

# URBAN FLOODSCAPES

The multispecies perspective



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Masters thesis 2023

# Urban floodscapes

The multispecies perspective



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## Abstract

For decades, when developing the urban landscape, anthropocentric models for growth and urban compaction have been seen as ideal, in search for an optimal urban paradigm for sustainability. With the existing climate crisis, caused by human use of planetary resources, natural systems are left out of balance. Rising temperatures and extreme weather caused by heavy pollution and increase in greenhouse gasses have contributed to the loss of species and decrease in biodiversity. Among other consequences, flooding risk in urban areas is exacerbated.

The thesis emphasizes the importance of the climate crisis and the need for displaying how cities can be redesigned to work with flooding and nature. The purpose of this thesis is to work with and bring awareness about the climate crisis through architecture and design and explores how nature as a design tool can expose and bridge the lost connections between humans and nature in an urban setting. The aim of the thesis is to create a speculative design proposal of a wetland in Borås with the scenario of flooding as driving force. This helps to showcase how a city can develop its urban fabric in consideration of nature and biodiversity. Literature research, reference studies, sketch storming, AI- based explorations and site analysis work methodologically in a parallel and iterative process that includes both research for design and research by design. Through understanding natural systems of the site and combining them with theoretical principles, design objectives are formed. Speculative design is used as the main technique to represent and discuss the project. The main outcome are design interventions that allow for a connection between humans and nature, by re-establishing a wetland, re-meandering a river and promoting flooding scenarios.

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## Reading instructions

### CHAPTER 1 - *Introduction*

The first chapter sets the ground for the development of the thesis. Problem setting, thesis question, aim & purpose, delimitations and method are presented.

### CHAPTER 2 - *Theoretical framework*

The second chapter presents theories grouped around three questions: "Why to design with nature in focus?"; "How to design with nature in focus?" and "How to tell stories around nature through architecture?".

### CHAPTER 3 - *Context*

The third chapter investigates the context and place of the case study. Both the development plans of the city and the physical condition of the local area are presented. A section on wetlands as characteristic landscape of the area is also included.

### CHAPTER 4 - *Design*

The main contribution of this chapter are design interventions that are based on a speculative approach but also connected to specific objectives and related back to theories.

### CHAPTER 5 - *Reflection and discussion*

The last chapter summarises the thesis with a discussion and a reflection upon theory, context and the proposal addressing the thesis question.



## Student background

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*Thank you,*

*to supervisor Marco Adelfio for all  
the support, kindness and believing  
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Introduction

## Problem setting

The planet is changing unexpectedly and rapidly, and the climate crisis is standing in our doorway as a result of our devastating actions. Heavy pollution, increase in greenhouse gasses and human usage of planetary resources are driving forces for rising temperatures, unbalanced natural systems, and all this has outpaced all other rhythms of life (Tsing, 2017). The constant increase of consumption and demand for resources such as energy, land and water, has forced a new geological epoch. This new epoch, the Anthropocene started in the 1950, with the Great Acceleration in terms of anthropocentric activities on the planet (National Geographic, n.d.) and is explained as the intense unsustainable and destructive human industrial use of planet resources and the environment. Humans as a single species have had such impact to drive the planet into a new epoch through their own destructive lifestyles (Grooten & Almond, 2018). In fact, the Anthropocene is in favour of the human species and only considers the rights of humans (Kopnina & Washington, 2020). The Anthropocene “generally glorifies human domination over nature”. (Kopnina & Washington, 2020, p. 6). Within this epoch and change in the environment, cities are expected to grow and host more people by each year. The growth of cities brings both positive benefits for human development, such as innovation and productivity but can also bring negative aspects that affects the environment and the living beings of the city, such as overcrowding, pollution and inequalities (Sustainable Development Solutions Network, 2022).

When developing the urban landscape, models for growth and compaction are seen as ideal. Urban compaction is often promoted (Hofstad, 2012) as a policy pathway whose characteristics are made universal with an abstract character to be able to transfer the model from one country to another using measurable pre-defined compact city qualities. Urban compaction becomes an internationally recognized generic development paradigm that usually overlooks local context. Such a model is focused on growth and human domination. The compact city development has gained a firm grip over the goal of sustainable development and is seen as a way to reach this. This model is at the same time criticised for not reaching those goals and yet it is presented as a desirable template for future cities of sustainable nature (Adelfio, Hamiduddin & Miedema, 2021). The problem in using the compact city template is that there is no universal definition of what constitutes the model (Adelfio, Kain, Stenberg, et al, 2022).

Alongside urban compaction, our modern human dominated societies are generally built upon linear systems of consumption (Wautelet, 2018), economic growth, and unsustainable overuse of materials. While nature works in connected networks, ecosystems, in circular loops without waste or overuse. Humans are part of these connected networks and depend on the ecosystems and the services they provide. By continuing in linear networks (Chowdhury et al., 2020) humans are causing harm to the climate and the ecosystems, decreasing biodiversity, and essentially reducing our own possibility to thrive. When we reshape the landscape, we also forget what was there before. The new landscapes become the new reality in which we often privilege some bio-

logical entanglements over others and the biological extinction is now beyond its historical levels (Tsing, 2017), the highest amount since the beginning of life. The main drivers of biodiversity decline are overexploitation of species, agriculture, and land conversion (Grooten & Almond, 2018). The problem with loss in biodiversity is not only individual species but of assemblages, which some will not recover (Tsing, 2017).

When designing cities, they are always focused on human life and intent to satisfy human needs in a denser location. Within the city, other species are pushed away from their homes and are forced to move. This move is not always successful since it does not take into account “interspecies justice” (Healey and Pepper, 2021).

Still, environmental problems are tangible today more than ever, hence a shift of focus from humans towards nature is needed. With the existing climate crisis, extreme weather occurs more often now than before. In Sweden this is seen in increased precipitation, increased risk of flooding, more intensive heavy rainfalls, water shortage and drought and temperature zones are moving north. By winters getting warmer, they also become wetter and this is another factor that would increase the risk of flooding along rivers and lakes (Naturvårdsverket, n.d.-a). The most common type of flooding is the one occurring along rivers and lakes in Sweden, around 70 %, and is often caused by long-term rainfall or snow melting. When the snow melts in the spring, the highest waterflows and water levels develop, causing flooding. Flooding caused by downpour is also common during summer and fall and generates large locally geographical damage (MSB, 2012).

Today we are told two stories that are used to avoid accepting the need for a change in behaviour and the scientific proof behind this. The first story is that it is not possible to change the system and that everything is connected globally in a network of non infiltrated layers of protection. The second story is that there is no obvious vision of what a possible alternative may look like. These stories are not true, we are able to reinvent the way economies work, rethink agricultural and industrial practices and redesign human behaviour in this epoch (Hes & du Plessis, 2015).

The climate crisis will cause irreversible damage unless we act now. We have the opportunity to make a change and decide the path ahead. As stated by Tsing (2017) “Disasters can be seen as opportunities as well as oppressions, each one a call to rediscover the powerful engagement and joy of design of genuine generosity for humans and nature in collaboration.”.

To address these issues, this thesis calls for a shift towards a post-anthropocentric, nature-sensitive approach in architectural design. This is aligned with Ghosn and Jazairy’s (2018) design focus on “environmental imagination that renders sensible the issues of climate change and (...) invites readers to relate to the complexity of Earth systems”.



## Purpose & aim

The purpose of this master thesis is to work with and bring awareness about the climate crisis through architecture and design. The thesis explores how the art of designing with nature can bridge the lost connections between humans and non-humans in an urban setting and rethink the relationship between them to promote interspecies justice (Healey and Pepper, 2021). By doing so, it shows how architecture and drawing can produce alternatives to urban planning ideas and concepts of growing cities, where humans are in focus.

This is achieved by means of speculative design, departing from a real scenario, the climate crisis, and taking the area of Getängen in the city of Borås as case study. The aim is to explore how architecture can help restore biodiversity at a site that has lost its connections to nature and its systems. The thesis presents multiple ways, in design implementations, of how we can use the art of design to build liveable and desirable spaces in our future cities where both human and non-human entities can co-habit peacefully.

### Keywords:

*Anthropocene, environmental sustainability, nature, humans, non-humans, landscapes, climate crisis, urban planning concepts, art of design, flooding, critical, speculative, rural, circularity, relationships, utopianism, degrowth, wetlands, biodiversity, multispecies*

## Research question

*How can urban space be designed with nature as a tool to reconnect multispecies relationships, within the scenario of flooding in Borås, and provide reconciled space between them?*

## Expected outcome, focus & delimitations

The result of the thesis is both a design proposal with multiple interpretations that presents a gradient of speculative design approaches and a discussion and prompt to rethink the practice normatively used, to create nature-sensitive design. The design proposal shows a transformation of a case study in Borås where the natural systems of the landscape are out of balance and need to be restored. The expected outcome is to display a perspective where nature is in equal or more in focus than humans through supporting the natural systems such as flooding and re-meandering of the river.

This thesis focuses on nature and ecosystems in the urban fabric engaging with characteristics of landscapes found in Borås and it uses a site-specific investigation, to understand natural environments that are out of balance. The focus lies within understanding how humans can reconnect to nature and non-humans. The thesis focuses also on flooding as a consequence of the actions in the Anthropocene. It proposes a counteractive design contradicting the mainstream urban compaction models.

In particular, the thesis investigates the landscapes of wetlands and their characteristics through the skills of an architect rather than going in detail of this landscape. It does not go in depth with urban compaction models or concepts, rather they are used as a starting point for problem setting.

### This project is about:

*Climate crisis  
Local context  
Flooding  
Urban development  
Rural landscapes  
Non-human and human entities  
Wetlands  
Critical approach and discussion  
Human relationships with the environment  
Nature and species  
Degrowth perspective  
Posthumanism  
Multispecies  
Environmental justice  
Post anthropocentric  
Speculative design  
Storytelling*

### The project is not about:

*Economic growth  
Innovative technical solutions  
Dystopia  
Nature effects on mental health  
Overall extreme weathers  
The compact city  
Detailed design of landscape, rather the skills as an architect are used to explore the landscape of wetlands*

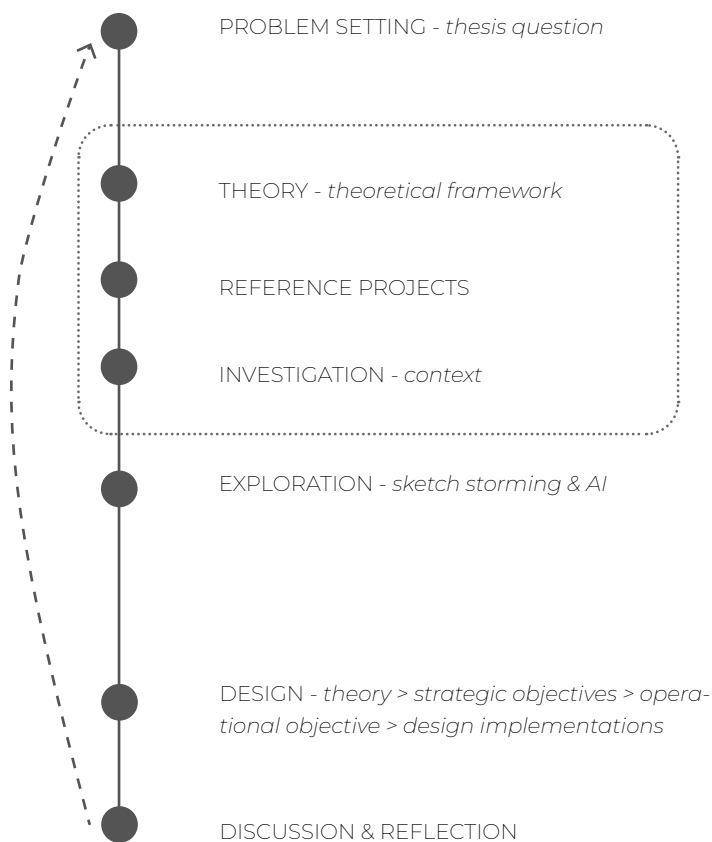
### The project touches upon:

*Urban development  
Urban concepts*



## Method & process

The project is driven by both an overarching approach, which involves research for design, which imply using theory to motivate the design, and research by design, learning by experimenting with design. The findings from the theoretical investigation, context and reference projects and the practice of speculative design are translated into strategic design objectives that work as a guide for design implementations. The thesis is concluded with a reflection and discussion upon methodology and the design in relation to theory, to answer the formulated thesis question.



### THEORY - theoretical framework

*Methods: Literature studies, reference projects*

Through literature research and reference projects, theory about regenerative design, speculative design, more-than-human design, biophilic design, infrastructural love, biomimicry and storytelling in architecture is framed and investigated to establish a ground for design objectives.

### INVESTIGATION - context

*Methods: wetland investigation, site analysis, mapping, flooding analysis*

To understand the context related landscape, wetlands, as well as the context of the site, grey literature, site visits, flooding maps, historical maps and current maps are used to understand the current physical condition and development of the site. The context analysis gave an understanding of what type of landscape is found in Borås and what futures and histories could look like at the site.

### EXPLORATION - sketch storming & AI

*Methods: Sketch storming, AI generator*

To trigger and explore ideas sketch storming and AI generated visualisations have been used. The sketches are a tool to understand and visualise design ideas but also a tool to present characteristics of non-human entities. The generated AI visualisations are used as a guideline to provoke design ideas of both interior and exterior spaces. The tool allows to receive inputs such as pictures or text and then generates visualisations.

### DESIGN - strategic objectives < operational objective < design implementations

*Methods: Digital models, speculative drawings, storytelling*

The design consists of three steps presented below:

1. The strategic objectives act as a summary of related theory and context in which the design can take place.
2. The main objective derives from the strategic objectives and serves to guide the design proposal.
3. Within the design proposal four different design implementations are presented. Each one show how the objectives work within the scale of speculation, which range from pragmatic to utopian.

### DISCUSSION & REFLECTION

To relate back to the thesis question and theory, the thesis concludes with a discussion and reflection upon the learnings from the process.

## Speculative design

Due to the central role of speculative design as a method, a specific section is devoted to it. To open a new way of thinking methodologically, critical perspectives are used to drive the imagination of possible futures and speculative design. Within this critical thinking, the question of whose future is being imagined and, particularly, the use of what-if questions has been at the heart of thoughts in the design process allowing for multiple interventions within a particular scenario to take place. The drawing as a tool for speculative design is used in the thesis to support critical arguments and telling stories.

Speculative design is used as a method that creates a “shift from protective to projective narrative, when the imagined or ‘what if’ changes what could be done at particular sites” (Erixon Aalto and Ernstson, 2017). The use of speculative design to reconstruct wetlands has been adopted by previous research, for instance the “Shifting Downtown” project, “to rebuild” an “existing town centre by adding dunes and wetlands to the extant street grid” and enhance “the primacy of natural systems together with effective concentrations of density” (Bryant et al., 2017).

In this work speculative design is applied following a gradient inspired by previous work by Yavuz Özgür and Tomturk (2017). According to them (see figure 01), “the domains of the futurist thinking vary” from more pragmatic to more utopian approaches or “modes of thinking” (Yavuz Özgür and Tumturk, 2017). In this thesis, different modes within the gradient are used, to allow for more possibilities of actions in design.

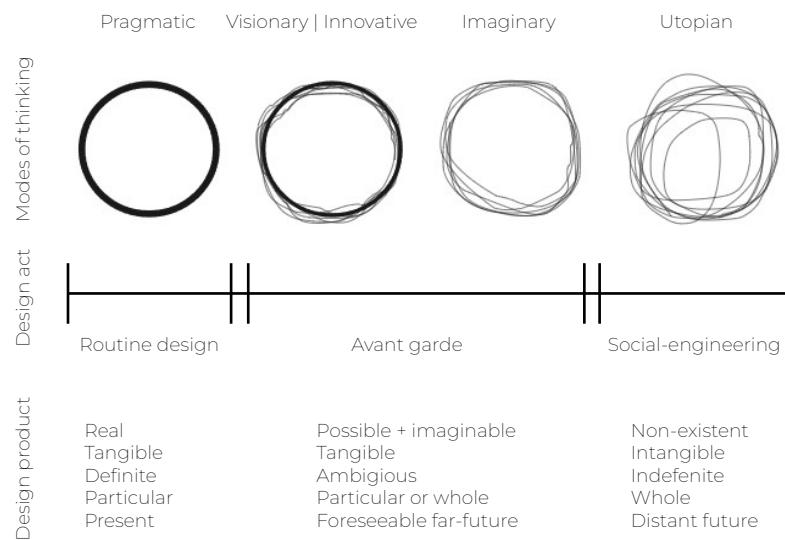


Figure: 01  
A tool for understanding a futuristic design thinking perspective (Yavuz Özgür and Tumturk, 2017).

## Positioning the thesis in the cone of futures

Futures can be related to eventualities and through visions, both good tools to understand the ambiguous possibility of futures and seeks to explore alternative futures. Futures associated with the possibilities and risks of the alternatives are referred to as possible and preferable futures. Possible futures explore what could happen and preferable futures explore what should happen. Within one future there can be a probable, possible and a preferable path (Wangel and Fauré, 2021). In the diagram below (see figure 02), the position of this work is set within the cone of futures.

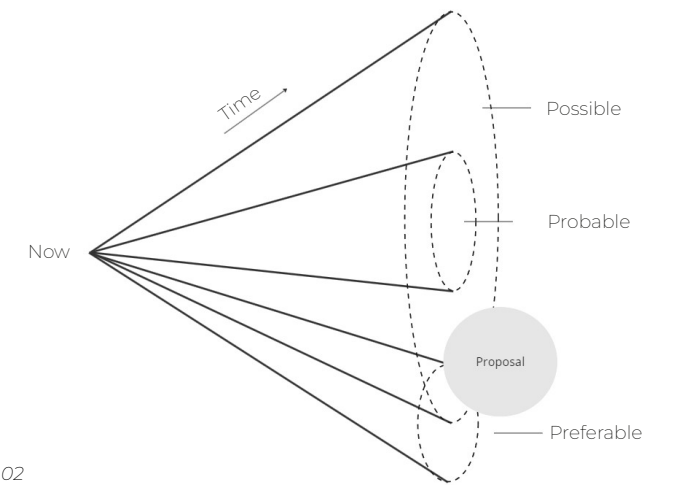


Figure: 02

Futures can also be divided into different scenarios related to eventualities that actively seek for uncertainties and possible discontinuities. Hence, “relating to the future visions means developing and exploring ideas of preferable – or desirable – futures.” (Wangel and Fauré, 2021, p. 37). The image below positions this work in the scenario diagram where four statements describe possible scenarios. The work is positioned at scenario B which imposes that flooding increases and environmental concerns are prioritized in society (see figure 03).

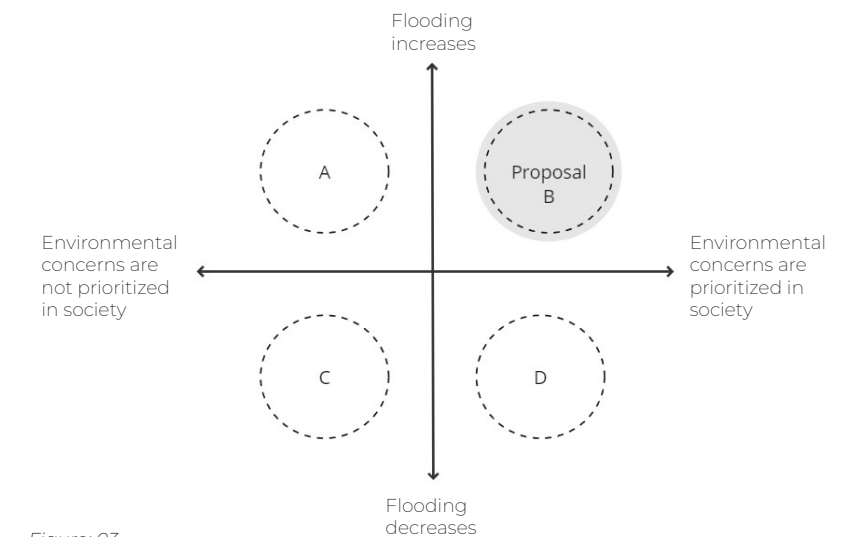


Figure: 03



## Theoretical framework

This chapter has the purpose of organizing the theory around three questions, all of which in turn set the ground for addressing, at the end of the thesis process, the main research question set in the beginning. The first question “Why to design with nature in focus?” serves as a justification for the nature-focused design approach of the work. The other two are more operational, in the sense that they pave the way for the development of the empirical part of the thesis by discussing “How to design with nature in focus?” and “How to tell stories around nature through architecture?”.



## Why to design with nature in focus?

As the Anthropocene has proven to be unsustainably focusing on the perspective of the human being, a post-anthropocentric approach (Harriss and House, 2022) that brings nature more into focus is needed. This approach is hereby developed and explained by a) rethinking and redesigning human relationships with a more than human design approach and b) desiring a collaboration between humans and nature through the concept of “infrastructural love” (Frichot et al., 2022).

### Rethink and redesign human relationships with the environment

Influenced by a hierarchical attitude human perspectives create the dominant point of view in current efforts to transition towards a more sustainable way of living (Romani, Casnati, & Iannello, 2022). Human-centered design is questioned concerning if the approach still is equipped to identify and address the complex and new challenges the planet faces within the anthropocene. There is a need to rethink the methodologies used today, in order to consider ecological and environmental challenges in a more complex scale (Wright, 2020). The impacts of human activity influence humans but also non-humans, whose interests and rights are rarely considered and overlooked (Romani, Casnati, & Iannello, 2022).

Within this, new visions are ascending through collective imagination approaches, influencing the transformational processes to become sustainable in non-anthropocentric perspectives. Such visions involve speculative scenarios of non-hierarchical interrelationships in which non-humans, such as natural elements or animals, are considered as living entities with their own rights (Romani, Casnati, & Iannello, 2022). This interrelationship is defined as the more-than-human approach and can extend human ability to impact humans and to also consider the impact on non-human actors. Wright states that we need to “redesign human agency and understandings of agency, to consider our intended and unintended involvement of non-human actors — animals, forests, weather events, waterways, and more.” (Wright, 2020).

Planet-centric design (Vignoli et al., 2021) is another approach to reconceptualize design thinking from a human-centered design to one that proposes the need for the planet to be in focus. This approach, with economic growth and innovation as drivers for change, intends to relocate the attention to the need for sustainability, circularity, and regenerative design. Still, the risk of this approach is that humans are left out of the process (Wright, 2020).

So how do we allow both humans and non-humans to be considered in design equally? The more-than-human design approach implies to include both human and non-human actors in the process of design. The concept of more-than-human design is “to stimulate actions toward social and behavioral change in the Anthropocene and rethink and redesign human relationships with the environment.” (Wright, 2020).

The more-than-human design approach intends to keep humans in focus but allows for other actors to be included, while planet-centric design is seen as to place non-human actors in focus instead. Humans will always be at the center of design and therefore a more-than-human design approach would be most profitable for our future. We need to change social concepts and human

behavior in order to address environmental problems and be able to design for a brighter future (Wright, 2020). Within the context of rethinking human relationships with the environment design concepts such as cradle-to-cradle design and biomimicry design emphasize the regenerative approach linked to multispecies futures (Romani, Casnati, & Iannello, 2022).

### Desiring a collaboration between humans and nature through infrastructural love

The concept of infrastructure is often associated with specific functions - e.g. transporting goods and people, extracting resources, or providing services -, and is often taken in consideration from a purely technical perspective, which means that their physically built structure is more important than their impact on the environment. A common characteristic of infrastructures is that, when constructed they follow the logic of development and progress and after they have been built, infrastructures need to be maintained, updated, and cared for (Frichot et al., 2022).

Infrastructures such as pipelines, railways, or structures for extraction of natural resources are seen as a colonial instrument (Curley, 2021) for delimitation of territories and transformation of ground into profitable land, and these infrastructures often lead to violent processes of exclusion. By contrast, a collaborative approach in which humans live in harmony with nature entails a reconsideration of infrastructures as something that connects human beings with nature, instead of a colonial imposition of the human domination over nature. Therefore, instead of following an impulse of colonization driven from a territorializing construct, through following “a decolonial gesture, infrastructure connects us to earth” (Frichot et al., 2022, p.13). In a decolonized direction we are able to peacefully cohabit with nature, and it becomes a safe space where we can be protected and care for our world. By decolonizing infrastructure, the question of “how the world is breaking down” shifts to “how the world gets put back together” (Frichot et al., 2022).

A practical example of how infrastructure connects humans with nature is when infrastructural systems have the possibility to serve as parks and green transportation (Frichot et al., 2022). On a more general level, architects can increase the relationship between humans and nature by designing infrastructures as “active forms” that enable liveability of multiple species. They become in this way non-living bodies (constructions) that connect living bodies (humans and nature for instance). Such “active forms” of infrastructures are “embedded with a capacity to transform existing conditions, positions, and relationships among bodies.” (Frichot et al., 2022, p.15) and they have the ability to unfold over time to shape space and relationships (Frichot et al., 2022). Spaces for discovering new active forms and multispecies liveability are found in the relationship between assemblages of the dead and the living (bodies). Within the relationship among these bodies histories and stories are embedded (Tsing, 2017).

As said before, having nature in focus does not imply an exclusion of humans but rather a collaborative approach in which humans work together with nature and other non-human entities. It is necessary to imagine different forms of living together. Through the concept of collaborative survival, Anna Tsing (2015) explores the idea of living together, humans and non-humans. While understanding the collaborative connections it is necessary to study “humans as a part of multi-species communities.” (Doucet, 2019) and with the concept

#### *Learnings:*

*- Rethink methods of environmental challenges*

*- Both humans and non-humans need to be in equal focus*

*- Rethink human relationships with the environment*

of “response-ability” we can respond with care and responsibility when creating worlds we can co-habit in as multi-species (Doucet, 2019).

