change from urbanized centers to alternating industrial and fallow land. Partial renaturation efforts are taking place. Sävån has previously been polluted, pushed back and neglected, waiting to reclaim its potential and a valid space in Gothenburg's cityscape.

The image of the river valley of Sävån is one which represents a high level of industrialization and failure to acknowledge the presence of the water. For the majority of time, the river seems to be pushed back in order to make space for industrial functions. The closer one gets to its connection with Göta Älv, the more hidden Sävån becomes.

Before the industrialization the natural landscape of Sävån used to be one filled with crop fields and green riverbanks. The remains of what it used to be can be found upstream where river flows freely, creating creeks and an enchanting and inviting landscape filled with meadows.

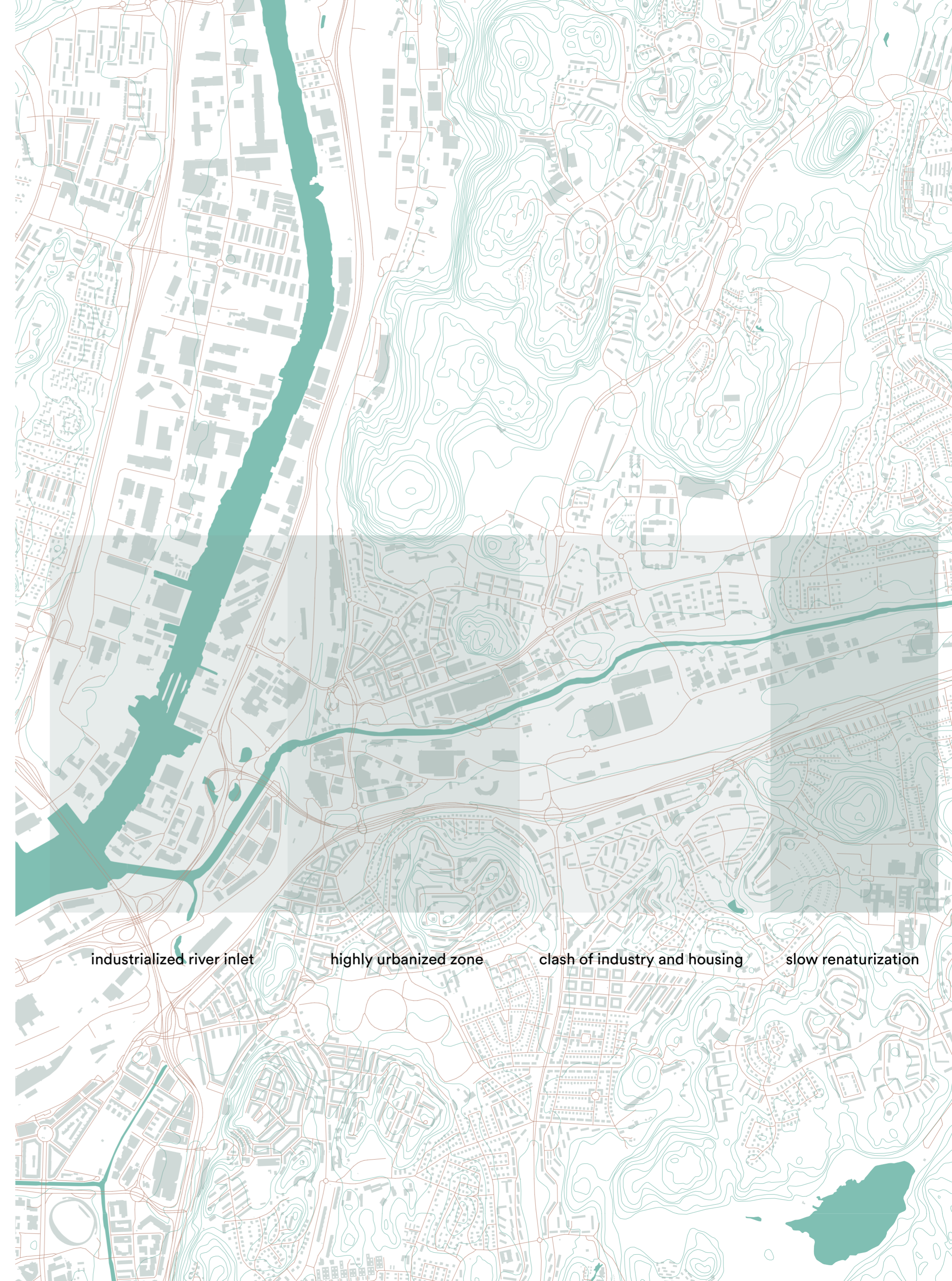
What we are facing today around Sävån is landscape that is mostly flat but also filled with hard, impermeable surfaces which increase the flood risk in case of a river overflow due to rainy conditions. It's a landscape in which the river was accustomed fully to the human needs.

The riverbanks are mostly privatized, they either belong to the industries or to private owners who use them as seasonal storage for their boats. This approach results in the riverbanks being inaccessible and most of the time invisible to a passerby. These privatized riverbanks are not only a barrier for humans but also for other species.

While doing our site visit and conducting analysis we were able to divide the river into four chapters based on their main characteristics. Along Marieholm, the river is represented with a high level of industrialization and the whole area being a subject to a major flood risk. Moving inland, we find ourselves near the former SKF headquarters, where the surroundings expose a more urbanized character with the industrial remains still being present on the southern riverbank. Entering the Bellevue area, we find a glimpse of hope. With newly built housing areas on the northern riverbank we are able to find a more naturalized river edge with increased accessibility towards the river. However, on the southern riverbank it is once again met with heavy industry which constructs both a spatial and mental barrier when it comes to crossing the river. Eventually, when we leave Utby and enter more of a rural landscape, the river seems to regain its shape and natural course with its banks being full of greenery and accessible both to humans and other species.

While dissecting all the factors that came into forming our understanding of how this river landscape functions, we came to the conclusion that we have to approach the whole system holistically. Instead of focusing on solving particular areas, we aimed to propose a system of interventions, which when cooperating together, can provide a new image of the green-blue structure of Sävån.

In the upcoming chapters, we aim to explain step by step the approach applied to designing the new river corridor. Beginning with analyses and strategies, which then become layered, we present a general idea of a set of interventions, which we believe, should be introduced alongside the riverbank.





pollution

The southern riverbank is heavily occupied by industrial clusters. They have a direct effect on the air quality and cause a threat to water, air and soil pollution.



industry as a barrier

The industrial belt covers almost all of the southern riverbank and partly the northern one as well. Together, with the infrastructure, it creates both a mental and spatial barrier.



romantic landscapes

The former SKF owner villa is located just by the Sävån riverbank. Surrounded by lush vegetation, it exposes great potential as a future cultural point of interest.



details

In certain spots along the riverbank, there can be seen a glimpse of hope and there is care shown along the shores. There can be found small interventions which aim to mitigate the flood risk.



privatized riverbank

Most of the riverbanks adjacent to the industrial functions are privatized. Unaccessible areas are vast and cover most of the riverbanks in the area of interest.



housing areas

The northern riverbank is covered mainly with housing areas which lack points of attraction for the inhabitants. There's also a clear absence of connections between the residential areas.



riverbank closeness

Near the housing areas there can be found signs of willingness to connect the locals and the river. This small portion of landscape is a signal of a hopefully upcoming change.



clash of characters

The natural river valley landscape is met with heavy industrialization. Mainly the southern riverbank is covered with industrial clusters which cause a disturbance in general perception of the green-blue corridor.

_02 context and river valley analysis





Topography and water run off analysis | 1 : 15000

Legend:

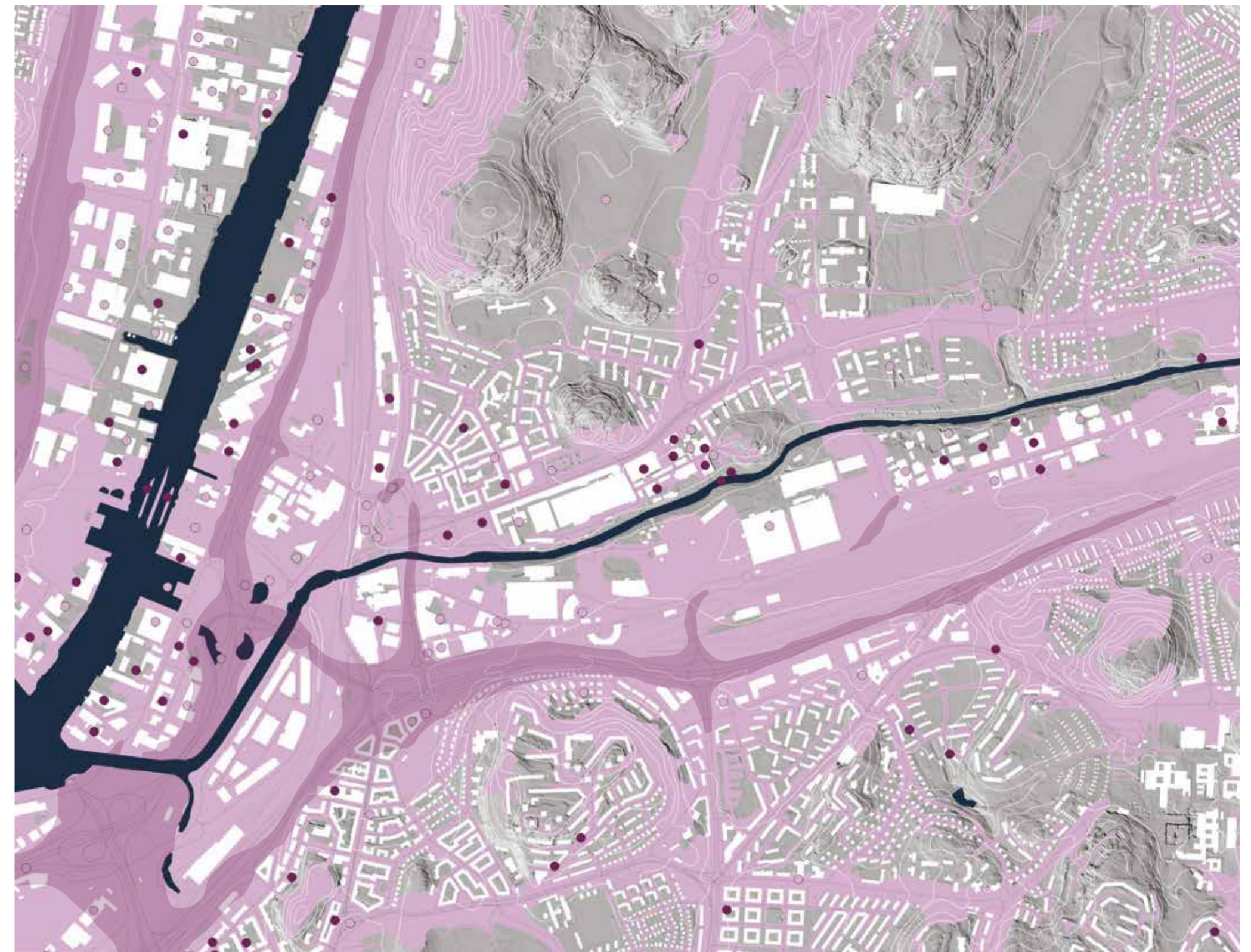
- water
- buildings
- hard surfaces
- main water run-off paths
- flood - 2m level

Description:

First of the analyses, focused on understanding and delineating the water run off paths and grasping the relation between them and the unpermeable surfaces and topography. Major run off paths were exposed and they were mostly met with hard surfaces which leads to increased flood risk.

conclusions

- water run off paths met with hard, unpermeable surfaces which lead to increased flood risk
- Marieholm under threat of flooding almost entirely
- the rest of riverbanks seem remotely safe



Pollution and risk contamination analysis | 1 : 15000

Legend:

