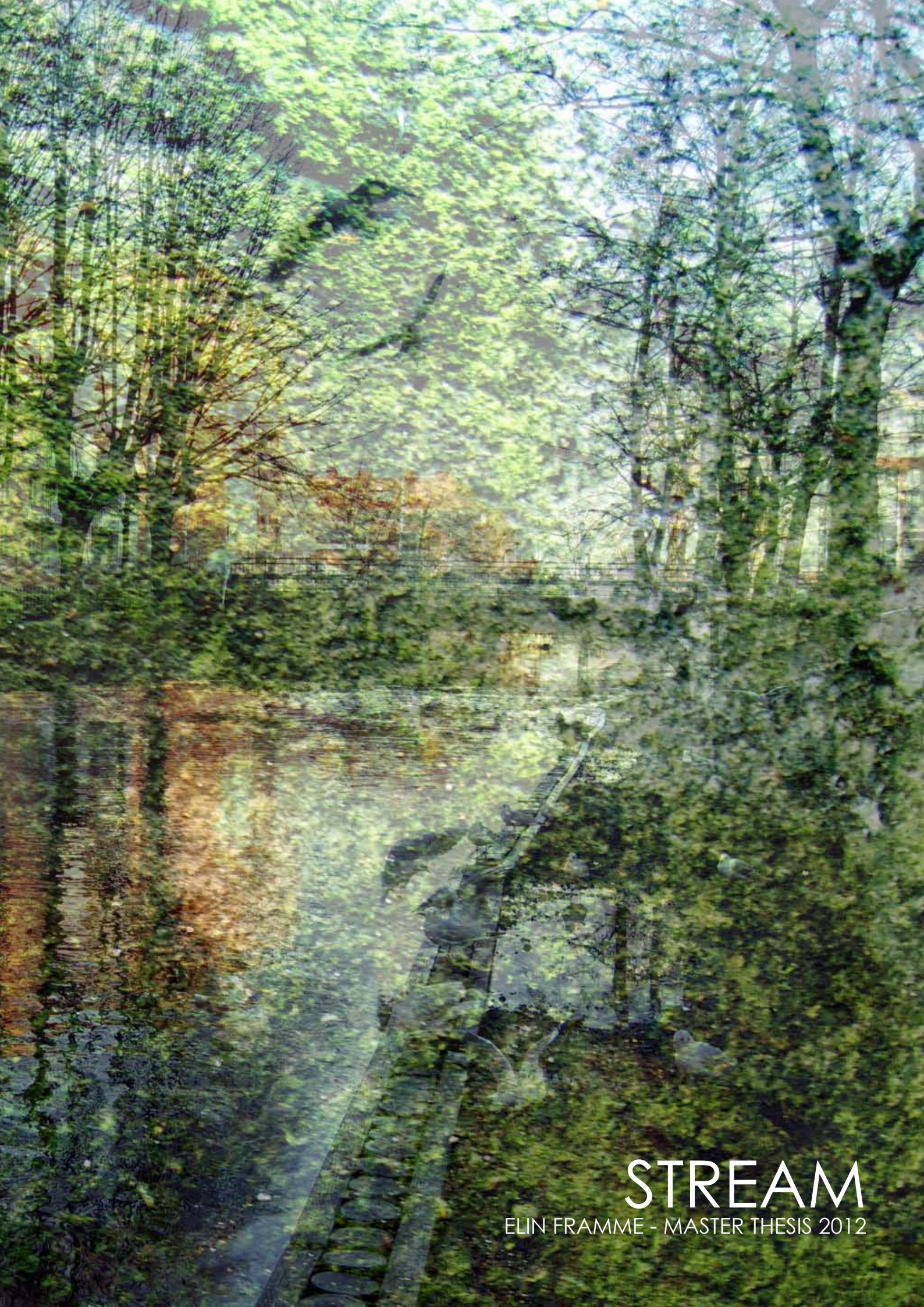

STREAM

ELIN FRAMME - MASTER THESIS 2012

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Stream

Aims and objectives

The master thesis contains a bicycle and pedestrian trail that facilitates access to two urban streams in Göteborg - Mölndalsån and Säveån - and to the nature and areas surrounding them.

The aim is to upgrade and re-evaluate urban nature in this forgotten area. The streams could be attractions and excursion goals, which relates to a sustainable "local tourism" strategy. The new trail provides local recreation, poetical dimensions and experiences of nature and water, and at the same time work as commuting links and social connectors between urban districts.

I have worked with a greater urban strategy, with connections between urban districts and to the streams and on a more local scale focused on a botanical water garden and its design of intimate situations aiming to experience nature.

The title of the project – *stream* – could mean
~ A natural body of running water flowing on or under the earth
~ A dominant course of successive events or ideas, eg. "stream of consciousness"
which is symbolic to the physical and psychological situations I want to create along the trail.

The trail is situated in an urban context, where people easily can access it and where the trail itself can contribute to linking different areas in the city and increase urban integration. The site chosen is where two urban rivers in Göteborg, Mölndalsån and Säveån, meet and enter Göta älv. Links to surrounding areas – Stampen, Olskroken and Ringön/Tingstadsvass – are established or improved. Possibilities to travel from e.g. Gamlestaden, Kortedala and Bergsjön to the central city, with bike or by foot and in close connection to the streams, will be created.

Touch/Smell/Presence

Proximity/Attainability

Proximity/Distance/Attainability/Flooding

The project is discussing issues on an urban scale while still providing the poetics and qualities of specific spaces, relating to a sensorial nerve, often lost while presenting urban scenarios. This poetic dimension might entail:

- Exploration of seeing and moving from above, from the side, through, inside, over, on, next to and underneath.

- Elaboration of light and darkness investigating light, shadows and reflections in relation to water, landscape and vegetation.

- Providing possibilities to touch, where water, vegetation, and parts of the natural and artificial environment can be touched and thus increase understanding of environmental processes or evoke sensorial experiences.

- Enhancing orientation through spaces and ultimately making sense in this scattered area.

- Exploring natural materiality – e.g. wood, stone and gravel, water, mud and living or dead vegetation, and artificial materiality – e.g. metal, asphalt and concrete. Exploring opposites like soft and hard, cold and hot, smooth and rough, natural and artificial in materiality.

- Revealing and making use of forgotten, neglected and interesting places like parts of the streams; flood banks; spaces under bridges and passages; spaces on bridges; culverts; industrial remains; railway remains; framing views and revealing and making use of height differences.

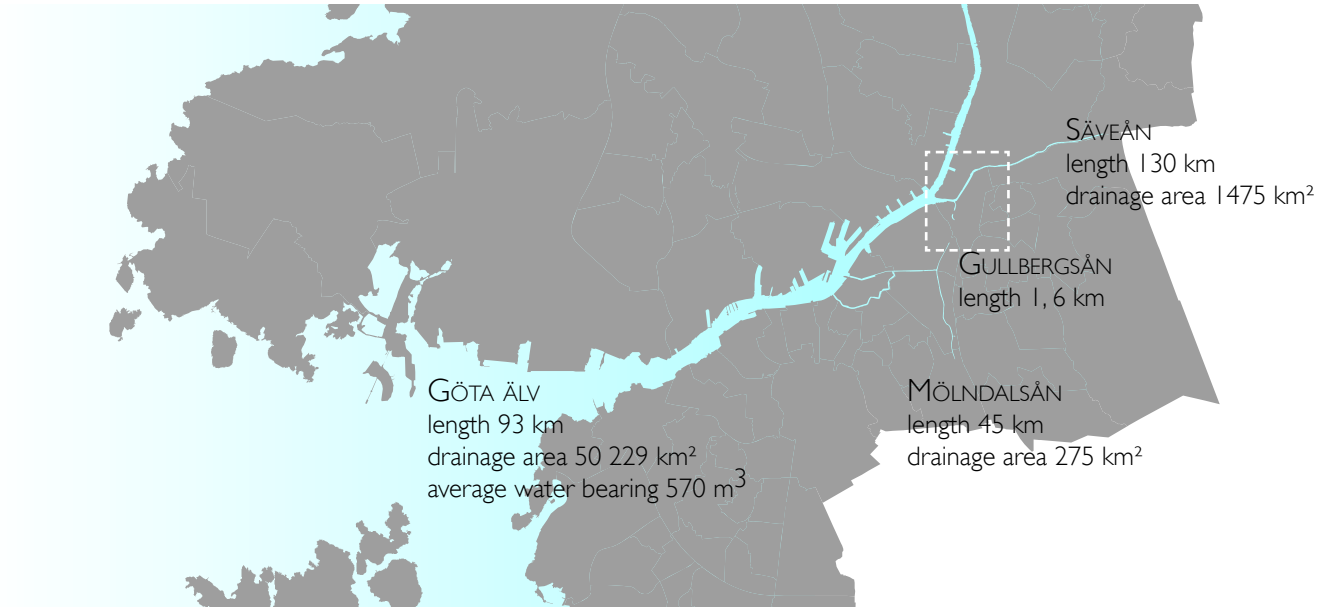
- Exploring references to flooding – certain things or areas visible and/or attainable when it is or is not flooded, references to water level heights e.g. in levels, type of vegetation, walkways, floating elements and changing movement pattern when flooded.

Methods

- Case studies of projects with similar conditions, similar methods and/or similar aims.
- Field studies of the site and situation, processed in mapping, diagrams and images
- Sketching through modelling, drawing, painting and writing. This is made to study concept, function, space, volume, landscape and connections
- Literature and field studies of functions – how they work and what they require.

Background

Gullbergsån, Mölndalsån and Säveån are all part of an important watershed that flows through both natural and urban areas. It has important ecological values with water cleaning abilities, flood retention and is an essential and unusual habitat to a wide range of species. It has historical values from the industrialised era when it was used for e.g. transport and water supply. But maybe most importantly, it has great human values – its streams act as sanctuaries in the urban pattern and provide reflection, recreation and bring nature and wildlife to the city.



However, whereas the streams are highly valued and protected in their rural origins, their presence and importance in urban areas are neglected and underestimated in favour of development and infrastructure. Why are these streams, with their extremely central location, recreational and environmental values and by many appreciated existence, not treated better and made advantage of? Why are all the interesting encounters between natural and urban not highlighted? Why is their outlet into Göta älv inaccessible? Why is prime recreational land going to waste when it could be one of the most interesting and beautiful areas in the city?

Mölndalsån starts its course in the municipality of Bollebygd south of Göteborg, and flows through Härryda, Mölndal and finally Göteborg, where it divides into Fattighusån and Gullbergsån. The latter eventually unites with Säveån and enter Göta älv. Mölndalsån passes several types of nature, such as wetlands, forests and floodplains, and goes from natural to urban in Mölnlycke, Mölndal and Göteborg. The wildlife in its early parts is very rich and varied. (Vattenmiljöer i Mölndalsåns avrinningsområde - en resurs för människor och ekosystem, 2011)

Gullbergsån, on the other hand, only flows through urban areas, and passes housing areas, roads, railways, tramways and the massive traffic chaos south of Tingstadstunneln. Its stream banks are to a great part canalised and levees have been constructed in the final parts to protect surrounding areas from flooding, which has been frequent in the recent years (Vattenmiljöer i Mölndalsåns avrinningsområde - en resurs för människor och ecosystem, 2011). The stream flows in a culvert for about 800 meters, about half its course, which makes Gullbergsån inaccessible and totally disconnected. The wildlife seems to be rather poor, with the exception of some birds, probably because of embankments, culverts and controlled water flow. Nonetheless, the accessible part of Gullbergsån seems to be highly appreciated in terms of e.g. walking on the riverbanks and feeding the birds.

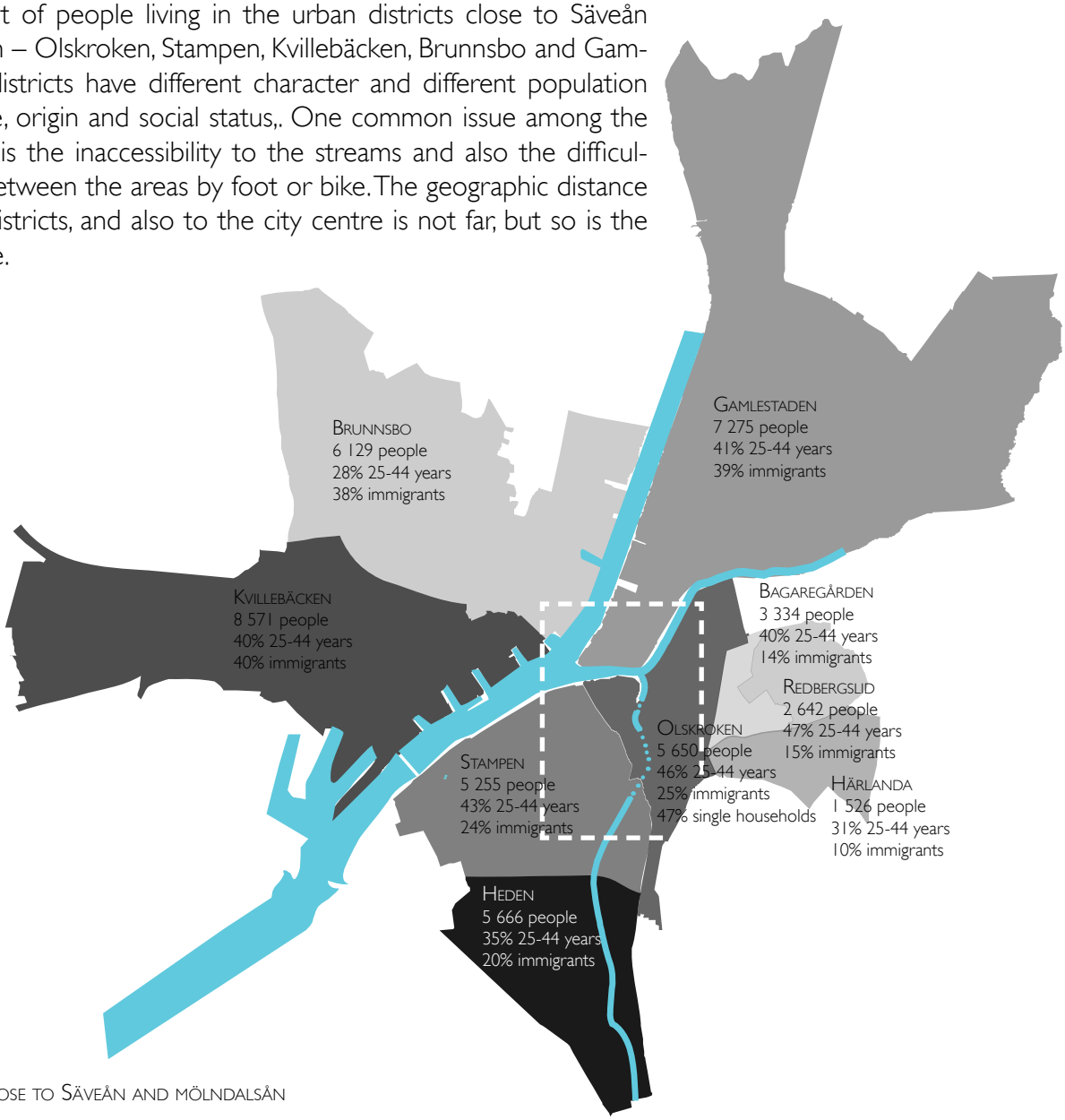
Historic course of the streams

Säveån is substantially bigger than Mölndalsån, and originates in Borås and Vårgårda, east of Göteborg. The stream flows through Alingsås, Lerum and Partille before it reaches Göteborg and Göta älv. Similarly to Mölndalsån, it has important natural habitats and several rare animal species, and is protected according to Natura 2000 directives (Fakta om Göta älv: En beskrivning av Göta älv och dess omgivning 2005, 2006). From Partille and downstream, almost all of the surrounding areas are developed with roads and railway, housing complexes and industrial activity. Two of the most important industrial influences are Renova/Sävenäs, a waste treatment plant, and SKF, a ball bearing factory (Fakta om Göta älv: En beskrivning av Göta älv och dess omgivning 2005, 2006). Säveån is an attractive, accessible and well-kept recreational area from its origins downstream to Gamlestaden. But from this point, it becomes highly inaccessible and neglected and is mainly dominated by industrial activity, often in close connection to the stream. Other great influences are railways, tramway and roads, in particular the new road connection Partihallsförbindelsen, which covers large parts of the riverbanks and also stretches over Säveån at several points.

