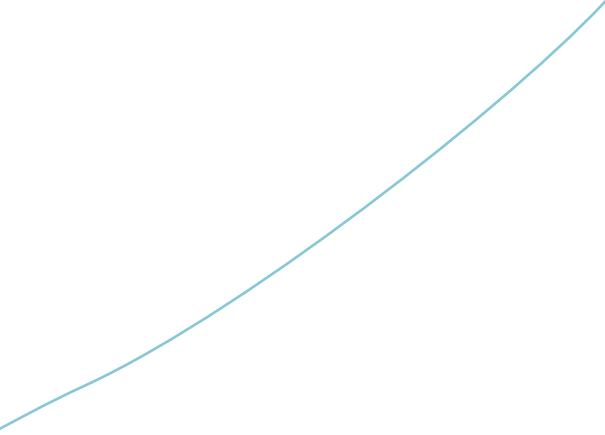


**W T E R**  
**A D E**  
**E A R T H**

**BUILDING ON**

**IN AND BY THE WATER**



**This is a report of the first part of the design research  
into the future of the peatlands of Friesland.**

It was carried out by Lund University (architecture) and was  
commissioned by the Province of Fryslân. in collaboration  
with the Municipalities of Leeuwarden, Smallerland,  
Heerenveen and De Fryske Marren.

The research with Lund University took place in the first half of 2024  
and the research with the Amsterdam Academy of Architecture  
will take place in the second half of 2024.

The design research WATEREARTH is a follow-up to previous  
master classes on the learning line: Lines to the landscape  
in collaboration with Lund University.

The project is an initiative of NooN in collaboration with  
the Province of Fryslân.

September 2024

## ONTWERPEND ONDERZOEK

# LINES TO

## CONTEXT

### LINES TO THE LANDSCAPE 3

#### HOE KUNNEN WE LEEUWARDEN VEERKRACHTIGER MAKEN? ONTWERPEND ONDERZOEK NAAR STEDELIJKE TRANSFORMATIE VAN LEEUWARDEN

Onze omgeving gaat de komende jaren veranderen. Grote maatschappelijke opgaven zoals de energietransitie, klimaatadaptatie, biodiversiteit en woningbouw vragen om antwoorden en om ruimte. Hoe gaan we die ontwikkelingen allemaal een plaats geven in Leeuwarden, en dan nog waar?

#### SPOORZONE ALS BELANGRIJKSTE STEDELIJKE TRANSFORMATIE

Dit is de derde editie van 'Lines to the Landscape'. Studenten van de opleiding Architectuur van de Lund University in Zweden hebben onderzoek gedaan naar de ruimtelijke opgaven in en rondom Leeuwarden. Dit keer hebben de studenten zich gefocust op de Spoorzone. De Spoorzone is het belangrijkste ontwikkelingsgebied langs de spoorlijn van Leeuwarden. Deze zone vormt nu een ruimtelijke en sociale scheiding die de stad rent in de ontwikkeling naar een vitale en opgedeelde stad.

#### VEERKRACHT DOOR BETERE VERBINDING TUSSEN STAD EN LAND

De opdracht aan de studenten was om te kijken of we Leeuwarden veerkrachtiger kunnen maken. De studenten hebben gekeken of ze de Spoorzone en het landschap eromheen duurzaam en meer in samenhang met elkaar kunnen ontwerpen. Hierbij hebben ze gefocust op ingrepen om de stad en het landelijk gebied dichtbij elkaar te brengen. Denk aan een sterkere ruimtelijke of functionele verbinding bij de overgang van stad naar het landelijk gebied. Hoe kunnen we bijvoorbeeld het landelijk gebied veel meer als een kennis- en productielandschap voor de stad zelf gebruiken? En hoe maken we de stad en haar voorzieningen meer toegankelijk voor de bewoners van het platteland?

**VEERKRACHT DOOR NIEUWE TYPE FUNCTIEMIX, MOBILITEIT EN PUBLIEKE RUIMTE**  
Niet alleen een verbeterde overgang tussen stad en land kan Leeuwarden veerkrachtiger maken. Ook hebben we misschien een nieuwe verdeling van functies, een andere inzet van publieke ruimte en mobiliteit nodig. Voordat we hier een nieuwe woonwijk ontwikkelen, biedt deze plek ons de kans om te experimenteren met verschillende tijdelijke functies. Bijvoorbeeld combinaties van tijdelijke onderzoekscentra, retail en flexwonen.

Ook de mogelijke komst van de Lelylijn biedt kansen om anders naar de organisatie en ontwikkeling van de stad te kijken. Denk aan andere manieren om de binnenstad te bereiken, waarbij het nieuwe station Westertehoeek bijvoorbeeld een belangrijke overstap naar duurzaam vervoer wordt.



## NAAR STEDELIJKE TRANSFORMATIE

# THE LAND

## PROCES

### LINES TO THE LANDSCAPE 3



## VAN LEEUWARDEN

# 3 SCAPE

## BEVINDINGEN

### LINES TO THE LANDSCAPE 3

#### 11 RUIMTELIJKE VOORSTELLEN OM DE KWALITEIT VAN LEEUWARDEN EN HAAR OMGEVING TE HERWAARDEREN

Voor deze derde editie van 'Lines to the landscape' hebben de studenten 11 ruimtelijke voorstellen gemaakt. Deze voorstellen gaan over ontwikkelingsprincipes voor stad en haar omgeving. De voorstellen zoomen in op de relatie tussen stad en het landelijk gebied, de grote ontwikkelingsopgave rondom een nieuw en het bestaande station en de ruimtelijke en sociale barrières in de stad.

De gemeere deler in de voorstellen is om de kwaliteit van Leeuwarden en omgeving te herwaarderen. De voorstellen zijn in te delen in drie thema's:

- Van buiten naar binnen
- De symbiotische stad
- De publieke tussenuimte als vliegwiel.

We lichten de bevindingen hieronder per thema toe.

#### VAN BUITEN NAAR BINNEN

Het thema 'Van buiten naar binnen' gaat over wisaherking tussen de stad en het landelijke gebied. In een aantal plannen stellen de studenten voor om stad en landelijk gebied niet als toegesporen te zien. Maar stad en haar omgeving als één geïntegreerde ruimte te ontwerpen. Hun voorstel is om de verstedelijking van Leeuwarden dan ook niet perse in of aan de stad te verbinden. Maar de ontwikkelingen juist in het landelijk gebied te beginnen. Het ontwikkelingsproces keren ze hier dus als het ware om. Dit resulteert in concepten waarin de groei en vergroening juist in de dorpen start in plaats van in de stad.

Door deze nieuwe manier van ontwikkelen kunnen we meer 'eren' van de sterke identiteit van de omgeving. Denk aan de dorpen als Wiedum en Wirdum en het tussengebied landschap. Is het mogelijk om voor de nieuwe wijken ook zo'n sterke identiteit te ontwikkelen, zodat we een unieke manier van verstedelijking in Leeuwarden kunnen introduceren? Bijvoorbeeld bij de inrichting van Spoordock, waar we op deze manier meer oog voor de relatie met het productielandschap krijgen.

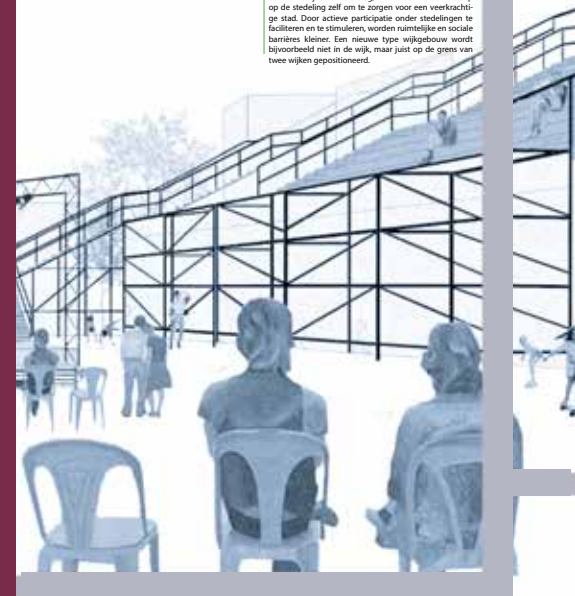
**DE SYMBIOTISCHE STAD**  
Leeuwarden staat voor een aantal grote maatschappelijke opgaven, zoals klimaatadaptatie en versterken van de biodiversiteit. Willen we een meer veerkrachtige stad worden, dan is het essentieel dat we de opgaven meer met elkaar verbinden. In een aantal plannen stellen de studenten voor om de verstedelijking met veel meer ruimte voor groen en water te combineren. Dit betekent een nieuwe identiteit voor Leeuwarden als symbiotische stad.