- water
- buildings
- soil contamination points
- noise pollution
- harmful SO2 levels - air pollution

Description:

Pollution and contamination analysis focused on determining the areas which could be most sensitive to air and noise pollution. Areas that are „safe“ from pollution are mostly the ones that are surrounded by built structures.

conclusions

- almost the whole riverbank is a subject to pollution coming from extensive road and railway infrastructure
- Marieholm is again under influence of heavy noise and air pollution that contain harmful SO2 levels



Biodiversity and green structure analysis | 1 : 15 000

Legend:

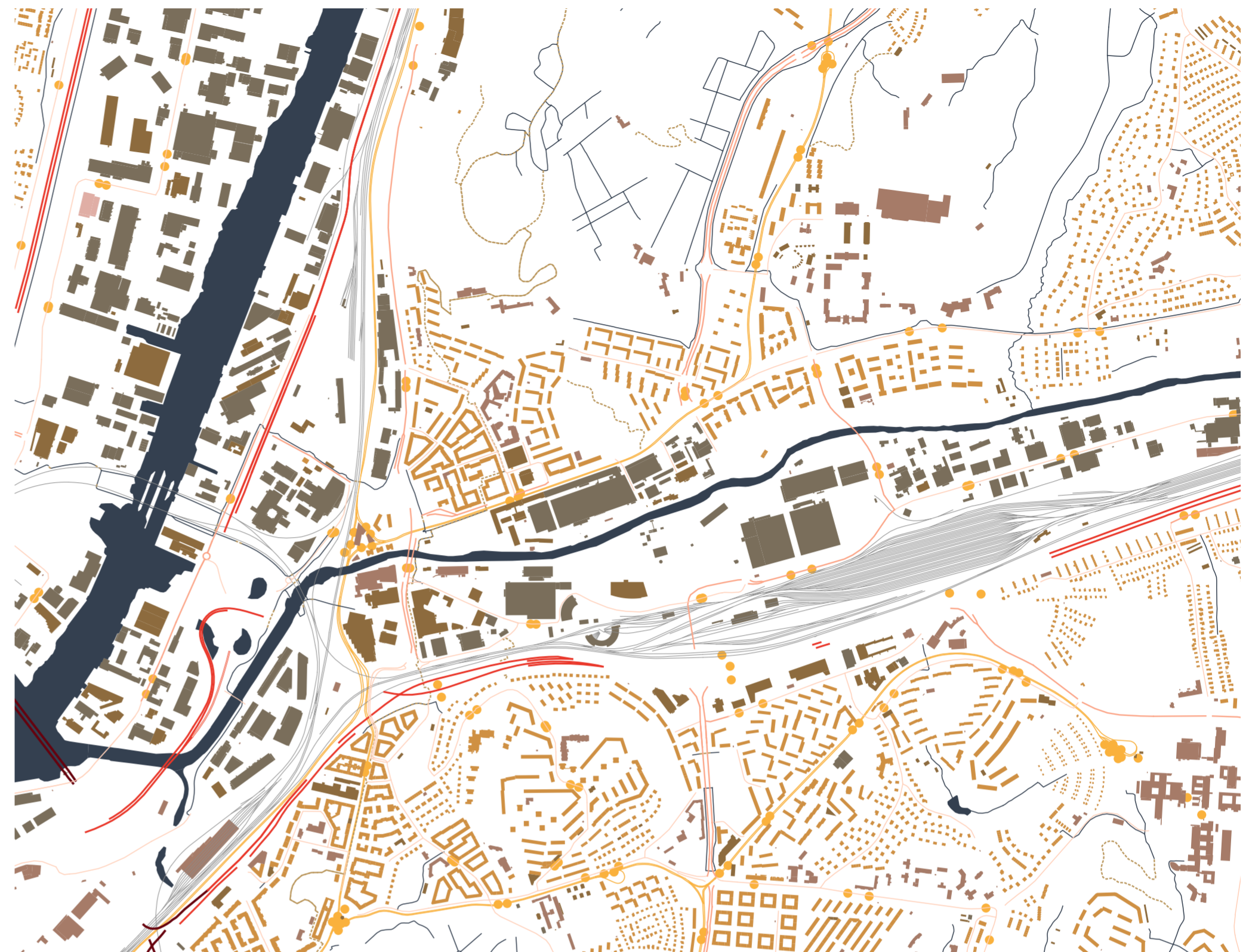
- | | |
|---|---|
| <ul style="list-style-type: none"> water industrial buildings forest areas planted areas parks | <p>Species of protected trees:</p> <ul style="list-style-type: none"> Elm Aspen Sessile oak Birch Swedish white beam Sweet cherry Beech Oak Horse chestnut Black alder Linden tree |
|---|---|
- Biodiversity hotspots (indicated by number of bird species present):
- >2
 - 2-5
 - 5<

Description:

The biodiversity and green structure analysis is exposing the lack of green spaces in the riverbank valley. The existing green structures have no connection between each other which disturbs the flow of species in between them. Biodiversity spots can be found mainly in the industrial areas which showcases potential.

conclusions

- lack of green structures along the riverbank
- no connectivity between green spaces
- potential biodiversity hotspots located in industrial areas



Communication and building function analysis | 1 : 15 000

Legend:

- | | |
|--|---|
| <ul style="list-style-type: none"> water railway bike lanes pedestrian paths tram line tram/bus stops | <p>building function:</p> <ul style="list-style-type: none"> housing services industrial economic |
|--|---|
- traffic flow (yearly mean weekday traffic):
- 0 - 8500
 - 8500 - 33400
 - 33400 - 79500
 - 79500 - 119000

Description:

The communication and building function analysis showcaes the function clusters that are present in the river valley of Sävåån. The lack of pedestrian connections across the riverbank, as well as along it, is evident and calls for intervention.

conclusions

- extensive road infrastructure, however not heavily trafficed
- zoning of functions (housing and industrial clusters) with lack of connectivity
- clear abundance of cultural points of interest and pedestrian paths

main challenges

With a high presence of hard, unpermeable surfaces certain areas around Sävån are a subject to flooding. These areas are mainly covered with industrial functions or road infrastructure which do not allow the water to pass through and be absorbed.

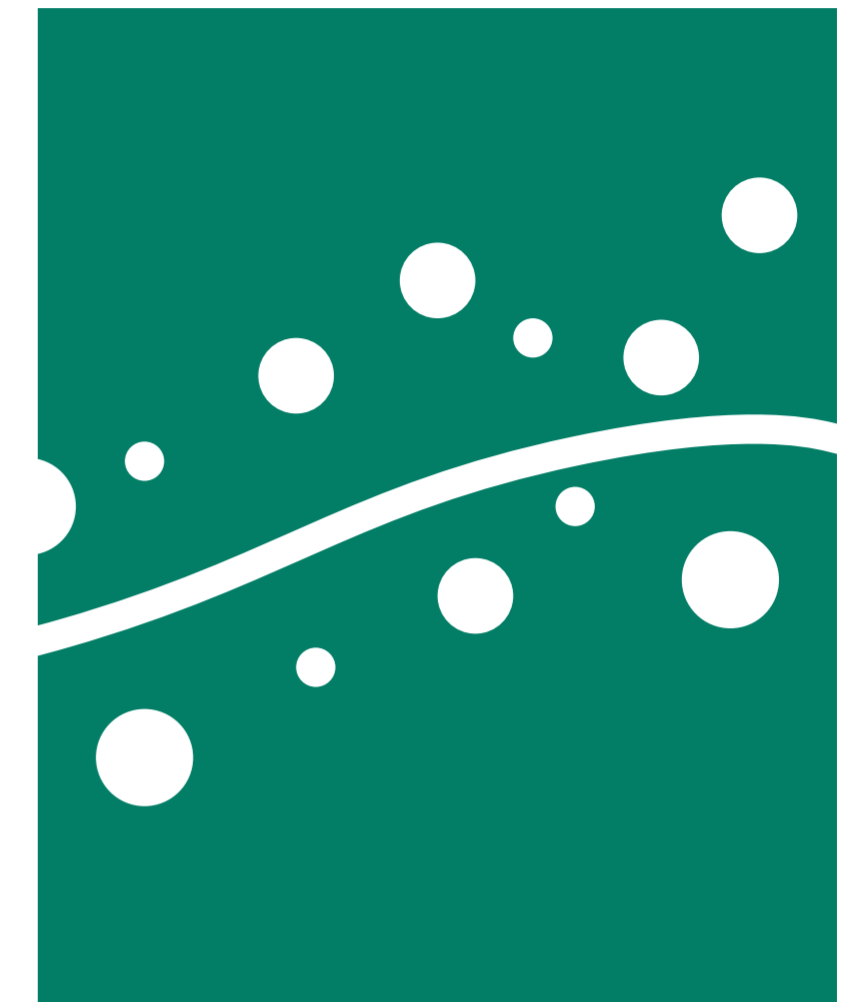
The privatized riverbanks are omnipresent along the river corridor. They limit the access to the river and cause disturbance in connectivity for humans as well as other species.

Another challenging factor which needs to be taken into the consideration is the risk of pollution. The current landscape provides no barriers or filters which could aid in mitigating the risk of water and air contamination.

There can be found multiple biodiversity hotspots along the riverbank of Sävån, however they lack stepping stones which could introduce connections between them. The chance of animals migrating inbetween these areas is minor.



privatized riverbank



pollution

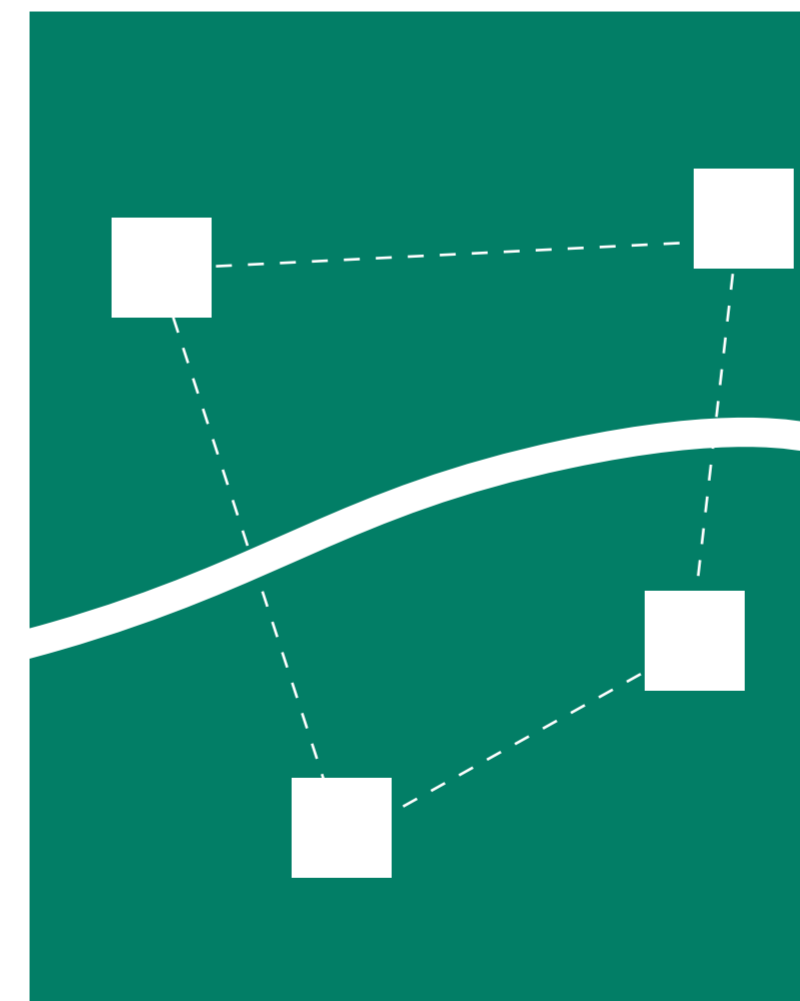
main assets

The area represents a loadful of assets that are waiting to be uncovered and explored further.