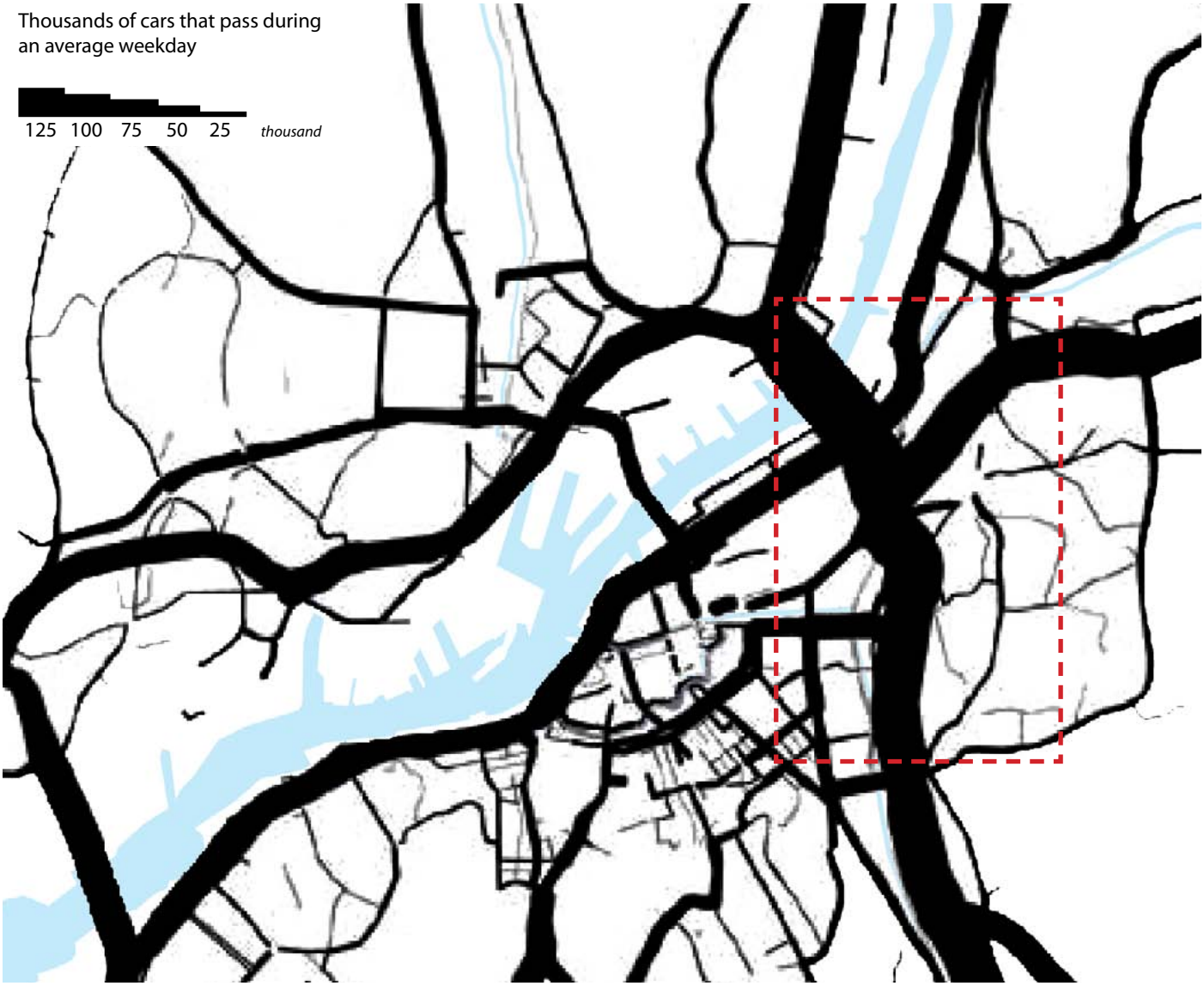
Even though nature and wildlife in and along these streams often is mistreated and pushed away, some animals and plants manage to survive under these circumstances and even to prosper – the urban wildlife can mean that there are alternative food sources, a slightly warmer climate, runoff water and stream currents that protect from ice formation, industrial remains that serve as hiding and nesting spots and so on. Especially some birds seem to manage well in urban conditions, whereas e.g. amphibians have a harder time. This special relationship between nature and urban conditions is extremely interesting, and is another argument of the importance of urban nature and why we should look at it differently than "natural" nature.

Surrounding districts

There are a lot of people living in the urban districts close to Säveån and Mölndalsån – Olskroken, Stampen, Kvillebäcken, Brunnsbo and Gamlestaden. The districts have different character and different population in terms of age, origin and social status,. One common issue among the urban districts is the inaccessibility to the streams and also the difficulties to move between the areas by foot or bike. The geographic distance between the districts, and also to the city centre is not far, but so is the mental distance.

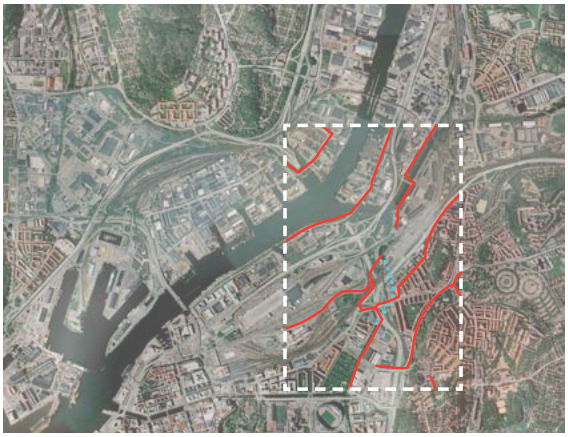


Urban districts close to Säveån and mölndalsån



Traffic

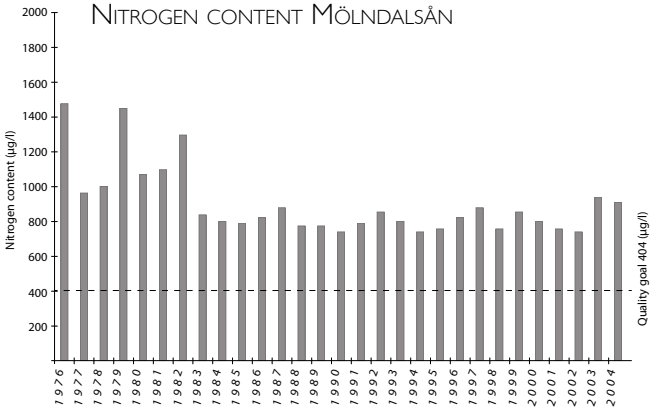
Huge roads and railways pass over and next to Säveån and Mölndalsån, and industrial activity surround the streams. Tingstadstunneln, a passage under the river Göta älv for the highway and the most frequented traffic node in Göteborg with approximately 125 000 cars per day, (figure from Trafikkontoret, 2005) is situated in close relation to the streams, naturally affecting the area in many ways, but most of all affect the accessibility to the streams and within the area in general.

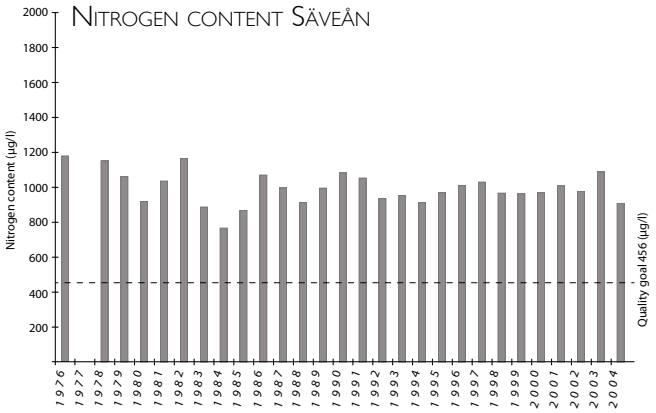


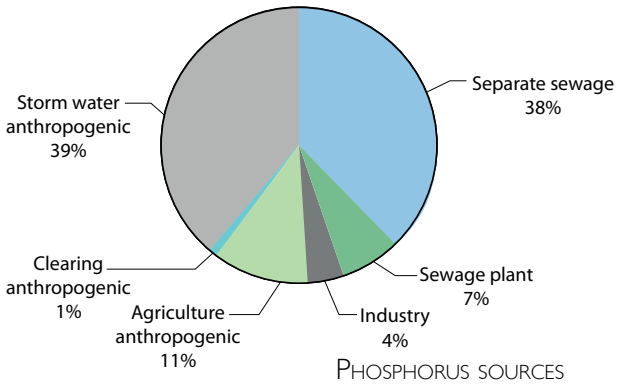
Biking or walking possibilities close to the streams are poor and often interrupted, and you have to pass through rather unsafe and traffic-influenced areas. Following the course of the streams is hard, since part of Mölndalsån during the 60s was buried under the highway in culverts. When moving close to the streams without car you have to walk under roads, you always move at a distance from the stream, not seeing the water, and reaching the water and the waterside is difficult because of fencing and canalisation and resting possibilities along the course are rather poor.

Eutrophication

Gullbergsån, Mölndalsån and Säveån have problems with eutrophication. High levels of nutrients like phosphorus and nitrogen cause faster overgrowth of vegetation and algae, which leads to oxygen poor water environments and loss of species. Nitrogen seems to be the greatest influence on eutrophication in the area. The nitrogen con-





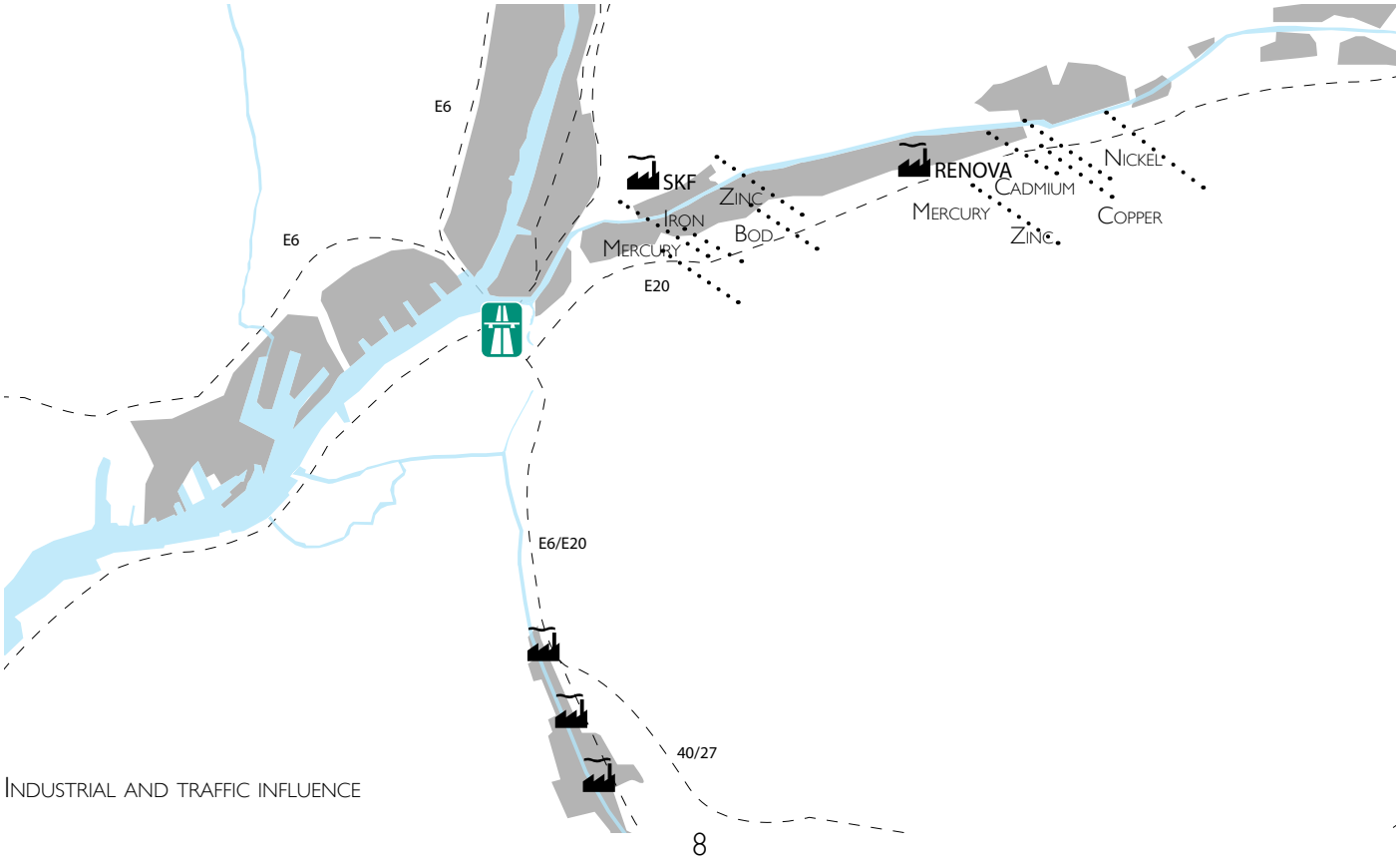


Phosphorus sources

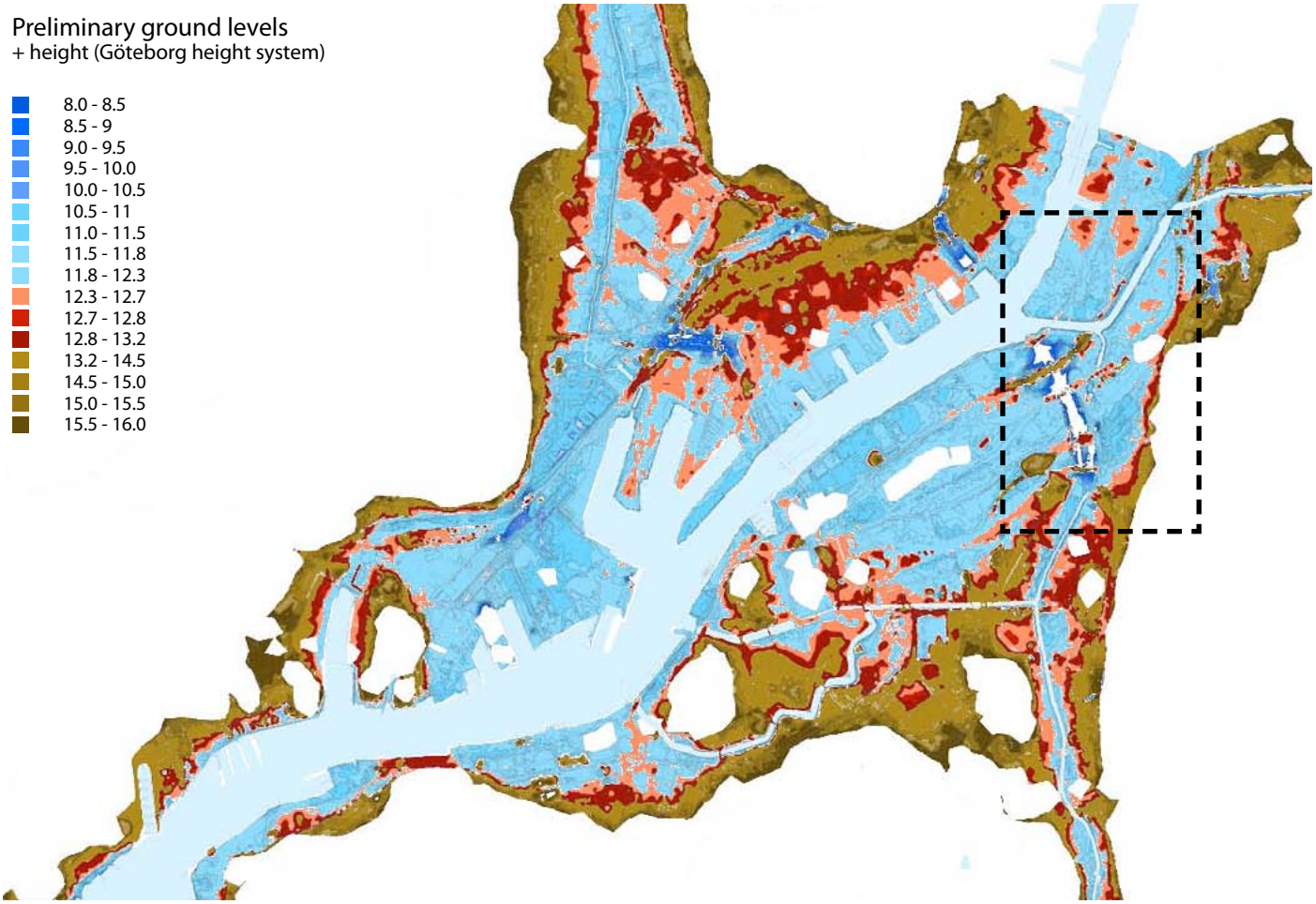
tent in Mölndalsån and Säveån is more than twice as high as the desired levels. The emissions come from atmospheric precipitation as well as from e.g. agriculture and air pollution from traffic. The human contribution to nutrient overload in the area is high – 46% of the phosphorus content derives from human activity. The greatest sources are private sewage systems and storm water runoff, naturally with high levels of storm water runoff in areas with dense development and road structure. (Vattenmiljöer i Mölndalsåns avrinningsområde - en resurs för människor och ekosystem, 2011)

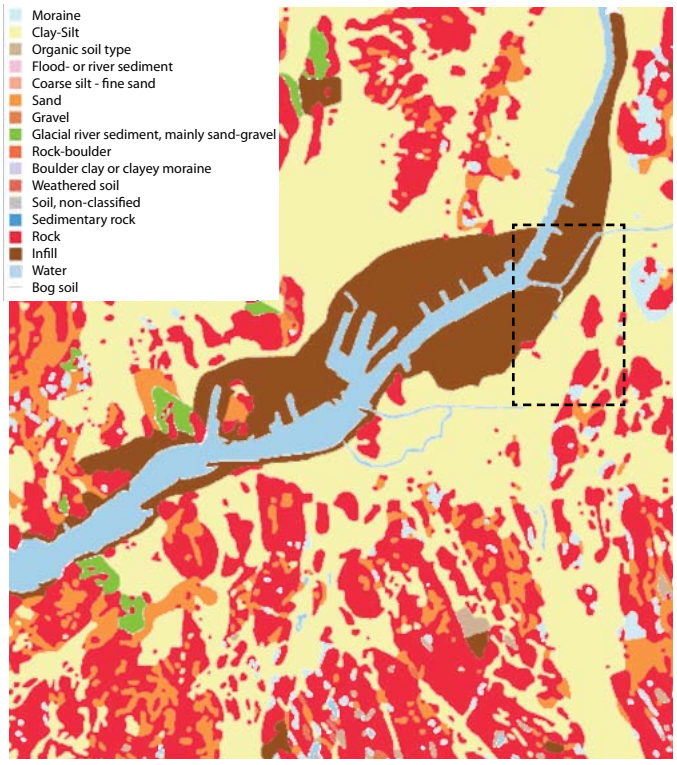
Environmental toxins

Another problem is environmental pollutants and toxins. There are a great number of contaminated areas within the watershed – the industrial activity along Mölndalsån and Säveån has been important through history and some polluting industrial activity still remains. Other possible sources are old waste deposits. Even though a lot of the industries have been shut down or improved in terms of emissions, the ground still remains contaminated. Roads and paved surfaces mean fast and significant storm water runoff, which dissolves and carries contaminants to the streams. Detected contaminants in the area are metals like cadmium, nickel, chrome, zinc, mercury, lead and copper, industrial pollutants like dichloromethane, tetrachlorethylene, aromatic hydrocarbon, benzene and naphthalene and pesticides from agricultural activity. (Vattenmiljöer i Mölndalsåns avrinningsområde - en resurs för människor och ekosystem, 2011)