Collaboration can be done by rethinking the concept of infrastructure as something that can connect humans with nature. This means going beyond the technical idea of infrastructure and giving the term another semantic and even a metaphoric meaning, which emerges through the idea of “infrastructural love” (Frichot et al., 2022). As noted by Frichot et al. (2022), “infrastructural love as an affective orientation encourages a radical engagement with the world, putting the architect in close proximity with that which requires support and exposing the architect to the risks of such encounters”. Conventionally, infrastructures have been considered as systems that support basic services to humanity and allow the society to support its shape and structure. This support function goes beyond the technical meaning and takes a symbolic value and architectural spaces are part of supporting infrastructures but also themselves become infrastructures (Frichot et al., 2022).

Infrastructure can become an approach to create good relationships between environments and technologies, natures and cultures and humans and non-humans when given the needed love and care (Frichot et al., 2022). In this way, infrastructures can be conceived as support systems for such relationships and are vulnerable and dependent on their human and natural hosts and would not exist without them. Support is a concept that should be involved, embedded, embodied, and entangled when thinking about how to work with nature. Architecture supports infrastructures and those in turn support the relationship with nature (Frichot et al., 2022). This idea is related to the notion of care, which implies that multiple species co-exist and survive in a collaborative manner. As noted by Doucet (2019), working as architects with nature reshapes the idea of infrastructures beyond the technocratic functions and sees “the world through connections rather than divisions (between facts and values, science and arts, nature and culture, human and non-human beings), and calls for studying humans as part of multi-species communities” (Doucet, 2019).

Good relations can be achieved between environments and technologies, natures and cultures and humans and non-humans where infrastructure benefit from a caring architecture (Frichot et al. 2022). When infrastructures are natural, so-called healthy ecosystems, they provide many benefits to society and infrastructures can work in an innovative hybrid where a combination of natural and build features are connected (Sutton-Grier et al., 2015).

Much of the human history developed long before cities and buildings even existed in harmony with nature and “the evolutionary traits that allow our species to thrive are still present and influence our well-being.” (Hes & du Plessis, 2015, p.46). To be able to work with more care in architecture it is necessary to reduce the distance between the architect and the environmental problems, beginning with considering humans as one of the multiple species that exist in nature. By rethinking how architecture is connected with infrastructure, new possibilities of inclusive design can be made, both rethinking the actual built structure but also the non-physical aspects of what infrastructure can give, such as the relationship between nature and humans.

#### *Learnings:*

*- Collaborative approaches connects humans to nature*

*- Decolonizing infrastructure connects humans to nature*

*- “Active forms” of infrastructures allow spaces and relationships to develop*

*- Humans are part of multispecies communities*

*- Infrastructures go beyond technical aspects*

*- Infrastructures support collaborative relationships*

## Nature centred design approaches –how to design with nature

In order to focus on nature when designing, architects should embrace the values of an ecological worldview based on the understanding of (1)“wholeness anchored in the idea of an interconnected, interdependent and integrated world”( Hes & du Plessis, 2015), (2) the idea of connection and importance of relationships and (3) the fact that the world is constantly changing and is impermanent and unpredictable. This worldview shifts the use of values from assigning value to a basis of valuing. The values presented below, from Du Plessis' book Designing for Hope (2015), “provide a solid and coherent base from which to develop a normative framework for action.” (Hes & du Plessis, 2015, p.36) in nature-centred design:

- Integrity
  - Inclusivity
  - Harmony
  - Respect
  - Mutuality
  - Positive reciprocity
  - Fellowship
  - Responsibility
  - Humility
  - Non-attachment
- (Hes & du Plessis, 2015)

When actions are taken, some things need to be taken in consideration, such as the values of the ecological worldview together with a holistic process of considering all interests and impacts on multiple levels and the collaboration between them including nature. For most effective action, the laws of nature, collaboration with nature and learning from nature should be driving forces. The result of actions should benefit nourishment, well-being, and regeneration of the world and within creating an alternative future, principles of carefulness, adaptation and non-attachment should be the leading cause (Hes & du Plessis, 2015). In literature, there is a wide range of design approaches that focus on collaborating and co-existing with nature. Here, three of them are selected as examples: biophilic design, biomimicry and regenerative design.

The first example, within this theoretical section of the thesis, of a design approach which explains how to collaborate with nature when designing is biophilic design, that suggests to re-connect humans to nature and other non-humans (Hes & du Plessis, 2015). Biophilia “is an emotional response to life and other living organisms rooted in the co-evolution of humans and their environments” (Hes & du Plessis, 2015, p.45). Biophilia is more than just the greenery of a city, it is the connection and renewal relationship that is experienced when we are allowed to connect to nature and the history of that connection (Hes & du Plessis, 2015).

Biophilic design is expected to make humans more caring and guarding of nature since it fosters “an appreciation of nature, which, in turn, leads to greater connection to and protection of natural areas.” (Hes & du Plessis, 2015, p.47). The biophilic features go beyond what humans normally can see or access, like parks, plants, or daylight, they are more subtle like the shadow drop of a roof or wall with patterns inspired by nature, and they can result in humans being

#### *Learnings:*

*- Actions derive from laws, collaboration and learning of nature*

*- Biophilic design connects humans to nature*

*- Biophilic design make humans more caring of nature*

*- Appreciate complexity of ecosystems*

comfortable and allow for a more subconscious connection to nature. It is then possible to satisfy the need for connecting humans to nature by means of the design of the built environment (Hes & du Plessis, 2015). When using nature in the built environment it is necessary to consider and appreciate the complexity and the layers of information of the ecosystems included in design. Biophilic design can be described in six dimensions that are interconnected with each other: environmental features, natural shapes and forms, natural patterns, and processes, light and space, place-based relationships, and evolved human-nature relationships (Hes & du Plessis, 2015).

Another design approach that relates humans with nature is biomimicry (Hargroves and Smith, 2006), that aims to let us learn about and from nature and shows how we can collaborate with nature (Hes & du Plessis, 2015). Nature becomes a “model, measure and mentor” (Hargroves and Smith, 2006) to inspire solutions in design. The laws of natural systems are described by Benyus (2002) and by, following them, we “manufacture, farm and develop the way animals, plants and ecosystems to” (Hes & du Plessis, 2015, p.74). The nature laws behind biomimicry by Benyus (2002):

- “Nature runs on sunlight
- Nature uses only the energy it needs
- Nature fits form to function
- Nature recycles everything
- Nature rewards cooperation
- Nature banks on diversity
- Nature demands local expertise
- Nature curbs excesses from within
- Nature taps the power of limits” (Hes & du Plessis, 2015, p.74).

We have long lived with the assumption that what humans create for humans is also good for the environment, but this is wrong. Instead, there is a need for a change that requires us to learn what is best for the environment and understand its limits (Hes & du Plessis, 2015). By understanding that nature has developed in a way that it has streamlined its systems and processes it can show us how we can confront human problems of waste, resource efficiency and management problems (Hargroves and Smith, 2006). A third example of nature-focused design approaches is regenerative design, that highlights the need to create design solutions that will increase the potential and regenerative capacity of the application site (Hes & du Plessis, 2015).

Regenerative design “draws explicitly on the ecological worldview, providing an example of how a consciously held worldview can shape new practices and transform the way we engage with the built environment.” (Hes & du Plessis, 2015, p.112). This approach is based on four main principles, (1) humans are seen as part of nature and hereby have the important role to participate as nature and develop the living systems they inhabit, (2) the importance of developing a new way of thinking and to think of the built environment as “energy systems”, webs of interconnected dynamic processes” (Hes & du Plessis, 2015, p.112), (3) the role of the designer needs to change to a conscious mind of the gardener, whom is responsible for the health of the garden and its constant need to evolve and adapt and (4) allowing systems to work in a higher level and caring for the value of the whole system that can achieve higher goals (Hes & du Plessis, 2015).

#### *Learnings:*

- *Biomimicry uses nature as a model, measure and mentor*
- *Understand limits of nature*
- *The built environment is seen as webs of complex processes*
- *The designer needs to be more caring*
- *Within regenerative design, humans are seen as part of nature*

## How we tell stories - to engage with nature

According to Ghosn & Jazairy (2018, p.13) “stories are a means for understanding the world, for nurturing new habitats of seeing, and, ultimately, for projecting alternative forms of organizing life.” Instead, in the sustainability era, the two stories we have been told about urban sustainability are that first (1), we cannot change the system and second (2), there is no clear vision of the future (Hes & du Plessis, 2015). Both are problematic because they undermine our way of thinking about possibilities and limit the actual perspective of sustainable futures. This dominant discourse remains in a state of fear-based narratives that revolve around an instrumental and reductionist worldview. Within such a perspective, the role of science is to control nature for the benefit of humans, which leads to modernization and development but also increases the rights and freedoms of the individual (human individual) (Hes & du Plessis, 2015). By focusing on the human individual, the assembly or the individual of non-human kind is put aside and left untouched for it to be sorted out by itself. The non-human individual rights are not seen in this type of story and development.

The believed sustainable stories we tell are utopian and dystopian stories, and they are written from a yang perspective – masculinist and controlling (Doucet, 2022). According to Leguin (2015) today we seem to only write about dystopias, where yin is completely dominated by yang. The same author questions what a yintopia would look like and argues “If utopias rely on control (yang) then yin would instead inform acceptance of impermanence and imperfection, a patience with uncertainty and the makeshift, a friendship with water, darkness and the earth.” (Leguin, 2015). Following Leguin’s position, utopias should perhaps be written from a yin perspective - yintopia (Doucet, 2022). A yintopia would then be caring, soft, friendly and have space for differences or imperfections, allowing nature to be itself.

Another author that focuses on the concept of utopia is Peter Cook, and his interpretation of it relates to the idea of storytelling. His interpretation of utopianisms is incited with a conscious choice of avoiding obviousness, full-frontality or the direct answer to encourage the audience to use their own interpretations and this relies on the fact that the author keeps a critical distance (Guneri, 2020). This interpretation of utopianism allows for stories to be told, from different authors, and make it possible to include as authors both humans and nature. Utopianism can resemble reality as a way of thinking differently (Guneri, 2020).

When a distinction between what a yintopia and a yangtopia can tell stories in terms of future utopias or dystopias, these become tools to critically see different potentialities of the future. Doucet (2022, p.39) argues that “different stories allow for different sensitivities” and points to the capacity of the yin and yang perspectives of utopias to become critical potentialities for different futures. A sense of care, concern and responsibility can be activated through stories and at the same time stories can create hope, but they can of course also mislead if they do not consider the conditions, stories and histories of a particular context (Doucet, 2022). To not forget or overlook histories of a place, it is important to watch the present and wander through our landscapes, where we can find assemblages of dead together with the living, where past and present are found in interconnections (Tsing, 2017). As said by Doucet (2022, p.40) “situated perspectives resist making generalizing observations about a situation that do

#### *Learnings:*

- *Utopias should be written from a yin perspective*
- *Different stories allow for different sensitivities*
- *Stories can create hope and trigger awareness*
- *Stories of multispecies expose injustices and problems*
- *Stories of multispecies expose the potentials or possibilities of other futures*
- *Storytelling overcome techno-fixing approaches*



honour the specific circumstances of that situation". When stories of multiple species, both human and non-human species are told, they represent a way to expose the context-related problems and injustices but also the potential or possibility to imagine other possible futures (Doucet, 2022).

In general, environmental questions are seen as complex, large, and extending over long periods of time, which makes it difficult to engage and invest in them. Technical solutions tend to be the routine and human-centred, but they are not necessarily based on what nature needs (Frichot et al., 2022). Storytelling as a tool is believed to overcome any techno-fixing approaches to environmental problems, and through storytelling the complexity of environmental problems can be highlighted and becomes more accessible to a larger public and will eventually trigger awareness (Doucet, 2022). The context-related "attention to diverse environmental imaginaries" (Doucet, 2022, p.37) can offer collective dreaming, aspiration, collaboration, and negotiation with respect for local nature, community, and places.

### Storytelling: how it can be used as an approach by architects working with nature

For engaging with environmental care, storytelling and the role of a narrative are important (Doucet, 2022). Stories allow for experience – "of telling and retelling, of the dolorousness and delight when you feel your thought and imagination affected, put into emotion, connected to things and places you were indifferent to before." (Ghosn and Jazairy, 2018, p.20). Through this emotional experience revealed through stories, they can support the connection between humans, non-humans, and nature. A shift in the relationship between humans and the planet requires a change in how the world is viewed (Ghosn and Jazairy, 2018).

To achieve such a shift, it is important that those who are concerned about the environmental damage and climate change, such as designers and architects, make Earth a priority and make it visible through design (Ghosn and Jazairy, 2018). The role of the architect is to tell and sell stories where futures are imagined, and this visionary storytelling is an important instrument in the practice of architecture. Stories told from architects "can embrace continuity and also induce radical change." (Doucet, 2022, p.40). The stories architects tell imagine other connections and offer possibilities and new interpretations and are often rooted in scenarios of growth and progress. Architects have proven to be able to imagine other possible futures in ways that are radical and pragmatic, yet they are often mistaken to be seen as utopian, naïve or unrealistic (Doucet, 2019).

Storytelling in architecture has the capacity to be a space of conjunction between critique and speculation, when understood as a tool for exploring future scenarios and critical exposure (Doucet, 2022). The crises the world faces today make futurist speculation easily inclined towards dystopian rather than utopian futures, as pointed out earlier. When telling stories, there is a great challenge in getting the right ratio between speculation and the disbelief in the future. When storytelling is seen as a tool for critically exposing and exploring future scenarios, this tool can open a path and space between critique and speculation, which can be described as poetic pragmatics (Doucet, 2022). This

#### Learnings:

- Stories support relationships between humans and non-humans
- Stories offer other connections and possibilities
- Storytelling offers a space for critique and speculation

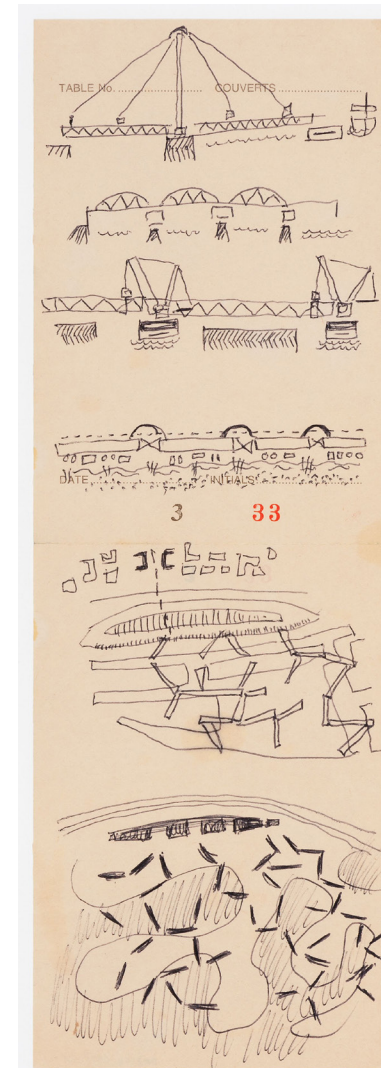


Figure 04. (Canadian Centre for Architecture, No date)

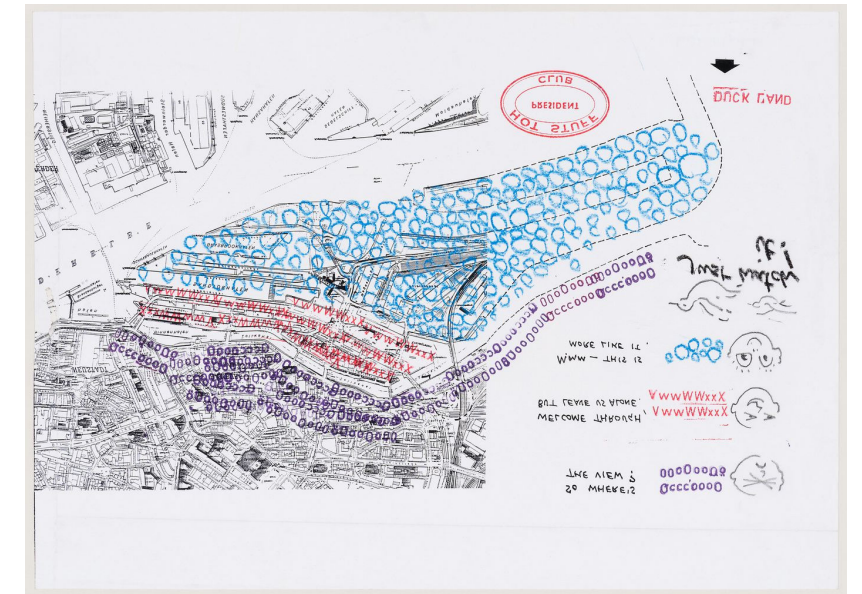


Figure 05. (Canadian Centre for Architecture, No date)

can be used when working with nature. For example, the project Duck land (also called Ducklands) by Price architects, a participant in a competition for urban development between 1989 and 1991 (Canadian Centre for Architecture, n.d.), used such approach of poetic pragmatics when they opened a space for critique and speculation with their proposal for the dock in Hamburg. The project challenges the idea of development and breaks "the process of creative destruction" (Doucet, 2019) of the environment, usually promoted by the anthropocentric type of development.

Ducklands suggests an interspecies relationship where, instead of land for ships and trade, a land for ducks and birds is proposed with a visitors' centre with close connection to the history of Hamburg. The space allows birds, people and the river to co-habit together and the non-human and human relationships are described through zones of privacy (see figure 05). Walkways are designed to follow and be adjustable to the plants and resting and breeding birds and to only be connected at one end, leaving the other at a dead end. Through symbols showing how private the birds want to live, the human does not have direct access but is allowed to make the conscious choice of passing through the area keeping respect and sensitivity to nature or go around the area. The drawings (see figure 04) show that the non-human perspective is the priority by indicating that the birds inhabit the space while humans are the visitors (Doucet, 2019). Instead of offering the city a lucrative deal by the dockland, the proposal hoped to bring awareness to the lost connection between people and water and wanted to reconnect humans to their river and nature (Doucet, 2022).

The proposal of the Ducklands brings forward the collaboration between humans and non-humans, being at the same time ecological and commercial, incorporating urban and tourism functions. Following the concept of "anticipatory architecture" (Price, 1995 cited by Hardingham, 2016), it was accepted how this project may have not turned out to be the best solution and would

therefore be prone to have reactions. One of the aims of the proposal was to slow down hasty development decisions and show new opportunities for collaborative futures between humans and non-humans where a mutual response-ability is made with care and concern (Doucet, 2019). By revisiting projects such as Ducklands we are able to consider alternative scenarios to the current neoliberal human-centred norm and question the logic of growth (Doucet, 2019). This approach can be used to make stories more yinly and positive, so that they “can thrive on the collective voices of humans and non-humans (...) they can “brew” rather than “author” and (...) they might nurture collective rather than individual worldmaking” (Doucet, 2022, p.42).

When used in critical design, one characteristic of storytelling is a certain degree of messiness (Doucet, 2022), which can be intended in a positive sense, as it shows an opportunity that “allows architecture to remain situated in the “real world”” (Doucet, 2022, p.45) and makes us mindful, caring, and responsible. One example of this are Van der Ryn’s designs (Van der Ryn and Cowen, 2007), that aim to show the messiness in physical structures that are otherwise kept invisible, such as sewage plants, garbage dumps, slaughterhouses, and electrical stations. He also argues that making nature visible is a way through which humans can reacquaint with nature and its species and at the same time it tells us about the ecological consequences of our actions. It is a type of design that incorporates nature, and it can trigger awareness, through projects that for example are preserving wetlands, incorporating drainage ponds and teaching “about the potentially symbiotic relationship between culture, nature and design” (Van der Ryn and Cowen, 2007). These types of design projects and approaches invite architects to think differently about future stories and open a path for exploring how design can do justice to complex, messy everyday practices when dealing with the environment and nature (Doucet, 2022).

By contrast, when the unsustainable use of natural and human resources is kept at a distance in design, we risk becoming unable to see environmental and human suffering. But through making projects that show the various ethical, aesthetic, and technical choices made by the designer, a trigger in the possibility to see a shared responsibility arises and those affected by the design can also inhabit these choices (Frichot et al., 2022).

It is necessary to work with imaginaries that explore different goals, values, and actions to understand who benefits from new imaginaries and to be attentive to hidden mechanisms of preference, bias and power in stories. Stories have the power to become tools that push to action and at the same time they risk being seen as blueprints and the opportunity for other possible stories to be visible is reduced. When using storytelling to work with nature, the importance of thought-experiments is valued and is used to allow for speculation around what could happen in the imagined scenario (Doucet, 2022). By establishing multi-species connections and collaborations and showing the interdependence between humans and nature, “stories can help us to believe in the possibility of such ethics of interdependence and provide the confidence needed to resist those pressures on the profession that prevent such ethics of interdependence from becoming a reality.” (Doucet, 2022, p.47).

#### Learnings:

- *Messiness in design makes us mindful, caring and responsible*
- *Making nature visible allows humans to reconnect to nature*
- *Shared responsibility arises when the designer show the ethical, aesthetic and technical choices made in the design*

## Geostories as practical reference connected to storytelling in architecture

Developed by the company Design Earth, the design of Geostories considers environmental externalities as matter of design importance (Ghosn and Jazairy, 2018). Geostories also show the political and ethical implications of our ecological actions, and “all while speculating on survival and adaptation strategies that invite us to make sense of the earth and envision it in ways that generate inquisitive, delightful and potentially subversive responses.” (Ghosn and Jazairy, 2018, p.15). The importance of Geostories as a reference in this work is twofold: on the one hand, their stories are sensible to the current state of things in the world and on the other they offer an example on how to speculate about the future.

Geostories show a narrative that is sensible to the conditions that are surrounding us. The purpose of such stories is not to call on the reader to do lifestyle changes, but rather to invite the reader to imagine threats and possibilities together and offer them support to begin to care and respond (Ghosn and Jazairy, 2018) (see figure 06). With sensitivity these stories bring an awareness to the table.

Geostories draw on science fiction and show the relation between technological solutions and the planet. Speculative fiction can help us understand new worldly conditions and “reflect on reality without realism, without optimization, without determinism, and without fear of the cosmic scale.” (Ghosn and Jazairy, 2018, p.21). Fiction allows for other ways of seeing reality, describing what is happening, what humans do and how humans relate to everything else and showing what may be hidden. The method of speculative design uses the “what-if” questions to open for new possibilities to be imagined of the future and how we are able to live on this damaged planet. The SF (“science fiction, speculative fabulation, string figures, speculative feminism, science fact” (Ghosn and Jazairy, 2018, p.21)) of Donna Haraway cultivates what current technologies, theories and habits cannot solve.