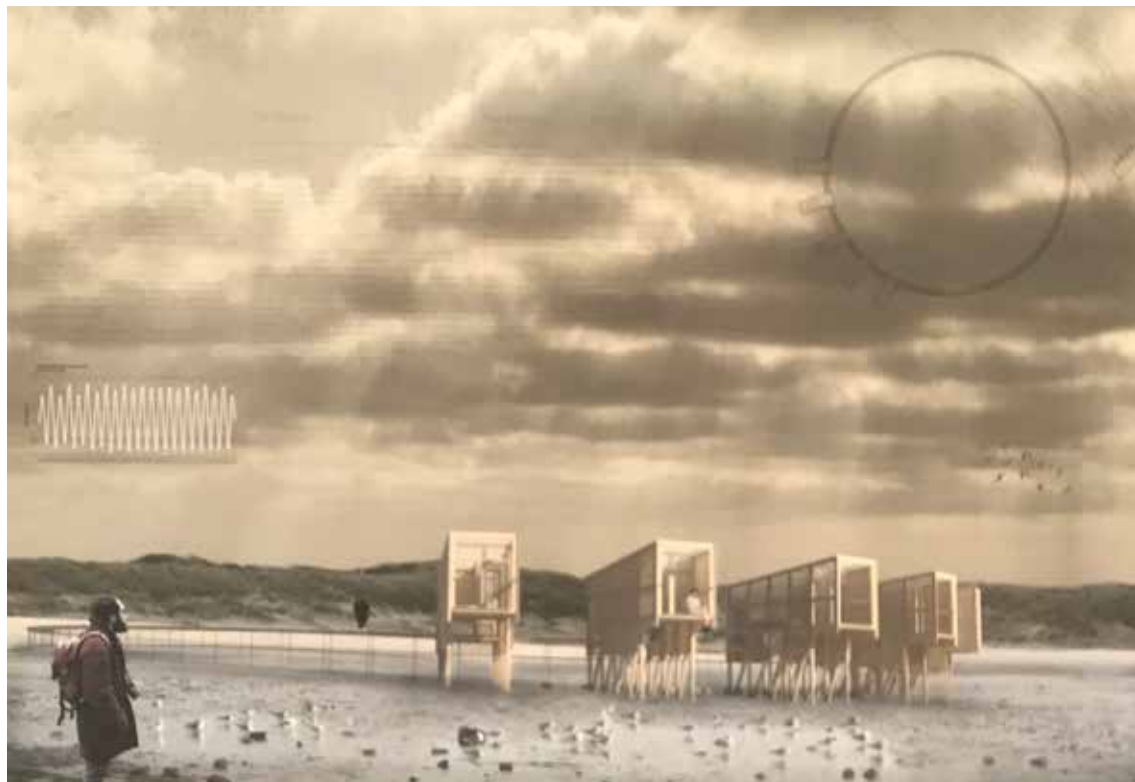
De plannen met betrekking tot de symbiotische stad zijn vertaald in concepten die meer groen en water in de stad brengen. De nieuwe verbindingen die daardoor ontstaan, vergroten de toegankelijkheid van het landelijk gebied. Studenten introduceren een nieuwe manier om de groei van de stad ruimtelijk te organiseren, waarbij ze meerdere ruimtelijke opgaven met elkaar verbinden. In een aantal plannen zijn bijvoorbeeld combinaties van andere benaderingen van landbouw, nieuwe concepten voor wonen en duurzame wijze van mobiliteit onderzocht.

**PUBLIEKE TUSSENRUIMTE ALS VLEGWIEL**  
Tot slot, zoomen studenten met een aantal plannen in op de ruimtelijke en sociale barrières in de stad. Ze dragen oplossingen aan over hoe we deze barrières kunnen verachten of zelfs wegnemen, zodat datgene wat de stad te bieden voor iedereen toegankelijk wordt.

Eén van de mogelijkheden is een nieuw soort tijdelijk gebruik van de publieke ruimte nabij de barrières te ontwerpen. Met tijdelijke bouwwerken kunnen we het effect van een bepaalde functiemix op die specifieke plek onderzoeken, en zo de ontwikkeling van de stad versnellen. Denk aan een kantoorzaak openstellen als openbare ontmoetingsplek of een parkeerplaats ombouwen tot een tijdelijk park.

In een tweetal plannen nemen studenten niet zover een ruimtelijke barriere weg, maar doen ze een beroep op de stedeling zelf om te zorgen voor een veerkrachtige stad. Door actieve participatie onder stedelingen te faciliteren en te stimuleren, worden ruimtelijke en sociale barrières kleiner. Een nieuwe type wijkgebouw wordt bijvoorbeeld niet in de wijk, maar juist op de grens van twee wijken gepositioneerd.





## BACKGROUND

In the north of the Netherlands there is the urgent need for new housing programs in a region where radical transformations in the landscape are needed.

In Friesland, the lowest central part has to be transformed into wetlands in order to provide a wateradaptive natural balance in the ground.

This means that farming will have to disappear or transform, but at the same time a shortage of a million houses in the Netherlands means that building on (new) water is needed. This was a starting point for a research design project which the province of Friesland, together with the cities of Sneek, Leeuwarden (Heerenveen) and Drachten launched in the spring of 2024.

In the studio of Integrated Design we will concentrate on prototypes of building on WATEREARTH.



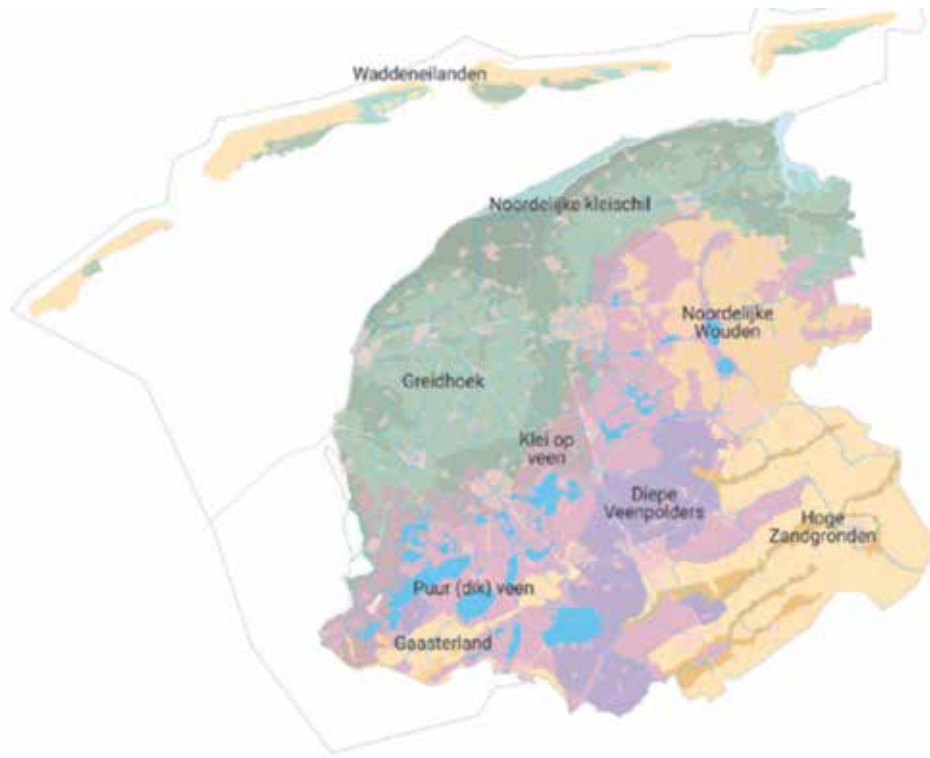


## PROJECT OVERVIEW

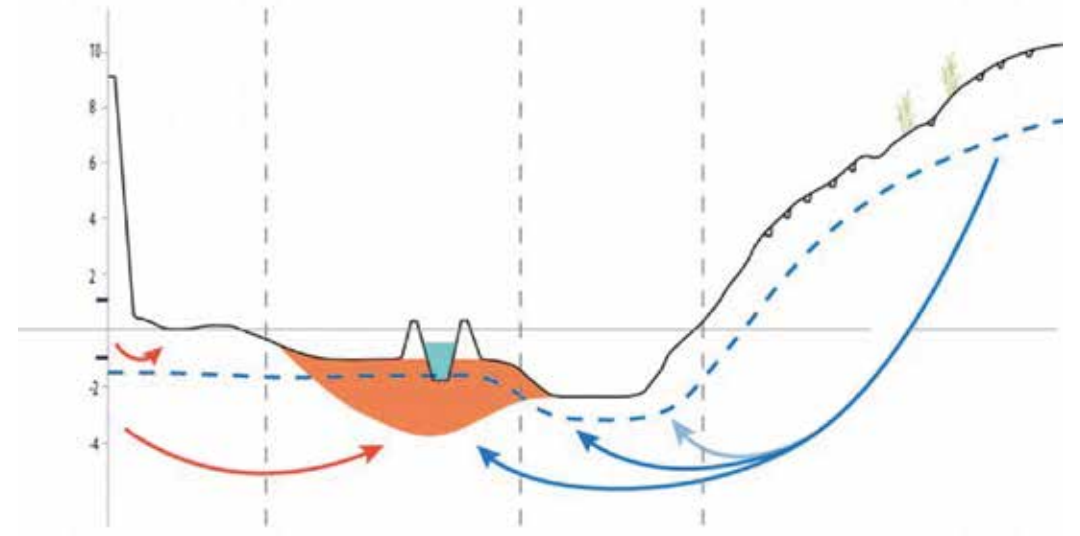
We will create some conceptual starting points for further investigation towards a series of specific architectural prototypes where construction and building techniques are integrated in natureinclusive designs. Within the course, we will create and exhibit 'a landscape' of floating villages and houses on poles where nature can have more space and living in the landscape is based on temporality rather than permanence.

The studies performed will lead to a next phase in the development of 'water robust building'. In the summer of 2024, the research design project in Friesland will continue with the realisation of 3 built prototypes designed by young architects in collaboration with 3 young landscapes architects from the north of the Netherlands. These designs will be adopted by 3 cities in the North and will cover at least 3 different perspectives; the new city edge, expanding the village, individual properties in the countryside.