Industrial and traffic influence



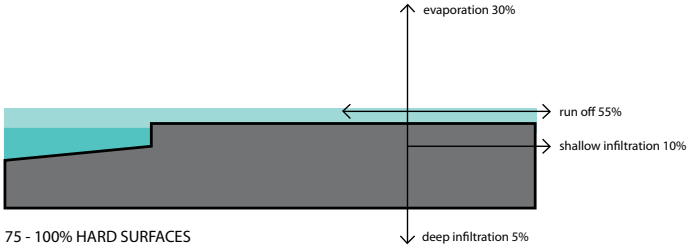


SOIL TYPES

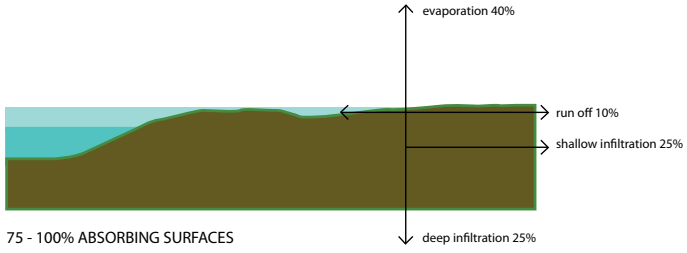
FLOODING

An additional issue in the area is flooding. As for the pollutants, a cause of this is greater development of buildings and roads along the streams and on natural flood plains, where paved surfaces obstruct water from infiltrating the ground and lack of vegetation means no absorption nor retention of runoff water. Other causes are altered water courses of the streams, canalized and artificial stream banks, embankments and altered height of the streams that change the water speed and natural fluctuations, as well as bridge foundations in the streams. (Vattenmiljöer i Mölndalsåns avrinningsområde - en resurs för människor och ekosystem)

Studying soil types in the area, it is apparent that a great part of the downstream area is made up from infill volumes. The content of this soil might be concrete, metal, asphalt and brick and usually very little organic matter, consequently this infill soil has very low absorption ability (STORSTADSSPECIFIKA RIKTVÄRDEN FÖR MALMÖ, GÖTEBORGS OCH STOCKHOLMS STAD, 2009).



75 - 100% HARD SURFACES

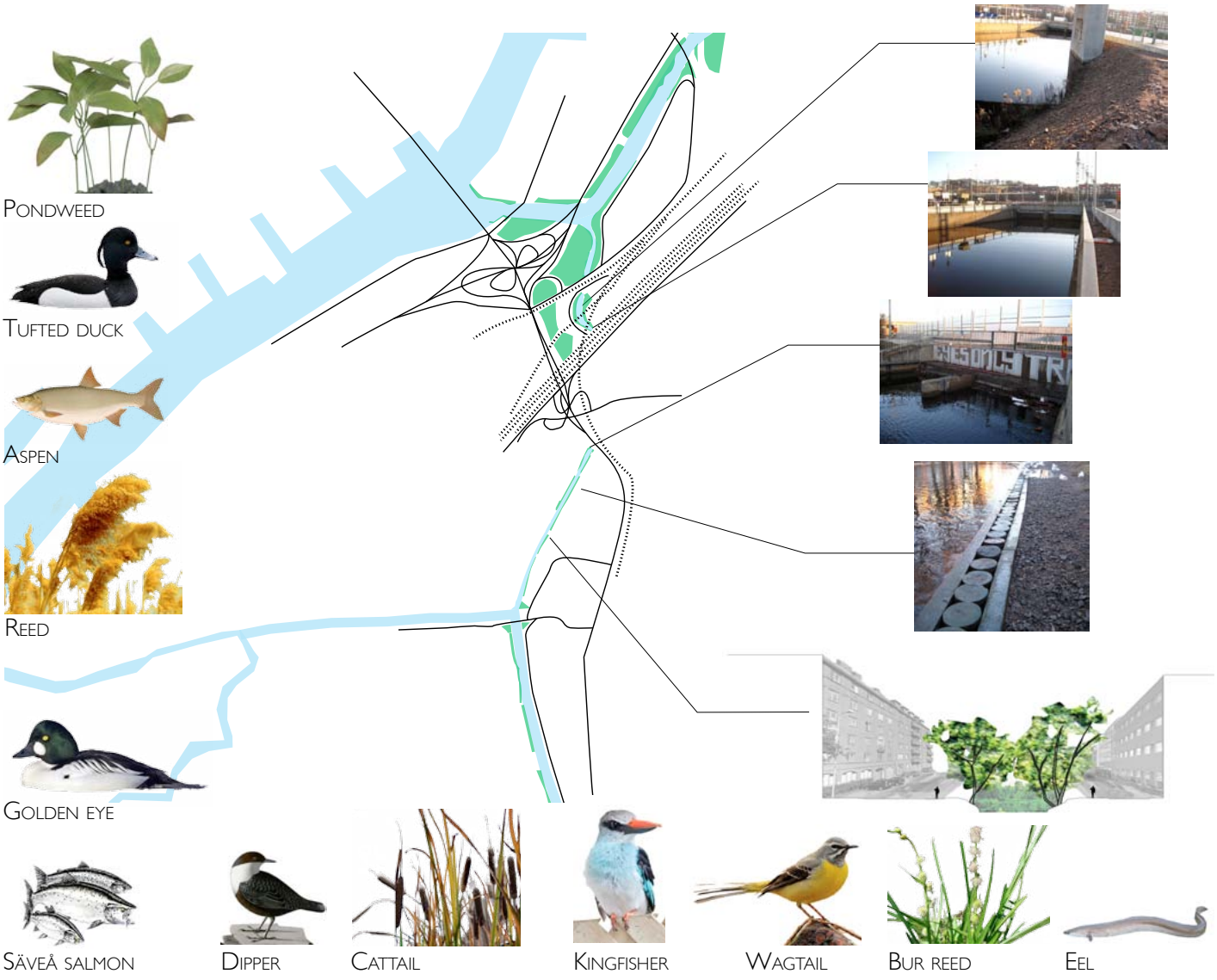


75 - 100% ABSORBING SURFACES

Natural flooding has always occurred, but higher water levels become a greater problem in areas with high economic values, sensitive infrastructure and polluting character. Simulations of higher water levels and extreme weather scenarios point out areas sensitive to flooding in Göteborg, where Mölndalsån and downstream parts of Säveån appear to be very sensitive. This is additionally critical and alarming, since the greatest traffic node of Göteborg, is situated exactly in this junction. Water levels in Mölndalsån and Säveån range from normal water level (10,2 m), to average high water (+1 m), highest high water (+1,8 m), average low water (-0,5 m) and lowest low water (-0,9 m)

Affected wildlife

The human interventions also affect the wildlife and biodiversity in the area. Roads, buildings, embankments and culverts are barriers for wandering organisms and destroy essential habitats, altered water levels and water speed affect the natural cycles of many species, eutrophication and pollutants make the water toxic and inadequate and flooding influence reproduction, food supply and nesting areas. (Vattenmiljöer i Mölndalsåns avrinningsområde - en resurs för människor och ekosystem, 2011) The green areas are marginalised and reduced to small strips of grass and single trees. Moreover, the green areas are disconnected from each other, which restrains wildlife migration – a very important factor in healthy habitats. Nevertheless, there is a wide range of animals in the area, such as mallard, kingfisher, dipper, wagtail, tufted duck, golden eye, eel, a genetically unique type of salmon, aspen. There are also plants like black alder, different kinds of salix, reeds, pondweeds, duckweed and bur reed.



Case studies

Studying some examples from over the world, it is interesting to see different approaches to nature, vegetation and water and how poetical strategies are implemented.

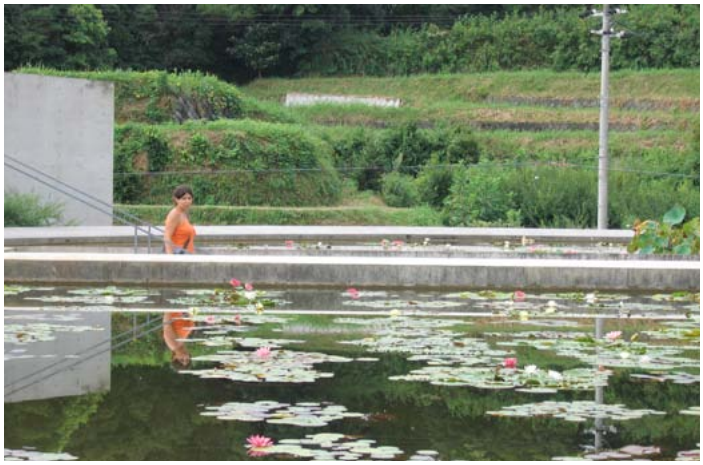
The High Line, New York, USA, by James Corner Field Operations

The High Line is an elevated park built on top of the skeleton of an old rail system. The planting design is inspired by the self-seeded landscape that grew on the rail tracks during the 25 years after trains stopped running. The species of perennials, grasses, shrubs and trees were chosen for their hardiness, sustainability as well as textural and color variation, with a focus on native species. The High Line offers new, often unexpected views of the city and the Hudson River. (http://www.beautyofnyc.org/HighLine/index.html)

Concrete walkways unify the trail, which swings from side to side, and divides into concrete tines that merge the hard surfaces with the planting embedded in railroad gravel mulch. Stretches of tracks and beams recall the High Line's former use. (ibid.)

Many opposites are brought together in surprising ways in this public park - hard and soft, freedom and plan, nature and urban, new and old. It encourages a human relation to wild and cultivated plants, old railroad tracks, history, other people, streets, buildings, the broad Hudson River and the wide sky. (ibid.)

Poetical dimensions: material contrast and merging of artificial and natural, soft and hard, old and new; reference to existing structure and former use; reference to existing vegetation; highlighted context of e.g. roads and city life; city and nature contrast and co-exist; different visual opportunities; framed and highlighted views; walking next to and through vegetation; exploring movement and motionlessness.



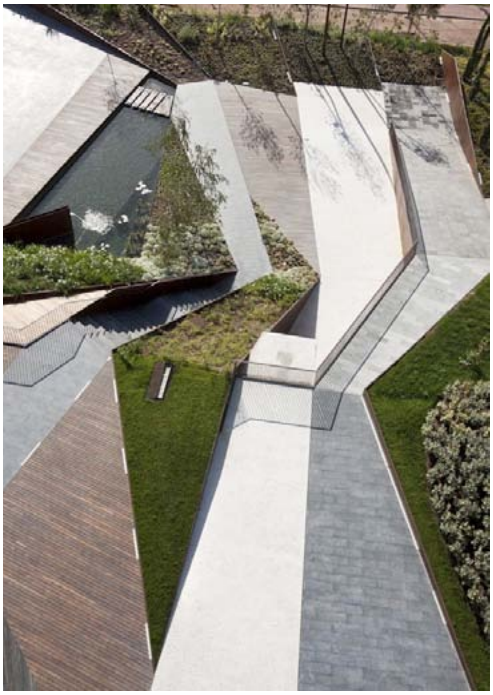
Water temple, Hompukuji, Japan, by Tadao Ando

The small Buddhist temple is more or less buried in a pool that is also its roof, with entrance through and down in the water itself. As the visitor approaches the temple, cement wings shielding the pool are hardly visible among bushes and trees. A long gravel path symbolises the beginning of the purification process believers go through before arriving at the sacred place. To reach the temple itself, visitors descend a stairway that gently steps down into the water. The combination of architecture with nature and the presence of the calm mirror of water naturally lead to meditation. Spatial sequences and mystic and unexpected qualities of space are main qualities. (http://www.floornature.com/projects-commerce/project-tadao-ando-water-temple-hompuki-japan-1989-1991-4043/)

Poetical dimensions: proximity to water; walking next to and under water; silence; sequence of spaces; contrast of spaces; enhanced transition between spaces; impression of the invisible and partly visible, material contrast - artificial and natural in concrete, water and single vegetation; reflections in water; stillness of water; reference to classical temple architecture; enhanced and sensory entrance situation; unexpectedness.

Forum de Negocios, Granada, Spain, by Francisco J. del Corral and Federico Wulff

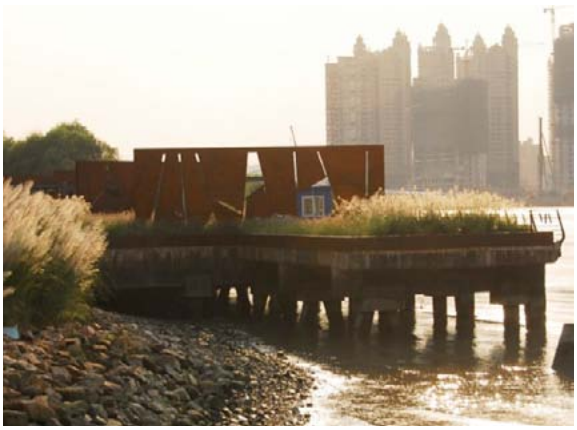
A public space for events, where an elaborated landscape strategy dialogues with the existing site, instead of camouflaging it. Space is defined through irrigation channels that traverse patches of vegetation. The channels guide and give shelter to the visitor, and create a dynamic succession of spaces. Strength lines traverse a topographic map in cracked continuity that intensifies their movement at the slope between two levels. These strength lines, made in oxidized steel, have different uses; define the limits of the different materials, contain vegetal topography, guide visitors and contain watercourses. The lower level is a large surface surrounded by large trees and a marked slope to protect the space from the noisy high-way. Water is one of the main instruments used for shaping the different spaces. Its sounds and presence influence the visitor; follow the trail in a water stair and land silently in a pond. (http://plusmood.com/2009/09/public-space-for-events-forum-de-negocios-francisco-j-del-corral-federico-wulff/)



Poetical dimensions: material contrast of artificial and natural, soft and hard, cold and hot; sequence of spaces; different levels and visual impressions; sound of water used to enhance function and impression of spaces; reference to the existing landscape; reference to the levels and terraces by enhancing them.

Shanghai Houtan Park, Shanghai, China, by Turenscape

The park's constructed wetland, flood control, reclaimed industrial structures and materials as well as urban agriculture are integral components of a restorative design strategy to treat polluted river water and recover the degraded waterfront in an aesthetically pleasing way. Cascades and terraces are used to oxygenate the nutrient rich water, remove and retain nutrients and reduce suspended sediments while creating pleasant water features. The terrace design facilitates the height difference between the city and the river and reconnects people to the water edge. The paths absorb and force people to circulate through the park. Numerous platforms and enclosed spaces are designed as nodes on the pedestrian network, including a 'hanging garden' transformed from a factory structure and a landscaped dock. Groves of bamboo and Chinese Redwood trees act as screens along the paths to break up the spaces and the enclosures surrounded by trees are used to exhibit art and industrial leftovers found on site. Reclaimed steel panels celebrate the site's former industrial spirit. Situated throughout the wetland, the folded steel panels frame views of Shanghai's skyline and highlight the industrial past. Crops and wetland plants were selected to create an urban farm allowing people to witness seasonal



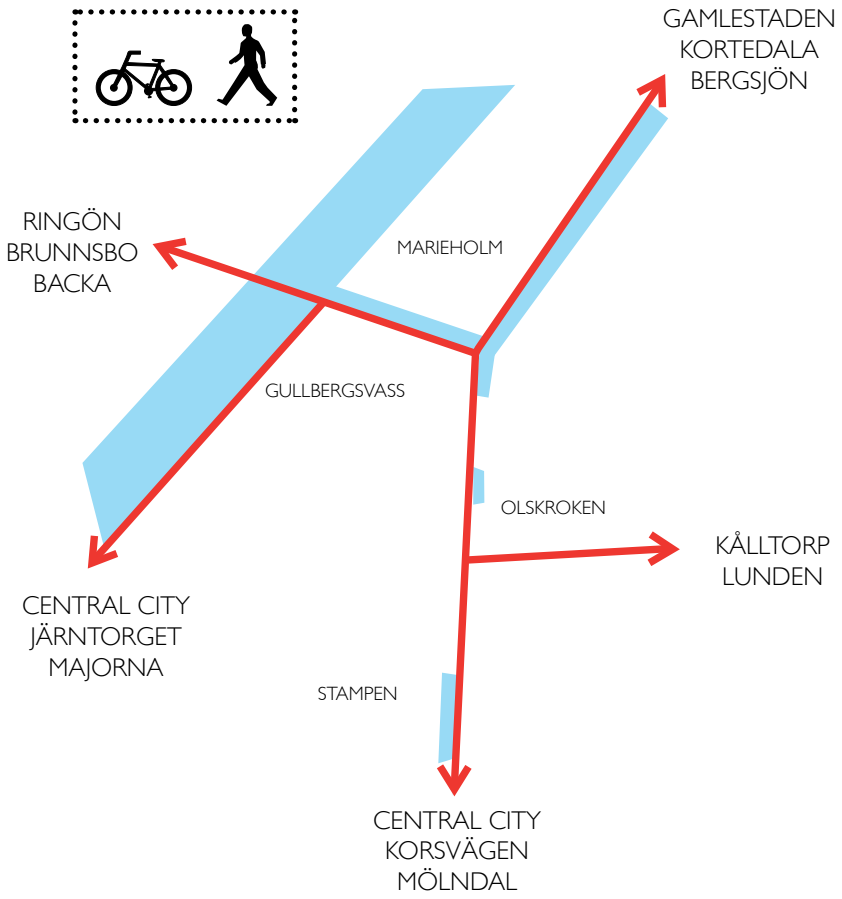
changes. It provides educational opportunity for people to learn about agriculture and farming within the city. (http://www.archdaily.com/131747/shanghai-houtan-park-turenscape/)

Poetical dimensions: proximity to nature, water and man-made elements; possibilities to touch, smell, see, hear; material contrasts of hard and soft, natural and artificial, old and new; reference to agricultural tradition and former industrial use; re-use of industrial structures; spatial opportunities of vegetation – possibilities to walk next to, under, above, through; framing of views; spatial enhancement at certain points; spatial sequences; raising awareness of ecological issues; improving accessibility to and movement on site, nature and water; highlighting seasonal changes

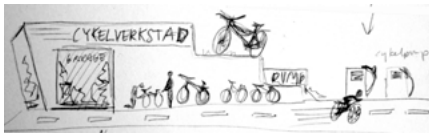
Idea

What if the streams could act as connectors between the districts surrounding them and at the same time as connectors to nature? The districts of Gamlestaden, Olskroken, Stampen and the districts on the island Hisingen become connected through a biking and walking trail on the streams, linking them mentally and physically.

