ARCHITECTURE AND URBAN SPACE DESIGN

BOOKLET TEAM I

ARK128 MPARC

CHALMERS SCHOOL OF TECHNOLOGY

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PROJECT MANAGEMENT APPROACH

In the studio we are aiming for the grade 4 or 5.

We have experience with working both in group and individually.

We have similar schedules and will mostly work on site.

When absent we will inform each other beforehand.

We are used to different software but have agreed to help and trach each other.

Our main communication is through Messenger chat.

Use assets such as a boat to visit our site and a contact within Gothenburg water management to ask questions.

DESIGN PHILOSOPHY

As a group we want to...

... try new things and methods.

... challenge ourselves.

... Working with physical models.

... Explore different materials.

... work conceptually.

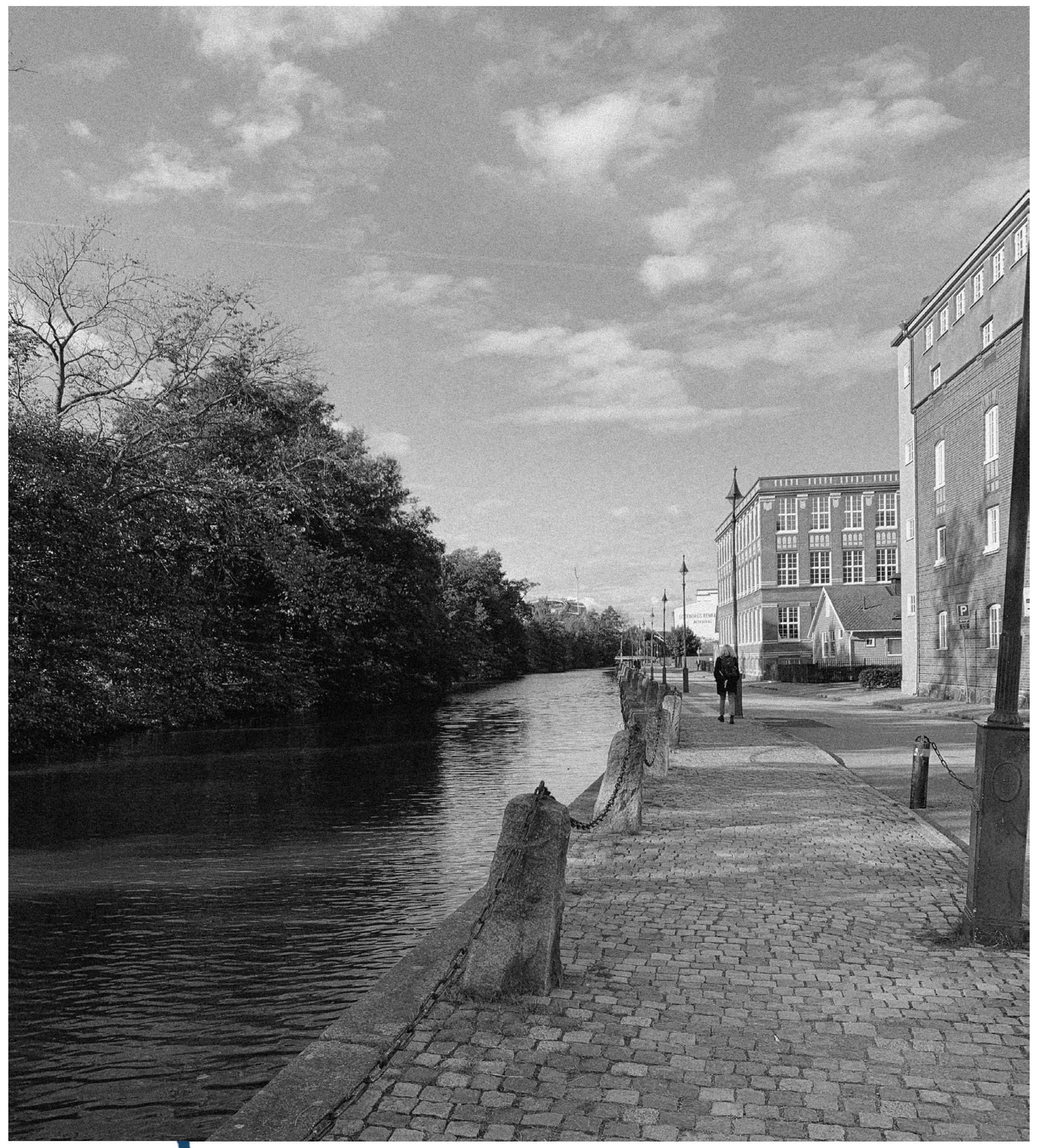
... work parallelly with system and form.

... not limit ourselves and each other.

I
SITE

BURGÅRDSPARKEN

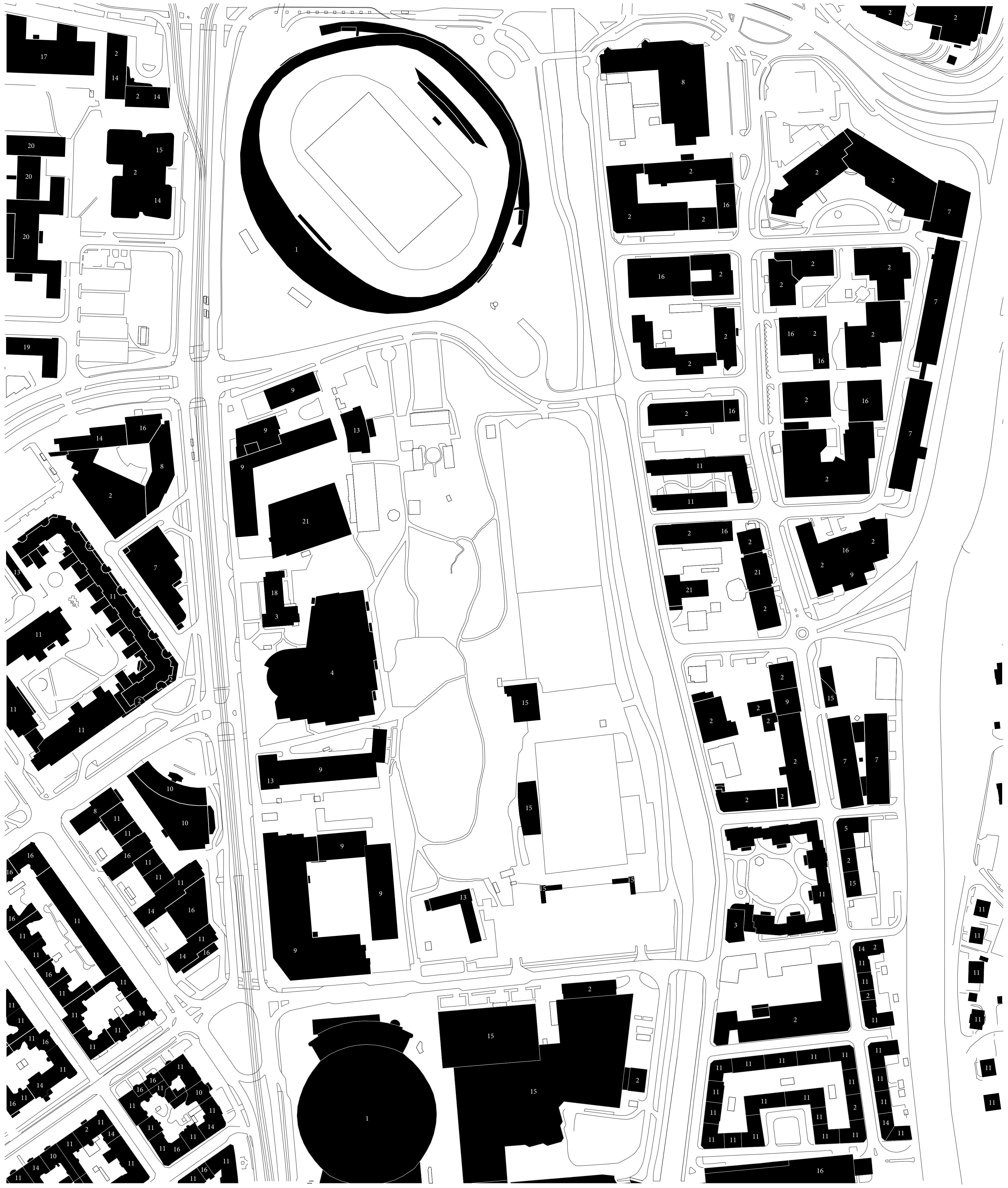
Burgårdsparken is a site located in the central area of Gothenburg in between Skånegatan and the highway E20/E6close. The site is close to both Heden, Korsvägen and Ullevi. Mölndalsån runs through the site and is currently dividing the site into two separate parts with different qualities, Burgårdsparken and Gårda. Gårda is part of a dense and urban context with a more homogenous terrain. Parts of the built context have some cultural heritage value, since many of the buildings are connected to the rope and textile factory, which was active around the turn of century. Burgårdsparken is a green and quite open area, with a wider range in height difference and less buildings. In Burgårdsparken there is also an old Landeri called Stora Katrinelund, since historically the site was used for farming and growing crops. Today there are also recreational facilities on this part of the site, such as a soccer field and a skatepark. Overall, Burgårdsparken is a very versatile site with buildings filled with different functions, such as schools, offices, housing, museums, cinemas, etc.



Situation plan

100 m

Photos of site 20220929

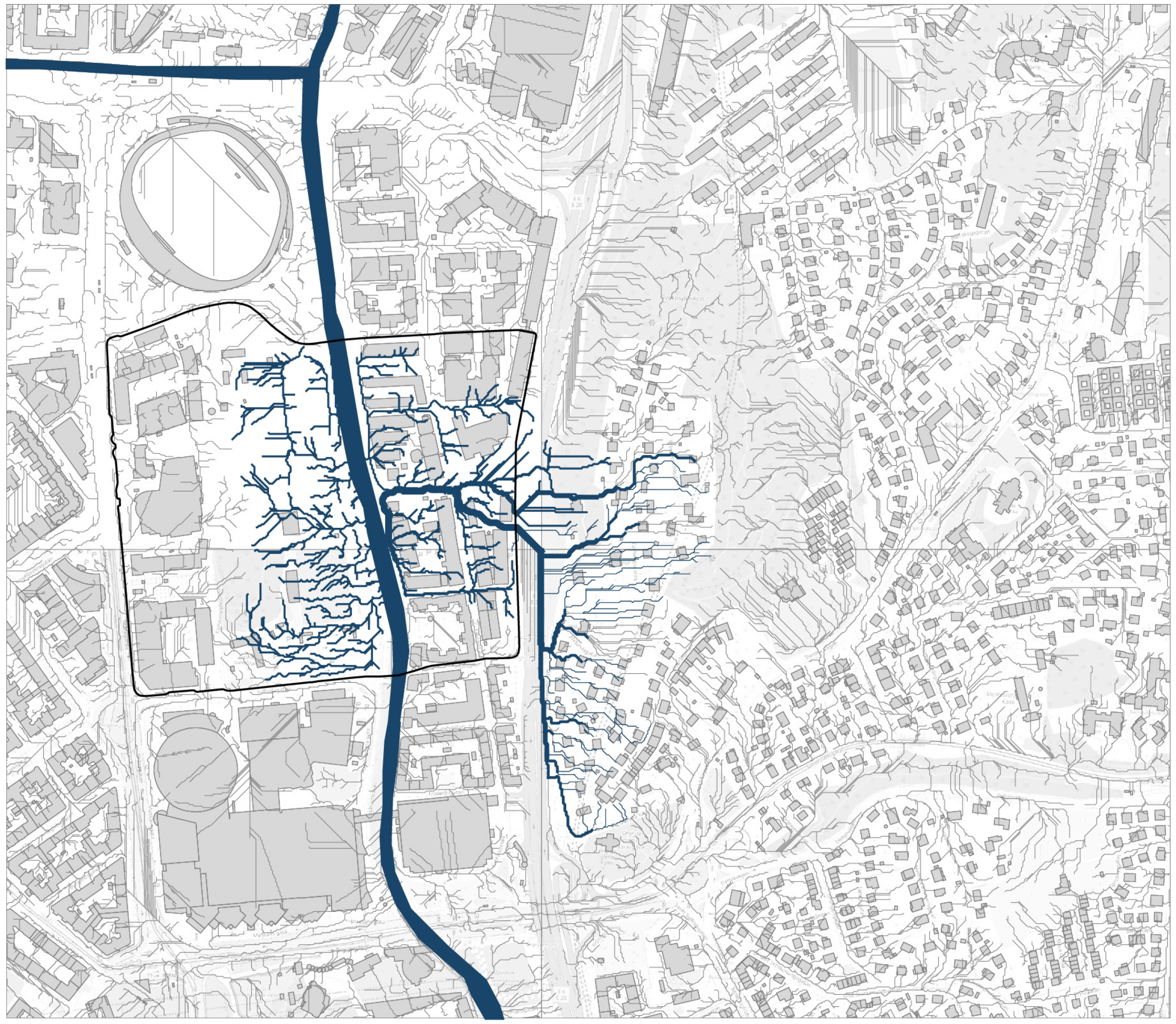


1. Arena
2. Business
3. Church
4. Cinema
5. Consulate
6. Fire station
7. Garage
8. Government agency
9. High school
10. Hotel
11. Housing
12. Museum
13. Pre-School
14. Restaurant/Café
15. Sports
16. Store
17. The District Court
18. The Norweigan House
19. The Police
20. Public Prosecutor's Office
21. University