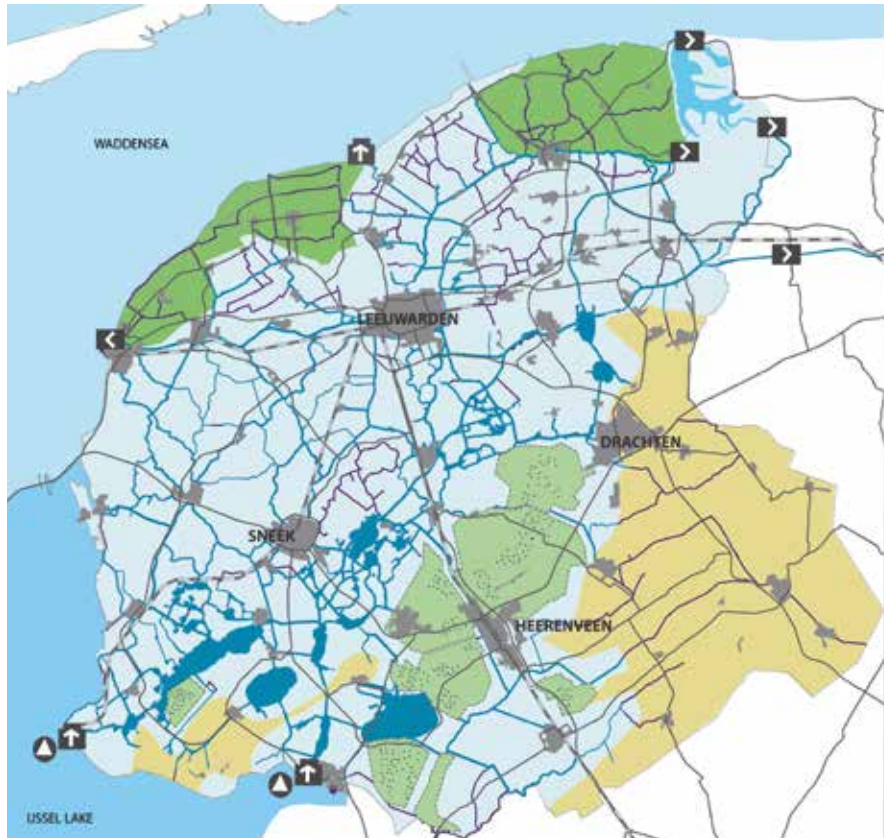




Cross-section from northwest (Wadden coast) to southeast (High sandy soils) that shows the interrelationship of the Frisian soil and water system



WATER MANAGEMENT BOARD RIJSDIJK WADDEBODEN (2017) RIJSDIJK WADDEBODEN (2017)



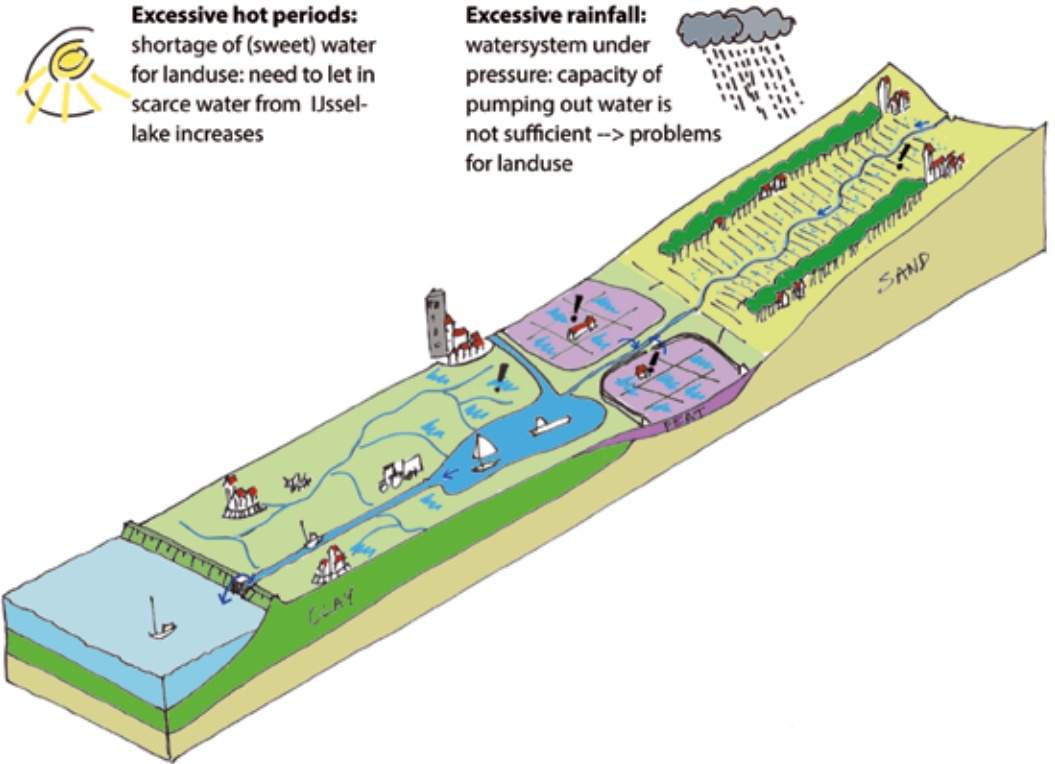
**Watersysteem**  
2023  
Frisian Boezem -0,52 NAP

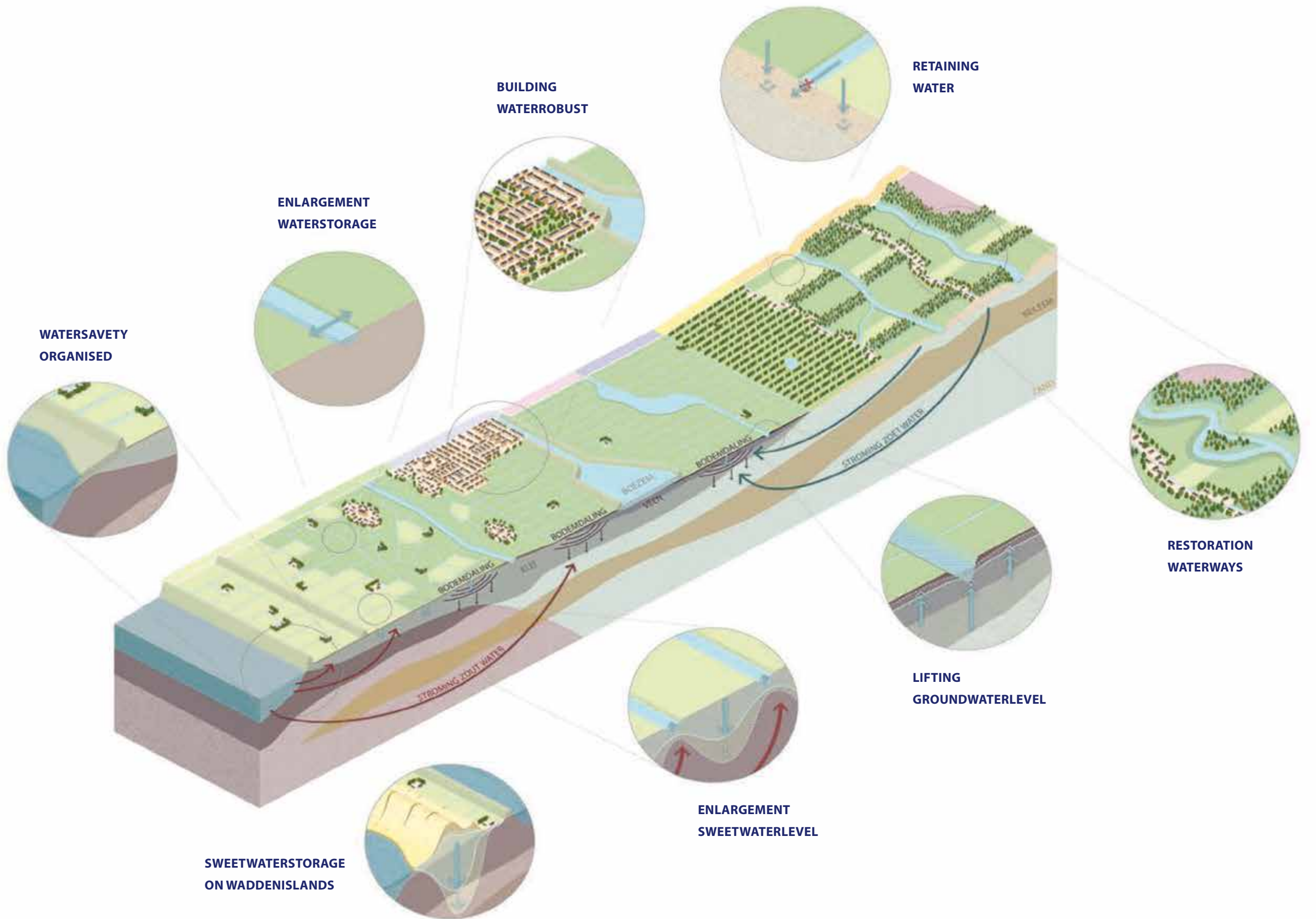
**LEGENDA**

- Poldersystem with pumping system to the Frisian Boezem
- Free floating system/stowed system (higher sandy soils with streams)
- Polders with separate stowed system to the Waddensea
- Peat polders: lowest parts of Friesland with up-pumping
- Boezemwater
- Polderwater
- Pumping station
- water outlet system
- water inlet system

The Frisian boezem is a system of interconnected lakes, canals and waterways with a controlled waterlevel of -0,52m below N.A.P. (Normal Amsterdam Level)