It represents multiple biodiversity hotspots, especially in the vast industrial areas with adjacent spaces (which for now are mainly parking lots) that could easily be turned into green patches and further be developed into ecotones.

Moreover, the river valley is shielded to a certain degree from noise and air pollution. The factors that blocks the pollution are currently mainly buildings, however the barriers may be expanded and have great effect using small interventions.

The river valley has a lot of future social focal points, which when interpreted according to the needs of community could be function as transition between human and nature. The existing social hotspots need adjustments and enhancement when it comes to the role they play in the community but they expose great potential already.



lack of connectivity



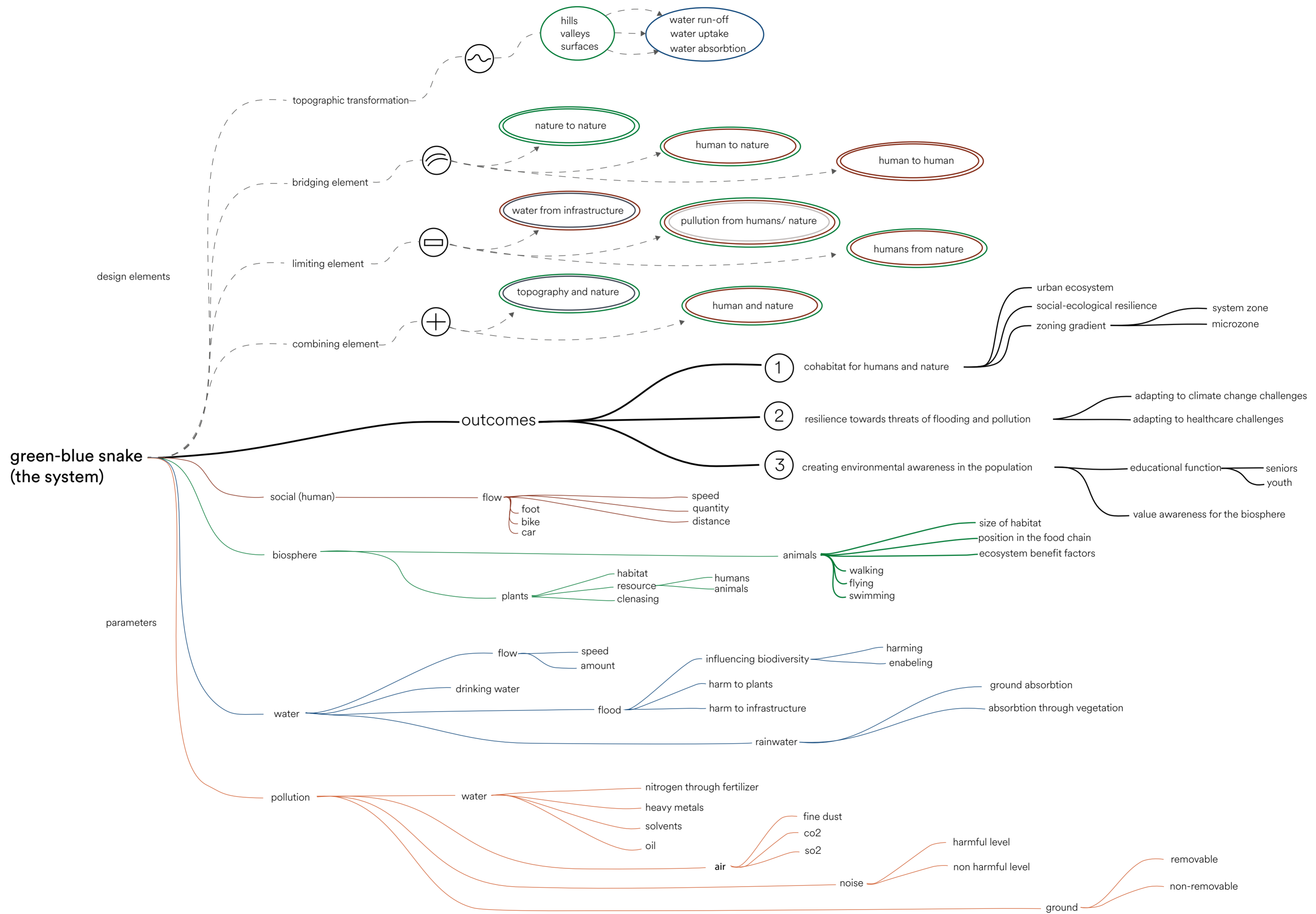
flood risk

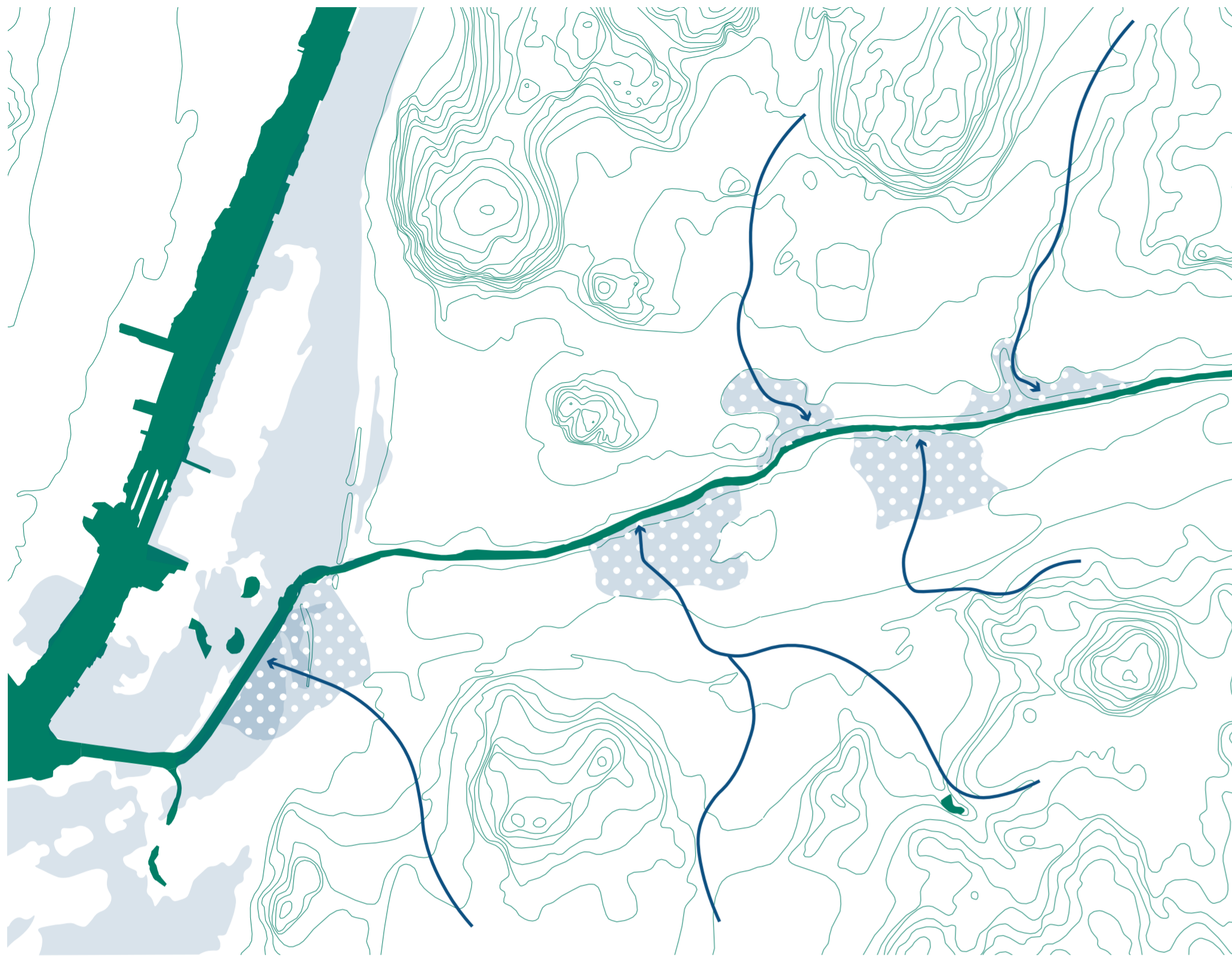
_03 landscape strategies



System diagram

The system diagram explains and aids in understanding the relationship between the used design elements and their relevance for the system. The core of the system is the cooperation of the design elements. By working together they solve multiple issues at once and influence one another, creating a multiplier effect within the system.





Strategy - flood risk mitigation | 1:15 000

Legend:

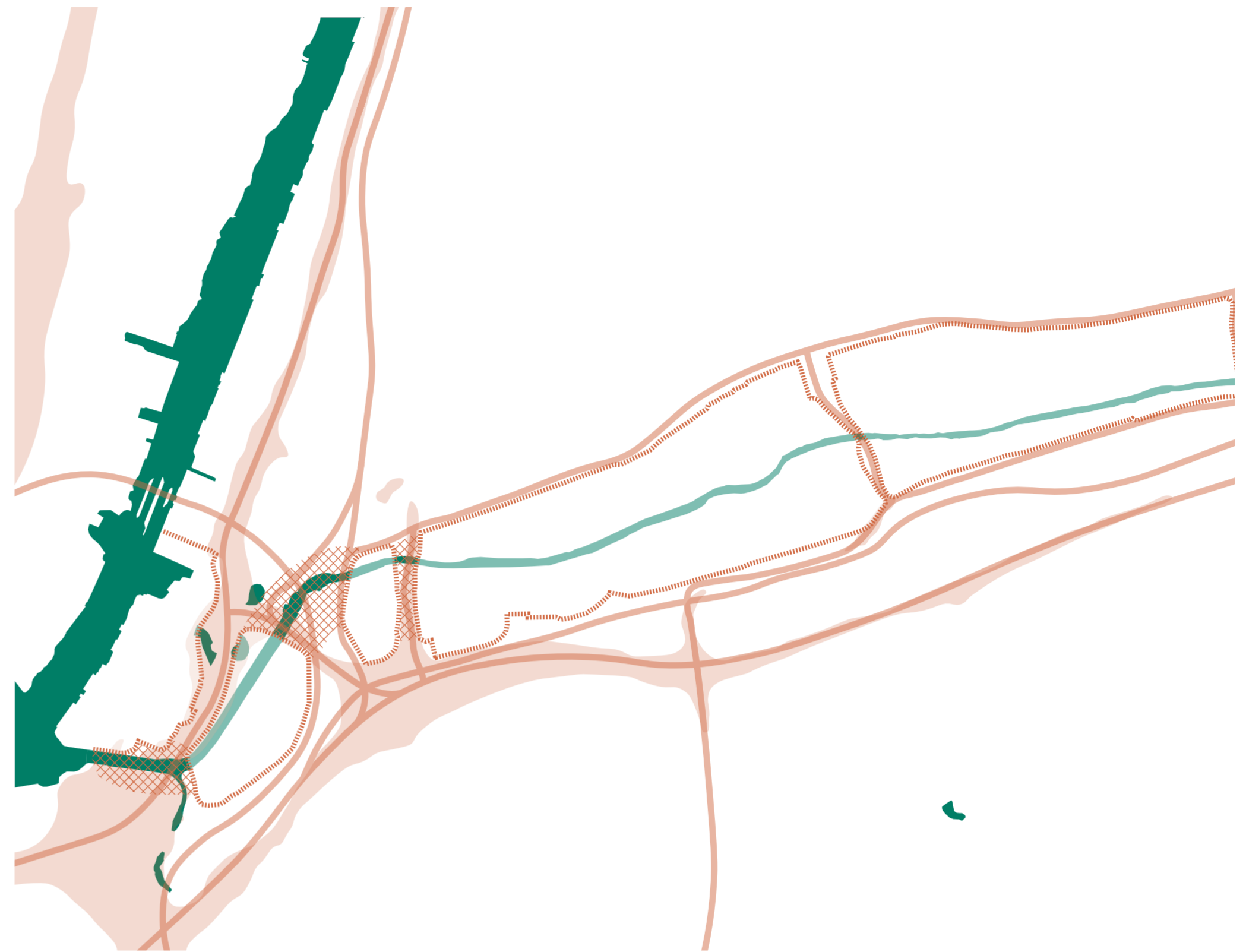
- water
- topography contours
- flood level - 2m
- water run off paths
- water retention areas