Scale 1:500

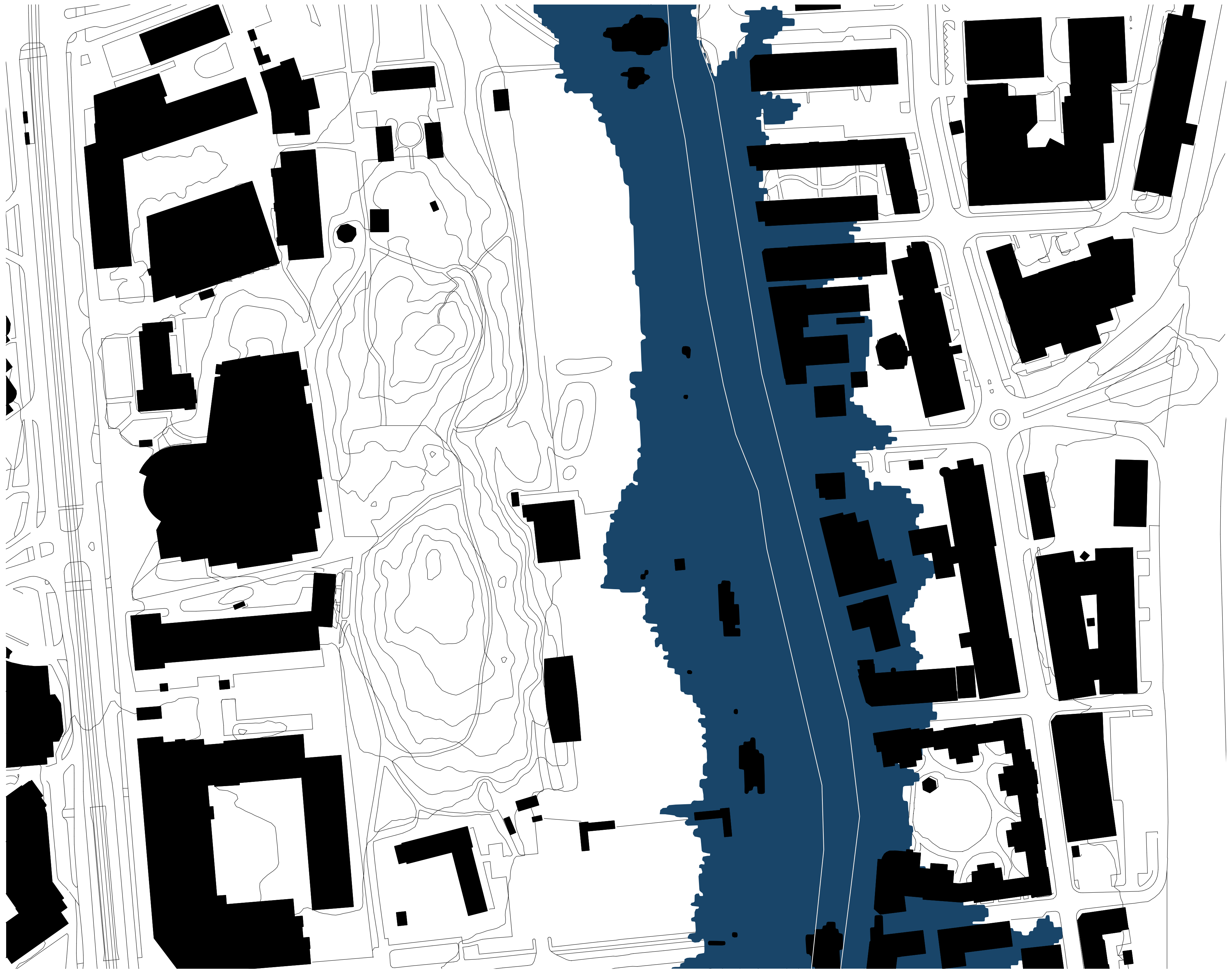
During a one-week workshop we built our site model using MDF and cardboard. With the MDF as a base plate w e lasered the current plan with existing buildings and roads. This helped us keep track of how our changes and artificial terrain affected the site. We then proceeded to place the current terrain and topography over the base plate and plan which left us with a clean slate to continue working with.

II
PROBLEMATIZATION



Rain water flows on to site

Surrounding Burgårdsparken there are steep inclinations, especially to the east. This leads to a lot of rainwater flowing onto our site and down into Mölndalsån. During heavy rainfalls these oncoming flows will lead to flooding.



Future scenario of flooding - 100 years flow

Not only do the oncoming flows lead to Mölndalsån flooding, but also the direct rainwater hitting the site. According to MSB:s "Översvämningsportal" if a 100-year rainfall would occur numerous buildings on our site, many with cultural heritage, would be flooded

Hydrosocial problem
Flooding

Example: Highly sealed urban environment

Description

Urban environments are often times not designed to tolerate unusually severe rain- or floodwater events. They are gradually densified and sealed structures with the problem of not being able to manage flood becoming a realization after the fact.

Impact

Property damage, death and injury, loss of land to erosion, disease outbreak through contamination of freshwater, blocked traffic, power outages, discomfort and inconvenience, quality of life.

Hydrosocial potential: Hydro-integration

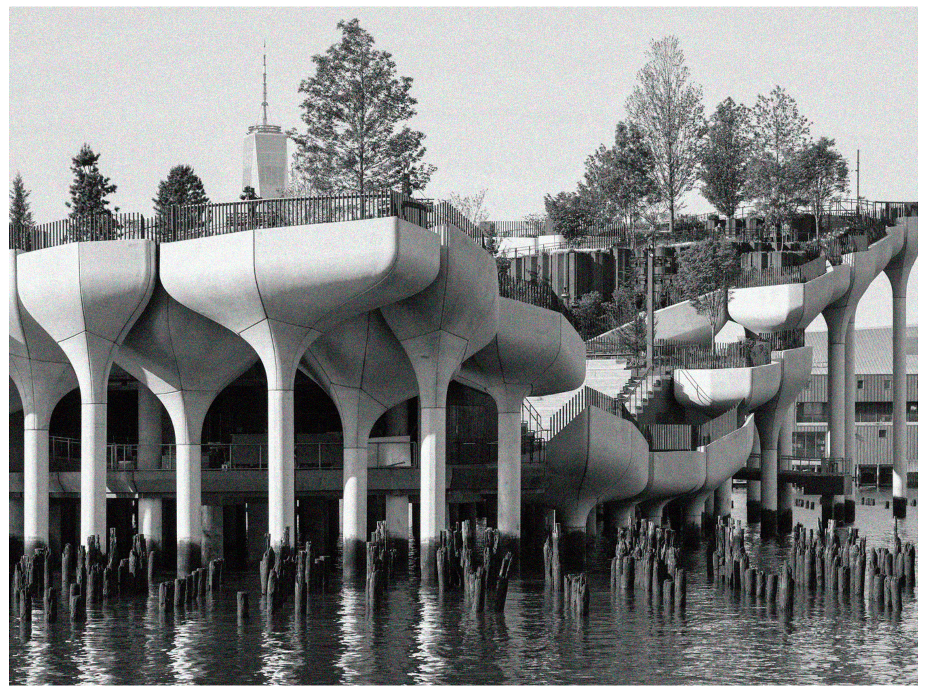
Execution

Designate space for water in urban context. Cost-efficient water-management through nature-based initiatives generate beneficial conditions by turning threat into potential mitigate concern through analysis and careful investigation of appropriate measures.

III
SYSTEM

THE BLUE RAMPARTS

In the project The Blue Ramparts, we show how nature-based solutions can be used to solve challenges such as fragmentation between the area's various forms of use, lack of infrastructural coherence, floods and over-asphalting, which creates a heat island effect. A way to renaturize a previous bare industrial wasteland. Turned the area into a space that works as flood area and space for people to recover and get in contact with nature. Integrate areas into the design that are capable of being flooded. This creates a buffer or sponge in case of flood events and protects our immediate designed structure as well as neighbouring communities.
Visualization: Marcin Jastrzebski

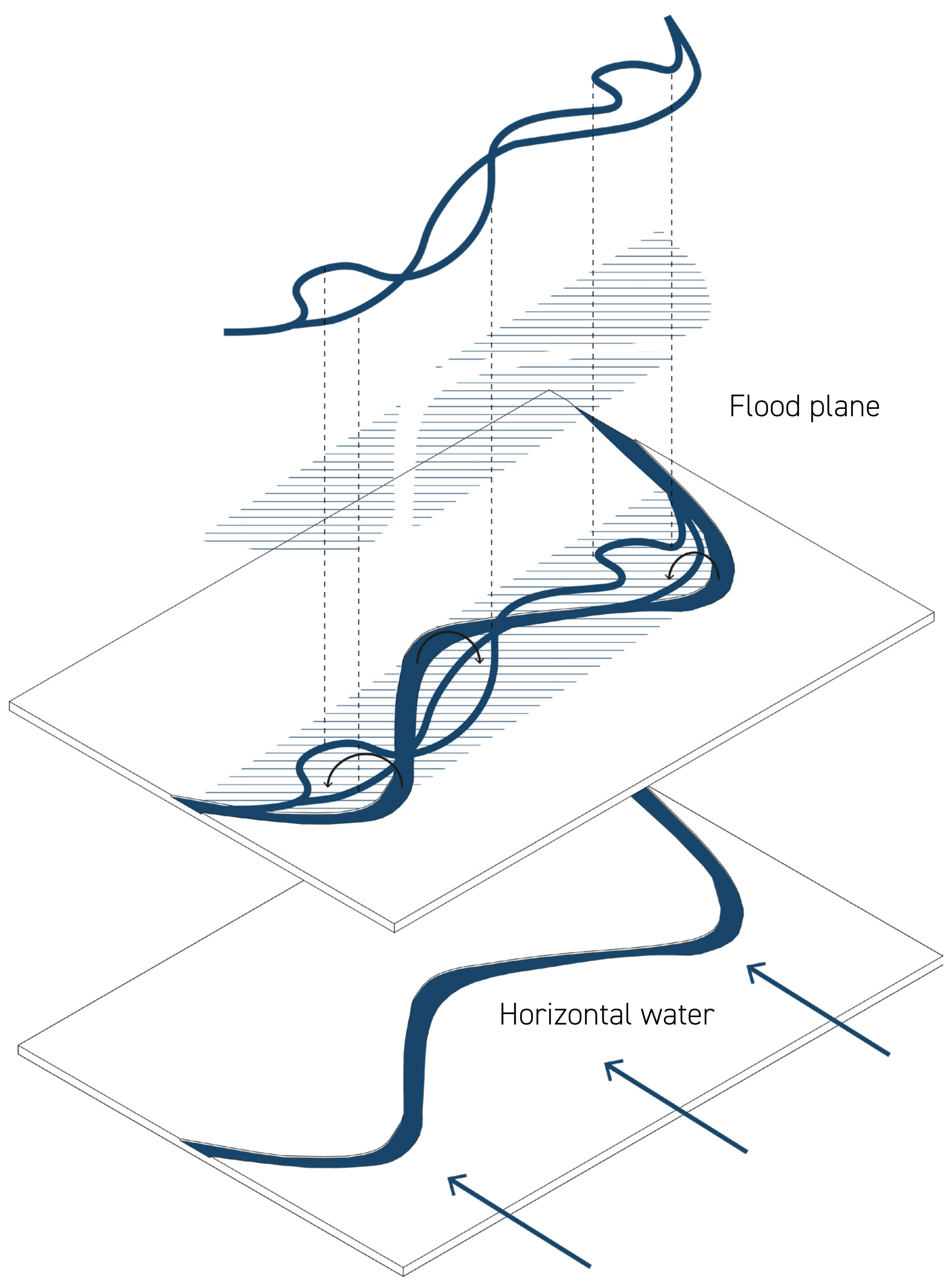


LITTLE ISLAND PARK

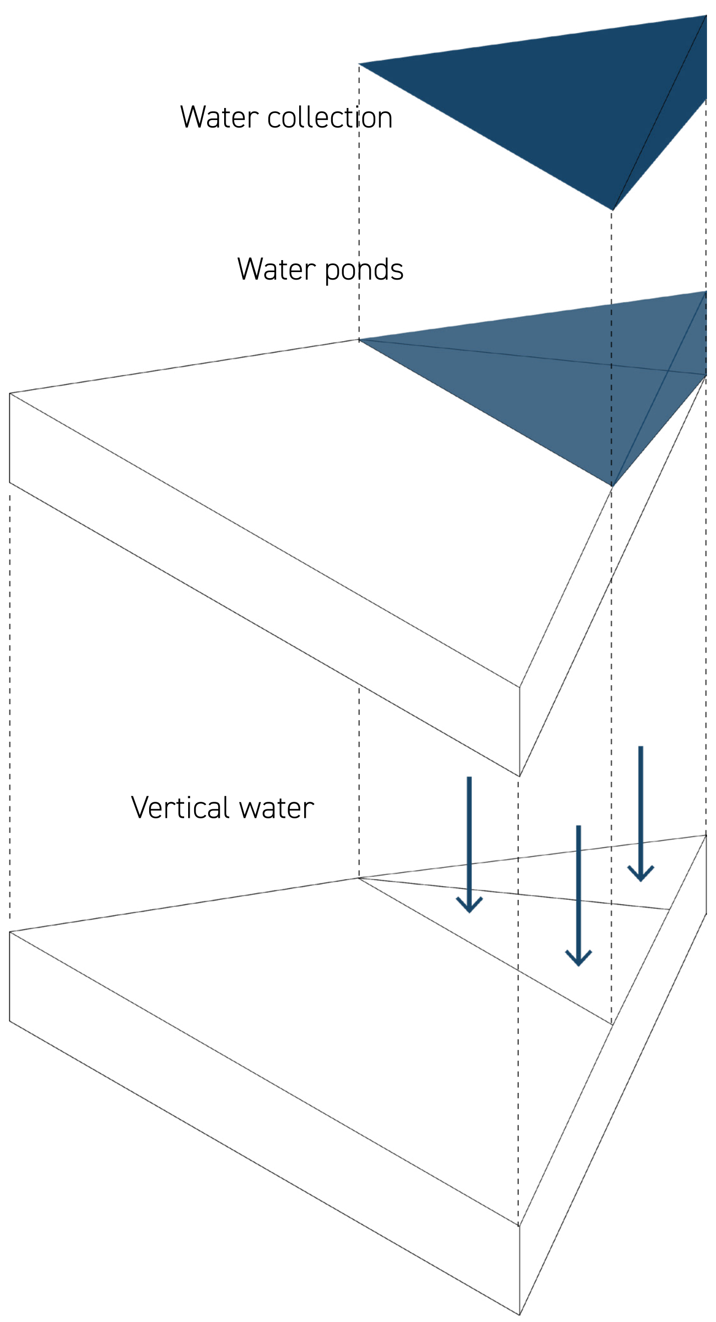
A public park on the Hudson River that is design for both humans and wildlife. Designed for the excitement of being over the water and being emersed in greenery. A shelter for wind and the pillars that goes down into the river is an important place for marine habitats. A landmark and destination in the city. We can take inspiration from the "cave system" under and how they have worked with layers and slopes. The pillars could also be applied to our project and the way they have a function. The little island park is an example of creating an environment for plants, humans and animals that is not threatened by floods, because it is risen above the water.
Photo: Timothy Schenck

For our systems we have decided to work with flooding and rainwater on our site. In order to clarify these systems, we have decided to categorize them into "System A" and "System B". System A is the horizontal water on our site (the oncoming rainwater flows). System B is the vertical water on our site (the direct rainwater). The water systems will be implemented in the terrain and used as part of the design. In order to deal with the water in system A we are working with floodplains. For dealing with the water in system B, in addition to the floodplains, we will also implement water basins on our terrain in order to collect water which then can be used for the different functions, e.g., housing, schools, businesses.