**Schematic 3D cross section: climate effects**

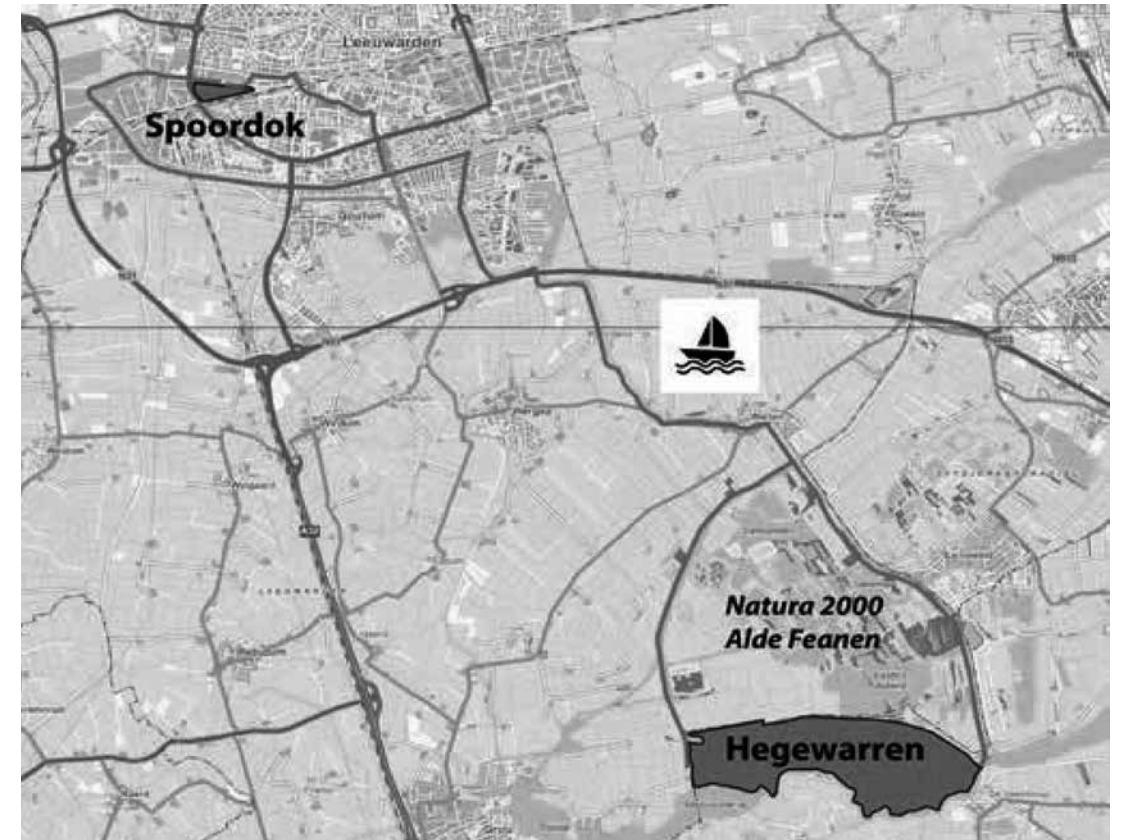




## **PROJECTS FROM EARLIER RESEARCH**

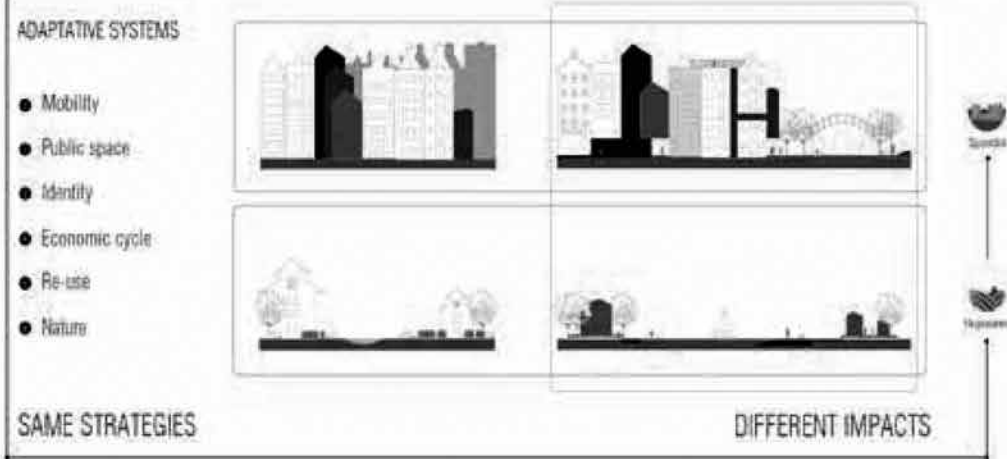
### **LINES TO THE LANDSCAPE 1, 2020 (WITH UNIVERSITY LUND)**

**Where the relation between  
the city of Leeuwarden en Veenpolder  
Hegewarren was investigated**



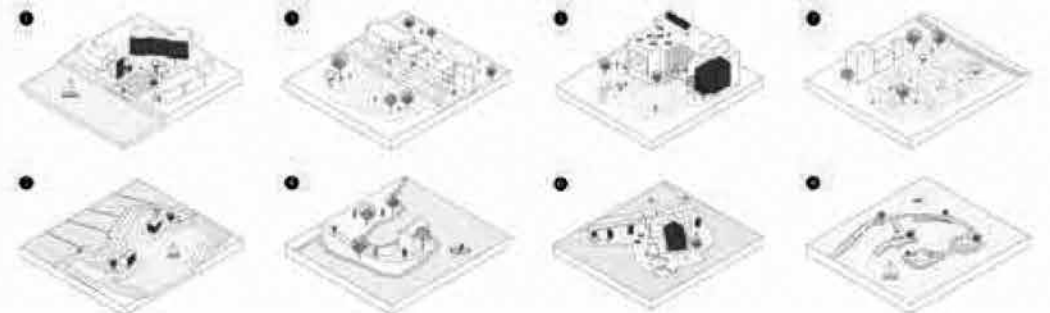
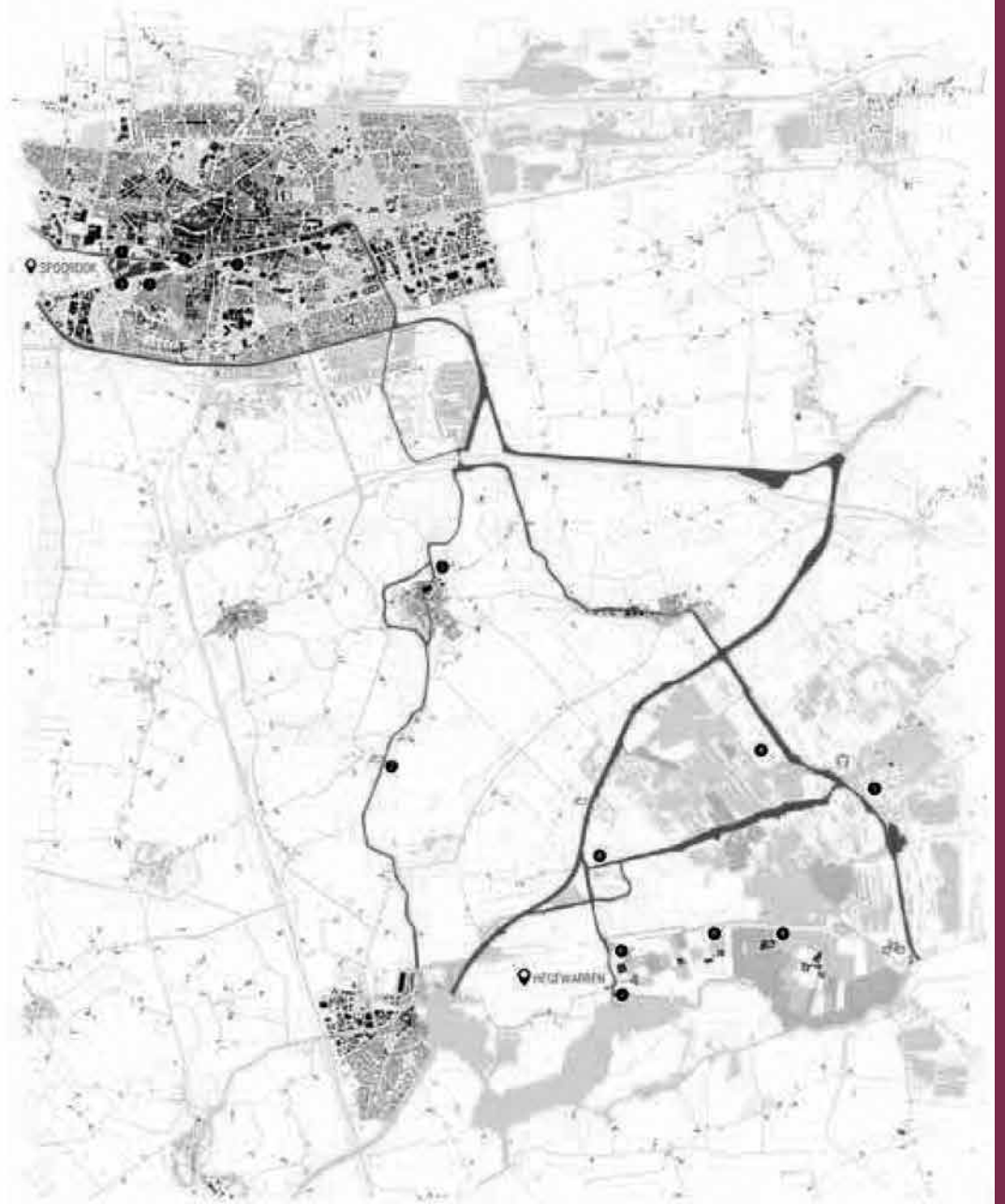
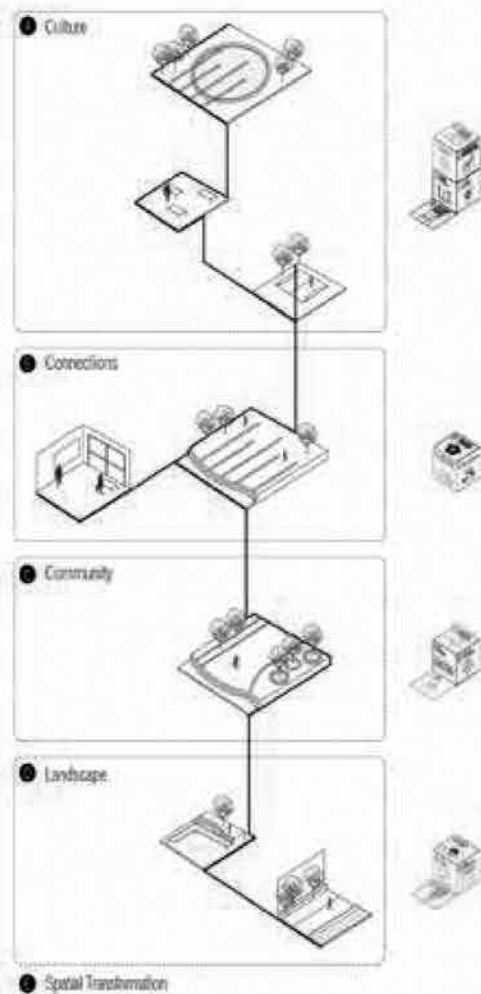
# RE- THINKING DENSIFICATION

## PARALLEL STRATEGIES



When thinking of renewing a district of a city the term **DENSIFICATION** is a keyword. It is often used as a synonym of an increasing of buildings in an interested area. During our research we thought about this word and its meaning. But what if densification is more than that? In our proposal we tried to rethink the expression densification to create a new definition of it. Therefore, we layered different strategies and combined their advantages.