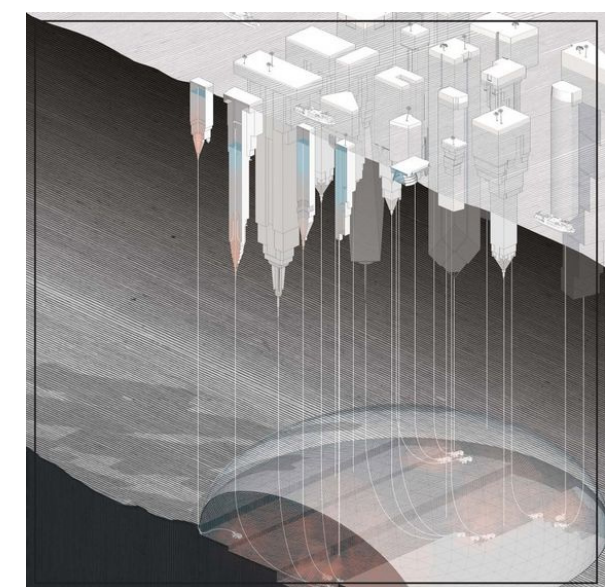


Figure 06. (Ghosn and Jazairy, 2018)



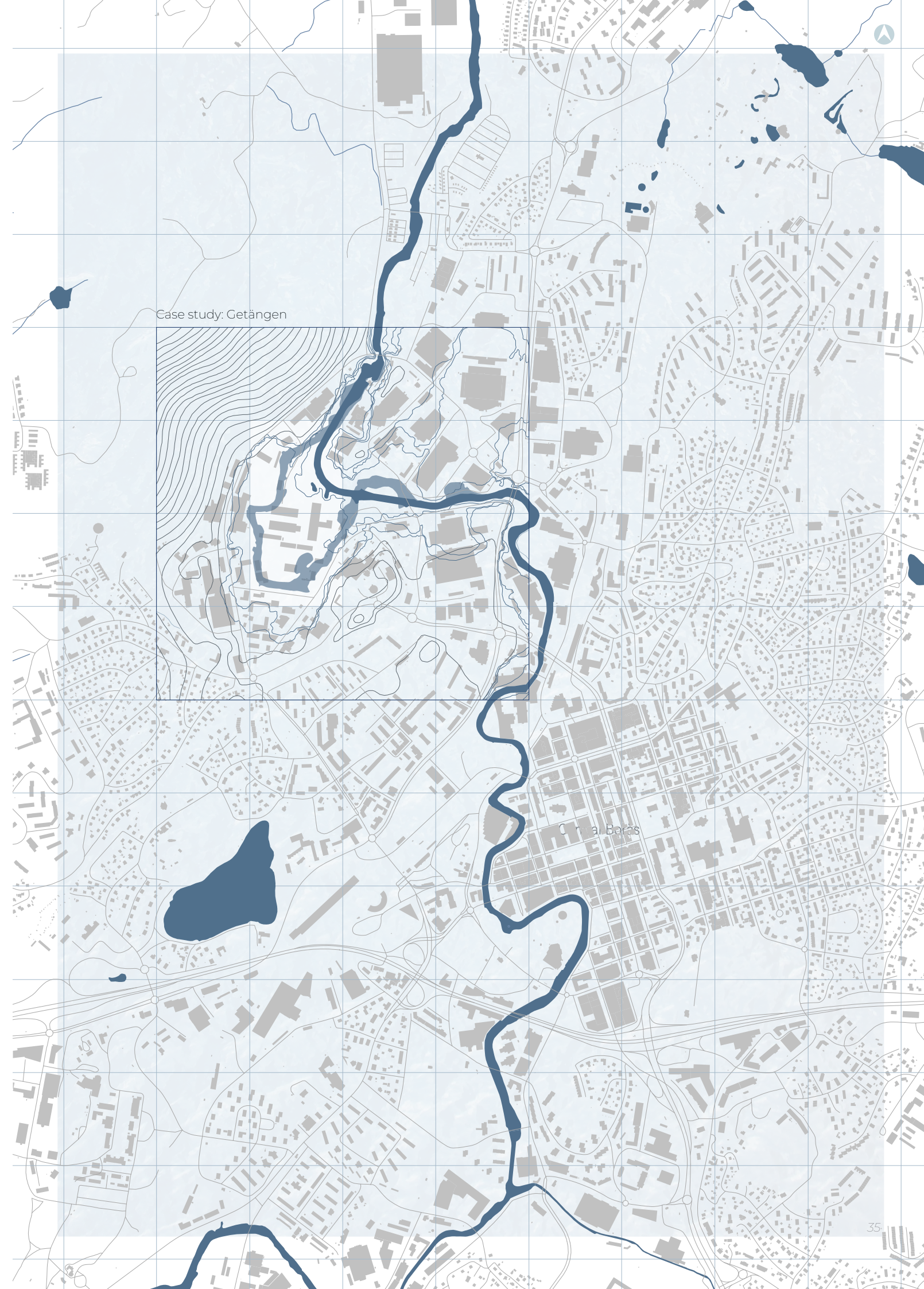


Context



## Borås

Borås is a city located in Västra Götaland and holds a population of around 1134 000 people, according to the municipality webpage (Borås stad, n.d.-b). It is located 50 minutes from Gothenburg. The city is surrounded by forests, rocky hills, and soft ground. In between the hills the city has developed and grown since 1621, when it was founded. Borås is well known for the history of producing textile and have since the XIX century produced cotton dyed textiles in spinning mills, dyehouses and factories for textile. To be able to manage the production of dye and textile the river Viskan was heavily used as a source of energy, but also as a place for waste. The river got over time more and more contaminated with toxins from the dye used to colour fabrics. The river is still contaminated, and the toxins threaten to knock out species from ecosystems in Borås and other places connected to the river. However, the river is still a valuable asset for the city and the municipality plans to develop a park connecting the river to the city even more. More information on the development plans is found in a specific section.





## Case study: Getängen

The area is composed of industrial land and hosts different activities and operations. A power plant is located in the east of the area, placed on a higher ground in mid-1960s. It requires a safety boundary which makes the area inaccessible and a physical barrier of a fence limits the space for human movement. Closer to the middle of Getängen municipal urban service trucks are stored. In this area it is possible to find all types of big machines and trucks parked here, waiting to be used for digging ground or to plough snow. The city government is planning to expand the area with buildings closer to the river. This area is also inaccessible because of fences. In the west of the site, the old spinning mill still stands. The mill is one of the first industries established in Getängen.

The area is a mix of activities, such as concrete production, gym, high school, colour store, scrap car facility, and more. The city of Borås has initial plans for developing the area to hold housing and services as a part of its densification strategy. The current functions are supposed to be moved to the outer parts of the city to activate and create an attractive area for the citizens. The nature reserve Rya åsar is an area of high natural and recreation value and limits the development of the area. The reserve is an asset of value for citizens, natural systems, and biodiversity.



1. Parkinglot



2. Industrial operations



3. Concrete production



4. Getängsvägen



5. Path between two barriers



6. Viskan



Scale 1:7000

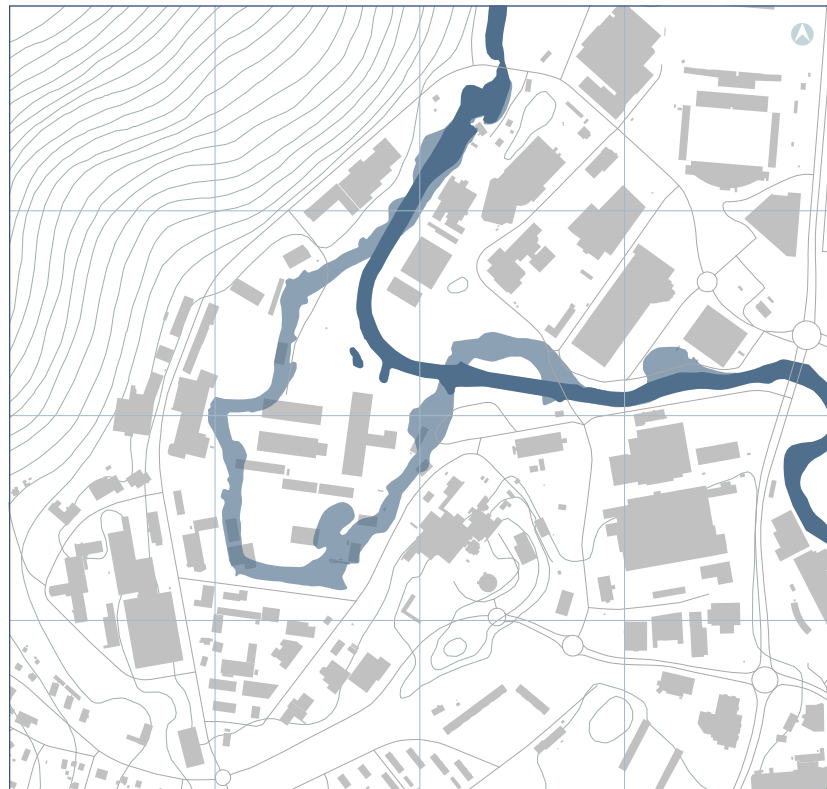
- A - Spinning mill
- B - Ryaverket kraftvärmeverk
- C - Service office Borås stad
- D - Getängen 23
- E - Stuart kile
- F - Viskan
- G - Rya åsar nature reserve
- Barrier

## Physical condition

Borås can be described as “a typical forest and middle town in Västergötland with a slightly hilly terrain where hills alternate with fissure valleys” (Borås stad, 2021a, p.7). Forests are characteristic vegetation on the hills while valleys are characterised by the presence of lakes. Sometimes forests leave space to agriculture, usually small scaled. In this context “rocks and soils are essentially nutrient poor” (Borås stad, 2021a, p.7). Furthermore, “the rich amount of down-pour has made the landscape rich in swamps and wetlands” (Borås stad, 2021a, p.7).

The city government report “Biologisk mångfald i Borås Stad” promotes preservation of the richness of nature and species in Borås highlighting how “nature should be easily approachable both for human habitats and non-human habitats that need to move in the landscape. It should be close to find nature and easy to get there” (Borås stad, 2021a, p.4). The same document also mentions how climate change can affect biodiversity, where drought and flooding cause invasive species to spread and take over native flora and fauna (Borås stad, 2021a).

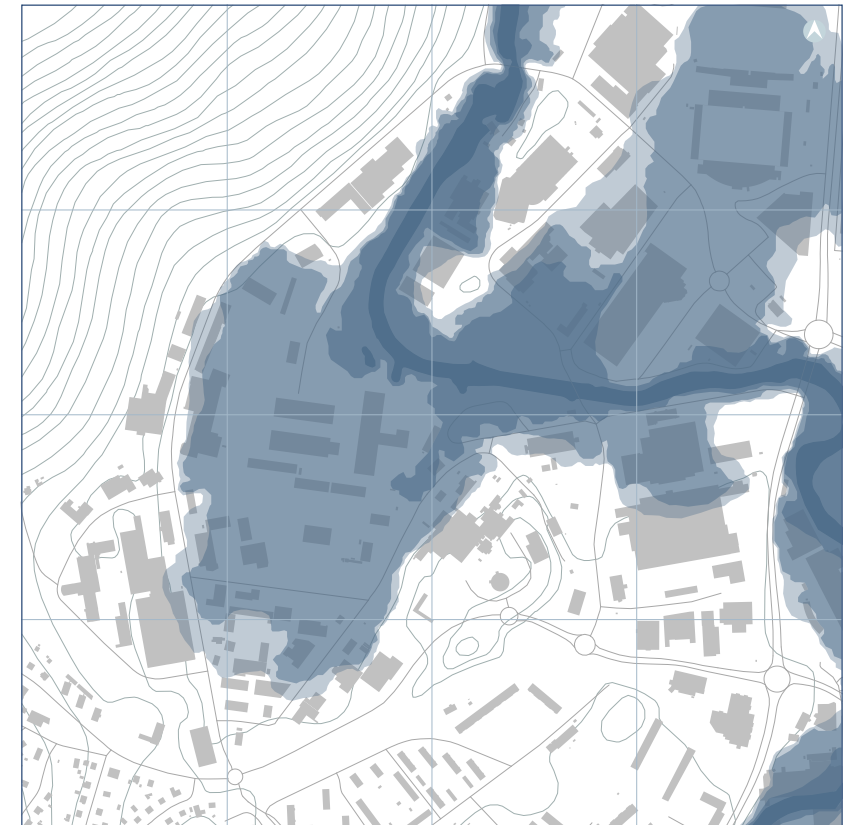
The physical condition of Getängen has undergone a lot of change since the area started to be developed by humans. Since the area is located in a valley the landscape is of wet character. The river was originally following another path through the area and the industries were placed close to the river to benefit from the natural flow of the water. While the area developed, there was a desire to be able to use all the land. The land was still wet and difficult to use. This is when the river was reshaped to its form of today. The river was shorted to make space for urban development.



The historical path of the flow of Viskan. The longer path the river had was useful for managing waterflow at the site. Scale 1:9000

- Original flow of the river
- Flow of the river today

The area risks flooding of many properties and can cause economical damage to the urban environment. The image on the right shows a 50 year flow, 100 year flow and 200 year highest flow of flooding. If nothing is changed higher up in the river, this is the reality the area faces. Scale 1:9000



- 200 year flow
- 100 year flow
- 50 year flow
- River Viskan

The greenery in the area is confined to the hills and around the river. These are the areas that are more difficult to build upon or are preserved from urban development such as the nature reserve Rya åsar. Scale 1:9000





## Development plans

This section describes the current development plans of Borås, which are an example of a still anthropocentric vision in how the built environment is shaped overall, even if some hints of ecological thinking exist, such as the proposal for redeveloping wetlands in peripheral areas of Borås (Borås Stad, n.d.-a). The proposal of this thesis acts as a counterpart to such development plans, where nature is viewed mostly from an anthropocentric approach that emerges for instance from the use by local authorities of “rationalist and external frameworks for analysing values in relation to urban natures (e.g. ecosystem services)” (Erixon Aalto and Ernstson, 2017).

The comprehensive plan of Borås city, is based on expansion strategies that mainly rely on consolidating the existing city and connecting Borås with surrounding service areas such as Dalsjöfors, Fristad, Sandared and Viskafor. The planning strategies promote compactness, density and mixed uses. The plan also supports the creation of meeting places, public transport, green-blue infrastructures and highlights the role of the river Viskan and of the textile industry in the city. (Borås stad, 2018). Being the second city in Västra Götaland with regional-level facilities such as its university and hospital, the city government promotes an integration on a regional level of Borås and Gothenburg’s labour markets (Borås stad, 2018).

Natural spaces are expected to be preserved by focusing on building inside the existing constructed areas, the focus on the river Viskan as ecosystem service and through a clear green infrastructure including recreational paths and ecological corridors (Borås stad, 2018), but this is not sufficient to say that the development of the city has nature as a main focus. Even the idea of ecosystem services is controversial and still relatively anthropocentric (Washington, 2020). The river Viskan has an historical importance but also contemporary nature and ecosystem values. Planning strategies for the city include the creation of public and meeting places along the river. By mixing the preservation of green infrastructures with the development of recreational and meeting areas the municipality seeks to highlight the natural qualities of the space (Borås stad, 2019). An important element in the plans is the creation of a linear park (see figure 07) that links urban structures with green-blue infrastructures in the city. The idea of the park is grounded in ten core values:

1. “The park should be designed with focus on the shaped living environment: life between the buildings.
2. The park shall constitute a cohesive green structure that bonds to nature in the outer parts of the park and should be a space where trees can grow and take up space in the urban landscape.
3. The park shall accommodate a great variation of ecosystem services.
4. The park shall go parallel to the river and interact with it where it is possible.
5. The park shall in a cohesive line, stretch from Getängen, Sjöbo and Knalleland in the north, through the city districts Norrby, Centrum, Göta and Gässlösa to Gässlösaskogen in the south.
6. The park shall be generally available and does not totally have to be owned by the municipality.
7. The parks different parts and places should contribute to its closest environments, with activities, functions and meeting spaces, and at the same time contribute to its whole.
8. The park is created over time and successively.



Figure 07. Viskan park (Borås stad, 2021a)

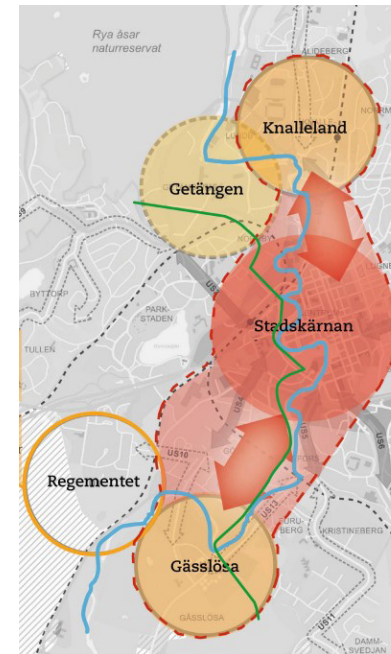


Figure 08. Priority areas for development (Borås stad, 2019)

9. The park sets the scene for coming detailed plans and their building permits that are given along the park
10. The park as a new urban planning principle originates in Borås 400th anniversary in 2021”. (Borås stad, 2021b, p.5).

At the same time, urban corridors are created as expansion areas, where new constructions and functions need to be developed, the park is developing as a line parallel to the urban corridors and is expected to promote shorter walking distances, while at the same time the focus on inner urban development is supposed to lead to urban densification. Urban corridors consider walkways through the urban landscape that have a rich diversity of services and city life (Borås stad, 2021b). The municipality has identified some priority areas to develop housing and services. Getängen, the case study of this thesis, is one of them (see figure 08). Here, the identified areas for transformation of land are dependent on how to deal with the existing power plant and when to demolish it. Due to these complications, the expected time for change is longer than usual (5-20 years) (Borås stad, 2018).

For Borås to be able to increase the biodiversity the city planning department collaborates with the environmental administration focusing on three main action areas: a “functioning green infrastructure, a favourable conservation status for species in Borås and ecosystem services with focus on pollination” (Borås stad, 2021a, p.3). Borås like other cities suffers from an urbanization pressure. Therefore, planning should consider green infrastructure, species, and ecosystem services in the process of urban development to mitigate impact of such development on biodiversity (Borås stad, 2021a).

Borås has still not reached any of the biodiversity-related national environment goals or has even gone towards a negative direction. There is a need for a more coordinated work from all the interested stakeholders (Borås stad, 2021a). The UN SDG (United nations, n.d.) number 15 (protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss) includes 5 targets can be of interest for the city of Borås (Borås stad, 2021a).

- “15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements”
- “15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally”
- “15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species”
- “15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species”
- “15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts.” (United nations, n.d.)

Having missed all such important environmental goals, the city needs to have a better focus on nature, which justify the usefulness of this thesis.



## Wetlands: an important ecological resource under threat and a characteristic historical landscape of Borås

### Description and characteristics of wetlands

This section explains the main characteristics of wetlands, a typical landscape of Borås. Wetlands are described as a landscape where water is held almost all the time below or above the ground level and come in different types and functions, all depending on the natural conditions of the context, such as typology, climate and hydrology, and build up over time to become rich in biodiversity and complexity. The slow process of ecological succession shapes the landscape allows for establishment and spreading of species (Sundberg & von Wachenfeldt, n.d.). Species are one of the actors of the wetlands who create and develop the right conditions for the habitat (Sundberg & von Wachenfeldt, n.d.). Wetlands work as a water purifier with their natural systems (WWF, n.d.) and are important for biodiversity (Sundberg & von Wachenfeldt, n.d.). One quality of wetlands is that they can take care of nutrients and other substances and prevent them from ending up in connected waterflows or lakes (WWF, n.d.) and the main goals are to strengthen biodiversity, preserve species and contain a healthy network of species and habitats (Sundberg & von Wachenfeldt, n.d.).

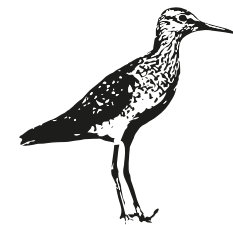
Wetlands have multiple positive functions such as: a) they clean stormwater from nutrients, heavy metals, oil, and other environmentally hazardous substances; b) wetlands are an additional water resource during droughts; c) the water works as a regulator of the temperature during the summer; d) they create habitats for different species and thereby increasing biological diversity; e) They are nature education environments that contribute to increased understanding of nature and cycles; f) they create attractive landscapes for recreation (Naturvårdsverket, n.d.-b) and g) they are equally valuable in relation to species as to urban environments (Sundberg & von Wachenfeldt, n.d.).

Spending time in nature promotes both physical and mental health, reduces stress and improves the immune system. By preserving, developing, and creating green landscapes such as wetlands, profits for both the collective and the individual are made. This is especially important close to human home and work, in the urban landscape (Naturvårdsverket, n.d.-b). Following Bryant et al. (2017), all such benefits show "the multiple roles the wetland landscape could have: as a place of beauty, biodiversity, identity, community building, recreation".

Wetlands that have the characteristics of nutrient-poor mosses or mineral-rich springs and swamps attract many species, such as birds, frogs, reptiles, and fish (WWF, n.d.), who thrive together with those species who use them temporarily, such as resting or nesting birds (Sundberg & von Wachenfeldt, n.d.). Some of the most common plants in wetlands are the so-called poor marsh plants and include for example bog-rosemary, bogbean, tussock cottongrass, water horsetail, tussock rush and cottongrass (Sundberg & von Wachenfeldt, 2023). Other plants that thrive in wetlands are cross-leaved heath, bog asphodel, sedge, heather, and white moss live in these conditions (Naturvårdsverket, 2011) in Borås. Among the bird species that can live in the wetlands of Borås it is possible to include crane, wood sandpiper, golden plover, yellow wagtail, and black grouse (Borås stad, 2021a).



Crane



Wood sandpiper



Yellow wagtail



Golden plover



Red-throated diver



Black grouse

### Species of wetlands - whom inspire the design



Bog-rosemary



Sedge



Tussock cottongrass & Cottongrass



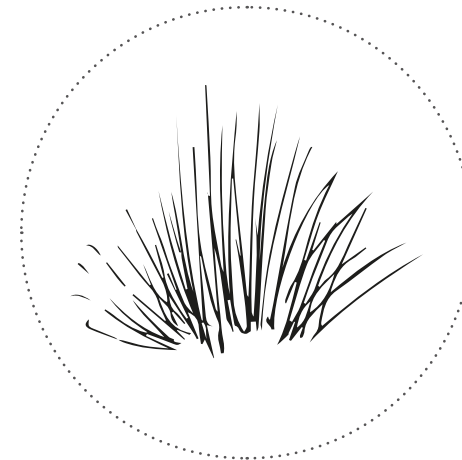
Bogbean



Water horsetail



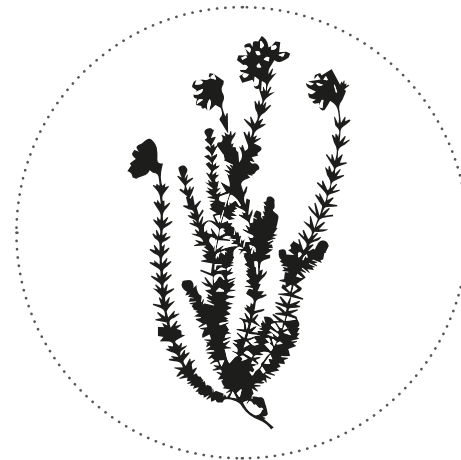
Heather



Tussock rush



Bog asphodel



Cross-leaved heath

## A resource under threat

Climate change brings consequences on the environment, some of which are increased precipitation and increased risk of flooding (Naturvårdsverket, n.d.-a) and human action in terms of change of land use and decrease of wetlands have led to a reduction in the wetlands' own ability to regulate their natural systems of waterflow (Naturvårdsverket, n.d.-b).

Wetlands have decreased as much as up to 90% on a local and regional level in Sweden and these rich landscapes of biodiversity and lively bodies have disappeared. About 80 % of the wetlands have registered interventions due to exploitation and the rest is untouched. Some other reasons why wetlands have decreased in amount is due to excavation and altered or destroyed hydrology, regrowth and nitrogen deposition (Sundberg & von Wachenfeldt, n.d.).

There is a great importance of keeping the water in the landscape, to support the rich diversity of species who thrive in wet and humid areas. By draining large landscapes, the risk of dry damage, fire and water shortage are increased (Länsstyrelsen västra götaland lään, 2018). Our urban landscape is filled with a lot of paved surfaces and the rainwater is not able to infiltrate the ground. Instead, the water is channeled in technical solutions for storm water and sewage. When the increase of heavy and intensive rainfalls occurs, these systems, like wells, basins and reservoirs are soon filled and the risk of flooding and unfiltered sewage water to be released in the water course becomes stressful. By constructing urban space with asphalt or other paved areas, the pressure for technical solutions increases, instead of using ecosystem solutions that do that work for free (Naturvårdsverket, n.d.-b).

## Solutions to prevent flooding including wetlands

Through preserving, maintaining, and restoring the natural systems of wetlands and water courses, significant values can be created, and flooding can be prevented (Naturvårdsverket, n.d.-b). The best solution is to delay the flow of water high in the river, but further down large reservoirs can be constructed to hold water in the landscape (Länsstyrelsen västra götaland lään, 2018).

When the water has longer time in the landscape it:

- "Increases evaporation
- the infiltration in the ground increases
- ground water reservoirs are filled
- surface runoff is reduced
- flow peaks in the waterways decrease
- erosion decreases
- sediment transportation decreases
- nutrient transport decreases
- the watercourses periods of low flows become shorter
- biodiversity increases" (Länsstyrelsen västra götaland lään, 2018, p.3)

To understand what characteristics the landscape has had, historical maps can show where water has been located and can determine spaces suitable for restoring wetlands or keeping water in the landscape through reservoirs, re-meandering, or diversion of water (Länsstyrelsen västra götaland lään, 2018). In the urban landscape, flooding can be prevented by adding vegetation in the design to shift the ground materials from paved surfaces to more porous ground, which allows up to 60% more rainwater (Naturvårdsverket, n.d.-b).

## Connecting back to context and the design phase

The municipality of Borås in 2021-2022, "to benefit biodiversity and climate" has analysed "116 potential places where wetlands can be created ", since "mitigating the impact of torrential rain on watercourses with the help of wetland development can be one of the efforts to climate-proof flood-sensitive areas in urban areas" (Borås Stad, n.d.). Locations are peripheral in the municipality. This thesis is a step forward as it brings wetlands closer to the Borås center.

Looking at the historical condition of the site in the Getängen case study the landscape could have been a wetland with a rich biodiversity and a more controlled water system management of flooding scenarios. The importance of wetlands is evident from the text before, and in the design part a concrete reconstruction of and speculation to highlight both the protection (of nature) and projection (of future) aspects of design, see Erixon Aalto and Ernstson (2017), a wetland will be presented for the Getängen case. The design proposes to bring wetlands closer to the city centre and brings nature to human landscapes, allowing for a reconnection of multispecies.





Design

## Introduction to design

The design chapter contains two main parts which are described below. The first part explains the different steps of preparation made to reach the main objective, to restore the wetland and the second part shows the design implemented in the wetland.