SYSTEM A



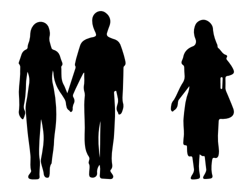
SYSTEM B



Site specificity

The inhabitants of each site are as unique as the site itself. Different age groups and social circles need to be addressed, a wide range of functions have to take plac e and all of that on a terrain that spans from flat to steep, containing wetlands, sealed surfaces and vegetation.

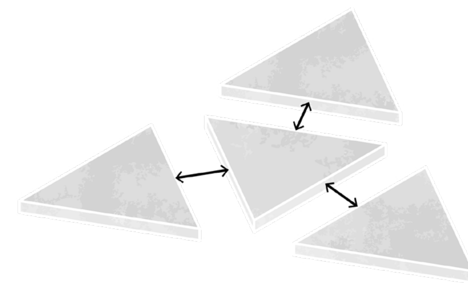
Social



Uniqueness of place and people

Problem specificity

In order to create a solution to the complex range of needs that have to be meat by a design, a modular approach allows a consequential strategy for the large scale of the project, while at the same time being able to address very specific needs on the small scale.



Large scale modularity

Functional approach

In order to provide for a successful terrain, the conventional functions needs to be compiled and incorporate into site. The site's conventional functions will be enriched with hydrosocial capabilities. The outcome will be arranged in space within the site.

Mental and physical health and education

IV
TERRAIN

FLOODPLAIN

DESCRIPTION

"Auenlandschaften" are planes below the average water level surrounding a river. They are characterized by flooding and drying off in regular intervals. They were generally carved out of lower river terrasses by the meltwater of the last major ice age and are composed mainly of fluvial sediments. They differentiate themselves by a flora and fauna adapted to these changing hydrological conditions. Typical plants are different herbs and reeds growing amongst willow- and alder tree forests.

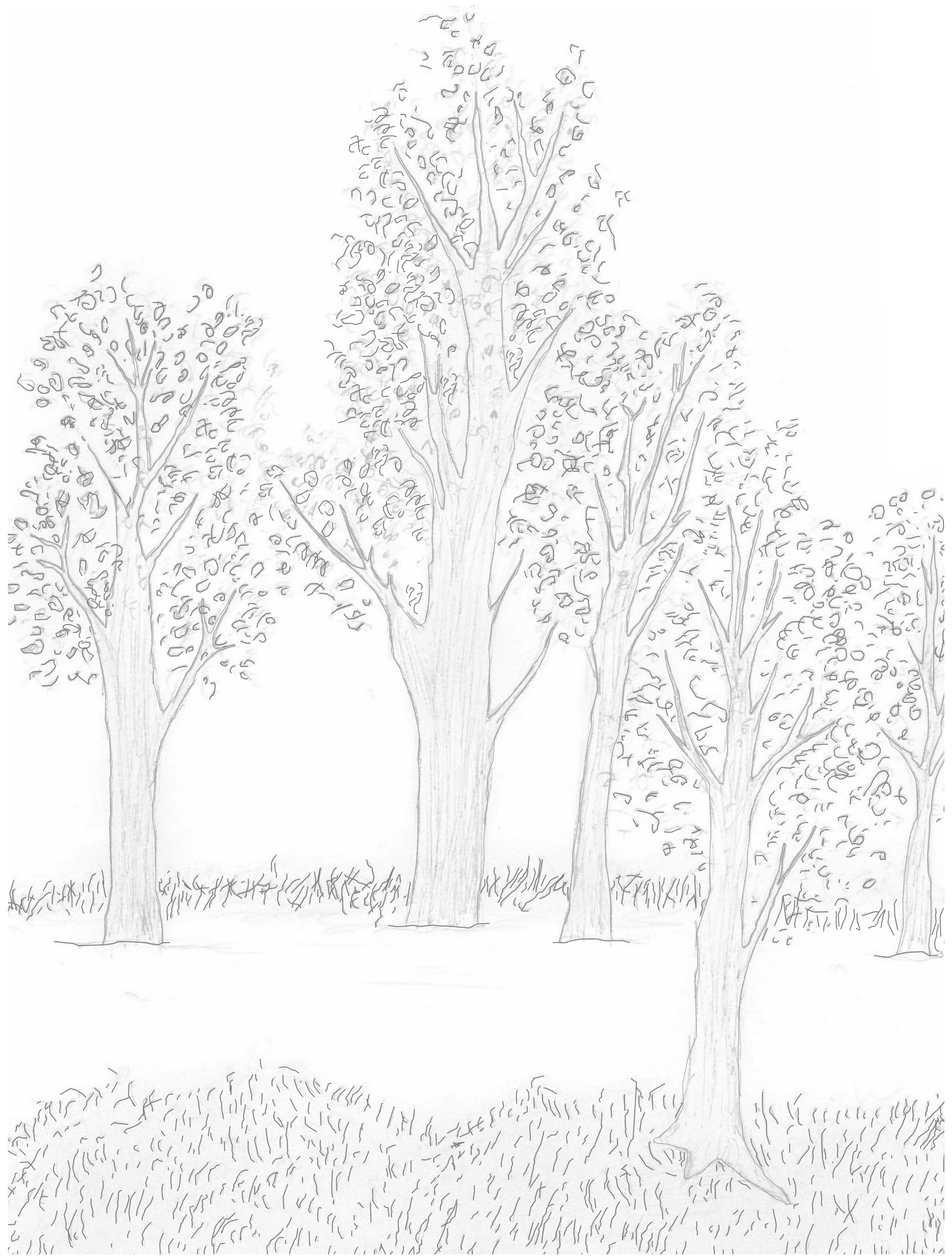
QUANTITATIVE PROPERTIES

Depending on the elevation of the landscape compared to the river, as well as the size of the river, flood intervals and intensitiesvary. Lower plains can be flooded for around 100 to 200 days of the year. Water levels can vary from under 50cm up to 300cm. Flow speeds are high. In higher Altitudes (relative to the river) flood intervals are lower and less severe. This allows for a different type of vegetation.

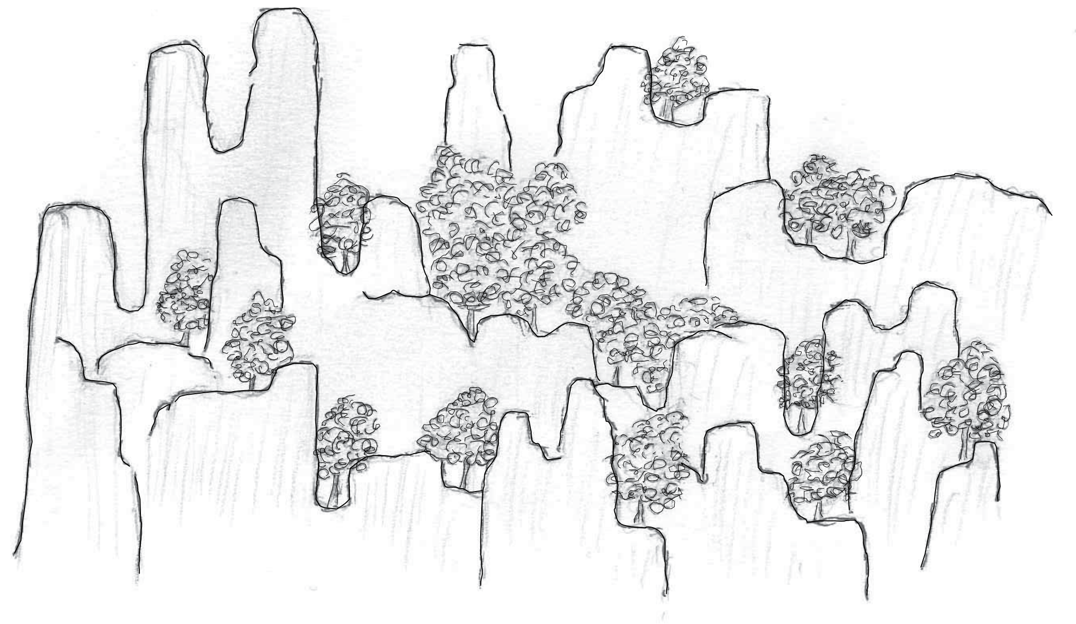
QUALITATIVE PROPERTIES

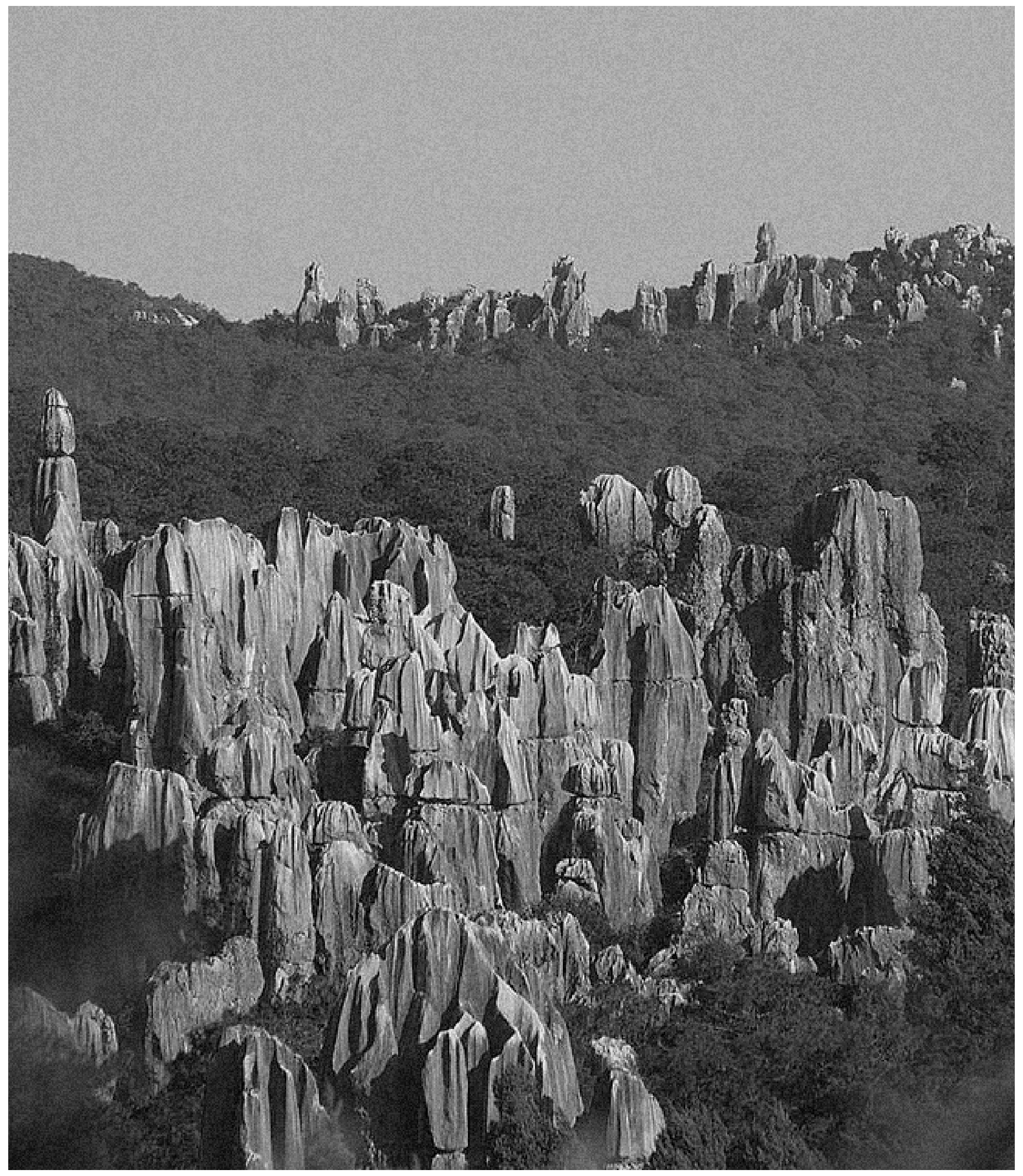
Auenlandschaften are amongst the highest biodiversity landscapes in Europe. By being flooded frequently they are subject to constant topographic change. The deposition of sediment also supplies nutrients. This causes a highly productive ecosystem with fast growing vegetation. To the observer, this form of landscape has long portrayed fascinating and mysterious qualities.

Photograph: Paul Nicklen



KARST TERRAIN





DESCRIPTION

Karst is a type of landscape where the dissolving of the bedrock (limestone, marble gypsum) has created sinkholes, sinking streams, caves, springs, and other characteristic features.