The strategies can be used and adapted in the city district Spoordok and the countryside Hegewarren. The layers of densification are culture, connection, landscape and community. This project should be for the inhabitants to improve their current situation. Therefore, and also because the process will be under the factor of temporality, they should be involved in the process of changing their city, to be able to fully enjoy it.



## GROUP 1

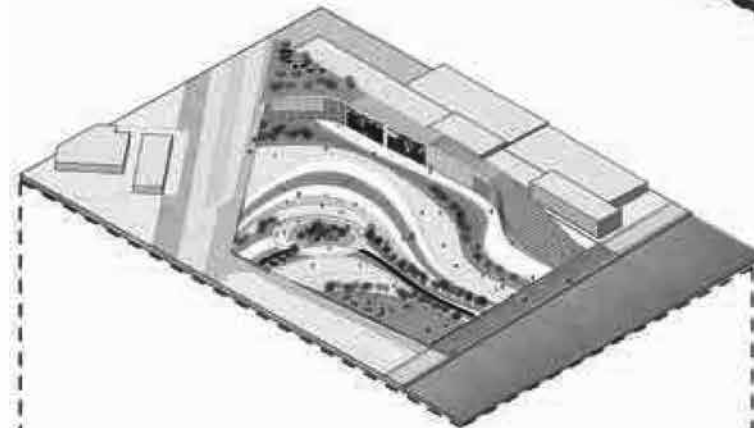
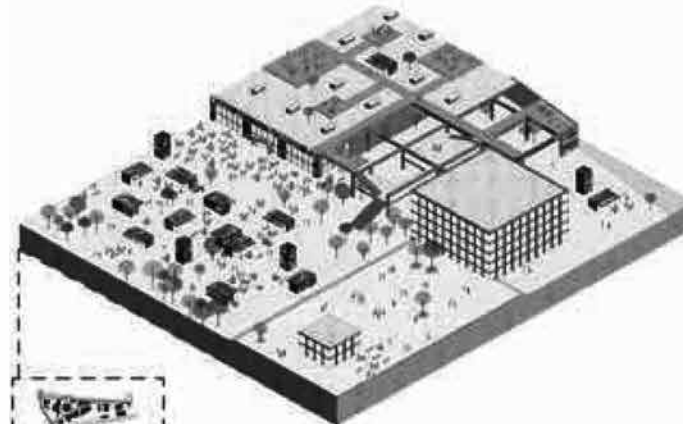
### CULTURE

Culture can be a catalyst to boost the image of an area. By creating a culture district in the city and bringing some satellite stations in the countryside an attraction can be established, which will not only be used by the inhabitants but can intrigue external tourists, too. This can happen by planting libraries, museums, workshops, stores and much more in already existing and unused structures in the city and the countryside.



### CONNECTIONS

In the city we tried to create new connections by creating passages and relations between the interested quarters. In the countryside the connection is formed between the surrounding and the area. So the inhabitants are able to reach from the city and the different near standing villages Hegewarren. But the connection is not just physical. The correlation should be created in the heads of the inhabitants to see the bigger connection of the zones and to see them as a unit. The mindset should start from space and end into culture.

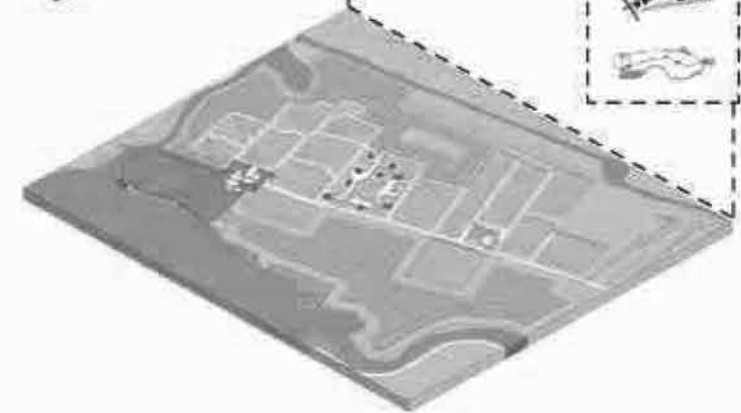
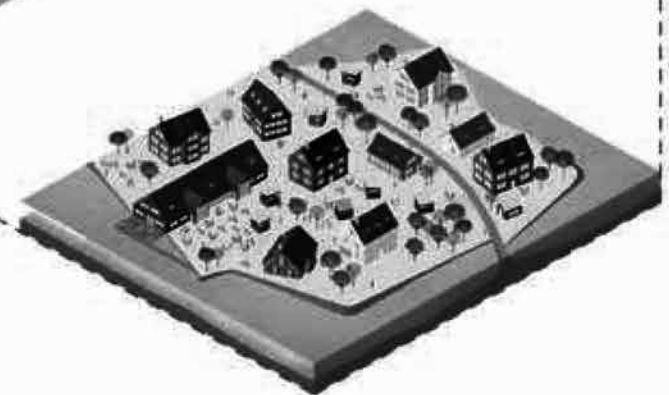


### LANDSCAPE

The idea of creating and letting landscape evolve comes with the idea of letting water in, because it has become our reality to work with water instead of against it. In the city this happens by creating a recreational area, a waterpark, which if needed can act as a waterscape to retain water. In Hegewarren the water is let in to avoid the high costs of pumping the water out of this sinking zone. Through that a water exhibition is created which is a mixture between water channels, dryer islands and wetland.

### COMMUNITY

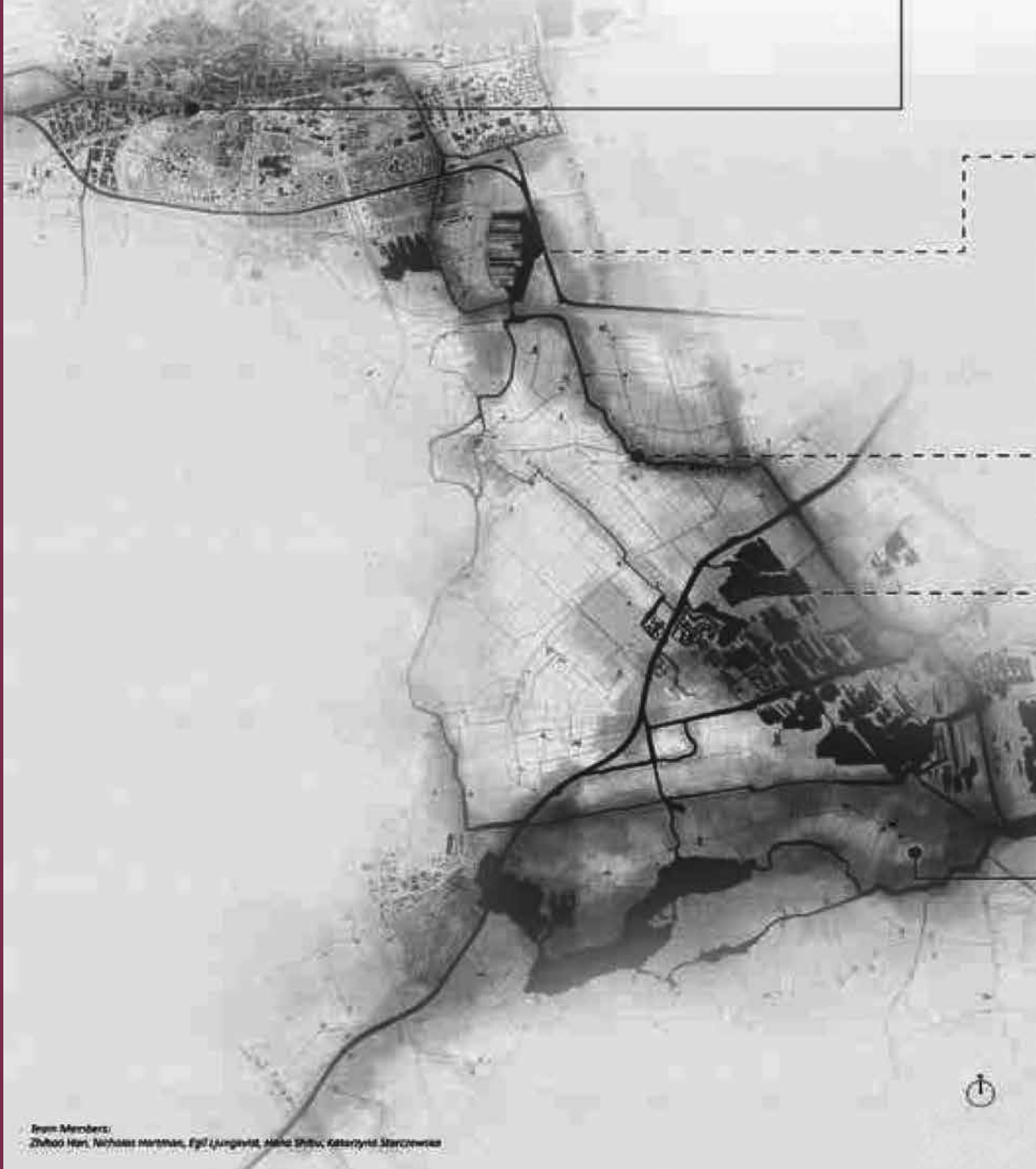
The most important factor are the people and therefore the community is a crucial part of the project. Just by changing the mindset of the locals it is possible to truly connect the city to the countryside. Therefore, both in Spoordok as Hegewarren new meeting points, cafés and spaces to exhibit are created to give people the opportunity to meet and feel part of the area.