Description:

The first strategy focuses on mitigating the flood risk and tackling the water run off paths within the river corridor. Main run off paths were identified and the adjacent surfaces which are mainly hard and unpermeable need to be altered in order to be able to cope effectively with the water run off.

conclusions

- critical water run-off points identified and gathered
- implied surfaces which need to be altered to contain excessive water quantities
- area of Marieholm needs radical means of intervention



Strategy - tackling pollution | 1:15 000

Legend:

- water
- strategic roads
- polluted areas
- new noise barriers around roads
- topographical noise barriers

Description:

Second strategy places its main focus on tackling air and noise pollution that are both connected to car traffic around the river valley. The most challenging ground again is Marieholm, where major interventions that involve working with topographical noise barriers will be implemented, as well as noise barriers around roads. The eastern part of the riverbank will be additionally shielded from noise and air pollution by filling in the gaps mostly along industrial complexes.

conclusions

- main river corridors exposed as a clean one
- more complex situation around Marieholm
- strategy works with topographic modification and pollution barriers around most heavily trafficed roads



Strategy - biodiversity enhancement | 1:15 000

Legend:

- water
- biodiversity hotspots
- green rooftops
- forest areas
- villa areas
- ecotones
- ecological corridor

Description:

The strategy around biodiversity places its main focus on creating a green ecological corridor along the riverbank. The new connection aims to create a new network between existing biodiversity hotspots and enhancing their relevance in the system. Rooftops of the industrial buildings are to be transformed into green roofs and become part of the system. Bare spaces that usually are adjacent to industrial buildings are to be transformed into ecotones that will further strengthen the new green corridor.

conclusions

- main goal is to introduce a green corridor along the riverbanks
- large industrial roofs are transformed into green ones - a new habitat for animals
- ecotones created along the green corridor to enhance biodiversity



Strategy - social connections | 1:15 000

Legend:

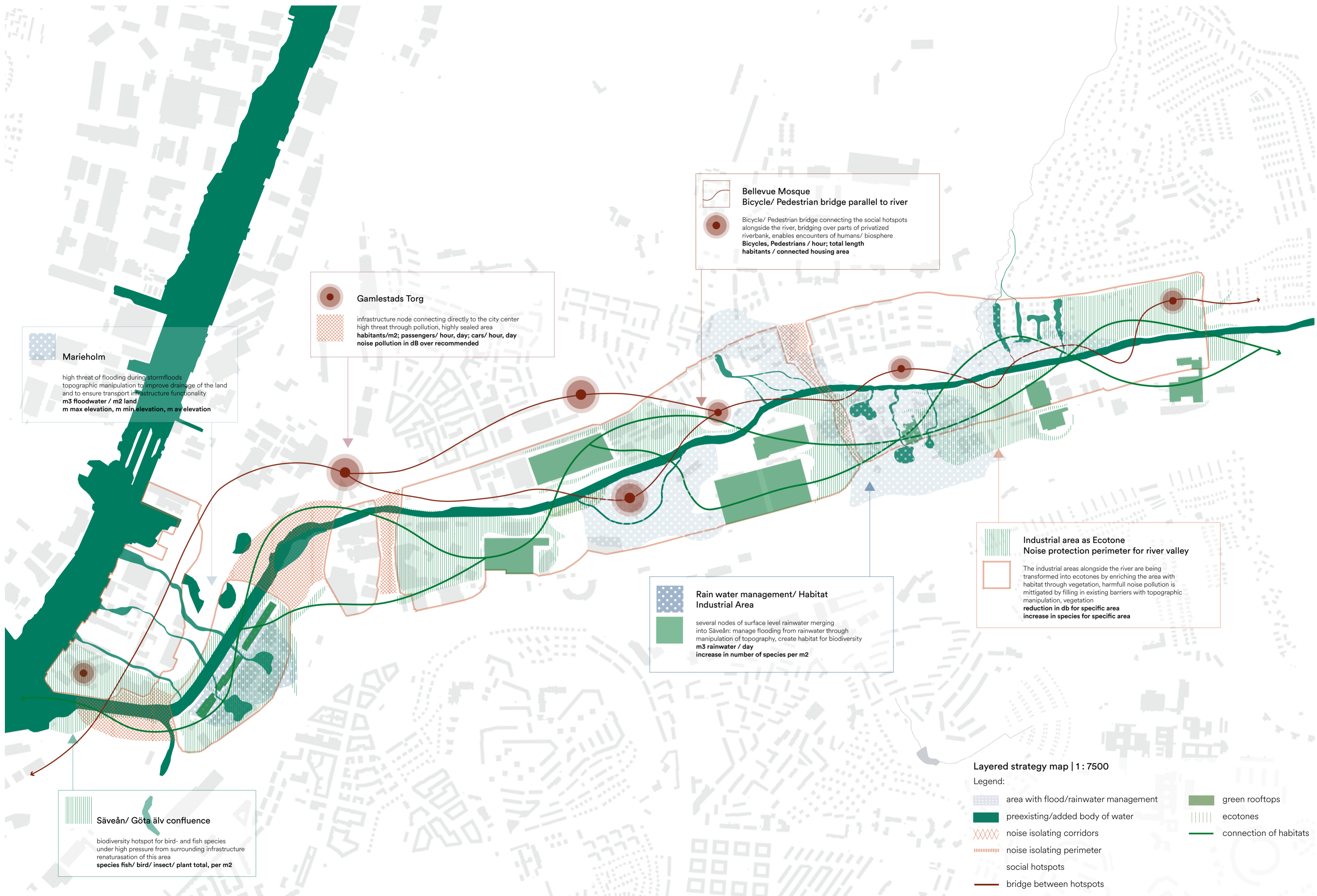
- water
- social focal points
- new social corridors
- privatized riverbank
- industrial belt
- housing clusters

Description:

The last strategy focuses on creating a social connectivity along the riverbank by establishing parallel and perpendicular relations across the river. It will tackle the inaccessibility that is caused by industrial areas that are often connected with privatized riverbanks. The new social network is to establish new social hotspots as well as enhance the existing ones by increasing their relevance in the system. Moreover, the strategy takes on the zoning of building functions that is present along the river valley and aims to reduce the established borders.

conclusions

- increasing the potential of existing social hotspots and introducing new ones
- tackle the inaccessibility of the river caused by the industry and privatized riverbanks
- creating pathway along the river and crossing between north and south



Marieholm

high threat of flooding during stormfloods
 topographic manipulation to improve drainage of the land
 and to ensure transport infrastructure functionality
 m³ floodwater / m² land
 m max elevation, m min elevation, m av elevation

Gamlestad's Torg

infrastructure node connecting directly to the city center
 high threat through pollution, highly sealed area
 inhabitants/m²; passengers/ hour, day; cars/ hour, day
 noise pollution in dB over recommended

Bellevue Mosque
 Bicycle/ Pedestrian bridge parallel to river

Bicycle/ Pedestrian bridge connecting the social hotspots
 alongside the river, bridging over parts of privatized
 riverbank, enables encounters of humans/ biosphere
 Bicycles, Pedestrians / hour; total length
 inhabitants / connected housing area

**Rain water management/ Habitat
 Industrial Area**

several nodes of surface level rainwater merging
 into Sävån: manage flooding from rainwater through
 manipulation of topography, create habitat for biodiversity
 m³ rainwater / day
 increase in number of species per m²

Industrial area as Ecotone
 Noise protection perimeter for river valley

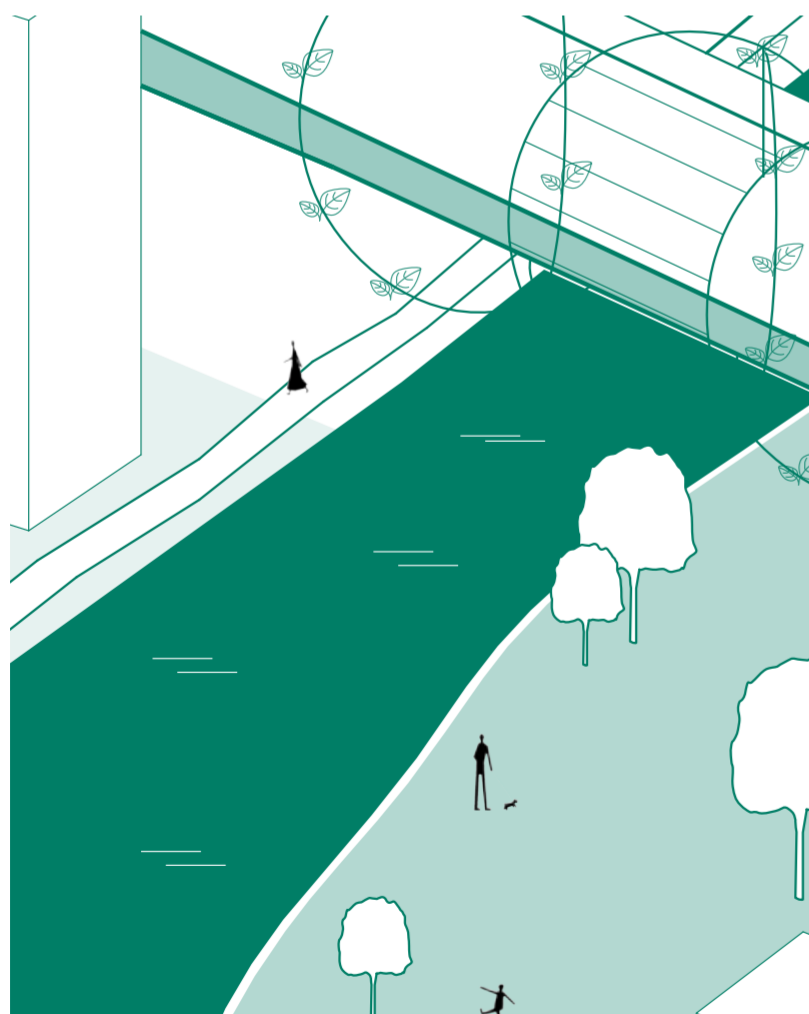
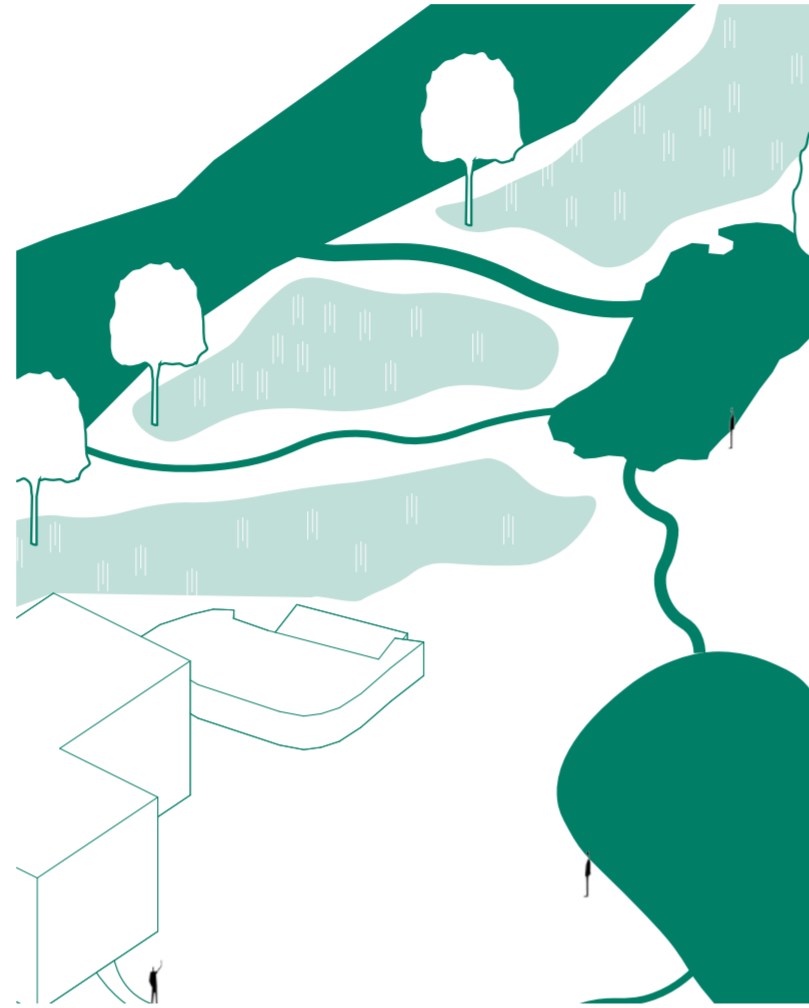
The industrial areas alongside the river are being
 transformed into ecotones by enriching the area with
 habitat through vegetation, harmful noise pollution is
 mitigated by filling in existing barriers with topographic
 manipulation, vegetation
 reduction in dB for specific area
 increase in species for specific area