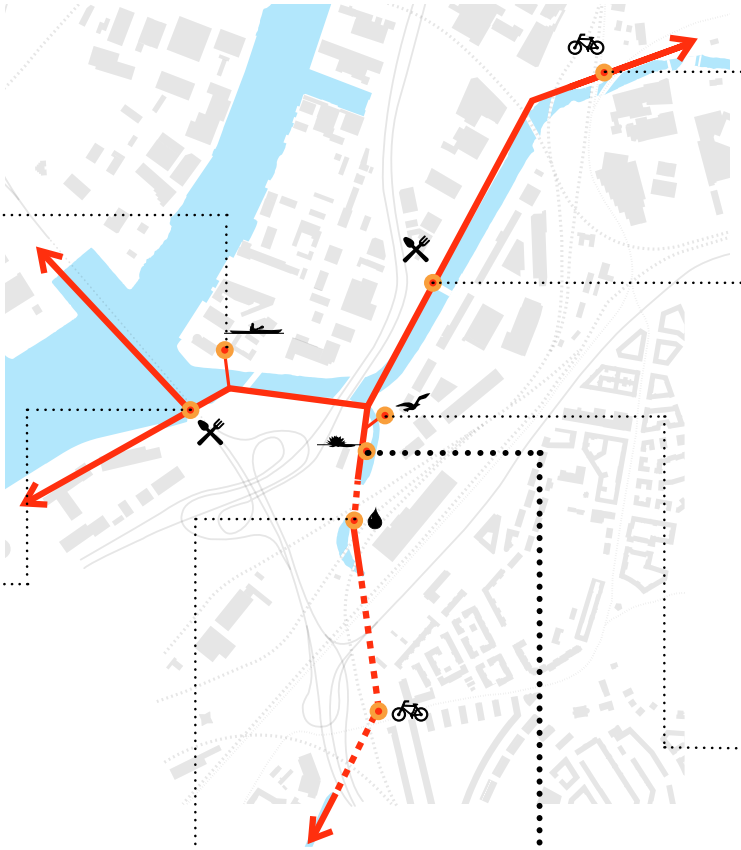
This new trail provides local recreation, poetical dimensions and experiences of nature and water, and at the same time work as fast commuting links and social connectors between urban districts.



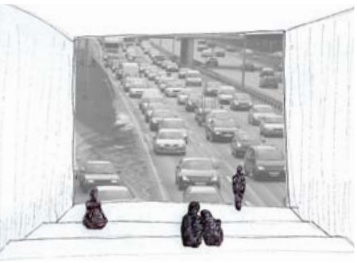
WATER SPORTS CENTRE



BIKE RENTAL & SERVICE STATION

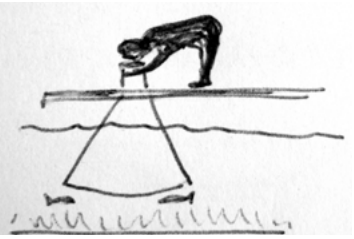


RESTAURANT & CAFÉ



RESTAURANT & TRAFFIC CINEMA

BIRD WATCHING STATION

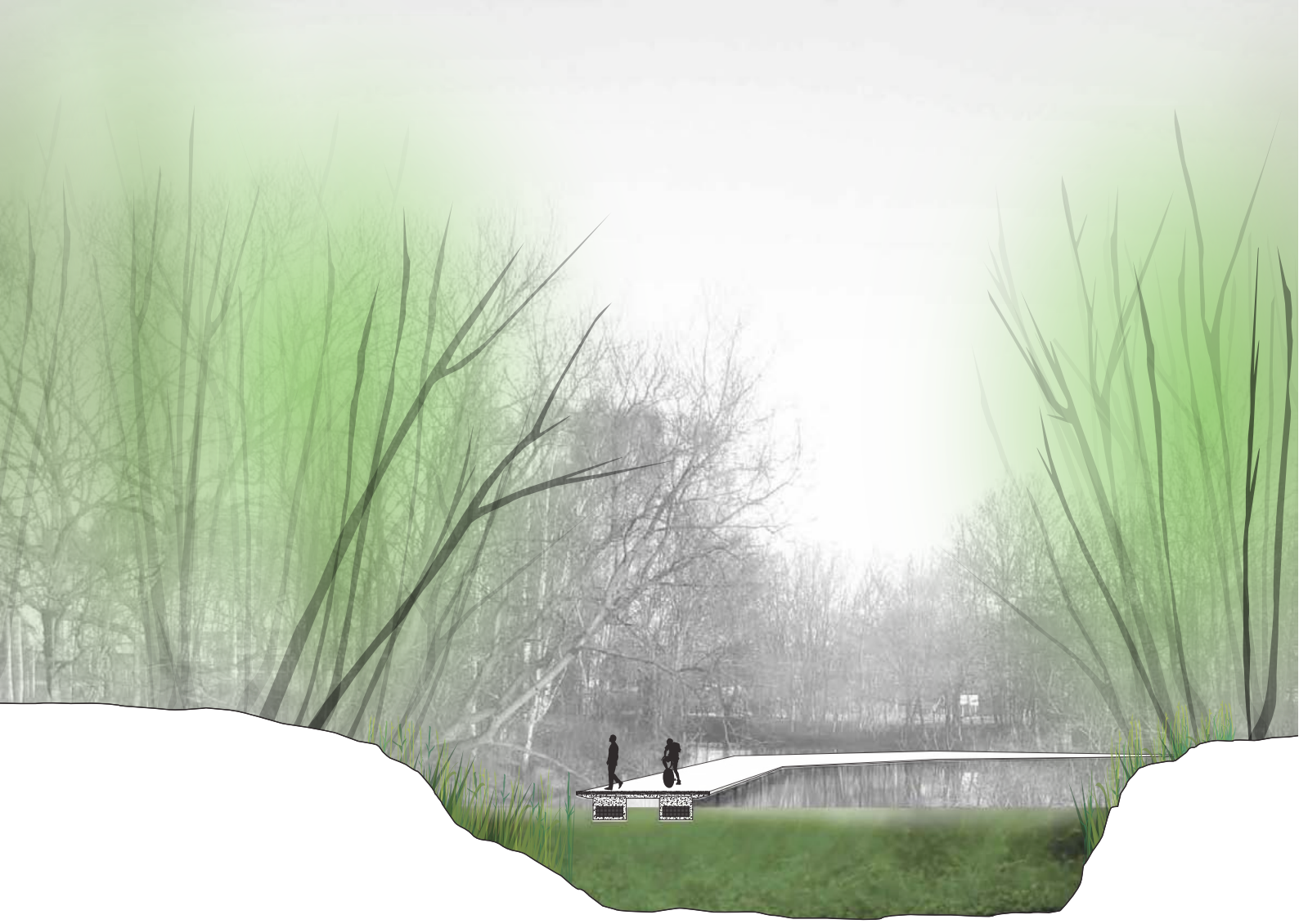


WATER MONITORING
& EDUCATION CENTRE

BOTANICAL & WATER GARDEN

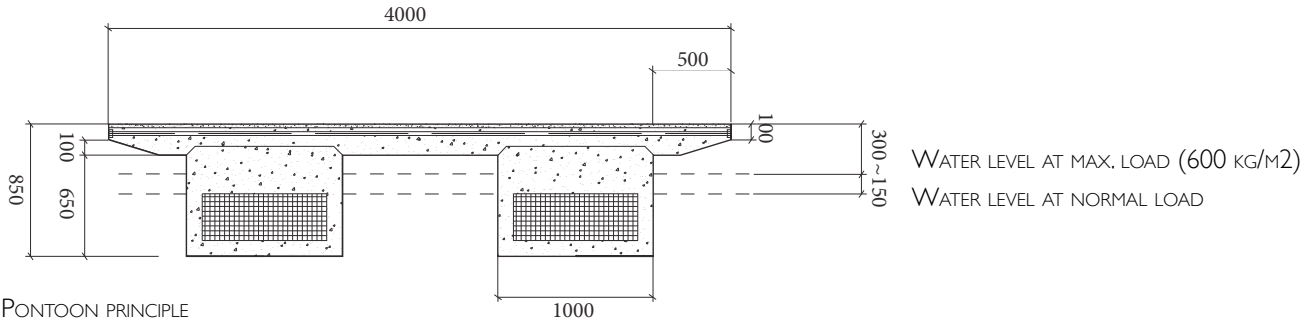
Along the trail are nodes stimulating the trail, but also working as attractions on their own. These are meant to complement each other, providing different experiences and different character, so that moving along the trail becomes a varied story. Some are more active, whereas some are more oriented towards the experience of nature and the area.
The nodes include:

- Bike stations where you can rent or fix your bike to then ride off on the trail, connected to the existing rental bike program "Styr och ställ"
- Restaurants and cafés for visitors of the trail, for employees in Marieholm and Gullbergsvass and for people living in the area
- A bird watching centre with indoor and outdoor spaces to take part of the interesting bird life in the area and to meet other bird watchers
- A node for water sports where you can rent kayaks to explore the streams further,
- A restaurant and traffic cinema, facing the river Göta älv and the island Hisingen, but also making an attraction of the massive traffic at Tingstadstunneln
- A water centre monitoring and educating about water quality in the streams concerning eutrophication and contaminants
- And a botanical water garden aiming on experiencing water and plants and being in a quiet and green oasis in the traffic desert



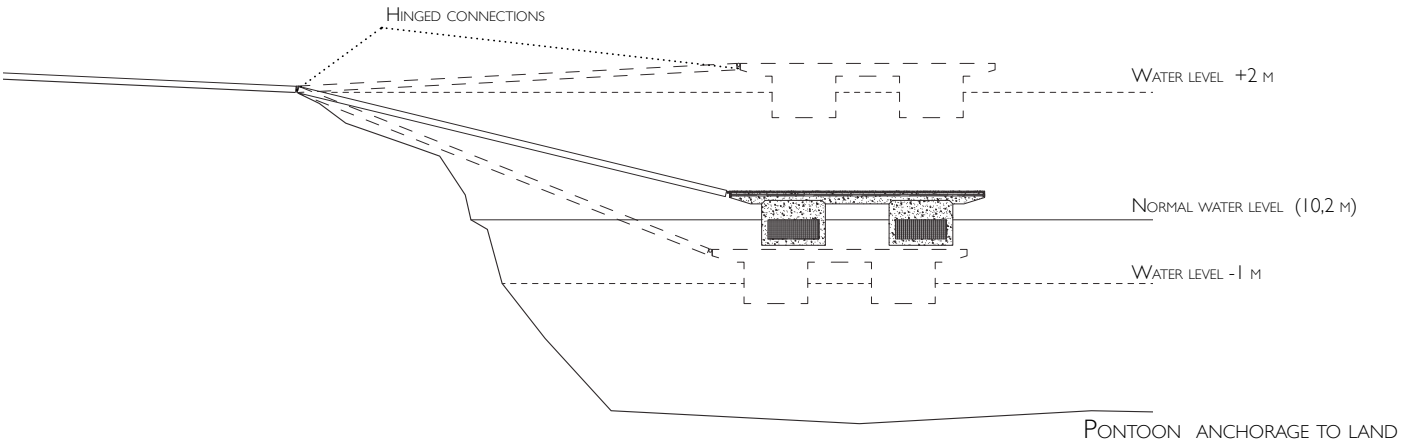
The trail

The principle of the trail is floating concrete pontoons, able to rise or sink when the water level fluctuates. Like this, the experience of the trail and the surroundings differs according to water level and functions even during flooding. The trail is situated close to the water edges, acting in the spatial condition that the water edge and the surrounding trees provide.



Pontoon principle

The pontoons float about half a meter over the water surface, which contributes to a feeling of the trail hovering over the water, but still keeps a proximity to the water surface. The construction is of reinforced concrete, with 1 meter wide floating elements with a core of cellular plastic. This makes a heavy construction which is stable in itself. Each pontoon can support a load equal to the mass of the water that it displaces, plus three times the normal load (200 kg/m2). With heavy load, a movement of ~150 mm is tolerated.



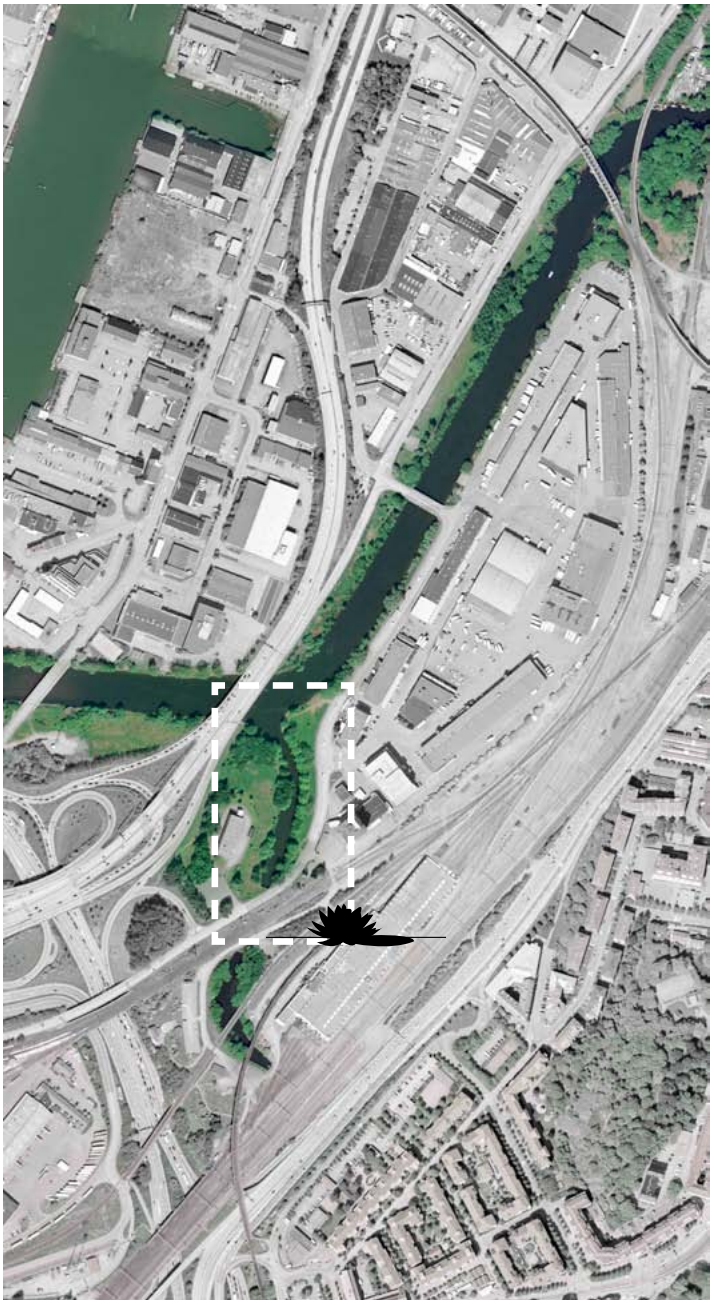
Pontoon anchorage to land
& reaction to different water levels

The pontoons are secured and anchored through the jetties towards the water edge, allowing lower water levels of one meter, and higher water levels up to 2 meters. These connections are hinged in two points – one in the pontoon, enabling the pontoon to rise or sink, and one attached to a concrete foundation on the ground. Diagonal beams in the jetty assure stiffness to the trail on a horizontal plane.

The trail is made up from standard elements. When there is a turn, the straight elements are joined together through an angled element, also being meeting points.