### Part one

Preparatory steps for creating the design of the wetland include:

1. Analysing flooding maps
2. Analysing historical maps
3. Shaping the wetland
  - 3.1. Localizing the wetland
  - 3.2. Remeander the river
  - 3.3. Translating rainfall patterns into design
  - 3.4. Translating local vegetation form into design
4. Removing buildings
5. AI generated visualisations to trigger design ideas

### Part two

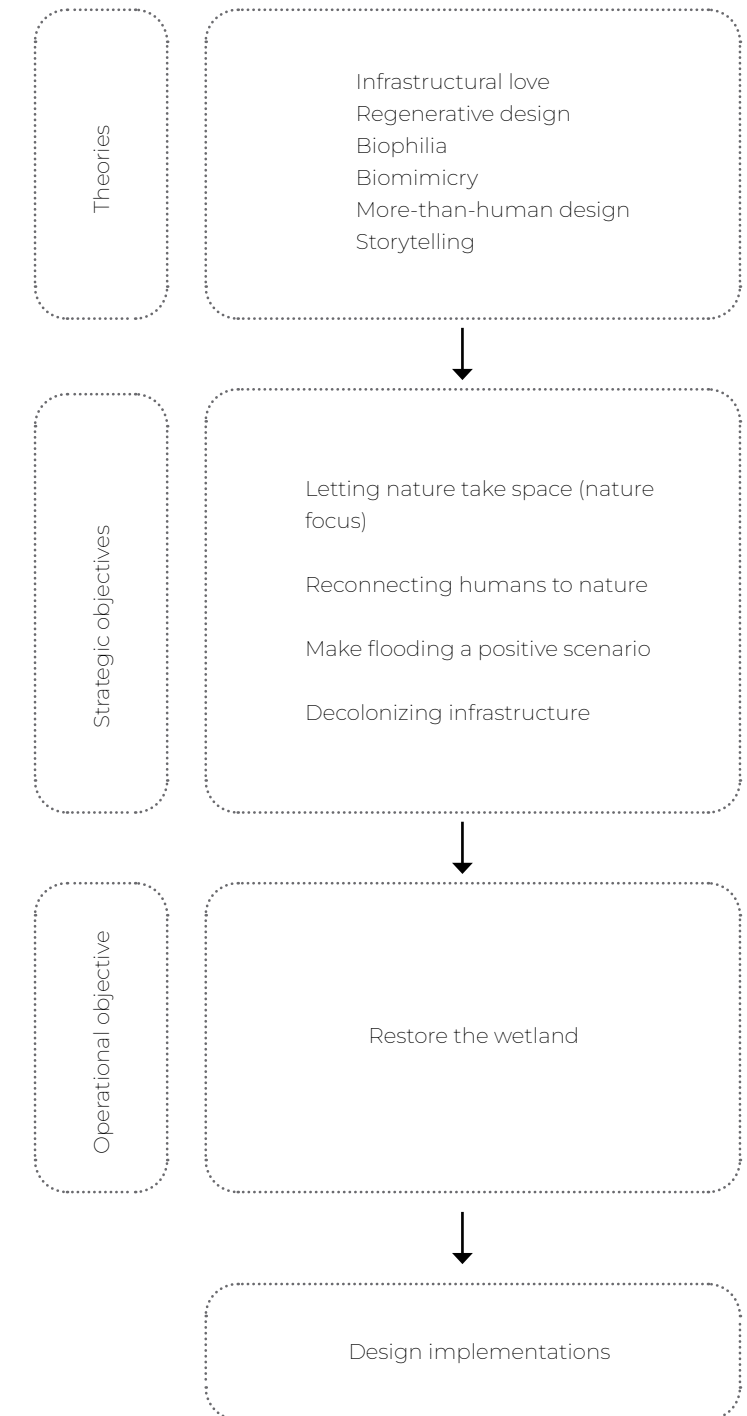
The second part of the design include the design implementations placed in the newly constructed wetland. These are described with functions, purposes, methods of design and placed on the scale of speculation.

The design implementations are:

- The walkways
- The pavilions
- The public pool
- The rain office

To connect the design to theory, strategic objectives are formulated. These strategic objectives represent the quintessence of the learnings mentioned in the theoretical chapter, reformulated to be used for the design. The strategic objectives together define the main operational objective, to restore the wetland. To achieve the operational objective, design implementations are suggested. These span wide over the scale of speculation to show how tangible or not tangible design can be, but still contribute to the goal of showing how nature can be at the same level as humans.

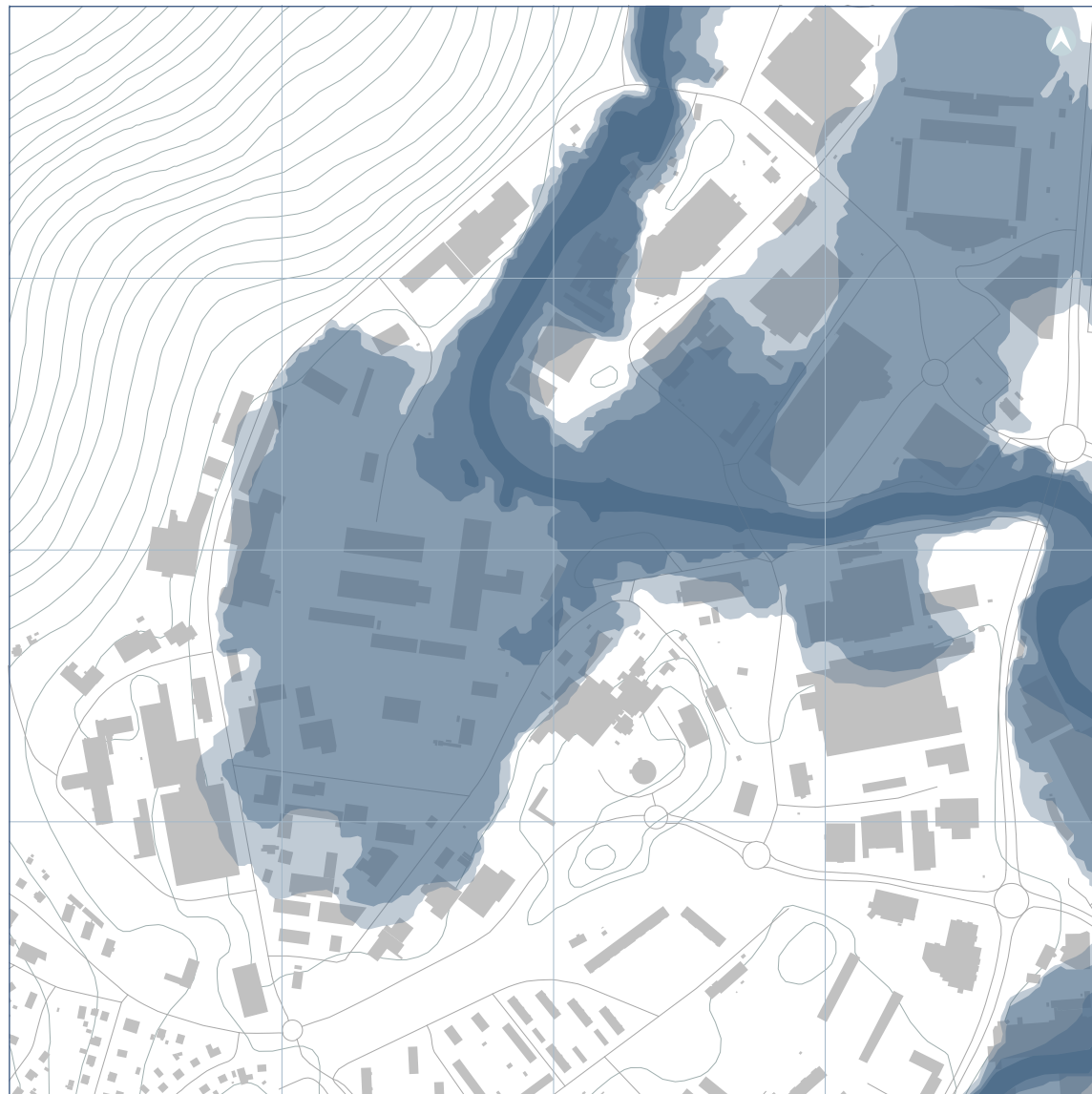
## Process towards design





### Step 1 - analysing flooding maps

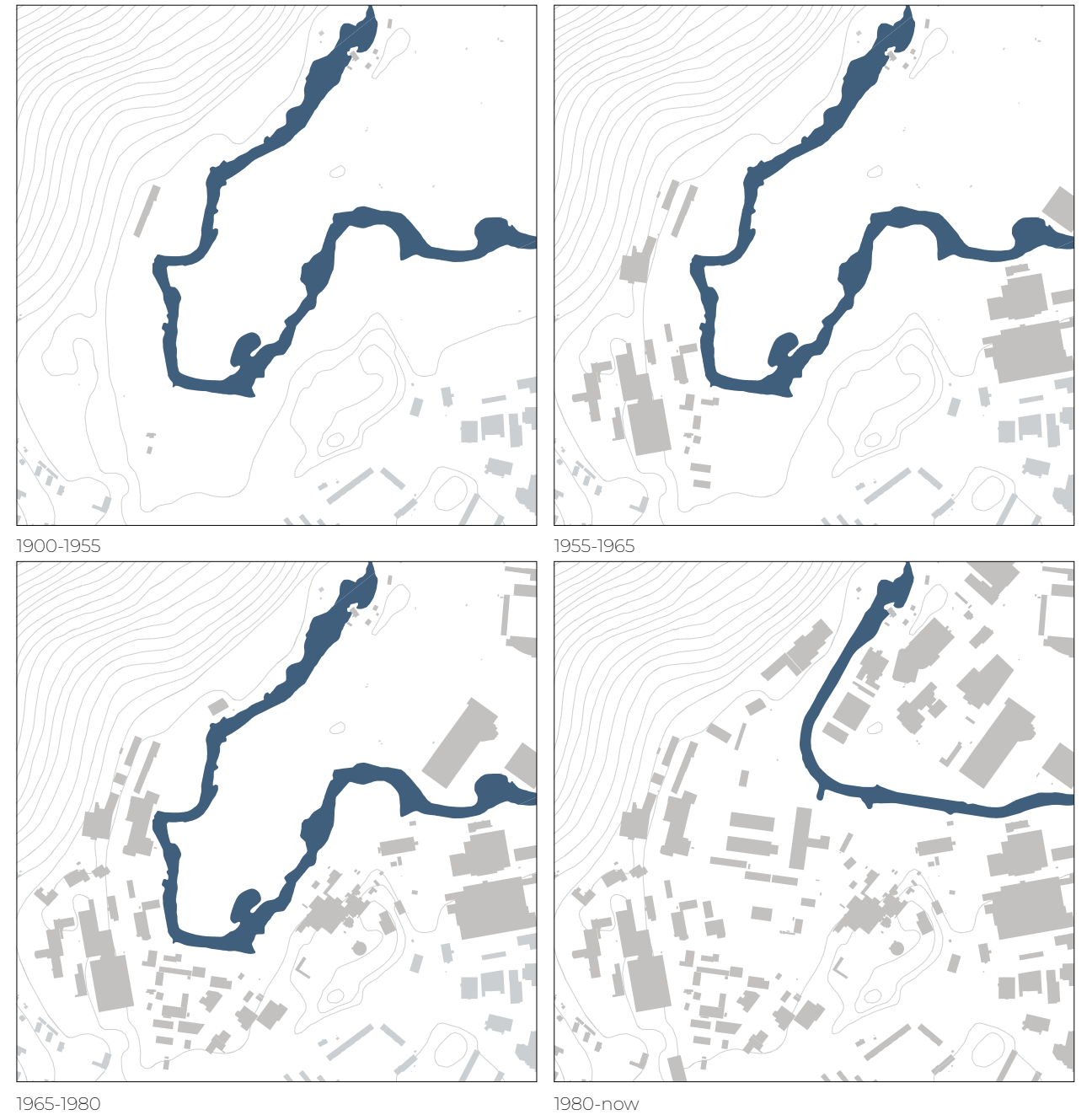
The risk of flooding will negatively affect multiple buildings and cause economical damage to the property. The area is sunken down inbetween hills and higher landscape, creating a space for water to gather. The flooded area has great possibility to be reconstructed to take care of water and nature.



- 200 year flow
- 100 year flow
- 50 year flow
- River Viskan

### Step 2 - analysing historical maps

Historically this site has been shaped differently and the river viskan had another waterflow through the landscape. With development the area has slowly evolved into urban landscape and the river reshaped to fit in the reconstructed landscape.



## Step 3 - shaping the wetland

The shaping of the wetland is done through 4 steps. Each one has their own connection to nature as a design tool. The wetland is shaped through:

### 3.1: Localizing the wetland

Flooding maps are studied and used as a reference for the placement of the wetland. The flooded area is suitable for restoring the wetland, due to the fact that water can be gathered in the wetland.

### 3.2: Remeandering the river

Historical maps of previous flow of the river counts as a ground for remeandering the river. The new waterflow runs similar to its original shape and a longer path than before to create a slower flow through the landscape..

### 3.3: Translating rainfall patterns into design

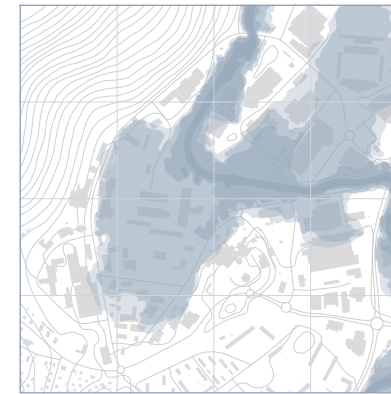
Flooding occurs when rain falls and the pattern of rain falling on water is used as design tool for shaping the structure of the higher and lower parts of the wetland.

### 3.4: Translating local vegetation form into design

Heather is one of the local plants that can be found within landscapes of wetlands in Borås. The shape of the vegetation acts as a guide for shaping the direction of waterflow in the shallow parts of the water through the concept of biomimicry.

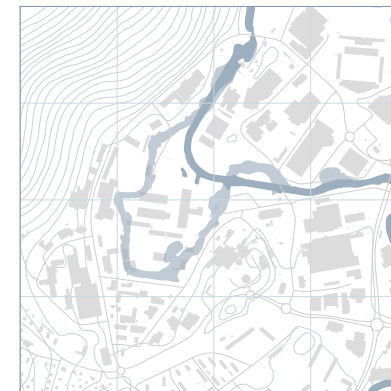
### 3.1: Localizing the wetland

Flooding maps show where the risk or possibility is highest. The boundary of the wetland is determined by where flooding affects the site.



### 3.2: Remeandering the river

Historical flow of the river show a path that is suitable for re-meandering the current river.

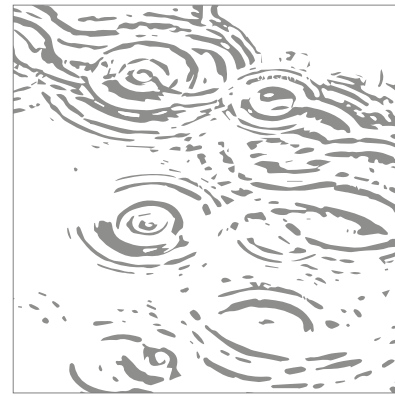




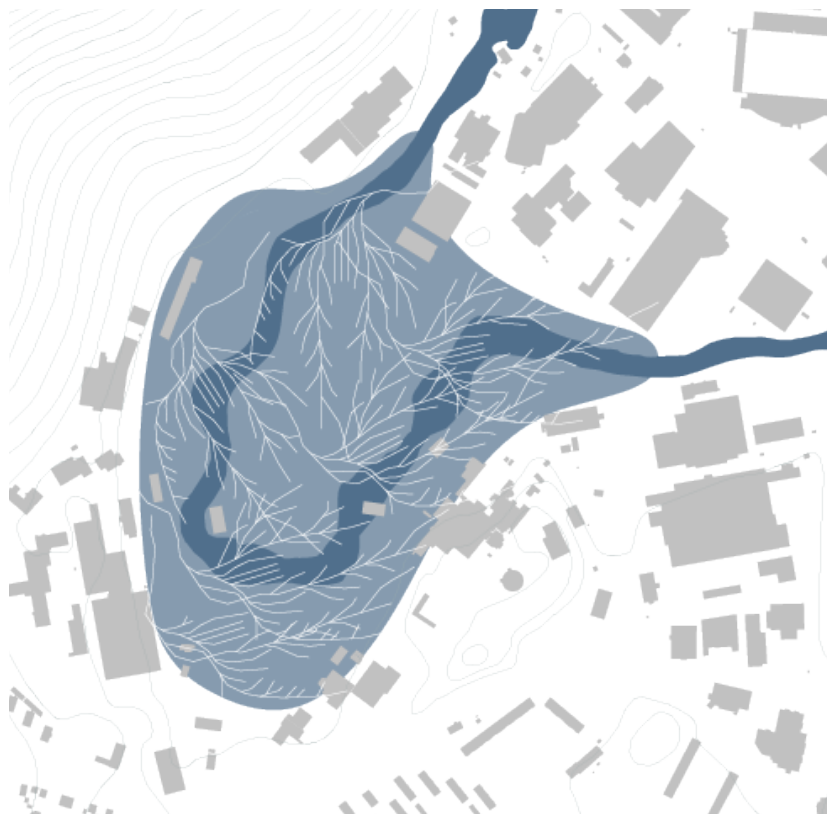
### 3.3: Translating rainfall patterns into design



Pattern of raindrops falling on the watersurface used with the method of sketching to shape the pattern of the wetland.



### 3.4: Translating local vegetation form into design



Growth shape of heather is used to guide the waterflow of the wetland and the direction of the previously constructed patterns.



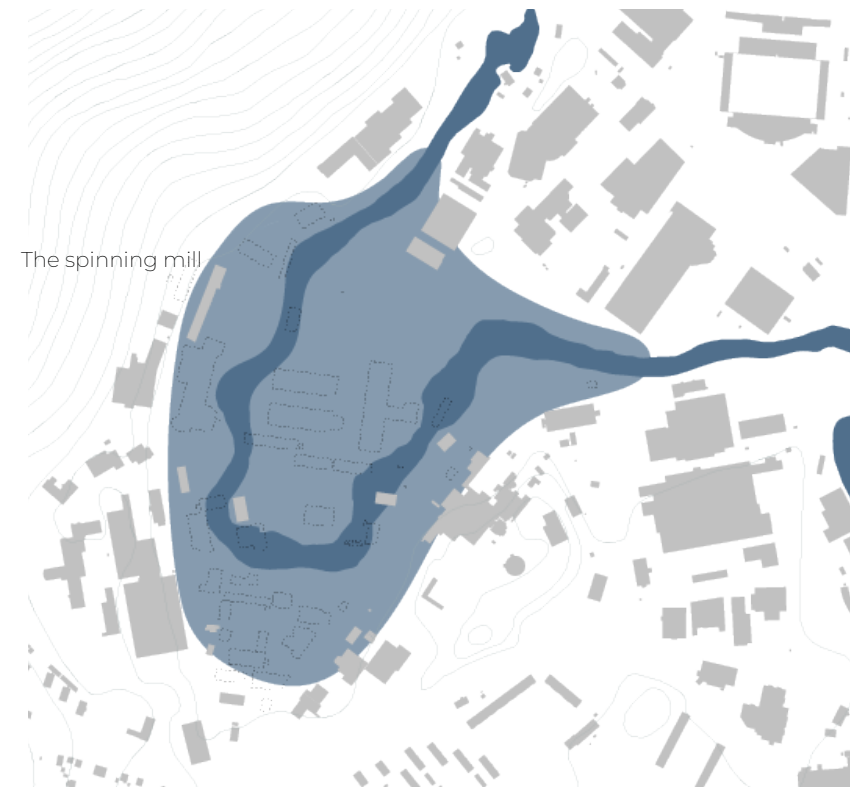
### Step 4 - Removing buildings

Buildings are removed to make space for nature and to not harm the economy of those buildings functions. Some criteria are used as guide to remove buildings:

- The buildings prevent nature from taking space
- The buildings are located in the risk zone of flooding
- The development plans of the city suggest removing buildings to allow for service and housing.

Buildings removed are either of no sustainable purpose for the future development or desire to grow and can do this at other places in Borås where their operations can have better possibility of attracting customers by being placed close to other operations like them.

The buildings kept at the site are of historical value or are seen as possible volumes for speculating about future scenarios. The spinning mill is one of the buildings kept as it has historical value and is part of the transformation to one of the design implementations. Other buildings kept have an interesting placement related to the re-meandering of the river and are of such operation that it is not dependent on other buildings around. These buildings also are of such character that the relationship between them and the wetland is interesting to explore. The buildings that are not placed within the wetland are kept for the sake of the unsustainable procedure of removing operations and functions that work well at this site.



The spinning mill

- - - Removed buildings



### Step 5 - AI generated visualisations

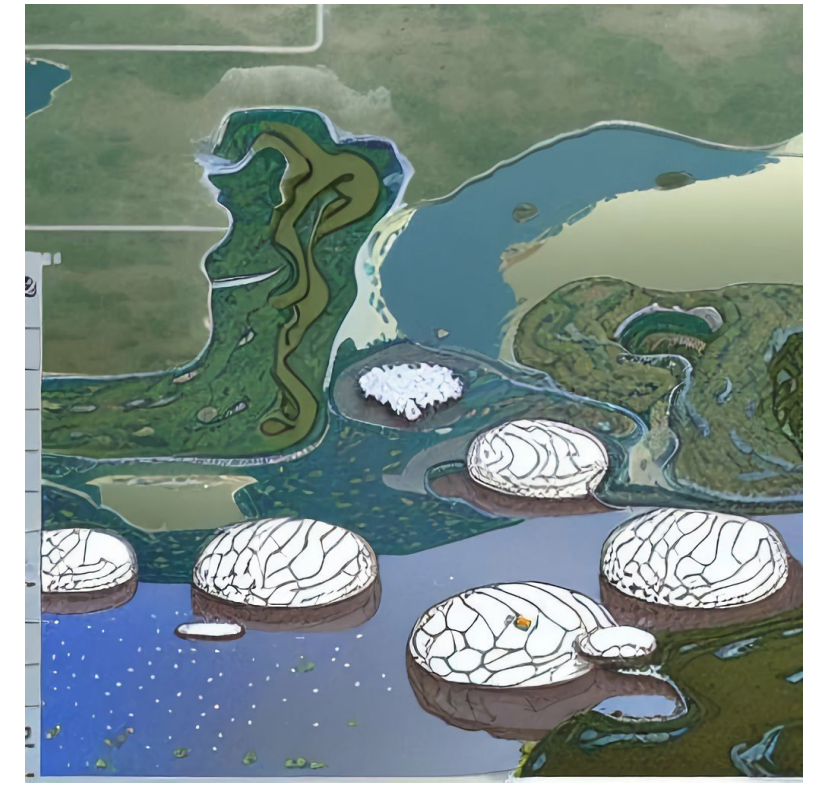
The AI generated visualisation were created in two different programs, (1) artbreeder and (2) picsart. Artbreeder offered a possibility to place figures, pictures, colours and text as inputs. Picsart only used text as inputs. The chosen inputs are placed beside the main output.