QUANTITATIVE PROPERTIES

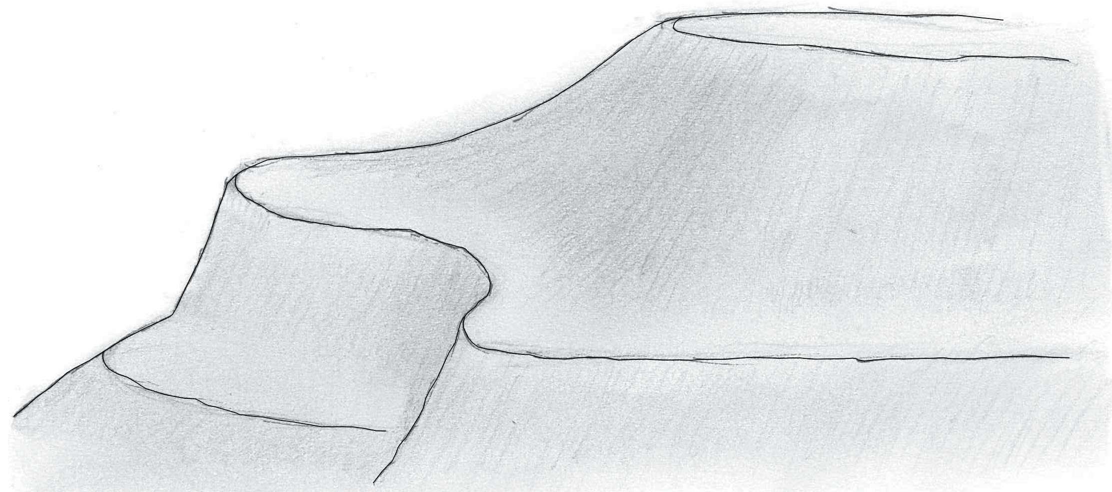
When cultivating vegetation in karst areas, the lack/scarcety of surface water must be considered. The soils may be fertile enough, and rainfall may be adequate, but rainwater quickly moves through the crevices into the ground, sometimes leaving the surface soil parched between rains. The porousness of the Karst, for vegetation a difficulty, is essential for Humans, as large percentages of consumed drinking water are transported through karst-aquifers (around 25% globally).

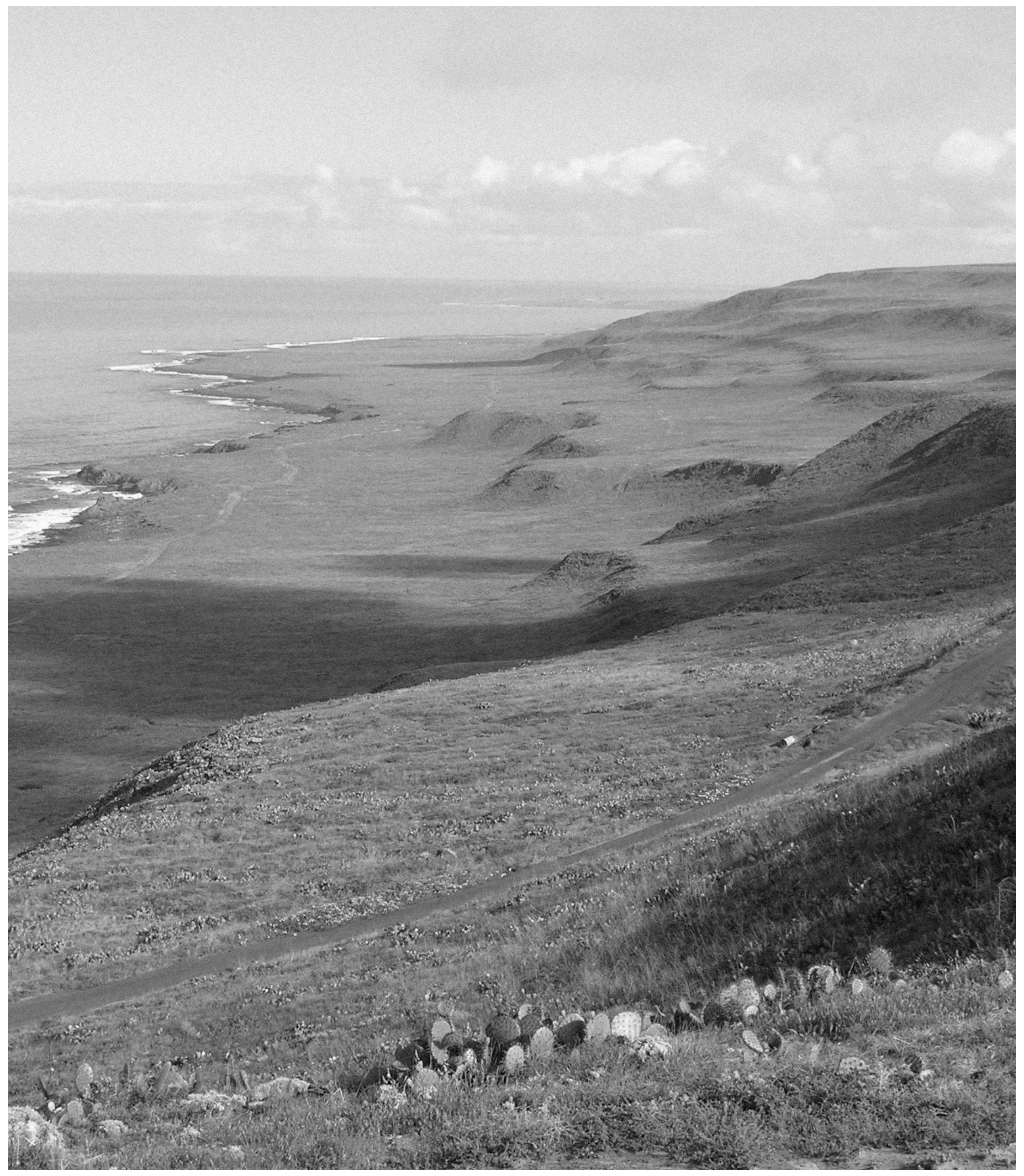
QUALITATIVE PROPERTIES

Karst topography is known for prominent features above, as well as underground (caves, gorges, rock-pillars). The uniqueness of these washed-out rock landscapes often provides an identification factor which causes large amounts of people to travel to national parks and get in touch with nature.

Photo: Ko Hon Chiu Vincent

MARINE TERRACE





DESCRIPTION

A marine surface a rock terrace that is defined as relatively flat surfaces that are bound together with steeper slopes. The formation of marine terraces are controlled by changes in environmental conditions, wave motions and rise and fall of sea levels, together with tectonic activity during recent geological times, such as uplift of the land surface. These terraces are there for a representation of the former shorelines.

QUANTITATIVE PROPERTIES

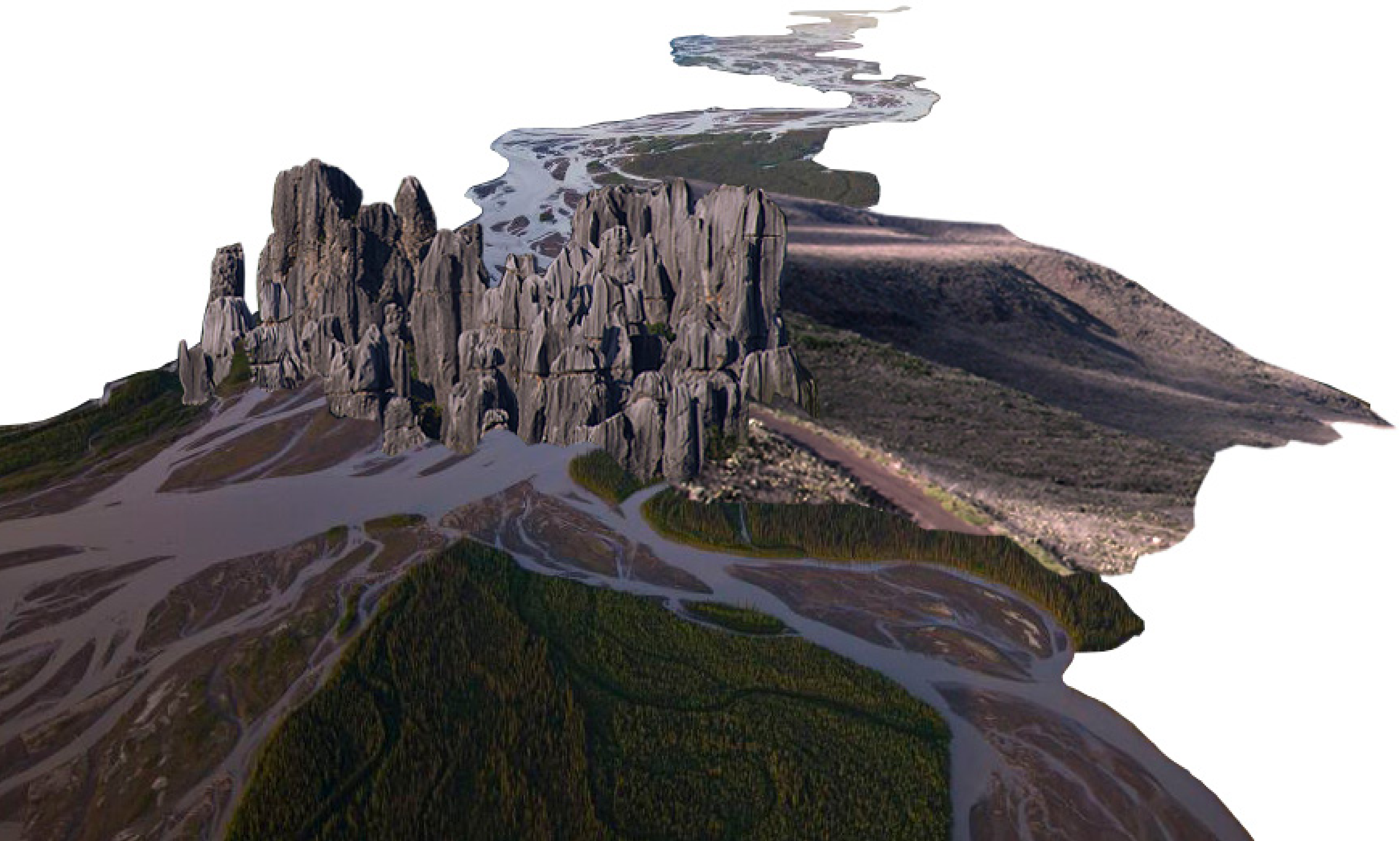
This terrain is in close relationship with water and the formation of the landscape is a water system. It also has this "stair-like" formation that leads down to the shoreline. The landscape also has this mixture of vegetation, such as grass plains, and hard rock materials.

QUALITATIVE PROPERTIES

Due to its generally flat shape, it is often used for anthropogenic structures such as settlements and infrastructure. The "stair-like" formation also makes it possible to reach the highest point of the structure without it being to steap. The combination of materials could be interesting to implement into a design.

Photo: Daniel Muhs

For our terrain we would like to use these references in terms of layering them in order to create our terrain.



1.

Base Layer
Floodplain Forest

Choosing a floodplain forest landscape for the bottom layer of our terrain composition allows us to utilize close to the entire site with a highly efficient floodwater buffering system. Not only our own structure, but also the neighbouring communities are being protected from potentially damaging rise of water levels that would be the result of a highly surface-sealed urban environment without any buffering capability.

2.

Structural Core
Karst Rock Formation

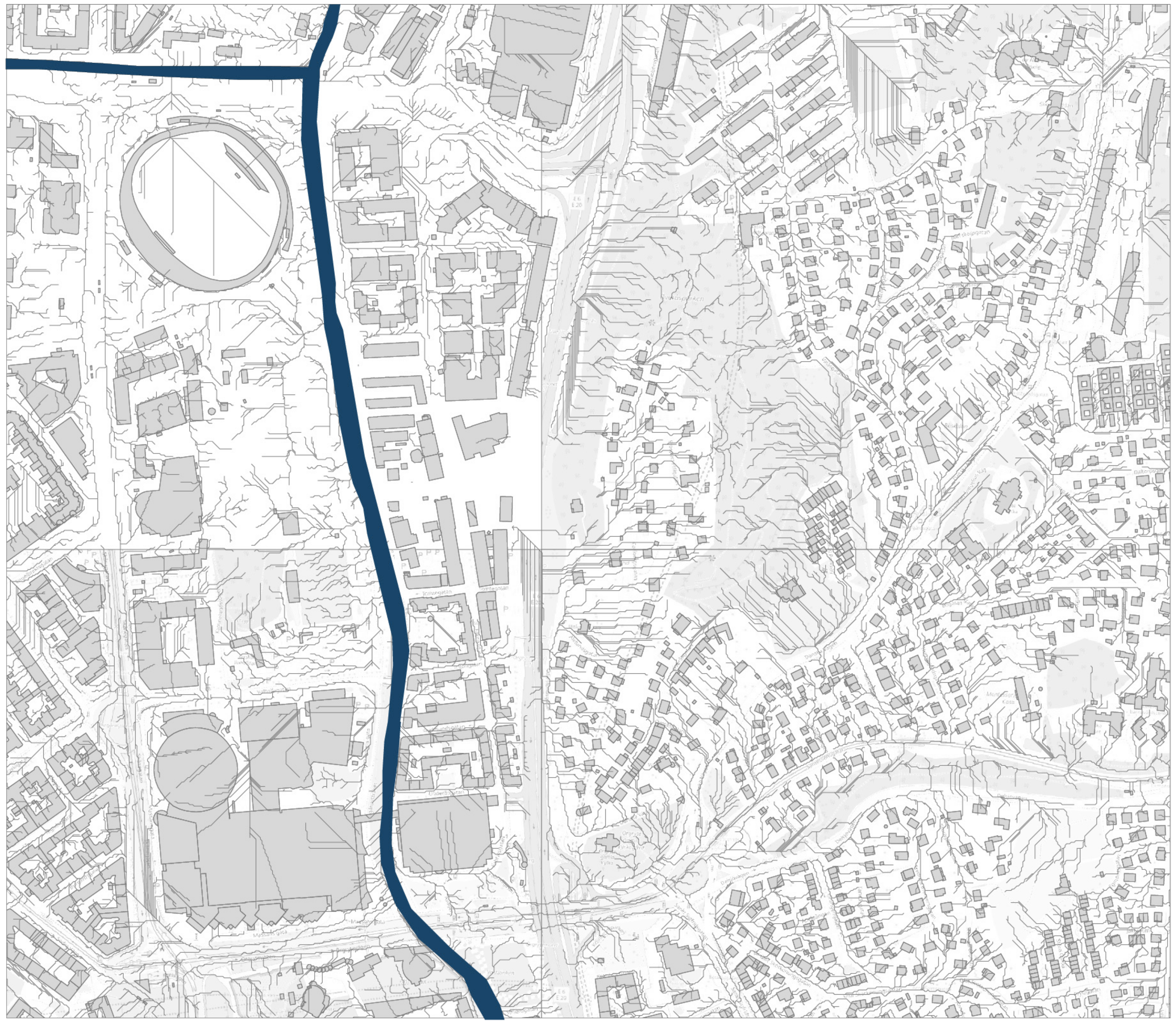
For our rising structure, we are utilizing the geologic karst formation in its properties of form and function. As core layer, connecting the ground to the sky, the Karst formation can function as the engine of our terrain composition. The porous qualities of the rocks themselves allow exchange and transport of gases and liquids. Oversaturated soil can be regulated by capillary uptake and evaporation over a greater surface area. Vertical Water (rain) can be naturally absorbed, minimizing the threat of topsoil-erosion. Naturally occurring networks of sinkholes, caves and channels on a smaller scale can transport water in greater quantities. On a larger Scale these networks can function as connections between locations or locations themselves for inhabitants to use.