The main transport routes has a surface of dark, quite rough concrete, while jetties and places where you can park your bike, sit down, are surfaced with oil-treated wood planks, allowing time and climate to leave their marks but still being resistant to moist. The material contrast makes a distinction between effectiveness facilitating speed – concrete - and calm and softness- wood - inviting to touch and to sit down. A strip of wood on the sides of the pontoon makes a safety distinction to the water.

The stretch of the trail, connecting to existing routes in Olskroken, Stampen and Gamlestaden. Mölndalsån is also brought up at Olskrokstorget, giving a water presence that the square had before the culverts. Also Gamlestadstorget, once a nice square, now a traffic mess, could improve by having a closer relation to the Säveån. Where Mölndalsån is buried in culverts, you move on the water, under the earth and traffic, to then come out to the water garden.



The water garden

The water garden is situated in the interesting junction between the two streams, where nature is lush and nature has sort of a free zone but where there is a pronounced contrast to surrounding traffic. It is sort of a secret world in between roads, railway and industrial activity. Trees like alder, birch and different kinds of willows follow the water edges and stretch out over and down into the water, creating a beautiful but inaccessible border to the stream Mölndalsån and giving a wild and unorganised impression. The trees and other greenery like different kinds of grass and reed contribute to a changing appearance between the seasons, contributing to a more or less compact framing of the stream.

The botanical water garden is about experiencing water and nature in different and subtle ways, where the design works as a medium providing possibilities to touch, smell, hear and see. Special focus is put on how you relate to and move – on, under, over, next to, through and along water and plants. The beautiful space created by the water edges and the trees overhanging the water is made use of, and complements are made carefully to leave part of the nature as it is.

The plants added are native to Sweden, whereof e.g. the red water lily is very rare. But the garden should not only interest botanists – plants are chosen according to their aesthetics in colour (e.g. water lilies), spatial quality (e.g. reed and cattail), expansion and density (e.g. duckweed and frogbit) and reaction to current (e.g. river water-crowfoot).

I have studied four spaces in the water garden. These spaces are stops on the path, providing calm and meditative moments in contrast to the movement on the trail and to all the traffic and noise around the area. Without any chronological order:

- Extending is relating to movement on and through water, under earth and under traffic and enables following the course of the stream.

- Buoying is about interacting with water and plants – moving on or over the water and is relating to the water edge and the trees and plants along it

- Reflecting deals with experiencing the reflective water surface, of being on or on level with water and floating plants

- Submerging explores moving down into and being surrounded by water and plants

Gamlestaden
Kortedala
Bergsjön

Gullbergsvass
Ringön
Brunnsbo
Backa

Reflecting - resting place

- Being on and on level with the water surface
- Overlooking the water and floating plants
- Experiencing a quiet moment with nature, away from the trail
- Touching water and plants

Submerging - underwater space

- Being surrounded by water
- Seeing water plants from the side and from underneath
- Stepping down under the water surface
- Seeing light seeping down through water and plants
- Experiencing the light and darkness of water

Buoying - floating play landscape

- Experiencing being and moving on and over water
- Moving through plants
- Coming closer to and accessing the water edge
- Experiencing and experimenting with floating stability

car access & parking

Olskroken
Central city
Korsvägen
Mölndal

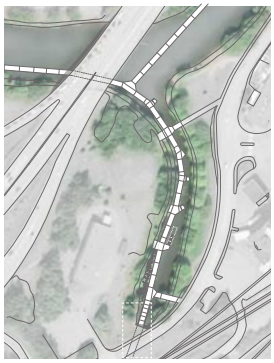
Extending - underground trail

- Moving down into the water
- Passing below earth and traffic
- Experiencing silence
- Viewing contrasts in light and darkness
- Experiencing damp
- Following the stream course
- Coming closer to the water surface

COMING OUT FROM THE CULVERT

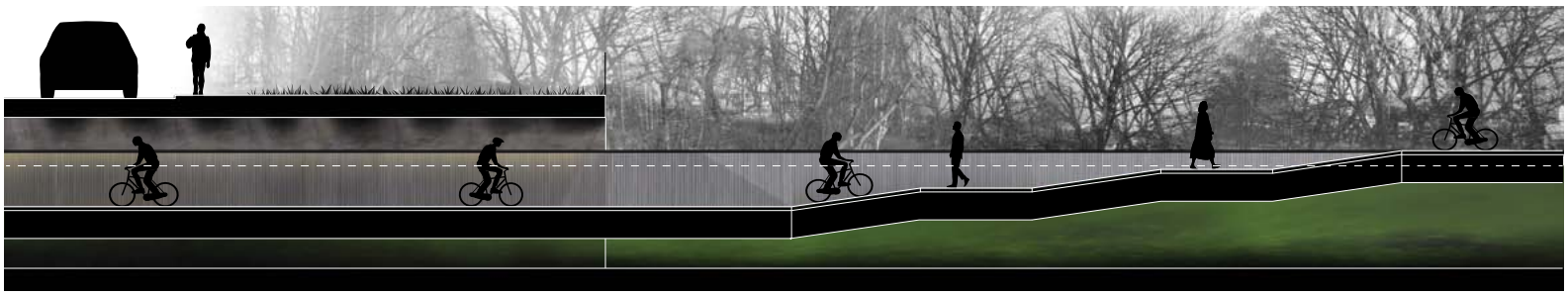
Extending

In the southern part of the water garden, the trail goes down, into a culvert under roads and railways for about 80 meters, connecting to the next node the water centre and further to the rest of the trail, making it possible to follow the course of the stream.



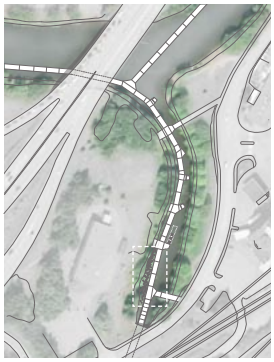
In the low culvert, the trail sinks down into the water in steps, coming closer and closer to the water, to even out where the water level is half a meter down from eye height. You can touch the water when standing on the trail, experience the dampness in the air and hear water streaming and echoing in an otherwise quiet situation.

The trail moves along one of the walls of the culvert but with a distance, allowing experiencing the water on both sides. In the dark tunnel, soft wooden railing with spotlights highlighting the trail, offer a warmer atmosphere together with subtle lighting emphasizing the water surface and the closest wall. The trail in the tunnel is suited for fast transport, but is also an exciting walk or bike ride with the contrast of moving in darkness and contained space under the earth, towards light, lush greenery an openness where the water garden begins.



Buoying

The relation between the trail and the water edge is more intimate on one side, with shallow water providing possibilities to play and interact with water and plants. Play islands and jetties in a landscape of varying density, is developing the proximity to and accessing the water edge and to the trees overhanging the water at the same time as really engaging with the water.



The islands are of different heights and sizes.They are floating but anchored to a weight on the stream bottom, some with straight connections for a looser situation and some with diagonal connections for a more fixed position. Like this, the experience of moving on the islands varies, it differs according to water level, where some islands might be under water, and the islands react to weight and movement.

This is exploring the ambivalence of safety versus instability, triggering playfulness of moving from one stone to another, buoying on and over the water, not knowing exactly how every island will react. Different routes are possible, and the movement pattern changes when flooded.

PLAYING AMONG PLANTS

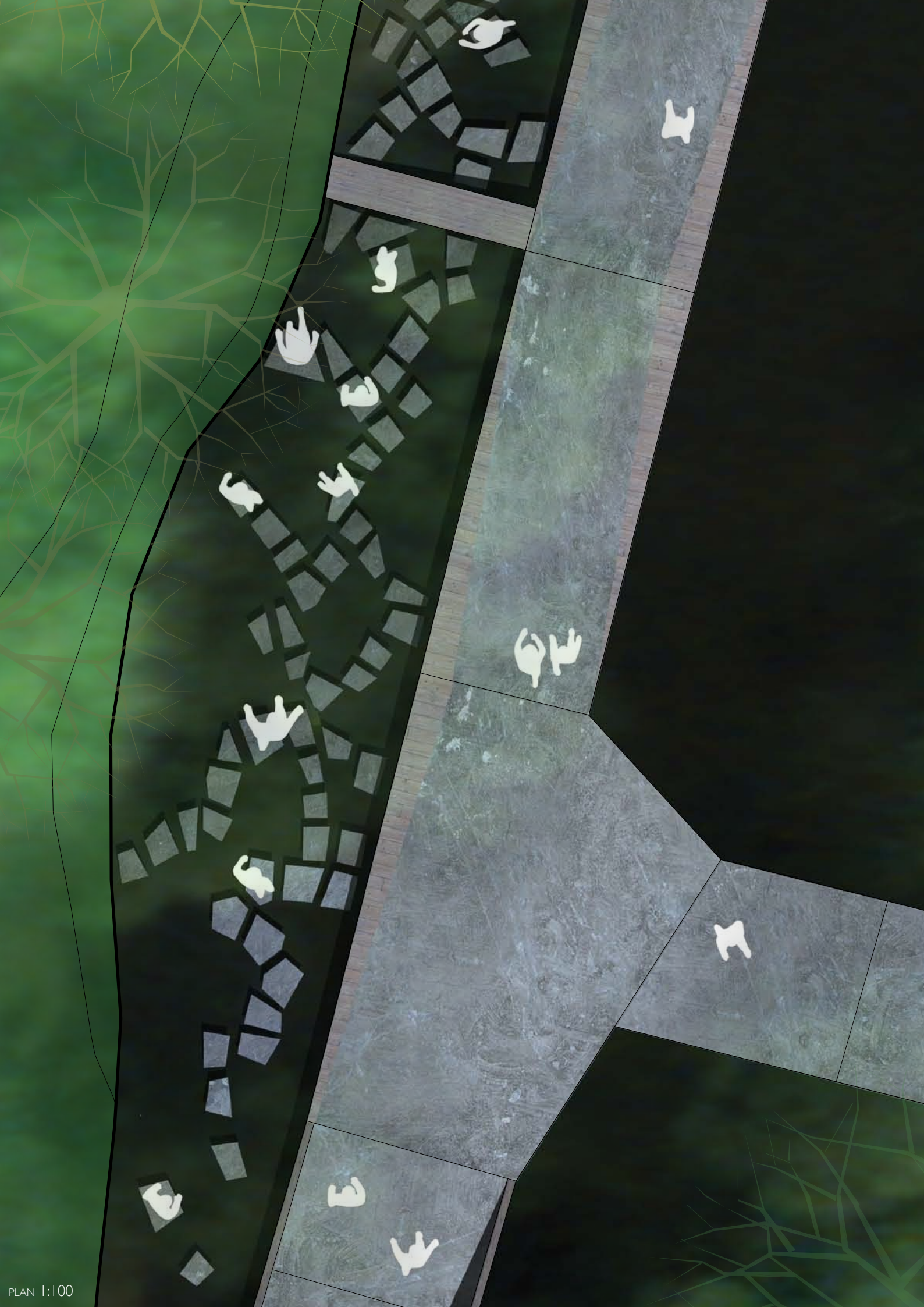
You move next to and through reed, cattail, bulrush and reed sweet-grass, which are high and tolerant plant species still standing during colder months creating intimate spaces on their own, inviting to touch, move through and hide in. The shallow water offers possibilities to e.g. wade through the water and build embankments, but still be safe.


COMMON REED

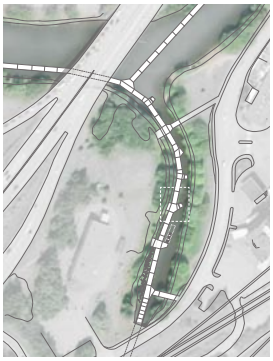

REED SWEET-GRASS

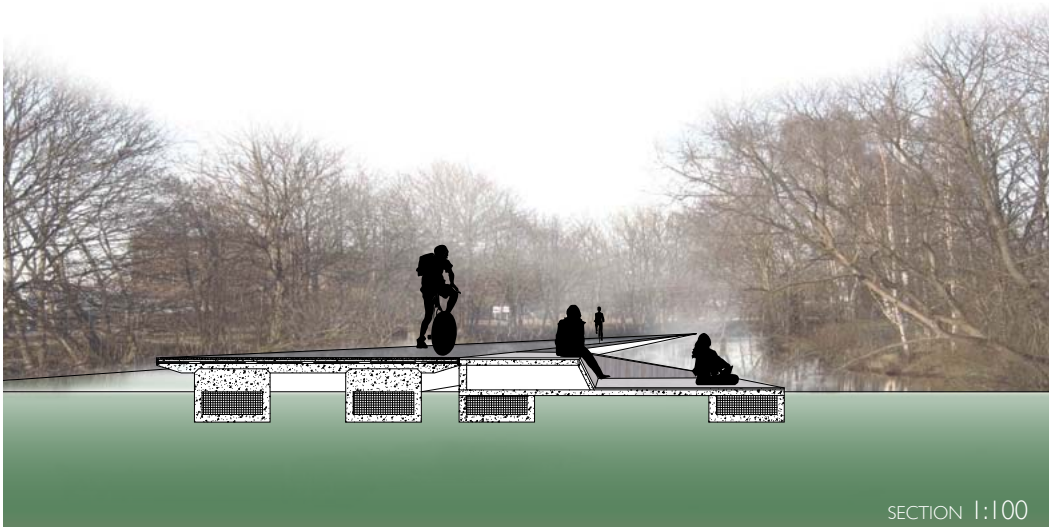

BULRUSH


CATTAIL



PLAN 1:100





Reflecting

On the other side of the trail, the water is more open. A few jetties reach out from connection points on the trail, towards the water and the opposite water edge. The aim here is experiencing the reflective water surface, open water and floating plants, and having an intimate and calm moment away from the trail.

The jetty first levels with the trail in a platform where you for example can park your bike, and then steps down onto the water surface. A wooden seat provides different sitting possibilities and a small jetty for sitting or lying down floats just on top of the water surface.

Here you can sit down in your own little world turning your back to the trail, overlook the water, look down into the water, have a picnic or sunbathe. The floating construction reacts to water movement, giving an even closer feeling of the water. Surfacing of wood planks gives a soft sensation, inviting to sit, to lie down and to touch.

The proximity to the water invites to touching the water and floating and sprawling plants like yellow water lilies, bogbean and frogbit that partly cover the water surface, giving a "second surface", and big heaps of river water-crowfoot reveals stream currents.

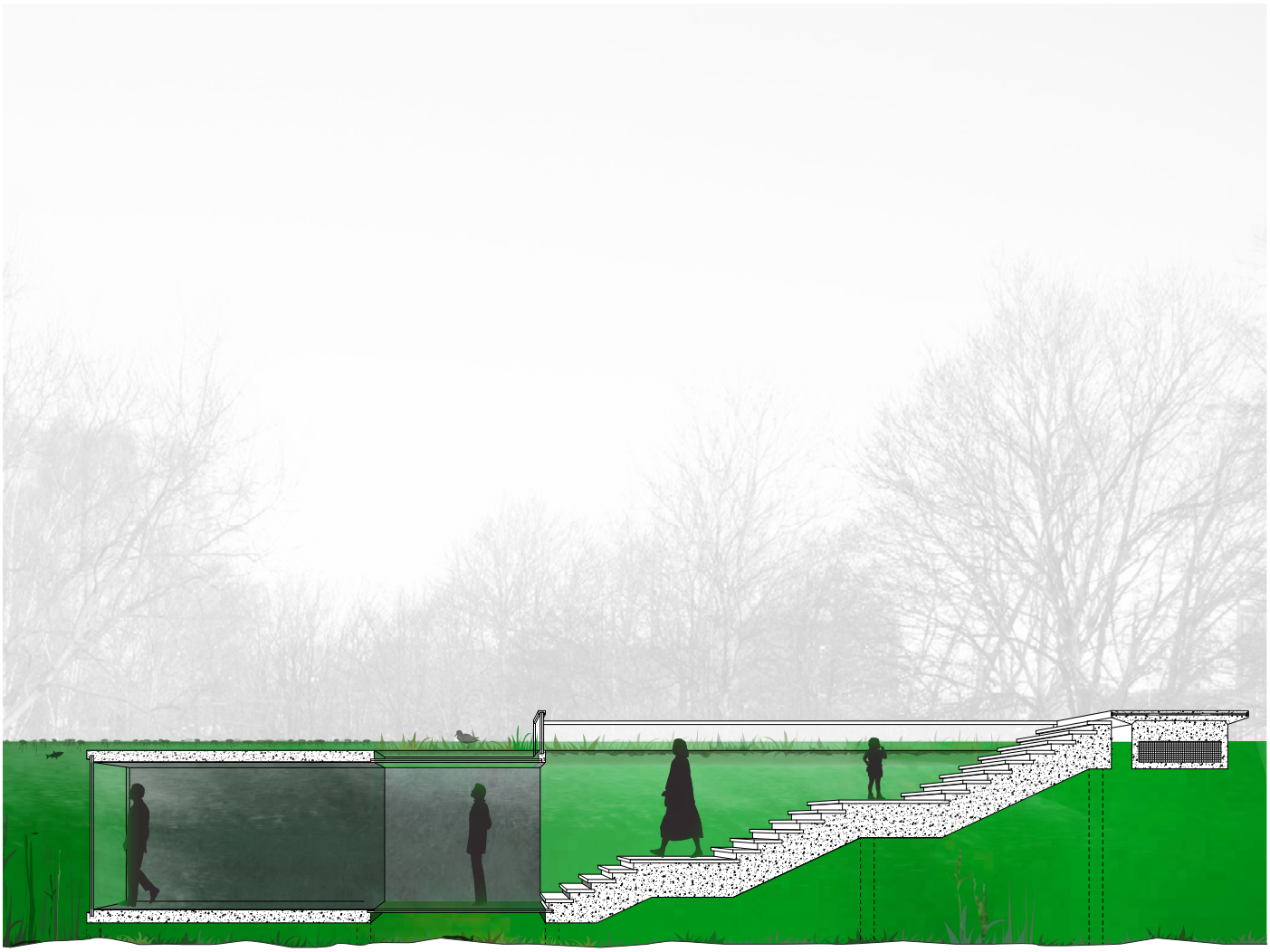
Yellow water lily

Frogbit

Bogbean

River water-crowfoot

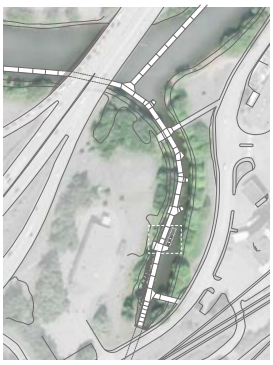
PLAN 1:100



SECTION 1:100

SUBMERGING

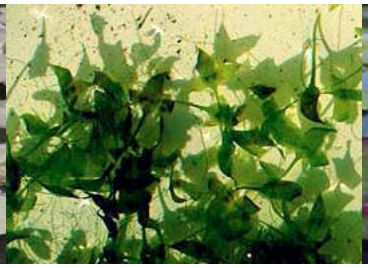
A sequence of underwater spaces is relating to a symbolic movement from a higher level down into the water and to being surrounded by water and by water plants. The construction is amphibious and hence follows the movement of the water, but is moored to pillars on which it can move up and down.