Input (artbreeder): Wetland river structure industry



Input (artbreeder): Wetland water giant blub structure



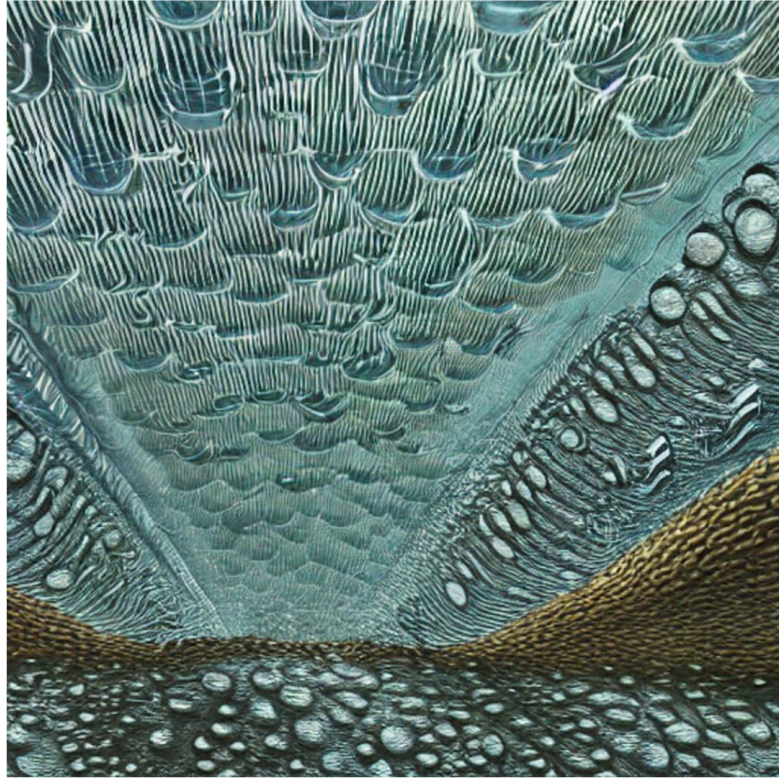
Input (artbreeder): Wetland river structure



Input (artbreeder): Wetland water blub structure

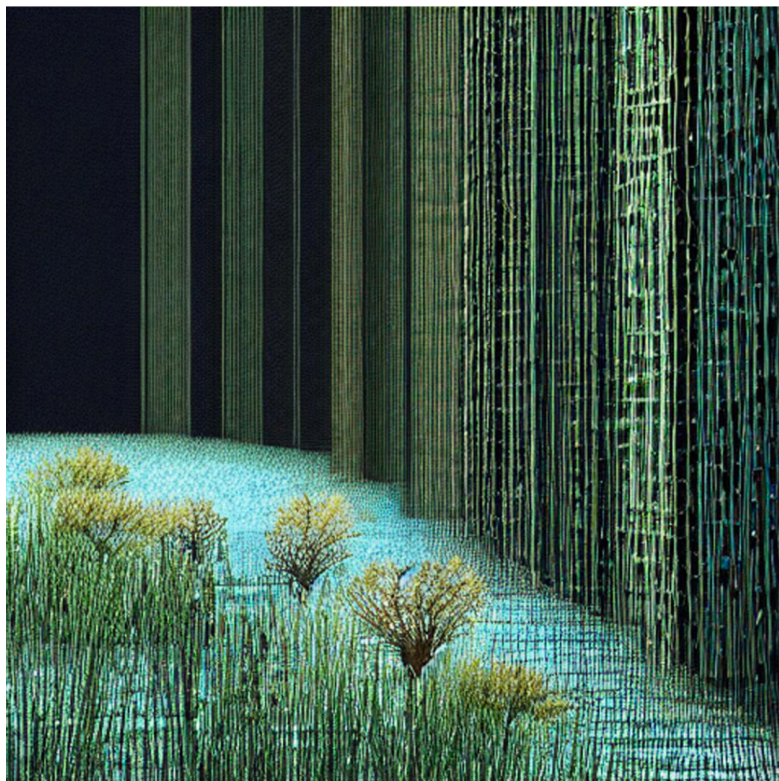
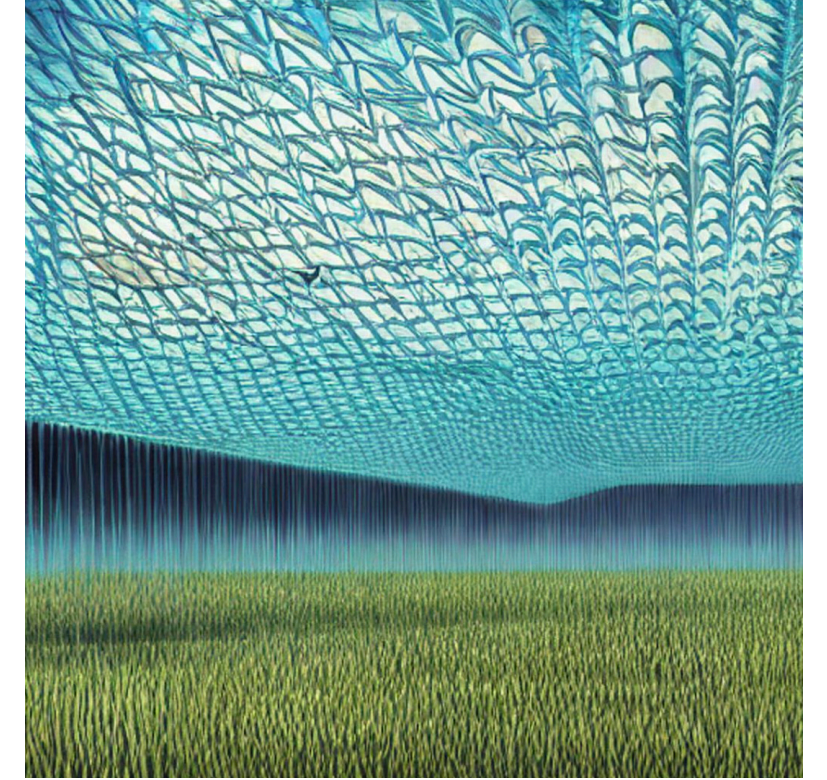






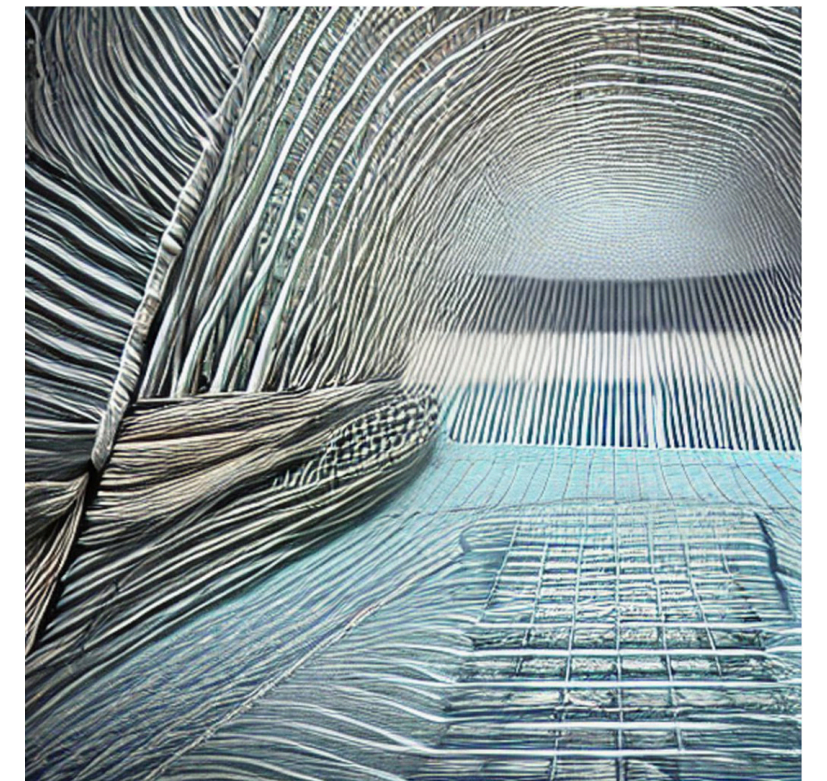
Input (picsart): Textile water-filtering rain structure in nature

Input (picsart): Textile water-filtering structure in wetland

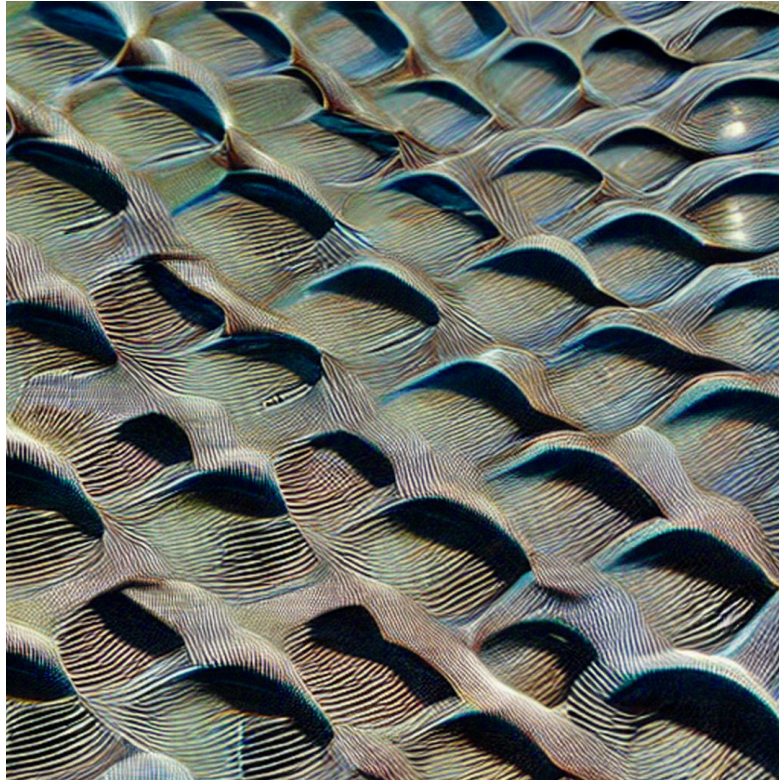


Input (picsart): Textile water-filtering structure in wetland

Input (picsart): Textile water-filtering structure in nature

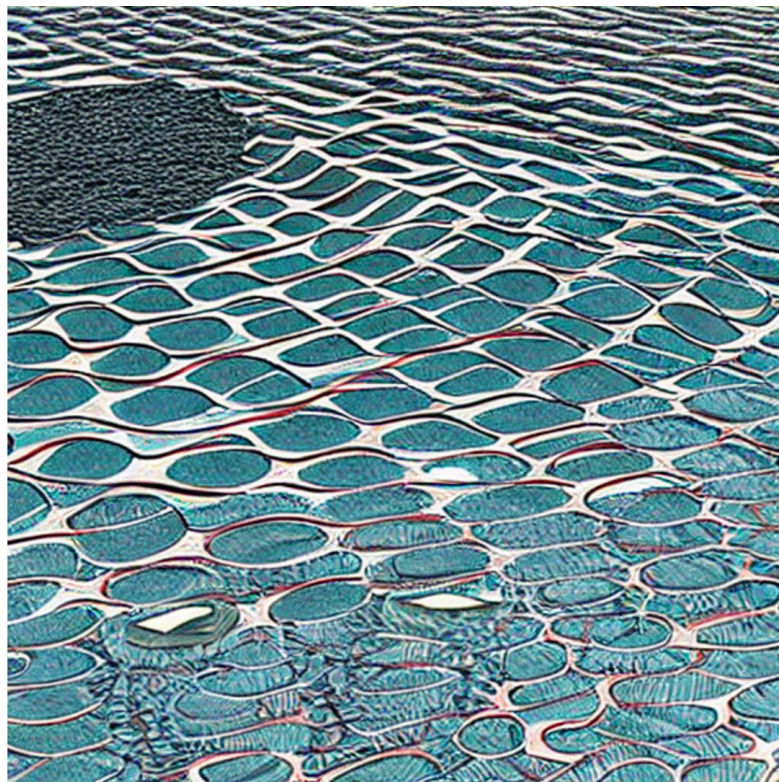
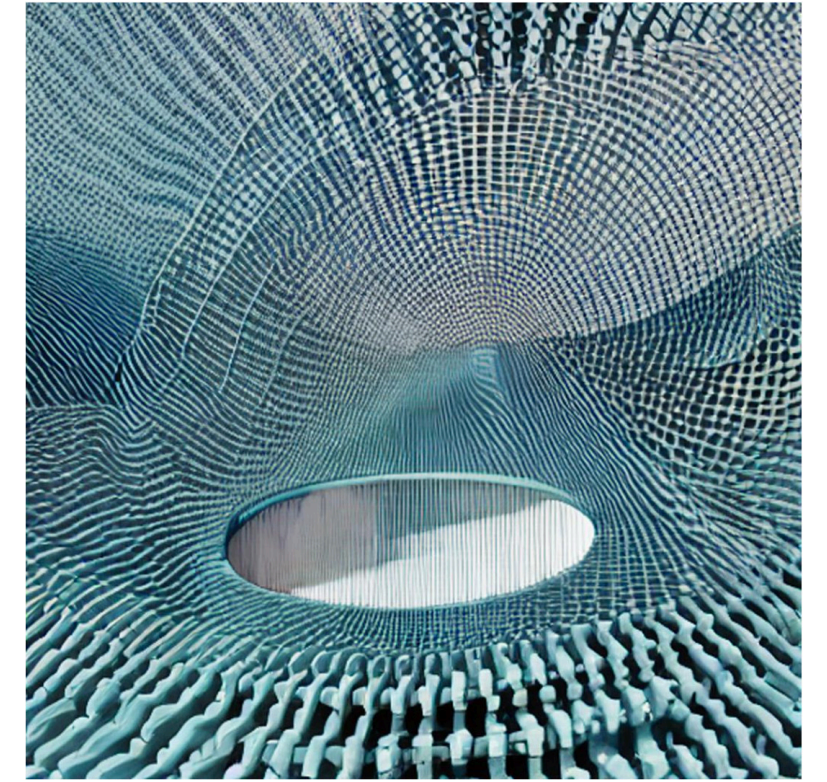






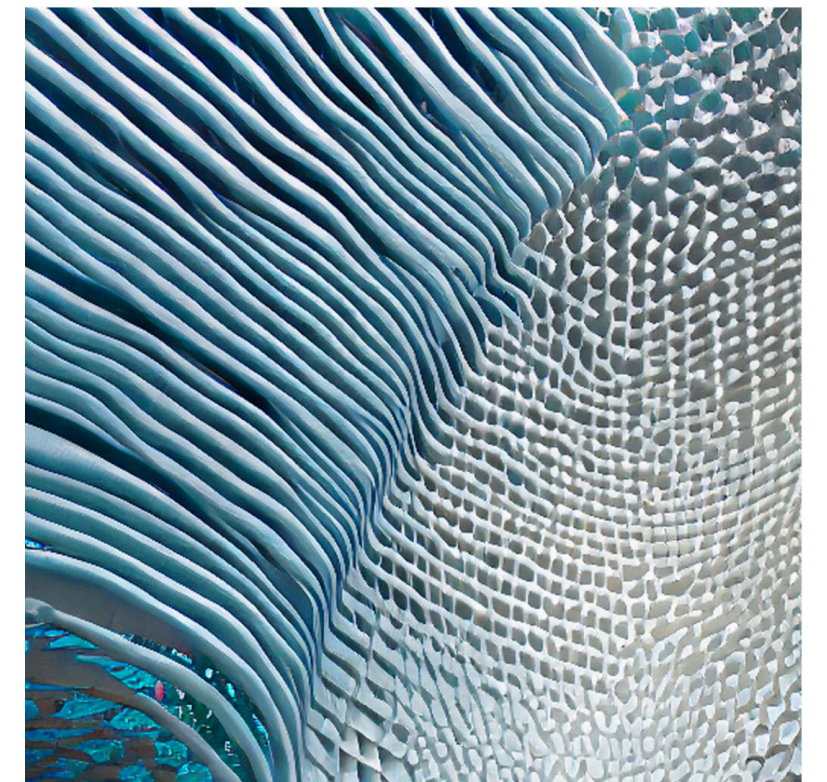
Input (picsart): Waterfiltering shell biomimicry structure

Input (picsart): Textile waterfiltering structure



Input (picsart): Textile biomimicry water structure

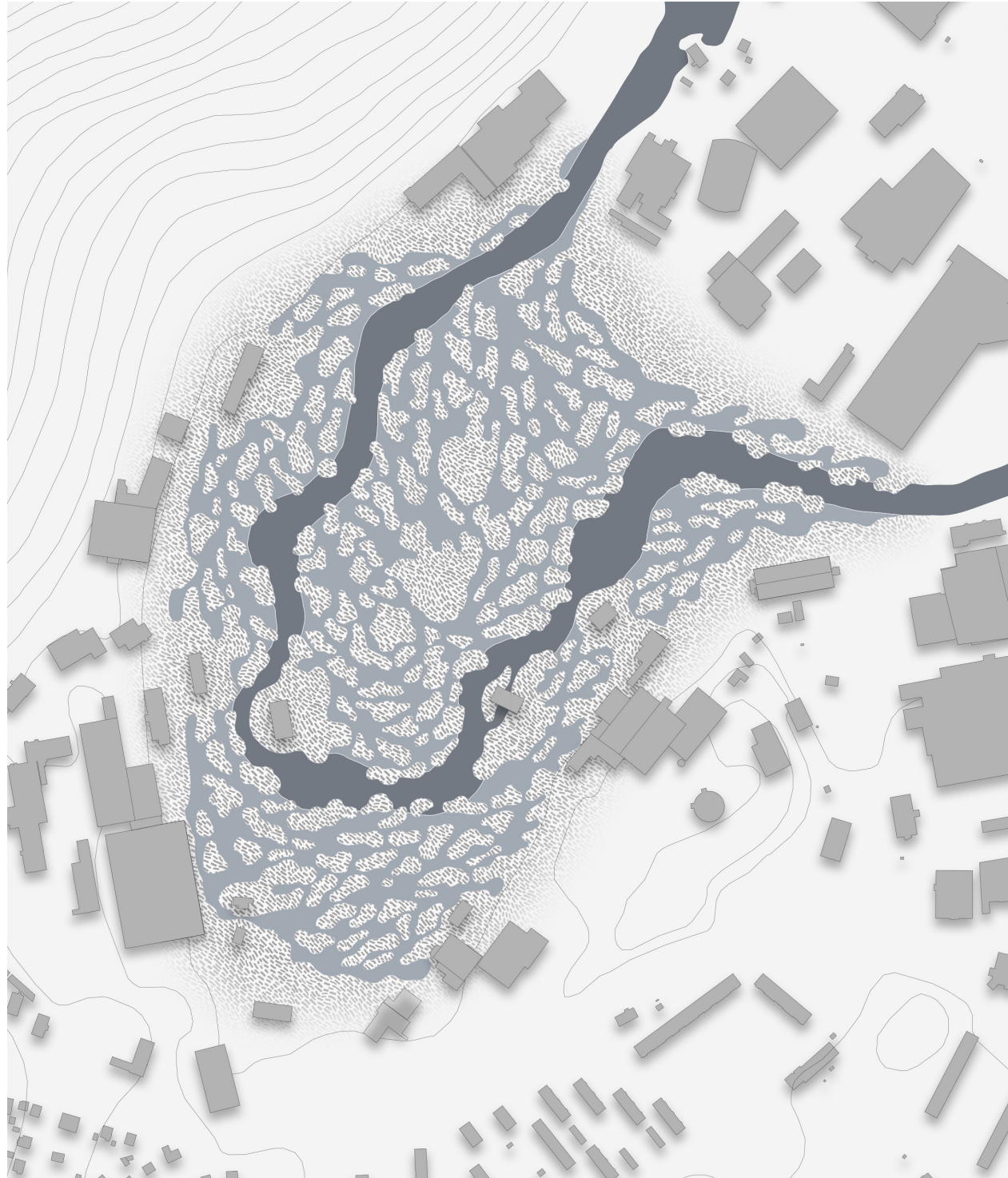
Input (picsart): Textile waterfiltering structure





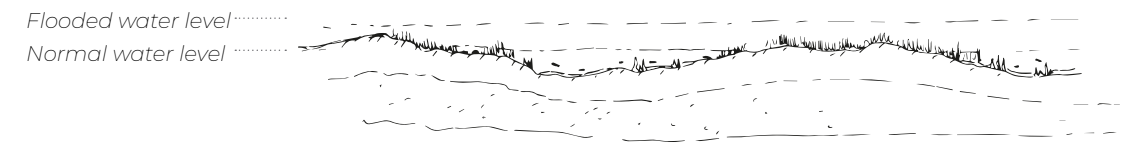
### Final outcome of wetland base

The wetland is now incorporated in the urban fabric, bringing nature closer to humans and promoting a closer connection them inbetween. The final outcome of the wetland allows for interventions of design to be implemented, either within existing buildings (kept in the wetland) or placed in the open landscape.



### Exploration of wetland through sketches

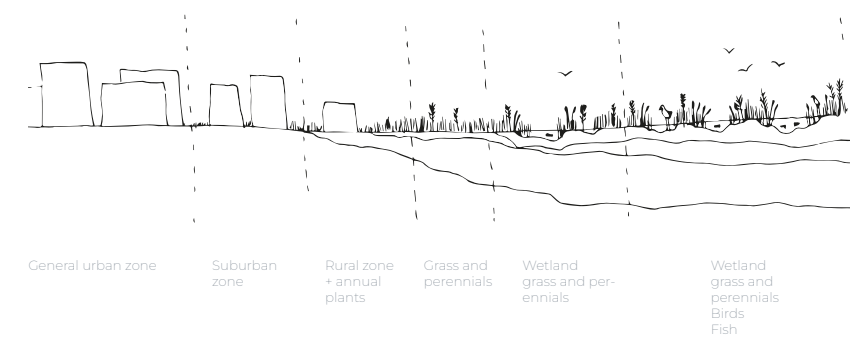
Water levels flooded vs not flooded



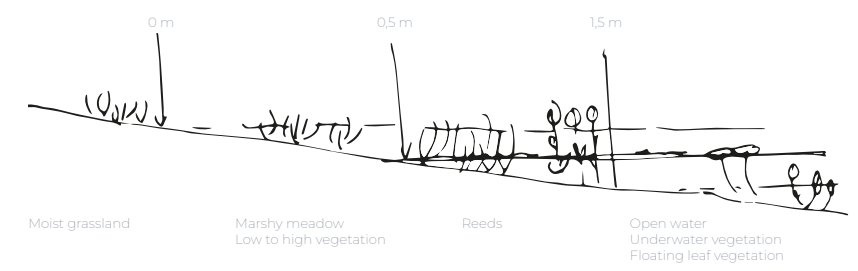
Species that live in wetlands in Borås



Gradient from urban landscape to wetland (ecological succession)



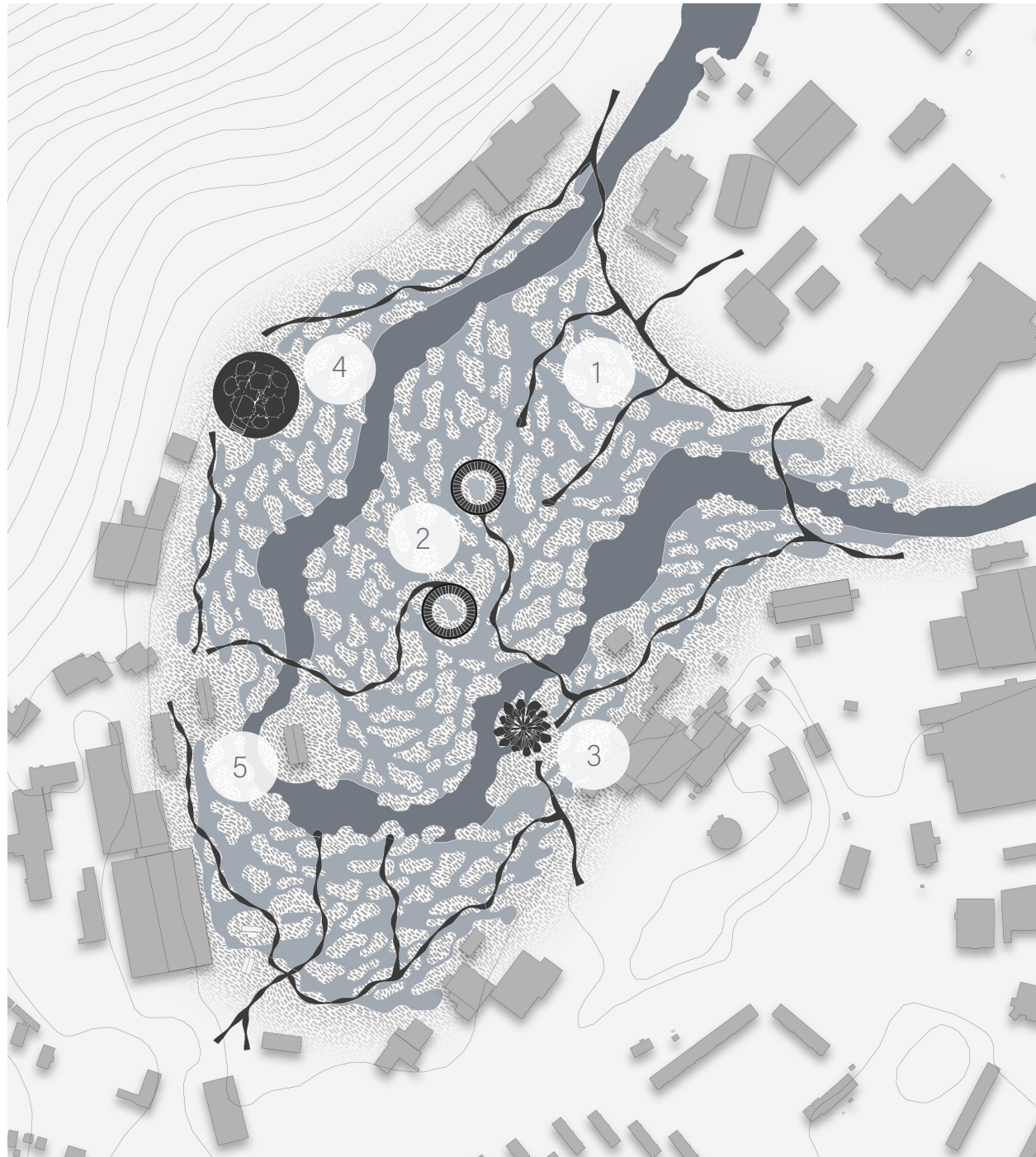
Types of plants in wetlands on different levels of depth





## Design implementations

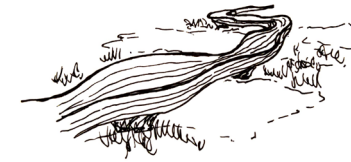
Four design implementations are suggested in the wetland to show how the strategic objectives have been translated into design. These interventions are examples of many interactions that can be made between nature and humans.



Location of design interventions

### Implementation 1

The walkways



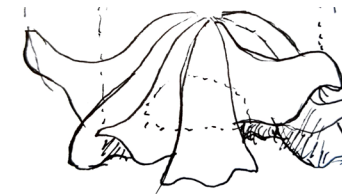
### Implementation 2

The pavilions



### Implementation 3

The public pool



### Implementation 4

The rain office



### Implementation 5



## The walkways

The walkways meanders through the wetland with the purpose to be the transportation support for human movement. They are connected in one end but not the other to create an awareness, in the visitor, of the nature and a sense of carefulness of the landscape. This will hopefully lead to responsibility of how the wetland is used and cared for.

For the walkways three of the strategic objectives are connected to the design:

*Letting nature take space* Through consciously placing restricted walkable paths through the wetland, to allow nature to live unbothered by human destructive activity.

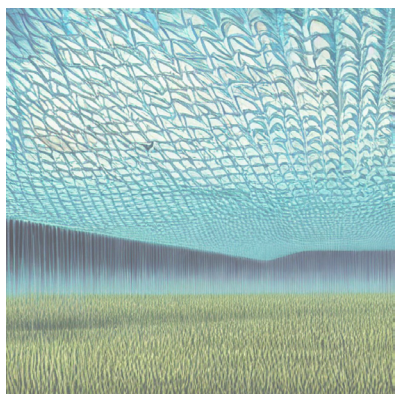
*Reconnecting humans to nature* Through letting the walkways only connect in one end and therefore letting humans take a conscious choice in exploring the walkways through the landscape. Creating an awareness around human action in nature.

*Decolonizing infrastructure* Through directing the walkways inward, the wetland, making them focus on the nature and its life, they critically go against the normative way to create a dense urban transportation network and now invites humans to move along and within the wetland, letting nature move uninterrupted.