3.

Top Layer
Marine Terrace

Draping a top layer over our first two layers is supposed to maximize the first two layers functional potential, as well as balance out their minor deficiencies. Primarily the top layer is supposed to provide a second level of largely continuous structure for the purpose of storing excessive amounts of rainwater as well as allowing for a walkable terrian. This becomes particularly important when the bottom layer is in a flooded state and its infrastructural and recreational functionality is reduced. Parallel the Top layer needs to allow certain amounts of light, water and air to reach the lower layers for the structure for them to retain their function as ecosystems. Qualitative properties of the marine terrace will be implemented in the design proposal, such as its geometrical inclination, allowing for walkable and non-walkable sections of terrain.

V
DESIGN PROCEDURE



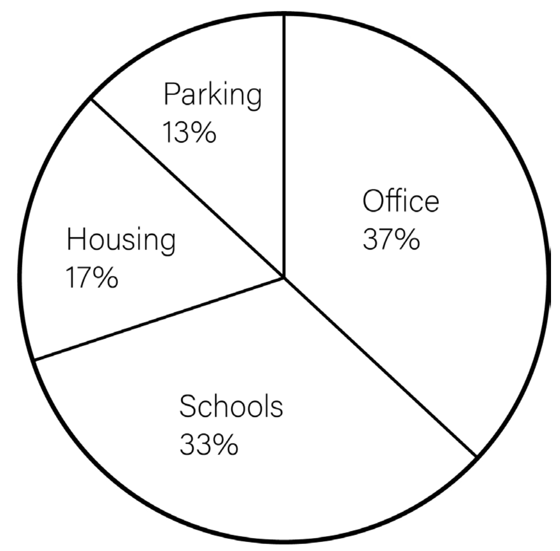
Existing canal

Buildings to keep

As we visited the site in the beginning of the studio we discussed the site in terms of what buildings to keep. We concluded that more buildings will be demolished than kept on the site, due to us wanting to have more creative freedom in our further work. Although, the functions within these buildings that are being demolished are being reestablished and implemented in our terrain proposal. We decided to keep some buildings with high historical and social value on the east side of Mölndalsån, such as old factory buildings, e.g., Remfabriken. On the west side of Mölndalsån we chose to keep the cinema, the Norwegian house and some school buildings. In order to keep track of the buildings being demolished and their functions we compiled a chart of their summarized floorplan area. In this way we could make sure that the buildings being demolished are compensated for in our terrain.

BUILDING	FLOOR	FLOORPLAN AREA	SUM
Katrinelundsgymnasiet 1	4	2350	9400
Katrinelundsgymnasiet 2	2	750	1500
Katrinelundsgymnasiet 3	1	700	700
Katrinelundsgymnasiet 4	2	1100	2200
Katrinelunds Idrottshall	1	2600	2600
Förskolan Levgrensvägen2	2	750	1500
Bernadottegymnasiet	2	1900	3800
Förskola Skånegatan	2	250	500
Valhallagatan Förskola	1,5	700	1050
IHM Business School 1	5,5	1200	6600
IHM Business School 2	2	300	600
Kunskapsgymnasiet	4	2750	11000
Dojo	2	350	700
Gårdaskolan	2	500	1000
MSC Sweden	4	1500	5200
Virtual Engenieering and Manufacturing	5,5	400	2200
Offices Fabriksgatan	1,5	2500	8750
Offices Gårdatorget 1	5	3500	17500
Offices Gårdatorget 2	6	900	5400
Offices Gårdatorget 3	5	1100	5500
Tomtegatan Offices	1	2900	4200
Värdursgatan Housing 1	6	1300	7800
Värdursgatan Housing 2	4	700	2800
Housing Fabriksgatan	5	2500	8750
Johan på Gårda Parking	3	1750	5250
Tomtegatan Garage	4	2900	11600

Schools 43150
Offices 48750
Housing 23100
Parking 16850



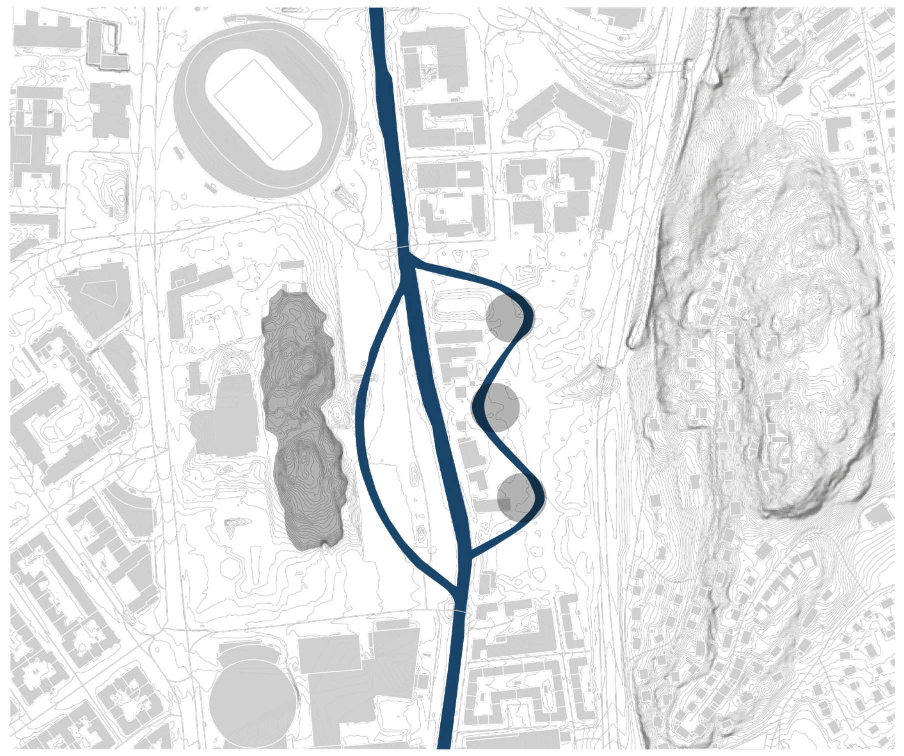
AUSD SITE 2022

Original site

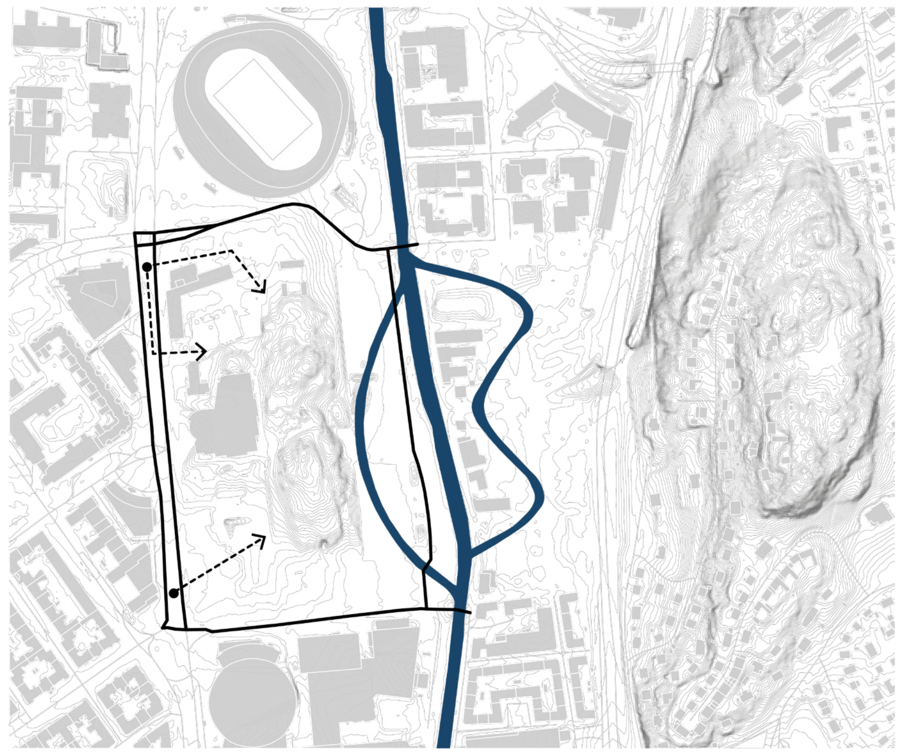
Altered site

Photo: Lantmäteriet

Existing site



Floodplane and greenery



Traffic connections

Neighbouring connections

When looking at the existing qualities of the site we decided that we through our project wanted to enhance the existing greenery and water in the site by keeping Burgårdsparken as it is and by also actively work with the canal and the water by creating floodplanes. We also decided to further work with connecting the site to the existing communications such as the tram stops at Ullevi Södra and Scandinavium, the bike path that goes next to the canal and the roads in the north, Levgrensvägen, and the south, Valhallagatan. By also removing some of the existing buildings we were able to open up the site and further connect it to the existing housing area close by as well as to connect Burgårdsparken with the historical neighborhood in Gårda.

OFF-SITE RAINWATER COLLECTING AREA (CA. 100.000M²)

Medium-low rainwater absorbtion potential
+ good amount of vegetation
- little soil due to granite rock formation
- high surface run-off due to steep slopes
50% surface run-off is not unlikely

EXTREME RAINFALL EVENT EXAMPLE

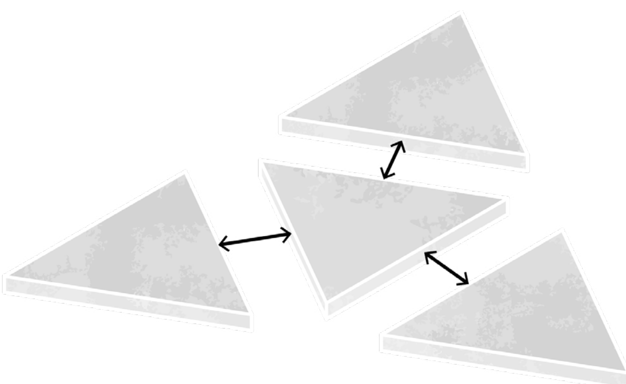
On 27.08.1997, the highest recordet daily rainfall for gothenburg, ca. 8.600m³ of rainwater would have fallen on this area with an absorbtion and evaporation potential of ca. 50% that leaves 4.300m³ in surface run-off.

FLOODPLAINS (CA. 12.000M²)

A reasonable threat from off-site floodwater might be higher than historically recorded amounts and therefore as extensive as 5.000m³ of water in one day. In order for the site to compensate this amount, the floodplains would need roughly this capacity to store water. For 12.000m² of area this would mean an average depth of 40cm compared to the surrounding build environment.

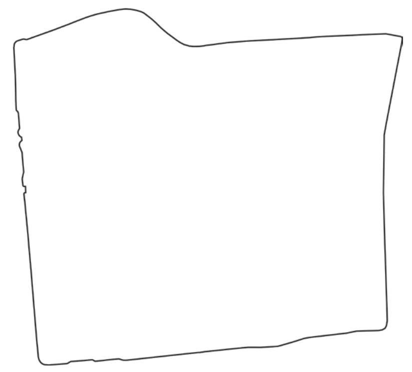
As a design strategy, a triangular grid is proposed for the terrain. Triangles are a simple shape to understand and work with, and will help us to define the desired terrain. The triangulated terrain will create a sharp and interesting contrast to the rest of the site's natural context, and allow for different types of interconnections throughout the site. The triangles will consist of different components, in order to create a diversity of textures and functions.