Plants like red and white water lilies contribute with long root systems, big surface leaves and give additional dimension when blooming. Different types of duckweed partially cover the water surface, offering a green carpet colouring the water and through which light can trickle down and through. Plants over the submerged rooms are growing in floating geotextiles, attached to the construction.

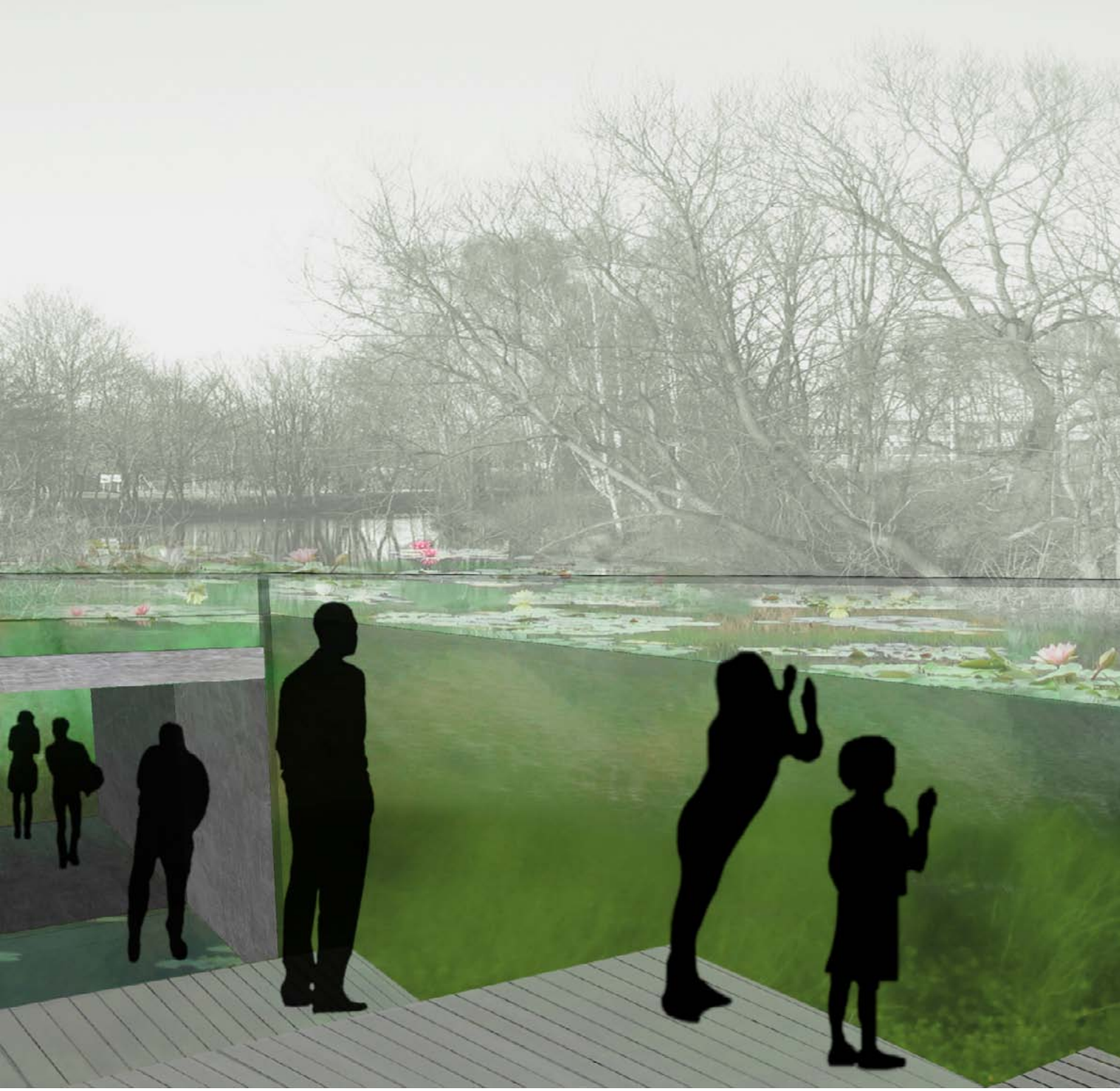
GREATER DUCKWEED

RED WATER LILY



IVY-LEAVED DUCKWEED

WHITE WATER LILY



Submerging provides three situations –

The first stepping down into the water, gradually passing down under the water surface, experiencing the water level at eye height, and seeing plants and their roots through transparent walls of acrylic glass

In the second, darker situation you are submerged, have water above and underneath you, experiencing light seeping down through water and through plants, seeing the plants from underneath through a transparent roof and sensing the dark stream bottom somewhere under your feet.

In the third space you walk in darkness along solid concrete walls towards a big window exposing the darkness of deeper water at the stream bottom and subtle light trickling down from the surface, giving the experience of infinite water and of being truly submerged.

Conclusions

The master thesis is discussing issues on an urban scale while still providing the poetics and qualities of specific spaces, acting in an on-going discussion of how to deal with urban nature and water in Göteborg and raising awareness of the issues, qualities and possibilities of the streams Mölndalsån and Säveån.

Proximity to nature and to the current situation is offered through simple means, respecting the existing while establishing a human relation to nature and to the architectural attributes, hopefully generating public consequence, pride and interest of the streams and of their environment, allowing protecting and making use of the watercourses as well as establishing favourable conditions for the wildlife.

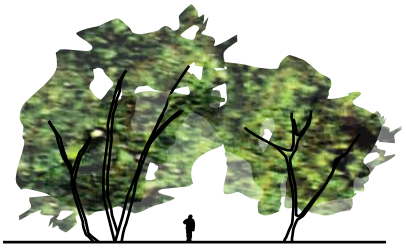
The project also demonstrates feasibility, presenting a simple strategy that could be built right away and that can evolve during time according to economy, urban conditions and societal interest. It could start with the main axis to which parts can be added, further establishing a network of paths and links, connecting to different parts of the city and of the environment.

The project relates to a sensorial nerve, often lost while discussing and establishing urban developments. This sensorial nerve is crucial to the human relation to nature and to architecture, which brings true understanding and experience of specific spaces and situations as well as creates depth in the infrastructural strategy.

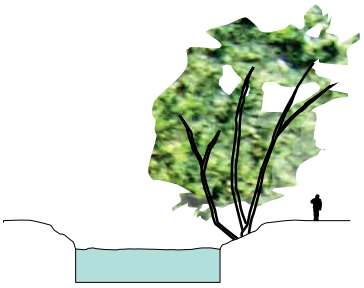
Process

Botanical water garden

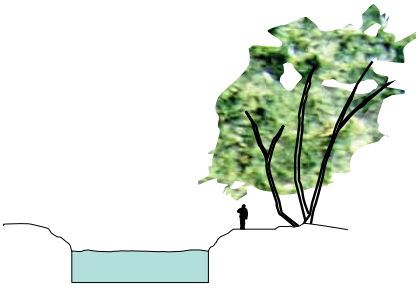
How to experience plants and water



Moving under/through greenery



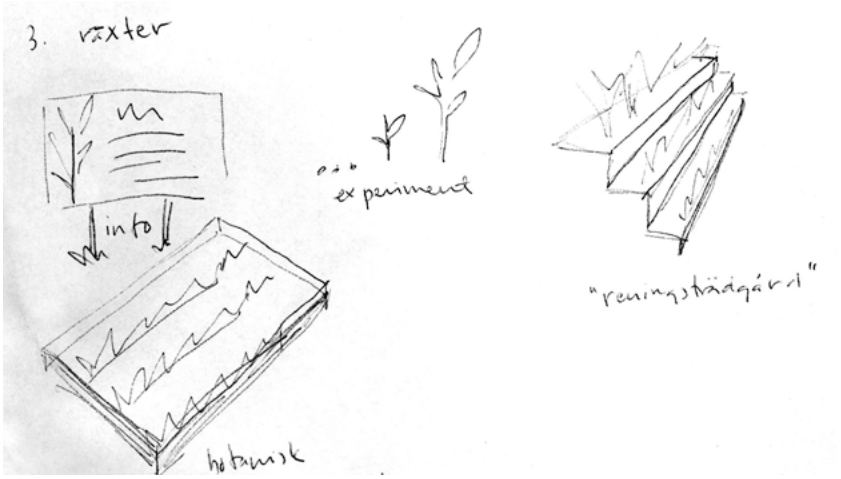
Relating to the stream through greenery/ at a distance

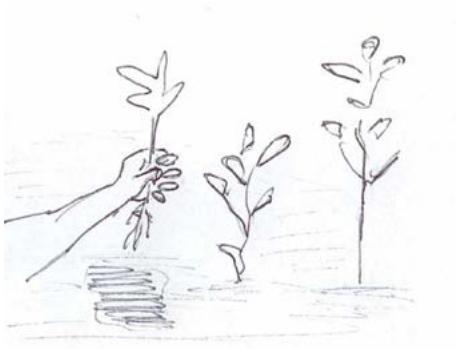


Relating to the stream and greenery in "contained" space

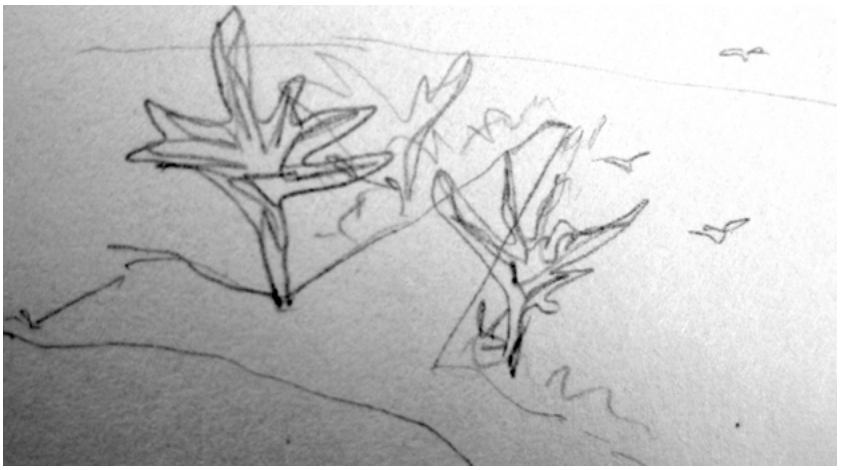
Moving through/next to water

Moving/being in water

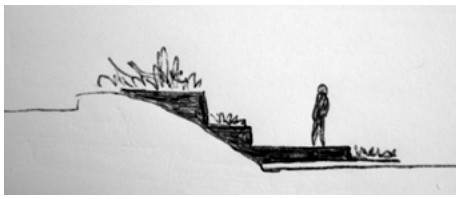




Touching plants



Moving towards water/through greenery



Artificial nature

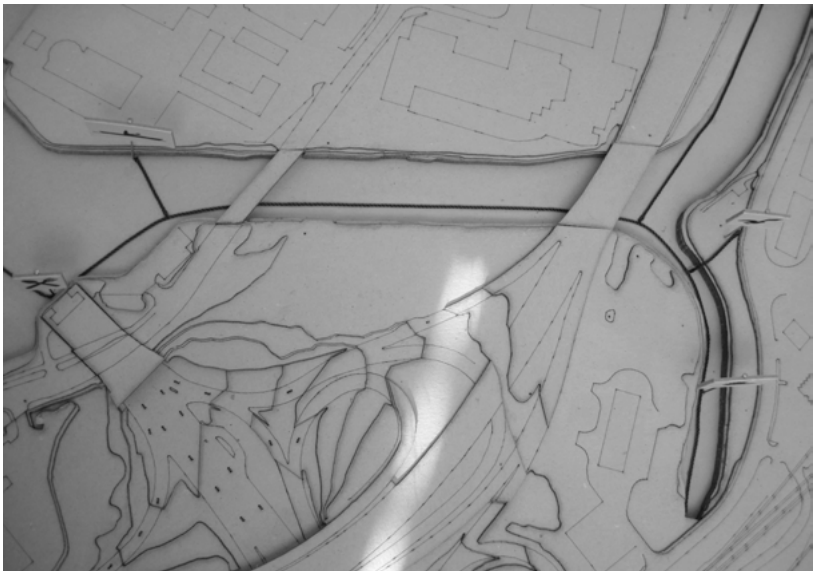
Moving through plants/"contained" space

Moving through greenery

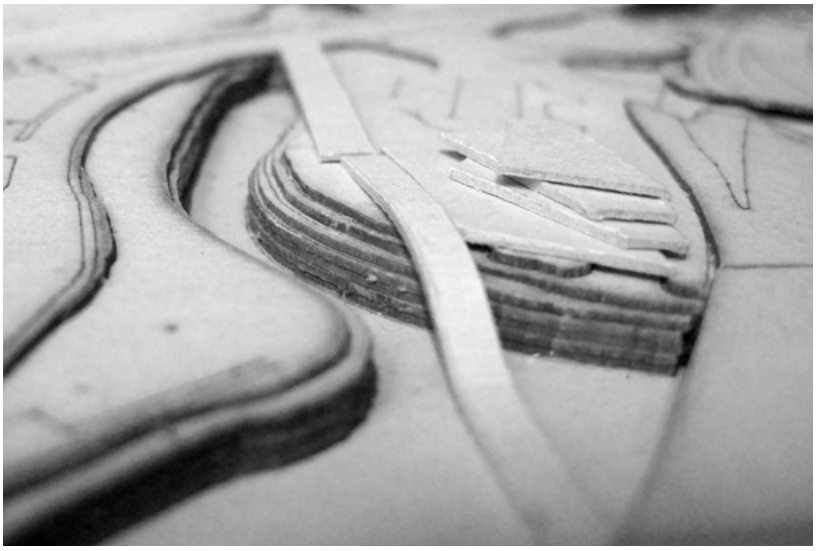
Process

The trail

How the trail relates to water, to the water edges

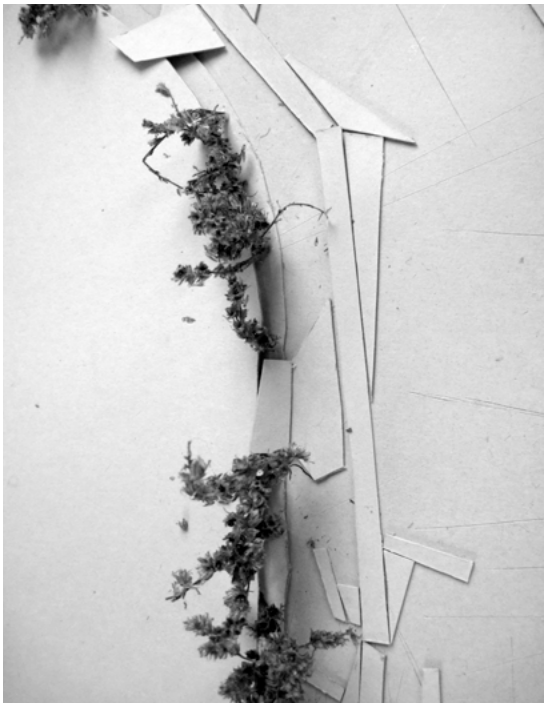


Investigating stretch of the trail and favourable location for nodes



Moving alternately on water and on land?