Sävån/ Göta älv confluence

biodiversity hotspot for bird- and fish species
 under high pressure from surrounding infrastructure
 renaturisation of this area
 species fish/ bird/ insect/ plant total, per m²

Layered strategy map | 1 : 7500

- Legend:
- area with flood/rainwater management
 - green rooftops
 - preexisting/added body of water
 - ||||| ecotones
 - XXXXX noise isolating corridors
 - connection of habitats
 - - - noise isolating perimeter
 - social hotspots
 - bridge between hotspots



strategies

Strategies are divided into four different layers with various points of main interest. While developing them separately, careful attention was paid to creating a layer of blue-green corridor with a different aspect in mind for each one of them.

Flood risk management - the main focus is placed on redirecting the run off water into preferable corridors. In the area of Marieholm, where flooding is a burning issue, the strategy is enhanced by introducing multiple ponds and creaks.

Air and noise pollution mitigation - the river valley is in exposure both to air and noise pollution. By altering topography in certain spaces and introducing the greenery the aim is to construct a natural barrier which would shield the river valley from noise disturbance and harmful pollution coming from the industrial buildings. When it comes to infrastructure, the aim is to introduce shielding structures along certain corridors to mitigate their effects on the surroundings.

Biodiversity enhancement - There are multiple areas along the riverbank which already represent high values of biodiversity. Our aim is to provide more space for ecotones which are the richest elements when it comes to biodiversity and by that increase the role of nature in the area.

Building social connections - there is a clear lack of connection between the riverbanks, as well as along the river corridor. The goal is to introduce pathways in a natural shape, that would be included in a natural river landscape and serve as a connector for the local community.

When layered, the strategies give a clear idea of most challenging points that are placed along the river corridor. The idea is to introduce complex interventions which tackle multiple factors at once and by those means contribute in a valuable way to creating the character and value of the new green-blue corridor of Sävåån.

conclusions

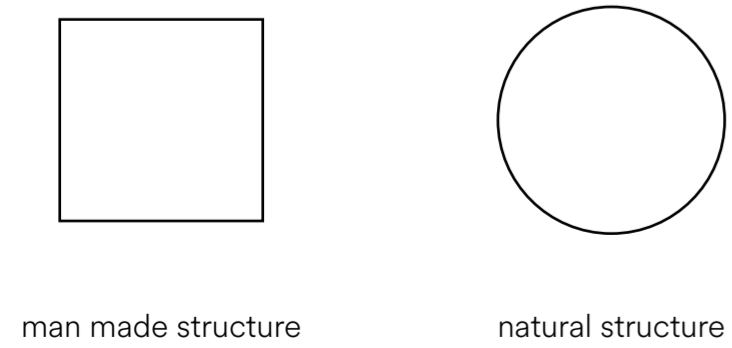
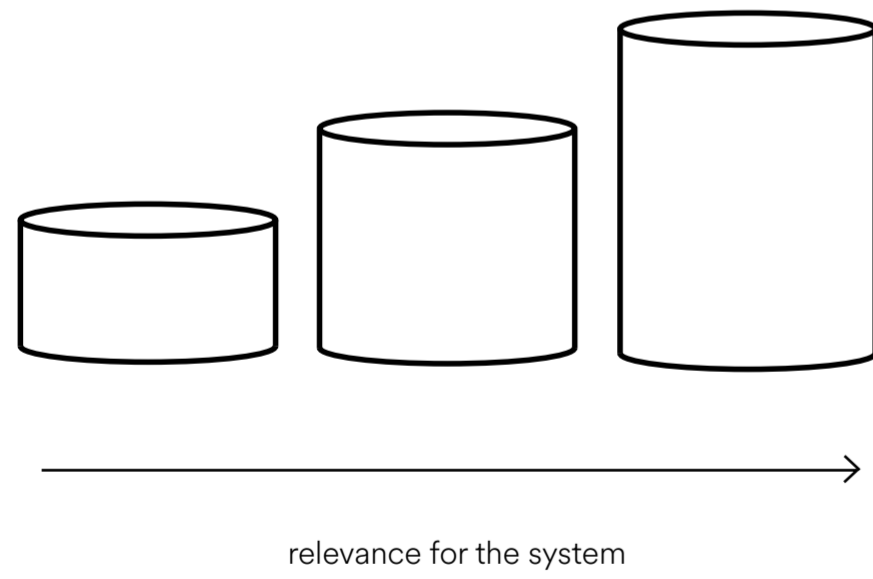
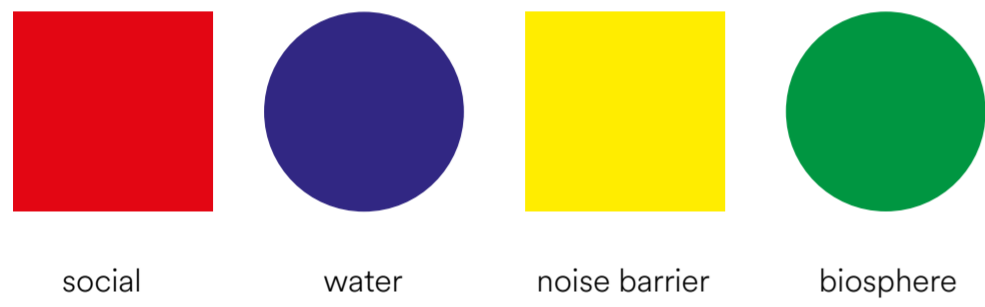
By developing these strategies, we came to an understanding of how complex the situation is and how careful we would need to be in creating our interventions in order not to omit any of the crucial factors. Each one of us chose to work with an area with slightly different characteristics. We wanted to propose different approaches and interpretations of the strategies mentioned above.

instructions on model reading

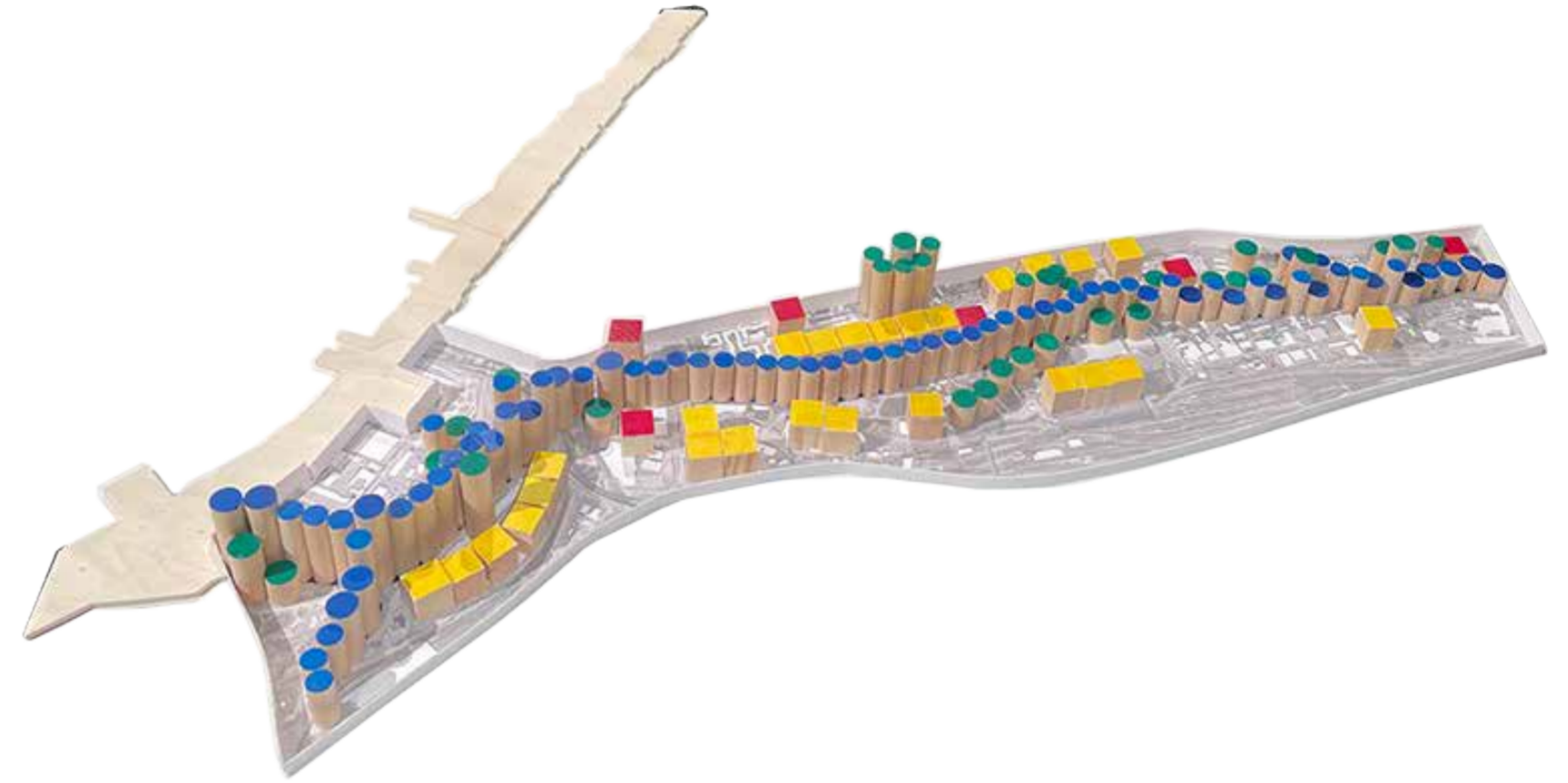
In order to be able to fully understand the factors that have to be taken into consideration when designing a green-blue river corridor the model making has been simplified. By using wooden blocks of different colors, shapes and sizes a landscape was created.