Easy to fragment

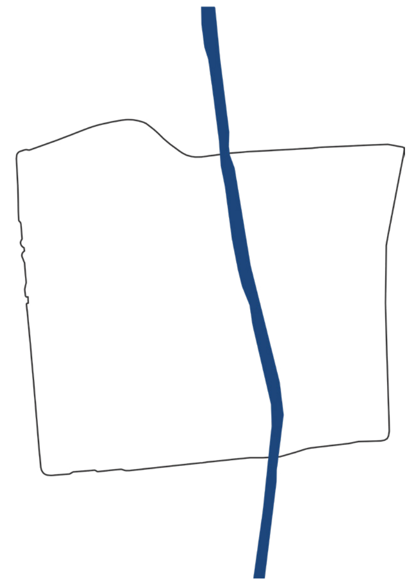


Three edges to build on to

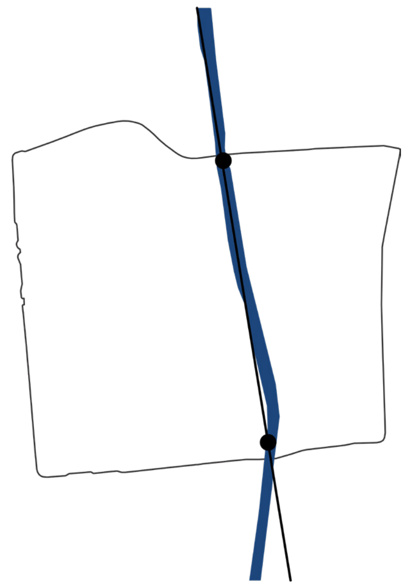
Easy to bend and break



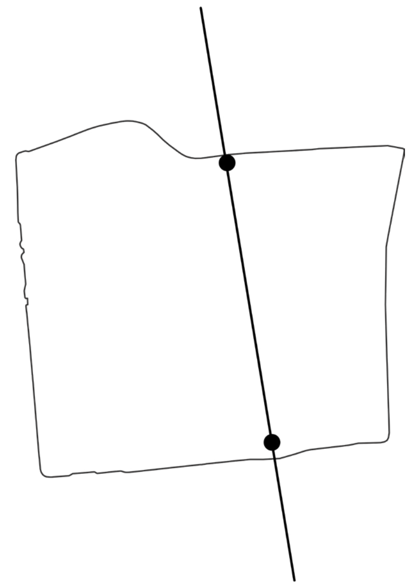
Site



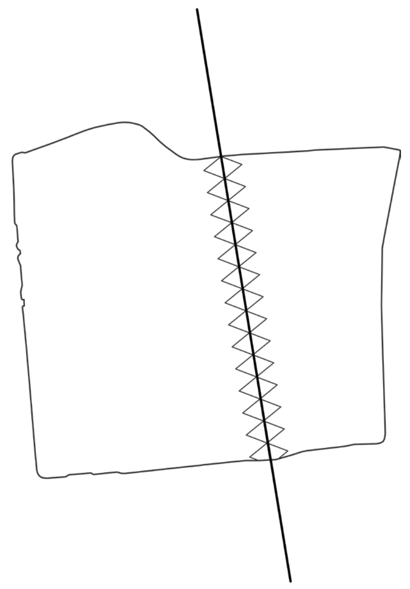
Site + canal



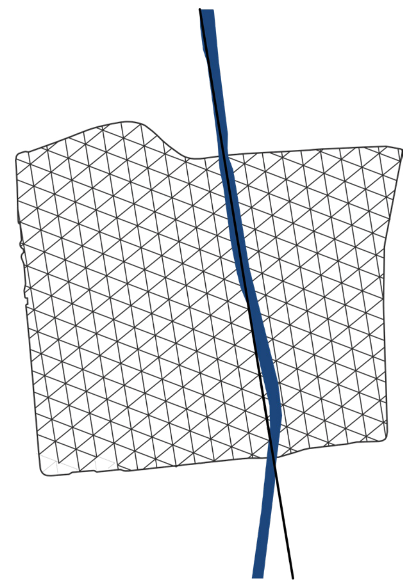
Orientation points



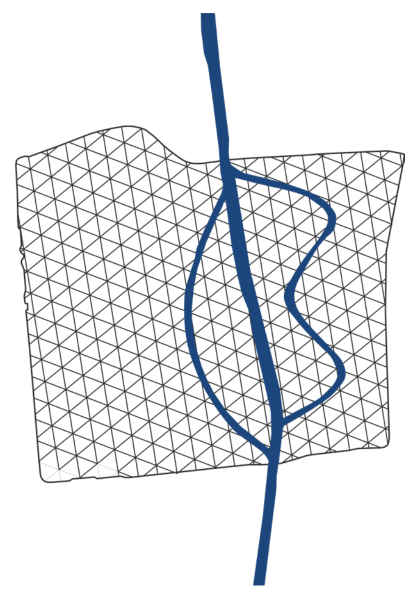
Orientation axis



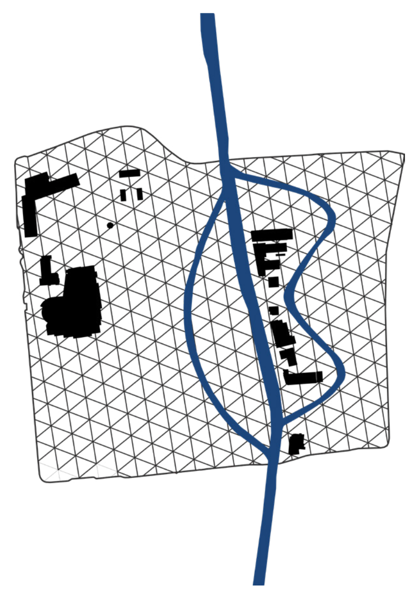
Grid base axis



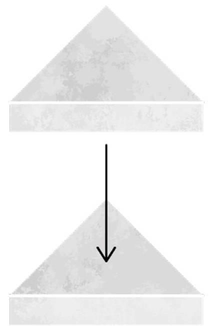
Canal + grid



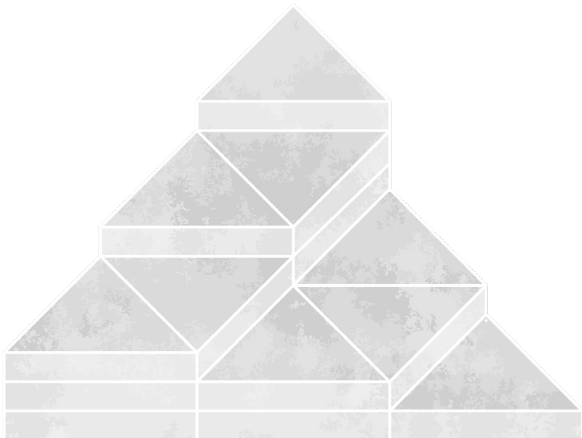
Extended canal + grid



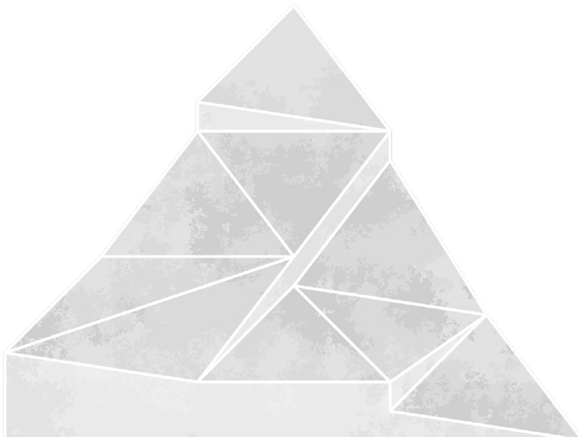
Site + grid



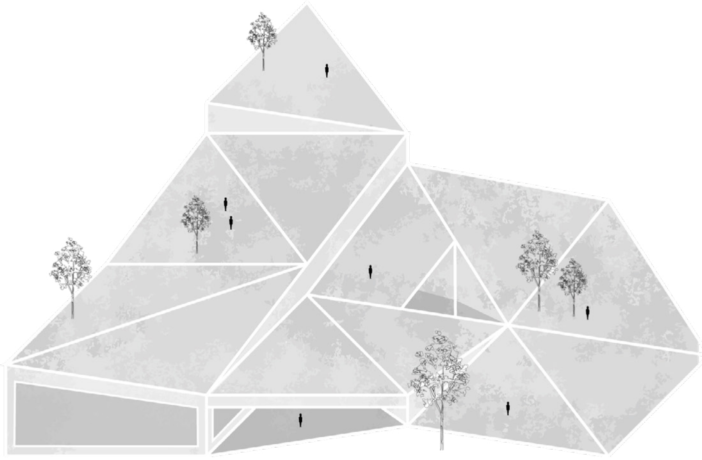
Individual triangle



Stacked traingles



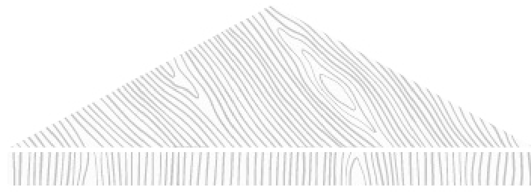
Carving the terrain



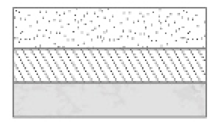
Applying values and functions

After establishing the triangle as the component of our terrain and creating the grid, we developed a method for designing. By stacking individual triangles with a side lengths of 33 meters we could determine the outline and height of our terrain. In order to make the terrain accessible and walkable we then started carving these triangles. Lastly, we started placing functions and values into the triangles.

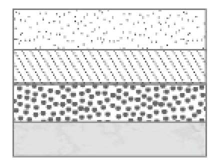
Concrete



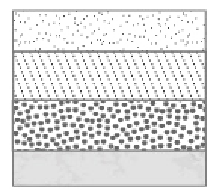
Wood



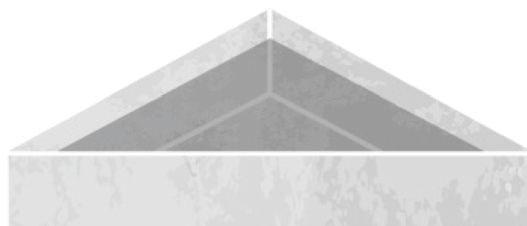
Grass
Soil
Concrete/wood 300 mm



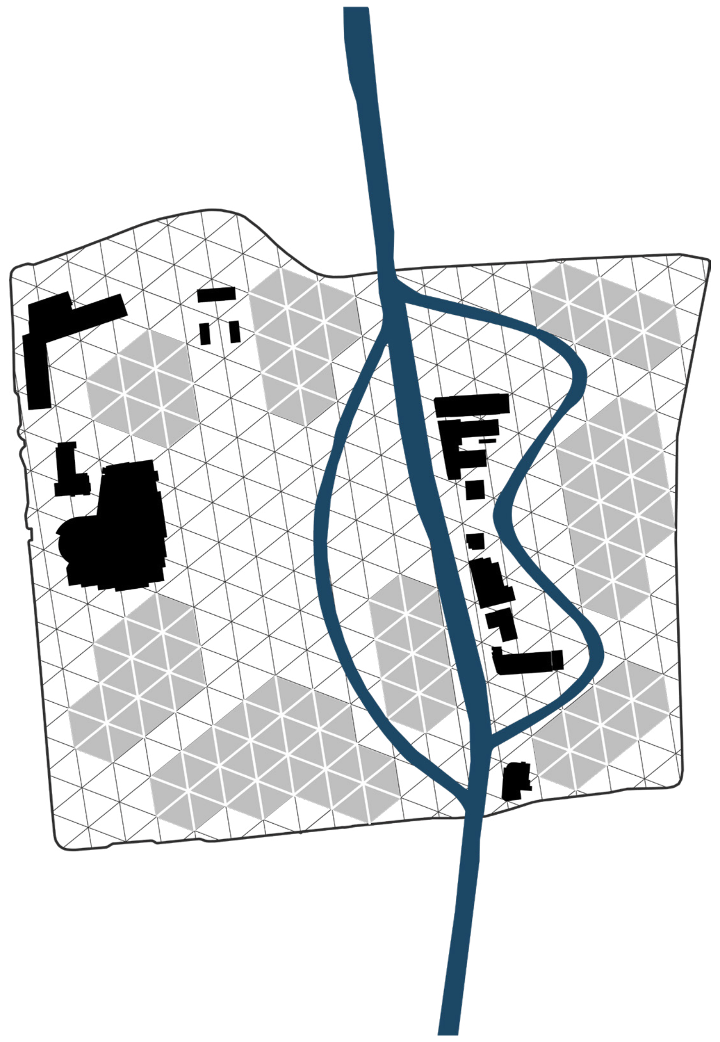
Low shrubs
Grass
Soil
Gravel
Concrete/wood 300 mm



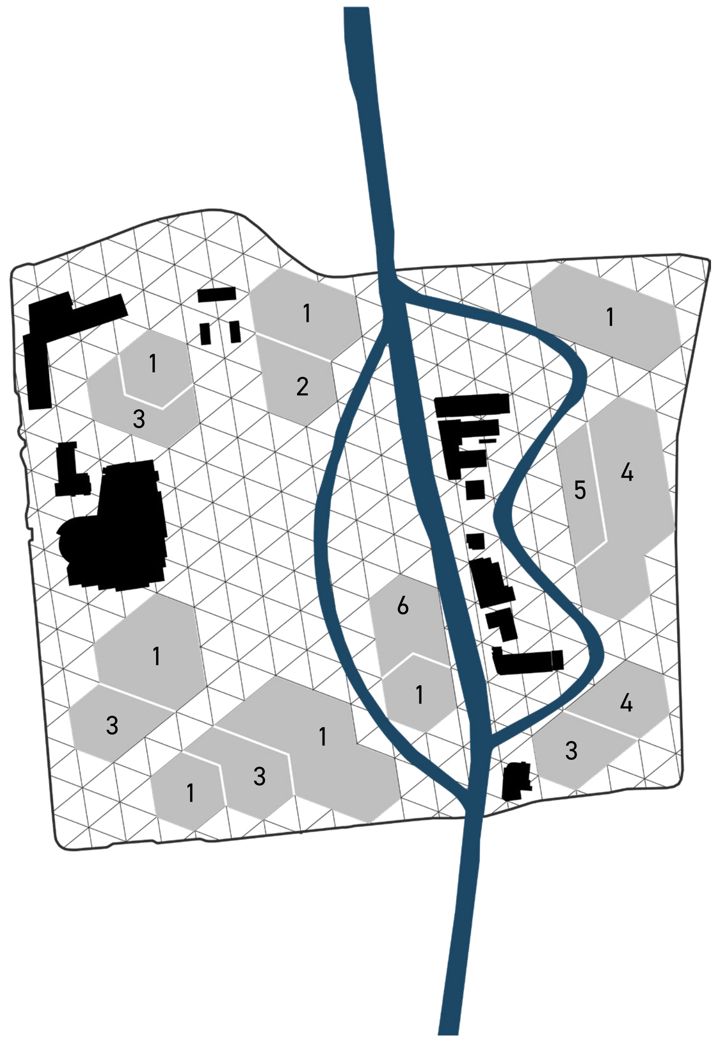
Trees
Grass
Soil
Gravel
Concrete/wood 300 mm