Passing under bridges, on water - avoiding complicated interactions with traffic and inclinations



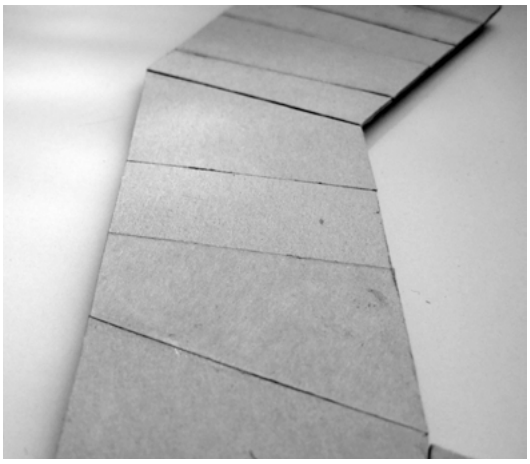
Connecting to the water edge and extending into the water

Protruding elements to come closer to water and having a calmer space away from the trail

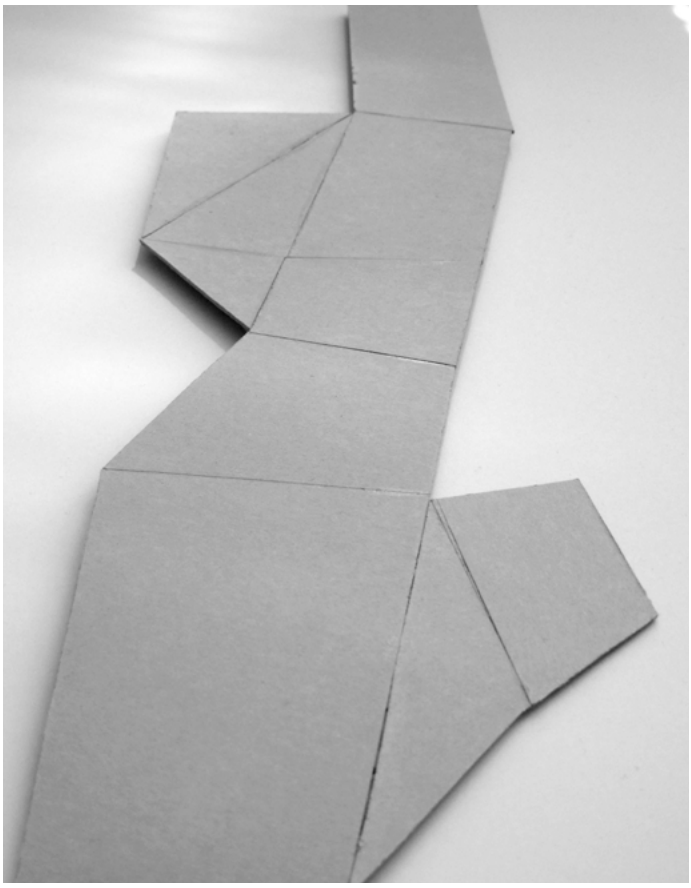
Intimate space between trail & one water edge

Process
The trail
Materials and configurations

The trail hovering over the water surface



Investigating angles & turns



Exploring divison of elements and protrusions

Material contrast
Concrete for safety, speed, effectiveness
Wood for calm, tactility & interaction with water

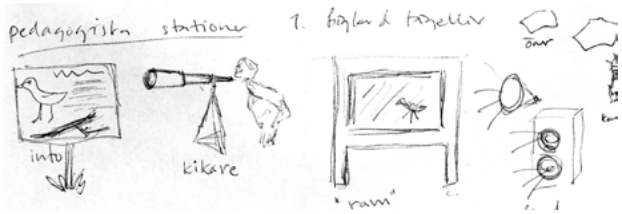
Exploring material on the pontoon edge

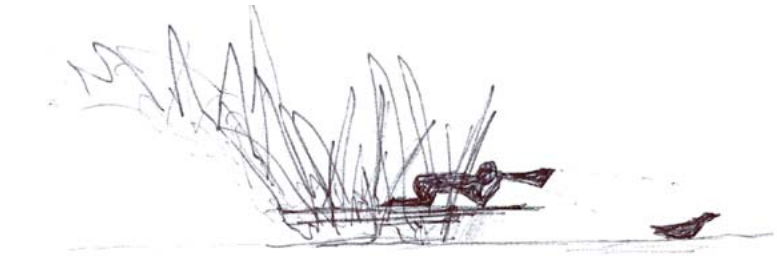
Wood meeting wood on jetties

Process

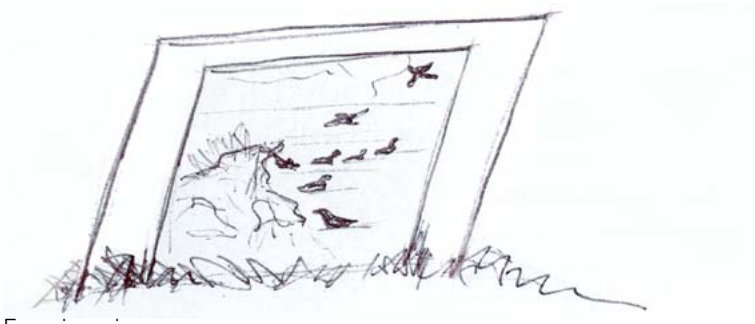
Bird centre

How to experience birds and nature



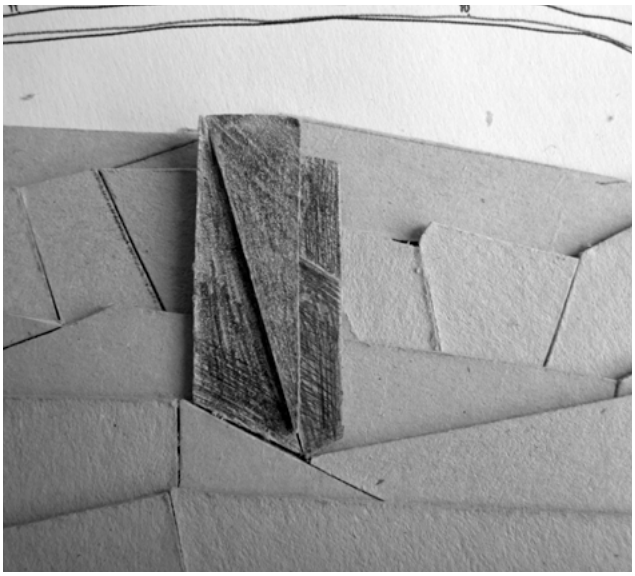


Intimate & "hidden" situations, both for birds & birdwatchers



Framing views

Hidden, semi-indoor lookout points

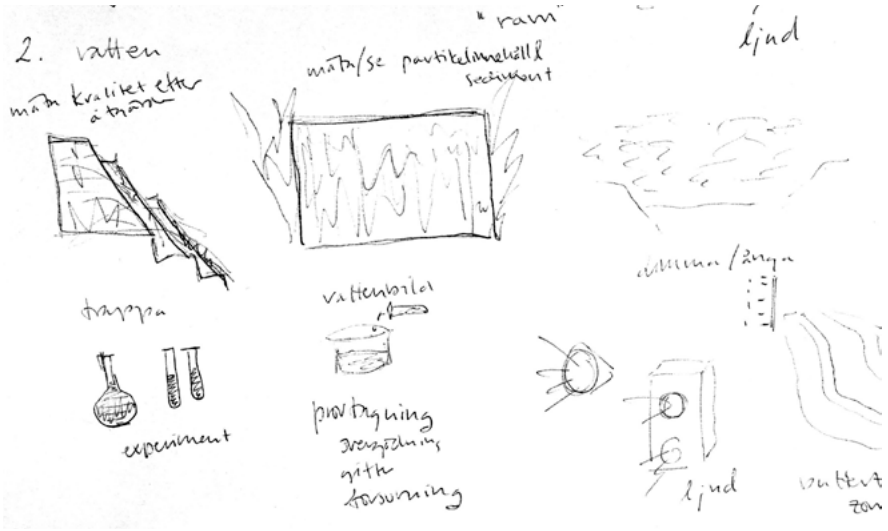


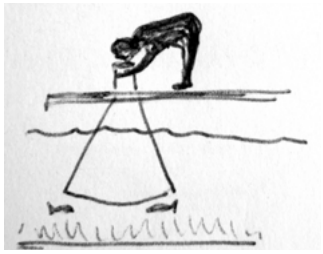
Bird centre, reaching towards the water

Process

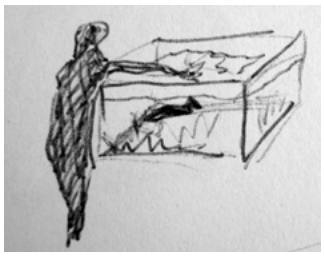
Water centre

How to experience & learn about water & water quality

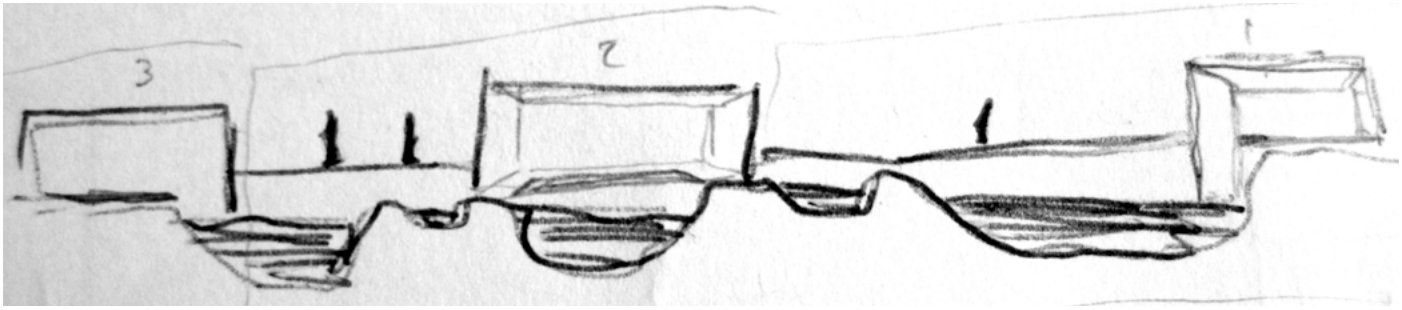




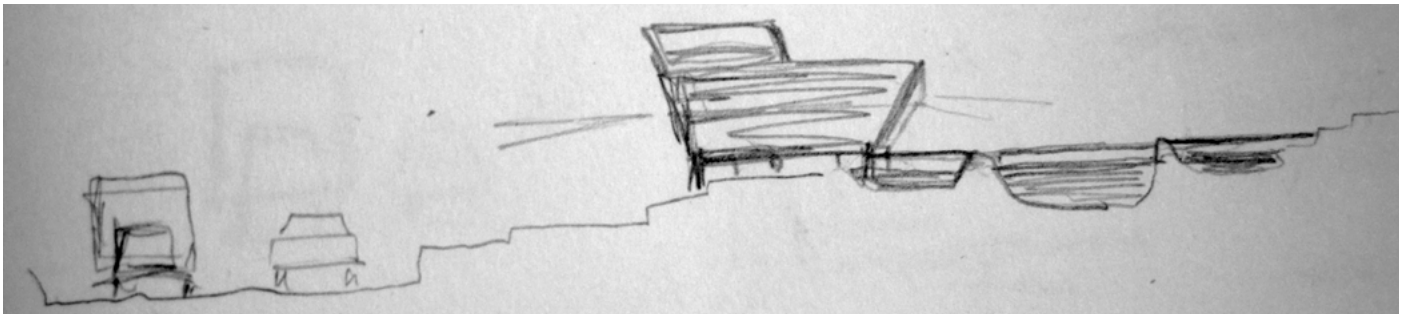
Seeing



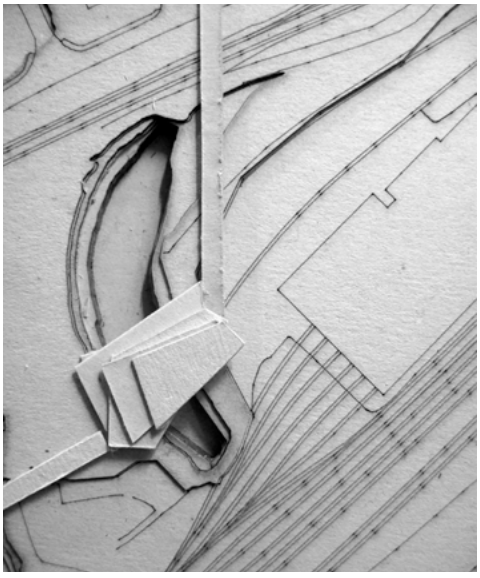
Touching



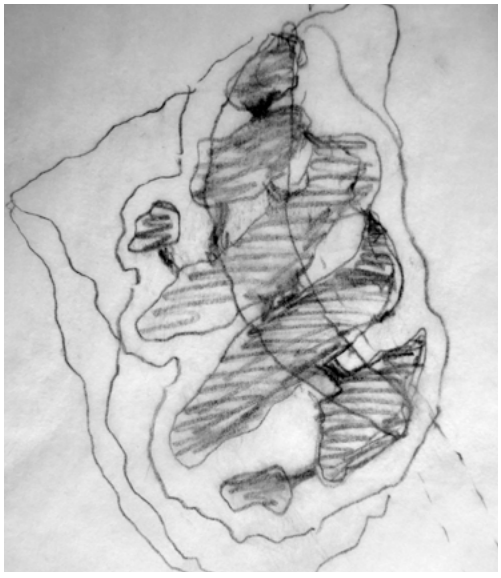
Buildings connected to/part of ponds



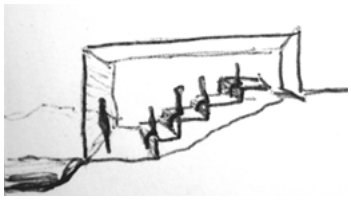
Buildings facing traffic as well as ponds



Buildings over ponds



System of ponds for different kinds of cleansing, sedimentation & monitoring



Lecture hall with water as background

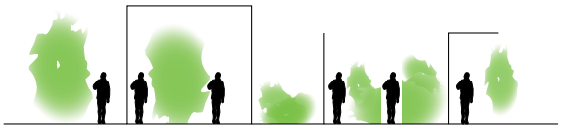
Process

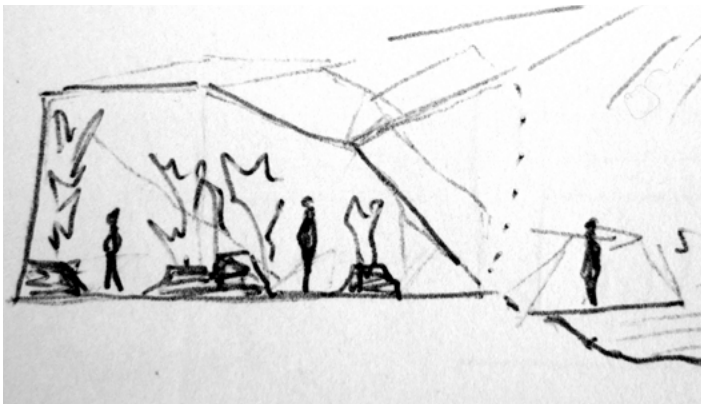
Green house

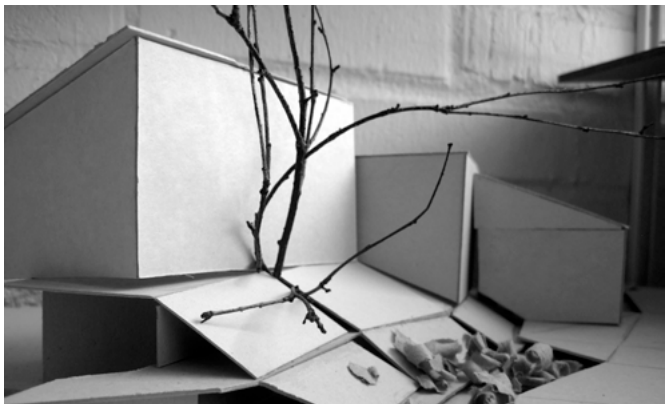
Building or not?