# Aquapuncture

## Placemaking and mobile living along the waterways

Historically the rivers of The Netherlands served as a vital means of transport and general movement through the landscape. However, the dominance of road and rail as the preferred modes of transport in modern times has largely sidelined water as an effective and efficient means for transportation. Faced with the prospect of rising sea levels, effective water management must now form a key component of future planning for all areas of The Netherlands. In Friesland, a province where 40% of the total surface area is water, we propose working with the growing blue landscape and reclaiming the rivers as a dynamic living and working space: a network of floating communities.



Maud, Andries and their two children recently moved their houseboat from the countryside to Spoorhoek as the new semester starts in school for their children. Andries works with his photography and Maud works from home while the kids are at school. All the comfortable benefits of the city make life easier than everything they need is close by. When the semester ends, they will take their houseboat out on adventures again.



Elze, Floris and Owen are three students and friends who live together collectively in a mobile floating house. When there are not occupied by their studies, they enjoy cooking together and socialising with the people from the local community where their houseboat is situated. These young friends move their houseboat into the city for a change of scenery every other two weeks.



Alex and Fem are a young couple who live and work in the floating market. They own a floating house connected to the market which provides a home and enough space to run a small arts and crafts shop. In the evening, the couple go out to explore the market and try out new food from different cuisines around the world.

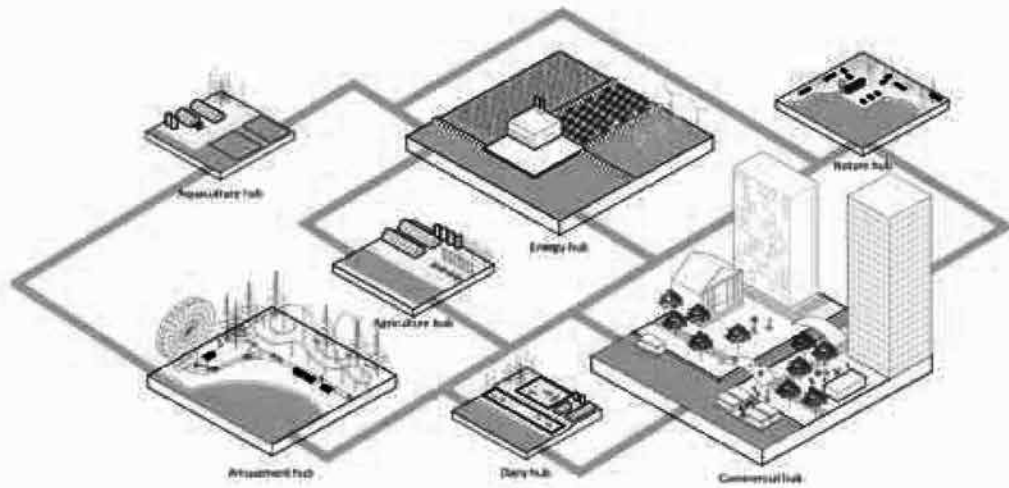


Farmer Alex spends his day working in an eco-agricultural community. When he finishes his work in the evening, it is only a short walk to his houseboat where he spends the rest of his day working on his artistry. During the weekend, he takes his houseboat to the floating market weekly, where he buys groceries and new clothes.



Elja is a full-time employee and consultant at the solar farm located in Hegewerven. Her work requires that she lives in the local community in Hegewerven as she needs to be available at all times in case there should be any problems with the solar farm. Every morning Elja takes her boat out to the solar farm in order to make her daily routine check and maintenance.





**Making the places:**

Developing small communities, each built around specific interests or a set activities, would allow each community's inhabitants to be more engaged in their immediate area of expertise. Housing in each community would be primarily made up of movable floating structures which could also serve as places for work and small-scale craft production. The connection with the water in these communities would allow for connection, movement and the exchange of ideas and goods between these hubs. Living as part of this nomadic system would give inhabitants the freedom to choose their own context and surrounding based on their interests, needs and evolving circumstances.

**Growth Strategy**

- Finding suitable places connected to the water-system
- Analysing the character and strength
- Engage in placemaking and communal growth
- Connecting different communities by movement along the water



**Aquapuncture example 1: Spoordok**

- ✕ Restaurants, cafes
- 🌳 Marrying the city with the countryside
- 🏡 Healthy work-life balance
- 🏭 Sustainable industrial developments
- 🏠 Social and economic hubs



Spoordok is situated on the outskirts of Leeuwarden inhabited by large industrial buildings with highway roads. Lack of nature and human scale makes it an unattractive place with no reason to visit. The water is present but unfortunately unapproachable.

The large warehouses have a potential to become new flexible, multipurpose buildings providing workshops for sustainable industrial development. Sinking parts of the city and adding wetland would echo the countryside fusing rural and urban spaces allowing for a more dynamic way of living.

**Aquapuncture example 2: Hegewarren**

- 🏠 Tourism
- 🌳 Expanding nature parks
- ☀️ Renewable energy production such as floating solar panels, wind turbines, algae for biofuel production
- 🐄 Animal farming such as dairy and meat
- 🎓 Educating public on energy production. Transparent way of living



Hegewarren is currently inhabited by 7 farms on the verge of flooding. 400.000 Euros is spent each year on pumping out the water and maintaining the dykes. The close proximity to the 12000 nature park and the potential to serve as an energy production hub are two of the strengths in the Hegewarren area.

Using energy production as a design tool to create new communities, a dynamic flow reflective of everyday life including businesses, agriculture, energy production and mobile housing. A more transparent way of living.



# WATER ARDE EARTH

## FINDINGS FROM THE THE FIRST PHASE OF THE PROGRAM WATEREARTH

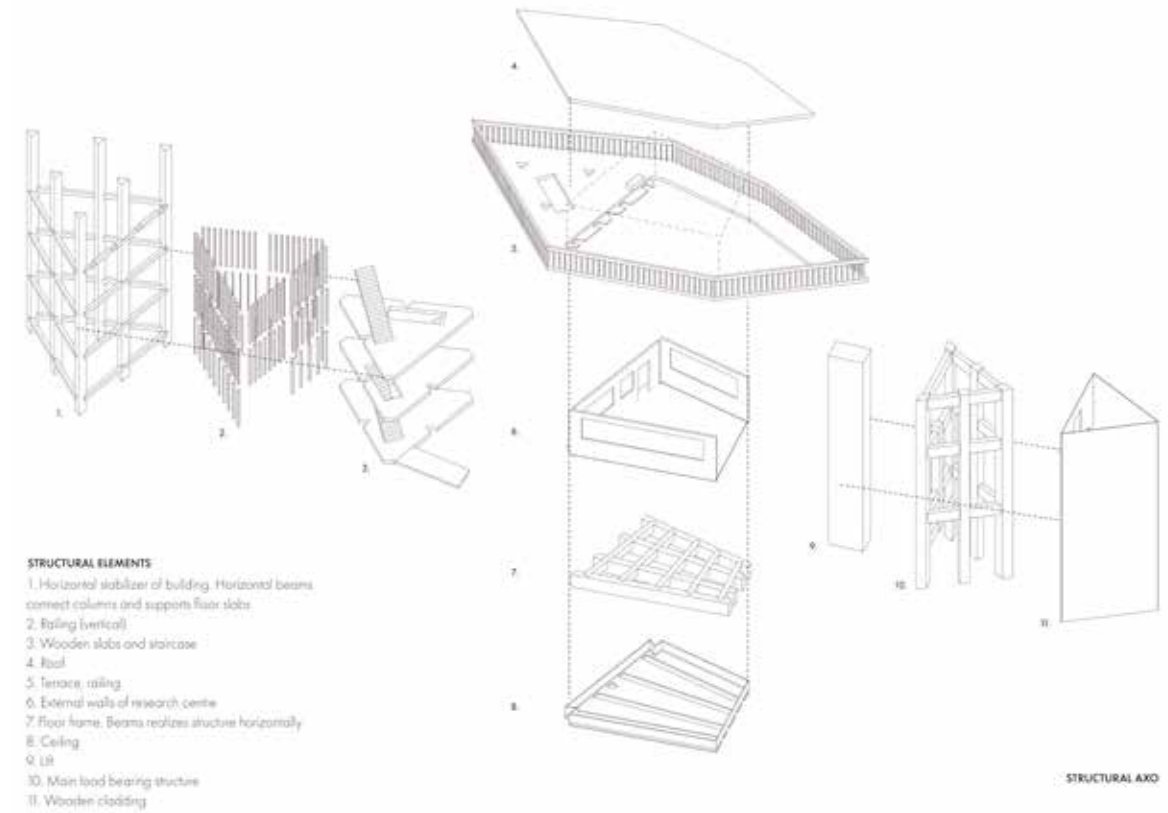
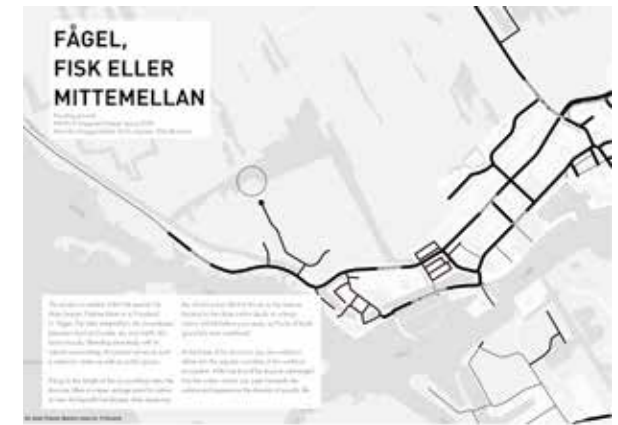
**12 combined groups of students architecture and engineering from the university of Lund worked on the task to rethink more responsible ways to built. They started with an abstract task to think about building in, on and by the water, which resambles the dynamic and changing conditions in the frisian peatlands. By describing these conditions, different innovative solutions were found to deal with the urgent matters which are obvious in the central and lower parts of Friesland.**

The work consists out of 12 individual approaches, with their own specific approach to the research and a choosen testing location. At the same time the projects can be categorized in 5 different outcomes.