Concrete/wood
Water



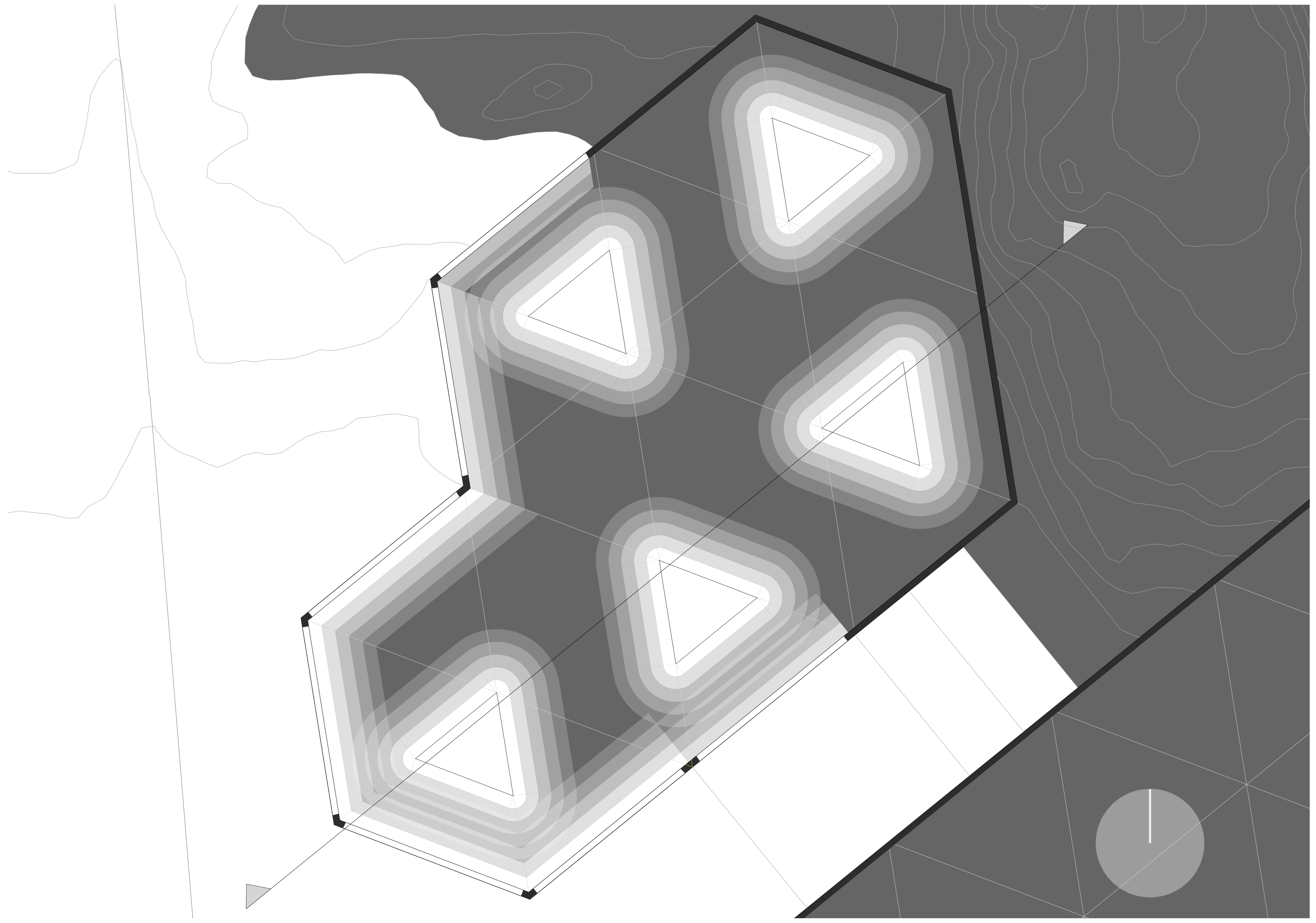
Volumes relating to grid



Volumes relating to function

1. Housing
2. Recreation
3. School
4. Office
5. Commercial
6. Culture and event

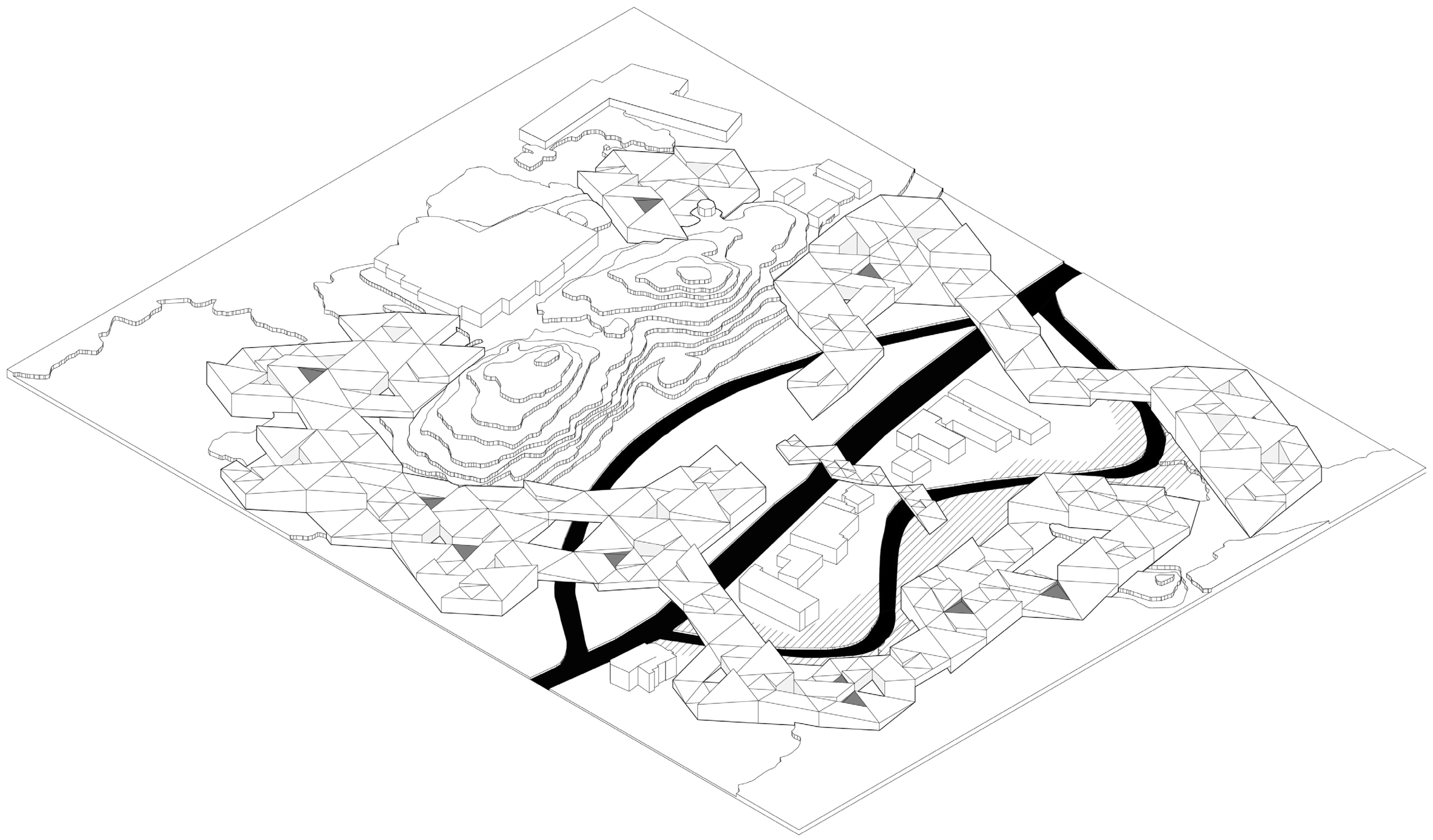
AUSD CONCEPT DIAGRAM 2022



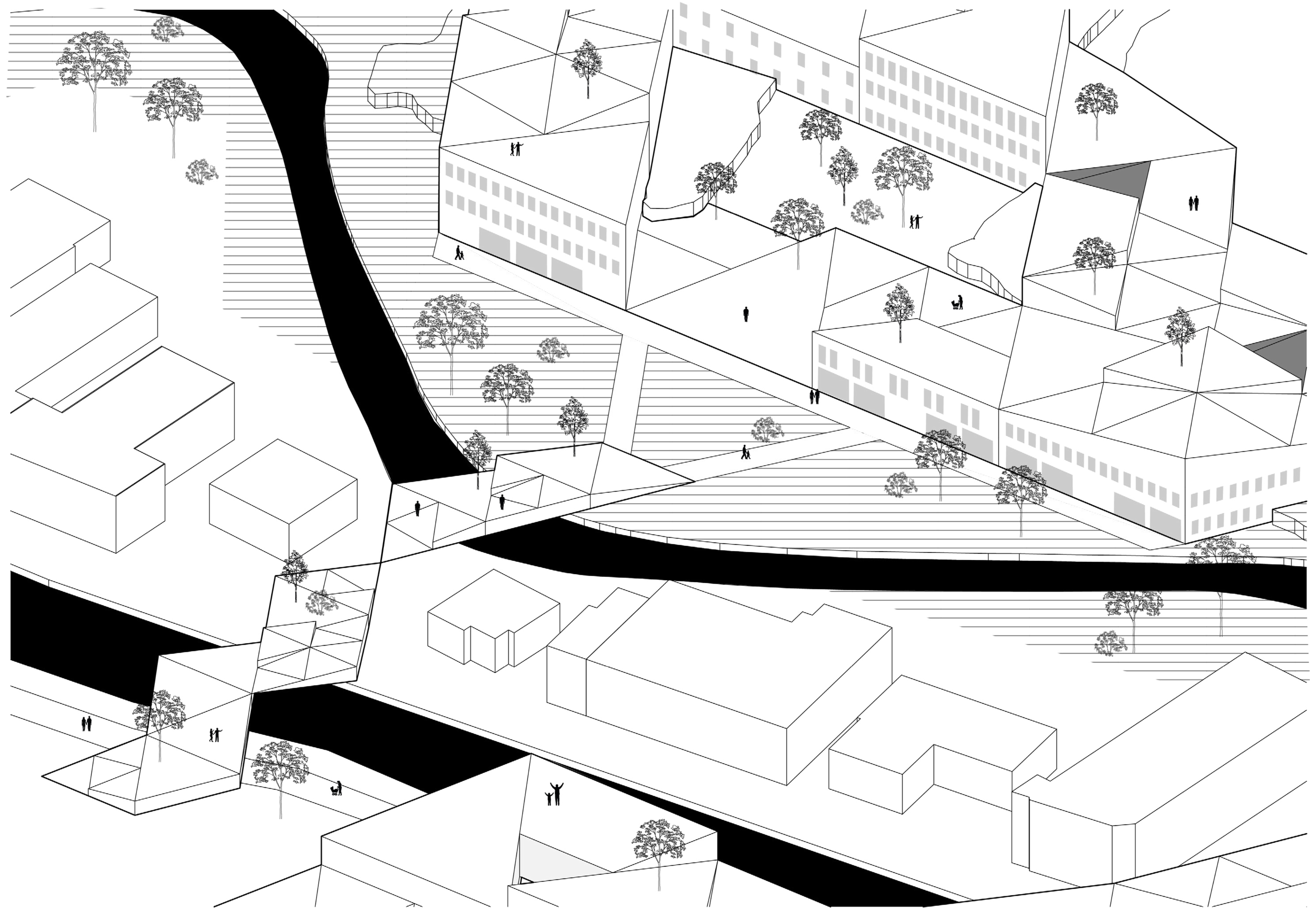
Light in relation to building, plan

VI
PROPOSAL

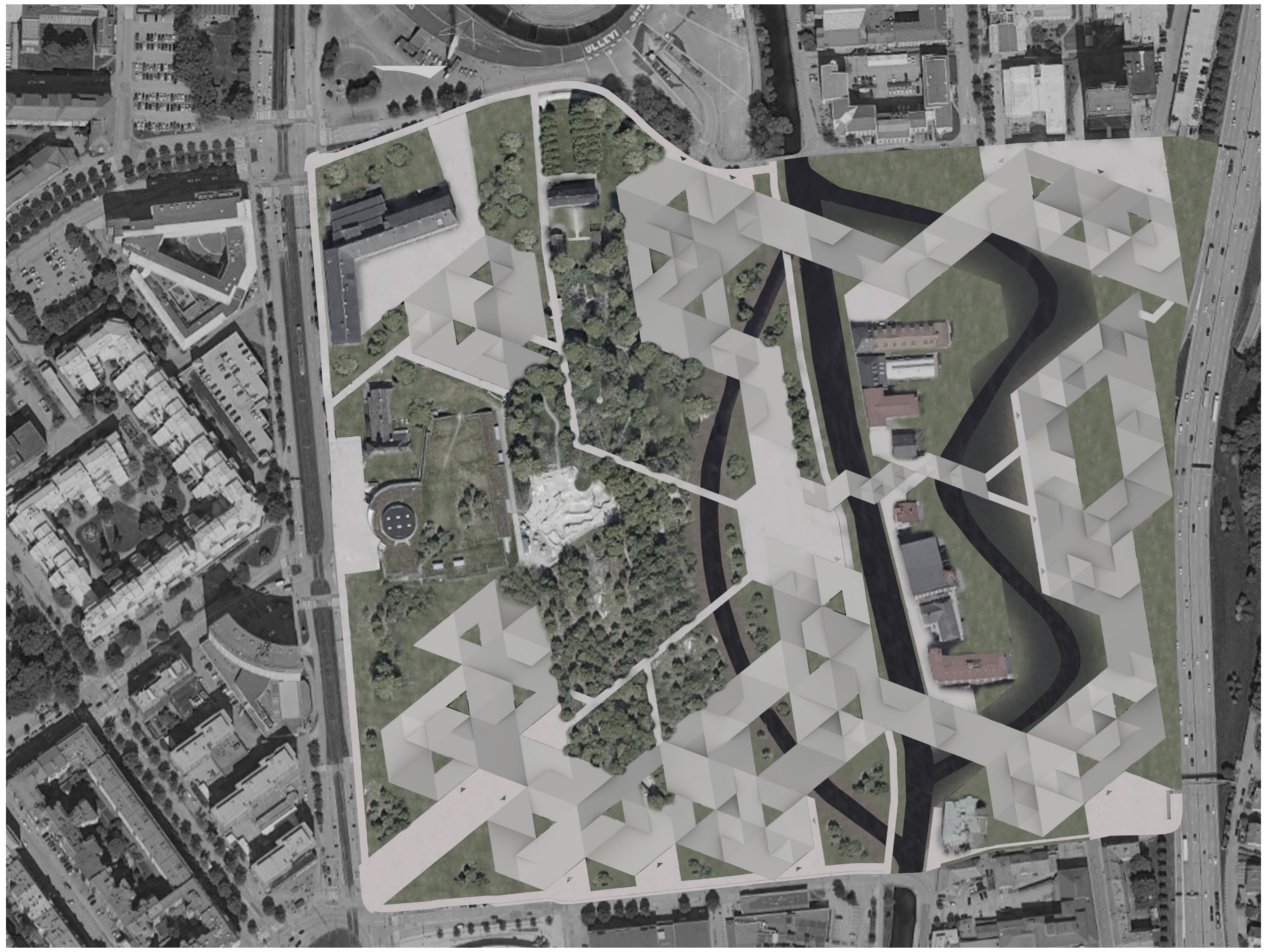
Our proposal for Burgårdsparken is a terrain that seamlessly extends throughout the site. With the help of our method and procedure of triangulation, we have created a versatile and accessible terrain that connects the different paths and entry points within our site borders. Our priority was to make the whole terrain walkable and fun to interact with. The terrain also holds a variety of functions such as: Housing, schools, recreation, commercial, offices and events. These functions are placed within and/or