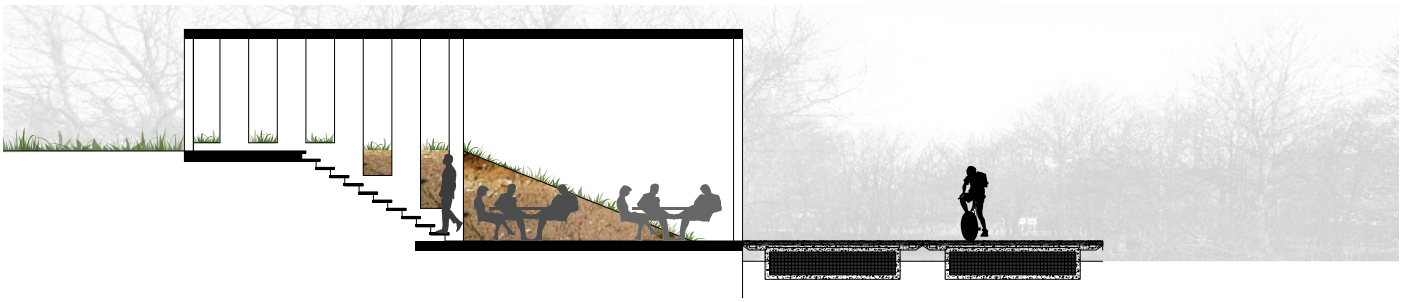
Indoor, outdoor and in-between spaces to experience plants

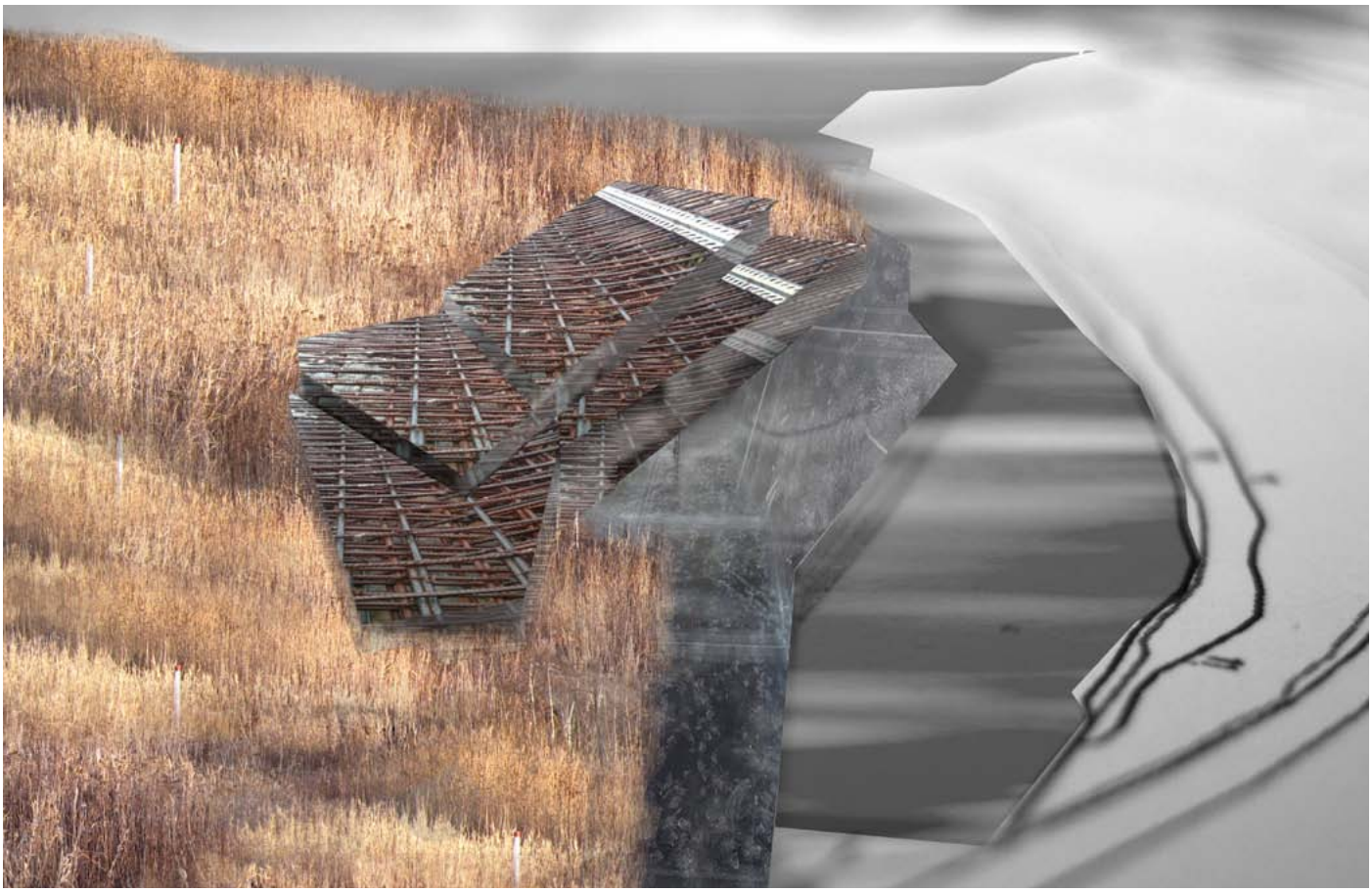
How does it relate to the water and the surrounding?





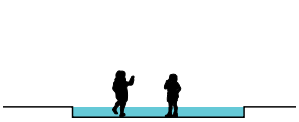


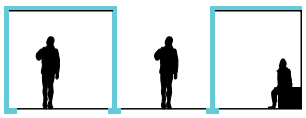


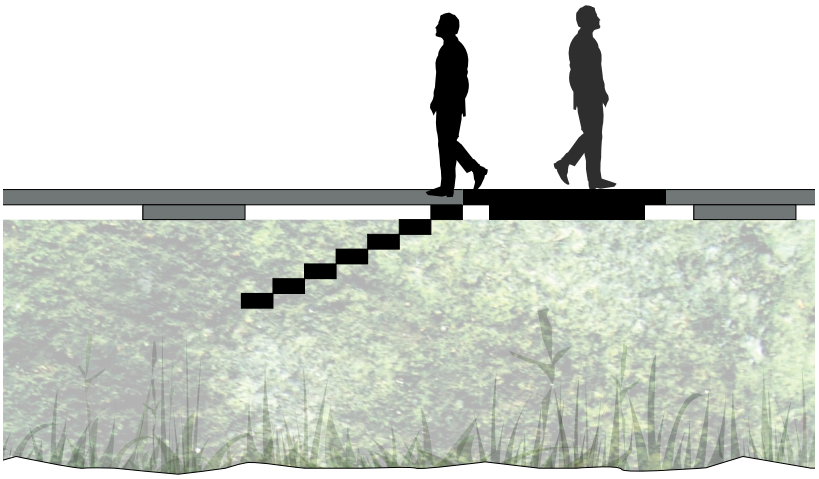


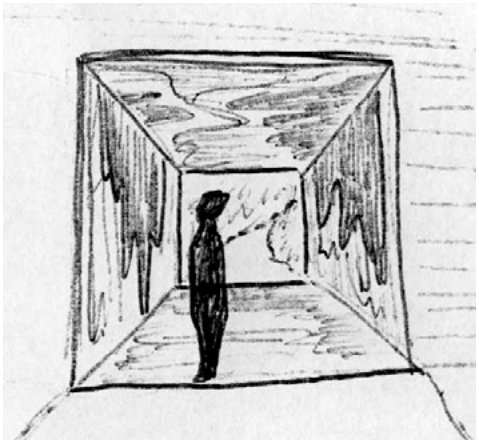
Submerging

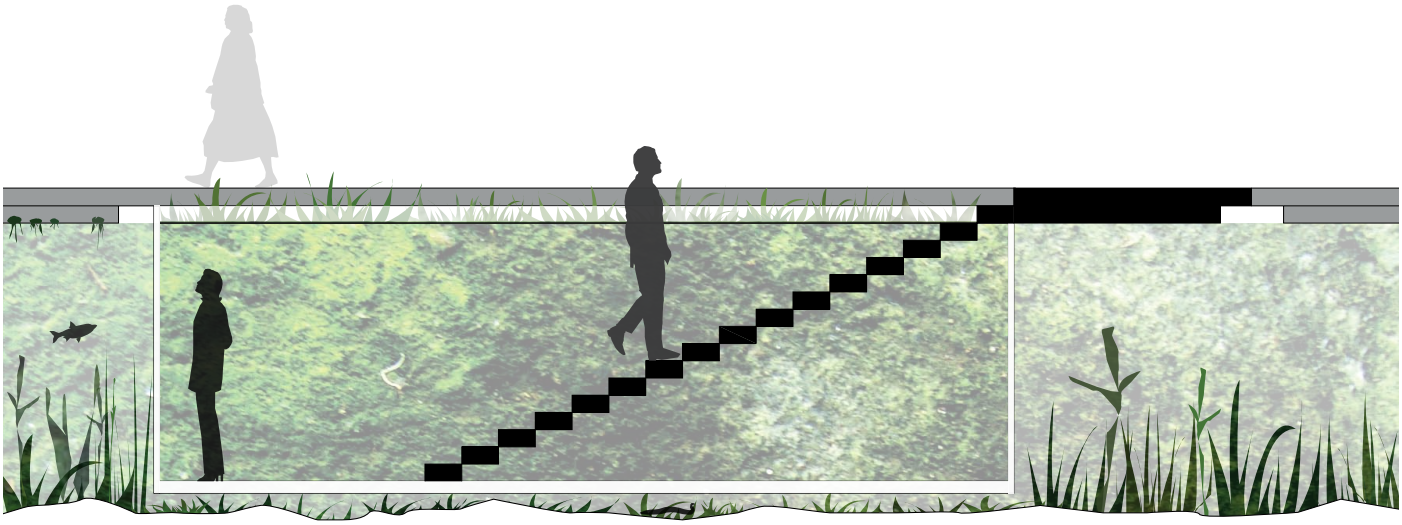
Being in, under, next to water, being surrounded by water - submerged
Moving down into water

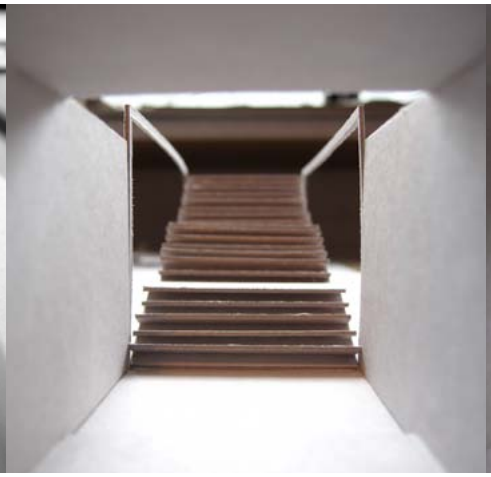






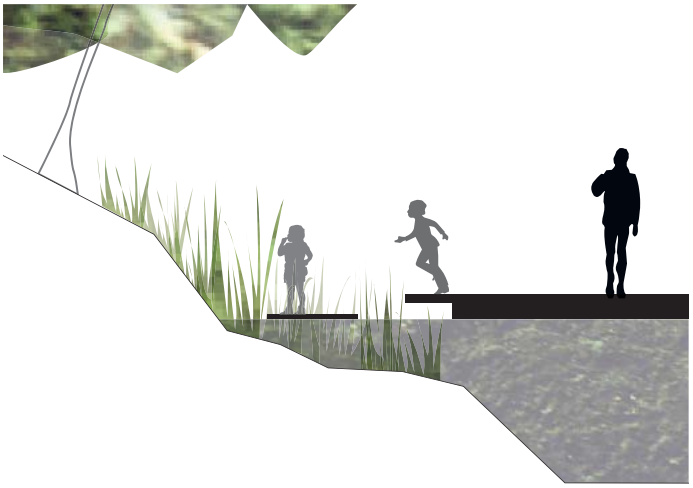


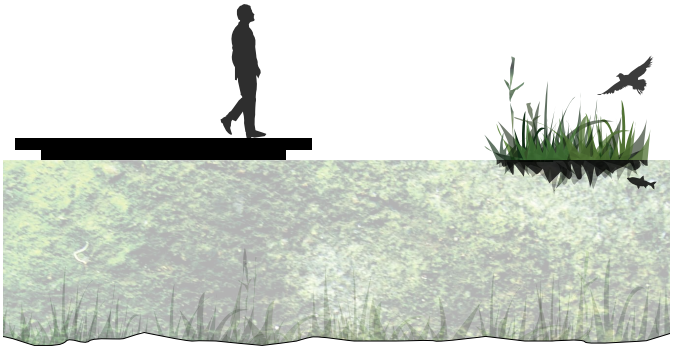




Buoying

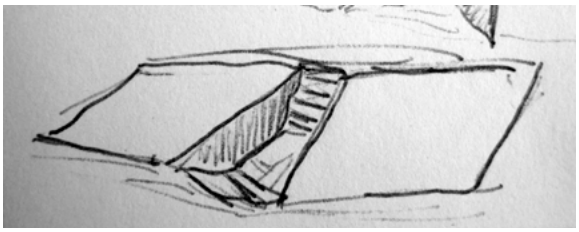
Floating islands to experience water and plants, moving on and over water, moving through plants

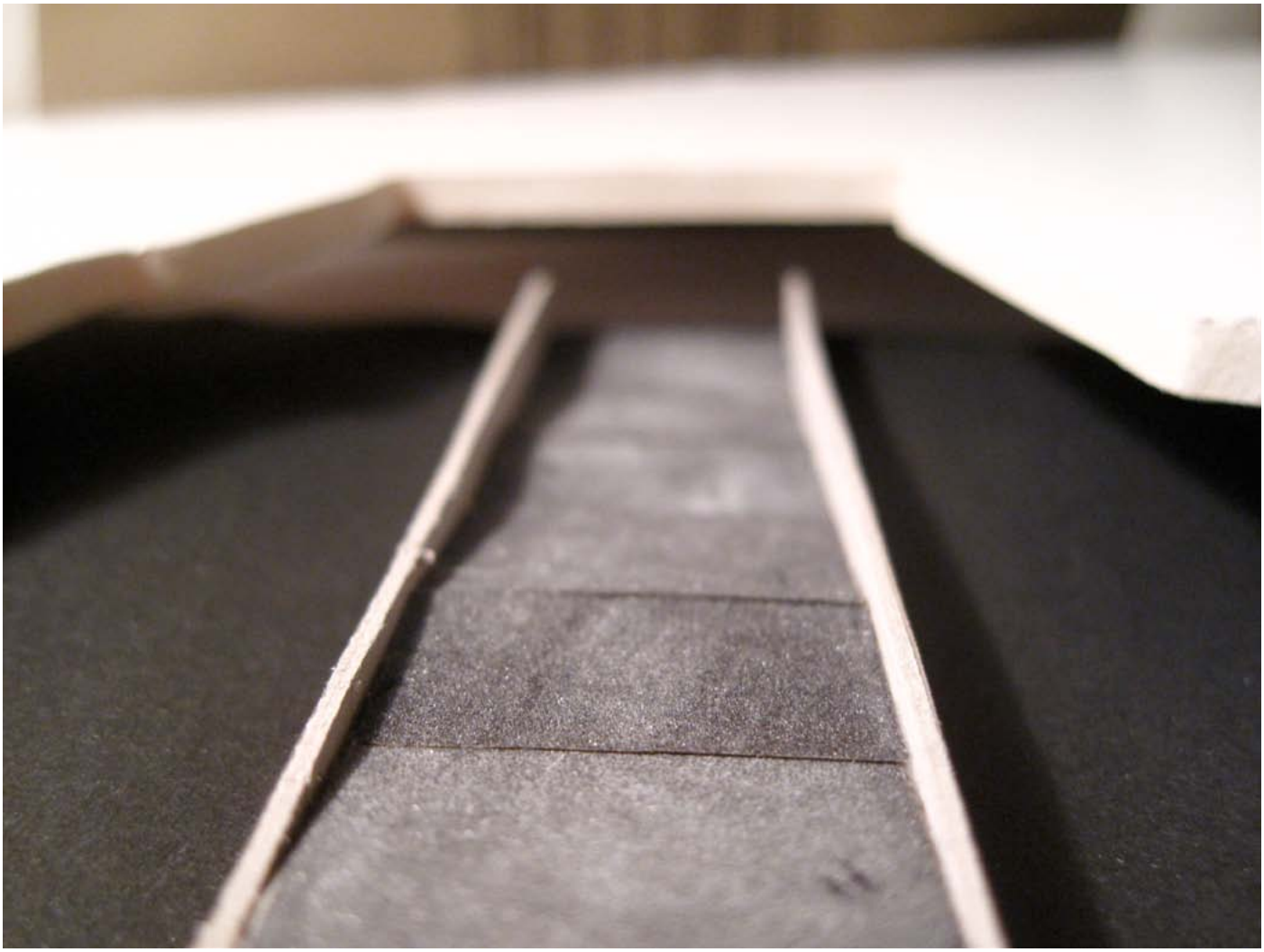




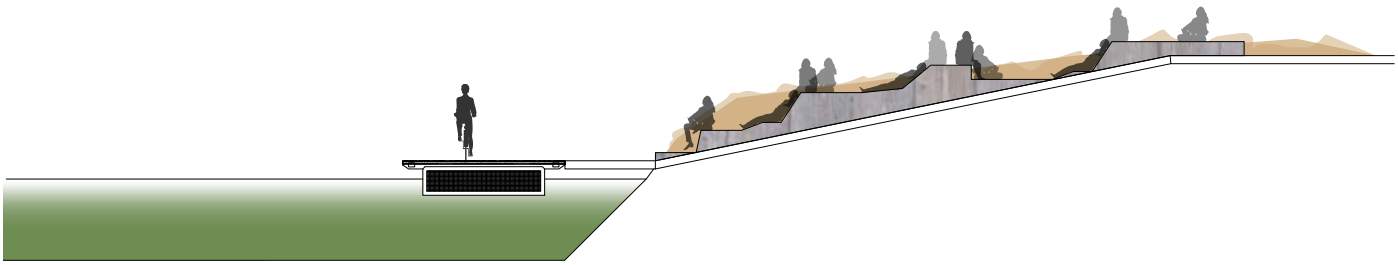
Extending

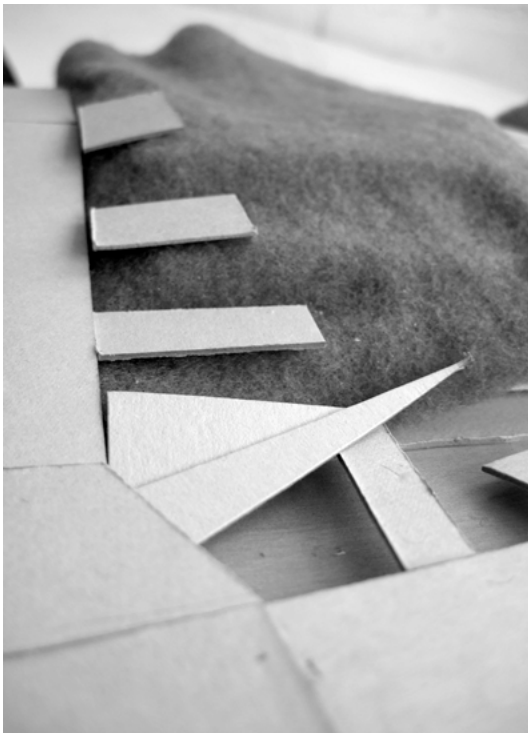
Moving down into water, moving under earth, contrasts in light/dark





Connections to land, relation to water edge, seating in greenery





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