By translating the existing landscape and its elements into wooden blocks an existing situation was created. Adding blocks piece by piece allowed for a better spatial understanding of the situation and the need for interventions.

translation of elements:



existing situation - image



existing situation - model interpretation



existing situation - model interpretation

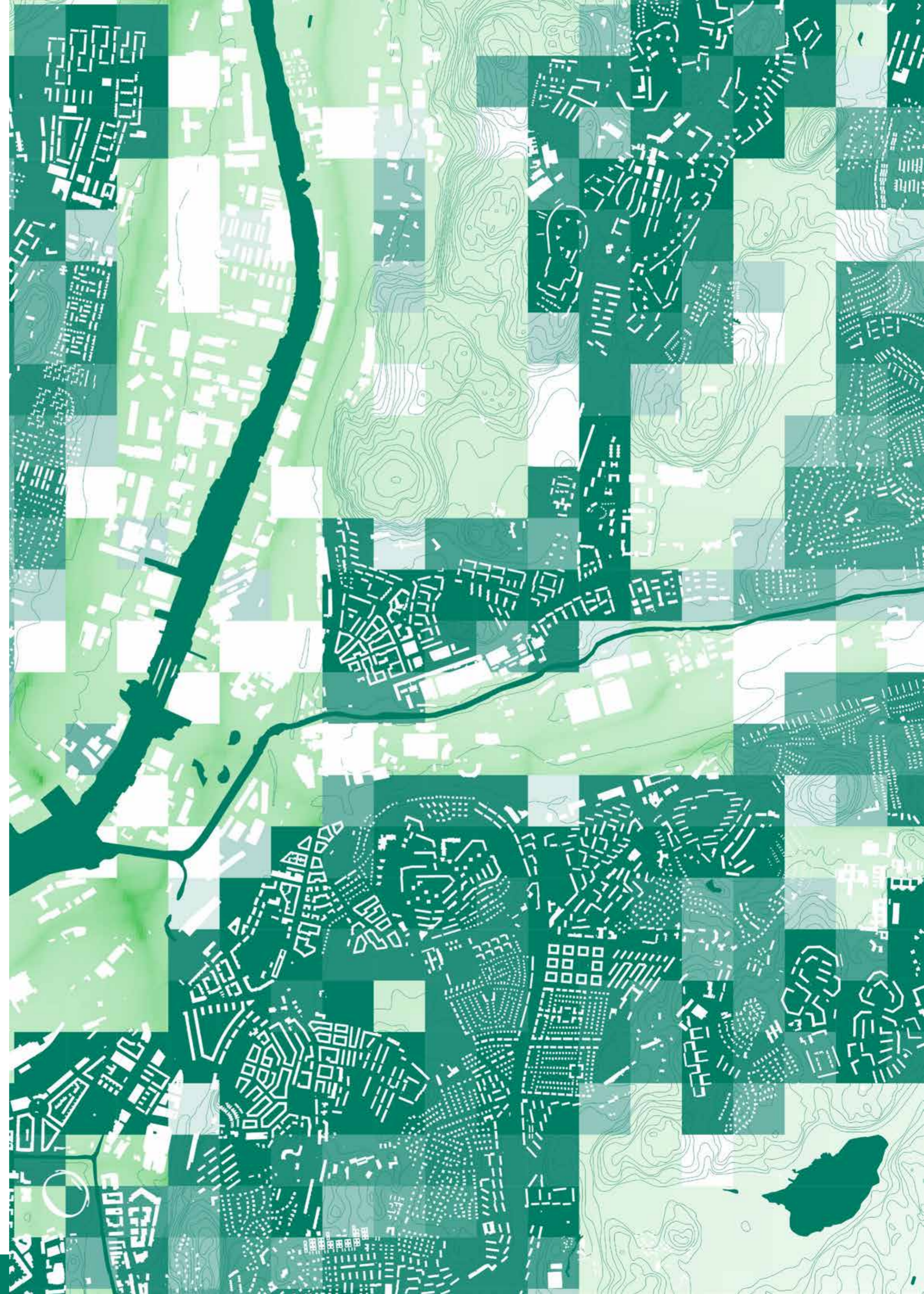


intervention - model interpretation



intervention - model interpretation

_04 case studies



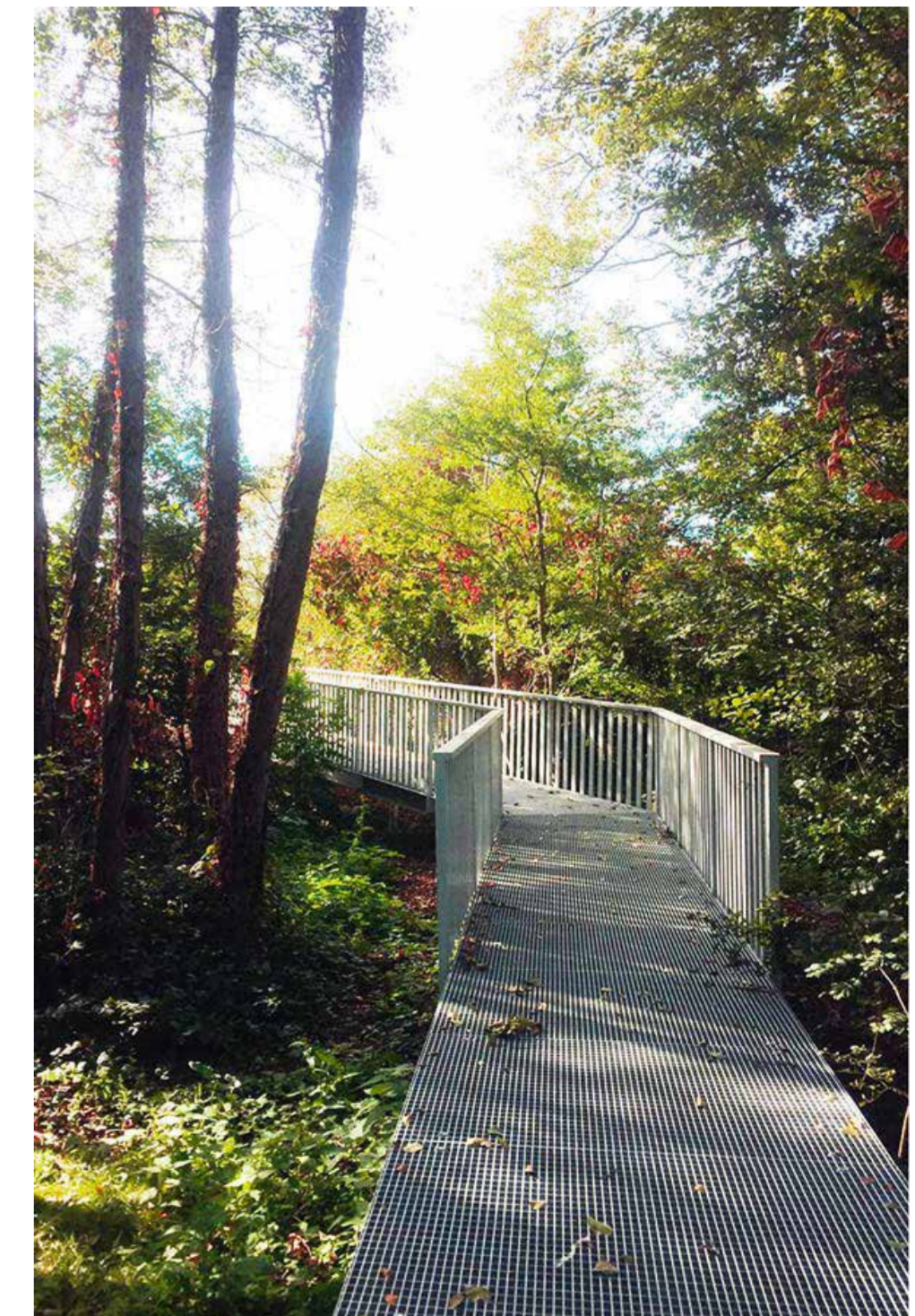
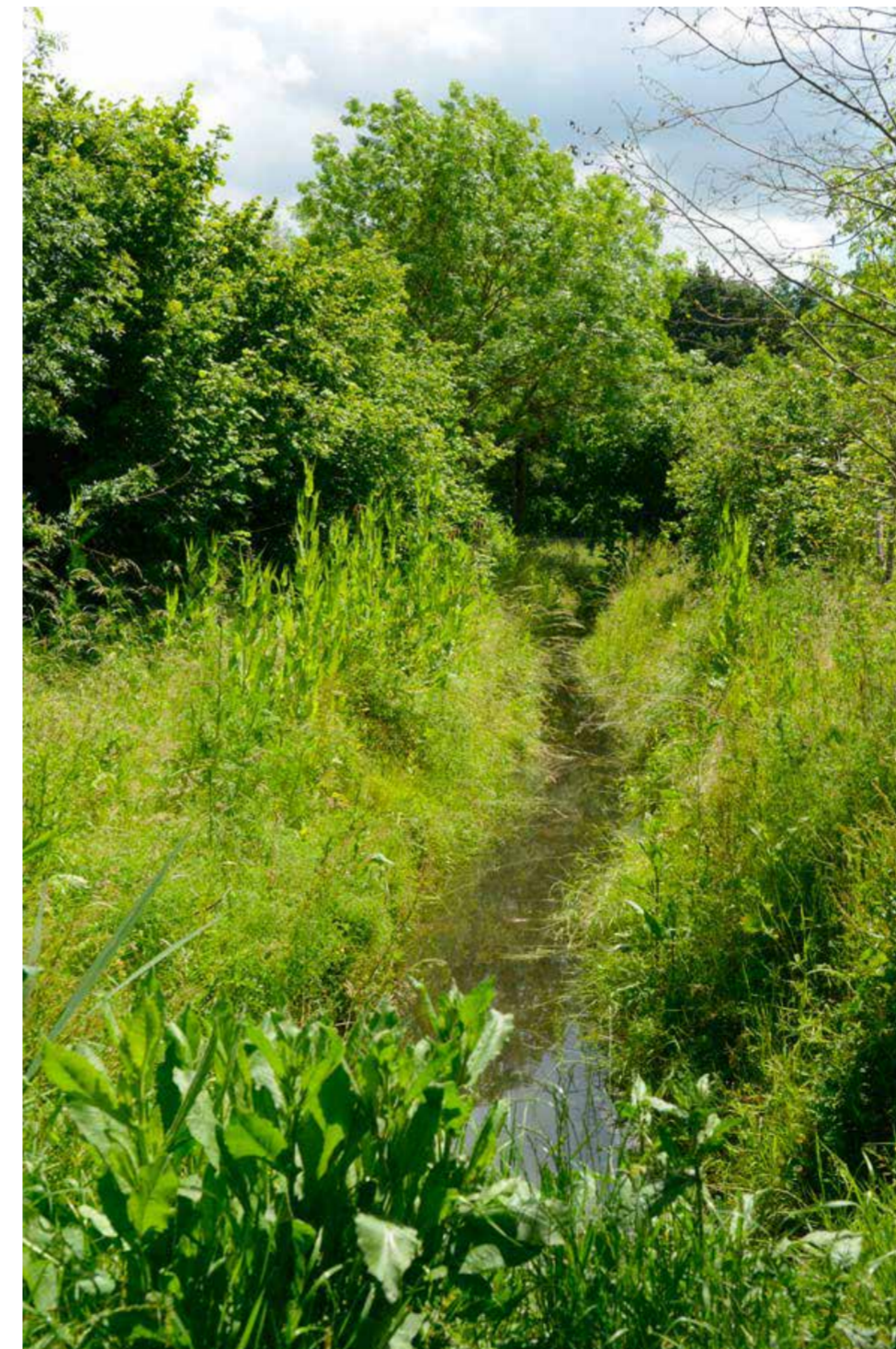
Saint-Martin Meadows – Rennes
by BASE Landscape Architecture

The landscape introduced in Rennes along the riverbank is a nod towards nature. By reintroducing meadows and floodable grounds the intervention gives back to the power of the river and lets nature take over.

All the interventions that are man made are extremely subtle. In the case of Sant-Martin Meadows nature takes the main place, while humas exist in the background and fully on the terms of the river.

The intervention works as a gradient - from dry to wet, from tamed nature to wild landscapes. The created space along the river is a diverse environment, which works on enhancing the existing structure and derives from it.

There is no defined border, neither is the site a sanctuary for nature. It aims to introduce a new outlook on nature in the city and how it can be maintained and drawn inspiration from. It's not discrediting the urban fabric neither, but more searching for a space of coexistence.