# GROUP 1 AND 8

## SITE SPECIFIC MANIFESTS

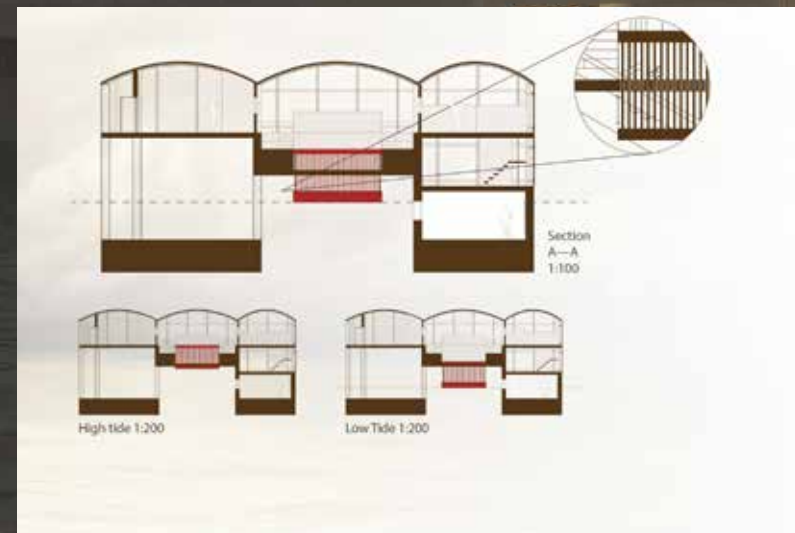
In group 1 and 8 a specific programma is chosen as a awareness experience for the public, situated in very sensitive contexts. The public buidlings project a different way of building resulting in learning facilities stimulating circular and bio based building as a generative form.



GROUP 1A site is tested in the nature area of Alde Feanen, with a research facility which connects knowledge about life in water, earth and air. The design reflects this multiple position in the landscape



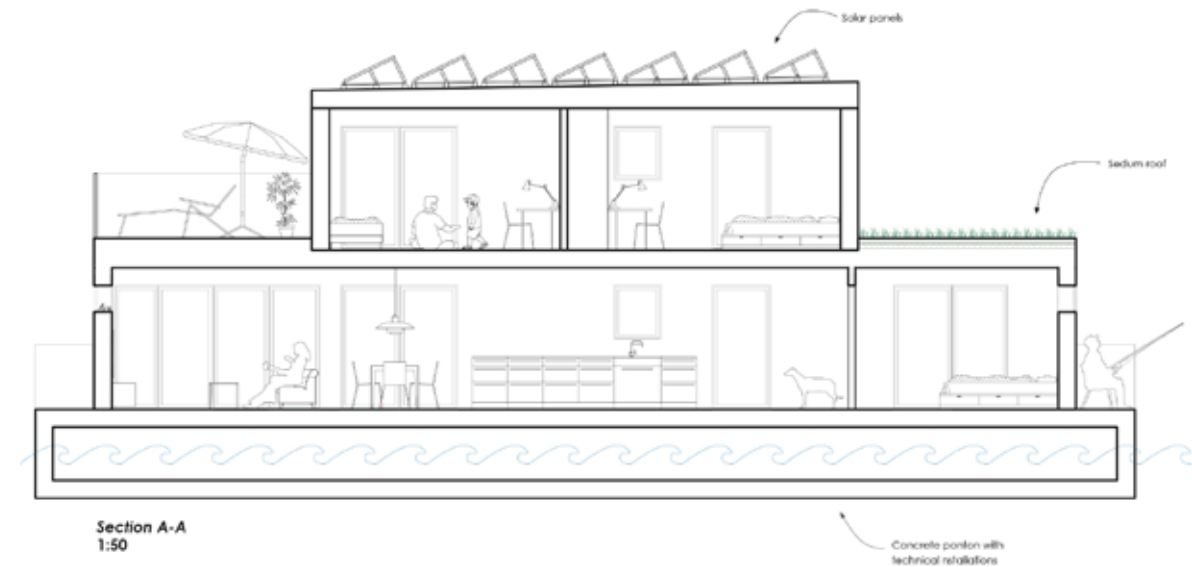
GROUP 8 Is a building where interactive water experiences can be found.



# GROUP 2 AND 6

## FLOATING TYPOLOGIES

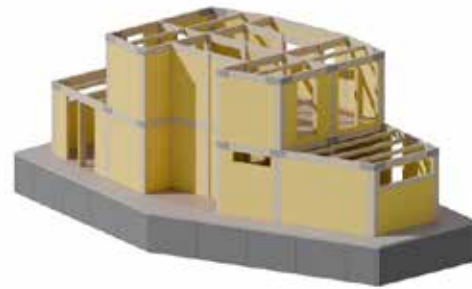
These groups investigate floating houses based on already existing typologies. Although both project rethink living on the water surface by more repetitive and modular units that are more efficient but also create more adaptable possibilities within the individual but also as possible collective qualities.



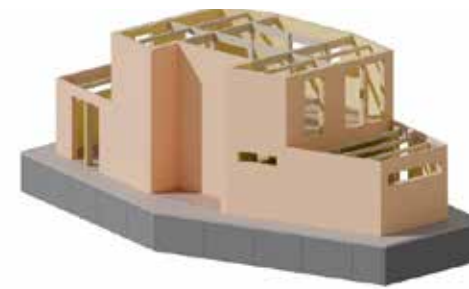
GROUP 2 Floating houses which can create different configurations in the water through their specific design.



1) Structure  
Lightweight wooden structure on concrete ponton



2) Insulation  
Organic wood wool insulation



3) Plaster  
Wind break



4) Exterior  
Wood facade and fin roof (with solar panels)



GROUP 6 A floating unit which can be anchored by a smart system. The design is adaptable to different user qualities and site conditions.



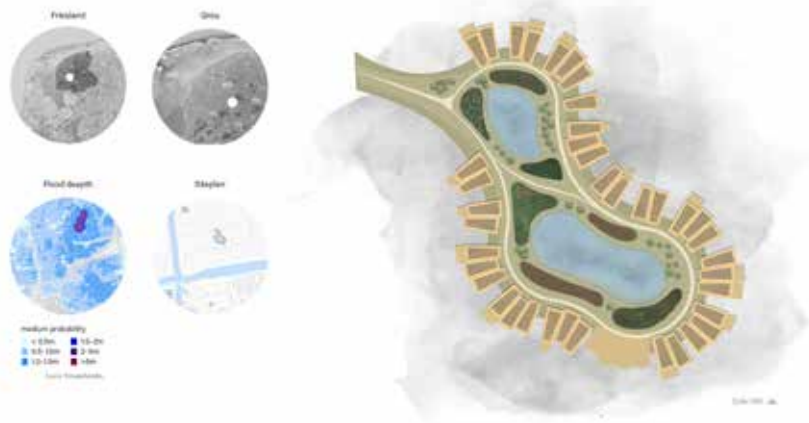


GROUP 7 Designed a well worked out flexible and removebla system created with local Bambo, a light and strong building material. The reults contribute on different scales to the the necessity of design with the nature instead of against it.

# GROUP 9, 10 AND 11

## MINIMAL IMPACT ON EARTH AND LANDSCAPE

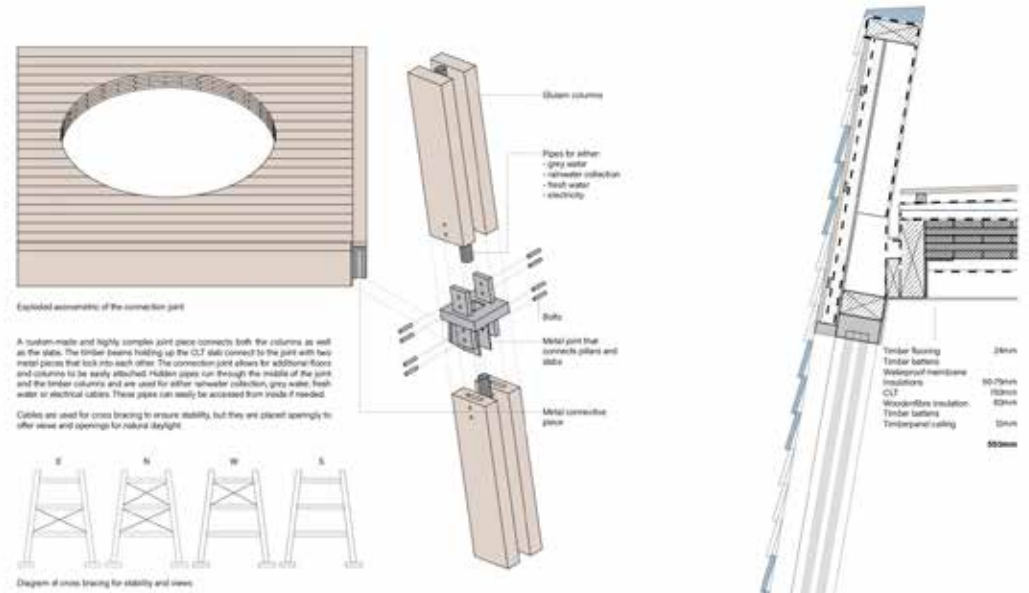
These groups create housing typologies which have a minimal impact on the ground and the landscape. The structures are designed to minimize the physical impact in the earth and with removeable and expendable parts, the housing units can easily be adapted to futere needs and leave the surface untouched as much as possible material wood is leading even for foundation strategies.