Pragmatic    Visionary | innovative    Imaginary    Utopian

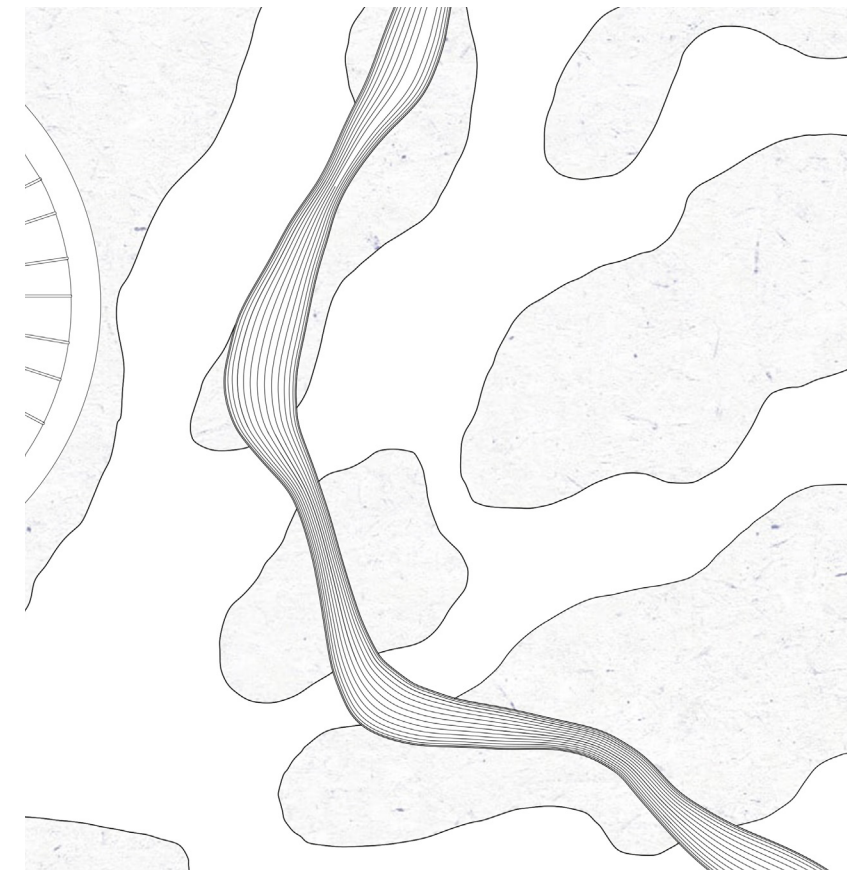


This design implementation is placed on the pragmatic side in relation to the gradient of speculation, the walkways are tangible and realistic.



AI generated visualisation that inspired the design of the walkways show the possible scene that can be seen walking through the wetland.

The placement of the walkways in the wetland. Connecting at many ends to the city and allows for many connections between the urban landscape and the wetland. The walkways also end in the wetland or close to other design implementations to make the walkways and the transportation along them as part of the experience of the other design implementations. The walkways also allow for lookout points where they end up.



The walkways lead to the design implementations and for example the pavilions. The walkway flows over the wetland without interrupting the nature. By the shape being inspired by nature the walkways are supposed to subconsciously connect humans to nature. When nature is incorporated in design humans can connect more easily but subconsciously to nature.



The story from the crane perspective:



*After a warm visit to more southern parts of the world, I arrive back to Borås in the spring. I seek a specific playground for my spectacular dance. The wetland in Getängen is the perfect place, and I see other cranes here too. My dance will attract my partner whom I will spend the summer with. Together we raise the young ones with care and an alert mind. At the wetland we have a lot of space to play and the distance from loud noise feels safe.*



The walkways are floating a couple decimetres over the landscape. The slits thought the walkways allows water to enter and leave when rain or flooding occurs. The walkways are designed to be used during all types of weather, and when flooding occurs there is a chance that humans can walk at the same level as the water or even on water bringing a closer physical connection between humans and nature.



Scene of life by the walkway, leading the ways into the wetland and the pavilions. On the walk through the wetland, the human is at a close distance to other species of the wetland, such as cranes, who live here.

The walkways are inspired by the shape and function of the plant tussock cottongrass. The stem of the plant has an inflated leaf sheath which is used as a tool for shaping the walkways as a garland of multiple inflated leaves.



## The pavilions

The pavilions are located at the end of two of the walkways directed into the wetland. This is a space for rest, reflection, care, and responsibility. The pavilions allow space that is sheltered from weather as well as without shelter, depending on the visitors' desire for experience. The visitor is allowed to get a closer look at the wetland and its non-human everyday life.

Strategic objectives that connect to the pavilions:

*Letting nature take space* Through creating an open pavilion that allows nature to live within the landscape of the wetland.

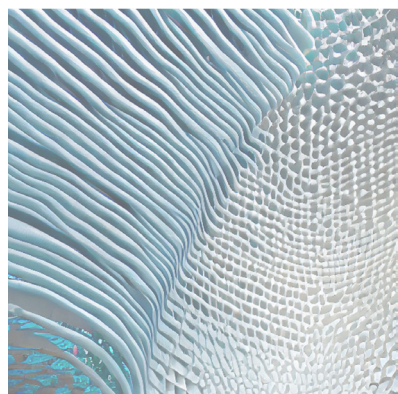
*Reconnecting humans to nature* Through letting humans get closer to the life of nature and being able to rest and reflect in the heart of the wetland to allow for spiritual connection between humans and nature.

*Make flooding a positive scenario* Through creating a pavilion that both give shelter and opens to the environment, the pavilion can be used during all types of weather. The senses of rain falling on the surface of the roof will be increased when it rains.

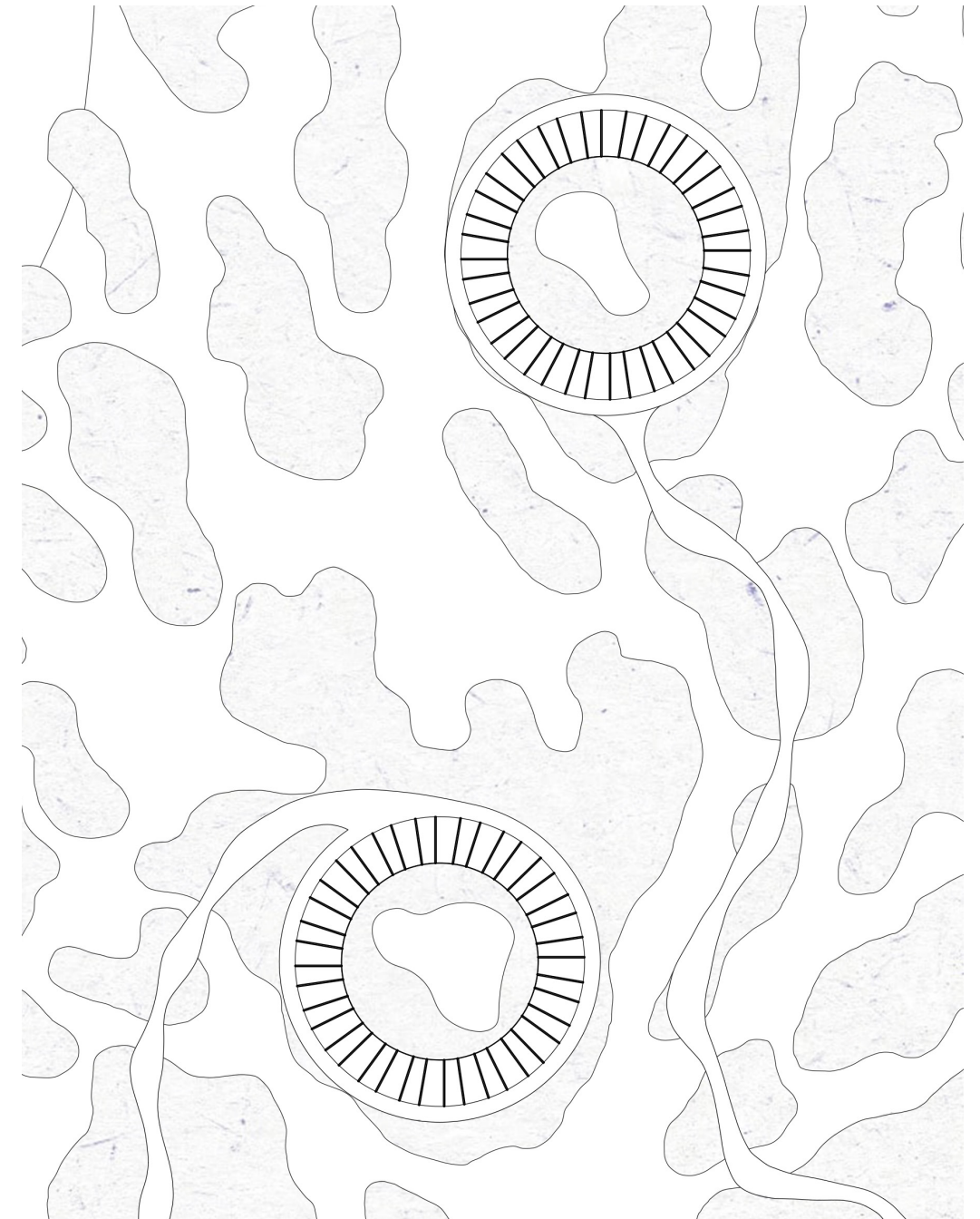
Pragmatic    Visionary | innovative    Imaginary    Utopian



This design implementation is placed on the pragmatic side in relation to the gradient of speculation, the pavilions are tangible and realistic.



AI generated visualisation that inspired the design of the pavilions show the feeling intended or structural shapes of the pavilions.



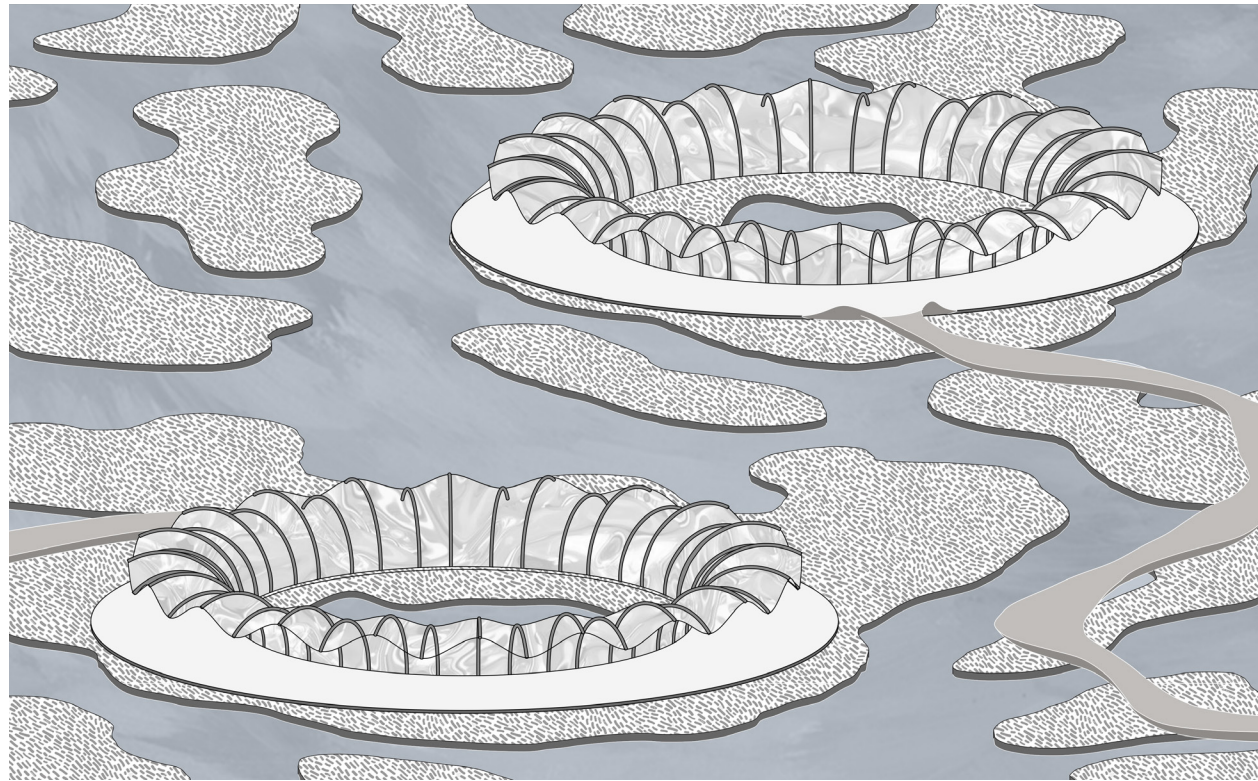
The pavilions are placed in the middle of the wetland to be at the heart of the calm, peaceful and kind nature. The placement allows for humans to deeply explore the beauty of the wetland. The placement in the middle of the wetland also makes the pavilions isolated in this landscape, making them more special to visit.





The pavilions are inspired by the shape of the flower on the cross-leaved heath. The leaves of the flower shape a form that is closed in the centre but opens at the top with a frill.

The pavilions float over the wetland still allowing water to flow through and under them. They are shaped to fit the wetland and to not disturb the waterflow and nature's systems. On the edge of the pavilions the human is able to get closer to the wetland by physical touch.



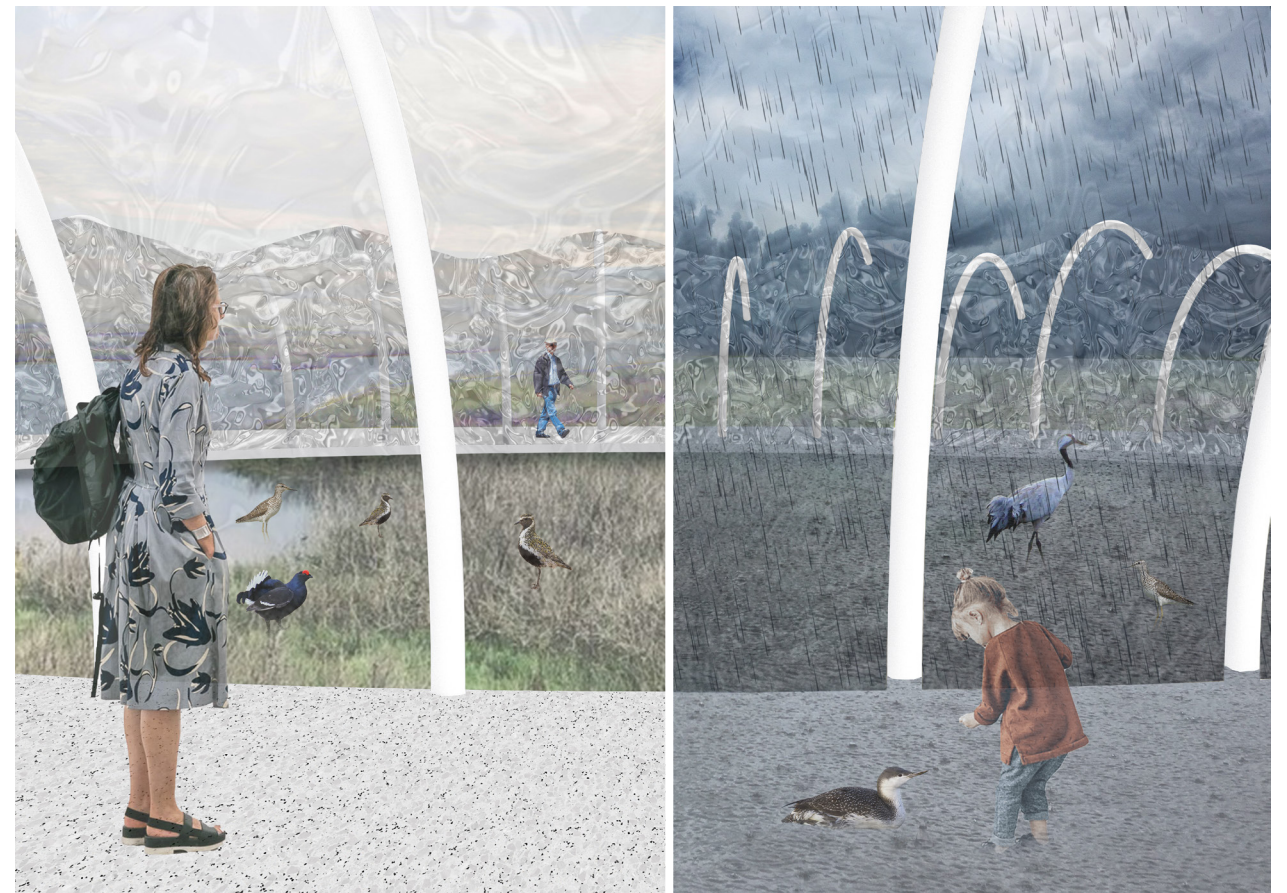
The story from the wood sandpiper perspective:



*After the annual visit to south Africa, we arrive back to Borås for the summer. We spend the time to breed and extend the family. For this we want a safe space for the kids to grow up and the wetland is the perfect place, where we can be unbothered. We find our spot to rest and the waiting starts. We see there are others not quite alike us, watching. Sometimes they are many and other times less, mostly depending on the weather. But they are harmless, and we are still secure at our spot.*



The pavilions seek to bring emotion and feelings to the human as well as it is a place to reflect and stay. The pavilions seek to expand the senses, by rain falling on the roofing hearing the sound of the rain or seeing its patterns making their way down the roof.



Scenes of life at the pavilions. Humans can see and feel nature at the pavilions in their own pace. Nature lives in and around the pavilions, enjoying their undisturbed space.

Scenes of life at the pavilions. They are to be used at all types of weather and seasons and provides spaces for children to learn about nature.





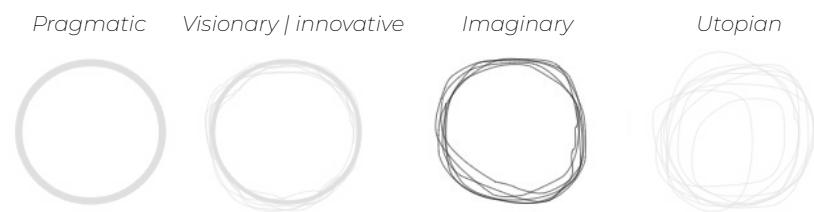


### 3 - The public pool

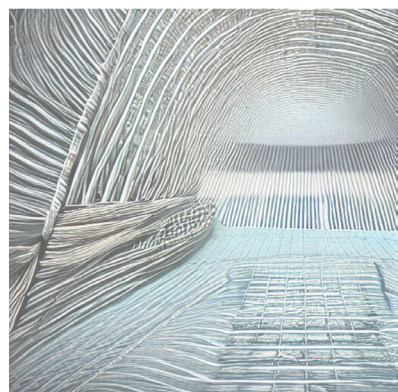
The adaptable structure works like a flower. The flower opens then the sun is out and closes when rain falls, just like this structure enfolds the public pool inside. The pool is a transformation of a building that is mirrored under the ground to create the pool. Through the pool a waterway for non-humans is created to allow for a close connection between humans and nature, only a glass wall is separating them.

Strategic objectives that connect to the public pool:

- Letting nature take space* Through allowing a structure placed directly in the wetland that supports natural ecosystems.
- Reconnecting humans to nature* Through transforming an existing building into a public pool that closely connect to the wetland, with the underwater tunnel allowing nature to move with humans.
- Make flooding a positive scenario* Through making the protective structure adaptable to weather, the structure opens like a flower when the sun is out to allow more air, sun, and light into the pool. and the structure closes when rain is falling to protect the pool from outer water, also to allow the pool to be used all year.



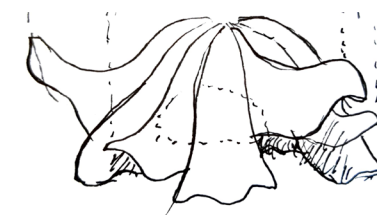
This design implementation is placed on the imaginary side in relation to the gradient of speculation, the public pool is imaginable and possible.



AI generated visualisation that inspired the design of the structure show what type of atmosphere is wanted inside the public pool.



The shape of the structure is inspired by a flower and nature. Consisting of two layers of leaves the structure with both layers act as protecting structure. The outer layer is adaptable to weather and the material opens like petals of a flower.



Sketch of open structure



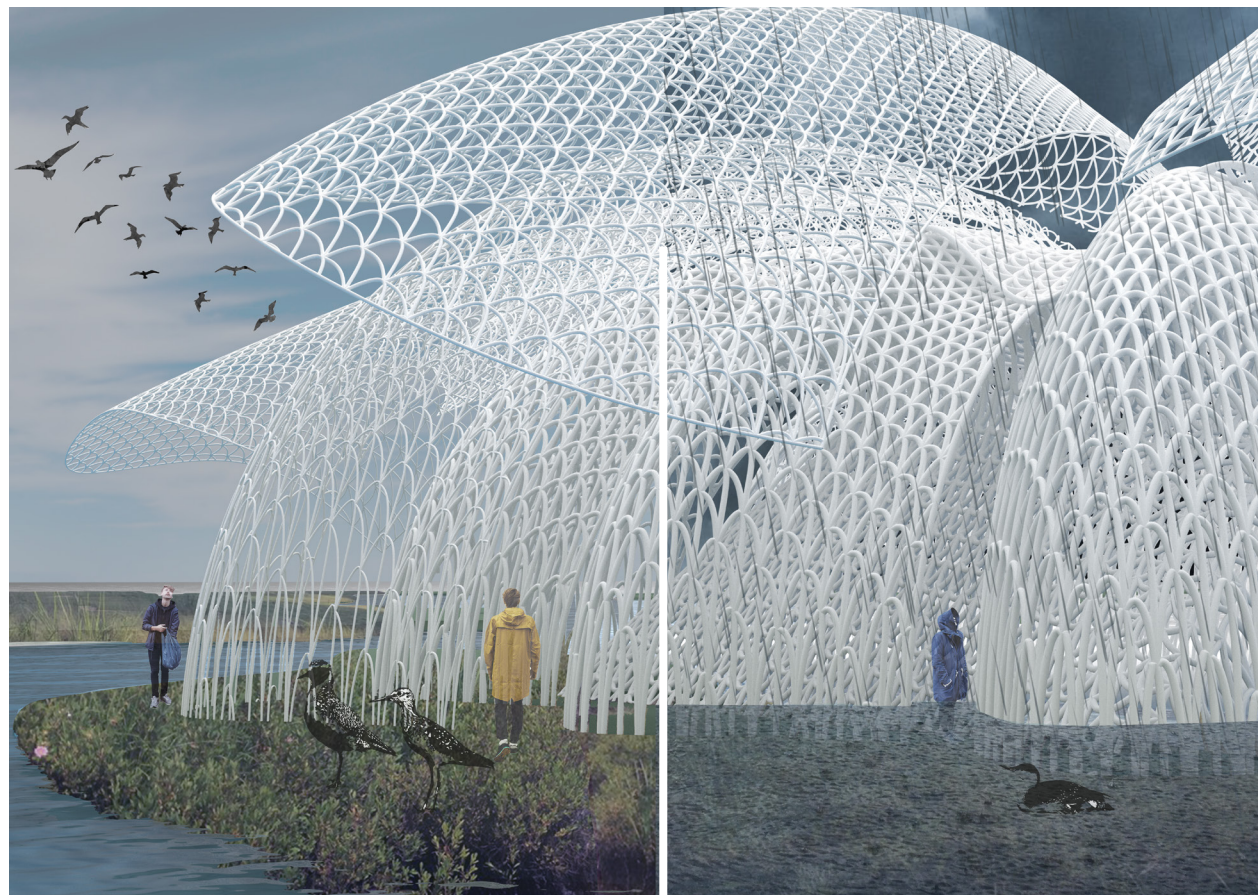
Sketch of closed structure



The story from the red-throated diver perspective:

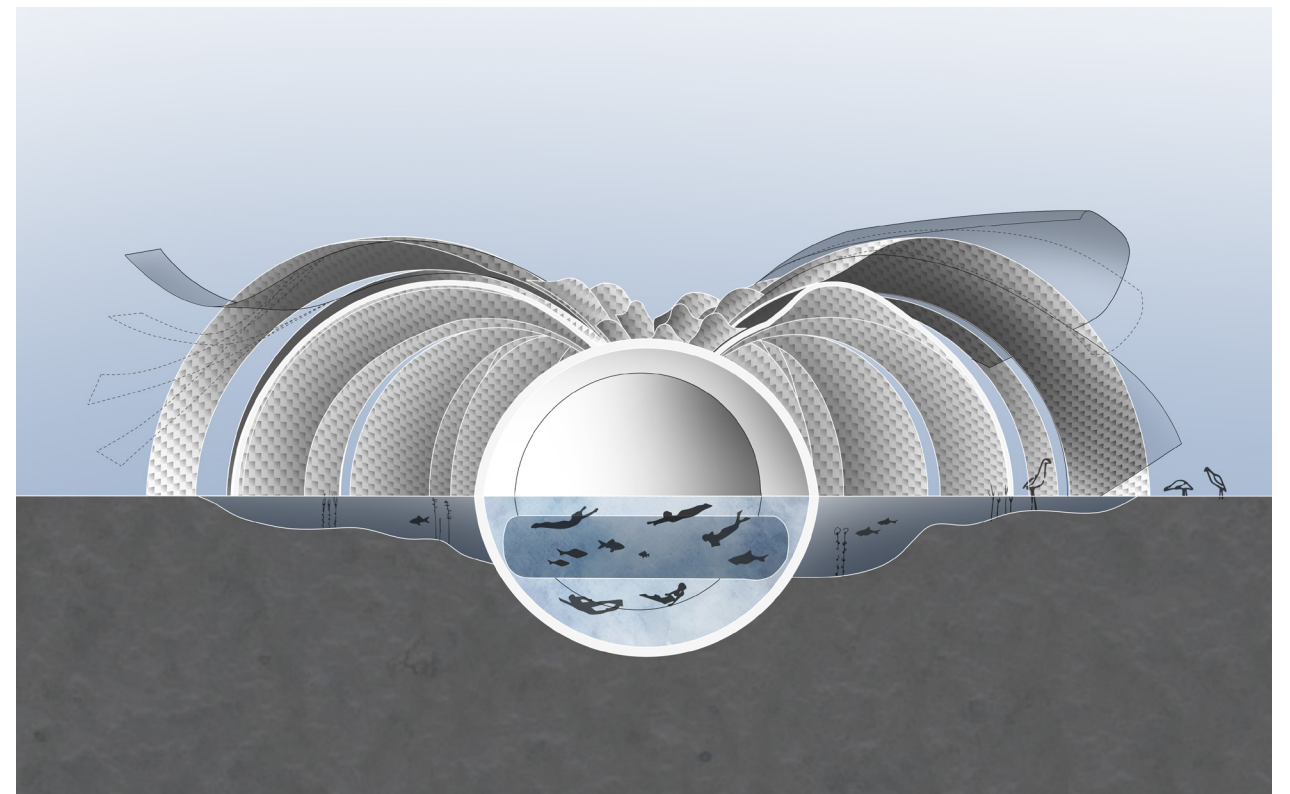


*I normally swim through the water together with my family, and sometimes we go up on land and have a walk. We usually hang out together in the wet landscape where we are unbothered and can live peacefully. Sometimes the rain falls for a very long time and the amount of water increases. Then new paths for swimming arises and we can explore new spaces of life. One time we saw this figure, closing when the rain kept falling, and we explored the area, seeing other beings swimming close to us, just divided us apart by a structure.*