Girona's shores
by EMF Landscape Architecture

The core of the reinterpretation of the Girona's shores is a set of small scale interventions that took place due to the initiative of the locals. It's an example of a project that worked in a reverse way to a usual cycle. Small scale interventions came first and formed the spine of a network of strategies that exists today.

The main aim was to reclaim a neglected green-urban structure on the cities periferies and create new green infrastructure that could serve the locals. It's goal is to be an extension of the city in which nature is a strategic asset that is accessible to everyone.

The strenght of the system is that it is supposed to be reapplicable in different cases. Even though the design is site-specific it presents a tool kit with key values that can be modified to fit the needs of a particular river



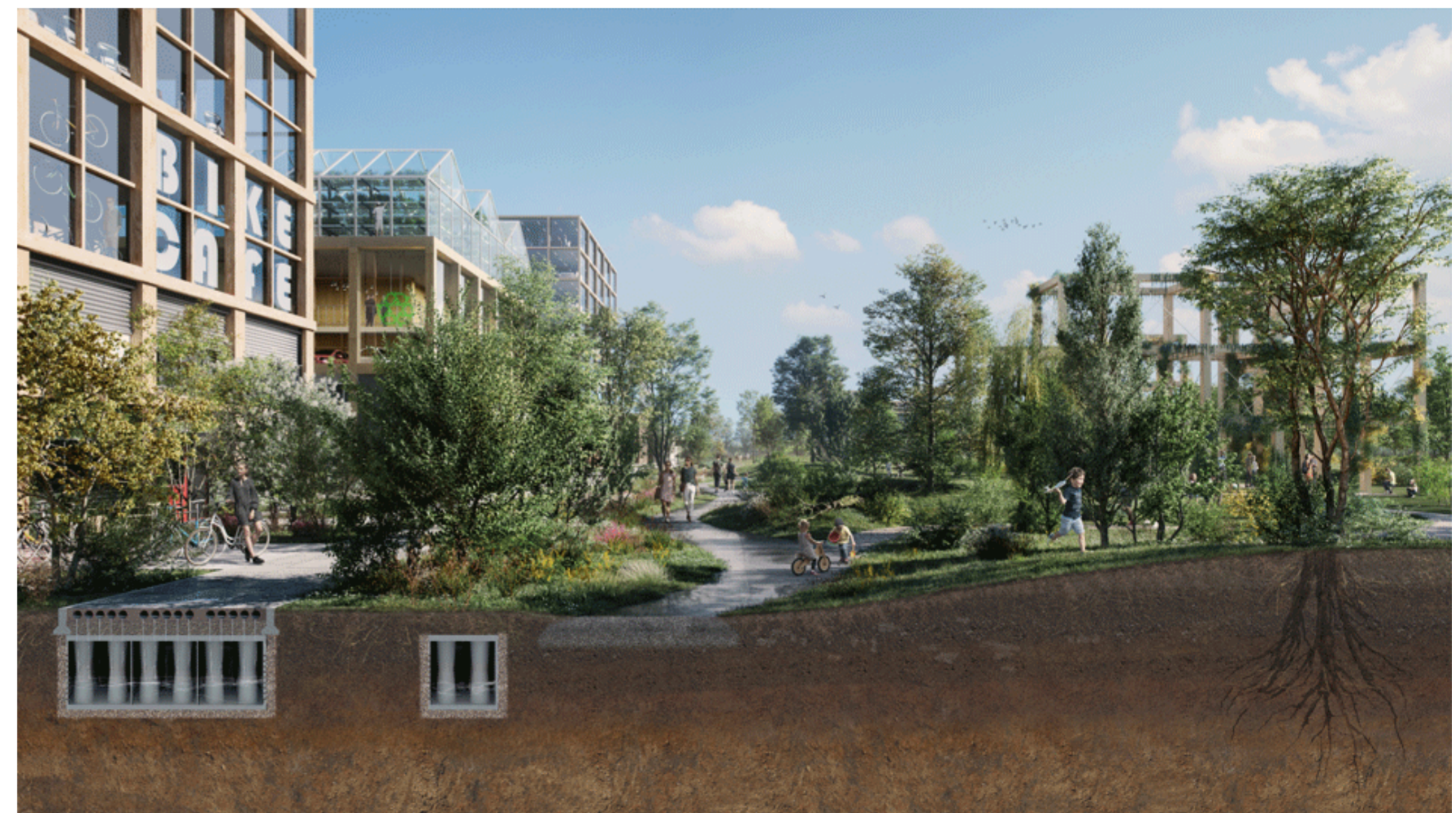
The Blue Ramparts in Holland by Tredje Natur

Tredje Natur's project aims to perceive the climate changes not only in a negative light but also as a new challenge to which, we as designers, have to provide solutions for.

The project area is a highly urbanized, dense area, where zoning of functions that range from industrial areas to housing, is very much present. The site is fragmented, lacks connectivity not only within itself but also towards outside factors. Hard surfaces are a key issue there, which causes a high flood risk.

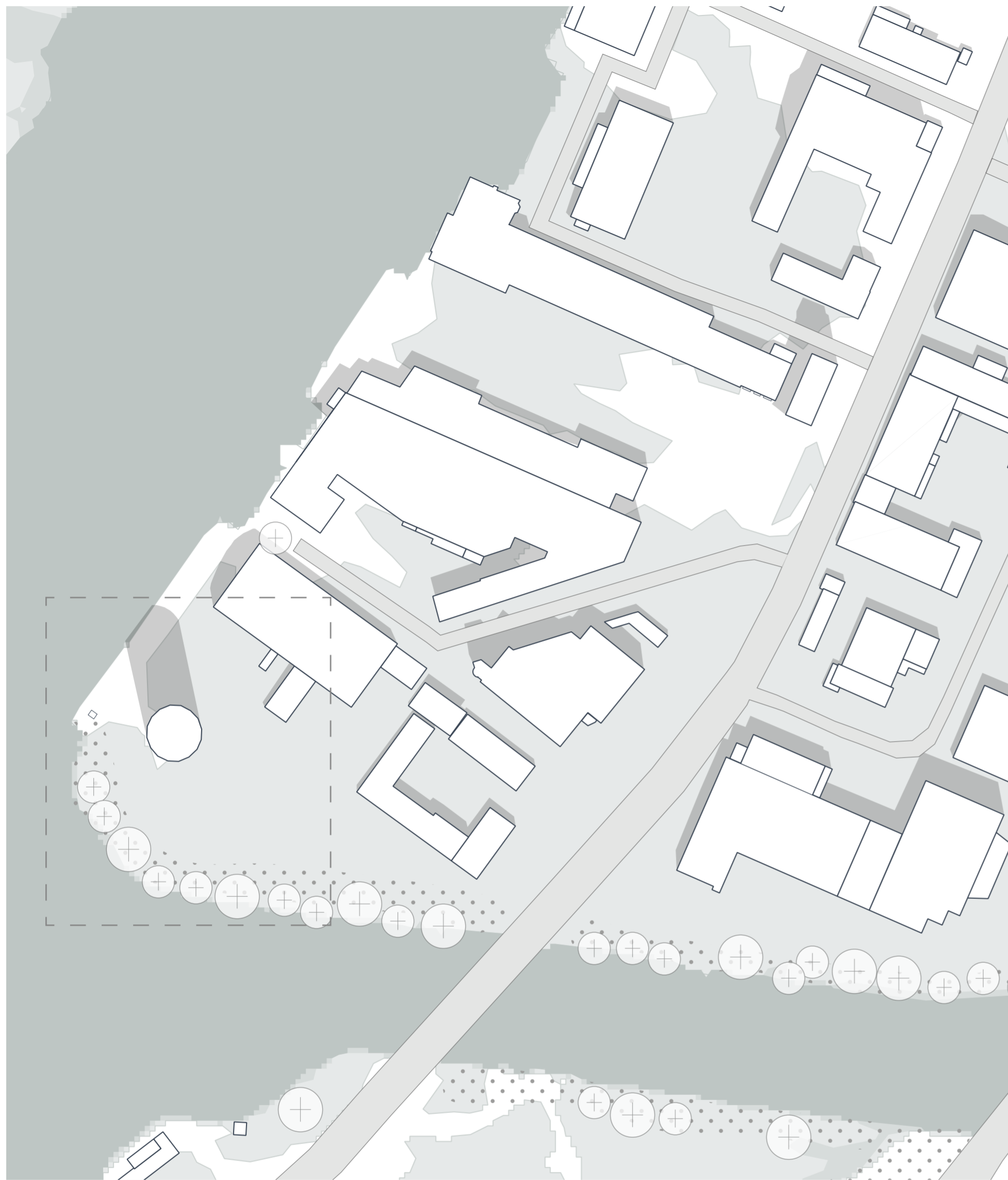
The river was solely used for industrial purposes. With their project, Tredje Natur aims to introduce a new water reservoir, with multiple creaks and ponds running alongside the main river corridor. They establish new connections as well and by introducing new bicycle and pedestrian pathways they rebuild the connective infrastructure on the site.

While introducing perforation in the hard surfaces on the site, the designers redirect water and use it as a resource for the enhancement of biodiversity.



_05 wetland of Marieholm
individual work

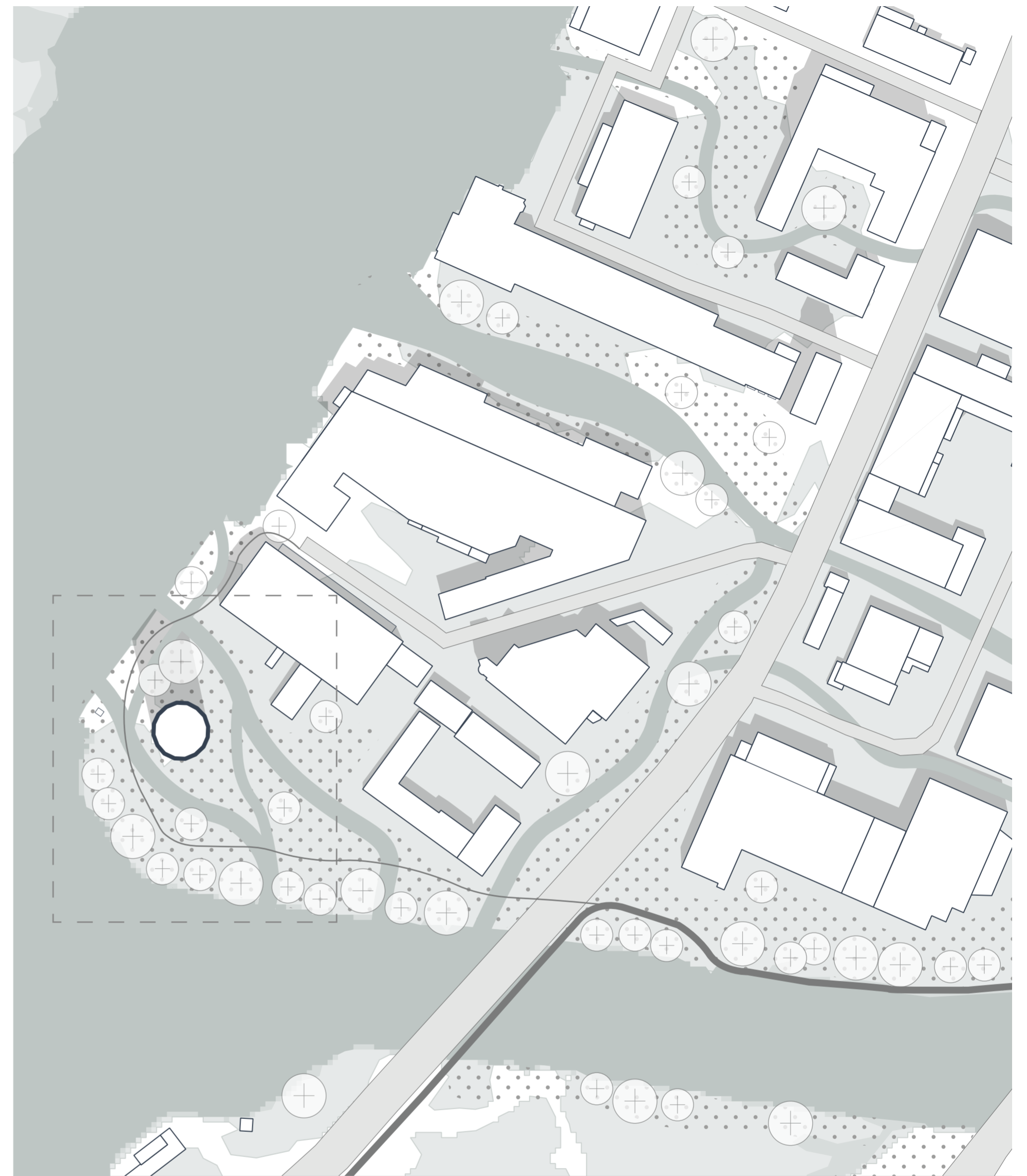




plan before intervention | 1 : 1500

The majority of Marieholm is under a flood risk if the water level rises over 2 meters. Most of the area is as well covered with concrete, unpermeable surfaces which increase the flood risk significantly. It's a solely industrial area so there is an evident lack of greenery, apart from the direct river bank. However, the area where Sävån merges with Göta Älv can be seen as a hotspot for biodiversity where various bird species can be located.