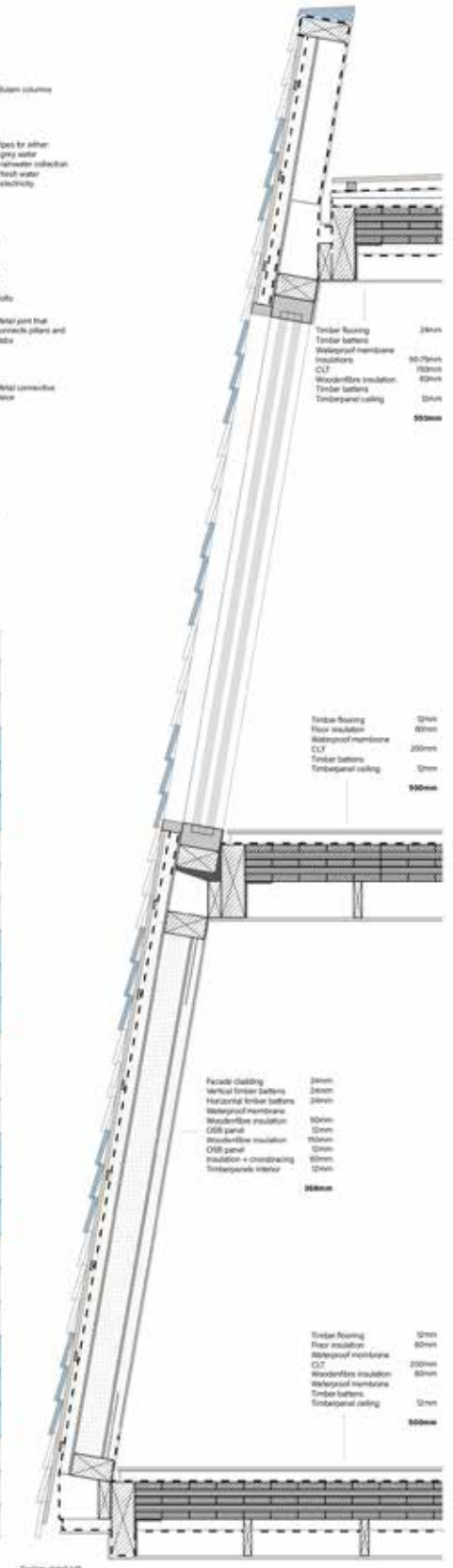
GROUP 9 Housing around a collective sweet water facility build in prefab wooden modules.



GROUP 10 A design resilient in flooding conditions. The house can be extended in height.



Facade detail 1/0

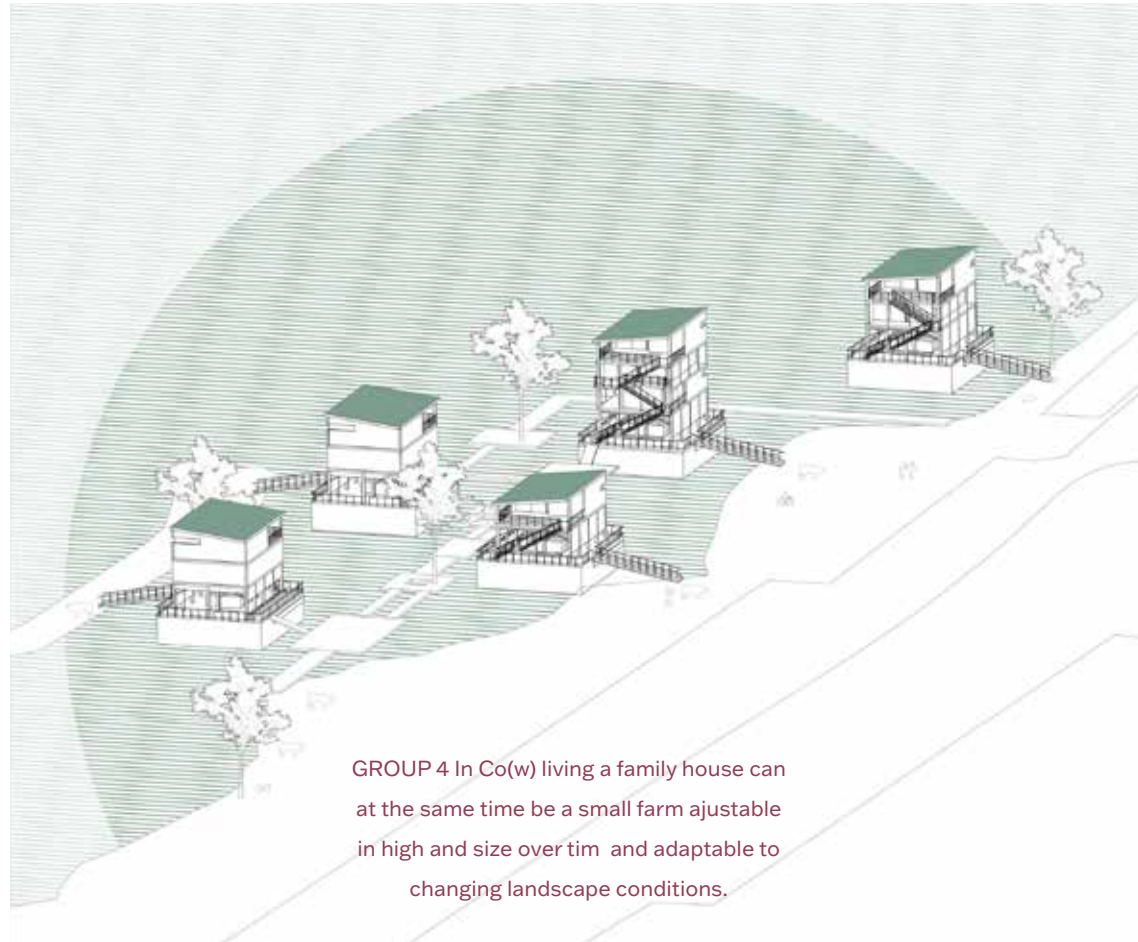




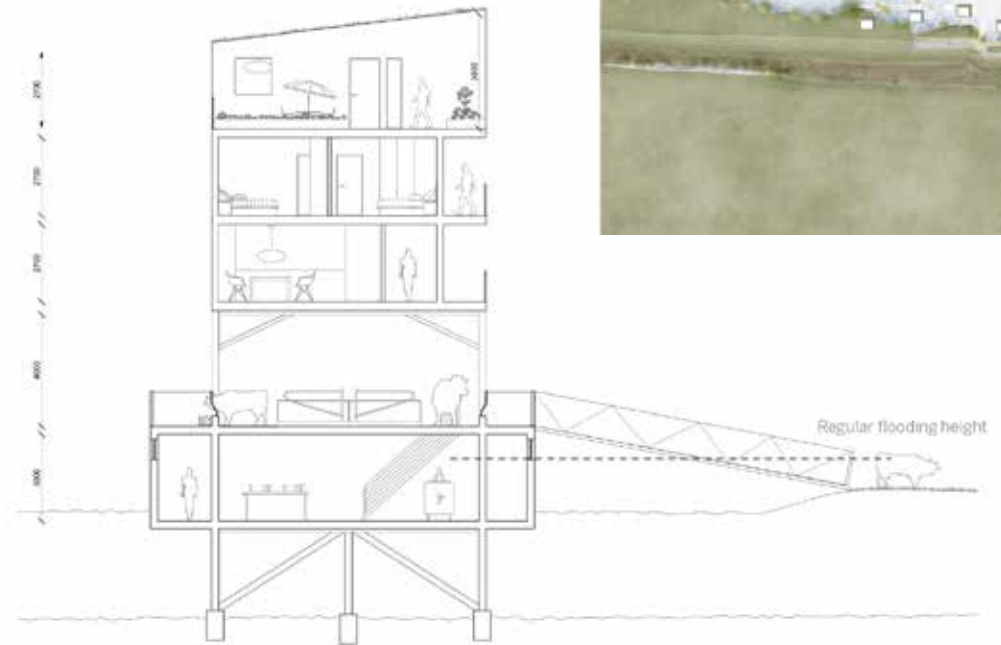
# GROUP 4, 5 AND 12

## NEW WAYS OF LIVING ON THE WATER

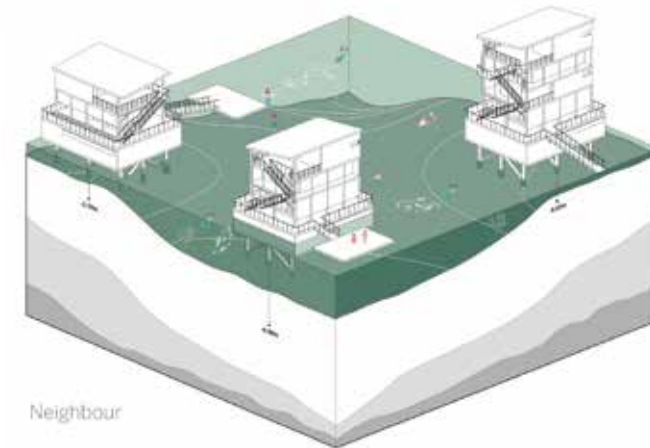
These proposals create a new narrative around living and working in the area. This requires both scaling down certain programmes but also combine functions instead of separating them.



GROUP 4 In Co(w) living a family house can at the same time be a small farm ajustable in high and size over tim and adaptable to changing landscape conditions.



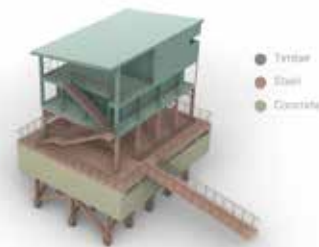
Section A-A  
1:100



Neighbour



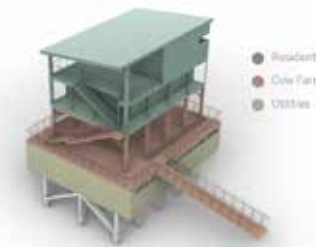
Circulation



Material



Vegetation



Program

# Bridging the terps...

A sustainable urban expansion in delicate environment



GROUP 5 The proposal bridging the terps is about a way of living above the waterscapes by a bridging wooden structure between artificial terps. Space for water is created.



GROUP 12 The Barnacle is a housing unit which is based on a concept between floating on and anchoring in the water. Changeable structures can adapt to site and depth of water.

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# W T E R A A R D E E A R T H

## COLOFON

The project waterearth is an initiative from the Province Fryslân in collaboration with Noon.

The execution is done by the university of Lund in Sweden and the research tasks are formulated together with the municipalities of Leeuwarden, Smallingerland and Heerenveen.

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