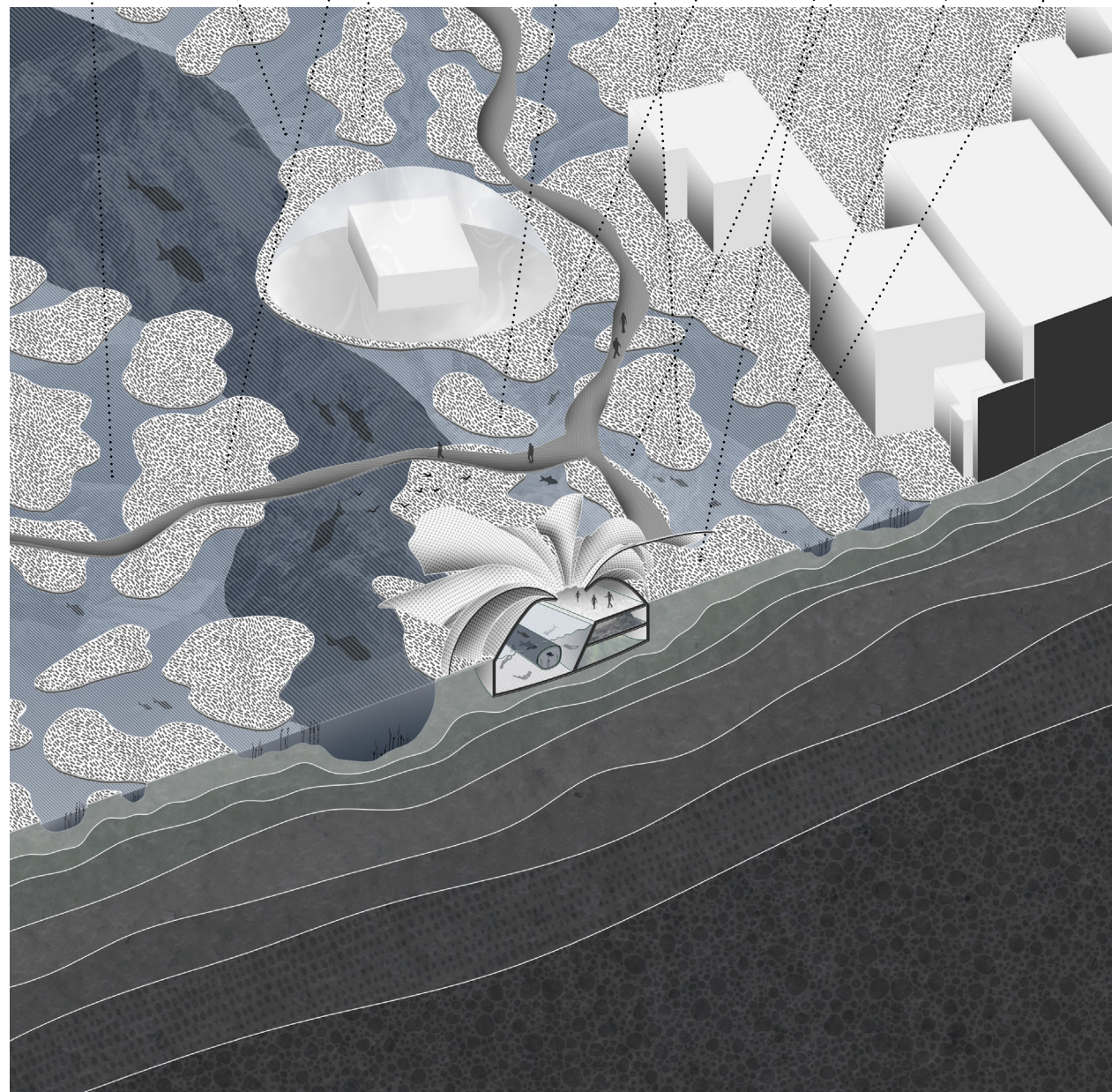
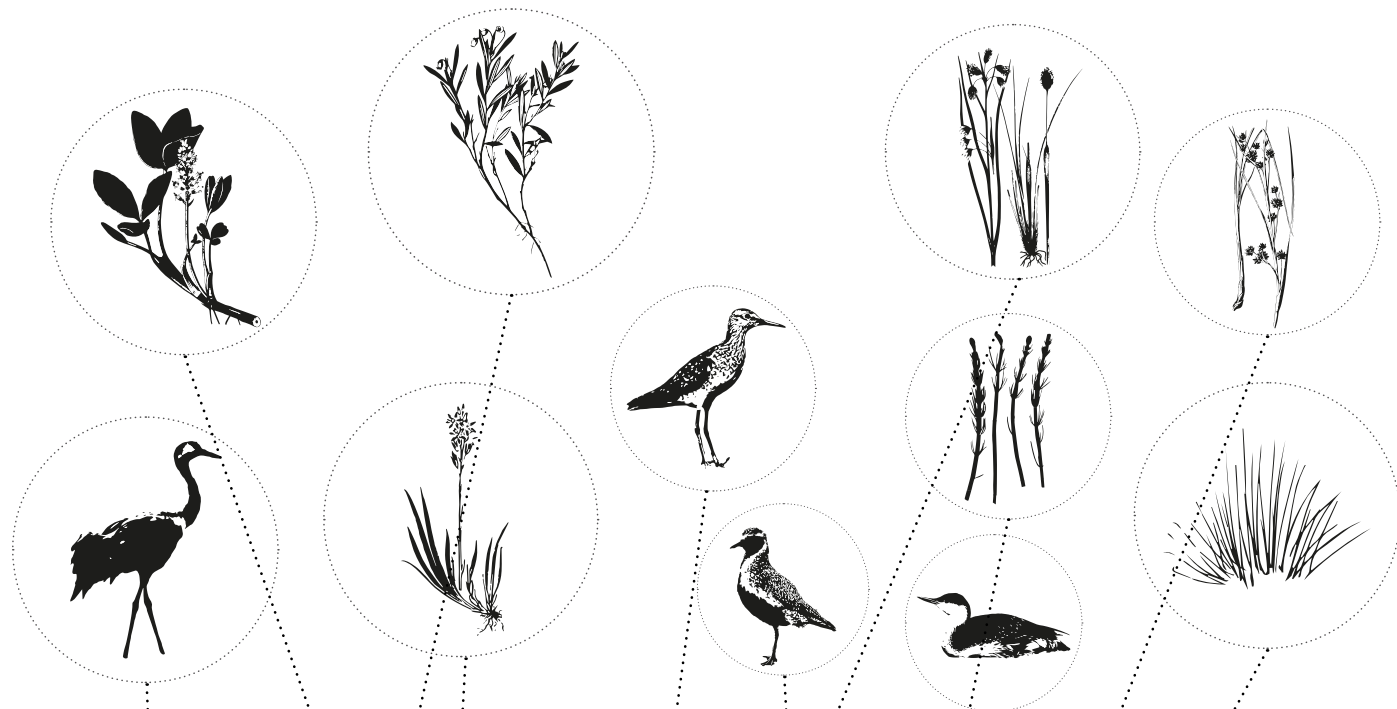
Scenes of life at the public pool. When the sun is out the structure has an open character. When the rain falls it closes like a flower to protect the humans inside the structure.

The public pool is inspired by the plant bog-rosemary and its small flowers. The flower has a sheer and almost see-through veil, that is used as design inspiration for the structure of the pool. The internal shape of the flower is also projected in plan of the structure, and it is also functioning like a flower, opening when there is sun and closing with rain.



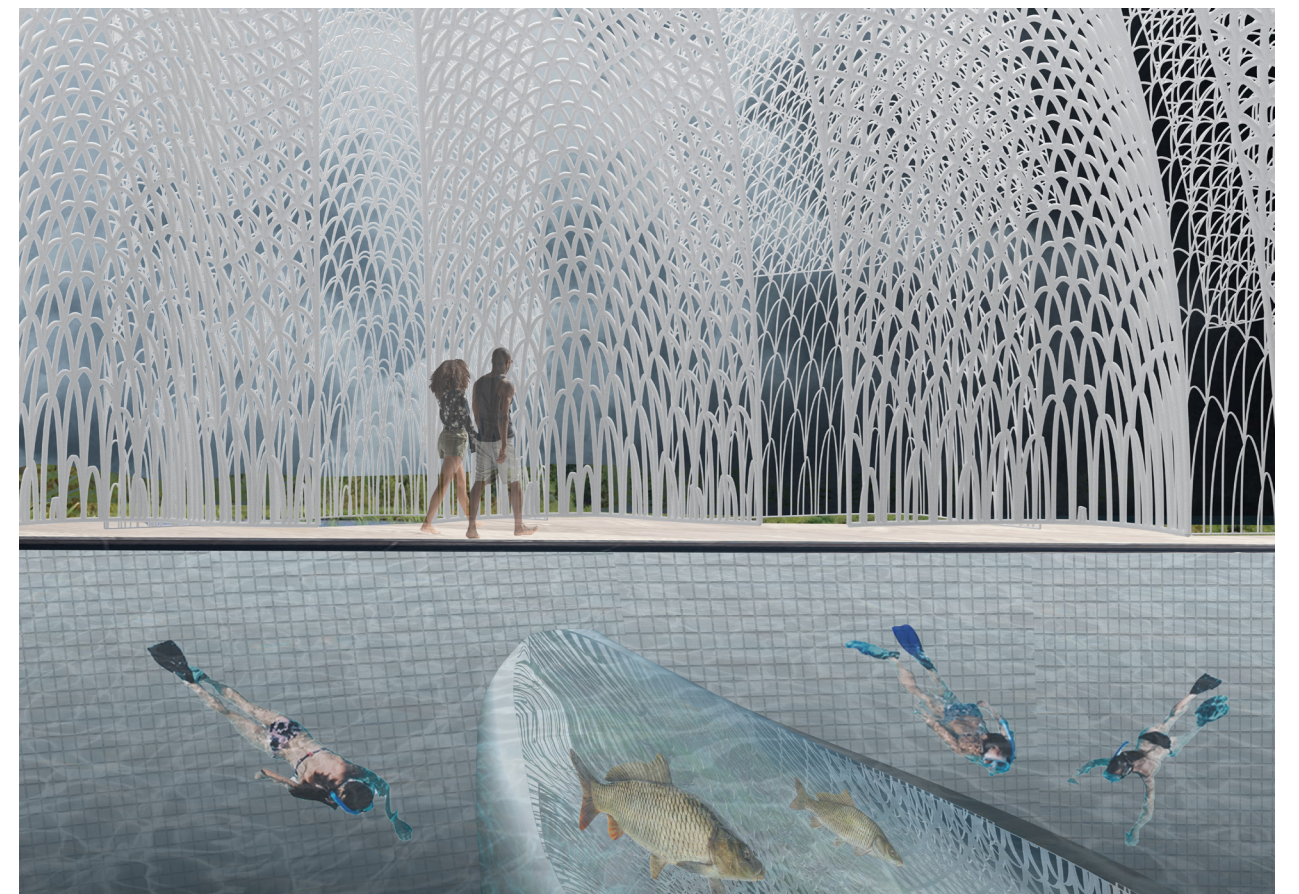
Scenes of life at the public pool. Inside the pool humans can swim side by side with fish of the wetland through a tunnel placed in the pool. The species are separated physically but visually and emotionally the pool seeks to connect them. The pool allows for continuous life of natural systems, such as waterflow.





The different species that live close to the public pool.

Scenes of life at the public pool interior perspective. Humans swim in the pool side by side with fish. This allows the humans to be more aware of their surroundings and the nature of the wetland. The structure has a see-through character inspired by the flower bog-rosemary, to allow for visual contact to the wetland outside, to not lose the context of the pool, and promoting greater connection to nature.



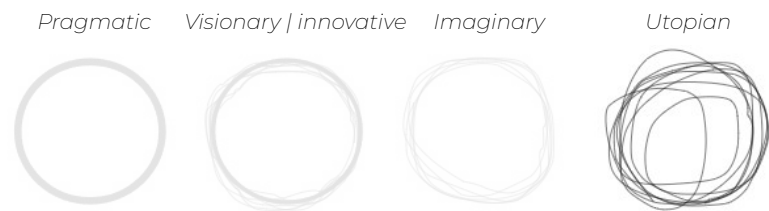


## 4 - The rain office

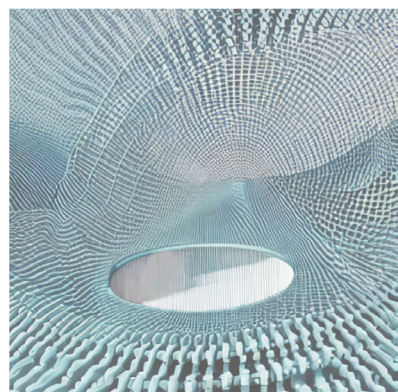
This building is surrounded by a bubble that acts as a water filtering system, that provides the building with its own fresh water. The structure has the shape of textile in hanging cloths from the roof of the bubble. The building is cut off and allows the office workers to work with the view of the wetland just outside.

Strategic objectives that connect to the structure:

- Letting nature take space*      The bubble divides the office landscape and the wetland apart to allow nature to have their ecosystems unbothered.
- Reconnecting humans to nature*      Through allowing humans to work in a building that is closely connected to the nature of the wetland it creates an awareness of the life of non-human species and allows humans to responsibly care for nature in everyday life.
- Make flooding a positive scenario*      The water filtering structure is dependent on heavy rainfall and flooding for it to work correctly.
- Decolonizing infrastructure*      Through creating a local water management structure, the building will be able to be self-sufficient of clean water source. The structure also minimizes the risk of the water to become infused by wastewater or toxins.



This design implementation is placed on the utopian side in relation to the gradient of speculation, the structure is imaginable, utopian, and intangible.



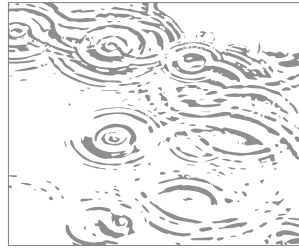
AI generated visualisation that inspired the design of the rain office show the structure of the water filtering system placed above the office.

The existing old spinning mill is used in this proposal and is transformed into the rain office. The building currently holds offices and other operations. To continue the purpose of reconnecting humans and nature, the office life is kept making this connection from an everyday perspective.





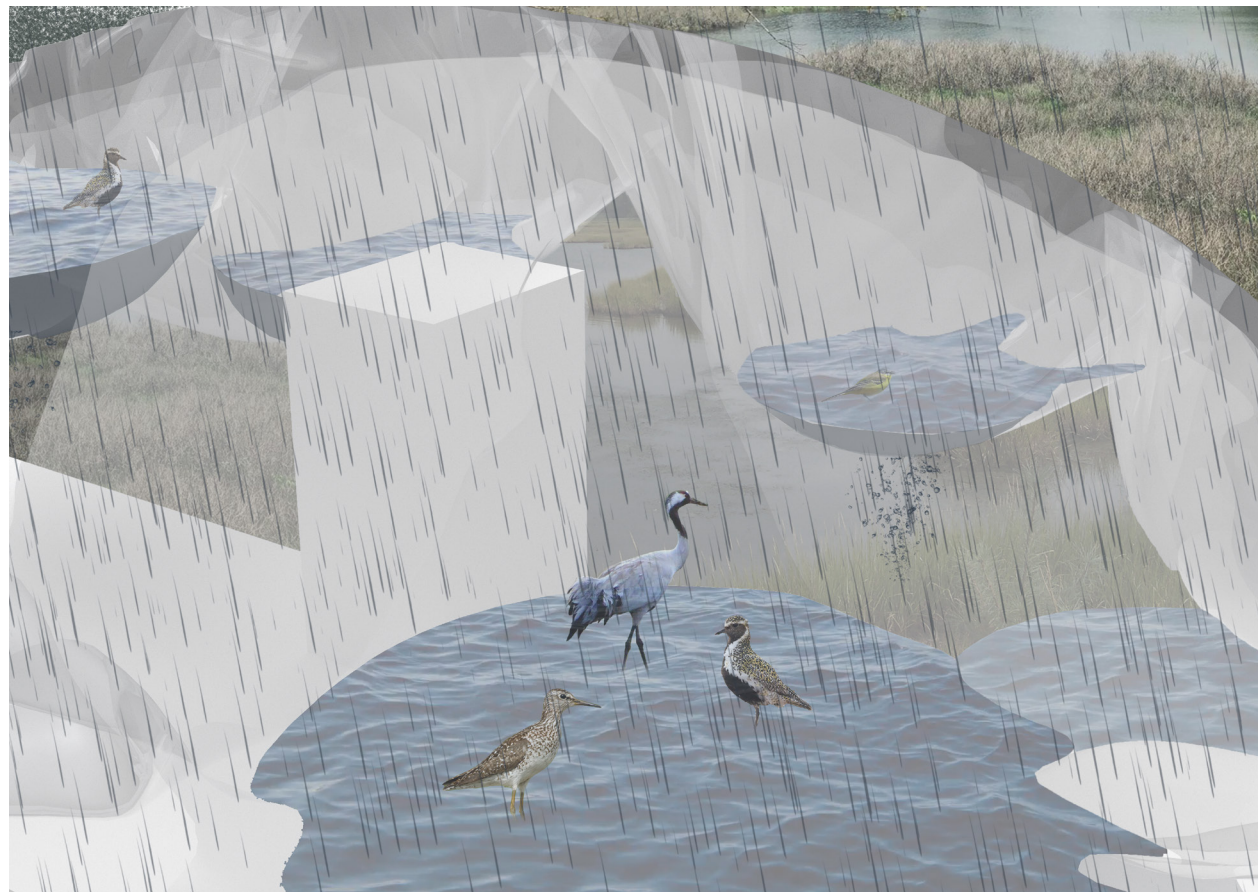
The rain office is inspired by water and the shape of rain hitting the water surface. Together with the material of textile, waterfilled cloths hang from the ceiling of the protective bubble.



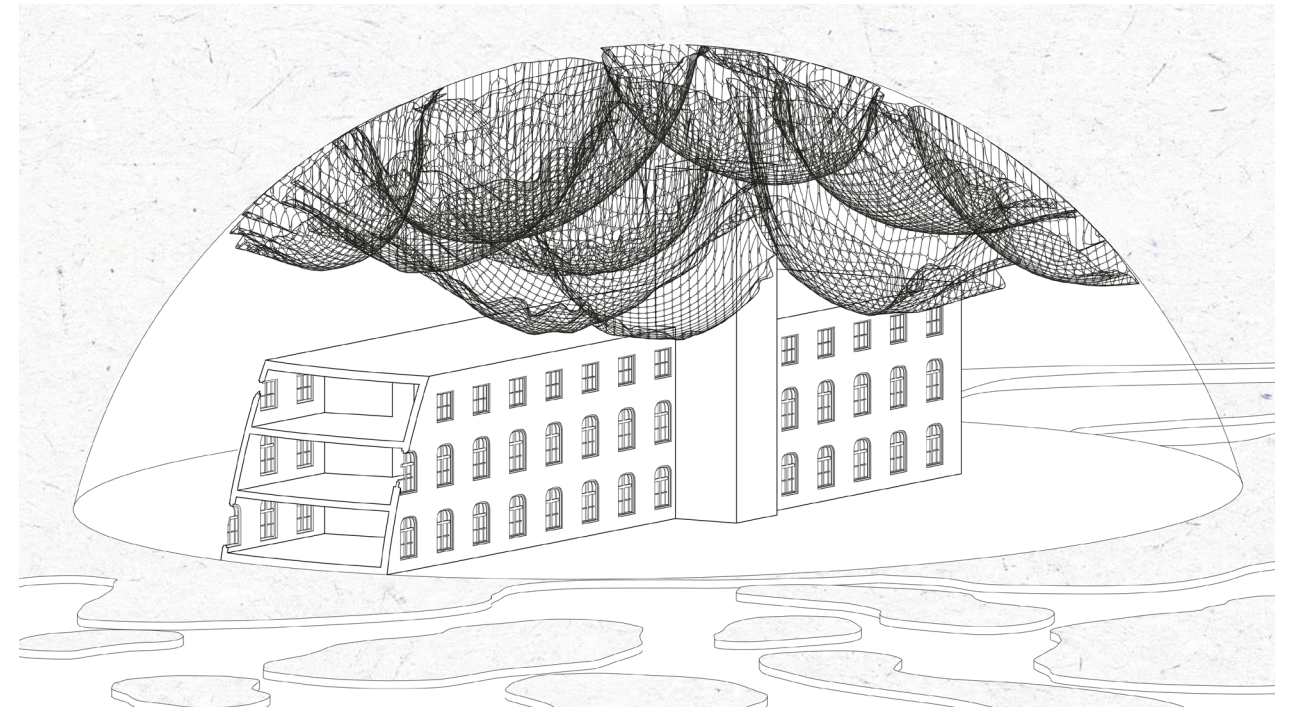
The story from the water perspective:



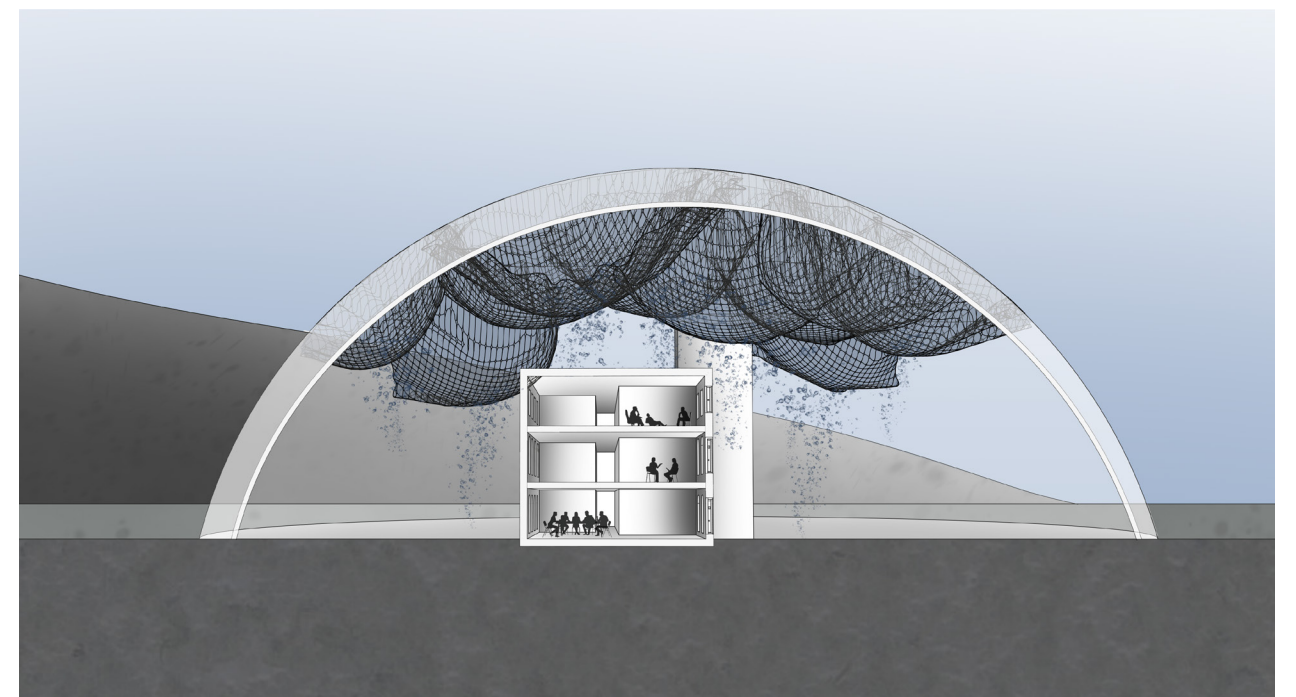
*I am waiting to be let out, to be free and then suddenly, I fall through the sky. Falling and falling the distance needed to hit something. I hit the soft fabric of cloths hanging and I land carefully together with my friends. There, we sit for a while, together we create a puddle of many of us. Sooner or later, slowly we fall again. Some of us into the next puddle, some into the system that brings us through that building. Some will be connected to earth once again.*



Scenes of life at the rain office. On top of the bubble protecting the building, birds have a perfect place for rest in the hanging cloths. Water is gathered in the cloths slowly being filtered through the cloths making their way to the building.