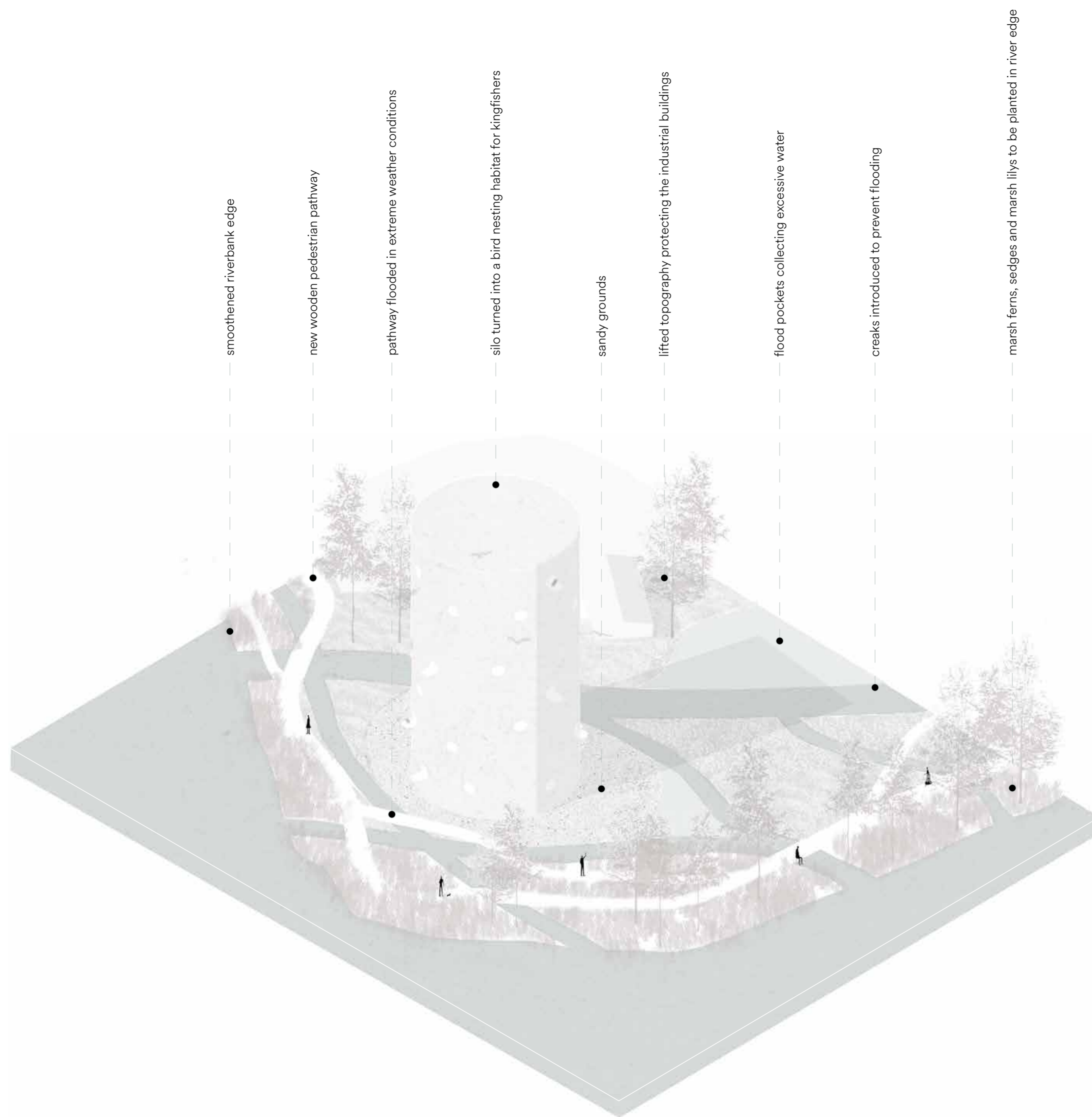
- water
- buildings
- roads
- 2 meters flood level
- + trees
- green/permeable surfaces
- area of detailed solution



plan after intervention | 1 : 1500

The strategy introduced is corresponding with an overall one for Marieholm. The logic of fragmentation and creaks running through the area is adjusted and adapted to the tip itself. By taking those measures the overall flood risk is mitigated and the tip of Marieholm can become a sanctuary for biodiversity. The spaces between the creaks will gradually become marshes and can turn into ecotones. Additionally, a new bike path, that is an extension of the one proposed in an overall strategy, is introduced. It enables connectivity between the river valley and the inner city for non-motorized users. The abandoned grain silo is transformed into a new habitat for birds present in the area - mostly kingfishers.

- water
- buildings
- roads
- 2 meters flood level
- + trees
- green/permeable surfaces
- added bike path
- area of detailed solution
- added pedestrian path



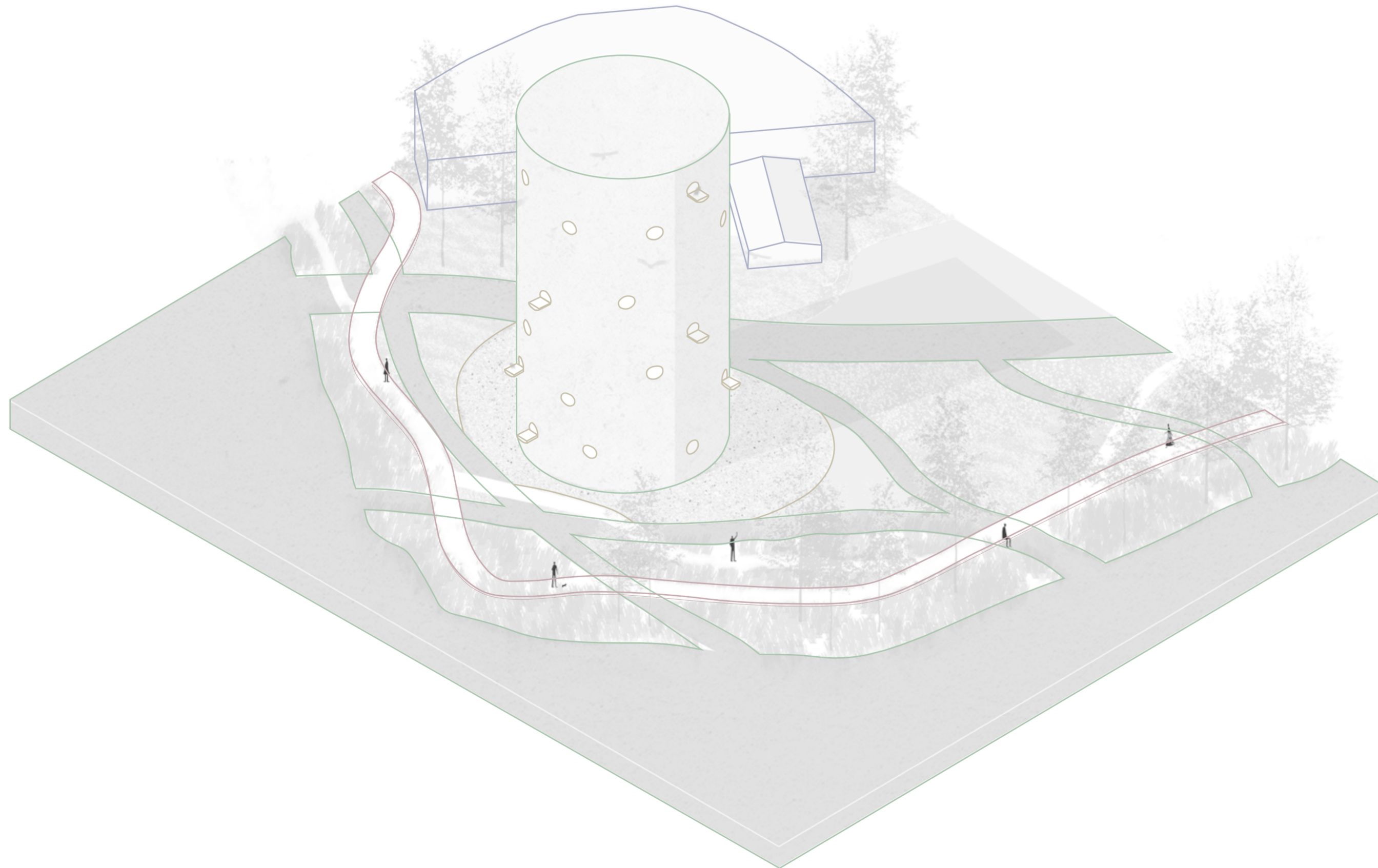
detailed axonometric drawing

In a detailed axonometric view the smoothened riverbank is exposed, along with the newly introduced streams and creaks that are an aid in occurring flooding scenarios. The former, abandoned grain silo is transformed into a new nesting habitat for the kingfishers, which thrive in harbour habitats during winter times. In order for the new habitat to be even more appealing for these species, additional greenery is introduced, including high ferns, as well as larger vegetation. Moreover, the ground is partially turned into a sandy environment, in which they flourish, making the new silo an all-season space for them. Finally, a new pathway is implemented for people, in order to provide the possibility for them to become silent viewers and admirers of the unique urban marshland.

drawing scale: 1:500 A2
1:250 A0

SWOT analysis of the proposal

In order to determine whether the proposal will be successful a SWOT analysis was conducted, highlighting its strengths, weaknesses, opportunities and threats.



strengths

The abandoned grain silo in itself is already a prominent landmark, placed right at the river mouth of Sävån. Transforming it and connecting it with biodiversity purposes might pave the path for upcoming industrial transformations. By introducing multiple new water passages and creating a set of islands the river valley shifts its attention towards neglected issues of flooding and rain water management.

weaknesses

Marieholm is a car oriented area and even though there is a bike and pedestrian path planned that shall improve the accessibility it might remain as a neglected and secondary space. The richness of biodiversity and closeness to nature, along with the lookout on the Göta Älv will aim to function as the only attractors for potential users.

opportunities

In the upcoming future, industrial areas will most likely run out of its current use. The industrial island of Marieholm with its prominent location might be transformed into an attractive area which will intrigue and invite even more users. The interventions that are proposed in this project will aid as a cornerstone for future redevelopment of the area.

threats

As the transformation of a former industrial silo is an experimental approach towards biodiversity and creating a new habitat, there is no way of predicting or controlling whether it will be a successful approach. All the factors that are supposed to enhance biodiversity and creation of a welcoming habitat for kingfishers are there in theory but only time can tell if the proposal will be rewarding.