under the terrain. The terrain is also a way of framing and making bridges for the floodplains that helps with the sites rain and flood water regulation. On the terrain there are also water ponds in which rainwater can be collected and be used for the different functions. These aspects of the design are a way of incorporating and dealing with the water in system A and B.



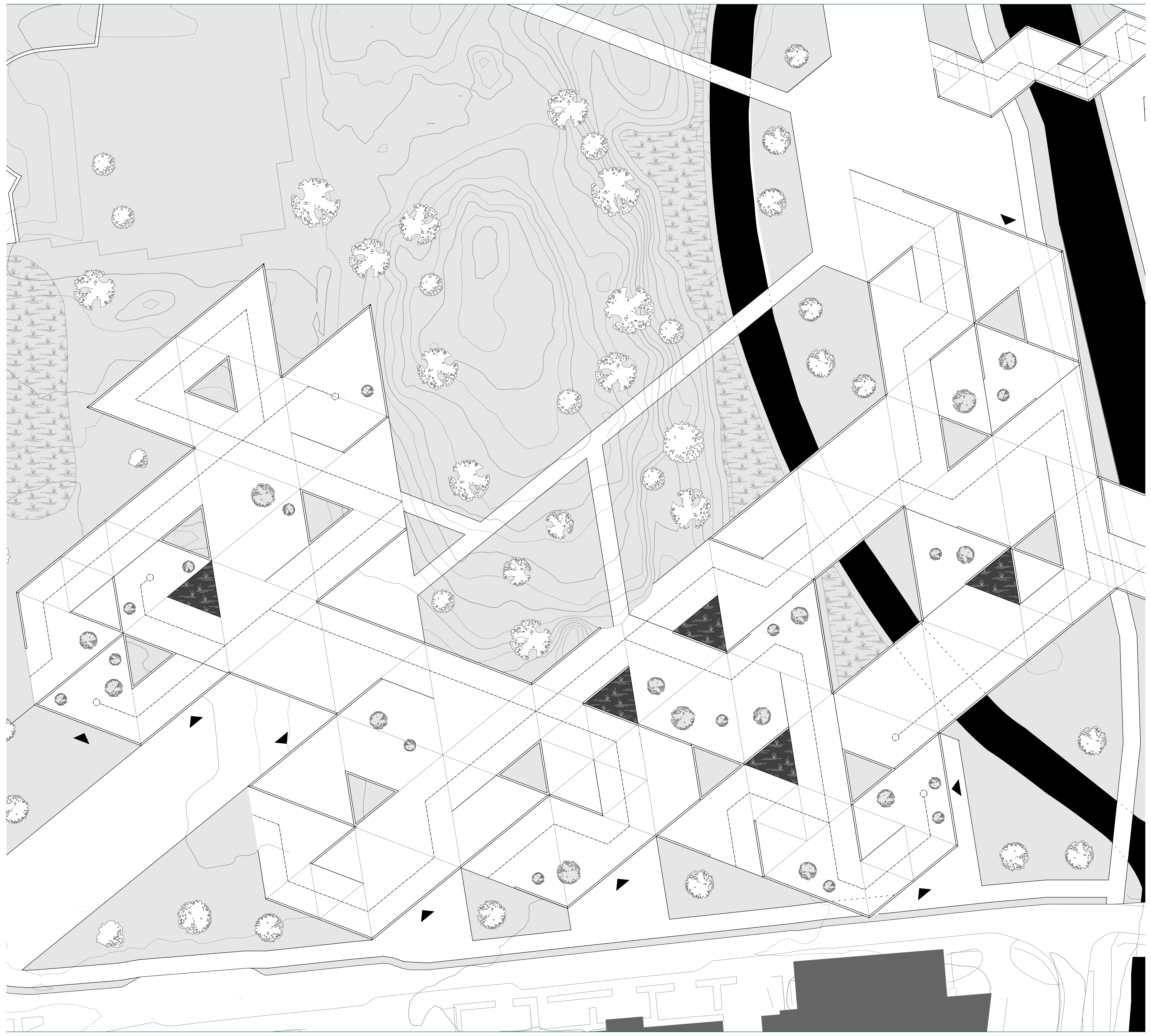
Situation axonometric drawing



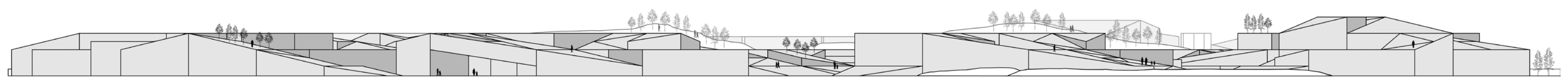
Key axonometric drawing



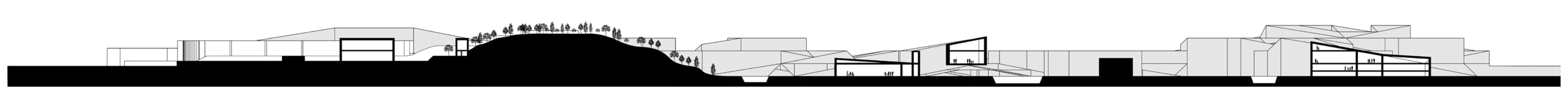
Situation plan



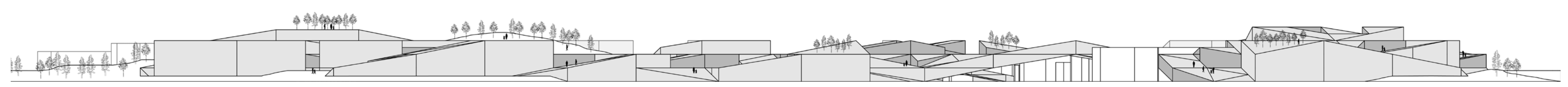
Key situation plan



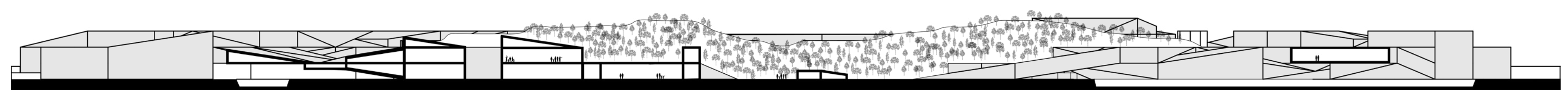
Key elevation



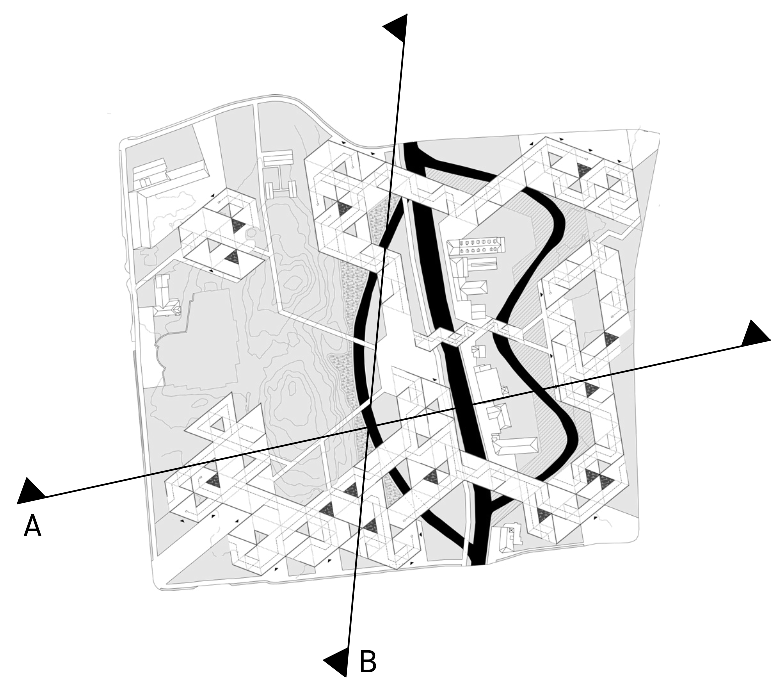
Key section A

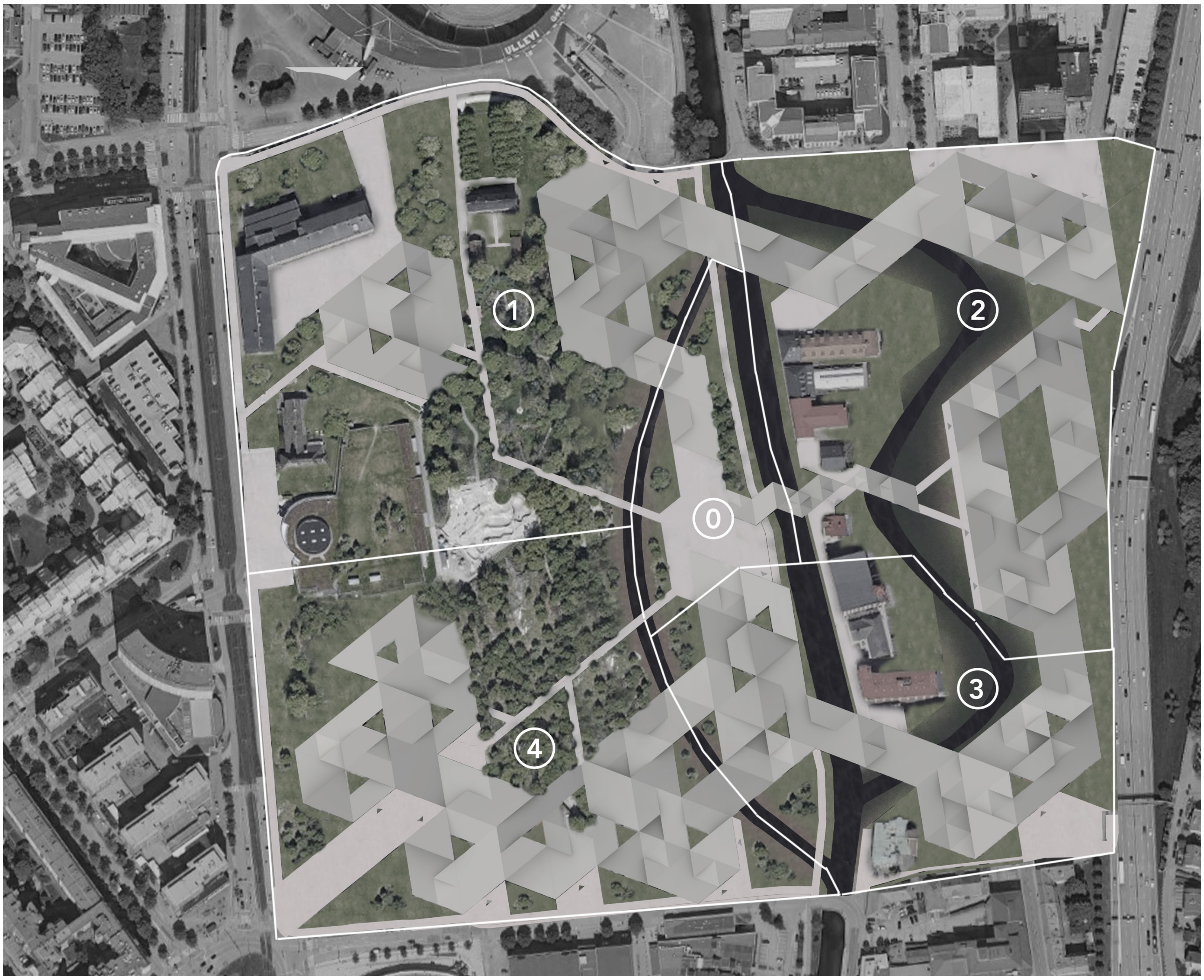


Key section



Key elevation B





Assigning parts of the terrain to the team

1. Silje
2. Klara
3. Elvira
4. Felix