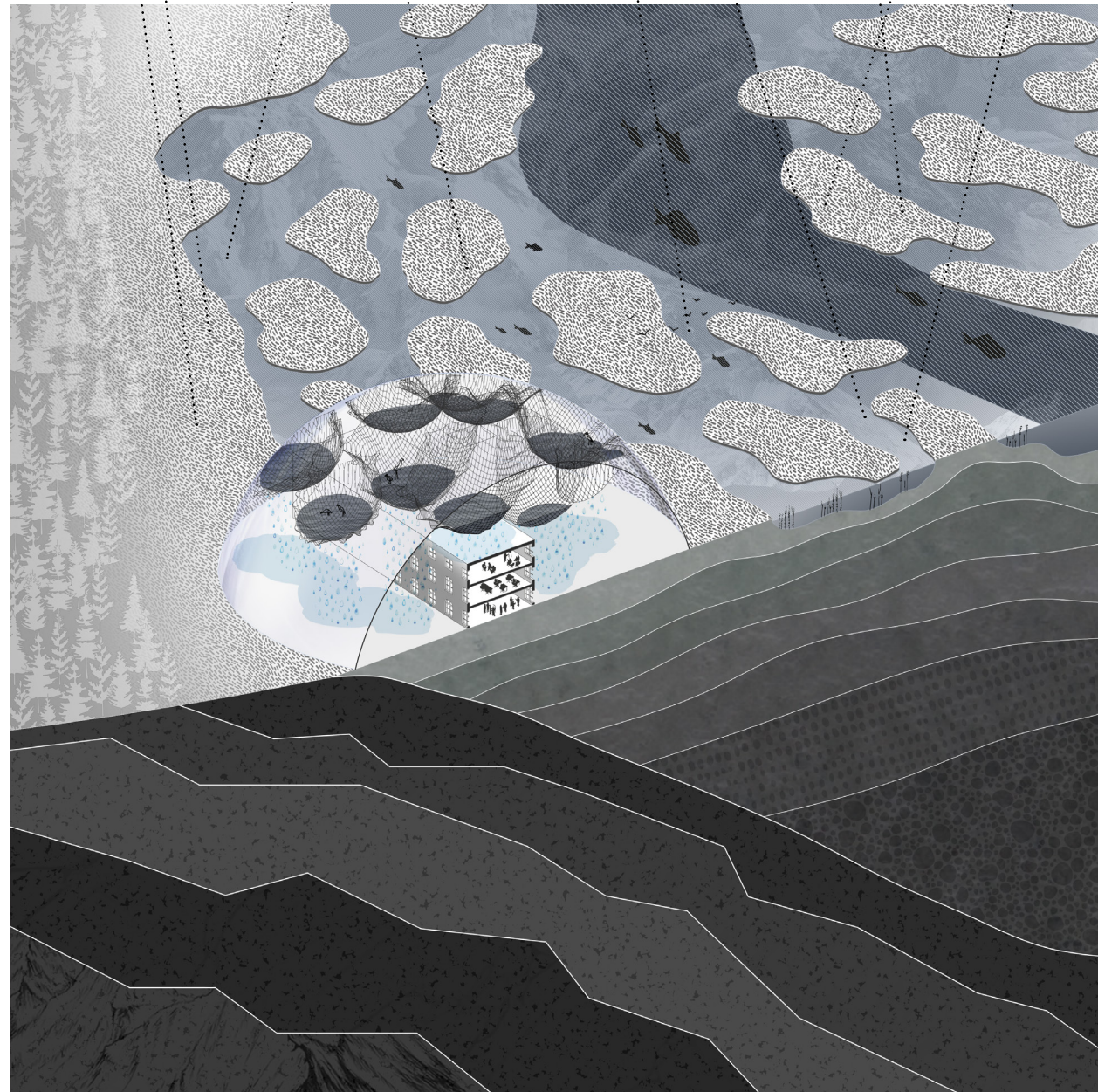


People are working just as in a regular office. One side of the building is cut off and allows for a big window directed to the nature of the wetland. Creating a visual contact to nature.



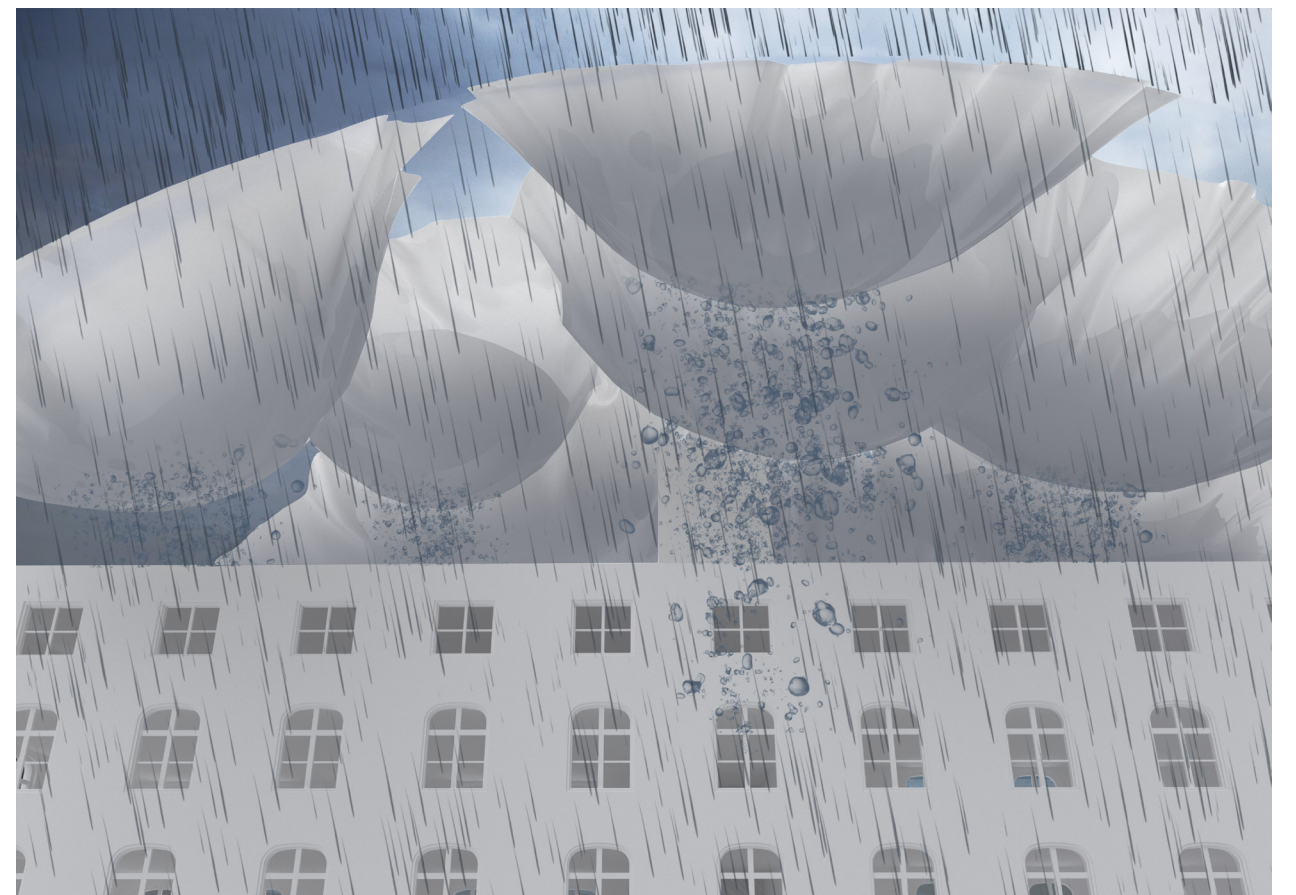
The rain office looks protected from outer life, rather the bubble surrounding acts as a structure holding the cloths in place. The material of the bubble is of transparent character both in visual and physical aspects. Allowing water to come through the bubble into the cloths.





Species that live close to the rain office.

Scenes of life at the rain office. The cloths act as a water filtering system that distributes the water to the building itself. The water in this design implementation is of important character, without water or rain the structure would not function. The built structures act as mediators of the connection between humans and nature, by the building for example acting as a distributor of clean water.







Discussion & reflection

## Discussion & reflection

The thesis has posed the following research question which I take as a starting point for discussion.

How can urban space be designed with nature as a tool to reconnect multispecies relationships, within the scenario of flooding in Borås, and provide reconciled space between them?

To reconnect humans to nature and establish a coherent relationship, theory and concepts about nature centred design has been investigated through literature studies, context analysis, AI exploration and sketches. Explored by means of speculative design these relationships have been presented through drawings that show how design can connect humans to nature. The design displays that Borås can allow for nature to take space in the urban fabric and still function as a city, but at the same time promoting a healthy multispecies relationship where both humans and non-human rights and opinions are considered equally.

### The relationship between humans and non-humans – as actors of the urban landscape

By rethinking the relationship between humans and non-humans from a post anthropocentric perspective, nature needs greater focus or needs to be lifted higher in the hierarchy of actors in design. By not only considering human rights and their interests in the built environment, nature can shine through and be allowed to have space where the rights of other species are considered. By designing collaborative situations humans are able to connect to nature in a more conscious way for example through swimming side by side with fish or ducks of the wetland. By questioning whose futures are being imagined, the often closed perception of the human perspective is opened to consider not only humans, and within the context of the case study, species of wetlands are naturally those who should be given space for foreseeable futures. This question opened a new way of thinking about nature, that allows for a collaboration rather than a design that mainly considers humans with nature as an add-on to the finalised design, which is often the case. Those add-ons are often forgotten or changed to a lower amount in the process of design and result in being dismissed totally or heavily reduced. The project aimed to not let this happen so instead of adding nature to the end, nature became the most central part of the project.

### Humans as part of nature

By seeing humans as part of nature instead of humans being detached from nature, new perspectives are made. Such perspectives make us rethink the normative connection usually presented, that humans and nature are not part of each other. In the proposal humans are part of the design, as well as nature is part of the design for it to function clearly. For example, the rain office would not function fully if humans did not use/work in the building. They are part of the circular system of water distribution to and from the building. The rain acts as a distributor, the structure as a filtering system, the building as a container, and the humans as the drainer of the water, in which the water is let out back into nature, in order for the wetland to be taken care of by its species and systems. The same goes for the public pool. Without humans, the connection is broken because the pure presence of humans contributes to the connection.

## Nature as a design tool

The thesis proposes a design that uses nature as a design tool following the concepts of biomimicry, biophilia and regenerative design, through considering the species characteristics and abilities, to form the functions and shapes of the design. By investigating the patterns and abilities of those species, mostly plants, they give inspiration for design with a softer tone and without any hard lines. The method of using nature as a tool has opened a new way of thinking about inclusive and caring design, by critically questioning and rethinking what shapes urban spaces can have and give to the environment. Seeing nature as a “model, measure and mentor” (Hargroves and Smith, 2006) is an easy way of rethinking the role of nature and how nature can be used as a tool. Believing that the limits of a natural system are guiding design is a great way of thinking, it allows for certain boundaries and can direct the design. For instance, water has its capabilities and limitations in which to manage itself. The fact that gravity pulls water towards the ground, the fact that water fills up at an equal level in everything it sits, the fact that it always desires to push out of the borders of what it holds within, and always seeks to be at equal level with itself, are examples of these. Nature is also used as a tool in considering the scenario of flooding as something positive, rather than negative. By changing this perception, it allows for the possibility of water to be part of the design and the pure occurrence of flooding becomes a key in the design. For example, the design of the rain office would not function if heavy rain and flooding were absent.

### Taking the rural into the urban

Contributing with a design that brings a rural landscape, like wetlands, into the urban, questions what the urban landscape can be and what a mix of rural and urban looks like. The design allows nature to take up space in the urban fabric and brings humans closer to nature. By doing so other urban areas become compressed and more densified, by pushing the city within certain limits when allowing space for nature, both benefiting from this design.

### Buildings as mediators for creating relationships between humans and nature

The aim to connect humans to nature implies the connection between their bodies and minds. Buildings and the built design act as mediators for this connection and the created relationships. The building is seen as an instrument for this connection, rather than the building itself being part of the connection and it acts as a translator. This means that the design is just one way of presenting this relationship.

### Storytelling as a tool for highlighting other possible futures and perspectives

By using the notion of storytelling other perspectives can be highlighted. There are many ways to tell stories. The thesis uses the voices of non-human beings to tell stories of possible futures. These perspectives open a new way of thinking about whom we design for and whose future is desired for. Architecture normally tells stories from the human perspective because the built environment mostly benefits the human needs and desires. When rethinking the



points of view of others can be highlighted. The stories told in the design are the ones from the perspective of nature and particularly from birds, water, and plants. Both through narrative drawings and snippets of written stories these perspectives are shown. The story can bring an awareness to the fact that the design does not only affect humans, and that design is not only for humans, but for nature too. This way of telling stories seeks to be just as self-evident as stories told from a human centred perspective.

Decolonizing infrastructure

By decolonizing infrastructure, the design promotes circular systems of distribution. For example, the structure of the rain office is a decolonized water distribution system that both filters rainwater but also supports the water system of that building, creating a local connection to the system, and a connection between nature and humans. Another example of a decolonized infrastructure is to see nature as an infrastructure. By protecting nature in the constructed wetland a projection of the future is made and by promoting that nature of this type will be preserved the design creates a decolonized nature and human relationship.

### Care and sensitivity in architecture

The importance of care and sensitivity in architecture is something I've learned since starting this project. To be able to allow for a world where nature can thrive and for an interconnection between nature and humans in an environmental justice perspective, the care for the nature around us and a sensitivity toward their systems is required. By understanding their (fragile) environments that are easily rubbed by human activity, it is important to also understand what type of human activity is allowed to not disrupt natural ecosystems. But at the same time still allow for human life to continue having a certain comfort. Also, when the designer shows the ethical, aesthetic, and technical choices made in the design a shared responsibility arises.

### Reflection upon the process

The purpose of the project was at first not clear. The beginning was a time for investigating and searching in the form of literature studies, reference projects and context, together with sketches where ideas could be visualised to gain understanding of what the thesis was supposed to investigate. The process of clearing the outlines of the thesis, the purpose and the size of the project was made through time of working with the thesis. With time the project slowly reached its form and by sorting in the theory, rewriting it, using the most important parts of the context analysis and with the help of AI generated visualizations it became clearer what the design could be. With the speculative approach used, the goal of design was not clear in the beginning. Theory was needed to understand what type of design could happen. One useful thing to do to drive the design forward was to remove such things that was not important, and this took a lot of time, both to understand what was important or not and to have the courage to remove it. But also, to be brave in exploring design when there was no tangible base for it. The process guided the design as well as the design guided the process, the first in the earlier part of the thesis and the second in the later part. Investigating speculative design through theory and also sketches and design, was a trial-and-error process. Because there

are not many measurable tools to understand what speculative design can be, this was something that I needed to decide for myself and with the help of the diagrams used in the thesis. I recognised myself with an inner conflict of how speculative or tangible the design should be, and if the range them in-between was enough for the design to be speculative. On one hand the design was too speculative, and I continuously came back to more tangible designs, and when realizing it had no speculation to it, this loop continued all over again. This resulted in the implementations having different amounts of speculation, which was a great way to present the multipurpose of what speculative design can be.

### What have I learnt?

There is a need to rethink the relationship between humans and non-humans, and this relationship needs to shift from a thinking of the human superior to nature, to a more equal species placement of all species involved. Humans should equal nature.

Depending on context different approaches are to be made dealing with the problem of the imbalance between nature and humans. In this thesis, the context of a former wetland is the key to approach the injustice of nature, by restoring that wetland and taking back nature.

This project has made me realize that I care more about a healthy planet and a promising positive future than that human unsustainable actions continue. Sustainability goes beyond the individual thinking, in the sense of that humans often are seen as an individual species, detached from others. This means that we need to think of humans as part of the collective relationships' nature holds.

Concerning individual thinking, a collective mindset is needed for a multispecies collaborative future to function. If one part does not want to collaborate, it risks being left out or take over (depending on what species, humans take over and nature is left out) but it is important that those who can speak, do so for those who cannot which implies that humans need to speak for nature.

There has always been an interest of mine in sustainability, and to learn how I can use the profession of architecture to create truly sustainable environments where both current and coming generations can live happy within. While I often find myself asking if methods used with the goal of sustainability, really reach that goal, it was interesting to investigate this topic in my thesis and contributing to the discussion of multispecies relationships in a post anthropocentric view. The result of the thesis points to the possibility to reach this sustainability beyond the norm and it becomes an important motivation for design in my profession as an architect, to be able to create such environments where I know the planet can not only survive but also thrive with its assemblages of species and relationships.

## Reference list

Adelfio, M., Hamiduddin, I. & Miedema, E. (2021). *London's King's Cross redevelopment: a compact, resource efficient and 'liveable' global city model for an era of climate emergency?*. Urban Research & Practice. <https://doi.org/10.1080/17535069.2019.1710860>

Adelfio, M., Kain, J., Stenberg, J. et al (2022). *Towards a systemic understanding of compact city qualities*. Journal of Urban Design, 27(1): 130-147. <http://dx.doi.org/10.1080/13574809.2021.1941825>

Borås stad. (n.d.-b). *Borås stad*. <https://www.boras.se/>

Borås stad. (2021a). *Biologisk mångfald i Borås stad*. <https://www.boras.se/download/18.12da25ec1868eaf959e133cb/1677508303826/Biologisk%20m%C3%A5ngfald%20i%20Bor%C3%A5s%20Stad%20TA.pdf>

Borås stad. (2021b). *Stadsbyggnadsprogram för Borås, Staden vid parken, Stadsplanering på ett nytt sätt - igen!*. <https://www.boras.se/download/18.3ce79020177db5c897ddda21/1631189214825/Stadsbyggnadsprogram%20f%C3%B6r%20Bor%C3%A5s%20Staden%20vid%20parken.pdf>

Borås stad. (2019). *Utbyggnadsstrategi 2018-2035*. <https://www.boras.se/download/18.2e4f2177173eb3556d49146d/1601548802899/Utbyggnadsstrategi%202018-2035,%20antagandehandling.pdf>

Borås stad. (2018). *Översiktsplan för Borås*. <https://www.boras.se/download/18.b2d2133162e1dd801e7b0bc/1524730020068/%C3%96versiktsplan%20f%C3%B6r%20Bor%C3%A5s.pdf>

Borås stad. (n.d.-a). *Våtmarksprojekt för att gynna biologisk mångfald och klimat*. <https://www.boras.se/hallbarutveckling/vardao ochbevaravarmiljo/varda ochbevaraskogochmark/vatmarksprojektforattgynnabiologiskmangfaldochklimat.4.435b992f1864a38c8aec81e3.html>

Bryant, M., Allan, P., & Kebbell, S. (2017). *A Settlers' Guide: Designing for Resilience in the Hinterlands*. Buildings, 7(4), 23. MDPI AG. <http://dx.doi.org/10.3390/buildings7010023>

Chowdhury, S., Kain, J., Adelfio, M. et al (2020). *Greening the Browns: A Bio-Based Land Use Framework for Analysing the Potential of Urban Brownfields in an Urban Circular Economy*. Sustainability, 12(15)

Curley, A. (2021). *Infrastructures as colonial beachheads: The Central Arizona Project and the taking of Navajo resources*. Environment and Planning D: Society and Space, 39(3), 387–404. <https://doi.org/10.1177/0263775821991537>

Doucet, I. (September 2019). *Anticipating Fabulous Futures*. e-flux architecture. <https://www.e-flux.com/architecture/overgrowth/284918/anticipating-fabulous-futures/>

Doucet, I. (2022). *Architectural storytelling: A Space between Critical Practice and Fragile Environments*, *Infrastructural Love: Caring for Our Architectural Support Systems* (pp. 37-51). Birkhäuser.

Erixon Aalto, H., & Ernstson, H. (2017). *Of Plants, High Lines and Horses: Civics and Designers in the Relational Articulation of Values of Urban Natures*. *Landscape and Urban Planning*, 157, 309–321.

Fricot, H., Carbonell, A., Frykholm, H. & Karami, S. (2022). *Infrastructural love: Caring for Our Architectural Support Systems*, *Infrastructural Love: Caring for Our Architectural Support Systems* (pp.11-35). Birkhäuser.

Hargroves, K. & Smith, M. (2006). *Innovation inspired by nature: Biomimicry*. ECOS. 129. 27-29. [10.1071/EC129p27](https://doi.org/10.1071/EC129p27)

Harriss, H., & House, N. (Eds.). (2022). *Design Studio Vol. 4: Working at the Intersection: Architecture After the Anthropocene* (1st ed.). RIBA Publishing.

Ghosn, R. & Jazairy, E. H. (2018). *Telling Geostories: We Are All in it Together: by Design Earth*. New York and Barcelona: ACTAR Publishers.

Grooten, M. & Almond, R.E.A.(Eds.). (2018). *Living Planet Report - 2018: Aiming Higher*. WWF, Gland, Switzerland. [https://c402277.ssl.cf1.rackcdn.com/publications/1187/files/original/LPR2018\\_Full\\_Report\\_Spreads.pdf](https://c402277.ssl.cf1.rackcdn.com/publications/1187/files/original/LPR2018_Full_Report_Spreads.pdf)

Guneri, G. D. (2020). *Peter Cook Beyond Archigram: Towards a Critical Utopianism*. Prostor 28[2020] 1[59], 130-141. <https://hrcak.srce.hr/file/348278>

Hardingham S. (2016). *Cedric Price Works 1952-2003, A Forward-Minded retrospective – Volume 2: Articles & Talks*. Architectural Association and Canadian Centre for Architecture.

Healey, R., Pepper, A. (2021). *Interspecies justice: agency, self-determination, and assent*. Philos Stud 178, pp. 1223–1243

Hes, D., du Plessis, C. (2015). *Designing for hope*. Routledge.

Hofstad, H. (2012). "Compact City Development: High Ideals and Emerging Practices." European Journal of Spatial Development 1 (1): 1–23.

Kopnina, H & Washington, H. (2020). *Conservation: integrating Social and Ecological Justice*. Springer.

Leguin U. (2015), 97. *Utopiyin, Utopiyang*. Online: <https://www.ursulakleguin.com/blog/97-utopiya-in-utopiya-ang>

Länsstyrelsen västra götalands län. (2018). *Naturbaserade lösningar mot översvämning, en praktisk handbok*. Short version of report 2018:13 ISSN 1403-168X. <https://www.lansstyrelsen.se/download/18.ac13c73166789a7547c9d/1539693509125/klimatanpassning-naturbaserade-losningar-kort.pdf>

Myndigheten för samhällsskydd och beredskap (MSB). (2012). *Översvämningar i Sverige 1901-2010*. <https://www.msb.se/RibData/Filer/pdf/26098.pdf>

National Geographic. (No date). *Anthropocene. Encyclopedic Entry*. Online: <https://education.nationalgeographic.org/resource/anthropocene/>



Naturvårdsverket. (n.d.-a). *Effekter i Sverige*. <https://www.naturvardsverket.se/amnesomraden/klimatforandringar/klimatet-i-framtiden/effekter-i-sverige/>

Naturvårdsverket. (n.d.-b). *Så minskar växtlighet översvämningar i staden*. Short version of report 6736. <https://www.naturvardsverket.se/contentassets/d05a57b0c92341a2b315ec9b23a8d2fe/978-91-620-6736-kort-faktablad-argumentekosys.pdf>

Naturvårdsverket. (2011). *Svenska tolkningar natura 2000 typer, Våtmarker 7110-7320*. <https://www.naturvardsverket.se/4a62f7/contentassets/314d0c514b-614f52901c298a9c6bec97/myrtolkningar-2011.pdf>

Romani, A., Casnati, F., Ianniello, A. (2022). *Codesign with more-than-humans: toward a meta co-design tool for human-non-human collaborations*. *European Journal of Future Research*. <https://doi.org/10.1186/s40309-022-00205-7>

Sundberg, S., von Wachenfeldt, E. (n.d.). *Våtmarkerna och deras arter*. SLU Art-databanken. <https://www.naturvardsverket.se/contentassets/845db9471d8a4d-6c9a996f36d31e2314/1.-vatmarkerna-och-deras-arter---slu.pdf>

Sustainable Development Solutions Network. (2022). *Europe sustainable development report 2022, achieving the SDG:s Europe´s compass in a Multipolar world*. <https://s3.amazonaws.com/sustainabledevelopment.report/2022/europe-sustainable-development-report-2022.pdf>

Sutton-Grier, A. & Wowk, K. & Bamford, H. (2015). *Future of our coasts: The potential for natural and hybrid infrastructure to enhance the resilience of our coastal communities, economies and ecosystems*. *Environmental Science & Policy*. 51. 137-148.

Tsing, A. L. (2017). *Arts of Living on a Damaged Planet : Ghosts and Monsters of the Anthropocene*. University of Minnesota Press.

Tsing A. (2015). *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton, NJ: Princeton University Press

United nations. (n.d.). *The 17 goals*. <https://sdgs.un.org/goals>

Wautelet, T. (2018). *Exploring the role of independent retailers in the circular economy: a case study approach. Thesis for: Master of Business Administration*. European University for Economics & Management, Luxembourg.

Wright, T. (22 oktober 2020). *More-than-human design: rethinking agency and sustainable practices*. UX Collective. <https://uxdesign.cc/more-than-human-design-rethinking-agency-and-sustainable-practices-926d580d5311>

WWF. (n.d.). *Projekt våtmarker*. <https://www.wwf.se/projekt/vatmarker-i-sverige/>



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